



Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-22/6264 of 26/08/2022
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	VJ Technology Injection system E410+ EC410+ for non-cracked concrete
Product family to which the construction product belongs:	Product code 33 - Fixings
Manufacturer:	VJ Technology Ltd. Brunswick Road Cobbs Wood Ind. Estate ASHFORD KENT TN23 1EN UK
Manufacturing plant(s):	VJ Technology Plant 1
This UK Technical Assessment contains:	17 pages including 3 annexes which form an integral part of this assessment
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	EAD 330332-01-0601 EAD 330499-01-0601

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1 Technical description of the product

The E410+, EC410+ modified Epoxy acrylate resin without styrene for non-cracked concrete is a bonded anchor consisting of a cartridge with injection mortar and a steel element. The steel elements consist of a commercial threaded rod, a hexagon nut, and a washer. The steel elements are manufactured of galvanized steel or stainless steel.

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 illustration and the description of the product are given in Annex A.

2 Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

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 anchor of at least 50 and/or 100 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 tension loads	See Annex C1
Characteristic resistance for shear loads	See Annex C2
Displacement	See Annex C3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	No performance assessed

3.3 Health, hygiene, and the environment (BWR 3)

Regarding dangerous substances, there may be additional legislative requirements falling outside of the scope of this document. These requirements must be complied with as appropriate.

3.4 Safety and accessibility in use (BWR 4)

For basic requirement safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

3.8 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1 System of assessment and verification of constancy of performance

According to UKAD No. EAD 330332-01-0601, UKAD No. 330499-01-0601 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 1 applies.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the construction works) or heavy units	-	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1 UKCA marking for the product/system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of certificate of constancy of performance
- UKTA number.

On behalf of the British Board of Agrément



Date of Issue: 26 August 2022

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ANNEXES

Annex A1 – Product description – Installed conditions

Annex A2 – Product description – Injection system

Annex A3 – Product description – Threaded rod

Annex A4 – Product description – Materials

Annex B1 – Intended use – Specifications

Annex B2 – Intended use – Installation parameters – Cleaning and setting tools

Annex B3 – Intended use – Installation instructions

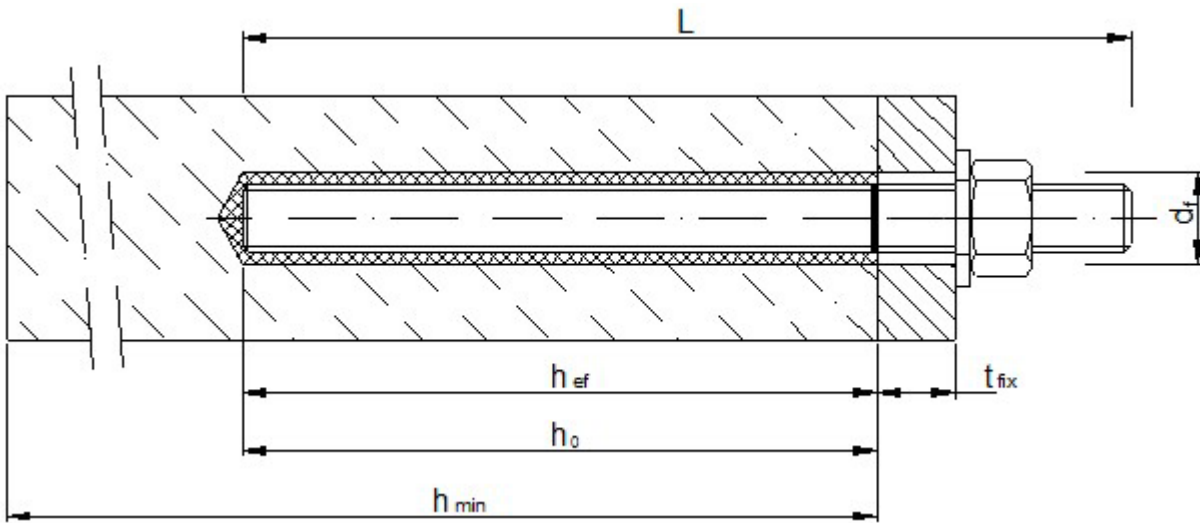
Annex B4 – Intended use – Installation instructions (continuation) - Curing time

Annex C1 – Performances – Characteristic values under tension loads in non-cracked concrete

Annex C2 – Performances – Characteristic values under shear loads in non-cracked concrete

