

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM Technical Product Information





We are one team. **We are Leviat.**

Leviat is the new name of CRH's construction accessories companies worldwide.

Under the Leviat brand, we have united the expertise, skills and resources of HALFEN and its sister companies to create a world leader in fixing, connecting and anchoring technology.

The products you know and trust, including the HALFEN DEHA KKT Spherical Head Lifting Anchor System, will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.

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HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEMS

Certified quality – Connected to safety.



The HALFEN DEHA Lifting anchor system meets the requirements of European Machinery Directive (MD) 2006/42/EC. The directive defines the required steel-load-bearing properties for anchor systems used for lifting.

In addition, the HALFEN DEHA spherical head lifting anchors already meet the current EN 13155 standard; "Cranes – Safety – Non-fixed load lifting attachments".

Important changes for use in the UK:

The UK is transitioning to its own UK based approval system and, as a result, from January 2023 will no longer accept CE marking. Leviat already has new UKCA marking in place and from 2023 at the latest, the UKCA mark will also be applied directly to the lifting systems, as required by the UKCA regulations. The conformity assessment processes and standards that can be used to demonstrate conformity under UKCA marking are aligned with those required for CE marking, so there is no difference in performance or testing requirements.



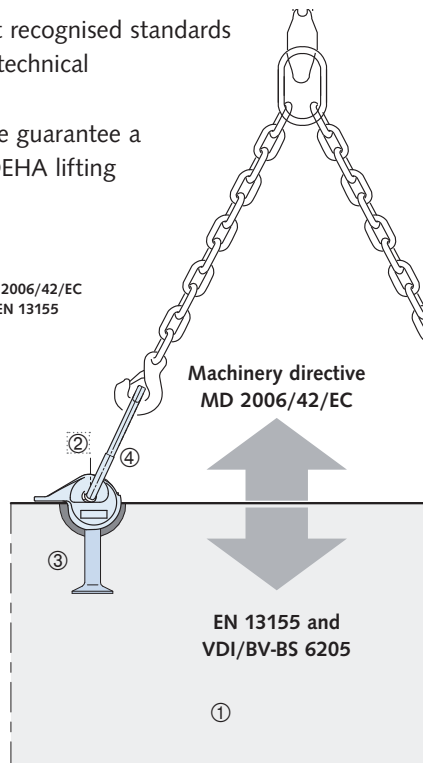
EN 13155 is the first harmonized European standard and is therefore a product standard setting out detailed requirements for specified "partly completed machinery", in this case Non-fixed load lifting attachments. The standard serves to coordinate with the Machinery Directive, and on a European technical level, now also considers the decisive composite material concrete, in precast concrete components. Previously, as a supplement to the Machinery Directive, the German guideline VDI/BV-BS 6205 regulated the resistances of embedded anchors required for the safe use of lifting anchor systems. In the process of publishing EN 13155, this guideline was also fundamentally revised. As before, it continues to provide basic and important additional information for manufacturing, design and use of lifting anchor systems. The VDI/BV-BS 6205 continues to represent recognised standards of technology in this field; applicable, valid technical specifications will continue to be observed. In combination with EN 13155, we therefore guarantee a consistent high level of safety when using DEHA lifting anchors and lifting anchor systems.

All our lifting anchor systems are CE marked. This confirms conformity with MD 2006/42/EC and EN 13155.



MD 2006/42/EC
EN 13155

This catalogue includes the installation and application instruction as defined in EN 13155. Our lifting anchors and lifting anchor systems are subject to a system of regular internal and external monitoring. We guarantee consistent high quality and maximum safety for you, your company and your employees.



- ① Precast element
- ② Lifting anchor system ③+④
- ③ Lifting anchor
- ④ Lifting link

Dependability

High ductility – high performance even in extreme situations



Specially tempered steel guarantees extensive elastic and plastic properties. The required unique steel compositions to achieve these product characteristics are specified by us. Numerous tests and many years of experience guarantee the best possible results and maximum reliability in all applications.

Toughness at subzero temperatures – Same material characteristics irrespective of weather conditions



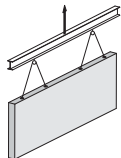
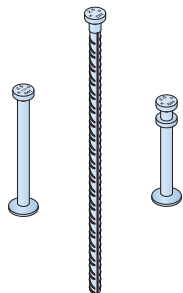
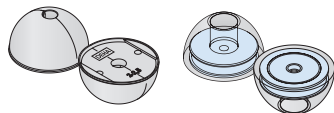
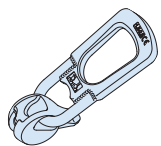

The special composition of the steel ensures constant identical characteristics (temperature independent). The steel used for our products exceeds the requirements of DIN EN 10025.

Quality control – for reliable application



By specifying products, materials and continual raw material and product monitoring, and testing by renowned independent bodies and universities, our customers can be sure that the quality and properties of all our Anchors remain consistent.

CONTENTS

Introduction	Page 4	
Quality	Page 6	
System overview	Page 10	
Product range	Page 12	
Installation and application	Page 16	
HALFEN DEHA KKT Spherical head lifting anchors	Page 24	
Spherical head anchor for beams and walls	Page 24	
Spherical head anchor for slabs	Page 30	
Spherical head rod anchor	Page 32	
Offset spherical head rod anchor and spherical head anchor	Page 34	
Spherical head eye anchor	Page 36	
Double-headed lifting anchor	Page 37	
DSM Quick fitting spherical head anchor	Page 38	
Spherical head pitching (tilting) anchor	Page 40	
Spherical head plate anchor	Page 42	
Recess formers – recess fillers and accessories	Page 43	
Installation	Page 43	
Recess formers (rubber and steel)	Page 44	
Recess fillers	Page 48	
Accessories	Page 49	
Lifting links	Page 50	
HALFEN DEHA Universal head lifting link	Page 50	
HALFEN DEHA Lifting anchor systems	Page 53	
HALFEN DEHA KKT Spherical head lifting anchor systems for use in excavation projects	Page 53	
Product Range	Page 54	
Lifting Anchors in Pipes	Page 56	
Lifting Anchors in Shafts	Page 58	
Lifting Devices	Page 64	
Positioning and Dimensioning of Lifting Anchors	Page 69	
Contact	Page 76	

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Quality



The HALFEN DEHA Spherical head lifting system guarantees simple, secure and fast connection and disconnection of lifting links and anchors.

The only quick release lifting clutch capable of capacities from load class 1,3 to a maximum load class of 45,0 t.

A wide selection of anchors in high killed steel quality "special grade"; with an alloy composition specially designed for lifting application in any environment.

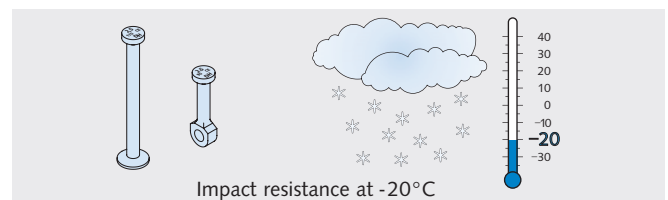
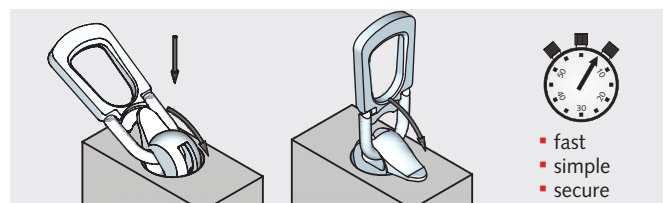
The HALFEN DEHA Spherical head lifting anchors are also available in zinc-galvanized and in stainless steel.

A large range of accessories especially for recess formers guarantees cost-effective use in all applications.

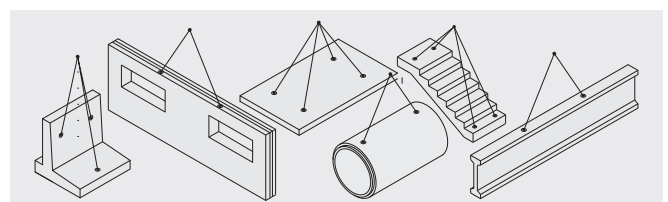
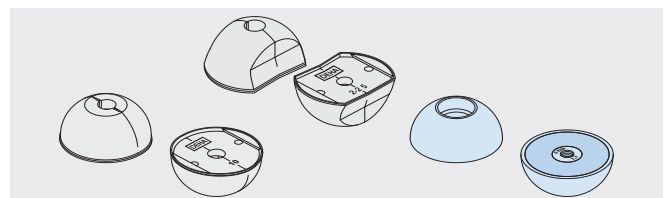
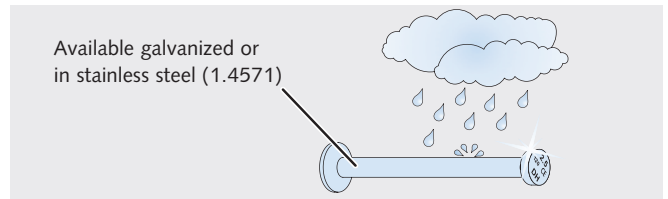
Suitable for lifting and transporting almost any shape and size of precast element in load class 1,3 up to 45,0.

The HALFEN DEHA KKT Spherical head lifting anchor system is a high quality and cost effective system for lifting all types of precast concrete elements. Application is possible for especially heavy precast elements with individual anchor loads up to load class 45,0.

Lifting and turning of heavy concrete pipes is made especially easy with the special turning and lifting link. A wide range of anchors and a selection of accessories allow almost any type of lifting application.



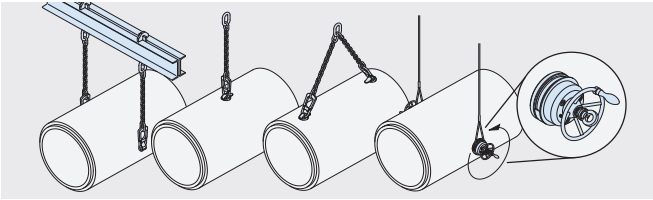
Available galvanized or in stainless steel (1.4571)



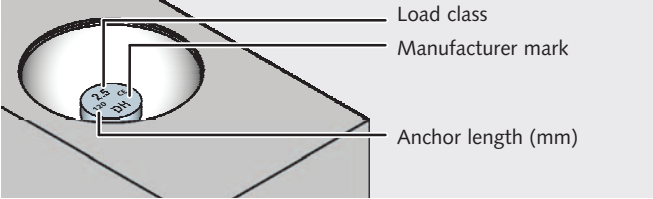
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Quality

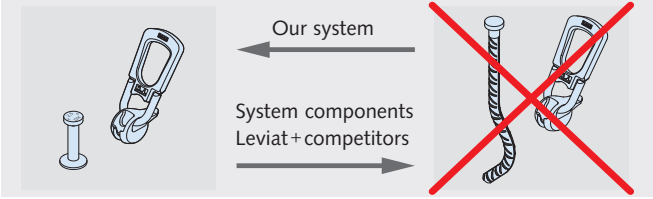
The ideal lifting anchor for installation in concrete pipes; can also be used as a turning and lifting link.



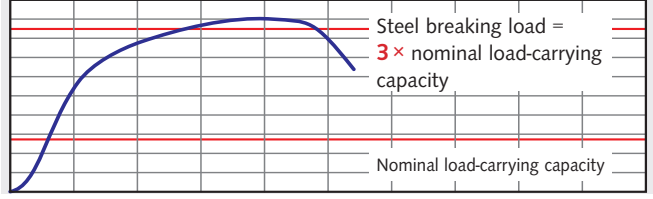
Mix-ups are avoided! All anchors are marked with the load class, the anchor length and the manufacturer mark; all systems are easily and safely identified, even after installation.



Maximal safety is only assured when using system components from only one manufacturer.



All anchors are sufficiently dimensioned to three times the safety factor for steel failure.



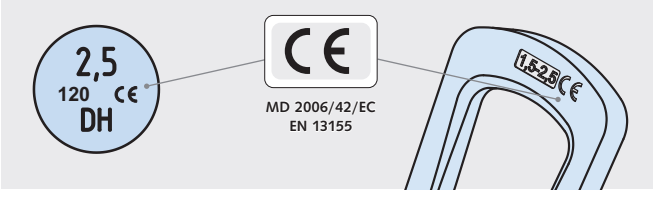
Extensively certified quality system that monitors the complete production process; starting with incoming raw materials, monitoring at every stage of production and final check of the finished product.



Extensive meticulous testing of every part of the system by independent certification bodies and universities.



All lifting links and anchors are CE marked.



Our facilities in Germany and Poland are Quality Management certified in accordance with DIN EN ISO 9001:2015, Certificate no. SZI-Q-1765-A.



Quality

Material procurement – but not at any price

All manufacturers of lifting systems endeavour to offer products at competitive prices, implementing strict cost management and effective raw material procurement to keep production costs low.

Products of this type are often manufactured in low-cost countries as finished articles. However, in applications where safety is important, a cheap product may not always be the best option and it is essential that a guarantee of product quality is also sought.

Any material defect can mask a serious fault. All material composition should be properly traced and production processes continually monitored. Low-cost suppliers may be unable to provide sufficient evidence of quality-controlled production.

Experience shows that a significant number of suppliers, many in so-called low-wage countries, are unable to provide sufficient evidence of acceptable quality-controlled production.

Unmonitored processes can lead to a liability risk!

In our opinion the only way to ensure the required product safety for our lifting anchor products is to regularly check material used and quality control production. Therefore, we source raw materials exclusively from suppliers who can verify and guarantee the stipulated performance and only supply lifting products that are either manufactured in our own production facilities or by approved suppliers.

We, as a supplier of lifting anchors made to the highest quality standards, minimize your liability risk.

The importance of quality steel for lifting anchors

Lifting anchors are used to lift and move heavy prefabricated concrete elements in precast plants and on construction sites.



It is inevitable that elements sometimes need to be manoeuvred over critical areas and facilities. The failure of an anchor here can have devastating consequences. Even with correct calculation, deviant material quality can still constitute the critical weak spot.

Anchors are subject to further stress especially from dynamic loads (shock factors). Impact strength and elongation at failure are both critical here. Selecting high quality raw material is therefore of the uppermost importance.

Experience is also essential when forging the lifting anchors; incorrect temper can change the structure in the steel, reducing its load bearing capacity. The standard of quality for HALFEN Lifting anchors is guaranteed by monitoring incoming raw materials, stringent quality controlled production and final product control; and of course the ISO 9001 certified Quality Management System.

We purchase raw materials exclusively from certified suppliers and we manufacture lifting anchors exclusively in our production facilities according to strict quality requirements.

We, as a supplier of high quality lifting anchors help you to minimize your risk.

Summary

The correct metallurgical composition of the steel is the only guarantee of permanent quality e.g. when using anchors at low temperatures and for effects of dynamic shock.

Forging demands proper equipment and a particularly high level of skill to eliminate detrimental, structural changes in steel and to temper forged components effectively.

The accuracy of the forging tools itself is a critical factor; this ensures the lifting anchors fit the lifting devices exactly, enabling the calculated loads to be lifted safely.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Quality

Quality – from start to finish

Quality and safety are the ultimate targets in the production of our Lifting anchors.

The fundamental requirements for the production of any of our products are quality and safety. Therefore all our production facilities are ISO 9001 certified.

On the one hand this involves continual inspection, machine maintenance and quality testing during the manufacturing process, and on the other hand it

involves stringent quality control procedures of incoming raw materials right through to delivery of the finished product.

Quality always comes first for our products and is guaranteed during each step of production.

The compliance of all our Lifting anchors to relevant national and European technical requirements has been tested and approved by us.

All produced lifting anchors are subject to stringent internal and

external quality checks. The extent, type and frequency of production checks carried out is defined by independent supervisory bodies.

Our Lifting anchors are made with strictly regulated raw material and originate exclusively from our own production facilities or approved suppliers. All raw materials or finished goods are procured solely from resources that meet our stringent in-house material specifications. Our suppliers must be ISO 9001 certified and must provide complete documentation on the required performance and quality. Therefore, our suppliers have to prove compliance with our material specifications with a 3.1 inspection certificate according to DIN EN 10204.

The inspection of incoming material is not limited to visual examination and dimensional checks. Every consignment is also chemically analysed to ensure the correct chemical content. Moreover, the required tensile strength values, yield stress and rupture points are tested.

Raw material is released for production only if all test results are satisfactory and comply with the provided 3.1-certification.

The anchors are continually checked during production for dimensional precision. The required frequency for measurement is set in our quality control procedures.

Each and every batch of anchors is quality checked; all anchors must prove a minimum safety factor against steel failure.

We ensure that the complete process chain, from receipt of the raw material up to final delivery of the finished products, is controllable and traceable. This ensures that all our products have the quality that we promise.



Dimensional inspection

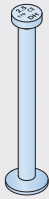




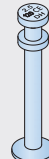

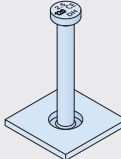

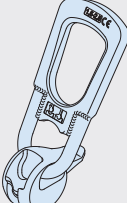
We understand the responsibility; we will continue to live up to our reputation as a supplier of high quality products.



Spectral analysis equipment

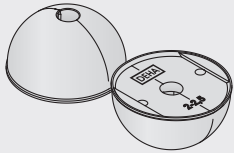
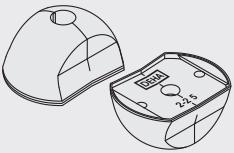
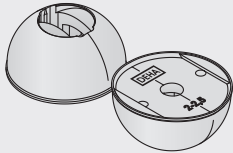
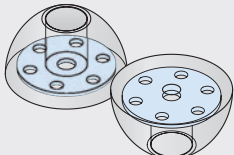
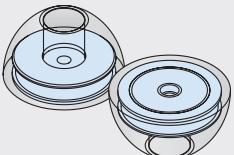
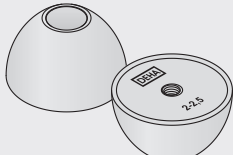
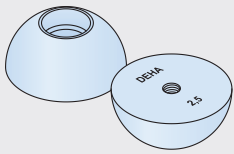
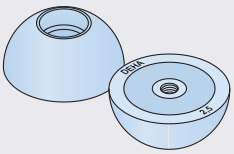
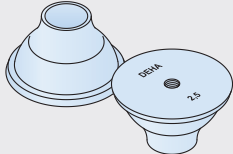
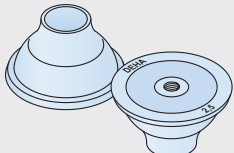
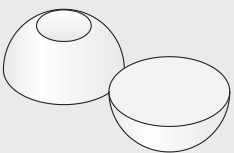
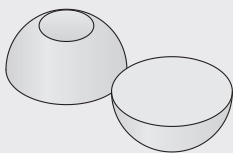
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

System Overview

HALFEN DEHA KKT Spherical head lifting anchors			
	Spherical head anchor 6000 Standard version	Spherical head rod anchor 6050 Standard version	Narrow foot spherical head anchor 6000 D
			
Applications	Columns, beams, slabs, walls, panels, pipes	Thin walls, prefabricated brick-faced walls	Prestressed beams with minimal thickness
Features	Element thickness, concrete compressive strength, reinforcement	Element thickness, concrete compressive strength, reinforcement	Element thickness, concrete compressive strength, reinforcement
Load class	1,3 – 45,0	2,5 – 15,0	10,0 – 32,0
	Offset spherical head anchor 6002	Offset spherical rod anchor 6052	DSM Quick fitting spherical head anchor 6073
			
Applications	Sandwich panels	Thin sandwich panels	Precast elements with restricted access anchor positions
Features	Element thickness, concrete compressive strength, reinforcement	Element thickness, concrete compressive strength, reinforcement	Element thickness, concrete compressive strength, reinforcement
Load class	1,3 – 20,0	2,5 – 15,0	1,3 – 2,5
	Spherical head eye anchor 6001	Spherical head plate anchor 6010	Spherical head pitching anchor 6006
			
Applications	Prestressed beams, thin-wall elements, low concrete strength	Large thin slabs with high weight, prefab garages	Thin panels that are lifted at 90° from the formwork
Features	Element thickness, concrete compressive strength, reinforcement	Element thickness, concrete compressive strength, reinforcement	Element thickness, concrete compressive strength, reinforcement
Load class	1,3 – 20,0	1,3 – 10,0	2,5 – 5,0
Lifting links			
	Universal head lifting link 6102		
			
Applications	Lifting device for all types of HALFEN DEHA KKT Spherical head lifting anchors in load classes 1,3 – 45,0		

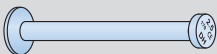
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

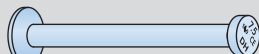
System Overview

Recess formers and recess-void fillers, accessories			
	Rubber recess former, round 6131/6132/6133	Rubber recess former, narrow 6137/6138/6145	Rubber recess former 6134, round, for spherical head pitching anchor 6006
			
Applications	For all anchors except tilt-up anchors and DSM	For all anchors except tilt-up anchors and DSM	Only for tilt-up anchors
Features	Highly durable and good resistance against formwork oil	Suitable for smaller recesses in very thin wall panels	Special adapter facilitates use of the universal head lifting link
Load class	1,3 – 45,0	1,3 – 20,0	2,5 – 5,0
	Polyurethane recess former for DSM 6127	Magnetic recess former for DSM 6126	Rubber recess former for DSM 6128
			
Applications	For quick fitting lifting anchor DSM	For quick fitting lifting anchor DSM	For quick fitting lifting anchor DSM
Features	Highly durable and form stability	Magnetic	Highly durable and good resistance against formwork oil
Load class	1,3 – 2,5	1,3 – 2,5	1,3 – 2,5
	Steel recess former, round 6150	Magnetic steel recess former, round 6150 M	Trumpet steel recess former 6152
			
	Installed with rubber grommet	Installed with rubber grommet	Installed with rubber grommet
Applications	For all anchors except tilt-up anchors and DSM	For all anchors except tilt-up anchors and DSM	For all anchors except tilt-up anchors and DSM
Features	Highly durable	Magnetic, highly durable	Highly durable
Load class	1,3 – 5,0	1,3 – 5,0	1,3 – 5,0
	Magnetic trumpet steel recess former 6152 M	Recess/void filler, Polystyrene 6015	Fibre reinforced concrete recess/void filler VKF 6172
			
	Installed with rubber grommet		
Applications	For all anchors except tilt-up anchors and DSM	Used to protect the recess from dirt, water and ice	To permanently seal recesses in concrete
Features	Magnetic, highly durable		With appropriate adhesive, watertight up to 5 bar
Load class	1,3 – 10,0	1,3 – 20,0	5,0 – 45,0

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Product Range Spherical Head Anchors

Spherical head anchor: load class 1,3 – 5,0				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.010-	Article name	Order no. 0735.-
1,3	• 6000-1,3-0040	00002	6000-1,3-0040 FV	200-00067
	• 6000-1,3-0050	00003	6000-1,3-0050 FV	200-00068
	• 6000-1,3-0055	00004	6000-1,3-0055 FV	200-00069
	• 6000-1,3-0065	00005	6000-1,3-0065 FV	200-00070
	• 6000-1,3-0085	00006	6000-1,3-0085 FV	200-00071
	• 6000-1,3-0120	00007	6000-1,3-0120 FV	200-00072
	• 6000-1,3-0240	00008	6000-1,3-0240 FV	200-00073
	2,5	• 6000-2,5-0045	00015	6000-2,5-0045 FV
• 6000-2,5-0055		00016	6000-2,5-0055 FV	200-00081
• 6000-2,5-0065		00017	6000-2,5-0065 FV	200-00082
• 6000-2,5-0075		00189	6000-2,5-0075 FV	200-00156
• 6000-2,5-0085		00018	6000-2,5-0085 FV	200-00083
• 6000-2,5-0120		00019	6000-2,5-0120 FV	200-00084
• 6000-2,5-0170		00020	6000-2,5-0170 FV	200-00085
• 6000-2,5-0210		00021	6000-2,5-0210 FV	200-00086
• 6000-2,5-0280		00022	6000-2,5-0280 FV	200-00087
5,0		• 6000-5,0-0055	00032	6000-5,0-0055 FV
	• 6000-5,0-0065	00033	6000-5,0-0065 FV	200-00096
	• 6000-5,0-0075	00034	6000-5,0-0075 FV	200-00097
	• 6000-5,0-0085	00035	6000-5,0-0085 FV	200-00098
	• 6000-5,0-0095	00036	6000-5,0-0095 FV	010-00172
	• 6000-5,0-0110	00037	6000-5,0-0110 FV	200-00167
	• 6000-5,0-0120	00038	6000-5,0-0120 FV	200-00100
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	• 6000-5,0-0480	00042	6000-5,0-0480 FV	200-00105

Spherical head anchor: load class 7,5 – 45,0				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.010-	Article name	Order no. 0735.-
7,5	• 6000-7,5-0100	00043	6000-7,5-0100 FV	200-00106
	• 6000-7,5-0120	00046	6000-7,5-0120 FV	200-00107
	• 6000-7,5-0140	00047	6000-7,5-0140 FV	200-00108
	• 6000-7,5-0165	00049	6000-7,5-0165 FV	200-00110
	• 6000-7,5-0200	00050	6000-7,5-0200 FV	200-00111
	• 6000-7,5-0300	00051	6000-7,5-0300 FV	010-00188
	• 6000-7,5-0540	00052	6000-7,5-0540 FV	200-00113
	• 6000-7,5-0680	00053	6000-7,5-0680 FV	200-00114
10,0	• 6000-10,0-0115	00054	6000-10,0-0115 FV	200-00116
	• 6000-10,0-0135	00056	6000-10,0-0135 FV	200-00117
	• 6000-10,0-0150	00057	6000-10,0-0150 FV	200-00118
	• 6000-10,0-0170	00058	6000-10,0-0170 FV	200-00119
	• 6000-10,0-0200	00059	6000-10,0-0200 FV	200-00158
	• 6000-10,0-0250	00060	6000-10,0-0250 FV	200-00120
	• 6000-10,0-0340	00061	6000-10,0-0340 FV	200-00121
	• 6000-10,0-0680	00062	6000-10,0-0680 FV	200-00123
15,0	• 6000-15,0-0140	00063	6000-15,0-0140 FV	200-00124
	• 6000-15,0-0165	00064	6000-15,0-0165 FV	200-00125
	• 6000-15,0-0200	00065	6000-15,0-0200 FV	200-00126
	• 6000-15,0-0300	00066	6000-15,0-0300 FV	200-00127
	• 6000-15,0-0400	00067	6000-15,0-0400 FV	200-00128
	• 6000-15,0-0840	00068	6000-15,0-0840 FV	200-00129
	20,0	• 6000-20,0-0180	00168	6000-20,0-0180 FV
• 6000-20,0-0200		00070	6000-20,0-0200 FV	200-00131
• 6000-20,0-0240		00071	6000-20,0-0240 FV	200-00132
• 6000-20,0-0340		00074	6000-20,0-0340 FV	200-00134
• 6000-20,0-0500		00075	6000-20,0-0500 FV	200-00135
• 6000-20,0-1000		00076	6000-20,0-1000 FV	200-00136
32,0		• 6000-32,0-0200	00077	6000-32,0-0200 FV
	• 6000-32,0-0250	00078	6000-32,0-0250 FV	200-00138
	• 6000-32,0-0280	00079	6000-32,0-0280 FV	200-00139
	• 6000-32,0-0320	00080	6000-32,0-0320 FV	200-00140
	• 6000-32,0-0700	00082	6000-32,0-0700 FV	200-00142
	• 6000-32,0-1200	00083	6000-32,0-1200 FV	200-00143
	45,0	• 6000-45,0-0500	00197	-
• 6000-45,0-1200		00159	-	-


Load class	Stainless steel A4	
	Article name	Order no.
1,3	• 6000-1,3-0085 A4	0735.010-00131
2,5	• 6000-2,5-0120 A4	0735.010-00137
5,0	• 6000-5,0-0180 A4	0735.010-00145
7,5	• 6000-7,5-0200 A4	0735.010-00147
20,0	• 6000-20,0-0180 A4	0735.010-00148


Items marked with (•) can be found in the load charts.

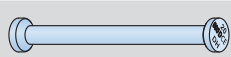
Other lengths in stainless steel A4 on request, minimum order 200 pieces. Delivery times on request.

