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MOMENT

# MOMENT LIFTING ANCHOR SYSTEM

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**Under the Leviat brand, we are uniting the expertise, skills and resources of Halfen Moment and its sister companies to create a world leader in fixing, connecting and anchoring technology.**

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

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

**This is an exciting change. Join us on our journey.**

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**60** locations

sales in **30+** countries

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# MOMENT LOCKING KLAWS

**For years the design of the lifting clutch has remained unchanged. But now innovation has caused a huge leap forward with a safer, faster, lighter & stronger design.**

Locking Klaws are used for lifting a wide range of precast concrete products for building and civil engineering including panels, pipes, pits, manholes, box culverts, road barriers, bridge beams, planks, sound walls, culverts etc. Fully compliant with all international lifting anchor standards, Locking Klaws improve safety, performance and flexibility in all situations, fixing the design flaws which have caused failures of other clutches.

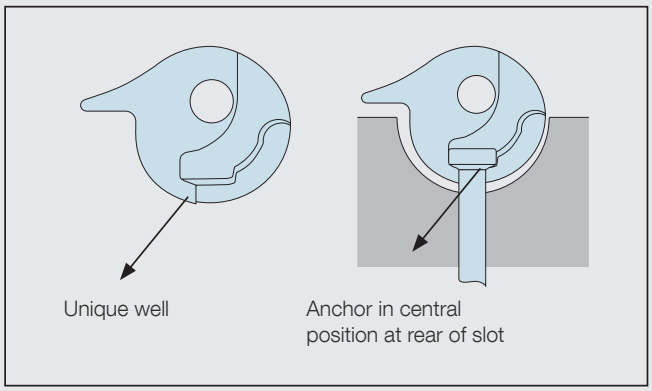
Safer, faster, lighter, stronger clutches for all spherical head lifting anchors

*The Locking Klaw includes a unique well in the curved lips that ensure the lifting anchor to remain locked in its optimum position. The innovative design also includes a reinforced side wall, a locking tail to further prevent disconnection and a lightweight figure-8 shaped chain link design to provide additional clearance when side lifting.*

Quality features:

## LOCKED KLAW

- Under load, the klaw locks and resists rotation toward the disconnected position, locking the 'tail'.
- The side of the well traps the anchor head and locks the klaw at its position of maximum strength and safety.
- The locked klaw protects against dangerous disconnections where there is a risk of fouling, a common problem when lowering precast drainage products in confined spaces.




## REINFORCED SIDE WALL

- The unique 'tapered cantilever' increases the strength when turning and side lifting.
- Lighter but stronger – more efficient metal distribution.

## LIGHT BUT COMPACT

- Lightweight and efficient figure-8 chain link design.
- Round links do not damage lifting hooks, links etc.

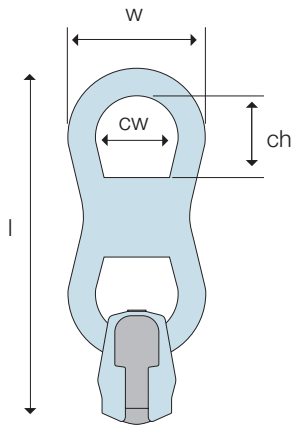
*Figure-8 chain link design*

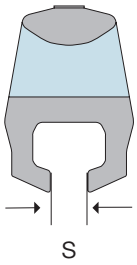
## Dimensions and Availability

| Product Code | SWL (t) | Dimension of Locking Klaw (mm) | | | | |
|---|---|---|---|---|---|---|
| | | l | w | ch | cw | s |
| MLK 1 | 1.3 | 170 | 66 | 44 | 40 | 11 |
| MLK 2 | 2.5 | 215 | 85 | 59 | 52 | 16 |
| MLK 5 | 5.0 | 270 | 110 | 62 | 70 | 22 |
| MLK 10 | 10.0 | 365 | 145 | 83 | 90 | 31 |

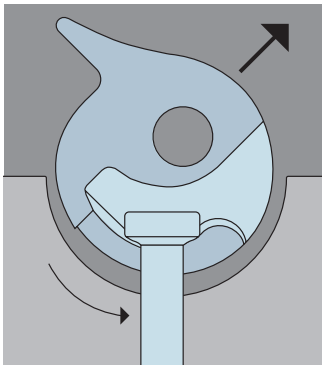
** MLK20 is available upon request*

The Locking Klaw comes in a wide range of sizes from 1T to 20T to fit the MOMENT Spherical Head Lifting Anchor range.

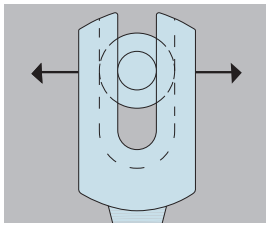


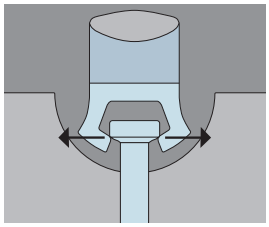




## Locking Klaws solve these critical problems, caused by traditional clutch designs

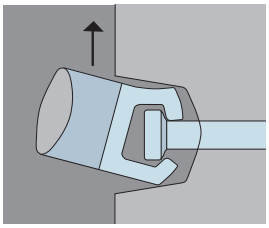


Sphere rotation under load because nothing traps the anchor.

