

**DECLARATION OF PERFORMANCE**  
DEMU Bolt anchor

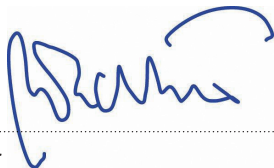
**CONF-DOP\_DEMU-BA 04/14-E**  
No. H03-13/0401

1.	Unique identification code of the product-type	<b>DEMU Bolt anchor</b>
2.	Type, batch or serial number or any other element allowing identification of the construction product as required pursuant to Article 11(4)	<b>DEMU Bolt anchor, type 1988 - See ETA-13/0401, Annex 4 and 5</b> <b>DEMU Bolt anchor, type 1985 - See ETA-13/0401, Annex 4 and 5</b>
3.	Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:	
	Generic type and use	Cast-in fixing anchor with internal threaded socket
	Product size covered	M12×55, M12×100, M12×150, M16×75, M16×140, M16×220, M20×90, M20×150, M20×180, M20×270, M24×110, M24×200, M24×320, M30×160, M30×240, M30×380, M36×300, M36×420, M42×300, M42×460
	For use in	Cracked and non-cracked concrete C20/25 to C50/60 according EN 206-1:2000-12
	Anchor material and intended use	<ul style="list-style-type: none"> <li>• Sleeve in electroplated steel for dry internal conditions, insignificant corrosion exposure</li> <li>• Sleeve in hot-dipped galvanised steel for low corrosion exposure</li> <li>• Sleeve in stainless steel (A4-50 and A4-80) for medium corrosion exposure</li> </ul>
	Loading	Static & quasi static tension and shear loads or the combination of tension and shear loads
4.	Name, registered trade name or registered trade mark and contact address of the manufacturer as required pursuant to Article 11(5)	Manufacturing plant: DEMU Metaalindustrie B.V., Atoomweg 1, 3542 Utrecht, Netherlands Holder of the approval: Halfen GmbH, Liebigstraße 14, 40764 Langenfeld, Germany
5.	Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2)	-
6.	System or systems of assessment and verification of consistency of performance of the construction product as set out in Annex V	System 1
7.	In case the declaration of performance is for a construction product covered by a harmonised standard	-
8.	In case the declaration of performance is for a construction product for which a European Technical Assessment has been issued	Deutsches Institut für Bautechnik (DIBt) issued ETA-13/0401 on the basis of CUAP 06.01/23, Version May 2010, the notified body 0620 performed under system 1 (i) Determination of the product type on the basis of type testing (including sample-testing), type calculation, tabulated values or descriptive documentation of the product; (ii) Initial inspection of the manufacturing plant and of factory production control; (iii) Continuous surveillance, assessment and evaluation of factory production control and issued certificate of conformity K78158/01

Declared performance						
	Essential characteristics	Design method	Performance	Harmonised technical specification		
9.	Characteristic resistance for tension	CEN/TS 1992-4-1 and CEN/TS 1992-4-2	ETA-13/0401, Annex 8-9	CUAP 06.01/23, Version May 2010		
	Characteristic resistance for shear		ETA-13/0401, Annex 10-11			
	Minimum spacing, minimum edge distance and minimum member thickness		ETA-13/0401, Annex 7			
	Maximum torque moment and minimum / maximum screw-in length of screws		ETA-13/0401, Annex 6			
	Displacement for serviceability limit state		ETA-13/0401, Annex 9 and 11			
	Where pursuant to Article 37 or 38 the Specific Technical Documentation has been used, the requirements with which the product complies		-			
	10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 9.					
This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.						

Langenfeld, 29.04.2014

Signed for and on behalf of the manufacturer by



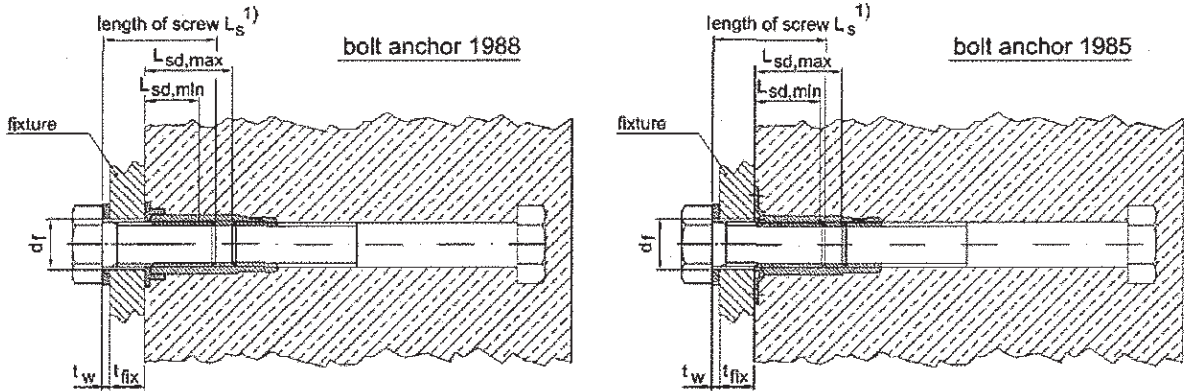
Richard Wachter  
(Managing Director)