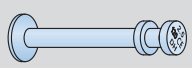
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

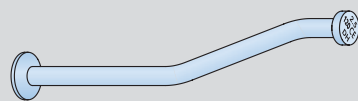
Product Range Spherical Head Anchors

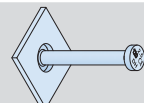
HALFEN DEHA Spherical head rod anchor				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.070-	Article name	Order no. 0735.200-
2,5	6050-2,5-0400	00002	6050-2,5-0400 FV	00030
	6050-2,5-0520	00003	6050-2,5-0520 FV	00031
5,0	6050-5,0-0580	00007	6050-5,0-0580 FV	00159
	6050-5,0-0900	00008	-	-
7,5	6050-7,5-0750	00009	6050-7,5-0750 FV	00037
	6050-7,5-1150	00010	-	-
10,0	6050-10,0-0870	00011	6050-10,0-0870 FV	00039
	6050-10,0-1300	00012	-	-
15,0	6050-15,0-1080	00013	6050-15,0-1080 FV	00041
	6050-15,0-1550	00014	6050-15,0-1550 FV	00042

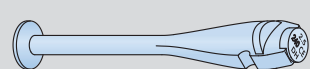
HALFEN DEHA Spherical head rod anchor, offset version				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.080-	Article name	Order no. 0735.200-
2,5	6052-2,5-0508	00002	6052-2,5-0508 FV	00024
5,0	6052-5,0-0565	00003	-	-
	6052-5,0-0885	00004	6052-5,0-0885 FV	00025
7,5	6052-7,5-1134	00006	6052-7,5-1134 FV	00026
10,0	6052-10,0-1284	00008	-	-
15,0	6052-15,0-1535	00010	6052-15,0-1535 FV	00028

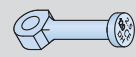
HALFEN DEHA Double-headed transport anchor				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.018-	Article name	Order no. 0735.208-
10,0	6000-10,0-0340D	00056	6000-10,0-0340D FV	00056
15,0	6000-15,0-0400D	00057	6000-15,0-0400D FV	00057
20,0	6000-20,0-0500D	00067	6000-20,0-0500D FV	00067
32,0	6000-32,0-0700D	00058	6000-32,0-0700D FV	00058

HALFEN DEHA Quick fitting spherical head anchor (DSM)				
Load class				
	Zinc galvanized			
	Article name	Order no. 0735.	Article name	Order no. 0735.
1,3	6073-1,3-0055	110-00017	6073-1,3-0065	110-00009
	6073-1,3-0085	110-00018	6073-1,3-0120	110-00010
	6073-2,5-0055	110-00019	6073-2,5-0065	110-00020
	6073-2,5-0085	110-00016	6073-2,5-0120	110-00021
2,5	6073-2,5-0175	210-00001		

HALFEN DEHA Spherical head anchor, offset version				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.030-	Article name	Order no. 0735.200-
1,3	6002-1,3-0227	00001	6002-1,3-0227 FV	00053
2,5	6002-2,5-0268	00002	6002-2,5-0268 FV	00054
5,0	6002-5,0-0466	00004	6002-5,0-0466 FV	00056
7,5	6002-7,5-0644	00005	6002-7,5-0644 FV	00057
10,0	6002-10,0-0667	00006	6002-10,0-0667 FV	00058
15,0	6002-15,0-0825	00007	6002-15,0-0825 FV	00059
20,0	6002-20,0-0986	00008	6002-20,0-0986 FV	00060

HALFEN DEHA Spherical head plate anchor				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.060-	Article name	Order no. 0735.200-
2,5	6010-2,5-0055	00001	6010-2,5-0055 FV	00043
	6010-2,5-0120	00002	6010-2,5-0120 FV	00044
5,0	6010-5,0-0065	00004	6010-5,0-0065 FV	00046
	6010-5,0-0110	00007	6010-5,0-0110 FV	00047
7,5	6010-7,5-0100	00008	6010-7,5-0110 FV	00173
10,0	6010-10,0-0115	00009	6010-10,0-0115 FV	00048
	6010-10,0-0150	00011	6010-10,0-0150 FV	00172

HALFEN DEHA Spherical head pitching (tilting) anchor				
Load class				
	Mill finish		Hot-dip galvanized	
	Article name	Order no. 0735.120-	Article name	Order no. 0735.200-
2,5	6006-2,5-0240	00001	6006-2,5-0240 FV	00151
5,0	6006-5,0-0240	00002	6006-5,0-0240 FV	00152

HALFEN DEHA Spherical head eye anchor					
Load class					
	Mill finish		Hot-dip galvanized		
	Article name	Order no. 0735.050-	Article name	Order no. 0735.200-	Order no. 0735.050-
1,3	6001-1,3-0065	00001	6001-1,3-0065 FV	00061	
2,5	6001-2,5-0090	00002	6001-2,5-0090 FV	00062	
5,0	6001-5,0-0090	00012	-	-	
	6001-5,0-0120	00003	6001-5,0-0120 FV	00063	
10,0	6001-10,0-0115	00011	-	-	
	6001-10,0-0180	00004	6001-10,0-0180 FV	00064	
20,0	6001-20,0-0250	00005	-	-	
Stainless steel A4					
Load class	Article name 6001-	Order no. 0735.050-	Load class	Article name 6001-	Order no. 0735.050-
2,5	2,5-0090 A4	00022	10,0	5,0-0180 A4	00024

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM Product Range Recess Formers

Rubber recess formers												
Load class	Hemispherical shape						Narrow					
	incl. plate with threaded rod		incl. plate with socket		without steel parts		incl. plate with threaded rod		incl. plate with socket		without steel parts	
	Article name	Order no. 0736.020-	Article name	Order no. 0736.030-	Article name	Order no. 0736.010-	Article name	Order no. 0736.070-	Article name	Order no. 0736.080-	Article name	Order no. 0736.060-
1,3	6132- 1,3	00001	6133-1,3	00001	6131-1,3	00001	6138-1,3	00001	6145-1,3	00001	6137-1,3	00001
2,5	6132- 2,5	00002	6133-2,5	00002	6131-2,5	00002	6138-2,5	00002	6145-2,5	00002	6137-2,5	00002
5,0	6132- 5,0	00004	6133-5,0	00005	6131-5,0	00004	6138-5,0	00004	6145-5,0	00004	6137-5,0	00004
7,5	6132- 7,5	00005	6133-7,5	00006	6131-7,5	00005	6138-7,5	00005	6145-7,5	00005	6137-7,5	00005
10,0	6132-10,0	00006	6133-10,0	00007	6131-10,0	00006	6138-10,0	00006	6145-10,0	00006	6137-10,0	00006
15,0	6132-15,0	00007	6133-15,0	00008	6131-15,0	00007	6138-15,0	00007	6145-15,0	00007	6137-15,0	00007
20,0	6132-20,0	00008	6133-20,0	00004	6131-20,0	00008	6138-20,0	00008	6145-20,0	00008	6137-20,0	00008
32,0	6132-32,0	00009	6133-32,0	00009	6131-32,0	00009	-	-	-	-	-	-
45,0												

Recess formers								Recess/void filler				
Load class	For spherical head pitching anchor		For quick fitting spherical head anchor DSM				Polystyrene		Fibre reinforced, light-weight concrete			
	Rubber, round		Polyurethane		Polyurethane with magnet		Rubber					
	Article name	Order no. 0736.150-	Article name	Order no. 0736.170-	Article name	Order no. 0736.190-	Article name	Order no. 0736.140-	Article name	Order no. 0737.010-	Article name	Order no. 0737.120-
1,3	-	-	6127-1,3	00001	6126-1,3	00001	6128-1,3	00002	6015-1,3	00001	-	-
2,5	6134-2,5	00001	6127-2,5	00002	6126-2,5	00002	6128-2,5	00001	6015-2,5	00002	-	-
5,0	6134-5,0	00002	6127-5,0	00003	6126-5,0	00003	-	-	6015-5,0	00003	6172-5,0	00004
7,5	-	-	-	-	-	-	-	-	6015-10,0	00004	6172-10,0	00001
10,0	-	-	-	-	-	-	-	-				
15,0	-	-	-	-	-	-	-	-	6015-20,0	00005	6172-20,0	00002
20,0	-	-	-	-	-	-	-	-				
32,0	-	-	-	-	-	-	-	-	-	-	6172-32,0	00003
45,0	-	-	-	-	-	-	-	-	-	-	-	-

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Product Range Recess formers, Lifting Links and Accessories

HALFEN DEHA Steel recess formers									Lifting Links	
Load class	Round		Trumpet shape		Round with magnet		Trumpet shaped with magnet		Universal head lifting link UKK	
	Article name	Order no. 0736.100-	Article name	Order no. 0736.120-	Article name	Order no. 0736.110-	Article name	Order no. 0736.130-	Article name	Order no. 0738.010-
1,3	6150-1,3	00001	6152-1,3	00001	6150-1,3 M	00001	6152-1,3 M	00001	6102- 1,3	00001
2,5	6150-2,5	00002	6152-2,5	00002	6150-2,5 M	00002	6152-2,5 M	00002	6102- 2,5	00002
5,0	6150-5,0	00003	6152-5,0	00003	6150-5,0 M	00003	6152-5,0 M	00003	6102- 5,0	00003
7,5	-	-	-	-	-	-	6152-10,0 M	00005	6102-10,0	00004
10,0	-	-	-	-	-	-			6102-20,0	00005
15,0	-	-	-	-	-	-	-	-	6102-32,0	00006
20,0	-	-	-	-	-	-	-	-	6102-45,0	00007
32,0	-	-	-	-	-	-	-	-		
45,0	-	-	-	-	-	-	-	-		

Accessories for HALFEN DEHA Recess former												
Load class	Rubber grommet		Double rubber grommet		Pitching plate		Plate with threaded rod and wing nut		Plate with socket		Threaded rod with wing nut	
	Article name	Order no. 0737.060-	Article name	Order no. 0737.070-	Article name	Order no. 0737.050-	Article name	Order no. 0737.020-	Article name	Order no. 0737.040-	Article name	Order no. 073.060-
1,3	6151- 1,3	00001	6151-1,3 D	00001	6060-1,3	00001	6141- 1,3	00001	6153-1,3	00001	S1-08	00001
2,5	6151- 2,5	00002	6151-2,5 D	00002	-	-	6141- 2,5	00002	6153-2,5	00002	S1-12	00002
5,0	6151- 5,0	00003	-	-	-	-	6141- 5,0	00003	6153-5,0	00003		
7,5	6151- 7,5	00004	6151-7,5 D	00004	-	-	6141-10,0	00004	6153-10,0	00004		
10,0	6151-10,0	00005	-	-	-	-	6141-20,0	00005	6153-20,0	00005	S1-16	00003
15,0	-	-	-	-	-	-	6141-45,0	00006	6153-45,0	0737,030-00006		
20,0	-	-	-	-	-	-						
32,0	-	-	-	-	-	-						
45,0	-	-	-	-	-	-						

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Installation and Application

Safety regulations

The lifting anchor system is made up of the permanently cast-in lifting anchor and the temporarily connected lifting equipment.

The basic principles for dimensioning and application of lifting anchors can be found in EN 13155. The methods in the guideline represent current technology.

The regulations require the following safety factors:

Failure safety factors	
Steel failure of anchors:	$\gamma = 3.0$
Concrete failure*:	$\gamma = 2.5$
Failure in the lifting-link:	$\gamma = 4.0$

* A safety factor of $\gamma = 2.3$ can be assumed for lifting anchors installed in a continuous supervised factory environment.



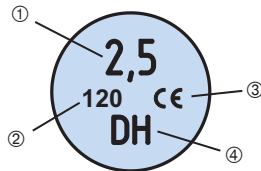
For safety reasons the installation and application instructions for HALFEN DEHA Lifting systems must always be available at the place of use.

The installation and application instructions must be readily available on site, in the precast plant or on the construction site. The plant or site manager must ensure that the operator has read and understood the installation and application instructions for this system.

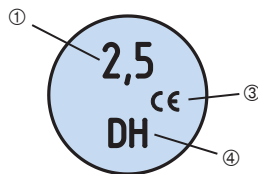
Identification

All HALFEN DEHA Lifting and hoisting equipment are clearly and visibly marked. According to EN 13155 identification marking of all lifting elements must remain clearly visible, even after installation.

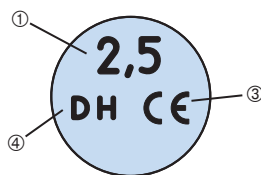
Spherical head lifting anchor 6000,
Spherical head plate anchor 6010,
Spherical head rod anchor 6050



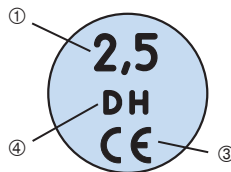
Spherical head rod-anchor 6050,
Offset spherical head rod anchor 6052,
Quick fitting spherical head anchor 6073



Spherical head eye-anchor 6001



Spherical head pitching anchor 6006



- ① Load class
- ② Lifting anchor length
- ③ CE marking
- ④ Manufacturer mark

Installation and application

The following technical specifications and requirements must be observed when installing HALFEN DEHA Spherical head lifting anchor systems.

Lifting anchors which are incorrectly installed, defective or damaged (for example corrosion damage or with visible deformities) must not be used for lifting.

Stainless steel lifting anchors

Lifting anchors may not be used repeatedly. Multiple lifting in the normal sequence of transporting and loading, through to final erection is not defined as repeated use. Lifting anchors for permanent use in crane ballast etc. must be made of stainless steel in accordance with approval regulation; approval no. EN 1993-1-4.

Quality control

All lifting anchors and systems are quality controlled in accordance with DIN EN ISO 9001.

Damaged anchors

Defective or damaged anchors (for example corrosion damage or visible deformation) must not be used for lifting.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Installation and Application

Criteria for anchor selection

Maximum load capacities, edge distances and installation values can be found in the respective tables. Irrespective of the selected anchor type (selected according to the load on the anchor) the following factors must be taken into account for calculation:

- › weight of precast element
- › number of anchors
- › anchor layout
- › number of load bearing anchors
- › spread angle in the hoist
- › anchor diagonal pull properties
- › dynamic loads
- › adhesion to the formwork

Ensure sufficient reinforcement if slabs are cast in the horizontal and subsequently lifted upright without a tilting table.

Number of anchors

The number of anchors determines the type of hoist that needs to be used. A hoist with more than two cables is statically indeterminate if the anchors are aligned along a single axis. Hoists with more than three cables are deemed statically indeterminate if measures are not taken to ensure the load is distributed amongst all anchors (for example; with a spreader beam etc.).

Installation and application

HALFEN DEHA Spherical head lifting anchor systems should only be installed when the following technical specifications and requirements have been met:

- › load capacity
- › edge spacing
- › concrete grade
- › load direction
- › additional reinforcement

Load capacity

The load capacity of the anchor depends on:

- › concrete compression strength f_{ci} at time of lift (cube-test $15 \times 15 \times 15$ cm)
- › anchorage length of the anchor
- › edge and axial anchor spacing
- › load direction
- › reinforcement layout

Calculating the tension load

As a rule the tension force Z in the anchor is calculated using the following formulae:

Load case: removing the formwork

$$F_Z = F_G \times z \times \xi / n$$

or

$$F_Z = (F_G + q_{adh} \times A_f) \times z / n$$

Load case: transport

$$F_Z = F_G \times z \times \psi_{dyn} / n$$

Abbreviations:

F_Z = tension force on the anchor [kN]

F_G = element weight [kN]
(according to DIN EN 1991-1-1: 12/2010) specific weight of $\gamma = 25 \text{ kN/m}^3$)

A_f = contact surface between the concrete and formwork [m^2]

n = number of load bearing anchors

z = spread angle factor

ξ = formwork adhesion factor

ψ_{dyn} = dynamic factor

q_{adh} = base value for formwork adhesion

F_{adh} = effective load caused by formwork adhesion [kN]

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

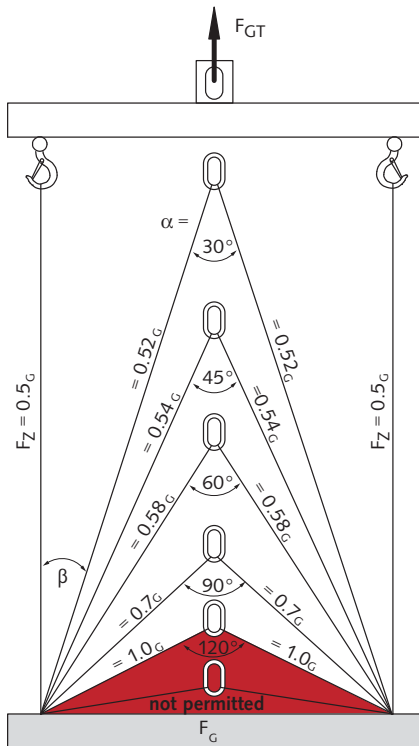
Installation and Application

Loads at the anchor – Dead weight

Element weight is defined as: Volume of the element × specific weight of the concrete

Increase factors:

- Spread angle



Spread angle factors		
Cable angle	Spread angle	Factor
β	α	z
0°	-	1.00
7.5°	15°	1.01
15°	30°	1.04
22.5°	45°	1.08
30°	60°	1.16
37.5°	75°	1.26
45°	90°	1.41
52.5°	105°	1.64
60°	120°	2.00

- Dynamic loads

The effect of dynamic loading depends mainly on the lifting equipment between the crane and the load lifting head.

Cables made of steel or synthetic fibre have a dampening effect. With increasing cable length the dampening effect is increased.

However, short chains have an unfavourable effect. The forces acting on the lifting anchors are calculated taking the shock factor ψ_{dyn} into account.

Dynamic-factors ψ_{dyn}^*	
Lifting unit	Shock factors ψ_{dyn}^*
Stationary crane, swing-boom crane, rail crane	1.3
Lifting and moving on level terrain	2.5
Lifting and moving on uneven terrain	≥ 4.0

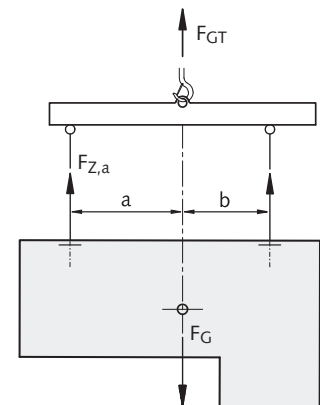
* If other values from reliable tests or through proven experience are available for ψ_{dyn} then these may be used for calculation.

For other transport and lifting situations the coefficient ψ_{dyn} is defined through reliable tests or proven experience.

- Non-symmetrical anchor layout

The load in each anchor is calculated using bar statics if the anchors are not installed symmetrically to the load's centre of gravity.

Uneven loading of the anchor caused by non-symmetrically installed anchors in respect to the load's centre of gravity:



The load's centre of gravity will always stabilise vertically under the crane hook. Load distribution in non-symmetrically installed anchors when using a spreader beam is calculated as below:

$$F_{Z,a} = F_G \times b / (a + b)$$

$$F_{Z,b} = F_G \times a / (a + b)$$

⚠ Note: To avoid precast elements hanging at a slant when being moved, the hook in the spreader beam should be directly above the centre of gravity. The lifting anchors should be installed symmetrically to the centre of gravity, if lifting elements without a spreader beam.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Installation and Application

Loads on the anchors – Adhesion

Adhesion:

- Adhesion forces

Depending on the material used for the formwork the adhesion between formwork and concrete can vary.

The following table can be used as a reference:

Adhesion to the formwork	
Lubricated steel formwork	$q_{adh} \geq 1 \text{ kN/m}^2$
Varnished timber formwork	$q_{adh} \geq 2 \text{ kN/m}^2$
Rough formwork	$q_{adh} \geq 3 \text{ kN/m}^2$

The adhesion value (F_{adh}) for the formwork is calculated using the following equation:

$$F_{adh} = q_{adh} \times A_f \text{ ①}$$

① Surface of the cast slab attached to the formwork before lifting.

- Increased adhesion

Increased adhesion must be assumed for π - panel and coffered ceiling slabs.

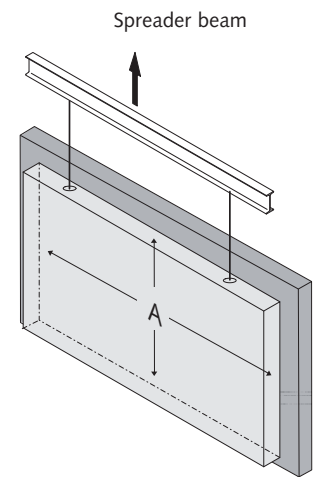
To simplify calculation, a multiple of the mass is used:

Increased adhesion to the formwork	
π - panel	$\xi = 2$
Ribbed panel	$\xi = 3$
Waffled panel	$\xi = 4$

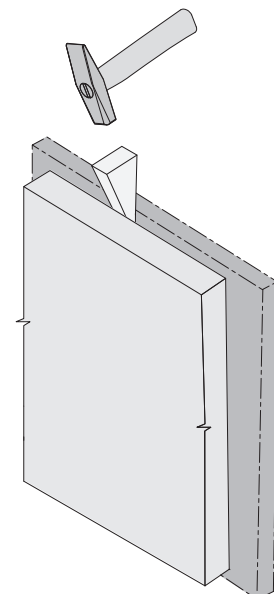
Substantial load increase can also be encountered when components are lifted parallel or near parallel to parts of the formwork. This applies to ribbed slabs and coffered ceiling slabs and can also apply to vertically cast columns and slabs.

- Striking the formwork

Adhesion to the formwork should be minimised before lifting by removing as many parts of the formwork as possible.



Use a wedge to carefully prise the formwork from the hardened concrete, if it proves difficult to remove.

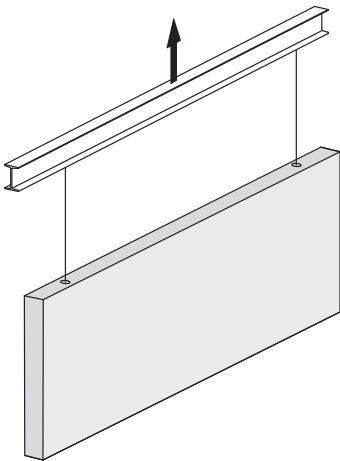


HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

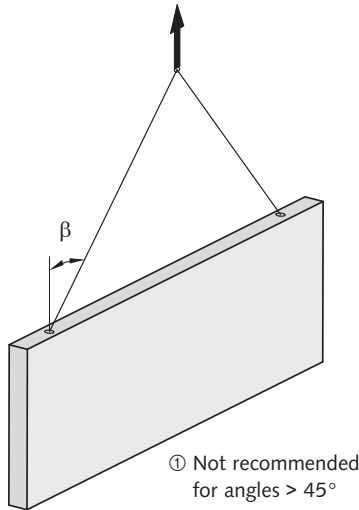
Installation and Application

Tensile loads at the anchors

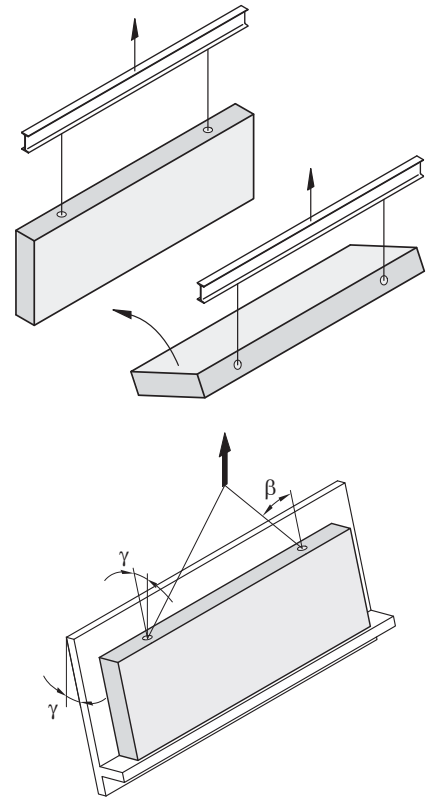
Axial pull β : 0° up to 10°



Diagonal pull lift β : 10° up to 60° ①



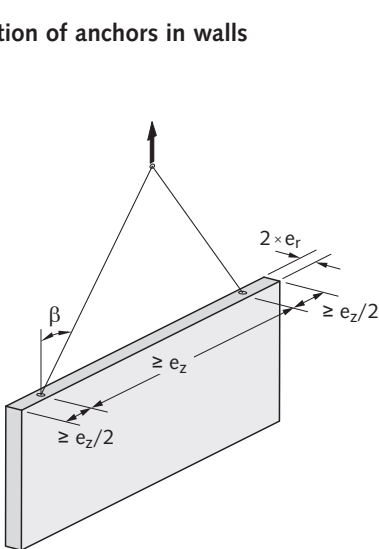
Tilting 90°



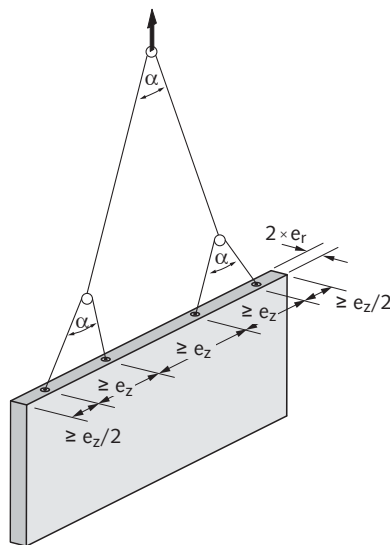
The transverse pull reinforcement can be omitted when using a tilting table and a load angle of $\gamma < 15^\circ$.

Statical systems

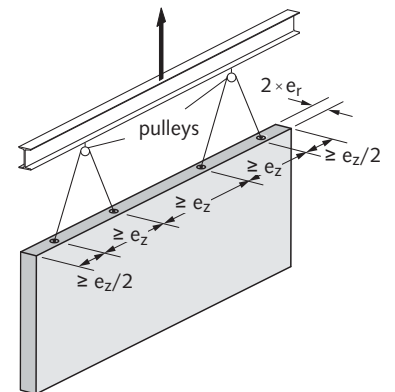
Position of anchors in walls



Assumed number of load bearing anchors: $n = 2$



Assumed number of load bearing anchors: $n = 4$



Assumed number of load bearing anchors: $n = 4$

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Installation and Application

Statical systems

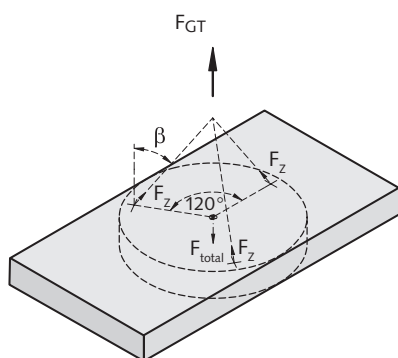
Anchor layout in slabs

In general it is impossible to calculate the precise load per anchor in a beam with more than two suspension points and in a panel with more than three suspension points; even if the anchors are arranged symmetrically to the load centre.

Due to unavoidable tolerances in suspension systems and in the position of anchors, it can never be determined whether the load is distributed equally amongst all anchors.

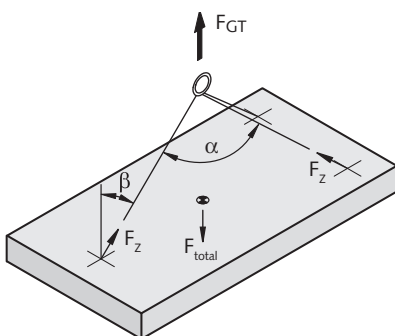
Examples

Using three anchors ensures a static determinate system.



Assumed number of load bearing anchors: $n = 3$

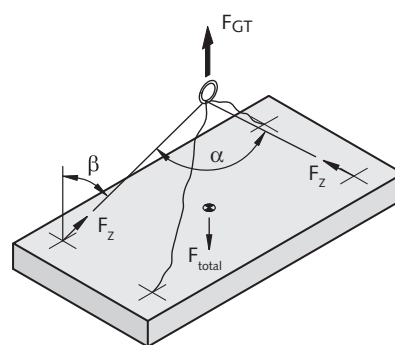
As the anchors are arranged asymmetrically, only two anchors can be assumed to be load bearing.



Assumed number of load bearing anchors: $n = 2$

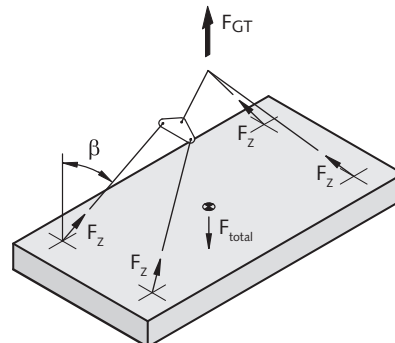
Using tolerance compensating suspension systems permit exact load distribution (e.g. articulated lifting beam combinations, multiple slings with compensating rig, etc.). This type of system should only be used by experienced specialists; also bear in mind that this system must be used both at the precast facility and on site.

With four independent cable runs or two single diagonal cables, only two anchors can be assumed to be load bearing.



Assumed number of load bearing anchors: $n = 2$

The system with compensating rig makes it possible to distribute the load evenly over 4 anchors.

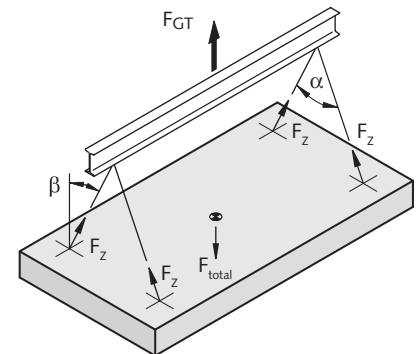


Assumed number of load bearing anchors: $n = 4$

If in doubt assume only two anchors are load bearing (BGR 500 Ch. 2.8 Point 3.5.3).

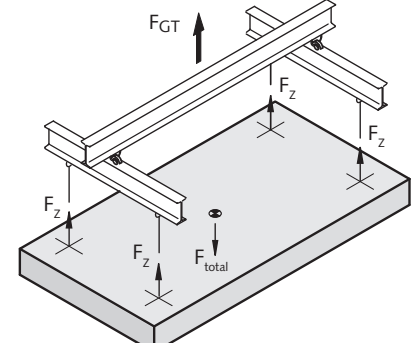
The use of two anchors is recommended for beams and upright panels, and four anchors installed symmetrically to the load centre is recommended for horizontal slabs. In both instances, it can be assumed that two anchors will be bearing equal loads.

A perfect static weight distribution is achieved by using a spreader beam and two symmetrical pairs of anchors.



Assumed number of load bearing anchors: $n = 4$

A perfect static weight distribution can be achieved using a spreader beam which avoids diagonal pull.



Assumed number of load bearing anchors: $n = 4$

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Installation and Application

Anchor installation and application – Static system

Lifting anchors are made out of killed steel with a high notch toughness, which retains its safe load capacity under shock load in temperatures as low as minus 20°C. Lifting anchors production is DIN EN ISO 9001 certified and is subjected to continuous monitoring.

The HALFEN DEHA KKT Spherical head lifting anchor is cast in with the recess former attached. After the concrete has set the recess former is removed; the lifting link can then be attached to the lifting anchor. The connection fulfils all work regulation safety requirements; the lifting anchor is in a recess, there are no protruding parts in the finished elements.

Our product range with its wide selection of lifting anchors in various load classes and lengths guarantees that for nearly every shape of reinforced concrete precast element the required technically, correct solution is available and remains cost-efficient – for conventional building projects (beams, ceiling slabs, trusses, columns and stairs); and also for utility and excavation projects (pipes and shafts).

Overview of transport anchors		
Lifting link; load class	Transport anchor; load class	Transport anchor length [mm]
1,3	1,3	40 - 240
2,5	2,5	45 - 280
5,0	5,0	75 - 480
10,0	7,5	100 - 540
	10,0	115 - 680
20,0	15,0	140 - 840
	20,0	180 - 1000
32,0	32,0	200 - 1200
45,0	45,0	500 and 1200

Advantages

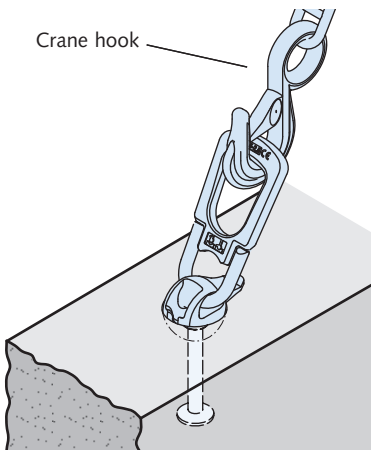
Safety is the priority when moving or lifting precast elements. The cast-in forged steel HALFEN DEHA KKT Spherical head lifting anchors include large safety factors against steel and concrete failure. The load class is clearly marked on all anchors; on some anchors the length is also marked.

There is no risk of using the wrong parts in any load class. The lifting link (the Universal head lifting link) is wear resistant even in the roughest construction situations.

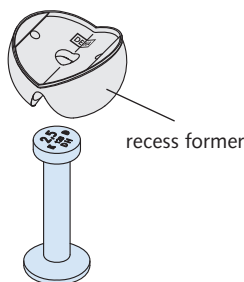
The system guarantees fastest possible anchor installation in precast elements and due to the special construction the crane hook is connected within seconds to the precast element.