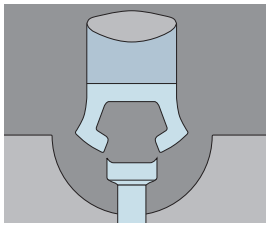




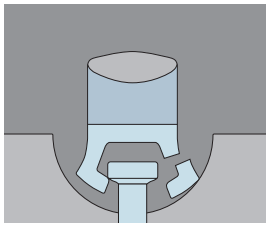
Anchor loses support from the rear of the sphere and the load spreads the lips of the clutch.



Side loading worsens the problem.



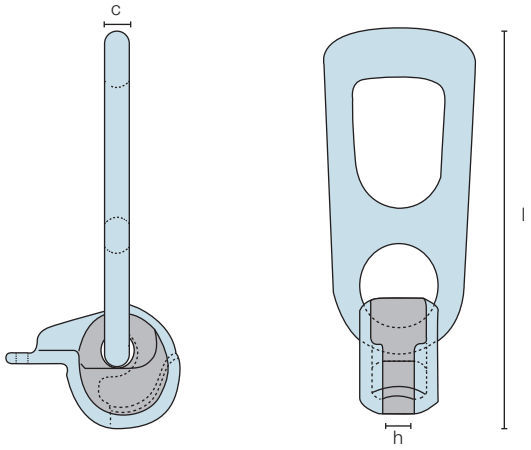
Spread lips cause pull-off failure and shearing of anchor heads.



And in severe cases, the side of the clutch bends and breaks.

# MOMENT LIFTING CLUTCHES

For the purely cost conscious precaster, there is also a solution from MOMENT by utilizing traditional technologies with Lifting Clutches. The MOMENT brand Lifting Clutch has been available in the market for many years and is therefore the tried and tested solution for lifting precast concrete elements.




## Dimensions and Availability

| Product code | SWL (t) | Dimension of Lifting Clutch (mm) | | |
|---|---|---|---|---|
| | | l | c | h |
| MLC 1 | 1.3 | 185 | 12 | 11 |
| MLC 2 | 2.5 | 229 | 14 | 16 |
| MLC 5 | 5.0 | 285 | 16 | 22 |
| MLC 7/10 | 10.0 | 401 | 25 | 30 |

** More sizes are available upon request*

Available in sizes from 1T to 10T which perfectly complements the MOMENT Spherical Head Lifting Anchor range.

# MOMENT RECESS FORMERS

Recess Formers are used to accurately create the correct recess to accommodate the Locking Klaws and Lifting Clutches during casting, the Recess Former is moulded from a rubber compound exclusively developed to ensure longevity when in contact with concrete.

The outer curved surface of the rubber compound has a hole at its apex to allow the anchor to extend out of the recess former. It is made of highly durable rubber encasing a high tensile steel bolt, complying with many international standards.

Besides, the geometry of the Recess Former is unique to each load classification of Locking Klaws and Lifting Clutces, therefore minimizing the risk of errors as the wrong size clutch cannot be attached.

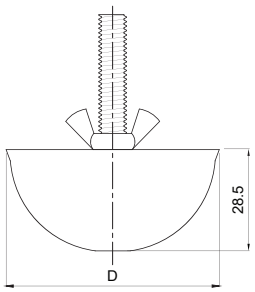
Quality features:

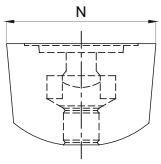
- Hard oil resistant, yet flexible, rubber
- For attachment to steel and timber forms or floats
- Durable rubber case allows easy and clean removal

## Dimensions and Availability

| Product Code | SWL (t) | Dimension of Recess Former (mm) |
|---|---|---|
| | | Diameter |
| MRF 1 | 1.3 | 60 |
| MRF 2 | 2.5 | 75 |
| MRF 5 | 5.0 | 95 |
| MRF 7 | 7.5 | 125 |
| MRF 10 | 10.0 | 125 |

** More sizes are available upon request*




# MOMENT NARROW RECESS FORMERS

Narrow Recess Formers are used to form the recess in very thin wall panels. Durable and resistant against oil, it is used when the load is only in one direction. It also can be used for several times.

## Dimensions and Availability

| Product Code | SWL (t) | Dimension of Recess Former (mm) | |
|---|---|---|---|
| | | D | N |
| MNF 1 | 1.3 | 60 | 42 |
| MNF 2 | 2.5 | 77 | 52 |
| MNF 5 | 5.0 | 95 | 69 |
| MNF 7 | 7.5 | 118 | 85 |
| MNF 10 | 10.0 | 118 | 85 |

# MOMENT SPHERICAL HEAD LIFTING ANCHORS

This classic design of lifting anchor has stood the test of time and has been successfully used to lift items as small as manhole covers and as large as bridge girders all over the world.

The Spherical Head Lifting Anchor is made of a round steel rod with a forged foot and head. Forged using a special impact resistant steel, the range of Spherical Head Lifting Anchor has been specifically engineered to safely lift precast concrete elements in the most challenging of environments and site conditions.

In the same load group, Spherical Head Lifting Anchors are available with different lengths. Longer anchors are installed for reduced edge spacing or for low concrete strengths. A visible manufacturer's mark is embossed on each anchor; this contains our brand MOMENT Lifting (ML), the length of the anchor in mm and the load class.

