

WA-S7 WEDGE ANCHOR

316 (A4) STAINLESS STEEL

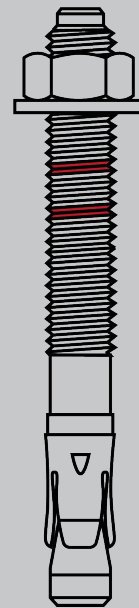
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APPROVAL DOC

TDS

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NCC Compliant AS 5216

This ETA document meets anchor testing and reporting requirements of AS 5216, essential for compliance with the NCC.



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European Technical Assessment

**ETA 17/0487
of 02/06/2017**

English translation prepared by IETcc. Original version in Spanish language

General Part

**Technical Assessment Body issuing
the ETA designated according to Art.
29 of Regulation (EU) 305/2011:**

**Trade name of the construction
product**

**Product family to which the
construction product belongs**

Manufacturer

Manufacturing plants

**This European Technical
Assessment contains**

**This European Technical
Assessment is issued in accordance
with regulation (EU) No 305/2011, on
the basis of**

Instituto de Ciencias de la Construcción Eduardo
Torroja (IETcc)

Wedge Anchor WA-S7 316 A4 S/S

Torque controlled expansion anchor made of
stainless steel of sizes M6, M8, M10, M12, M16
and M20 for use in non-cracked concrete.

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ETA Holder plant 1
ETA Holder plant 2

10 pages including 4 annexes which form an
integral part of this assessment.

European Technical Assessment EAD 330232-00-
0601 "Mechanical Fasteners for use in concrete",
ed. October 2016

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 should be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to article 25 (3) of Regulation (EU) No 305/2011.

SPECIFIC PART

1. Technical description of the product

The Allfasteners Wedge Anchor WA-S7 316 A4 S/S is an anchor made of stainless steel. The anchor is installed into a predrilled cylindrical hole and anchored by torque-controlled expansion. The anchorage is characterised by friction between expansion clip and concrete.

Product and 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 to 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
Wedge Anchor WA-S7 316 A4 S/S product performance for static or quasi static actions	See annex C

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for class A1
Resistance to fire	No performance determined

3.3 Hygiene, health and the environment (BWR 3)

This requirement is not relevant for the anchors.

3.4 Safety in use (BWR 4)

The essential characteristics regarding safety in use are included under the basic works requirements Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

This requirement is not relevant for the anchors.

3.6 Energy economy and heat retention (BWR 6)

This requirement is not relevant for the anchors.

3.7 Sustainable use of natural resources (BWR 7)

No performance determined

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

The applicable European legal act for the system of Assessment and Verification of Constancy of Performances (see annex V to Regulation (EU) No 305/2011) 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.

The technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at Instituto de ciencias de la construcción Eduardo Torroja.



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On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 2nd of June 2017

Marta Mª Castellote Armero
Director

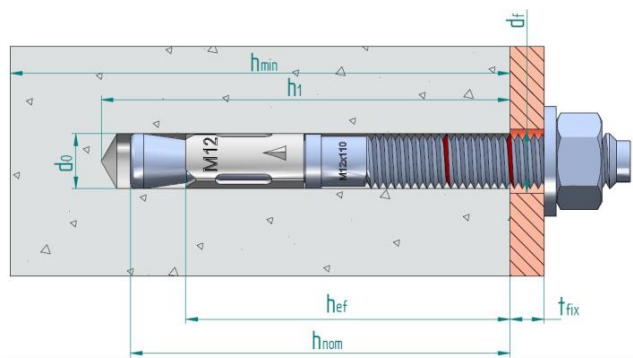
Product and installed condition

Wedge Anchor WA-S7 316 A4 S/S

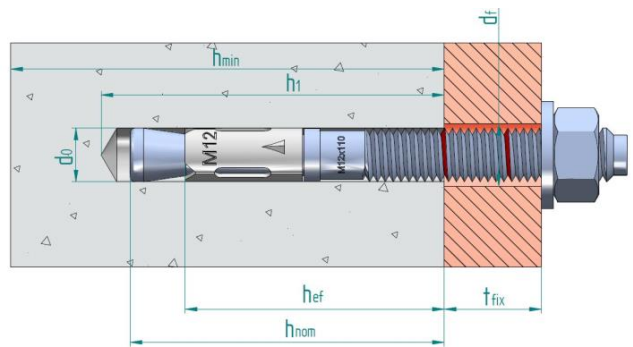


Identification on anchor:

