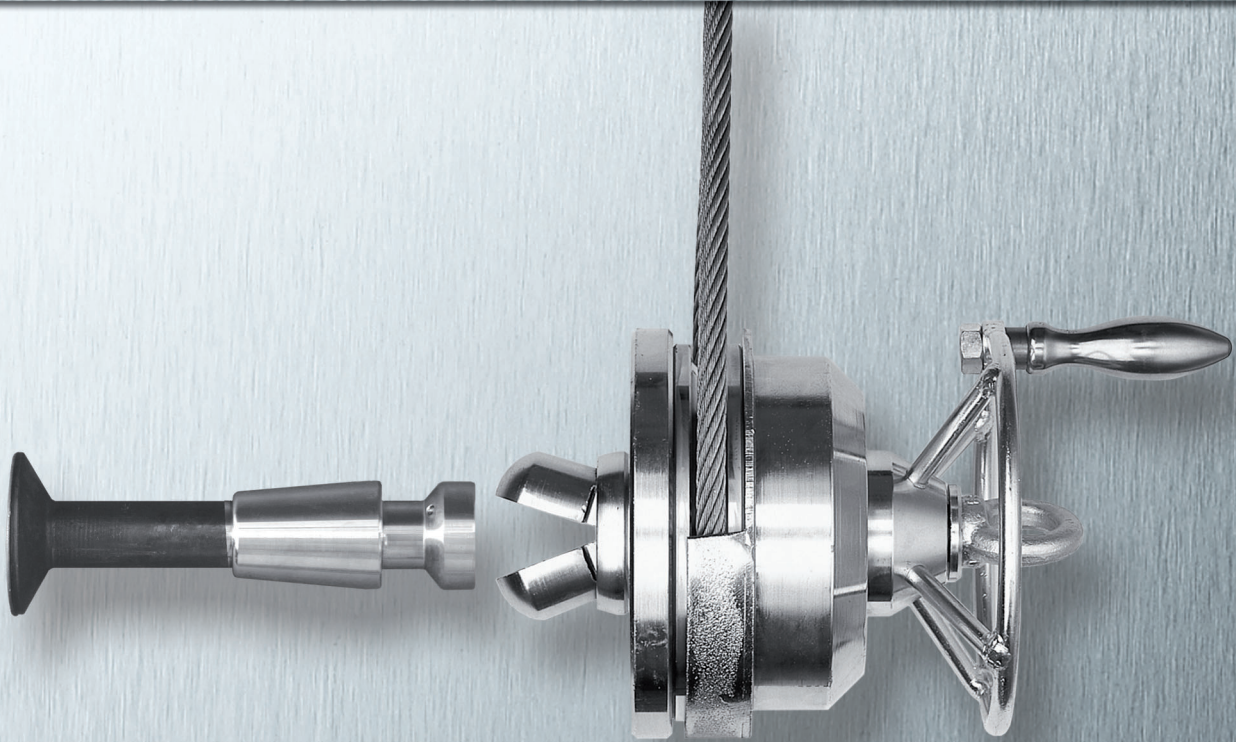


# LIFTING ANCHOR SYSTEM CIVIL ENGINEERING

## TECHNICAL PRODUCT INFORMATION



LIFTING ANCHOR SYSTEM CIVIL ENGINEERING

TT 17-E

CONCRETE

This catalogue conforms to the installation and application instructions according to the **VDI/BV-BS 6205** guidelines



**HALFEN**  
YOUR BEST CONNECTIONS

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Product Information

Certified quality from HALFEN – Connected to safety.



*The DEHA Lifting anchor system meets the requirements of the European machine guideline (MD) 2006/42/EC. The required steel load capacity for lifting systems is defined in these guidelines.*

To also ensure safe use of lifting anchor systems with the required resistance values for cast-in anchors, DEHA Lifting anchors and lifting anchor systems also meet the requirements of VDI/BV-BS regulation 6205.

The guideline "Lifting Anchors and Lifting Anchor Systems for concrete components" is based on up-to-date technology in this field.

HALFEN ensures a constant high standard of safety for its lifting anchors and systems by complying with the requirements set out in these regulations.

To guarantee a high level of safety all DEHA Anchors and anchor systems are subjected to regular in-house and third-party quality control.

To confirm conformity with the MD 2006/42/EC in connection with VDI/BV-BS 6205 all DEHA Lifting anchor systems are CE marked.

**This catalogue is an installation and application instruction as defined in VDI/BV-BS 6205.**

## HALFEN – dependability

- high ductility – high performance, even in extreme situations
- increased reliable cold-toughness – same characteristics irrespective of environmental conditions
- Quality control – for reliable application



Specially tempered steel guarantees high elastic and plastic properties. The required unique steel composition to achieve product characteristics are specified by HALFEN. Numerous tests and many years of experience guarantee best possible results and highest confidence in all applications.



The special composition of the steel ensures constant optimal characteristics (temperature independent).

Steel used by HALFEN exceeds the requirements of DIN EN 10025.



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

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

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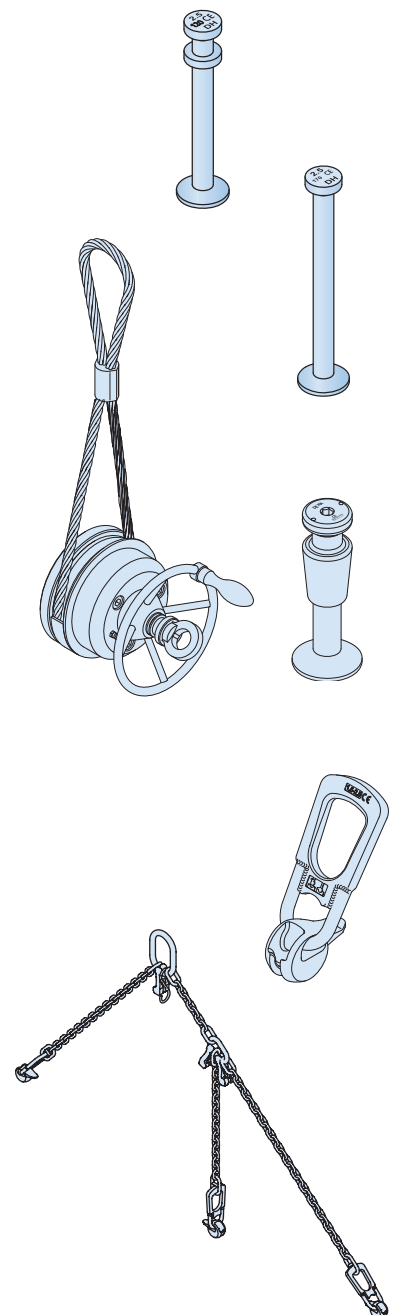
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# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

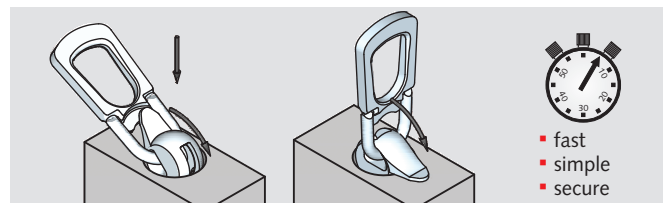
## Overview of System Advantages



The DEHA Spherical head transport anchor is a high quality and cost effective system for transporting all types of precast concrete elements. Application is possible for especially heavy precast elements with individual anchor loads of 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 transport application.

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



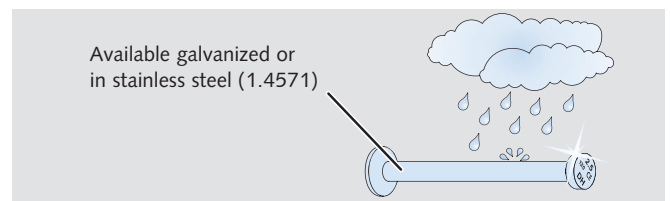
The only quick release lifting clutch capable of capacities from load class 1,3 to a maximum load class of 45,0.



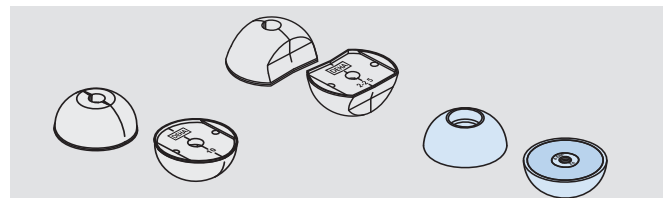
A wide selection of anchors in high killed steel quality "special grade"; with an alloy composition specially designed for transport application in any environment.



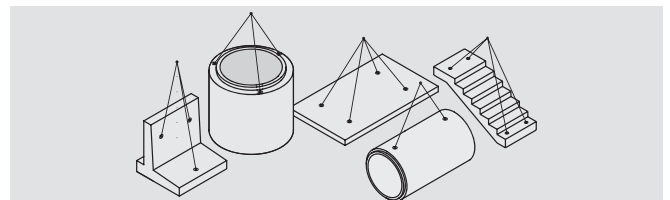
The DEHA Spherical head transport anchors are available mill finished, hot-dip galvanized and in stainless steel.



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



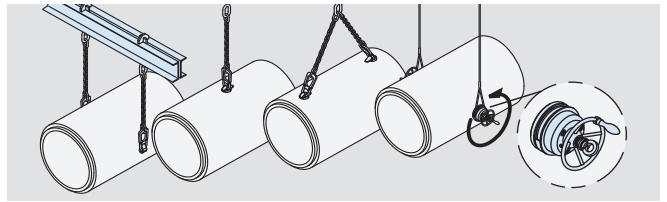
Suitable for lifting and transporting almost any shape and size of precast element in load class 1,3 up to 45,0.



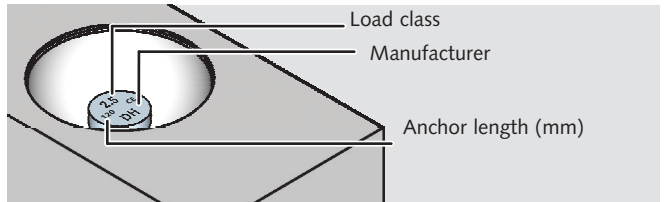
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Overview of System Advantages

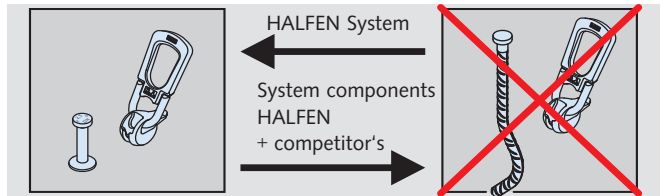
The ideal transport anchor for installation in concrete pipes; can also be used as a turning and lifting link.



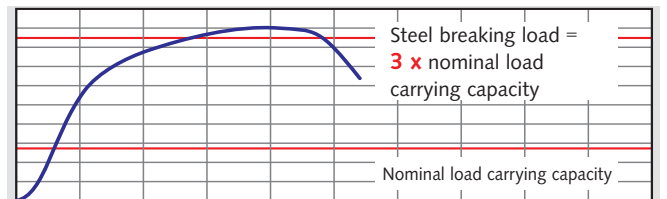
Mixups are avoided! All anchors are marked with the load class, the anchor length and the manufacturer's identification; all systems are easily and safely identified even after installation.



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.



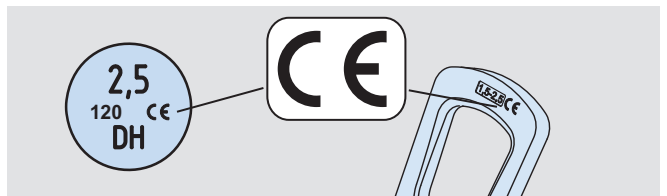
Extensive certified quality system that monitors the complete production process; starting with incoming raw materials, monitoring at every stage of production and quality check of the finished product.



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



All lifting links and anchors are CE marked.




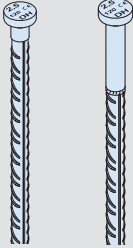


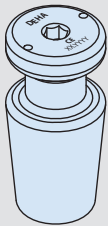
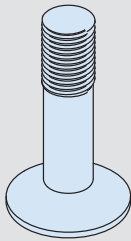
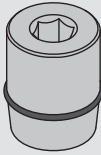
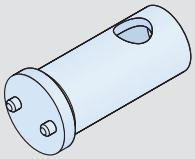
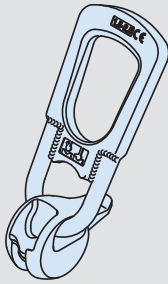
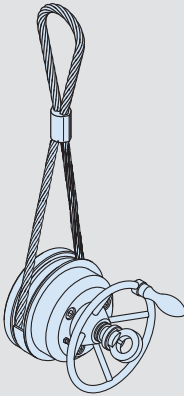

All HALFEN production facilities are certified according to ISO 9001.

"The Quality Management System of Halfen GmbH is certified for the locations in Germany, France, the Netherlands, Austria, Poland, Switzerland and the Czech Republic according to ISO 9001:2008, Certificate No. 202384-2016-AQ-GER-DAkKS."



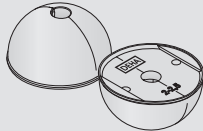
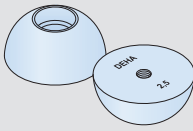
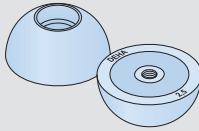
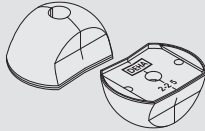
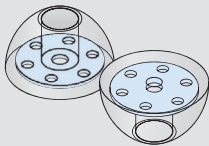
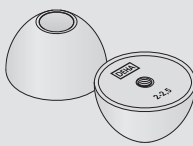
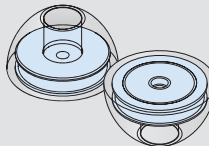
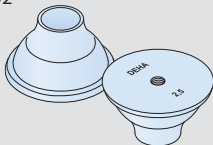
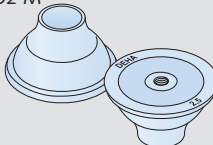
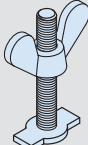

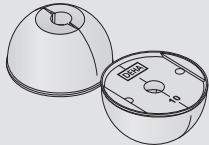
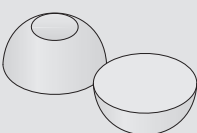
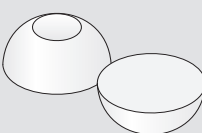
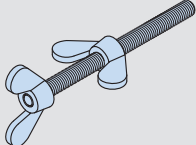
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Overview of System

DEHA Spherical head anchors				
	Spherical head anchor	Spherical head rod anchor	Narrow foot spherical head anchor	DSM Quick fitting spherical head anchor
	6000 	6050 	6000D 	6073 
Application	suitable for pipes and shaft elements	suitable for thin-walled shaft elements	for use in shaft walls and precast elements with high concrete strengths	easy and safe to use, especially when used in difficult to access formwork
Load class	1,3 – 45,0	2,5 – 15,0	10,0 – 32,0	1,3; 2,5 and 5,0
Conical pipe anchor for use in pipes with increased concrete cover				
	DKR Adapter head	DKR Conical pipe anchor (shaft)	DKR Plastic sealing caps	Tool for DKR
	6004 	6003 	6171 	6175 
	removable head for the DKR-System; can be used repeatedly	shaft for the DKR-Anchor (stays in the concrete)	screwable sealing cap	this tool is used if the adapter head cannot be removed with a standard Allen key
Load class	10,0; 20,0 and 32,0	10,0; 20,0 and 32,0	10,0; 20,0 and 32,0	10,0; 20,0 and 32,0
Lifting devices				
	Universal head lifting link	Turning and lifting link	Pipe installation device	
	6102 	6116 	6112 	
Application	lifting device for all spherical head lifting anchors	for turning heavy large size reinforced pipes	for transporting and laying concrete pipes with cast-in lifting anchors	
Load class	1,3 – 45,0	1,3 – 32,0	2,5 – 20,0	

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Overview of System

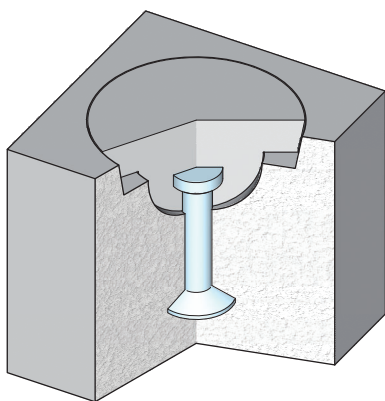
Recess-formers and accessories				
For spherical head anchors	Rubber recess former, round	Steel recess former, round	Magnetic steel recess former, round	Rubber recess former, narrow
	6131 	6150 	6150 M 	6137 
Application	for all spherical head anchors excluding DSM Quick fitting (action) and pitching anchors	for all spherical head anchors excluding DSM Quick fitting (action) and pitching anchors	for all spherical head anchors in metal formwork excluding pitching anchors and DSM	for all spherical head anchors excluding DSM Quick fitting (action) and pitching anchors
Special characteristics	good resistance against formwork oils	especially suitable for overhead work	durable, magnetic	for small recesses in thin concrete precast elements
Load class	1,3 – 32,0	1,3 – 5,0	1,3 – 5,0	1,3 – 20,0
For DSM Quick fitting spherical head anchor	Polyurethane recess former for DSM, round		Rubber recess former for DSM	Magnetic recess former for DSM
	6127 		6128 	6126 M 
Application	for DSM Quick fitting spherical head anchor			for DSM Quick fitting spherical head anchor for use with steel formwork
Special characteristics	specially adapted for quick fitting spherical head anchor			magnetic
Load class	1,3; 2,5 and 5,0		1,3 and 2,5	1,3; 2,5 and 5,0
For spherical head anchors in thin concrete precast components i.e. components with high stress	Trumpet steel recess former	Magnetic trumpet steel recess former	Plate with threaded rod	Plate with socket
	6152 	6152 M 	6141 	6153 
Application	especially suitable for pipe construction		used to secure the rubber recess formers	
Special characteristics	durable	durable, magnetic	when removing formwork in longitudinal direction of the threaded rod	when removing formwork at right angles to the threaded rod
Load class	1,3 – 7,5		1,3 – 32,0	
Recess former (for the DKR Anchor)	Recess void filler VKF, Fibre reinforced cement	Recess void filler, Polystyrene	Threaded rod with wing nut	
	6173 	6172 	6015 	S1 
Application	only for the DKR Anchor	for permanent sealing of recesses	used to seal recesses to prevent ingress of dirt, water or ice	for fixing recess formers
Special characteristics	high durability, good resistance against formwork oils			for fixing recess formers to formwork
Load class	10,0; 20,0 and 32,0	7,5 – 32,0	1,3 – 20,0	

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Conical Pipe Anchor System

### Product information

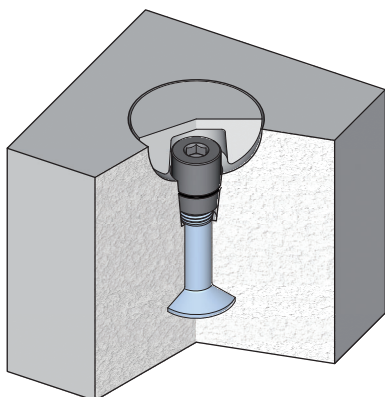
In some cases reinforced concrete pipes require a larger concrete cover for all metal elements. This can only be achieved with the standard lifting anchor if the anchor is cast deeper into the concrete. The larger concrete cover results in deeper recesses especially for anchors of load class 20,0 and 32,0.



