Great Magtech Electric
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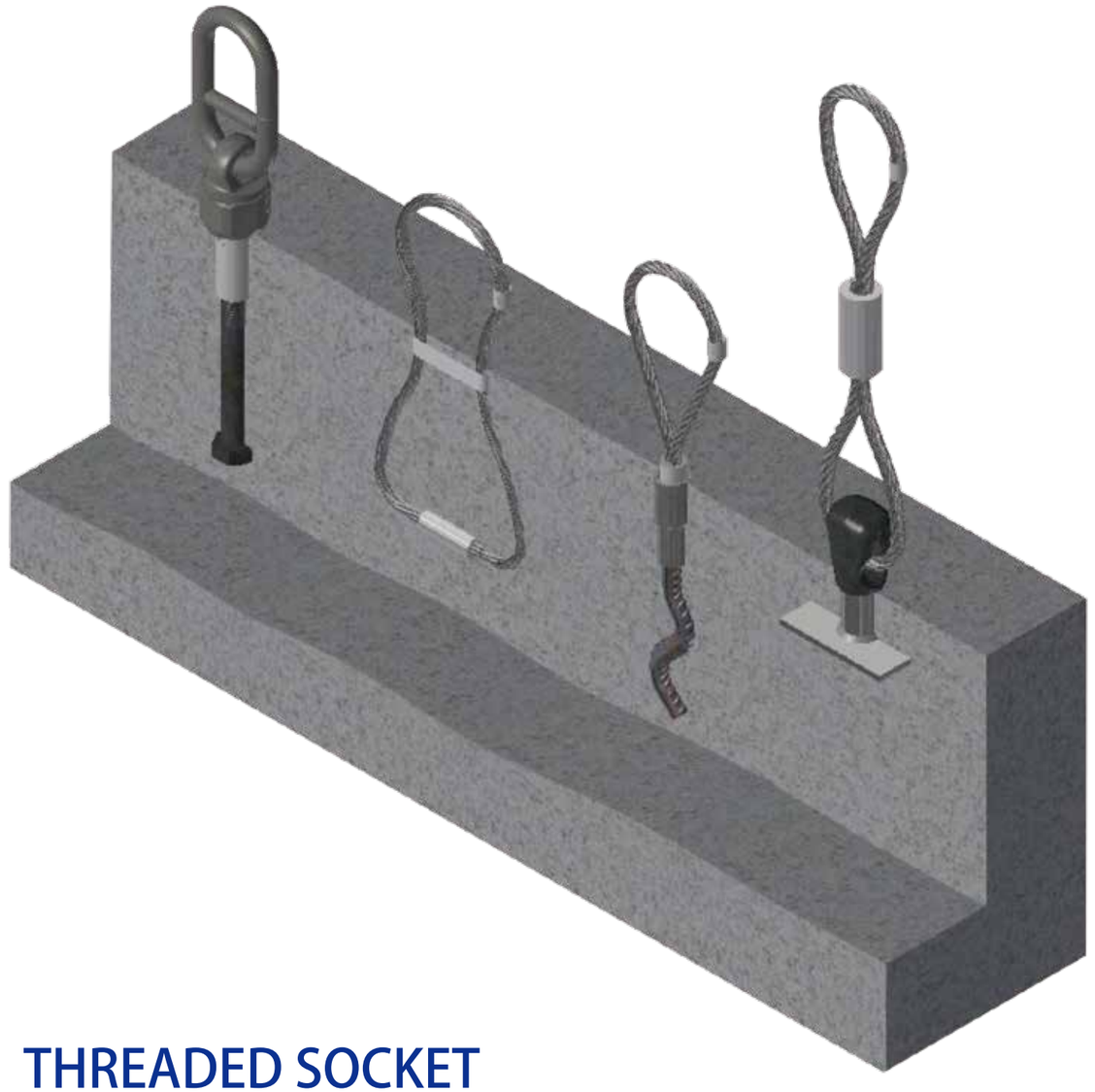
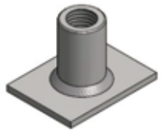
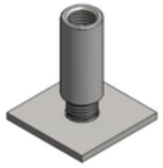


THREADED SOCKET LIFTING SYSTEM

INSTRUCTIONS FOR USE

Tel: 86-592-6682467 Fax: 86-592-6682467
Email: pcmagnet@greatmagtech.com
www.precastconcretemagnet.com

OVERVIEW

LIFTING SYSTEMS				
THL	THS1	THS3-HD	TIL	
				
LIFTING AND TRANSPORT ANCHORS				
TGK	TGL	TRL	HBB	HSB
				
HSB – with stopper	HSR	HSP	HBP	
				
FIXING ACCESORIES				
SN	KU-10	TPM	KU-02	TBP
				
DATA CLIP	PLASTIC PLUG	COVER SEALING CAP TP-02	COVER SEALING CAP TP-10	
				

CONTENTS:

LIFTING SYSTEMS DESIGN CRITERIA

We have four main systems available for the lifting of precast concrete units. The reasons for selection may be technical, economic, or may be due to the lifting equipment already owned.
CFS can supply all the accessories you need including lifting loops, clutches and recess formers for each of these systems.
All the lifting sockets have Rd thread suitable for the building site environment.

Threaded Sockets

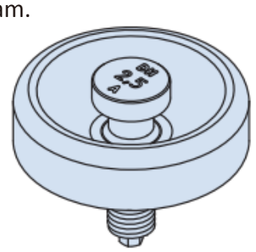
These are usually used for light to medi-um-weight units, they are easy to install in the concrete element and may be recessed if required.
Wavy Tail anchors are particularly easy to fix, High Load Wavy Tail type anchors may require no further reinforcement(for more information please contact CFS). Tube and flat plate sockets are also available, which depend on separate reinforcement.

Threaded Sockets

These lifters require no further accessories as the loop is attached directly to the crane hook.
They are economic where smaller numbers are required, as you do not have to buy a lifting clutch.
They can be used for units where the area around the lifting point is not visible in their permanent condition, as the loop is cast into the top of the concrete.

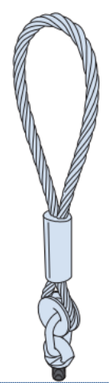
HD-Adapter

The HD-Adapter enables the Uni-
versal Head Lifting Link the DEHA Spherical Head Lifting Anchor System to be used with the HD-Anchor Sys-
tem.The Universal Head Lifting Link is used when it is required to rotate a panel without a spread-er beam.



