Technical and Test Institute for Construction Prague
Prosecká 811/76a
190 00 Prague
Czech Republic
eota@tzus.cz

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
www.eota.eu

European Technical Assessment

ETA 16/0542 of 12/12/2025

Technical Assessment Body issuing the ETA: Technical and Test Institute for Construction Prague	
Trade name of the construction product	WPSF100 WPSF100W WPSF100T
Product family to which the construction product belongs	Product area code: 33 Bonded injection type anchor for use in uncracked concrete
Manufacturer	J. van Walraven Holding B.V. Industrieweg 5 3641 RK Mijdrecht The Netherlands
Manufacturing plant	Walraven Factory A1
This European Technical Assessment contains	18 pages including 15 Annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 330499-02-0601 Bonded fasteners and bonded expansion fasteners for use in concrete

1. Technical description of the product

The WPSF100, WPSF100W (faster curing time) and WPSF100T (extended curing time) with steel elements is bonded anchor (injection type).

Steel elements can be galvanized or stainless steel threaded rods.

Steel element is placed into a drilled hole filled with injection mortar. The steel element 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 in accordance with the applicable EAD

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 provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years and 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 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 to C 3
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 4 and C 5
Displacements under short-term and long-term loading	See Annex C 6

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Satisfy the requirements for performance class A1
Resistance to fire	No performance assessed

3.3 Hygiene, health and environment (BWR 3)

No performance determined.

3.4 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B 1 are kept.

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

According to the Decision 96/582/EC of the European Commission[1] the system of assessment verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

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 works) or heavy units.	-	1

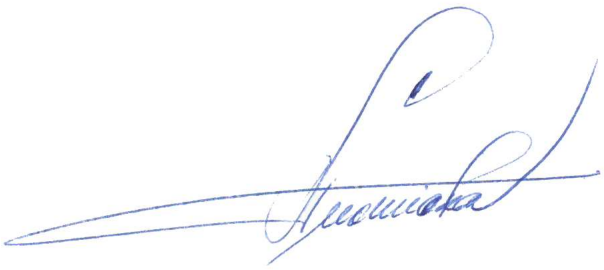
[1] Official Journal of the European Communities L 254 of 08.10.1996

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

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technical and Test Institute for Construction Prague.[2] The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

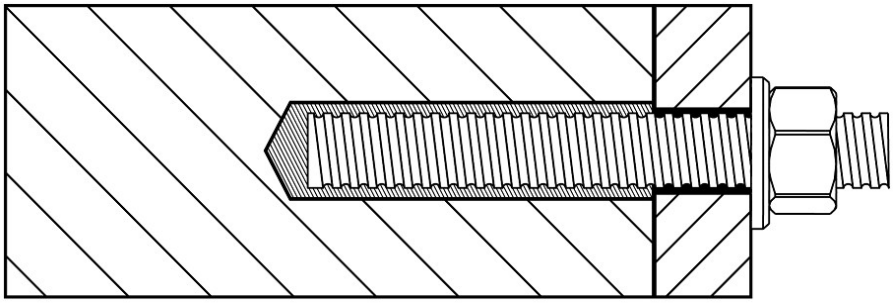
Issued in Prague on 12.12.2025

By
Ing. Jiří Studnička, Ph.D.
Head of the Technical Assessment Body

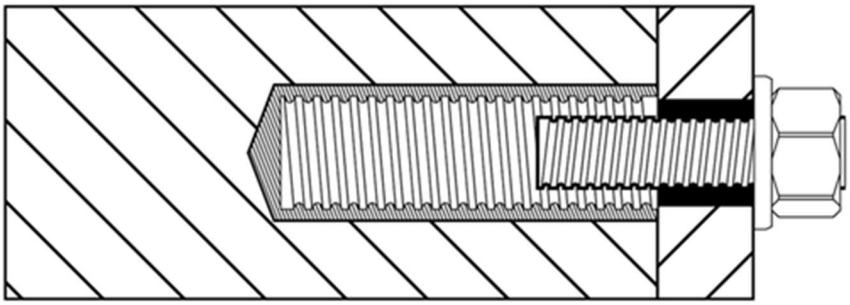


[2] The control plan is a confidential part of the documentation of the European Technical Assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

