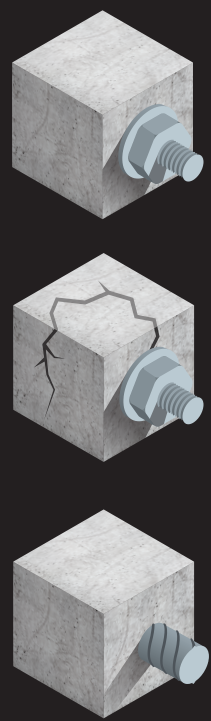
EUROPEAN TECHNICAL ASSESSMENT

XPRO



ETA
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EUROPEAN TECHNICAL ASSESSMENT
10/0262

Scell-it®

Deutsches Institut für Bautechnik

DIBt

Member of EOTA
www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment

ETA-10/0262 of 16 May 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	Scell-IT Injection System X-PRO, X-PRO Nordic for concrete
Product family to which the construction product belongs	Bonded fastener for use in concrete
Manufacturer	SCELL-IT 28 Rue Paul Dubrule 59854 LESQUIN FRANKREICH
Manufacturing plant	SCELL-IT, Plant1 Germany
This European Technical Assessment contains	25 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 330499-00-0601

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Specific Part

1 Technical description of the product

The "Scell-IT Injection system X-PRO, X-PRO Nordic for concrete" is a bonded anchor consisting of a cartridge with injection mortar X-PRO or X-PRO Nordic and a steel element. The steel element consist of a commercial threaded rod with washer and hexagon nut in the range of M8 to M30, reinforcing bar in the range of diameter ∅8 to ∅32 mm or internal threaded 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 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 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 C 1, C 2, C 4 and C 6
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 1, C 3, C 5 and C 7
Displacements (static and quasi-static loading)	See Annex C 8 to C 10
Characteristic resistance for seismic performance category C1	See Annex C 2, C 3, C 6 and C 7
Characteristic resistance and displacements for seismic performance category C2	No performance assessed

3.2 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 330499-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

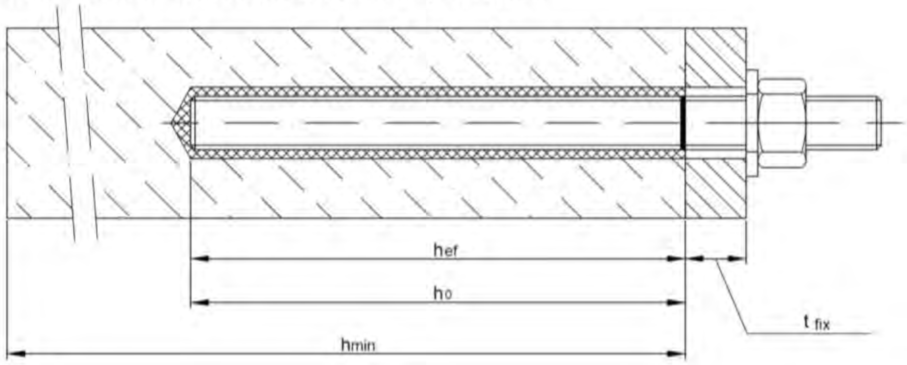
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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

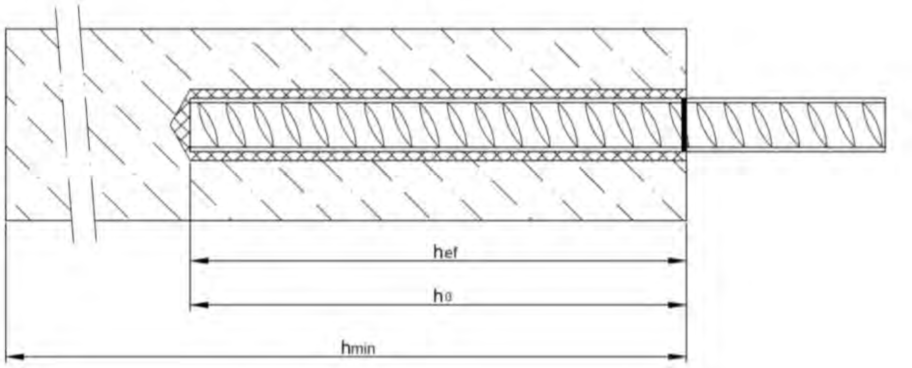
Issued in Berlin on 16 May 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow	*beglaubigt:*
Head of Department	Baderschneider

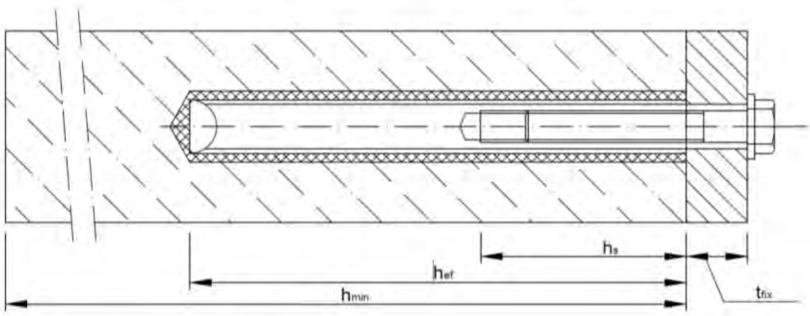
Installation threaded rod M8 up to M30



Installation reinforcing bar Ø8 up to Ø32



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



t_{fix} = thickness of fixture
h_{ef} = effective anchorage depth
h_0 = depth of drill hole
h_{min} = minimum thickness of member

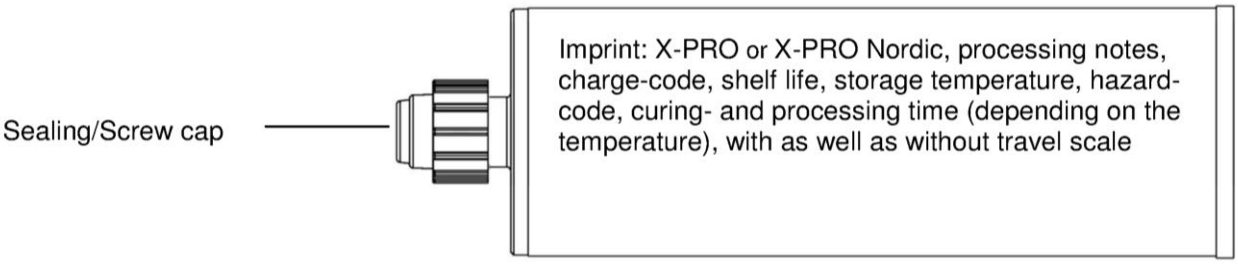
Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Product description
Installed condition

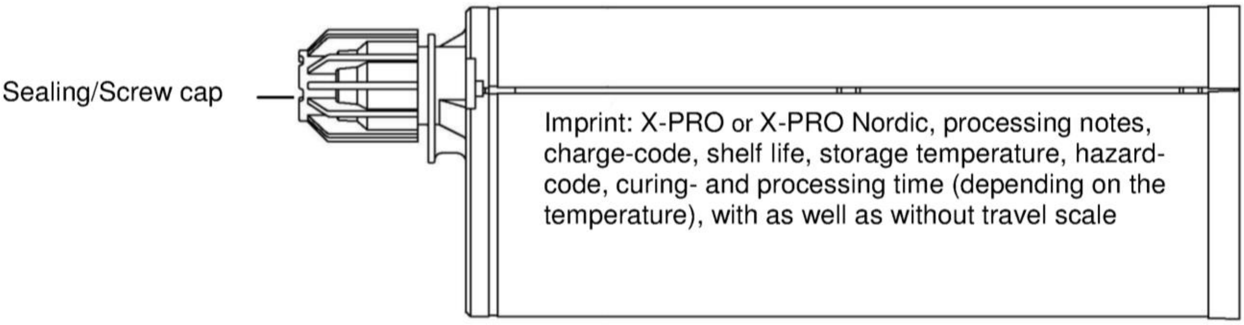
Annex A 1

Cartridge: X-PRO or X-PRO Nordic

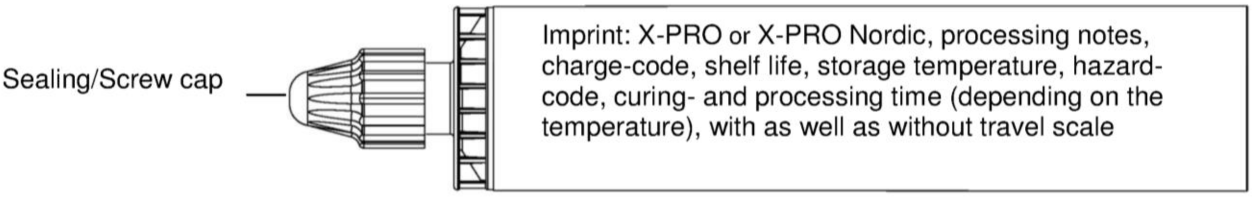
150 ml, 280 ml, 300 ml up to 333 ml and 380 ml up to 420 ml cartridge (Type: coaxial)