HD-Perfect Lifting Head

The Perfect Lifting Head is suitable especially for angled load and is used for rotating a wall into upright position with an applied load angle less than 90°.

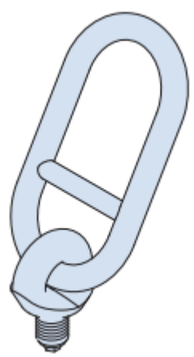


Threaded Socket pressed on steel rebar

The "straight"and "long wavy tail"versions are suitable for use in narrow walls,e.g. precast concrete thin wall structures. It can carry very high axial and shear loads. In thicker walls it is oftenmore economic to use the "short wavy tail"version.

HD-Lifting Link

For lifting precast elements in conjunction with HD-Anchors.
Load groups 1.3-15.0



Threaded sockets with cross hole

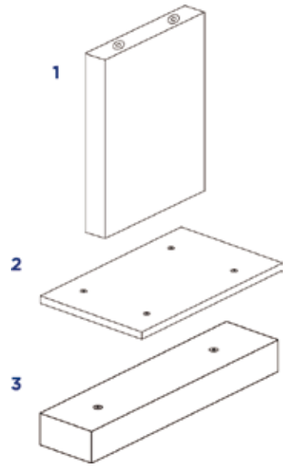
The "straight"and "long wavy tail"versions are suitable for use in narrow walls,e.g. precast concrete thin wall structures. It can carry very high axial and shear loads. In thicker walls it is oftenmore economic to use the "short wavy tail"version.

Sockets with plates and bolts

Owing to their relatively small depth, these sock-ets are ideal for fitting in slab-type elements perpendicular to the plane of the element.
The end plate increases the anchorage effect.
Schroeder lifting sockets are available with Rd and M threads.

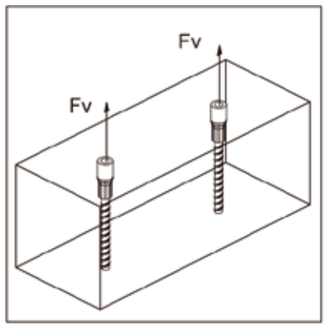
Selection of type within an anchor system

You must consider if the anchor is to be used in the edge of walls as(1), in slabs (2) or in beams (3), and also whether the unit will need to be tilted using the anchor, or simply be used for vertical lifting.
With these factors in mind, review the different types of anchors within this catalogue to decide which is most suitable for your application. If in doubt, please contact us for advice.

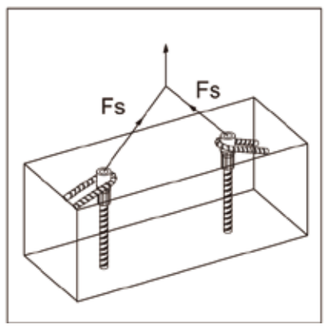


Load Cases

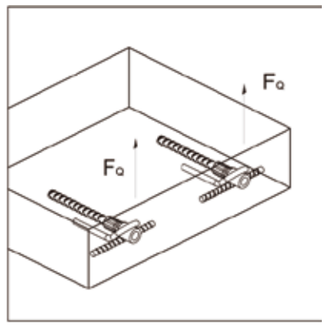
Lifting of unit must be considered from the demoulding to the final position on site. The load cases may have diferent direction of action which must be considered as the anchors have different capacities in axial, angled and shear lifting.



Axial Lift



Angled Lift up to a spread of 90°,or 45°from the vertical



Shear Lift

Typically there are six possible load cases that may be critical:

1. Demoulding by vertical lift from formwork at precast yard
2. Demoulding by tilting to vertical from formwork at precast yard
3. Handling vertically at precast yard
4. Tilting onto transport or storage at precast yard
5. Tilting from transport or storage on site
6. Handling vertically on site Typically handling at the precaster is with low strength concrete, but in a more controlled manner.
On site the concrete is more mature, but may receive rougher treatment.

APPLIED LOAD ON EACH ANCHOR

The way in which a unit is lifted influences the load that is applied to the anchors. For each load case that applies to your unit, the following factors must be considered:

Weight of the Unit, Fv

This should be the unfactored weight.
Typically:
FG = V x γ FG = self weight [kN]
V = Volume [m³]
γ = specific weight of the precast element [kN/m³]
Typically γ =25 kN/m³

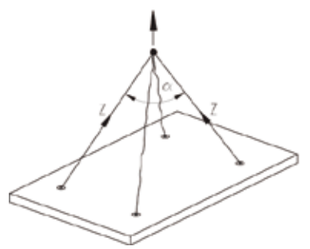
Number of lifting points, N

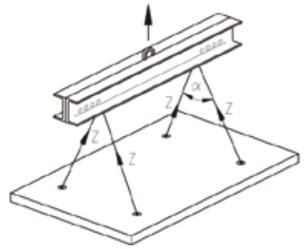
Two legged slings are statically determinate. N=2

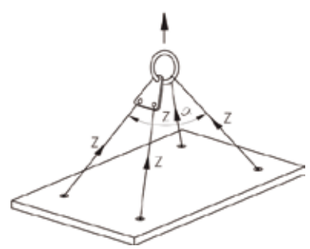
Three legged slings are statically determinate provided the anchors are not in one line. N=3

Four legged slings are statically indeterminate. It must be assumed that only two anchors are holding the load at any one time. N=2

A spreader beam or tri-plate can make a four legged sling statically determinate. N=4







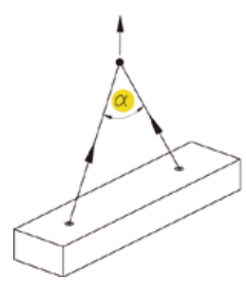
Position of the Anchors

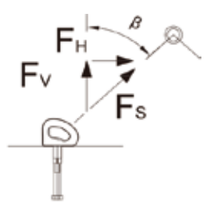
If the anchors cannot be placed symmetricaly to the centre of gravity, the load on the anchors must to be calculated according to simple static analysis.

Chain Angles

If no spreader beam is used, the spread angle a depends on the arrangement and length of the suspending cable.
The resulting horizontal component increases the tensile force on the anchor.

Spread Angle		Spread Coefficient
α	β	z
0°	0°	1
15°	7.5°	1.01
30°	15°	1.04
45°	22.5°	1.08
60°	30°	1.16
75°	37.5°	1.26
90°	45°	1.41





Dynamic Factors

The dynamic process of lifting a unit adds load to the anchors. The magnitude of this dynamic effect is determined by the choice of lifting equipment, the length and type of cable or chain, and the hoisting speed.
Cables made of steel or synthetic fibre have a damping effect that increases with cable length.
The table below provides typical values that you can use. If you are unsure as to which factor to apply please consult GME.

