INSTYTUT TECHNIKI BUDOWLANEJ

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European Technical Assessment

ETA-10/0108 of 28/06/2024

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	R-CAS-V
Product family to which the construction product belongs	Bonded anchor with anchor rod M8 to M30 made of galvanized steel or stainless steel for use in uncracked concrete
Manufacturer	RAWLPLUG S.A. ul. Kwidzyńska 6 51-416 Wrocław Poland
Manufacturing plant	Manufacturing Plant no. 30
This European Technical Assessment contains	14 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) 330499-01-0601 "Bonded fasteners for use in concrete"
This version replaces	ETA-10/0108 issued on 30/12/2022

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Specific Part

1 Technical description of the product

The R-CAS-V is a bonded anchor (capsule type) consisting of chemical mortar glass capsules and threaded anchor rod of sizes M8 to M30 made of:

- galvanized carbon steel,
- stainless steel,
- high corrosion resistant stainless steel,

with hexagon nut and washer.

The glass capsule is placed into a drilled hole previously cleaned and the threaded rod is driven by machine with simultaneous hammering and turning. The threaded rod is anchored by the bond between threaded rod, chemical mortar and concrete.

The threaded rods are available for all diameters with two type of tip end: a one side 45° chamfer or a two sides 45° chamfer.

Description of the product is given in Annex A.

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

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

The performances given in this European Technical Assessment are based on an assumed working life of the anchor of 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load and shear load (static and quasi static loading), displacements	See Annex C1 to C4

3.1.2 Hygiene, health and the environment (BWR 3)

No performance assessed.

3.2 Methods used for the assessment

The assessment has been made in accordance with the EAD 330499-01-0601.

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 (see Annex V to regulation (EU) No 305/2011) applies.

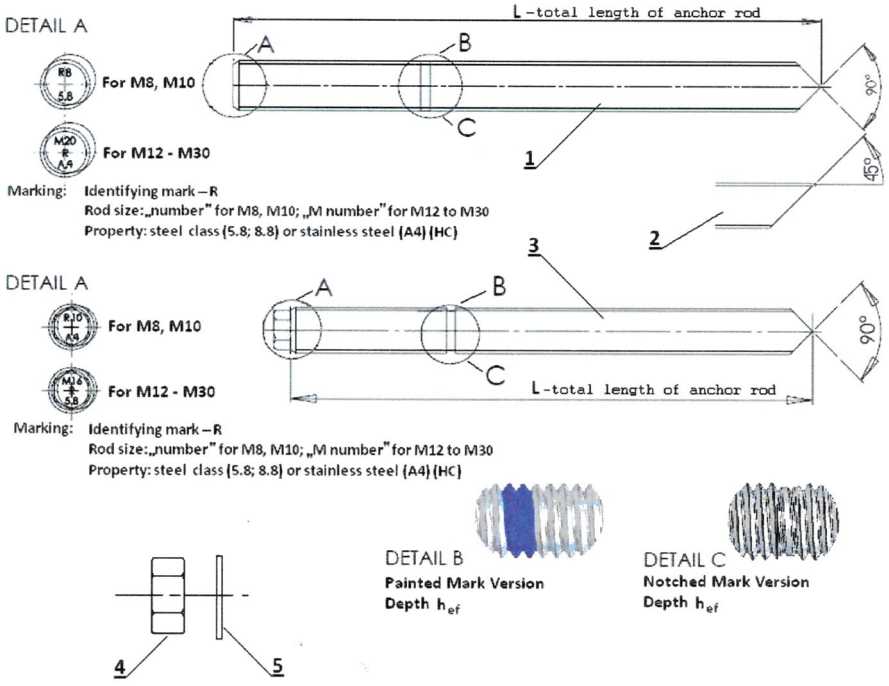
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document (EAD)

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at 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.

