WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM



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WIT-VM 250

VINYL ESTER INJECTION SYSTEM

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WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

1. Company Profile.



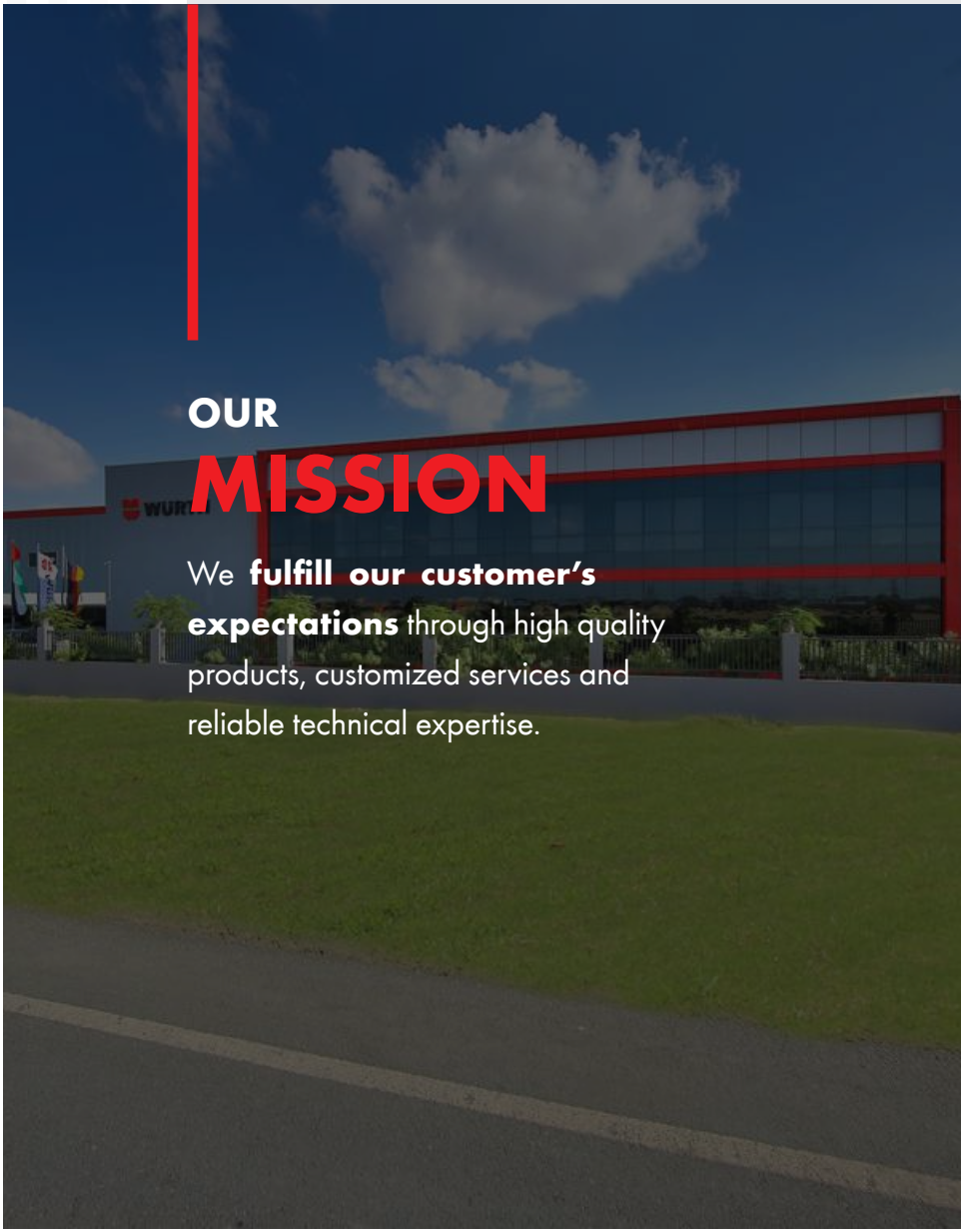
WÜRTH



WÜRTH GULF

COMPANY PROFILE





OUR
MISSION

We **fulfill our customer's expectations** through high quality products, customized services and reliable technical expertise.

WHO WE ARE

THE WÜRTH GROUP

€20.7 B
SALES

400+
COMPANIES

4.1 M
CUSTOMERS

86,000
EMPLOYEES

44,000
SALES FORCE

80+
COUNTRIES PRESENCE

The Würth Group is a German family-owned global leader in the development, production, and distribution of assembly and fastening materials. Founded in 1945 and headquartered in Künzelsau, Germany, the Group has expanded into a wide range of business areas including tools, chemicals, and safety equipment.

WÜRTH GULF

In 2000, Würth Gulf was established in Dubai, U.A.E., as part of the Würth Group, combining German quality with local market expertise. Today, Würth Gulf provides over 5,000 high-quality products to the auto, cargo, metal, construction, and trade sectors and serves more than 13,000 customers across the Emirates.

230
EMPLOYEES

13,000
CUSTOMERS

5000
PRODUCTS

25 YEARS
IN U.A.E.

WHY CHOOSE WÜRTH GULF

Würth Brand Reputation

German quality yet competitive to support our customers succeed.

Proximity with Customers

More than 120 Sales Consultants serving customers across the U.A.E.

Large Product Range

More than 5000 products designed to meet customer needs.

Customer Connect Points

Giving customers multiple ways to purchase: via direct sales, online shop, mobile app, retail shops, and phone.

Fast Deliveries

Delivery within 24 to 48 hours to customers in U.A.E.

OUR CORE MARKETS



PRODUCT CATEGORIES

- Anchors
- Automotive Parts
- Direct Fastening
- Electrical Installation
- Fasteners
- Sealants & Adhesives
- Hand Tools
- Abrasives
- Power Tools
- Safety Equipment (PPE)
- Workshop Equipment
- Chemical Sprays

AUTO PRODUCTS
BEST SELLER



BOND + SEAL 310ML



SILICON SPRAY 500ML



BRAKE CLEANER 500ML



WIPER BLADES



ENGINE SEALANT 85GR



WINDOW ADHESIVE 310ML



CABLE TIES



BULBS



TOOL SET



HOSE CLAMP



A/C SERVICE UNIT FROST



WORKSHOP TROLLEY

CARGO PRODUCTS
BEST SELLER



BRAKE CLEANER 20L



HAND CLEANER 4L



CONTACT SPRAY 500ML



MULTIPURPOSE GREASE



ENGINE SEALANT 85GR



ADHESIVE LUBRICANT 500ML



WORKSHOP TROLLEY CARGO



CABLE TIES

METAL PRODUCTS
BEST SELLER



BOND + SEAL 310ML



B3 FOAM 750ML



SILICONE ACETATE 280ML



WEATHER SEALANT 600ML



ZINC SPRAY 400ML



RUST OFF 400ML



HSS DRILL BITS



WELDING ELECTRODES



FLAP DISC



CUTTING DISC



PROTECTIVE GLOVE



WELDING GLOVE

CONSTRUCTION PRODUCTS BEST SELLER



PU SEALANT 600ML



B1 FOAM 750ML



SILICONE ACETATE 280ML



WEATHER SEALANT 600ML



CHEMICAL ANCHORS



ANGLE GRINDER



CUTTING DISC



DIAMOND DISCS



HAMMER DRILL BIT



SAFETY GOGGLES



SAFETY SHOE

TRADE PRODUCTS
BEST SELLER



RUSH CUTTING DISC



RAZOR CUTTING DISC



DIAMOND DISCS



BRAKE CLEANER



RUST REMOVER SPRAY



WEATHER SEALANT



SILICONE ACETATE

W-MAX

REACHABLE

Through Four Customer Contact Points

DIRECT SALES

Every customer benefits from a dedicated Sales Consultant, providing personalized, on-site support and expert guidance tailored to their needs.

SHOP

With multiple Shops across the U.A.E., customers can explore our products in person and purchase them instantly.

Scan to visit our E-shop

ONLINE SHOP & MOBILE APP

Our Online Shop and Mobile App deliver a fast, convenient, and fully digital purchasing experience at your fingertips.

Scan to visit our E-shop

Download our mobile App!

CUSTOMER HAPPINESS CENTER

Get in touch with Würth U.A.E., for product inquiries, order support, and website assistance. Our team is always ready to provide fast and reliable service whenever you need it.

Call toll-free: 800 98784

CUSTOMER HAPPINESS CENTER
800 WURTH (98784)



WÜRTH

WÜRTH GULF COMPANY PROFILE

Würth Gulf FZE
P.O.Box: 17036 Jebel Ali South 6,
Dubai, United Arab Emirates.
T. 800 WURTH (98784)
customerhappinesscenter@wurth.ae
eshop.wurth.ae

WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

2. Trade License / ISO.



رخصة تجارية عامة

General Trading License

Government of Dubai

CELEBRATING 40 YEARS
Jafza
المنطقة الحرة لجبل علي
Jebel Ali Free Zone

License Details / تفاصيل الرخصة

License Number	2421	٢٤٢١	رقم الرخصة
Licensee	Wurth Gulf FZE	وورث جلف م م ح	صاحب الرخصة
Trade Name	Wurth Gulf FZE	وورث جلف م م ح	الإسم التجاري
Legal Status	FZE (Limited Liability)	م م ح (ذات مسؤولية محدودة)	الشكل القانوني
Issue Date	01/01/2000	٢٠٠٠/٠١/٠١	تاريخ الإصدار
Expiry Date	30/11/2026	٢٠٢٦/١١/٣٠	تاريخ الإنتهاء
Business Unit	Jebel Ali Free Zone	المنطقة الحرة لجبل علي	قطاع العمل

Company Manager / مدير الشركة

Name of Manager	JEAN LUC MARCEL THESMAR	جيان لوس مارسيل ثيسمار	إسم مدير الشركة

Address / العنوان

Premises No.	Plot No: S61303 P. O. Box: 17036 Jebel Ali south 17036 Dubai United Arab Emirates	ارض رقم: اس ٦١٣٠٣ ص. ب: ١٧٠٣٦ جبل علي دبي الإمارات العربية المتحدة	المقر رقم
Floor Number			رقم الطابق
Building Name			إسم المبنى
Area Name			إسم المنطقة

Activities / النشاطات

General Trading	تجارة عامة
Occupational Hygiene & Safety Requisites Trading	تجارة لوازم السلامة والصحة والمهنية وأداوتها
Basic Steel Products Trading	تجارة منتجات الحديد الأساسية
Non Ferrous Metal Trading	تجارة المنتجات الأساسيه للمعادن غير الحديدية
Building Hardware & Tools Trading	تجارة عدد و أدوات البناء
Workshop Hardware & Tools Trading	تجارة عدد وأدوات الورش
Building & Construction Materials Trading	تجارة مواد البناء
Lubricants & Grease Trading	تجارة الشحوم وزيوت التزليق
Workshop Equipment, Machinery & Spare Parts Trading	تجارة معدات و مكائن الورش وقطع غيارها
Fire Fighting & Safety Equipment Trading	تجارة معدات وأجهزة السلامة وإطفاء الحريق
Construction Chemicals Trading	تجارة المواد الكيماوية لأغراض البناء
Building Metal Products Trading	تجارة الأشغال المعدنية للأبنية

License Remarks / ملاحظات الترخيص

001-00002421-010100

CN:1057 (GT)

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To verify the content and authenticity of this document visit https://ihub.dpworlduae.com/EDV and enter the EDV:72492340, Issue Date:22-DEC-2025 and Account Number:1057

الإمارات THE EMIRATES

وثيقة إلكترونية معتمدة و صادرة بدون توقيع من سلطة المنطقة الحرة لجبل علي
Approved electronic document issued without signature by JEBEL ALI FREE ZONE AUTHORITY

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حكومة دبي
GOVERNMENT OF DUBAI

DUBAI
للاقتصاد والسياحة
Economy and Tourism

رخصة تجارية
Commercial License

License Details / تفاصيل الرخصة

License No.	572033	رقم الرخصة	
Company Name	WURTH GULF (L L C)	اسم الشركة	وورث جلف (شركة ذات مسئولية محدودة)
Business Name	WURTH GULF (L L C)	الاسم التجاري	وورث جلف (ش ذ م م)
License Category	Dep. of Economic Development	فئة الرخصة	دائرة التنمية الاقتصادية
Legal Type	Limited Liability Company - Single Owner(LLC - SO)	الشكل القانونى	شركة ذات مسؤولية محدودة - الشخص الواحد (ذ.م.
Expiry Date	05/08/2027	تاريخ الإنتهاء	Issue Date 06/08/2005 تاريخ الإصدار
D&B D-U-N-S ® N	561529749	الرقم العالمى	Main License No. 572033 رقم الرخصة الام
Register No.	1778252	رقم السجل التجارى	DCCI No. 99967 عضوية الغرفة

License Members / الاطراف

رقم الشخص/No.	الإسم / Name	الجنسية / Nationality	الصفة / Role	الحصص / Share
1162256	وورث جلف م م ح WURTH GULF FZE	United Arab Emirates / الامارات	Shares Owner / مالك حصص	100.00%
1070435	جيان لوس مارسيل تيسمار JEAN LUC MARCEL THESMAR	فرنسا / France	Manager / مدير	
1162255	موكانى توفيق احمد موكانى اقبال احمد MOOKANE THAUFEEQUE AHMED MOOKANE IQBAL AHMED	الهند / India	Manager / مدير	

License Activities / أنشطة الرخصة

النشاط	الحالة	Status	Activity
تجارة المواد المقاومة والمانعة لإنتشار الحريق	فعال	Active	Fire Resistant & Retardant Materials Trading
تجارة عامة	فعال	Active	General Trading

Print Date 31/07/2026 12:18 تاريخ الطباعة

Receipt No. رقم الإيصال

الإمـــارات
THE EMIRATES

يمكنك الآن تجديد رخصتك التجارية من خلال الرسائل النصية القصيرة، أرسل رقم الرخصة إلى 6969 (دو/ اتصالات) للحصول على اذن الدفع.

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وثيقة إلكترونية معتمدة وصادرة بدون توقيع من دائرة الاقتصاد والسياحة في دبي .لمراجعة صحة البيانات الواردة في الرخصة يرجي مسح رمزالاستجابة السريعة

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العنوان / Address

صندوق بريد	17036	P.O. Box	
رقم القطعة	613-767	Parcel ID	
البريد الإلكتروني	mohamed.elsadig@wurth.ae	Email	

محل 02 ملك علي احمد خلفان - بردبي - راس الخور الصناعية الثانية

تليفون	971-4-8834229	Phone No	
فاكس	971-4-8834303	Fax No	
هاتف متحرك	971-50-7098917	Mobile No	

الملاحظات / Remarks

نقل الموقع بتاريخ 5/5/2015

رقم الإيصال		Receipt No.	
تاريخ الطباعة	12:18	31/07/2026	Print Date

يمكنك الآن تجديد رخصتك التجارية من خلال الرسائل النصية القصيرة، أرسل رقم الرخصة إلى 6969 (دو/ اتصالات) للحصول على اذن الدفع.

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الإمارات
THE EMIRATES

حكومة دبي
GOVERNMENT OF DUBAI

دبي للاقتصاد والسياحة
Economy and Tourism

شهادة شهر قيد شركة فى السجل التجارى
Commercial Register

تفاصيل القيد / Register Details

رقم القيد	1778252	Register No.	
الاسم التجاري	وورث جلف (شركة ذات مسئولية محدودة)		
الشكل القانونى	شركة ذات مسؤولية محدودة - الشخص الواحد (ذ.م.م.)		
تاريخ الإصدار	03/08/2005	Reg. Date	
الرقم العالمي	561529749		

Main Lice. Nr	572033	رقم الرخصة الأم	
Business Name	WURTH GULF (L L C)		
Legal Type	Limited Liability Company - Single Owner(LLC - SO)		
Expiry Date	05/08/2027	تاريخ الإنتهاء	
D&B D-U-N-S ® No.			

تفاصيل راس المال / Capital Details

الإسمى	300,000.00	Nominated	
المدفوع	300,000	Paid	
عدد الأسهم	300	No. of Shares	
العملة	درهم إماراتي	Currency	UAE Dirhams

عنوان الرخصة / License Address

محل 02 ملك علي احمد خلفان - بردبي - راس الخور الصناعية الثانية

عنوان السجل التجاري / Commerce Address

محل 02 ملك علي احمد خلفان - بردبي - راس الخور الصناعية الثانية

أنشطة السجل / Register Activities

تجارة عامة — General Trading

تجارة المواد المقاومة والمانعة لإنتشار الحريق — Fire Resistant & Retardant Materials Trading

Print Date	31/07/2026	12:18	تاريخ الطباعة	Receipt No.	رقم الإيصال

الإمـــارات
THE EMIRATES

يمكنك الآن تجديد رخصتك التجارية من خلال الرسائل النصية القصيرة، أرسل رقم الرخصة إلى 6969 (دو/ اتصالات) للحصول على اذن الدفع.

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وثيقة إلكترونية معتمدة وصادرة بدون توقيع من دائرة الاقتصاد والسياحة في دبي .لمراجعة صحة البيانات الواردة في الرخصة يرجي مسح رمزالاستجابة السريعة

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Management Service

CERTIFICATE

Certificate Registration No.: **12 100 23791 TMS** / Order No.: **70020920**

The Certification Body
of TÜV SÜD Management Service GmbH

certifies that the organization

WÜRTH

Adolf Würth GmbH & Co. KG

Reinhold-Würth-Str. 12-17 • 74653 Künzelsau
Germany

for the scope

Development and distribution of fasteners, hand tools and storage systems. Distribution of products (standard parts, special parts, systems) for industrial safety, construction, workshops, fire protection technology, chemical-technical applications, anchor technology, direct assembly, electrical installations, material processing, installation, measuring technology, soldering and welding technology, as well as of products such as electrical and pneumatic tools and machines, small and replacement parts for automotive vehicles, advertising media. Maintenance of electric power tools, pin driver technology and pneumatic tools as well as testing of fall arrest systems, length measuring tools (laser technology) and tools for torque measurement and vehicle conversion or installation of storage systems including load securing in vehicles as well

including the sites see enclosure

has established and applies a Quality Management System.

An audit was performed and has furnished proof
that the requirements according to

DIN EN ISO 9001:2015

are fulfilled.

The certificate is valid from **2024-04-10** until **2027-04-09**.

Fred Wenke
Head of Certification Body
Munich, 2024-03-13

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

DAkkS Deutsche Akkreditierungsstelle D-ZM-14143-01-00

TÜV®

MS/01-07/2023

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Management Service

ENCLOSURE OF CERTIFICATE

Certificate Registration No.: **12 100 23791 TMS** / Order No.: **70020920**

certificate holder:

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Str. 12-17
74653 Künzelsau
Germany

at the sites	scope
Adolf Würth GmbH & Co. KG Reinhold-Würth-Str. 12-17 74653 Künzelsau Germany	Development and distribution of fasteners, hand tools and storage systems. Distribution of products (standard parts, special parts, systems) for industrial safety, construction, workshops, fire protection technology, chemical-technical applications, anchor technology, direct assembly, electrical installations, material processing, installation, measuring technology, soldering and welding technology, as well as of products such as electrical and pneumatic tools and machines, small and replacement parts for automotive vehicles, advertising media. Maintenance of electric power tools, pin driver technology and pneumatic tools as well as testing of fall arrest systems, length measuring tools (laser technology) and tools for torque measurement.
Adolf Würth GmbH & Co. KG **Fahrzeugeinrichtungen** Am Seebach 2 74182 Obersulm-Willsbach Germany	Vehicle conversion or installation of storage systems including load securing in vehicles.

Fred Wenke
Head of Certification Body
Munich, 2024-03-13

MS/01-07/2023

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Management Service

CERTIFICATE

Certificate Registration No.: **12 104 23791 TMS** / Order No.: **70020920**

The Certification Body
of TÜV SÜD Management Service GmbH

certifies that the organization

WÜRTH

Adolf Würth GmbH & Co. KG

Reinhold-Würth-Str. 12-17 • 74653 Künzelsau
Germany

for the scope

Development and distribution of fasteners, hand tools and storage systems. Distribution of products (standard parts, special parts, systems) for industrial safety, construction, workshops, fire protection technology, chemical-technical applications, anchor technology, direct assembly, electrical installations, material processing, installation, measuring technology, soldering and welding technology, as well as of products such as electrical and pneumatic tools and machines, small and replacement parts for automotive vehicles, advertising media. Maintenance of electric power tools, pin driver technology and pneumatic tools as well as testing of fall arrest systems, length measuring tools (laser technology) and tools for torque measurement

has established and applies an Environmental Management System.

An audit was performed and has furnished proof
that the requirements according to

DIN EN ISO 14001:2015

are fulfilled.

The certificate is valid from **2024-05-24** until **2027-05-23**.

Fred Wenke
Head of Certification Body
Munich, 2024-03-13

IAF MLA DAkkS Deutsche Akkreditierungsstelle D-ZM-14143-01-00

MS/01-07/2023

WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

3. Schedule of Material & Area of Application.



Dubai,2026

SCHEDULE OF MATERIAL

To Whom It May Concern,

Schedule of Items for approval and area of application:

Art. No.	Description	Area of Application
090345020*	WIT- VM 250 in cracked and non-cracked concrete	Rebaring (Extension, adding missing rebar, etc.) Anchoring (Chemical anchoring applicable with threaded rods and anchor rods)

We trust to have been of service with this confirmation and remain,

With kindest regards,

Product Department
WURTH GULF FZE



WÜRTH

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SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

4. TDS / SDS.



VM 250 M WITH THREADED ROD (METRIC)

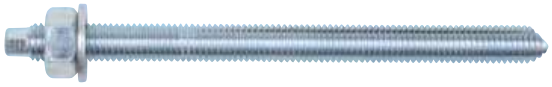
WIT-VM 250



420 ml
Art.no.:
0903450205



300 ml
Art.no.:
0903450201



Galvanized (5 microns): M8 - M30



Stainless steel - A4 (AISI 316): M8 - M30

Approved for:
Concrete C20/25 to C50/60, cracked

Suitable for:
Concrete C12/15

Benefits:

- The gelling/working time allows working very quick with large embedment depth and high loads.
- Its many approvals guarantees optimized load capacities for threaded rods and rebar.
- Its specially developed chemical composition allows a reliable installation in underwater conditions.
- The special chemical composition allows working in high corrosion areas.

Applications









Approvals and Certificates

Description	Authority/ Laboratory	Guideline for Assessment	No./date of issue
European Technical Approval	DIBt, Berlin	ETAG 001-T5	ETA-12/0164 / 2013-06-20
ICC-ES Evaluation Report	ICC	AC 308	ESR-2539 / 2012-03-01
Fire resistance	iBMB, Braunschweig	DIN EN 1363-1: 1999-10	(3058/042/12)-NB / 2013-05-30
Test Report LEED	eurofins	Leed 2009 EQ c4.1	G19427H / 2012-10-30
VOC Emissions Test report	eurofins	DEVL 1101903D, DEVL 1104875A	2013-03-13
NSF International	NSF International	NSF/ANSI Standard61	2013-11-13

Basic loading data (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction).
- No edge distance and spacing influence.
- Base material thickness, as specified in the table.
- Embedment depth, as specified in the table.
- Anchor material, as specified in the tables, steel grade 5.8.
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm², Concrete C 50/60, $f_{ck,cube}$ = 60 N/mm².
- Temperate range I (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C).
- Dry or wet conditions of drill hole, hammer drilling.
- Installation temperature range -10°C to +40°C.

Characteristic resistance

Anchor type: VM 250 M

Thread size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Effective anchorage depth		$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
Non-cracked concrete											
Tensile	C20/25	N_{Rk}	[kN]	18.3	33.9	49.8	70.6	111.9	153.7	187.8	224.0
	C50/60	N_{Rk}	[kN]	18.3	29.0	42.1	77.6	123.1	169.0	206.5	246.5
Shear	≥ C20/25	V_{Rk}	[kN]	9.2	14.5	21.1	39.2	61.2	88.1	114.8	140.1
Cracked concrete											
Tensile	C20/25	N_{Rk}	[kN]			22.8	34.6	58.7	87.1	132.3	160.0
	C50/60	N_{Rk}	[kN]			25.1	38.0	64.6	95.8	145.6	176.0
Shear	≥ C20/25	V_{Rk}	[kN]			21.1	39.2	61.2	88.1	114.8	140.1

Design resistance

Anchor type: VM 250 M

Thread size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Effective anchorage depth		$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
Non-cracked concrete											
Tensile	C20/25	N_{Rd}	[kN]	12.2	18.8	27.6	39.2	62.2	85.4	104.3	124.5
	C50/60	N_{Rd}	[kN]	12.2	19.3	28.1	43.1	68.4	93.9	114.7	136.9
Shear	≥ C20/25	V_{Rd}	[kN]	7.4	11.6	16.9	31.4	49.0	70.5	91.8	112.1
Cracked concrete											
Tensile	C20/25	N_{Rd}	[kN]			12.7	19.2	32.6	48.4	73.5	88.9
	C50/60	N_{Rd}	[kN]			13.9	21.1	35.9	53.2	80.9	97.8
Shear	≥ C20/25	V_{Rd}	[kN]			16.9	31.4	49.0	70.5	91.8	112.1

VM 250 M WITH THREADED ROD (METRIC)

Recommended / Allowable loads[1)]

Anchor type: VM 250 M

Thread size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Effective anchorage depth		$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
Non-cracked concrete											
Tensile	C20/25	N_{rec}	[kN]	8.7	13.5	19.7	28.0	44.4	61.0	74.5	88.9
	C50/60	N_{rec}	[kN]	8.7	13.8	20.1	30.8	48.9	67.1	82.0	97.8
Shear	≥ C20/25	V_{rec}	[kN]	5.3	8.3	12.1	22.4	35.0	50.3	65.6	80.1
Cracked concrete											
Tensile	C20/25	N_{rec}	[kN]			9.1	13.7	23.3	34.6	52.5	63.5
	C50/60	N_{rec}	[kN]			10.0	15.1	25.6	38.0	57.8	69.9
Shear	≥ C20/25	V_{rec}	[kN]			12.1	22.4	35.0	50.3	65.6	80.1

[1)] Material safety factor y_M and safety factor for action y_L = 1.4 are included. The material safety factor depends on the failure mode.

Design Method (simplified)

Simplified version of the design method according ETAG 001, TR 029. Design resistance according data given in ETA-12/0164, issue 2013-06-20:

- Influence of concrete strength.
- Influence of edge distance.
- Influence of spacing.
- Valid for a group of anchors. (The influencing factors must then be considered for each edge distance and spacing. The calculated design loads are then on the save side. They will be lower than the exact values according ETAG 001, Annex C. To avoid this, it is recommended to use the anchor design software of Würth).
- The design method is based on the following simplification: No different loads are acting on individual anchors (no eccentricity).
- Temperate range I (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C).
- Dry or wet conditions of drill hole, hammer drilling.
- Installation temperature range -10°C to +40°C.

Tension loading

The decisive design resistance in tension is the lowest value of the following failure modes:

Steel failure: $N_{Rd,s}$

Combined Pull out and concrete cone failure: $N_{Rd,p} = N^0_{Rd,p} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,p} \cdot f_{sy,p} \cdot f_{cx,1,p} \cdot f_{cx,2,p} \cdot f_{cy,p}$

Concrete cone failure: $N_{Rd,c} = N^0_{Rd,c} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx} \cdot f_{sy} \cdot f_{cx,1} \cdot f_{cx,2} \cdot f_{cy}$

Concrete splitting failure: $N_{Rd,sp} = N^0_{Rd,sp} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,sp} \cdot f_{sy,sp} \cdot f_{cx,1,sp} \cdot f_{cx,2,sp} \cdot f_{cy,sp} \cdot f_h$

Design steel resistance $N_{Rd,s}$ of a single anchor

Anchor type: VM 250 M

steel grade	Thread size		M8	M10	M12	M16	M20	M24	M27	M30
4.6	$N_{Rd,s}$	[kN]	7.5	11.5	17.0	32.5	49.0	70.5	92.0	112.0
5.8	$N_{Rd,s}$	[kN]	12.2	19.3	28.1	52.2	81.6	117.5	153.1	186.9
8.8	$N_{Rd,s}$	[kN]	19.5	30.9	44.9	83.6	130.6	188.0	245.0	299.0
A4-70	$N_{Rd,s}$	[kN]	13.7	21.7	31.5	58.6	91.6	132.2	172.3	210.2

VM 250 M WITH THREADED ROD (METRIC)

Influence of concrete strength

Concrete strength classes (EN 206:2000)			C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Characteristic compressive strength of concrete determined by testing cylinders[1)]	$f_{ck,cyl}$	[N/mm²]	12	16	20	25	30	35	40	45	50
Characteristic compressive strength of concrete determined by testing cube[2)]	$f_{ck,cube}$	[N/mm²]	15	20	25	30	37	45	50	55	60
Influencing factor	$f_{b,N}$	[-]	0.77	0.89	1.00	1.02	1.04	1.06	1.08	1.09	1.10

[1)] strength at 28days of 150mm diameter by 300mm cylinders.

[2)] strength at 28days of 150mm cubes.

Influence of embedment depth

$$f_{hef} = \frac{h_{ef}}{h_{ef,typ}}$$

Consider the approved range of embedment $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ according to the table "anchor characteristics".

Design combined pull-out and concrete cone resistance $N_{Rd,p}$ of a single anchor

$$N_{Rd,p} = N^0_{Rd,p} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,p} \cdot f_{sy,p} \cdot f_{cx,1,p} \cdot f_{cx,2,p} \cdot f_{cy,p}$$

Basic design pull-out and concrete cone resistance $N^0_{Rd,p}$ of a single anchor

Anchor type: VM 250 M

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
Non-cracked concrete									
$N^0_{Rd,p}$	[kN]	13.4	18.8	27.6	41.9	71.2	96.8	113.1	127.2
Cracked concrete									
$N^0_{Rd,p}$	[kN]			12.7	19.2	32.6	48.4	73.5	91.9

Characteristic edge distance $c_{cr,p}$ and spacing $s_{cr,p}$

Anchor type: VM 250 M

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
$s_{cr,p}$	[mm]	185	253	304	375	506	581	624	657
$c_{cr,p}$	[mm]	92	126	152	188	253	291	312	329

Concrete cone failure - Influence of spacing

$$f_{sx,p} = f_{sy,p} = \left(1 + \left(n_{x(y)} - 1\right)\frac{s_{x(y)}}{s_{cr,p}}\right) \cdot \frac{1}{n_{x(y)}} \leq 1$$

Number of fixing per direction	$s/s_{cr,p}$ [1]	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
2	$f_{sx,p}$, $f_{sy,p}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00
3	$f_{sx,p}$, $f_{sy,p}$	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.00
4	$f_{sx,p}$, $f_{sy,p}$	0.33	0.36	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.96	1.00
5	$f_{sx,p}$, $f_{sy,p}$	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in one row.

Concrete cone failure - Influence of edge distance

$$f_{cx,1,p} = 0.7 + 0.3\frac{c_x}{c_{cr,p}} \leq 1; \quad f_{cx,2,p} = f_{cy,p} = \left(1 + \frac{c_{x(y)}}{c_{cr,p}}\right) \cdot \frac{1}{2} \leq 1$$

$c/c_{cr,p}$	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
$f_{cx,1,p}$	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.94	0.96	0.97	0.99	1.00
$f_{cx,2,p}$ / $f_{cy,p}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00

Design concrete cone resistance $N_{Rd,c}$ and splitting resistance $N_{Rd,sp}$ of a single anchor

Concrete cone failure: $N_{Rd,c} = N^0_{Rd,c} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx} \cdot f_{sy} \cdot f_{cx,1} \cdot f_{cx,2} \cdot f_{cy}$

Concrete splitting failure: $N_{Rd,sp} = N^0_{Rd,sp} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,sp} \cdot f_{sy,sp} \cdot f_{cx,1,sp} \cdot f_{cx,2,sp} \cdot f_{cy,sp} \cdot f_h$

No verification of splitting is required if at least one of the conditions is fulfilled:

a) The edge distance in all directions is $c \geq c_{cr,sp}$ for single fasteners and $c \geq 1.2\ c_{cr,sp}$ for fastener groups and the member depth is $h \geq h_{min}$ in both cases.

b) The characteristic resistance for concrete cone failure and pull-out failure is calculated for cracked concrete and reinforcement resists the splitting forces and limits the crack width to $w_k \leq 0.3mm$.

VM 250 M WITH THREADED ROD (METRIC)

Basic design concrete cone resistance $N^0_{Rd,c}$ of a single anchor

Anchor type: VM 250 M

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
Non-cracked concrete									
$N^0_{Rd,c}$	[kN]	24.1	24.0	32.4	39.2	62.2	85.4	104.3	124.5
Cracked concrete									
$N^0_{Rd,c}$	[kN]	17.2	17.1	23.1	28.0	44.4	61.0	74.5	88.9

Influence of embedment depth

$$f_{hef} = \left(\frac{h_{ef}}{h_{ef,typ}}\right)^{1.5}$$

Consider the approved range of embedment $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ according to the table "anchor characteristics".

Concrete cone failure

Characteristic edge distance $c_{cr,N}$ and spacing $s_{cr,N}$

Anchor type: VM 250 M

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
$s_{cr,N}$	[mm]	240	270	330	375	510	630	720	810
$c_{cr,N}$	[mm]	120	135	165	188	255	315	360	405

Above characteristic spacing and edge distances are given for the typical effective anchorage depth. Calculating for smaller depths is leading to conservative load capacities. For calculation with bigger depths use the following:
$s_{cr,N} = 3 \cdot h_{ef}$ and $c_{cr,N} = 1.5 \cdot h_{ef}$.

Concrete cone failure - Influence of spacing

$$f_{sx} = f_{sy} = \left(1 + (n_{x(y)} - 1)\frac{s_{x(y)}}{s_{cr,N}}\right) \cdot \frac{1}{n_{x(y)}} \leq 1$$

Number of fixing per direction	$s/s_{cr,N}$ [1]	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
2	f_{sx}, f_{sy}	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00
3	f_{sx}, f_{sy}	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.00
4	f_{sx}, f_{sy}	0.33	0.36	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.96	1.00
5	f_{sx}, f_{sy}	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in one row.

Concrete cone failure - Influence of edge distance

$$f_{cx,1} = 0.7 + 0.3\frac{c_x}{c_{cr,N}} \leq 1; \quad f_{cx,2} = f_{cy} = \left(1 + \frac{c_{x(y)}}{c_{cr,N}}\right) \cdot \frac{1}{2} \leq 1$$

$c/c_{cr,N}$	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
$f_{cx,1}$	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.94	0.96	0.97	0.99	1.00
$f_{cx,2}$ / f_{cy}	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00

Concrete splitting failure

Characteristic edge distance $c_{cr,sp}$ and spacing $s_{cr,sp}$

Anchor type: VM 250 M

Thread size		**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
$s_{cr,sp}$	[mm]	360	420	528	600	816	1008	1152	1296
$c_{cr,sp}$	[mm]	180	210	264	300	408	504	576	648
h_{min}	[mm]	110	120	134	157	210	258	294	330

Above characteristic spacing and edge distances are given for the typical effective anchorage depth. Calculating for smaller depths is leading to conservative load capacities. For calculation with bigger depths use the following:

$s_{cr,N} = 2 \cdot c_{cr,sp}$ and $c_{cr,N} = \left\{h_{ef} \leq 2 \cdot h_{ef} \cdot \left(2.5 - \left(\frac{h_{min}}{h_{ef}}\right)\right) \leq 2.4 \cdot h_{ef}\right\}$

and h_{min} according to the table „anchor characteristics".

Concrete splitting failure - Influence of spacing

$$f_{sx,sp} = f_{sy,sp} = \left(1 + (n_{x(y)} - 1)\frac{s_{x(y)}}{s_{cr,sp}}\right) \cdot \frac{1}{n_{x(y)}} \leq 1$$

Number of fixing per direction	$s/s_{cr,sp}$ [1]	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
2	$f_{sx,sp}$, $f_{sy,sp}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00
3	$f_{sx,sp}$, $f_{sy,sp}$	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.00
4	$f_{sx,sp}$, $f_{sy,sp}$	0.33	0.36	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.96	1.00
5	$f_{sx,sp}$, $f_{sy,sp}$	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in one row.

VM 250 M WITH THREADED ROD (METRIC)

Concrete splitting failure - Influence of edge distance

$$f_{cx,1,sp} = 0.7 + 0.3\frac{c_x}{c_{cr,sp}} \leq 1; \quad f_{cx,2,sp} = f_{cy,sp} = \left(1 + \frac{c_{x(y)}}{c_{cr,sp}}\right) \cdot \frac{1}{2} \leq 1$$

$c/c_{cr,sp}$	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
$f_{cx,1,sp}$	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.94	0.96	0.97	0.99	1.00
$f_{cx,2,sp}$ / $f_{cy,sp}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00

Concrete splitting failure - Influence of concrete member thickness

$$f_h = \left(\frac{h}{h_{min}}\right)^{2/3} \leq max\left(1; \left(\frac{h_{ef} + 1.5c_1}{h_{min}}\right)^{2/3}\right) \leq 2$$

h/h_{min}	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.30	2.40	2.50	2.60	2.70	2.80	≥2.90
f_h	1.00	1.07	1.13	1.19	1.25	1.31	1.37	1.42	1.48	1.53	1.59	1.64	1.69	1.74	1.79	1.84	1.89	1.94	1.99	2.00

Shear loading

The decisive design resistance in shear is the lowest value of the following failure modes:

Steel failure: $V_{Rd,s}$

Concrete pry-out failure: $V_{Rd,cp} = k \cdot min\{N_{Rd,p}; N_{Rd,c}\}$

Concrete edge failure: $V_{Rd,c} = V^0_{Rd,c} \cdot f_{b,V} \cdot f_{h_{ef,V}} \cdot f_{s,V} \cdot f_{c1,V} \cdot f_{c2,V} \cdot f_\alpha \cdot f_h$

Design steel resistance $V_{Rd,s}$ of a single anchor

Anchor type: VM 250 M

steel grade	Thread size		M8	M10	M12	M16	M20	M24	M27	M30
4.6	$V_{Rd,s}$	[kN]	4.2	7.2	10.2	18.6	29.3	42.5	55.1	67.1
5.8	$V_{Rd,s}$	[kN]	7.4	11.6	16.9	31.4	49.0	70.5	91.8	112.1
8.8	$V_{Rd,s}$	[kN]	11.7	18.6	27.0	50.2	78.3	112.8	147.0	179.4
A4-70	$V_{Rd,s}$	[kN]	8.3	12.8	19.2	35.3	55.1	79.5	103.4	126.1

Design concrete pry-out resistance $V_{Rd,cp}$ of a single anchor

$$V_{Rd,cp} = k \cdot min\{N_{Rd,p}; N_{Rd,c}\}$$

Anchor type: VM 250 M

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
$h_{ef,typ}$	[mm]	80	90	110	125	170	210	240	270
k	[-]	2	2	2	2	2	2	2	2

Design concrete edge resistance $V_{Rd,c}$

$$V_{Rd,c} = V^0_{Rd,c} \cdot f_{b,V} \cdot f_{h_{ef,V}} \cdot f_{s,V} \cdot f_{c1,V} \cdot f_{c2,V} \cdot f_{\alpha} \cdot f_h$$

Verification of concrete edge failure may be omitted for single fasteners and groups with an edge distance in all directions $c \geq \max(10h_{ef}; 60d)$. For anchorages with more than one edge, the resistance for all edges shall be calculated. The smallest value should be used in the verification.

Basic design concrete edge resistance $V^0_{Rd,c}$ of a single anchor

Anchor type: VM 250 M

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Non-cracked concrete									
$V^0_{Rd,c}$	[kN]	5.2	7.5	10.1	16.4	24.3	33.7	40.3	46.3
Cracked concrete									
$V^0_{Rd,c}$	[kN]	3.7	5.3	7.1	11.6	17.1	23.7	28.3	32.6

Influence of concrete strength

$$f_{b,V} = \sqrt{\frac{f_{ck,cube}}{25}} = \sqrt{\frac{f_{ck,cyl}}{20}}$$

Concrete strength classes (EN 206:2000)			C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Characteristic compressive strength of concrete determined by testing cylinders[1)]	$f_{ck,cyl}$	[N/mm²]	12	16	20	25	30	35	40	45	50
Characteristic compressive strength of concrete determined by testing cube[2)]	$f_{ck,cube}$	[N/mm²]	15	20	25	30	37	45	50	55	60
Influencing factor	$f_{b,V}$	[-]	0.77	0.89	1.00	1.10	1.22	1.34	1.41	1.48	1.55

[1)] strength at 28days of 150mm diameter by 300mm cylinders.

[2)] strength at 28days of 150mm cubes.

VM 250 M WITH THREADED ROD (METRIC)

Influence of embedment depth

h_{ef} /d	4	5	6	7	8	9	10	11	≥ 12
$f_{hef,V}$	0.87	0.91	0.94	0.97	1.00	1.02	1.05	1.07	1.08

Influence of edge distance c_1

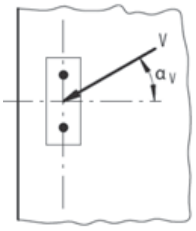
c_1 /d	4	8	12	15	20	30	40	50	60	100	150	200
$f_{c1,V}$	0.47	1.19	2.05	2.76	4.05	6.96	10.22	13.76	17.54	34.66	59.52	87.35

Influence of load direction

$$f_\alpha = \sqrt{\frac{1}{\cos^2\alpha_V + \left(\frac{\sin\alpha_V}{2.0}\right)^2}} \leq 2.0$$

α[1]	0	10	20	30	40	50	60	70	80	90
$f_{\alpha,V}$	1.00	1.01	1.05	1.11	1.20	1.34	1.51	1.72	1.92	2.00

[1] For α ≥ 90° the component of the shear load acting away from the edge may be neglected and the verification may be done with component acting parallel to the edge only.



Influence of spacing

In groups loaded perpendicular to the edge only two adjacent anchors closest and parallel to the edge carry the load. The smallest spacing should be used for the verification.

$$f_{s,V} = \frac{1}{3} \cdot \frac{s}{c_1} + 1 \leq 2$$

s/c_1[1]	0.50	0.60	0.70	0.80	0.90	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
$f_{s,V}$	1.17	1.20	1.23	1.27	1.30	1.33	1.40	1.47	1.53	1.60	1.67	1.73	1.80	1.87	1.93	2.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in the row closest to the edge.

Influence of second edge distance

$$f_{c2,V} = \left(\frac{1}{2} + \frac{1}{3}\frac{c_2}{c_1}\right)\left(0.7 + 0.3\frac{c_2}{1.5c_1}\right) \leq 1$$

c_2/c_1[1]	1.00	1.10	1.20	1.30	1.40	1.50
$f_{c,V}$	0.75	0.80	0.85	0.90	0.95	1.00

[1] Distance to the second edge: $c_1 \leq c_2$.

Influence of concrete member thickness

$$f_{h,V} = \left(\frac{h}{1.5c_1}\right)^{1/2}$$

h/c_1	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	≥ 1.50
$f_{h,V}$	0.26	0.37	0.45	0.52	0.58	0.63	0.68	0.73	0.77	0.82	0.86	0.89	0.93	0.97	1.00

Structural Verification

Tension

$$N_{Sd}^h \leq N_{Rd} = \min\left(N_{Rd,s}; N_{Rd,p}; N_{Rd,c}; N_{Rd,sp}\right)$$

$$\beta_N = max\left(\frac{N_{Sd}^h}{N_{Rd,s}}; \frac{N_{Sd}^h}{N_{Rd,p}}; \frac{N_{Sd}^h}{N_{Rd,c}}; \frac{N_{Sd}^h}{N_{Rd,sp}}\right) \leq 1$$

Shear

$$V_{Sd}^h \leq V_{Rd} = \min\left(V_{Rd,s}; V_{Rd,cp}; {}^{V_{Rd,c}}/_{n}\right)$$

$$\beta_V = max\left(\frac{V_{Sd}^h}{V_{Rd,s}}; \frac{V_{Sd}^h}{V_{Rd,cp}}; \frac{V_{Sd}^g}{V_{Rd,c}}\right) \leq 1$$

Combined tension and shear

$$\beta_N + \beta_V \leq 1.2$$

VM 250 M WITH THREADED ROD (METRIC)

Service temperature

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+50 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 ° C

Design bond strength for different use categories

Anchor type: VM 250 M

Non-cracked concrete

Thread size			M8	M10	M12	M16	M20	M24	M27	M30
Design bond strength according to ETA-12/0164 / dry and wet concrete / hammer drilling										
Temperature range I	$\tau_{Rd,ucr}$	[N/mm²]	6.7	6.7	6.7	6.7	6.7	6.1	5.6	5.0
Temperature range II	$\tau_{Rd,ucr}$	[N/mm²]	5.0	5.0	5.0	5.0	5.0	4.7	4.2	3.6
Temperature range III	$\tau_{Rd,ucr}$	[N/mm²]	3.7	3.6	3.6	3.6	3.6	3.6	3.1	2.8
Design bond strength according to ETA-12/0164 / flooded concrete / hammer drilling										
Temperature range I	$\tau_{Rd,ucr}$	[N/mm²]	3.6	4.0	4.0	4.0				
Temperature range II	$\tau_{Rd,ucr}$	[N/mm²]	2.6	3.1	3.1	3.1				
Temperature range III	$\tau_{Rd,ucr}$	[N/mm²]	1.9	2.4	2.4	2.4				

Cracked concrete

Thread size			M8	M10	M12	M16	M20	M24	M27	M30
Design bond strength according to ETA-12/0164 / dry and wet concrete / hammer drilling										
Temperature range I	$\tau_{Rd,cr}$	[N/mm²]			3.1	3.1	3.1	3.1	3.6	3.6
Temperature range II	$\tau_{Rd,cr}$	[N/mm²]			2.2	2.2	2.2	2.2	2.5	2.5
Temperature range III	$\tau_{Rd,cr}$	[N/mm²]			1.7	1.7	1.7	1.7	1.9	1.9
Design bond strength according to ETA-12/0164 / flooded concrete / hammer drilling										
Temperature range I	$\tau_{Rd,cr}$	[N/mm²]			2.6	2.6				
Temperature range II	$\tau_{Rd,cr}$	[N/mm²]			1.9	1.9				
Temperature range III	$\tau_{Rd,cr}$	[N/mm²]			1.4	1.4				

Reduction factor for different use categories

Anchor type: VM 250 M

Non-cracked concrete

Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Reduction factor strength according to ETA-12/0164 / dry and wet concrete / hammer drilling									
Temperature range I	$f_{\tau,red}$	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temperature range II	$f_{\tau,red}$	0.75	0.75	0.75	0.75	0.75	0.77	0.75	0.72
Temperature range III	$f_{\tau,red}$	0.55	0.54	0.54	0.54	0.54	0.59	0.55	0.56
Reduction factor according to ETA-12/0164 / flooded concrete / hammer drilling									
Temperature range I	$f_{\tau,red}$	0.54	0.61	0.61	0.61				
Temperature range II	$f_{\tau,red}$	0.39	0.46	0.46	0.46				
Temperature range III	$f_{\tau,red}$	0.29	0.36	0.36	0.36				

Cracked concrete

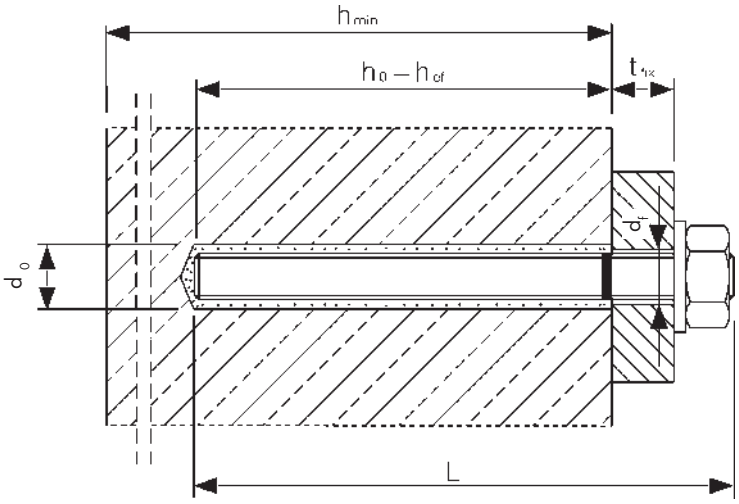
Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Reduction factor according to ETA-12/0164 / dry and wet concrete / hammer drilling									
Temperature range I	$f_{\tau,red}$			1.00	1.00	1.00	1.00	1.00	1.00
Temperature range II	$f_{\tau,red}$			0.73	0.73	0.73	0.73	0.69	0.69
Temperature range III	$f_{\tau,red}$			0.55	0.55	0.55	0.55	0.54	0.54
Reduction factor according to ETA-12/0164 / flooded concrete / hammer drilling									
Temperature range I	$f_{\tau,red}$			0.86	0.86				
Temperature range II	$f_{\tau,red}$			0.62	0.62				
Temperature range III	$f_{\tau,red}$			0.47	0.47				

VM 250 M WITH THREADED ROD (METRIC)

Anchor characteristics

Anchor type: VM 250 M

Thread size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Effective anchorage depth	$h_{ef,min}$	[mm]	60	60	70	80	90	96	108	120
	$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600
Nominal drill hole diameter	d_0	[mm]	10	12	14	18	24	28	32	35
Drill depth	h_0 / h_1	[mm]	$= h_{ef}$							
Diameter of steel brush	$d_b \geq$	[mm]	12	14	16	20	26	30	34	37
Clearance-hole in fixture to be attached	d_f	[mm]	9	12	14	18	22	26	30	33
Wrench size	SW	[mm]	13	17	19	24	30	36	41	46
Required torque	T_{inst}	[Nm]	10	20	40	80	120	160	180	200
Min. thickness of concrete member	h_{min}	[mm]	$= h_{ef} + 30mm \geq 100mm$			$= h_{ef} + 2d_0$				
Minimum spacing	s_{min}	[mm]	40	50	60	80	100	120	135	150
Minimum edge distances	c_{min}	[mm]	40	50	60	80	100	120	135	150



Mechanical characteristics

Anchor type: VM 250 M

steel grade	Thread size			M8	M10	M12	M16	M20	M24	M27	M30
	Stressed cross section	A_s	[mm²]	37	58	84	157	245	352	459	561
	Section Modulus	W	[mm³]	31	62	109	277	540	933	1389	1872
4.6	Yield strength	f_y	[N/mm²]	240	240	240	240	240	240	240	240
	Tensile strength	f_u	[N/mm²]	400	400	400	400	400	400	400	400
	Design bending moment	$M^0_{Rd,s}$	[Nm]	9	18	31	80	156	269	400	539
5.8	Yield strength	f_y	[N/mm²]	400	400	400	400	400	400	400	400
	Tensile strength	f_u	[N/mm²]	500	500	500	500	500	500	500	500
	Design bending moment	$M^0_{Rd,s}$	[Nm]	15	30	52	133	259	448	667	899
8.8	Yield strength	f_y	[N/mm²]	640	640	640	640	640	640	640	640
	Tensile strength	f_u	[N/mm²]	800	800	800	800	800	800	800	800
	Design bending moment	$M^0_{Rd,s}$	[Nm]	24	48	84	212	415	717	1067	1438
A4-70	Yield strength	f_y	[N/mm²]	450	450	450	450	450	450	450	450
		f_u	[N/mm²]	700	700	700	700	700	700	700	700
	Design bending moment	$M^0_{Rd,s}$	[Nm]	17	34	59	149	292	504	750	1011

VM 250 M WITH THREADED ROD (METRIC)

Material specification of anchor

Anchor type: VM 250 M

Designation	Material
Steel, zinc plated ≥ 5 µm acc. to EN ISO 4042 or Steel, hot-dip galvanised ≥ 40 µm acc. to EN ISO 1461 and EN ISO 10684	
Anchor rod	Steel, EN 10087 or EN 10263 Property class 4.6 8.8, EN ISO 898-1:1999
Hexagon nut, EN 24032	Property class 4 (for class 4.6 rod) EN898-2 Property class 5 (for class 5.8 rod) EN 898-2 Property class 8 (for class 8.8 rod) EN 898-2
Washer, EN ISO 7089, EN ISO 7093 or EN ISO 7094	Steel, zinc plated or hot-dip galvanised
Stainless steel	
Anchor rod	Material 1.4401 / 1.4404 / 1.4571, EN 10088-1: 2005 Property class 70 EN ISO 3506 or for > M24: Property class 50 EN ISO 3506
Hexagon nut, EN 4032	Material 1.4401 / 1.4404 / 1.4571, EN 10088 Property class 70 EN ISO 3506 or for > M24: Property class 50 EN ISO 3506
Washer, EN ISO 7089,EN ISO 887 EN ISO 7093 or EN ISO 7094	Material 1.4401, 1.4404 or 1.4571, EN 10088
High corrosion resistance steel	
Anchor rod	Material 1.4529 / 1.4565, EN 10088-1:2005, > M24: Property class 50 EN ISO 3506 ≤ M24: Property class 70 EN ISO 3506
Hexagon nut, EN 4032	Material 1.4529 / 1.4565, EN 10088, > M24: Property class 50 (for class 50 rod) EN ISO 3506 ≤ M24: Property class 70 (for class 70 rod) EN ISO 3506
Washer, EN ISO 7089, EN ISO 887 EN ISO 7093 or EN ISO 7094	Material 1.4529 or 1.4565, EN 10088

Properties of adhesive

Property		Testing method	Results
Stability			
UV-resistance (sunlight)			not resistant
Temperature resistance			120 °C
Water resistancy			resistant
Cleaning agents			1% tenside solution: no effects
Physical properties			
Flexural Properties	Flexural strength	DIN EN 196-1	after 24 hours: 14.7 N/mm^2
Compressive Properties	Compressive strength	DIN EN 196-1	after 24 hours: ≥ 100 N/mm^2
Dynamic Modulus of Elasticity		DIN EN 12504-4	after 24 hours: 14.09 GPa
Thermal conductivity	Modified transient plane source method		0.66 / 0.63 W/mK
Specific contact resistance		IEC 93	3.6 x 10^9 Ωcm
Density		DIN 53479	1.77 ± 0.1 g/cm^3
Workability features			
Watertightness / Impermeability		DIN EN 12390-8	after 72 hours at 5bar: 0mm
Open time (10-20°C)			15 min
Curing time (10-20°C)			80 min
Shelf life			18 months

For information use only. Values are not to be considered as a specification and do not reflect the performance of the system. The given values are typical values and are subject to change without notice.

VM 250 M WITH THREADED ROD (METRIC)

Working time and curing time

Temperature of Concrete	Gelling - working time	Minimum Curing time in dry concrete	Minimum Curing time in wet concrete
-10°C bis -4°C[1)]	90 min	24 h	48 h
-5°C bis -1°C	90 min	14 h	28 h
0°C bis 4°C	45 min	7 h	14 h
5°C bis 10°C	25 min	2 h	4 h
10°C bis 19°C	15 min	80 min	160 min
20°C bis 29°C	6 min	45 min	90 min
30°C bis 34°C	4 min	25 min	50 min
35°C bis 39°C	4 min	20 min	40 min
≥ 40°C	1.5 min	15 min	30 min

[1)] Cartridge temperature must be at min. 15°C

Filling Quantity

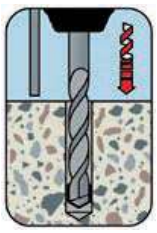
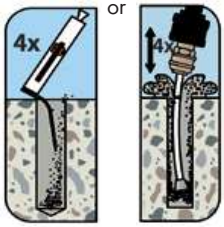
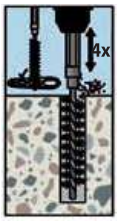
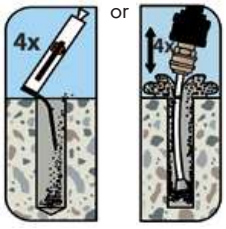
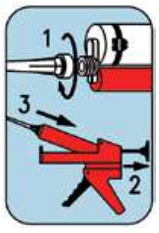
Anchor type: VM 250 M

Thread size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal drill hole diameter	d_0	[mm]	10	12	14	18	24	28	32	35
Drill depth	h_0 / h_1	[mm]	= h_{ef}							
Filling volume per 10mm embedment depth		[ml]	0.52	0.67	0.83	1.14	2.40	3.00	3.98	4.57

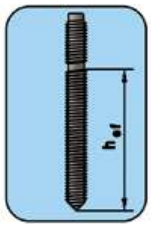
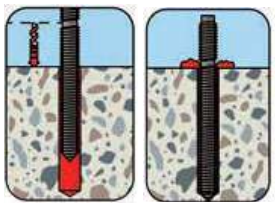
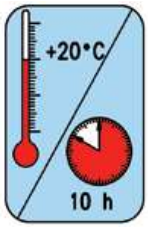
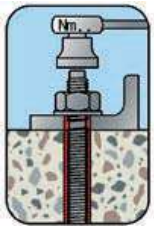
Assumed wastage of 15% included.

Installation instruction

Anchor type: VM 250 M

	Installation	Control
	Choose the right system tools.	There is a system: drilling machine, drill bit, hand-pump, brush, brush diameter gauge.
	Drill the hole with a hammer drill. Drill bit diameter and its working length are determined by the diameter and depth of the drill hole of the selected anchor. (see table anchor characteristics).	Working length of drill bit must be bigger than the given drill hole depth.
	Clean the bore hole 4x from the bottom. If the bore hole bottom is not reached an extension shall be used. The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger than 20 mm or deeper than 240 mm, compressed air (min. 6 bar) must be used.	Check the whole system on the site, the system includes the brush and brush diameter gauge, the hand-pump or compressor (air without oil).
	Brush the bore hole 4x by a twisting motion and removing it with the required brush. Use a drilling machine or a battery screwdriver. If the bore hole bottom is not reached with the brush, a brush extension shall be used.	Control the diameter of the brush with a brush diameter gauge.
	Clean again the bore hole 4x from the bottom until the return air straem is without dust. If the bore hole bottom is not reached an extension shall be used. The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger then 20 mm or deeper 240 mm, compressed air (min. 6 bar) must be used.	
	Attach the supplied static-mixing nozzle to the cartridge and insert the cartridge into the correct dispensing tool. Do not modify the static-mixing nozzle. For every working interruption longer than the recommended working time as well as for new cartridges, a new static-mixer shall be used.	Only use static-mixing nozzle of the system.