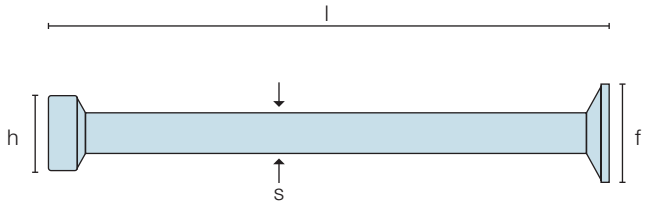

Quality features:

- Safe, quick, efficient
- Durable clutch is resistant to abrasion
- Huge range of anchors and accessories for all types of precast elements
- 8 load classes from 1.3 to 10.0
- Ideal for beam or wall elements

## Dimensions and Availability

| Product Code | SWL (t) | Standard Anchor Length, l (mm) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 40 | 50 | 55 | 65 | 70 | 75 | 90 | 95 | 100 | 120 | 135 | 150 | 165 | 170 | 210 | 240 | 280 | 300 | 340 |
| MSA 1 | 1.3 | √ | √ | | √ | | | | | | √ | | | | | | | | | |
| MSA 2 | 2.5 | | | √ | | √ | | √ | | | √ | | | | √ | √ | | √ | | |
| MSA 4 | 4 | | | | | | √ | | | √ | | | | | | | √ | | | |
| MSA 5 | 5 | | | | | | | | √ | | √ | | | | √ | | √ | | | |
| MSA 7 | 7 | | | | | | | | √ | | √ | | | √ | | | | | √ | |
| MSA 10 | 10 | | | | | | | | | | √ | √ | √ | | √ | | | | | √ |

** More sizes available upon request*




| Product Code | SWL (t) | Dimension Of Spherical Head Lifting Anchor (mm) | | |
|---|---|---|---|---|
| | | h | s | f |
| MSA 1 | 1.3 | 18 | 10 | 25 |
| MSA 2 | 2.5 | 25 | 14 | 35 |
| MSA 4 | 4 | 35 | 18 | 44 |
| MSA 5 | 5 | 36 | 20 | 50 |
| MSA 7 | 7 | 46 | 24 | 60 |
| MSA 10 | 10 | 46 | 28 | 70 |

** More info is available on request*

# MOMENT LIFTING EYE ANCHORS

Manufactured using the same impact resistant forged steel as the Spherical Head Lifting Anchors, these Lifting Eye Anchors are ideally suited for lifting thin, heavy panels or whenever the concrete thickness or strength cannot support Spherical Head Lifting Anchors.

The Lifting Eye Anchor is designed to transfer the entire anchor load through the reinforcement into the concrete. The eye anchor has flexibility beyond its looks as the shape of the rebar used to transfer the load can be manipulated to fit the available space.

The additional reinforcement must be installed securely in the hole with full contact with the eye anchor. In the case of this Lifting Eye Anchor, the reinforcing or hanger bar is the part that does all the heavy lifting. The additional reinforcement must be bent at an angle of 30° as shown. Bend the ends into the eye as in figure 1,(pg6).

Quality features:

- Ideal for lifting thin, heavy panels
- Used with a hanger bar where the concrete is too weak for a cone anchor
- Flexible as the hanger bar can be manipulated to fit the available space

## Dimensions and Availability

| Standard Anchor Length, l (mm) | | | | | |
|---|---|---|---|---|---|
| SWL (t) | 50 | 65 | 90 | 120 | 180 |
| 1 | √ | √ | | | |
| 2 | | √ | √ | | |
| 5 | | | | √ | |
| 10 | | | | | √ |