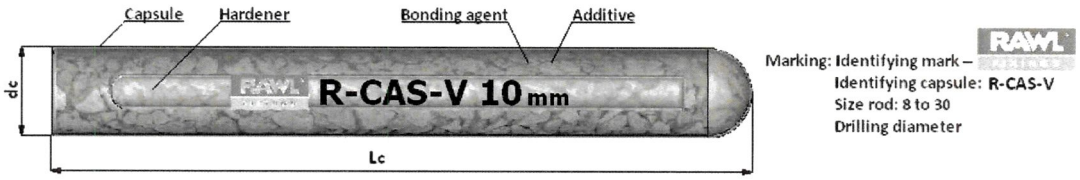
Issued in Warsaw on 28/06/2024 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB



1. Anchor rod R-STUDS–(88),(A4),(HC)-FL
2. 45° shape with anchor rod
3. Anchor rod R-STUDS–(88),(A4),(HC) with the hexagonal tip
4. Hexagonal nut
5. Washer

1. Anchor rod R-STUDS - (5.8, 8.8,..) (A4),(HC) – FL
2. 45°shape with anchor rod
3. Anchor rod R-Studs - (5.8, 8.8,..) (A4),(HC) – with Hex-drive
4. Hexagonal nut
5. Washer



R-CAS-V (glass capsules)	8 mm	10 mm	12 mm	16 mm	20 mm	24 mm	30 mm
L_c [mm]	85 ± 3%	85 ± 3%	95 ± 2%	95 ± 2%	180 ± 2%	215 ± 1%	270 ± 1%
d_c [mm]	9,25	10,75	12,65	16,75	21,55	23,75	33,20
R-STUDS (anchor rods)	M8	M10	M12	M16	M20	M24	M30
L [mm]	110, 160, 250	130, 170, 190, 220, 250	160, 190, 220, 260, 300	190, 220, 260, 300, 310, 380	260, 350	300, 400	380

R-CAS-V	Annex A1
Product description Characteristic of the product	of European Technical Assessment ETA-10/0108

Table A1: Threaded anchor rods

Designation		Material			
Steel, zinc plated: **electroplated ≥ 5 µm according to EN ISO 4042** **hot-dip galvanized ≥ 50 µm according to EN ISO 1461** **non-electrolytically applied zinc flake coating ≥ 8 µm according to EN ISO 10683**					
Threaded rod	**Property class**	**Characteristic steel ultimate strength**	**Characteristic steel yield strength**	**Fracture elongation**	
	5.8	$f_{uk} \geq 500$ N/mm²	$f_{yk} \geq 400$ N/mm²	$A_5 > 8\%$	EN ISO 898-1
	8.8	$f_{uk} \geq 800$ N/mm²	$f_{yk} \geq 640$ N/mm²	$A_5 \geq 8\%$	
	10.9	$f_{uk} \geq 1000$ N/mm²	$f_{yk} \geq 900$ N/mm²	$A_5 > 8\%$	
	12.9	$f_{uk} \geq 1200$ N/mm²	$f_{yk} \geq 1080$ N/mm²	$A_5 > 8\%$	
Hexagon nut	5	for class 5.8 rods			EN ISO 898-2
	8	for class 8.8 rods			
	10	for class 10.9 rods			
	12	for class 12.9 rods			
Washer	Steel according to EN ISO 7089; corresponding to anchor rod material				
Stainless steel A4 **(Materials) 1.4401, 1.4404, 1.4571** **High corrosion resistance stainless steel (HCR)** **(Materials) 1.4529, 1.4565, 1.4547**					
Threaded rod	**Property class**	**Characteristic steel ultimate strength**	**Characteristic steel yield strength**	**Fracture elongation**	
	70	$f_{uk} \geq 700$ N/mm²	$f_{yk} \geq 450$ N/mm²	$A_5 \geq 8\%$	EN 10088 EN ISO 3506
	80	$f_{uk} \geq 800$ N/mm²	$f_{yk} \geq 600$ N/mm²	$A_5 \geq 8\%$	
Hexagon nut	70	for class 70 rods			EN 10088 EN ISO 3506
	80	for class 80 rods			
Washer	Steel, according to EN 10088; corresponding to anchor rod material				

Table A2: Chemical mortar

Product	Composition
R-CAS-V	Bonding agent: Vinylester styrene free resin Hardener: Dibenzoyl peroxide Additive: Quartz sand (filler)

Specification of intended use

Anchors subject to:

Static and quasi-static loads: M8 to M30.

Base material:

- Reinforced or unreinforced normal weight concrete (without fibers) of strength class C20/25 to C50/60 according to EN 206.
- Uncracked concrete: M8 to M30.

Temperature range:

The anchors may be used in the following temperature range:

- -40°C to +40°C (max. short term temperature +40°C and max. long term temperature +24°C).
- -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 1993-1-4:2006+A1:2015 corresponding to corrosion resistance class (CRC):
  - stainless steel A4 according to Annex A, Table A1: CRC III,
  - high corrosion resistance steel (HCR) according to Annex A, Table A1: CRC V.