VM 250 M WITH THREADED ROD (METRIC)

	Installation	Control
	Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods.	Check the marker on the anchor rod.
	Prior to dispensing into the anchor hole, squeeze out separately a minimum of 3x strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.	
	Starting from the bottom of the hole fill the hole up to (see table working and curing time) approximately 2/3 with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating voids. For embedment larger than 190 mm an extension nozzle shall be used. For overhead and horizontal installation in bore holes larger than ⌀ 20 mm a injection adapter and extension nozzle shall be used. Observe the given working times.	Marking the static mixing nozzle makes it easier to fill every hole with the same volume.
	While turning slightly push the threaded rod or reinforcing bar into the anchor hole to ensure uniform distribution of the adhesive until the embedment depth is reached.	Make sure that the embedment depth is observed and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For overhead installation fix embedded part (e.g.wedges).
	Do not move or load the anchor until the mortar is fully cured.	
	After fully cured, the fixture can be installed.	Check the max. torque by using a calibrated torque wrench.

Accessoires

Anchor type: VM 250 M

Thread size			M8	M10	M12	M16	M20	M24	M27	M30
Nominal drill hole diameter	d_0	[mm]	10	12	14	18	24	28	32	35
Drill depth	h_0 / h_1	[mm]	= h_{ef}							
Wrench size	SW	[mm]	13	17	19	24	30	36	41	46
Required torque	T_{inst}	[Nm]	10	20	40	80	120	160	180	200

Hammer Drills



H 36-MAS / H24-MLS (SDS-plus)	
BMH 32-XE (SDS-Plus)	
BMH 40-XES (SDS-Max)	
BMH 45-XE (SDS-Max)	

Drill Bits

LONGLIFE QUADRO-L (0648 xxx yyy)	
LONGLIFE QUADRO-L (0647 0xx yyy)	
QUADRO-S (0647 7xx yyy)	

Brush



Thread size			M8	M10	M12	M16	M20	M24	M27	M30
Brush diameter	d_b	[mm]	12	14	16	20	26	30	34	37
Brush length	l_b	[mm]	170	200	200	300	300	300		
Brush 0905 499 ...			...001	...002	...003	...004	...005	...008	on demand	
Brush extension			0905 499 111							
Brush diameter gauge			0905 499 099							
SDS adapter for machine cleaning			0905 499 102							
Hex adapter for machine cleaning			0905 499 101							

Blow-out (manual)



Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Blow-out pump (manual)		0903 990 001							
Reducing adapter for M8 0905 499 ...		...202							

VM 250 M WITH THREADED ROD (METRIC)

Compressed-air cleaning



Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Jet nozzle						0903 489 217			
Thread adapter						0903 489 291			
Thread adapter						0699 903 7			

Injecting






Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Dispensing gun		0891 003							
Dispensing gun Handy Max (420 ml)		0891 007 10							
Mixer nozzle		0903 420 001							
Mixer extension		0903 420 004							
Injection adapter (repulsion piston) 0903 488 ...						...051	...052		

Chemical resistance

Chemical Agent	Concentration	Resistant	Not Resistant
Accumulator acid		●	
Acetic acid	40		●
Acetic acid	10	●	
Acetone	10		●
Ammonia, aqueous solution	5	●	
Aniline	100		●
Beer		●	
Benzene (kp 100-140 °F)	100	●	
Benzol	100		●
Boric Acid, aqueous solution		●	
Calcium carbonate, suspended in water	all	●	
Calcium chloride, suspended in water		●	
Calcium hydroxide, suspended in water		●	
Carbon tetrachloride	100	●	
Caustic soda solution	10	●	
Citric acid	all	●	
Diesel oil	100	●	
Ethyl alcohol, aqueous solution	50		●
Formic acid	100		●
Formaldehyde, aqueous solution	30	●	
Freon		●	
Fuel Oil		●	
Gasoline (premium grade)	100	●	
Glycol (Ethylene glycol)		●	
Hydraulic fluid	conc.	●	
Hydrochloric acid (Muriatic Acid)	conc.		●
Hydrogen peroxide	30		●
Isopropyl alcohol	100		●
Lactic acid	all	●	
Linseed oil	100	●	
Lubricating oil	100	●	
Magnesium chloride, aqueous solution	all	●	
Methanol	100		●
Motor oil (SAE 20 W-50)	100	●	
Nitric acid	10		●
Oleic acid	100	●	
Perchloroethylene	100	●	
Petroleum	100	●	
Phenol, aqueous solution	8		●
Phosphoric acid	85	●	
Potash lye (Potassium hydroxide)	10	●	
Potassium carbonate, aqueous solution	all	●	
Potassium chlorite, aqueous solution	all	●	
Potassium nitrate, aqueous solution	all	●	
Sodium carbonate	all	●	
Sodium Chloride, aqueous solution	all	●	
Sodium phosphate, aqueous solution	all	●	
Sodium silicate	all	●	
Standard Benzine	100	●	
Sulfuric acid	10	●	
Sulfuric acid	70		●
Tartaric acid	all	●	
Tetrachloroethylene	100	●	
Toluene			●
Trichloroethylene	100		●
Turpentine	100	●	

Results shown in the table are applicable to brief periods of chemical contact with full cured adhesive (e.g. temporary contact with adhesive during a spill).

WIT-VM 250 WITH REBAR

WIT-VM 250



420 ml
Art.no.:
0903450205



300 ml
Art.no.:
0903450201



ø8 - ø40

Approved for:
Concrete C20/25 to C50/60, cracked

Suitable for:
Concrete C12/15

Benefits:

- The gelling/working time allows working very quick with large embedment depth and high loads.
- Its many approvals guarantees optimized load capacities for threaded rods and rebar.
- Its specially developed chemical composition allows a reliable installation in underwater conditions.
- The special chemical composition allows working in high corrosion areas.

Applications









Approvals and Certificates

Description	Authority/ Laboratory	Guideline for Assessment	No./date of issue
European Technical Approval	DIBt, Berlin	ETAG 001-T5	ETA-12/0164 / 2013-06-20
European Technical Approval	DIBt, Berlin	TR 023 / EC2	ETA-12/0166 / 2012-03-16
ICC-ES Evaluation Report	ICC	AC 308	ESR-2539 / 2012-03-01
Fire resistance	iBMB, Braunschweig	ISO 834	(3371/436/09)-CM / 2009-10-19
Test Report LEED	eurofins	Leed 2009 EQ c4.1	G19427H / 2012-10-30
VOC Emissions Test report	eurofins	DEVL 1101903D, DEVL 1104875A	2013-03-13
NSF International	NSF International	NSF/ANSI Standard61	2013-11-13

Basic loading data (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction).
- No edge distance and spacing influence.
- Base material thickness, as specified in the table.
- Embedment depth, as specified in the table.
- Anchor material, as specified in the tables, steel grade BST 500 S, B500B
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm², Concrete C 50/60, $f_{ck,cube}$ = 60 N/mm².
- Temperate range I (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C).
- Dry or wet conditions of drill hole, hammer drilling.
- Installation temperature range +5°C to +40°C.

Characteristic resistance

Anchor type: VM 250 R

Thread size				**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
Effective anchorage depth		$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
Non-cracked concrete												
Tensile	C20/25	N_{Rk}	[kN]	20.1	33.9	49.8	70.6	70.6	111.9	153.7	224.0	256.4
	C50/60	N_{Rk}	[kN]	22.1	37.3	54.7	77.6	77.6	123.1	169.0	246.5	282.0
Shear	≥ C20/25	V_{Rk}	[kN]	13.8	21.6	31.1	42.3	55.3	86.4	135.0	169.3	169.3
Cracked concrete												
Tensile	C20/25	N_{Rk}	[kN]			22.8	34.6	43.2	70.5	98.0	160.0	187.4
	C50/60	N_{Rk}	[kN]			25.1	38.0	47.5	77.5	107.8	176.0	206.2
Shear	≥ C20/25	V_{Rk}	[kN]			31.1	42.3	55.3	86.4	135.0	169.3	169.3

Design resistance

Anchor type: VM 250 R

Thread size				**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
Effective anchorage depth		$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
Non-cracked concrete												
Tensile	C20/25	N_{Rd}	[kN]	13.4	18.8	27.6	39.2	39.2	62.2	85.4	124.5	142.4
	C50/60	N_{Rd}	[kN]	14.7	20.7	30.4	43.1	43.1	68.4	93.9	136.9	156.7
Shear	≥ C20/25	V_{Rd}	[kN]	9.2	14.4	20.7	28.2	36.9	57.6	90.0	112.9	112.9
Cracked concrete												
Tensile	C20/25	N_{Rd}	[kN]			12.7	19.2	24.0	39.2	54.4	88.9	104.1
	C50/60	N_{Rd}	[kN]			13.9	21.1	26.4	43.1	59.9	97.8	114.5
Shear	≥ C20/25	V_{Rd}	[kN]			20.7	28.2	36.9	57.6	90.0	112.9	112.9

WIT-VM 250 WITH REBAR

Recommended / Allowable loads[1)]

Anchor type: VM 250 R

Thread size				Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Effective anchorage depth		$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
Non-cracked concrete												
Tensile	C20/25	N_{rec}	[kN]	9.6	13.5	19.7	28.0	28.0	44.4	61.0	88.9	101.7
	C50/60	N_{rec}	[kN]	10.5	14.8	21.7	30.8	30.8	48.9	67.1	97.8	111.9
Shear	≥ C20/25	V_{rec}	[kN]	6.6	10.3	14.8	20.2	26.3	41.1	64.3	80.6	80.6
Cracked concrete												
Tensile	C20/25	N_{rec}	[kN]			9.1	13.7	17.1	28.0	38.9	63.5	74.4
	C50/60	N_{rec}	[kN]			10.0	15.1	18.9	30.8	42.8	69.9	81.8
Shear	≥ C20/25	V_{rec}	[kN]			14.8	20.2	26.3	41.1	64.3	80.6	80.6

[1)] Material safety factor y_M and safety factor for action y_L = 1.4 are included. The material safety factor depends on the failure mode.

Design Method (simplified)

Simplified version of the design method according ETAG 001, TR 029. Design resistance according data given in ETA-12/0164, issue 2013-06-20:

- Influence of concrete strength.
- Influence of edge distance.
- Influence of spacing.
- Valid for a group of anchors. (The influencing factors must then be considered for each edge distance and spacing. The calculated design loads are then on the save side. They will be lower than the exact values according ETAG 001, Annex C. To avoid this, it is recommended to use the anchor design software of Würth).
- The design method is based on the following simplification: No different loads are acting on individual anchors (no eccentricity).
- Temperate range I (min. base material temperature -40°C, max. long term/short term base material temperature: +24°C/40°C).
- Dry or wet conditions of drill hole, hammer drilling.
- Installation temperature range -10°C to +40°C.

Tension loading

The decisive design resistance in tension is the lowest value of the following failure modes::

Steel failure: $N_{Rd,s}$

Combined Pull out and concrete cone failure: $N_{Rd,p} = N^0_{Rd,p} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,p} \cdot f_{sy,p} \cdot f_{cx,1,p} \cdot f_{cx,2,p} \cdot f_{cy,p}$

Concrete cone failure: $N_{Rd,c} = N^0_{Rd,c} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx} \cdot f_{sy} \cdot f_{cx,1} \cdot f_{cx,2} \cdot f_{cy}$

Concrete splitting failure: $N_{Rd,sp} = N^0_{Rd,sp} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,sp} \cdot f_{sy,sp} \cdot f_{cx,1,sp} \cdot f_{cx,2,sp} \cdot f_{cy,sp} \cdot f_h$

Design steel resistance $N_{Rd,s}$ of a single anchor

Anchor type: VM 250 R

Code	Rebar grade	Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
BS4449:1997	460A	$N_{Rd,s}$	[kN]	17.4	27.1	39.0	53.1	69.4	108.4	169.4	212.4	277.4
	460B	$N_{Rd,s}$	[kN]	17.8	27.9	40.1	54.6	71.3	111.5	174.2	218.5	285.4
DIN1045-1:2008:08 / DIN 488-1:2009:08 / DIN EN 1992-1-1:2011-01	BST 500 S, B500B	$N_{Rd,s}$	[kN]	19.7	30.9	44.4	60.5	79.0	123.4	192.8	241.9	316.0

WIT-VM 250 WITH REBAR

Influence of concrete strength

Concrete strength classes (EN 206:2000)			C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Characteristic compressive strength of concrete determined by testing cylinders[1)]	$f_{ck,cyl}$	[N/mm²]	12	16	20	25	30	35	40	45	50
Characteristic compressive strength of concrete determined by testing cube[2)]	$f_{ck,cube}$	[N/mm²]	15	20	25	30	37	45	50	55	60
Influencing factor	$f_{b,N}$	[-]	0.77	0.89	1.00	1.02	1.04	1.06	1.08	1.09	1.10

[1)] strength at 28days of 150mm diameter by 300mm cylinders.

[2)] strength at 28days of 150mm cubes.

Influence of embedment depth

$$f_{hef} = \frac{h_{ef}}{h_{ef,typ}}$$

Consider the approved range of embedment depth $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ according to the table "anchor characteristics".

Design combined pull-out and concrete cone resistance $N_{Rd,p}$ of a single anchor

$$N_{Rd,p} = N^0_{Rd,p} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,p} \cdot f_{sy,p} \cdot f_{cx,1,p} \cdot f_{cx,2,p} \cdot f_{cy,p}$$

Basic design combined pull-out and concrete cone resistance $N^0_{Rd,p}$ of a single anchor

Anchor type: VM 250 R

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
Non-cracked concrete										
$N^0_{Rd,p}$	[kN]	13.4	18.8	27.6	41.9	52.4	85.5	108.9	141.4	142.4
Cracked concrete										
$N^0_{Rd,p}$	[kN]			12.7	19.2	24.0	39.2	54.4	91.9	108.9

Characteristic edge distance $c_{cr,p}$ and spacing $s_{cr,p}$

Anchor type: VM 250 R

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
$s_{cr,p}$	[mm]	185	253	304	375	375	510	630	693	681
$c_{cr,p}$	[mm]	92	126	152	188	188	255	315	346	341

Concrete cone failure - Influence of spacing

$$f_{sx,p} = f_{sy,p} = \left(1 + \left(n_{x(y)} - 1\right)\frac{s_{x(y)}}{s_{cr,p}}\right) \cdot \frac{1}{n_{x(y)}} \leq 1$$

Number of fixing per direction	$s/s_{cr,p}$ [1]	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
2	$f_{sx,p}$, $f_{sy,p}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00
3	$f_{sx,p}$, $f_{sy,p}$	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.00
4	$f_{sx,p}$, $f_{sy,p}$	0.33	0.36	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.96	1.00
5	$f_{sx,p}$, $f_{sy,p}$	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in one row.

Concrete cone failure - Influence of edge distance

$$f_{cx,1,p} = 0.7 + 0.3\frac{c_x}{c_{cr,p}} \leq 1; \quad f_{cx,2,p} = f_{cy,p} = \left(1 + \frac{c_{x(y)}}{c_{cr,p}}\right) \cdot \frac{1}{2} \leq 1$$

$c/c_{cr,p}$	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
$f_{cx,1,p}$	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.94	0.96	0.97	0.99	1.00
$f_{cx,2,p}$ / $f_{cy,p}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00

Design concrete cone resistance $N_{Rd,c}$ and splitting resistance $N_{Rd,sp}$ of a single anchor

Concrete cone failure: $N_{Rd,c} = N^0_{Rd,c} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx} \cdot f_{sy} \cdot f_{cx,1} \cdot f_{cx,2} \cdot f_{cy}$

Concrete splitting failure: $N_{Rd,sp} = N^0_{Rd,sp} \cdot f_{b,N} \cdot f_{hef} \cdot f_{sx,sp} \cdot f_{sy,sp} \cdot f_{cx,1,sp} \cdot f_{cx,2,sp} \cdot f_{cy,sp} \cdot f_h$

No verification of splitting is required if at least one of the conditions is fulfilled:

a) The edge distance in all directions is $c \geq c_{cr,sp}$ for single fasteners and $c \geq 1.2\ c_{cr,sp}$ for fastener groups and the member depth is $h \geq h_{min}$ in both cases.

b) The characteristic resistance for concrete cone failure and pull-out failure is calculated for cracked concrete and reinforcement resists the splitting forces and limits the crack width to $w_k \leq 0.3mm$.

WIT-VM 250 WITH REBAR

Basic design concrete cone resistance $N^0_{Rd,c}$ of a single anchor

Anchor type: VM 250 R

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
Non-cracked concrete										
$N^0_{Rd,c}$	[kN]	24.1	24.0	32.4	39.2	39.2	62.2	85.4	124.5	145.8
Cracked concrete										
$N^0_{Rd,c}$	[kN]	17.2	17.1	23.1	28.0	28.0	44.4	61.0	88.9	104.1

Influence of embedment depth

$$f_{hef} = \left(\frac{h_{ef}}{h_{ef,typ}}\right)^{1.5}$$

Consider the approved range of embedment $h_{ef,min} \leq h_{ef} \leq h_{ef,max}$ according to the table "anchor characteristics".

Concrete cone failure

Characteristic edge distance $c_{cr,N}$ and spacing $s_{cr,N}$

Anchor type: VM 250 R

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
$s_{cr,N}$	[mm]	240	270	330	375	375	510	630	810	900
$c_{cr,N}$	[mm]	120	135	165	188	188	255	315	405	450

Above characteristic spacing and edge distances are given for the typical effective anchorage depth. Calculating for smaller depths is leading to conservative load capacities. For calculation with bigger depths use the following: $s_{cr,N} = 3 \cdot h_{ef}$ and $c_{cr,N} = 1.5 \cdot h_{ef}$.

Concrete cone failure - Influence of spacing

$$f_{sx} = f_{sy} = \left(1 + (n_{x(y)} - 1)\frac{s_{x(y)}}{s_{cr,N}}\right) \cdot \frac{1}{n_{x(y)}} \leq 1$$

Number of fixing per direction	$s/s_{cr,N}$ [1]	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
2	f_{sx}, f_{sy}	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00
3	f_{sx}, f_{sy}	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.00
4	f_{sx}, f_{sy}	0.33	0.36	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.96	1.00
5	f_{sx}, f_{sy}	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in one row.

Concrete cone failure - Influence of edge distance

$$f_{cx,1} = 0.7 + 0.3\frac{c_x}{c_{cr,N}} \leq 1; \quad f_{cx,2} = f_{cy} = \left(1 + \frac{c_{x(y)}}{c_{cr,N}}\right) \cdot \frac{1}{2} \leq 1$$

$c/c_{cr,N}$	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
$f_{cx,1}$	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.94	0.96	0.97	0.99	1.00
$f_{cx,2}$ / f_{cy}	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00

Concrete splitting failure

Characteristic edge distance $c_{cr,sp}$ and spacing $s_{cr,sp}$

Anchor type: VM 250 R

Thread size		**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
$s_{cr,sp}$	[mm]	360	420	528	600	590	816	1008	1296	1440
$c_{cr,sp}$	[mm]	180	210	264	300	295	408	504	648	720
h_{min}	[mm]	110	120	134	157	165	218	264	330	364

Above characteristic spacing and edge distances are given for the typical effective anchorage depth. Calculating for smaller depths is leading to conservative load capacities. For calculation with bigger depths use the following:

$s_{cr,N} = 2 \cdot c_{cr,sp}$ and $c_{cr,N} = \left\{h_{ef} \leq 2 \cdot h_{ef} \cdot \left(2.5 - \left(\frac{h_{min}}{h_{ef}}\right)\right) \leq 2.4 \cdot h_{ef}\right\}$

and h_{min} according to the table „anchor characteristics".

Concrete splitting failure - Influence of spacing

$$f_{sx,sp} = f_{sy,sp} = \left(1 + (n_{x(y)} - 1)\frac{s_{x(y)}}{s_{cr,sp}}\right) \cdot \frac{1}{n_{x(y)}} \leq 1$$

Number of fixing per direction	$s/s_{cr,sp}$ [1]	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
2	$f_{sx,sp}$, $f_{sy,sp}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00
3	$f_{sx,sp}$, $f_{sy,sp}$	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80	0.83	0.87	0.90	0.93	0.97	1.00
4	$f_{sx,sp}$, $f_{sy,sp}$	0.33	0.36	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.96	1.00
5	$f_{sx,sp}$, $f_{sy,sp}$	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96	1.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in one row.

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Concrete splitting failure - Influence of edge distance

$$f_{cx,1,sp} = 0.7 + 0.3\frac{c_x}{c_{cr,sp}} \leq 1; \quad f_{cx,2,sp} = f_{cy,sp} = \left(1 + \frac{c_{x(y)}}{c_{cr,sp}}\right) \cdot \frac{1}{2} \leq 1$$

$c/c_{cr,sp}$	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	≥ 1.0
$f_{cx,1,sp}$	0.73	0.75	0.76	0.78	0.79	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.94	0.96	0.97	0.99	1.00
$f_{cx,2,sp}$ / $f_{cy,sp}$	0.55	0.58	0.60	0.63	0.65	0.68	0.70	0.73	0.75	0.78	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00

Concrete splitting failure - Influence of concrete member thickness

$$f_h = \left(\frac{h}{h_{min}}\right)^{2/3} \leq max\left(1; \left(\frac{h_{ef} + 1.5c_1}{h_{min}}\right)^{2/3}\right) \leq 2$$

h/h_{min}	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.30	2.40	2.50	2.60	2.70	2.80	≥2.90
f_h	1.00	1.07	1.13	1.19	1.25	1.31	1.37	1.42	1.48	1.53	1.59	1.64	1.69	1.74	1.79	1.84	1.89	1.94	1.99	2.00

Shear loading

The decisive design resistance in shear is the lowest value of the following failure modes:

Steel failure: $V_{Rd,s}$

Concrete pry-out failure: $V_{Rd,cp} = k \cdot min\{N_{Rd,p}; N_{Rd,c}\}$

Concrete edge failure: $V_{Rd,c} = V^0_{Rd,c} \cdot f_{b,V} \cdot f_{h_{ef,V}} \cdot f_{s,V} \cdot f_{c1,V} \cdot f_{c2,V} \cdot f_\alpha \cdot f_h$

Design steel resistance $V_{Rd,s}$ of a single anchor

Anchor type: VM 250 R

Code	Rebar grade	Rebar size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
BS4449:1997	460A	$V_{Rd,s}$	[kN]	8.1	12.6	18.2	24.8	32.4	50.6	79.0	99.1	99.1
	460B	$V_{Rd,s}$	[kN]	8.3	13.0	18.7	25.5	33.3	52.0	81.3	102.0	102.0
DIN1045-1:2008:08 / DIN 488-1:2009:08 / DIN EN 1992-1-1: 2011-01	BST 500 S, B500B	$V_{Rd,s}$	[kN]	9.2	14.4	20.7	28.2	36.9	57.6	90.0	112.9	112.9

Design concrete pry-out resistance $V_{Rd,cp}$ of a single anchor

$$V_{Rd,cp} = k \cdot min\{N_{Rd,p}; N_{Rd,c}\}$$

Anchor type: VM 250 R

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$h_{ef,typ}$	[mm]	80	90	110	125	125	170	210	270	300
k	[-]	2	2	2	2	2	2	2	2	2

Design concrete edge resistance $V_{Rd,c}$

$$V_{Rd,c} = V^0_{Rd,c} \cdot f_{b,V} \cdot f_{h_{ef},V} \cdot f_{s,V} \cdot f_{c1,V} \cdot f_{c2,V} \cdot f_{\alpha} \cdot f_h$$

Verification of concrete edge failure may be omitted for single fasteners and groups with an edge distance in all directions $c \geq \max(10h_{ef}; 60d)$. For anchorages with more than one edge, the resistance for all edges shall be calculated. The smallest value should be used in the verification.

Basic design concrete edge resistance $V^0_{Rd,c}$ of a single anchor

Anchor type: VM 250 R

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Non-cracked concrete										
$V^0_{Rd,c}$	[kN]	5.2	7.5	10.1	13.1	16.4	24.3	36.3	42.3	50.5
Cracked concrete										
$V^0_{Rd,c}$	[kN]	3.7	5.3	7.1	9.2	11.6	17.1	25.6	29.7	35.5

Influence of concrete strength

$$f_{b,V} = \sqrt{\frac{f_{ck,cube}}{25}} = \sqrt{\frac{f_{ck,cyl}}{20}}$$

Concrete strength classes (EN 206:2000)			C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Characteristic compressive strength of concrete determined by testing cylinders[1)]	$f_{ck,cyl}$	[N/mm²]	12	16	20	25	30	35	40	45	50
Characteristic compressive strength of concrete determined by testing cube[2)]	$f_{ck,cube}$	[N/mm²]	15	20	25	30	37	45	50	55	60
Influencing factor	$f_{b,V}$	[-]	0.77	0.89	1.00	1.10	1.22	1.34	1.41	1.48	1.55

[1)] strength at 28days of 150mm diameter by 300mm cylinders.

[2)] strength at 28days of 150mm cubes.

WIT-VM 250 WITH REBAR

Influence of embedment depth

h_{ef} /d	4	5	6	7	8	9	10	11	≥ 12
$f_{hef,V}$	0.87	0.91	0.94	0.97	1.00	1.02	1.05	1.07	1.08

Influence of edge distance c_1

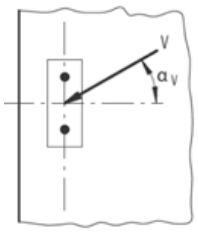
c_1 /d	4	8	12	15	20	30	40	50	60	100	150	200
$f_{c1,V}$	0.47	1.19	2.05	2.76	4.05	6.96	10.22	13.76	17.54	34.66	59.52	87.35

Influence of load direction

$$f_\alpha = \sqrt{\frac{1}{cos^2\alpha_V + \left(\frac{sin\alpha_V}{2.0}\right)^2}} \leq 2.0$$

α[1]	0	10	20	30	40	50	60	70	80	90
$f_{\alpha,V}$	1.00	1.01	1.05	1.11	1.20	1.34	1.51	1.72	1.92	2.00

[1] For α ≥ 90° the component of the shear load acting away from the edge may be neglected and the verification may be done with component acting parallel to the edge only.



Influence of spacing

In groups loaded perpendicular to the edge only two adjacent anchors closest and parallel to the edge carry the load. The smallest spacing should be used for the verification.

$$f_{s,V} = \frac{1}{3} \cdot \frac{s}{c_1} + 1 \leq 2$$

s/c_1[1]	0.50	0.60	0.70	0.80	0.90	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
$f_{s,V}$	1.17	1.20	1.23	1.27	1.30	1.33	1.40	1.47	1.53	1.60	1.67	1.73	1.80	1.87	1.93	2.00

[1] Choose always the lowest value of the spacing s, when there are different spacings in the row closest to the edge.

Influence of second edge distance

$$f_{c2,V} = \left(\frac{1}{2} + \frac{1}{3}\frac{c_2}{c_1}\right)\left(0.7 + 0.3\frac{c_2}{1.5c_1}\right) \leq 1$$

c_2/c_1[1]	1.00	1.10	1.20	1.30	1.40	1.50
$f_{c,V}$	0.75	0.80	0.85	0.90	0.95	1.00

[1] Distance to the second edge: $c_1 \leq c_2$.

Influence of concrete member thickness

$$f_{h,V} = \left(\frac{h}{1.5c_1}\right)^{1/2}$$

h/c_1	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	≥ 1.50
$f_{h,V}$	0.26	0.37	0.45	0.52	0.58	0.63	0.68	0.73	0.77	0.82	0.86	0.89	0.93	0.97	1.00

Structural Verification

Tension

$$N_{Sd}^h \leq N_{Rd} = \min\left(N_{Rd,s}; N_{Rd,p}; N_{Rd,c}; N_{Rd,sp}\right)$$

$$\beta_N = max\left(\frac{N_{Sd}^h}{N_{Rd,s}}; \frac{N_{Sd}^h}{N_{Rd,p}}; \frac{N_{Sd}^h}{N_{Rd,c}}; \frac{N_{Sd}^h}{N_{Rd,sp}}\right) \leq 1$$

Shear

$$V_{Sd}^h \leq V_{Rd} = \min\left(V_{Rd,s}; V_{Rd,cp}; {}^{V_{Rd,c}}/_{n}\right)$$

$$\beta_V = max\left(\frac{V_{Sd}^h}{V_{Rd,s}}; \frac{V_{Sd}^h}{V_{Rd,cp}}; \frac{V_{Sd}^g}{V_{Rd,c}}\right) \leq 1$$

Combined tension and shear

$$\beta_N + \beta_V \leq 1.2$$

WIT-VM 250 WITH REBAR

Service temperature

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range I	-40 °C to +40 °C	+24 °C	+40 °C
Temperature range II	-40 °C to +80 °C	+50 °C	+80 °C
Temperature range III	-40 °C to +120 °C	+72 °C	+120 ° C

Design bond strength for different use categories

Anchor type: VM 250 R

Non-cracked concrete

Thread size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Design bond strength according to ETA-12/0164 / dry and wet concrete / hammer drilling											
Temperature range I	$\tau_{Rd,ucr}$	[N/mm²]	6.7	6.7	6.7	6.7	6.7	6.7	6.1	5.6	4.7
Temperature range II	$\tau_{Rd,ucr}$	[N/mm²]	5.0	5.0	5.0	5.0	5.0	5.0	4.4	3.9	3.3
Temperature range III	$\tau_{Rd,ucr}$	[N/mm²]	3.7	3.6	3.6	3.6	3.6	3.6	3.3	2.8	2.5
Design bond strength according to ETA-12/0164 / flooded concrete / hammer drilling											
Temperature range I	$\tau_{Rd,ucr}$	[N/mm²]	3.6	4.0	4.0	4.0	4.0				
Temperature range II	$\tau_{Rd,ucr}$	[N/mm²]	2.6	3.1	3.1	3.1	3.1				
Temperature range III	$\tau_{Rd,ucr}$	[N/mm²]	1.9	2.4	2.4	2.4	2.4				

Cracked concrete

Thread size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Design bond strength according to ETA-12/0164 / dry and wet concrete / hammer drilling											
Temperature range I	$\tau_{Rd,cr}$	[N/mm²]			3.1	3.1	3.1	3.1	3.1	3.6	3.6
Temperature range II	$\tau_{Rd,cr}$	[N/mm²]			2.2	2.2	2.2	2.2	2.2	2.5	2.5
Temperature range III	$\tau_{Rd,cr}$	[N/mm²]			1.7	1.7	1.7	1.7	1.7	1.9	1.9
Design bond strength according to ETA-12/0164 / flooded concrete / hammer drilling											
Temperature range I	$\tau_{Rd,cr}$	[N/mm²]			2.6	2.6	2.6				
Temperature range II	$\tau_{Rd,cr}$	[N/mm²]			1.9	1.9	1.9				
Temperature range III	$\tau_{Rd,cr}$	[N/mm²]			1.4	1.4	1.4				

Reduction factor for different use categories

Anchor type: VM 250 R

Non-cracked concrete

Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Reduction factor strength according to ETA-12/0164 / dry and wet concrete / hammer drilling										
Temperature range I	$f_{\tau,red}$	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temperature range II	$f_{\tau,red}$	0.75	0.75	0.75	0.75	0.75	0.75	0.73	0.70	0.71
Temperature range III	$f_{\tau,red}$	0.55	0.54	0.54	0.54	0.54	0.54	0.55	0.50	0.53
Reduction factor according to ETA-12/0164 / flooded concrete / hammer drilling										
Temperature range I	$f_{\tau,red}$	0.54	0.61	0.61	0.61	0.61				
Temperature range II	$f_{\tau,red}$	0.39	0.46	0.46	0.46	0.46				
Temperature range III	$f_{\tau,red}$	0.29	0.36	0.36	0.36	0.36				

Cracked concrete

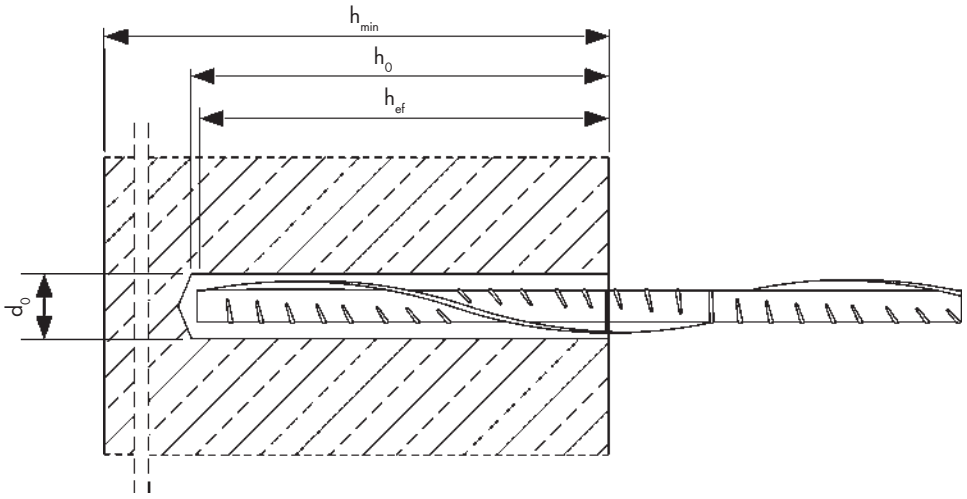
Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Reduction factor according to ETA-12/0164 / dry and wet concrete / hammer drilling										
Temperature range I	$f_{\tau,red}$			1.00	1.00	1.00	1.00	1.00	1.00	1.00
Temperature range II	$f_{\tau,red}$			0.73	0.73	0.73	0.73	0.73	0.69	0.69
Temperature range III	$f_{\tau,red}$			0.55	0.55	0.55	0.55	0.55	0.54	0.54
Reduction factor according to ETA-12/0164 / flooded concrete / hammer drilling										
Temperature range I	$f_{\tau,red}$			0.86	0.86	0.86				
Temperature range II	$f_{\tau,red}$			0.62	0.62	0.62				
Temperature range III	$f_{\tau,red}$			0.47	0.47	0.47				

WIT-VM 250 WITH REBAR

Anchor characteristics

Anchor type: VM 250 R

Thread size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Effective anchorage depth	$h_{ef,min}$	[mm]	60	60	70	75	80	90	100	112	128
	$h_{ef,max}$	[mm]	160	200	240	280	320	400	480	540	640
Nominal drill hole diameter	d_0	[mm]	12	14	16	18	20	24	32	35	40
Drill depth	h_0 / h_1	[mm]	$= h_{ef}$								
Diameter of steel brush	$d_b \geq$	[mm]	14	16	18	20	22	26	34	37	41.5
Min. thickness of concrete member	h_{min}	[mm]	$= h_{ef}$ +30mm ≥ 100mm		$= h_{ef} + 2d_0$						
Minimum spacing	s_{min}	[mm]	40	50	60	70	80	100	125	140	160
Minimum edge distances	c_{min}	[mm]	40	50	60	70	80	100	125	140	160



VM 250 R

Mechanical characteristics

Anchor type: VM 250 R

	rebar grade	Rebar size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
		Stressed cross section	A_s	[mm²]	50	79	113	154	201	314	491	616	804
		Section Modulus	W	[mm³]	50	98	170	269	402	785	1534	2155	3217
BS4449: 1997	460A	Yield strength	f_y	[N/mm²]	460	460	460	460	460	460	460	460	460
		Tensile strength	f_u	[N/mm²]	483	483	483	483	483	483	483	483	483
		Design bending moment	$M^0_{Rd,s}$	[Nm]	19	38	66	104	155	303	593	833	1243
	460B	Yield strength	f_y	[N/mm²]	460	460	460	460	460	460	460	460	460
		Tensile strength	f_u	[N/mm²]	497	497	497	497	497	497	497	497	497
		Design bending moment	$M^0_{Rd,s}$	[Nm]	20	39	67	107	160	312	610	857	1279
DIN1045-1:2008:08 / DIN 488-1:2009:08 / DIN EN 1992-1-1:2011-01	BST 500 S, B500B	Yield strength	f_y	[N/mm²]	500	500	500	500	500	500	500	500	500
		Tensile strength	f_u	[N/mm²]	550	550	550	550	550	550	550	550	550
		Design bending moment	$M^0_{Rd,s}$	[Nm]	22	43	75	119	177	346	675	948	1415

WIT-VM 250 WITH REBAR

Material specification of rebar

Abstract of EN 1992-1-1 Annex C, Table C.1, Properties of reinforcement

Product form		Bars and de-coild rods	
Class		B	C
Characteristic yield strenght f_{yk} or $f_{0,2k}$ (N/mm^2)		400 to 600	
Minimum value of $k=(f_t/f_y)_k$		≥1,08	≥1,15 <1,35
Characteristic strain at maximum force ε_{uk} (%)		≥5,0	≥7,5
Bendability		Bend / Rebend test	
Maximum deviation from nominal mass (individual bar) (%)	Nominal bar size (mm) ≤8 >8	±6,0 ±4,5	

Abstact of EN 1992-1-1 Annex C, Table C.2N, Properties of reinforcement

Product form		Bars and de-coild rods	
Class		B	C
Min. value of related rip area f_{Rmin}	Nominal diameter of the rebar (mm) 8 to 12 >12	0,040 0,056	

Rib height of the bar shall be in the range: $0,05d \leq h \leq 0,07d$
(d: Nominal diameter of the bar; h: Rip height of the bar).

Properties of adhesive

Property		Testing method	Results
Stability			
UV-resistance (sunlight)			not resistant
Temperature resistance			120 °C
Water resistancy			resistant
Cleaning agents			1% tenside solution: no effects
Cleaning agents			1% tenside solution: no effects
Physical properties			
Flexural Properties	Flexural strength	DIN EN 196-1	after 24 hours: 14.7 N/mm^2
Compressive Properties	Compressive strength	DIN EN 196-1	after 24 hours: ≥ 100 N/mm^2
Dynamic Modulus of Elasticity		DIN EN 12504-4	after 24 hours: 14.09 GPa
Thermal conductivity	Modified transient plane source method		0.66 / 0.63 W/mK
Specific contact resistance		IEC 93	3.6 x 10^9 Ωcm
Density		DIN 53479	1.77 ± 0.1 g/cm^3
Workability features			
Watertightness / Impermeability		DIN EN 12390-8	after 72 hours at 5bar: 0mm
Open time (10-20°C)			15 min
Curing time (10-20°C)			80 min
Shelf life			18 months

For information use only. Values are not to be considered as a specification and do not reflect the performance of the system. The given values are typical values and are subject to change without notice.

WIT-VM 250 WITH REBAR

Working time and curing time

Temperature of Concrete	Gelling - working time	Minimum Curing time in dry concrete	Minimum Curing time in wet concrete
-10°C to -4°C[1)]	90 min	24 h	48 h
-5°C to -1°C	90 min	14 h	28 h
0°C to 4°C	45 min	7 h	14 h
5°C to 10°C	25 min	2 h	4 h
10°C to 19°C	15 min	80 min	160 min
20°C to 29°C	6 min	45 min	90 min
30°C to 34°C	4 min	25 min	50 min
35°C to 39°C	4 min	20 min	40 min
≥ 40°C	1.5 min	15 min	30 min

[1)] Cartridge temperature must be at min. 15°C

Filling Quantity

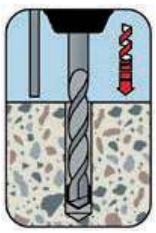
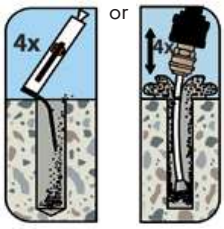
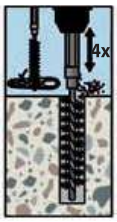
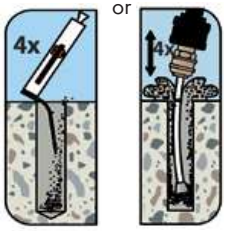
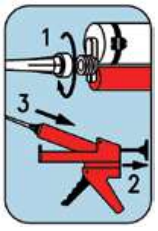
Anchor type: VM 250 R

Thread size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Nominal drill hole diameter	d_0	[mm]	12	14	16	18	20	24	32	35	40
Drill depth	h_0 / h_1	[mm]	= h_{ef}								
Filling volume per 10mm embedment depth		[ml]	0.80	0.96	1.11	1.27	1.45	2.21	2.70	4.30	5.64

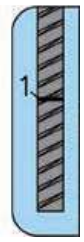
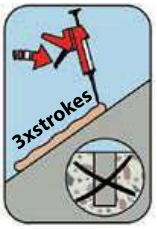
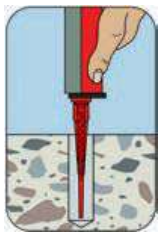
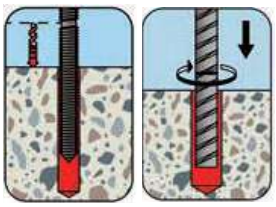
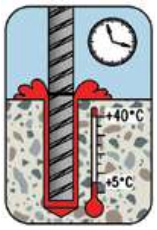
Assumed wastage of 15% included.

Installation instruction

Anchor type: VM 250 R

	Installation	Control
	Choose the right system tools.	There is a system: drilling machine, drill bit, hand-pump, brush, brush diameter gauge.
	Drill the hole with a hammer drill or comresses air drilling. Drill bit diameter and its working length are determined by the diameter and depth of the drill hole of the selected rebar. (see table rebar characteristics).	Working length of drill bit must be bigger than the given drill hole depth.
	Clean the bore hole with compressed air or hand pump 4x from the bottom of the drill hole. If the the drill hole bottom is not reached use an extension. For drill holes deeper then 240 mm you have to use comressed air.	Check the whole system on the site, the system includes the brush and brush diameter gauge, the compressor (air without oil).
	Check brush diameter and clean the hole 4x with drilling machine or a battery screwdriver. If the bottom is not reached use an extension.	
	Clean the bore hole with compressed air or hand pump 4x from the bottom of the drill hole. If the the drill hole bottom is not reached use an extension. For drill holes deeper then 240 mm you have to use compressed air.	
	Attach the supplied static-mixing nozzle to the cartridge and insert the cartridge into the correct dispensing tool. Do not modify the static-mixing nozzle. For every working interruption longer than the recommended working time as well as for new cartridges, a new static-mixer shall be used.	Only use static-mixing nozzle of the system.

WIT-VM 250 WITH REBAR

	Installation	Control
	Marker the embedment depth on the reinforcment bar.	
	Prior to dispensing into the anchor hole, squeeze out separately a minimum of 3 strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour.	
	Prepare mortar cartridge with static mixer, extension pipe and injection adapter. Use the right injection adapter for the bore hole diameter. The length of the extension pipe has to appropriate to the drill hole depth. Marker on the extension pipe according ETA -07/0313. Inject the motar bubble-free by starting from the bottom of the drilled hole. For overhead and horizontal installation and drilling holes deeper than 240 mm a piston plug and the appropriate mixer have to be used.	Marking the static mixing nozzle makes it easier to fill every hole with the same volume.
	While turning slightly push the reinforcing bar into bore hole to ensure uniform distribution of the adhesive until the embedment depth is reached. Excessive injection mortar must come out of the drill hole.	Make sure that the embedment depth is observed and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For overhead installation fix embedded part (e.g.wedges).
	Observe working and curing time.	

Accessoires

Anchor type: VM 250 R

Thread size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Nominal drill hole diameter	d_0	[mm]	12	14	16	18	20	24	32	35	40
Drill depth	h_0 / h_1	[mm]	= h_{ef}								

Hammer Drills



H 36-MAS / H24-MLS (SDS-plus)	
BMH 32-XE (SDS-Plus)	
BMH 40-XES (SDS-Max)	
BMH 45-XE (SDS-Max)	

Drill Bits

LONGLIFE QUADRO-L (0648 xxx yyy)	
LONGLIFE QUADRO-L (0647 0xx yyy)	
QUADRO-S (0647 7xx yyy)	

Brush





Thread size			Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Brush diameter	d_b	[mm]	14	16	18	20	22	26	34	37	41.5
Brush length	l_b	[mm]	= h_{ef}								
Brush 0905 499 ...			...002	...003		...004		...005			
0905 489 ...					...012		...016		...025	...028	
Brush extension			0903 489 111								
Brush diameter gauge			0903 489 099								
SDS adapter for machine cleaning			0903 489 101								

Blow-out (manual)



Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Blow-out pump (manual)		0903 990 001								

WIT-VM 250 WITH REBAR

Compressed-air cleaning



Thread size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Jet nozzle		0903 489 210		0903 489 214		0903 489 217		0903 489 227		
Thread adapter		0903 489 291						0903 489 292		
Hose		0699 903 7						0699 903 13		

Injecting




Thread size		M8	M10	M12	M16	M20	M24	M27	M30
Dispensing gun		0891 003							
Dispensing gun Handy Max (420 ml)		0891 007 10							
Mixer nozzle		0903 420 001							
Mixer extension		0903 420 004							
Injection adapter (repulsion piston) 0903 488 ...						...051	...052		

VM 250 R

Chemical resistance

Chemical Agent	Concentration	Resistant	Not Resistant
Accumulator acid		●	
Acetic acid	40		●
Acetic acid	10	●	
Acetone	10		●
Ammonia, aqueous solution	5	●	
Aniline	100		●
Beer		●	
Benzene (kp 100-140°F)	100	●	
Benzol	100		●
Boric Acid, aqueous solution		●	
Calcium carbonate, suspended in water	all	●	
Calcium chloride, suspended in water		●	
Calcium hydroxide, suspended in water		●	
Carbon tetrachloride	100	●	
Caustic soda solution	10	●	
Citric acid	all	●	
Diesel oil	100	●	
Ethyl alcohol, aqueous solution	50		●
Formic acid	100		●
Formaldehyde, aqueous solution	30	●	
Freon		●	
Fuel Oil		●	
Gasoline (premium grade)	100	●	
Glycol (Ethylene glycol)		●	
Hydraulic fluid	conc.	●	
Hydrochloric acid (Muriatic Acid)	conc.		●
Hydrogen peroxide	30		●
Isopropyl alcohol	100		●
Lactic acid	all	●	
Linseed oil	100	●	
Lubricating oil	100	●	
Magnesium chloride, aqueous solution	all	●	
Methanol	100		●
Motor oil (SAE 20 W-50)	100	●	
Nitric acid	10		●
Oleic acid	100	●	
Perchloroethylene	100	●	
Petroleum	100	●	
Phenol, aqueous solution	8		●
Phosphoric acid	85	●	
Potash lye (Potassium hydroxide)	10	●	
Potassium carbonate, aqueous solution	all	●	
Potassium chlorite, aqueous solution	all	●	
Potassium nitrate, aqueous solution	all	●	
Sodium carbonate	all	●	
Sodium Chloride, aqueous solution	all	●	
Sodium phosphate, aqueous solution	all	●	
Sodium silicate	all	●	
Standard Benzine	100	●	
Sulfuric acid	10	●	
Sulfuric acid	70		●
Tartaric acid	all	●	
Tetrachloroethylene	100	●	
Toluene			●
Trichloroethylene	100		●
Turpentine	100	●	

Results shown in the table are applicable to brief periods of chemical contact with full cured adhesive (e.g. temporary contact with adhesive during a spill).

ALLROUNDER WIT-VM 250 - 420 ML (comp. A)

Version	Revision Date:	SDS Number:	Date of last issue: 10.06.2026
18.0	22.10.2026	10636416-00027	Date of first issue: 09.04.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	:	ALLROUNDER WIT-VM 250 - 420 ML (comp. A)
Product code	:	0903450205
Unique Formula Identifier (UFI)	:	NNPE-H0MJ-300P-JXMC

This substance/ mixture contains nanoforms (according to REACH Regulation)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Sub-stance/Mixture	:	Adhesives, Resins Professional use product
Recommended restrictions on use	:	Not applicable

1.3 Details of the supplier of the safety data sheet

Company	:	Adolf Wuerth GmbH & Co. KG Reinhold-Würth-Str. 12-17 74653 Künzelsau
Telephone	:	+49 794015 0
Telefax	:	+49 794015 10 00
E-mail address of person responsible for the SDS	:	isi@wuerth.com

1.4 Emergency telephone number

+49 (0)6132 – 84463

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Skin sensitisation, Category 1	H317: May cause an allergic skin reaction.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Warning

Hazard statements : H317 May cause an allergic skin reaction.

Precautionary statements :

Prevention:

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves.

Response:

P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Hazardous components which must be listed on the label:

Tetramethylene dimethacrylate
Methacrylic acid, monoester with propane-1,2-diol
2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Components

Chemical name	CAS-No. EC-No. Index-No.	Classification	Concentration (% w/w)

	Registration number		
Tetramethylene dimethacrylate	2082-81-7 218-218-1 607-766-00-0 01-2119967415-30	Skin Sens. 1B; H317	>= 10 - < 20
Methacrylic acid, monoester with propane-1,2-diol	27813-02-1 248-666-3 01-2119490226-37	Eye Irrit. 2; H319 Skin Sens. 1; H317 STOT SE 3; H335	>= 1 - < 10
2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate	25852-47-5	Skin Sens. 1B; H317	>= 1 - < 10
Quartz (SiO2)	14808-60-7 238-878-4	STOT RE 1; H372 (Lungs)	>= 1 - < 10
1,1'-(p-tolylimino)dipropan-2-ol	38668-48-3 254-075-1 01-2119980937-17	Acute Tox. 2; H300 Eye Irrit. 2; H319 Aquatic Chronic 3; H412	>= 1 - < 2,5

For explanation of abbreviations see section 16.

This substance/ mixture contains nanoforms (according to REACH Regulation)

Components:

Silicon, amorphous (nano):

Particle characteristics

Assessment : This substance/ mixture contains nanoforms (according to REACH Regulation)

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

Protection of first-aiders : First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.
Remove contaminated clothing and shoes.
Get medical attention.

Wash clothing before reuse.
Thoroughly clean shoes before reuse.

In case of eye contact : Flush eyes with water as a precaution.
Get medical attention if irritation develops and persists.

If swallowed : If swallowed, DO NOT induce vomiting.
Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

4.2 Most important symptoms and effects, both acute and delayed

Risks : May cause an allergic skin reaction.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Treat symptomatically and supportively.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting : Exposure to combustion products may be a hazard to health.

Hazardous combustion products : Carbon oxides
Nitrogen oxides (NOx)
Silicon oxides

5.3 Advice for firefighters

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.
Use personal protective equipment.

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Use water spray to cool unopened containers.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Use personal protective equipment.
Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2 Environmental precautions

Environmental precautions : Avoid release to the environment.
Prevent further leakage or spillage if safe to do so.
Retain and dispose of contaminated wash water.
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Sweep up or vacuum up spillage and collect in suitable container for disposal.
Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.
Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures : See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.

Local/Total ventilation : Use only with adequate ventilation.

Advice on safe handling : Do not get on skin or clothing.
Avoid breathing dust, fume, gas, mist, vapours or spray.
Do not swallow.
Avoid contact with eyes.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
Take care to prevent spills, waste and minimize release to the environment.

Hygiene measures : If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace.
Wash contaminated clothing before re-use.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Keep in properly labelled containers. Store in accordance with the particular national regulations.
Advice on common storage	:	Do not store with the following product types: Strong oxidizing agents
Storage class (TRGS 510)	:	11
Storage period	:	18 Months
Recommended storage temperature	:	5 - 25 °C

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Silicon, amorphous (nano)	112945-52-5	AGW (Inhalable fraction)	1 mg/m3 (Silica)	DE TRGS 900
	Peak-limit: excursion factor (category): 8;(II)			
	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
		BM (Alveolar dust fraction)	0,5 mg/m3	DE TRGS 527
		MAK (measured as the alveolate fraction)	0,02 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 8; II			
	Further information: Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
Quartz (SiO2)	14808-60-7	TWA (Respirable dust)	0,1 mg/m3	2004/37/EC
	Further information: Carcinogens or mutagens			

This substance(s) is not bioavailable and therefore does not contribute to a dust inhalation hazard.

Quartz (SiO2)

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006

Substance name	End Use	Exposure routes	Potential health effects	Value
Methacrylic acid, mo-	Workers	Inhalation	Long-term systemic	14,7 mg/m3

noester with propane-1,2-diol			effects	
	Workers	Skin contact	Long-term systemic effects	4,2 mg/kg bw/day
	Consumers	Inhalation	Long-term systemic effects	4,35 mg/m3
	Consumers	Skin contact	Long-term systemic effects	2,5 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	2,5 mg/kg bw/day
1,1'-(p-tolylimino)dipropan-2-ol	Workers	Inhalation	Long-term systemic effects	2 mg/m3
	Workers	Skin contact	Long-term systemic effects	0,6 mg/kg bw/day
	Consumers	Inhalation	Long-term systemic effects	0,4 mg/m3
	Consumers	Skin contact	Long-term systemic effects	0,3 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	0,3 mg/kg bw/day
Tetramethylene di-methacrylate	Workers	Inhalation	Long-term systemic effects	14,5 mg/m3
	Workers	Skin contact	Long-term systemic effects	4,2 mg/kg bw/day
	Consumers	Inhalation	Long-term systemic effects	4,3 mg/m3
	Consumers	Skin contact	Long-term systemic effects	2,5 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	2,5 mg/kg bw/day

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006

Substance name	Environmental Compartment	Value
Methacrylic acid, monoester with propane-1,2-diol	Fresh water	0,904 mg/l
	Freshwater - intermittent	0,972 mg/l
	Marine water	0,09 mg/l
	Sewage treatment plant	10 mg/l
	Fresh water sediment	6,28 mg/kg dry weight (d.w.)
	Marine sediment	6,28 mg/kg dry weight (d.w.)
	Soil	0,727 mg/kg dry weight (d.w.)
1,1'-(p-tolylimino)dipropan-2-ol	Fresh water	0,017 mg/l
	Marine water	0,0017 mg/l
	Intermittent use/release	0,17 mg/l
	Sewage treatment plant	199,5 mg/l
	Fresh water sediment	0,0782 mg/kg
	Marine sediment	0,00782 mg/kg
	Soil	0,005 mg/kg

Tetramethylene dimethacrylate	Fresh water	0,087 mg/l
	Marine water	0,009 mg/l
	Intermittent use/release	0,098 mg/l
	Sewage treatment plant	20 mg/l
	Fresh water sediment	3,12 mg/kg
	Marine sediment	0,312 mg/kg
	Soil	0,573 mg/kg

8.2 Exposure controls

Appropriate engineering controls

Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection : Wear the following personal protective equipment:
Safety glasses
Equipment should conform to DIN EN 166

Hand protection

Material : Nitrile rubber
Break through time : > 480 min
Glove thickness : > 0,2 mm
Guideline : Equipment should conform to DIN EN 374

Remarks : Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday.

Skin and body protection : Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential.
Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).

Respiratory protection : If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.
Filter should conform to DIN EN 14387

Filter type : Combined particulates and organic vapour type (A-P)

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state : solid

Form : Pasty solid

Colour : light beige

Odour : characteristic

Odour Threshold	:	No data available
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	No data available
Flammability (solid, gas)	:	Not classified as a flammability hazard
Upper explosion limit / Upper flammability limit	:	Not applicable
Lower explosion limit / Lower flammability limit	:	Not applicable
Flash point	:	Not applicable
Auto-ignition temperature	:	Not applicable
Decomposition temperature	:	No data available
pH	:	substance/mixture is non-soluble (in water)
Viscosity		
Viscosity, kinematic	:	Not applicable
Solubility(ies)		
Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	Not applicable
Vapour pressure	:	Not applicable
Density	:	1,71 g/cm³ (20 °C)
Relative vapour density	:	Not applicable
Particle characteristics		
Assessment	:	This substance/ mixture contains nanoforms (according to REACH Regulation)
Particle size	:	No data available
		Further particle properties for nanomaterials see section 3

9.2 Other information

Explosives	:	Not explosive

Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Evaporation rate	:	Not applicable

SECTION 10: Stability and reactivity

10.1 Reactivity
Not classified as a reactivity hazard.

10.2 Chemical stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Hazardous reactions : Can react with strong oxidizing agents.

10.4 Conditions to avoid
Conditions to avoid : None known.

10.5 Incompatible materials
Materials to avoid : Oxidizing agents

10.6 Hazardous decomposition products
No hazardous decomposition products are known.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008
Information on likely routes of exposure : Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Product:

Acute oral toxicity : Acute toxicity estimate: > 2.000 mg/kg
Method: Calculation method

Components:

Tetramethylene dimethacrylate:

Acute oral toxicity : LD50 (Rat): 10.066 mg/kg

Acute dermal toxicity : LD50 (Rabbit): > 2.000 mg/kg
Remarks: Based on data from similar materials

Methacrylic acid, monoester with propane-1,2-diol:

Acute oral toxicity : LD50 (Rat): > 2.000 mg/kg

Method: OECD Test Guideline 401
Assessment: The substance or mixture has no acute oral toxicity

Acute dermal toxicity : LD50 (Rabbit, male): > 5.000 mg/kg

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Acute oral toxicity : LD50 (Rat): > 5.000 mg/kg

Quartz (SiO2):

Acute oral toxicity : LD50 (Rat): > 22.500 mg/kg

1,1'-(p-tolylimino)dipropan-2-ol:

Acute oral toxicity : LD50 (Rat): > 25 - 200 mg/kg
Method: OECD Test Guideline 423

Acute dermal toxicity : LD50 (Rat): > 2.000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation

Not classified based on available information.