Recessed spherical head anchor

These recesses must be completely filled to guarantee the required concrete cover.

As an alternative HALFEN can supply a suitable anchor; DEHA Conical pipe anchor (DKR).



DKR Conical pipe anchor

### Solution: The DEHA Conical pipe anchor system



▪ **Reusable DKR Adapter-head**  
The DKR Adapter head matches the lifting link used (universal head lifting link as well as the turning and lifting link).



▪ **Conical pipe anchor (shaft)**  
Installing the DKR-Anchor guarantees the proven anchorage capability of the spherical head anchor: The large head allows short anchor lengths.



▪ **Sealing cap**  
Is screwed onto the anchor shaft to prevent corrosion of the anchor.

▪ **Recess former**  
For fixing the DKR-Anchor to the formwork the recess former matches the shape of the DKR-Anchor.



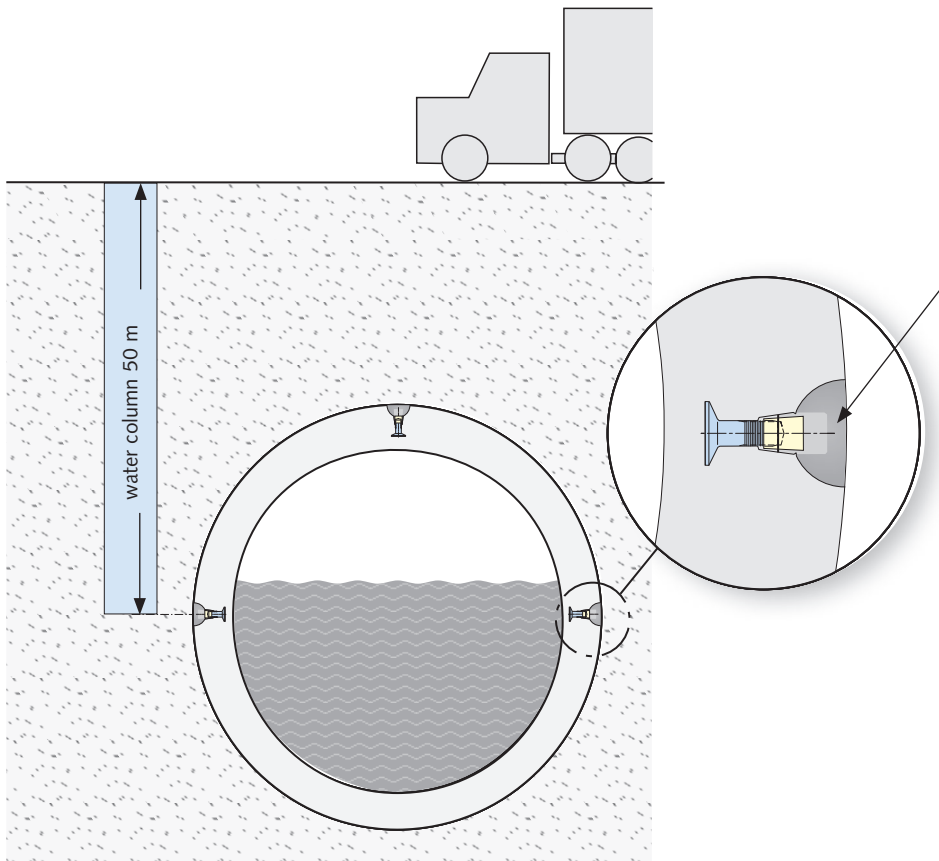
▪ **Recess void filler**  
The filler is used to permanently seal recesses in concrete to prevent ingress of dirt, water and ice. Watertight for pressures of up to 5 bar when used with suitable adhesive.



# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Void Fillers

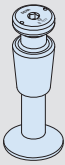
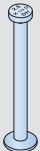
### Recess void fillers for DKR Anchors and Spherical head lifting anchor



Fibre reinforced concrete fillers used in combination with the DKR Anchor system are watertight for water pressure of up to 5 bar if an adhesive suitable for this level of pressure is used.

Tested by the **ikt** Institut für Kanaltechnik (Institute for Pipe Technology) in Gelsenkirchen, Germany



Applicable load classes for the recess fillers							
Load class		7,5	10,0	15,0	20,0	32,0	45,0
DKR-Anchor			●		●	●	
KKT-Anchor no special requirements on watertightness		●	●	●	●	●	●



### Advantages of the recess filler:

- available for all DKR Systems
- meets all the requirements for watertight concrete according to DIN
- watertight up to 5 bar\*
- certification available
- suitable for load classes 7,5-32,0 as recess filler for KKT-Anchors

\* If using a watertight adhesive suitable for pressures of up to 5 bar.

Recommended adhesives: **Carbolan** or **Carbopast**

Supplier: Minova, Essen / Germany.

All test requirements were met when using this product.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Installation and Application Instructions

### Safety regulations

Safety regulations apply to mass-produced lifting anchors and systems for lifting prefabricated concrete elements with lifting systems.

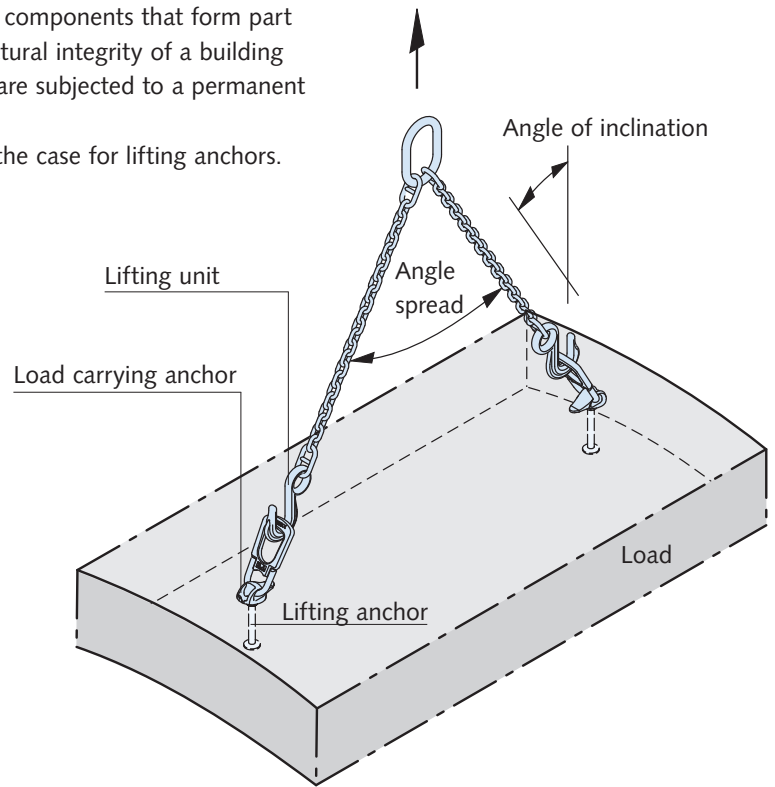
A lifting system, as defined in the safety regulations, is the combination of precast concrete with permanent cast-in anchors and the temporarily attached lifting device.

Lifting and anchoring systems must be constructed for their intended purpose; a safe, reliable lifting of precast elements.

Construction approvals issued by the German Institute for Construction Technology in Berlin (DIBt) are only

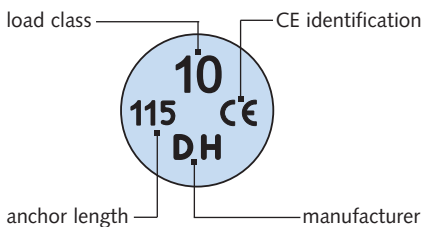
granted for components that form part of the structural integrity of a building and which are subjected to a permanent load.

This is not the case for lifting anchors.



### Identification

All DEHA Lifting and hoisting equipment is clearly and visibly marked. According to safety regulations for lifting anchors and systems, identification markings for all lifting elements must remain clearly visible, even after installation.



### Installation and application

The following technical specifications must be observed when using the DEHA Lifting anchor system.

Mixing system parts from different manufacturers is prohibited; repeated use of a lifting anchor is not permitted. Multiple lifting within one transport chain from production to final installation of an element is not regarded as repeated use.

Lifting with incorrectly installed or damaged components, for example elements with visible deformation or damage caused by corrosion, is forbidden.

The installation and assembly instructions for all lifting systems used in a precast plant or on a construction site must be readily available on-site. It is the responsibility of the plant management or the construction site project management to ensure that operators and users read and understand the safety instructions before installation and use.

### Dimensioning – Safety

Safety factors	
Steel failure in the anchor:	$\gamma = 3$
Concrete failure:	$\gamma = 2.5$
Failure of lifting device:	$\gamma = 4$

### Quality management

All required tests on the lifting anchors are carried out as part of an internal quality assurance according to ISO 9001.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Installation and Application Instructions

### Lifting anchor application

The load capacity of lifting anchors is dependent on the dimensions of the finished component, edge clearance, the type of lifting anchors as well as their positions and the concrete quality (concrete strength at time of first lift).

### Choosing the anchor

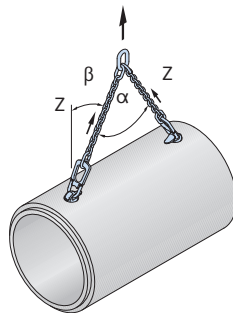
The anchor length is critical. Refer to the relevant table for load capacity, edge clearance and installation and other critical values.  
For individual enquiries please contact our engineering team. They can provide you with an economical and perfected solution adapted to your individual requirements (full anchor calculation).

When selecting an anchor type the choice largely depends on the type of loads acting on the anchors. The following factors must be taken into consideration in any calculation.

- weight of precast component
- number of anchors
- position of anchors
- angle spread in the hoist
- diagonal-pull characteristics in the anchor / lifting components
- dynamic loads
- adhesion to the formwork

### Angle spread of cables

The loads acting on the anchors increase when using a hoist. An increase in the angle spread results in greater stress on the anchors and cables. When selecting a lifting anchor, the influence of the hoist is taken into account by the factor  $\omega$  which is dependent on the angle spread  $\alpha$ . We recommend an angle spread of  $60^\circ$ . Angle-spread larger than  $90^\circ$  is not permitted.



Angle spread		
Angle spread $\alpha$	Cable inclination $\beta$	Angle spread factor $\omega$
$0^\circ$	$0^\circ$	1.00
$30^\circ$	$15^\circ$	1.04
$60^\circ$	$30^\circ$	1.16
$90^\circ$	$45^\circ$	1.41

### 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  $\psi$  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 $\psi_{dyn}^*$

Lifting unit	Shock factors $\psi_{dyn}^*$
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	$\geq 4.0$

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

### Stress (pull) on the anchor

The force Z acting on the anchor is generally determined by the following formula:

#### Load case lifting

$$Z = G \times \omega \times \psi / n$$

#### Where:

- Z = Pull on the anchor (kN)
- G = Weight of component (kN)
- n = Number of load bearing anchors
- $\omega$  = Angle spread factor
- $\psi$  = Shock factors

n = 1



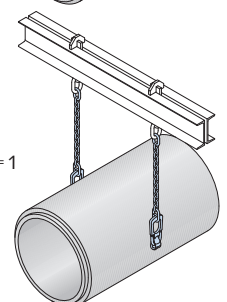
n = 2

Angle spread factor  $\omega$



n = 2

Angle spread factor  $\omega = 1$



# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Selecting the Lifting Anchor System

### Lifting device

The load capacity of the hoisting gear depends on the rated capacity of the attached universal head lifting link. All lifting links must be checked by an expert at least once a year. A record of these checks must be kept. The "code of practice for cables, chains and hoists used in the construction industry" as defined in building trade association regulations must be observed.

### Crane

Use a mechanical digger or a motorised or stationary crane, equipped with a precision and load gauge when laying steel or concrete pipe with the DEHA Pipe installation device. The load gauge allows controlled connection of the pipes if no other gauging device is available.

### Pipe installation device

According to DIN EN 1610, when using a DEHA Pipe installation device, the bedding surface should consist of compacted sand or, alternatively, concrete.



A uniform distribution of pressure in the bedding must be ensured. Uneven load distribution must be avoided. Prepare sufficiently large depressions for sockets and couplings in the sub-surface. The minimum width of trenches, as stated in DIN 4124, must be observed.

### Unloading on site

Check all pipes, pipe parts and seals on delivery (compare to DIN EN 1610). The angle spread measured at the crane hook should not exceed 60°.

### On-site storage

Pipes and any pipe paraphernalia must be stored at a sufficient distance from any trenches to avoid any pressure on the trench sidings (Ref. DIN EN 1610).

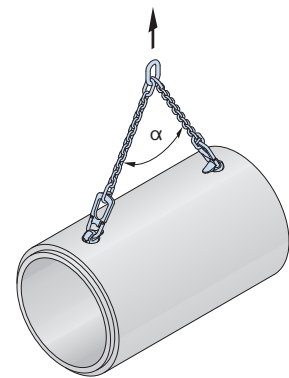
### Lifting and installation regulations

Remove any ice, dirt, concrete residue or other foreign objects from the recess before attaching the lifting device. The lifting anchors must be checked for any deformation, changes or damage, especially any caused by corrosion. Attach the lifting device by hand. It is not permitted to use a hammer or any similar tool. Repeated use of a lifting anchor is not permitted. Multiple lifting within one transport chain from production to final installation of an element is not regarded as repeated use and is therefore allowed.

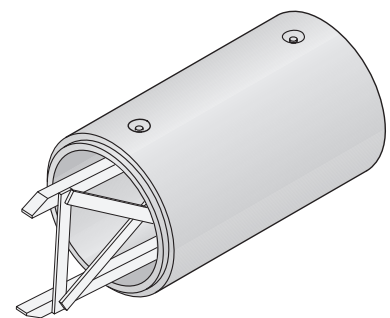
Lifting with incorrectly installed or damaged components can be dangerous. It is not permitted to use the lifting anchor if there is damage to the concrete; for example visible cracks that could reduce load capacity.

### Lowering into the pipe trench

Lower pipes into pipe trenches in compliance with DIN EN 1610. Round pipes must be shored on both sides to prevent movement. Manufacturer's instructions must be observed for specifications of the pipe and sealants (for example necessary lubrication of connections etc.).