** More sizes are available upon request*

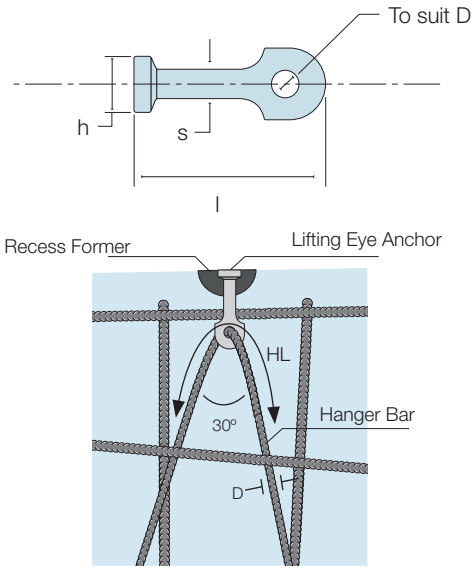


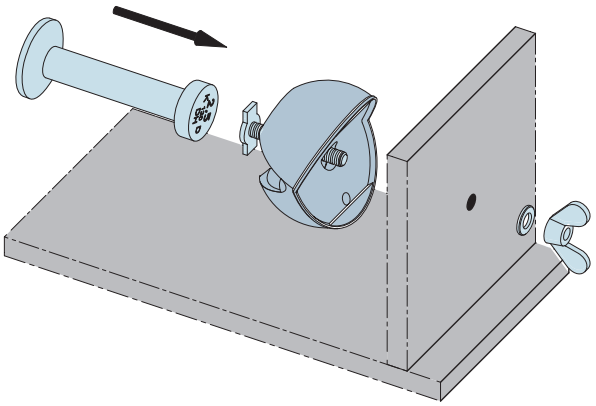

figure 1

## Dimensions and Availability

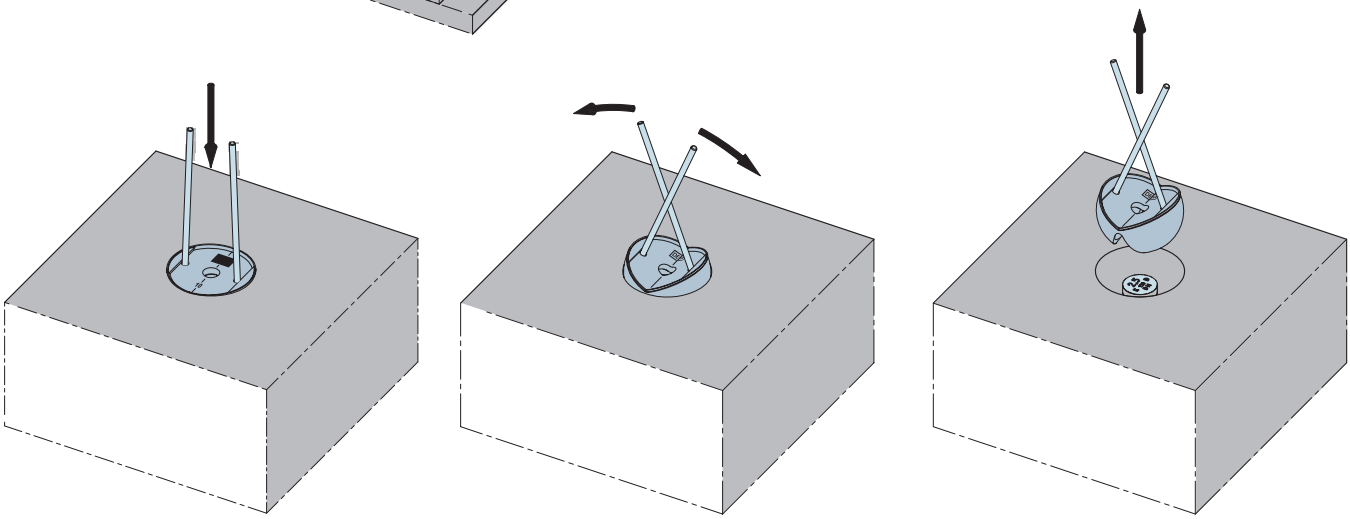
| Product Code | SWL (t) | Dimension of Lifting Eye Anchor (mm) | | | | |
|---|---|---|---|---|---|---|
| | | h | l | s | Hanger Bar Dia D | HL Cut Hanger Bar Length for 15MPa |
| MEA 1 | 1.3 | 19 | 65 | 10 | R8 | 700 |
| MEA 2 | 2.5 | 26 | 90 | 14 | T10 | 870 |
| MEA 5 | 5 | 36 | 120 | 20 | T16 | 1020 |
| MEA 10 | 10 | 47 | 180 | 28 | T20 | 1520 |

** More sizes are available upon request*

# ANCHOR INSTALLATION INSTRUCTION



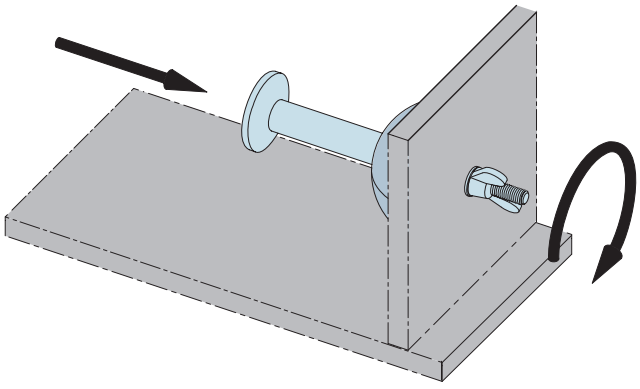
1. Insert lifting anchor into the recess former. Together with its locating plate, the recess former can be attached to the formwork



2. The recess former is then fixed onto the formwork using its wing nut on the top of the recess former

3. Finally the recess former is tightened firmly onto the formwork closing around the anchor head and hence holding it into position

4. Upon removal of the locating plate, the recess former has two holes which can be used as a lever to remove from the cured concrete



# MOMENT THREADED LIFTING LOOPS

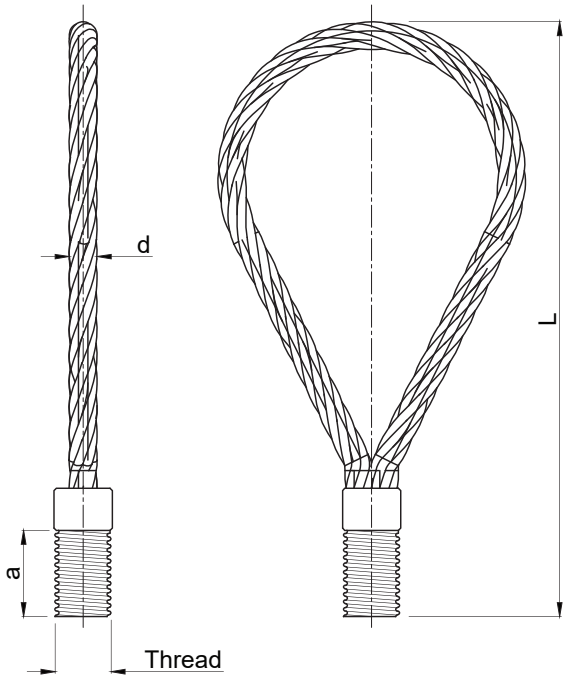
The Threaded Lifting Loop is manufactured from high grade steel wire, swaged in a steel ferrule and finished with zinc plating. Designed for use with a threaded lifting socket, it provides a versatile and economic method of lifting precast units and are suitable for most applications, particularly site operations. Loops are available from 16 to 36 mm sizes in Rd thread types. The load capacity for each application is to be taken from the corresponding tables.