Threaded rod



Threaded socket



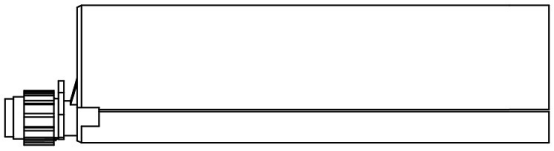
WPSF100, WPSF100W, WPSF100T	**Annex A 1**
Product description Installed conditions	

Coaxial cartridge
WPSF100, WPSF100W, WPSF100T

150 ml
380 ml
400 ml
410 ml

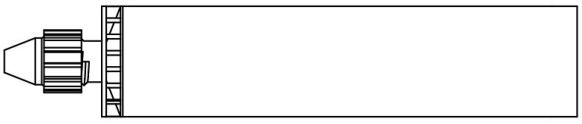
Side by side cartridge
WPSF100, WPSF100W, WPSF100T

345 ml
825 ml



Two part foil in a single piston component cartridge
WPSF100, WPSF100W, WPSF100T

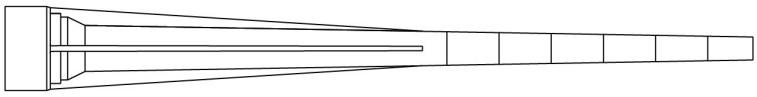
170 ml
300 ml
550 ml
850 ml



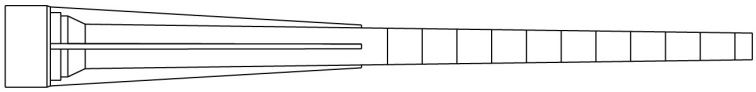
Marking of the mortar cartridges
Identifying mark of the producer, Trade name, Charge code number, Storage life, Curing and processing time