Annex C3 – Performances – Displacement

Installation threaded rod



- d_f = diameter of clearance hole in the fixture
- t_{fix} = thickness of fixture
- h_{ef} = effective embedment depth
- h_o = depth of drill hole
- h_{min} = minimum thickness of member

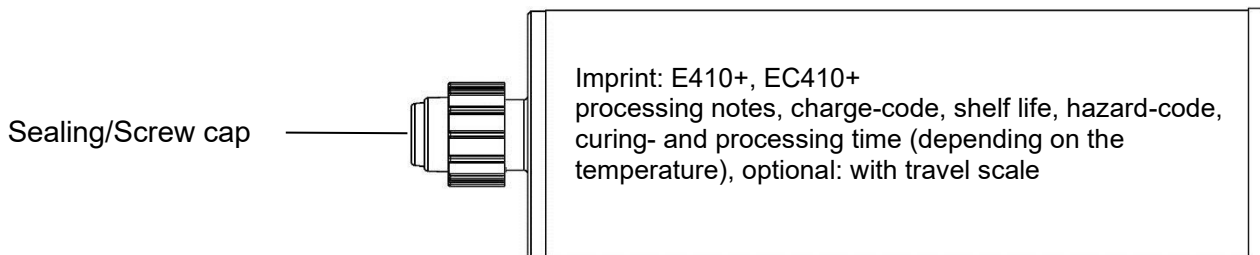
VJ Technology Injection system for concrete E410+, EC410+

Product description
Installed conditions

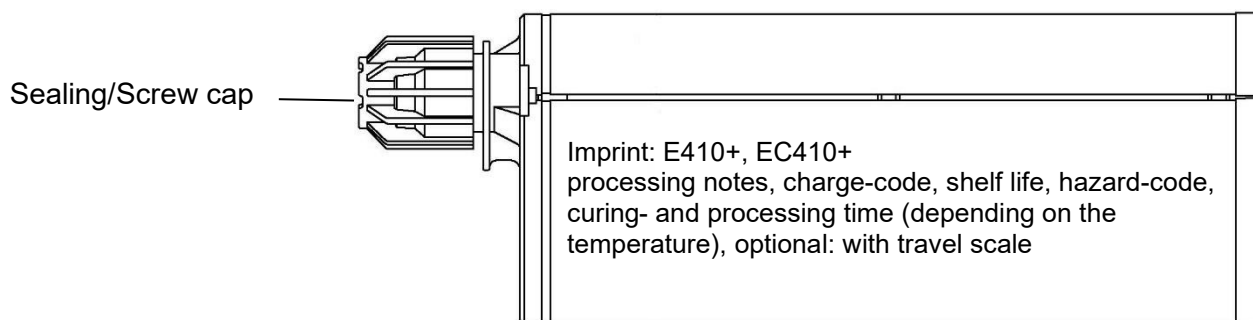
Annex A1

Cartridge: E410+, EC410+

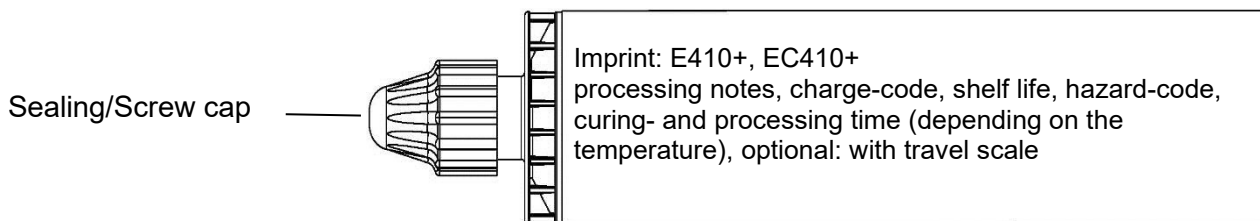
150 ml, 280 ml, 300 ml up to 330 ml and 380 ml up to 420 ml cartridge (Type: coaxial)



235 ml, 345 ml up to 360 ml and 825 ml cartridge (Type: “side-by-side”)

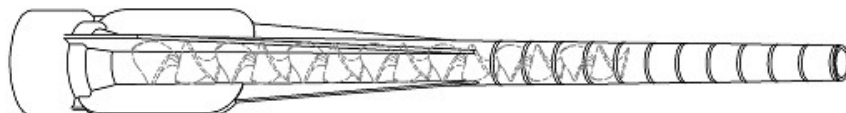


165 ml and 300 ml cartridge (Type: “foil tube”)