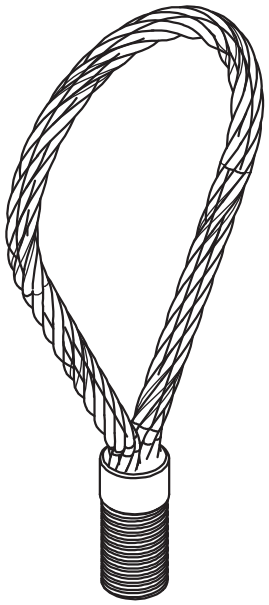
The Threaded Lifting Loops can be subjected to a diagonal lift up to 45°. If a transverse loading is to be applied, a Swivel Lifting Eye should be used to allow the lifting link to rotate through 360°.

Threaded Lifting loops should only be attached to the unit after the concrete strength has reached 15 MPa. In some cases it may be economic and practical to leave the loops with the unit until final installation.

Quality features:

- Versatile
- Economic Threaded Lifting Loops for one off operations



## Dimensions and Availability

| Product Code | SWL (t) | Dimension of Threaded Lifting Loop (mm) | Size of Rd Thread |
|---|---|---|---|
| | | l | |
| MTL 0.5 | 0.5 | 150 | 12 |
| MTL 1 | 1.2 | 155 | 16 |
| MTL 2 | 2.0 | 215 | 20 |
| MTL 2 | 2.5 | 255 | 24 |
| MTL 4 | 4.0 | 300 | 30 |
| MTL 6 | 6.3 | 340 | 36 |

** 20t & 23t are available upon request*

# MOMENT THREADED LIFTING SOCKETS

Threaded Lifting Sockets are economic and have advantages in thin components, where the long tail provides excellent anchorage. The reinforcement tail is essential and must be installed and fitted to transfer the load into the concrete as shown.

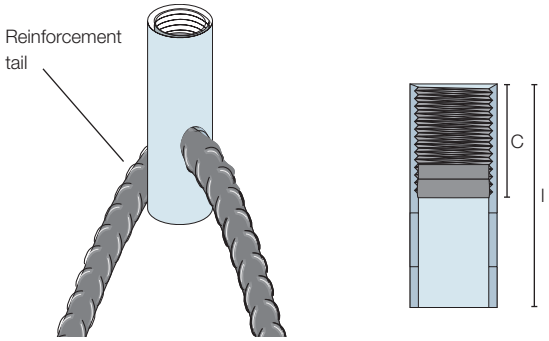
Threaded Lifting Sockets are available in Zinc plated and stainless steel both with Rd threads. These sockets are specially made for lifting are not to be confused with fixing sockets. For thin units that have to be turned through 180° from mould to final position, Threaded Lifting Sockets can be made double threaded to pass right through the unit.

Plastic Stopper Caps are also available to protect threads from weathering and ingress of dirt or foreign matter that can prevent the threads from engaging completely down the length of the socket.

Quality features:

- Available with Zinc Plated with Rd thread
- The socket is anchored into the concrete unit using a reinforcement bar passing through the cross-hole
- 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

** Stainless steel is available on request*




## Dimensions and Availability

| Product Code | SWL (t) | Dimension of Threaded Lifting Socket (mm) | | Size of Rd Thread |
|---|---|---|---|---|
| | | c | l | |
| MTS 0.5 | 0.5 | 22 | 40 | 12 |
| MTS 1.2 | 1.2 | 27 | 54 | 16 |
| MTS 2 | 2.0 | 35 | 69 | 20 |
| MTS 2.5 | 2.5 | 43 | 78 | 24 |
| MTS 4 | 4.0 | 56 | 103 | 30 |
| MTS 6.3 | 6.3 | 68 | 125 | 36 |

** More sizes are available upon request*

# MOMENT WIRE LIFTING LOOPS

Wire Lifting Loops are used to facilitate the safe and efficient handling of precast and prestressed reinforced concrete units, including bridge and shell beams.

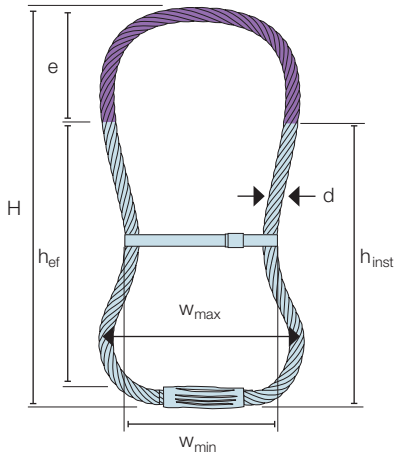
Each Wire Lifting Loop is manufactured from galvanized, high strength, fibre-cored/steel-cored steel wire rope, joined with a swaged ferrule and fitted with a tag detailing the product code, safe working load and batch number. A painted section, designed to be left exposed after installation, provides a visual check that the correct embedment depth has been achieved.