Mixing nozzle

WIS Standard Nozzle

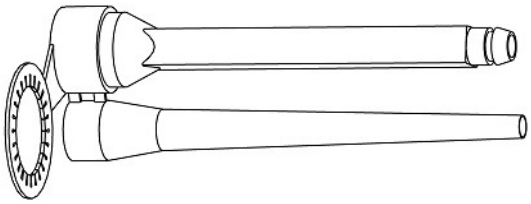


WIS Wide-outlet Nozzle

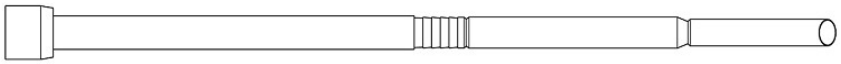


Mixer Nozzle EF

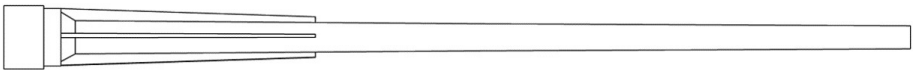
WIS Short Nozzle



WIS Long Nozzle

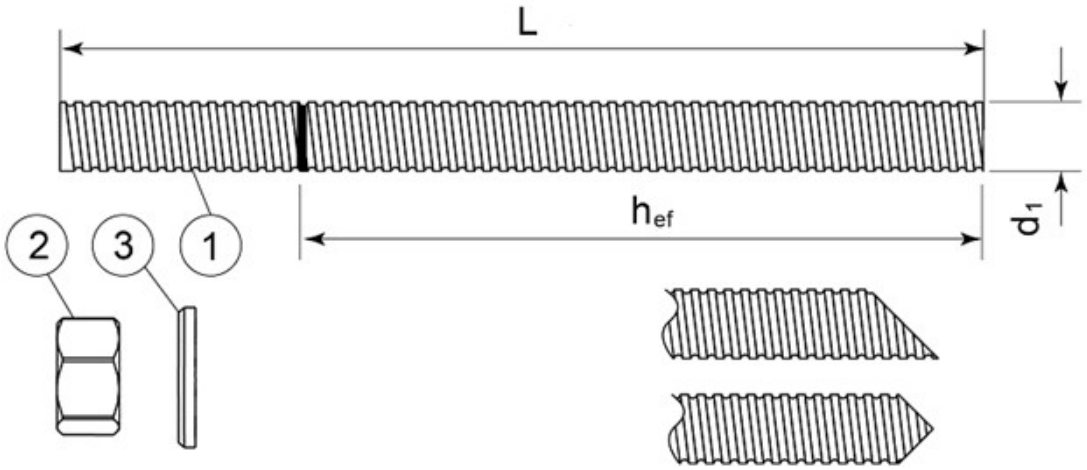


WIS Nozzle 850



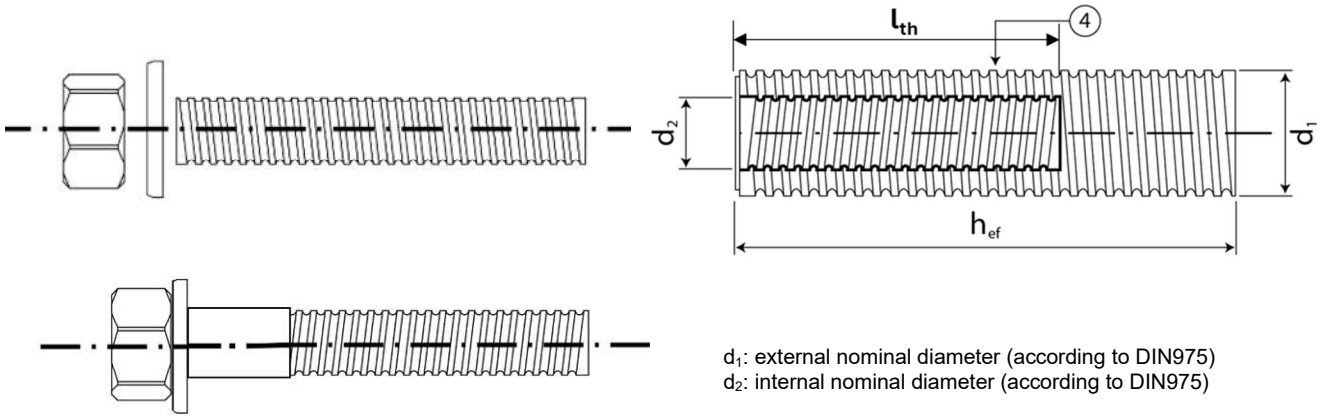
WPSF100, WPSF100W, WPSF100T	**Annex A 2**
Product description Injection system	

Threaded rod M8, M10, M12, M16, M20, M24



Standard commercial threaded rod with marked embedment depth.

Threaded socket M6, M8, M10, M12, M16



d_1: external nominal diameter (according to DIN975)
d_2: internal nominal diameter (according to DIN975)

Standard commercial threaded socket.

WPSF100, WPSF100W, WPSF100T	Annex A 3
Product description Threaded rod and materials	

Part	Designation	Material
Steel, zinc plated ≥ 5 µm acc. to EN ISO 4042 or Steel, Hot-dip galvanized ≥ 40 µm acc. to EN ISO 1461 and EN ISO 10684 or Steel, zinc diffusion coating ≥ 15 µm acc. to EN 13811		
1	Anchor rod	Steel, EN 10087 or EN 10263 Property class 4.6, 4.8, 5.6, 5.8, 8.8, 10.9* EN ISO 898-1
2	Hexagon nut EN ISO 4032	According to threaded rod, EN 20898-2
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod
4	Threaded socket	Steel, EN 10087 or EN 10263 Property class 4.6, 4.8, 5.6, 5.8, 8.8, 10.9* EN ISO 898-1
Stainless steel		
1	Anchor rod	Material: A2-70, A4-70, A4-80, EN ISO 3506
2	Hexagon nut EN ISO 4032	According to threaded rod
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod
4	Threaded socket	Material: A2-70, A4-70, A4-80, EN ISO 3506
High corrosion resistant steel		
1	Anchor rod	Material: 1.4529, 1.4565, EN 10088-1
2	Hexagon nut EN ISO 4032	According to threaded rod
3	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	According to threaded rod
4	Threaded socket	Material: 1.4529, 1.4565, EN 10088-1

*Galvanized rod of high strength are sensitive to hydrogen induced brittle failure

Specifications of intended use

Anchorages subject to:
- Static and quasi-static load.

Base materials
- Uncracked concrete.
- Reinforced or unreinforced normal weight concrete without fibres of strength class C20/25 at minimum and C50/60 at maximum according EN 206:2013 + A2:2021.