- Expansion clip:
 - Wedge Anchor WA-S7 316 A4 S/S: Company logo + “WA-S7” + Metric.
- Anchor body: Metric x Length
- Red ring marks to show embedment depths



**Standard
embedment depth**



**Reduced
embedment depth
(M8, M10 and M12)**

- d_0 : Nominal diameter of drill bit
 d_f : Fixture clearance hole diameter
 h_{ef} : Effective anchorage depth
 h_1 : Depth of drilled hole
 h_{nom} : Overall anchor embedment depth in the concrete
 h_{min} : Minimum thickness of concrete member
 t_{fix} : Fixture thickness

Wedge Anchor WA-S7 316 A4 S/S

Product description

Installed condition

Annex A1

Table A1: materials

Item	Designation	Material for Wedge Anchor WA-S7 316 A4 S/S
1	Anchor Body	Stainless steel, grade A4
2	Washer	DIN 125, DIN 9021 or DIN 440, stainless steel grade A4
3	Nut	DIN 934, stainless steel grade A4
4	Expansion clip	Stainless steel, grade A4

Wedge Anchor WA-S7 316 A4 S/S

Product description

Materials

Annex A2

Intended use

Anchorage subjected to:

- Static or quasi static loads, all sizes and embedment depths

Base materials:

- Reinforced and unreinforced concrete according to EN 206-1
- Strength classes C20/25 to C50/60 according to EN 206-1
- Uncracked concrete

Use conditions (environmental conditions):

- The anchor shall only be used in dry internal conditions: all anchor types
- Structural subjected to external atmospheric exposure (including industrial and marine environment) and to permanent internal conditions with no particular aggressive conditions exists: screw types made of stainless steel with marking A4. Such 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:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete.
- Verifiable calculation rules and drawings are prepared taking into account of the loads to be attached. 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 under static or quasi-static are designed for design Method A in accordance with:
 - ETAG 001, Annex C, edition August 2010 or
 - CEN/TS 1992-4:2009

Installation:

- Hammer drilling only.
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.

Wedge Anchor WA-S7 316 A4 S/S

Intended use

Specifications

Annex B1

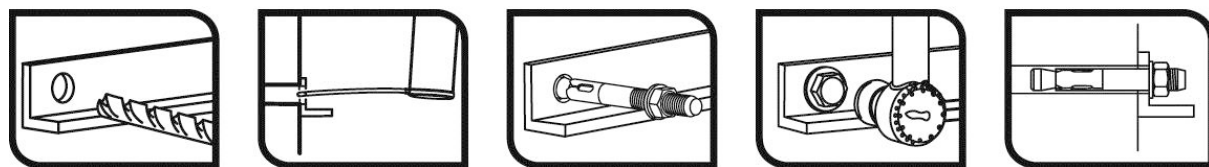
Table D1: Installation parameters for Wedge Anchor WA-S7 316 A4 S/S

Wedge Anchor WA-S7 316 A4 S/S: STAINLESS STEEL ANCHOR Installation parameters		Performances					
		M6	M8	M10	M12	M16	M20
d_0	Nominal diameter of drill bit: [mm]	6	8	10	12	16	20
d_f	Fixture clearance hole diameter: [mm]	7	9	12	14	18	22
T_{inst}	Nominal installation torque: [Nm]	7	20	35	60	120	240
Standard embedment depth							
L_{min}	Total length of the bolt: [mm]	60	75	85	100	125	160
L_{max}		180	155	170	180	170	220
h_{min}	Minimum thickness of concrete member: [mm]	100	100	110	130	168	206
h_1	Depth of drilled hole: [mm]	55	65	75	85	110	135
h_{nom}	Overall anchor embed depth in concrete: [mm]	49.5	59.5	66.5	77	103.5	125
$h_{ef, std}$	Effective anchorage depth: [mm]	40	48	55	65	84	103
t_{fix}	Thickness of fixture for DIN 125 washer ²⁾ : [mm]	L-58	L-70	L-80	L-92	L-108	L-122
t_{fix}	Thickness of fixture for DIN 9021 or DIN 440 washer ²⁾ : [mm]	L-58	L-71	L-80	L-94	L-108	L-124
s_{min}	Minimum allowable spacing: [mm]	50	65	70	85	110	135
c_{min}	Minimum allowable distance: [mm]	50	65	70	85	110	135
Reduced embedment depth							
L_{min}	Total length of the bolt: [mm]	--	60	70	80	--	--
L_{max}		--	155	170	180	--	--
h_{min}	Minimum thickness of concrete member: [mm]	--	100	100	100	--	--
h_1	Depth of drilled hole: [mm]	--	50	60	70	--	--
h_{nom}	Overall anchor embed depth in concrete: [mm]	--	46.5	53.5	62	--	--
$h_{ef, red}$	Effective anchorage depth: [mm]	--	35 ¹⁾	42	50	--	--
t_{fix}	Thickness of fixture for DIN 125 washer ²⁾ : [mm]	--	L-57	L-67	L-77	--	--
t_{fix}	Thickness of fixture for DIN 9021 or DIN 440 washers ²⁾ : [mm]	--	L-58	L-67	L-79	--	--
s_{min}	Minimum allowable spacing: [mm]	--	65	70	85	--	--
c_{min}	Minimum allowable distance: [mm]	--	65	70	85	--	--