Anchor installation using the system accessories is remarkably easy. Engaging and disengaging the universal lifting link – fitted to a crane cable – with the lifting anchor is easy and can be done with one hand.

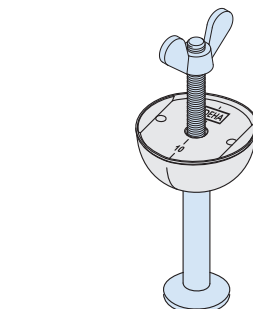
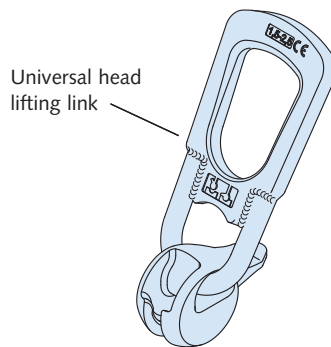
Thanks to the shape and the effective manufacturing process the HALFEN DEHA KKT Spherical head lifting anchor is reasonably priced. The extensive anchor range and the numerous system accessories allow the most economical solution for every precast element; regardless of shape.



Cast-in anchor with recess and attached lifting link



HALFEN DEHA KKT Spherical head lifting anchor



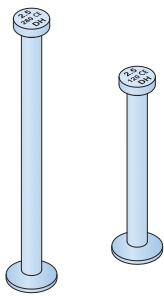
HALFEN DEHA KKT Spherical head lifting anchor with recess former

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

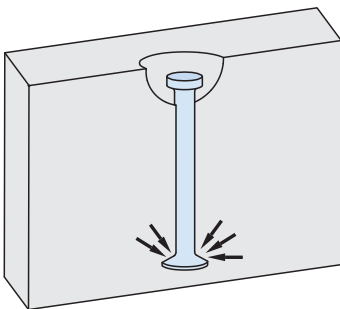
Installation and Application

Load transfer and failure behaviour

The HALFEN DEHA KKT Spherical head lifting anchors for load classes 1,3 to 45,0 are forged from rod material. Depending on the application, anchors are available in different lengths. Longer anchors are available if reduced edge spacings or low concrete strengths need to be considered.



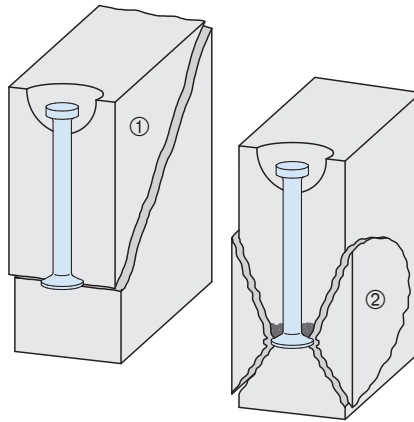
The load transfer into the concrete is via the anchor foot. This allows high possible loads with relatively short anchor lengths. In very thin elements these concentrated loads lead to lateral spalling caused by high tensile splitting.



Compared with other lifting anchor systems the symmetrical design of the anchor foot does not require specific placement when installing the anchor (rotational symmetry).

In typical wall thicknesses the concentrated load distribution as displayed by the HALFEN DEHA KKT Spherical head lifting anchor foot has advantages in comparison with gradual, supposedly smooth load distribution effecting from ribbed steel. This has been proved in numerous tests by the Institute for Concrete and Masonry Construction at the Technical University of Darmstadt (*Institut für Massivbau der TU Darmstadt*).

A typical failure pattern in tests is a cone shaped failure originating from the foot of the anchor. By using a longer anchor a larger area is used to distribute the load in the concrete.



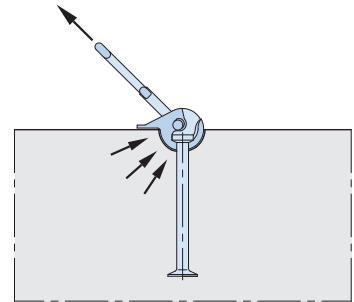
- ① Expected failure if anchor load is too high
- ② Blow-out failure only in very thin elements

The length of the spherical head lifting anchors depends on the concrete cross-section and concrete grade, and are designed for optimal load capacity.



Welding and adapting the HALFEN DEHA KKT Spherical head lifting anchors especially near the head and foot is not permitted.

The universal head lifting link rests against the concrete in diagonal pull and transfers the horizontal load factor directly into the concrete.



Consequently there is no reduction in load bearing capacity to account for diagonal loading in large surface elements. For example; as is standard for sleeve anchors. Additional reinforcement is not required.

Additional diagonal bursting reinforcement is required in thin wall elements. Details can be found in the section "HALFEN DEHA KKT Spherical head lifting anchor for beams and walls".

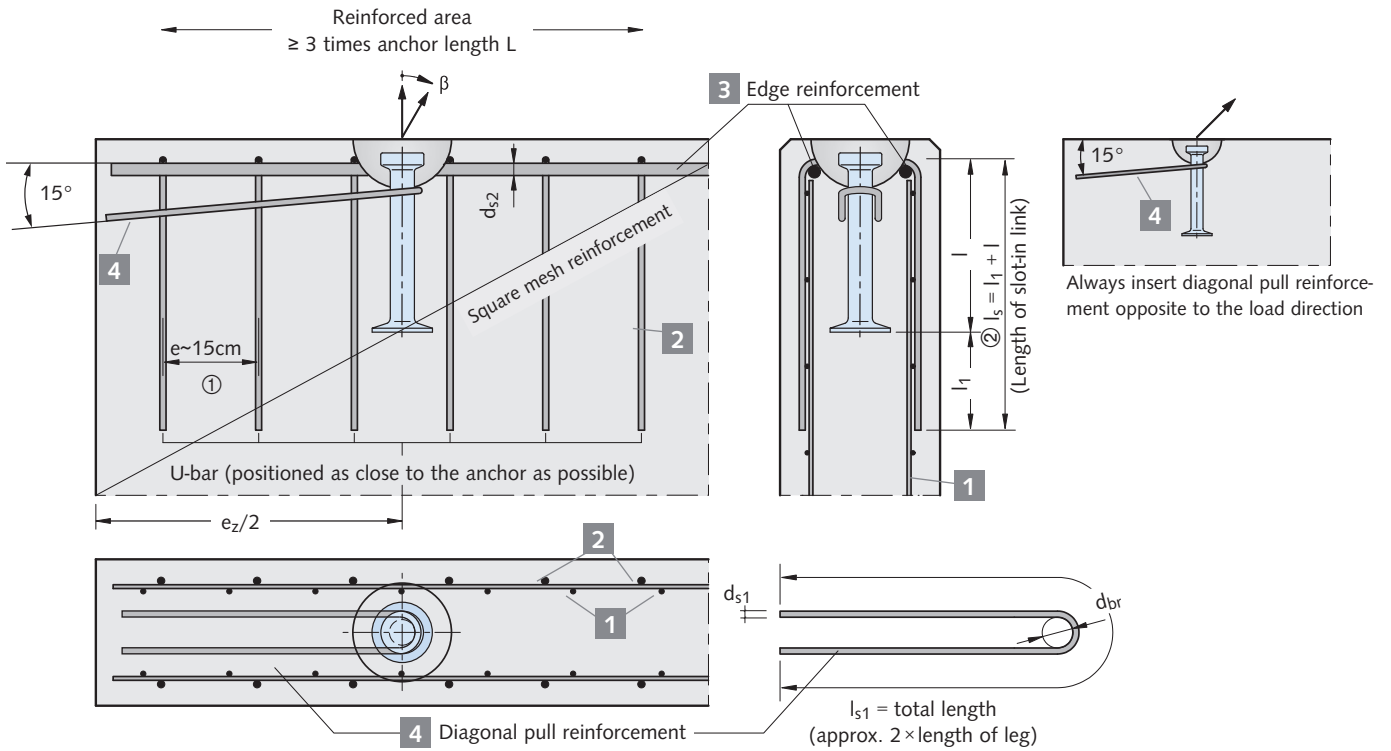
A tilting aid is required with transverse stress in thin wall elements at 90° to the slab surface. A tilting anchor can be used for load classes 2,5 and 5,0. We generally recommend using a tilting table.

Multi-layer elements can be moved using the HALFEN DEHA KKT Offset spherical head rod anchor or the offset spherical head lifting anchor. Further information can be found in the section "HALFEN DEHA KKT Spherical head lifting anchors and offset spherical head lifting anchors".

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Beams and Walls

Additional reinforcement when using the spherical head anchors in wall elements



- ① Using short anchors and a high minimum number of u-bars, spacing has to be less than 15 cm.
- ② Length of the link (l_s) = length of the anchor (l) + (l_1) from the table below.

The bend radius according to DIN 488 is not mandatory for the diagonal u-bar.

! The diagonal pull reinforcement must be placed as close as possible under the recess former and installed with full contact to the anchor.

Reinforcement in walls

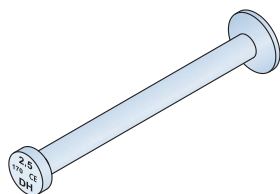
Load class	1 ①		2 ②③④						3 ③		4 ⑤⑥		
	Square mesh reinforcement	[mm ² /m]	for axial pull ≤ 30° [β]			for diagonal pull > 30° [β]			Edge reinforcement B500B		Diagonal pull stirrup B500B		
			nons	d_s [mm]	l_1 [mm]	nons	d_s [mm]	l_1 [mm]	d_{s2} [mm]	d_{s1} [mm]	d_{br1} [mm]	l_{s1} [mm]	
1,3	2 × 60	≥ 2	∅ 6	300	≥ 2	∅ 6	450	∅ 10	∅ 8	25	800		
2,5	2 × 100	≥ 2	∅ 8	610	≥ 4	∅ 8	610	∅ 10	∅ 10	25	1500		
5,0	2 × 140	≥ 2	∅ 10	720	≥ 4	∅ 10	720	∅ 12	∅ 16	35	2000		
7,5	2 × 160	≥ 4	∅ 10	720	≥ 6	∅ 10	720	∅ 12	∅ 16	40	2300		
10,0	2 × 180	≥ 4	∅ 10	720	≥ 8	∅ 10	720	∅ 12	∅ 20	50	2600		
15,0	2 × 240	≥ 4	∅ 12	800	≥ 6	∅ 12	1000	∅ 16	∅ 25	80	3000		
20,0	2 × 350	≥ 6	∅ 12	1000	≥ 10	∅ 12	1000	∅ 16	2 × ∅ 25	90	3400		
32,0	2 × 400	≥ 8	∅ 12	1000	≥ 10	∅ 14	1100	∅ 16	2 × ∅ 25	80	3000		
45,0	2 × 500	≥ 10	∅ 14	1400	≥ 12	∅ 14	1440	∅ 20	2 × ∅ 25	90	3400		

- ③ With very thin panels ($2 \times e_r \leq 70$) the square mesh can be used in one layer (example $2 \times 66 \text{ mm}^2/\text{m}$ required, lay $1 \times 132 \text{ mm}^2/\text{m}$ in the middle). The u-bars in this case can be placed diagonally, but the edge reinforcement must be placed on both sides of the anchor.
- ④ The u-bars should be evenly distributed on each side of the anchor in an area $2.5 \times$ the anchor length, the first u-bar on each side must be as close as possible to the recess former.
- ⑤ Diagonal pull reinforcement is only needed if $\beta > 30^\circ$. Diagonal pull reinforcement may not be required if the edge distance is greater (see load tables).
- ⑥ If the dimensions of the precast element restrict the length of the diagonal pull reinforcement, the end 40% of the bar can be bent to form a loop.

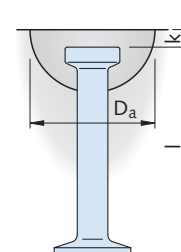
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Beams and Walls

Walls and beams – dimensions of spherical head anchors



The spherical head anchor is made of a round steel rod with a forged foot and head.



Dimensions of spherical head anchors

Load class	Article name mill finish	Order no. 0735.010-	Article name hot-dip galvanized	Order no. 0735.-	l [mm]	k [mm]	D _a [mm]
1,3	6000-1,3-0085	00006	6000-1,3-0085 FV	200-00071	85	10	60
	6000-1,3-0120	00007	6000-1,3-0120 FV	200-00072	120		
	6000-1,3-0240	00008	6000-1,3-0240 FV	200-00073	240		
2,5	6000-2,5-0120	00019	6000-2,5-0120 FV	200-00084	120	11	74
	6000-2,5-0170	00020	6000-2,5-0170 FV	200-00085	170		
	6000-2,5-0280	00022	6000-2,5-0280 FV	200-00087	280		
5,0	6000-5,0-0240	00040	6000-5,0-0240 FV	010-00174	240	15	94
	6000-5,0-0340	00041	6000-5,0-0340 FV	200-00104	340		
	6000-5,0-0480	00042	6000-5,0-0480 FV	200-00105	480		
7,5	6000-7,5-0200	00050	6000-7,5-0200 FV	200-00111	200	15	118
	6000-7,5-0300	00051	6000-7,5-0300 FV	010-00188	300		
	6000-7,5-0540	00052	6000-7,5-0540 FV	200-00113	540		
10,0	6000-10,0-0170	00058	6000-10,0-0170 FV	200-00119	170	15	118
	6000-10,0-0340	00061	6000-10,0-0340 FV	200-00121	340		
	6000-10,0-0680	00062	6000-10,0-0680 FV	200-00123	680		
15,0	6000-15,0-0300	00066	6000-15,0-0300 FV	200-00127	300	15	160
	6000-15,0-0400	00067	6000-15,0-0400 FV	200-00128	400		
	6000-15,0-0840	00068	6000-15,0-0840 FV	200-00129	840		
20,0	6000-20,0-0340	00074	6000-20,0-0340 FV	200-00134	340	15	160
	6000-20,0-0500	00075	6000-20,0-0500 FV	200-00135	500		
	6000-20,0-1000	00076	6000-20,0-1000 FV	200-00136	1000		
32,0	6000-32,0-0320	00080	6000-32,0-0320 FV	200-00140	320	23	214
	6000-32,0-0700	00082	6000-32,0-0700 FV	200-00142	700		
	6000-32,0-1200	00083	6000-32,0-1200 FV	200-00143	1200		
45,0	6000-45,0-0500	00197	not available	-	500	23	214
	6000-45,0-1200	00159	not available	-	1200		

Other anchor lengths are available on request.

The minimum edge distance ($e_z/2$) for the spherical head anchor must be observed.

Using constructive measures to lower the edge distance (reinforcement) is possible.

Present reinforcement can be applied towards the minimal required reinforcement for the lifting anchor.

The customer is responsible for further distribution of the load in the element.

Horizontally cast element must be removed from the tilting table near vertical, at an angle $\geq 75^\circ$.

Load class 1,3 can be tilting using a pitching plate.

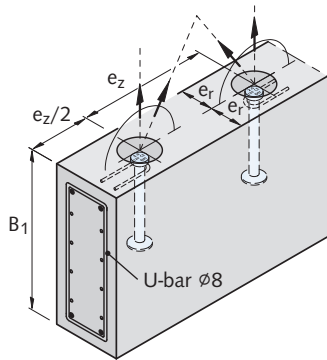
The spherical head pitching anchor can be used for load classes 2,5 and 5,0.

Reducing the reinforcement is possible if the anchor is not subjected to maximum possible load or if further constructive measures are used.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Beams and Walls

Load capacity of spherical head anchors in beams and walls without special requirements on the reinforcement



i Required reinforcement **1**.
Reinforcement **4** only with diagonal pull → see table on page 24 "reinforcement in walls".

Spherical head anchors in beams and walls with no special requirements on the reinforcement (load class 1,3 – 7,5)

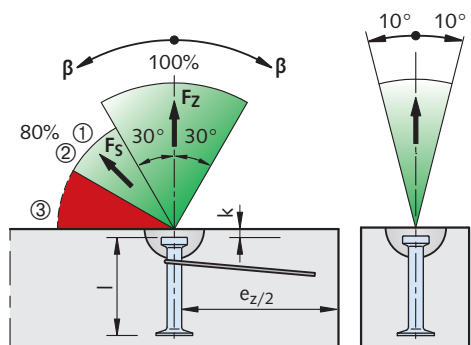
Load class	Article name	Anchor length l [mm]	Minimum height of beams B ₁ [mm]	Wall thickness 2 × e _r [mm]	Load capacity [kN] at concrete strength f _{ci} for				Axial spacing of anchors e _z [mm]	
					Axial pull up to 30° [β]	Diagonal pull up to 60° [β]	Axial pull and diagonal pull up to 60° [β] 25 N/mm ²	Axial pull and diagonal pull up to 60° [β] 35 N/mm ²		
										15 N/mm ²
1,3	6000-1,3-0085	85	180	100	12.2	9.8	13.0	13.0	270	
				120	13.0	11.2				
				140		12.5				
	6000-1,3-0120	120	250	80	13.0	10.7	13.0	13.0	375	
				100		12.7				
				120		13.0				
6000-1,3-0240	240	490	60	9.9	9.9	12.7	13.0	735		
			80	13.0	13.0	13.0				
			100							
2,5	6000-2,5-0120	120	248	120	18.1	14.5	23.3	25.0	375	
				140	20.3	16.2	25.0			
				160	22.4	17.9				
	6000-2,5-0170	170	348	100	20.7	16.5	25.0	25.0	525	
				120	23.7	19.0				
				140	25.0	21.3				
	6000-2,5-0280	280	568	80	18.4	18.4	23.8	25.0	855	
				100	23.0	23.0	25.0			
				120	25.0	25.0	25.0			
5,0	6000-5,0-0240	240	490	200	45.7	36.5	50.0	50.0	735	
				220	49.1	39.2				
				240	50.0	41.9				
	6000-5,0-0340	340	690	160	50.0	40.6	50.0	50.0	1035	
				180		44.4				
				200		48.0				
6000-5,0-0480	480	970	140	46.1	46.1	50.0	50.0	1455		
			160	50.0	50.0					
			180							
7,5	6000-7,5-0200	200	410	240	45.1	36.0	58.2	68.8	610	
				260	47.8	38.3	61.8	73.1		
				280	50.6	40.5	65.3	75.0		
	6000-7,5-0300	300	610	200	54.1	43.3	69.9	75.0	75.0	910
				220	58.1	46.5				
				240	62.2	49.7				
	6000-7,5-0540	540	1090	160	63.2	58.4	75.0	75.0	1630	
				180	71.1	63.8				
				200	75.0	69.1				

f_{ci} = concrete cube strength at time of lifting

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Beams and Walls

Load capacity of spherical head anchors in beams and walls without special requirements on the reinforcement



- ① Diagonal pull at $30^\circ \leq \beta \leq 60^\circ$ without reinforcement is only permitted for:
 $f_{ci} \geq 15 \text{ N/mm}^2$ and 3 times minimum wall thickness $2 \times e_r$
 $f_{ci} \geq 25 \text{ N/mm}^2$ and 2.5 times minimum wall thickness $2 \times e_r$
 $f_{ci} \geq 35 \text{ N/mm}^2$ and 2 times minimum wall thickness $2 \times e_r$
- ② With a concrete strength of $f_{ci} \geq 23 \text{ N/mm}^2$ is $F_S = F_Z$.
- ③ Diagonal pull with cable/chain spread $\beta > 60^\circ$ is not permitted!

Continued; spherical head anchors in beams and walls with no special requirements on the reinforcement (load class 10,0 - 45,0)

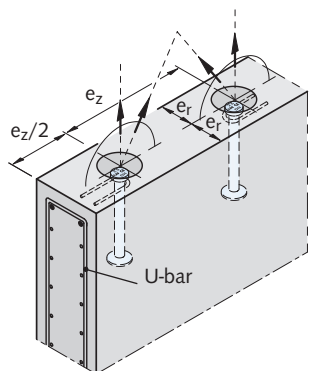
Load class	Article name	Length of anchor l [mm]	Minimum height of beams B ₁ [mm]	Wall thickness 2 × e _r [mm]	Load capacity [kN] at concrete strength f _{ci} for				Axial spacing of anchors e _z [mm]
					Axial pull up to 30° [β]		Diagonal pull up to 60° [β]		
					15 N/mm ²	15 N/mm ²	Axial pull and diagonal pull up to 60° [β] 25 N/mm ²	Axial pull and diagonal pull up to 60° [β] 35 N/mm ²	
10,0	6000-10,0-0170	170	340	300	46.4	37.2	60.0	70.9	520
				350	52.1	41.7	67.3	79.6	
				400	57.6	46.1	74.4	88.0	
	6000-10,0-0340	340	680	280	76.6	61.3	98.9	100.0	1030
				300	80.7	64.5	100.0		
				320	84.7	67.7	100.0		
	6000-10,0-0680	680	1360	160	73.7	70.0	95.2	100.0	2050
				180	83.0	76.5	100.0		
				200	92.2	82.8	100.0		
15,0	6000-15,0-0300	300	600	350	81.3	65.0	104.9	124.2	900
				400	89.5	71.9	116.0	137.2	
				500	106.2	85.0	137.1	150.0	
	6000-15,0-0400	400	800	350	102.5	82.0	132.3	150.0	1200
				400	113.2	90.6	146.2		
				450	123.7	99.0	150.0		
	6000-15,0-0840	840	1680	300	150.0	132.5	150.0	150.0	2520
				340		145.5			
				380		150.0			
20,0	6000-20,0-0340	340	670	500	116.6	93.3	150.6	178.2	1010
				750	158.1	126.5	200.0	200.0	
				1000	196.2	156.9	200.0	200.0	
	6000-20,0-0500	500	990	400	134.8	107.9	174.1	200.0	1490
				500	159.4	127.5	200.0		
				600	182.8	146.2	200.0		
	6000-20,0-1000	1000	1990	240	154.9	128.6	199.9	200.0	3000
				300	190.0	152.0	200.0		
				330	200.0	163.2	200.0		
32,0	6000-32,0-0320	320	630	600	126.7	101.3	163.5	193.5	940
				800	157.2	125.7	202.9	240.1	
				1200	177.2	141.8	228.8	270.7	
	6000-32,0-0700	700	1390	500	208.6	166.9	269.4	318.7	2080
				600	239.2	191.4	308.8	320.0	
				750	282.8	226.2	320.0	320.0	
	6000-32,0-1200	1200	2390	400	272.5	218.0	320.0	320.0	3580
				450	297.7	238.2			
				500	320.0	257.8			
45,0	6000-45,0-0500	500	990	800	226.0	180.8	291.8	345.3	1480
				1000	267.2	213.8	345.0	408.2	
				1500	358.4	286.7	450.0	450.0	
	6000-45,0-1200	1200	2400	500	322.2	257.8	416.0	450.0	3580
				600	369.4	295.5	450.0		
				750	436.7	349.4	450.0		

f_{ci} = concrete cube strength at time of lifting

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Beams and Walls

Load capacity of spherical head anchors in walls with stressed reinforcement



i Required reinforcement **1 - 3**.
Reinforcement **4** only with diagonal pull → see table on page 24 "reinforcement in walls".

Load capacity of spherical head anchors in walls with stressed reinforcement (load class 1,3 - 7,5)

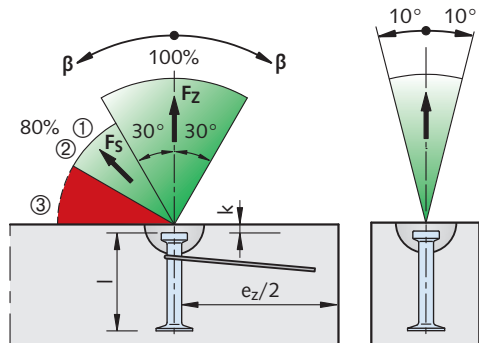
Load class	Article name	Anchor length l [mm]	Wall thickness $2 \times e_r$ [mm]	Load capacity [kN] at concrete strength f_{ci} for				Axial spacing of anchors e_z [mm]
				Axial pull up to 30° [β]	Diagonal pull up to 60° [β]	Axial pull and diagonal pull up to 60° [β]	Axial pull and diagonal pull up to 60° [β]	
				15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²	
1,3	6000-1,3-0120	120	60	9.9	9.9	12.8	13.0	375
			80	13.0	13.0	13.0		
			100	13.0	13.0	13.0		
	6000-1,3-0240	240	60	9.9	9.9	12.8	13.0	735
			80	13.0	13.0	13.0		
			100	13.0	13.0	13.0		
2,5	6000-2,5-0170	170	80	18.4	18.4	23.8	25.0	525
			100	23.0	23.0	25.0		
			120	25.0	25.0	25.0		
	6000-2,5-0280	280	80	18.4	18.4	23.8	25.0	855
			100	23.0	23.0	25.0		
			120	25.0	25.0	25.0		
5,0	6000-5,0-0240	240	160		45.2		50.0	735
			180	50.0	48.0	50.0		
			200	50.0	50.0	50.0		
	6000-5,0-0340	340	120	39.5	39.5		50.0	1035
			140	46.1	46.1	50.0		
			160	50.0	50.0	50.0		
	6000-5,0-0480	480	100	32.9	32.9	42.5	50.0	1455
			120	39.5	39.5	50.0		
			140	46.1	46.1	50.0		
7,5	6000-7,5-0300	300	160	63.2	56.6		75.0	910
			180	71.1	60.0	75.0		
			200	75.0	63.2	75.0		
	6000-7,5-0540	540	140	55.3	55.3	71.4	75.0	1630
			160	63.2	63.2	75.0		
			180	71.1	71.1	75.0		

Min. wall height = Lifting anchor length l + k (see page 29) + required concrete cover below foot
 f_{ci} = concrete cube strength at time of lifting

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Beams and Walls

Load capacity of spherical head anchors in walls with stressed reinforcement



- ① Diagonal pull at $30^\circ \leq \beta \leq 60^\circ$ without reinforcement is only permitted for:
 $f_{ci} \geq 15 \text{ N/mm}^2$ and 3 times minimum wall thickness $2 \times e_r$
 $f_{ci} \geq 25 \text{ N/mm}^2$ and 2.5 times minimum wall thickness $2 \times e_r$
 $f_{ci} \geq 35 \text{ N/mm}^2$ and 2 times minimum wall thickness $2 \times e_r$
- ② With a concrete strength of $f_{ci} \geq 23 \text{ N/mm}^2$ is $F_s = F_z$
- ③ Diagonal pull with cables/chains spread of $\beta > 60^\circ$ is not permitted!

continued; load capacity of spherical head anchors in walls with stressed reinforcement (load class 10,0 – 45,0)

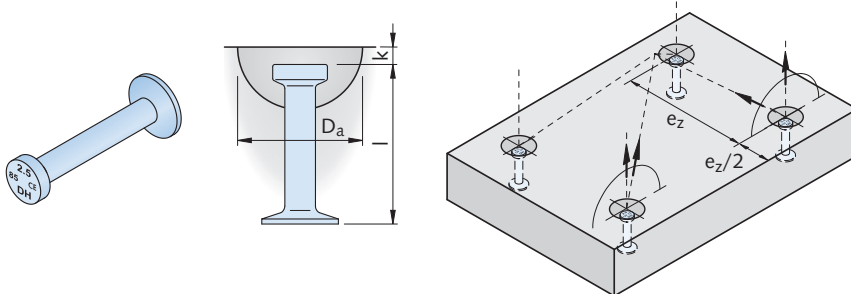
Load class	Article name	Anchor length l [mm]	Wall thickness $2 \times e_r$ [mm]	Load capacity [kN] at concrete strength f_{ci} for				Axial spacing of anchors e_z [mm]	
				Axial pull up to 30° [β] 15 N/mm ²	Diagonal pull up to 60° [β] 15 N/mm ²	Axial pull and diagonal pull up to 60° [β] 25 N/mm ²	Axial pull and diagonal pull up to 60° [β] 35 N/mm ²		
10,0	6000-10,0-0340	340	200	89.5	71.6	100.0	100.0	1030	
			240	98.0	78.4				
			280	100.0	84.7				
	6000-10,0-0680	680	160	73.7	73.7	95.2	100.0		2050
			180	83.0	83.0	100.0			
			200	92.2	92.2	100.0			
15,0	6000-15,0-0400	400	300	128.9	103.1	150.0	150.0	1200	
			400	148.9	119.1				
			500	150.0	133.1				
	6000-15,0-0840	840	200	111.9	111.9	144.5	150.0		2520
			220	123.1	123.1	150.0			
			240	134.2	134.2	150.0			
20,0	6000-20,0-0500	500	300	162.1	129.7	200.0	200.0	1490	
			400	175.1	140.1				
			500	187.2	149.7				
			600	200.0	183.4				
	6000-20,0-1000	1000	240	154.9	154.9	199.9	200.0		3000
			260	167.8	167.8	200.0			
280			180.7	180.7	200.0				
32,0	6000-32,0-0700	700	450	282.6	226.1	320.0	320.0	2080	
			550	312.5	250.0				
			650	320.0	271.8				
	6000-32,0-1200	1200	300	266.7	266.7	320.0	320.0		3580
			350	311.1	311.1				
			400	320.0	320.0				
45,0	6000-45,0-1200	1200	400	355.5	355.5	450.0	450.0	3580	
			500	444.4	421.6				
			600	450.0	450.0				

Minimum wall height = Lifting anchor length l + k + required concrete cover below foot
 f_{ci} = concrete cube strength at time of lifting

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Slabs

Dimensions of spherical head anchors for slabs



i Required reinforcement **1**.
Reinforcement **4** only with diagonal pull → see table on page 24 "reinforcement in walls".