Installation:

- Dry or wet concrete (use category I1): M8 to M30.
- Flooded holes with the exception of seawater (use category I2): M8 to M30.
- Installation direction D2 (downward and horizontal installation).
- All anchor sizes are suitable for rotary hammer drilled holes: M8 to M30.

Design methods:

- Anchorages under static or quasi-static loads are designed in accordance with EN 1992-4:2018 and EOTA Technical Report TR 055.
- Anchors are designed under the responsibility of the 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 (e.g. relative to reinforcement or to supports, etc.).

R-CAS-V	**Annex B1** of European Technical Assessment ETA-10/0108
Intended use Specifications	

Table B1: Installation data

Size		M8	M10	M12	M16	M20	M24	M30
Diameter of anchor rod	d [mm]	8	10	12	16	20	24	30
Nominal drill hole diameter	d_0 [mm]	10	12	14	18	24	28	35
Maximum diameter hole in the fixture	d_f [mm]	9	12	14	18	22	26	33
Effective embedment depth	$h_{ef} = h_{nom}$ [mm]	80	90	110	125	170	210	270
Depth of the drilling hole	h_0 [mm]	h_{ef} + 5 mm						
Minimum thickness of concrete member	h_{min} [mm]	h_{ef} + 30 mm; ≥ 100 mm				$h_{ef} + 2d_0$		
Maximum installation torque	$T_{inst,max}$ [Nm]	10	20	40	80	120	180	300
Minimum spacing	s_{min} [mm]	40	45	55	62,5	85	105	135
Minimum edge distance	c_{min} [mm]	40	45	55	62,5	85	105	135

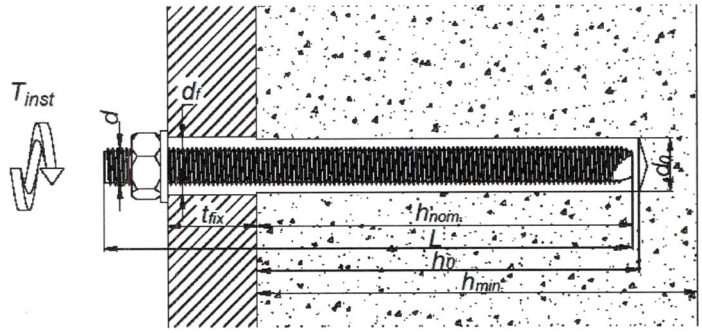
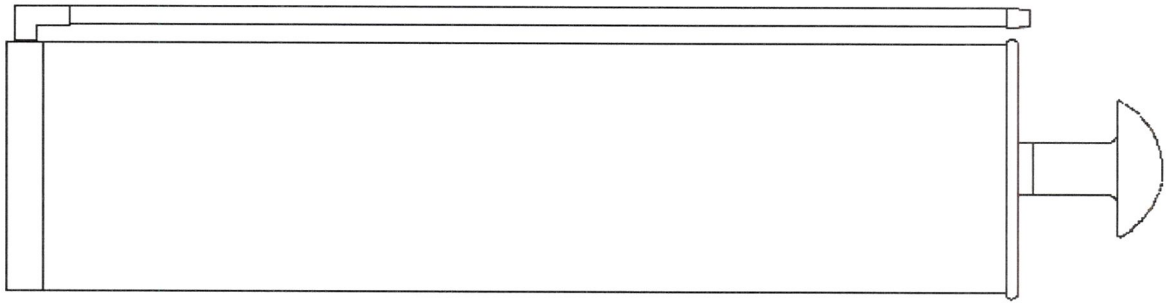


Table B2: Minimum curing time

Concrete temperature	Minimum curing time[1)]
-5°C	8 h
0°C	4 h
5°C	2,5 h
10°C	2 h
15°C	1,5 h
20°C	45 min
30°C	20 min
40°C	10 min

[1)] Curing time shall be doubled for wet concrete.