Static mixer

SM 14W



CM 8W

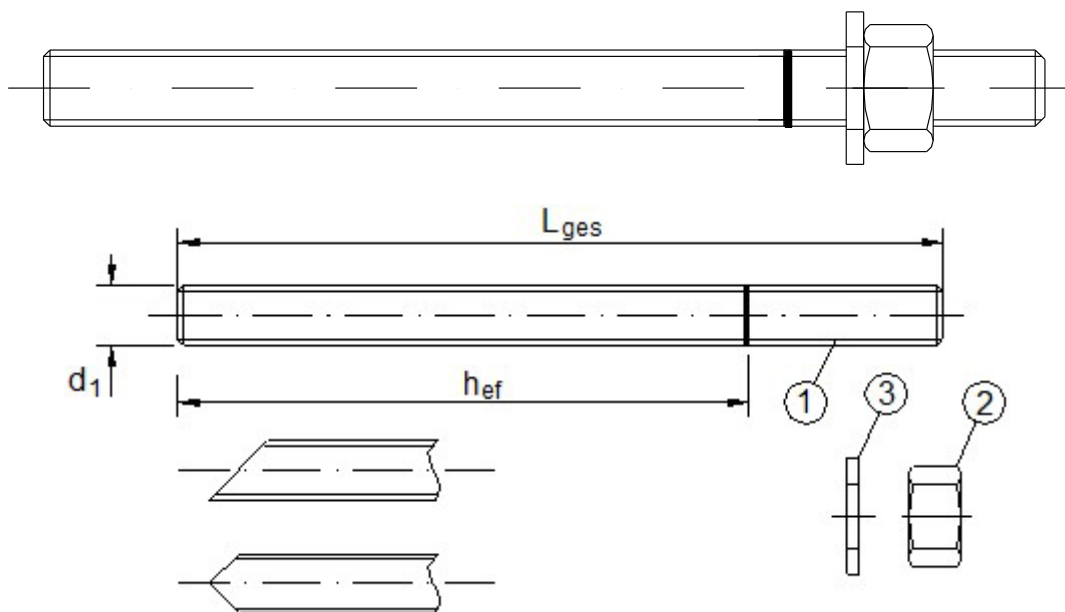


VJ Technology Injection system for concrete E410+, EC410+

Product description
Injection system

Annex A2

Threaded rod M8, M10, M12, M16, M20, M24 with washer and hexagon nut



Commercial standard threaded rod with:

- Materials, dimensions, and mechanical properties acc. Table A1
- Inspection certificate 3.1 acc. to BS EN 10204: 2004
- Marking of embedment depth

VJ Technology Injection system for concrete E410+, EC410+

Product description
Threaded rod

Annex A3

Table A1: Materials		
Part	Designation	Material
Steel, zinc plated $\geq 5 \mu\text{m}$ acc. to BS EN ISO 4042: 2018 or Steel, hot-dip galvanised $\geq 40 \mu\text{m}$ acc. to BS EN ISO 1461: 2009 and BS EN ISO 10684: 2004 + AC: 2009		
1	Anchor rod	Steel, BS EN ISO 683-4: 2018 or BS EN 10263: 2017 Property class 4.6, 4.8, 5.8, 8.8, BS EN 1993-1-8: 2005 + AC: 2009
2	Hexagon nut, BS EN ISO 4032: 2012	Steel acc. to BS EN ISO 683-4: 2018 or BS EN 10263: 2017 Property class 4 (for class 4.6 or 4.8 rod) BS EN ISO 898- 2: 2012, Property class 5 (for class 5.8 rod) BS EN ISO 898-2: 2012, Property class 8 (for class 8.8 rod) BS EN ISO 898-2: 2012
3	Washer, BS EN ISO 887:2000, BS EN ISO 7089:2000, BS EN ISO 7093:2000 or BS EN ISO 7094:2000	Steel, zinc plated, or hot-dip galvanised
Stainless steel		
1	Anchor rod	Material 1.4401 / 1.4404 / 1.4571, BS EN 10088-1: 2014, Property class 70 BS EN ISO 3506-1: 2020
2	Hexagon nut, BS EN ISO 4032:2012	Material 1.4401 / 1.4404 / 1.4571 BS EN 10088-1:2014, Property class 70 (for class 70 rod) BS EN ISO 3506-2: 2020
3	Washer, BS EN ISO 887: 2000, BS EN ISO 7089:2000, BS EN ISO 7093: 2000 or BS EN ISO 7094: 2000	Material 1.4401, 1.4404 or 1.4571, BS EN 10088-1: 2014
High corrosion resistant steel		
1	Anchor rod	Material 1.4529 / 1.4565, BS EN 10088-1: 2014, Property class 70 BS EN ISO 3506-1: 2020
2	Hexagon nut, BS EN ISO 4032: 2012	Material 1.4529 / 1.4565 BS EN 10088-1: 2014, Property class 70 (for class 70 rod) BS EN ISO 3506-2: 2020
3	Washer, BS EN ISO 887: 2000, BS EN ISO 7089: 2000, BS EN ISO 7093: 2000 or BS EN ISO 7094: 2000	Material 1.4529 / 1.4565, BS EN 10088-1: 2014
VJ Technology Injection system for concrete E410+, EC410+		Annex A4
Product description Materials		