Components:

Tetramethylene dimethacrylate:

Species : Rabbit
Result : No skin irritation

Methacrylic acid, monoester with propane-1,2-diol:

Species : Rabbit
Result : No skin irritation

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Species : Rabbit
Method : Draize Test
Result : No skin irritation

Quartz (SiO2):

Species : Rabbit
Method : OECD Test Guideline 404
Result : No skin irritation
Remarks : Based on data from similar materials

1,1'-(p-tolylimino)dipropan-2-ol:

Species : Rabbit

Method : OECD Test Guideline 404
Result : No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Components:

Tetramethylene dimethacrylate:

Species : Rabbit
Result : No eye irritation

Methacrylic acid, monoester with propane-1,2-diol:

Species : Rabbit
Result : Irritation to eyes, reversing within 21 days

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Species : Rabbit
Method : Draize Test
Result : No eye irritation

Quartz (SiO2):

Species : Rabbit
Method : OECD Test Guideline 405
Result : No eye irritation
Remarks : Based on data from similar materials

1,1'-(p-tolylimino)dipropan-2-ol:

Species : Rabbit
Method : OECD Test Guideline 405
Result : Irritation to eyes, reversing within 7 days

Respiratory or skin sensitisation

Skin sensitisation

May cause an allergic skin reaction.

Respiratory sensitisation

Not classified based on available information.

Components:

Tetramethylene dimethacrylate:

Test Type : Local lymph node assay (LLNA)
Exposure routes : Skin contact
Species : Mouse
Method : OECD Test Guideline 429
Result : positive

Assessment : Probability or evidence of low to moderate skin sensitisation

rate in humans

Methacrylic acid, monoester with propane-1,2-diol:

Exposure routes	:	Skin contact
Species	:	Humans
Result	:	positive
Assessment	:	Probability or evidence of skin sensitisation in humans

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Test Type	:	Local lymph node assay (LLNA)
Exposure routes	:	Skin contact
Species	:	Mouse
Method	:	OECD Test Guideline 429
Result	:	positive
Remarks	:	Based on data from similar materials
Assessment	:	Probability or evidence of low to moderate skin sensitisation rate in humans

1,1'-(p-tolylimino)dipropan-2-ol:

Test Type	:	Maximisation Test
Exposure routes	:	Skin contact
Species	:	Guinea pig
Method	:	OECD Test Guideline 406
Result	:	negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Tetramethylene dimethacrylate:

Genotoxicity in vitro	:	Test Type: Bacterial reverse mutation assay (AMES) Method: OECD Test Guideline 471 Result: negative Test Type: Chromosome aberration test in vitro Method: OECD Test Guideline 473 Result: negative Test Type: In vitro mammalian cell gene mutation test Method: OECD Test Guideline 476 Result: negative
Genotoxicity in vivo	:	Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Mouse Application Route: Ingestion

Method: OECD Test Guideline 474
Result: negative

Methacrylic acid, monoester with propane-1,2-diol:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

Test Type: Chromosome aberration test in vitro
Result: positive

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Ingestion
Method: OECD Test Guideline 474
Result: negative

1,1'-(p-tolylimino)dipropan-2-ol:

Genotoxicity in vitro : Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: negative

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Carcinogenicity

Not classified based on available information.

Components:

Methacrylic acid, monoester with propane-1,2-diol:

Species	:	Rat
Application Route	:	Ingestion
Exposure time	:	2 Years
Result	:	negative
Remarks	:	Based on data from similar materials

Reproductive toxicity

Not classified based on available information.

Components:

Tetramethylene dimethacrylate:

Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Effects on foetal development : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Methacrylic acid, monoester with propane-1,2-diol:

Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Effects on foetal development : Test Type: Embryo-foetal development
Species: Rabbit
Application Route: Ingestion
Method: OECD Test Guideline 414
Result: negative
Remarks: Based on data from similar materials

1,1'-(p-tolylimino)dipropan-2-ol:

Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Effects on foetal development : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

STOT - single exposure

Not classified based on available information.

Components:

Methacrylic acid, monoester with propane-1,2-diol:

Assessment : May cause respiratory irritation.

STOT - repeated exposure

Not classified based on available information.

Components:

Quartz (SiO2):

Exposure routes	:	inhalation (dust/mist/fume)
Target Organs	:	Lungs
Assessment	:	Shown to produce significant health effects in animals at concentrations of 0.02 mg/l/6h/d or less.

Repeated dose toxicity

Components:

Tetramethylene dimethacrylate:

Species	:	Rat
NOAEL	:	300 mg/kg
Application Route	:	Ingestion
Exposure time	:	33 Days
Method	:	OECD Test Guideline 422

Methacrylic acid, monoester with propane-1,2-diol:

Species	:	Rat
NOAEL	:	300 mg/kg
Application Route	:	Ingestion
Exposure time	:	54 Days
Method	:	OECD Test Guideline 422

Quartz (SiO2):

Species	:	Humans
LOAEL	:	0,053 mg/m3
Application Route	:	Inhalation
Remarks	:	This substance(s) is not bioavailable and therefore does not contribute to a dust inhalation hazard.

Aspiration hazard

Not classified based on available information.

11.2 Information on other hazards

Endocrine disrupting properties

Not classified based on available information.

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12: Ecological information

12.1 Toxicity

Components:

Tetramethylene dimethacrylate:

Toxicity to fish : EC50 (Leuciscus idus (Golden orfe)): 32,5 mg/l
Exposure time: 48 h
Method: DIN 38412
Remarks: Based on data from similar materials

Toxicity to algae/aquatic plants : EC10 (Desmodesmus subspicatus (green algae)): 4,35 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

ErC50 (Desmodesmus subspicatus (green algae)): 9,79 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : EC10: 7,51 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 211

Methacrylic acid, monoester with propane-1,2-diol:

Toxicity to fish : LC50 (Leuciscus idus (Golden orfe)): 493 mg/l
Exposure time: 48 h
Method: DIN 38412

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 143 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : ErC50 (Raphidocelis subcapitata (freshwater green alga)): > 97,2 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

NOEC (Raphidocelis subcapitata (freshwater green alga)): >= 97,2 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 45,2 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 211

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Toxicity to fish : LC50 (Danio rerio (zebra fish)): > 10 - 100 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : EC10: > 1 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 211
Remarks: Based on data from similar materials

Quartz (SiO2):

Toxicity to fish : LC50 (Danio rerio (zebra fish)): 508 mg/l
Exposure time: 96 h
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 731 mg/l
Exposure time: 48 h
Remarks: Based on data from similar materials

1,1'-(p-tolylimino)dipropan-2-ol:

Toxicity to fish : LC50 (Danio rerio (zebra fish)): 17 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 28,8 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : NOEC (Desmodesmus subspicatus (green algae)): 57,8 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

ErC50 (Desmodesmus subspicatus (green algae)): 245 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to microorganisms : EC10 : > 1.995 mg/l
Exposure time: 30 min

12.2 Persistence and degradability

Components:

Tetramethylene dimethacrylate:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 84 %
Exposure time: 28 d
Method: OECD Test Guideline 310

Methacrylic acid, monoester with propane-1,2-diol:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 81 %
Exposure time: 28 d
Method: OECD Test Guideline 301C

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Biodegradability : Result: Readily biodegradable.
Remarks: Based on data from similar materials

1,1'-(p-tolylimino)dipropan-2-ol:

Biodegradability : Result: Inherently biodegradable.
Biodegradation: 90,1 %
Exposure time: 60 d
Method: OECD Test Guideline 301B

12.3 Bioaccumulative potential

Components:

Tetramethylene dimethacrylate:

Partition coefficient: n-octanol/water : log Pow: 3,1

Methacrylic acid, monoester with propane-1,2-diol:

Partition coefficient: n-octanol/water : log Pow: 0,97

2-(2-Methylprop-2-enoyloxy)ethyl 2-methylprop-2-enoate:

Partition coefficient: n-octanol/water : log Pow: < 4
Method: OECD Test Guideline 117

1,1'-(p-tolylimino)dipropan-2-ol:

Partition coefficient: n-octanol/water : log Pow: 2,1

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Dispose of in accordance with local regulations.
According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.
Do not dispose of waste into sewer.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

Waste Code : The following Waste Codes are only suggestions:

used product
08 04 09*, waste adhesives and sealants containing organic solvents or other hazardous substances

unused product
08 04 09*, waste adhesives and sealants containing organic solvents or other hazardous substances

uncleaned packagings
15 01 10*, packaging containing residues of or contaminated by hazardous substances

Acc. Packaging Act properly emptied packaging:
Properly emptied, non-contaminated packaging of non-hazardous products can be supplied to a system for the collection of sales packaging.

SECTION 14: Transport information

14.1 UN number or ID number

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.2 UN proper shipping name

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.3 Transport hazard class(es)

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.4 Packing group

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA (Cargo)	:	Not regulated as a dangerous good
IATA (Passenger)	:	Not regulated as a dangerous good

14.5 Environmental hazards

Not regulated as a dangerous good

14.6 Special precautions for user

Not applicable

14.7 Maritime transport in bulk according to IMO instruments

Remarks	:	Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) :

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)

Conditions of restriction for the following entries must be considered:
Number on list 75
If you intend to use this product as tattoo ink, please contact your vendor.

Substance(s) or mixture(s) are listed here according to their appearance in the regulation, irrespective of their use/purpose or the conditions of the restriction. Please refer to the conditions in corresponding Regulation to determine whether an entry is applicable to the placing on the market or not.

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : Not applicable

Regulation (EU) No 2024/590 on substances that deplete the ozone layer : Not applicable

Regulation (EU) 2019/1021 on persistent organic pollutants (recast) : Not applicable

Regulation (EU) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals : Not applicable

REACH - List of substances subject to authorisation (Annex XIV) : Not applicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.
Not applicable

Water hazard class (Germany) : WGK 1 slightly hazardous to water
Classification according to AwSV, Annex 1 (5.2)

TA Luft List (Germany) : 5.2.7.1.1: Quartz fine dust PM4:
others: Quartz (SiO2)

Volatile organic compounds : Directive 2010/75/EU of 24 November 2010 on industrial and livestock rearing emissions (integrated pollution prevention and control)
Volatile organic compounds (VOC) content: 0 %, 0 g/l
Remarks: VOC content excluding water

Other regulations:

Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

15.2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

Other information	:	Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Full text of H-Statements

H300	:	Fatal if swallowed.
H317	:	May cause an allergic skin reaction.
H319	:	Causes serious eye irritation.
H335	:	May cause respiratory irritation.
H372	:	Causes damage to organs through prolonged or repeated exposure if inhaled.
H412	:	Harmful to aquatic life with long lasting effects.

Full text of other abbreviations

Acute Tox.	:	Acute toxicity
Aquatic Chronic	:	Long-term (chronic) aquatic hazard
Eye Irrit.	:	Eye irritation
Skin Sens.	:	Skin sensitisation
STOT RE	:	Specific target organ toxicity - repeated exposure
STOT SE	:	Specific target organ toxicity - single exposure
2004/37/EC	:	Europe. Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens, mutagens or reprotoxic substances at work - Annex III
DE DFG MAK	:	Germany. MAK BAT Annex IIa
DE TRGS 527	:	Germany. TRGS 527 - Activities with nanomaterials
DE TRGS 900	:	Germany. TRGS 900 - Occupational exposure limit values.
2004/37/EC / TWA	:	Long term exposure limit
DE DFG MAK / MAK	:	MAK value
DE TRGS 527 / BM	:	Assessment scale
DE TRGS 900 / AGW	:	Time Weighted Average

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; BGW - Biological Limit Values; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmo-

nised System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); LSPN - List of Hazardous Notified Substances (Chile); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organisation for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Sources of key data used to compile the Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/

Classification of the mixture:		**Classification procedure:**
Skin Sens. 1	H317	Calculation method

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

DE / EN

ALLROUNDER WIT-VM 250 - 420 ML (comp. B)

Version	Revision Date:	SDS Number:	Date of last issue: 06.10.2026
19.8	16.10.2026	10622751-00030	Date of first issue: 09.04.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	:	ALLROUNDER WIT-VM 250 - 420 ML (comp. B)
Product code	:	0903450205
Unique Formula Identifier (UFI)	:	TJK0-G0UU-C00W-Q7A6

This substance/ mixture contains nanoforms (according to REACH Regulation)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture	:	Hardener Professional use product
Recommended restrictions on use	:	Not applicable

1.3 Details of the supplier of the safety data sheet

Company	:	Adolf Wuerth GmbH & Co. KG Reinhold-Würth-Str. 12-17 74653 Künzelsau
Telephone	:	+49 794015 0
Telefax	:	+49 794015 10 00
E-mail address of person responsible for the SDS	:	isi@wuerth.com

1.4 Emergency telephone number

+49 (0)6132 – 84463

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Skin sensitisation, Category 1	H317: May cause an allergic skin reaction.
Eye irritation, Category 2	H319: Causes serious eye irritation.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Warning

Hazard statements :
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

Precautionary statements :

Prevention:

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/ eye protection/ face protection.

Response:

P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Hazardous components which must be listed on the label:

Dibenzoyl peroxide

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Components

Chemical name	CAS-No. EC-No. Index-No.	Classification	Concentration (% w/w)

	Registration number		
Dibenzoyl peroxide	94-36-0 202-327-6 617-008-00-0 01-2119511472-50	Org. Perox. B; H241 Eye Irrit. 2; H319 Skin Sens. 1; H317 Aquatic Acute 1; H400 Aquatic Chronic 1; H410 M-Factor (Acute aquatic toxicity): 10 M-Factor (Chronic aquatic toxicity): 10	>= 10 - < 20

For explanation of abbreviations see section 16.

This substance/ mixture contains nanoforms (according to REACH Regulation)

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

Protection of first-aiders : First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : In case of contact, immediately flush skin with plenty of water.
Remove contaminated clothing and shoes.
Get medical attention.
Wash clothing before reuse.
Thoroughly clean shoes before reuse.

In case of eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.
If easy to do, remove contact lens, if worn.
Get medical attention.

If swallowed : If swallowed, DO NOT induce vomiting.
Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

4.2 Most important symptoms and effects, both acute and delayed

Risks	:	May cause an allergic skin reaction. Causes serious eye irritation.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment	:	Treat symptomatically and supportively.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting	:	Exposure to combustion products may be a hazard to health.
Hazardous combustion products	:	Carbon oxides Metal oxides Silicon oxides

5.3 Advice for firefighters

Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Use personal protective equipment. Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2 Environmental precautions

Environmental precautions	:	Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages

cannot be contained.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up	:	Soak up with inert absorbent material. For large spills, provide dyking or other appropriate containment to keep material from spreading. If dyked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	Use only with adequate ventilation.
Advice on safe handling	:	Do not breathe decomposition products. Do not get on skin or clothing. Avoid breathing dust, fume, gas, mist, vapours or spray. Do not swallow. Do not get in eyes. Wash skin thoroughly after handling. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Take care to prevent spills, waste and minimize release to the environment.
Hygiene measures	:	If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before re-use.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Keep in properly labelled containers. Store in accordance with the particular national regulations.
Advice on common storage	:	Do not store with the following product types: Strong oxidizing agents
Storage class (TRGS 510)	:	11

Storage period : 9 Months

Recommended storage temperature : 5 - 25 °C

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Dibenzoyl peroxide	94-36-0	MAK (measured as the alveolate fraction)	1 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 4; II			
	Further information: Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
		MAK (inhalable fraction)	4 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 2; I			
	Further information: Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
		AGW (Inhalable fraction)	4 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(I)			
	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
		AGW (Alveolate fraction)	1 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 4;(II)			
	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
Glycerine	56-81-5	AGW (Inhalable fraction)	200 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(I)			
	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
		MAK (inhalable fraction)	200 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 2; I			
	Further information: Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
Aluminum hydroxide	21645-51-2	AGW (Inhalable fraction)	10 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(II)			

	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
		AGW (Alveolate fraction)	1,25 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(II)			
	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
		MAK (Alveolar dust fraction)	0,05 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 8; II			
	Further information: Substances that cause cancer in humans or animals or that are considered to be carcinogenic for humans and for which a MAK value can be derived., Either there are no data for an assessment of damage to the embryo or foetus, including developmental neurotoxicity, or the currently available data are not sufficient for classification in one of the groups A - C			
		MAK (Dust, measured as the inhalable fraction)	0,5 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 8; II			
	Further information: Substances that cause cancer in humans or animals or that are considered to be carcinogenic for humans and for which a MAK value can be derived., Either there are no data for an assessment of damage to the embryo or foetus, including developmental neurotoxicity, or the currently available data are not sufficient for classification in one of the groups A - C			

Occupational exposure limits of decomposition products

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Benzoic acid	65-85-0	AGW (Vapour and aerosols)	0,1 ppm 0,5 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 4;(II)			
	Further information: Skin absorption, When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
		MAK (measured as the alveolate fraction)	0,1 ppm 0,5 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 4; II			
	Further information: Danger of absorption through the skin, Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
		MAK (inhalable fraction)	0,39 ppm 2 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 2; I			
	Further information: Danger of absorption through the skin, Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
Benzene	71-43-2	TWA	0,2 ppm 0,66 mg/m3	2004/37/EC
	Further information: Skin, Carcinogens or mutagens			
	Further information: Substances that cause cancer in man and can be as-			

	sumed to contribute to cancer risk, Danger of absorption through the skin, Substances which have been shown to induce genetic damage in germ cells of humans or animals, or which produce mutagenic effects in somatic cells of mammals in vivo and have been shown to reach the germ cells in an active form			
		Tolerable concentration	0,6 ppm 1,9 mg/m3	DE TRGS 910
	Peak-limit: excursion factor (category): 8 - Excursion factor according to Number 3.2.6			
	Further information: Skin-resorptive			
		Acceptable concentration	0,06 ppm 0,2 mg/m3	DE TRGS 910
	Further information: Skin-resorptive			
	Further information: Substances that cause concern that they could be carcinogenic for man but cannot be assessed conclusively because of lack of data, Danger of absorption through the skin			

Biological occupational exposure limits of decomposition products.

Substance name	CAS-No.	Control parameters	Sampling time	Basis
Benzene	71-43-2	Benzene: 5 µg/l (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift	TRGS 910
		Benzene: 0,8 µg/l (Urine)	Equivalence Value for Acceptance concentration: end of exposure or end of shift	TRGS 910
		S-phenylmercapturic acid: 25 µg/g creatinine (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift	TRGS 910
		S-phenylmercapturic acid: 3 µg/g creatinine (Urine)	Equivalence Value for Acceptance concentration: end of exposure or end of shift	TRGS 910
		trans,trans-muconic acid: 500 µg/g creatinine (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift	TRGS 910

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006

Substance name	End Use	Exposure routes	Potential health effects	Value
1,2-Cyclohexanedicarboxylic acid, 1,2-diisononyl ester	Workers	Inhalation	Long-term systemic effects	35 mg/m3
	Workers	Skin contact	Long-term systemic	41 mg/kg

			effects	bw/day
	Consumers	Inhalation	Long-term systemic effects	21 mg/m3
	Consumers	Skin contact	Long-term systemic effects	25 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	2 mg/kg bw/day
Dibenzoyl peroxide	Workers	Inhalation	Long-term systemic effects	39 mg/m3
	Workers	Skin contact	Long-term systemic effects	13,3 mg/kg bw/day
	Workers	Skin contact	Long-term local effects	0,034 mg/cm2
	Consumers	Ingestion	Long-term systemic effects	2 mg/kg bw/day
Glycerine	Workers	Inhalation	Long-term local effects	56 mg/m3
	Consumers	Ingestion	Long-term systemic effects	229 mg/kg bw/day
	Consumers	Inhalation	Long-term local effects	33 mg/m3
Benzoic acid, C9-11-branched alkyl esters	Workers	Inhalation	Long-term systemic effects	181 mg/m3
	Workers	Skin contact	Long-term systemic effects	206 mg/kg bw/day
	Consumers	Inhalation	Long-term systemic effects	53 mg/m3
	Consumers	Skin contact	Long-term systemic effects	29 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	15,48 mg/kg bw/day
Aluminum hydroxide	Workers	Inhalation	Long-term local effects	10,76 mg/m3
	Workers	Inhalation	Long-term local effects	10,76 mg/m3
	Consumers	Ingestion	Long-term systemic effects	4,74 mg/kg bw/day

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006

Substance name	Environmental Compartment	Value
1,2-Cyclohexanedicarboxylic acid, 1,2-diisononyl ester	Soil	44,7 mg/kg dry weight (d.w.)
Dibenzoyl peroxide	Fresh water	0,02 µg/l
	Marine water	0,002 µg/l
	Intermittent use/release	0,602 µg/l
	Sewage treatment plant	0,35 mg/l
	Fresh water sediment	0,013 mg/kg
	Marine sediment	0,001 mg/kg
	Soil	0,003 mg/kg
Glycerine	Fresh water	0,885 mg/l
	Marine water	0,0885 mg/l
	Intermittent use/release	8,85 mg/l

	Sewage treatment plant	1000 mg/l
	Fresh water sediment	3,3 mg/kg dry weight (d.w.)
	Marine sediment	0,33 mg/kg dry weight (d.w.)
	Soil	0,141 mg/kg dry weight (d.w.)
Benzoic acid, C9-11-branched alkyl esters	Fresh water sediment	0,065 mg/kg dry weight (d.w.)
	Oral (Secondary Poisoning)	6667 mg/kg food

8.2 Exposure controls

Appropriate engineering controls

Processing may form hazardous compounds (see section 10).
Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection : Wear the following personal protective equipment:
Safety goggles
Equipment should conform to DIN EN 166

Hand protection

Material : Nitrile rubber
Break through time : > 480 min
Glove thickness : 0,5 mm
Guideline : Equipment should conform to DIN EN 374

Remarks : Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday.

Skin and body protection : Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential.
Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).

Respiratory protection : If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.
Filter should conform to DIN EN 14387

Filter type : Combined particulates and organic vapour type (A-P)

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state : solid

Form : paste

Colour	:	black
Odour	:	characteristic
Odour Threshold	:	No data available
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	No data available
Flammability (solid, gas)	:	Not classified as a flammability hazard
Upper explosion limit / Upper flammability limit	:	Not applicable
Lower explosion limit / Lower flammability limit	:	Not applicable
Flash point	:	Not applicable
Auto-ignition temperature	:	Not applicable
Decomposition temperature	:	No data available
pH	:	substance/mixture is non-soluble (in water)
Viscosity		
Viscosity, kinematic	:	Not applicable
Solubility(ies)		
Water solubility	:	insoluble
Partition coefficient: n-octanol/water	:	Not applicable
Vapour pressure	:	Not applicable
Relative density	:	No data available
Density	:	1,59 g/cm³ (20 °C)
Relative vapour density	:	Not applicable
Particle characteristics		
Assessment	:	This substance/ mixture contains nanoforms (according to REACH Regulation) based on: Supplier information
Particle size	:	No data available

9.2 Other information

Explosives	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Evaporation rate	:	Not applicable
Available oxygen content	:	< 0,74 %

SECTION 10: Stability and reactivity

10.1 Reactivity

Not classified as a reactivity hazard.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions	:	Can react with strong oxidizing agents. Hazardous decomposition products will be formed at elevated temperatures.

10.4 Conditions to avoid

Conditions to avoid	:	None known.

10.5 Incompatible materials

Materials to avoid	:	Oxidizing agents

10.6 Hazardous decomposition products

Thermal decomposition	:	Benzoic acid Benzene Phenyl benzoate Biphenyl

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Information on likely routes of exposure	:	Skin contact Ingestion Eye contact

Acute toxicity

Not classified based on available information.

Components:

Dibenzoyl peroxide:

Acute oral toxicity	:	LD50 (Mouse): > 2.000 mg/kg

Method: OECD Test Guideline 401
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC0 (Rat): 24,3 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Skin corrosion/irritation

Not classified based on available information.

Components:

Dibenzoyl peroxide:

Species : Rabbit
Result : No skin irritation

Serious eye damage/eye irritation

Causes serious eye irritation.

Components:

Dibenzoyl peroxide:

Result : Irritation to eyes, reversing within 21 days
Remarks : Based on national or regional regulation.

Respiratory or skin sensitisation

Skin sensitisation

May cause an allergic skin reaction.

Respiratory sensitisation

Not classified based on available information.

Components:

Dibenzoyl peroxide:

Test Type : Local lymph node assay (LLNA)
Exposure routes : Skin contact
Species : Mouse
Result : positive

Assessment : Probability or evidence of skin sensitisation in humans

Germ cell mutagenicity

Not classified based on available information.

Components:

Dibenzoyl peroxide:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

Test Type: Chromosome aberration test in vitro
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

Not classified based on available information.

Components:

Dibenzoyl peroxide:

Species	:	Rat
Application Route	:	Skin contact
Exposure time	:	104 weeks
Result	:	negative

Reproductive toxicity

Not classified based on available information.

Components:

Dibenzoyl peroxide:

Effects on fertility : Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 422
Result: negative

Effects on foetal development : Test Type: Embryo-foetal development
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 414
Result: negative

STOT - single exposure

Not classified based on available information.

STOT - repeated exposure

Not classified based on available information.

Repeated dose toxicity

Components:

Dibenzoyl peroxide:

Species	:	Rat
NOAEL	:	500 mg/kg
Application Route	:	Ingestion
Exposure time	:	54 Days
Method	:	OECD Test Guideline 422

Aspiration hazard

Not classified based on available information.

11.2 Information on other hazards

Endocrine disrupting properties

Not classified based on available information.

Product:

Assessment	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish	:	LC50 (Danio rerio (zebra fish)): > 500 mg/l Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 500 mg/l Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to fish (Chronic toxicity)	:	NOEC: 250 mg/l
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 100 mg/l

Ecotoxicology Assessment

Acute aquatic toxicity	:	No toxicity at the limit of solubility

Chronic aquatic toxicity	:	No toxicity at the limit of solubility

Components:

Dibenzoyl peroxide:

Toxicity to fish	:	LC50 (Oncorhynchus mykiss (rainbow trout)): 0,0602 mg/l Exposure time: 96 h Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 0,11 mg/l Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	:	ErC50 (Pseudokirchneriella subcapitata (green algae)): 0,0711 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 NOEC (Pseudokirchneriella subcapitata (green algae)): 0,02 mg/l Exposure time: 72 h Method: OECD Test Guideline 201
M-Factor (Acute aquatic toxicity)	:	10
Toxicity to microorganisms	:	EC50 : 35 mg/l Exposure time: 0,5 h Method: OECD Test Guideline 209
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	EC10: 0,001 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea) Method: OECD Test Guideline 211
M-Factor (Chronic aquatic toxicity)	:	10

12.2 Persistence and degradability

Components:

Dibenzoyl peroxide:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 71 % Exposure time: 28 d Method: OECD Test Guideline 301D

12.3 Bioaccumulative potential

Components:

Dibenzoyl peroxide:

Partition coefficient: n-octanol/water : log Pow: 3,2

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Dispose of in accordance with local regulations.
According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.
Do not dispose of waste into sewer.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

Waste Code : The following Waste Codes are only suggestions:

used product
08 04 09*, waste adhesives and sealants containing organic solvents or other hazardous substances

unused product
08 04 09*, waste adhesives and sealants containing organic

solvents or other hazardous substances

uncleaned packagings
15 01 10*, packaging containing residues of or contaminated by hazardous substances

Acc. Packaging Act properly emptied packaging:
Properly emptied, non-contaminated packaging of non-hazardous products can be supplied to a system for the collection of sales packaging.

SECTION 14: Transport information

14.1 UN number or ID number

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.2 UN proper shipping name

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.3 Transport hazard class(es)

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA	:	Not regulated as a dangerous good

14.4 Packing group

ADN	:	Not regulated as a dangerous good
ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA (Cargo)	:	Not regulated as a dangerous good

IATA (Passenger) : Not regulated as a dangerous good

14.5 Environmental hazards

Not regulated as a dangerous good

14.6 Special precautions for user

Not applicable

14.7 Maritime transport in bulk according to IMO instruments

Remarks : Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) :

Conditions of restriction for the following entries must be considered:
Number on list 75
If you intend to use this product as tattoo ink, please contact your vendor.

Substance(s) or mixture(s) are listed here according to their appearance in the regulation, irrespective of their use/purpose or the conditions of the restriction. Please refer to the conditions in corresponding Regulation to determine whether an entry is applicable to the placing on the market or not.

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : Not applicable

Regulation (EU) No 2024/590 on substances that deplete the ozone layer : Not applicable

Regulation (EU) 2019/1021 on persistent organic pollutants (recast) : Not applicable

Regulation (EU) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals : Not applicable

REACH - List of substances subject to authorisation (Annex XIV) : Not applicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.
Not applicable

Water hazard class (Germany) : WGK 2 obviously hazardous to water
Classification according to AwSV, Annex 1 (5.2)

TA Luft List (Germany) : 5.2.5: Organic Substances:

Class 1: Dibenzoyl peroxide
5.2.7.1.1: Quartz fine dust PM4:
others: Quartz (SiO2)

Volatile organic compounds : Directive 2010/75/EU of 24 November 2010 on industrial and livestock rearing emissions (integrated pollution prevention and control)
Volatile organic compounds (VOC) content: 4,3 %, 68,4 g/l

Other regulations:

Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

15.2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

Other information : Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Full text of H-Statements

H241	:	Heating may cause a fire or explosion.
H317	:	May cause an allergic skin reaction.
H319	:	Causes serious eye irritation.
H400	:	Very toxic to aquatic life.
H410	:	Very toxic to aquatic life with long lasting effects.

Full text of other abbreviations

Aquatic Acute	:	Short-term (acute) aquatic hazard
Aquatic Chronic	:	Long-term (chronic) aquatic hazard
Eye Irrit.	:	Eye irritation
Org. Perox.	:	Organic peroxides
Skin Sens.	:	Skin sensitisation
2004/37/EC	:	Europe. Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens, mutagens or reprotoxic substances at work - Annex III
DE DFG MAK	:	Germany. MAK BAT Annex IIa
DE TRGS 900	:	Germany. TRGS 900 - Occupational exposure limit values.
DE TRGS 910	:	Germany. TRGS 910 - Substance-specific acceptable and tolerable concentrations and equivalence values for carcinogenic hazardous substances.
TRGS 910	:	Germany. TRGS 910 - Substance-specific acceptable and tolerable concentrations and equivalence values for carcinogenic hazardous substances
2004/37/EC / TWA	:	Long term exposure limit
DE DFG MAK / MAK	:	MAK value
DE TRGS 900 / AGW	:	Time Weighted Average

DE TRGS 910 / Acceptable concentration	:	Acceptable concentration
DE TRGS 910 / Tolerable concentration	:	Tolerable concentration

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; BGW - Biological Limit Values; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonised System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); LSPN - List of Hazardous Notified Substances (Chile); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organisation for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Sources of key data used to compile the Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/

Classification of the mixture:		**Classification procedure:**
Skin Sens. 1	H317	Calculation method
Eye Irrit. 2	H319	Calculation method

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be

considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

DE / EN

WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

5. Compliance Statement.



Dubai,2026

COMPLIANCE STATEMENT

To Whom It May Concern,

No.	Section	Description	Compliance / remarks
1	SECTION 03 60 00 GROUTING	1.4 DEFINITIONS C. "Anchoring Grouts" are grouts specifically materials designed for anchoring purposes.	Comply
2	SECTION 03 60 00 GROUTING	1.5 GENERAL RQUIREMENTS 3. Anchoring grouts shall be used to secure anchor bolts; rebar. Grout manufacturer shall operate under a certified ISO 9000 Quality System.	Comply
3	SECTION 03 60 00 GROUTING	2.3 ANCHORING GROUT A. Grout for anchoring rebar, bolts or other anchors shall be a pre-measured two pack polyester or epoxy resin specifically developed for anchoring purposes. 1. The resin must be non-expansive and tolerant to wet or damp surfaces. 2. Minimum compressive strength: 60 N/mm2 3. Minimum flexural strength: 28N/mm2 4. Minimum tensile strength: 14N/mm2	Comply

With kindest regards,

Product Department
WURTH GULF FZE

وورث جلف م.م.ح
WÜRTH GULF FZE
P.O.Box: 17036
Product Department

WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

6. Test Reports.



Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

Member of EOTA www.eota.eu

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-12/0164 of 8 August 2025

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete
Product family to which the construction product belongs	Bonded fasteners and bonded expansion fasteners for use in concrete
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Werk 3
This European Technical Assessment contains	34 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330499-02-0601, Edition 12/2023
This version replaces	ETA-12/0164 issued on 12 November 2015

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Specific Part

1 Technical description of the product

The "Würth Injection system WIT-VM 250 or WIT-NORDIC for concrete" is a bonded anchor consisting of a cartridge with injection mortar WIT-VM 250 or WIT-NORDIC and a steel element. The steel element consists of a commercial threaded rod with washer and hexagon nut in the range of M8 to M30 or reinforcing bar in the range of ∅ 8 to ∅ 32 mm or an internal threaded anchor rod IG-M6 to IG-M20.
The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the fastener is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastener of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load (static and quasi-static loading)	See Annex B 3, C 1, C 2, C 3, C 5 and C 7
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1, C 4, C 6 and C 8
Displacements (static and quasi-static loading)	See Annex C 9 to C 11
Characteristic resistance for seismic performance categories C1	See Annex C 12 and C 13
Characteristic resistance and displacements for seismic performance categories C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	See Annex C 14 to C 16

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD 330499-02-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 8 August 2025 by Deutsches Institut für Bautechnik

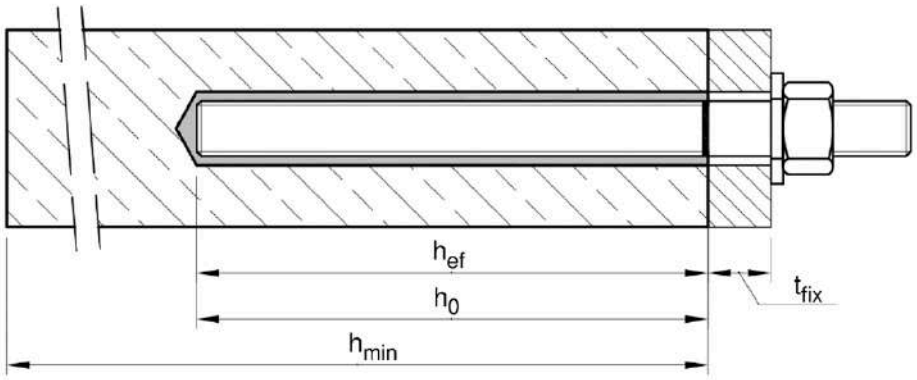
Dipl.-Ing. Beatrix Wittstock
Head of Section

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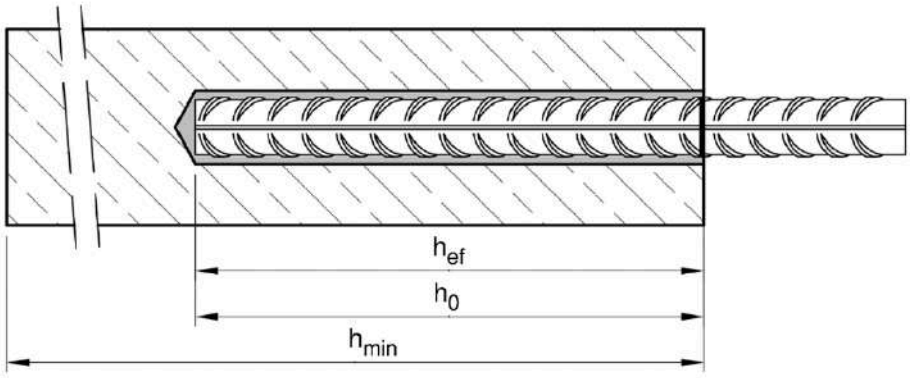
Deutsches Institut für Bautechnik DIBt

Installation threaded rod M8 up to M30

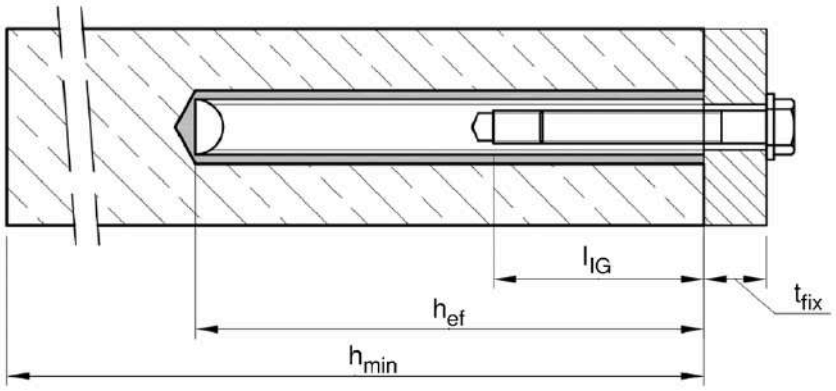
prepositioned installation or
push through installation (annular gap filled with mortar)



Installation reinforcing bar Ø8 up to Ø32



Installation internal threaded anchor rod IG-M6 up to IG-M20



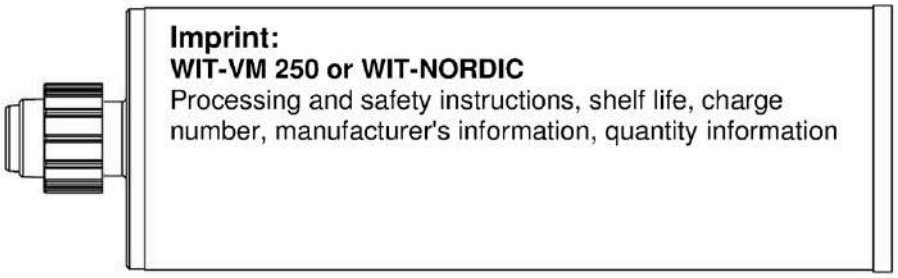
t_{fix}	=	thickness of fixture	h_0	=	nominal drill hole diameter
h_{ef}	=	effective embedment depth	l_{IG}	=	thread engagement length
h_{min}	=	minum thickness of member			

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex A 1**
Product description Installed condition	

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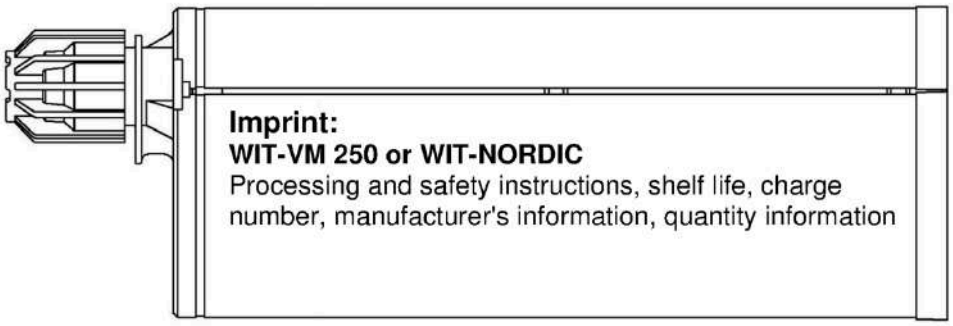
Cartridge system

Coaxial Cartridge:
150 ml, 280 ml, 300 ml up to 333 ml and 380 ml up to 420 ml



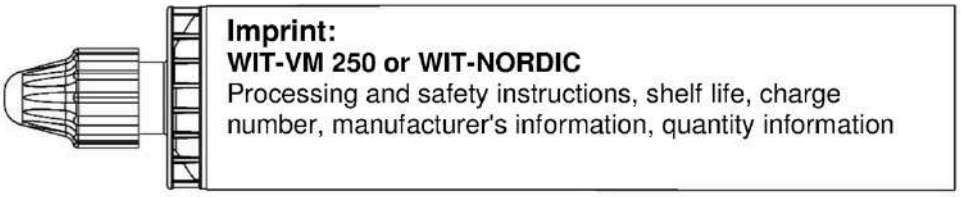
Imprint:
WIT-VM 250 or WIT-NORDIC
Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Side-by-Side Cartridge:
235 ml, 345 ml up to 360 ml and 825 ml



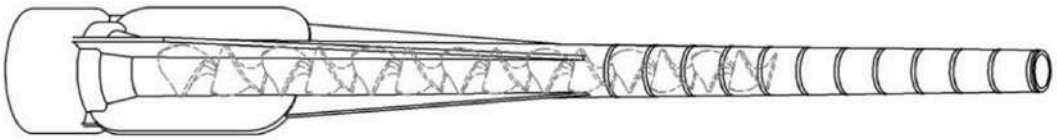
Imprint:
WIT-VM 250 or WIT-NORDIC
Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Foil tube Cartridge:
165 ml and 300 ml

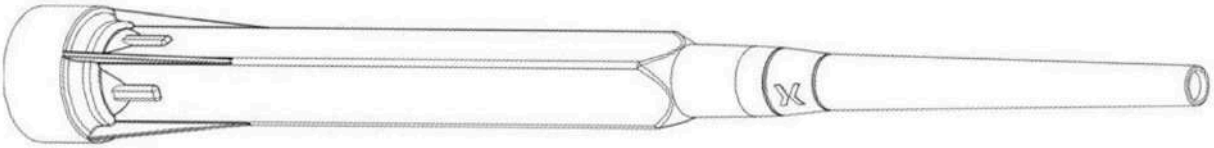


Imprint:
WIT-VM 250 or WIT-NORDIC
Processing and safety instructions, shelf life, charge number, manufacturer's information, quantity information

Static mixer WIT-M 14 W / Fill & Clean



Static mixer WIT-M19 W / WIT-MX

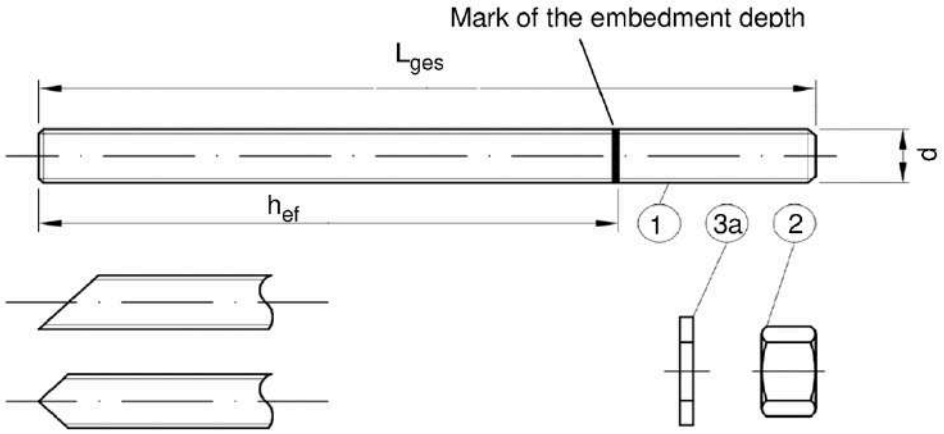


Piston plug WIT-VS and mixer extension



Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex A 2**
Product description Injection system	

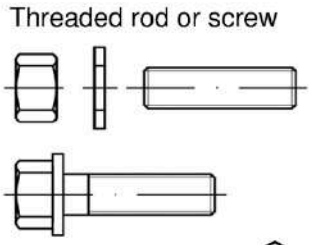
Threaded rod M8 up to M30 with washer and hexagon nut

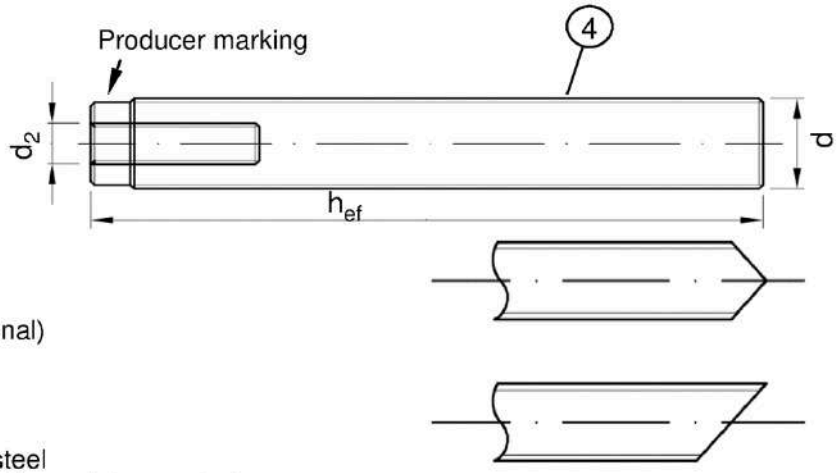


Commercial standard rod with:
- Materials, dimensions and mechanical properties acc. to Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004. The document shall be stored.
- Marking of embedment depth

For hot dip galvanized elements, the requirements with regards to the combination of nuts and rods according to EN ISO 10684:2004+AC:2009 Annex F shall be considered.

Internal threaded rod IG-M6 to IG-M20

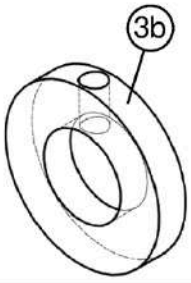




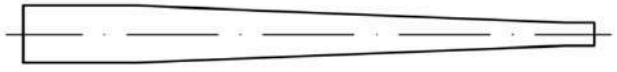
Producer marking: e.g.  M8

I	Marking Internal thread (optional)
	Mark
M8	Thread size (Internal thread)
A4	additional mark for stainless steel
HCR	additional mark for high-corrosion resistance steel
-8	additional mark for property class 8.8

Filling washer WIT-SHB



Mixer reduction nozzle WIT-MR



Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex A 3**
Product description Threaded rod; Internal threaded rod Filling washer; Mixer reduction nozzle	

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Table A1: Materials

Part	Designation	Material				
Steel, zinc plated (Steel acc. to EN ISO 683-4:2018 or EN 10263:2017) - zinc plated ≥ 5 µm acc. to EN ISO 4042:2022 or - hot-dip galvanised ≥ 40 µm acc. to EN ISO 1461:2022 and EN ISO 10684:2004+AC:2009 or - sherardized ≥ 45 µm acc. to EN ISO 17668:2016						
1	Threaded rod	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 898-1:2013	4.6	f_{uk} = 400 N/mm²	f_{yk} = 240 N/mm²	A_5 > 8%
			4.8	f_{uk} = 400 N/mm²	f_{yk} = 320 N/mm²	A_5 > 8%
			5.6	f_{uk} = 500 N/mm²	f_{yk} = 300 N/mm²	A_5 > 8%
			5.8	f_{uk} = 500 N/mm²	f_{yk} = 400 N/mm²	A_5 > 8%
			8.8	f_{uk} = 800 N/mm²	f_{yk} = 640 N/mm²	A_5 ≥ 8%
2	Hexagon nut	acc. to EN ISO 898-2:2022	4	for anchor rod class 4.6 or 4.8		
			5	for anchor rod class 5.6 or 5.8		
			8	for anchor rod class 8.8		
3a	Washer	Steel, zinc plated, hot-dip galvanised or sherardized (e.g.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000)				
3b	Filling washer	Steel, zinc plated, hot-dip galvanised or sherardized				
4	Internal threaded anchor rod	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 898-1:2013	5.8	f_{uk} = 500 N/mm²	f_{yk} = 400 N/mm²	A_5 > 8%
			8.8	f_{uk} = 800 N/mm²	f_{yk} = 640 N/mm²	A_5 > 8%
Stainless steel A2 (Material 1.4301 / 1.4307 / 1.4311 / 1.4567 or 1.4541, acc. to EN 10088-1:2023) **Stainless steel A4** (Material 1.4401 / 1.4404 / 1.4571 / 1.4362 or 1.4578, acc. to EN 10088-1:2023) **High corrosion resistance steel** (Material 1.4529 or 1.4565, acc. to EN 10088-1:2023)						
1	Threaded rod[1)3)]	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 3506-1:2020	50	f_{uk} = 500 N/mm²	f_{yk} = 210 N/mm²	A_5 ≥ 8%
			70	f_{uk} = 700 N/mm²	f_{yk} = 450 N/mm²	A_5 ≥ 8%
			80	f_{uk} = 800 N/mm²	f_{yk} = 600 N/mm²	A_5 ≥ 8%
2	Hexagon nut[1)3)]	acc. to EN ISO 3506-1:2020	50	for anchor rod class 50		
			70	for anchor rod class 70		
			80	for anchor rod class 80		
3a	Washer	A2: Material 1.4301 / 1.4307 / 1.4311 / 1.4567 or 1.4541, acc. to EN 10088-1:2023 A4: Material 1.4401 / 1.4404 / 1.4571 / 1.4362 or 1.4578, acc. to EN 10088-1:2023 HCR: Material 1.4529 or 1.4565, acc. to EN 10088-1:2023 (e.g.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000)				
3b	Filling washer	Stainless steel A4, High corrosion resistance steel				
4	Internal threaded anchor rod[1)2)]	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 3506-1:2020	50	f_{uk} = 500 N/mm²	f_{yk} = 210 N/mm²	A_5 > 8%
			70	f_{uk} = 700 N/mm²	f_{yk} = 450 N/mm²	A_5 > 8%

1) Property class 70 or 80 for anchor rods and hexagon nuts up to M24 and Internal threaded anchor rods up to IG-M16
2) for IG-M20 only property class 50
3) Property class 80 only for stainless steel A4 and HCR

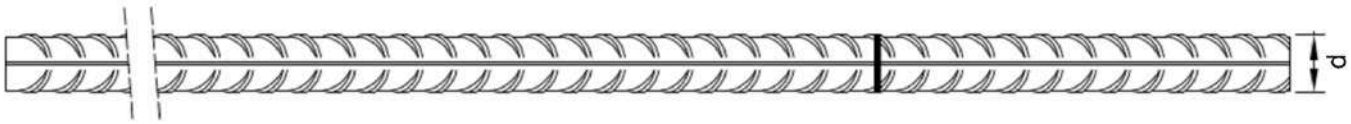
Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Product description
Materials threaded rod and internal threaded rod

Annex A 4

Deutsches Institut für Bautechnik DIBt

Reinforcing bar: ø8 up to ø32



Minimum value of related rip area $f_{R,min}$ according to EN 1992-1-1:2004+AC:2010
Rib height of the bar shall be in the range $0{,}05d \le h_{rib} \le 0{,}07d$
(d: Nominal diameter of the bar; h_{rib}: Rib height of the bar)

Table A2: Materials Reinforcing bar

Part	Designation	Material
Rebar		
1	Reinforcing steel according to EN 1992 1 1:2004+AC:2010, Annex C	Bars and rebars from ring class B or C f_{yk} and k according to NDP or NCI according to EN 1992-1-1/NA $f_{uk} = f_{tk} = k \cdot f_{yk}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex A 5**
Product description Materials reinforcing bar	

Deutsches Institut für Bautechnik DIBt

Specification of the intended use

Fasteners subject to (Static and quasi-static loads):

	Working life 50 years		Working life 100 years	
Base material	uncracked concrete	cracked concrete	uncracked concrete	cracked concrete
HD: Hammer drilling HDB: Hammer drilling with hollow drill bit CD: Compressed air drilling	M8 to M30, ∅8 to ∅32, IG-M6 to IG-M20		No performance assessed	
Temperature Range	I: - 40°C to +40°C[1)] II: - 40°C to +80°C[2)] III: - 40°C to +120°C[3)]		No performance assessed	

Fasteners subject to (seismic action):

	Performance Category C1	Performance Category C2
Base material	Cracked and uncracked concrete	
HD: Hammer drilling HDB: Hammer drilling with hollow drill bit CD: Compressed air drilling	M8 to M30, Ø8 to Ø32	No performance assessed
Temperature Range	I: - 40°C to +40°C[1)] II: - 40°C to +80°C[2)] III: - 40°C to +120°C[3)]	No performance assessed

Fasteners subject to (fire exposure):

Base material	Cracked and uncracked concrete
HD: Hammer drilling HDB: Hammer drilling with hollow drill bit CD: Compressed air drilling	M8 to M30, ∅8 to ∅32, IG-M6 to IG-M20
Temperature Range:	I: - 40°C to +40°C[1)] II: - 40°C to +80°C[2)] III: - 40°C to +120°C[3)]

1) (max. long-term temperature +24°C and max. short-term temperature +40°C)
2) (max. long-term temperature +50°C and max. short-term temperature +80°C)
3) (max. long-term temperature +72°C and max. short-term temperature +120°C)

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex B 1**
Intended Use Specifications	

Base material:

- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013 + A2:2021.
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A2:2021.

Use conditions (Enviromental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006 + A1:2015 corresponding to corrosion resistance class:
  - Stainless steel Stahl A2 according to Annex A 4, Table A1: CRC II
  - Stainless steel Stahl A4 according to Annex A 4, Table A1: CRC III
  - High corrosion resistance steel HCR according to Annex A 4, Table A1: CRC V

Design:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.).
- Fasteners are designed under the responsibility of an engineer experienced in fasteners and concrete work.
- The fasteners are designed in accordance to EN 1992-4:2018 and Technical Report TR 055, Edition February 2018
- The fasteners under fire exposure are designed in accordance to Technical Report TR 082, Edition June 2023.

Installation:

- Dry, wet concrete or flooded bore holes (not sea-water).
- Hole drilling by hammer (HD), hollow (HDB) or compressed air (CD).
- Overhead installation allowed.
- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installation temperature in concrete:
  WIT-VM 250: -10°C up to +40°C for the standard variation of temperature after installation.
  WIT-NORDIC: -20°C up to +10°C for the standard variation of temperature after installation.

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex B 2**
Intended Use Specifications (Continued)	

Deutsches Institut für Bautechnik DIBt

Table B1: Installation parameters for threaded rod

Threaded rod				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Diameter of element		$d = d_{nom}$	[mm]	8	10	12	16	20	24	27	30
Nominal drill hole diameter		d_0	[mm]	10	12	14	18	24	28	32	35
Effective embedment depth		$h_{ef,min}$	[mm]	60	60	70	80	90	96	108	120
		$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600
Diameter of clearance hole in the fixture	Prepositioned installation	$d_f \leq$	[mm]	9	12	14	18	22	26	30	33
	Push through installation	d_f	[mm]	12	14	16	20	24	30	33	40
Maximum installation torque		max T_{inst}	[Nm]	10	20	40	60	100	170	250	300
Minimum thickness of member		h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm			$h_{ef} + 2d_0$				
Minimum spacing		s_{min}	[mm]	40	50	60	80	100	120	135	150
Minimum edge distance		c_{min}	[mm]	40	50	60	80	100	120	135	150

Table B2: Installation parameters for reinforcing bar

Reinforcing bar			**Ø 8[1)]**	**Ø 10[1)]**	**Ø 12[1)]**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Diameter of element	$d = d_{nom}$	[mm]	8	10	12	14	16	20	25	28	32
Nominal drill hole diameter	d_0	[mm]	10 | 12	12 | 14	14 | 16	18	20	25	32	35	40
Effective embedment depth	$h_{ef,min}$	[mm]	60	60	70	75	80	90	100	112	128
	$h_{ef,max}$	[mm]	160	200	240	280	320	400	500	560	640
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm		$h_{ef} + 2d_0$						
Minimum spacing	s_{min}	[mm]	40	50	60	70	80	100	125	140	160
Minimum edge distance	c_{min}	[mm]	40	50	60	70	80	100	125	140	160

1) both nominal drill hole diameter can be used

Table B3: Installation parameters for Internal threaded anchor rod

Internal threaded anchor rod			**IG-M6**	**IG-M8**	**IG-M10**	**IG-M12**	**IG-M16**	**IG-M20**
Internal diameter of anchor rod	d_2	[mm]	6	8	10	12	16	20
Outer diameter of anchor rod[1)]	$d = d_{nom}$	[mm]	10	12	16	20	24	30
Nominal drill hole diameter	d_0	[mm]	12	14	18	24	28	35
Effective embedment depth	$h_{ef,min}$	[mm]	60	70	80	90	96	120
	$h_{ef,max}$	[mm]	200	240	320	400	480	600
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14	18	22
Maximum installation torque	max T_{inst}	[Nm]	10	10	20	40	60	100
Thread engagement length min/max	l_{IG}	[mm]	8/20	8/20	10/25	12/30	16/32	20/40
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm		$h_{ef} + 2d_0$			
Minimum spacing	s_{min}	[mm]	50	60	80	100	120	150
Minimum edge distance	c_{min}	[mm]	50	60	80	100	120	150

1) With metric threads according to EN 1993-1-8:2005+AC:2009

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Intended Use
Installation parameters

Annex B 3

Deutsches Institut für Bautechnik DIBt

Table B4: Parameter cleaning and installation tools








Threaded Rod	Re-inforcing bar	Internal threaded anchor rod	d_0 Drill bit - Ø HD, HDB, CD	d_b Brush - Ø		$d_{b,min}$ min. Brush - Ø	Piston plug	Installation direction and use of piston plug		
[mm]	[mm]	[mm]	[mm]	WIT-	[mm]	[mm]	WIT-	↓	→	↑
M8	8		10	RMB10	12	10,5	No plug required			
M10	8 / 10	IG-M6	12	RMB12	14	12,5				
M12	10 / 12	IG-M8	14	RMB14	16	14,5				
	12		16	RMB16	18	16,5				
M16	14	IG-M10	18	RMB18	20	18,5	VS18	h_{ef} > 250 mm	h_{ef} > 250 mm	all
	16		20	RMB20	22	20,5	VS20			
M20		IG-M12	24	RMB24	26	24,5	VS24			
	20		25	RMB25	27	25,5	VS25			
M24		IG-M16	28	RMB28	30	28,5	VS28			
M27	25		32	RMB32	34	32,5	VS32			
M30	28	IG-M20	35	RMB35	37	35,5	VS35			
	32		40	RMB40	41,5	40,5	VS40			

Cleaning and installation tools

Hand pump
(Volume 750 ml, $h_0 \leqq 10\ d_s$, $d_0 \leq 20$mm)



Compressed air tool
(min 6 bar)



Brush WIT-RMB



Piston Plug WIT-VS



Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	Annex B 4
Intended Use Cleaning and installation tools	

Deutsches Institut für Bautechnik DIBt

Table B5: Working time and curing time WIT-VM 250

Temperature in base material			Maximum working time	Minimum curing time[1)]
T			t_{gel}	t_{cure}
- 10 °C	to	- 6 °C	90 min[2)]	24 h
- 5 °C	to	- 1 °C	90 min	14 h
0 °C	to	+ 4 °C	45 min	7 h
+ 5 °C	to	+ 9 °C	25 min	2 h
+ 10 °C	to	+ 19 °C	15 min	80 min
+ 20 °C	to	+ 29 °C	6 min	45 min
+ 30 °C	to	+ 34 °C	4 min	25 min
+ 35 °C	to	+ 39 °C	2 min	20 min
+40°C			1,5 min	15 min
Cartridge temperature			+5°C to +40°C	

1) The minimum curing time is only valid for dry base material.
In wet base material the curing time must be doubled.
2) Cartridge temperature must be at least +15°C

Table B6: Working time and curing time WIT-NORDIC

Temperature in base material			Maximum working time	Minimum curing time [1)]
T			t_{gel}	t_{cure}
- 20 °C	to	- 16 °C	75 min	24 h
- 15 °C	to	- 11 °C	55 min	16 h
- 10 °C	to	- 6 °C	35 min	10 h
- 5 °C	to	- 1 °C	20 min	5 h
0 °C	to	+ 4 °C	10 min	2,5 h
+ 5 °C	to	+ 9 °C	6 min	80 min
+ 10 °C			6 min	60 min
Cartridge temperature			-20°C to +10°C	

1) The minimum curing time is only valid for dry base material.
In wet base material the curing time must be doubled.