Manual blower pump

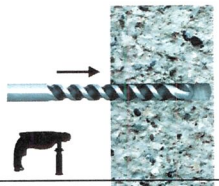
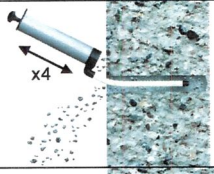
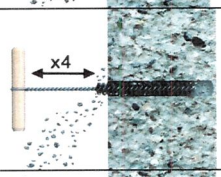
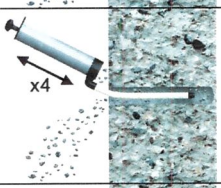
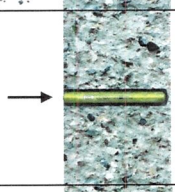
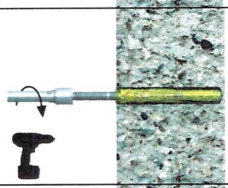
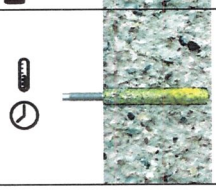
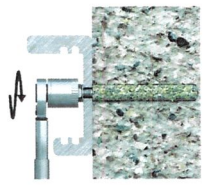


Steel brush



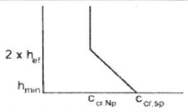
Size rod	M8	M10	M12	M16	M20	M24	M30
Brushes diameter d_b (mm)	12	14	16	20	26	30	37

R-CAS-V	**Annex B3** of European Technical Assessment ETA-10/0108
Intended use Cleaning tools	

	Drill a hole to the required diameter and depth using a rotary hammer drilling machine.
	4 x blowing starting from the bottom of the drilled hole using the hand pump.
	4 x brushing (at least) using the specified steel brush.
	4 x blowing starting from the bottom of the drilled hole using the hand pump.
	Insert the glass capsule into the cleaned hole.
	Positioning the stud into the drilled hole. Switch on the drilling machine (simultaneous hammering and turning) and drive the stud into the drilled hole until the embedment depth is reached. Setting control: mortar excess flows out at the top of the drilled hole.
	Leave the fixing undisturbed until the cure time elapses.
	Attach the fixture and tighten the nut to the required torque.

R-CAS-V	**Annex B4** of European Technical Assessment ETA-10/0108
Intended use Installation instruction	

Table C1: Characteristic resistance under tension loads

Size				M8	M10	M12	M16	M20	M24	M30
Steel failure										
Steel failure with threaded rod grade 5.8										
Characteristic resistance	$N_{Rk,s}$	[kN]		18	29	42	78	122	176	280
Partial safety factor	γ_{Ms} [1)]	[-]		1,50						
Steel failure with threaded rod grade 8.8										
Characteristic resistance	$N_{Rk,s}$	[kN]		29	46	67	126	196	282	449
Partial safety factor	γ_{Ms} [1)]	[-]		1,50						
Steel failure with threaded rod grade 10.9										
Characteristic resistance	$N_{Rk,s}$	[kN]		37	58	84	157	245	353	561
Partial safety factor	γ_{Ms} [1)]	[-]		1,40						
Steel failure with threaded rod grade 12.9										
Characteristic resistance	$N_{Rk,s}$	[kN]		44	70	101	188	294	424	673
Partial safety factor	γ_{Ms} [1)]	[-]		1,40						
Steel failure with stainless steel threaded rod grade A4-70										
Characteristic resistance	$N_{Rk,s}$	[kN]		26	41	59	110	171	247	393
Partial safety factor	γ_{Ms} [1)]	[-]		1,87						
Steel failure with stainless steel threaded rod grade A4-80										
Characteristic resistance	$N_{Rk,s}$	[kN]		29	46	67	126	196	282	449
Partial safety factor	γ_{Ms} [1)]	[-]		1,60						
Steel failure with high corrosion resistance stainless steel rod grade 70										
Characteristic resistance	$N_{Rk,s}$	[kN]		26	41	59	110	171	247	393
Partial safety factor	γ_{Ms} [1)]	[-]		1,87						
Combined pull-out and concrete cone failure										
Characteristic bond resistance in uncracked concrete C20/25	$\tau_{Rk,ucr}$	[N/mm²]		12	10	11	10	9,5	8,5	8
Increasing factor for $\tau_{Rk,ucr}$ in uncracked concrete	ψ_c	C30/37		1,04					1,0	
		C40/50		1,07					1,0	
		C50/60		1,09					1,0	
Sustained load factor	ψ^0_{sus}	24°C / 40°C		0,66						
		50°C / 80°C		0,60						
Concrete cone failure										
Effective anchorage depth	h_{ef}	[mm]		80	90	110	125	170	210	270
Factor for uncracked concrete	$k_{ucr,N}$	[-]		11						
Edge distance	$c_{ucr,N}$	[mm]		$1,5 \cdot h_{ef}$						
Spacing	$s_{ucr,N}$	[mm]		$3,0 \cdot h_{ef}$						
Splitting failure										
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]		$2,0 \cdot h_{ef}$					$1,5 \cdot h_{ef}$	
	$c_{cr,sp}$ for $h_{min} < h$ [2)] $< 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)									
	$c_{cr,sp}$ for h [2)] $\geq 2 \cdot h_{ef}$			$c_{cr,N}$						
Spacing	$s_{cr,sp}$	[mm]		$2,0 \cdot c_{cr,sp}$						
Installation safety factors for combined pull-out, concrete cone and splitting failure										
Installation safety factor for use category 1	γ_{inst}	[-]		1,2						
Installation safety factor for use category 2		[-]		1,4						