Lifting Equipment	Typical DynamicImpact Factor, ψ
Tower crane,Overhead crane,Portal crane	1.2[a]
Mobile Crane	1.3
Lifting and moving on flat terrain	2.0-2.5
Lifting and moving on rough terrain	3-4

[a]In precasting factories and if specific provisions are made at the building site, lower values may be appropriate

Demoulding Adhesion to Formwork

Adhesion forces between the formwork and the concrete vary according to the type of formwork used.
The following may be taken as a guide:

Formwork Type	Adhesion coefficient, q_{adh}(kN/m^2)
Oiled steel formwork	1
Varnished timber formwork	2
Rough formwork	3

$F_{adh} = q_{adh}$ x A F_{adh} = Adhesion Force [kN]
q_{adh} = Adhesion forces [kN/m^2]
A = Surface area in contact with the formwork prior to lifting [m^2]
Heavily profiled panels cause more adhesion. Please contact GME for advice if required.

THREADED SYSTEMS FOR LIFTING

Tube Cross-Hole Socket

Solid Cross-Hole Socket

Flat Steel Socket

Crown Foot Socket Anchor

Bolt Anchor

Bolt Anchor with Plate

Short Wavy Tail Anchor

Long Wavy Tail Anchor

Rebar Anchor

CE CONFORMITY AND TRACEABILITY MARKING

Loading categories changed when the European Machinery directive and VDI/BV-B5 Gudeline 6205 (lifting systems for PCC elements) came into effect.
Given the load group and the defined typical boundary conditions in the table, it is possible to determine the permissible load of every anchor.
· Unique material batch marking for liting socket systems wil be phased in during 2017.

Thread type, diameter and load class are embossed on the socket together with CE marking.

Technical Standards

CEN/TR 15728-31st March 2016

Design and use of inserts for lifting and handling of precast concrete elements CEN/TC229 (European Committee For Standardization)Draft July 2013

VDI/BV-BS 6205 April 2012

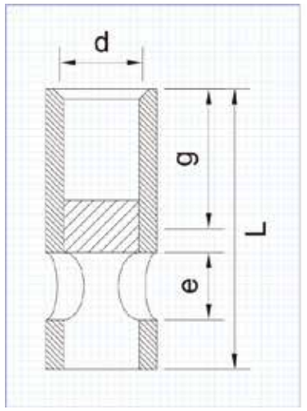
Lifting inserts and liftings inserts systems for precast concrete elements:principles,design,applications

MD2006/42/EC

Machinery guidelines-17 May 2006

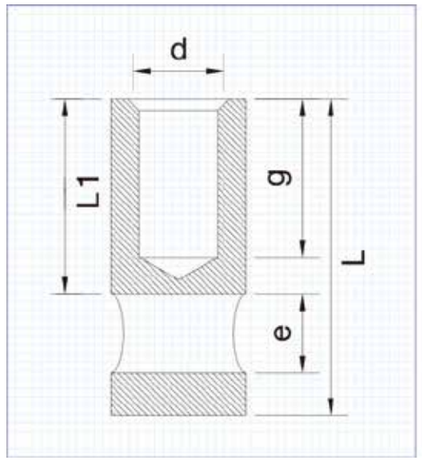
TUBE CROSS-HOLE SOCKETS

- Electroplated or stainless steel
- Precision steel tube(S355) or stainless steel(A2-standard,A4-on request)
- Rd thread
- The socket is anchored into the concrete unit using a reinforcement bar through the cross-hole.
- A pressed-plastic stopper prevents the penetration of the concrete from below into the thread.
- Sockets can be used in a wide range of applications due to the flexible way in which the reinforcement can be applied; pipes, walls, slabs



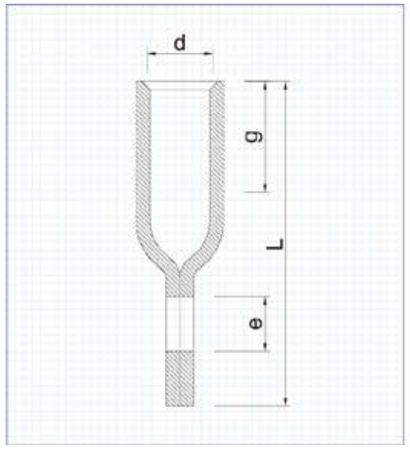
SOLID CROSS-HOLE SOCKETS

- Electroplated or stainless steel(A2-standard,A4-on request)
- Mthread The socket is anchored into the concrete unit using a reinforcement bar threaded through the
- cross-hole This socket can provide good corrosion resistance as there is protection by solid stainless steel
- Sockets can be used in a vwide range of applications due to the flexible way in which the reinforcement
- can be applied;pipes,walls,slabs These sockets may also be used as fixing sockets



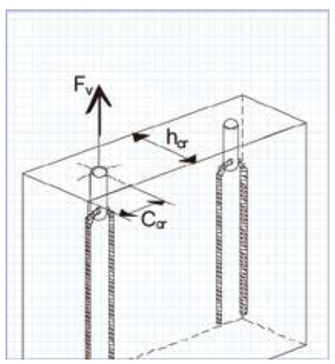
ECONOMY CROSS-HOLE SOCKETS

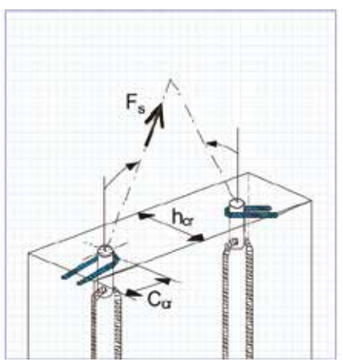
- An economical range of flat end lifting sockets Zinc plated or stainless steel(A2-standard,A4-on reques)
- M thread The socket is anchored into the concrete unit using a reinforcement bar threaded through the
- cross-hole.
- Sockets can be used for wide range of applications such as pipes, walls, slabs, etc.