Temperature range:
- -40°C to +80°C (max. short. term temperature +80°C and max. long term temperature +50°C)

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

Concrete conditions:
- I1 – installation in dry or wet (water saturated) concrete and use in service in dry or wet concrete.
- I2 – installation in water-filled (not sea water) and use in service in dry or wet concrete

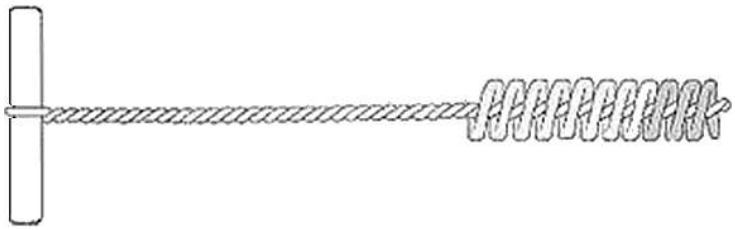
Design:
- The anchorages are designed in accordance with the EN 1992-4 under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings.

Installation:
- Hole drilling by hammer drilling.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Installation direction:
- D3 – downward and horizontal and upwards (e.g. overhead) installation

WPSF100, WPSF100W, WPSF100T	**Annex B 1**
Intended use Specifications	

Cleaning brush



Applicator gun

A

B

C

D

E

F

G

Applicator gun	A	B	C	D	E	F	G
Cartridge	Coaxial 380ml 400ml 410ml	Side by side 345ml	Foil capsule 170ml 300ml 550ml	Foil capsule 170ml 300ml	Coaxial 150ml	Side by side 825ml	Foil capsule 850ml

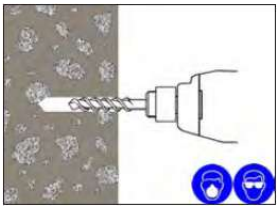
WPSF100, WPSF100W, WPSF100T

Intended use
Hollow drill bit system, Cleaning brush
Applicator guns

Annex B 2

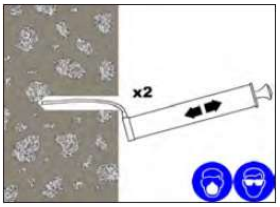
Installation procedure

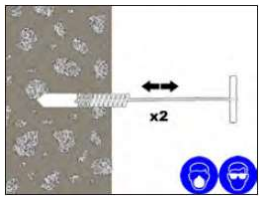
1. Drill the hole to the correct diameter and depth. This can be done with either a rotary percussion or rotary hammer drilling machine depending upon the substrate.

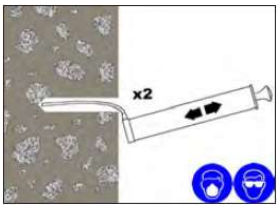


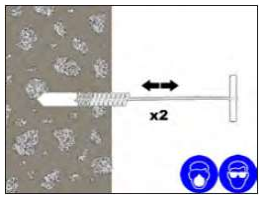
2. Thoroughly clean the hole in the following sequence using the brush with the required extensions and a blow pump.

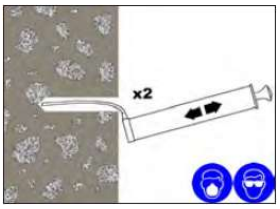
Blow Clean x2.
Brush Clean x2.
Blow Clean x2.
Brush Clean x2.
Blow Clean x2.









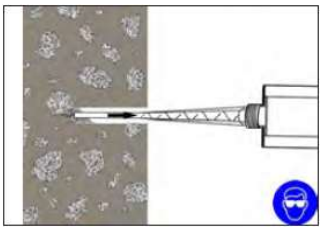


If the hole collects water after the initial cleaning this water must be removed before injecting the resin.

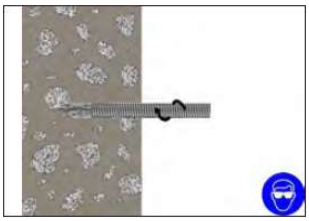
3. Select the appropriate static mixer nozzle for the installation, open the cartridge/foil and screw onto the mouth of the cartridge. Insert the cartridge into the correct applicator gun.

5. If necessary, cut the extension tube to the depth of the hole and push onto the end of the mixer nozzle, and (for threaded bar 16mm dia. or more) fit the correct resin stopper to the other end. Attach extension tubing and resin stopper.

6. Insert the mixer nozzle (resin stopper / extension tube if applicable) to the bottom of the hole. Begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the hole to approximately ½ to ¾ full and remove the mixer nozzle completely.