It is easily installed, without recess formers, ready for direct connection to standard lifting hooks and shackles. Besides, Wire Lifting Loop is suitable for axial and diagonal lifting, with a maximum sling angle of 60°, from manufacture until final installation of the precast concrete element.

The multi-stranded, fibre-cored/steel construction of Wire Lifting Loop features small diameter outer wires (see table for details) which generate low bending stresses when loaded. When shackle pins are used in high load designed applications we recommend a diameter not less than 3.5 times diameter rope thickness.

Quality features:

- Safe, reliable, fully engineered solution
- Suitable for axial and diagonal lifting
- Manufactured from corrosion resistant galvanised steel
- No specialist lifting clutches or equipment required
- No recess formers required
- Suitable for use with standard lifting hooks/shackles

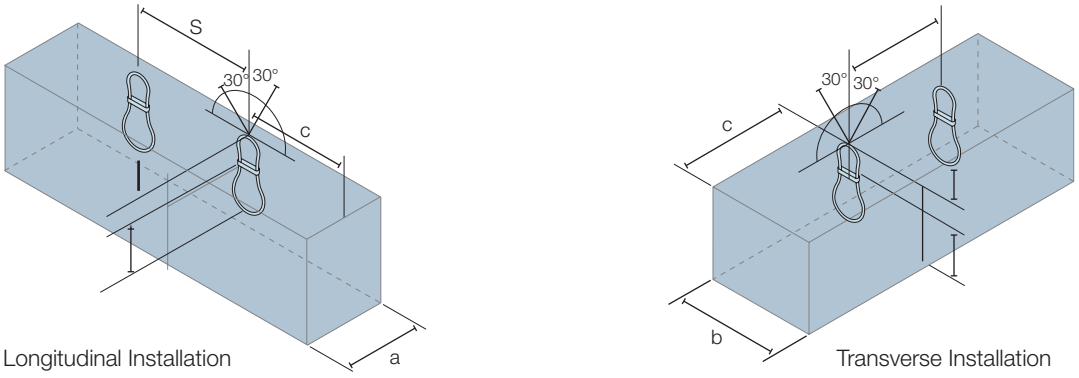



## Dimensions and Availability

| Product Code | SWL (t) | Dimension of Wire Lifting Loop (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Approx. Weight kg | Rope Diameter (d) | Overall Height (H) | Embedment Depth ($h_{ef}$) | Installation Depth ($h_{inst}$) | Exposed Insert Height (e) | Min. Width ($h_{min}$) | Max. Width ($h_{min}$) |
| MLL 4 | 4 | 0.6 | 12 | 370 | 269 | 275 | 95 | 100 | 160 |
| MLL 6 | 6.0 | 1.2 | 16 | 425 | 312 | 320 | 105 | 145 | 200 |
| MLL 8 | 8 | 1.8 | 18 | 480 | 331 | 340 | 140 | 170 | 235 |
| MLL 10 | 10 | 2.4 | 20 | 525 | 380 | 390 | 135 | 185 | 255 |
| MLL 12 | 12.5 | 3.5 | 22 | 590 | 424 | 435 | 155 | 200 | 285 |
| MLL 16 | 16 | 4.5 | 24 | 670 | 478 | 490 | 180 | 260 | 330 |
| MLL 20 | 20 | 6.8 | 28 | 750 | 531 | 545 | 205 | 280 | 325 |
| MLL 25 | 25 | 9.8 | 32 | 850 | 599 | 615 | 235 | 300 | 400 |
| MLL 28 | 28 | 12.6 | 36 | 850 | 597 | 615 | 235 | 300 | 425 |
| MLL 32 | 32 | 12.9 | 36 | 870 | 632 | 650 | 220 | 310 | 425 |
| MLL 37 | 37 | 17.5 | 40 | 950 | 670 | 690 | 260 | 340 | 470 |
| MLL 42 | 42 | 22.2 | 44 | 1000 | 698 | 720 | 280 | 350 | 545 |
| MLL 47 | 47 | 24.3 | 44 | 1100 | 748 | 770 | 330 | 390 | 545 |
| MLL 52 | 52 | 31.5 | 48 | 1200 | 846 | 870 | 330 | 420 | 580 |
| MLL 57 | 57 | 35.4 | 48 | 1350 | 946 | 970 | 380 | 480 | 590 |