¹⁾ Use restricted to anchoring of structural components which are statically indeterminate

²⁾ L = total anchor length

Installation process



Wedge Anchor WA-S7 316 A4 S/S

Performances

Installation parameters and installation procedure

Annex C1

Table D2: Characteristic values to tension loads of design method A according to ETAG 001, Annex C or CEN/TS 1992-4 for Wedge Anchor WA-S7 316 A4 S/S

Wedge Anchor WA-S7 316 A4 S/S: STAINLESS STEEL ANCHOR			Performances					
			M6	M8	M10	M12	M16	M20
STEEL FAILURE								
$N_{Rk,s}$	Characteristic resistance:	[kN]	10.1	19.1	34.3	49.6	85.9	140.7
$\gamma_{M,s}$	Partial safety factor:	[-]	1.68					
PULL OUT FAILURE								
Standard embedment depth								
$N_{Rk,p}$	Characteristic resistance in C20/25 uncracked concrete:	[kN]	-- ³⁾	12	16	25	35	50
$\gamma_{2,1}^{(2)}$	Installation safety factor:	[-]	--	1.0	1.2	1.2	1.2	1.2
Reduced embedment depth								
$N_{Rk,p}$	Characteristic resistance in C20/25 uncracked concrete:	[kN]	--	9 ⁴⁾	12	16	--	--
$\gamma_{2,1}^{(2)}$	Installation safety factor:	[-]	--	1.2	1.2	1.2	--	--
Ψ_c	Increasing factors for $N_{Rk,c}^0$:	C30/37	1.22					
		C40/50	1.41					
		C50/60	1.55					
CONCRETE CONE FAILURE AND SPLITTING FAILURE								
Standard embedment depth								
$h_{ef, std}$	Effective anchorage depth:	[mm]	40	48	55	65	84	103
$k_{ucr,1}^{(2)}$	Factor for uncracked concrete:	[-]	10.1					
$\gamma_{2,1}^{(2)}$	Installation safety factor:	[-]	1.0	1.0	1.2	1.2	1.2	1.2
$S_{cr,N}$	Concrete cone failure:	[mm]	3 x h_{ef}					
$C_{cr,N}$		[mm]	1.5 x h_{ef}					
$S_{cr,sp}$	Splitting failure:	[mm]	160	192	220	260	336	412
$C_{cr,sp}$		[mm]	80	96	110	130	168	206
Reduced embedment depth								
$h_{ef, std}$	Effective anchorage depth:	[mm]	--	35 ⁴⁾	42	50	--	--
$k_{ucr,1}^{(2)}$	Factor for uncracked concrete:	[-]	10.1					
$\gamma_{2,1}^{(2)}$	Installation safety factor:	[-]	--	1.2	1.2	1.2	--	--
$S_{cr,N}$	Concrete cone failure:	[mm]	--	3 x h_{ef}			--	--
$C_{cr,N}$		[mm]	--	1.5 x h_{ef}			--	--
$S_{cr,sp}$	Splitting failure:	[mm]	--	140	168	200	--	--
$C_{cr,sp}$		[mm]	--	70	84	100	--	-

¹⁾ Parameter relevant only for design according to CEN/TS 1992-4:2009

²⁾ Parameter relevant only for design according to ETAG 001, Annex C

³⁾ Pull out failure is not decisive

⁴⁾ Use restricted to anchoring of structural components which are statically indeterminate

Wedge Anchor WA-S7 316 A4 S/S	Annex C2
Performances	
Characteristic values for tension load.	