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

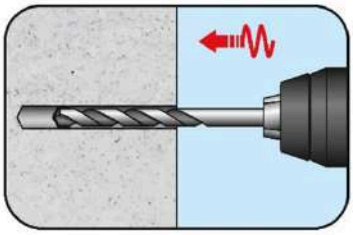
Intended Use
Working time and curing time

Annex B 5

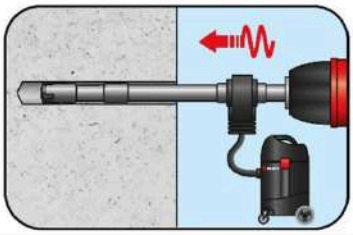
Deutsches Institut für Bautechnik DIBt

Installation instructions

Drilling of the bore hole



1a. **Hammer drilling (HD) / Compressed air drilling (CD)**
Drill a hole to the required embedment depth.
Drill bit diameter according to Table B1, B2 or B3.
Aborted drill holes shall be filled with mortar.
Proceed with Step 2 (CAC and MAC).

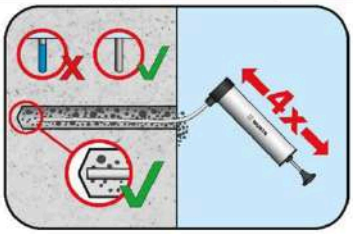


1b. **Hollow drill bit system (HDB)**
Drill a hole to the required embedment depth.
Drill bit diameter according to Table B1, B2 or B3.
Aborted drill holes shall be filled with mortar.
Proceed with Step 2 (CAC and MAC).

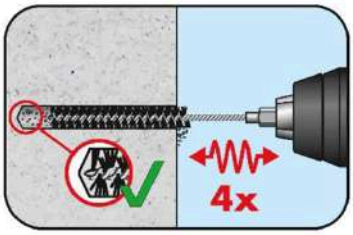
Attention! Standing water in the bore hole must be removed before cleaning

Manual Air Cleaning (MAC)

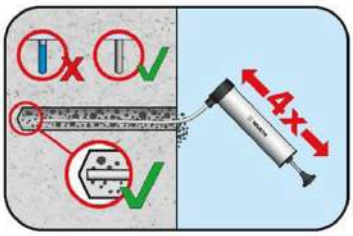
for bore hole diameter $d_0 \leq 20$mm and bore hole depth $h_0 \leq 10d_{nom}$ ($d_0 < 14$mm uncracked concrete only)
with drilling method HD, HDB and CD



2a. Blow the bore hole clean minimum 4x from the bottom or back by hand pump (Annex B 4).



2b. Brush the bore hole minimum 4x with brush WIT-RMB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension shall be used.)



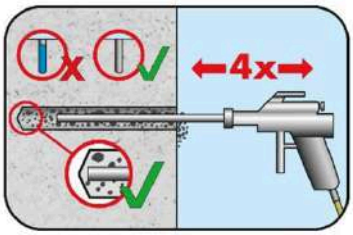
2c. Finally blow the bore hole clean minimum 4x from the bottom or back by hand pump (Annex B 4).

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex B 6**
Intended Use Installation instructions	

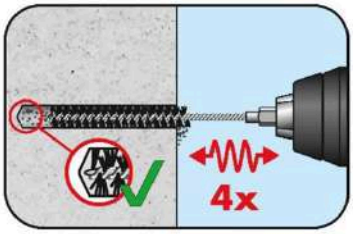
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Installation instructions (continuation)

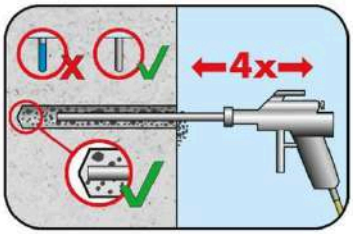
Compressed Air Cleaning (CAC):
All diameter with drilling method HD, HDB and CD



2a. Blow the bore hole clean minimum 4x with compressed air (min. 6 bar) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

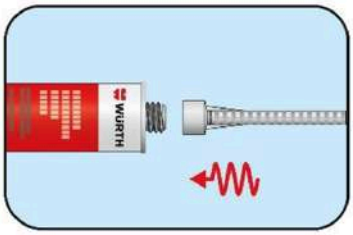


2b. Brush the bore hole minimum 4x with brush WIT-RMB according to Table B4 over the entire embedment depth in a twisting motion. (If necessary, a brush extension shall be used.)

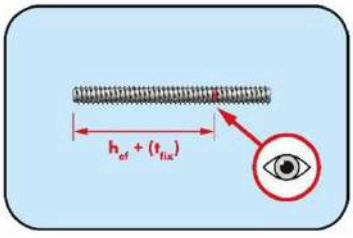


2c. Finally blow the bore hole clean minimum 4x with compressed air (min. 6 bar) (Annex B 4) over the entire embedment depth until return air stream is free of noticeable dust. (If necessary, an extension shall be used.)

Cleaned bore hole has to be protected against re-contamination in an appropriate way, If necessary, repeat cleaning process directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again.



3. Screw on static-mixing nozzle WIT-M 14 W / WIT-M19 W / WIT-MX / Fill & Clean and load the cartridge into an appropriate dispensing tool. With foil tube cartridges cut off the foil tube clip before use.
For every working interruption longer than the maximum working time t_{work} (Annex B 5) as well as for new cartridges, a new static-mixer shall be used.

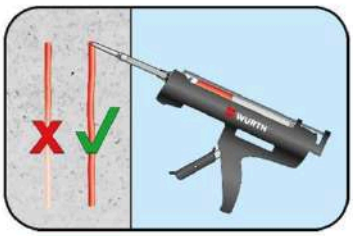


4. Mark embedment depth on the anchor rod.
The anchor rod shall be free of dirt, grease, oil or other foreign material.

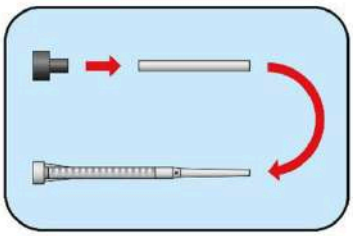
Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex B 7**
Intended Use Installation instructions (continuation)	

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Installation instructions (continuation)

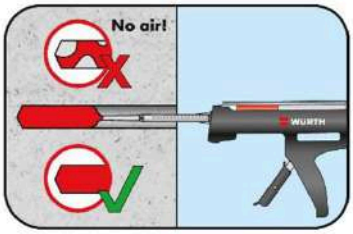


5. Not proper mixed mortar is not sufficient for fastening.
Dispense and discard mortar until an uniform grey or red colour is shown (at least 3 full strokes, for foil tube cartridges at least 6 full storkes).

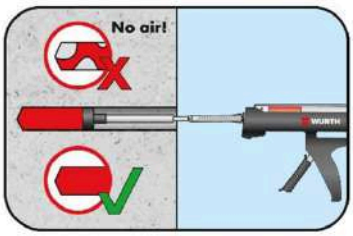


6. Piston plugs WIT-VS and mixer nozzle extensions shall be used according to Table B4 for the following applications:
- Horizontal and vertical downwards direction: Drill bit-Ø $d_0 \geq 18$ mm and embedment depth $h_{ef} > 250$mm
- Vertical upwards direction: Drill bit-Ø $d_0 \geq 18$ mm

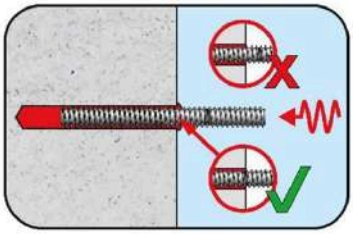
Assemble mixing nozzle, mixer extension and piston plug before injecting mortar.



7a. **Injecting mortar without piston plug WIT-VS:**
Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension shall be used.)
Slowly withdraw of the static mixing nozzle avoid creating air pockets.
Observe the temperature related working time t_{work} (Annex B 5).



7b. **Injecting mortar with piston plug WIT-VS:**
Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension shall be used.)
During injection the piston plug is pushed out of the bore hole by the back pressure of the mortar.
Observe the temperature related working time t_{work} (Annex B 5). .

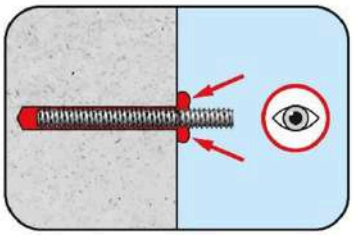


8. Insert the anchor rod while turning slightly up to the embedment mark.

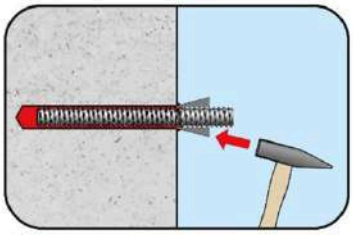
Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex B 8**
Intended Use Installation instructions (continuation)	

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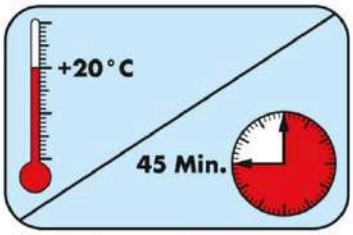
Installation instructions (continuation)



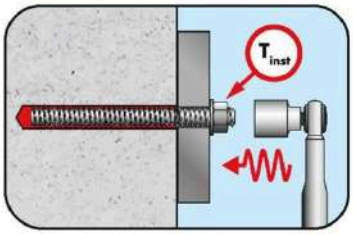
9. Annular gap between anchor rod and base material must be completely filled with mortar. In case of push through installation the annular gap in the fixture must be filled with mortar also.
Otherwise, the installation must be repeated starting from step 7 before the maximum working time t_{work} has expired.



10. For application in vertical upwards direction the anchor rod shall be fixed (e.g. wedges).



11. Temperature related curing time t_{cure} (Annex B 5) must be observed.
Do not move or load the fastener during curing time.



12. Install the fixture by using a calibrated torque wrench. Observe maximum installation torque (Table B1, B2 or B3).
In case of static requirements (e.g. seismic), fill the annular gab in the fixture with mortar (Annex A 3). Therefore replace the washer by the filling washer WIT-SHB and use the mixer reduction nozzle WIT-MR.

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete	**Annex B 9**
Intended Use Installation instructions (continuation)	

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Table C1: Characteristic values for steel tension resistance and steel shear resistance of threaded rods

Threaded rod				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Cross section area		A_s	[mm²]	36,6	58	84,3	157	245	353	459	561
Characteristic tension resistance, Steel failure [1]											
Steel, Property class 4.6 and 4.8		$N_{Rk,s}$	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
Steel, Property class 5.6 and 5.8		$N_{Rk,s}$	[kN]	18 (17)	29 (27)	42	78	122	176	230	280
Steel, Property class 8.8		$N_{Rk,s}$	[kN]	29 (27)	46 (43)	67	125	196	282	368	449
Stainless steel A2, A4 and HCR, class 50		$N_{Rk,s}$	[kN]	18	29	42	79	123	177	230	281
Stainless steel A2, A4 and HCR, class 70		$N_{Rk,s}$	[kN]	26	41	59	110	171	247	-[3]	-[3]
Stainless steel A4 and HCR, class 80		$N_{Rk,s}$	[kN]	29	46	67	126	196	282	-[3]	-[3]
Characteristic tension resistance, Partial factor [2]											
Steel, Property class 4.6 and 5.6		$\gamma_{Ms,N}$	[-]	2,0							
Steel, Property class 4.8, 5.8 and 8.8		$\gamma_{Ms,N}$	[-]	1,5							
Stainless steel A2, A4 and HCR, class 50		$\gamma_{Ms,N}$	[-]	2,86							
Stainless steel A2, A4 and HCR, class 70		$\gamma_{Ms,N}$	[-]	1,87							
Stainless steel A4 and HCR, class 80		$\gamma_{Ms,N}$	[-]	1,6							
Characteristic shear resistance, Steel failure [1]											
Without lever arm	Steel, Property class 4.6 and 4.8	$V^0_{Rk,s}$	[kN]	9 (8)	14 (13)	20	38	59	85	110	135
	Steel, Property class 5.6 and 5.8	$V^0_{Rk,s}$	[kN]	11 (10)	17 (16)	25	47	74	106	138	168
	Steel, Property class 8.8	$V^0_{Rk,s}$	[kN]	15 (13)	23 (21)	34	63	98	141	184	224
	Stainless steel A2, A4 and HCR, class 50	$V^0_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140
	Stainless steel A2, A4 and HCR, class 70	$V^0_{Rk,s}$	[kN]	13	20	30	55	86	124	-[3]	-[3]
	Stainless steel A4 and HCR, class 80	$V^0_{Rk,s}$	[kN]	15	23	34	63	98	141	-[3]	-[3]
With lever arm	Steel, Property class 4.6 and 4.8	$M^0_{Rk,s}$	[Nm]	15 (13)	30 (27)	52	133	260	449	666	900
	Steel, Property class 5.6 and 5.8	$M^0_{Rk,s}$	[Nm]	19 (16)	37 (33)	65	166	324	560	833	1123
	Steel, Property class 8.8	$M^0_{Rk,s}$	[Nm]	30 (26)	60 (53)	105	266	519	896	1333	1797
	Stainless steel A2, A4 and HCR, class 50	$M^0_{Rk,s}$	[Nm]	19	37	66	167	325	561	832	1125
	Stainless steel A2, A4 and HCR, class 70	$M^0_{Rk,s}$	[Nm]	26	52	92	232	454	784	-[3]	-[3]
	Stainless steel A4 and HCR, class 80	$M^0_{Rk,s}$	[Nm]	30	59	105	266	519	896	-[3]	-[3]
Characteristic shear resistance, Partial factor [2]											
Steel, Property class 4.6 and 5.6		$\gamma_{Ms,V}$	[-]	1,67							
Steel, Property class 4.8, 5.8 and 8.8		$\gamma_{Ms,V}$	[-]	1,25							
Stainless steel A2, A4 and HCR, class 50		$\gamma_{Ms,V}$	[-]	2,38							
Stainless steel A2, A4 and HCR, class 70		$\gamma_{Ms,V}$	[-]	1,56							
Stainless steel A4 and HCR, class 80		$\gamma_{Ms,V}$	[-]	1,33							

[1] Values are only valid for the given stress area A_s. Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot-dip galvanised threaded rods according to EN ISO 10684:2004+AC:2009.
[2] in absence of national regulation
[3] Fastener type not part of the ETA

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values for steel tension resistance and steel shear resistance of threaded rods

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic values of tension loads under static and quasi-static action

Fastener				All Anchor types and sizes
Concrete cone failure				
Uncracked concrete		$k_{ucr,N}$	[-]	11,0
Cracked concrete		$k_{cr,N}$	[-]	7,7
Edge distance		$c_{cr,N}$	[mm]	$1,5\ h_{ef}$
Axial distance		$s_{cr,N}$	[mm]	$2\ c_{cr,N}$
Splitting				
Edge distance	$h/h_{ef} \geq 2,0$	$c_{cr,sp}$	[mm]	$1,0\ h_{ef}$
	$2,0 > h/h_{ef} > 1,3$			$2 \cdot h_{ef} \left(2,5 - \frac{h}{h_{ef}} \right)$
	$h/h_{ef} \leq 1,3$			$2,4\ h_{ef}$
Axial distance		$s_{cr,sp}$	[mm]	$2\ c_{cr,sp}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values for Concrete cone failure and Splitting with all kind of action

Annex C 2

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic values of tension loads under static and quasi-static action

Threaded rod					**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure												
Characteristic tension resistance			$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$ (or see Table C1)							
Partial factor			$\gamma_{Ms,N}$	[-]	see Table C1							
Combined pull-out and concrete failure												
Characteristic bond resistance in uncracked concrete C20/25												
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	10	12	12	12	12	11	10	9,0
	II: 80°C/50°C				7,5	9,0	9,0	9,0	9,0	8,5	7,5	6,5
	III: 120°C/72°C				5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
	I: 40°C/24°C	flooded bore hole			7,5	8,5	8,5	8,5	No Performance Assessed			
	II: 80°C/50°C				5,5	6,5	6,5	6,5				
	III: 120°C/72°C				4,0	5,0	5,0	5,0				
Characteristic bond resistance in cracked concrete C20/25												
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5
	II: 80°C/50°C				2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5
	III: 120°C/72°C				2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5
	I: 40°C/24°C	flooded bore hole			4,0	4,0	5,5	5,5	No Performance Assessed			
	II: 80°C/50°C				2,5	3,0	4,0	4,0				
	III: 120°C/72°C				2,0	2,5	3,0	3,0				
Reduktion factor ψ^0_{sus} in cracked and uncracked concrete C20/25												
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	ψ^0_{sus}	[-]	0,73							
	II: 80°C/50°C				0,65							
	III: 120°C/72°C				0,57							
Increasing factors for concrete			ψ_c	[-]	$(f_{ck} / 20)^{0,11}$							
Characteristic bond resistance depending on the concrete strength class			$\tau_{Rk,ucr}$ =		$\psi_c \cdot \tau_{Rk,ucr}(C20/25)$							
			$\tau_{Rk,cr}$ =		$\psi_c \cdot \tau_{Rk,cr}(C20/25)$							
Concrete cone failure												
Relevant parameter					see Table C2							
Splitting												
Relevant parameter					see Table C2							
Installation factor												
for dry and wet concrete			γ_{inst}	[-]	1,0	1,2						
for flooded bore hole					1,4				No Performance Assessed			

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of tension loads under static and quasi-static action (Threaded rod)

Annex C 3

Deutsches Institut für Bautechnik DIBt

Table C4: Characteristic values of shear loads under static and quasi-static action

Threaded rod			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure without lever arm										
Characteristic shear resistance Steel, strength class 4.6, 4.8, 5.6 and 5.8	$V^0_{Rk,s}$	[kN]	$0,6 \cdot A_s \cdot f_{uk}$ (or see Table C1)							
Characteristic shear resistance Steel, strength class 8.8 Stainless Steel A2, A4 and HCR, all classes	$V^0_{Rk,s}$	[kN]	$0,5 \cdot A_s \cdot f_{uk}$ (or see Table C1)							
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C1							
Ductility factor	k_7	[-]	1,0							
Steel failure with lever arm										
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	$1,2 \cdot W_{el} \cdot f_{uk}$ (or see Table C1)							
Elastic section modulus	W_{el}	[mm³]	31	62	109	277	541	935	1387	1874
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C1							
Concrete pry-out failure										
Factor	k_8	[-]	2,0							
Installation factor	γ_{inst}	[-]	1,0							
Concrete edge failure										
Effective length of fastener	l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$						$\min(h_{ef}; 300mm)$	
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γ_{inst}	[-]	1,0							

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of shear loads under static and quasi-static action (Threaded rod)

Annex C 4

Deutsches Institut für Bautechnik DIBt

Table C5: Characteristic values of tension loads under static and quasi-static action

Internal threaded anchor rods					**IG-M6**	**IG-M8**	**IG-M10**	**IG-M12**	**IG-M16**	**IG-M20**
Steel failure[1]										
Characteristic tension resistance, Steel, strength class	5.8		$N_{Rk,s}$	[kN]	10	17	29	42	76	123
	8.8		$N_{Rk,s}$	[kN]	16	27	46	67	121	196
Partial factor, strength class 5.8 and 8.8			$\gamma_{Ms,N}$	[-]	1,5					
Characteristic tension resistance, Stainless Steel A4 and HCR, Strength class 70 [2]			$N_{Rk,s}$	[kN]	14	26	41	59	110	124
Partial factor			$\gamma_{Ms,N}$	[-]	1,87					2,86
Combined pull-out and concrete cone failure										
Characteristic bond resistance in uncracked concrete C20/25										
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	12	12	12	12	11	9,0
	II: 80°C/50°C				9,0	9,0	9,0	9,0	8,5	6,5
	III: 120°C/72°C				6,5	6,5	6,5	6,5	6,5	5,0
	I: 40°C/24°C	flooded bore hole			8,5	8,5	8,5	No Performance Assessed		
	II: 80°C/50°C				6,5	6,5	6,5			
	III: 120°C/72°C				5,0	5,0	5,0			
Characteristic bond resistance in cracked concrete C20/25										
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,cr}$	[N/mm²]	5,0	5,5	5,5	5,5	5,5	6,5
	II: 80°C/50°C				3,5	4,0	4,0	4,0	4,0	4,5
	III: 120°C/72°C				2,5	3,0	3,0	3,0	3,0	3,5
	I: 40°C/24°C	flooded bore hole			4,0	5,5	5,5	No Performance Assessed		
	II: 80°C/50°C				3,0	4,0	4,0			
	III: 120°C/72°C				2,5	3,0	3,0			
Reduktion factor ψ^0_{sus} in cracked and uncracked concrete C20/25										
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	ψ^0_{sus}	[-]	0,73					
	II: 80°C/50°C				0,65					
	III: 120°C/72°C				0,57					
Increasing factors for concrete			ψ_c	[-]	$(f_{ck} / 20)^{0,11}$					
Characteristic bond resistance depending on the concrete strength class			$\tau_{Rk,ucr}$ =		$\psi_c \cdot \tau_{Rk,ucr}(C20/25)$					
			$\tau_{Rk,cr}$ =		$\psi_c \cdot \tau_{Rk,cr}(C20/25)$					
Concrete cone failure										
Relevant parameter					see Table C2					
Splitting failure										
Relevant parameter					see Table C2					
Installation factor										
for dry and wet concrete			γ_{inst}	[-]	1,2					
for flooded bore hole					1,4			No Performance Assessed		

1) Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element.

2) For IG-M20 strength class 50 is valid

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of tension loads under static and quasi-static action
(Internal threaded anchor rod)

Annex C 5

Deutsches Institut für Bautechnik DIBt

Table C6: Characteristic values of shear loads under static and quasi-static action

Internal threaded anchor rods				**IG-M6**	**IG-M8**	**IG-M10**	**IG-M12**	**IG-M16**	**IG-M20**
Steel failure without lever arm[1]									
Characteristic shear resistance, Steel, strength class	5.8	$V^0_{Rk,s}$	[kN]	5	9	15	21	38	61
	8.8	$V^0_{Rk,s}$	[kN]	8	14	23	34	60	98
Partial factor, strength class 5.8 and 8.8		$\gamma_{Ms,V}$	[-]	1,25					
Characteristic shear resistance, Stainless Steel A4 and HCR, Strength class 70[2]		$V^0_{Rk,s}$	[kN]	7	13	20	30	55	40
Partial factor		$\gamma_{Ms,V}$	[-]	1,56					2,38
Ductility factor		k_7	[-]	1,0					
Steel failure with lever arm[1]									
Characteristic bending moment, Steel, strength class	5.8	$M^0_{Rk,s}$	[Nm]	8	19	37	66	167	325
	8.8	$M^0_{Rk,s}$	[Nm]	12	30	60	105	267	519
Partial factor, strength class 5.8 and 8.8		$\gamma_{Ms,V}$	[-]	1,25					
Characteristic bending moment, Stainless Steel A4 and HCR, Strength class 70[2]		$M^0_{Rk,s}$	[Nm]	11	26	52	92	233	456
Partial factor		$\gamma_{Ms,V}$	[-]	1,56					2,38
Concrete pry-out failure									
Factor		k_8	[-]	2,0					
Installation factor		γ_{inst}	[-]	1,0					
Concrete edge failure									
Effective length of fastener		l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$					min (h_{ef}; 300mm)
Outside diameter of fastener		d_{nom}	[mm]	10	12	16	20	24	30
Installation factor		γ_{inst}	[-]	1,0					

1) Fastenings (incl. nut and washer) must comply with the appropriate material and property class of the internal threaded rod. The characteristic tension resistance for steel failure is valid for the internal threaded rod and the fastening element.
2) For IG-M20 strength class 50 is valid

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of shear loads under static and quasi-static action
(Internal threaded anchor rod)

Annex C 6

Deutsches Institut für Bautechnik DIBt

Table C7: Characteristic values of tension loads under static and quasi-static action

Reinforcing bar					**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure													
Characteristic tension resistance			$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$ [1]								
Cross section area			A_s	[mm²]	50	79	113	154	201	314	491	616	804
Partial factor			$\gamma_{Ms,N}$	[-]	1,4 [2]								
Combined pull-out and concrete failure													
Characteristic bond resistance in uncracked concrete C20/25													
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	10	12	12	12	12	12	11	10	8,5
	II: 80°C/50°C				7,5	9,0	9,0	9,0	9,0	9,0	8,0	7,0	6,0
	III: 120°C/72°C				5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5
	I: 40°C/24°C	flooded bore hole			7,5	8,5	8,5	8,5	8,5	No Performance Assessed			
	II: 80°C/50°C				5,5	6,5	6,5	6,5	6,5				
	III: 120°C/72°C				4,0	5,0	5,0	5,0	5,0				
Characteristic bond resistance in cracked concrete C20/25													
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,0	5,0	5,5	5,5	5,5	5,5	5,5	6,5	6,5
	II: 80°C/50°C				2,5	3,5	4,0	4,0	4,0	4,0	4,0	4,5	4,5
	III: 120°C/72°C				2,0	2,5	3,0	3,0	3,0	3,0	3,0	3,5	3,5
	I: 40°C/24°C	flooded bore hole			4,0	4,0	5,5	5,5	5,5	No Performance Assessed			
	II: 80°C/50°C				2,5	3,0	4,0	4,0	4,0				
	III: 120°C/72°C				2,0	2,5	3,0	3,0	3,0				
Reduktion factor ψ^0_{sus} in cracked and uncracked concrete C20/25													
Temperature range	I: 40°C/24°C	Dry, wet concrete and flooded bore hole	ψ^0_{sus}	[-]	0,73								
	II: 80°C/50°C				0,65								
	III: 120°C/72°C				0,57								
Increasing factors for concrete			ψ_c	[-]	$(f_{ck} / 20)^{0,11}$								
Characteristic bond resistance depending on the concrete strength class			$\tau_{Rk,ucr}$ =		$\psi_c \cdot \tau_{Rk,ucr}(C20/25)$								
			$\tau_{Rk,cr}$ =		$\psi_c \cdot \tau_{Rk,cr}(C20/25)$								
Concrete cone failure													
Relevant parameter					see Table C2								
Splitting													
Relevant parameter					see Table C2								
Installation factor													
for dry and wet concrete			γ_{inst}	[-]	1,0	1,2							
for flooded bore hole					1,4					No Performance Assessed			

[1] f_{uk} shall be taken from the specifications of reinforcing bars

[2] in absence of national regulation

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of tension loads under static and quasi-static action
(Reinforcing bar)

Annex C 7

Deutsches Institut für Bautechnik DIBt

Table C8: Characteristic values of shear loads under static and quasi-static action

Reinforcing bar			**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure without lever arm											
Characteristic shear resistance	$V^0_{Rk,s}$	[kN]	$0{,}50 \cdot A_s \cdot f_{uk}$ [1)]								
Cross section area	A_s	[mm²]	50	79	113	154	201	314	491	616	804
Partial factor	$\gamma_{Ms,V}$	[-]	1,5 [2)]								
Ductility factor	k_7	[-]	1,0								
Steel failure with lever arm											
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	$1.2 \cdot W_{el} \cdot f_{uk}$ [1)]								
Elastic section modulus	W_{el}	[mm³]	50	98	170	269	402	785	1534	2155	3217
Partial factor	$\gamma_{Ms,V}$	[-]	1,5 [2)]								
Concrete pry-out failure											
Factor	k_8	[-]	2,0								
Installation factor	γ_{inst}	[-]	1,0								
Concrete edge failure											
Effective length of fastener	l_f	[mm]	$\min(h_{ef}; 12 \cdot d_{nom})$						$\min(h_{ef}; 300mm)$		
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	14	16	20	25	28	32
Installation factor	γ_{inst}	[-]	1,0								

1) f_{uk} shall be taken from the specifications of reinforcing bars
2) in absence of national regulation

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of shear loads under static and quasi-static action
(Reinforcing bar)

Annex C 8

Deutsches Institut für Bautechnik DIBt

Table C9: Displacements under tension load[1)]

Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete C20/25 under static and quasi-static action										
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
Cracked concrete C20/25 under static and quasi-static action										
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,090		0,070					
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,105		0,105					
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219		0,170					
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255		0,245					
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219		0,170					
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255		0,245					

1) Calculation of the displacement
$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau$; τ: action bond stress for tension
$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot \tau$;

Table C10: Displacements under shear load[1)]

Threaded rod			M8	M10	M12	M16	M20	M24	M27	M30
Uncracked concrete C20/25 under static and quasi-static action										
All temperature ranges	δ_{V0}-factor	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
	$\delta_{V\infty}$-factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
Cracked concrete C20/25 under static and quasi-static action										
All temperature ranges	δ_{V0}-factor	[mm/kN]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
	$\delta_{V\infty}$-factor	[mm/kN]	0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10

1) Calculation of the displacement
$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V$; V: action shear load
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V$;

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Performances
Displacements under static and quasi-static action
(threaded rods)

Annex C 9

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Table C11: Displacements under tension load[1)]

Internal threaded anchor rod			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Uncracked concrete C20/25 under static and quasi-static action								
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,023	0,026	0,031	0,036	0,041	0,049
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,033	0,037	0,045	0,052	0,060	0,071
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,056	0,063	0,075	0,088	0,100	0,119
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,081	0,090	0,108	0,127	0,145	0,172
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,056	0,063	0,075	0,088	0,100	0,119
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,081	0,090	0,108	0,127	0,145	0,172
Cracked concrete C20/25 under static and quasi-static action								
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,090	0,070				
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,105	0,105				
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219	0,170				
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255	0,245				
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219	0,170				
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255	0,245				

1) Calculation of the displacement
$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau$; τ: action bond stress for tension
$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot \tau$;

Table C12: Displacements under shear load[1]

Internal threaded anchor rod			IG-M6	IG-M8	IG-M10	IG-M12	IG-M16	IG-M20
Uncracked and cracked concrete C20/25 under static and quasi-static action								
All temperature ranges	δ_{V0}-factor	[mm/kN]	0,07	0,06	0,06	0,05	0,04	0,04
	$\delta_{V\infty}$-factor	[mm/kN]	0,10	0,09	0,08	0,08	0,06	0,06

1) Calculation of the displacement
$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V$; V: action shear load
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V$;

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Performances
Displacements under static and quasi-static action
(Internal threaded anchor rod)

Annex C 10

Deutsches Institut für Bautechnik DIBt

Table C13: Displacements under tension load[1] (rebar)

Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Uncracked concrete C20/25 under static and quasi-static action											
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,075
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
Cracked concrete C20/25 under static and quasi-static action											
Temperature range I: 40°C/24°C	δ_{N0}-factor	[mm/(N/mm²)]	0,090	0,070							
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,105	0,105							
Temperature range II: 80°C/50°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219	0,170							
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255	0,245							
Temperature range III: 120°C/72°C	δ_{N0}-factor	[mm/(N/mm²)]	0,219	0,170							
	$\delta_{N\infty}$-factor	[mm/(N/mm²)]	0,255	0,245							

[1] Calculation of the displacement
$\delta_{N0} = \delta_{N0}\text{-factor} \cdot \tau$; τ: action bond stress for tension
$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot \tau$;

Table C14: Displacement under shear load[1] (rebar)

Anchor size reinforcing bar			Ø 8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
Uncracked concrete C20/25 under static and quasi-static action											
All temperature ranges	δ_{V0}-factor	[mm/kN]	0,06	0,05	0,05	0,04	0,04	0,04	0,03	0,03	0,03
	$\delta_{V\infty}$-factor	[mm/kN]	0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,04	0,04
Cracked concrete C20/25 under static and quasi-static action											
All temperature ranges	δ_{V0}-factor	[mm/kN]	0,12	0,12	0,11	0,11	0,10	0,09	0,08	0,07	0,06
	$\delta_{V\infty}$-factor	[mm/kN]	0,18	0,18	0,17	0,16	0,15	0,14	0,12	0,11	0,10

[1] Calculation of the displacement
$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V$; V: action shear load
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V$;

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Performances
Displacements under static and quasi-static action
(Reinforcing bar)

Annex C 11

Deutsches Institut für Bautechnik DIBt

Table C15: Characteristic values of tension loads under seismic action (performance category C1)

Threaded rod					**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure												
Characteristic tension resistance			$N_{Rk,s,eq,C1}$	[kN]	$1,0 \cdot N_{Rk,s}$							
Partial factor			$\gamma_{Ms,N}$	[-]	see Table C1							
Combined pull-out and concrete failure												
Characteristic bond resistance in uncracked and cracked concrete C20/25												
Temperature range	I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,eq,C1}$	[N/mm²]	2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5
	II: 80°C/50°C				1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1
	III: 120°C/72°C				1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
	I: 40°C/24°C	flooded bore hole			2,5	2,5	3,7	3,7	No Performance Assessed			
	II: 80°C/50°C				1,6	1,9	2,7	2,7				
	III: 120°C/72°C				1,3	1,6	2,0	2,0				
Increasing factors for concrete			ψ_c	[-]	1,0							
Characteristic bond resistance depending on the concrete strength class			$\tau_{Rk,eq,C1} =$		$\psi_c \cdot \tau_{Rk,eq,C1}(C20/25)$							
Installation factor												
for dry and wet concrete			γ_{inst}	[-]	1,0	1,2						
for flooded bore hole					1,4				No Performance Assessed			

Table C16: Characteristic values of shear loads under seismic action (performance category C1)

Threaded rod			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure without lever arm										
Characteristic shear resistance (Seismic C1)	$V_{Rk,s,eq,C1}$	[kN]	$0,70 \cdot V^0_{Rk,s}$							
Partial factor	$\gamma_{Ms,V}$	[-]	see Table C1							
Factor for annular gap	α_{gap}	[-]	0,5 (1,0)[1)]							

1) Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended

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Performances
Characteristic values of tension loads and shear loads under seismic action (performance category C1) (Threaded rod)

Annex C 12

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Table C17: Characteristic values of tension loads under seismic action (performance category C1)

Reinforcing bar				**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure												
Characteristic tension resistance		$N_{Rk,s,eq,C1}$	[kN]	$1,0 \cdot A_s \cdot f_{uk}$ [1]								
Cross section area		A_s	[mm²]	50	79	113	154	201	314	491	616	804
Partial factor		$\gamma_{Ms,N}$	[-]	1,4 [2]								
Combined pull-out and concrete failure												
Characteristic bond resistance in uncracked and cracked concrete C20/25												
Temperature range I: 40°C/24°C	Dry, wet concrete	$\tau_{Rk,eq,C1}$	[N/mm²]	2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5
Temperature range II: 80°C/50°C	Dry, wet concrete	$\tau_{Rk,eq,C1}$	[N/mm²]	1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1
Temperature range III: 120°C/72°C	Dry, wet concrete	$\tau_{Rk,eq,C1}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4
Temperature range I: 40°C/24°C	flooded bore hole	$\tau_{Rk,eq,C1}$	[N/mm²]	2,5	2,5	3,7	3,7	3,7	No Performance Assessed			
Temperature range II: 80°C/50°C	flooded bore hole	$\tau_{Rk,eq,C1}$	[N/mm²]	1,6	1,9	2,7	2,7	2,7				
Temperature range III: 120°C/72°C	flooded bore hole	$\tau_{Rk,eq,C1}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0				
Increasing factors for concrete		ψ_c	[-]	1,0								
Characteristic bond resistance depending on the concrete strength class		$\tau_{Rk,eq,C1} =$		$\psi_c \cdot \tau_{Rk,eq,C1}(C20/25)$								
Installation factor												
for dry and wet concrete		γ_{inst}	[-]	1,2	1,2							
for flooded bore hole		γ_{inst}	[-]	1,4					No Performance Assessed			

1) f_{uk} shall be taken from the specifications of reinforcing bars
2) in absence of national regulation

Table C18: Characteristic values of shear loads under seismic action (performance category C1)

Reinforcing bar			**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure without lever arm											
Characteristic shear resistance	$V_{Rk,s,eq,C1}$	[kN]	$0,35 \cdot A_s \cdot f_{uk}$ [2]								
Cross section area	A_s	[mm²]	50	79	113	154	201	314	491	616	804
Partial factor	$\gamma_{Ms,V}$	[-]	1,5 [2]								
Factor for annular gap	α_{gap}	[-]	0,5 (1,0) [3]								

1) f_{uk} shall be taken from the specifications of reinforcing bars
2) in absence of national regulation
3) Value in brackets valid for filled annular gab between fastener and clearance hole in the fixture. Use of special filling washer Annex A 3 is recommended

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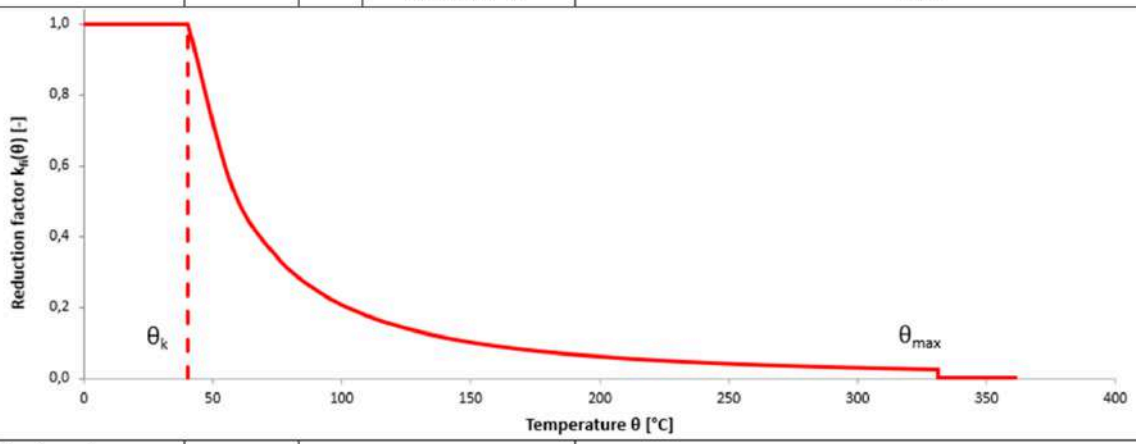
Performances
Characteristic values of tension loads and shear loads under seismic action (performance category C1) (Reinforcing bar)

Annex C 13

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Table C19: Characteristic values of tension and shear loads under fire exposure in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)

Threaded rod					**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Steel failure												
Characteristic tension resistance; Steel, Stainless Steel A2, A4 and HCR, strength class 5.8 resp. 50 and higher	$N_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30	1,1	1,7	3,0	5,7	8,8	12,7	16,5	20,2
				60	0,9	1,4	2,3	4,2	6,6	9,5	12,4	15,1
				90	0,7	1,0	1,6	3,0	4,7	6,7	8,7	10,7
				120	0,5	0,8	1,2	2,2	3,4	4,9	6,4	7,9
Characteristic bond resistance in cracked and uncracked concrete C20/25 up to C50/60 under fire conditions for a given temperature θ												
Temperature reduction factor	$k_{fi,p}(\theta)$	[-]	$\theta < 21°C$		1,0							
			$21°C \leq \theta \leq 331°C$		$589,7 \cdot \theta^{-1,726} \leq 1,0$							
			$\theta > 331°C$		0,0							



Characteristic bond resistance for a given temperature (θ)	$\tau_{Rk,fi}(\theta)$	[N/mm²]	$k_{fi,p}(\theta) \cdot \tau_{Rk,cr,(C20/25)}$ [1)]

Steel failure without lever arm												
Characteristic shear resistance; Steel, Stainless Steel A2, A4 and HCR, strength class 5.8 resp. 50 and higher	$V_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30	1,1	1,7	3,0	5,7	8,8	12,7	16,5	20,2
				60	0,9	1,4	2,3	4,2	6,6	9,5	12,4	15,1
				90	0,7	1,0	1,6	3,0	4,7	6,7	8,7	10,7
				120	0,5	0,8	1,2	2,2	3,4	4,9	6,4	7,9
Steel failure with lever arm												
Characteristic bending moment; Steel, Stainless Steel A2, A4 and HCR, strength class 5.8 resp. 50 and higher	$M^0_{Rk,s,fi}$	[Nm]	Fire exposure time [min]	30	1,1	2,2	4,7	12,0	23,4	40,4	59,9	81,0
				60	0,9	1,8	3,5	9,0	17,5	30,3	44,9	60,7
				90	0,7	1,3	2,5	6,3	12,3	21,3	31,6	42,7
				120	0,5	1,0	1,8	4,7	9,1	15,7	23,3	31,5

1) $\tau_{Rk,cr,(C20/25)}$ characteristic bond resistance for cracked concrete for concrete strength class C20/25 for the relevant temperature range

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

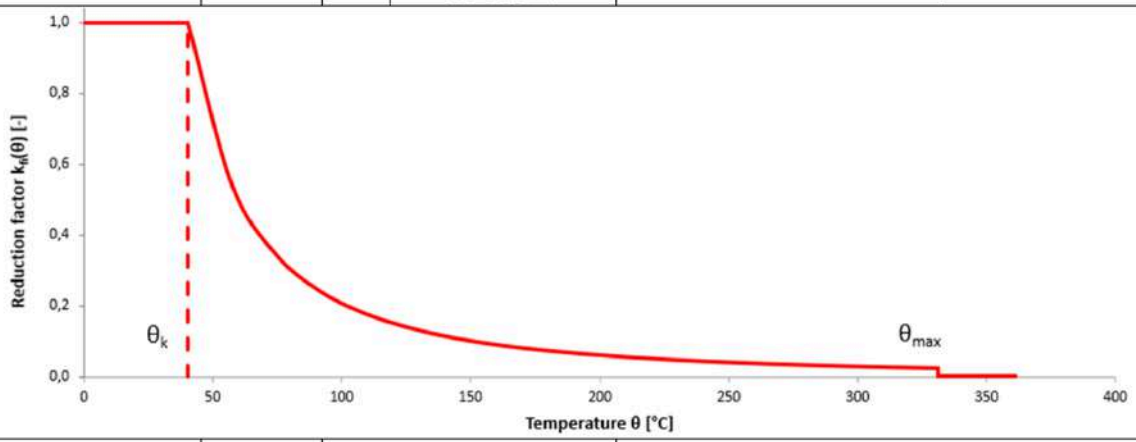
Performances
Characteristic values of tension and shear loads under fire exposure (internal threaded anchor rod)

Annex C 14

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Table C20: Characteristic values of tension and shear loads under fire exposure in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)

Internal threaded anchor rods					**IG-M6**	**IG-M8**	**IG-M10**	**IG-M12**	**IG-M16**	**IG-M20**
Steel failure										
Characteristic tension resistance; Steel, Stainless Steel A4 and HCR, strength class 5.8 and 8.8 resp. 70	$N_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30	0,3	1,1	1,7	3,0	5,7	8,8
				60	0,2	0,9	1,4	2,3	4,2	6,6
				90	0,2	0,7	1,0	1,6	3,0	4,7
				120	0,1	0,5	0,8	1,2	2,2	3,4
Characteristic bond resistance in cracked and uncracked concrete C20/25 up to C50/60 under fire conditions for a given temperature θ										
Temperature reduction factor	$k_{fi,p}(\theta)$	[-]	$\theta < 21°C$		1,0					
			$21°C \leq \theta \leq 331°C$		$589,7 \cdot \theta^{-1,726} \leq 1,0$					
			$\theta > 331°C$		0,0					



Characteristic bond resistance for a given temperature (θ)	$\tau_{Rk,fi}(\theta)$	[N/mm²]	$k_{fi,p}(\theta) \cdot \tau_{Rk,cr,(C20/25)}$ [1)]

Steel failure without lever arm										
Characteristic shear resistance; Steel, Stainless Steel A4 and HCR, strength class 5.8 and 8.8 resp. 70	$V_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30	0,3	1,1	1,7	3,0	5,7	8,8
				60	0,2	0,9	1,4	2,3	4,2	6,6
				90	0,2	0,7	1,0	1,6	3,0	4,7
				120	0,1	0,5	0,8	1,2	2,2	3,4
Steel failure with lever arm										
Characteristic bending moment; Steel, Stainless Steel A4 and HCR, strength class 5.8 and 8.8 resp. 70	$M^0_{Rk,s,fi}$	[Nm]	Fire exposure time [min]	30	0,2	1,1	2,2	4,7	12,0	23,4
				60	0,2	0,9	1,8	3,5	9,0	17,5
				90	0,1	0,7	1,3	2,5	6,3	12,3
				120	0,1	0,5	1,0	1,8	4,7	9,1

1) $\tau_{Rk,cr,(C20/25)}$ characteristic bond resistance for cracked concrete for concrete strength class C20/25 for the relevant temperature range

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

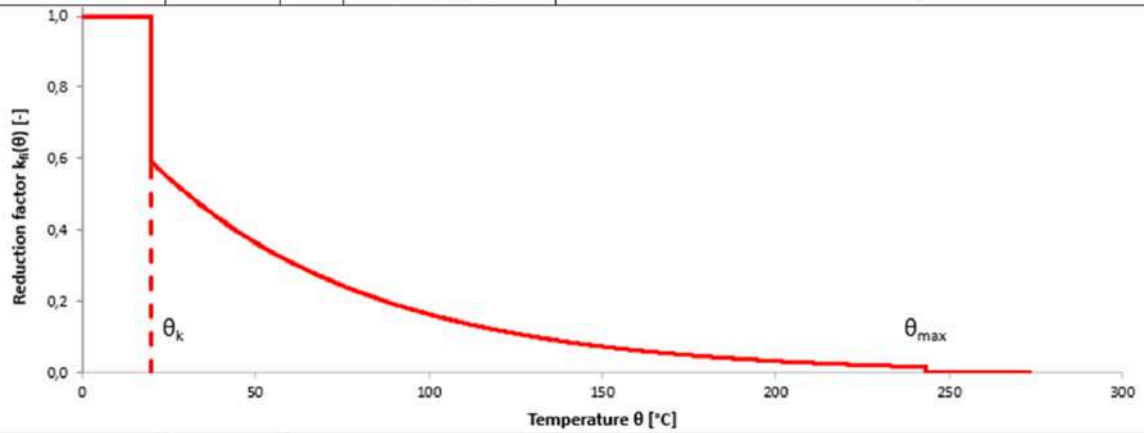
Performances
Characteristic values of tension and shear loads under fire exposure (internal threaded anchor rod)

Annex C 15

Deutsches Institut für Bautechnik DIBt

Table C21: Characteristic values of tension and shear loads under fire exposure in hammer drilled holes (HD), compressed air drilled holes (CD) and in hammer drilled holes with hollow drill bit (HDB)

Reinforcing bar					**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 24**	**Ø 25**	**Ø 28**	**Ø 32**
Steel failure														
Characteristic tension resistance; BSt 500	$N_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30	0,5	1,2	2,3	3,1	4,0	6,3	9,0	9,8	12,3	16,1
				60	0,5	1,0	1,7	2,3	3,0	4,7	6,8	7,4	9,2	12,1
				90	0,4	0,8	1,5	2,0	2,6	4,1	5,9	6,4	8,0	10,5
				120	0,3	0,6	1,1	1,5	2,0	3,1	4,5	4,9	6,2	8,0
Characteristic bond resistance in cracked and uncracked concrete C20/25 up to C50/60 under fire conditions for a given temperature θ														
Temperature reduction factor	$k_{fi,p}(\theta)$	[-]	$\theta < 21°C$		$1,0$									
			$21°C \leq \theta \leq 243°C$		$0,81 \cdot e^{-0,016 \cdot \theta} \leq 1,0$									
			$\theta > 243°C$		$0,0$									



Characteristic bond resistance for a given temperature (θ)	$\tau_{Rk,fi}(\theta)$	[N/mm²]	$k_{fi,p}(\theta) \cdot \tau_{Rk,cr,(C20/25)}$ [1)]

Steel failure without lever arm														
Characteristic shear resistance; BSt 500	$V_{Rk,s,fi}$	[kN]	Fire exposure time [min]	30	0,5	1,2	2,3	3,1	4,0	6,3	9,0	9,8	12,3	16,1
				60	0,5	1,0	1,7	2,3	3,0	4,7	6,8	7,4	9,2	12,1
				90	0,4	0,8	1,5	2,0	2,6	4,1	5,9	6,4	8,0	10,5
				120	0,3	0,6	1,1	1,5	2,0	3,1	4,5	4,9	6,2	8,0
Steel failure with lever arm														
Characteristic bending moment; BSt 500	$M^0_{Rk,s,fi}$	[Nm]	Fire exposure time [min]	30	0,6	1,8	4,1	6,5	9,7	18,8	32,6	36,8	51,7	77,2
				60	0,5	1,5	3,1	4,8	7,2	14,1	24,4	27,6	38,8	57,9
				90	0,4	1,2	2,6	4,2	6,3	12,3	21,2	23,9	33,6	50,2
				120	0,3	0,9	2,0	3,2	4,8	9,4	16,3	18,4	25,9	38,6

1) $\tau_{Rk,cr,(C20/25)}$ characteristic bond resistance for cracked concrete for concrete strength class C20/25 for the relevant temperature range

Würth Injection System WIT-VM 250 or WIT-NORDIC for concrete

Performances
Characteristic values of tension and shear loads under fire exposure (reinforcing bar)

Annex C 16

Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

Member of EOTA www.eota.eu

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-16/0757 of 20 December 2024

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry
Product family to which the construction product belongs	Metal Injection anchors for use in masonry
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Werk 3
This European Technical Assessment contains	77 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330076-01-0604, Edition 10/2022
This version replaces	ETA-16/0757 issued on 15 December 2016

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Specific Part

1 Technical description of the product

The "Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry" is a bonded anchor (injection type) consisting of a mortar cartridge with injection mortar WIT-VM 250 or WIT-NORDIC, a perforated sleeve and an anchor rod with hexagon nut and washer or an Internal threaded rod. The steel elements are made of zinc coated steel, stainless steel or high corrosion resistant steel.

The anchor rod is placed into a drilled hole filled with injection mortar and is anchored via the bond between steel element, injection mortar and masonry and mechanical interlock.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the fastener is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the fastener of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for static and quasi-static loading	See Annexes B 5, B 6 C 1 to C 56
Characteristic resistance and displacements for seismic loading	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire under tension and shear loading with and without lever arm. Minimum edge distances and spacing	See Annexes C2, C7, C8, C13, C14, C17, C18, C19, C20, C37, C38, C43, C44, C45, C46, C51 and C52

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD 330076-01-0604 the applicable European legal act is: [97/177/EC].

