INSTYTUT TECHNIKI BUDOWLANEJ

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European Technical Assessment

ETA-24/0060 of 27/03/2024

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	ESPS-CS
Product family to which the construction product belongs	Concrete screws for fastening sandwich panels
Manufacturer	Van Roij Fasteners Europe B.V. (EUROFAST / EUROFAST GROUP) Indumastraat 18 5753 RJ Deurne Netherlands
Manufacturing plant	Van Roij Fasteners Europe B.V. plants
This European Technical Assessment contains	13 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	European Assessment Document (EAD) 332700-00-0601 "Concrete screws for fastening sandwich panels"

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Specific Part

1 Technical description of the product

ESPS-CS are concrete screws made of galvanized carbon steel with additional PREMIUM coating (ESPS-CS2-P) or made of stainless steel (ESPS-CS2-B). The screws are completed with metal washers made of aluminum or stainless steel and EPDM seals.

The description of the products is given in Annex A.

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

ESPS-CS concrete screws are intended to be used for fasting sandwich panels to concrete structures (non-cracked and cracked concrete).

The intended use comprises connections with predominantly static load (e.g., wind loads, dead loads). In case of using the screws under wind loads (e.g. for outside walls) the cyclic pull-through resistances shall be used by the designer.

The performances given in Section 3 are only valid if the ESPS-CS concrete screws are used in compliance with the specifications and conditions given in Annexes A to C.

The provisions given in this European Technical Assessment are based on an assumed working life of the screws of 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic value of tension resistance of the connection between screw and sandwich panel and associated permissible head deflection	see Annexes C3 and C4
Characteristic value of shear resistance of the connection between screw and sandwich panel without gap	see Annexes C3 and C4
Characteristic values of resistance of the screw in concrete	see Annexes C1 and C2
Durability	No performance assessed

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.2 Methods used for the assessment

The assessment has been made in accordance with EAD 332700-00-0601.

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

According to Decision 96/582/EC of the European Commission the system 1 of assessment and verification of constancy of performance applies (see Annex V to regulation (EU) No 305/2011).

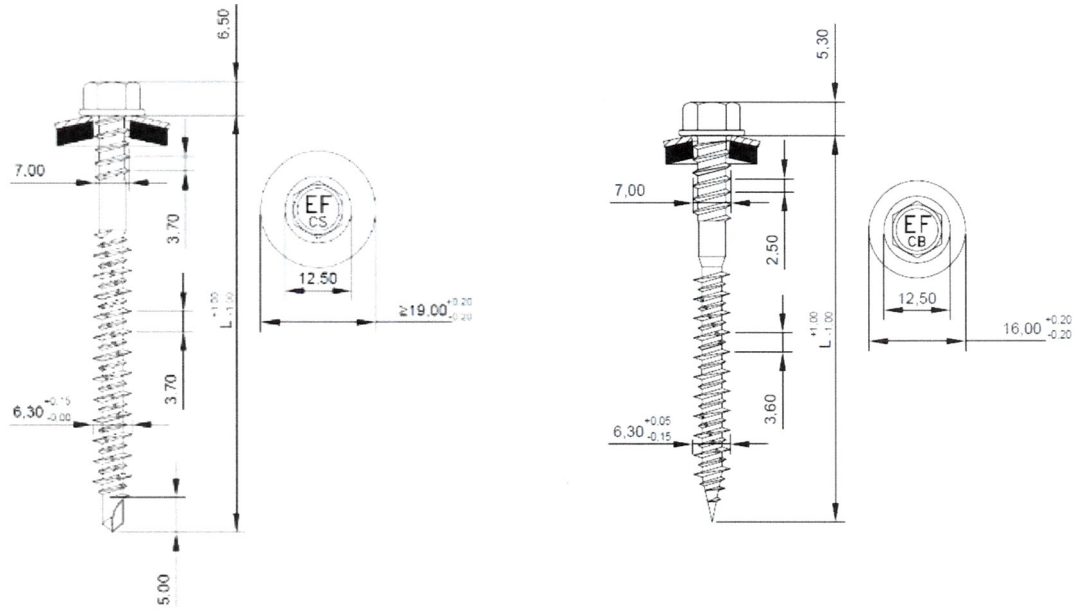
5 Technical details necessary for the implementation of the AVCP system, as provided in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 27/03/2024 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB