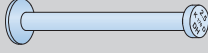
### Connecting the pipes



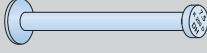
According to DIN 4033, paragraph 7.4, all pipes must be accurately and centrally aligned. Using a guide (see illustration above) guarantees that the pipes slot together correctly.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Product Range

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
4,0		• 6000-4,0-0075	00023	6000-4,0-0075 FV
	• 6000-4,0-0100	00024	6000-4,0-0100 FV	200-00089
	• 6000-4,0-0120	00025	6000-4,0-0120 FV	200-00090
	• 6000-4,0-0170	00027	6000-4,0-0170 FV	200-00091
	• 6000-4,0-0210	00028	6000-4,0-0210 FV	200-00092
	• 6000-4,0-0240	00029	6000-4,0-0240 FV	200-00093
	• 6000-4,0-0340	00030	6000-4,0-0340 FV	200-00094
	• 6000-4,0-0420	00031	6000-4,0-0420 FV	200-00095
5,0	• 6000-5,0-0055	00032	on request	-
	• 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	on request	-
	• 6000-5,0-0120	00038	6000-5,0-0120 FV	200-00100
	• 6000-5,0-0180	00039	6000-5,0-0180 FV	200-00101
	• 6000-5,0-0210	00173	6000-5,0-0210 FV	200-00102
	• 6000-5,0-0240	00040	6000-5,0-0240 FV	010-00174
• 6000-5,0-0340	00041	6000-5,0-0340 FV	200-00104	
• 6000-5,0-0480	00042	6000-5,0-0480 FV	200-00105	

Load charts are available for articles marked with a (•).

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	on request	-	
	• 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	
32,0	• 6000-20,0-1000	00076	6000-20,0-1000 FV	200-00136	
	• 6000-32,0-0200	00077	6000-32,0-0200 FV	200-00137	
	• 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	not available	-	
	• 6000-45,0-1200	00159	not available	-	

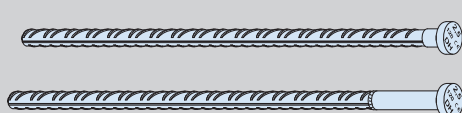
  

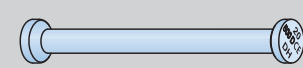
Load class	Stainless steel	
	Article name	Order no.
1,3	• 6000-1,3-0065 A4	0735.010-00130
	• 6000-1,3-0085 A4	0735.010-00131
	• 6000-1,3-0120 A4	0735.010-00132
2,5	• 6000-2,5-0120 A4	0735.010-00137
	• 6000-2,5-0170 A4	0735.010-00138
5,0	• 6000-5,0-0120 A4	0735.010-00144
	• 6000-5,0-0180 A4	0735.010-00145
	• 6000-5,0-0240 A4	0735.010-00146

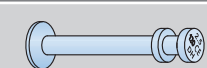
Other lengths and stainless steel A4 on request.  
Minimum orders and delivery times on request.

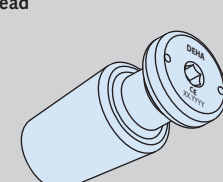
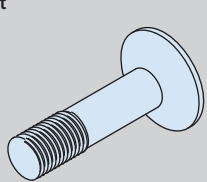
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Product Range

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	00158
	6050- 2,5-0520	00003	-	-
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- 7,5-1150	00010	-	-
10,0	6050-10,0-0870	00011	-	-
	6050-10,0-1300	00012	-	-
15,0	6050-15,0-1080	00013	-	-
	6050-15,0-1550	00014	-	-

Narrow-foot 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

Quick fitting (action) anchor (DSM)				
Load class				
	mill finish		hot-dip galvanized	
	Article name	Order no. 0735.110-	Article name	Order no. 0735.200-
1,3	6073-1,3-0065	00005	6073-1,3-0065 FV	00001
	6073-1,3-0120	00004	6073-1,3-0120 FV	00002
2,5	6073-2,5-0085	00001	6073-2,5-0085 FV	00003
	6073-2,5-0120	00002	6073-2,5-0120 FV	00004
	6073-2,5-0170	00003	6073-2,5-0170 FV	00005
5,0	6073-5,0-0110	00006	6073-5,0-0110 FV	00006
	6073-5,0-0240	00007	6073-5,0-0240 FV	00007

Conical pipe anchor system				
Load class	Adapter head reusable 		Anchor shaft mill finish 	
	Article name	Order no. 0735.150-	Article name	Order no. 0735.140-
10,0	6004-10	00001	6003-10-0060	00011
			6003-10-0075	00001
			6003-10-0100	00002
			6003-10-0125	00003
20,0	6004-20	00002	6003-20-0100	00012
			6003-20-0130	00004
			6003-20-0155	00005
			6003-20-0180	00006
32,0	6004-32	00003	6003-32-0120	00013
			6003-32-0140	00015
			6003-32-0155	00007
			6003-32-0175	00008
			6003-32-0200	00009
			6003-32-0225	00010
			6003-32-0235	00014

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Product Range

Rubber recess formers												
Load class	Round						Narrow					
	Including plate with threaded rod		Including plate with socket		Without steel parts		Including plate with threaded rod		Including 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
4,0	6132-4,0	00003	6133-4,0	00003	6131-4,0	00003	6138-4,0	00003	6145-4,0	00003	6137-4,0	00003
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 for quick fitting DSM Spherical head anchor						
Load class	Polyurethane		Polyurethane with magnet		Rubber	
	Article name	Order no. 0736.170-	Article name	Order no. 0736.190-	Article name	Order no. 0736.140-
1,3	6127-1,3	00001	6126-1,3	00001	6128-1,3	00002
2,5	6127-2,5	00002	6126-2,5	00002	6128-2,5	00001
4,0	6127-5,0	00003	6126-5,0	00003	-	-
5,0	-	-	-	-	-	-
7,5	-	-	-	-	-	-
10,0	-	-	-	-	-	-

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Product Range

Steel recess formers								Accessories for DEHA 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	
4,0	-	-	6152-4,0/5,0	00003	-	-	6152-4,0/5,0 M	00003	-	-	6151-4,0 D	00003	
5,0	6150-5,0	00003			6150-5,0 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	-	-	

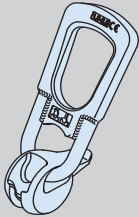
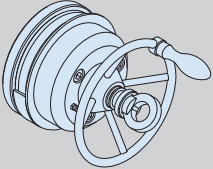


Recess formers and accessories for conical-pipe anchor system								
Load class	DKR Recess formers no steel parts		Plastic sealing cap		Recess void filler ①		Tool for DKR	
	Article name	Order no. 0736.180-	Article name	Order no. 0737.110-	Article name	Order no. 0737.120-	Article name	Order no. 0736.230-
10,0	6173-10	00001	6171-10	00001	6172-10	00001	6175-10	00001
20,0	6173-20	00002	6171-20	00002	6172-20	00002	6175-20	00002
32,0	6173-32	00003	6171-32	00003	6172-32	00003	6175-32	00003

① Recess is watertight up to 5 bar, if fixed with Minova Carbopast

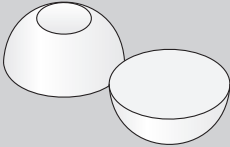
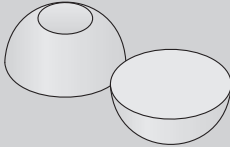
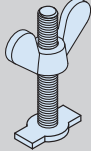

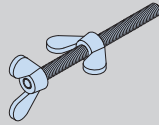


# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Product Range

Lifting device									
Load class	Universal head lifting link		Turning and lifting link				Pipe laying system		
									
	Article name	Order no. 0738.010-	Article name	Order no. 0738.040-	Order no. 0568.129-	Order no. 0738.049-	Article name	For pipe lengths	Order no. 0736.140-
1,3	6102-1,0/1,3	00001	6116-1,0/1,3	00001	00001 ①	00001	6112-1,5/2,5	up to 3.5 m	00001
2,5	6102-1,5/2,5	00002	6116-1,5/2,5	00002					
4,0	6102-3,0/5,0	00003	6116-3,0/5,0	00003					
5,0		00004	6116-6,0/10	00004					
7,5	6102-6,0/10	00004	6116-6,0/10	00004					
10,0	6102-12/20	00005	6116-12/20	00005					
15,0							from 3.0 m	00005	
20,0	from 3.5 m	00006							
32,0	6102-32	00006	6116-32	00006			-	-	-
45,0	6102-45	00007	-	-			-	-	-

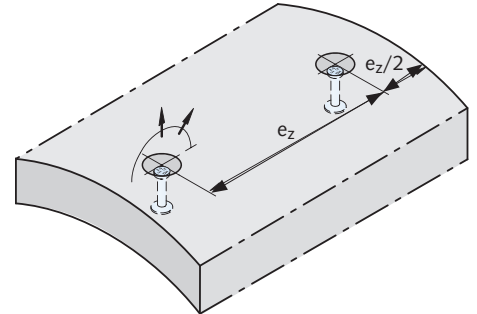
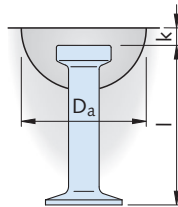
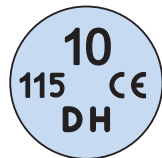
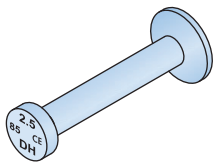
① Load class, please state length and position of ferrule

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
4,0	6015-4,0/5,0	00003	-	-	6141-4,0/5,0	00003	6153-4,0/5,0	00003		
5,0		00004	6172-10	00001		6141-7,5/10				
7,5	6015-7,5/10	00004	6172-20	00002	6141-15/20	00005	6153-15/20	00005		
10,0	6015-15/20	00005	6172-32	00003	6141-32	00006	6153-32	00006	S1-16	00004
15,0									00005	6172-20
20,0	6015-15/20	00005	6172-32	00003	6141-32	00006	6153-32	00006	S1-16	00004
32,0									-	-

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Spherical Head Anchors in Pipes

### Dimensions of spherical head anchors in pipes



### Dimensions of spherical head anchors in pipes

Load class	Article name mill finished	Order no. 0735.010-	Article name hot-dip galvanized	Order no. 0735.-	l [mm]	k [mm]	D <sub>a</sub> [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		
	6000-1,3-0055	00004	6000-1,3-0055 FV	200-00069	55		
	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		
2,5	6000-2,5-0045	00015	6000-2,5-0045 FV	200-00080	45	11	74
	6000-2,5-0055	00016	6000-2,5-0055 FV	200-00081	55		
	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		
4,0	6000-4,0-0075	00023	6000-4,0-0075 FV	200-00088	75	15	94
	6000-4,0-0100	00024	6000-4,0-0100 FV	200-00089	100		
	6000-4,0-0120	00025	6000-4,0-0120 FV	200-00090	120		
5,0	6000-5,0-0075	00034	6000-5,0-0075 FV	200-00097	75	15	94
	6000-5,0-0085	00035	6000-5,0-0085 FV	200-00098	85		
	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		
7,5	6000-5,0-0180	00039	6000-5,0-0180 FV	200-00101	180	15	118
	6000-7,5-0100	00043	6000-7,5-0100 FV	200-00106	100		
	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		
10,0	6000-7,5-0200	00050	6000-7,5-0200 FV	200-00111	200	15	118
	6000-10,0-0115	00054	6000-10,0-0115 FV	200-00116	115		
	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		
15,0	6000-10,0-0250	00060	6000-10,0-0250 FV	200-00120	250	15	160
	6000-15,0-0140	00063	6000-15,0-0140 FV	200-00124	140		
	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		
20,0	6000-15,0-0300	00066	6000-15,0-0300 FV	200-00127	300	15	160
	6000-20,0-0180	00168			180		
	6000-20,0-0200	00070	6000-20,0-0200 FV	200-00131	200		
	6000-20,0-0240	00071	6000-20,0-0240 FV	200-00132	240		
32,0	6000-20,0-0340	00074	6000-20,0-0340 FV	200-00134	340	23	214
	6000-32,0-0200	00077	6000-32,0-0200 FV	200-00137	200		
	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		

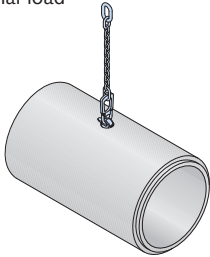
Other lengths and types in stainless steel A4 on request

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

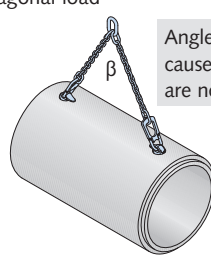
## Spherical Head Anchors in Pipes

### Load capacity of the spherical head anchor in pipes

Axial load

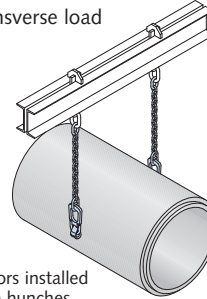


Diagonal load

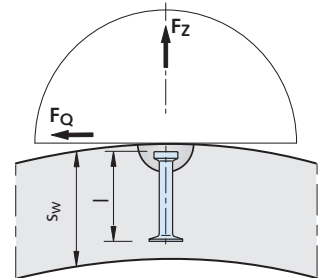


Angles  $\beta > 60^\circ$   
caused by cable spread  
are not permitted!

Transverse load



Anchors installed  
in the hunches



Anchor(s) installed in the apex

### Load capacities of spherical head anchors

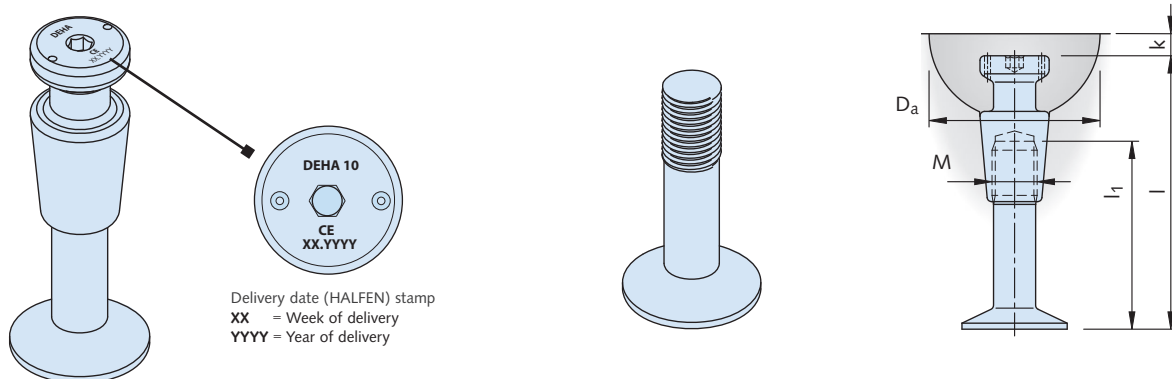
Load class	Article name	Anchor length l [mm]	Pipe wall thickness sw min [mm]	Load capacity in kN with concrete strength						Minimum axial spacing ez [mm]
				35 N/mm <sup>2</sup>		45 N/mm <sup>2</sup>		55 N/mm <sup>2</sup>		
				Axial and diagonal load	Transverse load	Axial and diagonal load	Transverse 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				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
4,0	6000-4,0-0075	75	115	26.8		30.4		33.6		240
	6000-4,0-0100	100	140	38.6	40.0	40.0	40.0	40.0	40.0	320
	6000-4,0-0120	120	160	40.0		40.0		40.0		540
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		430
	6000-7,5-0165	165	205	74.2	75.0	75.0	75.0	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

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## DKR Conical Pipe Anchors in Pipes

### DKR Conical pipe anchors



### Dimensions and installation of anchor shafts

Load class	Article name	Order no. 0735.140	Thread	l [mm]	l <sub>1</sub> [mm]	k [mm]	D <sub>a</sub> [mm]
10,0	6003-10-0060	00011	30	120	63	15	118
	6003-10-0075	00001		135	78		
	6003-10-0100	00002		160	103		
	6003-10-0125	00003		185	128		
20,0	6003-20-0100	00012	39	185	99	15	160
	6003-20-0130	00004		215	129		
	6003-20-0155	00005		240	154		
	6003-20-0180	00006		265	179		
32,0	6003-32-0120	00013	52	232	119	23	214
	6003-32-0140	00015		252	139		
	6003-32-0155	00007		267	154		
	6003-32-0175	00008		287	174		
	6003-32-0200	00009		312	199		
	6003-32-0225	00010		337	224		
	6003-32-0235	00014		347	234		

Some reinforced concrete pipes require an increased concrete cover for all steel elements (reinforcement and transport anchors).

With the conventional spherical head anchor this can only be achieved if the anchor is installed deeper into the concrete.

However, deeper installation of anchors means deeper recesses, especially for anchors of load class 20,0 and 32,0.

After laying the pipe, the recesses must be completely filled and sealed to guarantee the required concrete cover. Using the DKR Anchor guarantees the same trusted anchorage of the spherical head anchor: The large foot allows shorter anchor lengths. The embedment depth remains unchanged. The same lifting equipment (turning and lifting link and universal head link) can still be used.

Instead of a conventional anchor head the DKR Anchor has a dirt-resistant thread, the anchor is delivered with a plastic cap to protect the thread against mechanical impact. To connect to the lifting device a reusable adapter head is screwed onto the anchor shaft.