The system to be applied is: 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 20 December 2024 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

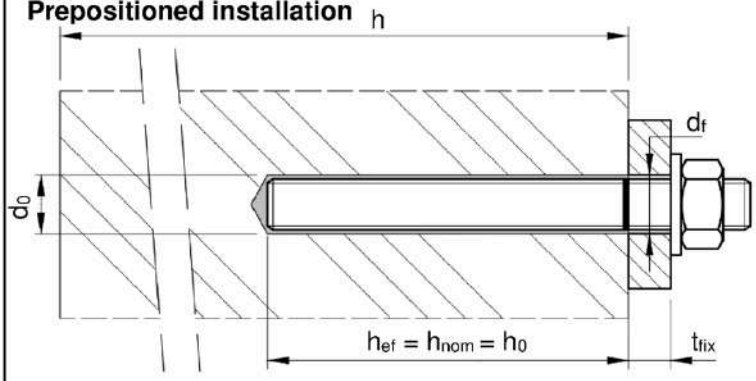
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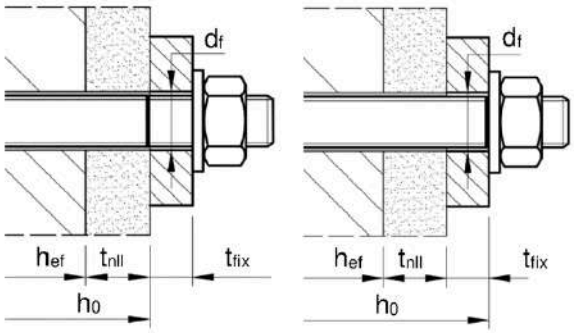
Installation in solid brick with or without non-loadbearing layer

Threaded rod M8 up to M16 / Internal threaded rod IG-M6 up to IG-M10 without sleeve

Prepositioned installation

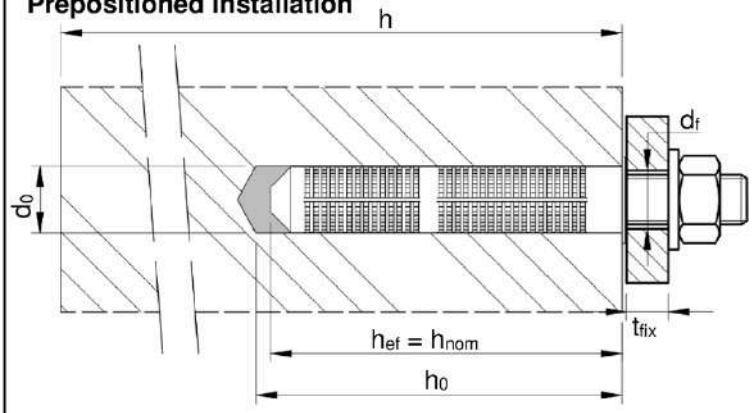


Push through installation

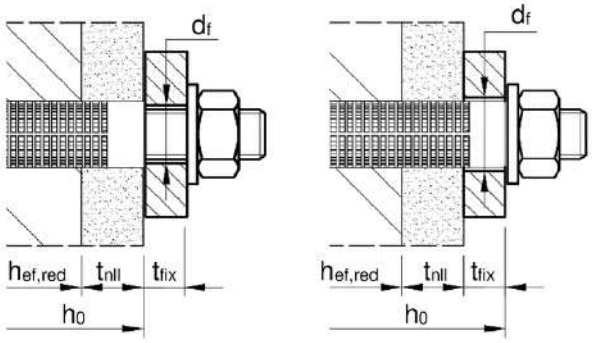


Threaded rod M8 up to M16 / Internal threaded rod IG-M6 up to IG-M10 with sleeve

Prepositioned installation



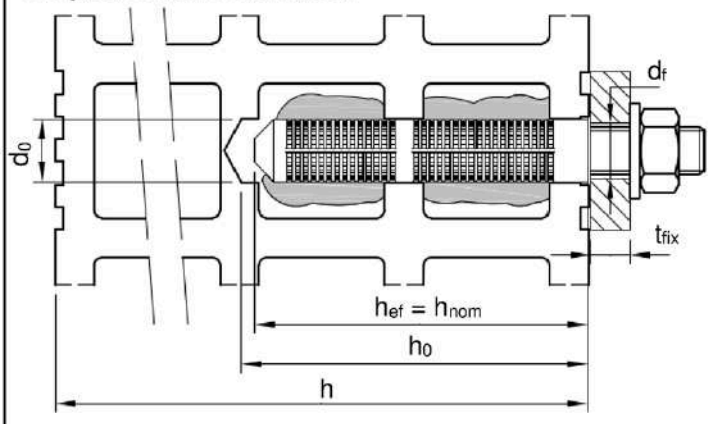
Push through installation



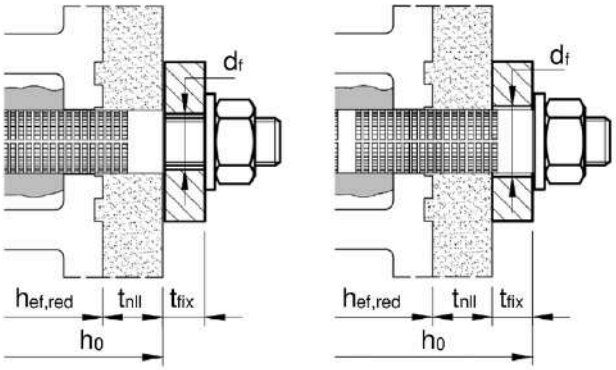
Installation in hollow brick with or without non-loadbearing layer

Threaded rod M8 up to M16 / Internal threaded rod IG-M6 up to IG-M10 with sleeve

Prepositioned installation



Push through installation



For push through installation the annular gap between rod and fixure must be filled with mortar

h_{ef}	=	effective anchorage depth	d_0	=	nominal drill hole diameter
h_{nom}	=	overall anchor embedment depth	d_f	=	diameter clearance hole
h_0	=	drill hole depth	t_{fix}	=	thickness of fixture
h	=	thickness of masonry member	t_{nll}	=	thickness of non-loadbearing layer

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Product description
Installed condition

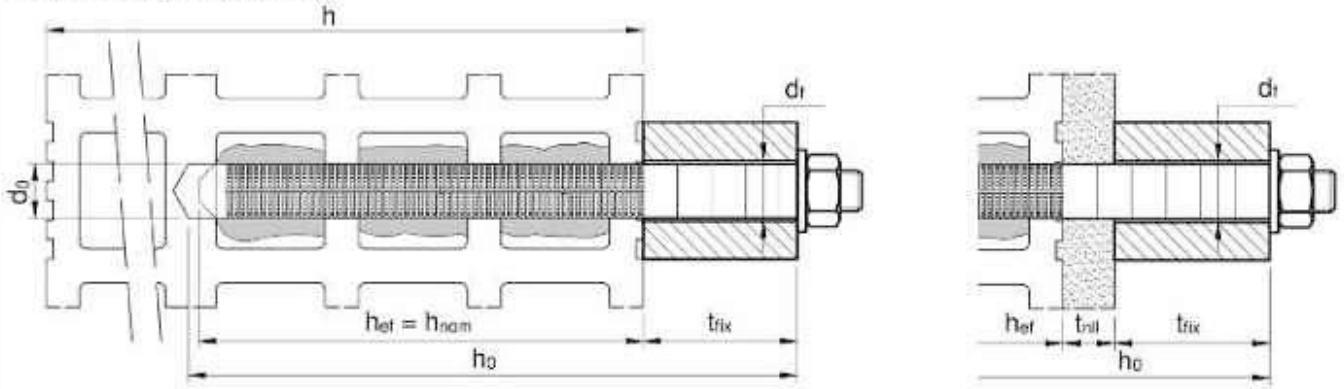
Annex A 1

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Installation in hollow brick with or without non-loadbearing layer and / or thermal isolation

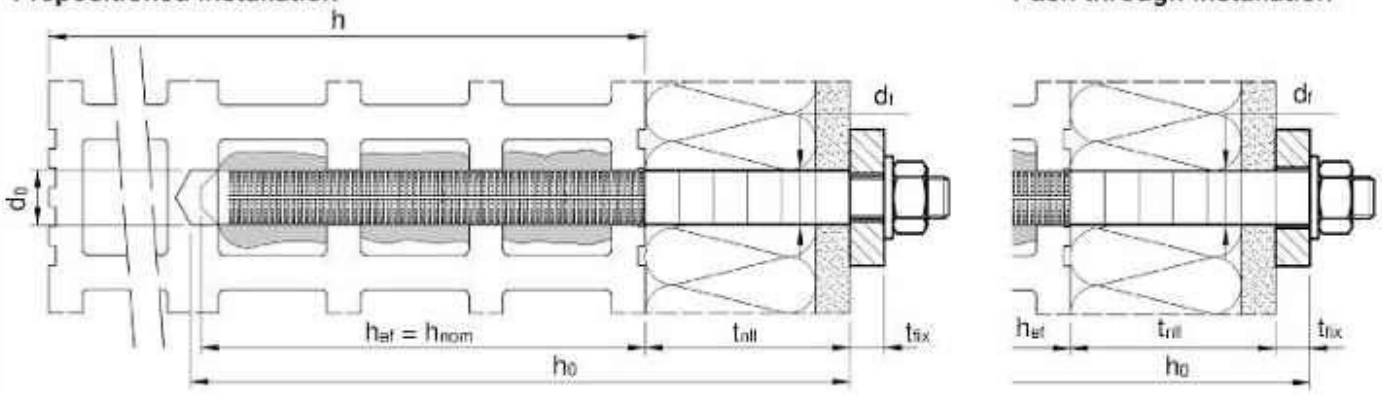
Threaded rod M8 and M10 / Internal threaded rod IG-M6 with sleeve SH 16x130/330

Push through installation



Prepositioned installation

Push through installation



h_{ef}	=	effective anchorage depth	d_0	=	nominal drill hole diameter
h_{nom}	=	overall anchor embedment depth	d_f	=	diameter clearance hole
h_0	=	drill hole depth	t_{fix}	=	thickness of fixture
h	=	thickness of masonry member	t_{nll}	=	thickness of non-loadbearing layer

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

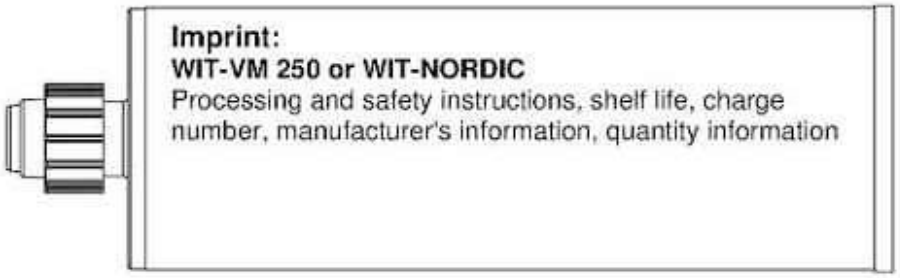
Product description
Installed condition

Annex A 2

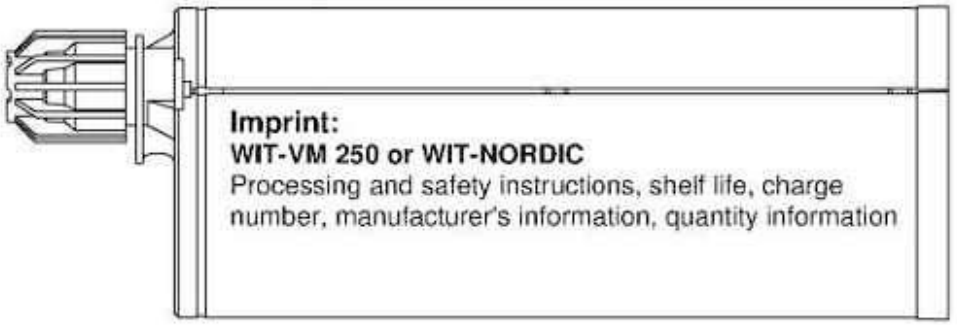
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Cartridge system

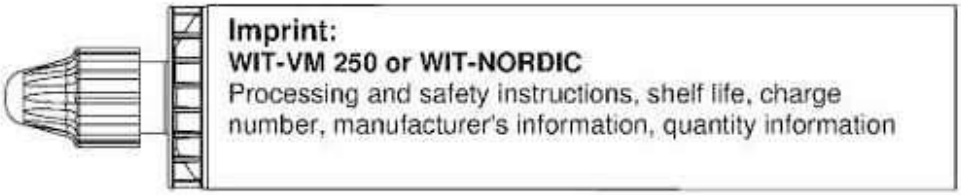
Coaxial Cartridge:
150 ml, 160ml, 280 ml,
300 ml up to 333 ml and
380 ml up to 420 ml



Side-by-Side Cartridge:
235 ml, 345 ml up to 360 ml
and 825 ml



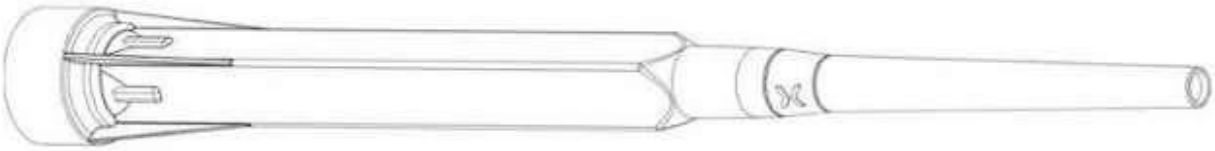
Foil Tube Cartridge:
165 ml and 300 ml



Static mixer WIT-M 14 W / Fill & Clean



Static mixer WIT-M19 W / WIT-MX

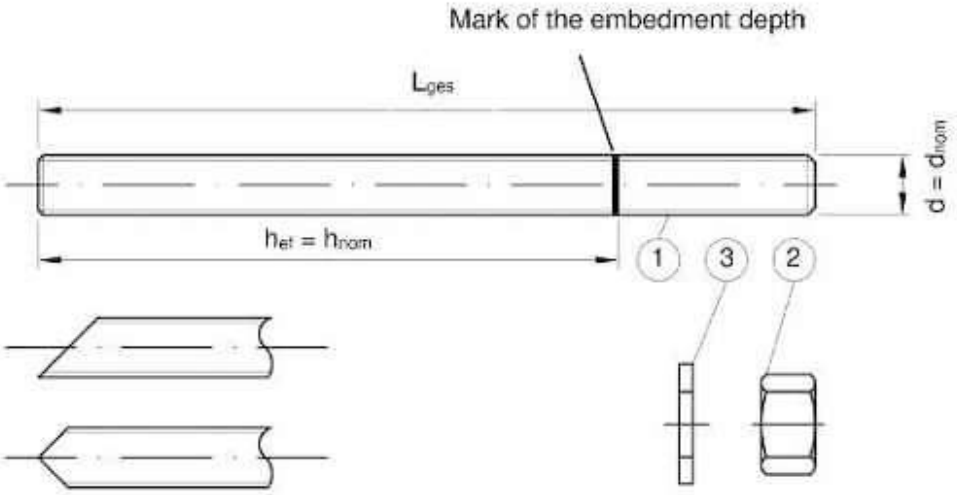


Mixer extension



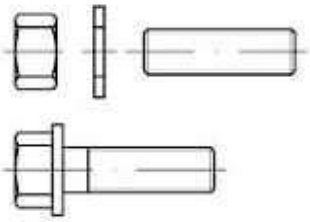
Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	Annex A 3
Product description Injection system	

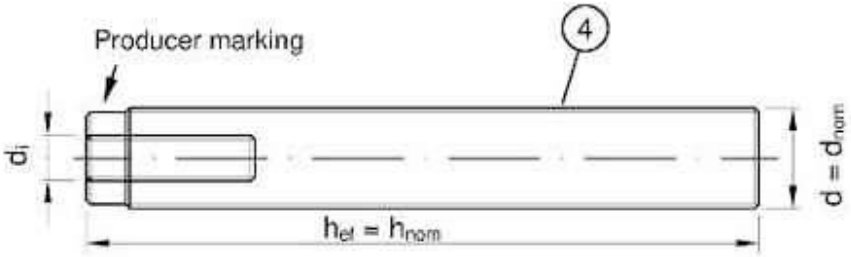
Threaded rod M8 up to M16 with washer and hexagon nut



Commercial standard rod with:
- Materials, dimensions and mechanical properties acc. to Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004. The document shall be stored
- Marking of embedment depth

Internal threaded rod IG-M6 to IG-M10





Producer marking: e.g.  M8



Marking Internal thread (optional)

Mark

M8	Thread size (Internal thread)
A4	additional mark for stainless steel
HCR	additional mark for high-corrosion resistance steel
-8	additional mark for property class 8.8

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex A 4**
Product description Threaded rod and Internal threaded rod	

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Table A1: Materials

Part	Designation		Material			
Steel, zinc plated (Steel acc. to EN ISO 683-4:2018 or EN 10263:2017) - zinc plated ≥ 5 µm acc. to EN ISO 4042:2022 or - hot-dip galvanised ≥ 40 µm acc. to EN ISO 1461:2022 and EN ISO 10684:2004+AC:2009 or - sherardized ≥ 45 µm acc. to EN ISO 17668:2016						
1	Threaded rod	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 898-1:2013	4.6	f_{uk} = 400 N/mm²	f_{yk} = 240 N/mm²	A_5 > 8%
			4.8	f_{uk} = 400 N/mm²	f_{yk} = 320 N/mm²	A_5 > 8%
			5.6	f_{uk} = 500 N/mm²	f_{yk} = 300 N/mm²	A_5 > 8%
			5.8	f_{uk} = 500 N/mm²	f_{yk} = 400 N/mm²	A_5 > 8%
			8.8	f_{uk} = 800 N/mm²	f_{yk} = 640 N/mm²	A_5 > 8%
2	Hexagon nut	acc. to EN ISO 898-2:2022	4	for anchor rod class 4.6 or 4.8		
			5	for anchor rod class 5.6 or 5.8		
			8	for anchor rod class 8.8		
3	Washer	Steel, zinc plated, hot-dip galvanised or sherardized (e.g.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000)				
4	Internal threaded anchor rod[2]	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 898-1:2013	5.8	f_{uk} = 500 N/mm²	f_{yk} = 400 N/mm²	A_5 > 8%
			8.8	f_{uk} = 800 N/mm²	f_{yk} = 640 N/mm²	A_5 > 8%
Stainless steel A2 (Material 1.4301 / 1.4307 / 1.4311 / 1.4567 or 1.4541, acc. to EN 10088-1:2023) **Stainless steel A4** (Material 1.4401 / 1.4404 / 1.4571 / 1.4362 or 1.4578, acc. to EN 10088-1:2023) **High corrosion resistance steel** (Material 1.4529 or 1.4565, acc. to EN 10088-1: 2023)						
1	Threaded rod[1]	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 3506-1:2020	50	f_{uk} = 500 N/mm²	f_{yk} = 210 N/mm²	A_5 > 8%
			70	f_{uk} = 700 N/mm²	f_{yk} = 450 N/mm²	A_5 > 8%
			80	f_{uk} = 800 N/mm²	f_{yk} = 600 N/mm²	A_5 > 8%
2	Hexagon nut[1]	acc. to EN ISO 3506-1:2020	50	for anchor rod class 50		
			70	for anchor rod class 70		
			80	for anchor rod class 80		
3	Washer	Stainless steel A2, A4 or HCR (e.g.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 or EN ISO 7094:2000)				
4	Internal threaded anchor rod[2]	Property class		Characteristic steel ultimate tensile strength	Characteristic steel yield strength	Elongation at fracture
		acc. to EN ISO 3506-1:2020	50	f_{uk} = 500 N/mm²	f_{yk} = 210 N/mm²	A_5 > 8%
			70	f_{uk} = 700 N/mm²	f_{yk} = 450 N/mm²	A_5 > 8%

1) Property class 80 only for stainless steel A4 and HCR
2) Using internally threaded anchor rod screws and threaded rods (incl. nut and washer) must at least correspond to the material and strength class of the internally threaded anchor rod used.

Plastic perforated sleeve	
Sieve sleeve SH	Polypropylene (PP)

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

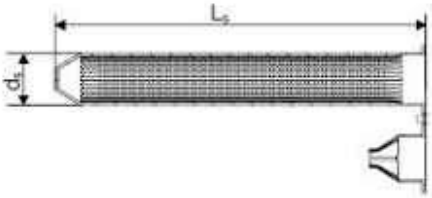
Product description
Materials

Annex A 5

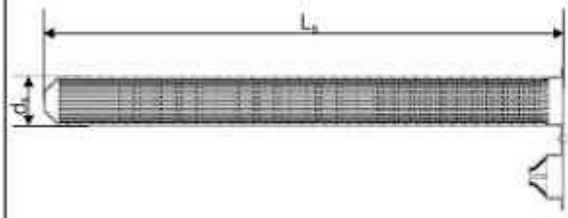
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Tabelle A2: Perforated sleeve

SH 12x80
SH 16x85
SH 20x85



SH 16x130
SH 20x130
SH 20x200



SH 16x130 / 330

For installtions through insulation up to a thickness of 20 cm or push through installtion

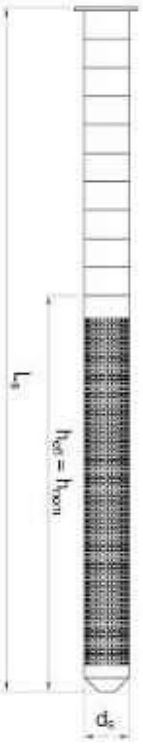


Table A3: Sleeve dimensions

Sleeve			
Size	d_s	L_s	$h_{ef} = h_{nom}$
[mm]	[mm]	[mm]	[mm]
SH 12x80	12	80	80
SH 16x85	16	85	85
SH 16x130	16	130	130
SH 16x130 / 330[1)]	16	330	130
SH 20x85	20	85	85
SH 20x130	20	130	130
SH 20x200	20	200	200

1) In Annxes C4 – C56 this sleeve is covered with SH 16x130

Table A4: Steel parts

Anchor rod			
Size	$d = d_{nom}$	d_i	l_{ges}
[mm]	[mm]	[mm]	[mm]
IG-M6[1)]	10	6	with sleeve: h_{ef} - 5mm without sleeve: h_{ef}
IG-M8[1)]	12	8	
IG-M10[1)]	16	10	
M8	8	-	$h_{ef} + t_{fix} + 9,5$
M10	10	-	$h_{ef} + t_{fix} + 11,5$
M12	12	-	$h_{ef} + t_{fix} + 17,5$
M16	16	-	$h_{ef} + t_{fix} + 20,0$

1) Internal threaded rod with metric external thread

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Product description
Sleeves and steel parts

Annex A 6

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Specifications of intended use

Anchorages subject to:	Static and quasi-static loads, fire exposure under tension and shear loads M8 up to M16, IG-M6 up to IG-M10 (with and without sleeve)	
Base material	Masonry group b: Solid brick masonry Masonry group c: Hollow brick masonry Masonry group d: Autoclaved Aerated Concrete	Annex B 2 Annex B 2 to B 4 Annex B 2
	Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2016. For other bricks in solid masonry and in hollow masonry or in autoclaved aerated concrete, the characteristic resistance of the anchor may be determined by job site tests according to EOTA TR 053, Edition July 2022 under consideration of the β-factor according to Annex C 1, Table C1.	
Hole drilling	See Annex C 4 – C 56	
Use category	Condition d/d: Installation and use in dry masonry Condition w/w: Installation and use in dry or wet masonry (incl. w/d installation in wet masonry and use in dry masonry)	
Temperature Range	T_a: - 40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C) T_b: - 40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C) T_a: - 40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C)	

Note: The characteristic resistance for solid bricks and autoclaved aerated concrete are also valid for larger brick sizes and larger compressive strenght oft he masonry unit.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006+ A2:2020 corresponding to corrosion resistance classes to Table A1 (stainless steel and high corrosion resistant steel).

Design:

- Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings.
- The anchorages are designed in accordance with the EOTA TR 054, Edition July 2022, under the responsibility of an engineer experienced in anchorages and masonry work.
- Applies to all bricks if no other values are specified:
  - $N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$
  - $V_{Rk} = V_{Rk,b} = V_{Rk,c,II} = V_{Rk,c,\perp}$
- For the calculation of pulling out a brick under tension loading $N_{Rk,pb}$ or pushing out a brick under shear loading $V_{Rk,pb}$ see EOTA Technical Report TR 054, Edition July 2022.
- $N_{Rk,s}$, $V_{Rk,s}$ and $M^0_{Rk,s}$ see Annexes C 1 - C 2
- For application with sleeve with drill bit size ≤ 15mm installed in joints not filled with mortar:
  - $N_{Rk,p,j} = 0{,}18 * N_{Rk,p}$ and $N_{Rk,b,j} = 0{,}18 * N_{Rk,b}$ ($N_{Rk,p} = N_{Rk,b}$ see Annex C 4 to C 56)
  - $V_{Rk,c,j} = 0{,}15 * V_{Rk,c}$ and $V_{Rk,b,j} = 0{,}15 * V_{Rk,b}$ ($V_{Rk,b}$ see Annex C 4 to C 56; and $V_{Rk,c}$ see Annex C 3)
- Application without sleeve installed in joints not filled with mortar is not allowed.

Installation:

- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex B 1**
Intended use Specifications	

Deutsches Institut für Bautechnik DIBt

Table B1: Overview brick types and properties with corresponding fastening elements (Anchor and Sleeves)

Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve	Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve
Hollow light weight concrete brick acc. to EN 771-4:2011+A1:2015				**Hollow light weight concrete brick acc. to EN 771-3:2011+A1:2015**			
AAC ρ = 0,35 - 0,60 ≥ 499x240x249 Table C4 - C10		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	VBL ρ ≥ 0,6 ≥ 240x300x113 Table C187 - C193		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200
Hollow light weight concrete brick acc. to EN 771-3:2011+A1:2015							
HBL 16DF ρ ≥ 1,0 500x250x240 Table C172 - C179		M8 - M16 IG-M6 - IG-M10	16x85 16x130 20x85 20x130 20x200	Bloc creux B40 ρ ≥ 0,8 495x195x190 Table C180 - C186		M8 - M16 IG-M6 - IG-M10	16x130 20x130
Calcium silica bricks acc. to EN 771-2:2011+A1:2015							
KS ρ ≥ 2,0 ≥ 240x115x71 Table C11 - C18		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	KSL-3DF ρ ≥ 1,4 240x175x113 Table C19 - C25		M8 - M16 IG-M6 - IG-M10	16x85 16x130 20x85 20x130
KSL-8DF ρ ≥ 1,4 248x240x238 Table C26 - C32		M8 - M16 IG-M6 - IG-M10	16x130 20x130 20x200	KSL-12DF ρ ≥ 1,4 498x175x238 Table C33 - C40		M8 - M16 IG-M6 - IG-M10	16x130 20x130
Solid clay bricks acc. to EN 771-1:2011+A1:2015							
Mz-1DF ρ ≥ 2,0 ≥ 240x115x55 Table C41 - C47		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Mz – 2 DF ρ ≥ 2,0 ≥ 240x115x113 Table C48 - C55		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex B 2**
Intended use Brick types and properties with corresponding fastening elements	

Deutsches Institut für Bautechnik DIBt

Table B1: Overview brick types and properties with corresponding fastening elements (Anchor and Sleeves) (Continued)

Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve	Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve
Hollow clay bricks acc. to EN 771-1:2011+A1:2015							
Hlz-10DF ρ ≥ 1,25 300x240x249 Table C56 - C63		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Porotherm Homebric ρ ≥ 0,7 500x200x299 Table C64 - C70		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130
BGV Thermo ρ ≥ 0,6 500x200x314 Table C71 - C77		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130	Brique creuse C40 ρ ≥ 0,7 500x200x200 Table C92 - C98		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130
Calibric R+ ρ ≥ 0,6 500x200x314 Table C78 - C84		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130	Blocchi Leggeri ρ ≥ 0,6 250x120x250 Table C99 - C105		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130
Urbanbric ρ ≥ 0,7 560x200x274 Table C85 - C91		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130	Doppio Uni ρ ≥ 0,9 250x120x120 Table C106 - C112		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130
Hollow clay bricks with thermal insulation acc. to EN 771-1:2011+A1:2015							
Coriso WS07 ρ ≥ 0,55 248x365x249 Mineral wool Table C113 - C119		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	T8P ρ ≥ 0,56 248x365x249 Perlite Table C128 - C134		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200
T7MW ρ ≥ 0,59 248x365x249 Mineral wool Table C120 - C127		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	MZ90-G ρ ≥ 0,68 248x365x249 Mineral wool Table C135 - C141		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Intended use
Brick types and properties with corresponding fastening elements

Annex B 3

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Table B1: Overview brick types and properties with corresponding fastening elements (Anchor and Sleeves) (Continued)

Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve	Naming Density [kg/dm³] Dimensions LxBxH [mm] Annex	Picture	Anchor rods	Perforated sleeve
Hollow clay bricks with thermal insulation acc. to EN 771-1:2011+A1:2015							
Poroton FZ7,5 ρ ≥ 0,90 248x365x249 Mineral wool Table C142 - C149		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Poroton FZ9 ρ ≥ 0,90 248x365x249 Mineral wool Table C150 - C157		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200
Poroton S9 ρ ≥ 0,85 248x365x249 Perlite Table C158 - C164		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200	Thermopor TV8+ ρ ≥ 0,70 248x365x249 Mineral wool Table C165 - C171		M8 - M16 IG-M6 - IG-M10	12x80 16x85 16x130 20x85 20x130 20x200

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex B 4**
Intended use Brick types and properties with corresponding fastening elements	

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Table B2: Installation parameters in autoaerted AAC and solid masonry (without sleeve) for prepositioned or push through installation

Anchor size				M8	M10	IG-M6	M12	IG-M8	M16	IG-M10
Nominal drill hole diameter		d_0	[mm]	10	12		14		18	
Drill hole depth		h_0	[mm]	$h_{ef} + t_{fix}$ [1]						
Effective anchorage depth		h_{ef}	[mm]	80	≥ 90		≥ 100		≥ 100	
Diameter of clearance hole in the fixture	Prepositioned installation	$d_f \leq$	[mm]	9	12	7	14	9	18	12
	Push through installation	$d_f \leq$	[mm]	12	14	14	16	16	20	20
Maximum installation torque		T_{inst}	[Nm]	See Annexes C 4 – C 56						
Minimum thickness of member		h_{min}	[mm]	$h_{ef} + 30$						
Minimum spacing		s_{min}	[mm]	See Annexes C 4 – C 56						
Minimum edge distance		c_{min}	[mm]							

1) Consider t_{fix} in case of push through installation.

Table B3: Installation parameters in solid and hollow brick (with perforated sleeve) for prepositioned installation

Anchor size			M8	M8 / M10 / IG-M6			M12 / M16 / IG-M8 / IG-M10		
Perforated sleeve SH			12x80	16x85	16x130	16x130/330	20x85	20x130	20x200
Nominal drill hole diameter	d_0	[mm]	12	16	16	16	20	20	20
Drill hole depth	h_0	[mm]	85	90	135	330	90	135	205
Effective anchorage depth	h_{ef}	[mm]	80	85	130	130	85	130	200
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	7 (IG-M6) / 9 (M8) / 12 (M10)			9 (IG-M8) / 12 (IG-M10) / 14 (M12) / 18 (M16)		
Maximum installation torque	T_{inst}	[Nm]	See Annexes C 4 – C 56						
Minimum thickness of member	h_{min}	[mm]	115	115	195	195	115	195	240
Minimum spacing	s_{min}	[mm]	See Annexes C 4 – C 56						
Minimum edge distance	c_{min}	[mm]							

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Intended use
Installation parameters

Annex B 5

Deutsches Institut für Bautechnik DIBt

Table B4: Installation parameters in solid and hollow bricks (with perforated sleeve) for prepositioned installation through non-load-bearing layers and/or push-through installation

Anchor size				M8 / M10 / IG-M6		M12 / M16 / IG-M8 / IG-M10	
	Perforated sleeve SH			16x130	16x130/330	20x130	20x200
Nominal drill hole diameter		d_0	[mm]	16	16	20	20
Drill hole depth		h_0	[mm]	h_{ef} + 5mm + t_{nll} + t_{fix} [1]			
Effective embedment depth	Prepositioned installation	h_{ef}	[mm]	130	130	130	200
	Push through installation	h_{ef}	[mm]	85	130	85	85
Maximum thickness of non-loadbearing layer		max t_{nll}	[mm]	45	200	45	115
Diameter of clearance hole in the fixture	Prepositioned installation	$d_f \leq$	[mm]	7 (IG-M6) / 9 (M8) / 12 (M10)		9 (IG-M8) / 12 (IG-M10) / 14 (M12) / 18 (M16)	
	Push through installation	$d_f \leq$	[mm]	18		22	
Maximum installation torque		T_{inst}	[Nm]	See Annexes C 4 – C 56			
Minimum thickness of member		h_{min}	[mm]	195 (115)	195	195 (115)	240 (115)
Minimum spacing		s_{min}	[mm]	See Annexes C 4 – C 56			
Minimum edge distance		c_{min}	[mm]				

[1] Consider t_{nll} and/or t_{fix} in case of non-loadbearing layers and/or push through installation.

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Intended use
Installation parameters

Annex B 6

Deutsches Institut für Bautechnik DIBt

Table B5: Parameter cleaning and installation tools






Anchor rod	Perforated sleeve	d_0 Drill bit - Ø HD, CA	d_b Brush - Ø		$d_{b,min}$ min. Brush - Ø
[mm]		[mm]	WIT-	[mm]	[mm]
Autoaerted ACC and solid masonry (without sleeve)					
M8	-	10	RMB10	12	10,5
M10	-	12	RMB12	14	12,5
M12	-	14	RMB14	16	14,5
M16	-	18	RMB18	20	18,5
Solid and hollow masonry (with sleeve)					
M8	SH 12x80	12	RMB12	14	12,5
M8 / M10 / IG-M6	SH 16x85	16	RMB16	18	16,5
	SH 16x130				
	SH 16x130/330				
M12 / M16 / IG-M8 / IG-M10	SH 20x85	20	RMB20	22	20,5
	SH 20x130				
	SH 20x200				

Cleaning and installation tools

Hand pump
(Volume ≥ 750 ml)



Compressed air tool
(min 6 bar)



Brush WIT-RMB



Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex B 7**
Intended use Cleaning and installation tools	

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Table B6: Working and curing time - WIT-VM 250

Temperature in base material			Maximum working time	Minimum curing time [1]
T			t_{work}	t_{cure}
- 10 °C	to	- 6 °C	90 min[2]	24 h
- 5 °C	to	- 1 °C	90 min	14 h
0 °C	to	+ 4 °C	45 min	7 h
+ 5 °C	to	+ 9 °C	25 min	2 h
+ 10 °C	to	+ 19 °C	15 min	80 min
+ 20 °C	to	+ 24 °C	6 min	45 min
+ 25 °C	to	+ 29 °C	4 min	25 min
+ 30 °C	to	+ 39 °C	2 min	20 min
+ 40 °C			1,5 min	15 min
Cartridge temperature			+5°C to +40°C	

1) The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.
2) Cartridge temperature must be at minimum +15°C

Table B7: Working and curing time - WIT-NORDIC

Temperature in base material			Maximum working time	Minimum curing time [1]
T			t_{work}	t_{cure}
- 20 °C	to	- 16 °C	75 min	24 h
- 15 °C	to	- 11 °C	55 min	16 h
- 10 °C	to	- 6 °C	35 min	10 h
- 5 °C	to	- 1 °C	20 min	5 h
0 °C	to	+ 4 °C	10 min	2.5 h
+ 5 °C	to	+ 9 °C	6 min	80 min
+ 10 °C			6 min	60 min
Cartridge temperature			-20°C to +10°C	

1) The minimum curing time is only valid for dry base material. In wet base material the curing time must be doubled.

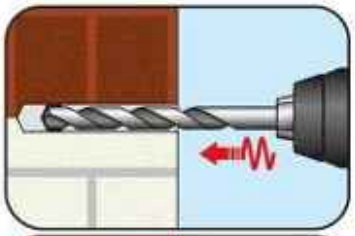
Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Intended use
Working and curing time

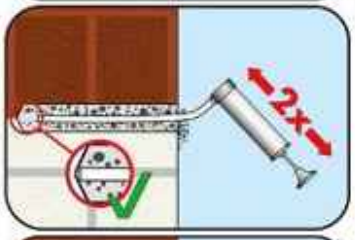
Annex B 8

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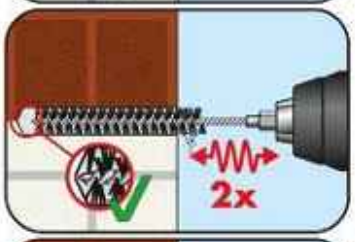
Installation instructions



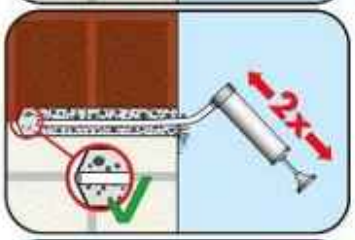
1. Drill a hole to the required embedment depth with drilling method according to Annex C 4 - C 56.
Drill bit diameter according to Table B5.



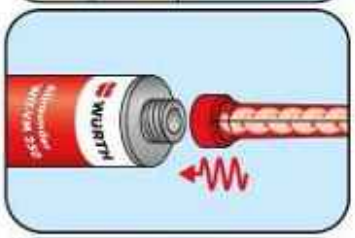
2a. Blow the bore hole clean minimum 2x from the bottom or back by hand pump or compressed air tool (Annex B 7). For applications in solid masonry with a bore hole depth h_0 > 100mm cleaning with compressed air is required.



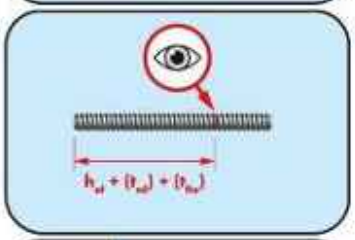
2b. Attach brush WIT-RMB according to Table B5 to a drilling machine or a cordless screwdriver.
Brush the bore hole minimum 2x with brush over the entire embedment depth in a twisting motion (if necessary, use a brush extension).



2c. Finally blow the bore hole clean minimum 2x from the bottom or back by hand pump or compressed air tool (Annex B 7). For applications in solid masonry with a bore hole depth h_0 > 100mm cleaning with compressed air is required.

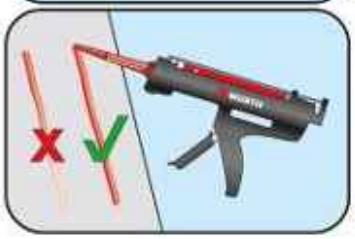


3. Screw on static-mixing nozzle WIT-M 14 W / WIT-M19 W / WIT-MX, and load the cartridge into an appropriate dispensing tool.
If necessary, cut off the foil tube clip before use.
For every working interruption longer than the maximum working time t_{work} (Annex B 8) as well as for new cartridges, a new static-mixer shall be used.



4. Mark setting position on the anchor rod. Consider t_{nll} and/or t_{fix} in case of installation through non-loadbearing layers and/or push through installation.

The anchor rod shall be free of dirt, grease, oil or other foreign material.



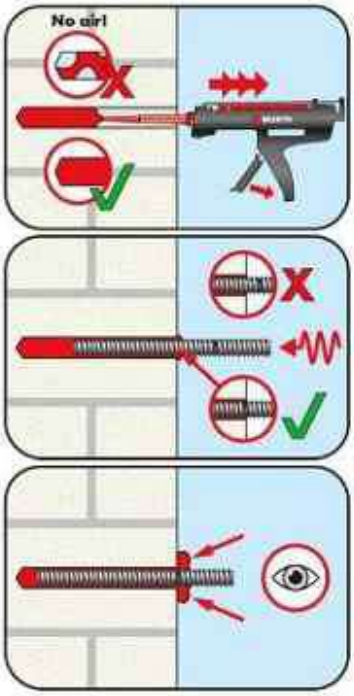
5. Not proper mixed mortar is not sufficient for fastening.
Dispense and discard mortar until an uniform grey colour is shown (at least 3 full strokes; for foil tube cartridges at least 6 full strokes).

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex B 9**
Intended use Installation instructions	

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Installation instructions (continuation)

Installation without sleeve

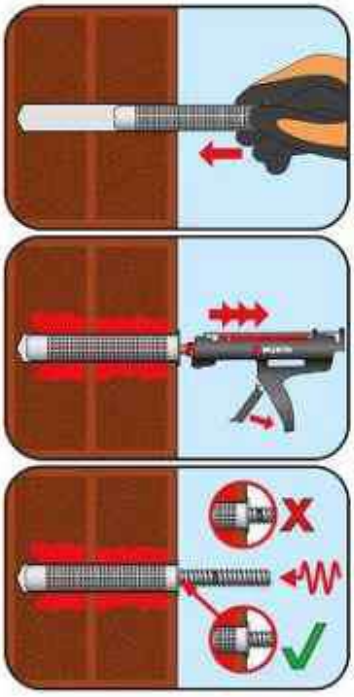


6 Starting at bottom of the hole and fill the hole up to approximately two-thirds with adhesive. (If necessary, a mixer nozzle extension shall be used.)
Slowly withdraw of the static mixing nozzle avoid creating air pockets
Observe the temperature related working time t_{work} (Annex B 8).

7 Insert the anchor rod while turning slightly up to the embedment mark.

8 Annular gap between anchor rod and base material must be completely filled with mortar. For push through installation the annular gap between anchor rod and fixture must be filled with mortar.
Otherwise, the installation must be repeated starting from step 6 before the maximum working time t_{work} has expired.

Installation with sleeve



6 Insert the perforated sleeve into the hole flush with the surface of the masonry. Never modify the sleeve in anchoring area (h_{ef}).
For installation with sleeve SH 16x130/330 through a non-load-bearing layer and/or fixture the clamping area may be reduced to the thickness of the non-load-bearing layer and/or attachment.

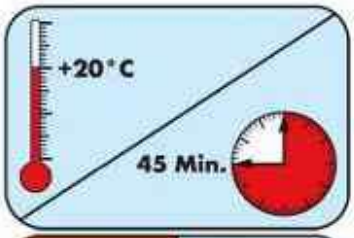
7 Starting from the bottom or back fill the sleeve with mortar. (If necessary, a mixer nozzle extension shall be used.)
Refer to the cartridge label or the technical data sheet for the exact amount of mortar. For push-through installation through the fixture the sleeve must also be completely filled with mortar up to the fixture.
Observe the temperature related working time t_{work} (Annex B 8).

8 Insert the anchor rod with a slight twist up to the mark

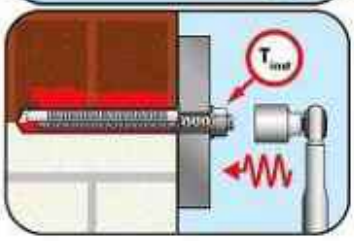
Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	Annex B 10
Intended use Installation instructions (continuation)	

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Installation instructions (continuation)



9. Temperature related curing time t_{cure} (Annex B 8) must be observed.
Do not move or load the fastener during curing time.



10. Install the fixture by using a calibrated torque wrench. Observe maximum installation torque (Annex C 4 to C 56).

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex B 11**
Intended use Installation instructions (continuation)	

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Table C1: β-factor for job-site testing under tension loading

Base material	anchor size	Perforated sleeve SH	Anchorage depth	β-Factor					
				T_a: 40°C / 24°C		T_b: 80°C / 50°C		T_c: 120°C / 72°C	
			h_{ef}	d/d	w/d w/w	d/d	w/d w/w	d/d	w/d w/w
Autoclaved aerated concrete	all sizes	with and without SH	all	0,95	0,86	0,81	0,73	0,81	0,73
Calcium silica bricks	$d_0 \leq 14$ mm	with SH	all	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16$ mm			0,93	0,93	0,87	0,87	0,65	0,65
	$d_0 \leq 14$ mm	without SH	≤ 100 mm	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16$ mm			0,93	0,93	0,87	0,87	0,65	0,65
	all sizes	without SH	> 100 mm	0,93	0,56	0,87	0,52	0,65	0,40
Clay Bricks	all sizes	with SH	all	0,86	0,86	0,86	0,86	0,73	0,73
		without SH	≤ 100 mm	0,93	0,80	0,87	0,74	0,65	0,56
		without SH	> 100 mm	0,86	0,43	0,86	0,43	0,73	0,37
Concrete bricks	$d_0 \leq 12$ mm	with and without SH	all	0,93	0,80	0,87	0,74	0,65	0,56
	$d_0 \geq 16$ mm			0,93	0,93	0,87	0,87	0,65	0,65

Table C2: Characteristic steel resistance

Anchor size				M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Cross section area		A_s	[mm²]	36,6	58	84,3	157	-	-	-
Characteristic tension resistance, Steel failure [1]										
Steel, Property class	4.6 and 4.8	$N_{Rk,s}$	[kN]	15 (13)	23 (21)	34	63	-3)	-3)	-3)
	5.6 and 5.8	$N_{Rk,s}$	[kN]	18 (17)	29 (27)	42	78	10	17	29
	8.8	$N_{Rk,s}$	[kN]	29 (27)	46 (43)	67	125	16	27	46
Stainless steel A2, A4 and HCR, class (A2 only class 50 and 70)	50	$N_{Rk,s}$	[kN]	18	29	42	79	-3)	-3)	-3)
	70	$N_{Rk,s}$	[kN]	26	41	59	110	14	26	41
	80	$N_{Rk,s}$	[kN]	29	46	67	126	-3)	-3)	-3)
Characteristic tension resistance, Partial factor [2]										
Steel, Property class	4.6 and 5.6	$\gamma_{Ms,N}$	[-]	2,0				-3)		
	4.8, 5.8 and 8.8	$\gamma_{Ms,N}$	[-]	1,5						
Stainless steel A2, A4 and HCR, class (A2 only class 50 and 70)	50	$\gamma_{Ms,N}$	[-]	2,86				-3)		
	70	$\gamma_{Ms,N}$	[-]	1,87						
	80	$\gamma_{Ms,N}$	[-]	1,6				-3)		
Characteristic shear resistance, Steel failure without lever arm [1]										
Steel, Property class	4.6 and 4.8	$V^0_{Rk,s}$	[kN]	7 (6)	12 (10)	17	31	-3)	-3)	-3)
	5.6 and 5.8	$V^0_{Rk,s}$	[kN]	9 (8)	15 (13)	21	39	5	9	15
	8.8	$V^0_{Rk,s}$	[kN]	15 (13)	23 (21)	34	63	8	14	23
Stainless steel A2, A4 and HCR, class (A2 only class 50 and 70)	50	$V^0_{Rk,s}$	[kN]	9	15	21	39	-3)	-3)	-3)
	70	$V^0_{Rk,s}$	[kN]	13	20	30	55	7	13	20
	80	$V^0_{Rk,s}$	[kN]	15	23	34	63	-3)	-3)	-3)

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances
β-factors for job site testing under tension load
Characteristic steel resistance under tension and shear load

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C2: Characteristic steel resistance (continuation)

Anchor size				**M8**	**M10**	**M12**	**M16**	**IG-M6**	**IG-M8**	**IG-M10**
Cross section area		A_s	[mm²]	36,6	58	84,3	157	-	-	-
Characteristic shear resistance, Steel failure with lever arm [1]										
Steel, Property class	4.6 and 4.8	$M^0_{Rk,s}$	[Nm]	15 (13)	30 (27)	52	133	3)	3)	3)
	5.6 and 5.8	$M^0_{Rk,s}$	[Nm]	19 (16)	37 (33)	65	166	8	19	37
	8.8	$M^0_{Rk,s}$	[Nm]	30 (26)	60 (53)	105	266	12	30	60
Stainless steel A2, A4 and HCR, class (A2 only class 50 and 70)	50	$M^0_{Rk,s}$	[Nm]	19	37	66	167	3)	3)	3)
	70	$M^0_{Rk,s}$	[Nm]	26	52	92	232	11	26	52
	80	$M^0_{Rk,s}$	[Nm]	30	59	105	266	3)	3)	3)
Characteristic shear resistance, Partial factor [2]										
Steel, Property class	4.6 and 5.6	$\gamma_{Ms,V}$	[-]	1,67				3)		
	4.8, 5.8 and 8.8	$\gamma_{Ms,V}$	[-]	1,25						
Stainless steel A2, A4 and HCR, class (A2 only class 50 and 70)	50	$\gamma_{Ms,V}$	[-]	2,38				3)		
	70	$\gamma_{Ms,V}$	[-]	1,56						
	80	$\gamma_{Ms,V}$	[-]	1,33				3)		

1) Values are only valid for the given stress area A_s. Values in brackets are valid for undersized threaded rods with smaller stress area A_s for hot-dip galvanised threaded rods according to EN ISO 10684:2004+AC:2009.
2) in absence of national regulation
3) Fastener type not part of the ETA

Table C3: Characteristic steel resistance under fire exposure [1]

Anchor size				**M8**	**M10**	**M12**	**M16**	**IG-M6**	**IG-M8**	**IG-M10**
Characteristic tension resistance, Steel failure										
Steel, Property class 5.8, and higher; Stainless steel A2, A4 and HCR, class 50 and higher	R30	$N_{Rk,s,fi}$	[kN]	1,1	1,7	3,0	5,7	0,3	1,1	1,7
	R60	$N_{Rk,s,fi}$	[kN]	0,9	1,4	2,3	4,2	0,2	0,9	1,4
	R90	$N_{Rk,s,fi}$	[kN]	0,7	1,0	1,6	3,0	0,2	0,7	1,0
	R120	$N_{Rk,s,fi}$	[kN]	0,5	0,8	1,2	2,2	0,1	0,5	0,8
Characteristic shear resistance, Steel failure without lever arm										
Steel, Property class 5.8, and higher; Stainless steel A2, A4 and HCR, class 50 and higher	R30	$V_{Rk,s,fi}$	[kN]	1,1	1,7	3,0	5,7	0,3	1,1	1,7
	R60	$V_{Rk,s,fi}$	[kN]	0,9	1,4	2,3	4,2	0,2	0,9	1,4
	R90	$V_{Rk,s,fi}$	[kN]	0,7	1,0	1,6	3,0	0,2	0,7	1,0
	R120	$V_{Rk,s,fi}$	[kN]	0,5	0,8	1,2	2,2	0,1	0,5	0,8
Characteristic shear resistance, Steel failure with lever arm										
Steel, Property class 5.8, and higher; Stainless steel A2, A4 and HCR, class 50 and higher	R30	$M_{Rk,s,fi}$	[Nm]	1,1	2,2	4,7	12,0	0,2	1,1	2,2
	R60	$M_{Rk,s,fi}$	[Nm]	0,9	1,8	3,5	9,0	0,2	0,9	1,8
	R90	$M_{Rk,s,fi}$	[Nm]	0,7	1,3	2,5	6,3	0,1	0,7	1,3
	R120	$M_{Rk,s,fi}$	[Nm]	0,5	1,0	1,8	4,7	0,1	0,5	1,0

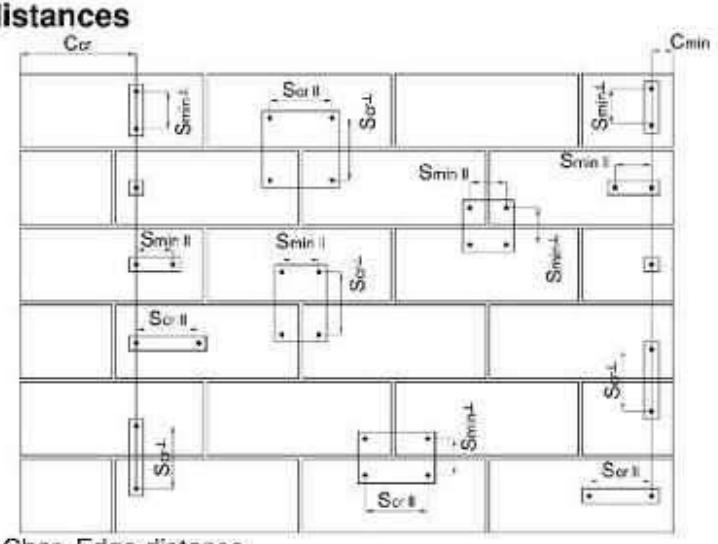
1) partial factor in case of fire is 1,0 for all steel types and load directions.

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

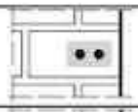
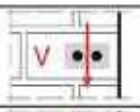
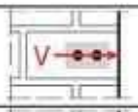
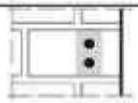
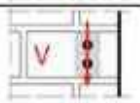
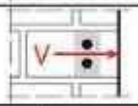
Performances
Characteristic steel resistance under tension and shear load – under fire exposure

Annex C 2

Spacing and edge distances



c_{cr} = Char. Edge distance
c_{min} = Minimum Edge distance
$s_{cr,ll}$; ($s_{min,ll}$) = Characteristic (minimum) spacing for anchors placed parallel to horizontal joint
$s_{cr,\perp}$; ($s_{min,\perp}$) = Characteristic (minimum) spacing for anchors placed perpendicular to horizontal joint

Load direction / Anchor position	Tension load		Shear load parallel to free edge V_{ll}		Shear load perpendicular to free edge $V_{\perp}$	
Anchors parallel to horizontal joint $s_{cr,ll}$; ($s_{min,ll}$)		$\alpha_{g\,ll,N}$		$\alpha_{g\,ll,V\,ll}$		$\alpha_{g\,ll,V\,\perp}$
Anchors vertical to horizontal joint $s_{cr,\perp}$; ($s_{min,\perp}$)		$\alpha_{g\,\perp,N}$		$\alpha_{g\,\perp,V\,ll}$		$\alpha_{g\,\perp,V\,\perp}$

$\alpha_{edge,N}$ = Reduction factor for tension loads at the free edge for $c_{min} \le c < c_{cr}$ (single anchor)
$\alpha_{edge,V\perp}$ = Reduction factor for shear loads perpendicular to the free edge for $c_{min} \le c < c_{cr}$ (single anchor)
$\alpha_{edge,V\,ll}$ = Reduction factor for shear loads parallel to the free edge for $c_{min} \le c < c_{cr}$ (single anchor)
$\alpha_{g\,ll,N}$ = Group factor for anchors parallel to horizontal joint under tension load
$\alpha_{g\perp,N}$ = Group factor for anchors perpendicular to horizontal joint under tension load
$\alpha_{g\,ll,V\,ll}$ = Group factor for anchors parallel to horizontal joint under shear load parallel to the free edge
$\alpha_{g\perp V\,ll}$ = Group factor for anchors perpendicular to horizontal joint under shear load parallel to the free edge
$\alpha_{g\,ll,V\perp}$ = Group factor for anchors parallel to horizontal joint under shear load perpendicular to the free edge
$\alpha_{g\perp V\perp}$ = Group factor for anchors perpendicular to hor. joint under shear load perpendicular to the free edge

Single anchor at the edge:
$N_{Rk,b,c} = \alpha_{edge,N} * N_{RK,b}$ resp. $N_{Rk,p,c} = \alpha_{edge,N} * N_{RK,p}$
$V_{Rk,c\,ll} = \alpha_{edge,V\,ll} * V_{Rk,b}$
$V_{Rk,c\perp} = \alpha_{edge,V\perp} * V_{Rk,b}$

Group of 2 anchors:
$N^{g}_{Rk} = \alpha_{g,N} * N_{RK,b}$
$V^{g}_{Rk\,ll} = \alpha_{g,V\,ll} * V_{Rk,b}$ resp. $V^{g}_{Rk\perp} = \alpha_{g,V\perp} * V_{Rk,b}$ (for $c \ge c_{cr}$)
$V^{g}_{Rk,c\,ll} = \alpha_{g,V\,ll} * V_{Rk,b}$ resp. $V^{g}_{Rk,c\perp} = \alpha_{g,V\perp} * V_{Rk,b}$ (for $c \ge c_{min}$)

Group of 4 anchors:
$N^{g}_{Rk} = \alpha_{g\,ll,N} * \alpha_{g\perp,N} * N_{RK,b}$
$V^{g}_{Rk\,ll} = \alpha_{g\,ll,V\,ll} * \alpha_{g\perp V\,ll} * V_{Rk,b}$ resp. $V^{g}_{Rk\perp} = \alpha_{g\,ll,V\perp} * \alpha_{g\perp V\perp} * V_{Rk,b}$ (for $c \ge c_{cr}$)
$V^{g}_{Rk,c\,ll} = \alpha_{g\,ll,V\,ll} * \alpha_{g\perp V\,ll} * V_{Rk,b}$ resp. $V^{g}_{Rk,c\perp} = \alpha_{g\,ll,V\perp} * \alpha_{g\perp V\perp} * V_{Rk,b}$ (for $c \ge c_{min}$)

Equations depend on anchor position and load direction (see table above). Reduction factor, group factor and resistances see annex C 4 – C 56. Reduction for installation in joints see annex B 1.