ppa. Dr.-Ing. Dirk Albartus  
(Manager Engineering)

Direct contact between fixture and data clip / nailing plate

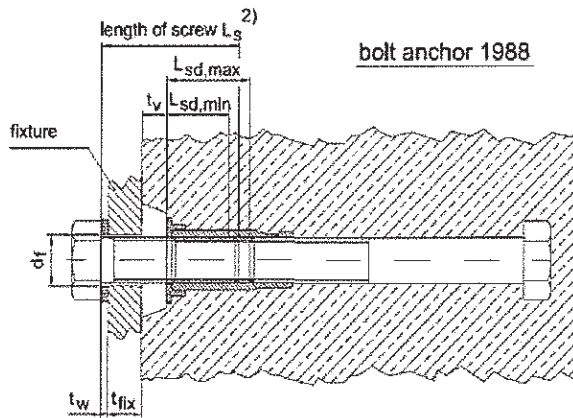
The fixture is braced to data clip / nailing plate, if necessary by suitable washer.



$$1) t_w + t_{fix} + L_{sd,min} \leq L_s \leq t_w + t_{fix} + L_{sd,max}$$

General application

The fixture is braced to concrete (anchor is embedded sunk in the concrete) resp. braced to concrete and dataclip / nailing plate (anchor is embedded flush in the concrete).



$$2) t_w + t_{fix} + t_v + L_{sd,min} \leq L_s \leq t_w + t_{fix} + t_v + L_{sd,max}$$

Table 6: Installation parameters

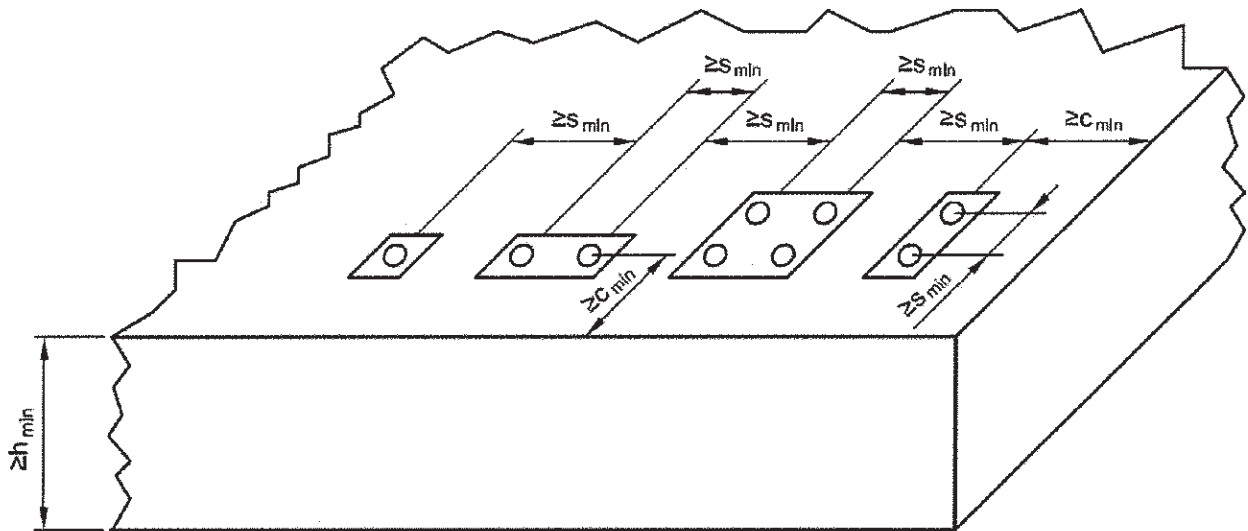
Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42
Maximum torque moment	max. $T_{inst}$	[Nm]	≤ 10	≤ 30	≤ 50	≤ 90	≤ 180	≤ 250	≤ 300
Minimum screw-in length - 1988	$L_{sd,min}$	[mm]	16.4	21.2	26.0	30.8	38.0	45.2	52.4
Minimum screw-in length - 1985	$L_{sd,min}$	[mm]	18.0	24.0	30.0	36.0			
Maximum screw-in length - 1988	$L_{sd,max}^{1)}$	[mm]	25.0	31.0	37.0	48.0	62.0	76.0	70.0
Maximum screw-in length - 1985	$L_{sd,max}$	[mm]	23.0	29.0	35.0	46.0			
Diameter of clearance hole in fixture	$d_f$	[mm]	14.0	18.0	22.0	26.0	33.0	39.0	45.0