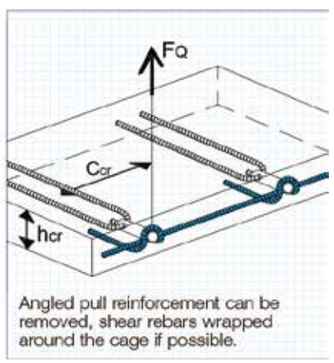


LIFTING CAPACITIES FOR CROSS-HOLE SOCKETS

Tables below show the application of these sockets as lifting points. They should be compared with the loads calculated using the method outlined in section 1 of this catalogue and include consideration of dynamic factors, formwork adhesion etc.
These tables show a typical situation, please check if your situation is within these parameters. If your situation falls out of these parameters, please contact CFS for bespoke advice and calculations.
Where two or more sockets are in use, they should be spaced at a minimum of 2xCor apart.
Minimum reinforcement of two layers of 131mm2/m mesh.

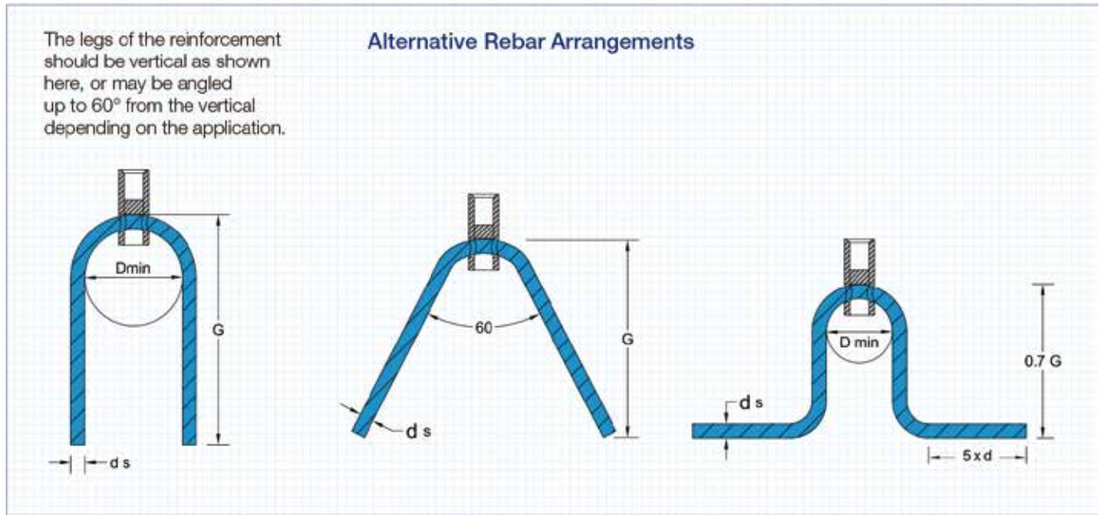






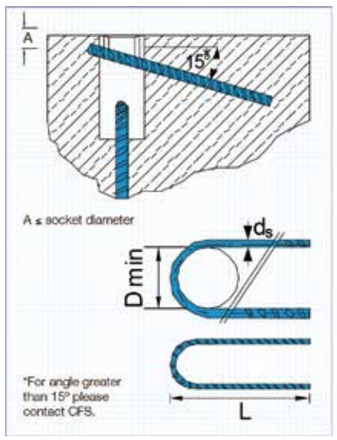
ANCHORAGE REINFORCEMENT FOR CROSS-HOLE SOCKETS

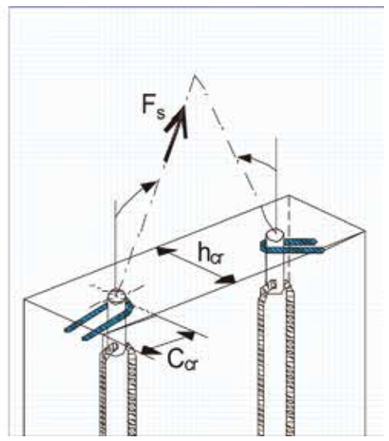
Cross-Hole sockets must be used with anchorage reinforcement.



ANGLED PULL REINFORCEMENT FOR CROSS-HOLE SOCKETS

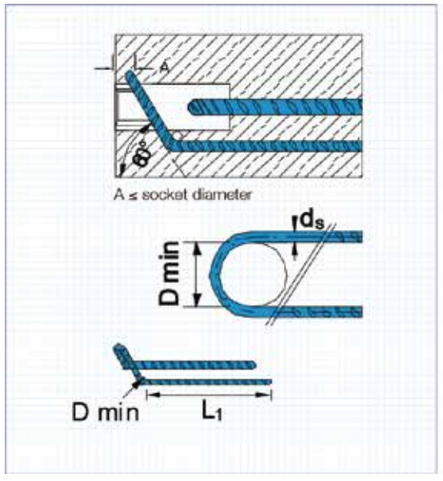
Where the lifting chains are angled greater than 15 from the vertical, the additional reinforcement must be used and placed on the opposite side of the socket, opposing the pull force. This reinforcing bar should-touch the socket where it wraps around and be located as close to the concrete surface as cover allows (dimension A should be ≤ socket diameter).

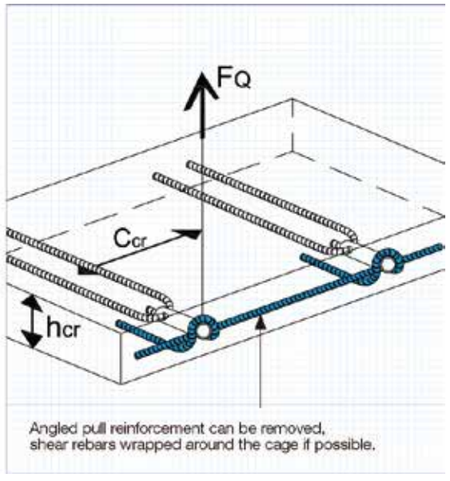




SHEAR REINFORCEMENT FOR CROSS-HOLE SOCKETS

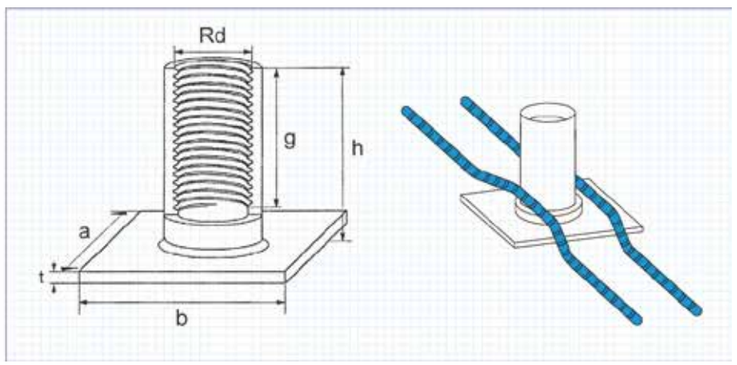
Where the unit is being tited, or the lift is in the edge of the element resulting in a shear pull on the socket, the reinforcement shown here must be used. This reinforcing bar should touch the socket where it wrapsaround and be located as close to the concrete surface as cover allows(dimension A should be ≤ socket diameter).