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances
Definition of the reduction- and group factors

Annex C 3

Deutsches Institut für Bautechnik DIBt

Brick type: Autoclaved aerated concrete – AAC

Table C4: Stone description

Brick type		Autoclaved aerated concrete AAC
Density	ρ [kg/dm³]	0,35 – 0,6
Normalised mean compressive strenght	f_b [N/mm²]	≥ 2, ≥ 4 or ≥ 6
Code		EN 771-4:2011+A1:2015
Producer (Country)		e.g. Porit (DE)
Brick dimensions	[mm]	≥ 499 x 240 x 249
Drilling method		Rotary drilling



Table C5: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 10
Char. Edge distance	c_{cr}	[mm]	150 (for shear loads perpendicular to the free edge: c_{cr} = 210)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	300						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C6: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	0,85		50	0,12		50	0,70
				125	0,50		125	0,85
	150	1,00		210	1,00		150	1,00

Table C7: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	1,10		50	50	0,75
	150	50	1,25		150	50	0,90
	150	300	2,00		150	250	2,00

Table C8: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\parallel,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
		50	50	0,20		50	50	0,25
		210	50	1,60		210	50	1,80
		210	300	2,00		210	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\parallel,V\parallel}$		with c ≥	with s ≥	$\alpha_{g\perp,V\parallel}$
		50	50	1,15		50	50	0,80
		150	50	1,60		150	50	1,10
		150	300	2,00		150	250	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances Autoclaved Aerated Concrete - AAC
Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 4

Deutsches Institut für Bautechnik DIBt

Brick type: Autoclaved aerated concrete – AAC

Table C9: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
	d_s	h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [1]			$N_{Rk,b} = N_{Rk,p}$ [1]			$V_{Rk,b}$ [1]
	[mm]	[mm]	[kN]						
Normalised mean compressive strenght $f_b \geq 2$ N/mm²; Density $\rho \geq 0{,}35$ kg/dm³									
M8	-	80	1,2	0,9	0,9	0,9	0,9	0,9	1,5
M10 / IG-M6	-	90	1,2	0,9	0,9	0,9	0,9	0,9	2,5
M12 / M16 / IG-M8 / IG-M10	-	100	2,0	1,5	1,5	1,5	1,5	1,5	2,5
M8	SH 12	80	1,2	0,9	0,9	0,9	0,9	0,9	1,5
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	0,9	0,9	0,9	0,9	0,9	2,5
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	2,0	1,5	1,5	1,5	1,5	1,5	2,5

1) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\parallel} = V_{Rk,c\perp}$ according to Annex C 3

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
	d_s	h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [1]			$N_{Rk,b} = N_{Rk,p}$ [1]			$V_{Rk,b}$ [1]
	[mm]	[mm]	[kN]						
Normalised mean compressive strenght $f_b \geq 4$ N/mm²; Density $\rho \geq 0{,}50$ kg/dm³									
M8	-	80	3,0	2,5	2,0	2,5	2,0	2,0	4,5
M10 / IG-M6	-	90	3,0	2,5	2,0	2,5	2,0	2,0	7,5
M12 / M16 / IG-M8 / IG-M10	-	100	5,0	4,5	4,0	4,5	4,0	4,0	7,5
M8	SH 12	80	3,0	2,5	2,0	2,5	2,0	2,0	4,5
M8 / M10/ IG-M6	SH 16	≥ 85	3,0	2,5	2,0	2,5	2,0	2,0	7,5
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	5,0	4,5	4,0	4,5	4,0	4,0	7,5

1) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\parallel} = V_{Rk,c\perp}$ according to Annex C 3

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances autoclaved aerated concrete - AAC
Characteristic Resistances and Displacements

Annex C 5

Deutsches Institut für Bautechnik DIBt

Brick type: Autoclaved aerated concrete – AAC

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [1]			$N_{Rk,b} = N_{Rk,p}$ [1]			$V_{Rk,b}$ [1]
		[mm]	[kN]						
Normalised mean compressive strenght $f_b \geq 6$ N/mm²; Density $\rho \geq 0{,}60$ kg/dm³									
M8	-	80	4,0	3,5	3,0	3,5	3,0	3,0	6,0
M10 / IG-M6	-	90	4,0	3,5	3,0	3,5	3,0	3,0	10,0
M12 / M16 / IG-M8 / IG-M10	-	100	7,0	6,0	5,5	6,5	5,5	5,5	10,0
M8	SH 12	80	4,0	3,5	3,0	3,5	3,0	3,0	6,0
M8 / M10/ IG-M6	SH 16	≥ 85	4,0	3,5	3,0	3,5	3,0	3,0	10,0
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	7,0	6,0	5,5	6,5	5,5	5,5	10,0

1) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,I}$ according to Annex C 3

Table C10: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	$0{,}1 \cdot N_{Rk} / 2{,}8$	$2 \cdot \delta_{N0}$	0,3	$0{,}3 \cdot V_{Rk} / 2{,}8$	$1{,}5 \cdot \delta_{V0}$
M16	all				0,1	$0{,}1 \cdot V_{Rk} / 2{,}8$	$1{,}5 \cdot \delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances autoclaved aerated concrete – AAC
Characteristic Resistances and Displacements

Annex C 6

Deutsches Institut für Bautechnik DIBt

Brick type: Solid calcium silica brick KS-NF

Table C11: Stone description

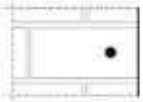
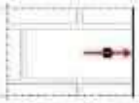
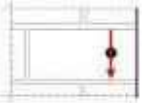
Brick type		Solid calcium silica brick KS-NF
Density	ρ [kg/dm³]	≥ 2,0
Normalised mean compressive strenght	f_b [N/mm²]	≥ 28
Conversion factor for lower compressive strengths		$(f_b / 28)^{0,5} \leq 1,0$
Code		EN 771-2:2011+A1:2015
Producer (Country)		e.g. Wemding (DE)
Brick dimensions	[mm]	≥ 240 x 115 x 71
Drilling method		Hammer drilling



Table C12: Installation parameter

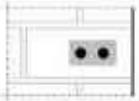
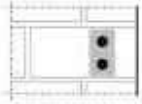
Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 10	≤ 10	≤ 15	≤ 15	≤ 10	≤ 10	≤ 10
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	150 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 240)						
Minimum Edge Distance	c_{min}	[mm]	60						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	240 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	150 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	75						

Table C13: Reduction factors for single anchors at the edge

Tension load			Shear load perpendicular to free edge			Shear load parallel to free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	60[1]	0,50		60	0,30		60	0,60
	100[1]	0,50		100	0,50		100	1,00
	150[1]	1,00		240	1,00		150	1,00
	180	1,00						

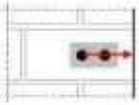
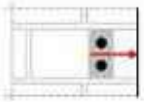
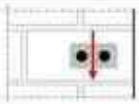
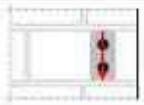
1) All applications, except for hef = 200mm and without sleeve

Table C14: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	60[1]	75	0,70		60[1]	75	1,15
	150[1]	75	1,40		150[1]	75	2,00
	150[1]	240	2,00		150[1]	150	2,00
	180[2]	75	1,00		180[2]	75	1,15
	180[2]	240	1,70		180[2]	150	2,00
	240[2]	240	2,00				

1) All applications, except for hef = 200mm and without sleeve
2) Only for application with h_{ef} = 200mm and without sleeve

Table C15: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\parallel,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
		60	75	0,75		60	75	0,90
		150	75	2,00		150	75	2,00
		150	240	2,00		150	150	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\parallel,V\parallel}$		with c ≥	with s ≥	$\alpha_{g\perp,V\parallel}$
		60	75	2,00		60	75	2,00
		150	75	2,00		150	75	2,00
		150	240	2,00		150	150	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid calcium silica brick KS-NF
Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 7

Deutsches Institut für Bautechnik DIBt

Brick type: Solid calcium silica brick KS-NF

Table C16: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/w (w/d)
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 28$ N/mm² [1]									
M8	-	80	7,0	6,5	5,0	6,0	5,5	4,0	7,0
M10 / IG-M6	-	≥ 90							
M12 / IG-M8	-	≥ 100							
M16 / IG-M10	-	≥ 100	7,0	6,5	5,0	7,0	6,5	5,0	
M10 / M12 / M16 / IG-M6 / IG-M8 / IG-M10	-	200	9,0	8,5	6,5	5,5	5,0	4,0	
M8	SH 12	80	7,0	6,5	5,0	6,0	5,5	4,0	
M8 / M10/ IG-M6	SH 16	≥ 85	7,0	6,5	5,0	7,0	6,5	5,0	
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C11. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\parallel} = V_{Rk,c\perp}$ according to Annex C 3

Table C17: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	$0{,}1 * N_{Rk} / 3{,}5$	$2 * \delta_{N0}$	0,3	$0{,}3 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$
M16	all				0,1	$0{,}1 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$

Table C18: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effective anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8	-	80	0,48	0,41	0,34	0,30
M10 / IG-M6	-	≥ 90				
M12 / IG-M8	-	≥ 100				
M16 / IG-M10	-	≥ 100				
M8	SH 12	80	0,47	0,26	- [1]	- [1]
M8 / M10 /IG-M6	SH 16	≥ 85				
M12 / M16 / IG-M8 /IG-M10	SH 20	≥ 85				

1) no performance assessed

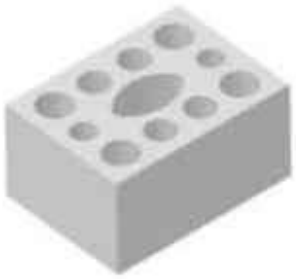
Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry	**Annex C 8**
Performances solid calcium silica brick KS-NF Characteristic Resistances and Displacements	

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Calcium silica brick KSL-3DF

Table C19: Stone description

Brick type		Hollow calcium silica brick KSL-3DF
Density	ρ [kg/dm³]	≥ 1,4
Normalised mean compressive strenght	f_b [N/mm²]	≥ 14
Conversion factor for lower compressive strengths		$(f_b / 14)^{0,75} \leq 1,0$
Code		EN 771-2:2011+A1:2015
Producer (Country)		e.g. KS-Wemding (DE)
Brick dimensions	[mm]	≥ 240 x 175 x 113
Drilling method		Rotary drilling



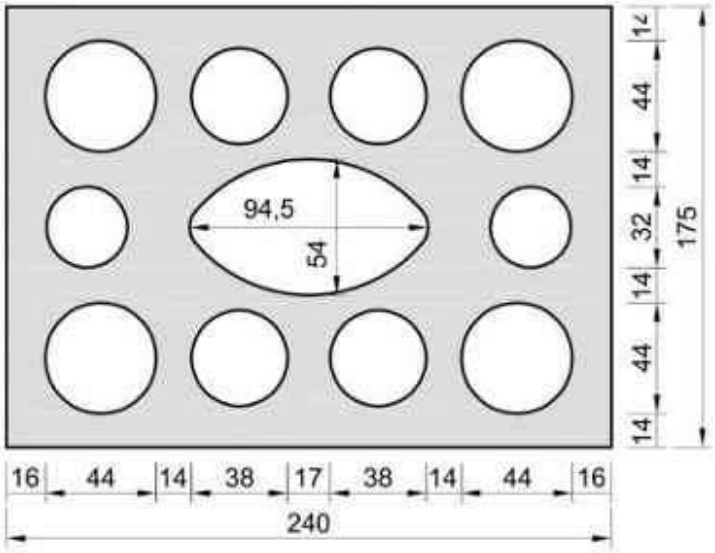


Table C20: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 8	≤ 8	≤ 5	≤ 8	≤ 8
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 240)						
Minimum Edge Distance	c_{min}	[mm]	60						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	240						
	$s_{cr,\perp}$	[mm]	120						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	120						

Table C21: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	60	1,00		60	0,30		60	1,00
	120	1,00		240	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow calcium silica brick KSL-3DF
Description of the stone, Installation parameters, Reductionfactors

Annex C 9

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Calcium silica brick KSL-3DF

Table C22: Factors for anchor groups under tension load

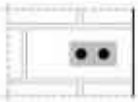
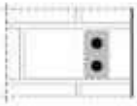
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	60	120	1,50		60	120	1,00
	120	120	2,00				
	120	240	2,00		120	120	2,00

Table C23: Factors for anchor groups under shear load

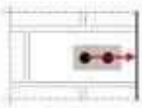
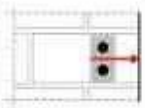
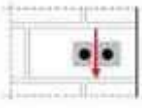
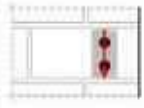
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		60	120	0,30		60	120	0,30
		120	120	1,00				
		120	240	2,00		240	120	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		60	120	1,00		60	120	1,00
		120	120	1,60				
		120	240	2,00		120	120	2,00

Table C24: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}							
			Use condition							
			d/d			w/d w/w			d/d w/d w/w	
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges	
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]	
		[mm]	[kN]							
Normalised mean compressive strength $f_b \geq 14$ N/mm² [1)]										
M8 / M10/ IG-M6	SH 16	≥ 85	2,5	2,5	1,5	2,5	2,5	1,5	6,0	
		130	2,5	2,5	2,0	2,5	2,5	2,0	6,0	
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85	6,5	6,0	4,5	6,5	6,0	4,5	6,0	

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C19. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C25: Displacements

Anchor size	h_{ef} [mm]	$\delta N / N$ [mm/kN]	$\delta N0$ [mm]	$\delta N\infty$ [mm]	$\delta V / V$ [mm/kN]	$\delta V0$ [mm]	$\delta V\infty$ [mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk} / 3,5$	$2*\delta N0$	0,55	$0,55*V_{Rk} / 3,5$	$1,5*\delta V0$
M16	all				0,31	$0,31*V_{Rk} / 3,5$	$1,5*\delta V0$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow calcium silica brick KSL-3DF
Group factors, characteristic Resistances and Displacements

Annex C 10

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Calcium silica brick KSL-8DF

Table C26: Stone description

Brick type		Hollow Calcium silica brick KSL-8DF
Density	ρ [kg/dm³]	≥ 1,4
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0,75} \leq 1,0$
Code		EN 771-2:2011+A1:2015
Producer (Country)		e.g. KS-Wemding (DE)
Brick dimensions	[mm]	≥ 248 x 240 x 238
Drilling method		Rotary drilling



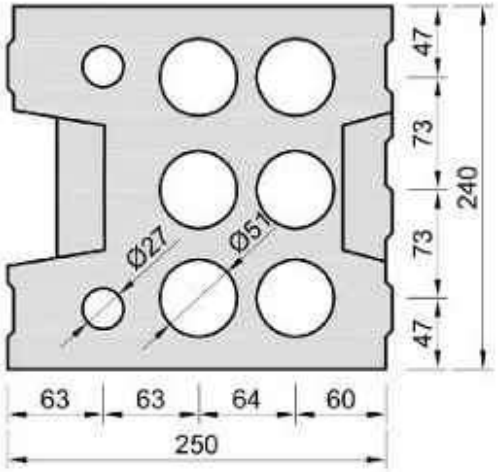


Table C27: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 8	≤ 8	≤ 5	≤ 8	≤ 8
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	120						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C28: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,30		50	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow calcium silica brick KSL-8DF
Description of the stone, Installation parameters, Reductionfactors

Annex C 11

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Calcium silica brick KSL-8DF

Table C29: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,00		50	50	1,00
	120	250	2,00		120	120	2,00

Table C30: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,45		50	50	0,45
		250	50	1,15		250	50	1,20
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,30		50	50	1,00
		120	250	2,00		120	250	2,00

Table C31: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All Temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ 2)			$N_{Rk,b} = N_{Rk,p}$ 2)			$V_{Rk,b}$ 2)
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 12$ N/mm² 1)									
M8 / M10/ IG-M6	SH 16	130	5,0	4,5	3,5	5,0	4,5	3,5	3,5
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 130	5,0	4,5	3,5	5,0	4,5	3,5	6,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C26. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C32: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*δ_{N0}	0,55	0,55*V_{Rk} / 3,5	1,5*δ_{V0}
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*δ_{V0}

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow calcium silica brick KSL-8DF
Group factors, characteristic Resistances and Displacements

Annex C 12

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Calcium silica brick KSL-12DF

Table C33: Stone description

Brick type		Hollow Calcium silica brick KSL-12DF
Density	ρ [kg/dm³]	≥ 1,4
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0,75} \leq 1,0$
Code		EN 771-2:2011+A1:2015
Producer (Country)		e.g. KS-Wemding (DE)
Brick dimensions	[mm]	≥ 498 x 175 x 238
Drilling method		Rotary drilling



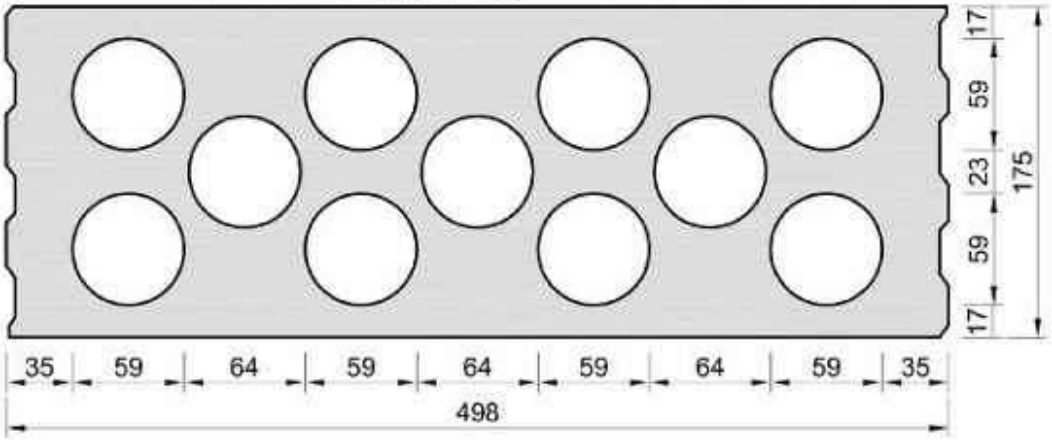


Table C34: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 4	≤ 4	≤ 5	≤ 5	≤ 4	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 500)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	500 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	120 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C35: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,45		50	1,00
	120	1,00		500	1,00		120	1,00

Table C36: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	1,50		50	50	1,00
	120	500	2,00		120	240	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow calcium silica brick KSL-12DF
Description of the stone, Installation parameters, Reductionfactors

Annex C 13

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Calcium silica brick KSL-12DF

Table C37: Factors for anchor groups under shear load

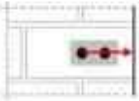
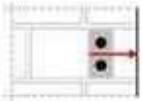
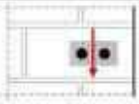
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
		50	50	0,55		50	50	0,50
		500	50	1,00		500	50	1,00
		500	500	2,00		500	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\perp,V\,II}$
		50	50	2,00		50	50	1,30
		120	500	2,00		120	250	2,00

Table C38: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/w (w/d)
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ 2)			$N_{Rk,b} = N_{Rk,p}$ 2)			$V_{Rk,b}$ 2)
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 12$ N/mm² 1)									
M8 / M10/ IG-M6	SH 16	130	3,5	3,5	2,5	3,5	3,5	2,5	3,5
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 130	3,5	3,5	2,5	3,5	3,5	2,5	7,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C33. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C39: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*δ_{N0}	0,55	0,55*V_{Rk} / 3,5	1,5*δ_{V0}
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*δ_{V0}

Table C40: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effective anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8 / M10 /IG-M6	SH 16	130	0,37	0,27	0,17	-1)
M12 / IG-M8	SH 20	≥ 130				
M16 / IG-M10	SH 20	≥ 130				0,12

1) no performance assessed

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow calcium silica brick KSL-12DF
Group factors, characteristic Resistances and Displacements

Annex C 14

Deutsches Institut für Bautechnik DIBt

Brick type: Solid clay brick 1DF

Table C41: Stone description

Brick type		Solid clay brick Mz-1DF
Density	ρ [kg/dm³]	≥ 2,0
Normalised mean compressive strenght	f_b [N/mm²]	≥ 20
Conversion factor for lower compressive strengths		$(f_b / 20)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	≥ 240 x 115 x 55
Drilling method		Hammer drilling



Table C42: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Char. Edge distance	c_{cr}	[mm]	150 (for shear loads perpendicular to the free edge: c_{cr} = 240)						
Minimum Edge Distance	c_{min}	[mm]	60						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	240						
	$s_{cr,\perp}$	[mm]	130						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	65						

Table C43: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	60	0,75		60	0,10		60	0,30
	150	1,00		100	0,50		100	0,65
	180	1,00		240	1,00		150	1,00

Table C44: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	60	65	0,85		60	65	1,00
	150	65	1,15		150	65	1,20
	150	240	2,00		150	130	2,00

Table C45: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\parallel,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
		60	65	0,40		60	65	0,30
		240	65	2,00		240	65	2,00
		240	240	2,00		240	130	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\parallel,V\parallel}$		with c ≥	with s ≥	$\alpha_{g\perp,V\parallel}$
		60	65	1,75		60	65	1,10
		150	65	2,00		150	65	2,00
		150	240	2,00		150	130	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid clay brick 1DF
Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 15

Brick type: Solid clay brick 1DF

Table C46: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 20$ N/mm² [1)]									
M8	-	80	7,0	6,0	6,0	7,0	6,0	6,0	8,0
M10 / IG-M6	-	≥ 90							
M12 / IG-M8	-	≥ 100							
M16 / IG-M10	-	≥ 100	8,0	6,5	6,5	8,0	6,5	6,5	12,0
M8	SH 12	80	7,0	6,0	6,0	7,0	6,0	6,0	8,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20								
M16 / IG-M10	SH 20	≥ 85	8,0	6,5	6,5	8,0	6,5	6,5	12,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C41. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,I}$ according to Annex C 3

Table C47: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	0,1*N_{Rk} / 3,5	2*δ_{N0}	0,3	0,3*V_{Rk} / 3,5	1,5*δ_{V0}
M16	all				0,1	0,1*V_{Rk} / 3,5	1,5*δ_{V0}

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid clay brick 1DF
Characteristic Resistances and Displacements

Annex C 16

Deutsches Institut für Bautechnik DIBt

Brick type: Solid clay brick 2DF

Table C48: Stone description

Brick type		Solid clay brick Mz- 2DF
Density	ρ [kg/dm³]	≥ 2,0
Normalised mean compressive strenght	f_b [N/mm²]	≥ 28
Conversion factor for lower compressive strengths		$(f_b / 28)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	≥ 240 x 115 x 113
Drilling method		Hammer drilling



Table C49: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	150 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 240)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	240 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	240 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C50: Reduction factors for single anchors at the edge

Tension load		Shear load perpendicular to free edge		Shear load parallel to free edge	
with c ≥	$\alpha_{edge,N}$	with c ≥	$\alpha_{edge,V\perp}$	with c ≥	$\alpha_{edge,V\parallel}$
50[1]	1,00	50	0,20	50	1,00
150[1]	1,00	125	0,50		
180	1,00	240	1,00	150	1,00

1) All applications, except for hef = 200mm and without sleeve

Table C51: Factors for anchor groups under tension load

Anchor position parallel to hor. joint			Anchor position perpendicular to hor. joint		
with c ≥	with s ≥	$\alpha_{g\parallel,N}$	with c ≥	with s ≥	$\alpha_{g\perp,N}$
50[1]	50	1,50	50[1]	50	0,80
150[1]	240	2,00	150[1]	240	2,00
180[2]	60	1,00	180[2]	60	1,00
180[2]	240	1,55	180[2]	120	2,00
240[2]	240	2,00			

1) All applications, except for hef = 200mm and without sleeve
2) Only for application with hef = 200mm and without sleeve

Table C52: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
Shear load perpendicular to the free edge	50	50	0,40		50	50	0,20
	240	50	1,20		240	50	0,60
	240	240	2,00		240	125	1,00
					240	240	2,00
	with c ≥	with s ≥	$\alpha_{g\parallel,V\parallel}$		with c ≥	with s ≥	$\alpha_{g\perp,V\parallel}$
Shear load parallel to the free edge	50	50	1,20		50	50	1,00
	150	240	2,00		50	125	1,00
					150	240	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid clay brick 2DF
Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 17

Deutsches Institut für Bautechnik DIBt

Brick type: Solid clay brick 2DF

Table C53: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 28$ N/mm² [1]									
M8	-	80	9,0	9,0	7,5	9,0	9,0	7,5	9,5
M10 / IG-M6	-	≥ 90							
M12 / IG-M8	-	≥ 100	9,0	9,0	7,5	9,0	9,0	7,5	12
M16 / IG-M10	-	≥ 100	9,0	9,0	7,5	9,0	9,0	7,5	12 [3]
M10 / M12 / IG-M6 / IG-M8	-	200	11,5	11,5	10,0	6,0	6,0	5,0	8,0
M16 / IG-M10	-	200	11,5	11,5	10,0	6,0	6,0	5,0	12,0
M8	SH 12	80	9,0	9,0	7,5	9,0	9,0	7,5	9,5
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	12,0
M16 / IG-M10	SH 20	≥ 85	9,0	9,0	7,5	9,0	9,0	7,5	12,0 [3]

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C48. For stones with higher strengths, the shown values are valid without conversion.
2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\parallel} = V_{Rk,c\perp}$ according to Annex C 3
3) Valid for all stone strengths with min. 10 N/mm²

Table C54: Displacements

Anchor size	h_{ef} [mm]	δN / N [mm/kN]	δN_0 [mm]	δN_∞ [mm]	δV / V [mm/kN]	δV_0 [mm]	δV_∞ [mm]
M8 – M12 / IG-M6 – M10	all	0,1	$0,1 * N_{Rk} / 3,5$	$2 * \delta N_0$	0,3	$0,3 * V_{Rk} / 3,5$	$1,5 * \delta V_0$
M16	all				0,1	$0,1 * V_{Rk} / 3,5$	$1,5 * \delta V_0$

Table C55: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8	-	80	0,51	0,44	0,36	0,33
M10 / IG-M6	-	≥ 90				
M12 / IG-M8	-	≥ 100				
M16 / IG-M10	-	≥ 100				
M8	SH 12	80	0,36	0,26	0,15	0,10
M8 / M10 /IG-M6	SH 16	≥ 85	0,36	0,26	0,15	0,10
		130	0,92	0,74	0,57	0,49
M12 / M16 / IG-M8 /IG-M10	SH 20	≥ 85	0,36	0,26	0,15	0,10
		≥ 130	0,92	0,74	0,57	0,49

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid clay brick 2DF
Characteristic Resistances and Displacements

Annex C 18

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick 10 DF

Table C56: Stone description

Brick type		Hollow clay brick HLZ-10DF
Density	ρ [kg/dm³]	≥ 1,25
Normalised mean compressive strenght	f_b [N/mm²]	≥ 20
Conversion factor for lower compressive strengths		$(f_b / 20)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	300 x 240 x 249
Drilling method		Rotary drilling



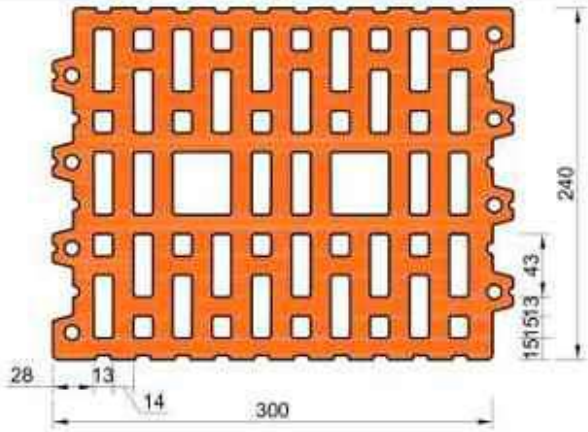


Table C57: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 10	≤ 10	≤ 10	≤ 5	≤ 5	≤ 10
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 300)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	300 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	250 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C58: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,20		50	1,00
	120	1,00		300	1,00		120	1,00

Table C59: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	1,55		50	50	1,00
	120	300	2,00		120	250	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick HLZ 10DF
Description of the stone, Installation parameters, Reductionfactors

Annex C 19

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick 10 DF

Table C60: Factors for anchor groups under shear load

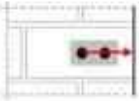
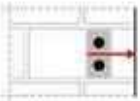
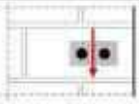
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,30		50	50	0,20
		300	50	1,40		300	50	1,00
		300	300	2,00		300	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,85		50	50	1,00
		120	300	2,00		120	250	2,00

Table C61: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 20$ N/mm² [1]									
M8	SH 12	80	2,5	2,5	2,0	2,5	2,5	2,0	8,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85	5,0	5,0	4,5	5,0	5,0	4,5	8,0
M16 / IG-M10	SH 20	≥ 85	5,0	5,0	4,5	5,0	5,0	4,5	11,5

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C56. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,I}$ according to Annex C 3

Table C62: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk}$ / 3,5	$2*\delta_{N0}$	0,55	$0,55*V_{Rk}$ / 3,5	$1,5*\delta_{V0}$
M16	all				0,31	$0,31*V_{Rk}$ / 3,5	$1,5*\delta_{V0}$

Table C63: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8 / M10 /IG-M6	SH 16	130	0,57	0,39	0,21	0,12
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130				

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick HLZ 10DF
Group factors, characteristic Resistances and Displacements

Annex C 20

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Porotherm Homebric

Table C64: Stone description

Brick type		Hollow clay brick Porotherm Homebric
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f_b [N/mm²]	≥ 10
Conversion factor for lower compressive strengths		$(f_b / 10)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (FR)
Brick dimensions	[mm]	500 x 200 x 300
Drilling method		Rotary drilling



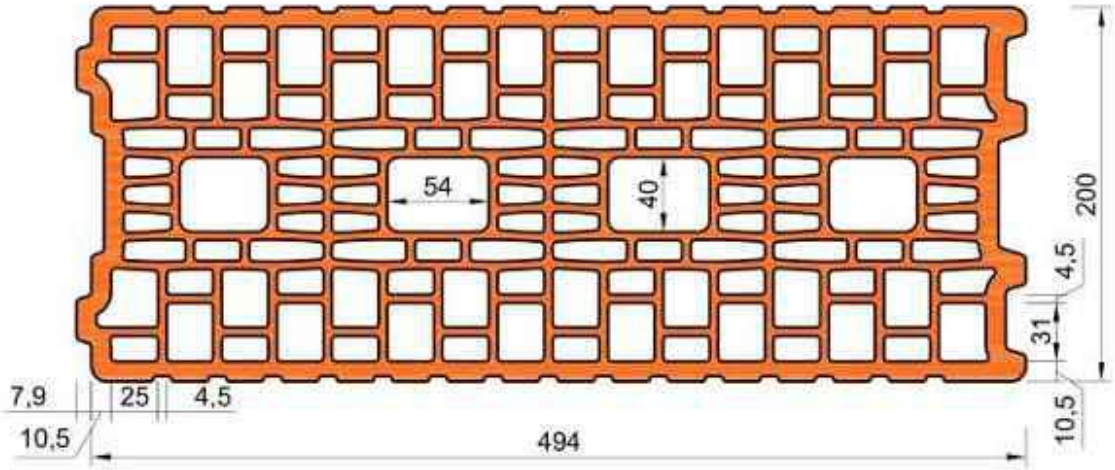


Table C65: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 500)						
Minimum Edge Distance	c_{min}	[mm]	120						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	500						
	$s_{cr,\perp}$	[mm]	300						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	120						

Table C66: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	120	1,00		120	0,30		120	0,60
				250	0,60			
	120	1,00		500	1,00		200	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Porotherm Homebric
Description of the stone, Installation parameters, Reductionfactors

Annex C 21

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Porotherm Homebric

Table C67: Factors for anchor groups under tension load

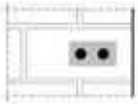
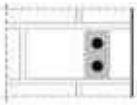
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	120	100	1,00		120	100	1,00
	200	100	2,00		200	100	1,20
	120	500	2,00		120	300	2,00

Table C68: Factors for anchor groups under shear load

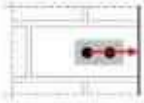
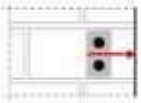
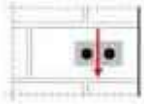
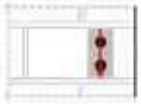
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		120	100	0,30		120	100	0,30
		250	100	0,60		250	100	0,60
		500	100	1,00		120	300	2,00
		120	500	2,00				
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		120	100	1,00		120	100	1,00
		120	500	2,00		120	300	2,00

Table C69: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ 2)			$N_{Rk,b} = N_{Rk,p}$ 2)			$V_{Rk,b}$ 2)
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 10$ N/mm² 1)									
M8	SH 12	80	1,2						3,0
M8 / M10/ IG-M6	SH 16	≥ 85	1,2						3,0
		130	1,5						3,5
M12 / M16/ IG-M8 / IG-M10	SH 20	≥ 85	1,2						4,0
		≥ 130	1,5						4,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C64. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C70: Displacements

Anchor size	h_{ef}	δN / N	δN_0	δN_∞	δV / V	δV_0	δV_∞
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*δN_0	0,55	0,55*V_{Rk} / 3,5	1,5*δV_0
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*δV_0

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Porotherm Homebric
Group factors, characteristic Resistances and Displacements

Annex C 22

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick BGV Thermo

Table C71: Stone description

Brick type		Hollow clay brick BGV Thermo
Density	ρ [kg/dm³]	≥ 0,60
Normalised mean compressive strenght	f_b [N/mm²]	≥ 10
Conversion factor for lower compressive strengths		$(f_b / 10)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Leroux (FR)
Brick dimensions	[mm]	500 x 200 x 314
Drilling method		Rotary drilling



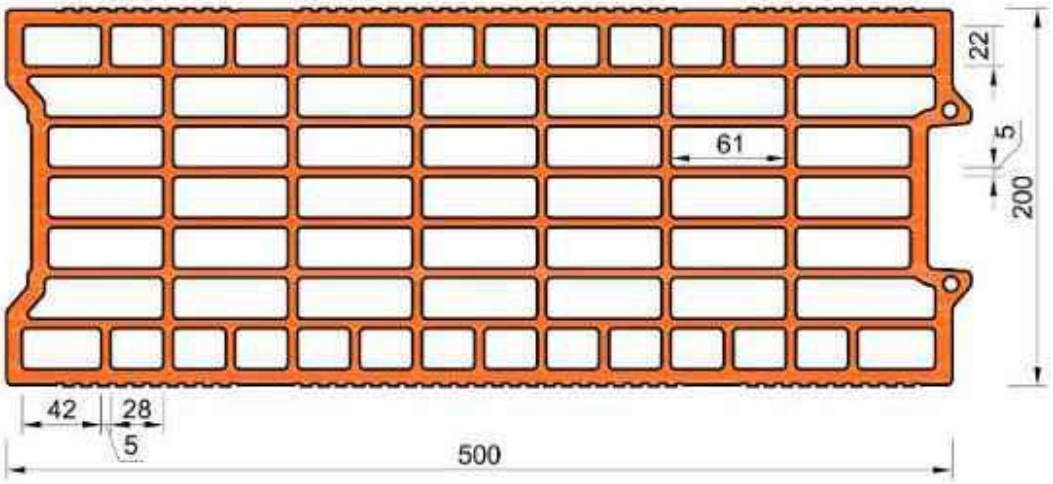


Table C72: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 500)						
Minimum Edge Distance	c_{min}	[mm]	120						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	500						
	$s_{cr,\perp}$	[mm]	315						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	120						

Table C73: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	120	1,00		120	0,30		120	0,60
				250	0,60			
	120	1,00		500	1,00		250	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick BGV Thermo
Description of the stone, Installation parameters, Reductionfactors

Annex C 23

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick BGV Thermo

Table C74: Factors for anchor groups under tension load

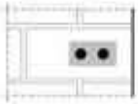
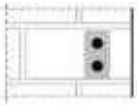
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	120	100	1,00		120	100	1,00
	200	100	1,70		200	100	1,10
	120	500	2,00		120	315	2,00

Table C75: Factors for anchor groups under shear load

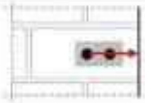
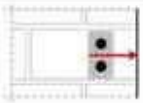
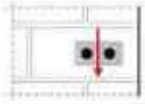
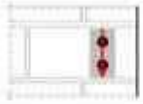
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		120	100	1,00		120	100	1,00
		120	500	2,00		120	315	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		120	100	1,00		120	100	1,00
		120	500	2,00		120	315	2,00

Table C76: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effecive Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 10$ N/mm² [1]									
M8	SH 12	80	0,9						3,5
M8 / M10/ IG-M6	SH 16	≥ 85	0,9						3,5
		130	2,0		1,5	2,0		1,5	4,0
M12 / M16 IG-M8 / IG-M10	SH 20	≥ 85	0,9						4,0
		≥ 130	2,0		1,5	2,0		1,5	4,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C71. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C77: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk}$ / 3,5	$2*\delta_{N0}$	0,55	$0,55*V_{Rk}$ / 3,5	$1,5*\delta_{V0}$
M16	all				0,31	$0,31*V_{Rk}$ / 3,5	$1,5*\delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick BGV Thermo
Group factors, characteristic Resistances and Displacements

Annex C 24

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Calibric R+

Table C78: Stone description

Brick type		Hollow clay brick Calibric R+
Density	ρ [kg/dm³]	≥ 0,60
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0.5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Leroux (FR)
Brick dimensions	[mm]	500 x 200 x 314
Drilling method		Rotary drilling



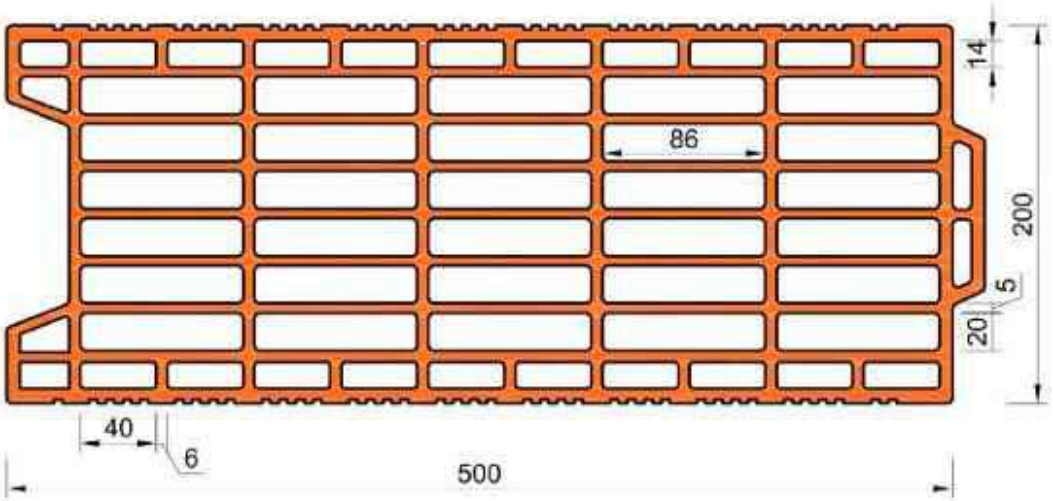


Table C79: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 500)						
Minimum Edge Distance	c_{min}	[mm]	120						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	500						
	$s_{cr,\perp}$	[mm]	315						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	120						

Table C80: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	120	1,00		120	0,15		120	0,30
				250	0,30			
	120	1,00		500	1,00		250	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Calibric R+
Description of the stone, Installation parameters, Reductionfactors

Annex C 25

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Calibric R+

Table C81: Factors for anchor groups under tension load

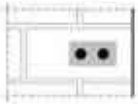
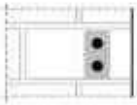
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	120	100	1,00		120	100	1,00
	175	100	1,70		175	100	1,10
	120	500	2,00		120	315	2,00

Table C82: Factors for anchor groups under shear load

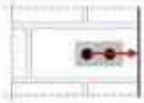
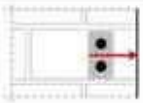
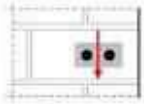
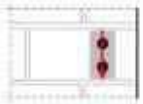
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		120	100	1,00		120	100	1,00
		120	500	2,00		120	315	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		120	100	1,00		120	100	1,00
		120	500	2,00		120	315	2,00

Table C83: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}							
			Use condition							d/d w/d w/w
			d/d			w/d w/w				
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C		All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]				$V_{Rk,b}$ [2)]
		[mm]	[kN]							
Normalised mean compressive strength $f_b \geq 12$ N/mm² [1)]										
M8	SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9		4,0
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9		5,5
		130	1,5	1,5	1,2	1,5	1,5	1,2		5,5
M12 / M16 IG-M8 /IG-M10	SH 20	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9		8,5
		≥ 130	1,5	1,5	1,2	1,5	1,5	1,2		8,5

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C78. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C84: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0{,}13 * N_{Rk} / 3{,}5$	$2 * \delta_{N0}$	0,55	$0{,}55 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$
M16	all				0,31	$0{,}31 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow Clay brick Calibric R+
Group factors, characteristic Resistances and Displacements

Annex C 26

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Urbanbric

Table C85: Stone description

Brick type		Hollow clay brick Urbanbric
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0.5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Imerys (FR)
Brick dimensions	[mm]	560 x 200 x 274
Drilling method		Rotary drilling



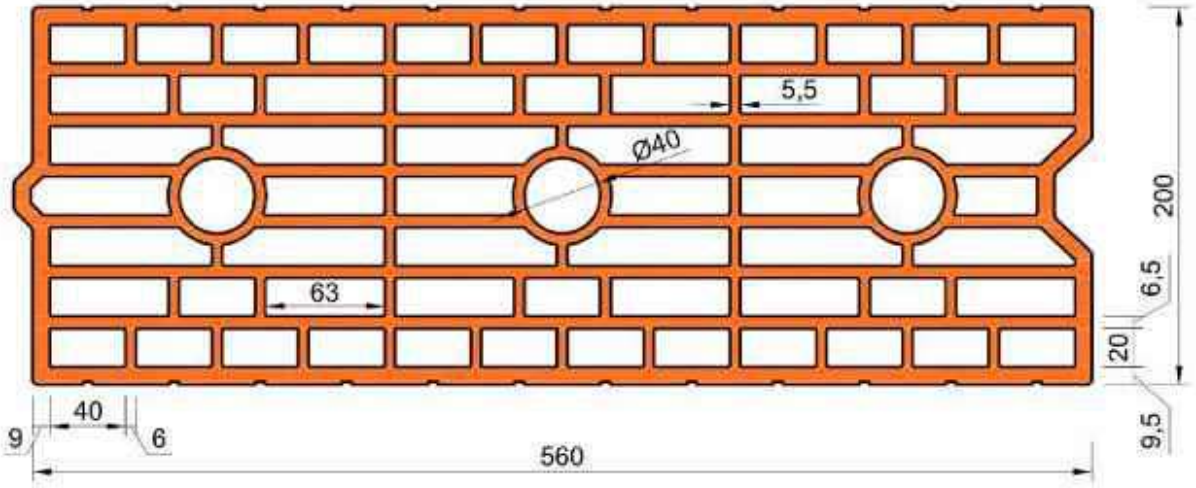


Table C86: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 500)						
Minimum Edge Distance	c_{min}	[mm]	120						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	560						
	$s_{cr,\perp}$	[mm]	275						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	100						

Table C87: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	120	1,00		120	0,25		120	0,50
				250	0,50			
	120	1,00		500	1,00		250	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Urbanbric
Description of the stone, Installation parameters, Reductionfactors

Annex C 27

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Urbanbric

Table C88: Factors for anchor groups under tension load

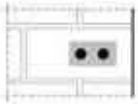
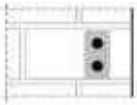
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	120	100	1,00		120	100	1,00
	185	100	1,90		185	100	1,10
	120	560	2,00		120	275	2,00

Table C89: Factors for anchor groups under shear load

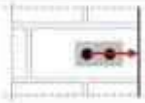
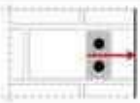
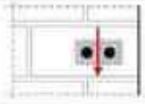
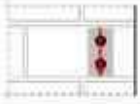
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		120	100	1,00		120	100	1,00
		120	560	2,00		120	275	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		120	100	1,00		120	100	1,00
		120	560	2,00		120	275	2,00

Table C90: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}							
			Use condition							
			d/d			w/d w/w			d/d w/d w/w	
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges	
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]	
		[mm]	[kN]							
Normalised mean compressive strength $f_b \geq 12$ N/mm² [1]										
M8	SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	4,5	
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	4,5	
		130	3,0	3,0	2,5	3,0	3,0	2,5	4,5	
M12 / M16 IG-M8 / IG-M10	SH 20	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	5,0	
		≥ 130	3,0	3,0	2,5	3,0	3,0	2,5	5,0	

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C85. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C91: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*δ_{N0}	0,55	0,55*V_{Rk} / 3,5	1,5*δ_{V0}
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*δ_{V0}

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Urbanbric
Group factors, characteristic Resistances and Displacements

Annex C 28

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Brique creuse C40

Table C92: Stone description

Brick type		Hollow clay brick Brique creuse C40
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Terreal (FR)
Brick dimensions	[mm]	500 x 200 x 200
Drilling method		Rotary drilling



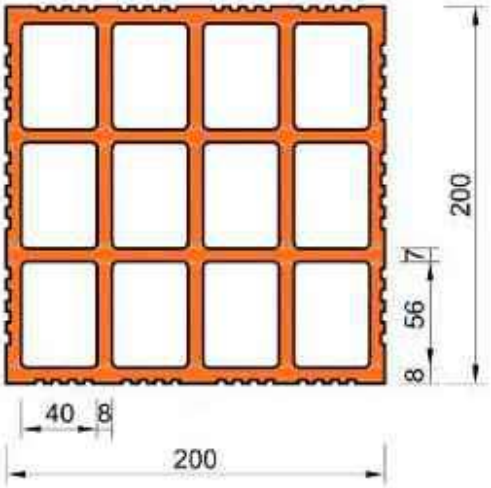


Table C93: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 500)						
Minimum Edge Distance	c_{min}	[mm]	120						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	500						
	$s_{cr,\perp}$	[mm]	200						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	200						

Table C94: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	120	1,00		120	0,83		120	1,00
	120	1,00		500	1,00		250	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Brique Creuse C40
Description of the stone, Installation parameters, Reductionfactors

Annex C 29

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Brique creuse C40

Table C95: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	120	500	2,00		120	200	2,00

Table C96: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		120	500	2,00		120	200	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		120	500	2,00		120	200	2,00

Table C97: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 12$ N/mm² 1)									
M8	SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	1,5
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C92. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C98: Displacements

Anchor size	h_{ef}	δN / N	δN_0	δN_∞	δV / V	δV_0	δV_∞
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk}$ / 3,5	$2*\delta N_0$	0,55	$0,55*V_{Rk}$ / 3,5	$1,5*\delta V_0$
M16	all				0,31	$0,31*V_{Rk}$ / 3,5	$1,5*\delta V_0$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Brique Creuse C40
Group factors, characteristic Resistances and Displacements

Annex C 30

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Blocchi Leggeri

Table C99: Stone description

Brick type		Hollow clay brick Blocchi Leggeri
Density	ρ [kg/dm³]	≥ 0,60
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0.5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (IT)
Brick dimensions	[mm]	250 x 120 x 250
Drilling method		Rotary drilling



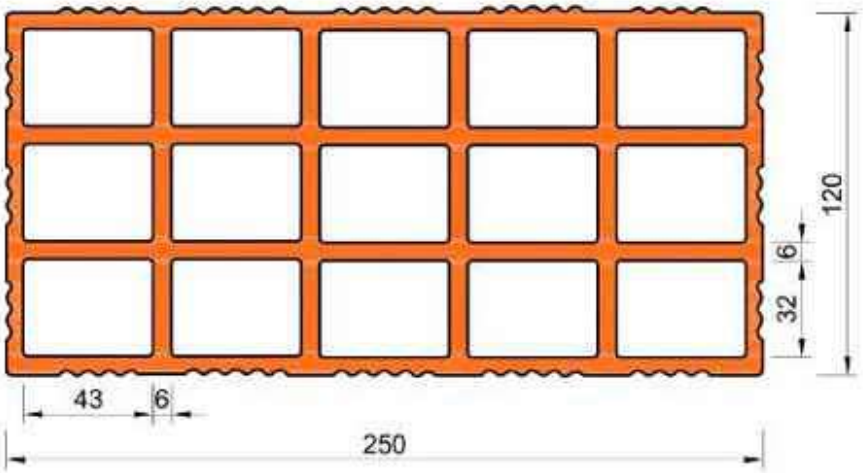


Table C100: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	60						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	100						

Table C101: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	60	1,00		60	0,40		60	0,40
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Blocchi Leggeri
Description of the stone, Installation parameters, Reductionfactors

Annex C 31

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Blocchi Leggeri

Table C102: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	60	100	1,00		60	100	2,00
	120	250	2,00		120	250	2,00

Table C103: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		60	100	0,40		60	100	0,40
		250	100	1,00		250	100	1,00
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		60	100	0,40		60	100	0,40
		120	100	1,00		120	100	1,00
		120	250	2,00		120	250	2,00

Table C104: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 12$ N/mm² [1)]									
M8	SH 12	80	0,6	0,6	0,6	0,6	0,6	0,6	3,5
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C99. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C105: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk}$ / 3,5	$2*\delta_{N0}$	0,55	$0,55*V_{Rk}$ / 3,5	$1,5*\delta_{V0}$
M16	all				0,31	$0,31*V_{Rk}$ / 3,5	$1,5*\delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Blocchi Leggeri
Group factors, characteristic Resistances and Displacements

Annex C 32

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Doppio Uni

Table C106: Stone description

Brick type		Hollow clay brick Doppio Uni
Density	ρ [kg/dm³]	≥ 0,90
Normalised mean compressive strenght	f_b [N/mm²]	≥ 28
Conversion factor for lower compressive strengths		$(f_b / 28)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (IT)
Brick dimensions	[mm]	250 x 120 x 120
Drilling method		Rotary drilling



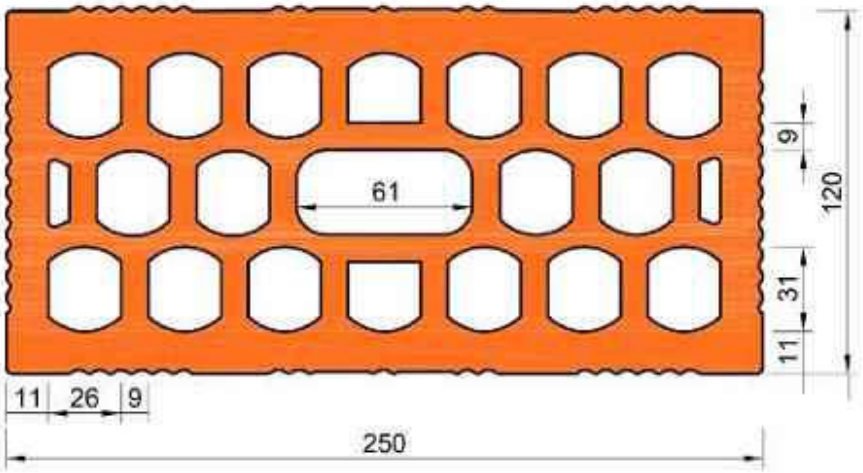


Table C107: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	100						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	120						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	100						

Table C108: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	100	1,00		100	0,50		100	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Doppio Uni
Description of the stone, Installation parameters, Reductionfactors

Annex C 33

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow Clay brick Doppio Uni

Table C109: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	100	100	1,00		100	120	2,00
	120	250	2,00		120	120	2,00

Table C110: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		100	100	1,00		100	100	1,00
		250	250	2,00		250	120	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		100	100	1,00		100	100	1,00
		120	250	2,00		120	120	2,00

Table C111: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 28$ N/mm² [1]									
M8	SH 12	80	1,2	1,2	0,9	1,2	1,2	0,9	2,5
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C106. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C112: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0{,}13 * N_{Rk} / 3{,}5$	$2 * \delta_{N0}$	0,55	$0{,}55 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$
M16	all				0,31	$0{,}31 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Doppio Uni
Group factors, characteristic Resistances and Displacements

Annex C 34

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Coriso WS07 with insulation

Table C113: Stone description

Brick type		Hollow clay brick Coriso WS07
Insulationmaterial		Rock wool
Density	ρ [kg/dm³]	≥ 0,55
Normalised mean compressive strenght	f_b [N/mm²]	≥ 6
Conversion factor for lower compressive strengths		$(f_b / 6)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Unipor (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



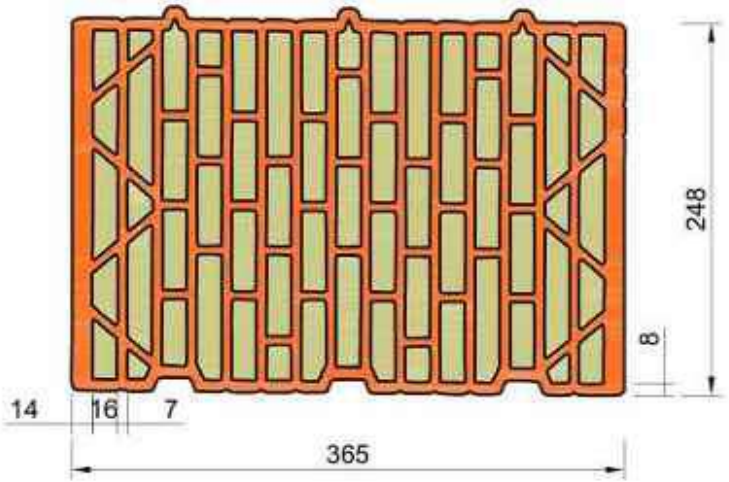


Table C114: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C115: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
•	50	1,00		50	0,30		50	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Coriso WS07 with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 35

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Coriso WS07 with insulation

Table C116: Factors for anchor groups under tension load

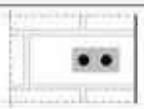
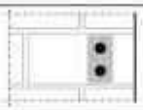
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,50		50	50	1,00
	120	250	2,00		120	250	2,00

Table C117: Factors for anchor groups under shear load

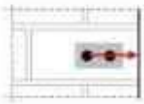
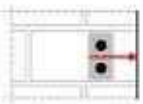
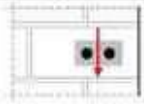
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,40		50	50	0,40
		250	50	1,00		250	50	1,20
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,65		50	50	1,00
		120	250	2,00		120	250	2,00

Table C118: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 6$ N/mm² [1)]									
M8	SH 12	80	1,5	1,5	1,5	1,5	1,5	1,5	5,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C113. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C119: Displacements

Anchor size	h_{ef} [mm]	δN / N [mm/kN]	$\delta N0$ [mm]	$\delta N\infty$ [mm]	δV / V [mm/kN]	$\delta V0$ [mm]	$\delta V\infty$ [mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*$\delta N0$	0,55	0,55*V_{Rk} / 3,5	1,5*$\delta V0$
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*$\delta V0$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow Clay brick Coriso WS07 with insulation
Group factors, characteristic Resistances and Displacements

Annex C 36

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick T7 MW with insulation

Table C120: Stone description

Brick type		Hollow clay brick T7 MW
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,59
Normalised mean compressive strenght	f_b [N/mm²]	≥ 8
Conversion factor for lower compressive strengths		$(f_b / 8)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



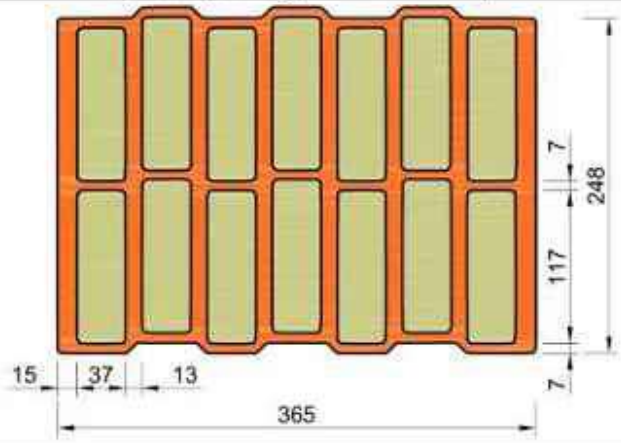


Table C121: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	250 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	250 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C122: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,35		50	1,00
	120	1,00		250	1,00		120	1,00

Table C123: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	1,40		50	50	1,15
	120	250	2,00		120	250	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick T7 MW with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 37

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick T7 MW with insulation

Table C124: Factors for anchor groups under shear load

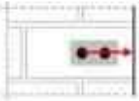
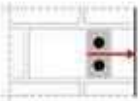
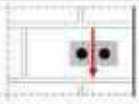
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,60		50	50	0,40
		250	50	1,55		250	50	1,00
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	2,00		50	50	1,20
		120	250	2,00		120	250	2,00

Table C125: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 8$ N/mm² [1]									
M8	SH 12	80	2,0	2,0	1,5	2,0	2,0	1,5	3,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85							
M16 / IG-M10	SH 20	≥ 85							4,5

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C120. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,I}$ according to Annex C 3

Table C126: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*δ_{N0}	0,55	0,55*V_{Rk} / 3,5	1,5*δ_{V0}
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*δ_{V0}

Table C127: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8 / M10 /IG-M6	SH 16	130	0,64	0,37	0,11	-[1]
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130				

1) no performance assessed

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick T7 MW with insulation
Group factors, characteristic Resistances and Displacements

Annex C 38

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick T8 P with insulation

Table C128: Stone description

Brick type		Hollow clay brick T8 P
Insulation material		Perlite
Density	ρ [kg/dm³]	≥ 0,56
Normalised mean compressive strenght	f_b [N/mm²]	≥ 6
Conversion factor for lower compressive strengths		$(f_b / 6)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Wienerberger (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



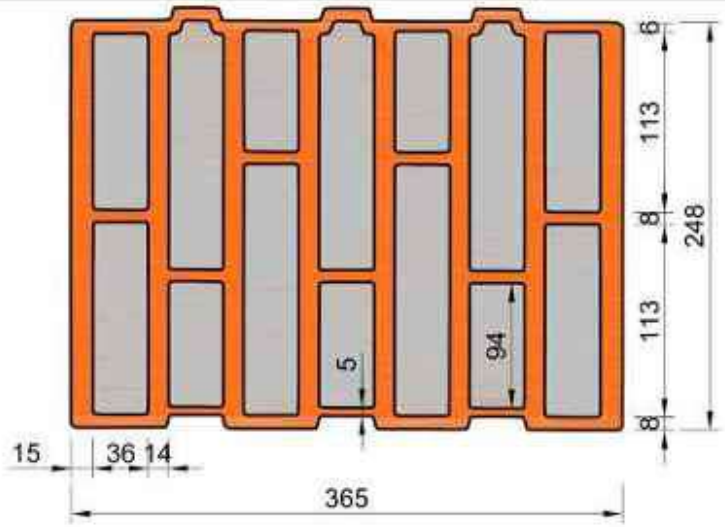


Table C129: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 4	≤ 4	≤ 10	≤ 10	≤ 4	≤ 4	≤ 4
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C130: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,25		50	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick T8 P with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 39

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick T8 P with insulation

Table C131: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,30		50	50	1,10
	120	250	2,00		120	250	2,00

Table C132: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,40		50	50	0,30
		250	50	1,35		250	50	1,20
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,70		50	50	1,00
		120	250	2,00		120	250	2,00

Table C133: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ 2)			$N_{Rk,b} = N_{Rk,p}$ 2)			$V_{Rk,b}$ 2)
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 6$ N/mm² 1)									
M8	SH 12	80	1,5	1,5	1,5	1,5	1,5	1,5	4,5
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85							
M16 / IG-M10	SH 20	≥ 85	2,5	2,5	2,0	2,5	2,5	2,0	7,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C128. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C134: Displacements

Anchor size	h_{ef}	δN / N	$\delta N0$	$\delta N\infty$	δV / V	$\delta V0$	$\delta V\infty$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*$\delta N0$	0,55	0,55*V_{Rk} / 3,5	1,5*$\delta V0$
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*$\delta V0$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick T8 P with insulation
Group factors, characteristic Resistances and Displacements

Annex C 40

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Thermoplan MZ90-G with insulation

Table C135: Stone description

Brick type		Hollow clay brick Thermoplan MZ90-G
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,68
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Mein Ziegelhaus (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



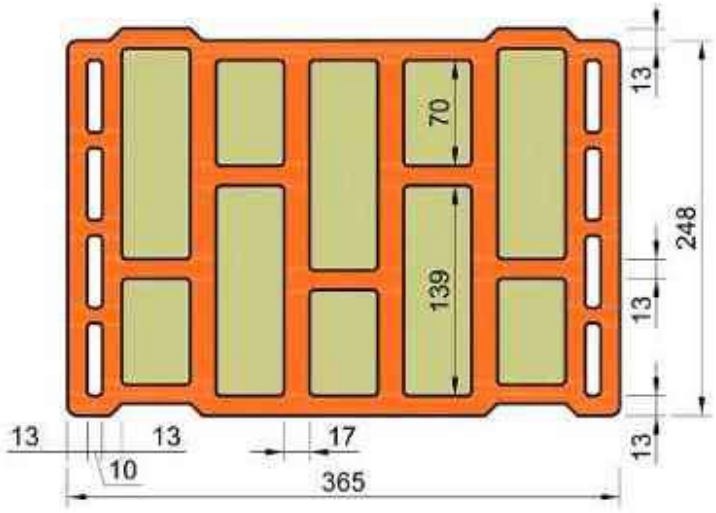


Table C136: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 4	≤ 4	≤ 10	≤ 10	≤ 4	≤ 4	≤ 4
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C137: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,25		50	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Thermoplan MZ90-G with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 41

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Thermoplan MZ90-G with insulation

Table C138: Factors for anchor groups under tension load

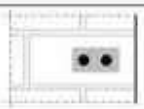
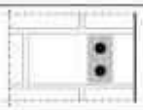
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,00		50	50	1,00
	120	250	2,00		120	250	2,00

Table C139: Factors for anchor groups under shear load

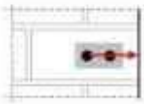
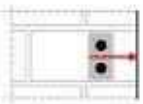
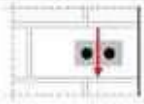
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,75		50	50	0,50
		250	50	2,00		250	50	1,70
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,65		50	50	1,15
		120	250	2,00		120	250	2,00

Table C140: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 12$ N/mm² [1)]									
M8	SH 12	80	3,0	3,0	2,5	3,0	3,0	2,5	4,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85							
M16 / IG-M10	SH 20	≥ 85	3,5	3,5	3,0	3,5	3,5	3,0	7,5

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C135. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C141: Displacements

Anchor size	h_{ef}	$\delta N / N$	δN_0	δN_∞	$\delta V / V$	δV_0	δV_∞
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk} / 3,5$	$2*\delta N_0$	0,55	$0,55*V_{Rk} / 3,5$	$1,5*\delta V_0$
M16	all				0,31	$0,31*V_{Rk} / 3,5$	$1,5*\delta V_0$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Thermoplan MZ90-G with insulation
Group factors, characteristic Resistances and Displacements

Annex C 42

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Poroton FZ7,5 with insulation

Table C142: Stone description

Brick type		Hollow clay brick Poroton FZ7,5
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f_b [N/mm²]	≥ 8
Conversion factor for lower compressive strengths		$(f_b / 8)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Schlagmann (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



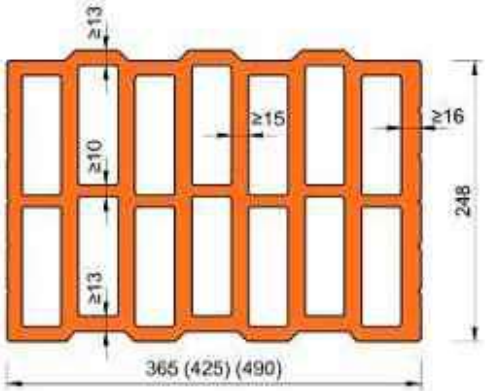


Table C143: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	250 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	250 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C144: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,35		50	1,00
	120	1,00		250	1,00		120	1,00

Table C145: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	1,40		50	50	1,15
	120	250	2,00		120	250	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Poroton FZ7,5 with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 43

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Poroton FZ7,5 with insulation

Table C146: Factors for anchor groups under shear load

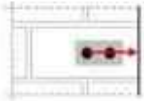
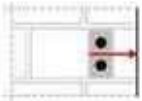
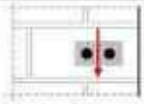
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,60		50	50	0,40
		250	50	1,55		250	50	1,00
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	2,00		50	50	1,20
		120	250	2,00		120	250	2,00

Table C147: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 8$ N/mm² [1]									
M8	SH 12	80	2,0	2,0	1,5	2,0	2,0	1,5	3,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85							
M16 / IG-M10	SH 20	≥ 85							4,5

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C142. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C148: Displacements

Anchor size	h_{ef}	δN / N	$\delta N0$	$\delta N\infty$	δV / V	$\delta V0$	$\delta V\infty$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*$\delta N0$	0,55	0,55*V_{Rk} / 3,5	1,5*$\delta V0$
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*$\delta V0$

Table C149: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8 / M10 /IG-M6	SH 16	130	0,64	0,37	0,11	-[1]
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130				

1) no performance assessed

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Poroton FZ7,5 with insulation
Group factors, characteristic Resistances and Displacements

Annex C 44

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Poroton FZ9 with insulation

Table C150: Stone description

Brick type		Hollow clay brick Poroton FZ9
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,90
Normalised mean compressive strenght	f_b [N/mm²]	≥ 10
Conversion factor for lower compressive strengths		$(f_b / 10)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Schlagmann (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