7. Insert the clean threaded bar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time.

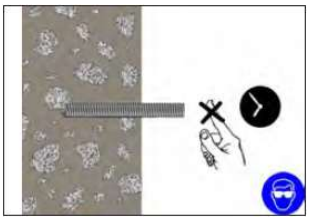


8. Any excess resin should be expelled from the hole evenly around the steel element showing that the hole is full.

   This excess resin should be removed from around the mouth of the hole before it sets.

9. Leave the anchor to cure.

   Do not disturb the anchor until the appropriate loading/curing time has elapsed depending on the substrate conditions and ambient temperature.



10 Attach the fixture and tighten the nut to the recommended torque.

   Do not overtighten.

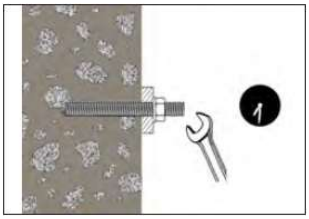


Table B1: Installation parameters of threaded rod

Size			M8	M10	M12	M16	M20	M24
Nominal drill hole diameter	$Ød_0$	[mm]	10	12	14	18	22	26
Diameter of cleaning brush	d_b	[mm]	14	14	20	20	29	29
Torque moment	max T_{fix}	[Nm]	10	20	40	80	150	200
Depth of drill hole for $h_{ef,min}$	$h_0 = h_{ef}$	[mm]	64	80	96	128	160	192
Depth of drill hole for $h_{ef,max}$	$h_0 = h_{ef}$	[mm]	96	120	144	192	240	288
Minimum edge distance	c_{min}	[mm]	35	40	50	65	80	96
Minimum spacing	s_{min}	[mm]	35	40	50	65	80	96
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm				h_{ef} + $2d_0$	

Table B2: Installation parameters of threaded socket

Size			M6	M8	M10	M12	M16
Nominal drill hole diameter	$Ød_0$	[mm]	12	14	18	22	26
Cleaning brush			14	20	20	29	29
Nominal Internal diameter of socket	d_2	[mm]	M6	M8	M10	M12	M16
Nominal external diameter of socket	d_1	[mm]	M10	M12	M16	M20	M24
Torque moment	max T_{fixt}	[Nm]	10	10	20	40	80
Depth of drill hole for $h_{ef,min}$	$h_0 = h_{ef}$	[mm]	80	96	128	160	192
Depth of drill hole for $h_{ef,max}$	$h_0 = h_{ef}$	[mm]	120	144	192	240	288
Threaded engagement length min/max	l_{th}	[mm]	8/20	8/20	10/25	12/30	16/40
Minimum edge distance	c_{min}	[mm]	40	50	65	80	96
Minimum spacing	s_{min}	[mm]	40	50	65	80	96
Minimum thickness of member	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm		h_{ef} + $2d_0$		

WPSF100, WPSF100W, WPSF100T

Intended use
Installation parameters

Annex B 4

Table B4.1: Minimum curing time PSF-V

Resin cartridge temperature [°C]	T Work [mins]	Base material Temperature [°C]	T Load [mins]
min +5	18	min +5	145
+5 to +10	10	+5 to +10	
+10 to +20	6	+10 to +20	85
+20 to +25	5	+20 to +25	50
+25 to +30	4	+25 to +30	40
+30		+30	35

Table B4.2: Minimum curing time WPSF100W

Resin cartridge temperature [°C]	T Work [mins]	Base material Temperature [°C]	T Load [mins]
min +5	10	-10	30 hours
min +5	3,5	-5	9 hours
min +5	2	0	3 hours
min +5	5	0 to +5	125
+5 to +10	3,5	+5 to +10	60
+10 to +20	2	+10 to +20	40
+20 to +25	1,5	+20 to +25	20
+25 to +30	1	+25 to +30	15
+30		+30	10

Table B4.3: Minimum curing time WPSF100T

Resin cartridge temperature [°C]	T Work [mins]	Base material Temperature [°C]	T Load [mins]
min +10	30	min +10	5 hours
+10 to +20	15	+10 to +20	
+20 to +25	10	+20 to +25	145
+25 to +30	7,5	+25 to +30	85
+30 to +35	5	+30 to +35	50
+35 to +40	3,5	+35 to +40	40
+40 to +45	2,5	+40 to +45	35
+45		+45	12

T work is typical gel time at highest temperature T load is set at the lowest temperature

Table C1: Design method EN 1992-4
Steel failure - Characteristic values of resistance to tension load of threaded rod