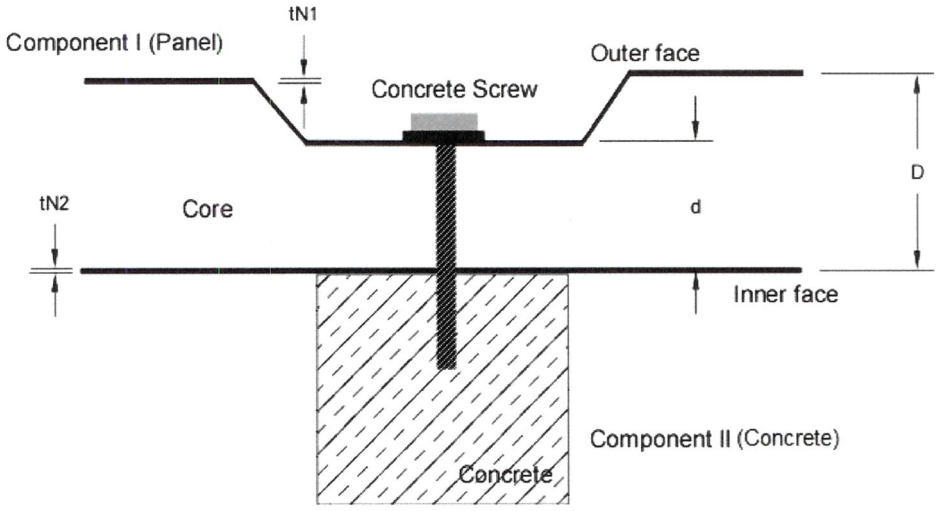
ESPS-CS2-P ESPS-CS2-B

Figure A1. The ESPS-CS concrete screw

Table A1: Dimensions and materials

Concrete screws			**ESPS-CS2-P**	**ESPS-CS2-B**
Thread size	d_s / $d1_s$	[mm]	6,3 / 7,0	
Nominal core diameter	$d_k = d_{nom}$	[mm]	4,7	
Nominal thread diameter	d_s	[mm]	6,3	
Length of screw	L	[mm]	100 - 300	
Tip chamfer	h_s	[mm]	5,0	
Pitch	h_t	[mm]	3,7	3,6
Screw			Carbon steel SAE 1022, quenched, tempered and coated: galvanized with PREMIUM coating	Stainless steel SAE 304M (1.4301)
Washer			Aluminium with vulcanised EPDM seals ø16 or ø19 mm	Stainless steel with vulcanised EPDM seals ø16 or ø19 mm

ESPS-CS	**Annex A1**
Product description Dimensions and materials	of European Technical Assessment ETA-24/0060



Dimensions

tN1 thickness of the outer cover sheet of the sandwich panel
tN2 thickness of the inner cover sheet of the sandwich panel
D, d thickness of the Component I (sandwich panel)

Determination of design values

The design value of the tensile and shear resistance of a connection may be determined as fallows, unless otherwise specified in the national regulations:

$$N_{R,d} = \min\left\{\frac{N_{Rk,SP,cycl}}{\gamma_M};\ N_{Rk,p}\right\} \qquad V_{R,d} = \frac{V_{Rk}}{\gamma_M}$$

The characteristic values $N_{Rk,SP,cycl}$ and V_{Rk} are given in Annexes C3 and C4. The recommended partial safety factor γ_M is 1,33 unless a partial safety factor is given in the national regulations.

The design value $N_{Rk,p}$ is the pull-out resistance of the screw from the concrete.

For the concrete the recommended partial safety factor γ_C is 1,50 (according to EN 1992-4:2018) unless a partial safety factor is given in the national regulations.

ESPS-CS	Annex B1 of European Technical Assessment ETA-24/0060
Product description Example of an application. Design	

Specification of intended use

Anchorages subject to:

- Static and quasi-static loads.

Base material:

- Reinforced or unreinforced normal weight concrete (without fibres) with strength class C20/25 to C50/60 according to EN 206.
- Uncracked and cracked concrete.