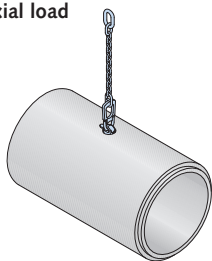
The adapter, the anchor and the matching recess former are fixed together and attached to the formwork as one unit.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## DKR Conical Pipe Anchors in Pipes

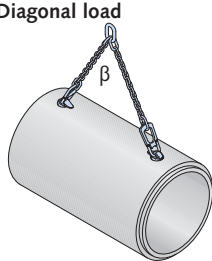
### Load capacity of the conical pipe anchor

Axial load



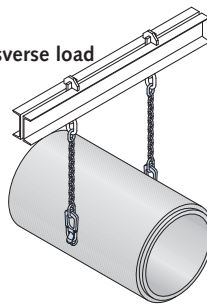
Anchor(s) installed in the apex

Diagonal load




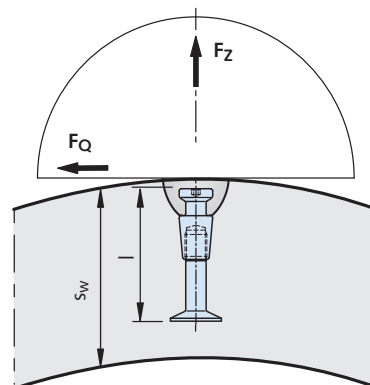
Anchor(s) installed in the apex

Transverse load



Anchors installed in the hunches

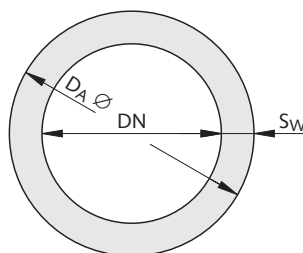
 Angles  $\beta > 60^\circ$  caused by cable spread are not permitted!



### Load capacity of the DEHA Conical pipe anchor

Load class	Article name	Order no. 0735.140-	Anchor length l [mm]	Pipe wall thickness Sw min [mm]	Load capacity in kN with concrete strength					
					35 N/mm <sup>2</sup>		45 N/mm <sup>2</sup>		55 N/mm <sup>2</sup>	
					Axial and diagonal load up to 45° [β]	Transverse load	Axial and diagonal load up to 45° [β]	Transverse load	Axial and diagonal load up to 45° [β]	Transverse load
10,0	6003-10-0060	00011	120	180	64.9	100.0	73.6	100.0	81.4	100.0
	6003-10-0075	00001	135	200	77.2	100.0	87.6	100.0	96.8	100.0
	6003-10-0100	00002	160	220	95.5	100.0	100.0	100.0	100.0	100.0
	6003-10-0125	00003	185	250	100.0	100.0	100.0	100.0	100.0	100.0
20,0	6003-20-0100	00012	185	250	114.8	174.5	130.2	197.9	143.9	200.0
	6003-20-0130	00004	215	280	141.9	200.0	160.9	200.0	177.9	200.0
	6003-20-0155	00005	240	300	164.1	200.0	186.1	200.0	200.0	200.0
	6003-20-0180	00006	265	330	191.2	200.0	200.0	200.0	200.0	200.0
32,0	6003-32-0120	00013	232	300	157.9	205.3	179.1	232.8	198.0	257.3
	6003-32-0140	00015	252	325	179.6	233.5	203.6	264.7	225.1	292.7
	6003-32-0155	00007	267	330	191.2	248.6	216.8	281.9	239.7	311.6
	6003-32-0175	00008	287	360	216.3	281.2	245.3	318.8	271.2	320.0
	6003-32-0200	00009	312	380	241.9	314.4	274.2	320.0	303.2	320.0
	6003-32-0225	00010	337	400	268.3	320.0	304.2	320.0	320.0	320.0
	6003-32-0235	00014	347	420	295.7	320.0	320.0	320.0	320.0	320.0

It is recommended to assume a splitting force from load induction and the load path to estimate and install the minimum required reinforcement.



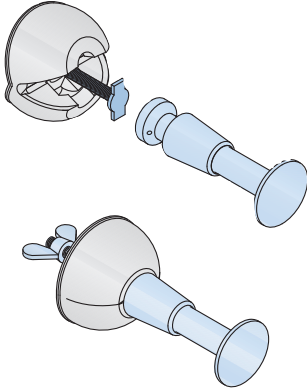
$$D_A = D_N + 2 \times S_w$$

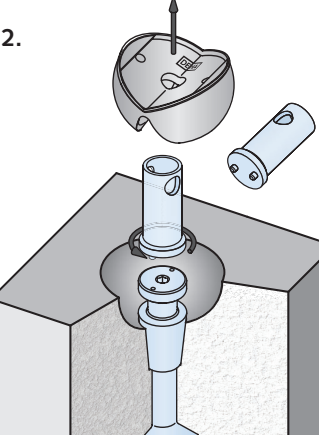
The stated load capacities for the DKR Anchor in pipes were established in tests at the Institute of Concrete Structures at the Technical University of Darmstadt.

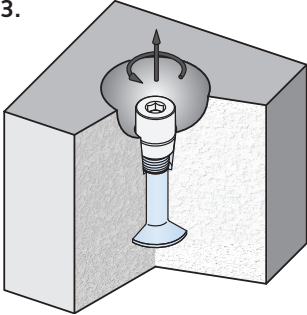
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

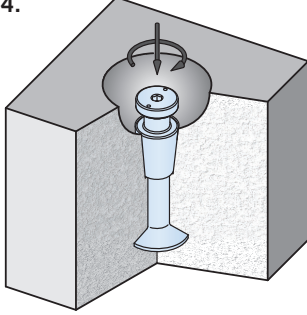
## DKR Conical Pipe Anchors in Pipes

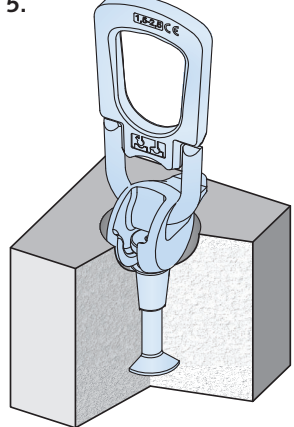
### Installation and application of DEHA Conical pipe anchor systems

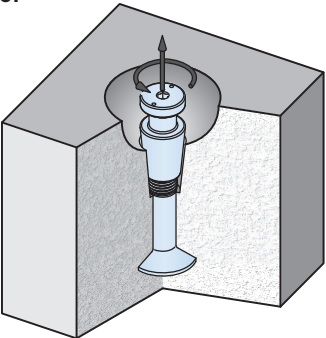
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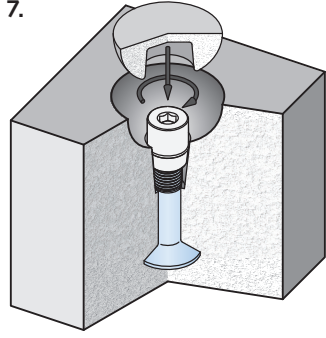
1. Adapter head and anchor shaft are screwed together by hand before installation. The shaft is screwed into the adapter head until the thread is no longer visible.
- 

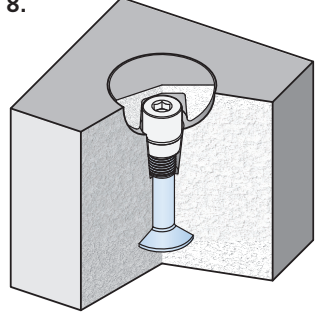
2. Cast-in anchor shaft with adapter head screwed in place ready for transporting. Check the head clearance  $k$  to make sure the head is correctly installed. Remove the recess former after the concrete has been poured and has set. Unscrew the adapter head with the HALFEN DKR Tool to loosen or fully remove from the concrete.
- 

3. The sealing cap is temporarily screwed on to the shaft to prevent corrosion and damage to the thread during storage.
- 

4. Remove the sealing cap and replace the adapter head for transporting. The adapter head is screwed in until the cone is fully concealed in the concrete.
- 

5. Lifting the precast component with the universal head lifting link.
- 

6. The adapter head is removed when the concrete component is on site and after final installation.
- 

7. To prevent the anchor corroding, the sealing cap is replaced on the cast-in anchor.
- 

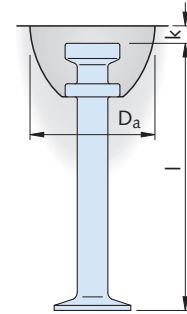
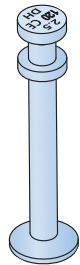
8. The recess is sealed with a VKF fibre cement recess void filler. Using a suitable adhesive the recess is watertight up to 5 bar. Recommended adhesives; Carbolan or Carbopast manufactured and distributed by the Minova company.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## DSM Quick fitting (Action) Anchor in Pipes

### Dimensions and load capacity of quick fitting (action) anchor DSM in pipes

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



#### Dimensions of DSM Quick fitting (action) anchor

Load class	Article name	Order no. 0735.110-	l [mm]	k [mm]	D <sub>a</sub> [mm]
1,3	6073-1,3-0065	00005	65	10	60
2,5	6073-2,5-0085	00001	85	11	74
	6073-2,5-0120	00002	120	11	74
5,0	6073-5,0-0110	00006	110	15	94

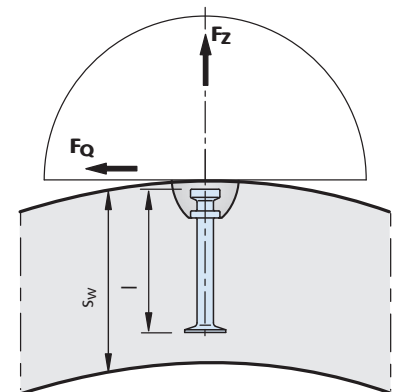
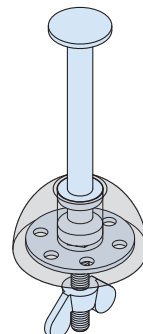
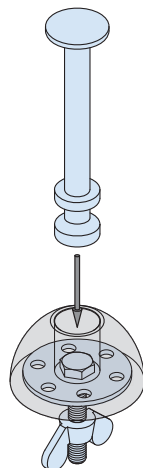
#### Load capacity of DSM Quick fitting (action) anchor

Load class	Article name	Anchor length l [mm]	Pipe-wall thickness s <sub>w</sub> min [mm]	Load capacity in kN with concrete strength					
				35 N/mm <sup>2</sup>		45 N/mm <sup>2</sup>		55 N/mm <sup>2</sup>	
				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
5,0	6073-5,0-0110	110	150	43.1	50.0	48.9	50.0	50.0	50.0

Apply a small amount of lubricant to the anchor before inserting into the recess former. The centre ring of the quick fitting (action) 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 (action) anchor.

The DEHA Quick fitting (action) 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.

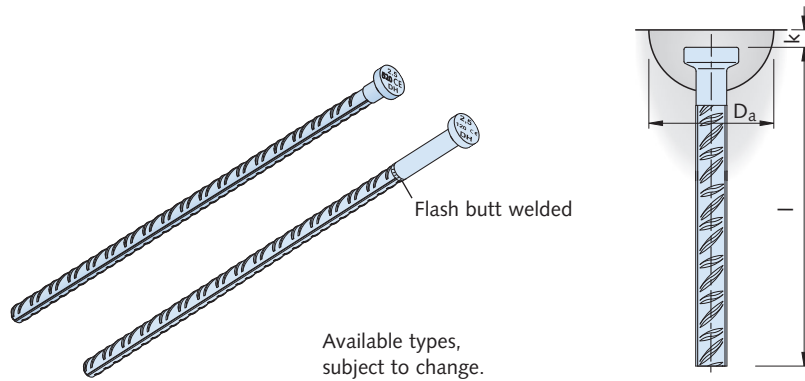


# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## 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.



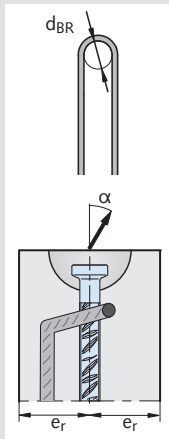
### Dimensions — Spherical head rod anchors

Load class	Article name mill finish	Order no. 0735.070-	Article name hot-dip galvanized	Order no. 0735.070-	l [mm]	k [mm]	D <sub>a</sub> [mm]
2,5	6050-2,5-0400 WB	00002	6050- 2,5-0400 FV	00158	400	11	74
	6050-2,5-0520 WB	00003	-	-	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	-	-	750	15	118
	6050-7,5-1150 WB	00010	-	-	1150	15	118
10,0	6050-10,0-0870 WB	00011	-	-	870	15	118
	6050-10,0-1300 WB	00012	-	-	1300	15	118
15,0	6050-15,0-1080 WB	00013	-	-	1080	15	160
	6050-15,0-1550 WB	00014	-	-	1550	15	160

Other lengths on request

### Reinforcement and load capacities — Spherical head rod anchors

Load class	Article name	Element thickness 2 × e <sub>r</sub> [mm]	Basic reinforcement crosswise [mm <sup>2</sup> /m]	Diagonal load ∅ × cut length l	d <sub>BR</sub> [mm]	Allowable load capacity in kN with concrete strength		
						15 N/mm <sup>2</sup> Axial and diagonal load up to 30°	25 N/mm <sup>2</sup> Axial and diagonal load up to 30°	35 N/mm <sup>2</sup> Axial and diagonal load up to 30°
2,5	6050-2,5-0400	80	2 × 100	∅ 12 × 800	34	25.0	25.0	25.0
	6050-2,5-0520	100						
5,0	6050-5,0-0580	100	2 × 140	∅ 16 × 1000	40	50.0	50.0	50.0
		120						
		140						
		160						
6050-5,0-0900	120	2 × 160	∅ 20 × 1500	50	75.0	75.0	75.0	
	140							
7,5	6050-7,5-0750	120	2 × 180	∅ 20 × 1600	50	100.0	100.0	100.0
		140						
6050-7,5-1150	140	2 × 240	∅ 25 × 2000	80	150.0	150.0	150.0	
	160							
10,0	6050-10,0-0870	140	2 × 240	∅ 25 × 2000	80	150.0	150.0	150.0
	6050-10,0-1300	160						
15,0	6050-15,0-1080	160	2 × 240	∅ 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

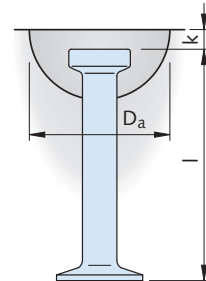
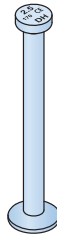


# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## 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.



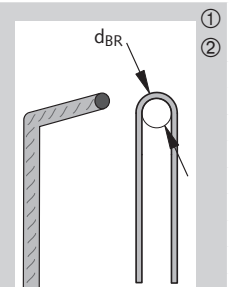
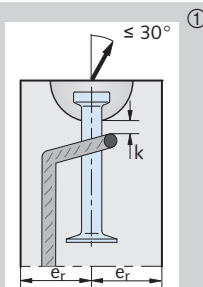
### Dimensions – Spherical head lifting anchors

Load class	Article name mill finish	Order no. 0735.010-	Article name hot-dip galvanized	Order no. 0735-	l [mm]	k [mm]	D <sub>a</sub> [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		
4,0	6000-4,0-0170	00027	6000-4,0-0170 FV	200-00091	170	15	94
	6000-4,0-0240	00029	6000-4,0-0240 FV	200-00093	240		
	6000-4,0-0340	00030	6000-4,0-0340 FV	200-00094	340		
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 <sup>2</sup> /m]	Diagonal load reinforcement Ø mm × length · l = [mm]	Bending rolls - Ø d <sub>BR</sub>
1,3	1 × 125	10 × 650	25
2,5	2 × 100	12 × 800	30
4,0	2 × 125	14 × 900	35
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



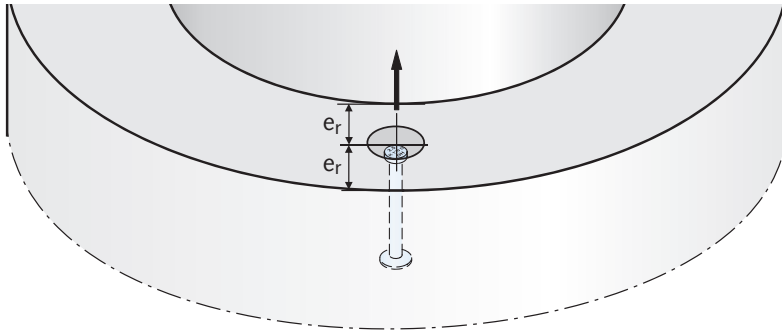
① This reinforcement can be omitted if the edge spacing  $e_r \geq e_1$  or if the diagonal load  $\leq 10^\circ$ .

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

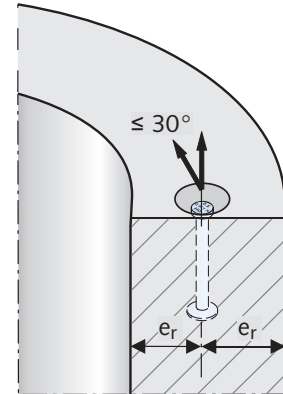
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## 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 × e <sub>r</sub> [mm]	Allowable load capacity in kN axial and diagonal force up to 30° concrete compressive strength			Edge spacing* e <sub>1</sub> [mm] for		
				15 N/mm <sup>2</sup>	25 N/mm <sup>2</sup>	35 N/mm <sup>2</sup>	15 N/mm <sup>2</sup>	25 N/mm <sup>2</sup>	35 N/mm <sup>2</sup>
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					
4,0	6000-4,0-0170	170	160	29.8	38.5	40.0			
			180	32.5	40.0				
			200	35.2	40.0				
	6000-4,0-0240	240	120	31.3	40.0	40.0			
			140	35.2					
			160	38.9					
6000-4,0-0340	340	100	29.6	38.2	40.0				
		120	35.6	40.0					
		140	40.0	40.0					
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<sub>r</sub> < e<sub>1</sub> or reduce the load by 25%.