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



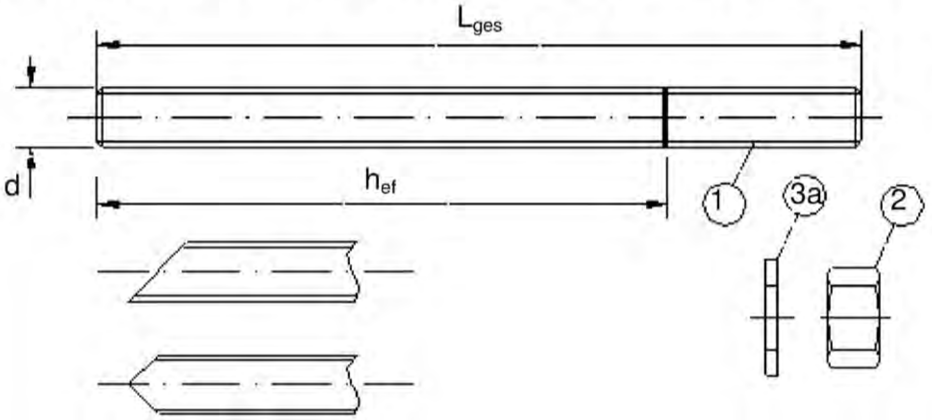
165 ml and 300 ml cartridge (Type: "foil tube")



Static Mixer

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete	**Annex A 2**
Product description Injection system	

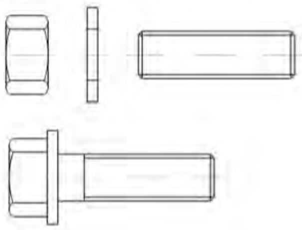
Threaded rod M8, M10, M12, M16, M20, M24, M27, M30 with washer and hexagon nut

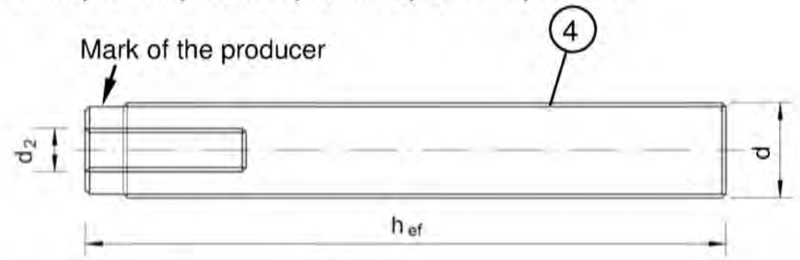


Commercial standard threaded rod with:
- Materials, dimensions and mechanical properties acc. Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004
- Marking of embedment depth

Internal Internal threaded anchor rod IG-M6, IG-M8, IG-M10, IG-M12, IG-M16, IG-M20

Threaded rod or Screw





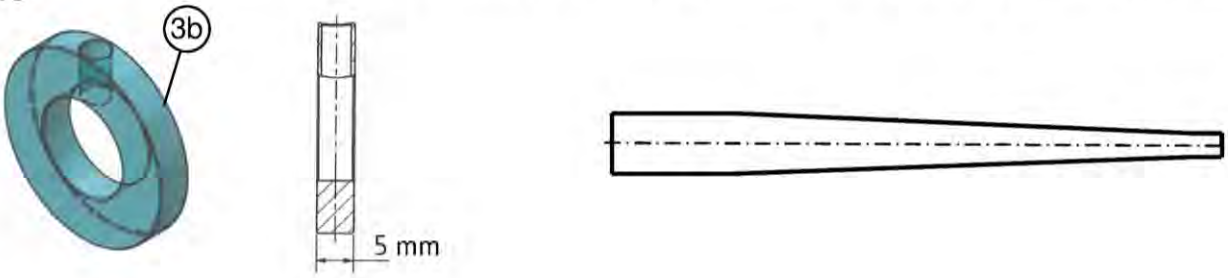
Marking: e.g. M8

I Marking Internal thread

Mark

M8 Thread size (Internal thread)
A4 additional mark for stainless steel
HCR additional mark for high-corrosion resistance steel

Filling washer and mixer reduction nozzle for filling the annular gap between anchor rod and fixture



Scell-IT Injection system X-PRO, X-PRO Nordic for concrete	**Annex A 3**
Product description Threaded rod, internal threaded rod and filling washer	

Table A1: Materials

	Designation	Material		
Steel, zinc plated (Steel acc. to EN 10087:1998 or EN 10263:2001) zinc plated ≥ 5 µm acc. to EN ISO 4042:1999 odr hot-dip galvanised ≥ 40 µm acc. to EN ISO 1461:2009 and EN ISO 10684:2004+AC:2009 or sherardized ≥ 40 µm acc. to DIN EN 17668:2016-06				
1	Anchor rod	Property class acc. to EN ISO 898-1:2013	4.6	f_{uk}=400 N/mm^2; f_{yk}=240 N/mm^2; A_5 > 8% fracture elongation
			4.8	f_{uk}=400 N/mm^2; f_{yk}=320 N/mm^2; A_5 > 8% fracture elongation
			5.6	f_{uk}=500 N/mm^2; f_{yk}=300 N/mm^2; A_5 > 8% fracture elongation
			5.8	f_{uk}=500 N/mm^2; f_{yk}=400 N/mm^2; A_5 > 8% fracture elongation
			8.8	f_{uk}=800 N/mm^2; f_{yk}=640 N/mm^2; A_5 > 8% fracture elongation
2	Hexagon nut	Property class acc. to EN ISO 898-2:2012	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, (z.B.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 oder EN ISO 7094:2000)	Steel, zinc plated, hot-dip galvanised or sherardized		
3b	Filling washer			
4	Internal threaded anchor rod	Property class acc. to EN ISO 898-1:2013	5.8	f_{uk}=500 N/mm^2; f_{yk}=400 N/mm^2; A_5 > 8% fracture elongation
			8.8	f_{uk}=800 N/mm^2; f_{yk}=640 N/mm^2; A_5 > 8% fracture elongation
Stainless steel A2 (Material 1.4301 / 1.4303 / 1.4307 / 1.4567 oder 1.4541, acc. to EN 10088-1:2014) and Stainless steel A4 (Material 1.4401 / 1.4404 / 1.4571 / 1.4362 or 1.4578, acc. to EN 10088-1:2014)				
1	Anchor rod[1)3)]	Property class acc. to EN ISO 3506-1:2009	50	f_{uk}=500 N/mm^2; f_{yk}=210 N/mm^2; A_5 > 8% fracture elongation
			70	f_{uk}=700 N/mm^2; f_{yk}=450 N/mm^2; A_5 > 8% fracture elongation
			80	f_{uk}=800 N/mm^2; f_{yk}=600 N/mm^2; A_5 > 8% fracture elongation
2	Hexagon nut [1)3)]	Property class acc. to EN ISO 3506-1:2009	50	for anchor rod class 50
			70	for anchor rod class 70
			80	for anchor rod class 80
3a	Washer, (z.B.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 oder EN ISO 7094:2000)	A2: Material 1.4301 / 1.4303 / 1.4307 / 1.4567 or 1.4541, EN 10088-1:2014 A4: Material 1.4401 / 1.4404 / 1.4571 / 1.4362 or 1.4578, EN 10088-1:2014		
3b	Filling washer[4)]			
4	Internal threaded anchor rod [1)2)]	Property class acc. to EN ISO 3506-1:2009	50	f_{uk}=500 N/mm^2; f_{yk}=210 N/mm^2; A_5 > 8% fracture elongation
			70	f_{uk}=700 N/mm^2; f_{yk}=450 N/mm^2; A_5 > 8% fracture elongation
High corrosion resistance steel (Material 1.4529 or 1.4565, acc. to EN 10088-1: 2014)				
1	Anchor rod[1)]	Property class acc. to EN ISO 3506-1:2009	50	f_{uk}=500 N/mm^2; f_{yk}=210 N/mm^2; A_5 > 8% fracture elongation
			70	f_{uk}=700 N/mm^2; f_{yk}=450 N/mm^2; A_5 > 8% fracture elongation
			80	f_{uk}=800 N/mm^2; f_{yk}=600 N/mm^2; A_5 > 8% fracture elongation
2	Hexagon nut [1)]	Property class acc. to EN ISO 3506-1:2009	50	for anchor rod class 50
			70	for anchor rod class 70
			80	for anchor rod class 80
3a	Washer, (z.B.: EN ISO 887:2006, EN ISO 7089:2000, EN ISO 7093:2000 oder EN ISO 7094:2000)	Material 1.4529 or 1.4565, acc. to EN 10088-1: 2014		
3b	Filling washer			
4	Internal threaded anchor rod [1) 2)]	Property class acc. to EN ISO 3506-1:2009	50	f_{uk}=500 N/mm^2; f_{yk}=210 N/mm^2; A_5 > 8% fracture elongation
			70	f_{uk}=700 N/mm^2; f_{yk}=450 N/mm^2; A_5 > 8% fracture elongation