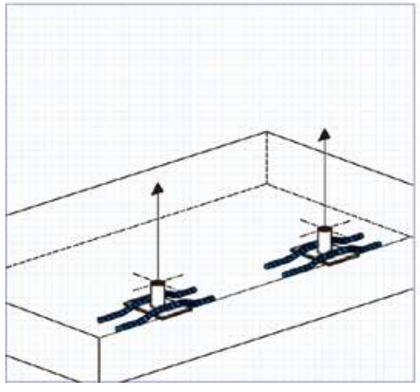
FLAT STEEL ANCHORS

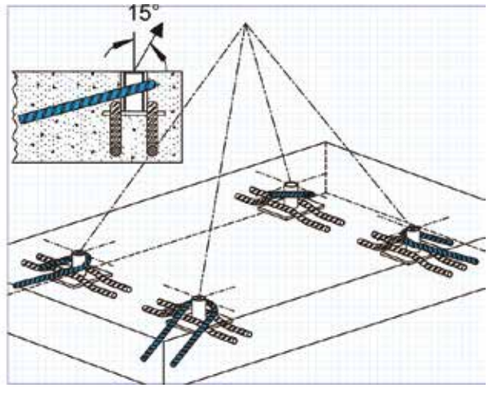
- Electroplated or stainless steel(A2-standard,A4-on request)
- Rd thread
- The flattest profile lifting socket available
- The socket is anchored into the concrete unit using reinforcement over its flat plate.
- Sockets are typically used in slabs



LIFTING CAPACITIES FOR FLAT STEEL ANCHORS

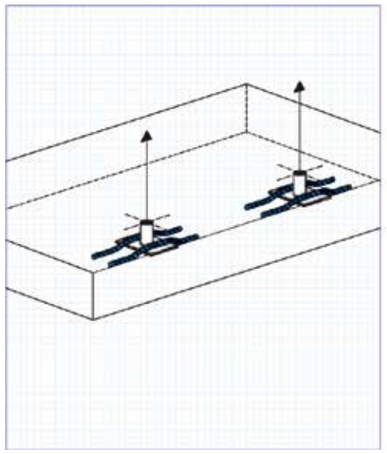
Tables below show the application of these sockets as lifting points. They should be compared with theloads calculated using the method outined in section 1 of this catalogue and include consideration of dynamic factors, formwork adhesion etc.
These tables show a typical situation and you should check your situation is within these parameters.
If your situation falls out of these parameters, please contact CFS for bespoke advice and calculations.

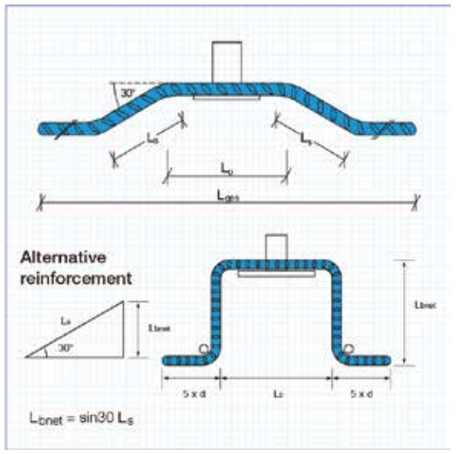




ANCHORAGE REINFORCEMENT FOR FLAT STEEL ANCHORS

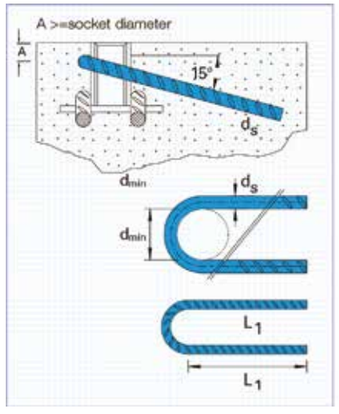
Axial Loads are permitted only with reinforcement as shown below.Please ensure that the reinforcement touches the end plate of the socket.

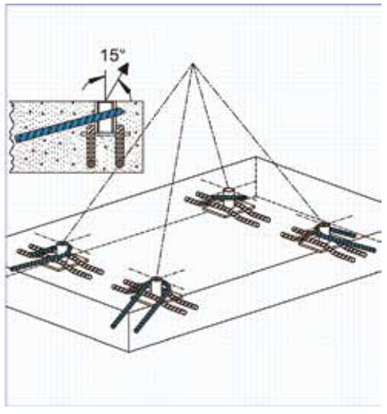




ANGLED PULL REINFORCEMENT FOR FLAT STEEL ANCHORS

Where the lifting chains are angled greater than 15° from the vertical, the additional reinforcerment must be used and placed on the opposite side of the socket, opposing the pull force. This reinforcing bar should-touch the socket where it wraps around and be located as close to the concrete surface as cover allows (dirmension A should be s socket diarmeter).

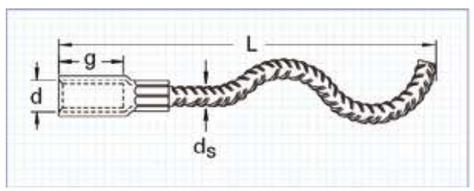




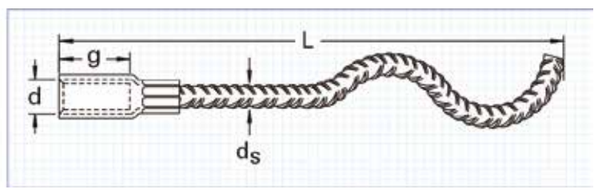
WAVY TAIL SOCKET ANCHORS

- Zinc plated or stainless steel A2 standard,A4 on request
- Rd thread
- The socket is anchored into the concrete unit using its integrated reinforcement bar. No need for anchor-age reinforcement
- Quick and easy to fix into unit
- Wavy Tail Short Anchors are typically used in beams
- Wavy Tail Long Anchors are typically used in panels and walls
- High Load Wavy Tails can be arranged if higher capacities are required. Contact GME for further info.

Short Way Tail



Long Wavy Tail



REINFORCEMENT

Short Way Tail can be installed-as from a concrete compressive strength of 15 N/mm2with the minimum necessary surface reinforcement according to Table 1-without special additional reinforcement, provided that the maximum angle of inclination is not exceeded. The swaged on waved rebar itself then transmits the local forces into the concrete. The user is then responsible for transmitting the forces within the precast concrete unit.