Specifications of intended use

Anchorage subject to:

Static and quasi-static loads

Base materials:

- Reinforced or unreinforced normal weight concrete according to BS EN 206: 2013 + A2: 2021.
- Strength classes C20/25 to C50/60 according to BS EN 206: 2013 + A2: 2021.
- Non-cracked concrete

Temperature range:

- I: - 40 °C to +40 °C (max long-term temperature +24 °C and max short-term temperature +40 °C)
- II: - 40 °C to +80 °C (max long-term temperature +50 °C and max short-term temperature +80 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (Zinc coated steel, stainless steel, or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no aggressive conditions exist (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition if other aggressive conditions exist (high corrosion resistant steel).
Note: 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:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Anchorages under static or quasi-static actions are designed in accordance with:
 - EOTA Technical Report TR 029 "Design of bonded anchors", Edition September 2010 or
 - BS EN 1992-4: 2018

Installation:

- Dry, wet, or flooded bore holes.
- Hole drilling by hammer or compressed air drill mode.
- Overhead installation allowed.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site

VJ Technology Injection system for concrete E410+, EC410+

Intended use
Specifications

Annex B1

Table B1: Installation parameters for threaded rod

Anchor size		M 8	M 10	M 12	M 16	M 20	M 24
Nominal drill hole diameter	d_0 [mm] =	10	12	14	18	24	28
Effective anchorage depth	$h_{ef,min}$ [mm] =	60	60	70	80	90	96
	$h_{ef,max}$ [mm] =	160	200	240	320	400	480
Diameter of clearance hole in the fixture	d_f [mm] ≤	9	12	14	18	22	26
Diameter of steel brush	d_b [mm] ≥	12	14	16	20	26	30
Torque moment	T_{inst} [Nm] ≤	10	20	40	80	120	160
Thickness of fixture	$t_{fix,min}$ [mm] >	0					
	$t_{fix,max}$ [mm] <	1500					
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
Minimum edge distance	c_{min} [mm]	40	50	60	80	100	120

Steel brush

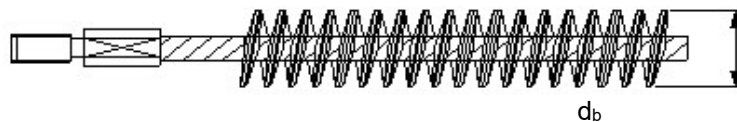


Table B2: Parameter cleaning and setting tools

Threaded Rod	d_0 Drill bit - Φ	d_b Brush - Φ	$d_{b,min}$ min. Brush - Φ
(mm)	(mm)	(mm)	(mm)
M8	10	12	10.5
M10	12	14	12.5
M12	14	16	14.5
M16	18	20	18.5
M20	24	26	24.5
M24	28	30	28.5



Hand pump (volume 750 ml)
Drill bit diameter (d_0): 10 mm to 20 mm
and anchorage depth up to 240 mm



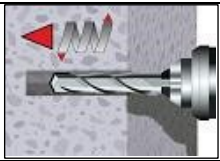
Recommended compressed air tool (min 6 bar)
All applications

**VJ Technology Injection system for concrete
E410+, EC410+**

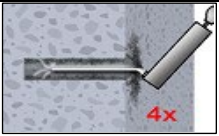
Intended use
Installation parameters
Cleaning and setting tools

Annex B2

Installation instructions



1. Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor (Table B1). In case of aborted drill hole: the drill hole shall be filled with mortar.