** More info is available on request*

** Not stocked, stock available on request*



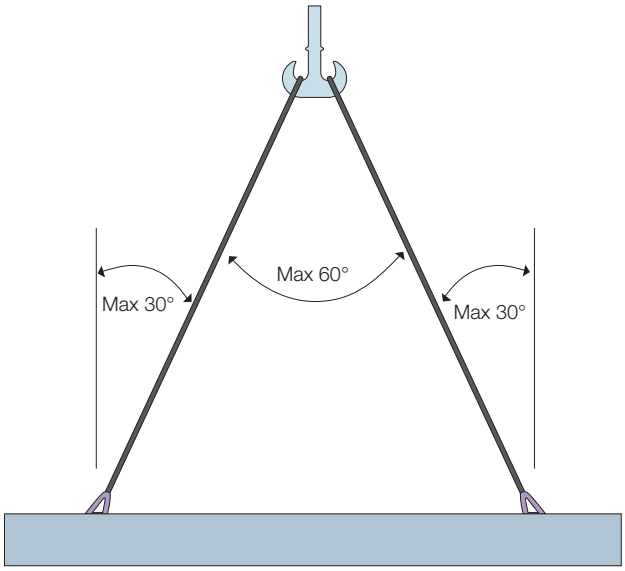

Longitudinal Installation

Transverse Installation

Figure 1

## Lifting and Handling

Wire Lifting Loop may be diagonally loaded at an inclination of 30° (Sling angle 60°), see Maximum Sling Angle drawing. The rigging design shall be provided by the lifting design engineer and shown on the erection shop drawings. Refer to Figure 2.




*Maximum Sling Angle*

Figure 2

# OTHER TECHNOLOGIES AVAILABLE ON REQUEST

List of other technologies available, including Threaded Inserts, Frimeda Anchors, Magnets, Nailing Plates, Shims, Weld Plates, Anchors and Edjpro.

Plate Anchors

Nailing Plate

Shims

Threaded Inserts

Weld Plates

Flat Threaded Anchor

Two Hole Anchor

# DESIGN

*The following advice is for guidance only. It is given to the best of our knowledge and for general use only and shall be considered as non-binding information.*

Due to the interaction with the crane and rigging industries, lifting design is one of the few remaining structural designs that still operates predominantly on a working stress design model rather than limit state design.

**Therefore, Safe Working Load of anchor > applied service load.**

Also, care needs to be given to assess each load case including demoulding, storage, transportation and erection as the carnage and concrete strength could differ for each.

For specific project information, please contact our technical team.

# DETERMINATION OF APPLIED SERVICE LOAD

Element weight, based on 2400-2500kg/m3 is the initial start point for any lifting design. However, there are a number of additional factors that need to be taken in to account:

1. Suction between the concrete element and the formwork can vary depending on the material and geometry of the casting bed. For example:

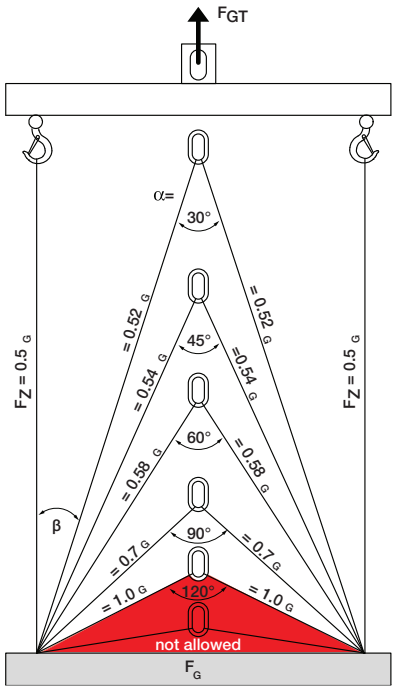
| Adhesion to the formwork | |
|---|---|
| Lubricated steel formwork | ≥ 1kN/m² |
| Vanished timber formwork | ≥ 2kN/m² |
| Rough formwork | ≥ 3kN/m² |

These values are for flat casting beds only and additional factors need to be applied if the geometry is different. For exact guidance, please contact Moment's engineering team.

2. Sling angle factor for the rigging also affects the amplitude of the service load on the anchor and is often directly affected by the amount of height clearance at the precast factory.

It is generally accepted that a sling angle (α) of 60 degrees (β=30) is the best compromise and therefore tends to be the default for most lifting designs.

| Spread angle factors | | |
|---|---|---|
| Cable angle ß=30 | Spread angle | Factor z |
| 0° | - | 1.00 |
| 7.5° | 15° | 1.01 |
| 15° | 30° | 1.04 |
| 22.5° | 45° | 1.08 |
| 30° | 60° | 1.16 |
| 37.5° | 75° | 1.26 |
| 45° | 90° | 1.41 |
| 52.5° | 105° | 1.64 |
| 60.0° | 120° | 2.0 |



# DYNAMIC IMPACT FACTOR

Another important consideration is estimating the effect of dynamic impact on the lifting system.

This is based on engineering judgement about the type of crane and ground conditions. A fixed gantry crane will have much less dynamic impact than a crawler crane moving over uneven ground.

| Dynamic-factors Ψdyn* | |
|---|---|
| Lifting Unit | Shock factors Ψdyn* |
| Stationary crane, swing-boom crane, rail crane | 1.2 |
| Lifting and moving on level terrain | 2.5 |
| Lifting and moving on uneven terrain | ≥ 4.0 |

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

For other transport and lifting situations the coefficient Ψdyn is defined through reliable tests or proven experience.

# DETERMINATION OF SAFE WORKING LOAD

Each anchor is allocated a load class, but this can give a misleading level of confidence as it is only the steel capacity and the concrete capacity can be much lower.

## Steel Capacity

The steel capacity is stamped on every anchor head as is determined by taking the characteristic (5% fractile) strength of the anchor and dividing it by 3. Therefore, a 5T anchor will typically survive a load of 15T before it breaks.