<sup>1)</sup> For bolt anchors with sealing on bottom of sleeve (material 3 + 4) the values have to be decreased by 3.0 mm.

DEMU Bolt anchor

Positions of the fixture  
Installation parameters

Annex 6



The mentioned spacings, edge distances and member thicknesses apply also for anchors installed in the front edge.

Table 7: Min. thickness of concrete member, min. edge distances and spacing

Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42
Minimum spacing	$s_{min}$	[mm]	100	100	120	150	180	220	260
Minimum edge distance	$c_{min}$	[mm]	50	50	60	75	90	110	130
Minimum thickness of concrete member	$h_{min}$	[mm]	$h_{nom} + c_{nom}^{1)}$						
<sup>1)</sup> $c_{nom}$ acc. EN 1992-1 with $c_{nom} \geq 20$									

DEMU Bolt anchor

Arrangement of anchors and member thickness

Annex 7

Table 8a: Characteristic values for tension loads												
Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42			
Steel failure, bolt anchor (material 1 or 2) and screw (min. steel strength 4.6) made of electroplated / hot-dipped galvanised steel	$N_{Rk,s}$	[kN]	33.7	62.8	98.0	141.2	224.4	326.8	448.4 <sup>2)</sup>			
Partial safety factor	$\gamma_{Ms}$	[-]	2.00									
Steel failure, bolt anchor (material 1 or 2) and screw (min. steel strength 5.6) made of electroplated / hot-dipped galvanised steel	$N_{Rk,s}$	[kN]	42.2	78.5	122.5	176.5	280.5	408.5	560.5 <sup>2)</sup>			
Partial safety factor	$\gamma_{Ms}$	[-]	2.00									
Steel failure, bolt anchor (material 1 or 2) and screw (min. steel strength 8.8) made of electroplated / hot-dipped galvanised steel	$N_{Rk,s}$	[kN]	45.8	93.1	139.6	219.5	335.0	490.5	588.1 <sup>2)</sup>			
Characteristic resistance	$N_{Rk,s}$	[kN]	1.58									
zughöriger Teilsicherheitsbeiwert	$\gamma_{Ms}$	[-]										
Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-50) made of stainless steel	$N_{Rk,s}$	[kN]	42.2	81.0	110.3							
Characteristic resistance	$N_{Rk,s}$	[kN]	3.09									
Partial safety factor	$\gamma_{Ms}$	[-]	2.86									
Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-70, A4-80) made of stainless steel	$N_{Rk,s}$	[kN]	46.4	81.0	110.3							
Characteristic resistance	$N_{Rk,s}$	[kN]	3.09									
Partial safety factor	$\gamma_{Ms}$	[-]										
Steel failure, bolt anchor (material 4: A4-80) and screw (min. steel strength A4-80) made of stainless steel	$N_{Rk,s}$	[kN]	59.0	125.6	180.1	282.4	448.8					
Characteristic resistance	$N_{Rk,s}$	[kN]	1.60									
Partial safety factor	$\gamma_{Ms}$	[-]	1.48									
<b>Pull-out failure</b>												
Charact. resistance in cracked concrete	$N_{Rk,p}$	[kN]	25.1	44.7	69.8	100.5	168.9	240.3	341.0			
Charact. resistance in uncracked concrete	$N_{Rk,p}$	[kN]	35.2	62.5	97.7	140.7	236.4	336.4	477.4			
	$\psi_c$	[-]	1.20									
	$\psi_c$	[-]	1.48									
	$\psi_c$	[-]	1.80									
	$\psi_c$	[-]	2.00									
	$\psi_c$	[-]	2.20									
	$\psi_c$	[-]	2.40									
Partial safety factor	$\gamma_{Mip}$	[-]	1.50									