[1)] In the absence of other national regulations
[2)] h – concrete member thickness

Table C2: Characteristic resistance under shear loads – steel failure without lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	9	14	21	39	61	88	140
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,25						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	224
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,25						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$V_{Rk,s}$	[kN]	18	29	42	78	122	176	280
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,50						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$V_{Rk,s}$	[kN]	22	35	51	94	147	212	337
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,50						
Steel failure with stainless steel threaded rod grade A4-70									
Characteristic resistance	$V_{Rk,s}$	[kN]	13	20	29	55	86	124	196
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,56						
Steel failure with stainless steel threaded rod grade A4-80									
Characteristic resistance	$V_{Rk,s}$	[kN]	15	23	34	63	98	141	224
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,33						
Steel failure with high corrosion resistance stainless steel threaded rod grade 70									
Characteristic resistance	$V_{Rk,s}$	[kN]	13	20	29	55	86	124	196
Factor considering ductility	k_7	[-]	1,0						
Partial safety factor	γ_{Ms} [1)]	[-]	1,56						

[1)] In the absence of other national regulations

Table C3: Characteristic resistance under shear loads – steel failure with lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with threaded rod grade 5.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Partial safety factor	γ_{Ms} [1)]	[-]	1,25						
Steel failure with threaded rod grade 8.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor	γ_{Ms} [1)]	[-]	1,25						
Steel failure with threaded rod grade 10.9									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	37	75	131	333	649	1123	2249
Partial safety factor	γ_{Ms} [1)]	[-]	1,50						
Steel failure with threaded rod grade 12.9									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	45	90	157	400	779	1347	2699
Partial safety factor	γ_{Ms} [1)]	[-]	1,50						
Steel failure with stainless steel threaded rod grade A4-70									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor	γ_{Ms} [1)]	[-]	1,56						
Steel failure with stainless steel threaded rod grade A4-80									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor	γ_{Ms} [1)]	[-]	1,33						
Steel failure with high corrosion stainless steel threaded rod grade 70									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor	γ_{Ms} [1)]	[-]	1,56						

[1)] In the absence of other national regulations

Table C4: Characteristic resistance under shear loads – pry-out and concrete edge failure

Size			M8	M10	M12	M16	M20	M24	M30
Pry-out failure									
Factor	k_8	[-]	2						
Concrete edge failure:									
Effective anchor length	l_f	[mm]	$l_f = h_{ef}$ and $\leq 12\ d_{nom}$						$l_f = h_{ef}$ and $\leq$ max ($8 \cdot d_{nom}$; 300 mm)
Diameter of the anchor	d_{nom}	[mm]	8	10	12	16	20	24	30

Table C5: Displacements under tension loads

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement under tension loads in uncracked concrete C20/25 to C50/60									
Admissible service load	N	[kN]	11,5	14,2	22,1	30,0	47,3	62,9	95,1
Displacement	δ_{N0}	[mm]	0,30	0,30	0,35	0,35	0,40	0,45	0,50
	$\delta_{N\infty}$	[mm]	0,65	0,65	0,65	0,65	0,65	0,65	0,65
These values are suitable for each temperature range and categories specified in Annex B1									

Table C6: Displacements under shear loads

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement under shear loads in uncracked concrete C20/25 to C50/60									
Admissible service load	V	[kN]	3,7	5,8	8,4	15,7	24,5	35,3	55,6
Displacement	δ_{V0}	[mm]	2,5	2,5	2,5	2,5	2,5	2,5	2,5
	$\delta_{V\infty}$	[mm]	3,7	3,7	3,7	3,7	3,7	3,7	3,7
These values are suitable for each temperature range and categories specified in Annex B1									