Dimensions of spherical head anchors

Load class	Article name mill finish	Order no. 0735.010-	Article name hot-dip galvanized	Order no. 0735.-	l [mm]	k [mm]	Da [mm]
1,3	6000-1,3-0040	00002	6000-1,3-0040 FV	200-00067	40	10	60
	6000-1,3-0050	00003	6000-1,3-0050 FV	200-00068	50		
	6000-1,3-0065	00005	6000-1,3-0065 FV	200-00070	65		
	6000-1,3-0085	00006	6000-1,3-0085 FV	200-00071	85		
	6000-1,3-0120	00007	6000-1,3-0120 FV	200-00072	120		
2,5	6000-2,5-0055	00016	6000-2,5-0055 FV	200-00081	55	11	74
	6000-2,5-0065	00017	6000-2,5-0065 FV	200-00082	65		
	6000-2,5-0085	00018	6000-2,5-0085 FV	200-00083	85		
	6000-2,5-0120	00019	6000-2,5-0120 FV	200-00084	120		
	6000-2,5-0170	00020	6000-2,5-0170 FV	200-00085	170		
5,0	6000-5,0-0085	00035	6000-5,0-0085 FV	200-00098	85	15	94
	6000-5,0-0095	00036	6000-5,0-0095 FV	010-00172	95		
	6000-5,0-0120	00038	6000-5,0-0120 FV	200-00100	120		
	6000-5,0-0180	00039	6000-5,0-0180 FV	200-00101	180		
	6000-5,0-0240	00040	6000-5,0-0240 FV	010-00174	240		
7,5	6000-7,5-0100	00043	6000-7,5-0100 FV	200-00106	100	15	118
	6000-7,5-0120	00046	6000-7,5-0120 FV	200-00107	120		
	6000-7,5-0140	00047	6000-7,5-0140 FV	200-00108	140		
	6000-7,5-0165	00049	6000-7,5-0165 FV	200-00110	165		
	6000-7,5-0200	00050	6000-7,5-0200 FV	200-00111	200		
	6000-7,5-0300	00051	6000-7,5-0300 FV	010-00188	300		
10,0	6000-10,0-0115	00054	6000-10,0-0115 FV	200-00116	115	15	118
	6000-10,0-0135	00056	6000-10,0-0135 FV	200-00117	135		
	6000-10,0-0150	00057	6000-10,0-0150 FV	200-00118	150		
	6000-10,0-0170	00058	6000-10,0-0170 FV	200-00119	170		
	6000-10,0-0200	00059	6000-10,0-0200 FV	200-00158	200		
	6000-10,0-0250	00060	6000-10,0-0250 FV	200-00120	250		
15,0	6000-15,0-0140	00063	6000-15,0-0140 FV	200-00124	140	15	160
	6000-15,0-0165	00064	6000-15,0-0165 FV	200-00125	165		
	6000-15,0-0200	00065	6000-15,0-0200 FV	200-00126	200		
	6000-15,0-0300	00066	6000-15,0-0300 FV	200-00127	300		
	6000-15,0-0400	00067	6000-15,0-0400 FV	200-00128	400		
20,0	6000-20,0-0200	00070	6000-20,0-0200 FV	200-00131	200	15	160
	6000-20,0-0240	00071	6000-20,0-0240 FV	200-00132	240		
	-	-	6000-20,0-0250 FV	200-00133	250		
	6000-20,0-0340	00074	6000-20,0-0340 FV	200-00134	340		
	6000-20,0-0500	00075	6000-20,0-0500 FV	200-00135	500		
32,0	6000-32,0-0200	00077	6000-32,0-0200 FV	200-00137	200	23	214
	6000-32,0-0250	00078	6000-32,0-0250 FV	200-00138	250		
	6000-32,0-0280	00079	6000-32,0-0280 FV	200-00139	280		
	6000-32,0-0320	00080	6000-32,0-0320 FV	200-00140	320		

Other lengths and stainless steel anchors on request

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchors for Slabs

Load capacity of spherical head anchors in slabs for any direction of pull												
Load class	Article name	Load capacity [kN] for minimal slab thickness					Load capacity [kN] for normal slab thickness					Axial anchor spacing e_z [mm]
		Slab thickness B_2 [mm]	Concrete strength f_{ci} for				Slab thickness B_3 [mm]	Concrete strength f_{ci} for				
			Axial pull up to $\beta = 30^\circ$ 15 N/mm ²	Diagonal pull up to $\beta = 60^\circ$ 15 N/mm ²	Axial pull and diagonal pull up to $\beta = 60^\circ$ 25 N/mm ² 35 N/mm ²			Axial pull up to $\beta = 30^\circ$ 15 N/mm ²	Diagonal pull up to $\beta = 60^\circ$ 15 N/mm ²	Axial pull and diagonal pull up to $\beta = 60^\circ$ 25 N/mm ² 35 N/mm ²		
1,3	6000-1,3-0040	75	3.0	2.4	3.9	4.6	90	3.8	3.0	4.9	5.7	180
	6000-1,3-0050	85	10.1	10.1	13.0	13.0	110	12.0	10.4			220
	6000-1,3-0065	100	13.0	11.1	13.0	13.0	140					260
	6000-1,3-0085	120	13.0	13.0	13.0	13.0	180	13.0	13.0	13.0	13.0	315
	6000-1,3-0120	155	13.0	13.0	13.0	13.0	250					375
2,5	6000-2,5-0055	90	4.7	3.8	6.1	7.2	120	5.6	4.5	7.2	8.6	240
	6000-2,5-0065	100	13.8	13.8	17.8	21.1	140	17.0	17.0	22.0		285
	6000-2,5-0085	120	19.5	19.5	25.0	25.0	180		20.1			325
	6000-2,5-0120	155	25.0	22.8	25.0	25.0	250	25.0	25.0	25.0	25.0	410
	6000-2,5-0170	205	25.0	25.0	25.0	25.0	350		25.0			520
5,0	6000-5,0-0085	125	20.1	20.1	26.0	30.8	180	25.7	25.7	33.1	39.2	360
	6000-5,0-0095	135	23.3	23.3	30.0	35.5	200	30.2	30.2	39.0	46.2	400
	6000-5,0-0120	160	31.7	31.7	41.0	48.5	250	42.7	40.0			475
	6000-5,0-0180	220	50.0	44.4	50.0	50.0	370			50.0	50.0	630
	6000-5,0-0240	280	50.0	50.0	50.0	50.0	490					735
7,5	6000-7,5-0100	140	24.5	24.5	31.6	37.4	205	31.6	31.6	40.9	48.3	415
	6000-7,5-0120	160	31.3	31.3	40.4	47.8	245	41.7	41.7	53.8	63.6	490
	6000-7,5-0140	180	38.6	38.6	49.9	59.0	285	52.6	52.6	67.9	75.0	550
	6000-7,5-0165	205	48.6	48.6	62.7	74.2	335	67.6	60.0			620
	6000-7,5-0200	240	63.8	60.0	75.0	75.0	405		72.4	75.0	75.0	710
6000-7,5-0300	340	75.0	75.0	75.0	75.0	605	75.0	75.0			910	
10,0	6000-10,0-0115	155	29.1	29.1	37.5	44.4	230	38.0	38.0	49.1	58.1	470
	6000-10,0-0135	175	36.3	36.3	46.8	55.4	270	48.7	48.7	62.9	74.4	550
	6000-10,0-0150	190	42.0	42.0	54.3	64.2	300	57.3	57.3	73.9	87.5	590
	6000-10,0-0170	210	50.2	50.2	64.8	76.6	340	69.4	69.4	89.6	100.0	655
	6000-10,0-0200	240	63.2	63.2	81.7	96.6	400	89.2	80.0			730
6000-10,0-0250	290	87.3	80.0	100.0	100.0	500			100.0	100.0	890	
6000-10,0-0340	380	100.0	100.0	100.0	100.0	680	100.0	100.0			1025	
15,0	6000-15,0-0140	180	37.5	37.5	48.4	57.2	275	49.8	49.8	64.3	76.1	560
	6000-15,0-0165	205	47.3	47.3	61.1	72.3	325	64.5	64.5	83.2	98.5	640
	6000-15,0-0200	240	62.4	62.4	80.6	95.3	395	87.2	87.2	112.5	133.1	730
	6000-15,0-0300	340	113.0	113.0	145.8	150.0	595		131.3	150.0	150.0	1020
	6000-15,0-0400	440	150.0	138.6	150.0	150.0	795	150.0	150.0	150.0	150.0	1195
20,0	6000-20,0-0200	240	61.6	61.6	79.5	94.1	390	85.1	85.1	109.9	130.0	780
	6000-20,0-0240	280	80.5	80.5	103.9	122.9	470	113.7	113.7	146.7	173.6	900
	6000-20,0-0340	380	134.9	134.9	174.2	200.0	670	196.9	160.0			1175
	6000-20,0-0500	540	200.0	192.6	200.0	200.0	990	200.0	200.0	200.0	200.0	1485
32,0	6000-32,0-0200	248	62.4	62.4	80.5	95.3	385	83.8	83.8	108.1	127.9	800
	6000-32,0-0250	298	86.4	86.4	111.5	132.0	485	119.7	119.7	154.5	182.9	1000
	6000-32,0-0280	328	102.1	102.1	131.8	155.9	545	143.4	143.4	185.1	219.0	1065
6000-32,0-0320	368	124.4	124.4	160.6	190.0	625	177.2	177.2	228.8	270.7	1120	

- required reinforcement: minimal structural reinforcement
- for B_2 the minimum concrete cover for the anchor foot is 25 mm
- the slab thickness is = 2 times anchoring depth for B_3
- slabs thinner than B_2 are only possible with suitable corrosion protection

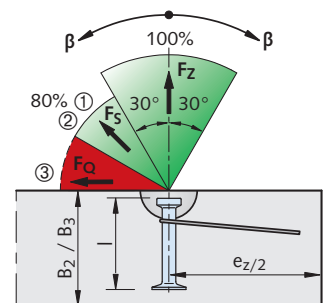
- linear interpolation is permitted between B_2 and B_3
- see ① for diagonal pull loads
- f_{ci} = concrete cube strength at time of lifting

- ① Diagonal pull of $30^\circ \leq \beta \leq 60^\circ$ without diagonal pull reinforcement is only permitted for:
- $f_{ci} \geq 15 \text{ N/mm}^2 + 3 \text{ times min. edge distance } e_z / 2$
 - $f_{ci} \geq 25 \text{ N/mm}^2 + 2,5 \text{ times min. edge distance } e_z / 2$
 - $f_{ci} \geq 35 \text{ N/mm}^2 + 2 \text{ times min. edge distance } e_z / 2$
- ② With a concrete strength $f_{ci} \geq 23 \text{ N/mm}^2$ is $F_Q = F_S = F_Z$
- ③ Diagonal pull with cables/chains spread of $\beta > 60^\circ$ is not permitted!

i Required reinforcement **4** only with diagonal pull → see table on page 24 "reinforcement in walls".

! The slab must be designed for the load-case "lifting"

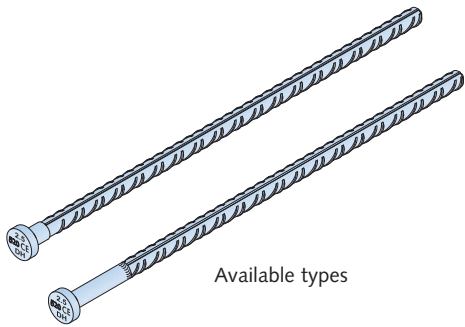
Load diagram applies to concrete strength $\leq 23 \text{ N/mm}^2$



HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

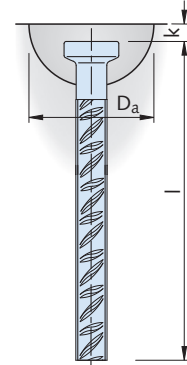
HALFEN DEHA KKT Spherical Head Rod Anchor

Dimensions of spherical head rod anchors



Available types

The spherical head rod anchor is designed for use in very thin walls, in reinforced beams or prefabricated garages. The anchor may also be used to lift prefabricated masonry panels.



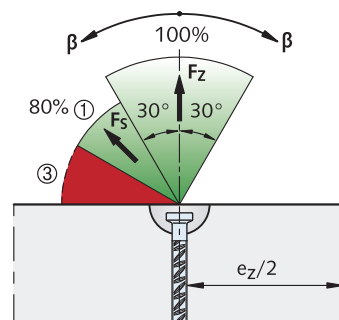
Dimensions of spherical head rod anchors

Load class	Article name mill finish	Order no. 0735.070-	Article name hot-dip galvanized	Order no. 0735.070-	l [mm]	k [mm]	D _a [mm]
2,5	6050-2,5-0400	00002	6050-2,5-0400 FV	00030	400	11	74
	6050-2,5-0520	00003	6050-2,5-0520 FV	00031	520		
5,0	6050-5,0-0580	00007	6050-5,0-0580 FV	00159	580	15	94
	6050-5,0-0900	00008	-	-	900		
7,5	6050-7,5-0750	00009	6050-7,5-0750 FV	00037	750	15	118
	6050-7,5-1150	00010	-	-	1150		
10,0	6050-10,0-0870	00011	6050-10,0-0870 FV	00039	870	15	118
	6050-10,0-1300	00012	-	-	1300		
15,0	6050-15,0-1080	00013	6050-15,0-1080 FV	00041	1080	15	160
	6050-15,0-1550	00014	6050-15,0-1550 FV	00042	1550		

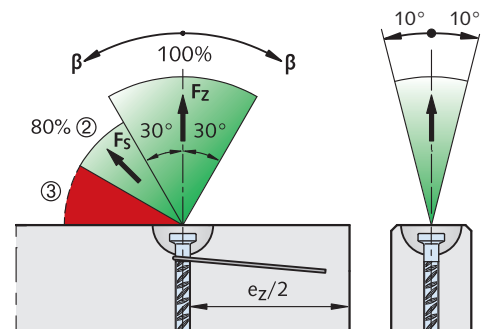
① Other lengths on request

A concentrated load in the foot of the anchor in very thin precast elements is not desirable. It is more efficient to transfer the anchor loads only through the rebar ribs into the precast concrete.

Without diagonal pull reinforcement



With diagonal pull reinforcement



- ① Diagonal pull with $30^\circ < \beta \leq 60^\circ$ without reinforcement is only permitted for:
 - $f_{ci} \geq 15 \text{ N/mm}^2 + 3\text{-times minimum element thickness } 2 \times e_r$
 - $f_{ci} \geq 25 \text{ N/mm}^2 + 2.5\text{-times minimum element thickness } 2 \times e_r$
 - $f_{ci} \geq 35 \text{ N/mm}^2 + 2\text{-times minimum element thickness } 2 \times e_r$
- ② For concrete strength $f_{ci} \geq 23 \text{ N/mm}^2$ is $F_S = F_Z$
- ③ Diagonal pull with cables/chain spread $\beta > 60^\circ$ is not permitted.

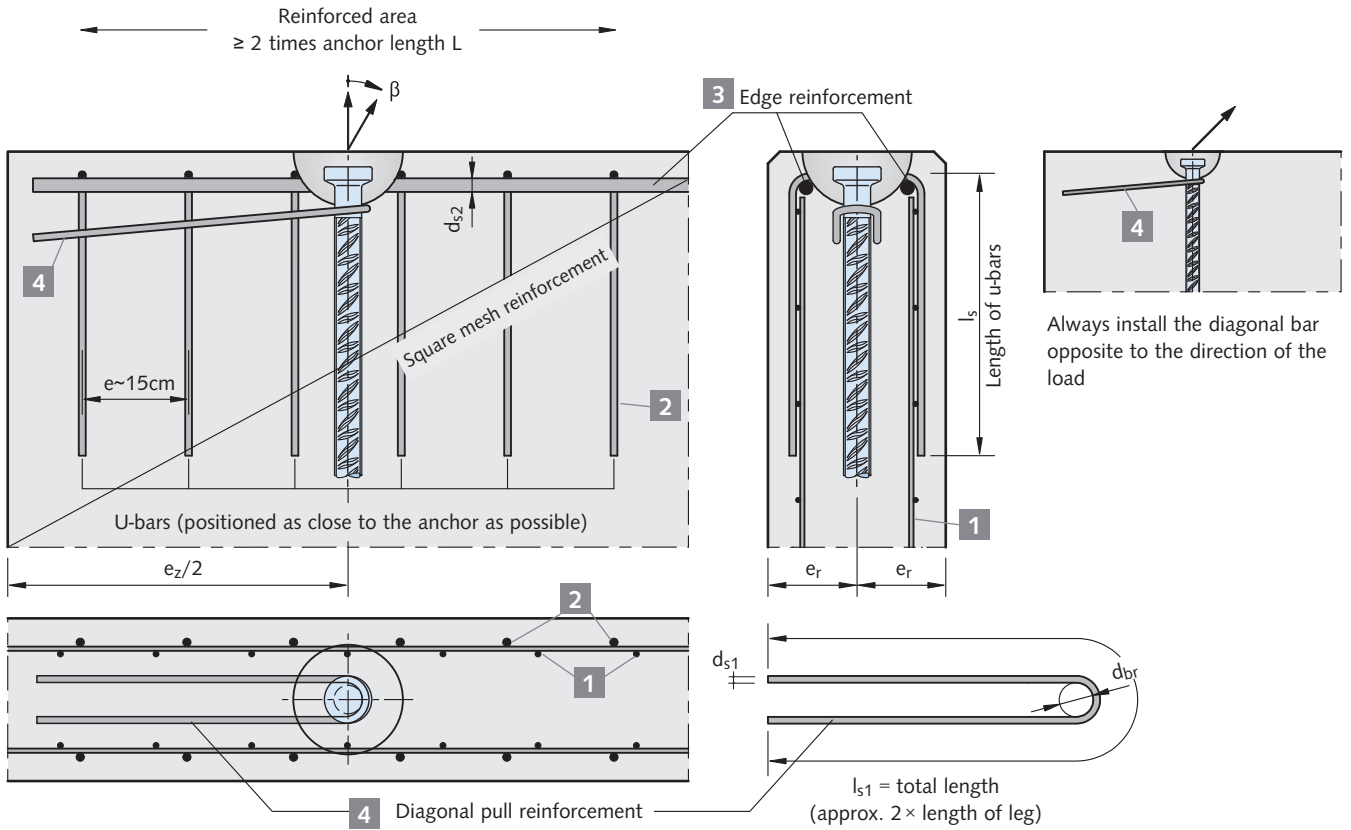


The diagonal reinforcement has to be placed as close as possible under the recess former and must be installed with full contact to the anchor.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Rod Anchor

Load capacity and reinforcement of spherical head rod anchors



Reinforcement and load capacity for the spherical head anchor

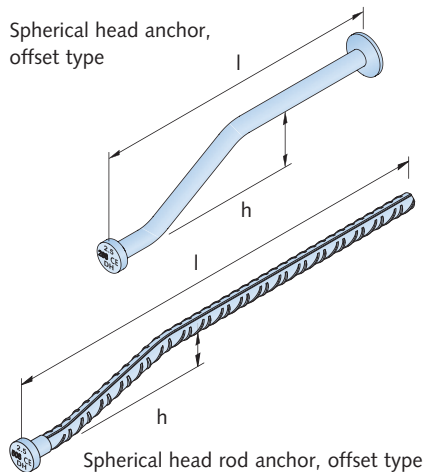
Load class	Article-name	Element thickness	Anchors axial spacing	1		2 U-bar stirrups		Axial pull $< 30^\circ [\beta]$				Diagonal pull $< 60^\circ [\beta]$			
				Square mesh reinforcement	①	3	Allowable load capacity [kN] at concrete strength f_{ci}		4			Allowable load capacity [kN] at concrete strength f_{ci}			
							Edge reinforcement	15	25	Diagonal reinforcement	15	25			
2,5	6050-2,5-0400	80	360	2×100	90	-	-	25,0	25,0	10	600	24	20,0	25,0	
		100						25,0	25,0				20,0	25,0	
	120	25,0						25,0	20,0				25,0		
	6050-2,5-0520	100						-	-				25,0	25,0	20,0
5,0	6050-5,0-0580	100	540	2×140	120	$2 \varnothing 12$	-	40,9	50,0	12	1000	34	32,7	50,0	
		120						44,2	50,0				35,4	50,0	
		140						47,1	50,0				37,7	50,0	
		160						50,0	50,0				40,0	50,0	
	6050-5,0-0900	120						-	-				50,0	50,0	40,0
7,5	6050-7,5-0750	120	610	2×160	140	$2 \varnothing 12$	-	66,1	75,0	20	1000	41	52,9	75,0	
		140						70,1	75,0				56,1	75,0	
		160						75,0	75,0				60,0	75,0	
	6050-7,5-1150	140						-	-				75,0	75,0	60,0
10,0	6050-10,0-0870	160	720	2×180	160	$2 \varnothing 14$	-	100,0	100,0	20	1100	49	80,0	100,0	
	6050-10,0-1300	140						-	-				100,0	100,0	80,0
15,0	6050-15,0-1080	200	900	2×240	200	$2 \varnothing 14$	-	150,0	150,0	25	1100	70	120,0	150,0	
	6050-15,0-1550	160						-	-				150,0	150,0	120,0

$\beta \leq 30^\circ$ is preferred
 ① No u-bars required if element thickness is $2 \times e_r > a_1$ f_{ci} = concrete cube strength at time of lifting

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

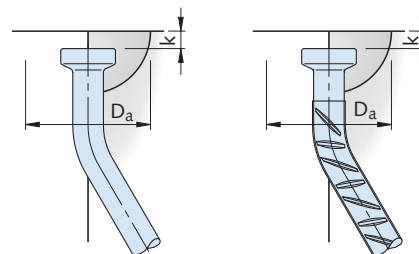
HALFEN KKT Spherical Head Anchor and Spherical Head Rod Anchor, Offset Type

Dimensions of spherical head anchor and spherical head rod anchor, offset type



The special shape of this anchor allows its use in multi-layer elements. In special cases, the offset spherical head anchor can be used in thin shell elements, for example in precast garages or sandwich panels.

The bend in the body is the only difference between the offset spherical head anchor and the standard spherical head anchor. After installation the anchor head is near the centre axis of gravity.



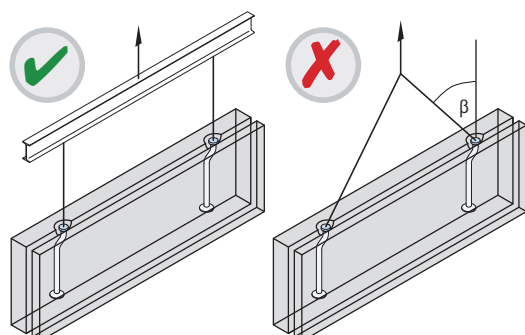
To ensure safe load anchorage the anchor foot is located in the centre of the support layer. This allows near vertical lifting and installation.

Dimensions of spherical head anchor, offset type

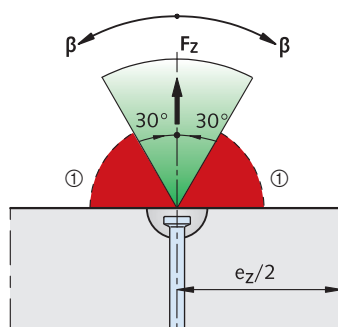
Load class	Article name mill finish	Order no. 0735.030-	Article name hot-dip galvanized	Order no. 0735.200-	l [mm]	h [mm]	k [mm]	D _a [mm]
1,3	6002-1,3-0227	00001	6002-1,3-0227 FV	00053	227	50	10	60
2,5	6002-2,5-0268	00002	6002-2,5-0268 FV	00054	268	50	11	74
5,0	6002-5,0-0466	00004	6002-5,0-0466 FV	00056	466	60	15	94
7,5	6002-7,5-0644	00005	6002-7,5-0644 FV	00057	664	70	15	118
10,0	6002-10,0-0667	00006	6002-10,0-0667 FV	00058	667	70	15	118
15,0	6002-15,0-0825	00007	6002-15,0-0825 FV	00059	825	70	15	160
20,0	6002-20,0-0986	00008	6002-20,0-0986 FV	00060	986	90	15	160

Dimensions of spherical head rod anchor, offset type

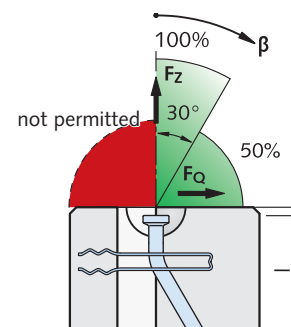
Load class	Article name mill finish	Order no. 0735.080-	Article name hot-dip galvanized	Order no. 0735.200-	l [mm]	h [mm]	k [mm]	D _a [mm]
2,5	6052-2,5-0508	00002	6052-2,5-0508 FV	00024	508	50	11	74
5,0	6052-5,0-0885	00004	6052-5,0-0885 FV	00025	885	60	15	94
7,5	6052-7,5-1134	00006	6052-7,5-1134 FV	00026	1134	70	15	118
10,0	6052-10,0-1284	00008	-	-	1284	70	15	118
15,0	6052-15,0-1535	00010	6052-15,0-1535 FV	00028	1535	70	15	160



Not advisable (diagonal pull with $\beta > 30^\circ$ is not permitted)



① Lifting loads resulting from cable spread within this (angle) range is not permitted.



A tilt-up table is recommended if casting the sandwich panel element using the face-up method.

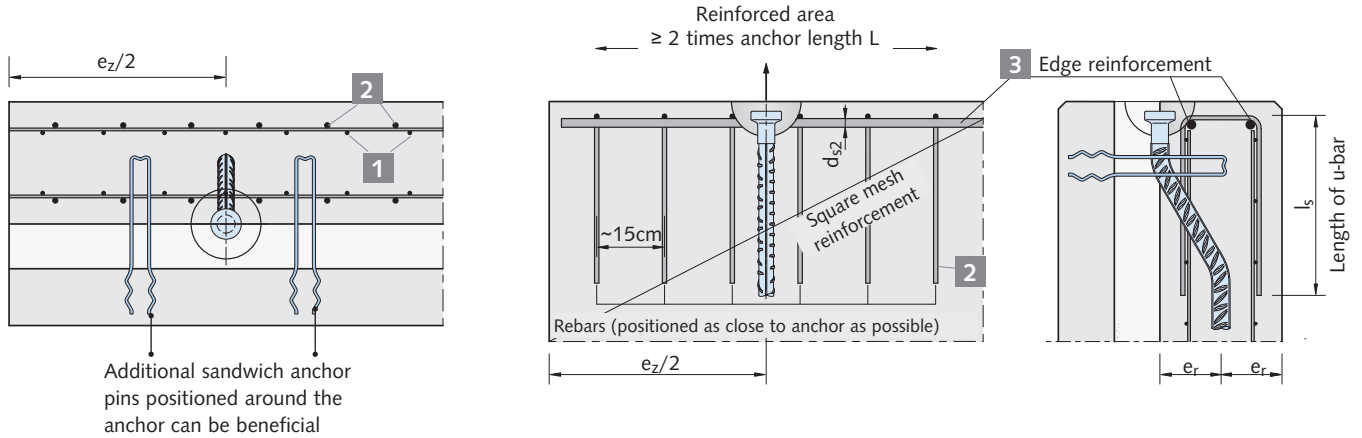
Using a spreader beam can help to prevent concrete spalling when precast elements are being lifted and transported or during installation.

Using a short chain hoist may cause the spherical head to bend, resulting in the insulation being damaged and the concrete spalling.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Anchor and Spherical Head Rod Anchor, Offset Type

Load capacity and reinforcement of spherical head anchor and spherical head rod anchor, offset type



Reinforcement and load capacity of spherical head anchor; offset type with axial pull $< \beta = 30^\circ$

Load class	Article name	Element thickness $2 \times e_r$ [mm]	Axial spacing e_z ① [mm]	1 Square mesh reinforcement [mm ² /m]	2 U-rebar		3 Edge reinforcement d_{s2} [mm]	Load capacity [kN] for			
					d_s [mm]	l_s [mm]		Axial pull		Transverse pull (pitching)	
								concrete strength f_{ci}			
1,3	6002-1,3-0227	80	260	2×60	$\phi 6$	400	$2 \times \phi 10$	13.0	13.0	6.5	6.5
2,5	6002-2,5-0268	100	370	2×100	$\phi 8$	500	$2 \times \phi 10$	15.9	20.3	9.5	12.2
		140						20.5	25.0	12.2	12.5
5,0	6002-5,0-0466	100	820	2×140	$\phi 8$	750	$2 \times \phi 10$	35.2	45.4	21.2	25.0
		140						45.3	50.0	25.0	
7,5	6002-7,5-0664	120	1210	2×160	$\phi 10$	1000	$2 \times \phi 12$	50.9	65.8	30.5	37.5
		150						60.2	75.0	36.0	
10,0	6002-10,0-0667	140	1220	2×180	$\phi 10$	1000	$2 \times \phi 12$	66.5	86.0	39.9	50.0
		180						80.3	100.0	48.2	
15,0	6002-15,0-0825	180	1500	2×240	$\phi 10$	1000	$2 \times \phi 16$	103.2	133.0	61.9	75.0
		220						120.0	150.0	72.0	
20,0	6002-20,0-0986	200	2030	2×350	$\phi 12$	1100	$2 \times \phi 16$	135.1	174.4	81.1	100.0
		250						159.7	200.0	95.9	

① $e_z = \text{min. axial spacing of anchors}$; $e_z/2 = \text{min. edge distance}$ $f_{ci} = \text{concrete cube strength at time of lifting}$

Reinforcement and load capacity of spherical head rod anchor, offset type with axial pull $< \beta = 30^\circ$

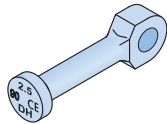
Load class	Article name	Element thickness $2 \times e_r$ [mm]	Axial spacing e_z ① [mm]	1 Square mesh reinforcement [mm ² /m]	2 U-rebar		3 Edge reinforcement d_{s2} [mm]	Load capacity [kN] for			
					d_s [mm]	l_s [mm]		Axial pull		Transverse pull (pitching)	
								concrete strength f_{ci}			
2,5	6052-2,5-0508	80	360	2×100	$\phi 8$	700	$2 \times \phi 10$	25.0	25.0	12.5	12.5
5,0	6052-5,0-0885	100	540	2×140	$\phi 8$	820	$2 \times \phi 12$	40.9	50.0	24.5	25.0
		120						44.2	50.0	25.0	
		140						47.1	50.0	25.0	
7,5	6052-7,5-1134	160	610	2×160	$\phi 10$	950	$2 \times \phi 12$	50.0	50.0	25.0	37.5
		120						66.1	75.0	37.5	
		140						70.1	75.0	37.5	
10,0	6052-10,0-1284	140	720	2×180	$\phi 10$	1000	$2 \times \phi 12$	75.0	75.0	37.5	37.5
15,0	6052-15,0-1535	160	900	2×240	$\phi 12$	1200	$2 \times \phi 16$	100.0	100.0	50.0	50.0
								150.0	150.0	75.0	75.0

① $e_z = \text{min. axial spacing of anchors}$; $e_z/2 = \text{min. edge distance}$ $f_{ci} = \text{concrete cube strength at time of lifting}$

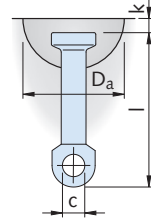
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Eye Anchor

Dimensions, load capacity and reinforcement for the spherical head eye anchor



In some applications the spherical head eye anchor is used with additional reinforcement to increase the load capacity of the anchor foot, mainly in thin reinforced concrete elements, e.g. in thin truss elements and beams.



