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European Technical Assessment

ETA-21/0529 of 22/06/2021

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	Wedge Anchor WA
Product family to which the construction product belongs	Torque controlled expansion anchor of sizes M6, M8, M10, M12, M16 and M20 for use in non-cracked concrete
Manufacturer	Yuyao Rhino Hardware Co., LTD Room 705, Youao WanDa Plaza, Building No. 13, YuYao 314500 NingBo China
Manufacturing plant	HanDan JingGong Construction Anchors Hou-Ju street, High Tech Industrial Area, YongNian County, HanDan City, China
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) 330232-00-0601 "Mechanical fasteners for use in concrete"

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Specific Part

1 Technical description of the product

The Wedge Anchor WA in the sizes of M6, M8, M10, M12, M16 and M20 is an anchor made of galvanized steel which is placed into a drill hole and anchored by torque-controlled expansion.

An illustration and the description of the anchor are given in Annex A.

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

The performances given in Annex C 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. The indications given on the working life cannot be interpreted as a guarantee given by the producer or 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 resistance to tension load (static and quasi-static loading), displacements	Annex C1
Characteristic resistance to shear load (static and quasi-static loading), displacements	Annex C2

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	Annex C3 and C4

3.2 Methods used for the assessment

The assessment of the products has been made in accordance with the EAD 330232-00-0601 “Mechanical fasteners for use in concrete”.

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 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 deposited in Instytut Techniki Budowlanej.

For the 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 22/06/2021 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB

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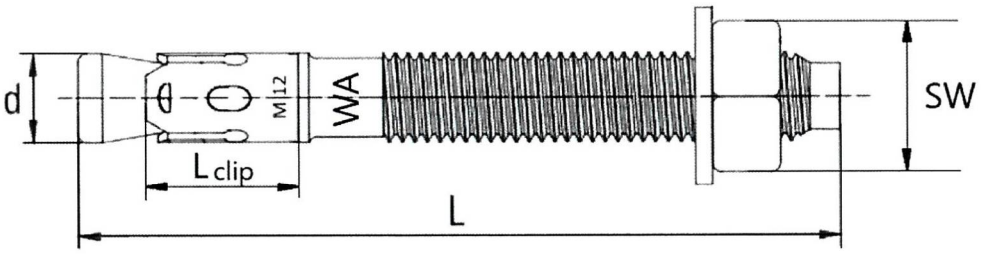


Table A1: Wedge Anchor WA dimensions

Size	Marking	d [mm]	L [mm]	L_{clip}(1) [mm]	SW [mm]	T_{fix}(2) [mm]
M6	WA M6	6	45 – 110	12,8	10	1 – 55
M8	WA M8	8	55 – 200	15,3	13	1 – 130
M10	WA M10	10	60 – 220	17,9	17	1 – 140
M12	WA M12	12	80 – 240	21,25	19	1 – 140
M16	WA M16	16	100 – 260	24,4	24	1 – 140
M20	WA M20	20	115 – 280	28,62	30	1 – 140

(1) – expansion clip length

(2) – thickness of the fixture

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Wedge Anchor WA	**Annex A1** of European Technical Assessment ETA-21/0529
Product description Dimensions and marking	

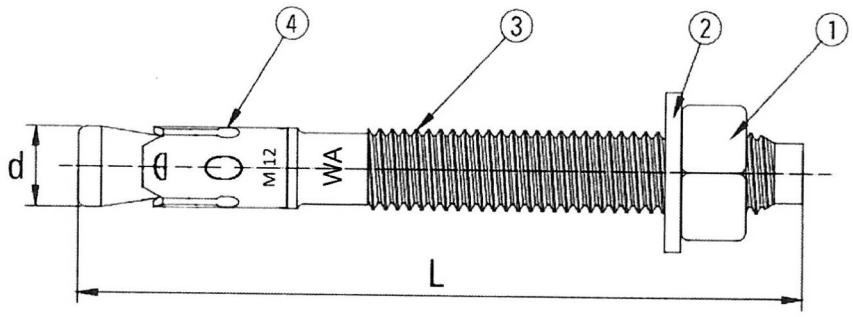


Table A2: Materials

Part	Designation	Material	Protection
1	Hexagonal nut	Carbon steel class 8 acc. to EN ISO 898-2 or DIN 934	Zinc plated ≥ 5 µm acc. to EN ISO 4042
2	Washer	Cold-formed steel	
3	Expansion clip	f_{uk} ≥ 400 MPa f_{yk} ≥ 270 MPa	
4	Threaded bolt		