<sup>1)</sup> in absence of other national regulations; <sup>2)</sup> only available in GV (material 1 acc. to Annex 4)

DEMU Bolt anchor

Characteristic values for tension loads

Annex 8

Table 8b: Characteristic values for tension loads

Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42
Concrete cone failure									
Effective anchorage depth	$h_{ef}^1$	[mm]	M12x55: 49.0	M16x75: 67.0	M20x90: 79.0	M24x110: 97.0	M30x160: 143.0	M36x300: 279.0	M42x300: 276.0
		[mm]	M12x100: 94.0	M16x140: 132.0	M20x150: 139.0	M24x200: 187.0	M30x240: 223.0	M36x420: 399.0	M42x460: 436.0
		[mm]	M12x150: 144.0	M16x220: 212.0	M20x180: 169.0	M24x320: 307.0	M30x380: 363.0		
Factor to take into account the influence of load transfer mechanisms in cracked and uncracked concrete	$k_{cr}$	[-]	8.5						
	$k_{tcr}$	[-]	11.9						
Characteristic spacing	$s_{cr,N}$	[mm]	$3.0 \cdot h_{ef}$						
Characteristic edge distance	$c_{cr,N}$	[mm]	$1.5 \cdot h_{ef}$						
Partial safety factor	$\gamma_{Me}^2$	[-]	1.50						
<b>Splitting</b>									
Effective anchorage depth	$h_{ef}^1$	[mm]	M12x55: 49.0	M16x75: 67.0	M20x90: 79.0	M24x110: 97.0	M30x160: 143.0	M36x300: 279.0	M42x300: 276.0
		[mm]	M12x100: 94.0	M16x140: 132.0	M20x150: 139.0	M24x200: 187.0	M30x240: 223.0	M36x420: 399.0	M42x460: 436.0
		[mm]	M12x150: 144.0	M16x220: 212.0	M20x180: 169.0	M24x320: 307.0	M30x380: 363.0		
Characteristic spacing	$s_{cr,sp}$	[mm]	$4.0 \cdot h_{ef}$						
Characteristic edge distance	$c_{cr,sp}$	[mm]	$2.0 \cdot h_{ef}$						
Partial safety factor	$\gamma_{Me,sp}^2$	[-]	1.50						

<sup>1)</sup> for bolt anchor type 1985 the values have to be decreased by 2.0 mm; <sup>2)</sup> in absence of other national regulations

Table 9: Displacements under tension loads

Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42
Displacements $\delta_{Np}$ to 0.7 mm for short term loading in cracked and uncracked concrete under following tension loads <sup>1)</sup>	N	[kN]	14.0	20.0	29.0	40.0	63.0	83.0	113.0

<sup>1)</sup> for long term tension loading the displacements  $\delta_{Np}$  can be increased to 1.8 mm

DEMU Bolt anchor

Characteristic values for tension loads  
Displacements under tension loads

Annex 9

Table 10a: Characteristic values for shear loads												
Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42			
<b>Shear loads without lever arm</b>												
Group factor (CEN/TS 1992-4-2, 6.3.3.1)	$k_2$	[-]	1.0									
Steel failure, bolt anchor (material 1 or 2), and screw (min. steel strength 4.6) made of electroplated / hot-dipped galvanized steel	$V_{Rk,s}$	[kN]	16.9	31.4	49.0	70.6	112.2	163.4	224.2 <sup>2)</sup>			
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	1.67									
Steel failure, bolt anchor (material 1 or 2), and screw (min. steel strength 5.6) made of electroplated / hot-dipped galvanized steel	$V_{Rk,s}$	[kN]	21.1	39.3	61.3	88.3	140.3	204.3	280.3 <sup>2)</sup>			
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	1.67									
Steel failure, bolt anchor (material 1 or 2), and screw (min. steel strength 8.8) made of electroplated / hot-dipped galvanized steel	$V_{Rk,s}$	[kN]	22.9	46.5	69.8	109.7	167.5	245.2	294.1 <sup>2)</sup>			
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	1.32									
Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-50) made of stainless steel	$V_{Rk,s}$	[kN]	21.1	40.5	55.1							
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	2.58									
Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-70, A4-80) made of stainless steel	$V_{Rk,s}$	[kN]	23.2	40.5	55.1							
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	2.58									
Steel failure, bolt anchor (material 4: A4-80) and screw (min. steel strength A4-80) made of stainless steel	$V_{Rk,s}$	[kN]	29.5	62.8	90.0	141.2	224.4					
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	1.23									
Shear loads with lever arm: see Annex 10, Table 10b	$V_{Rk,s}$	[kN]	1.23	1.33	1.23							
Characteristic resistance	$V_{Rk,s}$	[kN]										
Partial safety factor	$\gamma_{Ms}$	[-]	1.33									
<b>Pry-out failure</b>												
Factor	$k_3$	[-]	M12x55: 1.0 M12x100: 2.0 M12x150: 2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
Partial safety factor	$\gamma_{Mop}$	[-]	1.50									
<b>Concrete edge failure (without suppl. reinforcement)</b>												
Effective length of fixing anchor (for shear loads)	$l_f$	[mm]	M12x55: 47.0 M12x100: 92.0 M12x150: 124.0	M16x75: 65.0 M16x140: 130.0 M16x220: 168.0	M20x80: 77.0 M20x150: 137.0 M20x240: 185.0	M24x110: 95.0 M24x200: 185.0 M24x320: 255.0	M30x160: 141.0 M30x240: 221.0 M30x380: 320.0	M36x300: 277.0 M36x420: 380.0 M36x460: 432.0	M42x300: 274.0 M42x460: 432.0			
Effective outside diameter	$d_{nom}$	[mm]	15.5 / 16.0 <sup>3)</sup> 21.0 / 21.3 <sup>3)</sup> 26.0 32.0 40.0 47.5 54.0									
Partial safety factor	$\gamma_{Mop}$	[-]	1.50									