Dimensions of spherical head eye anchor								
Load class	Article name mill finish	Order no. 0735.050-	Article name hot-dip galvanized	Order no. 0735.200-	l [mm]	c [mm]	k [mm]	D _a [mm]
1,3	6001-1,3-0065	00001	6001-1,3-0065 FV	00061	65	10	10	60
2,5	6001-2,5-0090	00002	6001-2,5-0090 FV	00062	90	14	11	74
5,0	6001-5,0-0120	00003	6001-5,0-0120 FV	00063	120	20	15	94
10,0	6001-10,0-0180	00004	6001-10,0-0180 FV	00064	180	25	15	118
20,0	6001-20,0-0250	00005	-	-	250	38	15	160

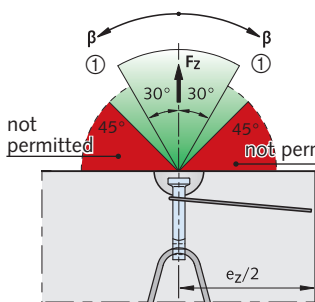
The anchor is also suitable for use in lightweight concrete; in this application the reduced bond stress must be considered.

The spherical head eye anchor is designed to transfer the entire anchor load through the reinforcement into the concrete. The additional reinforcement must be installed securely in the hole with full contact with the anchor.

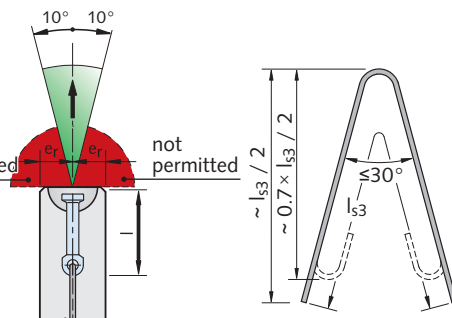
The additional reinforcement (B500B according to DIN 488) must be bent at an angle of 30° as shown. The rebar may be shortened if required. Bend the ends into hooks as in the illustration below.

- ① Diagonal pull at $30^\circ \leq \beta \leq 60^\circ$ without reinforcement is only permitted if:
 - $f_{ci} \geq 15 \text{ N/mm}^2$ and 3 times minimum wall thickness $2 \times e_r$
 - $f_{ci} \geq 25 \text{ N/mm}^2$ and 2.5 times minimum wall thickness $2 \times e_r$
 - $f_{ci} \geq 35 \text{ N/mm}^2$ and 2 times minimum wall thickness $2 \times e_r$

Diagonal pull reinforcement



Additional reinforcement



i Required reinforcement **4** only with diagonal pull → see table on p. 24 "reinforcement in walls".

! The diagonal pull reinforcement has to be placed as close as possible under the recess former and must be installed with full contact to the anchor.

Load capacity and reinforcement for the spherical head eye anchor

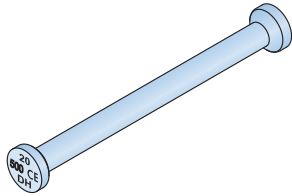
Load class	Article name	Min. element thickness	Axial spacing of anchors	Square mesh reinforcement both sides	Additional reinforcement			Load capacity (kN) for			
					d _{s3} [mm]	Concrete strength f _{ci}			Axial pull	Diagonal pull	Axial and diagonal
						15 N/mm ²	25 N/mm ²	35 N/mm ²	up to 30° [β]	up to 45° [β]	pull up to 45° [β]
		2 × e _r [mm]	e _z [mm]	[mm ² /m]		concrete strength f _{ci}			15 N/mm ²	15 N/mm ²	≥ 25 N/mm ²
1,3	6001-1,3-0065	80	500	60	8	650	510	420	13.0	10.2	13.0
2,5	6001-2,5-0090	80	600	100	12	1000	800	650	25.0	20.0	25.0
5,0	6001-5,0-0120	100	750	140	16	1700	1350	1100	50.0	40.0	50.0
10,0	6001-10,0-0180	140	1200	180	20	2000	1600	1300	100.0	80.0	100.0
20,0	6001-20,0-0250	180	1500	240	32	3000	2400	1950	200.0	160.0	200.0

f_{ci} = concrete cube strength at time of lifting

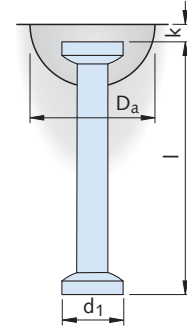
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Double-headed Lifting anchor

Dimensions, load capacity and reinforcement for narrow foot spherical head anchors



The narrow foot spherical head anchor is specially designed for use in pre-stressed beams with minimal truss thickness but high concrete compressive strength. They are easily distinguishable as the foot in the spherical head anchor is smaller than the standard foot.

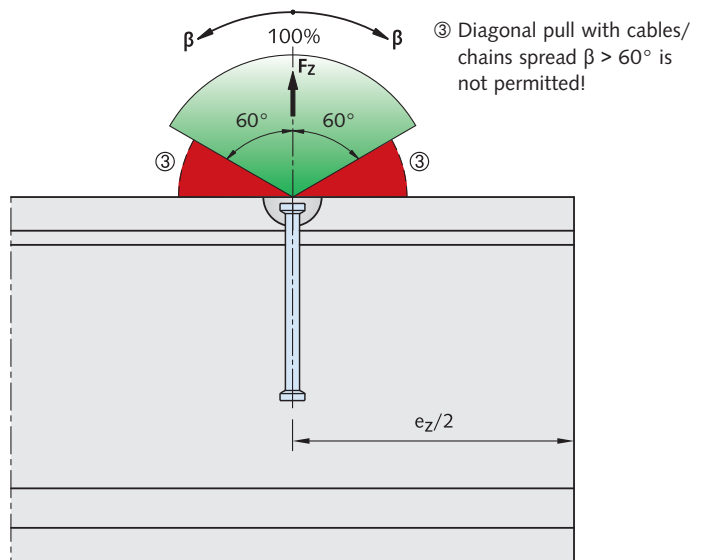
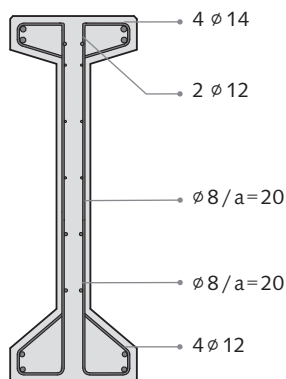
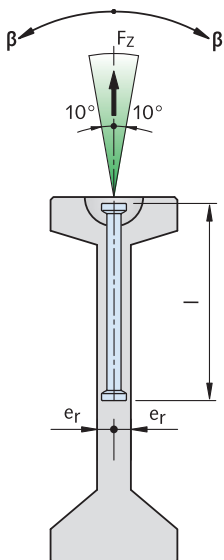


Dimensions of narrow foot spherical head anchors								
Load class	Article name mill finish	Order no. 0735.018-	Article name hot-dip galvanized	Order no. 0735.208-	l [mm]	d ₁ [mm]	k [mm]	D _a [mm]
10,0	6000-10,0-0340D	00056	6000-10,0-0340D FV	00056	340	46	15	118
15,0	6000-15,0-0400D	00057	6000-15,0-0400D FV	00057	400	69	15	160
20,0	6000-20,0-0500D	00067	6000-20,0-0500D FV	00067	500	69	15	160
32,0	6000-32,0-0700D	00058	6000-32,0-0700D FV	00058	700	88	23	214

Minimum reinforcement is shown in the illustration below. The existing reinforcement can be taken into account for calculation. Reinforcement for diagonal pull is not required. **The double headed anchor should not be used in concrete with a compression strength below 40 N/mm².**

Load capacities for axial pull and diagonal pull up to 60° [β]					
Load class	Article name	Min. web thickness 2 × e _r [mm]	Axial spacing of anchors e _z [mm]	Axial pull and diagonal pull up to 60° [β] Load capacity [kN] concrete strength f _{ci}	
				45 N/mm ²	55 N/mm ²
10,0	6000-10,0-0340D	120	≥ 1360	88.0	98.0
		140		100.0	100.0
15,0	6000-15,0-0400D	120	≥ 1600	130.0	145.0
		140		150.0	150.0
20,0	6000-20,0-0500D	120	≥ 2000	136.0	151.0
		140		173.0	192.0
		160		197.0	200.0
32,0	6000-32,0-0700D	120	≥ 2800	189.0	210.0
		140		220.0	245.0
		160		251.0	280.0
		180		282.0	315.0

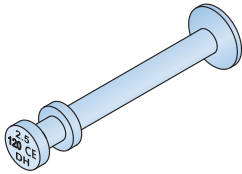
f_{ci} = concrete cube strength at time of lifting



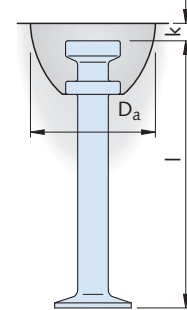
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

DSM Quick Fitting Spherical Head Anchor

Dimensions and load capacity of DSM Quick fitting spherical head anchor



This DSM quick installation anchor can be used in situations where the recess former stays fixed to the formwork. This can be in face-up production of slabs, overhead production of utility pipes and installation in stair elements. Use a lubricant with the anchor to push into the DSM Recess former.



Dimensions of DSM Quick fitting spherical head anchor

Load class	Article name zinc galvanized	Order no. 0735.	l [mm]	k [mm]	D _a [mm]
1,3	6073-1,3-0055	110-00017	55	10	60
	6073-1,3-0065	110-00009	65		
	6073-1,3-0085	110-00018	85		
	6073-1,3-0120	110-00010	120		
2,5	6073-2,5-0055	110-00019	55	11	74
	6073-2,5-0065	110-00020	65		
	6073-2,5-0085	110-00016	85		
	6073-2,5-0120	110-00021	120		
	6073-2,5-0175	210-00001	170		

The ring below the quick installation anchor head seals the recess former and simultaneously secures the anchor in position. The recess formers (Article names 6126, 6127 and 6128) are specially adapted to the quick installation anchor head. The dimensions are the same as the spherical head anchor and allow continued use of the universal head and the turning and lifting link.

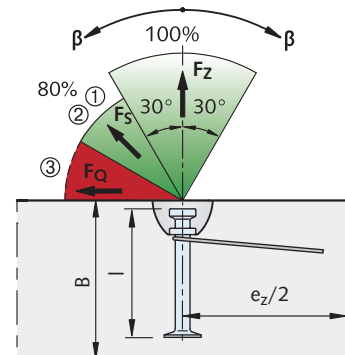
Load capacity when lifting slabs with any direction of pull

Load class	Article name	Anchor length l [mm]	slab thickness B _{min} [mm]	Axial anchors spacing e _z [mm]	Load capacity [kN] for concrete strength f _{ci}			
					Axial pull up to 30° [β]	Diagonal pull up to 60° [β]	Axial pull and diagonal pull up to 60° [β]	
					15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²
1,3	6073-1,3-0065	65	100	≥ 260	13.0	10.4	13.0	13.0
2,5	6073-2,5-0085	85	120	≥ 325	19.5	15.6	25.0	25.0

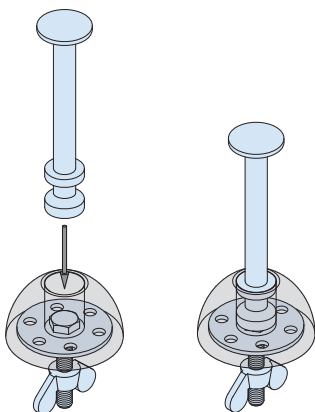
f_{ci} = concrete cube strength at time of lifting

With diagonal pull reinforcement

- ① Diagonal pull at 30° ≤ β ≤ 60° without reinforcement is only permitted for:
 - f_{ci} ≥ 15 N/mm² and 3 times minimum edge distance e_z/2
 - f_{ci} ≥ 25 N/mm² and 2.5 times minimum edge distance e_z/2
 - f_{ci} ≥ 35 N/mm² and 2 times minimum edge distance e_z/2
- ② For concrete strength f_{ci} ≥ 23 N/mm² is F_Q = F_S = F_Z.
- ③ Diagonal pull with cables/chains spread β > 60° is not permitted!



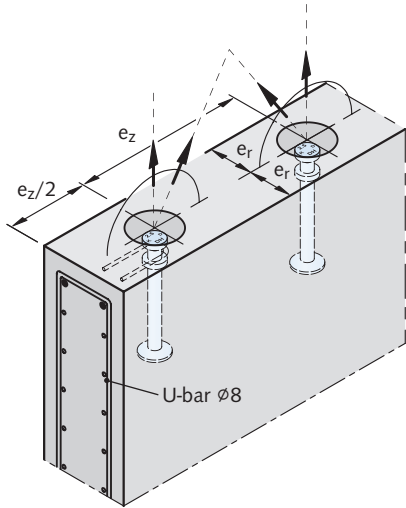
! The slab has to be calculated for the load-case "lifting".



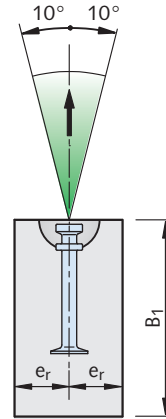
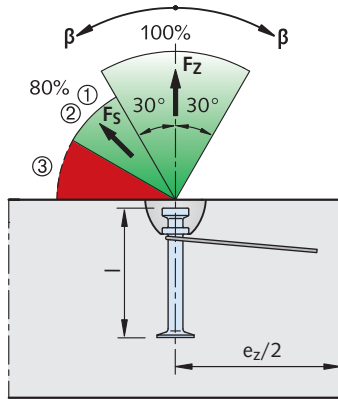
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

DSM Quick Fitting Spherical Head Anchor

Load capacity of DSM Quick fitting spherical head anchor in walls and beams



With diagonal pull reinforcement



i Required reinforcement **1-3**.
Reinforcement **4** only with diagonal pull → see table on page 24 "reinforcement in walls".

- ① Diagonal pull $30^\circ \leq \beta \leq 60^\circ$ without reinforcement is only permitted for:
 $f_{ci} \geq 15 \text{ N/mm}^2$ and 3 times min. wall thickness $2 \times e_r$
 $f_{ci} \geq 25 \text{ N/mm}^2$ and 2.5 times min. wall thickness $2 \times e_r$
 $f_{ci} \geq 35 \text{ N/mm}^2$ and 2 times min. wall thickness $2 \times e_r$
- ② For concrete strength $f_{ci} \geq 23 \text{ N/mm}^2$ is $F_S = F_Z$.
- ③ Diagonal pull with cables/chains spread $\beta > 60^\circ$ is not permitted!

Load capacity when transporting walls and beams

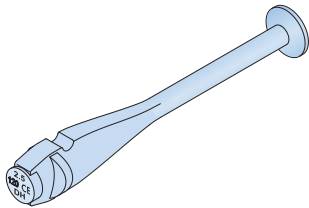
Load class	Article name	Anchor length l [mm]	Beam height B1 min [mm]	Min. wall thickness or beam width $2 \times e_r$ [mm]	Axial anchor spacing e_z [mm]	Load capacity [kN] for			
						Axial pull up to 30° [β]	Diagonal pull up to 60° [β]	Axial pull and Diagonal pull up to 60° [β]	
								concrete strength f_{ci}	
						15 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²
1,3	6073-1,3-0120	120	250	80	≥ 300	13.0	10.7	13.0	13.0
				100			12.7		
				120			13.0		
2,5	6073-2,5-0120	120	250	120	≥ 380	18.1	14.5	23.3	25.0
				140			16.2		
				160			17.9		
	6073-2,5-0170	170	350	100	≥ 380	20.7	16.5	25.0	25.0
				120			23.7		
				140			25.0		

f_{ci} = concrete cube strength at time of lifting

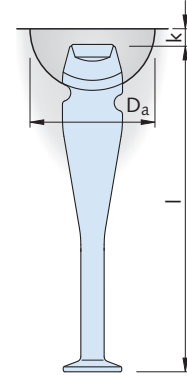
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Pitching Anchor

Dimensions, load capacity and reinforcement of spherical head pitching anchor

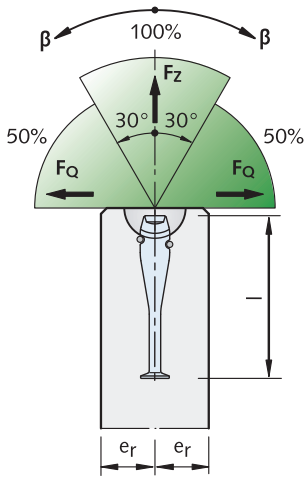


The spherical head pitching anchors are used to tilt and lift thin concrete wall or beam elements. They are especially suitable if a tilt-up table is not used for production. The universal head lifting link can be used for this anchor head as the head design is identical to the spherical head anchor.

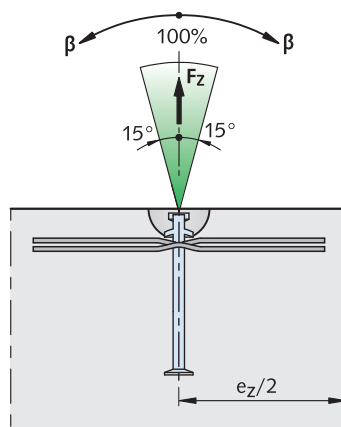


Dimensions of spherical head pitching anchors							
Load class	Article name mill finish	Order no. 0735.120-	Article name hot-dip galvanized	Order no. 0735.200-	l [mm]	k [mm]	D _a [mm]
2,5	6006-2,5-0240 WB	00001	6006-2,5-0240 FV	00151	240	11	74
5,0	6006-5,0-0240 WB	00002	6006-5,0-0240 FV	00152	240	15	94

Pitching



Transport



i Required reinforcement 1 - 3. Pitching reinforcement is used instead of diagonal pull reinforcement → see table on page 24 "reinforcement in walls".

Load capacity and reinforcement for the spherical head pitching anchor

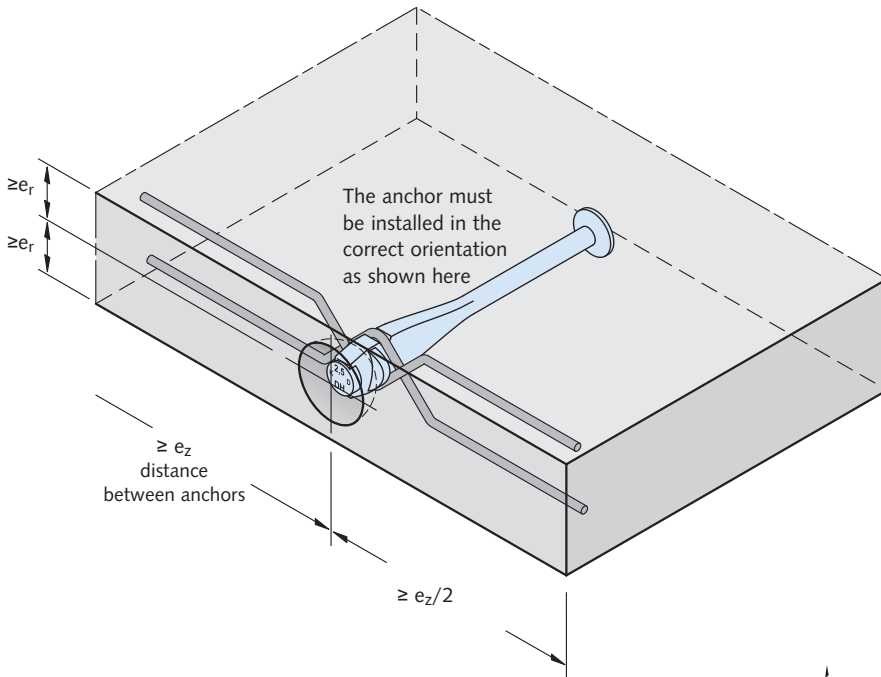
Load class	Article name	Element thickness 2 × e _r [mm]	Axial anchor spacing e _z [mm]	Square mesh reinforcement [mm ² /m]	Tilt-up reinforcement BST 500 S		Load capacity [kN] for			
					d _s [mm]	l _s [mm]	Transverse pull (pitching)		Axial pull and diagonal pull up to 15° [β]	
							15 N/mm ²	25 N/mm ²	concrete strength f _{ci}	
2,5	6006-2,5-0240	100	1530	2 × 125	∅ 12	800	7.8	10.1	15 N/mm ²	25 N/mm ²
		110					9.0	11.6	23.8	25.0
		120					10.3	12.5	25.0	
		130					11.6	12.5	25.0	
		140					12.5	12.5	25.0	
5,0	6006-5,0-0240	120	1530	2 × 140	∅ 16	1000	13.8	17.8	15 N/mm ²	25 N/mm ²
		130					14.6	18.8	33.1	42.7
		140					15.6	20.1	35.0	45.2
		150					17.3	22.3	36.8	47.5
		160					19.1	24.6	38.7	50.0
		180					20.9	25.0	42.2	50.0
200	22.6	25.0	45.7	50.0						

f_{ci} = concrete cube strength at time of lifting

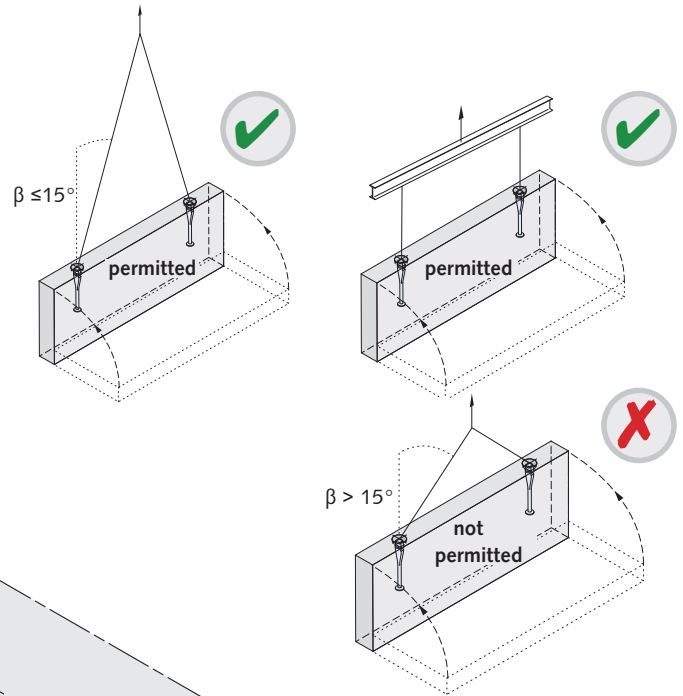
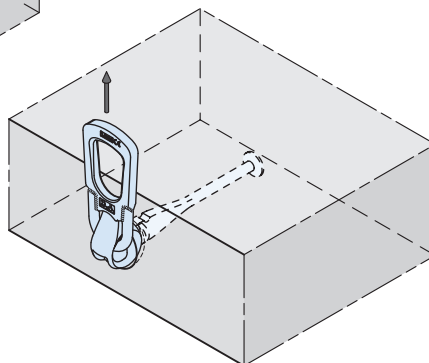
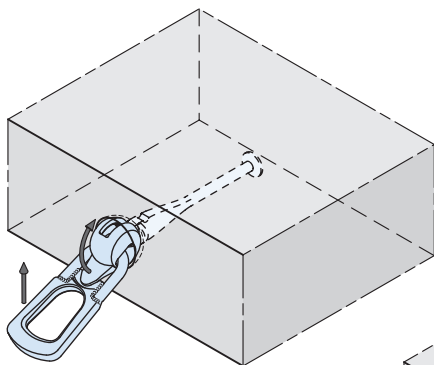
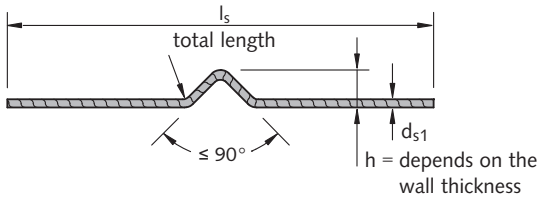
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Pitching Anchor

Installation and use



The pitching reinforcement is placed in the anchor notch



The main reinforcement and the additional reinforcement should be installed symmetrically to allow subsequent tilting in both directions. Observe the correct orientation when installing the pitching anchor. The pitching anchor is cast-in with a special recess former (article no. 6134-load class). After the concrete has set the recess former is removed and the universal head lifting link is attached. Ensure that the tongue on the lifting link points in the load direction (see illustration at bottom of page).

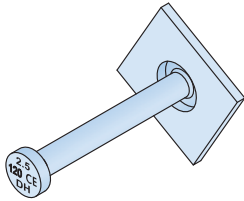
The universal head lifting link can be used for tilting and lifting. The special design of the universal head lifting link ensures that the link rests solely on the anchor and not on the concrete.

! The pitching anchor is permitted only for axial or transverse loading. Diagonal pull $\beta > 15^\circ$ is not permitted. A spreader beam must be used when tilting with $\beta > 15^\circ$.

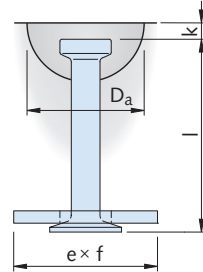
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Plate Anchor

Dimensions, load capacity and reinforcement of spherical head plate anchor



This anchor is recommended for all large surface, thin, precast elements that are lifted perpendicular to their main face (slabs and shell elements). This anchor can also be used in elements when the standard short spherical head anchor does not provide sufficient anchorage.



Dimensions of spherical head plate anchors

Load class	Article name mill finish	Order no. 0735.060-	Article name hot-dip galvanized	Order no. 0735.200-	l [mm]	e x f [mm]	k [mm]	Da [mm]
2,5	6010-2,5-0055	00001	6010-2,5-0055 FV	00043	55	70x70	11	74
	6010-2,5-0120	00002	6010-2,5-0120 FV	00044	120	70x70	11	74
5,0	6010-5,0-0065	00004	6010-5,0-0065 FV	00046	65	90x90	15	94
	6010-5,0-0110	00007	6010-5,0-0110 FV	00047	110	90x90	15	94
7,5	6010-7,5-0100	00008	6010-7,5-0100 FV	00173	95	90x90	15	118
10,0	6010-10,0-0115	00009	6010-10,0-0115 FV	00048	115	90x90	15	118
	6010-10,0-0150	00011	6010-10,0-0150 FV	00172	150	90x90	15	118

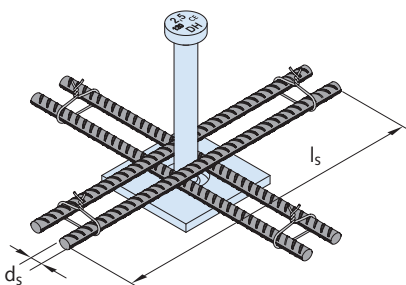
Other load classes and anchor lengths on request

Reinforcement and load capacity with arbitrary direction of pull

Load class	Article name	Element thickness B _{min} [mm]	Axial anchor spacing e _z [mm]	Reinforcement		Load capacity [kN] F _Q = F _S = F _Z			
				d _s [mm]	l _s [mm]	at concrete strength f _{ci}			
						15 N/mm ²	25 N/mm ²	35 N/mm ²	45 N/mm ²
2,5	6010-2,5-0055	85	560	8	200	10.8	13.9	16.5	18.7
	6010-2,5-0120	150	1000	10	300	25.0	25.0	25.0	25.0
5,0	6010-5,0-0065	100	1000	12	450	16.1	20.8	24.6	27.9
	6010-5,0-0110	145	1000	12	450	33.9	43.7	50.0	50.0
7,5	6010-7,5-0100	135	1000	14	550	29.5	38.1	45.1	51.2
10,0	6010-10,0-0115	150	1280	16	600	34.6	44.7	52.8	59.9
	6010-10,0-0150	185	1280	16	600	55.9	72.1	85.3	96.7

f_{ci} = concrete cube strength at time of lifting

To ensure load distribution in the anchor plate, it is crucial that the plate is positioned under the main reinforcement. If this is not possible, suitable additional reinforcement must be placed over the anchor plate (see illustration below).



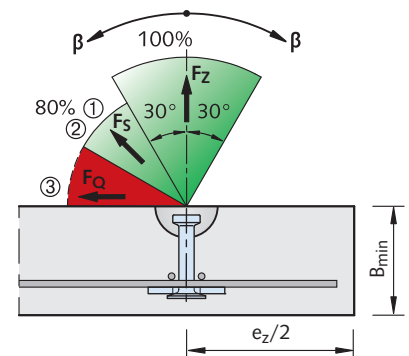
- ① Diagonal pull at $30^\circ \leq \beta \leq 60^\circ$ without reinforcement is only permitted for:
 - f_{ci} ≥ 15 N/mm² and 3 times minimum edge distance $2 \times e_z / 2$
 - f_{ci} ≥ 25 N/mm² and 2.5 times minimum edge distance $2 \times e_z / 2$
 - f_{ci} ≥ 35 N/mm² and 2 times minimum edge distance $2 \times e_z / 2$
- ② For concrete strength f_{ci} ≥ 23 N/mm² is F_Q = F_S = F_Z.
- ③ Spread of cables/chains with $\beta \geq 60^\circ$ is not permitted!

Additional reinforcement is not included in anchor delivery.



The slab has to be calculated for the load-case "lifting".

The minimum slab thickness B_{min} results from the anchor length, the head cover factor and the required concrete cover around the foot. Suitable measures must be taken to ensure that sufficient concrete flows under the anchor plate to prevent corrosion.

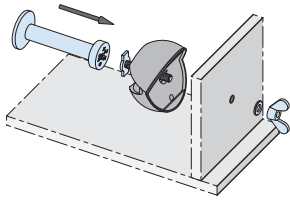


HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

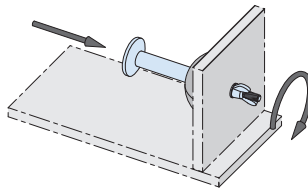
Recess Formers

Fixing the recess formers to the formwork

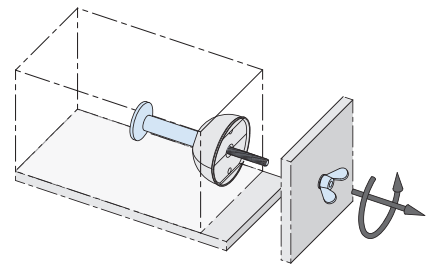
To install, place the threaded plate (article no. 6153 or 6141) and the anchor into the splayed recess former.



The recess former is subsequently attached to the formwork with a screw or with a wingnut.

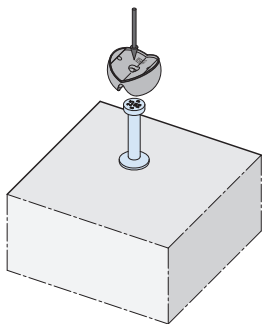


Loosen the screw or wingnut before striking the formwork.