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Wedge Anchor WA	**Annex A2**
Product description Materials	of European Technical Assessment ETA-21/0529

Specification of intended use

Anchorages subject to:
- Static and quasi-static loads.
- Anchorages with requirements related to resistance to fire.

Base material:
- Non-cracked concrete.
- Reinforced or unreinforced normal weight concrete of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016.

Use conditions (environmental conditions):
- Structures subject to dry internal conditions.

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 anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to snon-crupports, etc.).
- Anchorages under static and quasi-static loads and under fire exposure are designed in accordance with EN 1992-4:2018.

Installation of anchors:
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any component of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Effective anchorage depth, edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.

Wedge Anchor WA	**Annex B1** of European Technical Assessment ETA-21/0529
Intended use Specifications	

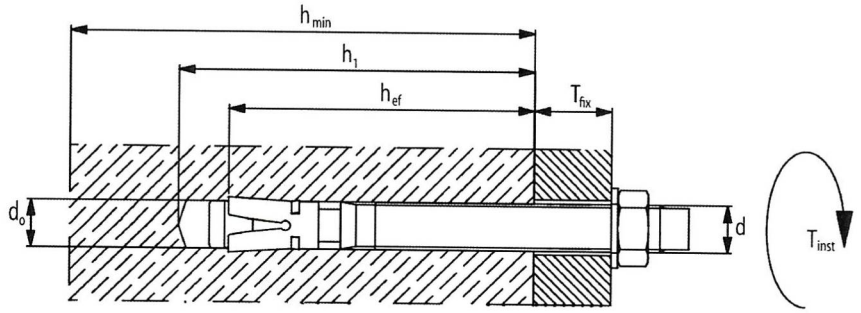
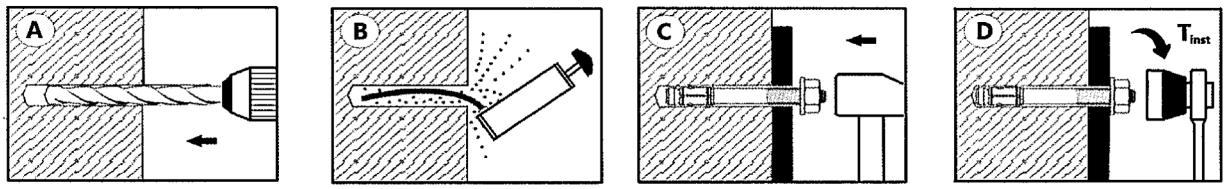


Table B1: Installation parameters

Anchor size		M6	M8	M10	M12	M16	M20
Nominal drill hole diameter	d_o [mm]	6	8	10	12	16	20
Depth of drill hole to deepest point	$h_1 \geq$ [mm]	50	60	65	90	110	120
Effective anchorage depth	h_{ef} [mm]	35	45	50	70	85	100
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	7	9	12	14	18	22
Installation torque moment	T_{inst} [Nm]	10	20	30	50	120	160
Thickness of the fixture	T_{fix} [mm]	1 – 55	1 – 130	1 – 140	1 – 140	1 – 140	1 – 140
Minimum thickness of base material	h_{min} [mm]	70	90	100	140	170	200
Minimum spacing	s_{min} [mm]	30	35	40	50	65	80
Minimum edge distance	c_{min} [mm]	30	35	40	50	65	80

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Wedge Anchor WA	**Annex B2** of European Technical Assessment ETA-21/0529
Intended use Installation parameters	



Wedge Anchor WA	**Annex B3** of European Technical Assessment ETA-21/0529
Intended use Installation instruction	