Size	Surface* reinforcement [mm2/m]
Rd12	≥131
Rd16	≥131
Rd20	≥188
Rd24	≥188
Rd30	≥188
Rd36	≥188
Rd42	≥188

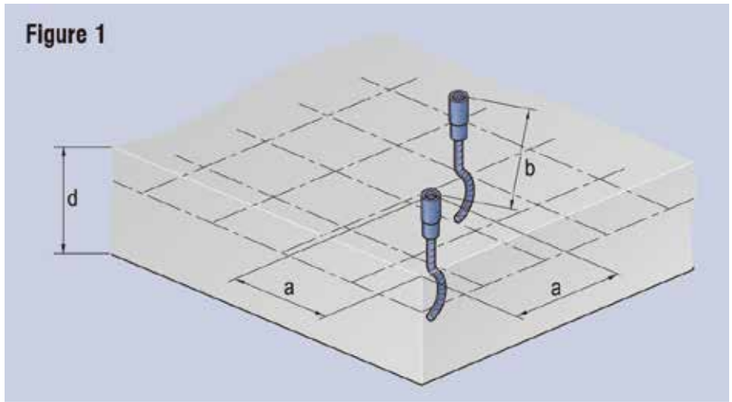
Table 1

*The required amount of reinforcement has to be installed in both directions.

EDGE DISTANCE,MINIMAL DISTANCE, MINIMAL THICKNESS OF BUILDING PART

In order to guarantee the local transfer of forces into the concrete, certain distances between the individ-ual anchors and from the edge must be observed.
It is also important that the thickness of the precast concrete unit does not fall short of a certain mini-mum, in order to prevent corrosion.
Table 2 shows the minimum values for the individual anchors. See also Fig.1.

Figure 1



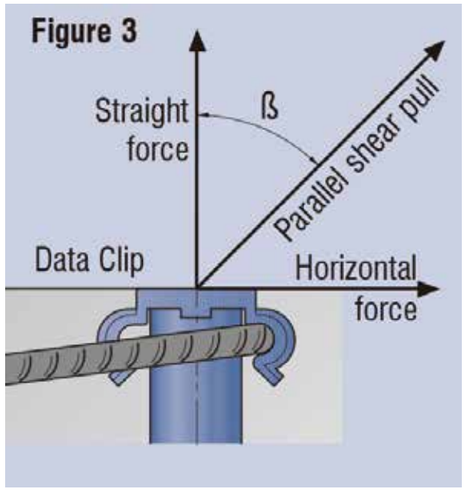
Size	adm.F kN	Edge Distance a mm	Minimum Distance b mm	Minimum Panel Thickness d mm
Rd12	5	95	200	130
Rd16	12	135	260	195
Rd20	20	170	350	215
Rd24	25	220	440	270
Rd30	40	275	550	320
Rd36	63	300	600	405
Rd42	80	400	800	470

Table 2

20 mm to section. For other uses and environmental conditions, the concrete cover c corresponding to section 6.3 of DIN 1045-1 must be increased so enlarging the panel thickness (Fig.2.). When making a recessed installation with the GME Recess Disc or the Magnetic Fixing, the minimum panel thickness must be increased by the depth of the recess.

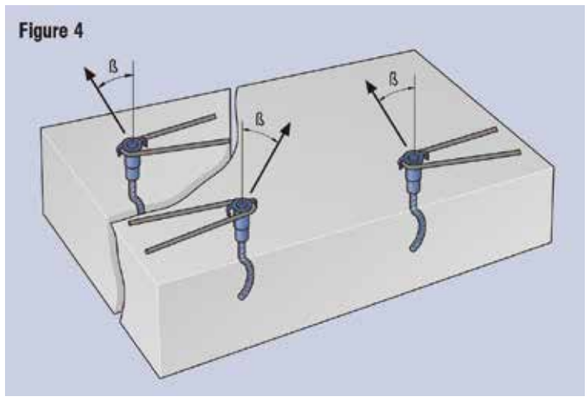
PARALLEL SHEAR REINFORCEMENT

Figure 3



If the Waved Anchors are loaded by parallel shear pull (see Fig.3 and Fig.4), the ensuing horizontal components (Fig.2) must be adopted by the pre-cast unit. Therefore, at an angle of inclination β>12,5° it is necessary to employ a rebar (shear force reinforcement) in the opposite direction of the horizontal component of the force on the anchor(see Table 3).
This reinforcement must be fixed to the Waved Anchor with the Data Clip; close contact is imperative.

Figure 4



Size	adm F_z kM	d_s mm	L cm	d_{Br} mm
Rd12	5	6	15	24
Rd16	12	8	20	32
Rd20	20	8	30	32
Rd24	25	10	30	40
Rd30	40	12	40	48
Rd36	63	14	55	56
Rd42	80	16	60	64

Table3

Length(L) according to DIN 1045-1, Section 12.6.2 for C12/15, good bond condition

Figure 2

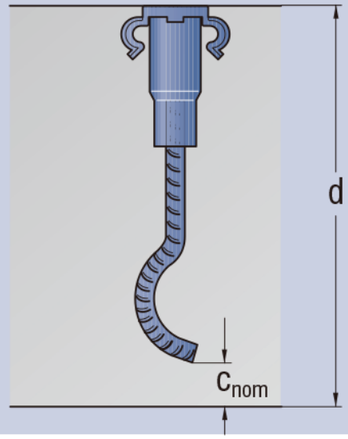
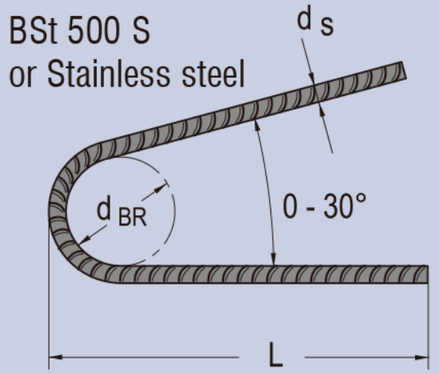
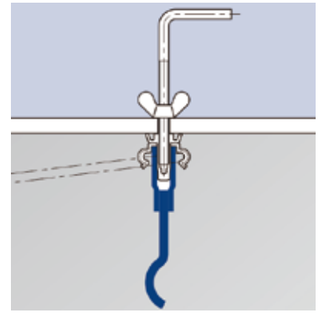


Figure 5



GME-Waved Anchor are manufactured completely with anchorage reinforcement for vertical installation into precast concrete units with large surface and average panel thickness.
The wave of the anchor guarantees a safe transmission of forces into the concrete.