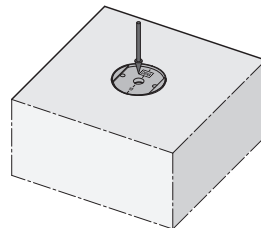
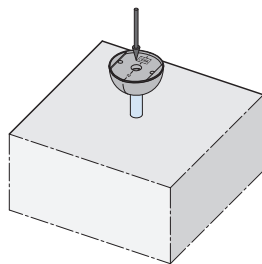


Installation in slabs

If the anchor is installed from above in wet concrete, e.g. in slab elements,

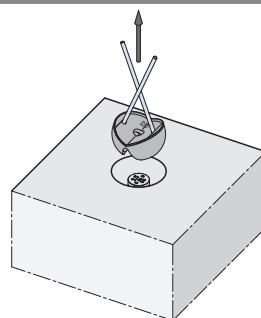
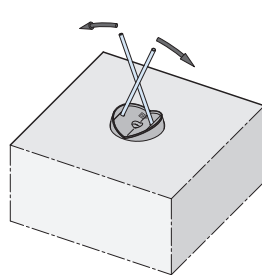
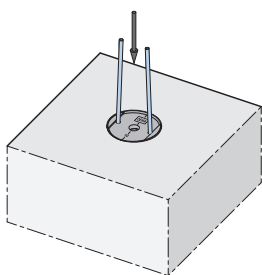


make a hole by removing a small amount of concrete with a trowel, place the recess former with the anchor in the hole.



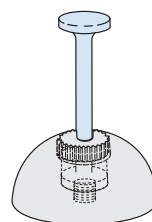
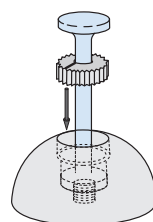
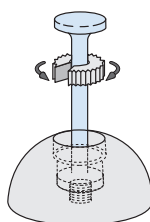
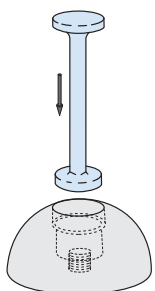
The concrete should be compacted until the upper surface of the former is flush with the surface of the concrete. To secure the anchor at the correct level, ensure that a plate (Art. No. 6141 or 6153) is inside the recess former. The anchors must be installed perpendicular to the surface. The use of formwork oil, especially inside the recess formers, eases removal and has a positive effect on the life span of the recess former.

Removal of the recess former



There are two holes in the recess former to help prise it out of the hardened concrete. Two reinforcement bars can be inserted in these holes and crossed against each other to open and remove the recess former. Excess concrete should be removed.

Spherical head anchor installation with rubber grommet in steel recess former



Slide the rubber grommet onto the anchor and press both into the hole in the steel recess former. If necessary, grease before use. Ensure the anchor is securely fitted and tied in place when the concrete is being poured.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

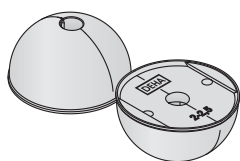
Rubber Recess Formers

Application of recess formers

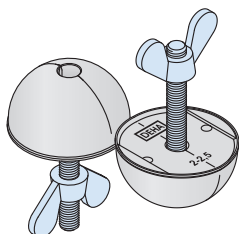
To fix the HALFEN DEHA KKT Spherical head lifting anchor to the formwork a HALFEN DEHA Recess former must be used.

This ensures simple and secure positioning of the anchor and leaves the anchor ready for the correct universal head lifting link.

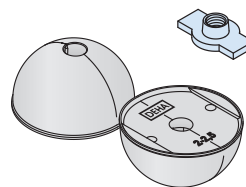
The rubber recess former keeps its shape even when heated up to 120°C or in contact with oil. It can be used repeatedly.



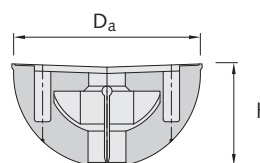
No metal parts



Including metal plate with threaded rod

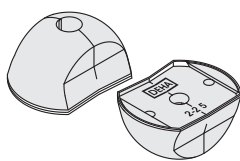


with socket

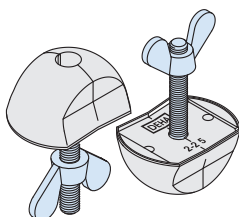


Rubber recess former, round

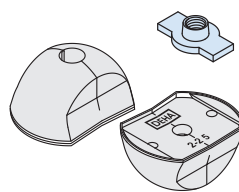
Load class	Article name	Order no. 0736.010-	Article name	Order no. 0736.020-	Article name	Order no. 0736.030-	Da [mm]	h [mm]	Colour
1,3	6131-1,3	00001	6132-1,3	00001	6133-1,3	00001	60	28,5	blue
2,5	6131-2,5	00002	6132-2,5	00002	6133-2,5	00002	74	35	yellow
5,0	6131-5,0	00004	6132-5,0	00004	6133-5,0	00005	94	44	blue
7,5	6131-7,5	00005	6132-7,5	00005	6133-7,5	00006	118	55,5	red
10,0	6131-10,0	00006	6132-10,0	00006	6133-10,0	00007	118	55	yellow
15,0	6131-15,0	00007	6132-15,0	00007	6133-15,0	00008	160	75,5	grey
20,0	6131-20,0	00008	6132-20,0	00008	6133-20,0	00004	160	75	black
32,0/45,0	6131-32,0	00009	6132-32,0	00009	6133-32,0	00009	214	100	black



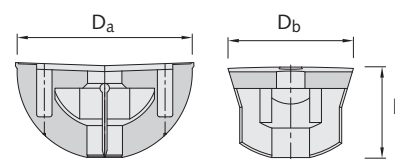
No metal parts



Including metal plate with threaded rod



with socket



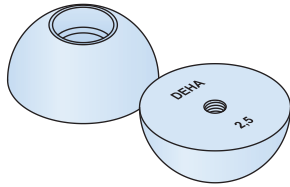
Rubber recess former, narrow

Load class	Article name	Order no. 0736.060-	Article name	Order no. 0736.070-	Article name	Order no. 0736.080-	Da [mm]	Db [mm]	h [mm]	Colour
1,3	6137-1,3	00001	6138-1,3	00001	6145-1,3	00001	62	42	28,5	blue
2,5	6137-2,5	00002	6138-2,5	00002	6145-2,5	00002	77	52	35	yellow
5,0	6137-5,0	00004	6138-5,0	00004	6145-5,0	00004	97	69	44	blue
7,5	6137-7,5	00005	6138-7,5	00005	6145-7,5	00005	122	85	55,5	red
10,0	6137-10,0	00006	6138-10,0	00006	6145-10,0	00006	122	85	55	yellow
15,0	6137-15,0	00007	6138-15,0	00007	6145-15,0	00007	160	124	75,5	grey
20,0	6137-20,0	00008	6138-20,0	00008	6145-20,0	00008	160	124	75	black

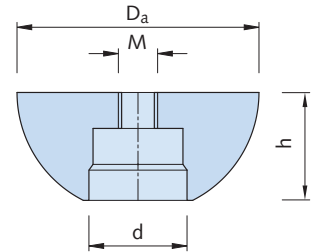
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Steel Recess Formers

Steel recess former, round



Steel recess formers with a rubber grommet are used if it is not possible to remove the recess formers before striking the formwork.



Steel recess former, round

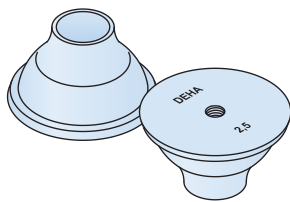
Load class	Article name	Order no. 0736.100-	Da [mm]	h [mm]	M [mm]	d [mm]	Matching rubber grommet		
							Article name	Order no. 0737.060-	
1,3	6150-1,3	00001	60	27.5	8	20.5	6151-1,3	00001	
2,5	6150-2,5	00002	74	33	12	30.0	6151-2,5	00002	
5,0	6150-5,0	00003	94	42	12	38.0	6151-5,0	00003	

Place the rubber grommet on the anchor shaft. The head of the anchor with the grommet attached is pushed into the recess former. The rubber grommet is pushed into the recess former until it is flush.

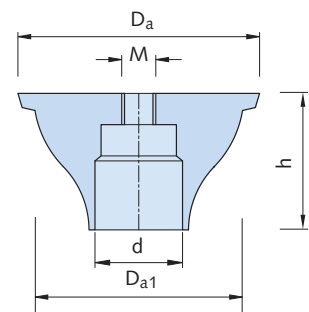
Apply formwork lubricant to the anchor head and the grommet before installation. When the precast element is removed from the formwork the grommet will slide out of the fixed recess former with ease.

If the lifting anchor is installed in the horizontal, precautions must be taken to avoid it moving when compacting the concrete (e.g. secure the anchor to the reinforcement or wedge in place with spacers).

Trumpet steel recess former



The trumpet steel recess former with rubber grommet is a variation of the recess former as described above.



Trumpet steel recess former

Load class	Article name	Order no. 0736.120-	Da [mm]	Da1 [mm]	h [mm]	M [mm]	d [mm]	Matching rubber grommet		
								Article name	Order no. 0737.070-	Order no. 0737.060-
1,3	6152-1,3	00001	68	59	40	8	20.5	6151-1,3 D	00001	-
								2 x 6151-1,3	-	00001
2,5	6152-2,5	00002	85	73	48	12	30.0	6151-2,5 D	00002	-
								2 x 6151-2,5	-	00002
5,0	6152-5,0	00003	107	93	56	12	38.0	2 x 6151-5,0	-	00003

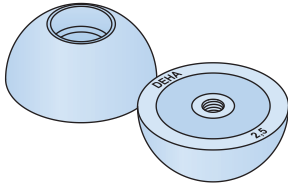
The increased length in the recess former means the anchor can be subjected to higher loads during the concrete pour.

Lifting anchors subjected to loads vertical to their longitudinal axis during the concrete pour are installed using this type of recess former.

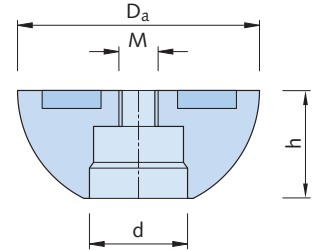
Double height rubber grommet or two standard height grommets are used in this recess former.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM Recess Formers

Magnetic, steel, round recess former



Magnetic steel recess formers are used in metal formwork when drilling is not an option.



Magnetic, steel, round recess former

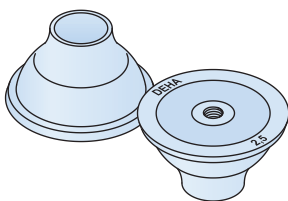
Load class	Article name	Order no. 0736.110-	Da [mm]	h [mm]	M [mm]	d [mm]	Matching rubber grommet	
							Article name	Order no. 0737.060-
1,3	6150-1,3 M	00001	60	27.5	8	20.5	6151-1,3	00001
2,5	6150-2,5 M	00002	74	33	12	30.0	6151-2,5	00002
5,0	6150-5,0 M	00003	94	42	12	38.0	6151-5,0	00003

Magnetic recess formers are available for use with steel formwork, no drilling is required.

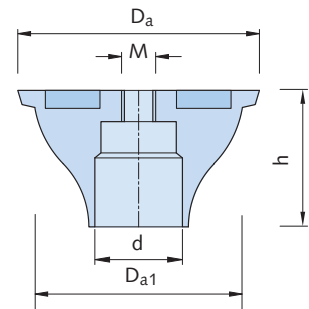
The recess former stays fixed to the formwork when striking the formwork.

The rubber grommet has to be removed from the lifting anchor before lifting.

Magnetic, steel, trumpet shape recess former



If the concrete is poured vertically to the axis of the lifting anchor the trumpet shaped recess former with increased anchor grip can be used.



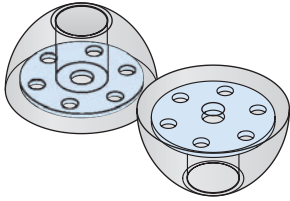
Magnetic, steel, trumpet shape recess former

Load class	Article name	Order no. 0736.130-	Da [mm]	Da1 [mm]	h [mm]	M [mm]	d [mm]	Matching rubber grommet		
								Article name	Order no. 0737.070-	Order no. 0737.060-
1,3	6152-1,3 M	00001	68	59	40	8	20.5	6151-1,3 D	00001	-
								2 × 6151-1,3	-	00001
2,5	6152-2,5 M	00002	85	73	48	12	30.0	6151-2,5 D	00002	-
								2 × 6151-2,5	-	00002
5,0	6152-5,0 M	00003	107	93	56	12	38.0	2 × 6151-5,0	-	00003
								6151-7,5 D	-	00004
7,5 and 10,0	6152-7,5 M	00005	134	117	77	16	48.5	2 × 6151-7,5	00004	-
								2 × 6151-10,0	-	00005

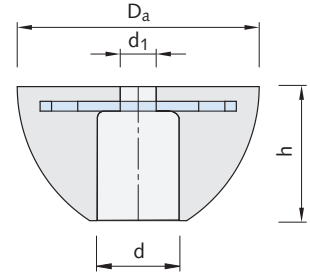
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Recess Formers

Polyurethane recess former for quick installation anchor



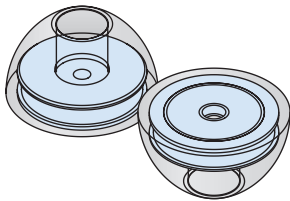
An especially durable recess former allows quick installation of the DSM Anchor; the recess former is attached to the formwork with a fixing screw.



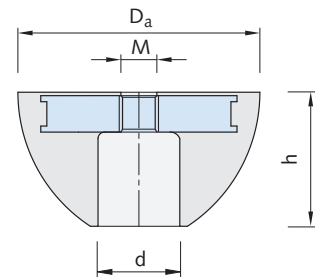
Polyurethane recess former

Load class	Article name	Order no. 0736.170-	D _a [mm]	h [mm]	d ₁ / for M [mm]	d [mm]	Colour
1,3	6127-1,3	00001	60	33	10 / 8	18	transparent
2,5	6127-2,5	00002	74	41	12 / 10	25	

Magnetic polyurethane recess former for quick installation anchor



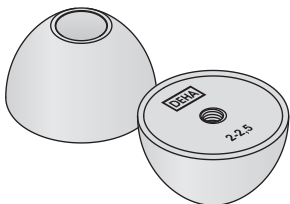
An especially durable recess former to fix the quick installation DSM Anchor to steel formwork; specially shaped to the dimensions of the quick installation anchor.



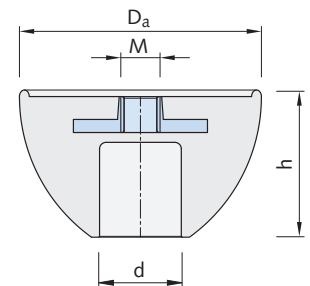
Polyurethane recess former with magnet

Load class	Article name	Order no. 0736.190-	D _a [mm]	h [mm]	M	d [mm]	Colour
1,3	6126-1,3	00001	60	33	8	18	transparent
2,5	6126-2,5	00002	74	41	12	25	

Rubber recess former for quick installation anchor with threaded plate



Hard rubber recess former, the quick installation for DSM Anchors; this recess former is attached to the formwork with a fixing screw.



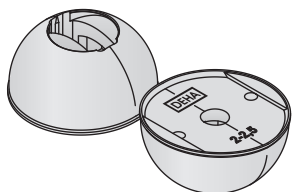
Rubber recess former

Load class	Article name	Order no. 0736.140-	D _a [mm]	h [mm]	M [mm]	d [mm]	Colour
1,3	6128-1,3	00002	60	35	8	18	blue
2,5	6128-2,5	00001	74	45	12	25	yellow

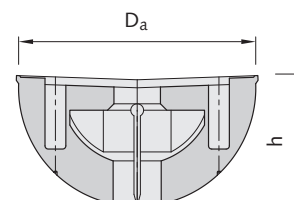
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Recess Formers and Recess Fillers

Rubber recess former for pitching anchor



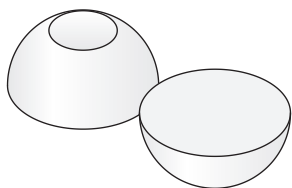
This former was specially developed for the spherical head pitching anchor (Article name 6006). They can be used repeatedly. The recess formers are colour coded to allow easy identification of different load classes.



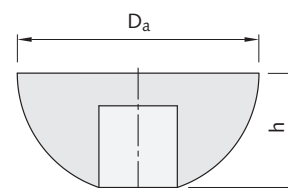
Rubber recess former for pitching anchor

Load class	Article name	Order no. 0736.150-	D _a [mm]	h [mm]	Colour	Matching plate
2,5	6134-2,5	00001	74	35	yellow	6141-2,0/2,5
5,0	6134-5,0	00002	102	44	blue	6141-5,0

Recess filler

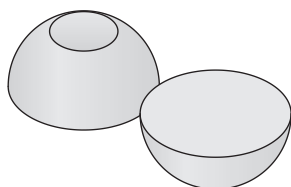


Polystyrene recess/void fillers are available for load classes 1,3 to 20,0 to seal the recess in concrete to protect against water and ice.

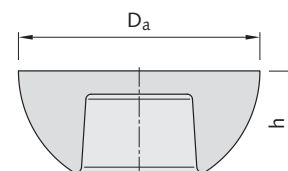


Recess filler, polystyrene

Load class	Article name	Order no. 0737.010-	D _a [mm]	h [mm]	Colour
1,3	6015- 1,3	00001	60	29	white
2,5	6015- 2,5	00002	74	35	
5,0	6015- 5,0	00003	94	44	
7,5 and 10,0	6015-10,0	00004	118	55	
15,0 and 20,0	6015-20,0	00005	160	72	



Fibre reinforced concrete recess formers are available to permanently seal recesses. These are fixed in place with quick-set mortar. Recess formers are available for load classes 5,0 to 45,0.



Concrete recess filler

Load class	Article name	Order no. 0737.120-	D _a [mm]	h [mm]	Colour
5,0	6172-5,0	00004	89	39	concrete grey
7,5 and 10,0	6172-10,0	00001	114	48	
15,0 and 20,0	6172-20,0	00002	156	65	
32,0 and 45,0	6172-45,0	00003	210	85	

Watertight up to 5 bar if applied with a suitable watertight mortar. We recommend Carbolan® or CarboPast (by Minova CarboTech). Where demands on watertightness are lower use quick-action mortar or adhesive in accordance with the manufacturer's instructions.

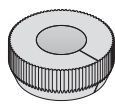
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Accessories for Recess Fillers

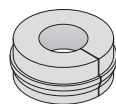
Rubber grommet for steel recess former

6151-load class

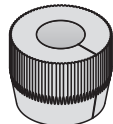
6151-load class D



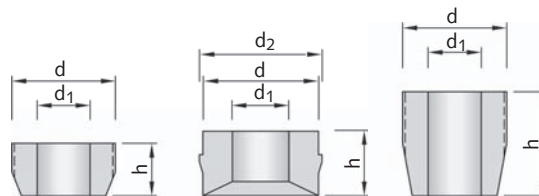
Load class
1,3-5,0



Load class
7,5-10,0



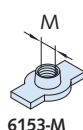
Rubber grommet for steel recess former 6150 and steel recess former 6152 to secure the anchor in the recess former.



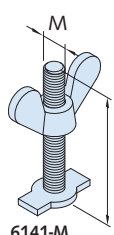
Rubber grommet

Load class	Article name Rubber grommet	Order no. 0737.060-	Article name Double rubber grommet	Order no. 0737.070-	d	d ₁	d ₂	h
1,3	6151-1,3	00001	-	-	21.5	11.0	-	11.0
	-	-	6151-1,3 D	00001				22.0
2,5	6151-2,5	00002	-	-	30.5	14.5	-	12.0
	-	-	6151-2,5 D	00002				25.0
5,0	6151-5,0	00003	-	-	38.5	21.0	-	14.0
7,5	6151-7,5	00004	-	-	49.0	24.0	52.0	27.5
	-	-	6151-7,5 D	00004				44.5
10,0	6151-10,0	00005	-	-	49.0	28.0	52.0	27.5

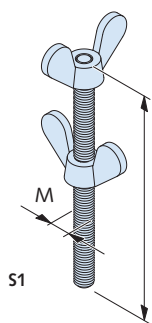
Fixing accessories for rubber recess formers



6153-M



6141-M



S1

Various versions of threaded plates are used to attach the rubber recess formers to the formwork. If the formwork can be removed in the axial direction of the threaded bar, use the plates with a welded threaded rod and wingnut (6141-M).

If the formwork can only be removed perpendicular to the threaded bar, the plates with a threaded socket should be used (6153-M). Remove the fixing screw before striking the formwork.

Plate with threaded rod and wingnut

Article name	Order no. 0737.020-	Thread M	l [mm]	For load class (Art. name 6131, round)	For load class (Art. name 6137, narrow)
6141- 1,3	00001	8	66	1,3	1,3
6141- 2,5	00002	12	87	2,5	2,5
6141- 5,0	00003	12	87	5,0	5,0
6141-10,0	00004	12	87	7,5 and 10,0	7,5 and 10,0
6141-20,0	00005	12	87	15,0 and 20,0	15,0 and 20,0
6151,32,0	00006	16	100	32,0	-

Plate with socket

Article name	Order no. 0737.040-	Thread M	For load class (Article name 6131, round)	For load class (Article name 6137, narrow)
6153- 1,3	00001	8	1,3	1,3
6153- 2,5	00002	12	2,5	2,5
6153- 5,0	00003	12	5,0	5,0
6153-10,0	00004	12	7,5 and 10,0	7,5 and 10,0
6153-20,0	00005	16	15,0 and 20,0	15,0 and 20,0
6153-32,0	00006	16	32,0	-

Holding bolt with wingnut

Article name	Order no. 0037.060-	Thread M	l [mm]
S1-M8	00001	M 8	160
S1-M12	00002	M 12	160
S1-M16	00003	M 16	160

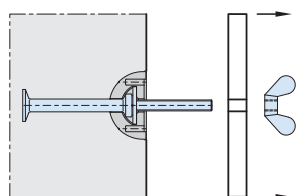


plate with a welded threaded bar

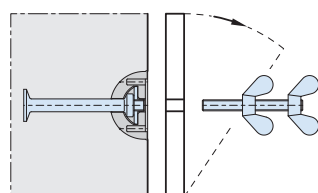


plate with a threaded socket

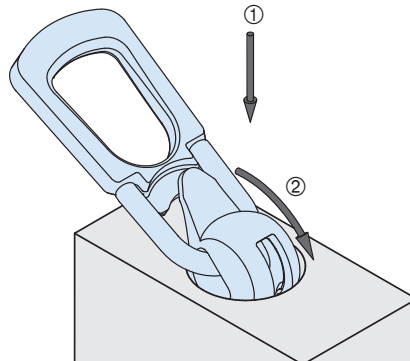
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Operating the HALFEN DEHA Universal Head Lifting Link

Using the HALFEN DEHA Universal head lifting link

Check the load capacity of the anchor against the lifting link.

- ① To engage; the ball is pushed with the opening facing downward over the anchor.
- ② Then rotate the tongue on the ball away from the lifting link towards the surface of the concrete. The universal lifting head is now secured and is ready for use.



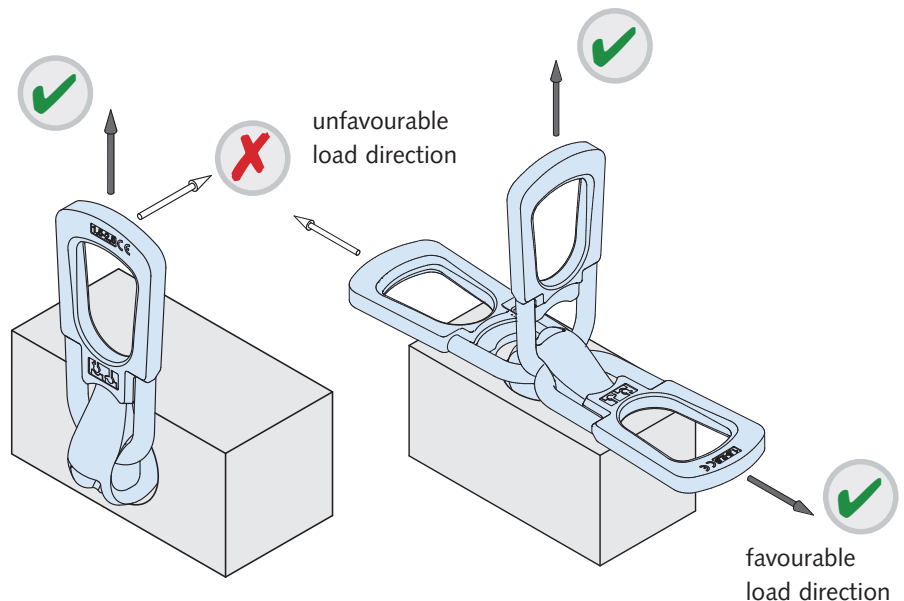
Turning is limited when the lifting link is under load.

Lifting

All rotation, tilt and swivel movements shown are permitted with the universal head lifting link. If subjected to diagonal load the position of the tongue is not critical.

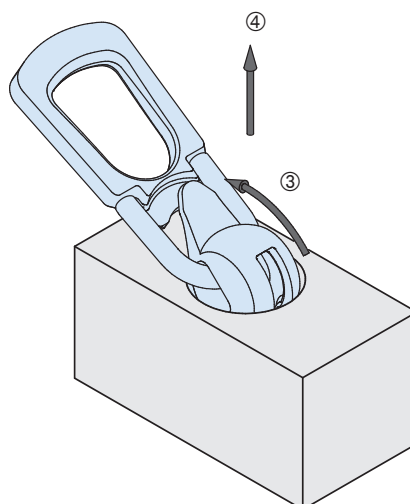
If the universal head lifting link is used for rotating and uprighting precast concrete elements, the position of the shackle must be as in the illustration on the left.

The ball is always kept in the correct position and counterweighted by the tongue, even in a nonloaded state.



Disengaging

To disengage the universal head lifting link, lower the lifting head ③ and swivel the ball ④ upward.



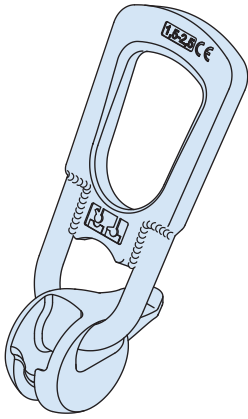
Assembly instruction

The installation and the assembly instructions must be readily available on site, i.e. in the precast plant or on the construction site. The plant or site manager must ensure the operator has read and understood the installation and assembly instructions for this system. Universal lifting links must be inspected by a qualified expert at least once a year. These inspections must be documented and a record kept (see also page 53).

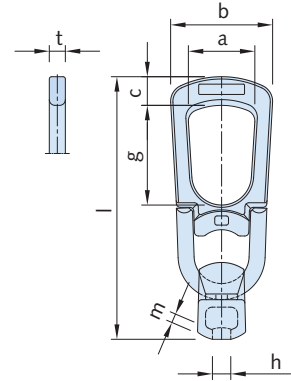
HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Lifting Links

HALFEN DEHA Universal head lifting link



The HALFEN DEHA Universal head lifting link is used for lifting and transporting precast concrete elements with cast in spherical head anchors. The universal head lifting link is a manual-release link. The universal head links currently available are Chromium-6-Free zinc galvanized.



Before each use visually check all lifting equipment for correct application and damage-free condition.
It is prohibited to use damaged lifting equipment.

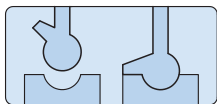
Allowable loads for each particular case can be found in the respective tables. In general the safety regulations in the country of use are to be observed, in particular those for the use of cranes and lifting equipment.

Dimensions of universal head lifting link

Load class	Article name	Order no. 0738.010-	Weight [kg]	a [mm]	b [mm]	c [mm]	g [mm]	h [mm]	t [mm]	l [mm]	m [mm]
1,3	6102-1,3	00001	0.9	47	75	20	71	11	12	188	7.0
2,5	6102-2,5	00002	1.4	59	91	25	86	16	14	230	8.5
5,0	6102-5,0	00003	3.4	70	118	37	88	21	16	283	10.0
7,5 and 10,0	6102-10,0	00004	9.1	88	160	50	115	30	25	401	14.0
15,0 and 20,0	6102-20,0	00005	21.0	106	180	75	135	41	30	506	21.0
32,0	6102-32,0	00006	47.0	172	272	100	189	52	40	680	28.5
45,0	6102-45,0	00007	59.0	179	349	100	192	52	40	676	28.5

Identification

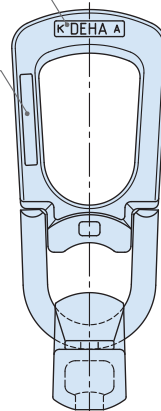
Each universal head lifting link is identified as shown: the manufacturer mark is stamped into the handle together with the application identifier K-A and the unique anchor number. The load class, the CE mark and an operating symbol can be found on the rear of the handle.



The ball is marked with the batch number and year of manufacture.

Manufacturer mark
Type K-A

Identification number



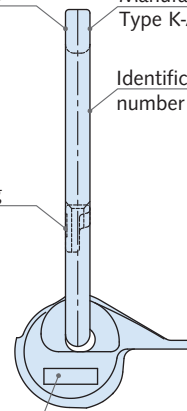
Load class
CE-mark

Manufacturer mark
Type K-A

Identification number

Operating icon

Batch no.
Year of manufacture



The application identifier K-A denotes that the universal head lifting link can be used for the following two HALFEN DEHA Lifting anchor systems:

- **K:** with KKT Spherical head lifting anchors for the HALFEN DEHA

KKT Spherical head lifting anchor system

- **A:** with adaptor 6366 for the HALFEN DEHA HA Socket anchor system

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

Lifting Links

Safety inspection for universal head lifting links

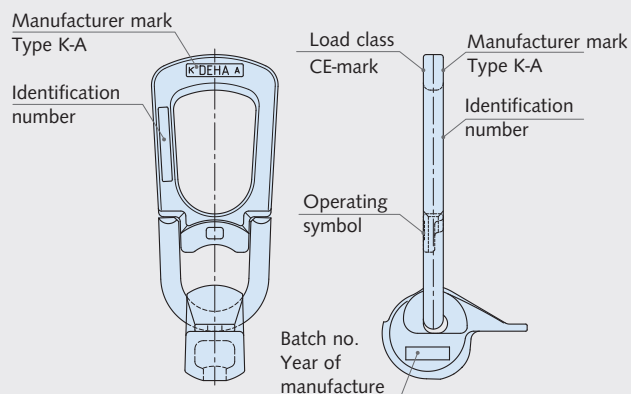
Annual inspection made easy

Each lifting link ordered has a unique identification number. The unique number correctly identifies the lifting link and helps to ensure each unit is checked for operational safety at regular intervals.