# 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 <sup>2</sup>	25 N/mm <sup>2</sup>	35 N/mm <sup>2</sup>	15 N/mm <sup>2</sup>	25 N/mm <sup>2</sup>	35 N/mm <sup>2</sup>
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				
			240	62.2	75.0				
	6000-7,5-0540	540	160	63.2	75.0	75.0			
			180	71.1					
			200	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				
			320	84.7	100.0				
	6000-10,0-0680	680	160	73.7	95.2	100.0			
			180	83.0	100.0				
			200	92.2	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				
			450	123.7	150.0				
	6000-15,0-0840	840	300	150.0	150.0	150.0			
			340						
			380						
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				
			600	182.8	200.0				
	6000-20,0-1000	1000	240	154.9	199.9	200.0			
			300	190.0	200.0				
			330	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					
			500	320.0					

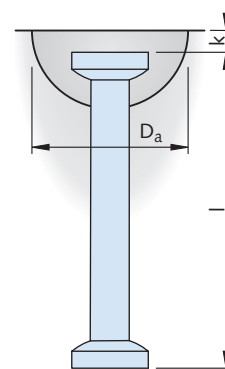
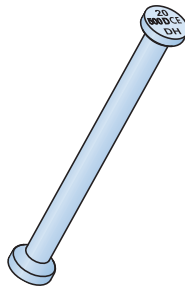
\* The reinforcement is according to page 25 if the edge spacings are  $e_r < e_1$ , or reduce the load by 25%.

# 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 <sub>a</sub> [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

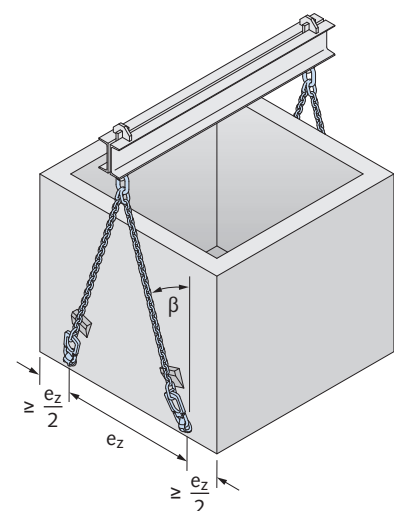
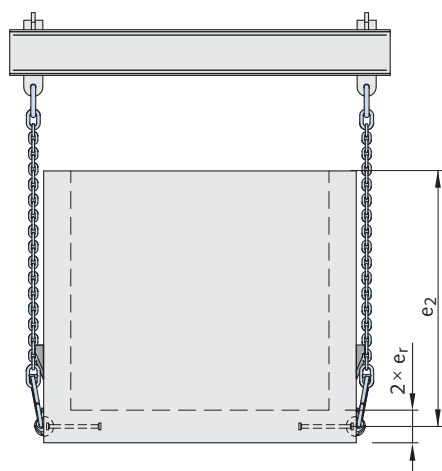
### Load capacity with transverse and diagonal load up to 45° [β]

Load class	Article name	Thickness of floor slab 2 × e <sub>r</sub> [mm]	Anchor - axial spacing e <sub>z</sub> [mm]	Minimum height of rising wall e <sub>2</sub> [mm]	Transverse stress load capacity in kN concrete strength	
					45 N/mm <sup>2</sup>	55 N/mm <sup>2</sup>
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.



# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

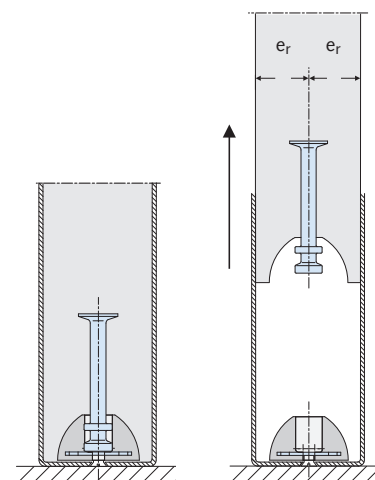
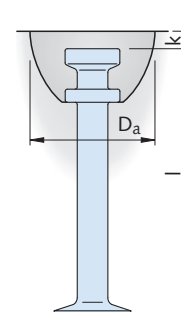
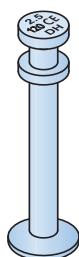
## DSM Quick fitting (Action) Anchors

### Dimensions and load capacity of DSM quick fitting (action) anchor

Installation requirements for the DSM Quick-fitting (action) 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 (action) anchor

Load class	Article name	Order no. 0735.110-	l [mm]	k [mm]	D <sub>a</sub> [mm]
1,3	6073-1,3-0065	00005	65	10	60
	6073-1,3-0120	00004	120		
2,5	6073-2,5-0085	00001	85	11	74
	6073-2,5-0120	00002	120		
	6073-2,5-0170	00003	170		
5,0	6073-5,0-0110	00006	110	15	96
	6073-5,0-0240	00007	240		

### Lifting shafts – load capacity

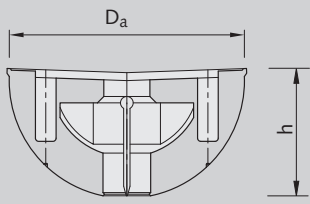
Load class	Article name	Anchor length l [mm]	Element thickness 2 × e <sub>r</sub> [mm]	Minimum edge clearance *		Load capacity in kN concrete strength		
						Axial and diagonal load up to 30°		
						15 N/mm <sup>2</sup>	25 N/mm <sup>2</sup>	35 N/mm <sup>2</sup>
1,3	6073-1,3-0120	120	80	125	100	13.0	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	
	6073-2,5-0170	170	100	250	150	20.7	25.0	25.0
			120			23.7		
140	25.0	25.0						
5,0	6073-5,0-0240	240	200	300	175	45.6	50.0	50.0
			220			49.0		
			240			50.0		

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

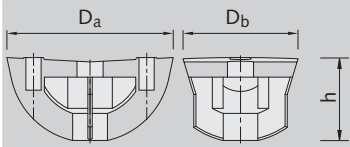
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Formers

### Rubber recess formers, round

Rubber recess former, round									
Load class	Recess former without metal parts		Including metal plate and threaded rod		Including metal plate with socket				
	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
4,0	6131-4,0	00003	6132-4,0	00003	6133-4,0	00003	94	44.5	blue
5,0	6131-5,0	00004	6132-5,0	00004	6133-5,0	00005		44	
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		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		75	black
32,0/45,0	6131-32,0	00009	6132-32,0	00009	6133-32,0	00009	214	100	

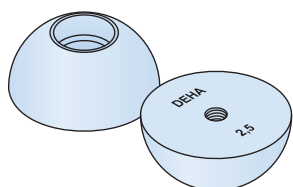
### Rubber recess former, narrow type

Load class	Recess former without metal parts		Including metal plate and threaded rod		Including plate with socket					
	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
4,0	6137-5,0	00004	6138-5,0	00004	6145-5,0	00004	97	69	44.5	blue
5,0									44	
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			55	yellow
15,0	6137-15,0	00007	6138-15,0	00007	6145-15,0	00007	164	124	75.5	grey
20,0	6137-20,0	00008	6138-20,0	00008	6145-20,0	00008			75	black

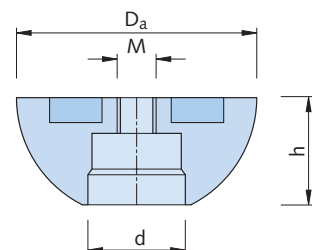
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Formers

### Steel recess formers, round



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



### Steel recess formers, round

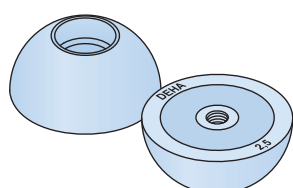
Load class	Article name	Order no. 0736.100-	D <sub>a</sub> [mm]	h [mm]	Thread M	d [mm]	Suitable rubber grommet	
							Article name	Order no. 0736.060-
1,3	6150-1,3	00001	60	27.5	8	20.5	6151-1,3	00001
2,5	6150-2,5	00002	74	33	12	30.0	6151-2,5	00002
5,0	6150-5,0	00003	94	42	12	38.0	6151-5,0	00003

This is the case if the precast element is turned after the formwork has been removed. The cast-in spherical head anchor is needed only after the initial turn. The rubber grommet is placed over the anchor shaft. The spherical head anchor and the grommet are pushed into the recess former.

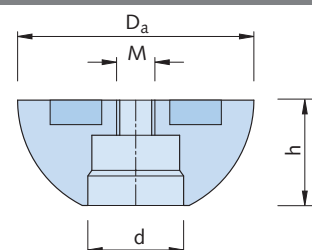
The rubber grommet is inserted into the recess former until it is flush with the surface. We recommend lubricating the anchor head and the rubber grommet to ease installation. The rubber grommet is then easily removed from the recess former before lifting the precast element.

If installed horizontally, measures must be taken to prevent the transport anchor becoming loose when vibrating and compacting the concrete; the anchor can be fixed to the reinforcement or spacers can be used to hold the anchor in position.

### Steel recess formers, round with magnet



Use magnetic recess formers to avoid drilling when using steel formwork.



### Steel recess formers, round with magnet

Load class	Article name	Order no. 0736.110-	D <sub>a</sub> [mm]	h [mm]	Thread M	d [mm]	Magnetic force [kN]	Suitable rubber grommet	
								Article name	Order no. 0737.060-
1,3	6150-1,3 M	00001	60	27.5	8	20.5	1.4	6151-1,3	00001
2,5	6150-2,5 M	00002	74	33	12	30.0	1.7	6151-2,5	00002
5,0	6150-5,0 M	00003	94	42	12	38.0	2.5	6151-5,0	00003

Due to the inherit properties of magnetism the magnetic force may decrease over time.

Drilling holes in steel formwork for retaining screws is not necessary when using magnetic recess formers.

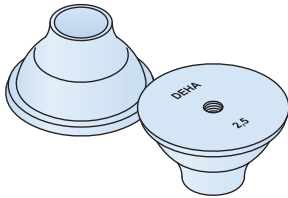
Recess formers with rubber grommet are also available with a magnet: (Standard shape Article name 6150 and Trumpet shape Article name 6152).

The magnetic loads specified in the tables refer to axial loads.

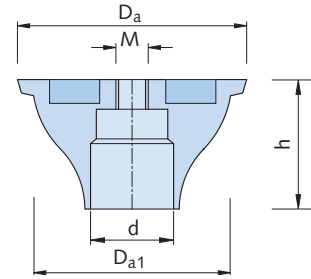
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Formers

### Steel recess formers – trumpet shape



The trumpet shaped steel recess former with rubber grommet is a specially shaped recess former as described for article name 6150 above.



### Steel recess formers, trumpet shape

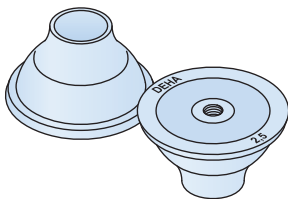
Load class	Article name	Order no. 0736.120-	D <sub>a</sub> [mm]	D <sub>a1</sub> [mm]	h [mm]	Thread M	d [mm]	Suitable rubber grommet		
								Article name	Order no. 0737.070-	Order no. 0737.060-
1,3	6152-1,3	00001	68	59	40	8	20.5	6151-1,3 D	00001	-
								2 × 6151-1,3	-	00001
2,5	6152-2,5	00002	85	73	48	12	30.0	6151-2,5 D	00002	-
								2 × 6151-2,5	-	00002
4,0 and 5,0	6152-4,0/5,0	00003	107	93	56	12	38.0	6151-4,0 D	00003	-
								2 × 6151-5,0	-	00003

The longer length in the recess former means that higher loads can be present when pouring the concrete.

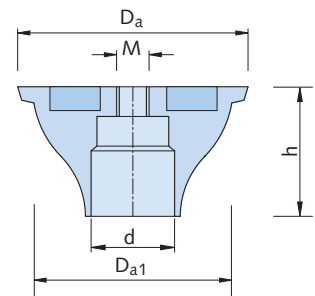
If a transport anchor is subjected to loads perpendicular to its longitudinal axis during concreting, the trumpet shaped steel recess former with rubber grommet must be used.

Double height or two standard height rubber grommets can be used with the trumpet shaped recess former.

### Steel recess formers, trumpet shape with magnet



If the concrete pour is perpendicular to the lifting anchor axis, the trumpet shaped recess former with its longer grip length can be used as a recess former.



### Steel recess formers, trumpet shape with magnet

Load class	Article name	Order no. 0736.130-	D <sub>a</sub> [mm]	D <sub>a1</sub> [mm]	h [mm]	Thread M	d [mm]	Suitable rubber grommet		
								Article name	Order no. 0737.070-	Order no. 0737.060-
1,3	6152-1,3 M	00001	60	59	40	8	20.5	6151-1,3 D	00001	-
								2 × 6151-1,3	-	00001
2,5	6152-2,5 M	00002	74	73	48	12	30.0	6151-2,5 D	00002	-
								2 × 6151-2,5	-	00002
4,0 and 5,0	6152-4,0/5,0 M	00003	94	93	56	12	38.0	6151-4,0 D	00003	-
								6151-7,5 D	-	00004
7,5 and 10,0	6152-7,5 M	00004	134	117	77	16	48.5	2 × 6151-7,5	00004	-
								2 × 6151-10,0	-	00005

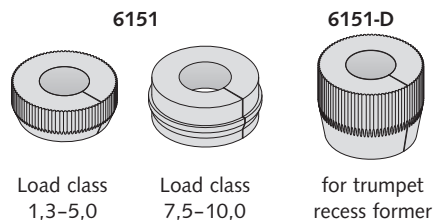
Due to the inherent properties of magnetism the magnetic force may decrease over time.



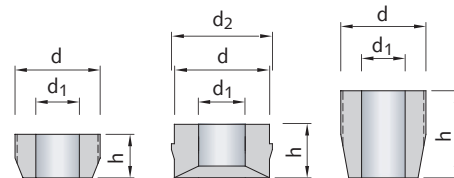
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Formers

### Rubber grommet for steel recess formers



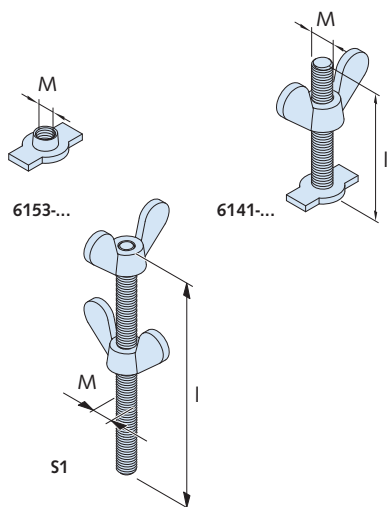
Rubber grommet for steel recess former 6150 and steel recess former 6152 to fix the anchor in the recess former.



### Rubber grommet

Load class	Article name Rubber grommet	Order no. 0737.060-	Article name Double rubber grommet	Order no. 0737.070-	d	d <sub>1</sub>	d <sub>2</sub>	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
4,0	-	-	6151-4.0 D	00003	38.5	19.0	-	28.0
5,0	6151-5,0	00003	-	-		21.0	-	14.0
7,5	6151-7,5	00004	-	-	49.0	24.0	52.0	27.5
	-	-	6151-7.5 D	00004		24.5	-	44.5
10,0	6151-10,0	00005	-	-	28.0	52.0	27.5	

### Fixing spherical head anchors using rubber grommets and metal recess formers



Various types of threaded plates are used to fix rubber recess formers to formwork. Plates with welded threaded bar and wing nut (6141) are used for formwork removed in the longitudinal direction of the threaded bar.

Plates with a threaded socket (6153-...) are used if the formwork is removed perpendicular to the threaded bar. It is important to ensure that the retaining bolt is unscrewed before attempting to remove the formwork.

Plate with threaded rod and wing nut					
Article name	Order no. 0737.020-	Thread M	l [mm]	For load class (Article name 6131, round)	For load class (Article name 6137, narrow)
6141-1,3	00001	8	65	1,3	1,3
6141-2,5	00002	12	87	2,5	2,5
6141-5,0	00003	12	87	4,0 and 5,0	4,0 and 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	00006	16	100	32,0	-

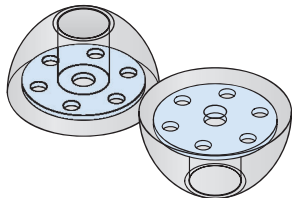
Plate with socket				
Article name	Order no. 0737.040-	Thread M	For load class (Article name 6131, round)	For load class (Article name 6137, narrow)
6153-1,3	00001	8	1,3	1,3
6153-2,5	00002	12	2,5	2,5
6153-5,0	00003	12	4,0 and 5,0	4,0 and 5,0
6153-10,0	00004	12	7,5 and 10,0	7,5 and 10,0
6153-20,0	00005	16	15,0 and 20,0	15,0 and 20,0
6153-32,0	00006	16	32,0	-

Retaining bolt with wing nut			
Article name	Order no. 0073.060-	Thread M	l [mm]
S1-M8	00001	8	160
S1-M12	00002	12	160
S1-M16	00003	16	180

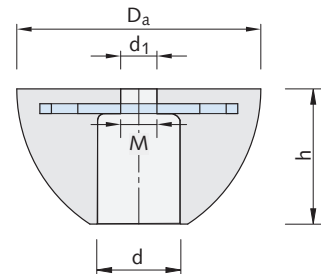
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Formers

### Recess formers for quick fitting (action) anchors in polyurethane



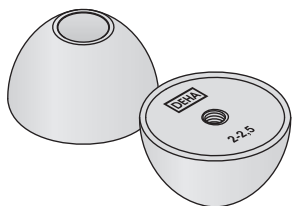
A particularly durable recess former, which is secured to the formwork with a retaining bolt.