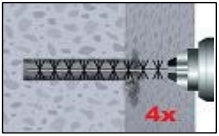
Attention! Standing water in the bore hole must be removed before cleaning.
2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) or a hand pump (Annex B2) a minimum of four times. If the bore hole ground is not reached an extension shall be used.

or

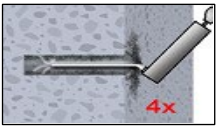


The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm.

For bore holes larger than 20 mm or deeper 240 mm, compressed air (min. 6 bar) **must** be used.

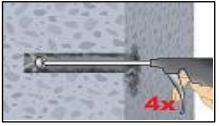


2b. Check brush diameter (Table B2) and attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush $> d_{b,min}$ (Table B2) a minimum of four times. If the bore hole ground is not reached with the brush, a brush extension shall be used (Table B2).

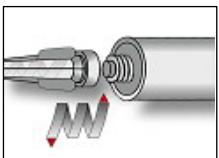


2c. Finally blow the hole clean again with compressed air (min. 6 bar) or a hand pump (Annex B2) a minimum of four times. If the bore hole ground is not reached an extension shall be used. The hand-pump can be used for anchor sizes up to bore hole diameter 20 mm. For bore holes larger than 20 mm or deeper 240 mm, compressed air (min. 6 bar) **must** be used.

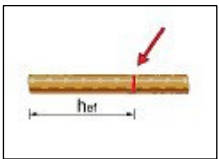
or



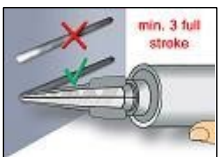
After cleaning, the bore hole must be protected against re-contamination in an appropriate way, until dispensing the mortar in the bore hole. If necessary, the cleaning repeated must be directly before dispensing the mortar. In-flowing water must not contaminate the bore hole again



3. Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. Cut off the foil tube clip before use. For every working interruption longer than the recommended working time (Table B3) as well as for new cartridges, a new static-mixer shall be used.



4. Prior to inserting the anchor rod into the filled bore hole, the position of the embedment depth shall be marked on the anchor rods.



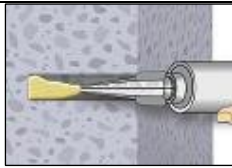
5. Prior to dispensing into the drill hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour. For foil tube cartridges it must be discarded a minimum of six full strokes.

VJ Technology Injection system for concrete E410+, EC410+

Intended use
Installation instructions

Annex B3

Installation instructions (continuation)

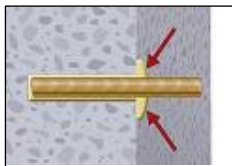


6. Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment larger than 190 mm an extension nozzle shall be used. Observe the gel-/ working times given in Table B3.

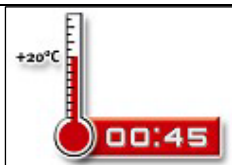


7. Push the threaded rod into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached.

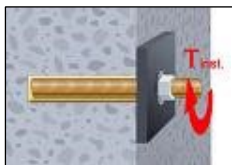
The anchor should be free of dirt, grease, oil, or other foreign material.



8. Be sure that the anchor is fully seated at the bottom of the hole and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application must be renewed. For overhead application the anchor rod should be fixed (e.g., wedges).



9. Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B3).



10. After full curing, the add-on part can be installed with the max. torque (Table B1) by using a calibrated torque wrench.

Table B3: Minimum curing time

Concrete temperature [°C]	E410+		EC410+	
	working time [min]	minimum curing time [min]	working time [min]	minimum curing time [min]
-10 to -6			60	240
-5 to -1	90	360	45	120
0 to +4	45	180	25	80
+5 to +9	25	120	10	45
+10 to +14	20	100	4	25
+15 to +19	15	80	3	20
+20 to +29	6	45	2	15
+30 to +34	4	25		
+35 to +39	2	20		
Cartridge temperature	+5°C to +40°C		-5°C to +30°C	