Steel failure – Characteristic resistance								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel grade **4.6**	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	2,00					
Steel grade **4.8**	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel grade **5.6**	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	γ_{Ms}	[-]	2,00					
Steel grade **5.8**	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel grade **8.8**	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel grade **10.9**	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Stainless steel grade **A2-70, A4-70**	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Stainless steel grade **A4-80**	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
High corrosion resistant steel grade **1.4529**	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	γ_{Ms}	[-]	1,50					
High corrosion resistant steel grade **1.4565**	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	γ_{Ms}	[-]	1,87					

Table C2: Design method EN 1992-4
Steel failure - Characteristic values of resistance to tension load of threaded socket

Steel failure – Characteristic resistance							
Size			**M6**	**M8**	**M10**	**M12**	**M16**
Steel grade **4.6**	$N_{Rk,s}$	[kN]	8	15	23	34	63
Partial safety factor	γ_{Ms}	[-]	2,00				
Steel grade **4.8**	$N_{Rk,s}$	[kN]	8	15	23	34	63
Partial safety factor	γ_{Ms}	[-]	1,50				
Steel grade **5.6**	$N_{Rk,s}$	[kN]	10	18	29	42	79
Partial safety factor	γ_{Ms}	[-]	2,00				
Steel grade **5.8**	$N_{Rk,s}$	[kN]	10	18	29	42	79
Partial safety factor	γ_{Ms}	[-]	1,50				
Steel grade **8.8**	$N_{Rk,s}$	[kN]	16	29	46	67	126
Partial safety factor	γ_{Ms}	[-]	1,50				
Steel grade **10.9**	$N_{Rk,s}$	[kN]	20	37	58	84	157
Partial safety factor	γ_{Ms}	[-]	1,33				
Stainless steel grade **A2-70, A4-70**	$N_{Rk,s}$	[kN]	14	26	41	59	110
Partial safety factor	γ_{Ms}	[-]	1,87				
Stainless steel grade **A4-80**	$N_{Rk,s}$	[kN]	16	29	46	67	126
Partial safety factor	γ_{Ms}	[-]	1,60				
High corrosion resistant steel grade **1.4529**	$N_{Rk,s}$	[kN]	14	26	41	59	110
Partial safety factor	γ_{Ms}	[-]	1,50				
High corrosion resistant steel grade **1.4565**	$N_{Rk,s}$	[kN]	14	26	41	59	110
Partial safety factor	γ_{Ms}	[-]	1,87				

Table C3: Design method EN 1992-4
Characteristic values of resistance to tension load of threaded rod

Combined pullout and concrete cone failure in uncracked concrete C20/25									
Size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Characteristic bond resistance in uncracked concrete for a working life of 50 years and 100 years									
Dry, wet concrete and flooded hole		$\tau_{Rk,ucr}$	[N/mm^2]	8,5	8,0	9,0	9,0	8,0	7,5
Installation safety factor		γ_{inst}	[-]	1,2					
Factor for influence of sustained load for a working life 50 and 100 years		ψ^0_{sus}	[-]	0,78					
Factor for concrete	C25/30	ψ_c	[-]	1,06					
	C30/37			1,12					
	C35/45			1,19					
	C40/50			1,23					
	C45/55			1,27					
	C50/60			1,30					

Concrete cone failure			
Factor for concrete cone failure	$k_{ucr,N}$	[-]	11
Edge distance	$c_{cr,N}$	[mm]	$1{,}5h_{ef}$

Splitting failure								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Edge distance	$c_{cr,sp}$	[mm]	$2{,}0h_{ef}$			$1{,}5h_{ef}$		
Spacing	$s_{cr,sp}$	[mm]	$4{,}0h_{ef}$			$3{,}0h_{ef}$		

Table C4: Design method EN 1992-4
Characteristic values of resistance to tension load of threaded socket

Combined pullout and concrete cone failure in uncracked concrete C20/25								
Size				**M6**	**M8**	**M10**	**M12**	**M16**
Nominal external diameter of socket				M10	M12	M16	M20	M24
Characteristic bond resistance in uncracked concrete for a working life of 50 years and 100 years								
Dry, wet concrete and flooded hole		$\tau_{Rk,ucr}$	[N/mm^2]	8,0	9,0	9,0	8,0	7,5
Installation safety factor		γ_{inst}	[-]	1,2				
Factor for influence of sustained load for a working life 50 and 100 years		ψ^0_{sus}	[-]	0,78				
Factor for concrete	C25/30	ψ_c	[-]	1,06				
	C30/37			1,12				
	C35/45			1,19				
	C40/50			1,23				
	C45/55			1,27				
	C50/60			1,30				