The following options are available when ordering:

- A certificate that confirms that all guidelines and quality controlled manufacture are observed; also includes type of lifting link, the identification number and an inspection table
- In addition to the certificate a written report confirming the lifting link was tested to twice its nominal load capacity

Please see our current price list for order numbers.



As with all lifting links, the universal head lifting links must be checked by suitably trained personnel at least once a year to ensure they are in a safe, usable condition. There is no pre-defined life expectancy for universal head lifting links.

We strongly advise against using Leviat products with non-Leviate products.

When checking the universal head lifting links for damage, the following points should be observed: Special attention should be paid to

any deformation and to general wear and tear. The identification on the link must always be legible. If the wear limits stated in the table are not met, then further use of the universal head is not permitted.

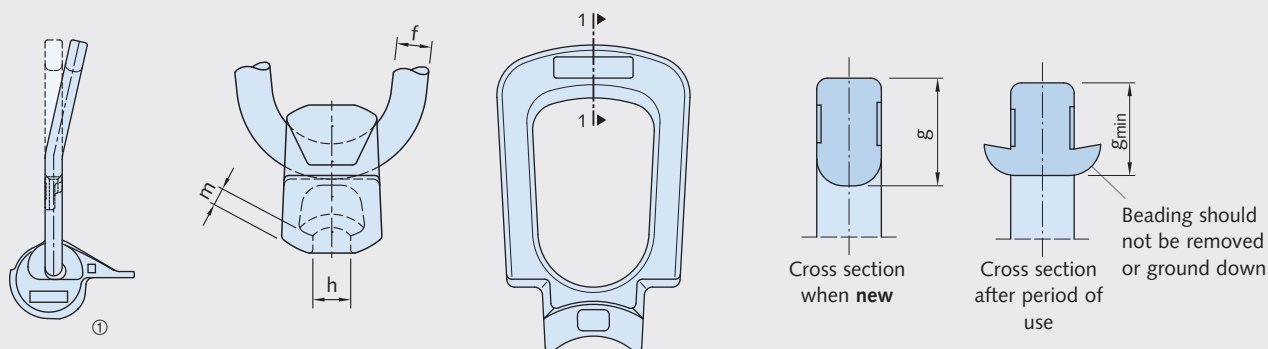
Tolerances for the universal head lifting link

Wear limits for the lip thickness "m" and hole size for "h" [mm]

Load class	1,3	2,5	5,0	10,0	20,0	32,0	45,0
m _{min}	5.5	6.0	8.0	12.0	18.0	24.0	24.0
h _{max}	13.0	18.0	24.5	32.5	47.5	58.0	58.0

Wear limits for minimum link diameter "g" and chain link elongation "f" [mm]

g _{min}	14.0	17.5	28.0	36.0	56.0	80.0	85.0
f _{min}	10.5	12.5	18.5	26.0	36.0	40.0	46.0



① It is prohibited to rebend any element damaged by misuse. Discard the universal head lifting link if there is any significant bending.

HALFEN DEHA KKT SPHERICAL HEAD LIFTING ANCHOR SYSTEM

HALFEN DEHA KKT Spherical Head Lifting Anchor System for Use in Excavation Projects

Moving and turning pipes and shafts

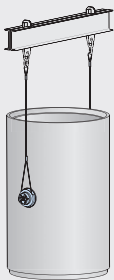
A wide range of spherical head anchors in various load classes and lengths ensures a cost effective and

safe solution for nearly all pipe and shaft applications.

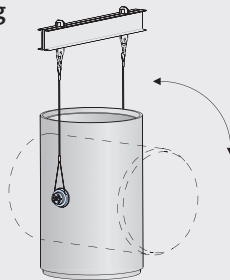
Application example:
Turning large diameter elements is also quick, easy and safe with the turning and lifting link.

Turning pipes

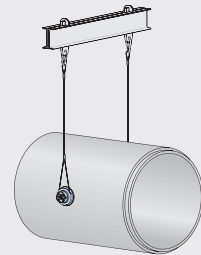
- lifting



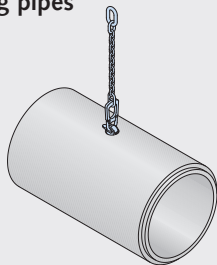
- turning



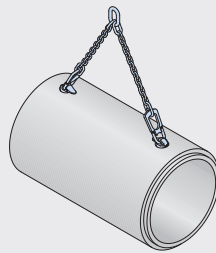
- transporting



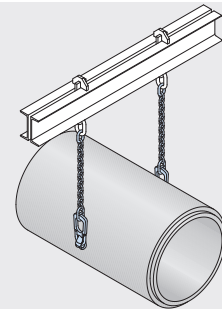
Moving pipes



Moving with one anchor
with low weight:
One anchor in the apex



Moving with two anchors:
Two anchors in the apex



Moving with two anchors in the hunches:
Installation of the anchors in the hunches

Moving shaft elements



Three or four spherical head lifting anchors are used, depending on the size and weight of the element.



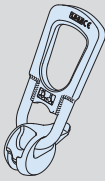
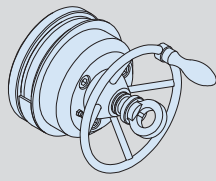

The lifting anchors can be installed in the pipe wall or in the tongue-end of the pipe.



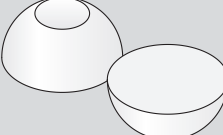
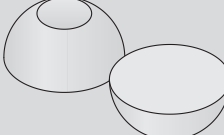
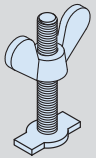

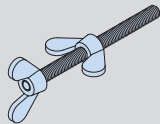
HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING Product Range

Steel recess formers								Accessories for Steel-recess-formers				
Load-class	Round		Trumpet-shaped		Round with magnet		Trumpet-shaped with magnet		Rubber grommet		Double rubber grommet	
	Article name	Order no. 0736.100-	Article name	Order no. 0736.120-	Article name	Order no. 0736.110-	Article name	Order no. 0736.130-	Article name	Order no. 0737.060-	Article name	Order no. 0737.070-
1,3	6150-1,3	00001	6152-1,3	00001	6150-1,3 M	00001	6152-1,3 M	00001	6151-1,3	00001	6151-1,3 D	00001
2,5	6150-2,5	00002	6152-2,5	00002	6150-2,5 M	00002	6152-2,5 M	00002	6151-2,5	00002	6151-2,5 D	00002
5,0	6150-5,0	00003	6152-5,0	00003	6150-5,0 M	00003	6152-5,0 M	00003	6151-5,0	00003-	-	-
7,5	-	-	-	-	-	-	6152-7,5 M	00005	6151-7,5	00004	6151-7,5 D	00004
10,0	-	-	-	-	-	-	-	-	6151-10,0	00005	-	-

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING Product Range

Lifting device										
Load class	Universal head lifting link				Turning and lifting link					
									Installation	
	Article name	Order no. 0738.010-	Article name	Order no. 0738.040-	Link	Order no. 0568.129-	Cable	Order no. 0738.049-	Installation	
1,3	6102-1,0/1,3	00001	6116-1,0/1,3	00001						
2,5	6102-1,5/2,5	00002	6116-1,5/2,5	00002						
5,0	6102-3,0/5,0	00003	6116-3,0/5,0	00003						
7,5	6102-6,0/10	00004	6116-6,0/10	00004	00001 ①	00001				
10,0										
15,0	6102-12/20	00005	6116-12/20	00005						
20,0										
32,0	6102-32	00006	6116-32	00006						
45,0	6102-45	00007	-	-			-	-		

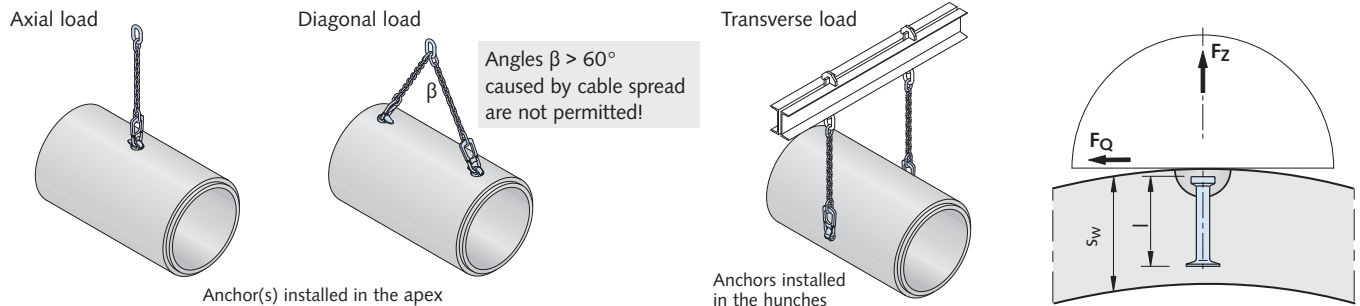
① Load class, please state length and position of ferrule

Recess void fillers and accessories										
Load class	Polystyrene®		VKF Fibre-reinforced concrete		Plate with threaded rod and wing nut		Plate with socket, sleeve with inner thread		Threaded rod with wing nut	
										
	Article name	Order no. 0737.010-	Article name	Order no. 0737.120-	Article name	Order no. 0737.020-	Article name	Order no. 0736.040-	Article name	Order no. 0736.010-
1,3	6015-1,3	00001	-	-	6141-1,3	00001	6153-1,3	00001	S1-08	00001
2,5	6015-2,5	00002	-	-	6141-2,5	00002	6153-2,5	00002	S1-12	00002
5,0	6015-5,0	00003	-	-	6141-5,0	00003	6153-5,0	00003		
7,5	6015-7,5/10	00004	6172-10	00001	6141-7,5/10	00004	6153-7,5/10	00004		
10,0										
15,0	6015-15/20	00005	6172-20	00002	6141-15/20	00005	6153-15/20	00005	S1-16	00004
20,0										
32,0	-	-	6172-32	00003	6141-32	00006	6153-32	00006		

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Spherical Head Anchors in Pipe

Load capacity of the spherical head anchor in pipes



Load capacities of spherical head anchors

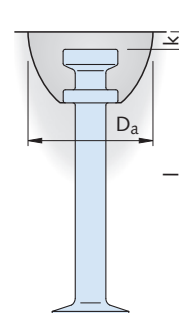
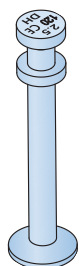
Load class	Article name	Anchor length l [mm]	Pipe wall thickness s_w min [mm]	Load capacity in kN with concrete strength						Minimum axial spacing e_z [mm]
				35 N/mm ²		45 N/mm ²		55 N/mm ²		
				Axial and diagonal load	Transverse load	Axial and diagonal load	Transverse load	Axial and diagonal load	Transverse load	
1,3	6000-1,3-0040	40	75	5.7		6.6		7.2		135
	6000-1,3-0050	50	85							165
	6000-1,3-0055	55	90	13.0	13.0	13.0	13.0	13.0	13.0	165
	6000-1,3-0065	65	100							210
	6000-1,3-0085	85	120							270
2,5	6000-2,5-0045	45	80	5.7	21.2	6.6	24.1	7.2		180
	6000-2,5-0055	55	90	8.6		9.8		10.8		180
	6000-2,5-0065	65	100	21.0		23.8			25.0	210
	6000-2,5-0085	85	120	25.0	25.0	25.0	25.0	25.0	25.0	265
	6000-2,5-0120	120	155	25.0		25.0				375
5,0	6000-5,0-0075	75	115	26.2	41.7	29.7	47.3	32.9		240
	6000-5,0-0085	85	125	30.8	48.9	34.9		38.6		270
	6000-5,0-0095	95	135	35.5		40.3		44.5	50.0	300
	6000-5,0-0120	120	160	48.5	50.0	50.0	50.0	50.0	50.0	375
	6000-5,0-0180	180	220	50.0		50.0		50.0		555
7,5	6000-7,5-0100	100	140	37.4	59.4	42.4	67.4	46.8	74.5	310
	6000-7,5-0120	120	160	47.8		54.2		59.9		370
	6000-7,5-0140	140	180	59.0		66.9		74.0	75.0	430
	6000-7,5-0165	165	205	74.2		75.0		75.0		505
	6000-7,5-0200	200	240	75.0		75.0		75.0		610
10,0	6000-10,0-0115	115	155	44.4	70.6	50.4	80.1	59.7	88.5	350
	6000-10,0-0135	135	175	55.4	88.1	62.8	99.9	69.5		410
	6000-10,0-0150	150	190	64.2		72.8		80.5		455
	6000-10,0-0170	170	210	76.6	100.0	86.9	100.0	96.1	100.0	515
	6000-10,0-0250	250	290	100.0		100.0		100.0		755
15,0	6000-15,0-0140	140	180	57.2	85.8	64.9	97.3	71.7	107.6	415
	6000-15,0-0165	165	205	72.3	108.4	82.0	122.9	90.6	135.9	490
	6000-15,0-0200	200	240	95.3	143.0	108.1	150.0	119.5	150.0	595
	6000-15,0-0300	300	340	150.0	150.0	150.0	150.0	150.0	150.0	895
20,0	6000-20,0-0180	180	220	80.7	114.5	91.5	129.9	101.1	143.6	525
	6000-20,0-0200	200	240	94.1	133.6	106.7	151.5	117.9	167.4	585
	6000-20,0-0240	240	280	122.9	174.5	139.4	197.9	154.1	200.0	705
	6000-20,0-0340	340	380	200.0	200.0	200.0	200.0	200.0	200.0	1005
32,0	6000-32,0-0200	200	250	95.8	117.8	108.6	133.6	120.1	147.7	580
	6000-32,0-0250	250	300	132.6	163.1	150.3	184.9	166.2	204.4	730
	6000-32,0-0280	280	330	156.6	192.6	177.5	218.4	196.3	241.4	820
	6000-32,0-0320	320	370	190.7	234.5	216.2	265.9	239.0	294.0	940

• Reinforcement requirements – minimum reinforcement for construction

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING DSM Quick Fitting Anchor in Pipes

Dimensions and load capacity of quick fitting anchor DSM in pipes

The quick fitting anchor can be used simply and easily where the recess former needs to remain attached to the formwork (for example: over-head production of utility culverts and installation in stair stringer elements).



Dimensions of DSM Quick fitting anchor

Load class	Article name	Order no. 0735.	l [mm]	k [mm]	D _a [mm]
1,3	6073-1,3-0065	110-00009	65	10	60
2,5	6073-2,5-0085	110-00016	85	11	74
	6073-2,5-0120	110-00021	120	11	74

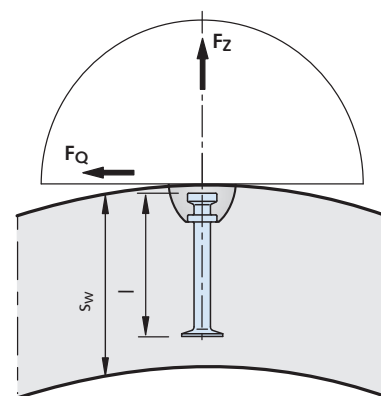
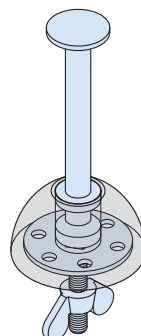
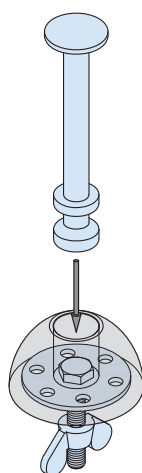
Load capacity of DSM Quick fitting anchor

Load class	Article name	Anchor length l [mm]	Pipe-wall thickness s _w min [mm]	Load capacity in kN with concrete strength					
				35 N/mm ²		45 N/mm ²		55 N/mm ²	
				Axial and diagonal load	Transverse load	Axial and diagonal load	Transverse load	Axial and diagonal load	Transverse load
1,3	6073-1,3-0065	65	100	13.0	13.0	13.0	13.0	13.0	13.0
2,5	6073-2,5-0085	85	120	25.0	25.0	25.0	25.0	25.0	25.0
	6073-2,5-0120	120	155	25.0	25.0	25.0	25.0	25.0	25.0

Apply a small amount of lubricant to the anchor before inserting into the recess former. The centre ring of the quick fitting anchor seals the recess former and simultaneously secures the position of the anchor.

The recess former (Article name 6126, 6127 and 6128) is designed for the quick fitting anchor.

The HALFEN DEHA Quick fitting anchor and the universal head lifting link have the same dimensions; this allows both the universal head lifting link and the turning and lifting link to be used.

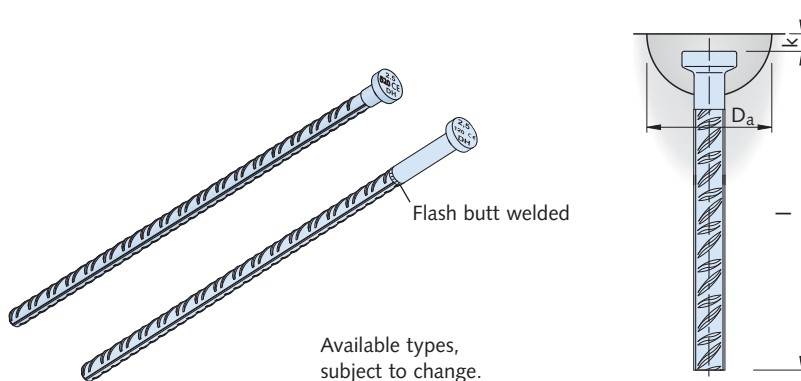


HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Spherical Head Rod Anchors in Shafts

Dimensions and load capacities for spherical head rod anchor in shafts

The spherical head anchor is used in shafts with very thin walls. In very thin precast elements a concentrated load transfer should be avoided, especially when concentrated in the foot. This is why the loads act exclusively through the ribbing in the rebar directly into the concrete.



Available types, subject to change.

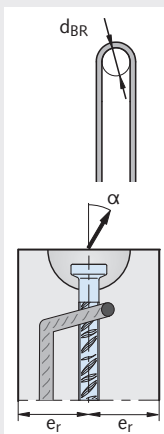
Dimensions – Spherical head rod anchors

Load class	Article name mill finish	Order no. 0735.070-	Article name hot-dip galvanized	Order no. 0735.200-	l [mm]	k [mm]	D _a [mm]
2,5	6050-2,5-0400 WB	00002	6050- 2,5-0400 FV	00030	400	11	74
	6050-2,5-0520 WB	00003	6050-2,5-0520 FV	00031	520	11	74
5,0	6050-5,0-0580 WB	00007	6050- 5,0-0580 FV	00159	580	15	94
	6050-5,0-0900 WB	00008	-	-	900	15	94
7,5	6050-7,5-0750 WB	00009	6050-7,5-0750 FV	00037	750	15	118
	6050-7,5-1150 WB	00010	-	-	1150	15	118
10,0	6050-10,0-0870 WB	00011	6050-10,0-0870 FV	00039	870	15	118
	6050-10,0-1300 WB	00012	-	-	1300	15	118
15,0	6050-15,0-1080 WB	00013	6050-15,0-1080 FV	00041	1080	15	160
	6050-15,0-1550 WB	00014	6050-15,0-1550 FV	00042	1550	15	160

Other lengths on request

Reinforcement and load capacities – Spherical head rod anchors

Load class	Article name	Element thickness 2 × e _r [mm]	Basic reinforcement crosswise [mm ² /m]	Diagonal load Ø × cut length l	d _{BR} [mm]	Allowable load capacity in kN with concrete strength		
						15 N/mm ² Axial and diagonal load up to 30°	25 N/mm ² Axial and diagonal load up to 30°	35 N/mm ² Axial and diagonal load up to 30°
2,5	6050-2,5-0400	80	2 × 100	Ø 12 × 800	34	25.0	25.0	25.0
	6050-2,5-0520	100						
5,0	6050-5,0-0580	100	2 × 140	Ø 16 × 1000	40	40.9 44.2 47.1 50.0	50.0	50.0
		120						
7,5	6050-7,5-0750	120	2 × 160	Ø 20 × 1500	50	66.1 70.1 75.0	75.0	75.0
		140						
10,0	6050-10,0-0870	140	2 × 180	Ø 20 × 1600	50	100.0	100.0	100.0
	6050-10,0-1300	160						
15,0	6050-15,0-1080	160	2 × 240	Ø 25 × 2000	80	150.0	150.0	150.0
	6050-15,0-1550	200						



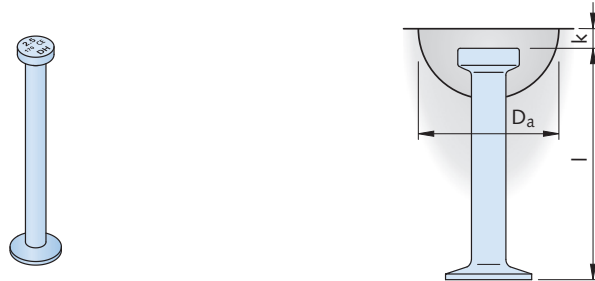
$\alpha \leq 10^\circ \rightarrow$ no shear reinforcement
 $\alpha \leq 30^\circ \rightarrow$ shear reinforcement and full load

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Spherical Head Lifting Anchors in Shafts

Dimensions of the spherical head lifting anchors in shafts

The spherical head anchor is made of a round steel rod with a forged foot and head.



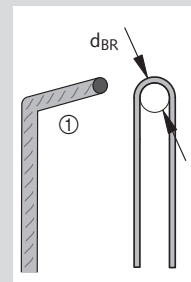
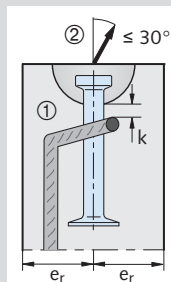
Dimensions — Spherical head lifting anchors

Load class	Article name mill finsh	Order no. 0735.010-	Article name hot-dip galvanized	Order no. 0735-	l [mm]	k [mm]	D _a [mm]
1,3	6000-1,3-0085	00006	6000-1,3-0085 FV	200-00071	85	10	60
	6000-1,3-0120	00007	6000-1,3-0120 FV	200-00072	120		
	6000-1,3-0240	00008	6000-1,3-0240 FV	200-00073	240		
2,5	6000-2,5-0120	00019	6000-2,5-0120 FV	200-00084	120	11	74
	6000-2,5-0170	00020	6000-2,5-0170 FV	200-00085	170		
	6000-2,5-0280	00022	6000-2,5-0280 FV	200-00087	280		
5,0	6000-5,0-0240	00040	6000-5,0-0240 FV	.010-00174	240	15	94
	6000-5,0-0340	00041	6000-5,0-0340 FV	200-00104	340		
	6000-5,0-0480	00042	6000-5,0-0480 FV	200-00105	480		
7,5	6000-7,5-0200	00050	6000-7,5-0200 FV	200-00111	200	15	118
	6000-7,5-0300	00051	6000-7,5-0300 FV	.010-00188	300		
	6000-7,5-0540	00052	6000-7,5-0540 FV	200-00113	540		
10,0	6000-10,0-0170	00058	6000-10,0-0170 FV	200-00119	170	15	118
	6000-10,0-0340	00061	6000-10,0-0340 FV	200-00121	340		
	6000-10,0-0680	00062	6000-10,0-0680 FV	200-00123	680		
15,0	6000-15,0-0300	00066	6000-15,0-0300 FV	200-00127	300	15	160
	6000-15,0-0400	00067	6000-15,0-0400 FV	200-00128	400		
	6000-15,0-0840	00068	6000-15,0-0840 FV	200-00129	840		
20,0	6000-20,0-0340	00074	6000-20,0-0340 FV	200-00134	340	15	160
	6000-20,0-0500	00075	6000-20,0-0500 FV	200-00135	500		
	6000-20,0-1000	00076	6000-20,0-1000 FV	200-00136	1000		
32,0	6000-32,0-0320	00080	6000-32,0-0320 FV	200-00140	320	23	214
	6000-32,0-0700	00082	6000-32,0-0700 FV	200-00142	700		
	6000-32,0-1200	00083	6000-32,0-1200 FV	200-00143	1200		

Other lengths and types in stainless steel A4 on request.

Reinforcement in walls

Load class	Basic reinforcement crosswise [mm ² /m]	Diagonal load reinforcement Ø mm × length - l = [mm]	Bending rolls - Ø d _{BR}
1,3	1 × 125	10 × 650	25
2,5	2 × 100	12 × 800	30
5,0	2 × 140	16 × 1000	40
7,5	2 × 160	20 × 1200	50
10,0	2 × 180	20 × 1500	50
15,0	2 × 240	25 × 1600	80
20,0	2 × 350	25 × 2000	80
32,0	2 × 400	32 × 2000	100



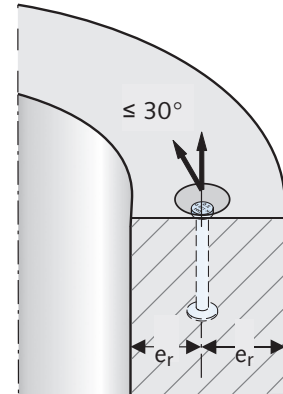
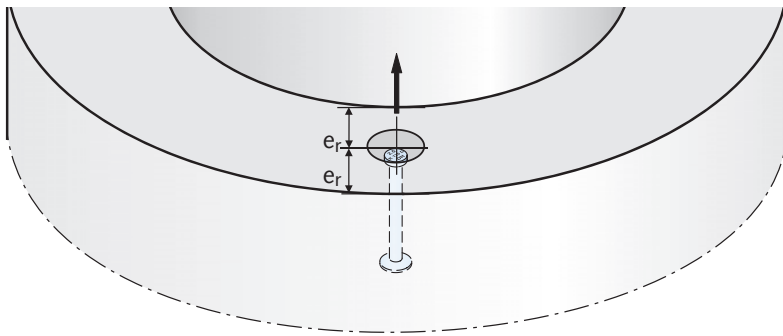
① This reinforcement can be omitted if the edge spacing $e_r \geq e_1$ or if the diagonal load $\leq 10^\circ$.

② Angles larger than 30° are to be avoided. For angles between 30° - 45° the load capacity rate is reduced by 25%.

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Spherical Head Lifting Anchors in Shafts

Load capacities of the spherical head lifting anchors in shafts



Reinforcement according to previous page

Spherical head lifting anchor in shafts; load class 1,3 - 5,0									
Load-class	Article name	Anchor length l [mm]	Wall thickness $2 \times e_r$ [mm]	Allowable load capacity in kN axial and diagonal force up to 30° concrete compressive strength			Edge spacing * e_1 [mm] for		
				15 N/mm ²	25 N/mm ²	35 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²
1,3	6000-1,3-0085	85	100	12.2	13.0	13.0	125	100	100
			120	13.0					
			140	13.0					
	6000-1,3-0120	120	80	13.0	13.0	13.0			
			100						
			120						
6000-1,3-0240	240	60	9.9	12.7	13.0				
		80	13.0	13.0					
		100	13.0	13.0					
2,5	6000-2,5-0120	120	120	18.1	23.3	25.0			
			140	20.3	25.0				
			160	22.4	25.0				
	6000-2,5-0170	170	100	20.7	25.0	25.0			
			120	23.7					
			140	25.0					
6000-2,5-0280	280	80	18.4	23.8	25.0				
		100	23.0	25.0					
		120	25.0	25.0					
5,0	6000-5,0-0240	240	200	45.7	50.0	50.0			
			220	49.1					
			240	50.0					
	6000-5,0-0340	340	160	50.0	50.0	50.0			
			180	50.0					
			200	50.0					
6000-5,0-0480	480	140	46.1	50.0	50.0				
		160	50.0						
		180	50.0						

* The reinforcement is according to page 25 if the edge spacings are $e_r < e_1$ or reduce the load by 25%.

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Spherical Head Lifting Anchors in Shafts

Load capacities for spherical head lifting anchors in shafts

Spherical head lifting anchor in shafts; load class 7,5 – 32,0									
Load class	Article name	Anchor length l [mm]	Wall thickness $2 \times e_r$ [mm]	Load capacity in kN Axial and diagonal load up to 30° concrete strength			Edge spacing * e_1 [mm] for		
				15 N/mm ²	25 N/mm ²	35 N/mm ²	15 N/mm ²	25 N/mm ²	35 N/mm ²
7,5	6000-7,5-0200	200	240	45.1	58.2	68.8	350	200	200
			260	47.8	61.8	73.1			
			280	50.6	65.3	75.0			
	6000-7,5-0300	300	200	54.1	69.9	75.0			
			220	58.1	75.0	75.0			
			240	62.2	75.0	75.0			
	6000-7,5-0540	540	160	63.2	75.0	75.0			
			180	71.1	75.0	75.0			
			200	75.0	75.0	75.0			
10,0	6000-10,0-0170	170	300	46.4	60.0	70.9	400	225	225
			350	52.1	67.3	79.6			
			400	57.6	74.4	88.0			
	6000-10,0-0340	340	280	76.6	98.9	100.0			
			300	80.7	100.0	100.0			
			320	84.7	100.0	100.0			
	6000-10,0-0680	680	160	73.7	95.2	100.0			
			180	83.0	100.0	100.0			
			200	92.2	100.0	100.0			
15,0	6000-15,0-0300	300	350	81.3	104.9	124.2	450	300	300
			400	89.5	116.0	137.2			
			500	106.2	137.1	150.0			
	6000-15,0-0400	400	350	102.5	132.3	150.0			
			400	113.2	146.2	150.0			
			450	123.7	150.0	150.0			
	6000-15,0-0840	840	300	150.0	150.0	150.0			
			340	150.0	150.0	150.0			
			380	150.0	150.0	150.0			
20,0	6000-20,0-0340	340	500	116.6	150.6	178.2	500	350	350
			750	158.1	200.0	200.0			
			1000	196.2	200.0	200.0			
	6000-20,0-0500	500	400	134.8	174.1	200.0			
			500	159.4	200.0	200.0			
			600	182.8	200.0	200.0			
	6000-20,0-1000	1000	240	154.9	199.9	200.0			
			300	190.0	200.0	200.0			
			330	200.0	200.0	200.0			
32,0	6000-32,0-0320	320	600	126.7	163.5	193.5	650	450	450
			800	157.2	202.9	240.1			
			1200	177.2	228.8	270.7			
	6000-32,0-0700	700	500	208.6	269.4	318.7			
			600	239.2	308.8	320.0			
			750	282.8	320.0	320.0			
	6000-32,0-1200	1200	400	272.5	320.0	320.0			
			450	297.7	320.0	320.0			
			500	320.0	320.0	320.0			

* The reinforcement is according to page 25 if the edge spacings are $e_r < e_1$, or reduce the load by 25%.