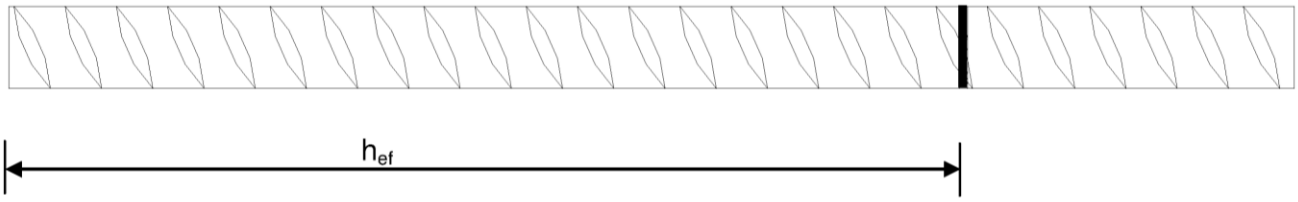
1) Property class 70 for anchor rods up to M24 and Internal threaded anchor rods up to IG-M16,
2) for IG-M20 only property class 50
3) Property class 70 only for stainless steel A4
4) Filling washer only with stainless steel A4

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Product description
Materials threaded rod and internal threaded rod

Annex A 4

Reinforcing bar ∅ 8, ∅ 10, ∅ 12, ∅ 14, ∅ 16, ∅ 20, ∅ 25, ∅ 28, ∅ 32



- 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 $0{,}05d \leq h \leq 0{,}07d$
  (d: Nominal diameter of the bar; h: Rip height of the bar)

Table A2: Materials

Part	Designation	Material
Reinforcing bars		
1	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 $f_{uk} = f_{tk} = k \cdot f_{yk}$

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Product description
Materials reinforcing bar

Annex A 5

Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Seismic action for Performance Category C1: M8 to M30 (except hot-dip galvanised rods), Rebar Ø8 to Ø32.

Base materials:
- Reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Non-cracked concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Cracked concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.

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)
- III: - 40 °C to +120 °C (max long term temperature +72 °C and max short term temperature +120 °C)

Use conditions (Environmental conditions):
- Structures subject to dry internal conditions
  (zinc coated steel, stainless steel A2 resp. A4 or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist
  (stainless steel A4 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:
- 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.
- The Anchorages are designed in accordance to:
  - FprEN 1992-4:2017 and Technical Report TR055

Installation:
- Dry or wet concrete: M8 to M30, Rebar Ø8 to Ø32, IG-M6 to IG-M20.
- Flooded holes (not sea water): M8 to M16, Rebar Ø8 to Ø16, IG-M6 to IG-M10.
- Hole drilling by hammer (HD), hollow (HDB) or compressed air drill mode (CD).
- 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.

Table B1: Installation parameters for threaded rod

Anchor size		**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M 24**	**M 27**	**M 30**
Outer diameter of anchor	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 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
Diameter of clearance hole in the fixture	d_f [mm] ≤	9	12	14	18	22	26	30	33
Diameter of steel brush	d_b [mm] ≥	12	14	16	20	26	30	34	37
Maximum torque moment	T_{inst} [Nm] ≤	10	20	40	80	120	160	180	200
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 rebar

Rebar size		**Ø 8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
Outer diameter of anchor	d_{nom} [mm] =	8	10	12	14	16	20	25	28	32
Nominal drill hole diameter	d_0 [mm] =	12	14	16	18	20	24	32	35	40
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	500	580	640
Diameter of steel brush	d_b [mm] ≥	14	16	18	20	22	26	34	37	41,5
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

Table B3: Installation parameters for internal threaded anchor rod

Size internal threaded anchor rod		**IG-M 6**	**IG-M 8**	**IG-M 10**	**IG-M 12**	**IG-M 16**	**IG-M 20**
Internal diameter of anchor	d_2 [mm] =	6	8	10	12	16	20
Outer diameter of anchor [1)]	d_{nom} [mm] =	10	12	16	20	24	30
Nominal drill hole diameter	d_0 [mm] =	12	14	18	22	28	35
Effective anchorage 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 [mm] =	7	9	12	14	18	22
Maximum torque moment	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

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Intended Use
Installation parameters

Annex B 2

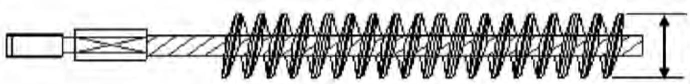
Table B4: Parameter cleaning and setting tools

										
Threaded Rod	**Rebar**	**Internal threaded Anchor rod**	**d_0 Drill bit - Ø HD, HDB, CA**	**d_b Brush - Ø**		**$d_{b,min}$ min. Brush - Ø**	**Piston plug**	**Installation direction and use of piston plug**		
(mm)	**(mm)**	**(mm)**	**(mm)**		**(mm)**	**(mm)**		↓	→	↑
M8			10	RBT10	12	10,5	-	-	-	-
M10	8	IG-M6	12	RBT12	14	12,5	-	-	-	-
M12	10	IG-M8	14	RBT14	16	14,5	-	-	-	-
	12		16	RBT16	18	16,5	-	-	-	-
M16	14	IG-M10	18	RBT18	20	18,5	VS18	h_{ef} > 250 mm	h_{ef} > 250 mm	all
	16		20	RBT20	22	20,5	VS20			
M20	20	IG-M12	24	RBT24	26	24,5	VS24			
M24		IG-M16	28	RBT28	30	28,5	VS28			
M27	25		32	RBT32	34	32,5	VS32			
M30	28	IG-M20	35	RBT35	37	35,5	VS35			
	32		40	RBT40	41,5	40,5	VS40			

MAC - Hand pump (volume 750 ml)
Drill bit diameter (d_0): 10 mm to 20 mm
Drill hole depth (h_0): < 10 d_{nom}
Only in non-cracked concrete

CAC - Rec. compressed air tool (min 6 bar)
Drill bit diameter (d_0): all diameters

Piston plug for overhead or horizontal installation VS
Drill bit diameter (d_0): 18 mm to 40 mm



d_b

Steel brush RBT
Drill bit diameter (d_0): all diameters

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete	**Annex B 3**
Intended Use Cleaning and setting tools	

Installation instructions

Drilling of the bore hole

1. Drill with hammer drill a hole into the base material to the size and embedment depth required by the selected anchor (Table B1, B2, or B3), with hammer (HD), hollow (HDB) or compressed air (CD) drilling. The use of a hollow drill bit is only in combination with a sufficient vacuum permitted.
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.