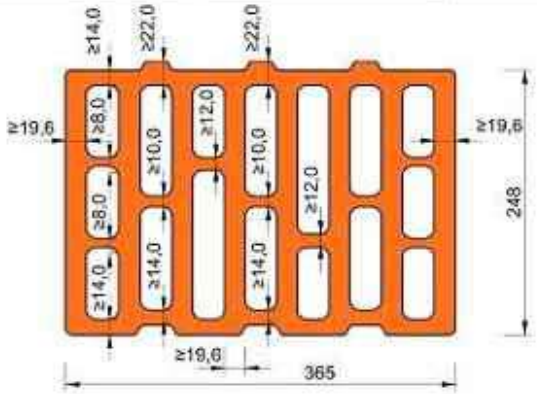


Table C151: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	250 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	250 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C152: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,35		50	1,00
	120	1,00		250	1,00		120	1,00

Table C153: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	1,40		50	50	1,15
	120	250	2,00		120	250	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Poroton FZ9 with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 45

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Poroton FZ9 with insulation

Table C154: Factors for anchor groups under shear load

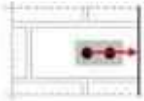
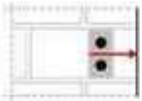
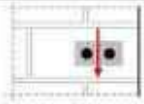
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,60		50	50	0,40
		250	50	1,55		250	50	1,00
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	2,00		50	50	1,20
		120	250	2,00		120	250	2,00

Table C155: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 10$ N/mm² [1]									
M8	SH 12	80	2,0	2,0	1,5	2,0	2,0	1,5	3,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85							
M16 / IG-M10	SH 20	≥ 85							4,5

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C150. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C156: Displacements

Anchor size	h_{ef}	$\delta N / N$	$\delta N0$	$\delta N\infty$	$\delta V / V$	$\delta V0$	$\delta V\infty$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk}$ / 3,5	$2*\delta N0$	0,55	$0,55*V_{Rk}$ / 3,5	$1,5*\delta V0$
M16	all				0,31	$0,31*V_{Rk}$ / 3,5	$1,5*\delta V0$

Table C157: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8 / M10 /IG-M6	SH 16	130	0,64	0,37	0,11	-[1]
M12 / M16 / IG-M8 IG-M10	SH 20	≥ 130				

1) no performance assessed

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Poroton FZ9 with insulation
Group factors, characteristic Resistances and Displacements

Annex C 46

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Poroton S9 with insulation

Table C158: Stone description

Brick type		Hollow clay brick Poroton S9
Insulationmaterial		Perlite
Density	ρ [kg/dm³]	≥ 0,85
Normalised mean compressive strenght	f_b [N/mm²]	≥ 12
Conversion factor for lower compressive strengths		$(f_b / 12)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. Schlagmann (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



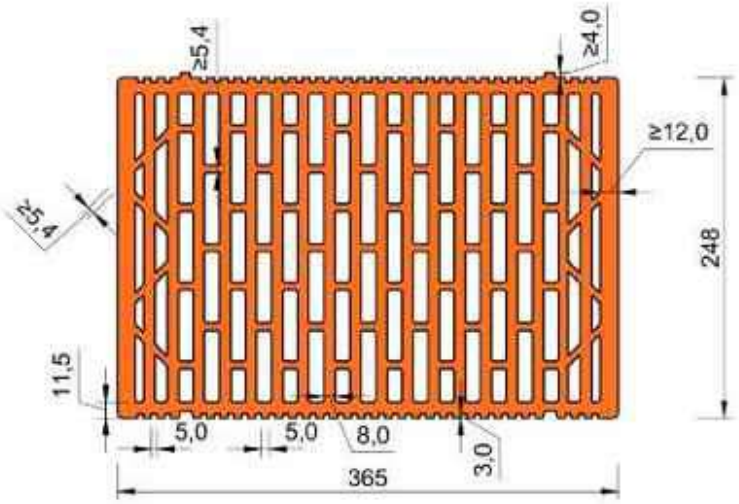


Table C159: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 5	≤ 5	≤ 10	≤ 10	≤ 5	≤ 5	≤ 5
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C160: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,30		50	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Poroton S9 with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 47

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Poroton S9 with insulation

Table C161: Factors for anchor groups under tension load

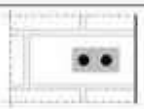
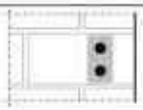
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,50		50	50	1,00
	120	250	2,00		120	250	2,00

Table C162: Factors for anchor groups under shear load

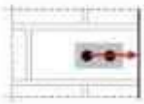
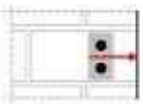
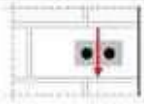
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,40		50	50	0,40
		250	50	1,00		250	50	1,20
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,65		50	50	1,00
		120	250	2,00		120	250	2,00

Table C163: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 12$ N/mm² [1)]									
M8	SH 12	80	1,5	1,5	1,5	1,5	1,5	1,5	5,0
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C158. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C164: Displacements

Anchor size	h_{ef} [mm]	δN / N [mm/kN]	δN_0 [mm]	δN_∞ [mm]	δV / V [mm/kN]	δV_0 [mm]	δV_∞ [mm]
M8 – M12 / IG-M6 – M10	all	0,13	0,13*N_{Rk} / 3,5	2*δN_0	0,55	0,55*V_{Rk} / 3,5	1,5*δV_0
M16	all				0,31	0,31*V_{Rk} / 3,5	1,5*δV_0

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Poroton S9 with insulation
Group factors, characteristic Resistances and Displacements

Annex C 48

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow clay brick Thermopor TV8+ with insulation

Table C165: Stone description

Brick type		Hollow clay brick Thermopor TV8+
Insulation material		Rock wool
Density	ρ [kg/dm³]	≥ 0,70
Normalised mean compressive strenght	f_b [N/mm²]	≥ 10
Conversion factor for lower compressive strengths		$(f_b / 10)^{0,5} \leq 1,0$
Code		EN 771-1:2011+A1:2015
Producer (Country)		e.g. THERMOPOR GmbH (DE)
Brick dimensions	[mm]	248 x 365 x 249
Drilling method		Rotary drilling



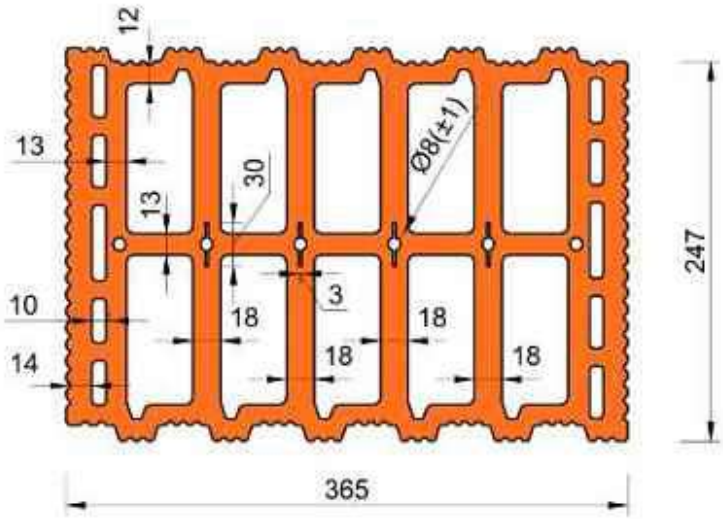


Table C166: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 4	≤ 4	≤ 10	≤ 10	≤ 4	≤ 4	≤ 4
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	250						
	$s_{cr,\perp}$	[mm]	250						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C167: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,25		50	1,00
	120	1,00		250	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Thermopor TV8+ with insulation
Description of the stone, Installation parameters, Reductionfactors

Annex C 49

Brick type: Hollow clay brick Thermopor TV8+ with insulation

Table C168: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,00		50	50	1,00
	120	250	2,00		120	250	2,00

Table C169: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,75		50	50	0,50
		250	50	2,00		250	50	1,70
		250	250	2,00		250	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,65		50	50	1,15
		120	250	2,00		120	250	2,00

Table C170: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						d/d w/d w/w
			d/d			w/d w/w			
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ 2)			$N_{Rk,b} = N_{Rk,p}$ 2)			$V_{Rk,b}$ 2)
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 10$ N/mm² 1)									
M8	SH 12	80	3,0	3,0	2,5	3,0	3,0	2,5	3,5
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / IG-M8	SH 20	≥ 85							
M16 / IG-M10	SH 20	≥ 85	3,5	3,5	3,0	3,5	3,5	3,0	7,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C165. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C171: Displacements

Anchor size	h_{ef}	$\delta N / N$	δN_0	δN_∞	$\delta V / V$	δV_0	δV_∞
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0,13*N_{Rk}$ / 3,5	$2*\delta N_0$	0,55	$0,55*V_{Rk}$ / 3,5	$1,5*\delta V_0$
M16	all				0,31	$0,31*V_{Rk}$ / 3,5	$1,5*\delta V_0$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow clay brick Thermopor TV8+ with insulation
Group factors, characteristic Resistances and Displacements

Annex C 50

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow light weight concrete brick HBL 16DF

Table C172: Stone description

Brick type		Hollow light weight concrete brick HBL 16DF
Density	ρ [kg/dm³]	≥ 1,0
Normalised mean compressive strenght	f_b [N/mm²]	≥ 3,1
Conversion factor for lower compressive strengths		$(f_b/3{,}1)^{0,5} \leq 1{,}0$
Code		EN 771-3:2011+A1:2015
Producer (Country)		e.g. KLB Klimaleichtblock (DE)
Brick dimensions	[mm]	500 x 250 x 240
Drilling method		Rotary drilling



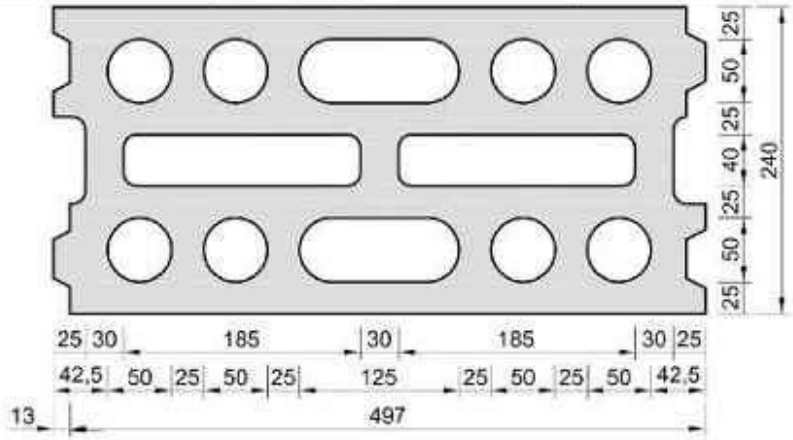


Table C173: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 5	≤ 5	≤ 2	≤ 5	≤ 5
Char. Edge distance (under fire conditions)	c_{cr}; ($c_{cr,fi}$)	[mm]	120 (2 h_{ef}) (for shear loads perpendicular to the free edge: c_{cr} = 250)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing (under fire conditions)	$s_{cr,\parallel}$; ($s_{cr,fi,\parallel}$)	[mm]	500 (4 h_{ef})						
	$s_{cr,\perp}$; ($s_{cr,fi,\perp}$)	[mm]	250 (4 h_{ef})						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C174: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,30		50	1,00
	120	1,00		250	1,00		120	1,00

Table C175: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	50	50	2,00		50	50	1,55
	120	500	2,00		120	250	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow light weight concrete brick HBL 16DF
Description of the stone, Installation parameters, Reductionfactors

Annex C 51

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow light weight concrete brick HBL 16DF

Table C176: Factors for anchor groups under shear load

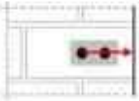
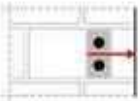
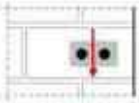
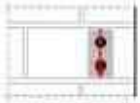
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
		50	50	0,60		50	50	0,35
		120	50	2,00		120	50	1,15
		120	500	2,00		120	250	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\perp,V\,II}$
		50	50	1,30		50	50	1,00
		120	250	2,00				
		120	500	2,00		120	250	2,00

Table C177: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 3{,}1$ N/mm² [1]									
M8 / M10/ IG-M6	SH 16	≥ 85	1,2	1,2	0,9	1,2	1,2	0,9	2,0
M12 / IG-M8	SH 20	≥ 85	1,5	1,5	1,2	1,5	1,5	1,2	3,0
M16 / IG-M10	SH 20	≥ 85							5,0

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C172. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\perp}$ according to Annex C 3

Table C178: Displacements

Anchor size	h_{ef}	$\delta N / N$	δN_0	δN_∞	$\delta V / V$	δV_0	δV_∞
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0{,}13 * N_{Rk} / 3{,}5$	$2 * \delta N_0$	0,55	$0{,}55 * V_{Rk} / 3{,}5$	$1{,}5 * \delta V_0$
M16	all				0,31	$0{,}31 * V_{Rk} / 3{,}5$	$1{,}5 * \delta V_0$

Table C179: Characteristic values of tension and shear load resistances under fire exposure

Anchor size	Perforated sleeve	Effecitve Anchorage depth	Characteristic Resistances $N_{Rk,b,fi} = N_{Rk,p,fi} = V_{Rk,b,fi}$			
		h_{ef}	R30	R60	R90	R120
		[mm]	[kN]			
M8 / M10 / IG-M6	SH 16	130	0,29	0,21	-1)	-1)
M12 / IG-M8	SH 20	≥ 130				
M16 / IG-M10	SH 20	≥ 130	0,29	0,21	0,12	-1)

1) no performance assessed

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow light weight concrete brick HBL 16DF
Group factors, characteristic Resistances and Displacements

Annex C 52

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow concrete brick Bloc Creux B40

Table C180: Stone description

Brick type		Hollow concrete brick Bloc Creux B40
Density	ρ [kg/dm³]	≥ 0,8
Normalised mean compressive strenght	f_b [N/mm²]	≥ 5,2
Conversion factor for lower compressive strengths		$(f_b / 5{,}2)^{0.5} \leq 1{,}0$
Code		EN 772-1
Producer (Country)		e.g. Leroux (FR)
Brick dimensions	[mm]	500 x 200 x 200
Drilling method		Rotary drilling



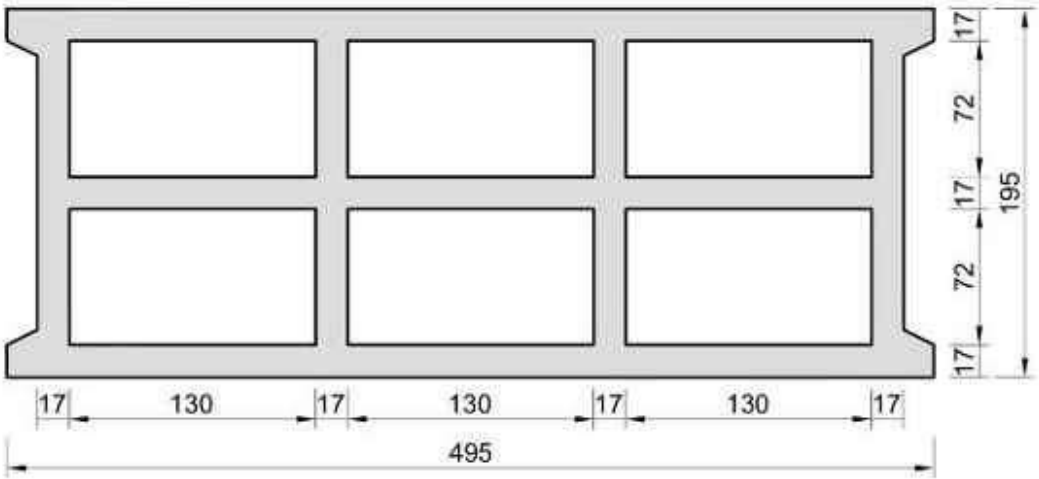


Table C181: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4	≤ 4
Char. Edge distance	c_{cr}	[mm]	120 (for shear loads perpendicular to the free edge: c_{cr} = 170)						
Minimum Edge Distance	c_{min}	[mm]	50						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	170						
	$s_{cr,\perp}$	[mm]	200						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	50						

Table C182: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	50	1,00		50	0,35		50	1,00
	120	1,00		170	1,00		120	1,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow concrete brick Bloc Creux B40
Description of the stone, Installation parameters, Reductionfactors

Annex C 53

Deutsches Institut für Bautechnik DIBt

Brick type: Hollow concrete brick Bloc Creux B40

Table C183: Factors for anchor groups under tension load

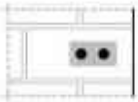
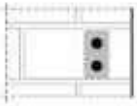
Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\,II,N}$		with c ≥	with s ≥	$\alpha_{g\,\perp,N}$
	50	50	1,50		50	50	1,40
	50	170	2,00		50	200	2,00
	120	170	2,00		120	200	2,00

Table C184: Factors for anchor groups under shear load

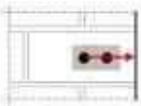
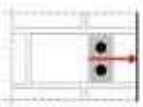
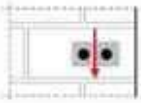
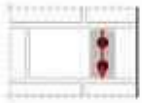
	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
Shear load perpendicular to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\perp}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\perp}$
		50	50	0,55		50	50	0,35
		120	50	1,30		120	50	0,85
		120	170	2,00		120	200	2,00
Shear load parallel to the free edge		with c ≥	with s ≥	$\alpha_{g\,II,V\,II}$		with c ≥	with s ≥	$\alpha_{g\,\perp,V\,II}$
		50	50	1,10		50	50	1,00
		120	170	2,00		50	200	2,00
						120	200	2,00

Table C185: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with c ≥ c_{cr} and s ≥ s_{cr}						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2)]			$N_{Rk,b} = N_{Rk,p}$ [2)]			$V_{Rk,b}$ [2)]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 5{,}2$ N/mm² [1)]									
M8 / M10/ IG-M6	SH 16	130	2,0	1,5	1,2	2,0	1,5	1,2	6,0
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 130							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C180. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C186: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,13	$0{,}13 * N_{Rk} / 3{,}5$	$2 * \delta_{N0}$	0,55	$0{,}55 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$
M16	all				0,31	$0{,}31 * V_{Rk} / 3{,}5$	$1{,}5 * \delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances hollow concrete brick Bloc Creux B40
Group factors, characteristic Resistances and Displacements

Annex C 54

Deutsches Institut für Bautechnik DIBt

Brick type: Solid light weight concrete brick

Table C187: Stone description

Brick type		Solid light weight concrete brick
Density	ρ [kg/dm³]	≥ 0,6
Normalised mean compressive strenght	f_b [N/mm²]	≥ 2
Conversion factor for lower compressive strengths		$(f_b / 2)^{0,5} \leq 1,0$
Code		EN 771-3:2011+A1:2015
Producer (Country)		e.g. Bisotherm (DE)
Brick dimensions	[mm]	≥ 240 x 300 x 113
Drilling method		Rotary drilling



Table C188: Installation parameter

Anchor size		[-]	M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Installation torque	T_{inst}	[Nm]	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2
Char. Edge distance	c_{cr}	[mm]	150						
Minimum Edge Distance	c_{min}	[mm]	60						
Characteristic Spacing	$s_{cr,\parallel}$	[mm]	300						
	$s_{cr,\perp}$	[mm]	300						
Minimum Spacing	$s_{min,\parallel}$; $s_{min,\perp}$	[mm]	120						

Table C189: Reduction factors for single anchors at the edge

Tension load			Shear load					
			Perpendicular to the free edge			Parallel to the free edge		
	with c ≥	$\alpha_{edge,N}$		with c ≥	$\alpha_{edge,V\perp}$		with c ≥	$\alpha_{edge,V\parallel}$
	60	1,00		60	0,25		60	0,40
	150	1,00		150	1,00		100	1,00

Table C190: Factors for anchor groups under tension load

Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
	with c ≥	with s ≥	$\alpha_{g\parallel,N}$		with c ≥	with s ≥	$\alpha_{g\perp,N}$
	60	120	1,00		60	120	1,00
	150	300	2,00		150	300	2,00

Table C191: Factors for anchor groups under shear load

	Anchor position parallel to hor. joint				Anchor position perpendicular to hor. joint			
		with c ≥	with s ≥	$\alpha_{g\parallel,V\perp}$		with c ≥	with s ≥	$\alpha_{g\perp,V\perp}$
Shear load perpendicular to the free edge		60	120	0,25		60	120	0,25
		150	120	1,00		150	120	1,00
		150	300	2,00		150	300	2,00
		with c ≥	with s ≥	$\alpha_{g\parallel,V\parallel}$		with c ≥	with s ≥	$\alpha_{g\perp,V\parallel}$
Shear load parallel to the free edge		60	120	0,40		60	120	0,40
		100	120	1,00		100	120	1,00
		150	300	2,00		150	300	2,00

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid light weight concrete brick
Description of the stone, Installation parameters, Reduction- and Group factors

Annex C 55

Deutsches Institut für Bautechnik DIBt

Brick type: Solid light weight concrete brick

Table C192: Characteristic values of tension and shear load resistances

Anchor size	Perforated sleeve	Effective Anchorage depth	Characteristic Resistances with $c \geq c_{cr}$ and $s \geq s_{cr}$						
			Use condition						
			d/d			w/d w/w			d/d w/d w/w
			40°C/24°C	80°C/50°C	120°C/72°C	40°C/24°C	80°C/50°C	120°C/72°C	All temperature ranges
		h_{ef}	$N_{Rk,b} = N_{Rk,p}$ [2]			$N_{Rk,b} = N_{Rk,p}$ [2]			$V_{Rk,b}$ [2]
		[mm]	[kN]						
Normalised mean compressive strength $f_b \geq 2$ N/mm² [1]									
M8	-	80	3,0	2,5	2,0	2,5	2,0	1,5	3,0
M10 / IG-M6	-	90							
M12 / M16 / IG-M8 / IG-M10	-	100							
M8	SH 12	80	2,5	2,5	2,0	2,5	2,0	1,5	
M8 / M10/ IG-M6	SH 16	≥ 85							
M12 / M16 / IG-M8 / IG-M10	SH 20	≥ 85							

1) For lower compressive strengths resistances must be multiplied by the conversion factor according to Table C187. For stones with higher strengths, the shown values are valid without conversion.

2) $N_{Rk,b,c} = N_{Rk,p,c}$ and $V_{Rk,c\,II} = V_{Rk,c\,\perp}$ according to Annex C 3

Table C193: Displacements

Anchor size	h_{ef}	δ_N / N	δ_{N0}	$\delta_{N\infty}$	δ_V / V	δ_{V0}	$\delta_{V\infty}$
	[mm]	[mm/kN]	[mm]	[mm]	[mm/kN]	[mm]	[mm]
M8 – M12 / IG-M6 – M10	all	0,1	$0,1*N_{Rk} / 3,5$	$2*\delta_{N0}$	0,3	$0,3*V_{Rk} / 3,5$	$1,5*\delta_{V0}$
M16	all				0,1	$0,1*V_{Rk} / 3,5$	$1,5*\delta_{V0}$

Würth Injection System WIT-VM 250 or WIT-NORDIC for masonry

Performances solid light weight concrete brick
Characteristic Resistances and Displacements

Annex C 56

Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Member of EOTA

www.eota.eu

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-12/0166 of 27 February 2018

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Würth Injection system WIT-VM 250 for rebar connection
Product family to which the construction product belongs	Injection system for post-installed rebar connections
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Adolf Würth GmbH & Co KG, Plant 3 Germany
This European Technical Assessment contains	21 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330087-00-0601
This version replaces	ETA-12/0166 issued on 18 June 2015

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Specific Part

1 Technical description of the product

The subject of this European Technical Assessment is the post-installed connection, by anchoring or overlap connection joint, of reinforcing bars (rebars) in existing structures made of normal weight concrete, using the "Würth Injection system WIT-VM 250 for rebar connection" in accordance with the regulations for reinforced concrete construction.

Reinforcing bars made of steel with a diameter ϕ from 8 to 32 mm or the tension anchor ZA from sizes M12 to M24 according to Annex A and injection mortar WIT-VM 250 are used for rebar connections. The rebar is placed into a drilled hole filled with injection mortar and is anchored via the bond between rebar, injection mortar and concrete.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the rebar connection of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Amplification factor α_{lb}, Bond resistance f_{bd}	See Annex C 1

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Rebar connections satisfy requirements for Class A1
Resistance to fire	See Annex C 2 and C 3

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with European Assessment Document EAD No. 330087-00-0601, the applicable European legal act is: [96/582/EC].

The system(s) to be applied is (are): 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 27 February 2018 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt
p.p. Head of Department

beglaubigt:
Baderschneider

Deutsches Institut für Bautechnik DIBt

Installation post installed rebar

Figure A1: Overlapping joint for rebar connections of slabs and beams

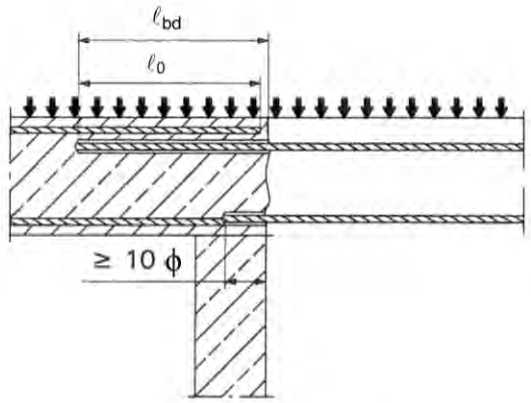


Figure A2: Overlapping joint at a foundation of a wall or column where the rebars are stressed in tension

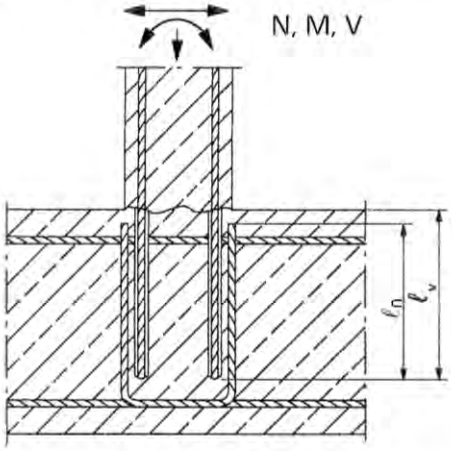


Figure A3: End anchoring of slabs or beams (e.g. designed as simply supported)

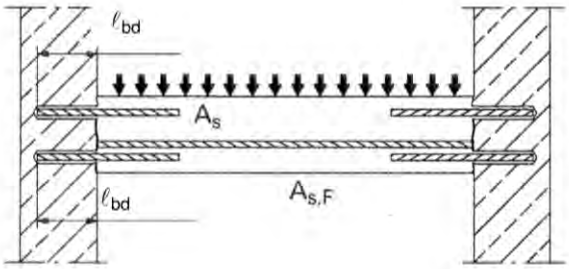


Figure A4: Rebar connection for components stressed primarily in compression. The rebars sre stressed in compression

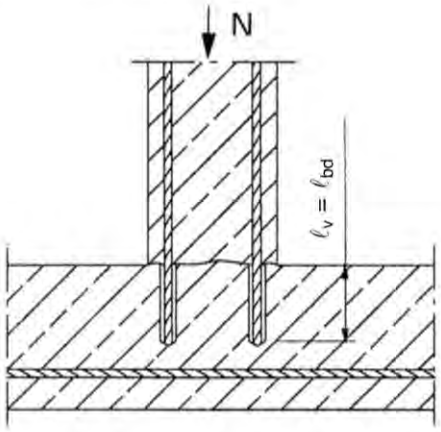
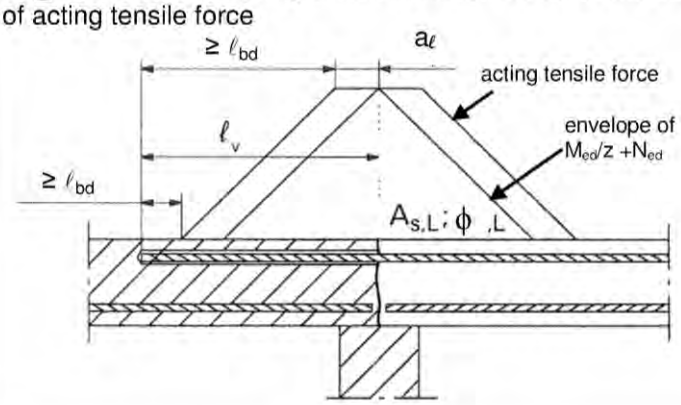


Figure A5: Anchoring of reinforcement to cover the line of acting tensile force



Note to Figure A1 to A5:

In the Figures no transverse reinforcement is plotted, the transverse reinforcement shall comply with EN 1992-1-1:2004+AC:2010.

Preparing of joints according to Annex B 2

Würth Injection system WIT-VM 250 for rebar connection	**Annex A 1**
Product description Installed condition and examples of use for rebars	

Deutsches Institut für Bautechnik DIBt

Installation tension anchor ZA

Figure A6: Overlapping joint of a column stressed in bending to a foundation

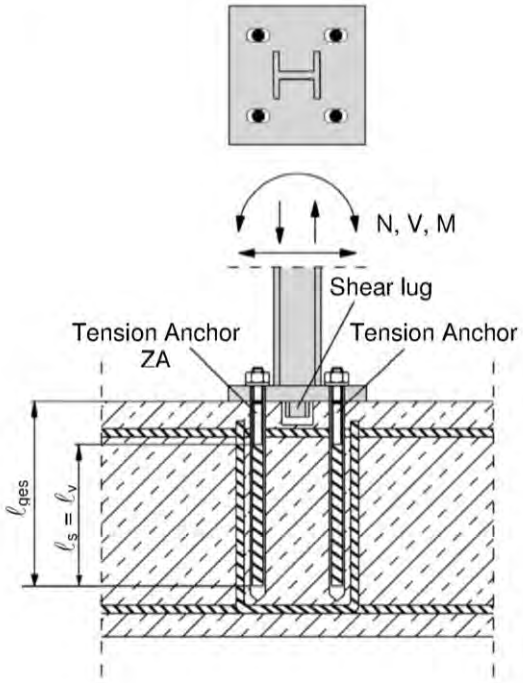


Figure A7: Overlap joint for the anchorage of barrier posts

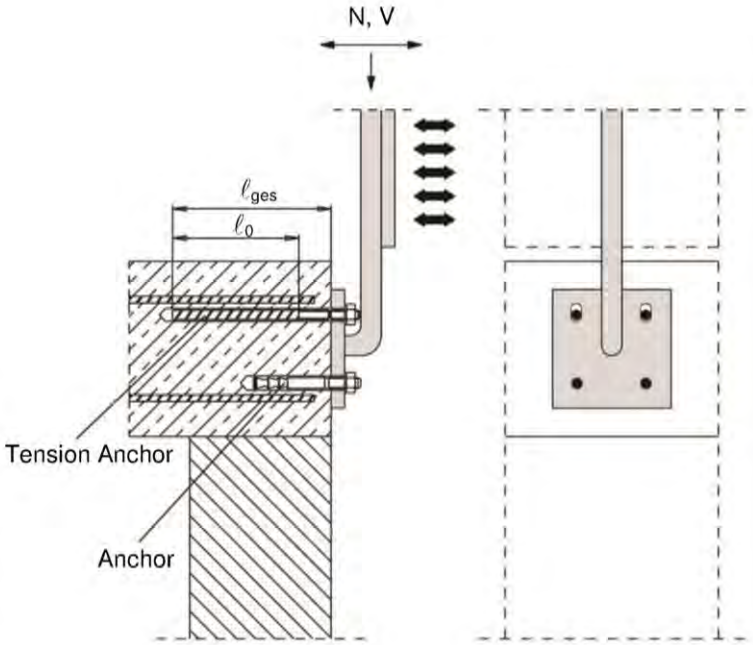
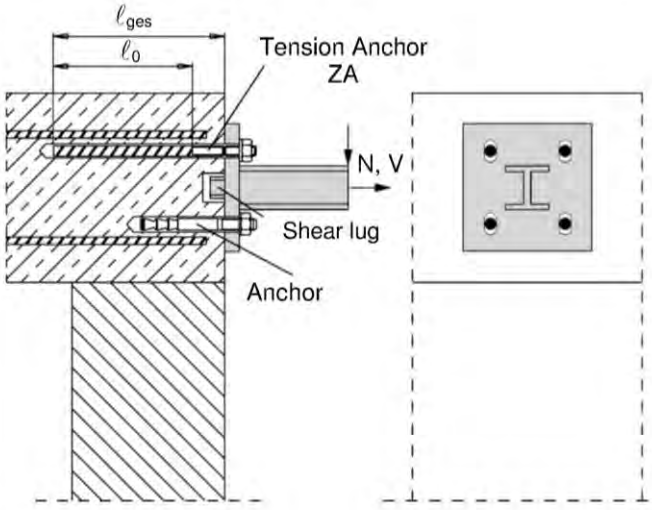


Figure A8: Overlap joint for the anchorage to centilever members



Note to Figure A6 to A8:

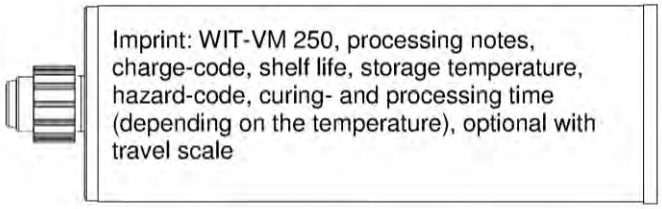
In the Figures no transverse reinforcement is plotted, the transverse reinforcement shall comply with EN 1992-1-1:2002+AC:2010

Würth Injection system WIT-VM 250 for rebar connection	
Product description Installed condition and examples of use for tension anchors ZA	**Annex A 2**

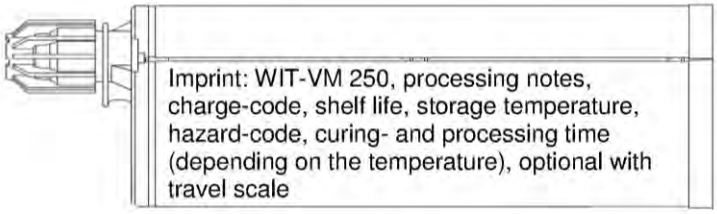
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Würth Injection system WIT-VM 250:

Injection mortar: WIT-VM 250
Typ "coaxial": 150 ml, 280 ml, 300 ml up to 333 ml and 380 ml cartridge



Type "side-by-side":
235 ml, 345 ml and 825 ml cartridge

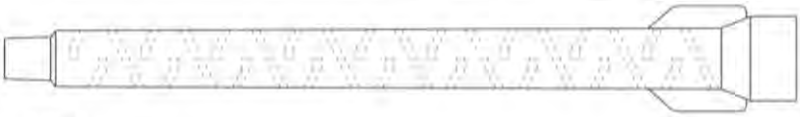


Static Mixer

WIT-M 14 W or Fill&Clean



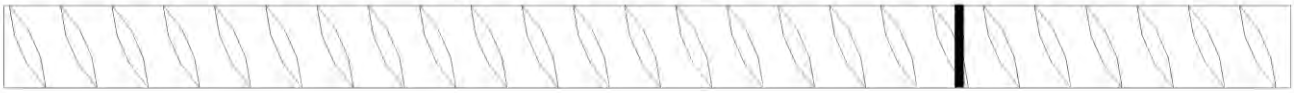
WIT-M 18 W



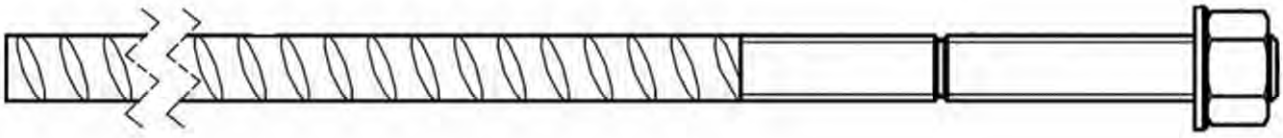
Piston plug WIT-VS and mixer extension



Reinforcing bar (rebar): ø8 to ø32



Tension Anchor ZA: M12 to M20



Würth Injection system WIT-VM 250 for rebar connection	**Annex A 3**
Product description Injection mortar / Static mixer / Rebar / Tension Anchor ZA	

Deutsches Institut für Bautechnik DIBt

Reinforcing bar (rebar): ø8, ø10, ø12, ø14, ø16, ø20, ø22, ø24, ø25, ø28, ø32



- Minimum value of related rip area $f_{R,min}$ according to EN 1992-1-1:2004+AC:2010
- Rib height of the bar shall be in the range $0{,}05\phi \le h \le 0{,}07\phi$
  (ϕ: Nominal diameter of the bar; h: Rip height of the bar)

Table A1: Materials

Designation	Material
Rebar EN 1992-1-1:2004+AC:2010, Annex C	Bars and de-coiled rods class B or C f_{yk} and k according to NDP or NCL of EN 1992-1-1/NA:2013 $f_{uk} = f_{tk} = k \cdot f_{yk}$

Würth Injection system WIT-VM 250 for rebar connection	**Annex A 4**
Product description Specifications Rebar	

Deutsches Institut für Bautechnik DIBt

Tension Anchor ZA: M12, M16, M20, M24

Marking: e.g. ◇ ZA 12 A4

◇	Mark of the producer
ZA	Trade name
12	Rod diameter/thread
A4	for stainless steel A4
HCR	for high corrosion resistance steel

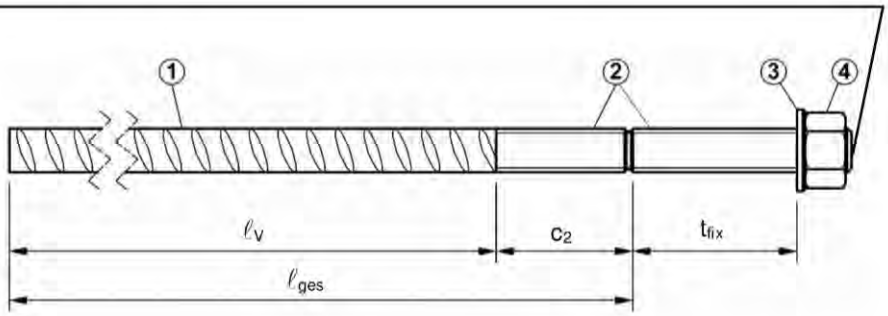


Table A2: Materials

Part	Designation	Material											
		ZA vz				ZA A4				ZA HCR			
		M12	M16	M20	M24	M12	M16	M20	M24	M12	M16	M20	M24
1	Reinforcement bar	Class B according to NDP or NCL of EN 1992-1-1/NA:2013 $f_{uk} = f_{tk} = k \cdot f_{yk}$											
2	Threaded rod	Steel, zinc plated according to EN 10087:1998 or EN 10263:2001				Stainless steel, 1.4362, 1.4401, 1.4404, 1.4571, EN 10088-1:2014				High corrosion resistant steel, 1.4529, 1.4565, EN 10088-1:2014			
	f_{yk} [N/mm²]	640				640			560	640			560
3	Washer	Steel, zinc plated according to EN 10087:1998 or EN 10263:2001				Stainless steel, 1.4362, 1.4401, 1.4404, 1.4571, EN 10088-1:2014				High corrosion resistant steel, 1.4529, 1.4565, EN 10088-1:2014			
4	Nut												

Table A3: Dimensions and installation parameter

Size				ZA-M12	ZA-M16	ZA-M20	ZA-M24
Diameter of threaded rod			[mm]	12	16	20	24
Diameter of reinforcement bar			[mm]	12	16	20	25
Drill hole diameter			[mm]	16	20	25	32
Diameter of clearance hole in fixture			[mm]	14	18	22	26
With across nut flats		SW	[mm]	19	24	30	36
Stress area		A_s	[mm²]	84	157	245	353
Effective embedment depth		ℓ_v	[mm]	according to static calculation			
Length of bonded thread	plated	c_2	[mm]	≥ 20	≥ 20	≥ 20	≥ 20
	A4/HCR			≥ 100	≥ 100	≥ 100	≥ 100
Minimum thickness of fixture		t_{fix}	[mm]	5	5	5	5
Maximum thickness of fixture		t_{fix}	[mm]	3000	3000	3000	3000
Maximum installation torque		T_{max}	[Nm]	50	100	150	150

Würth Injection system WIT-VM 250 for rebar connection

Product description
Specifications Tension Anchor ZA

Annex A 5

Deutsches Institut für Bautechnik DIBt

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads.
- Fire exposure

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C12/15 to C50/60 according to EN 206-1:2000.
- Maximum chloride concrete of 0,40% (CL 0.40) related to the cement content according to EN 206-1:2000.
- Non-carbonated concrete.

  Note: In case of a carbonated surface of the existing concrete structure the carbonated layer shall be removed in the area of the post-installed rebar connection with a diameter of ϕ + 60 mm prior to the installation of the new rebar.

  The depth of concrete to be removed shall correspond to at least the minimum concrete cover in accordance with EN 1992-1-1:2004+AC:2010.

  The foregoing may be neglected if building components are new and not carbonated and if building components are in dry conditions.

Temperature Range:

- - 40°C to +80°C (max. short term temperature +80°C and max long term temperature +50°C).

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions or subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist
  (high corrosion resistant steel).

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the forces to be transmitted.
- Design according to EN 1992-1-1:2004+AC:2010 and Annex B 2 and B 3.
- The actual position of the reinforcement in the existing structure shall be determined on the basis of the construction documentation and taken into account when designing.

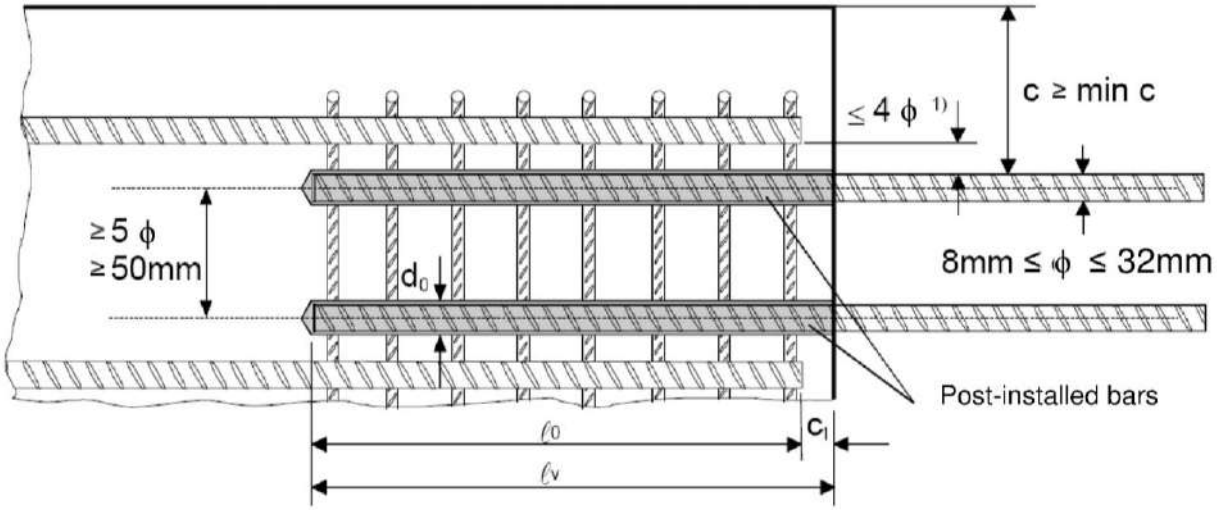
Installation:

- Dry or wet concrete.
- It must not be installed in flooded holes.
- Hole drilling by hammer drill (HD), hollow drill (HDB) or compressed air drill mode (CD).
- The installation of post-installed rebar resp. tension anchors shall be done only by suitable trained installer and under supervision on site; the conditions under which an installer may be considered as suitable trained and the conditions for supervision on site are up to the Member States in which the installation is done.
- Check the position of the existing rebars (if the position of existing rebars is not known, it shall be determined using a rebar detector suitable for this purpose as well as on the basis of the construction documentation and then marked on the building component for the overlap joint).

Würth Injection system WIT-VM 250 for rebar connection	**Annex B 1**
Intended use Specifications	

Figure B1: General construction rules for post-installed rebars

- Only tension forces in the axis of the rebar may be transmitted
- The transfer of shear forces between new concrete and existing structure shall be designed additionally according to EN 1992-1-1:2004+AC:2010.
- The joints for concreting must be roughened to at least such an extent that aggregate protrude.



1) If the clear distance between lapped bars exceeds 4ϕ, then the lap length shall be increased by the difference between the clear bar distance and 4ϕ.

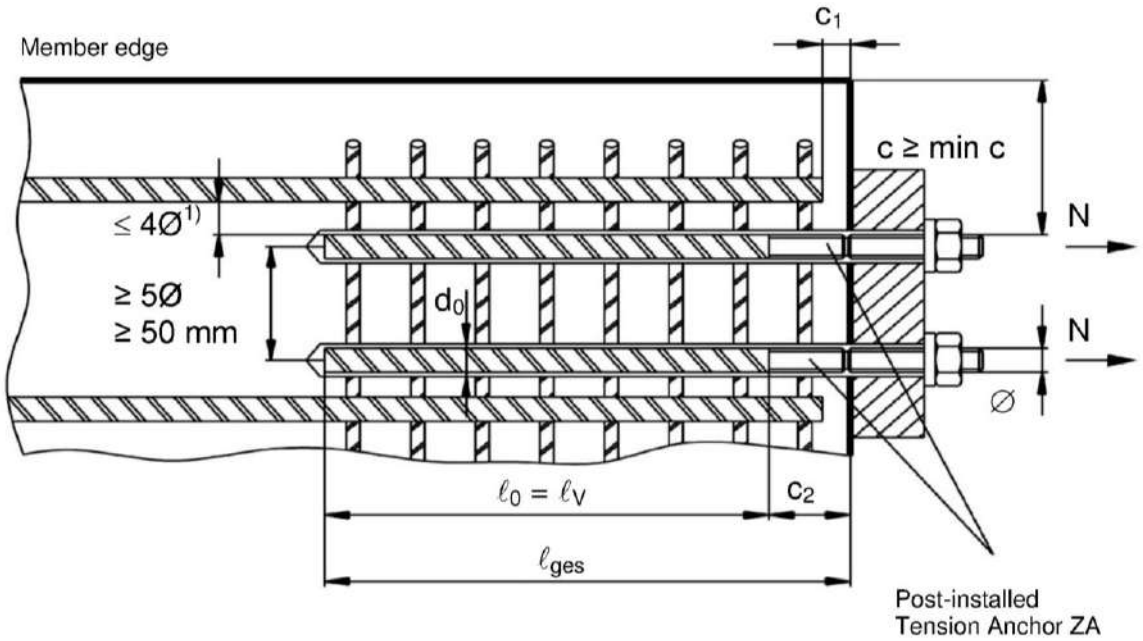
The following applies to Figure B1:

c	concrete cover of post-installed rebar
c_1	concrete cover at end-face of existing rebar
min c	minimum concrete cover according to Table B1 and to EN 1992-1-1:2004+AC:2010, Section 4.4.1.2
ϕ	diameter of post-installed rebar
ℓ_0	lap length, according to EN 1992-1-1:2004+AC:2010, Section 8.7.3
ℓ_v	effective embedment depth, ≥ $\ell_0 + c_1$
d_0	nominal drill bit diameter, see Annex B 6

Würth Injection system WIT-VM 250 for rebar connection	**Annex B 2**
Intended use General construction rules for post-installed rebars	

Figure B2: General construction rules for tension anchors ZA

- The length of the bonded-in thread may be not be accounted as anchorage
- Only tension forces in the direction of the bar axis may be transmitted by the tension anchor ZA
- The tension force must be transferred via an overlap joint to the reinforcement in the building part.
- The transfer of shear forces shall be ensured by appropriate additional measures, e.g shear lugs or by anchors with an European technical assessment.
- In the anchor plate, the holes for the tension anchors shall be executed as elongated holes with axis in the direction of the shear force.



1) If the clear distance between lapped bars exceeds 4ϕ, then the lap length shall be increased by the difference between the clear bar distance and 4ϕ.

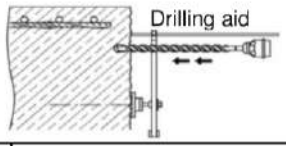
The following applies to Figure B2:

c	concrete cover of tension anchor ZA
c_1	concrete cover at end-face of existing rebar
c_2	Length of bonded thread
min c	minimum concrete cover according to Table B1 and to EN 1992-1-1:2004+AC:2010, Section 4.4.1.2
ϕ	diameter of tension anchor
ℓ_0	lap length, according to EN 1992-1-1:2004+AC:2010, Section 8.7.3
ℓ_v	effective embedment depth, ≥ $\ell_0 + c_1$
ℓ_{ges}	overall embedment depth, ≥ $\ell_0 + c_2$
d_0	nominal drill bit diameter, see Annex B 6

Würth Injection system WIT-VM 250 for rebar connection	**Annex B 3**
Intended use General construction rules for tension anchors	

Deutsches Institut für Bautechnik DIBt

Table B1: Minimum concrete cover min c[1] of post-installed rebar depending of drilling method



Drilling method	Rebar diameter	Without drilling aid	With drilling aid
Hammer drilling (HD)	< 25 mm	30 mm + 0,06 · ℓ_v ≥ 2 ϕ	30 mm + 0,02 · ℓ_v ≥ 2 ϕ
	≥ 25 mm	40 mm + 0,06 · ℓ_v ≥ 2 ϕ	40 mm + 0,02 · ℓ_v ≥ 2 ϕ
Compressed air drilling (CD)	< 25 mm	50 mm + 0,08 · ℓ_v	50 mm + 0,02 · ℓ_v
	≥ 25 mm	60 mm + 0,08 · ℓ_v	60 mm + 0,02 · ℓ_v

[1] see Annex B2, Figures B1 and Annex B3, Figure B2
Comments: The minimum concrete cover acc. EN 1992-1-1:2004+AC:2010 must be observed

Table B2: maximum embedment depth $\ell_{v,max}$

Rebar ϕ	Tension anchor ϕ	$\ell_{v,max}$ [mm]
8 mm		1000
10 mm		1000
12 mm	M12	1200
14 mm		1400
16 mm	M16	1600
20 mm	M20	2000
22 mm		2000
24 mm		2000
25 mm	M24	2000
28 mm		1000
32 mm		1000

Table B3: Base material temperature, gelling time and curing time

Concrete temperature	Gelling working time[1]	Minimum curing time in dry concrete	Minimum curing time in wet concrete
-10°C to -6°C	90 min[2]	24 h	48 h
- 5 °C to - 1 °C	90 min[3]	14 h	28 h
0 °C to + 4 °C	45 min[3]	7 h	14 h
+ 5 °C to + 9 °C	25 min[3]	2 h	4 h
+ 10 °C to + 19 °C	15 min[3]	80 min	160 min
+ 20 °C to + 24 °C	6 min[3]	45 min	90 min
+ 25 °C to + 29 °C	4 min[3]	25 min	50 min
+ 30 °C to + 40 °C	2,5 min[4]	15 min	30 min

[1] t_{gel}: maximum time from starting of mortar injection to completing of rebar setting.
[2] Cartridge temperature **must** be at minimum +15°C
[3] Cartridge temperature **must** be between +5°C and +25°C
[4] Cartridge temperature **must** be below +20°C

Würth Injection system WIT-VM 250 for rebar connection	**Annex B 4**
Intended use Minimum concrete cover Maximum embedment depth / working time and curing times	

Deutsches Institut für Bautechnik DIBt

Table B4: Dispensing tools

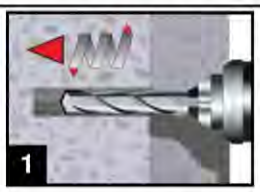
Cartridge type/size	Hand tool		Pneumatic tool
Coaxial cartridges 150, 280, 300 up to 333 ml	 e.g. Type H 297 or H244C		 e.g. Type TS 492 X
Coaxial cartridges 380 up to 420 ml	 e.g. Type CCM 380/10	 e.g. Type H 285 or H244C	 e.g. Type TS 485 LX
Side-by-side cartridges 235, 345 ml	 e.g. Type CBM 330A	 e.g. Type H 260	 e.g. Type TS 477 LX
Side-by-side cartridge 825 ml	-	-	 e.g. Type TS 498X

All cartridges could also be extruded by a battery tool.

Würth Injection system WIT-VM 250 for rebar connection	**Annex B 5**
Intended Use Dispensing tools	

Deutsches Institut für Bautechnik DIBt

A) Bore hole drilling



1. Drill a hole into the base material to the size and embedment depth required by the selected reinforcing bar with carbide hammer drill (HD) or a compressed air drill (CD). In case of aborted drill hole: the drill hole shall be filled with mortar.

Rebar - ϕ	ZA- ϕ	Drill - ∅ [mm]
8 mm		12
10 mm		14
12 mm	M12	16
14 mm		18
16 mm	M16	20
20 mm	M20	25
22 mm		28
24 mm		32
25 mm	M24	32
28 mm		35
32 mm		40



Hammer drill (HD)
Hollow drill (HDB)



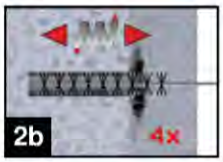
Compressed air drill (CD)

B) Bore hole cleaning (HD, HDB and CD)

MAC: Cleaning for bore hole diameter $d_0 \leq 20$mm and bore hole depth $h_0 \leq 10d_s$



2a. Starting from the bottom or back of the bore hole, blow the hole clean a hand pump (Annex B 7) a minimum of four times.



2b. Check brush diameter (Table B5). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (Table B5) a minimum of four times in a twisting motion.
If the bore hole ground is not reached with the brush, a brush extension shall be used.

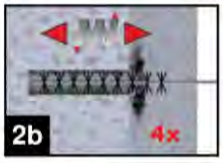


2c. Finally blow the hole clean again with a hand pump (Annex B 7) a minimum of four times.

CAC: Cleaning for all bore hole diameter and bore hole depth



2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) (Annex B 7) a minimum of four times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension shall be used.



2b. Check brush diameter (Table B5). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (Table B5) a minimum of four times.
If the bore hole ground is not reached with the brush, a brush extension shall be used (Table B5).



2c. Finally blow the hole clean again with compressed air (min. 6 bar) (Annex B 7) a minimum of four times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension shall be used.

Würth Injection system WIT-VM 250 for rebar connection

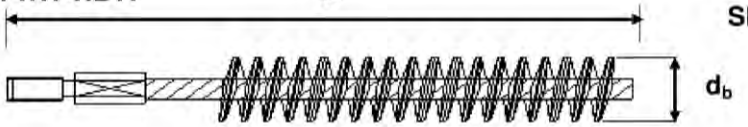
Intended Use
Installation instruction: Bore hole drilling and Bore hole cleaning

Annex B 6

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Table B5: Cleaning tools

Brush WIT-RBT:



SDS Plus Adapter:



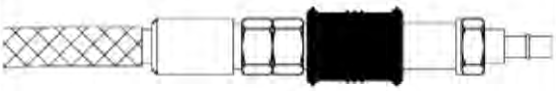
Brush extension:



ϕ Rebar	ϕ Tension anchor	d_0 Drill bit - Ø	d_b Brush - Ø		$d_{b,min}$ min. Brush - Ø
(mm)	(mm)	(mm)	WIT-	(mm)	WIT-
8		12	RBM12	14	12,5
10		14	RBM14	16	14,5
12	M12	16	RBM16	18	16,5
14		18	RBM18	20	18,5
16	M16	20	RBM20	22	20,5
20	M20	25	RBM25	27	25,5
22		28	RBM28	30	28,5
24		32	RBM32	34	32,5
25	M24	32	RBM32	34	32,5
28		35	RBM35	37	35,5
32		40	RBM40	41,5	40,5



Hand pump (volume 750 ml)

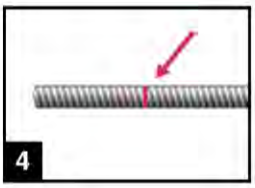


Rec. compressed air tool hand slide valve (min 6 bar)

C) Preparation of bar and cartridge



3. Attach the supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool.
For every working interruption longer than the recommended working time (Table B3) as well as for every new cartridges, a new static-mixer shall be used.



4. Prior to inserting the reinforcing bar into the filled bore hole, the position of the embedment depth shall be marked (e.g. with tape) on the reinforcing bar and insert bar in empty hole to verify hole and depth ℓ_v.
The reinforcing bar should be free of dirt, grease, oil or other foreign material.



5. Prior to dispensing into the anchor hole, squeeze out separately the mortar until it shows a consistent grey colour, but a minimum of three full strokes, and discard non-uniformly mixed adhesive components.

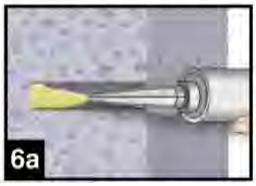
Würth Injection system WIT-VM 250 for rebar connection

Intended Use
Installation instruction: Cleaning tools and Preparation of bar and cartridge

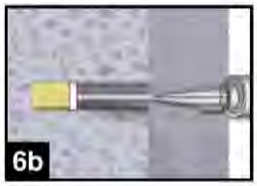
Annex B 7

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D) Filling the bore hole



6. Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment larger than 190 mm an extension nozzle shall be used.

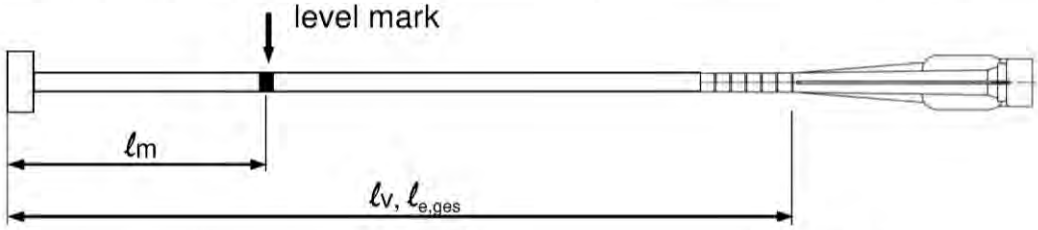


For overhead and horizontal installation and bore holes deeper than 240 mm a piston plug and the appropriate mixer extension must be used.