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

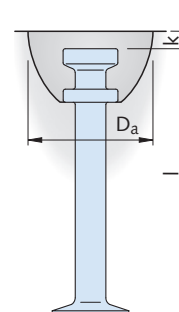
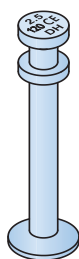
DSM Quick Fitting Anchors

Dimensions and load capacity of DSM quick fitting anchor

Installation requirements for the DSM Quick fitting anchor are similar to the spherical head anchor.

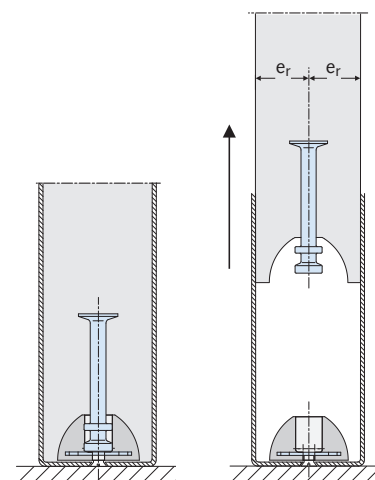
The required reinforcement is the same as for spherical head anchors in shafts.

The anchor is inserted into the recess former by hand, applying a small amount of lubricant.



Dimensions – DSM Quick fitting anchor

Load class	Article name	Order no. 0735.	l [mm]	k [mm]	D _a [mm]
1,3	6073-1,3-0065	110-00009	65	10	60
	6073-1,3-0120	110-00010	120		
2,5	6073-2,5-0085	110-00016	85	11	74
	6073-2,5-0120	110-00021	120		
	6073-2,5-0175	210-00001	175		



Lifting shafts – load capacity

Load class	Article name	Anchor length l [mm]	Element thickness 2 × e _r [mm]	Minimum edge clearance *		Load capacity in kN concrete strength		
						Axial and diagonal load up to 30°		
						15 N/mm ²	25 N/mm ²	35 N/mm ²
1,3	6073-1,3-0120	120	80	125	100	13.0	13.0	13.0
2,5	6073-2,5-0120	120	120	175	125	18.1	23.3	25.0
			140			20.3	25.0	
			160			22.4	25.0	
	6073-2,5-0175	175	100	250	150	20.7	25.0	25.0
			120			23.7		
140	25.0							

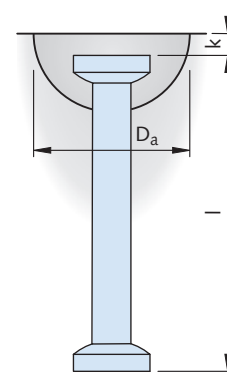
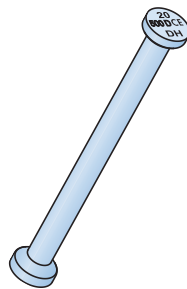
* If the edge distance is $e_r < e_1$ then install reinforcement as described on page 25, or reduce the load by 25%.

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Narrow Foot Lifting Anchors

Dimensions, load capacities and reinforcement the narrow foot anchor

The narrow foot spherical head anchor has a smaller foot than the standard spherical head anchor. The narrow foot spherical head anchor is limited to applications with high concrete strengths.



Dimensions – Narrow foot lifting anchors

Load class	Article name mill finish	Order no. 0735.018-	Article name hot-dip galvanized	Order no. 0735.208-	l [mm]	k [mm]	D _a [mm]
10,0	6000-10,0-0340D	00056	6000-10,0-0340D FV	00056	340	15	118
15,0	6000-15,0-0400D	00057	6000-15,0-0400D FV	00057	400	15	160
20,0	6000-20,0-0500D	00067	6000-20,0-0500D FV	00067	500	15	160
32,0	6000-32,0-0700D	00058	6000-32,0-0700D FV	00058	700	23	214

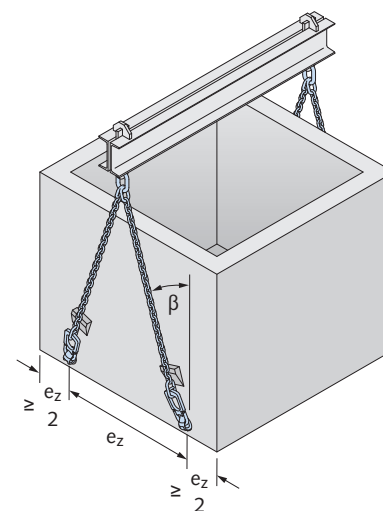
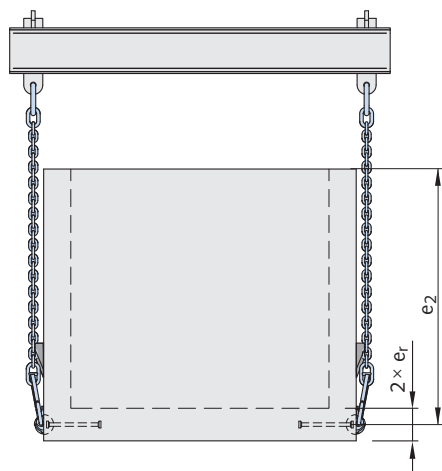
Load capacity with transverse and diagonal load up to 45° [β]

Load class	Article name	Thickness of floor slab 2 × e _r [mm]	Anchor - axial spacing e _z [mm]	Minimum height of rising wall e ₂ [mm]	Transverse stress load capacity in kN concrete strength	
					45 N/mm ²	55 N/mm ²
10,0	6000-10,0-0340D	120	≥ 680	≥ 680	88.0	98.0
15,0	6000-15,0-0400D	120	≥ 800	≥ 800	130.0	145.0
20,0	6000-20,0-0500D	120	≥ 1000	≥ 1000	136.0	151.0
		140	≥ 1000	≥ 1000	173.0	192.0
32,0	6000-32,0-0700D	120	≥ 1400	≥ 1400	189.0	210.0
		140	≥ 1400	≥ 1400	220.0	245.0

The installation of spherical head lifting anchors in the walls of shaft components is often not possible because of the minimal wall thicknesses and the high weight.

In this application, the double head anchor can be installed in the thicker floor. The rising walls allow the head anchor to be subjected to shear loads.

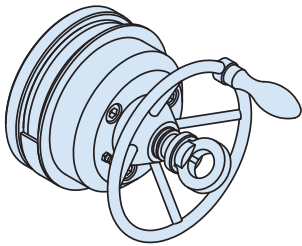
Take appropriate measures during lifting to ensure that precast components are not damaged. Angle spread larger than 30° is not permitted.



HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Lifting Devices

Turning and lifting link



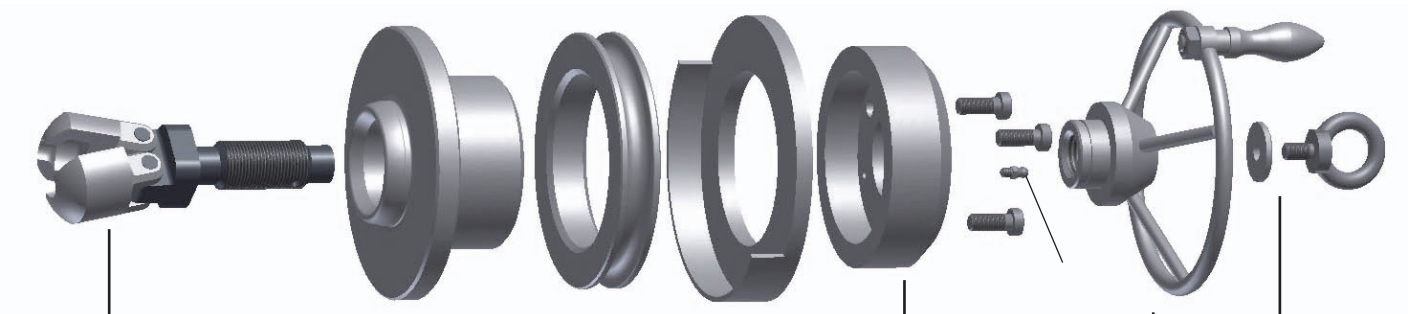
The design concept of this lifting link makes it an optimal lifting device for shear loads as lifting and rotating are possible simultaneously; the HALFEN DEHA Turning and lifting link is a manually operated lifting device.

The system consists of the lifting device and the cast-in HALFEN DEHA Spherical head anchor. Precast elements, especially pipes, which have previously been lifted with the universal lifting head, may not be subsequently lifted with the turning and lifting link.



Before each use visually check all lifting equipment for correct application and damage-free condition. It is prohibited to use damaged lifting equipment.

Parts of the turning and lifting link



SET 1
Mandrel with two-part anchor clutch

SET 2
Pressure plate with bearing ring

SET 3
Cable guide

SET 4
Cable cover

SET 5
Cap including bolts (does not include a grease nipple; standard available part)

Grease nipple

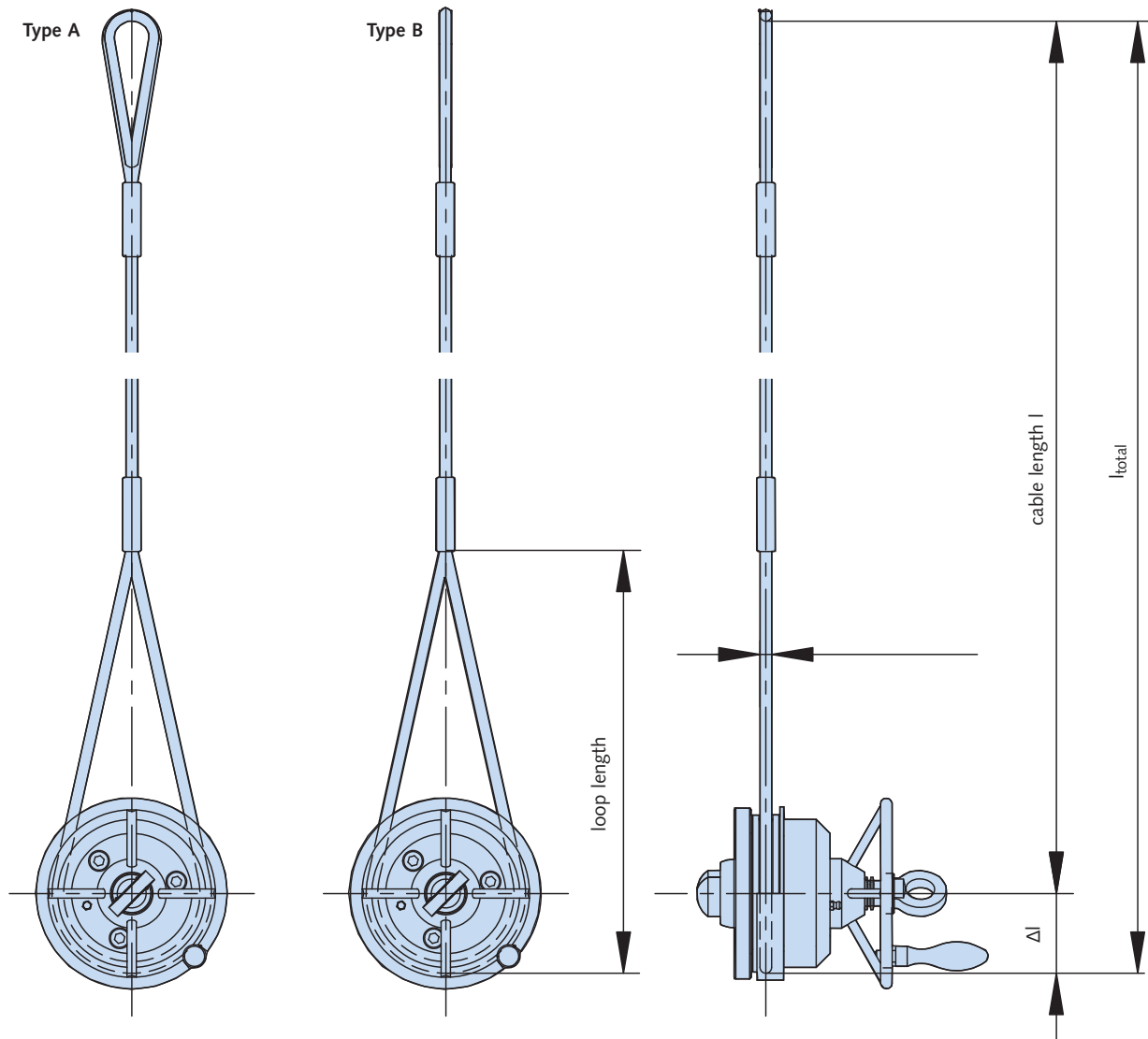
SET 6
Handwheel

SET 7
Ring nut with washer

Replacement sets 1–7; see maintenance instructions for more information

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Lifting Devices



Dimension – Turning and lifting link

Article name	Link Order no. 0738.040-	Cable Order no. 0568.129-	Installation Order no. 0738.049-	for anchor	Cable Ø [mm]	l min. [m]	Δl [mm]
6116-1,3	00001	00001	00004	1,3	10	0.8	60
6116-2,5	00002			2,5	14	1.0	65
6116-5,0	00003			5,0	18	1.2	70
6116-10,0	00004			7,5 and 10,0	26	1.5	80
6116-20,0	00005			15,0 and 20,0	34	1.6	100
6116-32,0	00006			32,0	42	2.0	120

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Lifting Devices

Using the turning and lifting link



The turning and lifting link before use.



Turn the handwheel to open the clutch.



Press tightly onto the anchor head.



Turn the handwheel to secure the lifting link to the anchor.



The handwheel is turned until the turning and lifting link sits tightly against the concrete.

Small diameters and light in weight pipes can be easily positioned by hand using two lifting and turning links attached to two spherical head anchors installed exactly in the axial centre of gravity of the pipe.

Lifting and turning pipes using two hooks

Lifting



Rotating



Transporting / moving



Lifting and turning larger pipes using three hooks

Lifting



Rotating



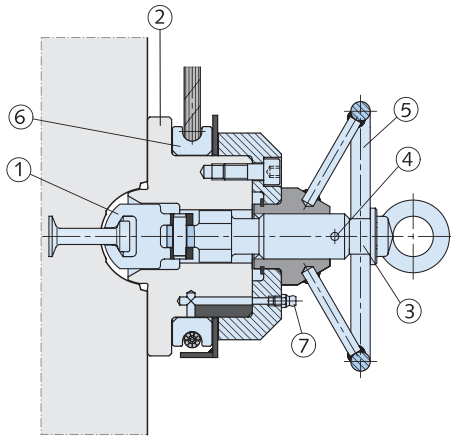
Transporting / moving



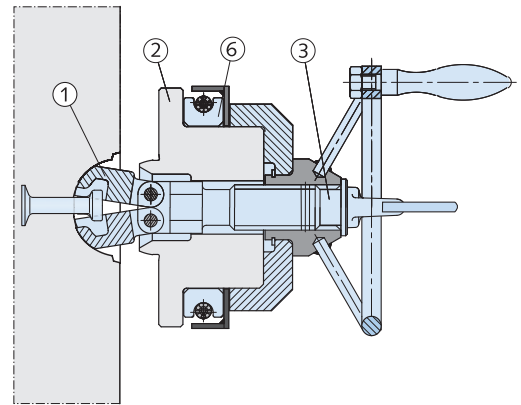
HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Lifting Devices

Use and maintenance of the turning and lifting link



- ① 2-part anchor link
- ② Pressure plate with bearing
- ③ Mandrel
- ④ Monitor hole
- ⑤ Hand wheel
- ⑥ Cable guide
- ⑦ Grease nipple



1. Checking the cables

The turning and lifting link must be stored in a clean and dry environment. Do not store in the open without sufficient protection.

The inside of the link must be lubricated at regular intervals.

Apply a suitable cup grease using a grease gun; for easy application a nipple is conveniently located on the link.

The cables must be checked regularly.

Use brushes and penetrating oil to clean and check the loops.

This check should also include the loop and ferrules.

Avoid contact with aggressive substances that can cause corrosion; acids, alkalis and similar.

Alterations, particularly welding and re-cutting threads, are **not permitted**.

Observe the regulations in DIN 3088 to determine discard periods for lifting cables.

The cables must be discarded if the following number of broken wires are visible:

- 4 broken wires in a cable length of 3 times the rope diameter
or
- 6 broken wires in a cable length of 6 times the rope diameter
or
- 16 broken wires in a cable length of 30 times the rope diameter

Cables must not be used with the following defects:

- breakage in a loop
- compressive deformation
- kinking
- bird-caging
- damage to the cable end connections
- especially heavy wear
- signs of corrosion
- or other obvious serious damage

A record must be kept including details of the type of maintenance done.

2. Visual checking

Check the condition of the turning and lifting link. The hand wheel and the cable guide may be slightly deformed, but must be correctly installed in order to use the lifting link. It is only permitted to open and close the turning and lifting link by hand (no tools are to be used). Ensure the cable moves freely and is not trapped or hindered by the cable cover.

3. Checking the mandrel movement

The mandrel must open and close smoothly without using tools. The mandrel is not to be forced beyond its designed stopping points.

4. Grease nipple

The turning and lifting link must be regularly greased to ensure the clutch moves freely. Use a suitable cup grease applied via the grease nipple. If the grease nipple is damaged or missing, replace with an original part.

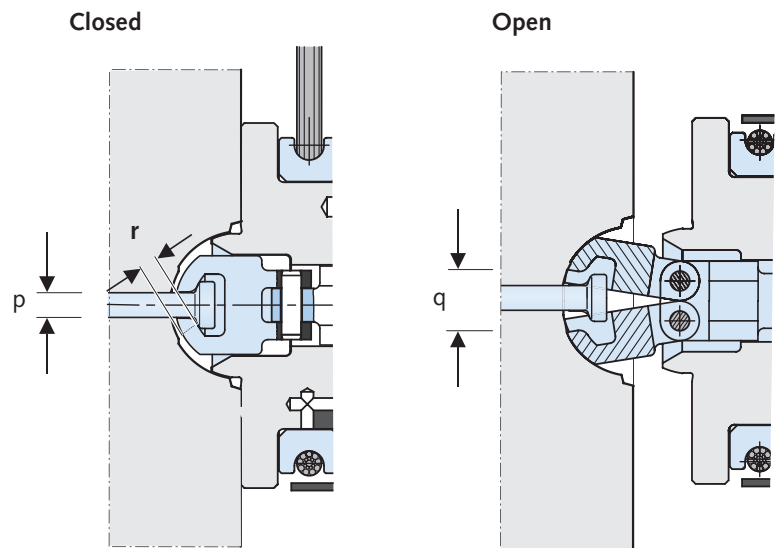
HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Lifting Devices

5. Anchor clutch

Checking the anchor clutch for wear and tear.

Clutch wear limits			
Load class	p [mm] max.	q [mm] min.	r [mm] min.
1,3	11.5	17.5	4.5
2,5	16.5	24.0	7.2
5,0	23.0	34.5	9.0
10,0	31.0	44.4	11.8
20,0	43.0	67.0	18.5
32,0	54.0	85.5	23.8



6. Maintenance

The contractor is responsible for ensuring that suitably trained personnel check the turning and lifting link before each use and that any damage has been repaired.

The contractor is responsible for ensuring that the turning and lifting links are checked by a qualified expert at least once a year (refer to VBG 9a §39 and §40).

All parts of the link, for example the retaining pin and threads, are subject to a certain amount of wear and tear. The two parts of the link held together by the retaining pin must be able to move freely, the pin in the link should ideally have only a minimal amount of movement. The two part link must be disassembled for maintenance after approximately 100 lifts; any worn or damaged parts must be replaced (use **original** replacement parts).

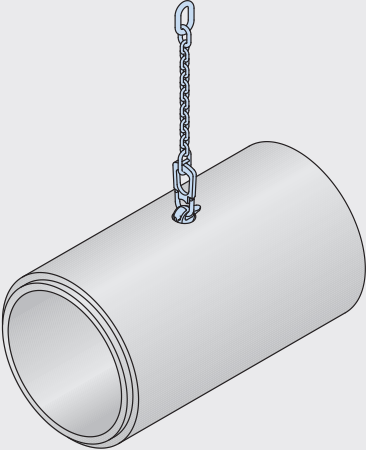
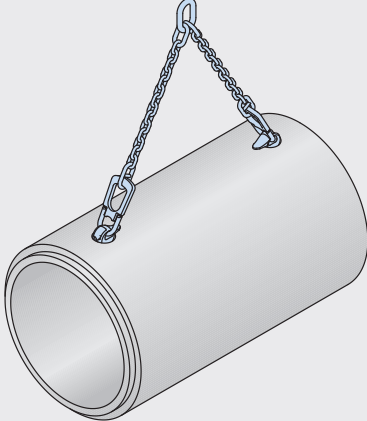
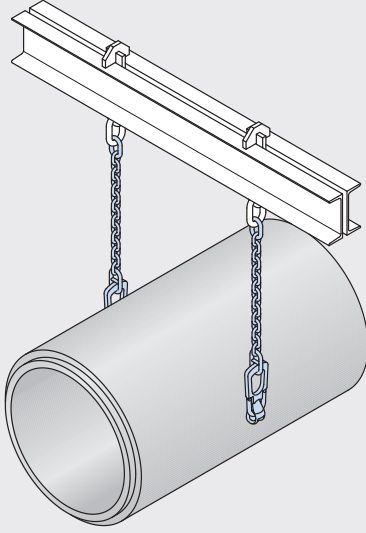
Clean and lubricate the threads and the inside of the link, in particular remove any concrete residue and other impurities.

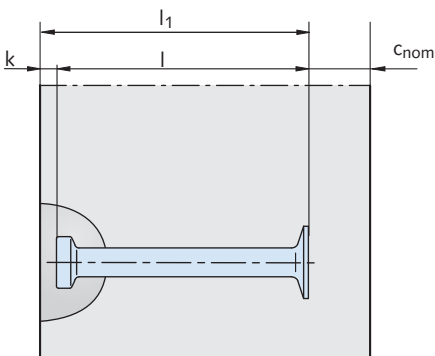
The inside of the link must be lubricated at regular intervals. Apply a suitable cup grease using a grease gun; to ease application, a grease nipple is conveniently located on the link. The cables must be checked regularly.

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Positioning and Dimensioning of Lifting Anchors

Positioning and dimensioning of lifting anchors in pipes

		
1 anchor in the apex	2 anchors in the apex	2 anchors in the haunches
Angle spread = 0° Factor 1.0	Angle spread ≤ 60° Factor 1.16	Angle spread = 0° Factor 1.0
Dynamic factor (→ see page 17)	Dynamic factor (→ see page 17)	Dynamic factor (→ see page 17)
Load per anchor, $F_z = F_G \times 1.65$	Load per anchor, $F_z = F_G \times 1.16 \times 1.65 / 2$	Load per anchor, $F_z = F_G \times 1.65 / 2$
		The anchors must be positioned at centre of gravity



The shock factor coefficient takes the moment of lift or loads into account when moving the pipe on-site. Depending on terrain and the type of machinery used the shock factor can be considerably higher than the recommended value. With heavy pipes, weight ≥ 12.0 t, it is possible to calculate with a reduced shock factor of 1.3, unless previous

experience suggests otherwise. The maximum spread angle must be ≤ 60°. The required transport anchor length depends on the concrete strength at the time of the first lift.

The minimum wall thickness of a pipe depends on the required anchor length (l), the head clearance of the lifting anchor (k), and the required concrete cover at the base of the component ($c_{nom} \geq 25 \text{ mm}$).

Dynamic loads

The effect of dynamic loading depends mainly on the lifting equipment between the crane and the load lifting head. Cables made of steel or synthetic fibre have a damping effect. With increased cable length the damping effect is greater. Short chains

however have an unfavourable effect. The forces acting on the lifting anchors are calculated taking the shock factor ψ into account. Depending on the situation and circumstances, it is possible to deviate considerably from the recommended shock factors in the following table. Where appropriate use the values stated in DIN 15 018.

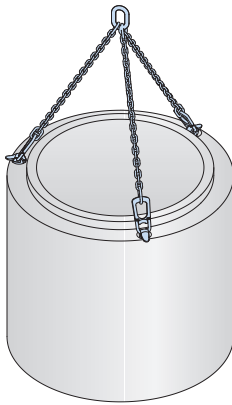
Recommended dynamic factors ψ_{dyn}^*	
Lifting unit	Shock factors ψ_{dyn}^*
Tower crane, gantry crane, mobile crane	1.3
Lifting <u>and</u> moving on level terrain	2.5
Lifting <u>and</u> moving on uneven terrain	≥ 4.0

* If other values from reliable tests or through proven experience are available for ψ_{dyn} , then these may be used for calculation

HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Positioning and Dimensioning of Lifting Anchors

Positioning and dimensioning of lifting anchors in shafts



Depending on weight and size, the shaft elements are moved using 3 or 4 spherical head anchors.



Anchors are positioned in the tongue end or in the side walls

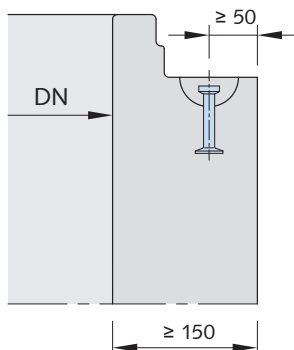


Installation in the tongue end

A load increase diagonal pull factor of 1.16 must be considered if the anchors are installed in the tongue end of the pipe (max. chain spread angle: 60°). A load increase factor of 1.65 for pipes DN 1200 must be considered for dynamic loading of the anchor during transport. For DN 1500 this factor is 1.30. The concrete strength at the time of the initial lift of anchor must be at least 25 N/mm^2 .

The following anchors are suitable for use in the tongue end of shafts ends

- max. $G = 2 \text{ t}$
3 items art. no. 6000-1,3-0120
- max. $G = 4 \text{ t}$
3 items art. no. 6000-2,5-0170
- max. $G = 6 \text{ t}$ ①
4 items art. no. 6000-2,5-0170



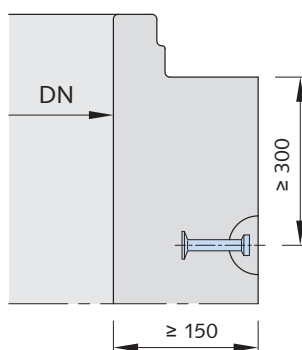
Side installation

When lifting use extra edge protection as required if the anchors are installed at the sides of the pipe. The distance of the anchor to the top edge of the (concrete) component must be at least 30 cm. Four anchors are normally required for this type of installation:

- max. $G = 3 \text{ t}$
4 items art. no. 6000-1.3-0065 ①
- max. $G = 6 \text{ t}$
4 items art. no. 6000-2.5-0085 ①

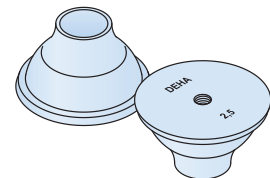
Transport anchors, load class 5,0 must be installed if the total weight is more than 6 t:

4 items, article no. 6000-5-120 ①
The concrete cover in the bottom is then only 15 mm.

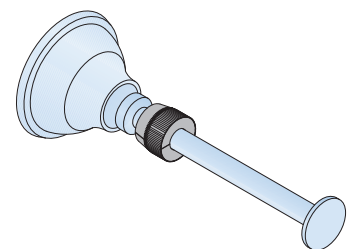


Installing the anchors

The anchors are installed using the metal recess former article no. 6150. Depending on the production method and manufacturer, custom shapes may be preferred.



The recess former is fastened to the socket by welding or with bolts. Metal recess formers with magnetic holders have proven suitable with two-part sleeves. The anchor is held in position in the recess former by two rubber grommets.



① Use a compensating hoist or a spreader beam when lifting.

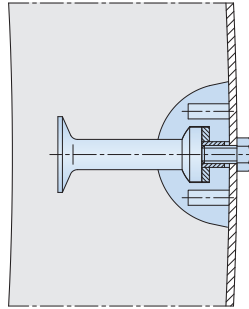
HALFEN DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

Positioning and Dimensioning of Lifting Anchors

Removing the formwork

When striking the formwork the rubber grommet stays on the anchor shaft (the rubber grommet is reusable).

Anchor head and rubber grommet should be well lubricated with formwork wax. To prevent ingress of cement slurry, the anchor shank and recess former must be treated with formwork wax.



Note:

Do not use soaping agent or lubricant. Round rubber recess formers are well proven for side installation of anchors. These are screwed firmly into the required position in the formwork.

Note:

Use a plate with inner thread. Remove the retaining screws before striking the formwork.

Lifting

Shaft bases and rings must be transported with precision, creep speed lifting equipment. All building machinery must comply with accident prevention regulation DGUV. Slow, shock free lifting, lowering and transporting are a prerequisite for structural integrity of the lifting anchor. It follows that sudden loading such as jerky lifting and lowering, hard positioning or dropping, is not permitted.

4-point hoists must be strictly of the compensated type.

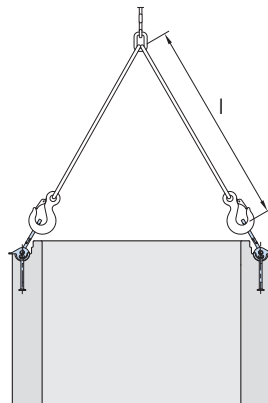
For load carrying use hoists according to DIN 3088, or chains according to DIN 5687-8. The load capacity of each individual length, considering a maximum spread angle of 60°, is based on the rated load capacity of the lifting device (universal head link).

All lifting gear equipment must be checked at least once a year by a qualified expert. Records must be kept for all lifting hoists.

The "guidelines for cables and chains in lifting gear in construction", issued by the building trade, must be observed.

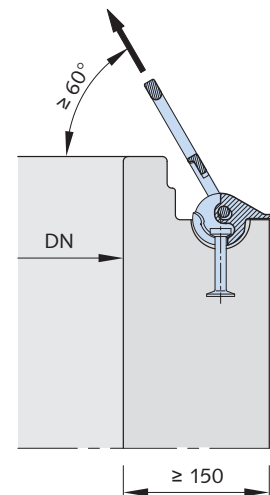
The length of the lifting gear is calculated as following;

- DN 1000: $l \geq 1200$ mm
- DN 1200: $l \geq 1400$ mm
- DN 1500: $l \geq 1700$ mm



It is important to ensure that the tongue and groove end of the shaft elements are not damaged. The maximum spread angle is limited to 60°.

Take appropriate measures to protect the ends and edges of the concrete shaft with anchor side installation.



Make sure that the recess is clear of any impurities such as sand, concrete residue or ice before engaging the universal lifting link. Engage the link manually; tools of any kind, hammer or similar are not permitted.

Defective or damaged anchors (for example corrosion damage) must not be used for lifting. The anchor may not be used if there is any damage to the concrete which may compromise the load capacity.

Use quick-set mortar to seal the recesses after the elements have been positioned and installed.





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