MAC: Cleaning for bore hole diameter $d_0 \leq 20$mm and bore hole depth $h_0 \leq 10d_{nom}$ (uncracked concrete only!)

2a. Starting from the bottom or back of the bore hole, blow the hole clean by a hand pump [1)] (Annex B 3) a minimum of four times.

2b. Check brush diameter (Table B4). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (Table B4) a minimum of four times in a twisting motion.
If the bore hole ground is not reached with the brush, a brush extension must be used.

2c. Finally blow the hole clean again with a hand pump (Annex B 3) a minimum of four times.

[1)] It is permitted to blow bore holes with diameter between 14 mm and 20 mm and an embedment depth up to $10d_{nom}$ also in cracked concrete with hand-pump.

CAC: Cleaning for all bore hole diameter in uncracked and cracked concrete

2a. Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) (Annex B 3) a minimum of four times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension must be used.

2b. Check brush diameter (Table B4). Brush the hole with an appropriate sized wire brush > $d_{b,min}$ (Table B4) a minimum of four times.
If the bore hole ground is not reached with the brush, a brush extension must be used.

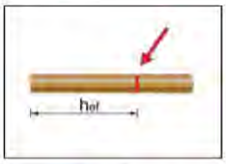
2c. Finally blow the hole clean again with compressed air (min. 6 bar) (Annex B 3) a minimum of four times until return air stream is free of noticeable dust. If the bore hole ground is not reached an extension must be used.

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

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete	**Annex B 4**
Intended Use Installation instructions	

Installation instructions (continuation)

3. Attach the 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 B5 or B6) 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.

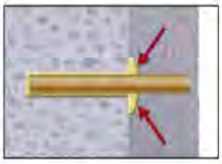
5. Prior to dispensing into the anchor hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey colour. For foil tube cartridges it must be discarded a minimum of six full strokes.

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 B5 or B6.

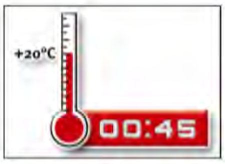
7. Piston Plugs and mixer nozzle extensions shall be used according to Table B4 for the following applications:
   - Horizontal assembly (horizontal direction) and ground erection (vertical downwards direction): Drill bit-Ø $d_0 \geq 18$ mm and embedment depth $h_{ef} > 250$mm
   - Overhead assembly (vertical upwards direction): Drill bit-Ø $d_0 \geq 18$ mm

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

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



9. 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 has to be renewed. For overhead application the anchor rod shall be fixed (e.g. wedges).



10. 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 B5 or B6).

11. After full curing, the add-on part can be installed with up to the max. torque (Table B1 or B3) by using a calibrated torque wrench. It can be optional filled the annular gap between anchor and fixture with mortar. Therefor substitute the washer by the filling washer and connect the mixer reduction nozzle to the tip of the mixer. The annular gap is filled with mortar, when mortar oozes out of the washer.

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Intended Use
Installation instructions (continuation)

Annex B 5

Table B5: Maximum Working time and minimum curing time X-PRO

Concrete temperature	Gelling- / working time	Minimum curing time in dry concrete [1)]
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) In wet concrete the curing time must be doubled.

Table B6: Maximum Working time and minimum curing time X-PRO Nordic

Concrete temperature	Gelling- / working time	Minimum curing time in dry concrete [1)]
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) In wet concrete the curing time must be doubled.

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

Size				M 8	M 10	M 12	M 16	M 20	M24	M 27	M 30
Characteristic tension resistance, Steel failure											
Steel, Property class 4.6 and 4.8		$N_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224
Steel, Property class 5.6 and 5.8		$N_{Rk,s}$	[kN]	18	29	42	78	122	176	230	280
Steel, Property class 8.8		$N_{Rk,s}$	[kN]	29	46	67	125	196	282	368	449
Stainless steel A2, A4 and HCR, Property class 50		$N_{Rk,s}$	[kN]	18	29	42	79	123	177	230	281
Stainless steel A2, A4 and HCR, Property class 70		$N_{Rk,s}$	[kN]	26	41	59	110	171	247	-	-
Stainless steel A4 and HCR, Property class 80		$N_{Rk,s}$	[kN]	29	46	67	126	196	282	-	-
Characteristic tension resistance, Partial factor											
Steel, Property class 4.6		$\gamma_{Ms,N}$ 1)	[-]	2,0							
Steel, Property class 4.8		$\gamma_{Ms,N}$ 1)	[-]	1,5							
Steel, Property class 5.6		$\gamma_{Ms,N}$ 1)	[-]	2,0							
Steel, Property class 5.8		$\gamma_{Ms,N}$ 1)	[-]	1,5							
Steel, Property class 8.8		$\gamma_{Ms,N}$ 1)	[-]	1,5							
Stainless steel A2, A4 and HCR, Property class 50		$\gamma_{Ms,N}$ 1)	[-]	2,86							
Stainless steel A2, A4 and HCR, Property class 70		$\gamma_{Ms,N}$ 1)	[-]	1,87							
Stainless steel A4 and HCR, Property class 80		$\gamma_{Ms,N}$ 1)	[-]	1,6							
Characteristic shear resistance, Steel failure											
Without lever arm	Steel, Property class 4.6 and 4.8	$V^0_{Rk,s}$	[kN]	9	14	20	38	59	85	110	135
	Steel, Property class 5.6 and 5.8	$V^0_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140
	Steel, Property class 8.8	$V^0_{Rk,s}$	[kN]	15	23	34	63	98	141	184	224
	Stainless steel A2, A4 and HCR, Property class 50	$V^0_{Rk,s}$	[kN]	9	15	21	39	61	88	115	140
	Stainless steel A2, A4 and HCR, Property class 70	$V^0_{Rk,s}$	[kN]	13	20	30	55	86	124	-	-
	Stainless steel A4 and HCR, Property class 80	$V^0_{Rk,s}$	[kN]	15	23	34	63	98	141	-	-
With lever arm	Steel, Property class 4.6 and 4.8	$M^0_{Rk,s}$	[Nm]	15	30	52	133	260	449	666	900
	Steel, Property class 5.6 and 5.8	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	560	833	1123
	Steel, Property class 8.8	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	896	1333	1797
	Stainless steel A2, A4 and HCR, Property class 50	$M^0_{Rk,s}$	[Nm]	19	37	66	167	325	561	832	1125
	Stainless steel A2, A4 and HCR, Property class 70	$M^0_{Rk,s}$	[Nm]	26	52	92	232	454	784	-	-
	Stainless steel A4 and HCR, Property class 80	$M^0_{Rk,s}$	[Nm]	30	59	105	266	519	896	-	-
Characteristic shear resistance, Partial factor											
Steel, Property class 4.6		$\gamma_{Ms,V}$ 1)	[-]	1,67							
Steel, Property class 4.8		$\gamma_{Ms,V}$ 1)	[-]	1,25							
Steel, Property class 5.6		$\gamma_{Ms,V}$ 1)	[-]	1,67							
Steel, Property class 5.8		$\gamma_{Ms,V}$ 1)	[-]	1,25							
Steel, Property class 8.8		$\gamma_{Ms,V}$ 1)	[-]	1,25							
Stainless steel A2, A4 and HCR, Property class 50		$\gamma_{Ms,V}$ 1)	[-]	2,38							
Stainless steel A2, A4 and HCR, Property class 70		$\gamma_{Ms,V}$ 1)	[-]	1,56							
Stainless steel A4 and HCR, Property class 80		$\gamma_{Ms,V}$ 1)	[-]	1,33							