Concrete cone failure			
Factor for concrete cone failure	$k_{ucr,N}$	[-]	11
Edge distance	$c_{cr,N}$	[mm]	$1{,}5h_{ef}$

Splitting failure							
Size			**M10**	**M12**	**M16**	**M20**	**M24**
Edge distance	$c_{cr,sp}$	[mm]	$2{,}0h_{ef}$		$1{,}5h_{ef}$		
Spacing	$s_{cr,sp}$	[mm]	$4{,}0h_{ef}$		$3{,}0h_{ef}$		

Table C5: Design method EN 1992-4
Characteristic values of resistance to shear load of threaded rod

Steel failure without lever arm								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel grade **4.6**	$V_{Rk,s}$	[kN]	9	14	20	38	59	85
Partial safety factor	γ_{Ms}	[-]	1,67					
Steel grade **4.8**	$V_{Rk,s}$	[kN]	9	14	20	38	59	85
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **5.6**	$V_{Rk,s}$	[kN]	11	17	25	47	74	106
Partial safety factor	γ_{Ms}	[-]	1,67					
Steel grade **5.8**	$V_{Rk,s}$	[kN]	11	17	25	47	74	106
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **8.8**	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **10.9**	$V_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	γ_{Ms}	[-]	1,5					
Stainless steel grade **A2-70, A4-70**	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,56					
Stainless steel grade **A4-80**	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,33					
High corrosion resistant steel grade **1.4529**	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,25					
High corrosion resistant steel grade **1.4565**	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,56					
Characteristic resistance of group of fasteners								
Ductility factor k_7 = 1,0 for steel with rupture elongation A_5 > 8%								

Steel failure with lever arm								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Steel grade **4.6**	$M^0_{Rk,s}$	[N.m]	15	30	52	133	260	449
Partial safety factor	γ_{Ms}	[-]	1,67					
Steel grade **4.8**	$M^0_{Rk,s}$	[N.m]	15	30	52	133	260	449
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **5.6**	$M^0_{Rk,s}$	[N.m]	19	37	66	166	325	561
Partial safety factor	γ_{Ms}	[-]	1,67					
Steel grade **5.8**	$M^0_{Rk,s}$	[N.m]	19	37	66	166	325	561
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **8.8**	$M^0_{Rk,s}$	[N.m]	30	60	105	266	519	898
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel grade **10.9**	$M^0_{Rk,s}$	[N.m]	37	75	131	333	649	1123
Partial safety factor	γ_{Ms}	[-]	1,50					
Stainless steel grade **A2-70, A4-70**	$M^0_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,56					
Stainless steel grade **A4-80**	$M^0_{Rk,s}$	[N.m]	30	60	105	266	519	898
Partial safety factor	γ_{Ms}	[-]	1,33					
High corrosion resistant steel grade **1.4529**	$M^0_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,25					
High corrosion resistant steel grade **1.4565**	$M^0_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,56					
Concrete pryout failure								
Factor for resistance to pry-out failure	k_8	[-]	2					

Concrete edge failure								
Size			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Outside diameter of fastener	d_{nom}	[mm]	8	10	12	16	20	24
Effective length of fastener	ℓ_f	[mm]	min (h_{ef}, 8 d_{nom})					

WPSF100, WPSF100W, WPSF100T

Performances
Design according to EN 1992-4
Characteristic resistance for shear loads - threaded rod

Annex C 4

Table C6: Design method EN 1992-4
Characteristic values of resistance to shear load of threaded socket