Table D3: Characteristic values to shear loads of design method A according to ETAG 001, Annex C or CEN/TS 1992- for Wedge Anchor WA-S7 316 A4 S/S

Wedge Anchor WA-S7 316 A4 S/S: STAINLESS STEEL ANCHOR				Performances					
				M6	M8	M10	M12	M16	M20
STEEL FAILURE WITHOUT LEVER ARM									
$V_{Rk,s}$	Characteristic resistance:	[kN]	6.0	10.9	17.4	25.2	47.1	73.5	
$k_2^{(1)}$	k_2 factor:	[-]	1.0						
$\gamma_{M,s}$	Partial safety factor	[-]	1.52						
STEEL FAILURE WITH LEVER ARM									
$M_{Rk,s}^0$	Characteristic bending moment:	[Nm]	9.2	22.5	44.9	78.6	200	389	
$\gamma_{M,s}$	Partial safety factor:	[-]	1.52						
CONCRETE PRYOUT FAILURE									
$k^{(2)}$	k factor:	for $h_{ef, std}$	[-]	1.0	1.0	1.0	2.0	2.0	
$k_3^{(1)}$		for $h_{ef, red}$	[-]	--	1.0 ⁽¹⁾	1.0	1.0	--	--
$\gamma_{2^{(2)}}^{(1)}$	Installation safety factor:	[-]	1.0						
CONCRETE EDGE FAILURE									
l_f	Effective length of anchor	for $h_{ef, std}$	[mm]	40	48	55	65	84	103
	under shear loads:	for $h_{ef, red}$	[mm]	--	35 ⁽³⁾	42	50	--	--
d_{nom}	Outside diameter of anchor:	[mm]	6	8	10	12	16	20	
$\gamma_{2^{(2)}}^{(1)}$	Installation safety factor:	[-]	1.0						

⁽¹⁾ Parameter relevant only for design according to CEN/TS 1992-4:2009

⁽²⁾ Parameter relevant only for design according to ETAG 001, Annex C

⁽³⁾ Use restricted to anchoring of structural components which are statically indeterminate

Table D4: Displacements under tension load for Wedge Anchor WA-S7 316 A4 S/S

Wedge Anchor WA-S7 316 A4 S/S: STAINLESS STEEL ANCHOR		Performances						
		M6	M8	M10	M12	M16	M20	
Standard embedment depth								
Tension load in non cracked concrete:		[kN]	4.3	5.7	6.3	9.9	13,8	19.8
$\bar{\delta}_{N0}$	Displacement:	[mm]	0.42	0.22	0.17	0.19	0.19	0.11
$\bar{\delta}_{N\infty}$		[mm]	1.33	1.33	1.33	1.33	1.33	1.33
Reduced embedment depth								
Tension load in non cracked concrete:		[kN]	--	4.2	5.7	7.6	--	--
$\bar{\delta}_{N0}$	Displacement:	[mm]	--	0.07	0.04	0.32	--	--
$\bar{\delta}_{N\infty}$		[mm]	--	0.60	0.60	0.60	--	--

Table D5: Displacements under shear load for Wedge Anchor WA-S7 316 A4 S/S

Wedge Anchor WA-S7 316 A4 S/S: STAINLESS STEEL ANCHOR		Performances					
		M6	M8	M10	M12	M16	M20
Standard embedment depth							
Shear load in non cracked concrete:	[kN]	2.8	5.1	8.1	11.8	22.1	34.5
$\bar{\delta}_{V0}$ Displacement:	[mm]	1.66	1.79	3.83	4.13	5.75	6.59
$\bar{\delta}_{V\infty}$	[mm]	2.49	2.68	5.74	6.19	8.62	9.88
Reduced embedment depth							
Shear load in non cracked concrete:	[kN]	--	5.1	8.1	11.8	--	--
$\bar{\delta}_{V0}$ Displacement:	[mm]	--	0.60	3.83	4.13	--	--
$\bar{\delta}_{V\infty}$	[mm]	--	0.90	5.74	6.19	--	--

Wedge Anchor WA-S7 316 A4 S/S

Performances

Characteristic values for shear load.
Displacements under tension and shear

Annex C3