1) in absence of national regulation

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

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

Annex C 1

Table C2: Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Anchor size threaded rod				**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M24**	**M27**	**M30**
Steel failure											
Characteristic tension resistance		$N_{Rk,s}$	[kN]	see Table C1							
		$N_{Rk,s,eq}$	[kN]	1,0 • $N_{Rk,s}$							
Partial factor		$\gamma_{Ms,N}$	[-]	see Table C1							
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/mm²]	10	12	12	12	12	11	10	9
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	7,5	8,5	8,5	8,5	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	7,5	9	9	9	9	8,5	7,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	5,5	5,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	4,0	5,0	5,0	5,0	No Performance Determined (NPD)			
Characteristic bond resistance in cracked concrete C20/25											
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	4,0	5,0	5,5	5,5	5,5	5,5	6,5	6,5
		$\tau_{Rk,eq}$	[N/mm²]	2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	4,0	5,5	5,5	No Performance Determined (NPD)			
		$\tau_{Rk,eq}$	[N/mm²]	2,5	2,5	3,7	3,7	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,5	4,0	4,0	4,0	4,0	4,5	4,5
		$\tau_{Rk,eq}$	[N/mm²]	1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,0	4,0	4,0	No Performance Determined (NPD)			
		$\tau_{Rk,eq}$	[N/mm²]	1,6	1,9	2,7	2,7	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	3,0	3,0	3,5	3,5
		$\tau_{Rk,eq}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,1	2,4	2,4
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	No Performance Determined (NPD)			
		$\tau_{Rk,eq}$	[N/mm²]	1,3	1,6	2,0	2,0	No Performance Determined (NPD)			
Increasing factors for concrete (only static or quasi-static actions) ψ_c		C25/30		1,02							
		C30/37		1,04							
		C35/45		1,07							
		C40/50		1,08							
		C45/55		1,09							
		C50/60		1,10							
Concrete cone failure											
Non-cracked 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 $c_{cr,sp}$							
Installation factor (dry and wet concrete)		γ_{inst}	[-]	1,0	1,2						
Installation factor (flooded bore hole)		γ_{inst}	[-]	1,4				No Performance Determined (NPD)			

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Annex C 2

Table C3: Characteristic values of shear loads under static, quasi-static action and seismic action (performance category C1)

Anchor size threaded rod			**M 8**	**M 10**	**M 12**	**M 16**	**M 20**	**M24**	**M 27**	**M 30**
Steel failure without lever arm										
Characteristic shear resistance	$V^0_{Rk,s}$	[kN]	see Table C1							
	$V_{Rk,s,eq}$	[kN]	$0{,}70 \cdot V^0_{Rk,s}$							
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]	see Table C1							
	$M^0_{Rk,s,eq}$	[Nm]	No Performance Determined (NPD)							
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]	$l_f = \min(h_{ef}; 8\ d_{nom})$							
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	16	20	24	27	30
Installation factor	γ_{inst}	[-]	1,0							
Factor for annular gap	α_{gap}	[-]	0,5 (1,0)[1)]							

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

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Characteristic values of shear loads under static, quasi-static action and seismic action (performance category C1)

Annex C 3

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

Anchor size internal threaded anchor rods				IG-M 6	IG-M 8	IG-M 10	IG-M 12	IG-M 16	IG-M 20
Steel failure[1]									
Characteristic tension resistance, Steel, strength class 5.8		$N_{Rk,s}$	[kN]	10	17	29	42	76	123
Partial factor		$\gamma_{Ms,N}$	[-]	1,5					
Characteristic tension resistance, Steel, strength class 8.8		$N_{Rk,s}$	[kN]	16	27	46	67	121	196
Partial factor		$\gamma_{Ms,N}$	[-]	1,5					
Characteristic tension resistance, Stainless Steel A4, Strength class 70		$N_{Rk,s}$	[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 non-cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	12	12	12	12	11	9
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	8,5	8,5	8,5	No Performance Determined (NPD)		
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	9	9	9	9	8,5	6,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	6,5	6,5	6,5	No Performance Determined (NPD)		
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	6,5	6,5	6,5	6,5	6,5	5,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	5,0	5,0	5,0	No Performance Determined (NPD)		
Characteristic bond resistance in cracked concrete C20/25									
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	5,0	5,5	5,5	5,5	5,5	6,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	5,5	5,5	No Performance Determined (NPD)		
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	3,5	4,0	4,0	4,0	4,0	4,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	3,0	4,0	4,0	No Performance Determined (NPD)		
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,0	3,0	3,0	3,0	3,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,0	3,0	No Performance Determined (NPD)		
Increasing factors for concrete ψ_c		C25/30		1,02					
		C30/37		1,04					
		C35/45		1,07					
		C40/50		1,08					
		C45/55		1,09					
		C50/60		1,10					
Concrete cone failure									
Non-cracked 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 failure									
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 $c_{cr,sp}$					
Installation factor (dry and wet concrete)		γ_{inst}	[-]	1,2					
Installation factor (flooded bore hole)		γ_{inst}	[-]	1,4			-		

1) Fastening screws or threaded rods (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 of the given strength class are valid for the internal threaded rod and the fastening element.

2) For IG-M20 strength class 50 is valid

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Characteristic values of tension loads under static and quasi-static action

Annex C 4

Deutsches Institut für Bautechnik DIBt

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

Anchor size for internal threaded anchor rods			IG-M 6	IG-M 8	IG-M 10	IG-M 12	IG-M 16	IG-M 20
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
Partial factor	$\gamma_{Ms,V}$	[-]	1,25					
Characteristic shear resistance, Steel, strength class 8.8	$V^0_{Rk,s}$	[kN]	8	14	23	34	60	98
Partial factor	$\gamma_{Ms,V}$	[-]	1,25					
Characteristic shear resistance, Stainless Steel A4, 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
Partial factor	$\gamma_{Ms,V}$	[-]	1,25					
Characteristic bending moment, Steel, strength class 8.8	$M^0_{Rk,s}$	[Nm]	12	30	60	105	267	519
Partial factor	$\gamma_{Ms,V}$	[-]	1,25					
Characteristic bending moment, Stainless Steel A4, 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]	$l_f = \min(h_{ef};\ 8\ d_{nom})$					
Outside diameter of fastener	d_{nom}	[mm]	10	12	16	20	24	30
Installation factor	γ_{inst}	[-]	1,0					

1) Fastening screws or threaded rods (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 of the given strength class are valid for the internal threaded rod and the fastening element.

2) For IG-M20 strength class 50 is valid

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Characteristic values of shear loads under static and quasi-static action

Annex C 5

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Table C6: Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Anchor size 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)								
		$N_{Rk,s,eq}$	[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 non-cracked concrete C20/25												
Temperature range I: 40°C/24°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	10	12	12	12	12	12	11	10	8,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	7,5	8,5	8,5	8,5	8,5	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	7,5	9	9	9	9	9	8,0	7,0	6,0
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	6,5	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,ucr}$	[N/mm²]	5,5	6,5	6,5	6,5	6,5	6,5	6,0	5,0	4,5
	flooded bore hole	$\tau_{Rk,ucr}$	[N/mm²]	4,0	5,0	5,0	5,0	5,0	No Performance Determined (NPD)			
Characteristic bond resistance in cracked concrete C20/25												
Temperature range I: 40°C/24°C	dry and 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
		$\tau_{Rk,eq}$	[N/mm²]	2,5	3,1	3,7	3,7	3,7	3,7	3,8	4,5	4,5
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	4,0	4,0	5,5	5,5	5,5	No Performance Determined (NPD)			
		$\tau_{Rk,eq}$	[N/mm²]	2,5	2,5	3,7	3,7	3,7	No Performance Determined (NPD)			
Temperature range II: 80°C/50°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,5	4,0	4,0	4,0	4,0	4,0	4,5	4,5
		$\tau_{Rk,eq}$	[N/mm²]	1,6	2,2	2,7	2,7	2,7	2,7	2,8	3,1	3,1
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,5	3,0	4,0	4,0	4,0	No Performance Determined (NPD)			
		$\tau_{Rk,eq}$	[N/mm²]	1,6	1,9	2,7	2,7	2,7	No Performance Determined (NPD)			
Temperature range III: 120°C/72°C	dry and wet concrete	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	3,0	3,0	3,0	3,5	3,5
		$\tau_{Rk,eq}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	2,0	2,1	2,4	2,4
	flooded bore hole	$\tau_{Rk,cr}$	[N/mm²]	2,0	2,5	3,0	3,0	3,0	No Performance Determined (NPD)			
		$\tau_{Rk,eq}$	[N/mm²]	1,3	1,6	2,0	2,0	2,0	No Performance Determined (NPD)			
Increasing factors for concrete (only static or quasi-static actions) ψ_c		C25/30		1,02								
		C30/37		1,04								
		C35/45		1,07								
		C40/50		1,08								
		C45/55		1,09								
		C50/60		1,10								
Concrete cone failure												
Non-cracked 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]	$2\ c_{cr,sp}$								
Installation factor (dry and wet concrete)		γ_{inst}	[-]	1,0	1,2							
Installation factor (flooded bore hole)		γ_{inst}	[-]	1,4					No Performance Determined (NPD)			