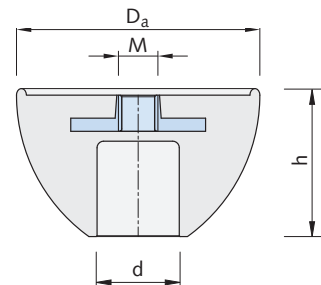
#### Recess formers – Polyurethane

Load class	Article name	Order no. 0736.170-	D <sub>a</sub> [mm]	h [mm]	d <sub>1</sub> [mm]	Thread M	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	
5,0	6127-5,0	00003	94	53	13	12	36	

### Recess formers for quick fitting (action) anchors; rubber with metal plate



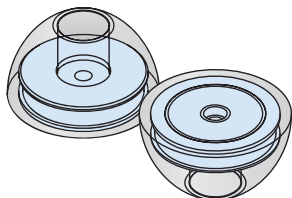
Recess former in rubber in our proven quality, bolted to the formwork.



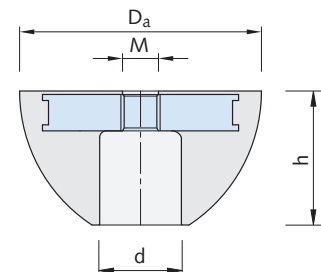
#### Recess former – rubber

Load class	Article name	Order no. 0736.140-	D <sub>a</sub> [mm]	h [mm]	Thread M	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

### Recess formers for DSM Quick fitting (action) anchors – polyurethane with magnet



Particularly durable recess former; used to attach the HALFEN Quick fitting (action) anchor DSM to steel formwork. The recess former is specially shaped for the quick fitting anchor.



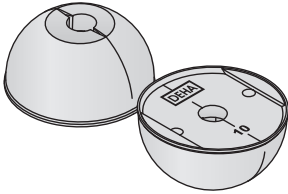
#### Recess formers – polyurethane with magnet

Load class	Article name	Order no. 0736.190-	D <sub>a</sub> [mm]	h [mm]	Thread 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	
5,0	6126-5,0	00003	94	53	12	36	

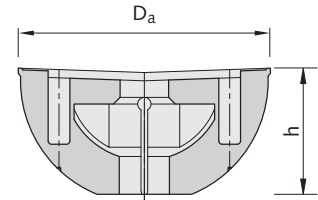
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Recess Formers

### Recess formers for DKR Conical pipe anchor



A special recess former is used for the DKR-Anchor. These rubber recess formers are made out of dimensionally stable, oil, and temperature resistant rubber (approximately 120°C). The recess formers are reusable.

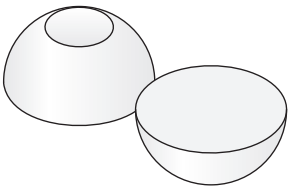


Different types of threaded plates are available to attach the rubber recess former to the formwork.

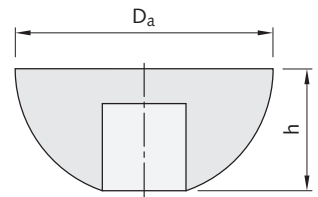
#### Rubber recess formers for the DKR Anchor

Load class	Article name	Order no. 0737.110-	D <sub>a</sub> [mm]	h [mm]	Colour	Suitable metal plate
2,5	6171-10	00001	118	56	yellow	6153-7,5/10,0
5,0	6171-20	00002	160	75	black	6153-15,0/20,0
	6171-32	00003	214	102		6153-32 030

### Recess fillers – Polystyrene®



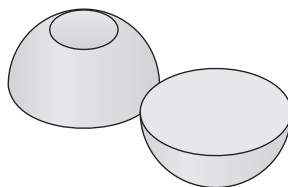
Recess fillers in Polystyrene® are available for load classes 1,3 to 20,0 to seal recesses in concrete and to protect anchors against water and ice.



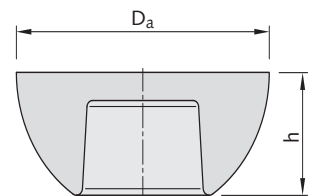
#### Polystyrene® recess fillers

Load class	Article name	Order no. 0737.010-	D <sub>a</sub> [mm]	h [mm]	Colour
1,3	6015-1,3	00001	60	29	white
2,5	6015-2,5	00002	74	35	
4,0 and 5,0	6015-4,0/5,0	00003	94	44	
7,5 and 10,0	6015-7,5/10,0	00004	118	55	
15,0 and 20,0	6015-15,0/20,0	00005	94	72	

### Recess fillers – concrete



Recess fillers made of fibre reinforced concrete are used to permanently seal anchor recesses; these are fixed using quick-set mortar. Make sure the underneath of the recess filler is completely filled with mortar, any unfilled space or void will negatively influence load capability.



Available for all load classes 7,5 - 45,0. Watertight up to 5 bar if a suitable watertight adhesive is used. Recommended adhesives: Carbolan or Carbopast made by Minova. Use quick-set mortar or adhesive according to manufacturer's instructions if negligible demands on watertightness are made.

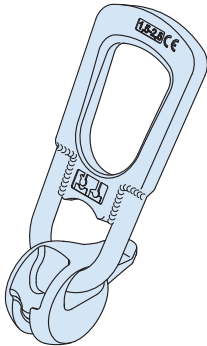
#### Concrete recess fillers

Load class	Article name	Order no. 0737.120-	D <sub>a</sub> [mm]	h [mm]	Colour
7,5 and 10,0	6172-10,0	00001	114	48	cement-grey
15,0 and 20,0	6172-20,0	00002	156	65	
32,0 and 45,0	6172-32,0	00003	210	90	

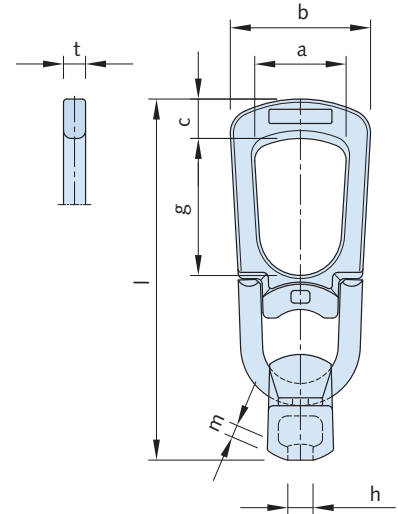
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

### Universal head lifting link



The DEHA Universal head lifting link is a lifting device for transporting precast concrete products with cast-in spherical head lifting anchors. The DEHA Universal head lifting link is hand operated. Please refer to the respective table for the load for each individual case. Always observe the applicable accident prevention regulations for your region. For Germany, these are BGV D 6.

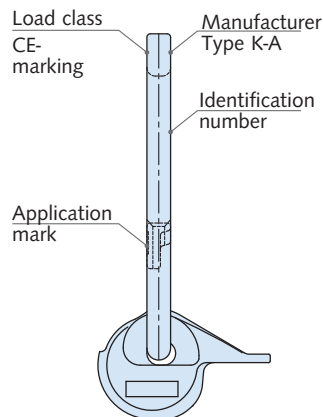
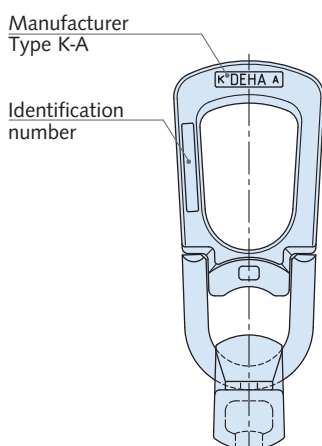


Before each use visually check all lifting equipment for correct application and damage-free condition. It is prohibited to use damaged lifting equipment.

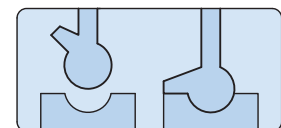
### Dimensions – Universal head lifting link

Load class	Article name	Order no. 0738.010-	for anchor	a [mm]	b [mm]	c [mm]	g [mm]	h [mm]	t [mm]	l [mm]	m [mm]
1,3	6102-1,3	00001	1,3	47	75	20	71	11	12	188	7.0
2,5	6102-2,5	00002	2,5	59	91	25	86	16	14	230	8.5
5,0	6102-5,0	00003	4,0 and 5,0	70	118	37	88	21	16	283	10.0
10,0	6102-10,0	00004	7,5 and 10,0	88	160	50	115	30	25	401	14.0
20,0	6102-20,0	00005	15,0 and 20,0	106	180	75	135	41	30	506	21.0
32,0	6102-32,0	00006	32,0	172	272	100	189	52	40	680	28.5
45,0	6102-45,0	00007	45,0	179	349	100	192	52	40	676	28.5

### Identification



Each universal head lifting link has a unique identification mark. The manufacturer's identification and the abbreviation K-A (universal head lifting link) are stamped onto the front of the link. The load class and operating symbol can be found on the reverse.



The abbreviation K-A indicates that the universal head lifting link can be used for the following two DEHA Transport anchor systems:

- for the DEHA Transport anchor system type K with spherical head transport anchor,
- for the DEHA Transport anchor system type A with adapter for DEHA Sleeve anchor.

All new universal head lifting links are delivered with a unique identification number.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

### Safety check guidelines – Universal head lifting link

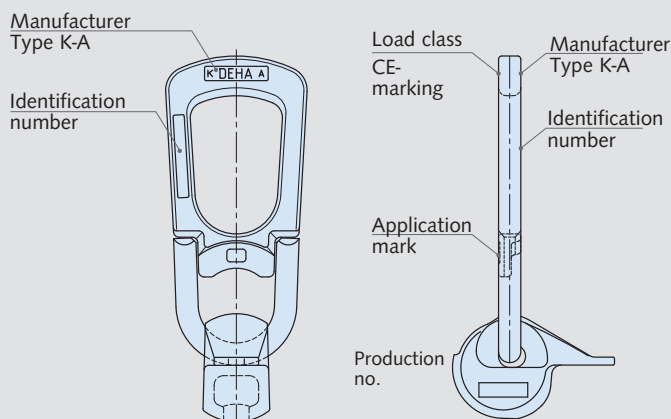
#### Annual inspection made easy

Each HALFEN Lifting link ordered has a unique identification number. The unique number correctly identifies the lifting link and helps to ensure that 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 was observed; includes type of lifting link, the identification number and an inspection table.
- a written report confirming the lifting link was tested to twice its nominal load capacity.

Please see our current price list for order numbers.



The contractor has to ensure that load suspension devices are inspected at least once a year by a qualified expert.

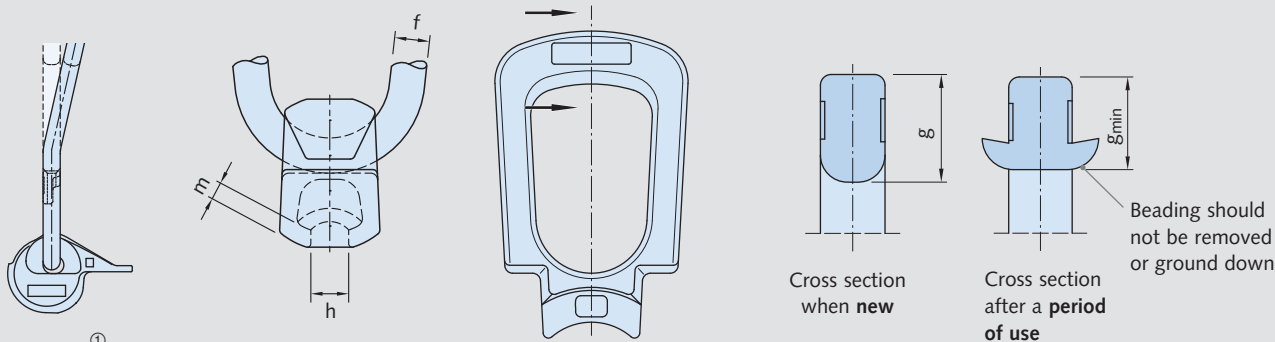
An expert is someone who has sufficient knowledge in the use of load lifting devices gained through technical training and experience and who has sufficient knowledge of the relevant industrial safety regulations to be able to judge the work-safe condition of load lifting devices.

Depending on the type of application it may be required to inspect the lifting devices more than once a year. This is the case with more than average usage, with increased wear or corrosion, if the effects of heat are an issue or if an increase in breakdowns is expected.

Check for any signs of damage, especially signs of wear. The identification label and marking 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.

### Wear limits – Universal head lifting link

Load class	1,3	2,5	5,0	10,0	20,0	32,0	45,0
Wear limits for the lip thickness „m” and hole size „h” [mm]							
$m_{min}$	5.5	6.0	8.0	12.0	18.0	24.0	24.0
$h_{max}$	13.0	18.0	25.0	32.0	46.0	58.0	58.0
Wear limits for minimum link diameter "g" and lengthening of chain link "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 re-bend any element damaged by misuse. Decommission the universal head lifting link if there is any significant bending.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

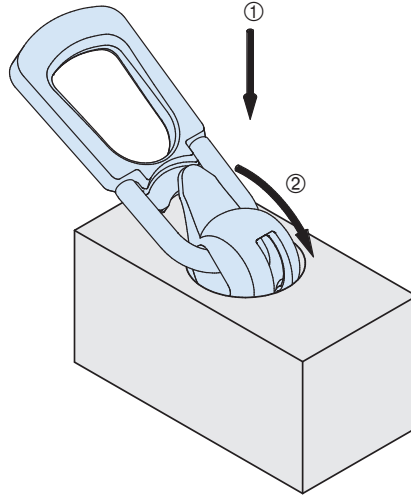
### Using the Universal head lifting link

Compare the load specification on the universal head lifting link with the specification on the anchor.

#### Engaging the clutch

- ① To engage: the ball is pushed with the opening facing downwards over the anchor.
- ② Then rotate the tongue on the ball away from the lifting link towards the surface of the concrete.

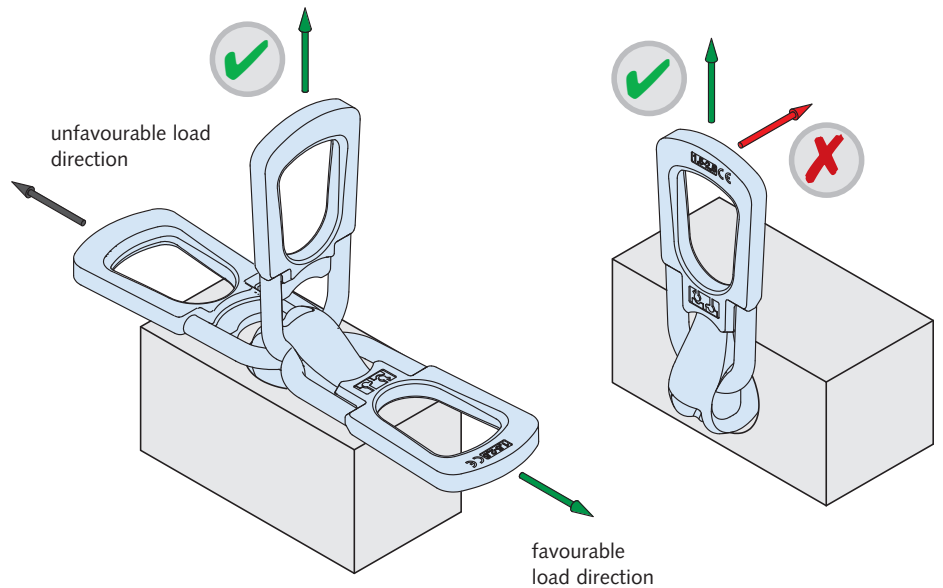
The universal head lifting link is now secured and is ready for use.



Rotating the link under load is only partially possible.

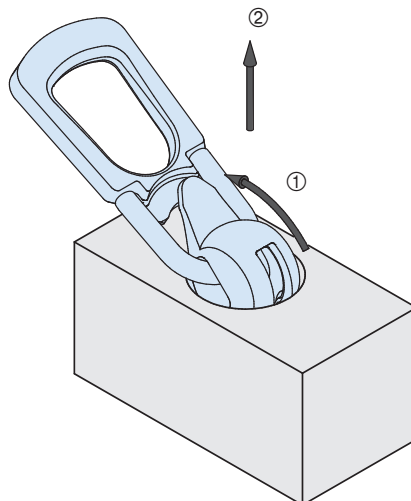
#### Lifting

All rotation, tilt and swivel movements are allowed with the universal head lifting link, even when under load. If subjected to diagonal load the position of the tongue is not critical. If the universal head lifting link is used for rotating and erecting precast concrete products, the position of the shackle must correspond to the description in the illustration on the left. The ball is always kept in the correct position and counterweighted by the tongue, even in a non loaded state.