Use conditions (environmental conditions):

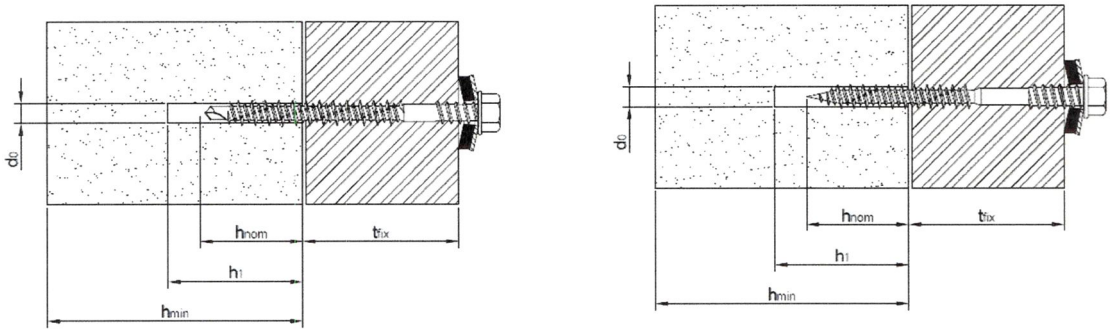
- Screws made of galvanized carbon steel with additional PREMIUM coating are subjected to dry internal environment.
- Screws made of stainless steel are subjected to environmental conditions CRC II according to EN 1993-1-4, table A.1.

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 loads to be transmitted. The position of the screws is indicated on the design drawings (e.g. position of the screws relative to reinforcement or to supports, etc.).
- Anchorages under static and quasi-static loads are designed in accordance with EN 1992-4:2018.
- Temperature changes of the sandwich panels causes head deflections on the screw head and has to be considered during dimensioning.

Installation:

- Hammer drilling only.
- Concrete screw installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Concrete screw in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- After installation further turning of the concrete screw is not possible. The head of the screw is supported on the sandwich panel and is not damaged.