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

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Characteristic values of tension loads under static, quasi-static action and seismic action (performance category C1)

Annex C 6

Table C7: Characteristic values of shear loads under static, quasi-static action and seismic action (performance category C1)

Anchor size 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)								
	$V_{Rk,s,eq}$	[kN]	$0{,}35 \cdot A_s \cdot f_{uk}$ 1)								
Cross section area	A_s	[mm²]	50	79	113	154	201	214	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)								
	$M^0_{Rk,s,eq}$	[Nm]	No Performance Determined (NPD)								
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]	$l_f = \min(h_{ef}; 8\ d_{nom})$								
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	14	16	20	25	28	32
Installation factor	γ_{inst}	[-]	1,0								
Factor for annular gap	α_{gap}	[-]	0,5 (1,0) 1)								

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 anchor and clearance hole in the fixture. Use of special filling washer Annex A 3 is required

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Characteristic values of shear loads under static, quasi-static action and seismic action (performance category C1)

Annex C 7

Table C8: Displacements under tension load[1)] (threaded rod)

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24	M 27	M 30
Non-cracked concrete C20/25										
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										
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 C9: Displacements under shear load[1)] (threaded rod)

Anchor size threaded rod			M 8	M 10	M 12	M 16	M 20	M24	M 27	M 30
For non-cracked concrete C20/25										
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
For cracked concrete C20/25										
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
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V;$

Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Displacements (threaded rods)

Annex C 8

Table C10: 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
Non-cracked concrete C20/25											
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											
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 C11: 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
Non-cracked concrete C20/25											
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											
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
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V$;

Table C12: Displacements under tension load[1] (Internal threaded anchor rod)

Anchor size Internal threaded anchor rod			IG-M 6	IG-M 8	IG-M 10	IG-M 12	IG-M 16	IG-M 20
Non-cracked 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 C13: Displacements under shear load[1] (Internal threaded anchor rod)

Anchor size Internal threaded anchor rod			IG-M 6	IG-M 8	IG-M 10	IG-M 12	IG-M 16	IG-M 20
Non-cracked 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
$\delta_{V\infty} = \delta_{V\infty}\text{-factor} \cdot V$;

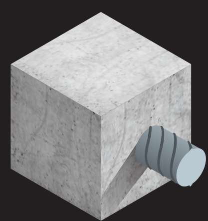
Scell-IT Injection system X-PRO, X-PRO Nordic for concrete

Performances
Displacements (Internal threaded anchor rod)

Annex C 10

EUROPEAN TECHNICAL ASSESSMENT

XPRO



ETA CE

EUROPEAN TECHNICAL ASSESSMENT

REBAR

10/0256

Scell-it®

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment

ETA-10/0256 of 11 December 2014

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	SCELL-IT Injection system X-PRO for rebar connection
Product family to which the construction product belongs	Post-installed rebar connection with SCELL-IT injection System X-PRO
Manufacturer	SCELL-IT 28 Rue Paul Dubrule 59854 LESQUIN FRANKREICH
Manufacturing plant	SCELL-IT, Plant1 Germany
This European Technical Assessment contains	15 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	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 5: "Bonded anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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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 "Scell-It Injection System X-PRO for rebar connection" in accordance with the regulations for reinforced concrete construction.

Reinforcing bars made of steel with a diameter ϕ from 8 to 25 mm and injection mortar X-PRO are used for rebar connections. The reinforcing bar is placed into a drilled hole filled with injection mortar and is anchored via the bond between embedded element, 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 rebar connection 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
Design values of the ultimate bond resistance	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	No performance determined (NPD)

3.3 Hygiene, health and the environment (BWR 3)

Not applicable.

3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision of the Commission of 24 June 1996 (96/582/EC) (OJ L 254 of 08.10.96 p. 62-65), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal anchors for use in concrete (heavy-duty type)	For fixing and/or supporting concrete structural elements or heavy units such as cladding and suspended ceilings	—	1

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

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 11 December 2014 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Baderschneider

Figure A1: Overlapping joint for rebar connections of slabs and beams

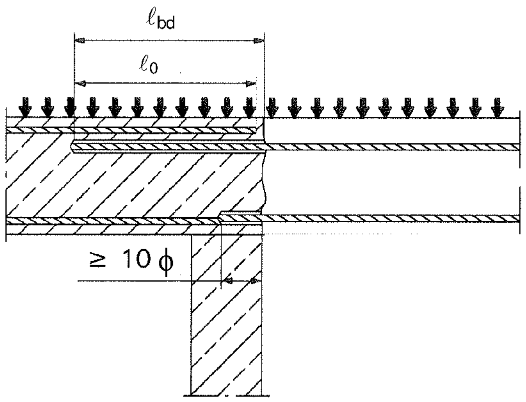


Figure A2: Overlapping joint at a foundation of a wall or column where the rebars are stressed in tension

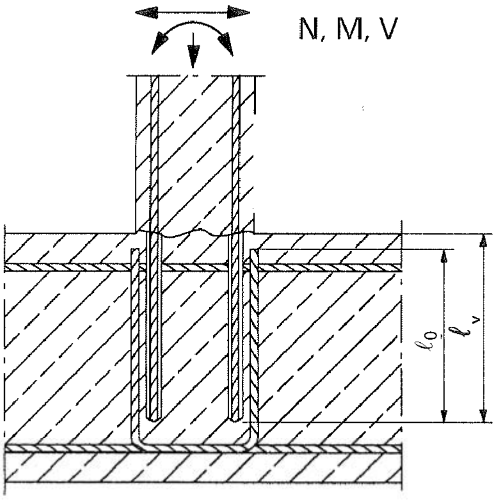


Figure A3: End anchoring of slabs or beams (e.g. designed as simply supported)

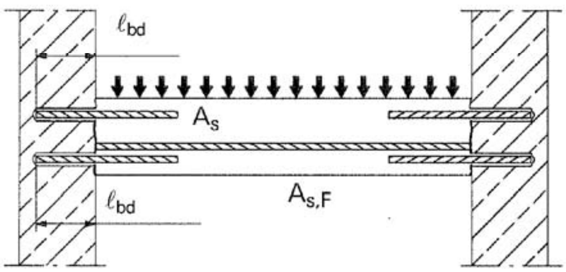


Figure A4: Rebar connection for components stressed primarily in compression. The rebars sre stressed in compression

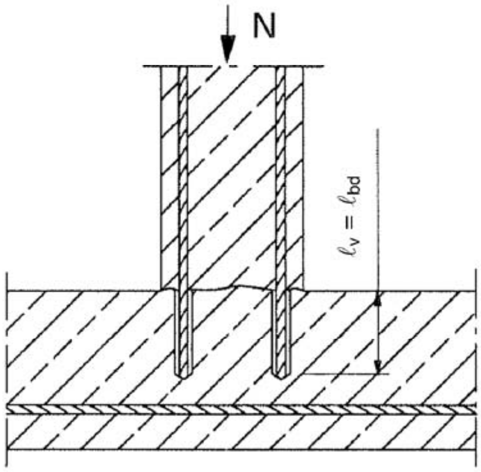
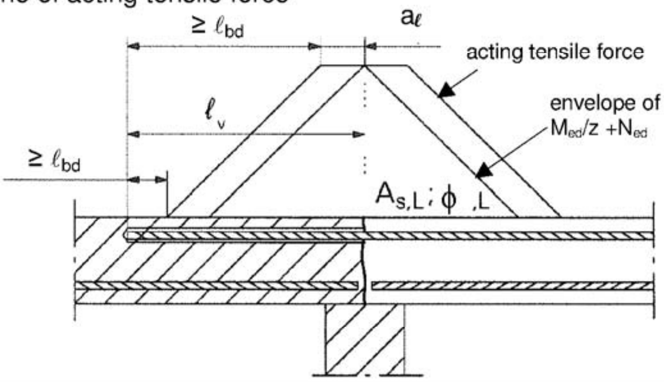


Figure A5: Anchoring of reinforcemend to cover the line of acting tensile force



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.