#### Releasing the clutch

To disengage the lifting clutch, lower the lifting head ① then swivel the ball ② upwards and lift the clutch.

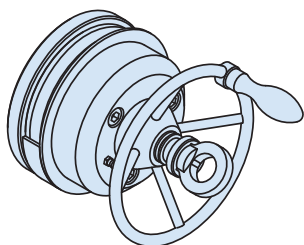


The installation and assembly instructions must be readily available on site, in the precast plant or on the construction site. The plant or site manager must ensure that the operator has read and understood the installation and assembly instructions for this system. Universal head lifting links must be inspected by an expert at least once a year. These inspections must be documented and kept on record (for more information see pages 36 and 37).

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

### Turning and lifting link

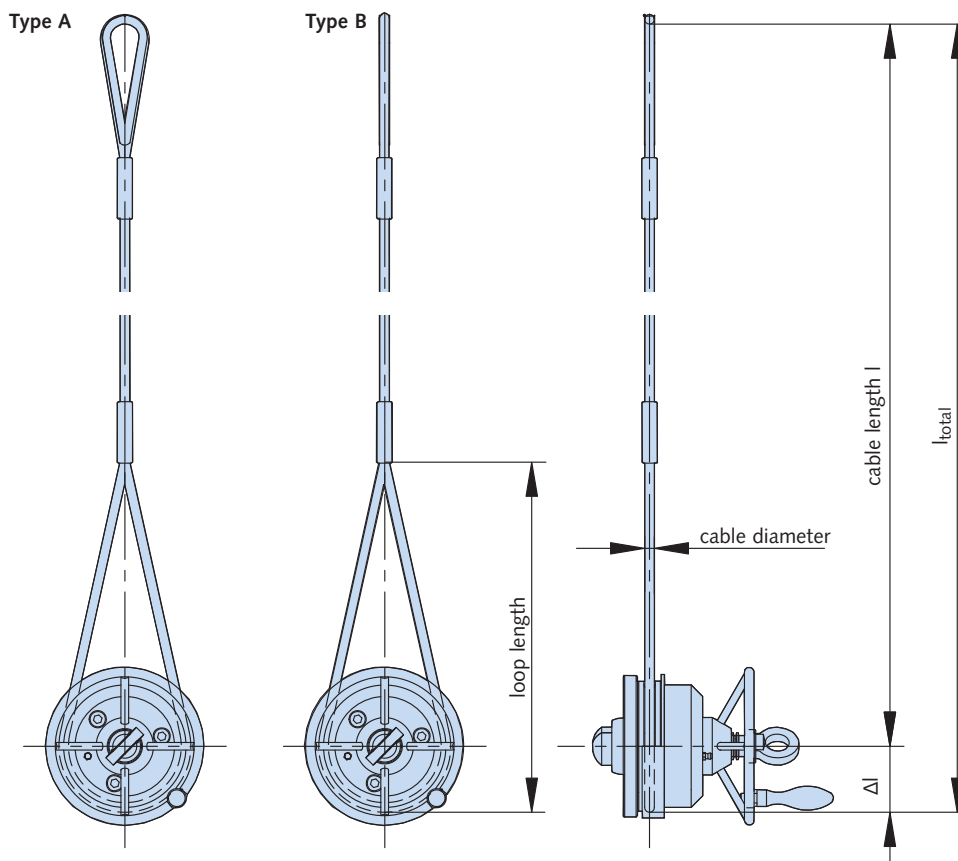


The design concept of this lifting link makes it an optimal lifting device for shear loads as lifting and rotating are possible simultaneously; the DEHA Turning and lifting link is a manually operated lifting device.

The system consists of the lifting device and the cast-in 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.**



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	00004	00004	1,3	10	0.8	60
6116-2,5	00002			2,5	14	1.0	65
6116-5,0	00003			4,0 and 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

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

### Using the turning and lifting link



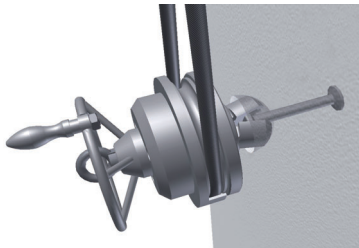
The turning and lifting link before use.



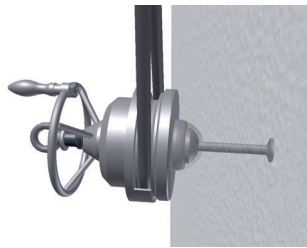
Turn the handwheel to open the clutch.



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 low 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

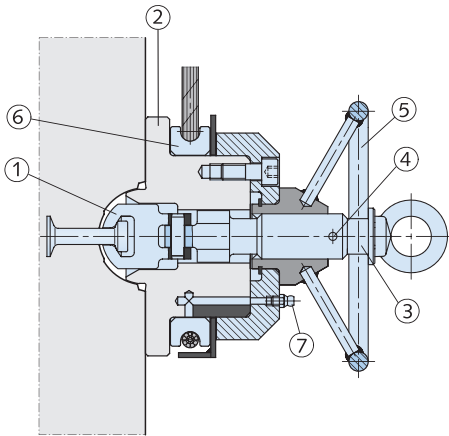




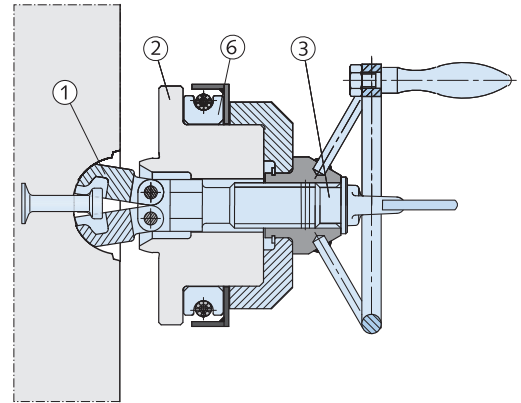
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## 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 HALFEN part.

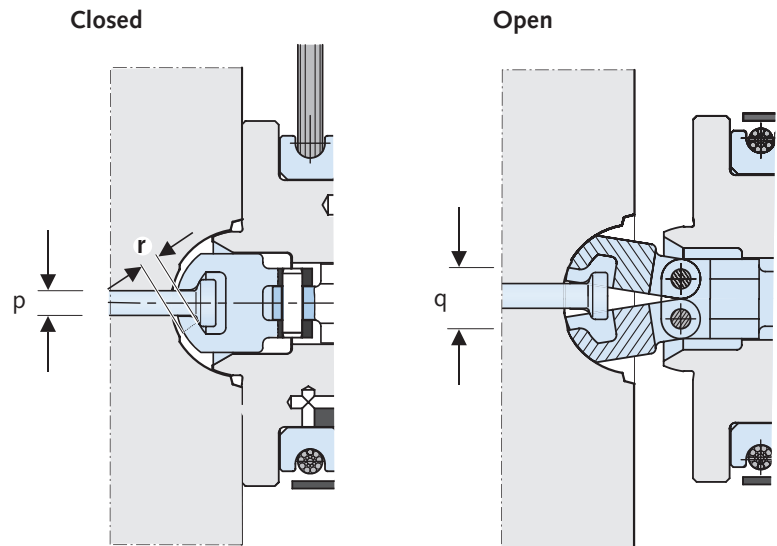
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## 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.

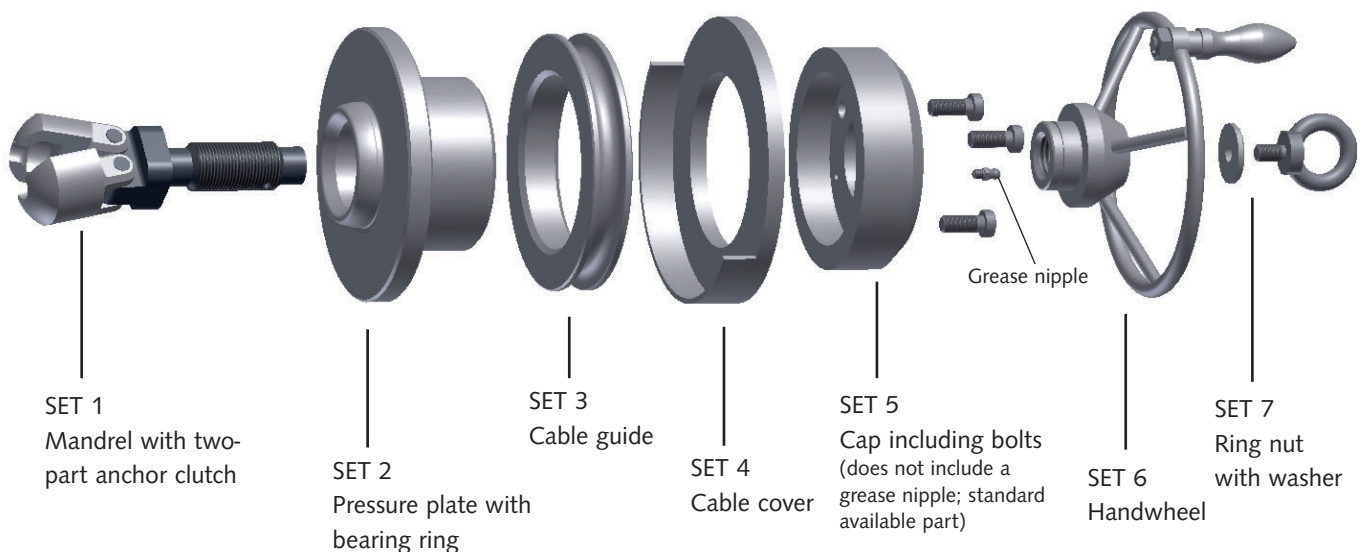
The contractor is responsible for ensuring that the turning and lifting links are checked by a qualified expert at least once a year (refer to VBG 9a §39 and §40).

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** HALFEN 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.

### Parts of the turning and lifting link



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

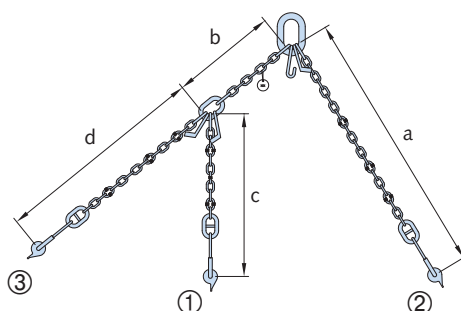
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

### Pipe installation device



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



#### Dimension of the pipe installation device

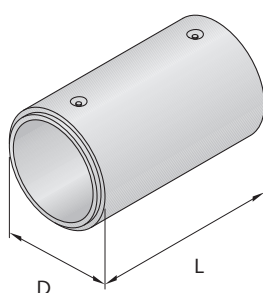
Load class of Ancor	Article name	Link order no. 0738.030-	Pipe length [m]	a [mm]	b [mm]	c [mm]	d [mm]	Identifying chain links [m / colour]
2,5	6112- 2,5	00001	up to 3.5	1972	433	1552	2602	2.5 / yellow
4,0 and 5,0	6112- 5,0	00002		1996	411	1567	2581	3.0 / red
7,5 and 10,0	6112- 10,0	00003		1986	440	1566	2586	3.5 / green
15,0 and 20,0	6112- 20,0	00004	from 2.5	1543	548	997	1933	-
		00005	from 3.0	1723	548	1177	2269	-
		00006	from 3.5	1957	548	1411	2659	-

The DEHA Pipe installation device can be described as a lifting device as well as an installation device. It can be used directly as a load lifting device or as a hoisting gear. It consists of 3 chain lengths, with a DEHA Universal head lifting link attached at each of the 3 ends. A symmetrical or an asymmetrical hoist configuration is possible.

The symmetrical chain configuration is used for lifting and transporting; the asymmetrical configuration is used for installing pipes. The DEHA Pipe installation device is available for load classes up to 20,0.

The chain lengths can be individually configured for different pipe lengths (1.5m - 2.5m - 3.5m), for load classes up to 10,0. Pipe installation devices for load classes up to 20,0 and pipe lengths of 2.5m, 3.0m and 3.5m are available as standard from HALFEN.

### Instructions for use



The minimal tension pull  $P_V$  on the crane for installing pipes depends on the angle of the chain and the frictional coefficient in the bedding. For example; the load gauge located in the crane will display the value for  $P_V$ .

We recommend increasing the calculated tension load  $P_V$  by approximately 10-15%. See table below.

The pipe bedding should be in concrete or consist of compacted sand or pebbles. The friction coefficient here is assumed as 0.35-0.6. The friction coefficient must not exceed the values in the table. Unfavourable conditions in the pipe dimensions (D/L) could result in the pipe tilting over. This can be compensated by changing the angle of the chains or by favourably influencing the friction coefficient. The dimension ratios for the chain angles friction coefficient must not be altered.

#### Minimal tension $P_V$ of the crane is dependent on the friction coefficient and angle of the chains

Friction coefficient	Chain angle	
	$\alpha = 45^\circ$	$\alpha = 50^\circ$
$\mu = 0.4$	$P_V = 0.29 \times G$	$P_V = 0.32 \times G$
$\mu = 0.5$	$P_V = 0.33 \times G$	$P_V = 0.37 \times G$
$\mu = 0.6$	$P_V = 0.38 \times G$	$P_V = 0.42 \times G$

#### Maximal permitted ratio D/L without risk of tilting $a = L/4$

Friction coefficient	Chain angle	
	$\alpha = 45^\circ$	$\alpha = 50^\circ$
$\mu = 0.4$	D/L < 1.50	D/L < 1.55
$\mu = 0.5$	D/L < 1.25	D/L < 1.30
$\mu = 0.6$	D/L < 1.08	D/L < 1.13

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## Lifting Devices

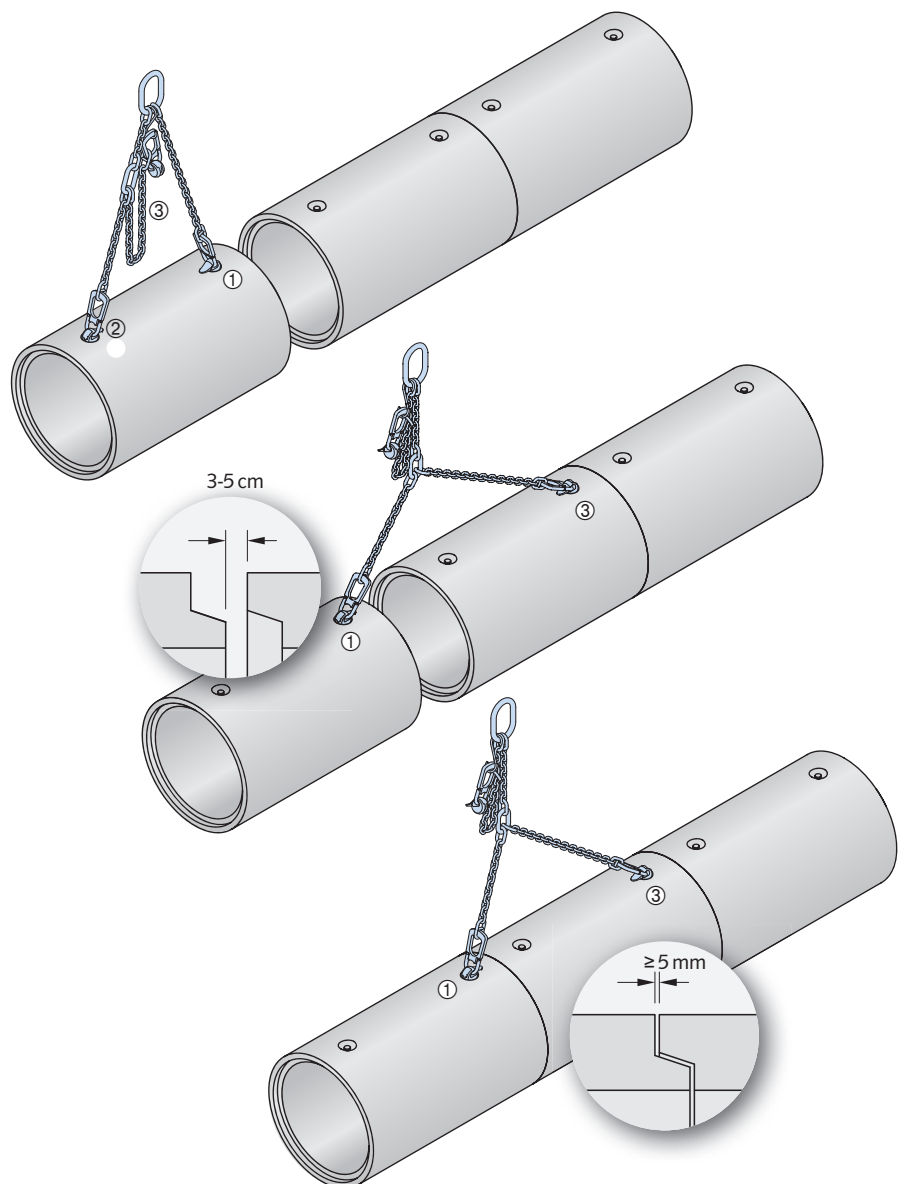
### Laying pipes

A symmetrical lifting gear is formed by attaching the universal head lifting links ① and ②.