Table C1: Design method A, characteristic resistance for tension loads

Anchor size			M6	M8	M10	M12	M16	M20
Steel failure								
Characteristic resistance		$N_{Rk,s}$ [kN]	8,04	14,60	23,20	33,70	62,80	98,0
Partial safety factor		γ_{Ms} [1)]	1,5					
Pull-out failure								
Characteristic resistance in non-cracked concrete C20/25		$N_{Rk,p}$ [kN]	7,0	14	18	30	40	50
Installation safety factor		γ_{inst}	1,0			1,2	1,0	
Increasing factor	concrete C30/37	ψ_c	1,00				1,04	
	concrete C40/50		1,00				1,07	
	concrete C50/60		1,00				1,10	
Concrete cone failure and splitting failure								
Effective anchorage depth		h_{ef} [mm]	30	40	50	65	75	90
Factor for non-cracked concrete		$k_1 = k_{ucr,N}$	11,0	11,0	11,0	11,0	11,0	11,0
Installation safety factor		γ_{inst}	1,0			1,2	1,0	
Characteristic resistance for splitting		$N^0_{Rk,sp}$ [kN]	7,0	14	18	30	40	50
Characteristic spacing	concrete cone failure	$s_{cr,N}$ [mm]	105	135	150	210	255	300
	splitting failure	$s_{cr,sp}$ [mm]	105	135	150	210	255	300
Characteristic edge distance	concrete cone failure	$c_{cr,N}$ [mm]	52,5	67,5	75	105	127,5	150
	splitting failure	$c_{cr,sp}$ [mm]	52,5	67,5	75	105	127,5	150

[1)] in the absence of other national regulations

Table C2: Displacements under tension loading

Anchor size			M6	M8	M10	M12	M16	M20
Tension load		N [kN]	3,2	6,8	8,5	12,26	21,62	26,7
Displacement		δ_{N0} [mm]	1,56	1,62	1,38	2,22	1,81	1,93
		$\delta_{N\infty}$ [mm]	0,74	0,74	0,74	0,74	0,74	0,74

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Wedge Anchor WA	**Annex C1** of European Technical Assessment ETA-21/0529
Performances Characteristic resistance for tension loads, displacements	

Table C3: Design method A, characteristic resistance for shear loads

Anchor size		M6	M8	M10	M12	M16	M20
Steel failure without lever arm							
Characteristic resistance	$V^0_{Rk,s}$ [kN]	4,0	7,3	11,6	16,9	31,4	49,0
Ductility factor	k_7	0,8					
Partial safety factor	γ_{Ms} [1)]	1,25					
Steel failure with lever arm							
Characteristic bending resistance	$M^0_{Rk,s}$ [Nm]	5,2	15,0	29,9	52,4	133,2	259,6
Partial safety factor	γ_{Ms} [1)]	1,2					
Concrete pry-out failure							
Factor	k_8	1,0			2,0		
Partial safety factor	γ_{Mc} [1)]	1,5	1,5	1,5	1,8	1,5	1,5
Concrete edge failure							
Effective length of anchor under shear loading	l_f [mm]	35	45	50	70	85	100
Outside diameter of anchor	d_{nom} [mm]	6	8	10	12	16	20
Partial safety factor	γ_{Mc} [1)]	1,5	1,5	1,5	1,8	1,5	1,5

[1)] in the absence of other national regulations

Table C4: Displacements under shear loading

Anchor size		M6	M8	M10	M12	M16	M20
Shear load	V [kN]	4,0	7,3	11,6	16,9	31,4	49,0
Displacement	δ_{V0} [mm]	1,57	2,23	1,90	2,11	2,51	2,21
	$\delta_{V\infty}$ [mm]	2,36	3,35	2,85	3,16	3,76	3,32

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Wedge Anchor WA	**Annex C2** of European Technical Assessment ETA-21/0529
Performances Characteristic resistance for shear loads, displacements	