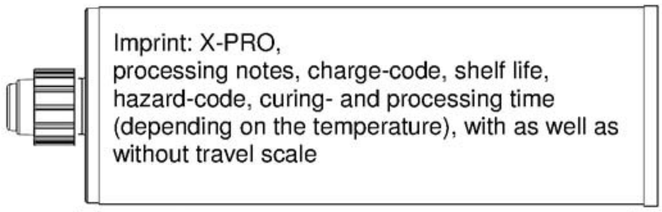
Preparing of joints according to Annex B 2

Scell-It Injection System X-PRO for rebar connection	**Annex A 1**
Product description Installed condition and examples of use for rebars	

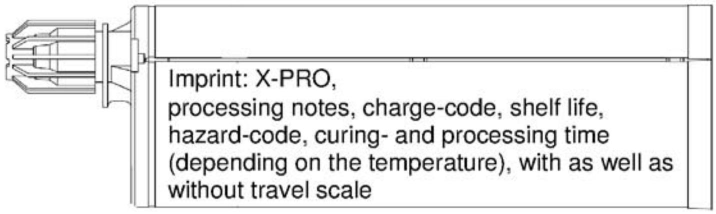
Scell-It Injection System X-PRO:

Injection mortar: X-PRO

Typ "coaxial": 150 ml, 280 ml,
300 ml up to 333 ml and
380 ml up to 420 ml Kartusche



Type "side-by-side":
235 ml, 345 ml and 825 ml
cartridge

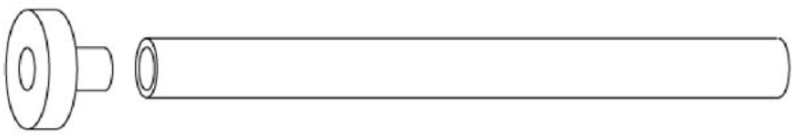


Static Mixer

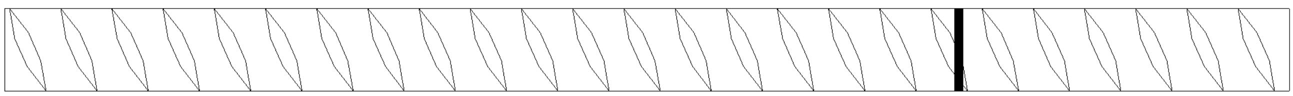
CRW 14W

TAH 18W

Piston plug and mixer extension



Reinforcing bar (rebar): ø8, ø10, ø12, ø14, ø16, ø20, ø22, ø24, ø25



- 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 $f_{uk} = f_{tk} = k \cdot f_{yk}$

Scell-It Injection System X-PRO for rebar connection

Product description
Injection mortar / Static mixer / Rebar
Materials

Annex A 2

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads.

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).

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.
- 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.

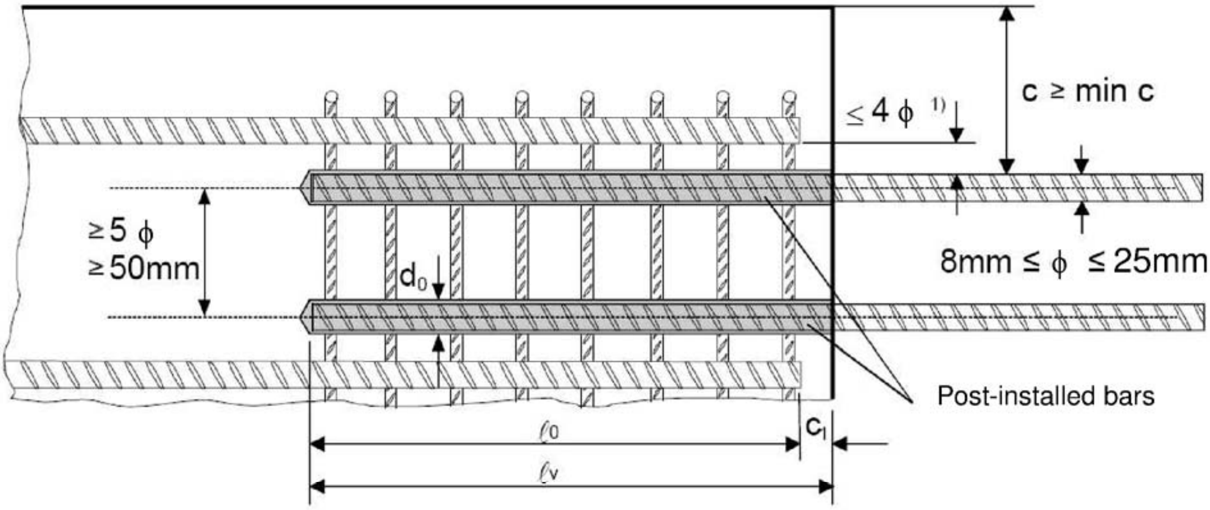
Installation:

- Dry or wet concrete.
- It must not be installed in flooded holes.
- Hole drilling by hammer drill or compressed air drill mode.
- The installation of post-installed rebar 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).

Scell-It Injection System X-PRO 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:

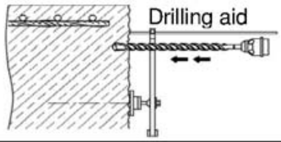
c	concrete cover of post-installed rebar
c_1	concrete cover at end-face of existing rebar
min c	minimum concrete cover according to Table B1 and to EN 1992-1-1:2004+AC:2010, Section 4.4.1.2
ϕ	diameter of post-installed rebar
ℓ_0	lap length, according to EN 1992-1-1:2004+AC:2010, Section 8.7.3
ℓ_v	effective embedment depth, $\geq \ell_0 + c_1$
d_0	nominal drill bit diameter, see Annex B 6

Scell-It Injection System X-PRO for rebar connection

Intended use
General construction rules for post-installed rebars

Annex B 2

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 · $\ell_v \geq 2\,\phi$	30 mm + 0,02 · $\ell_v \geq 2\,\phi$
	= 25 mm	40 mm + 0,06 · $\ell_v \geq 2\,\phi$	40 mm + 0,02 · $\ell_v \geq 2\,\phi$
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 Annexes B2, Figures B1
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	$\ell_{v,max}$ [mm]
8 mm	1000
10 mm	1000
12 mm	1200
14 mm	1400
16 mm	1600
20 mm	2000
22 mm	2000
24 mm	2000
25 mm	2000

Table B3: Base material temperature, gelling time and curing time

Concrete temperature	Gelling- / working time[1)]	Minimum curing time in dry concrete[5)]
	t_{gel}	$t_{cure,dry}$
-10°C bis -6°C	90 min[2)]	24 h
-5°C bis -1°C	90 min[3)]	14 h
0°C bis +4°C	45 min[3)]	7 h
+5°C bis +9°C	25 min[3)]	2 h
+10°C bis +19°C	15 min[3)]	80 min
+20°C bis +24°C	6 min[3)]	45 min
+25°C bis +29°C	4 min[3)]	25 min
+30°C bis +40°C	2,5 min[4)]	15 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
5) In wet concrete the curing time $t_{cure,dry}$ has to be doubled up

Scell-It Injection System X-PRO for rebar connection	Annex B 3
Intended use Minimum concrete cover Maximum embedment depth / working time and curing times	

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

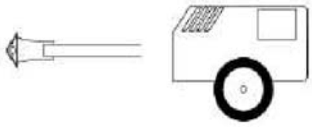
All cartridges could also be extruded by a battery tool.