VJ Technology Injection system for concrete E410+, EC410+

Intended use
Installation instructions (continuation)
Curing time

Annex B4

Table C1: Characteristic values under tension loads in non-cracked concrete									
Anchor size threaded rod				M 8	M 10	M 12	M 16	M 20	M24
Steel failure									
Characteristic tension resistance		$N_{Rk,s}$	[kN]	$A_s \times f_{uk}$					
Combined pull-out and concrete failure									
Characteristic bond resistance in non-cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	8.5	8.0	8.0	8.0	8.0	8.0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	8.5	8.0	8.0	8.0	8.0	8.0
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm ²]	6.5	6.0	6.0	6.0	6.0	6.0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm ²]	6.5	6.0	6.0	6.0	6.0	6.0
Increasing factors for concrete ψ_c		C25/30		1.04					
		C30/37		1.08					
		C35/45		1.13					
		C40/50		1.15					
		C45/55		1.17					
		C50/60		1.19					
Factor according to BS EN 1992-4: 2018 Section 7.2.1.6		k_8	[-]	10.1					
Concrete cone failure									
Factor according to BS EN 1992-4: 2018 Sections 7.2.1.8 & 7.4.1.5		k_{ucr}	[-]	10.1					
Edge distance		$c_{Cr,N}$	[mm]	1.5 h_{ef}					
Axial distance		$s_{Cr,N}$	[mm]	3.0 h_{ef}					
Splitting failure									
Edge distance		$c_{Cr,sp}$	[mm]	$1.0 \cdot h_{ef} \leq 2 \cdot h_{ef} \left(2.5 - \frac{h}{h_{ef}} \right) \leq 2.4 \cdot h_{ef}$					
Axial distance		$s_{Cr,sp}$	[mm]	2 $c_{Cr,sp}$					
Installation safety factor (dry and wet concrete)		$\gamma_2 = \gamma_{inst}$	[-]	1.2					
Installation safety factor (flooded bore hole)		$\gamma_2 = \gamma_{inst}$	[-]	1.2					
VJ Technology Injection system for concrete E410+, EC410+									
Performances Characteristic values under tension loads in non-cracked concrete								Annex C1	

Table C2: Characteristic values under shear loads in non-cracked concrete								
Anchor size threaded rod		M 8	M 10	M 12	M 16	M 20	M24	
Steel failure without lever arm								
Characteristic shear resistance,	$V_{Rk,s}$	[kN]	$0.5 \times A_s \times f_{uk}$					
Ductility factor according to BS EN 1992-4: 2018 Section 7.4.2.3.1	k_2	[-]	0.8					
Steel failure with lever arm								
Characteristic bending moment,	$M_{0Rk,s}$	[Nm]	$1.2 \times W_{el} \times f_{uk}$					
Concrete pry-out failure								
Factor k_3 in equation (27) of BS EN 1992-4-5: 2018 Section 7.2.2.4 Factor k in equation (5.7) of Technical Report TR 029	$k_{(3)}$	[-]	2.0					
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1.0					
Concrete edge failure								
Effective length of anchor	l_f	[mm]	$l_f = \min(h_{ef}; 8 d_{nom})$					
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1.0					
VJ Technology Injection system for concrete E410+, EC410+							Annex C2	
Performances Characteristic values under shear loads in non-cracked concrete								

Table C3: Displacement under tension load¹⁾

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24
Non-cracked concrete C20/25								
Temperature range I: 40°C/24°C	δ_{N0} -factor	[mm/(N/mm ²)]	0.03	0.04	0.05	0.07	0.08	0.10
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0.07	0.08	0.08	0.08	0.08	0.10
Temperature range II: 80°C/50°C	δ_{N0} -factor	[mm/(N/mm ²)]	0.02	0.03	0.03	0.04	0.04	0.05
	$\delta_{N\infty}$ -factor	[mm/(N/mm ²)]	0.15	0.17	0.17	0.17	0.17	0.17

¹⁾ Calculation of the displacement

$$\delta_{N0} = \delta_{N0}\text{-factor} \cdot T;$$

$$\delta_{N\infty} = \delta_{N\infty}\text{-factor} \cdot T;$$

Table C4: Displacement under shear load¹⁾

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24
For non-cracked concrete C20/25								
All temperature ranges	δ_{V0} -factor	[mm/(kN)]	0.02	0.02	0.01	0.01	0.01	0.01
	$\delta_{V\infty}$ -factor	[mm/(kN)]	0.03	0.02	0.02	0.01	0.01	0.01

¹⁾ Calculation of the displacement

$$\delta_{V0} = \delta_{V0}\text{-factor} \cdot V;$$

$$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V;$$

VJ Technology Injection system for concrete E410+, EC410+

Performances Displacement

Annex C3



British Board of Agrément,
1st Floor Building 3
Hatters Lane
Croxley Park
Watford
WD18 8YG