Using the pipe installer device in this setup the pipe is first moved to the pipe installation position and placed close, about 3 to 5 cm away, from the previously installed first pipe. The second pipe is placed in front of the previously installed pipe so that the centre longitude axis of both pipes are aligned. Any deviations may result in a poor fit. The elevation of the second pipe must be precisely plumb with the first pipe (use timber wedges on a concrete bedding to ensure the pipe is level).

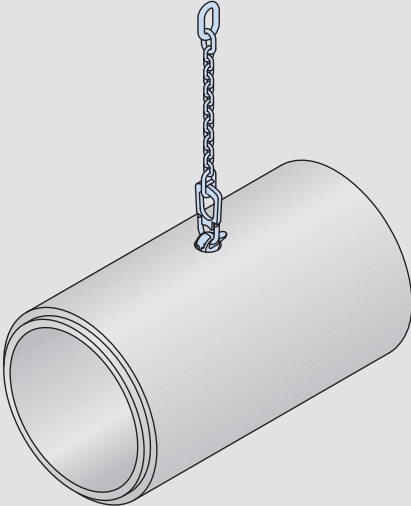
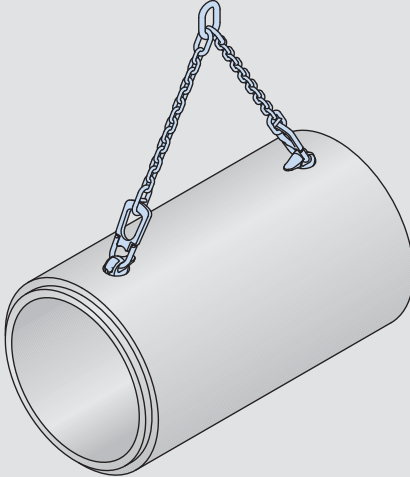
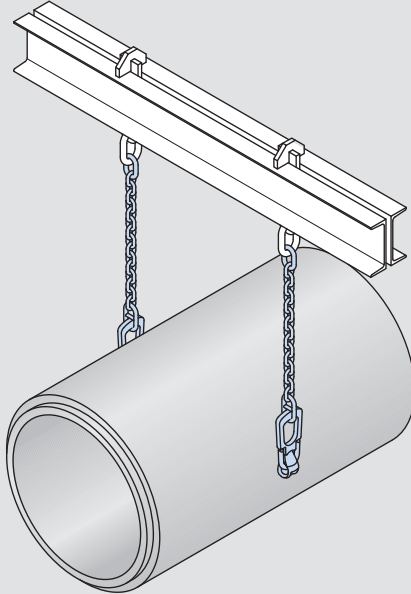
Move the universal head lifting link to make an asymmetrical suspension device. First link ② is detached from the anchor of the groove end of the second pipe. The chain length with link ③, which up to now was redundant, is attached to the tongue end of the first pipe. The crane cable must be positioned perpendicular to the centre line above the joint. The inclination angle of the short chain length should be about 40 - 50°. A horizontal load is generated with an upward movement of the crane cable. If the chain is properly adjusted, this provides sufficient force to connect both pipes without lifting. The pipes are pulled together centrally. Because of the lower inclination of the second chain length which is attached to the first pipe, previously installed pipes remain securely in place. Various types of pipes can be installed with this system; circular, oval, jaw-shaped cross section or pipes with supports. Pipes will not be damaged when using this system.

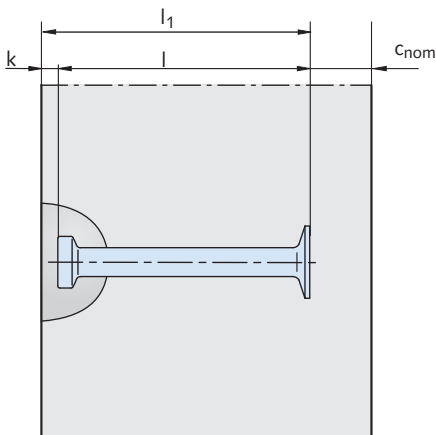
We recommend using appropriate spacers (hardwood wedges) to maintain the minimum 0.5 cm expansion joint width. In general, applicable constructions guidelines, for example DIN EN 1610, must be observed. When the pipes are properly positioned the suspension chains must be slack-ened immediately. Then remove the universal head lifting links.



# 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; according to page 11	Dynamic factor; according to page 11	Dynamic factor; according to page 11
Load per anchor $Z = G \times 1.65$	Load per anchor $Z = G \times 1.16 \times 1.65 / 2$	Load per anchor $Z = G \times 1.65 / 2$
		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  $\geq 12.0t$ , it is possible to calculate with a reduced shock factor of 1.3, unless previous experience suggests otherwise. The maximum spread angle must be  $\leq 60^\circ$ . 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 ( $c_{nom} \geq 25\text{ mm}$ ).

# 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<sup>2</sup>.

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

- max. G = 2 t  
3 items art. no. 6000-1,3-0120
- max. G = 4 t  
3 items art. no. 6000-2,5-0170
- max. G = 6 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 t  
4 items art. no. 6000-1.3-0065 ①
- max. G = 6 t  
4 items art. no. 6000-2.5-0085 ①

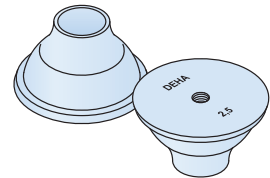
Transport anchors, load class 5,0 must be installed if the total weight is more than 6 t:

4 items, article no. 6000-5-120 ①

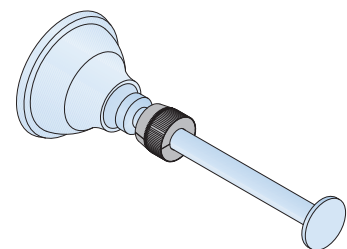
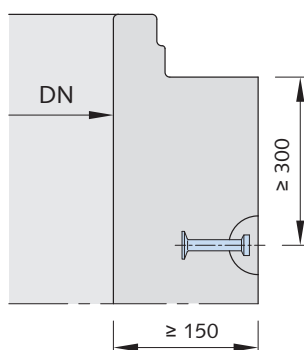
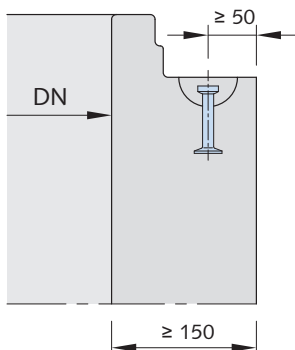
The concrete cover in the bottom is then only 15 mm.

#### 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.

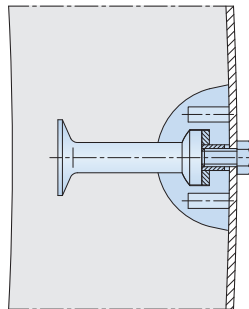
# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## 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:

Use no 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.

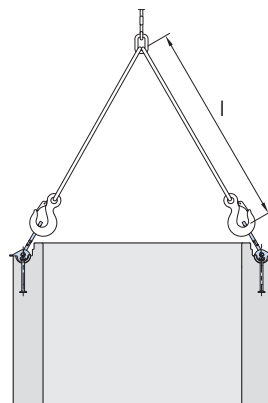
For load carrying use hoists according to DIN 3088, or chains according to DIN 5687-8. The load capacity of each individual length, considering a maximum spread angle of  $60^\circ$ , is based on the rated load capacity of the lifting device (universal head link).

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.

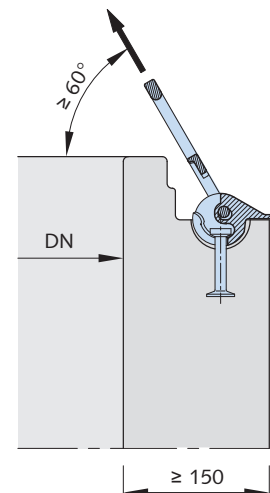
The length of the lifting gear is calculated as following;

- 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  $60^\circ$ .

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.

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## DEHA Lifting Anchor System for Use in Tunnels

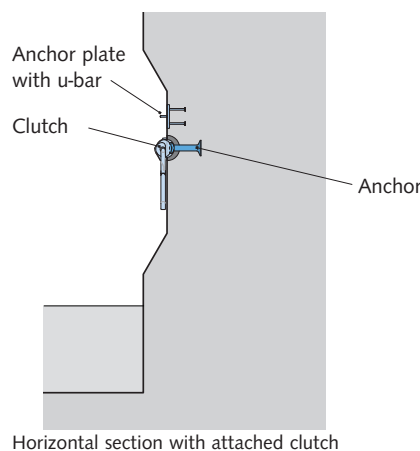
### HALFEN Accident recovery units in road tunnels

The accident recovery unit is installed in road tunnels as a precautionary measure. In the event of an accident crashed vehicles can be recovered effectively and quickly.

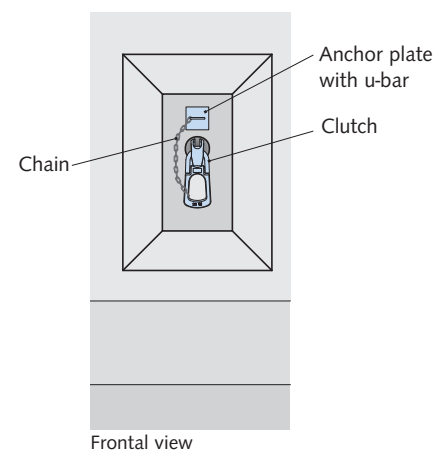
Increasingly, emergency and accident recovery services demand that suitable accident recovery units are installed every 100 metres in suitable recesses in tunnel walls.



The HALFEN Recovery anchor system is a cast-in stainless steel spherical head anchor (load class 20,0) on to which a freely pivoting standard lifting link is attached. The lifting link is similar to the type used for moving precast concrete elements.



A securing bolt is provided to prevent the unintentional removal of the lifting link.



### Tender example for the accident recovery system

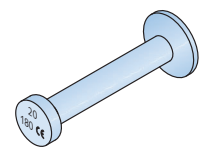
#### Deliver and install a load class 20,0, spherical head lifting anchor

Deliver and install a load class 20,0, spherical head lifting anchor, length 170 mm, in stainless steel A4 1.4571/1.4404 with reinforcement. Additional on-site reinforcement is not included. Construct a recess with a rear surface area of 60 cm x 120 cm, 20 cm deep, with side surfaces at a slant of 30°.

Insert the spherical head anchor in a round recess former and secure both to the formwork. Secure the recess former to the formwork with the threaded rod (included in delivery).

Place reinforcement around the recess former in the area around the anchor head.

Reference projects are required from the manufacturer when using the spherical head anchor for accident recovery in tunnels. All elements in the system must be from one manufacturer.



#### Deliver and install a load class 20,0, universal head lifting link

Deliver and install a load class 20,0, zinc galvanized, universal head lifting link.

The lifting link is attached to the spherical head anchor after striking the formwork.

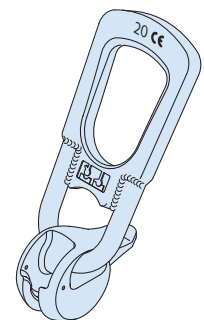
The universal head lifting link load class 20,0 is identified with a permanent unique identification number to facilitate annual safety checks.

The lifting link is fitted with a device by the manufacturer to prevent the unintentional release of the clutch from the anchor.

A chain fixed with a dowel (with an external thread) and a ring bolt are installed to prevent the theft of the recovery anchor.

Reference projects are required from the manufacturer when using the spherical head anchor for accident recovery in tunnels.

All elements in the system must be from one manufacturer.





# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## DEHA Lifting Anchor System for Overhead Application

### Universal head lifting links for overhead application

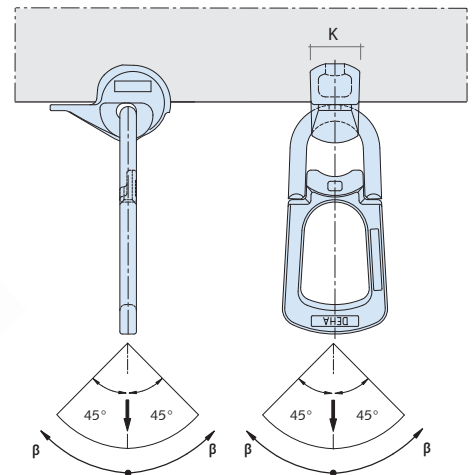
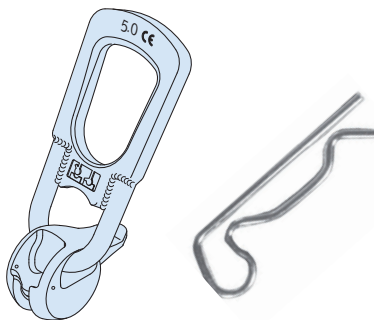


Typical set up for an overhead anchor system.  
Multiple anchors used together to lift heavy equipment


Lifting anchors can be cast in to the roof to facilitate installation and to secure heavy equipment for maintenance. A universal head lifting link is attached for installation. A chain or cable is passed through the attached link. The universal head lifting link has a hole through which a standard available safety clip can be inserted. This ensures the link is held securely in place.

Stainless steel is recommended for overhead lifting anchors.

A maximum diagonal angle of 45° must not be exceeded when subjecting the lifting head to load.



Load capacities for overhead lifting (hoisting hook)					
Load class	Article name	Order no. 0738.210-	Min. slab thickness for C25/30 [mm]	Max. load capacity [kN]	Head width K [mm]
2,5	6105-2,5	00001	120	25.0	42.0
5,0	6105-5,0	00002	220	50.0	57.0
10,0	6105-10,0	00003	290	100.0	74.0
20,0	6105-20,0	00004	440	150.0	113.0

 Always observe local safety regulations when lifting heavy objects!

# DEHA LIFTING ANCHOR SYSTEM FOR USE IN CIVIL ENGINEERING

## DEHA Lifting Anchor Systems for Lift Shafts

### DEHA Lift assembly set for use in lift shafts

The HALFEN Lift-assembly-set is used to facilitate the installation of lifts and lift components. After initial installation the HALFEN Lift set box is perfect for upgrade and maintenance work.

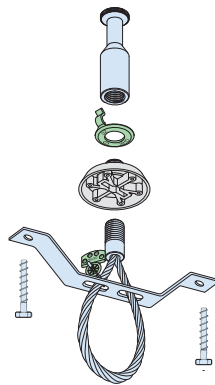
The pre-assembled box can be installed in machine rooms and in shaft heads where they are required to lift and install heavy components.

This system allows exact positioning of the drive motor in the machine room. The system can also be used for the initial installation of guide rails and other heavy lift components in the lift shaft.

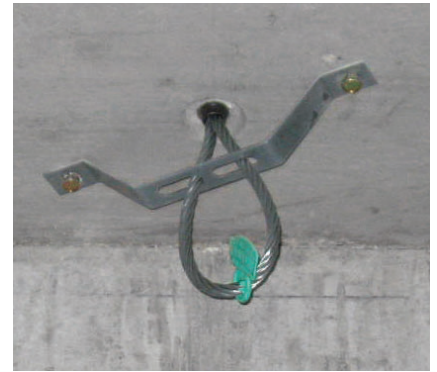
The HALFEN Lift assembly set consists of a cable loop, which is held in place by a safety bracket. The bracket is bolted to the ceiling with HALFEN Concrete

bolts to prevent the cable loop from turning and loosening from the ceiling. This guarantees maximum safety when working in the lift shaft. The system has been used by renowned lift manufacturers for many years and has the advantage of being easy to assemble, safe and time saving.

Lift assembly set			
Axial load capacity [kN]	Article name	Order no. 0742.	
5.0	DLM-RD 12	200-00001	
12.0	DLM-RD 16	200-00002	
20.0	DLM-RD 20	200-00003	
25.0	DLM-RD 24	200-00004	
40.0	DLM-RD 20HD	200-00005	



Cable loop with securing bracket (5.0 – 25.0 kN)



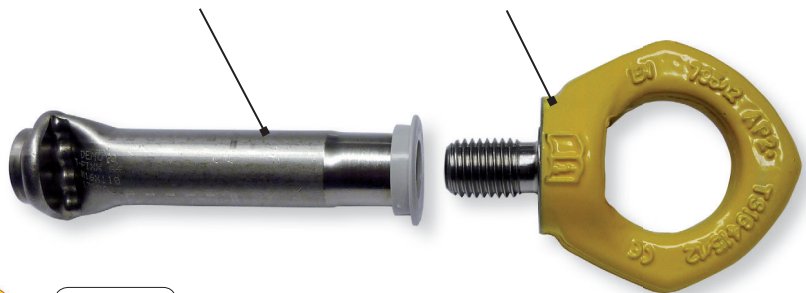
Cable loop installed in a lift shaft

### HALFEN PSA Anchor point for use with personal fall protection equipment

The anchor point for use with personal fall protective equipment (PSA) consists of an approved DEMU T-FIXX®, stainless steel sleeve anchor, an identification cap, and a connecting hook. The suitability of the approved sleeve bolt for fall protection was conducted in a DGUV test in accordance with CEN/TS 16415 for 2 people.

DEMU T-FIXX® M16, A4

Suitable connecting hook, for example: RUD PSA INOX STAR M16



Identification cap



Order no. T-FIXX® with identification cap for use as an anchor point for personal fall protection equipment (PSA): **0020.270-00508**

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