Scell-It Injection System X-PRO for rebar connection	**Annex B 4**
Intended Use Dispensing tools	

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.

Hammer drill (HD)

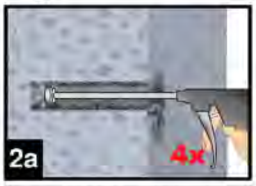


Compressed air drill (CD)

Rebar - Ø	**Drill - Ø**
ϕ	**[mm]**
8 mm	12
10 mm	14
12 mm	16
14 mm	18
16 mm	20
20 mm	25
22 mm	28
24 mm	32
25 mm	32

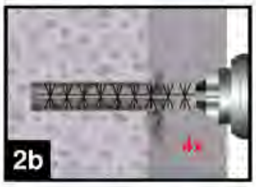
B) Bore hole cleaning

or

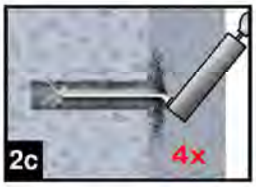


2a Starting from the bottom or back of the bore hole, blow the hole clean with compressed air (min. 6 bar) or a hand pump a minimum of four times. If the bore hole ground is not reached an extension shall be used.

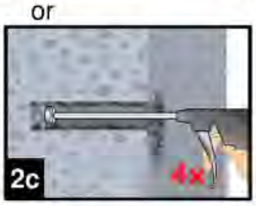
For bore holes deeper then 240 mm, compressed air (min. 6 bar) **must** be used.



2b Check brush diameter (Table B5) 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 B5) a minimum of four times.
If the bore hole ground is not reached with the brush, a brush extension shall be used.



or



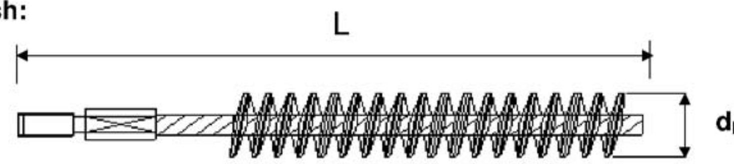
2c Finally blow the hole clean again with compressed air (min. 6 bar) or a hand pump a minimum of four times. If the bore hole ground is not reached an extension shall be used.

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

Scell-It Injection System X-PRO for rebar connection	**Annex B 5**
Intended Use Installation instruction: Bore hole drilling and Bore hole cleaning	

Table B5: Cleaning tools

Brush:

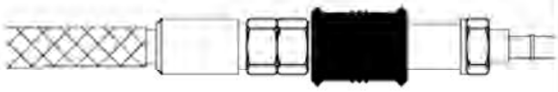


SDS Plus Adapter:

Brush extension:

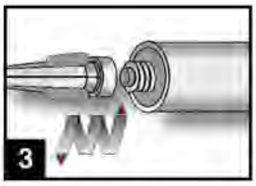
ϕ Rebar - ∅	d_0 Drill bit - ∅	d_b Brush - ∅	$d_{b,min}$ min. Brush - ∅	L Total length
(mm)	(mm)	(mm)	(mm)	(mm)
8	12	14	12,5	170
10	14	16	14,5	200
12	16	18	16,5	200
14	18	20	18,5	300
16	20	22	20,5	300
20	25	27	25,5	300
22	28	30	28,5	300
24	32	34	32,5	300
25	32	34	32,5	300

Hand pump (volume 750 ml)

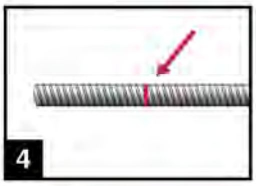


Rec. compressed air tool hand slide valve (min 6 bar)

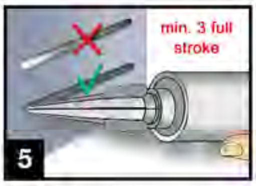
C) Preparation of bar and cartridge



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.

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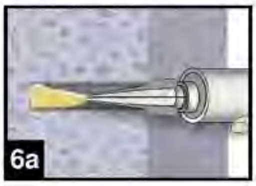
D) Filling the bore hole



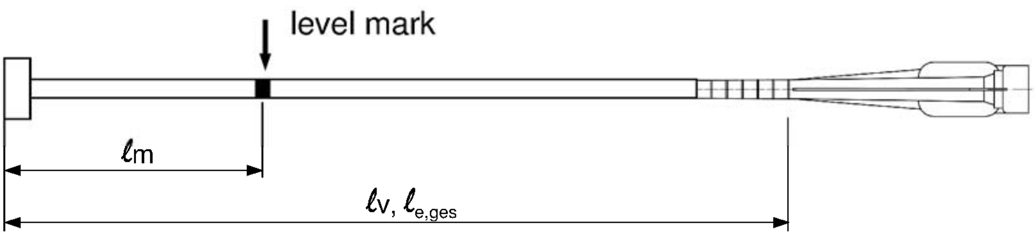
6 Starting from the bottom or back of the cleaned anchor hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid creating air pockets. For embedment larger than 190 mm an extension nozzle shall be used.

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

<table>
<tr><th rowspan="2">Bar size</th><th colspan="2" rowspan="2">Drill bit - ∅</th><th rowspan="3">Piston plug</th><th colspan="4">Cartridge: All sizes</th><th colspan="2">Cartridge: side-by-side (825 ml)</th></tr>
<tr><th colspan="2">Hand or battery tool</th><th colspan="2">Pneumatic tool</th><th colspan="2">Pneumatic tool</th></tr>
<tr><th>ϕ</th><th>HD</th><th>PD</th><th>$l_{v,max}$</th><th>Mixer extension</th><th>$l_{v,max}$</th><th>Mixer extension</th><th>$l_{v,max}$</th><th>Mixer extension</th></tr>
<tr><th>(mm)</th><th colspan="2">(mm)</th><th>No.</th><th>(cm)</th><th></th><th>(cm)</th><th></th><th>(cm)</th><th></th></tr>
<tr><td>8</td><td>12</td><td>-</td><td>-</td><td rowspan="5">70</td><td rowspan="9">VL 10/0,75</td><td>80</td><td rowspan="9">VL 10/0,75</td><td>80</td><td rowspan="2">VL 10/0,75</td></tr>
<tr><td>10</td><td>14</td><td>-</td><td>#14</td><td rowspan="4">100</td><td>100</td></tr>
<tr><td>12</td><td colspan="2">16</td><td>#16</td><td>120</td><td rowspan="7">VL 16/1,8</td></tr>
<tr><td>14</td><td colspan="2">18</td><td>#18</td><td>140</td></tr>
<tr><td>16</td><td colspan="2">20</td><td>#20</td><td>160</td></tr>
<tr><td>20</td><td>25</td><td>26</td><td>#25</td><td rowspan="4">50</td><td rowspan="2">70</td><td rowspan="4">200</td></tr>
<tr><td>22</td><td colspan="2">28</td><td>#28</td></tr>
<tr><td>24</td><td colspan="2">32</td><td>#32</td><td rowspan="2">50</td></tr>
<tr><td>25</td><td colspan="2">32</td><td>#32</td></tr>
</table>



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]

Scell-It Injection System X-PRO for rebar connection

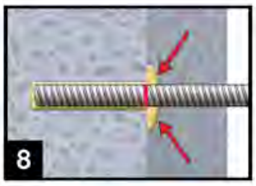
Intended Use
Installation instruction: Filling the bore hole

Annex B 7

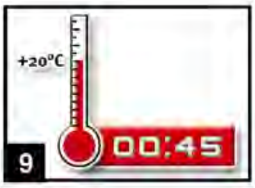
E) Inserting the rebar

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 t_{cure} has elapsed, the add-on part can be installed.

Scell-It Injection System X-PRO for rebar connection	**Annex B 8**
Intended Use Installation instruction: Inserting rebar	

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 a factor according to Table C1.

Table C1: Factor related to concrete class and drilling method

Concrete class	Drilling method	Factor
C12/15 to C50/60	Hammer drilling and compressed air drilling	1,0

Table C2: Design values of the ultimate bond resistance 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 - ∅	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	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3