Table C5: Characteristic resistance for tension loads under fire exposure

Anchor size				M6	M8	M10	M12	M16	M20
Steel failure									
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,2	0,4	0,9	1,7	3,1	4,9
	R60	$N_{Rk,s,fi}$	[kN]	0,2	0,3	0,8	1,3	2,4	3,7
	R90	$N_{Rk,s,fi}$	[kN]	0,1	0,3	0,6	1,1	2,0	3,2
	R120	$N_{Rk,s,fi}$	[kN]	0,1	0,2	0,5	0,8	1,6	2,5
Pullout failure									
Characteristic resistance	R30	$N_{Rk,p,fi}$	[kN]	1,8	3,5	4,5	7,5	10,0	12,5
	R60	$N_{Rk,p,fi}$	[kN]	1,8	3,5	4,5	7,5	10,0	12,5
	R90	$N_{Rk,p,fi}$	[kN]	1,8	3,5	4,5	7,5	10,0	12,5
	R120	$N_{Rk,p,fi}$	[kN]	1,4	2,8	3,6	6,0	8,0	10,0
Concrete cone failure									
Characteristic resistance	R30	$N_{Rk,c,fi}$	[kN]	1,8	3,4	4,5	10,4	16,8	25,3
	R60	$N_{Rk,c,fi}$	[kN]	1,8	3,4	4,5	10,4	16,8	25,3
	R90	$N_{Rk,c,fi}$	[kN]	1,8	3,4	4,5	10,4	16,8	25,3
	R120	$N_{Rk,c,fi}$	[kN]	1,5	2,7	3,6	8,3	13,5	20,2
Edge distance									
	R30	$c_{cr,N,fi}$	[mm]	$2 \cdot h_{ef}$					
	R60	$c_{cr,N,fi}$	[mm]						
	R90	$c_{cr,N,fi}$	[mm]						
	R120	$c_{cr,N,fi}$	[mm]						
In case of fire attack from more than one side minimum edge distance shall be ≥ 300 mm									
Spacing									
	R30	$s_{cr,N,fi}$	[mm]	$4 \cdot h_{ef}$					
	R60	$s_{cr,N,fi}$	[mm]						
	R90	$s_{cr,N,fi}$	[mm]						
	R120	$s_{cr,N,fi}$	[mm]						

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Wedge Anchor WA	**Annex C3** of European Technical Assessment ETA-21/0529
Performances Characteristic resistance for tension loads under fire exposure	

Table C6: Characteristic resistance for shear loads under fire exposure

Anchor size				M6	M8	M10	M12	M16	M20
Steel failure without lever arm									
Characteristic resistance	R30	$V^0_{Rk,s,fi}$	[kN]	0,2	0,4	0,9	1,7	3,1	4,9
	R60	$V^0_{Rk,s,fi}$	[kN]	0,2	0,3	0,8	1,3	2,4	3,7
	R90	$V^0_{Rk,s,fi}$	[kN]	0,1	0,3	0,6	1,1	2,0	3,2
	R120	$V^0_{Rk,s,fi}$	[kN]	0,1	0,2	0,5	0,8	1,6	2,5
Steel failure with lever arm									
Characteristic bending resistance	R30	$M^0_{Rk,s,fi}$	[Nm]	0,1	0,4	1,1	2,7	6,6	13,1
	R60	$M^0_{Rk,s,fi}$	[Nm]	0,1	0,3	1,0	2,0	5,0	9,8
	R90	$M^0_{Rk,s,fi}$	[Nm]	0,1	0,3	0,7	1,7	4,3	8,5
	R120	$M^0_{Rk,s,fi}$	[Nm]	0,1	0,2	0,6	1,3	3,3	6,5
Concrete edge failure									
	R30	$V^0_{Rk,c,fi}$	[kN]	$0,25 \cdot V^0_{Rk,c}$ [1)]					
	R60	$V^0_{Rk,c,fi}$	[kN]						
	R90	$V^0_{Rk,c,fi}$	[kN]						
	R120	$V^0_{Rk,c,fi}$	[kN]	$0,20 \cdot V^0_{Rk,c}$ [1)]					

[1)] $V^0_{Rk,c}$ - initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature

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Wedge Anchor WA	**Annex C4** of European Technical Assessment ETA-21/0529
Performances Characteristic resistance for shear loads under fire exposure	