GME BOLT ANCHOR

GME Bolt Anchors are ThreadSystem lifting anchors. The Bolt Anchor is a special short anchor for flat precast concrete slabs. The length is orientated between the length of the GME Waved Anchor, short and the GME Flat Steel Anchor. The forces are concentratet at the bolt head andtransferred deeply into the concrete.

REINFORCEMENT

GME Bolt Anchors can be installed as from a concrete compressivestrength of 15N/mm2with a minimum surface reinforcement, according to Table 1, without any special additional reinforcement-provided that the maximum angle of inclination (see 3.) is not exceeded. The swaged on threaded bolt itself takes over the transmission of forces into the concrete.
The user is responsible for the transmission of forces in the precast concrete unit itself.

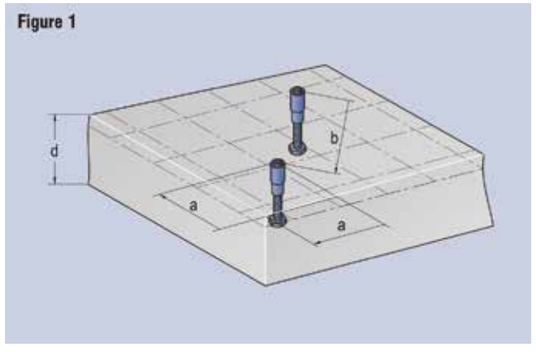
Size	Surface* reinforcement [mm2/m]
Rd12	≥131
Rd14	≥131
Rd16	≥131
Rd18	≥188
Rd20	≥188
Rd24	≥188
Rd30	≥188

*The required amount of reinforcement has to be installed in both directions.

EDGE DISTANCE,MINIMUM DISTANCE,MINIMUM PANEL THICKNESS

In order to guarantee the local transmission of force into the concrete, certain distances between the individual anchors and from the edge must be observed. Also, the panel thickness must not fall short of a certain minimum because of the danger of corrosion. The minimum values for the individual anchors are shown in Table 2. See also Fig.1.

Figure 1



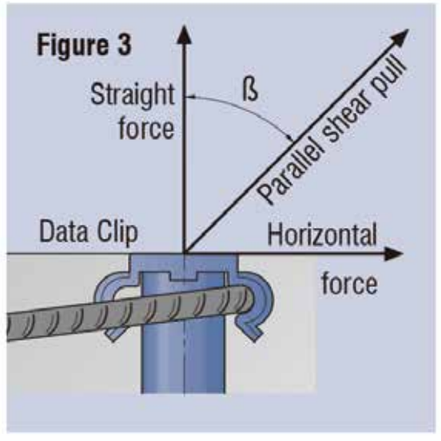
Size	adm.F kN	Edge Distance a mm	Minimum Distance b mm	Minimum Panel Thickness d mm
Rd 12	5	105	200	90
Rd 14	8	110	220	90
Rd 16	12	120	260	100
Rd 18	16	150	300	120
Rd 20	20	190	350	150
Rd 24	25	210	440	160
Rd 30	40	250	510	190

Table 2

The minimum panel thickness was determined by taking the concrete cover to 20 mm to section. For other uses and environmental conditions, the concrete cover c corresponding to section 6.3 of DIN 1045-1 must be increased so enlarging the panel thickness(Fig.2). When making a recessed installation with the GME Recess Disc or the Magnetic Fixing, the minimum panel thickness must be increased by the depth of the recess.

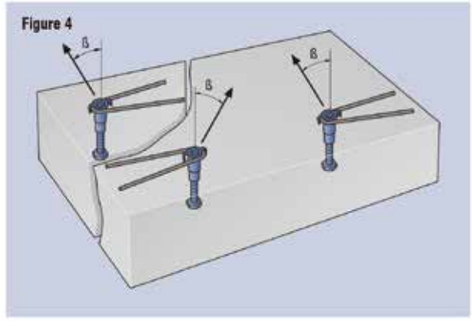
PARALLEL SHEAR PULL REINFORCEMENT

Figure 3



When Bolt Anchors are stressed by inclined forces, as shown in Fig.3 and Fig.4, the ensuing horizontal forces must be taken by the concrete. Therefore, as from a parallel shear pull angle β of more than 12,5°,a parallel shearreinforcement is necessary, running at right angles to the Bolt Anchor according to Table 3(Fig.5). This parallel shear reinforcement must be fixed to the BoltAnchor with the Data Clip (Fig 3). Closecontact is important! The parallel shear reinforcement must be installed in the opposite direction to the horizontal component of the shear force.

Figure 4



Size	adm F_z kM	d_s mm	L cm	d_{Br} mm
Rd 12	5	6	150	24
Rd 14	8	6	200	24
Rd 16	12	8	200	32
Rd 18	16	8	250	32
Rd 20	20	8	300	32
Rd 24	25	10	300	40
Rd 30	40	12	400	48

Table3

Figure 7

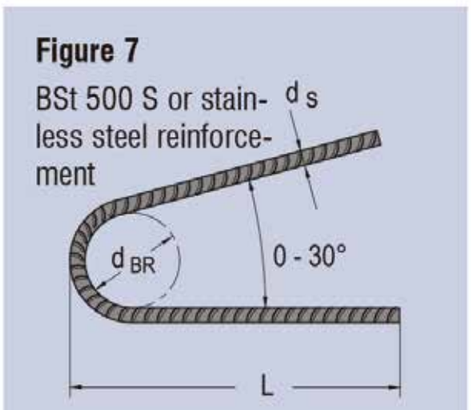
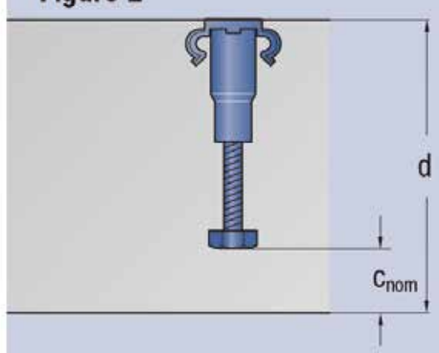
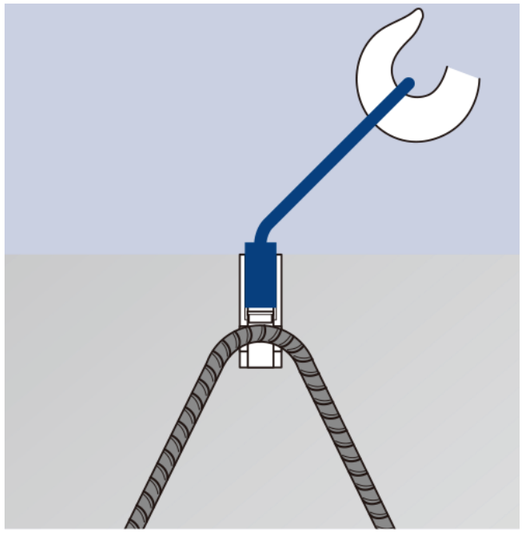