Steel failure without lever arm							
Size			**M6**	**M8**	**M10**	**M12**	**M16**
Nominal external diameter of socket			M10	M12	M16	M20	M24
Steel grade **4.6**	$V^0_{Rk,s}$	[kN]	5	9	14	20	38
Partial safety factor	γ_{Ms}	[-]			1,67		
Steel grade **4.8**	$V^0_{Rk,s}$	[kN]	5	9	14	20	38
Partial safety factor	γ_{Ms}	[-]			1,25		
Steel grade **5.6**	$V^0_{Rk,s}$	[kN]	6	11	17	25	47
Partial safety factor	γ_{Ms}	[-]			1,67		
Steel grade **5.8**	$V^0_{Rk,s}$	[kN]	6	11	17	25	47
Partial safety factor	γ_{Ms}	[-]			1,25		
Steel grade **8.8**	$V^0_{Rk,s}$	[kN]	8	15	23	34	63
Partial safety factor	γ_{Ms}	[-]			1,25		
Steel grade **10.9**	$V^0_{Rk,s}$	[kN]	10	18	29	42	79
Partial safety factor	γ_{Ms}	[-]			1,5		
Stainless steel grade **A2-70, A4-70**	$V^0_{Rk,s}$	[kN]	7	13	20	30	55
Partial safety factor	γ_{Ms}	[-]			1,56		
Stainless steel grade **A4-80**	$V^0_{Rk,s}$	[kN]	8	15	23	34	63
Partial safety factor	γ_{Ms}	[-]			1,33		
High corrosion resistant steel grade **1.4529**	$V^0_{Rk,s}$	[kN]	7	13	20	30	55
Partial safety factor	γ_{Ms}	[-]			1,25		
High corrosion resistant steel grade **1.4565**	$V^0_{Rk,s}$	[kN]	7	13	20	30	55
Partial safety factor	γ_{Ms}	[-]			1,56		
Characteristic resistance of group of fasteners							
Ductility factor k_7 = 1,0 for steel with rupture elongation A_5 > 8%							

Steel failure with lever arm							
Size			**M6**	**M8**	**M10**	**M12**	**M16**
Nominal external diameter of socket			M10	M12	M16	M20	M24
Steel grade **4.6**	$M^0_{Rk,s}$	[N.m]	6	15	30	52	133
Partial safety factor	γ_{Ms}	[-]			1,67		
Steel grade **4.8**	$M^0_{Rk,s}$	[N.m]	6	15	30	52	133
Partial safety factor	γ_{Ms}	[-]			1,25		
Steel grade **5.6**	$M^0_{Rk,s}$	[N.m]	8	19	37	66	166
Partial safety factor	γ_{Ms}	[-]			1,67		
Steel grade **5.8**	$M^0_{Rk,s}$	[N.m]	8	19	37	66	166
Partial safety factor	γ_{Ms}	[-]			1,25		
Steel grade **8.8**	$M^0_{Rk,s}$	[N.m]	12	30	60	105	266
Partial safety factor	γ_{Ms}	[-]			1,25		
Steel grade **10.9**	$M^0_{Rk,s}$	[N.m]	15	37	75	131	333
Partial safety factor	γ_{Ms}	[-]			1,50		
Stainless steel grade **A2-70, A4-70**	$M^0_{Rk,s}$	[N.m]	11	26	52	92	233
Partial safety factor	γ_{Ms}	[-]			1,56		
Stainless steel grade **A4-80**	$M^0_{Rk,s}$	[N.m]	12	30	60	105	266
Partial safety factor	γ_{Ms}	[-]			1,33		
High corrosion resistant steel grade **1.4529**	$M^0_{Rk,s}$	[N.m]	11	26	52	92	233
Partial safety factor	γ_{Ms}	[-]			1,25		
High corrosion resistant steel grade **1.4565**	$M^0_{Rk,s}$	[N.m]	11	26	52	92	233
Partial safety factor	γ_{Ms}	[-]			1,56		
Concrete pryout failure							
Factor for resistance to pry-out failure	k_8	[-]			2		

Concrete edge failure							
Size			**M6**	**M8**	**M10**	**M12**	**M16**
Nominal external diameter of socket			M10	M12	M16	M20	M24
Outside diameter of fastener	d_{nom}	[mm]	10	12	16	20	24
Effective length of fastener	ℓ_f	[mm]	min (h_{ef}, 8 d_{nom})				

WPSF100, WPSF100W, WPSF100T

Performances
Design according to EN 1992-4
Characteristic resistance for shear loads - threaded socket

Annex C 5

Table C7: Displacement of threaded rod under tension and shear load

Anchor size		**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Tension load							
δ_{N0}	[mm/kN]	0,03	0,03	0,03	0,02	0,02	0,02
$\delta_{N\infty}$	[mm/kN]	0,06	0,05	0,03	0,02	0,02	0,02
Shear load							
δ_{V0}	[mm/kN]	0,02	0,01	0,02	0,02	0,02	0,03
$\delta_{V\infty}$	[mm/kN]	0,04	0,02	0,03	0,03	0,03	0,05