<sup>1)</sup> in absence of other national regulations; <sup>2)</sup> only available in GV (material 1 acc. to Annex 4); <sup>3)</sup> higher value applies for material 3

DEMU Bolt anchor

Characteristic values for shear loads

Annex 10

Table 10b: Characteristic values for shear loads

Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42
<b>Shear loads with lever arm</b>									
<b>Steel failure, bolt anchor (material 1. or 2.) and screw (min. steel strength 4.6) made of electroplated / hot-dipped galvanised steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	52.4	13.2	259.6	449.0	899.6	1581.0	2541.1 <sup>2)</sup>
Partial safety factor	$\gamma_{Ms}$	[-]	1.67						
<b>Steel failure, bolt anchor (material 1. or 2.) and screw (min. steel strength 5.6) made of electroplated / hot-dipped galvanised steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	65.5	166.5	324.5	561.3	1124.5	1976.3	3176.3 <sup>2)</sup>
Partial safety factor	$\gamma_{Ms}$	[-]	1.67						
<b>Steel failure, bolt anchor (material 1. or 2.) and screw (min. steel strength 8.8) made of electroplated / hot-dipped galvanised steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	104.8	266.4	519.3	898.0	1799.2	3162.1	5082.1 <sup>2)</sup>
Partial safety factor	$\gamma_{Ms}$	[-]	1.25						
<b>Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-50) made of stainless steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	65.5	166.5	324.5				
Partial safety factor	$\gamma_{Ms}$	[-]	2.38						
<b>Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-70) made of stainless steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	91.7	383.7	659.4				
Partial safety factor	$\gamma_{Ms}$	[-]	2.58						
<b>Steel failure, bolt anchor (material 3: A4-50) and screw (min. steel strength A4-80) made of stainless steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	161.6	383.7	659.4				
Partial safety factor	$\gamma_{Ms}$	[-]	2.58						
<b>Steel failure, bolt anchor (material 4: A4-80) and screw (min. steel strength A4-80) made of stainless steel</b>									
Characteristic resistance	$M_{Rk,s}^D$	[Nm]	104.8	266.4	519.3	898.0	1799.2		
Partial safety factor	$\gamma_{Ms}$	[-]	1.33						

<sup>1)</sup> in absence of other national regulations; <sup>2)</sup> only available in GV (material 1 acc. to Annex 4)

Table 11: Displacements under shear loads

Thread size	d	[mm]	M12	M16	M20	M24	M30	M36	M42
<b>Displacements <math>\delta_{V,cr}</math> to 1.5 mm for short term loading in cracked and uncracked concrete under following shear loads<sup>1)</sup></b>									
	V	[kN]	13.0	23.0	36.0	52.0	82.0	120.0	160.0

<sup>1)</sup> for long term shear loading the displacements  $\delta_{V,cr}$  can be increased to 2.0 mm

DEMU Bolt anchor

Characteristic values for shear loads  
Displacements under shear loads

Annex 11