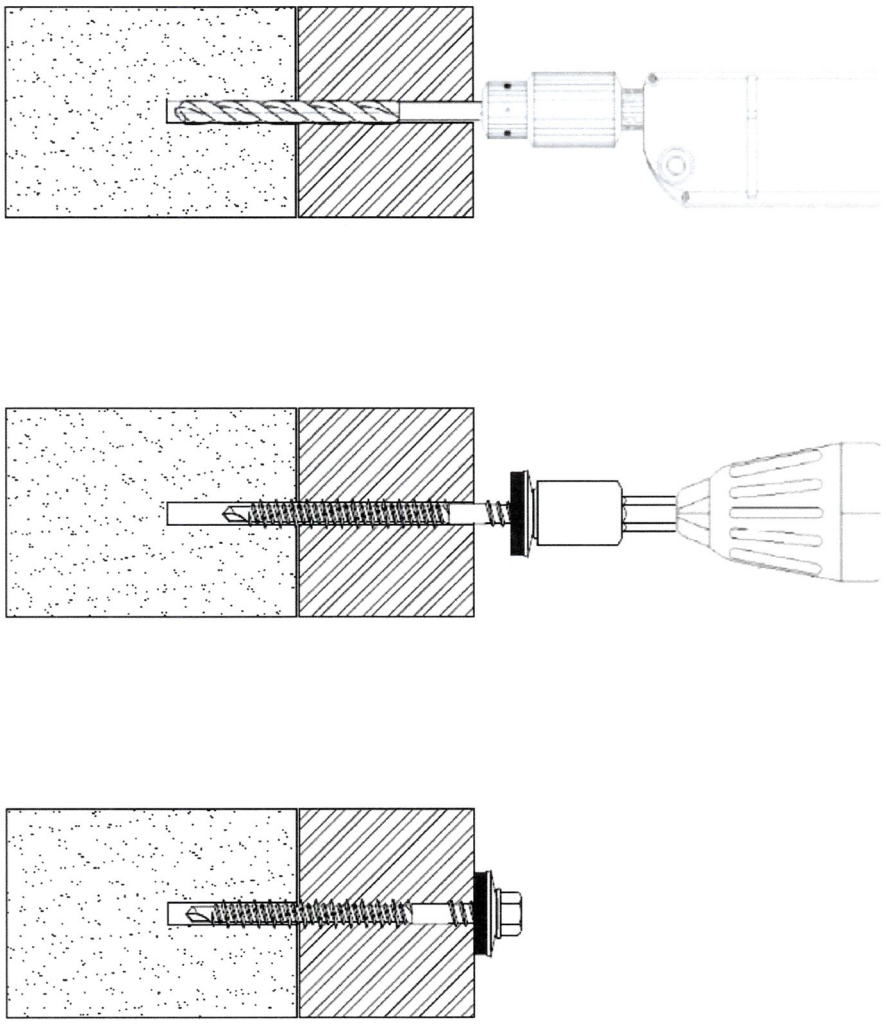


ESPS-CS2-P ESPS-CS2-B

Figure B1. Installed concrete screw

Table B1: Installation parameters

Concrete screws			**ESPS-CS**
Nominal embedment depth in concrete	h_{nom}	[mm]	50
Effective embedment depth in concrete	h_{ef}	[mm]	37
Hole diameter	d_0	[mm]	4,8* / 5,0**
Drill bit diameter	d_{cut}	[mm]	4,8* / 5,0**
Minimum drill hole depth	h_1	[mm]	55
Minimum thickness of concrete member	h_{min}	[mm]	100
Minimum spacing	s_{min}	[mm]	50
Minimum edge distance	c_{min}	[mm]	50
* for cracked concrete ** for uncracked concrete			



ESPS-CS	Annex B4
Intended use Installation instruction and tools	of European Technical Assessment ETA-24/0060

Table C1: Characteristic resistance in cracked and uncracked concrete C20/25 to C50/60

Concrete screws				**ESPS-CS2-P ESPS-CS2-B**
Nominal embedment depth in concrete		h_{nom}	[mm]	50
Min. thickness of concrete member		h_{min}	[mm]	100
Steel failure				
Characteristic tension resistance		$N_{Rk,s}$	[kN]	12,1
Partial safety factor		γ_{Ms} [1)]	[-]	1,4
Characteristic shear resistance		$V_{Rk,s}$	[kN]	6,0
Partial safety factor		γ_{Ms} [1)]	[-]	1,25
Factor of ductility		k_7	[-]	0,8
Characteristic bending resistance		$M^0_{Rk,s}$	[Nm]	13,8
Pull-out failure				
Characteristic resistance in uncracked concrete C20/25		$N_{Rk,p}$	[kN]	5,5
Characteristic resistance in cracked concrete C20/25		$N_{Rk,p}$	[kN]	1,0
Installation safety factor		γ_{inst}	[-]	1,4
Increasing factor	concrete C30/37	ψ_c	[-]	1,05
	concrete C40/50		[-]	1,09
	concrete C50/60		[-]	1,13
Concrete cone failure and splitting failure				
Effective anchor depth in concrete		h_{ef}	[mm]	37
Factor for uncracked concrete		$k_{ucr,N}$	[-]	11,0
Factor for cracked concrete		$k_{cr,N}$	[-]	7,7
Characteristic resistance to splitting		$N^0_{Rk,sp}$	[kN]	min ($N_{Rk,p}$; $N^0_{Rk,c}$ [2)])
Axis spacing for concrete cone failure		$s_{cr,N}$	[mm]	3 h_{ef}
Axis spacing for splitting failure		$s_{cr,sp}$	[mm]	3 h_{ef}
Edge distance for concrete cone failure		$c_{cr,n}$	[mm]	1,5 h_{ef}
Edge distance for splitting failure		$c_{cr,sp}$	[mm]	1,5 h_{ef}
Installation safety factor		γ_{inst}	[-]	1,4
Concrete pry-out failure				
Factor		k_8	[-]	1,0
Installation safety factor		γ_{inst}	[-]	1,4
Concrete edge failure				
Effective length of the screw		$l_f = h_{ef}$	[mm]	37
Effective diameter of the screw		d_{nom}	[mm]	5,0

[1)] In the absence of other national regulations
[2)] $N^0_{Rk,c}$ according to EN 1992-4:2018

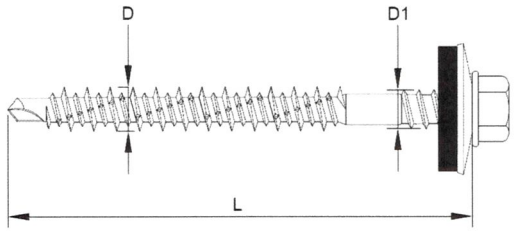
ESPS-CS	**Annex C1** of European Technical Assessment ETA-24/0060
Performances Characteristic resistance for tension loads	