Observe the gel-/ working times given in Table B3.

Table B6: Piston plugs, max anchorage depth and mixer extension

Bar size ϕ	Tension anchor ϕ	Drill bit - Ø HD, HDB	Drill bit - Ø CD	Piston plug	Cartridge: All sizes – Hand or battery tool $l_{v,max}$	Cartridge: All sizes – Hand or battery tool Mixer extension	Cartridge: All sizes – Pneumatic tool $l_{v,max}$	Cartridge: All sizes – Pneumatic tool Mixer extension	Cartridge: side-by-side (825 ml) – Pneumatic tool $l_{v,max}$	Cartridge: side-by-side (825 ml) – Pneumatic tool Mixer extension
[mm]	[mm]	[mm]		WIT-	[cm]		[cm]		[cm]	
8		12	-	-	70	VL 10/0,75	80	VL 10/0,75	80	VL 10/0,75
10		14	VS14	VS14			100		100	
12	M12	16		VS16			100		120	VL 16/1,8
14		18		VS18					140	
16	M16	20		VS20					160	
20	M20	25	VS25	VS25	50		70		200	
22		28		VS28						
24		32		VS32			50			
25	M24	32		VS32					200	
28		35		VS35						
32		40		VS40						



Injection tool must be marked by mortar level mark ℓ_m and anchorage depth ℓ_v resp. $\ell_{e,ges}$ with tape or marker.

Quick estimation: $\ell_m = 1/3 \cdot \ell_v$

Continue injection until the mortar level mark ℓ_m becomes visible.

Optimum mortar volume: $\ell_m = \ell_v$ resp $\ell_{e,ges} \cdot \left(1{,}2 \cdot \frac{\phi^2}{d_0^2} - 0{,}2\right)$ [mm]

Würth Injection system WIT-VM 250 for rebar connection

Intended Use
Installation instruction: Filling the bore hole

Annex B 8

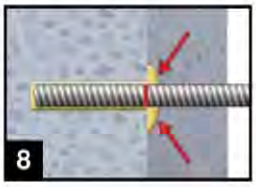
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E) Inserting the rebar



7. Push the reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.

   The bar should be free of dirt, grease, oil or other foreign material.



8. Be sure that the bar is inserted in the bore hole until the embedment mark is at the concrete surface and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For overhead installation fix embedded part (e.g. wedges).



9. Observe gelling time t_{gel}. Attend that the gelling time can vary according to the base material temperature (see Table B3). It is not allowed to move the bar after geling time t_{gel} has elapsed.
   Allow the adhesive to cure to the specified time prior to applying any load. Do not move or load the bar until it is fully cured (attend Table B3). After full curing time $\mathbf{t_{cure}}$ has elapsed, the add-on part can be installed.

Würth Injection system WIT-VM 250 for rebar connection	**Annex B 9**
Intended Use Installation instruction: Inserting rebar	

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Minimum anchorage length and minimum lap length

The minimum anchorage length $\ell_{b,min}$ and the minimum lap length $\ell_{0,min}$ according to EN 1992-1-1:2004+AC:2010 ($\ell_{b,min}$ acc. to Eq. 8.6 and Eq. 8.7 and $\ell_{0,min}$ acc. to Eq. 8.11) shall be multiply by the amplification factor α_{lb} according to Table C1.

Table C1: Amplification factor α_{lb} related to concrete class and drilling method

Concrete class	Drilling method	Bar size	Amplification factor α_{lb}
C12/15 to C50/60	Hammer drilling (HD), hollow drilling (HDB) and compressed air drilling (CD)	8 mm to 32 mm ZA-M12 to ZA-M24	1,0

Table C2: Design values of the ultimate bond stress f_{bd} in N/mm² for all drilling methods for good conditions

according to EN 1992-1-1:2004+AC:2010 for good bond conditions
(for all other bond conditions multiply the values by 0.7)

Rebar - Ø	Concrete class								
ϕ	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 to 25 mm ZA-M12 to ZA-M24	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28 to 32 mm	1,6	2,0	2,3	2,7	3,0	3,4	3,7	3,7	3,7

Würth Injection system WIT-VM 250 for rebar connection

Performances
Amplification factor α_{lb}
Design values of ultimate bond resistance f_{bd}

Annex C 1

Deutsches Institut für Bautechnik DIBt

Design value of the ultimate bond stress $f_{bd,fi}$ under fire exposure for concrete classes C12/15 to C50/60, (all drilling methods):

The design value of the bond strength $f_{bd,fi}$ under fire exposure has to be calculated by the following equation:

$$f_{bd,fi} = k_{b,fi}(\theta) \cdot f_{bd} \cdot \gamma_c / \gamma_{M,fi}$$

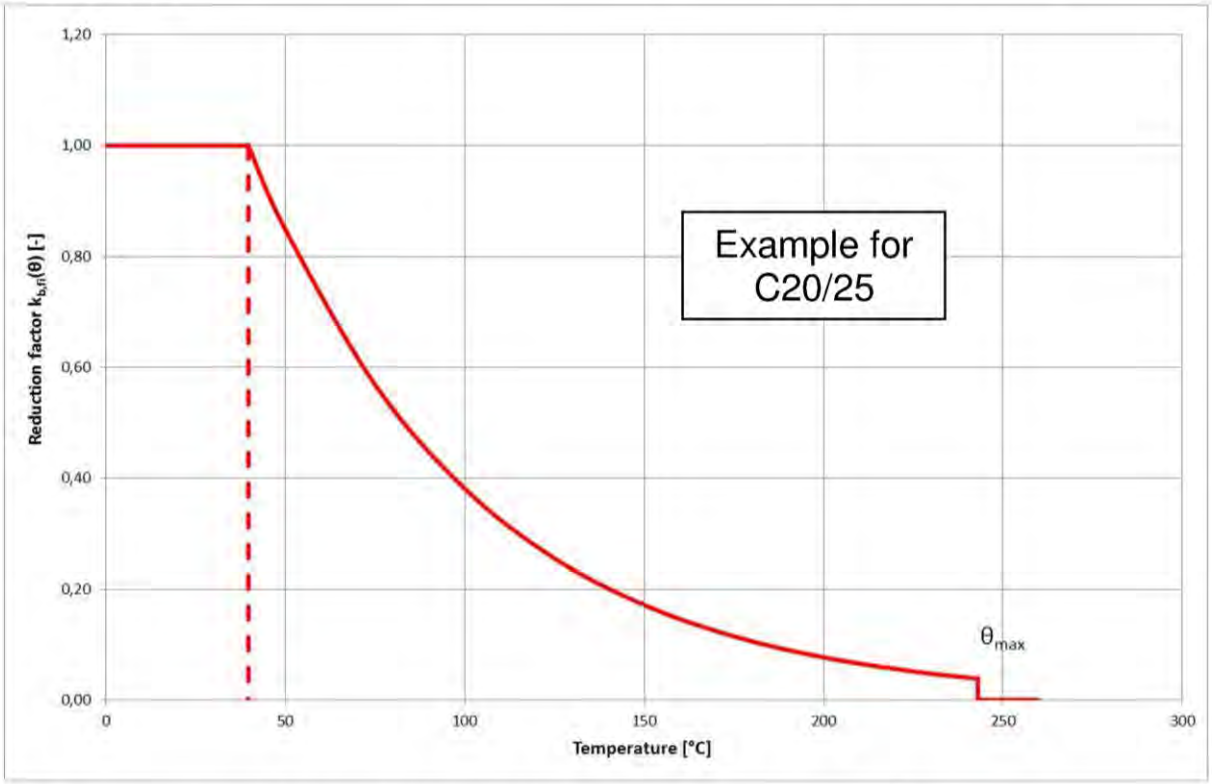
with: $\theta \leq 243°C$: $k_{b,fi}(\theta) = 18{,}88 \cdot e^{(\theta \cdot -0{,}016)} / (f_{bd} \cdot 4{,}3) \leq 1{,}0$

$\theta > 243°C$: $k_{b,fi}(\theta) = 0$

$f_{bd,fi}$	Design value of the ultimate bond stress in case of fire in N/mm²
θ	Temperature in °C in the mortar layer.
$k_{b,fi}(\theta)$	Reduction factor under fire exposure.
f_{bd}	Design value of the ultimate bond stress in N/mm² in cold condition according to Table C2 considering the concrete classes, the rebar diameter, the drilling method and the bond conditions according to EN 1992-1-1.
γ_c	partially safety factor according to EN 1992-1-1
$\gamma_{M,fi}$	partially safety factor according to EN 1992-1-2

For evidence under fire exposure the anchorage length shall be calculated according to EN 1992-1-1:2004+AC:2010 Equation 8.3 using the temperature-dependent ultimate bond stress $f_{bd,fi}$.

Example graph of Reduction factor $k_{b,fi}(\theta)$ for concrete classes C20/25 for good bond conditions:



Würth Injection system WIT-VM 250 for rebar connection

Performances
Design value of bond strength $f_{bd,fi}$ under fire exposure

Annex C 2

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic tension strength for tension anchor ZA under fire exposure,

concrete classes C12/15 to C50/60, according to Technical Report TR 020

Tension Anchor				**M12**	**M16**	**M20**	**M24**
Steel, zinc plated (ZA vz)							
Characteristic steel strength	R30	$\sigma_{Rk,s,fi}$	[N/mm²]	20			
	R60			15			
	R90			13			
	R120			10			
Stainless Steel (ZA A4 or ZA HCR)							
Characteristic steel strength	R30	$\sigma_{Rk,s,fi}$	[N/mm²]	30			
	R60			25			
	R90			20			
	R120			16			

Design value of the steel strength $\sigma_{Rd,s,fi}$ under fire exposure

The design value of the steel strength $\sigma_{Rd,s,fi}$ under fire exposure has to be calculated by the following equation:

$$\sigma_{Rd,s,fi} = \sigma_{Rk,s,fi} / \gamma_{M,fi}$$

with:

$\sigma_{Rk,s,fi}$ characteristic steel strength according to Table C3

$\gamma_{M,fi}$ partially safety factor according to EN 1992-1-2

Würth Injection system WIT-VM 250 for rebar connection

Performances

Design value of the steel strength $\sigma_{Rd,s,fi}$ for tension anchor ZA under fire exposure

Annex C 3

Institut für Stahlbau
und Werkstoffmechanik

Notified body No. 2873
TU Darmstadt
Institut für Stahlbau und Werkstoffmechanik
Franziska-Braun-Str. 3, 64287 Darmstadt

Certificate of constancy of performance

No. 2873-CPR–M 526-13/10.2020

In compliance with Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 (the Construction products Regulation or CPR) this certificate applies to the construction product

Würth Injection system WIT-VM 250 or WIT-Nordic for masonry
Metal Injection anchors for use in masonry

placed on the market by

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Straße 12-17
74653 Künzelsau
DEUTSCHLAND

and produced in the manufacturing plant

Werk 3.

This certificate attests that all provisions concerning the assessment and verification of constancy of performance described in the European Technical Assessment

ETA-16/0757 of 20 December 2024

and

EAD 330076-01-0604

under system 1 are applied and that the construction product fulfils all the prescribed requirements for these performances.

This certificate was first issued on 31.03.2025 and will remain valid as long as the ETA remains valid and the manufacturing conditions in the plant or the factory production control itself are not modified significantly, unless suspended or withdrawn by the product certification body.

Darmstadt, 31.03.2025

Technische Universität Darmstadt

F. Rädel

Dr.-Ing. habil. Felicitas Rädel
Head of the notified certification body

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-11048-02-00

Notified body No. 1343
Staatliche Materialprüfungsanstalt Darmstadt,
Grafenstraße 2, 64283 Darmstadt

Certificate of constancy of performance

No. 1343-CPR-M 526-08/09.18

In compliance with Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 (the Construction products Regulation or CPR) this certificate applies to the construction product

Würth Injection system WIT-VM 250 for rebar connection
Systems for post-installed rebar connections with mortar

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Straße 12-17
74653 Künzelsau
DEUTSCHLAND

and produced in the manufacturing plant

Adolf Würth GmbH & Co KG, Plant 3 Germany.

This certificate attests that all provisions concerning the assessment and verification of constancy of performance described in the European Technical Assessment

ETA - 12/0166 issued on 27 February 2018

and

EAD 330087-00-0601

under system 1 for the performances set out in this certificate are applied and that the construction product fulfil all the prescribed requirements for these performances.

This certificate was first issued on 30/11/2018 and will remain valid as long as the ETA remains valid and the manufacturing conditions in the plant or the factory production control itself are not modified significantly, unless suspended or withdrawn by the product certification body.

Darmstadt, 30/11/2018

Dr.-Ing. P. Bender
Head of the notified certification body

Dipl.-Ing.(FH) F. Persichella
Technical responsibility

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-11048-01-00

ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Adolf Würth GmbH & Co. KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-AWU-20230406-CBA5-EN
Issue date	15.09.2023
Valid to	16.01.2028

WIT-VM 250

Adolf Würth GmbH & Co. KG

Institut Bauen und Umwelt e.V.

www.ibu-epd.com | https://epd-online.com

ECO PLATFORM EPD VERIFIED







General Information

Adolf Würth GmbH & Co. KG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-AWU-20230406-CBA5-EN

This declaration is based on the product category rules:

Reaction resin products, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

15.09.2023

Valid to

16.01.2028

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

WIT-VM 250

Owner of the declaration

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Str. 12-17
74653 Künzelsau
Germany

Declared product / declared unit

The declared product is the two-component reaction resin mortar "WIT-VM 250". The declared unit is based on 1 kg reaction resin product in the ratio at which the two components must be mixed before use. The packaging is also included in the calculation, since the product is sold by Adolf Würth GmbH & Co. KG with its packaging. The declared unit is indicated in [kg].

Scope:

This document covers the two-component reaction resin mortar "WIT-VM 250". To prepare the life cycle assessment [*LCA*], specific data were collected from the manufacturing facility in Willich. The assessment is based on data from 2020 which correspond to the yearly average. The procedure by which the data are allocated to the declared unit is described in the "Allocation" section.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Angela Schindler,
(Independent verifier)

Product

Product description/Product definition
The declared product WIT-VM 250 is a two-component reaction resin mortar based on vinyl ester resin that is delivered in a two-component plastic cartridge. The high-performance product is applied through a static mixer using a manual, battery-operated or pneumatic gun. It was specially developed for use in securing threaded rods, rebar or internally threaded sleeves in solid brick, concrete, autoclaved aerated concrete and lightweight concrete. Due to its excellent mechanical strength, it can also be used in perforated brick by using a special perforated sleeve. WIT-VM 250 mortar has a wide range of possible applications at installation tempeartures as low as -10 °C and operating temperatures of up to 120 °C, and offers high chemical resistance in extreme environments like swimming pools (chlorine) or near the sea (salt). With its broad range of national and international approvals and certifications, it can be used in almost any application.

Marketing of the product in the EU/EFTA (except for Switzerland) is governed by *Regulation (EU) No. 305/2011 (CPR)*. The product requires a Declaration of Performance subject to *ETA-12/0164, ETA-20/0854, ETA-12/0166, ETA-16/0757* and CE marking.

Application
The declared product WIT-VM 250 is used to reliably secure threaded rods, internally threaded sleeves and post-installed rebar connections in dry and moist concrete or masonry. The WIT-VM 250 product can also be used for water-filled boreholes. The declared product WIT-VM 250 has very good mechanical and thermal properties as well as very high chemical resistance. It can be used in aggressive environments. The declared product WIT-VM 250 emits only a slight odour.

Sample applications

Suitable for securing façades, canopies, wooden structures, metal structures, metal profiles, supports, beams, panels, railings, gratings, plumbing fixtures, pipes, cable trays, post-installed rebar connections (for renovations or reinforcement), etc.

Technical Data
The following construction data are relevant for the declared product WIT-VM 250 as delivered:

Construction data

Name	Value	Unit
Density acc. to DIN 51757 for mixing the two components	1.6	g/ml
Compressive strength acc. to DIN EN 196 Part 1	100.6	N/mm²
Flexural strength acc. to DIN EN 196 Part 1	14.7	N/mm²

Storage:
Store in a cool, dry and dark place; storage temperature: +5°C to +25°C

Shelf life:
18 months in standard cartridge systems
18 months in foil tube cartridge systems

Gel and working time:
-10°C 90 min.
-5°C 90 min.
0°C 45 min.
+5°C 25 min.
+10°C 15 min.
+20°C 6 min.
+30°C 4 min.
+35°C 2 min.
+40°C 1.5 min.

Curing time in dry substrate:
-10°C 1440 min.
-5°C 840 min.
0°C 420 min.
+5°C 120 min.
+10°C 80 min.
+20°C 45 min.
+30°C 25 min.
+35°C 20 min.
+40°C 15 min.

For more information, please refer to the relevant technical data sheet.

Product performance values in accordance with the Declaration of Performance with regard to its principal charateristics according to *ETA-12/0164, ETA-20/0854, ETA-12/0166 and ETA-16/0757*.

Base materials/Ancillary materials
The declared product WIT-VM 250 is delivered as a two-component plastic cartridge and consists of a resin component and a curing agent component in a 10:1 volume ratio. The mixing ratio between the resin component and the curing agent component is set automatically as the product is pushed out of the cartridge. Curing begins immediately after the components are mixed.

1) "This product/article/at least one partial article contains substances in the ECHA candidate list of substances of very high concern (SVHC) (10 June 2022) above a concentration of 0.1% by mass: no."

2) "This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no"

3)"Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Regulation on Biocidal Products No. 528/2012): no"

The product considered in this EPD contains individual components in the following ranges:

Resin component:

Vinyl ester resin: 30 to 40% by weight

Mineral fillers: 50 to 70% by weight

Other components: < 5% by weight

Curing agent component:
Dibenzoyl peroxide: 10 to 15% by weight

Mineral fillers: 40 to 60% by weight

Other components: 10 to 35% by weight

Reference service life
The declared product WIT-VM 250 may be exposed to a wide range of environmental conditions during the use phase. Its expected reference service life depends on the specific installation situation and on the product's resulting exposure. The main factors influencing service life are weather conditions and mechanical and chemical stresses.

LCA: Calculation rules

Declared Unit
The product declared is a two-component reaction resin mortar with the product name WIT-VM 250. The declared unit is based on 1 kg reaction resin product in the ratio at which the two components must be mixed before use.

The mixing ratio between the resin component and the curing agent component is 9:1 [m/m] (volume ratio 10:1). The packaging is also included in the calculation at 0.3013 kg per 1 kg of reaction resin product. The declared unit data are presented in the table below.

Declared unit data

Name	Value	Unit
Declared unit	1	kg

System boundary
Type of EPD: Cradle to factory gate with options. The following information modules are defined as system boundaries in this study:

Production stage (A1- A3):
• A1, Raw material extraction,
• A2, Transport to the manufacturer,
• A3, Manufacturing.

End of life (C1- C4):
C1, Deconstruction/demolition,
C2, Transport,
C3, Waste processing,
C4, Disposal.

Reuse, recovery and recycling potential (D)

To precisely determine the indicators and environmental impacts of the declared unit, a total of 8 information modules are considered. The information modules A1 to A3 describe the material provision, the transport to the production site, as well as the production processes of the product itself.

The precursor products are sourced from Germany, England and France, Transport is mainly done by truck. Only the transport from England is done by rail. The following process diagrams illustrate the underlying production process.

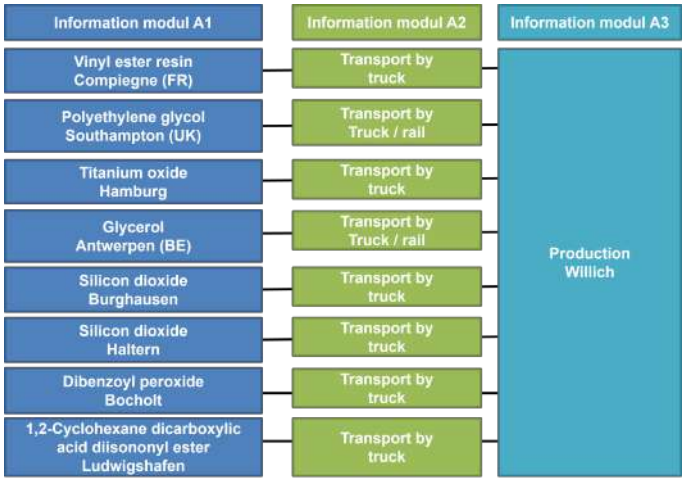


Figure 1 Information modules A 1 to A3 of the product

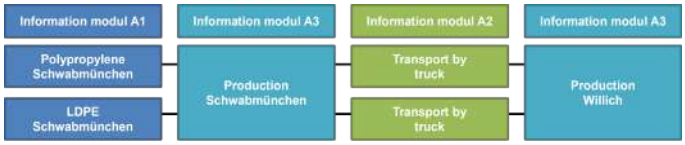


Figure 2 Information modules A 1 to A3 of the packaging

Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Germany

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
No renewable raw materials are used in the product or the packaging. The biogenic carbon value is therefore reported as zero.

Packaging per declared unit

Name	Value	Unit
Packaging PP	0.0318	kg
Packaging PA6	0.2696	kg

End of Life (C1-C4)

The product is demolished by using an electric chisel. The electrical energy consumption for this tool is estimated at 0.05 MJ for the declared unit. The power consumption is calculated using a European energy mix. Construcion waste is transported 200 km by truck to a waste treatment facility. At the waste treatment facility, the construction waste is shredded and the disposed of in a landfill.

Name	Value	Unit
Collected as mixed construction waste	1	kg
Shredding	1	kg
Disposal in landfill	1	kg

Reuse, recovery and recycling potential (D), relevant scenario specifications

The product has no reuse, recovery or recycling potential. Information module D is therefore declared and reported as zero.

Name	Value	Unit
Reuse, recovery and recycling potential	0	kg

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg WIT-VM 250

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	4.68E+00	5.12E-03	1.51E-02	2.6E-03	1.45E-02	0
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	4.68E+00	5.12E-03	1.5E-02	2.59E-03	1.45E-02	0
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	0	0	0	0	0	0
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	8E-04	1.08E-06	8.28E-05	1.2E-05	2.67E-05	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	6.24E-09	7.5E-14	8.9E-16	3.85E-15	3.4E-14	0
Acidification potential of land and water (AP)	mol H^+ eq	7.09E-03	1.12E-05	4.67E-05	1.34E-05	1.03E-04	0
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	2.57E-05	1.49E-08	4.43E-08	7.43E-09	2.45E-08	0
Eutrophication potential aquatic marine (EP-marine)	kg N eq	2.29E-03	2.52E-06	2.15E-05	6.11E-06	2.62E-05	0
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	2.1E-02	2.65E-05	2.4E-04	6.74E-05	2.88E-04	0
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	6.57E-03	6.82E-06	4.22E-05	1.66E-05	7.97E-05	0
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.14E-06	1.4E-09	1.24E-09	2.87E-09	1.48E-09	0
Abiotic depletion potential for fossil resources (ADPF)	MJ	9.01E+01	9.29E-02	1.98E-01	5.06E-02	1.9E-01	0
Water use (WDP)	m^3 world eq deprived	1.49E-01	1.17E-03	1.33E-04	4.99E-04	1.59E-03	0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg WIT-VM 250

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.17E+01	5.16E-02	1.13E-02	4.06E-03	2.85E-02	0
Renewable primary energy resources as material utilization (PERM)	MJ	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	1.17E+01	5.16E-02	1.13E-02	4.06E-03	2.85E-02	0
Non renewable primary energy as energy carrier (PENRE)	MJ	6.07E+01	9.3E-02	1.99E-01	5.07E-02	1.9E-01	0
Non renewable primary energy as material utilization (PENRM)	MJ	2.95E+01	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	9.02E+01	9.3E-02	1.99E-01	5.07E-02	1.9E-01	0
Use of secondary material (SM)	kg	0	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	1.33E-02	4.92E-05	1.28E-05	1.42E-05	4.82E-05	0

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg WIT-VM 250

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	9.76E-09	8.04E-12	9.53E-13	6.34E-13	9.75E-12	0
Non hazardous waste disposed (NHWD)	kg	8.53E-02	7E-05	2.85E-05	1.34E-05	9.71E-01	0
Radioactive waste disposed (RWD)	kg	1.33E-03	1.49E-05	2.45E-07	6.68E-07	2.11E-06	0
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg WIT-VM 250

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	ND	ND	ND	ND	ND	ND
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND

Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND

The dataset "DE: Epoxy Resin, Source: Sphera, Reference year: 2021" was updated with reference to the previous EPD. As this dataset has a strong influence on the overall calculation, the results are higher in comparison to the previous EPD from 2015.

References

Standards

DIN 51757
DIN 51757:2011-01
Testing of mineral oils and related materials - Determination of density

EN 196
DIN EN 196-1:2016-11
Test methods for cement - Part 1: Determination of strength
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EN 15804
EN 15804:2019-04+A2, Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

ISO 14025
DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

ISO 14044
DIN EN ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines.

Further references

ecoinvent 3.7.1
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ETA-12/0164
European Technical Assessment

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European Technical Assessment

ETA-16/0757
European Technical Assessment

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European Technical Assessment

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PCR PART A
Product Category Rules for Building-Related Products and Services - Calculation Rules for the Life Cycle Assessment and requirements on the Project Report V2.1, Institut Bauen und Umwelt e.V., 11.2021.

PCR: Reaction resin products
Guidance-Texts for Building-Related Products and Services. Part B: Requirements on the EPD for Reaction resin products, Version 1.3. Berlin: Institut Bauen und Umwelt e.V. (Hrsg.),07.2014.

Sphera
GaBi 10 Software: Life Cycle Assessment
Leinfelden-Echterdingen; Sphera Solution GmbH (Hrsg.).
http://www.gabi-software.com/deutsch/index/
(25/03/2022)

Regulation (EU) No. 305/2011 (CPR)
Regulation (EU) No. 528/2012 (Biocidal Product Regulation)

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Evaluation Report

Project **22419_short**

Injection System WIT-VM 250 for masonry – resistance to fire

Client **Adolf Würth GmbH & Co. KG**
Reinhold Würth Straße 12-17
74653 Künzelsau

Date **30-6-2024**

Pages **5**

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3 Product description....3
4 Scope of evaluation....3
5 Summary....5

1 General information

Adolf Würth GmbH & Co. KG authorized the evaluation of the fire resistance of the chemical anchor system WIT-VM 250 for axial tension and shear loads. The evaluation concerning steel strength and pullout resistance carried out in dependence on section 2.3 of Technical Report 020 [1]. The evaluation is based on tests that were conducted by the Technical University Kaiserslautern under fire exposure according to DIN EN 1363-1:2012 [2]. The test results are summarized in test reports 16030CT/15511 [3] and 18036MR/15561 [4].

This evaluation provides fire resistances which covers anchors with fire attack from one side only.

2 Reference documents

[1] Evaluation of Anchorages in Concrete Concerning Resistance to fire, EOTA TR 020, Edition May 2004

[2] Feuerwiderstandsprüfungen – Teil 1: Allgemeine Anforderungen, DIN EN 1363-1; Edition Oktober 2012

[3] Test Report 16030CT/15511, March 2017, deposited at Ingenieurbüro Thiele

[4] Test Report 18036MR/15561, August 2018, deposited at Ingenieurbüro Thiele

[5] European Technical Assessment ETA-16/0757 for Injection system WIT-VM 250 +SH or WIT-Nordic + SH for masonry, EOTA, 15 December 2016

[6] Guideline for European Technical Approval of Metal Injection Anchors for Use in Masonry, EOTA ETAG 029, April 2013

3 Product description

The WIT-VM 250 is a bonded anchor system consisting of a plastic cartridge containing the injection mortar and a steel part. For usage in hollow bricks also a perforated sleeve is part of the system.

The injection system WIT-VM 250 is designed for the use masonry according to the European Technical Approval ETA-16/0757.

4 Scope of evaluation

The present evaluation of the fire resistances of the injection system WIT-VM 250 in masonry is assessed with respect to its fire resistance properties as anchor in horizontal and

vertical applications. The tests which this evaluation refers to, are executed with horizontal arranged anchors and axial load application. Furthermore the anchors were exposed to the standard temperature-time curve (ETK) [2]. In the tests a fixture according to TR020 was used, therefore the following fire resistances cover only anchors protected from fire by attachments similar to the fixture according to TR020 [1].
The assessment is carried out in dependence on TR020 [1]. Divergent test results of all types of failure (steel failure, pullout failure) are assessed together.

a. Steel failure:
   No additional tests for the assessment of steel failure are necessary because the resulting fire resistances are smaller and values with steel failure are assessed together. Threaded rods with a minimum steel grade of 5.8 shall be used. The evaluation covers threaded rods made of stainless steel as well.

b. Pullout failure:
   Most results deliver pullout failure in the fire tests.

c. Brick failure:
   In the fire tests evaluated in this document no absolute brick breakout failure could be observed. Therefore it was suggested that this failure type has no influence on the fire resistances of the anchor system WIT-VM 250.

In hollow bricks the worse position in brick was tested, so that the fire resistances which are given in the following covers all positions in a hollow brick.
The fire resistances which are given in chapter 5 covers axial loads and shear loads as well. The evaluation is performed for the brick types given in ETA-16/0757 [5]. According to ETAG 029 [6], the results in Table 5-1 can also be transferred to solid brick types with higher strength and larger dimensions.

5 Summary

Table 5-1 and Table 5-2 show the fire resistances for the use of anchor system WIT-VM 250 in the proved undergrounds. The given fire resistances covers axial and radial loads.

Table 5-1: Summary of the characteristic resistance against pullout or steel failure for threaded rods

characteristic fire resitance for pullout and Steel failure								
Brick type		external thread	minumum anchorage depth	sieve sleeve	R30	R60	R90	R120
[-]		[mm]	[mm]	[mm x mm]	[kN]	[kN]	[kN]	[kN]
clay solid brick (Mz)		8	80	-	1,05	0,80	0,55	0,45
		10	90		2,10	1,60	1,05	0,80
		12	100		3,50	2,55	1,60	1,10
		16	100		4,70	3,25	1,80	1,05
sand lime solid brick (KS)		8	80	-	1,05	0,80	0,55	0,45
		10	90		2,10	1,60	1,05	0,80
		12	100		3,50	2,55	1,60	1,10
		16	100		4,70	3,25	1,80	1,05
aerated concrete		8	80	-	1,2 (1,35)[1)]	0,85	0,35	0,10
		10	90		1,70	1,15	0,65	0,35
		12	100		2,05	1,45	0,90	0,60
		16	100		1,70	1,20	0,70	0,45
clay hollow and solid brick (Hlz + Mz)		8	130	SH 16 x 130	0,21	0,13	0,05	0,00
		10	130	SH 16 x 130	0,21	0,13	0,05	0,00
		12	130	SH 20 x 130	0,21	0,13	0,05	0,00
		12	200	SH 20 x 200	0,21	0,13	0,05	0,00
sand lime hollow and solid brick (KSL und KS)		8	130	SH 16 x 130	0,21	0,13	0,05	0,00
		10	130	SH 16 x 130	0,21	0,13	0,05	0,00
		12	130	SH 20 x 130	0,21	0,13	0,05	0,00
		16	130	SH 20 x 200	0,21	0,13	0,05	0,00

[1)] Applies for stainless steel A4

Table 5-2: Summary of the characteristic resistance under fire against pullout or steel failure of the internally threaded sleeve IG

characteristic fire resitance for pullout and Steel failure of the internally threaded sleeve								
Brick type	internally threaded sleeve	external thread	minumum anchorage depth	sieve sleeve	R30	R60	R90	R120
[-]	**[mm]**		**[mm]**	**[mm x mm]**	**[kN]**	**[kN]**	**[kN]**	**[kN]**
clay solid brick (Mz), sand lime solid brick (KS)	IG M6	M10	90	-	1,03	0,73	0,43	0,29
	IG M8	M12	100		1,87	1,33	0,78	0,53
	IG M10	M16	100		2,97	2,10	1,23	0,87
aerated concrete	IG M6	M10	90	-	1,03	0,73	0,43	0,29
	IG M8	M12	100		1,87	1,33	0,78	0,53
	IG M10	M16	100		1,70	1,20	0,70	0,45
clay hollow and solid brick (Hlz + Mz), sand lime hollow and solid brick (KSL und KS)	IG M6	M10	90	SH 16 x 130	0,21	0,13	0,05	0,00
	IG M8	M12	100	SH 20 x 130	0,21	0,13	0,05	0,00
	IG M10	M16	100	SH 20 x 200	0,21	0,13	0,05	0,00

The load-bearing capacity of the screwed-in element must also be taken into account in the design.

apl.- Prof. Dr.-Ing. Catherina Thiele

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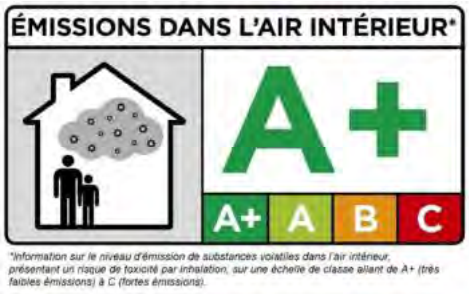
VOC Emissions Test report

1. Sample Information

Sample identification	WIT-VM 250
Product type	Sealant
Batch no.	-
Production date	-
Date when sample was received	26/10/2012
Testing (start - end)	31/10/2012 - 28/11/2012

2. Resulting VOC Emissions Class Label

This recommendation is based on French regulation of March 23, 2011 (décret DEVL1101903D) and of April 19, 2011 (arrêté DEVL1104875A). For details please see www.eurofins.com/france-voc



The product was assigned a VOC emission class without taking into account the measurement uncertainty associated with the result. As specified in French Decree no. 2011-321 of March 23, 2011, correct assignment of the VOC emission class is the sole responsibility of the party responsible for distribution of the product in the French market.

The results are only valid for the tested sample(s).
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3. Test Method

Method		Principle		Parameter	Quantification limit	Uncertainty
ISO 16000 parts -3, -6, -9, -11 Internal method numbers: 9810, 9811, 9812, 2808, 8400		GC/MS HPLC/UV		VOC Volatile alde-hydes	2 µg/m³ 3 µg/m³	22% (RSD) Um = 2 x RSD= 45 %
Test chamber parameter						
Chamber volume, l	119	Temperature, °C	23±1	Relative humidity, %	50±5	
Air change rate, 1/h	0.5	Loading ratio, m²/m³	0.007			
Test condition: Sample stayed in test chamber during the whole 28 days testing period.						
Sample preparation						
Thickness, mm		3				

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4. Results

	Concentration after 28 days µg/m³	C	B	A	A+
TVOC	74	>2000	<2000	<1500	<1000
Formaldehyde	<3	>120	<120	<60	<10
Acetaldehyde	<3	>400	<400	<300	<200
Toluene	<2	>600	<600	<450	<300
Tetrachloroethylene	<2	>500	<500	<350	<250
Ethylbenzene	<2	>1500	<1500	<1000	<750
Xylene	<2	>400	<400	<300	<200
Styrene	<2	>500	<500	<350	<250
2-Butoxyethanol	<2	>2000	<2000	<1500	<1000
Trimethylbenzene	<2	>2000	<2000	<1500	<1000
1,4-Dichlorobenzene	<2	>120	<120	<90	<60

< Means less than
> Means higher than

Thomas Neuhaus
Head of product emission test centre

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This is the Official Listing recorded on November 13, 2013.

Adolf Würth GmbH & Co. KG
Reinhold-Würth-Str. 12-16
74653 Künzelsau-Gaisbach
Germany
49 7940 15 0

Facility: # 2 Germany

Joining and Sealing Materials

Trade Designation	Size	Water Contact Temp	Water Contact Material
Adhesives			
Atrion AVM TOP QUATTRO	[1]	D. HOT	VE
WIT-PE 500	[1]	D. HOT	EPOXY
WIT-VM 250	[1]	D. HOT	VE

[1] Certified for use as an anchoring adhesive for installing thread rods (less than or equal to 1.3 inches in diameter) in concrete or masonry for water treatment applications.

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF International.

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General Manager, Water Systems

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Adolf Würth GmbH & Co. KG

Facility: # 2 Germany

AS COMPLYING WITH NSF/ANSI 61 AND ALL APPLICABLE REQUIREMENTS.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.

Certification Program
Accredited by the
American National
Standards Institute

Certification Program
Accredited by the
Standards Council
of Canada

This certificate is the property of NSF International and must be returned upon request. For the most current and complete information, please access NSF's website (www.nsf.org).

November 13, 2013
Certificate# C0173884 - 01

David Purkiss
General Manager, Water Systems

NSF International

RECOGNIZES

Adolf Würth GmbH & Co. KG

Germany

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November 13, 2013
Certificate# C0173880 - 01

David Purkiss
General Manager, Water Systems

WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

7. Country of Origin.



Dubai,2026

COUNTRY OF ORIGIN

To Whom It May Concern,

We herewith declare under our sole responsibility that:

Art. No.	Description	Country of Origin
090345020*	Injectable mortar WIT-VM 250	Germany

Is produced in accordance with Würth's Quality Management System and conforms to the applicable product specifications and quality requirements as stated in the latest approved Technical Data Sheet (TDS) and Safety Data Sheet (SDS).

We trust to have been of service with this confirmation and remain,

With kindest regards,

Product Department
WURTH GULF FZE

وورث جلف م.م.ح
WÜRTH GULF FZE
P.O.Box: 17036
Product Department

Wurth Gulf FZE-Plot # S61303, Jebel Ali South 6 ,Dubai ,U.A.E - P.O.Box:17036
T: +9714 8809991, 04 8834229(old), F: +971 4 8809255, 04 8834303(old), E: wurthglf@emirates.net.ae - www.wurth.ae

WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

8. Product Sample Picture.



Dubai,2026

PRODUCT SAMPLE PICTURE

To Whom It May Concern,



We trust to have been of service with this confirmation and remain,

With kindest regards,

Product Department
WURTH GULF FZE

وورث جلف م.م.ح
WÜRTH GULF FZE
P.O.Box: 17036
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WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

9. Previous Approvals.



CLIENT: **Roads and Transportation Authority** RTA طريقة الطرق والمواصلات ROADS & TRANSPORT AUTHORITY	**CONTRACTOR:** **Kabri International Contracting LLC** KABRI International Cont. Co. L.L.C شركة كابري للمقاولات ذ.م.م U.A.E - U.S.A - JORDAN
PROJECT: PTA/MAR/2135/2021 MAINTENANCE AND IMPROVEMENTS OF MARINE FACILITIES	Document Ref No: PTA-MAR-2135-2021-RFI-42 Date: 15-11-2023, Time: 11.30 AM

REQUEST FOR INSPECTION

We request your attendance to inspect the following works:

1. INSPECTION TIME: 11.30 AM		**Date: 15-11-2023**	
2. LOCATION: At Site - Dubai Marina Mall			
3. INSPECTION:	☐ First	☐ Second	☐ Others (Final Inspection)
4. THE WORK INVOLVE	Work Inspection	Authority Inspection ( )	
☐ Surveying	☐ Testing	☐ Quantity Surveying	☐ Others (Final Inspection)
Other Attachment			

5. DESCRIPTION OF WORK:

Pull Out Testing for Chemical anchor Bolts at MS Cantilever type Platform & Quay wall to Platform Connection Brackets.

6. Scope of Work:

Pull Out Testing for Chemical anchor Bolts at MS Cantilever type Platform & Quay wall to Platform Connection Brackets.

Notes: As per ITP- **KP0126-OTH-0019 R.01** Clause – 8.9

Name and signature: Raed Jamal Albarqouni Date:15-11-2023

7. INSPECTION BY:	Signature:	Date:
Engineer		
Site Inspector		
Material Inspector		
Others		

8. CLIENT'S COMMENTS:

THE WORKS ARE: ☑ Approved ☐ Approved as noted ☐ Rejected

Signature: Date:

P.O.Box: 99695 Dubai - U.A.E. 1 Kabri International Contracting Co. (L.L.C)

EMPLOYER	CONTRACTOR
ROADS AND TRANSPORT AUTHORITY.	KABRI INTERNATIONAL CONTRACTING L.L.C.

METHOD STATEMENT SUBMITTAL

PROJECT : PTA/MAR/2135/2021 MAINTENANCE AND IMPROVEMENTS TO MARINE FACILITIES

FOR INFORMATION AND RECORDS	O	FOR APPROVAL	O	Reference No.	PTA-MAR-KP126-MST-0020-02
				Date:	14-Jul-23

To:
Road and Transport Authority
Marine Department

Method Statement Document No: PTA-MAR-KP126-MST-0020-02
From: Kabri International Co LLC

Originator
Hazem AlHaj

Signature:
Date: **14-Jul-23**

Document Title:-

Method Statement for Modification of the Marina Mall Marine Transport Station

Location of related Works:- **Marina Mall WB Station**

Date Approval required by:

Stamp for receipt (RTA)

Other Remarks:

CLIENT/ENGINEERS RESPONSE (Please tick relevant box)

Clients / Engineer's Comments:

Stamp for receipt

- ✓ Approved
- o Approved as Noted
- o Revise & Resubmit
- o No Approval Required

For Client / Engineer representative:

Name: Nilanthi Jayawardena

Reference:

Signature:

Date: 8/9/2023

Client:	Contractor
GOVERNMENT OF DUBAI / هيئة الطرق والمواصلات ROADS & TRANSPORT AUTHORITY / RTA	KABRI International Cont. Co. L.L.C شركة كابري انترناشيونال للمقاولات ذ.م.م U.A.E - U.S.A - JORDAN

PROJECT

PTA/MAR/2135/2021- Maintenance and Improvements to Marine Facilities

DOCUMENT SUBMITTAL

☐ FOR INFORMATION AND RECORDS	☑ FOR APPROVAL	**Transmittal No:**	**KP0126-OTH-0019-R01**
		Previous Transmittal No:	**KP0126-OTH-0019-R00**
		Date:	**September 27, 2023**

To:	From:	Signature
Marine Transport Department Roads and Transport Authority Government of Dubai PO BOX 118899, Dubai UAE	**Kabri International Contracting Co. LLC** PO BOX 99695, Dubai UAE	P.O.Box: 99695 Dubai - U.A.E Kabri International Contracting Co. (L.L.C)

Details of Submittal		CLIENT'S RESPONSE (Please Tick Relevant Box)			
No.	**Document Title**	**A**	**AN**	**RR**	**R**
1	Inspection and Test Plan for Modification of EMAAR Pontoon to berth Water Taxies at Marina Mall WB Station as per WO # 5712686	✓			

DETAILED RESPONSE (please refer to corresponding serial no.)

For Client Representative:

Stamp Receipt for Client

Name Nilanthi Jayawardena Date 10/1/2023

Signature

Stamp Receipt for Contractor

A - APPROVED RR - REVISE & RESUBMIT AN - APOPROVEED AS NOTED R - REJECTED

Project Title: VERDANA G+3 TOWNHOUSES DUBAI INVESTMENT PARK, PLOT NO: 5980350, Dubai UAE

Reportage Prime Properties	IEB Architectural Design consultancy	MGC Building Contracting LLC
Reportage Prime Properties	IEB Architectural Design Consultancy	MODUN GULF BUILDING CONTRACTING

TECHNICAL SUBMITTAL (CIVIL-MAS)

MGC-IMG-MAS-CVL-024	Rev.00
Date: 6-Sep-23	

Sr. No.	Material Description		List of Enclosure *(Tick related boxes)*	
1	Item Description :	TECHNICAL SUBMITTAL FOR WIT-VM250 CHEMICAL ANCHOR – FAST CURING SUITABLE FOR REPAIRING & ANCHORING	■	Vendor's Technical Literature
2	Specs. / BOQ / Drawing / Reference :		■	Compliance Statement
3	Material Proposed:	WIT-VM250 CHEMICAL ANCHOR	■	Previous Test Results
4	Manufacture Details/Brand:	WURTH GULF-UAE	■	Copy of the Related Specs
5	Subcontractor /Supplier Details:	WURTH GULF FZE	■	Samples
6	Reason for Alternative :		■	List of Previous Projects Done
7	Remarks:		■	Others (Specify): (MSDS, MS, Previous Approvals)

DISCIPLINE (✓ *Tick as applicable*)

■ Civil /Architectural □ Mechanical / Plumbing □ Electrical □ Other

For CONTRACTOR

Name & Signature	Name & Signature
Engr. Mohamed Hosney **MGC Technical Manager**	**Engr. Mohamed Elgiza** **MGC Project Manager**

For CONSULTANT:

Status Code- (A)	Status Code- (B)	Status Code- (C)	Status Code- (D)
□ Approved	■ Approved with Comments	□ Revise and Resubmit	□ Not Approved

Comments : Approved with Comments : CODE B

1-Shop drawings and calculations to be submitted for approval.
2-Scanning test to be completed before start application.
3-If anchored rebars will stay long term without casting, coating material for rebars to be submitted for approval.
4-Touching surface between new concrete and old concrete to be prepared before casting, approved bonding materials to be used.
5-Strictly follow manufacturer's recommendation for proper site preparation and coordination during and after application.Safety precautions shall be taken during and after application.

NAME:	DESIGNATION:	SIGNATURE:	DATE :
Mohammed Saifelden Ahmed	Project Engineer		

For CLIENT:

Status Code- (A)	Status Code- (B)	Status Code- (C)	Status Code- (D)
□ Approved	■ Approved with Comments	□ Revise and Resubmit	□ Not Approved

Comments :

NAME:	DESIGNATION:	SIGNATURE:	DATE :

DOCUMENT SUBMITTAL

DOCUMENT CODE	PROJECT NO.	DOCUMENT TYPE	TRADE CODE	RUNNING NUMBER	REV.	DATE	AUTHOR
	C1058	DS	C	JEC/DS/C/110	00	06/09/2023	JAZAL ENG.

ISSUED BY:

SN	Description/Title	Document No. / Revision	Specs. Ref.	No. of Copies
1	DOCUMENT SUBMISSION FOR PULL OUT TEST REPORT - AT ELEVATION-01 NEAR MAIN ENTRANCE FOR SECONDARY STEEL SUPPORTS.	00		3 Hard+1 soft copy

CONTRACTOR'S SIGNATURE:

RECIPIENT'S SIGNATURE: 07/09/23

Consultant's Comments:

- Strictly follow the project specification and documents.
- Subject to ADM final approval.

	Approved
✓	Approved as Noted
	Revise & Resubmit
	Rejected

Engineer Representative: Signature: Date:

Client's Comments:

Client Representative: Signature: Date:

14-9-23

EPC FOR AL DABBI'YA SURFACE FACILITIES PHASE III PROJECT

PROJECT NO. P2065
CONTRACT NO. 15810.01

ADCO PROJECT DOCUMENT REVIEW

ADCO Transmittal No.	ATC-ED-NE-15810.01-24052	**Date**	13/03/2017
Contractor Transmittal No.	CTA-ED-NE-15810.01-24052	**Date**	09/03/2017
Addressed To:	Tecnimont – Project Director		
Copy To:	Tecnimont - Document Controller		

1. Doc. for ADCO Approval	☑	a) Doc. Approved
	☐	b) Doc. With Comments, to be resubmitted.
	☐	c) Rejected
2. Doc. for ADCO Comments	☐	a) To be resubmitted
	☐	b) CONTRACTOR to Proceed incorporating ADCO's Comments
3. Doc. For ADCO information	☐	a) Exceptional comment to be incorporated by Contractor.

ADCO DOCUMENT TRANSMITTAL

Approved.

S. No.	Document Title	ADCO Document No.	Tecnimont Document No.	Rev
1	ALJV-MATERIAL APPROVAL REQUEST - ADHESIVE ANCHOR BOLT FOR MASONRY WALL TO FIX THE EARTHING ITEM-CPP	02.99.83.1864	3844-LZ-VD-CAG320ELE006	A

Reviewed By

Name : Khaled Antali./ Essa Ahmed.
Position : Construction Eng / Construction Eng.

QA/QC Rep: 14.3 14/3/17

Name : Ibrahim Negm
Position : Construction Manager
Signature: 14/3/17

Name : Khalil Yahia Ali
Position : Construction Manager
Signature: 14/03/17

Approved by

Engineering Manager - PMC : Andrew John Kelly

Team Leader – PMC : Harry Gough

Project Manager – ADCO : Wael Al Musabi

Senior Project Manager – ADCO : Sami Al Ankar

Received By:

Signature:

Date:

Material Submittal Form

Record Reference:	Date:30/11/2013
Project Details:	Musanada Project Number:
Project Name: Abu Dhabi Future Schools Program Phase 4, Package 1, Al Jimi & Al Muwaiji	
Client: MUSANADA	PMC: Projacs International
Engineer: ATKINS	Contractor: National Projects and Construction LLC
MS No: MTS-CVL-AR-00194	Rev No :00

Discipline ☐ Civil ☑ Architecture ☐ Mechanical ☐ Electrical ☐ Others

Material Detail		*List of Enclosure (Tick the Related Box)*
Item Description	**Additional Anchors : W-FA/A4 , WIT VM-250 , W-UR8 (for Fixing Aluminium Window, Doors & Curtain walls)**	☒ Technical literature. ☒ Compliance Statement. ☒ Sustainability Compliance. ☐ Previous Test Results. ☒ Copy of the Related Specs. ☒ Samples with Sample Tag. ☒ List of Previous Projects Done. ☐ Others
Specs.Ref. *BOQ. Ref.* *Drwg. Ref.*	**083200 Glass doors** **BILL NO. 02 - SECTION H - DOORS AND WINDOWS** **As per required location on the drawings**	
Material Specified	**As per the Materials Specified in Projects Specs 083200 Glass doors**	
Material Proposed	**Wurth Brand : W-FA/A4 Mechanical anchors, WIT VM-250 Chemical Anchors w/A4 threaded Rods , W-UR8 -Pan head Screw with Plastic Plug**	
Manufacturer / Local Supplier	**M/s WURTH** **M/s PETRA**	
Reason for Alternative		
Remarks		

RECEIVED 30 NOV 2014 ATKINS SITE OFFICE 5119493 / R...2697

NPC NATIONAL PROJECTS 04 DEC 2014 RECEIVED ADFS

We certify that the material submitted herewith has been reviewed in details and in compliance with the Contract Drawings and Specifications except as otherwise stated above.

Contractor Signature: Engr. Alaa Mohamed Project Manager

Discipline Engineer:	**QA/ QC**	**HSE**	**MEP**	**Construction Manager:**
Received By		**Date**		

ADFS Site Office

The Engineer:
☐ A- Approved ☑ B- Approved with Comments ☐ C- Revise and Resubmit ☐ D- Rejected
☐ E- Approved with Comments/Resubmit

Comments: No tech. objection for proposed material, subject to satisfactions of relevant structural calculations. See Comments on sample tag.

Reviewed By & Signature: (The Engineer)	**Approved By & Signature: (The Engineer)**
Received By (The Contractor)	**Date**

Note: Engineer's approval is for conformance with information given and design concept expressed in Contract Documents. Approval does not authorize changes to Contract Documents. Engineer's approval does not relieve the Contractor from his contractual obligation to ensure conformance to the Contract Documents/Specifications. Any deviations, to the Specifications/Contract Documents found subsequent to Engineer's approval are to be corrected by the Employer/Engineer at no extra Cost/Time.

Distribution:

☐ Musanada	☐ PMC	☐ Engineer	☐ Contractor

CONSULTANT: Eng. Adnan Saffarini Office, Architects & Engineering Consultants, مكتب المهندس عدنان سفاريني معماريون ومهندسون استشاريون

MAIN CONTRACTOR: شركة العارف للمقاولات ذ.م.م. AL-ARIF CONTRACTING CO. (LLC) Est. Year - 1975 AL-ARIF GROUP

Material Submittal Approval

Project : Proposed 4B+G+23 Floors. Hotel Building Plot No. 2310379 Dubai for Mr. Muhammad Sultan Hassan Belshalat, Al Nahda 1st in Dubai.

Submittal Ref No:	**MS - 66**	**Rev.: 01**	**Date:**	**09-10-18**
Early Submittal	**Late Submittal**		**Due Date**	

To ENG. ADNAN SAFFARINI - Resident Engineer

Description of Material Submittal: Concrete Repair

Wurth Injection Mortar for Rebar Installation

Location of Use: All the floor

1) Bar size 12mm & 16mm dia.
2) 25mm Result of other project.

Specification Section	
Paragraph No:	

Scope of work : Concrete repair

Name: Wurth Gulf (L L C)

☐ Subcontractor ☑ Supplier ☐ Main Contractor

Tel : 04- 8809991

Fax : 04- 8809255

Email : wurthglf@emirates.net.ae

Attachments : 1 book

1) Technical Data Sheet
2) Lab Test Result

I hereby certify this submittal data has been reviewed and approved prior to submission to the Project Management Consultant and Engineer and the information contained within this submittal has been checked and coordinated with the requirements of the work and the contract.

Area Manager
Name: Eng. Waseem Khan
Signature: Date: 09-10-18

Project Manager (Received)
Name: Eng. Zaydoon Bayyoud
Date: Signature:

RECEIVED
10 OCT 2018
BY:.....

For use by Project Manager / Consultant

Approval Status A - ☐ Approved B - ☑ Approved As Noted C - ☐ Revise & Resubmit D - ☐ Rejected

Engineer's Comments:

- Application to be as per technical requirements
- Any usage of the material to be under the consultant supervision.

Project Manager
Name: Eng. Zaydoon Bayyoud
Date: 13/10/2018 Signature:

Area Manager (Received)
Name: Eng. Waseem Khan
Date: Signature:

WÜRTH

Pull-out Test Report

Type of Test: Proof Test
Tested Anchor: WIT-VM 250

Tested Base material: Concrete C60

Project Details: **(4B+G+23 Floors) Hotel BLDG.**
Client: **MR. Mohammed Sultan**
Consultant Name. **Eng. Adnan Saffarini (Design, Supervision & Consult)**

Oct. 9, 2018 Wurth Gulf

Name:Eng. Sherif Ibrahim

No.	Reabar Anchorage Depth	Rebar size	Type of Failure / Remarks	Proof Resistance Reached
	h_{ef}	Φ		N_{proof}
	mm	mm		kN
1	110	12	No Failure	32.80
2	110	12	No Failure	35.40
3	110	12	No Failure	28.20
4				
5				
6				
7	Remark:			
8	-It was agreed that 21.7 KN is the target to reach in the pullout test.			
9	-Applied stress in rebar (N/mm)2 =Applied load /Cross section area of the steel rebar.			
10	-Bond strength = Applied load /Bond area of steel in concrete.			
11	-Installation of the rebar was done according to Installation instructions and Method statement.			
12	-And we Supplied and installed all the rebar.			
13				
14				

Signature

Sherif Ibrahim

WÜRTH
P.O.Box: 17036
Jebel Ali
Dubai - U.A.E.
WURTH GULF FZE

WÜRTH

Pull-out Test Report

Type of Test: Proof Test
Tested Anchor: WIT-VM 250

Tested Base material: Concrete C60

Project Details: **(4B+G+23 Floors) Hotel BLDG.**
Client: **MR. Mohammed Sultan**
Consultant Name: **Eng. Adnan Saffarini (Design,Supervision & Consult)**

Oct. 9, 2018 Wurth Gulf

Name:Eng. Sherif Ibrahim

No.	Reabar Anchorage Depth	Rebar size	Type of Failure / Remarks	Proof Resistance Reached
	h_{ef}	ϕ		N_{proof}
	mm	mm		kN
1	125	16	No Failure	65.40
2	125	16	No Failure	48.80
3	125	16	No Failure	47.00
4				
5				
6				
7	Remark:			
8	-It was agreed that 30.8 KN is the target to reach in the pullout test.			
9	-Applied stress in rebar (N/mm)2 =Applied load /Cross section area of the steel rebar.			
10	-Bond strength = Applied load /Bond area of steel in concrete.			
11	-Installation of the rebar was done according to Installation instructions and Method statement.			
12	-And we Supplied and installed all the rebar.			
13				
14				

Signature

Sherif Ibrahim

WURTH GULF P.O.Box 17036 Jebel Ali Dubai - U.A.E.

WÜRTH

Pull-out Test Report

Type of Test: Proof Test
Tested Anchor: WIT-VM 250

Tested Base material: Concrete C60

Project Details: **(4B+G+23 Floors) Hotel BLDG.**
Client: **MR. Mohammed Sultan**
Consultant Name: **Eng. Adnan Saffarini (Design, Supervision & Consult)**

Oct. 9, 2018 Wurth Gulf

Name:Eng. Sherif Ibrahim

No.	Reabar Anchorage Depth	Rebar size	Type of Failure / Remarks	Proof Resistance Reached
	h_{ef}	ϕ		N_{proof}
	mm	mm		kN
1	210	25	No Failure	101.60
2	210	25	No Failure	99.70
3	210	25	No Failure	100.20
4				
5				
6				
7	Remark:			
8	-It was agreed that 67.1 KN is the target to reach in the pullout test.			
9	-Applied stress in rebar (N/mm)2 =Applied load /Cross section area of the steel rebar.			
10	-Bond strength = Applied load /Bond area of steel in concrete.			
11	-Installation of the rebar was done according to Installation instructions and Method statement.			
12	-And we Supplied and installed all the rebar.			
13				
14				

Signature



WÜRTH

WÜRTH GULF

SUBMITTAL

WÜRTH INJECTION TECHNOLOGY

WIT-VM 250

VINYL ESTER INJECTION SYSTEM

10. Draft Warranty.



Dubai,2026

DRAFT WARRANTY

To Whom It May Concern,

We as Würth Gulf and under our sole responsibility confirm a **10-year** warranty from date of TOC for below mentioned materials specifications and against material defects for our products providing the material is applied in accordance with the instructions provided by us.

Art. No.	Description
090345020*	Injectable mortar WIT-VM 250

The draft warranty shall be replaced with a final warranty addressing the project end user.

Disclaimer: This warranty is restricted to replacement of defective material against the original invoice cost,

Würth Gulf does not take responsibility for any defects caused by wrong application during.

We trust to have been of service with this confirmation and remain,

With kindest regards,

Product Department
WURTH GULF FZE



DRAFT