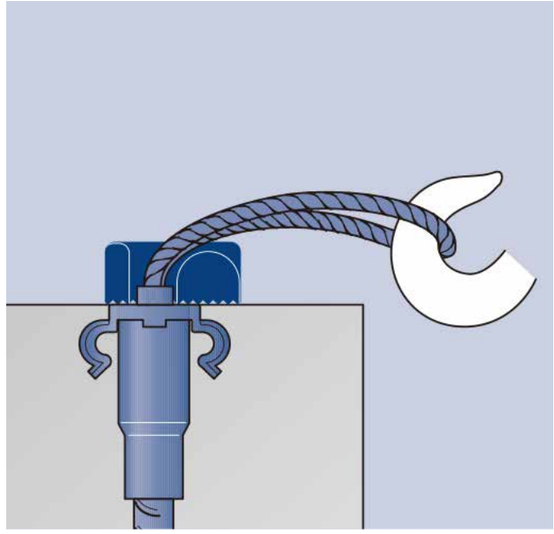
Figure 2



GME LIFTING LOOP
GME DISTRIBUTION BASIN

GME Lifting Loops are part of the GME Thread System and match perfectly to all the thread sockets.The reliability of the high-quality steel wire rope together with the swaged steel connection provides high SWL and great flexibility while a long life-span is guaranteed at the same time.The ferrule of the loop has a durable metric round external thread.
For shear pull exceeding 45°the use of a Distribution Basin is highly recommended.It prevents the wire rope from bending at the edge of the ferrule.Compressive forces on the distribution basin are evenly distributed throughout the concrete due to the large support surface.





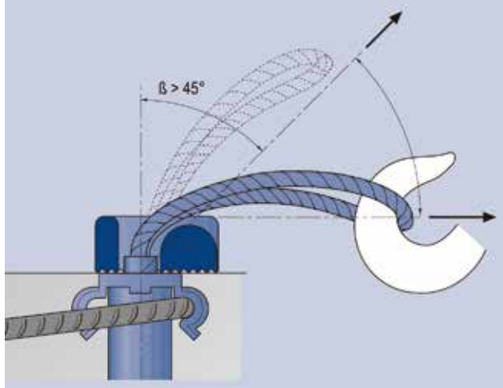
USE

GME Lifting Loops are to be used as lifting device for the lifting anchors of the GME Thread System. The GME Lifting Loops must be completely screwed into the lifting anchor threaded sockets until impact is made. Onlya maximum of one thread rotation may be visible from the lifting anchor. If necessary, dirty threads in the lifting anchor must be cleaned with the Thread Cleaner so that the complete screw-in depth is available for use.

PARALLEL SHEAR PULL

GME Lifting Loops are permitted for use up to a maximum angle of inclination B of 45°. At a larger angle of inclination β=45, the Swivel Eye should be used.As an alternative the GME Distribution Basin can be used with the Lifting Loop(Fig.1). This reduces the angle of inclination near the ferrule of the wire rope loop. The Distribution Basin will be pressed tightly on the panel, and distributes the forces back to the concrete panel with a slight possibility of ensuing indentation in the concrete.
The use of the Distribution Basin is not recommended for transversal shear pull when the lifting anchor is built in to the front side of thin panels. The Swivel Eye is to be preferred.
Distribution Basins are available up to size Rd 42.

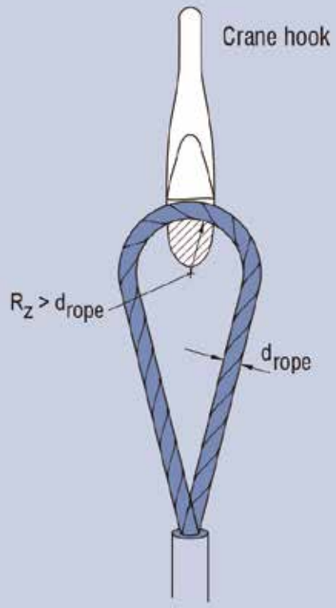
Figure 1



PARALLEL SHEAR PULL

As with all lifting equipment, GME Lifting Loops should be inspected at least once each year by a competent person as to their operational dependa-bility. Competent persons are those who are specialists with experience and sufficient knowledge in the field of lifting equipment, regulations for prevention of accidents, recommendations (DIN) and generally recognised rules of technology, enabling them to make decisions as to the safe working condition of lifting devices.
Discard time for Liting Loops must be determined according to the rules for ropes DIN EN 13414.
Lifting Loops should be discarded when the following number of broken wires are visible:
4 broken wires on a rope length of three times the rope diameter or
6 broken wires on a rope length of six times the rope diameter or
16 broken wires on a rope length of thirty times the rope diameter
Apart from this GME Lifting Loops should not be used any more when damaged as follows:
-broken strand
-crushing along the wire rope
-crushing in the support area of the lifting loop with more than four broken wires
-bends and kinks
-basket deformation
-deformed or damaged threaded ferrule
-heavy wear and tear
-damage due to corrosion
-loosening of the outer strands along the wire rope Prior to inspection the Lifting Loops should be cleaned with a brush using penetrating oil.
The inspection must also include a control of the connection between rope and swaged ferule.
GME Lifting Loops should not come in contact with acids, caustic solu-tions and other aggressive media.
GME Lifting Loops may only be hooked into crane hooks or lifting sling hooks, when their deflection radius corres-ponds at least with that of the rope diameter of the Lifting Loop. Sharp edged hooks or hooks with too small a diameter lead to an early discard.(Fig.2).

Figure 2



IDENTIFICATION

The GME Lifting Loop has an identification tag in the GME identification colour code bearing information which is necessary for the identification of the lifting device: Manufacturer GME TypeRd 24
Maximum working load 2,5t Year of manufacture 1992
Factory number The combination of type and year of manufacture counts as factory number(Rd24/92)