Table C2: Displacements

Concrete screws			**ESPS-CS2-P ESPS-CS2-B**
Displacements under tension loads in uncracked concrete			
Tension load	N	[kN]	2,7
Short term tension displacement	δ_{N0}	[mm]	0,16
Long term tension displacement	δ_{N}	[mm]	0,49
Displacements under tension loads in cracked concrete			
Tension load	N	[kN]	1,3
Short term tension displacement	δ_{N0}	[mm]	0,12
Long term tension displacement	$\delta_{N\infty}$	[mm]	0,35
Displacements under shear loads in uncracked and cracked concrete			
Shear load	V	[kN]	2,9
Short term shear displacement	δ_{V0}	[mm]	0,16
Long term shear displacement	$\delta_{V\infty}$	[mm]	0,49

Materials

Screw:	carbon steel SAE 1022, quenched, tempered and coated: galvanized with PREMIUM coating
Washer:	A16, A19 – washer made of aluminum with EPDM ring
Component I:	S280GD, S320GD or S350GD according to EN 10346
Component II:	concrete – class C20/25 to C50/60 according to EN 206



Component II h_1 = 55 mm h_{nom} = 50 mm			Washer	
			A16	A19
Characteristic shear resistance value $V_{R,k}$ [kN]	tN2 [mm] of Component I	0,40	0,82	
		0,50	1,02	
		0,55	1,02	
		0,60	1,26	
		0,63	1,44	
		0,70	1,52	
		0,75	1,90	
		0,88	1,90	
		1,00	1,90	
Characteristance pull through resistance value of the screw through the sandwich panel $N_{Rk,SP,cycl}$ [kN]	tN1 [mm] of Component I	0,40	1,02	1,21
		0,50	1,77	1,98
		0,55	1,77	1,97
		0,60	2,30	2,40
		0,63	2,43	2,66
		0,70	2,75	2,90
		0,75	2,86	3,10
		0,88	2,86	3,10
		1,00	2,86	3,10
max. head displacement "u" depending on sandwich panel thickness d or D [mm]		30	0,7	
		40	0,9	
		50	1,2	
		60	1,4	
		70	1,6	
		80	1,8	
		90	2,1	
		100	2,3	
		110	2,5	
		120	2,8	
		130	3,0	
		≥ 140	3,2	

ESPS-CS

ESPS-CS2-P with hexagon head
and washer A16 (Ø16 mm) or A19 (Ø19 mm)

Annex C3

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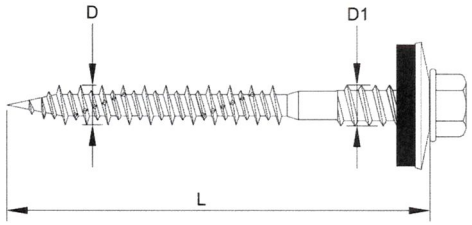
Materials

Screw: stainless steel SAE 304M
Washer: S16, S19 – washer made of stainless steel with EPDM ring

Component I: S280GD, S320GD or S350GD according to EN 10346
Component II: concrete – class C20/25 to C50/60 according to EN 206



Component II h_1 = 55 mm h_{nom} = 50 mm			Washer	
			S16	S19
Characteristic shear resistance $V_{R,k}$ [kN]	tN2 [mm] of Component I	0,40	0,82	
		0,50	1,02	
		0,55	1,02	
		0,60	1,26	
		0,63	1,44	
		0,70	1,52	
		0,75	1,90	
		0,88	1,90	
		1,00	1,90	
Characteristance pull through resistance of the screw through the sandwich panel $N_{Rk,SP,cycl}$ [kN]	tN1 [mm] of Component I	0,40	1,02	1,21
		0,50	1,77	1,98
		0,55	1,77	1,97
		0,60	2,30	2,40
		0,63	2,43	2,66
		0,70	2,75	2,90
		0,75	2,86	3,10
		0,88	2,86	3,10
		1,00	2,86	3,10
max. head displacement "u" depending on sandwich panel thickness d or D [mm]		30	2,1	
		40	2,8	
		50	3,5	
		60	4,2	
		70	4,9	
		80	5,6	
		90	6,3	
		100	7,0	
		110	7,7	
		120	8,4	
		130	9,1	
		≥ 140	9,8	

ESPS-CS

ESPS-CS2-B with hexagon head
and washer S16 (Ø16 mm) or S19 (Ø19 mm)

Annex C4

of European
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