## Concrete Capacity

There are a few different concrete failure mechanisms that can occur and for a detailed analysis you should refer to VDI BV-BS 6205 or CEN/TS 1992-4. However, concrete cone failure is the most well known and is a function of the **concrete strength** at time of lift, the **edge distance** and the **embedment depth** of the anchor. The general safety factor given to concrete failure mechanisms is 2.5 against the characteristic (5% fractile) strength of the concrete. It is lower than the steel as it is generally unaffected by multiple uses.

For a detailed analysis of your anchor capacity, please consult the Moment's engineering team.

# GUIDANCE ON SAFE RIGGING ARRANGEMENT

Ensuring an anchor with adequate capacity is only part of the battle when trying to determine a safe lifting design. Knowledge about the type of crane and the rigging arrangement are also critical to ensure that the loads are predictable and evenly distributed to all of the anchors.

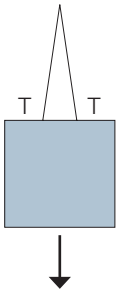
Incorrect rigging can result in the anchors being subjected to double the loads intended. If this is then combined with a different type of crane, it can easily lead to a catastrophic failure that was not predicted when designing the lifting anchors.

In order to minimise the risks associated with poor rigging, there are some basic rules that can be followed such as avoiding multiples of 3 anchors and fixed chain/sling lengths. However, there are some examples below to highlight of best practice in rigging.

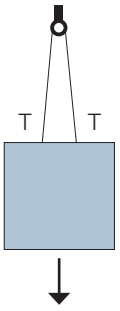
Correct rigging for equalised anchor loading

**2 points**

2 fixed length
Equal loads in each

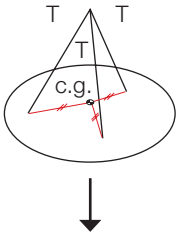



2 fixed length
Equal loads in each

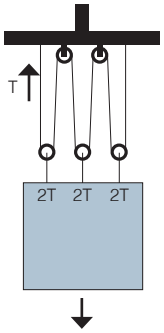



**3 points**

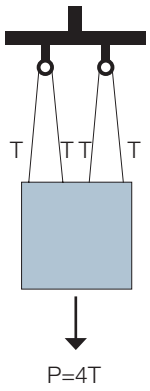
Only for special cases!

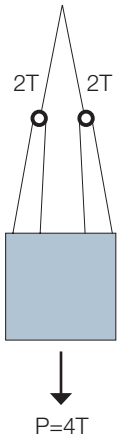


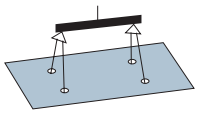

Special Case! 3 fixed leg slings equally distributed around the centre of gravity



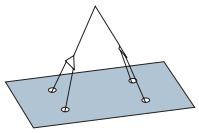

**4 points**



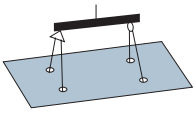



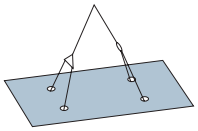
Flat lift - equalised



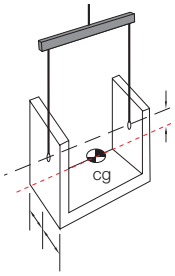
Flat lift - equalised



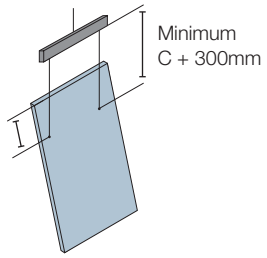
Flat lift - equalised



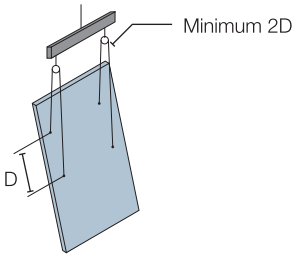
Flat lift - equalised



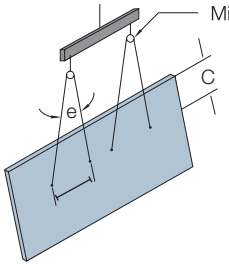

Always ensure that the centre of gravity (centroid) of the object being lifted lies below the centre of lift of the lifting anchors to avoid instability and toppling during lifting.




2 x 1

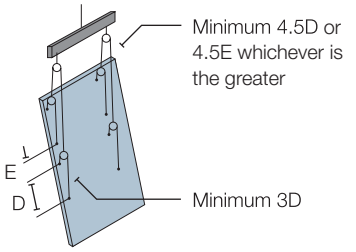



2 x 2

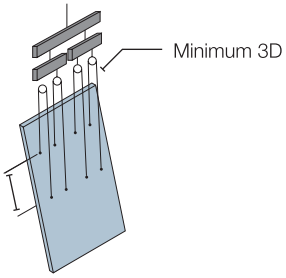



4 x 2

The maximum sling angle e should be specified in the lifting design.



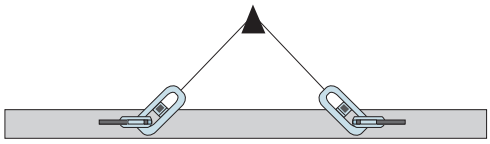

2 x 4




4 x 2

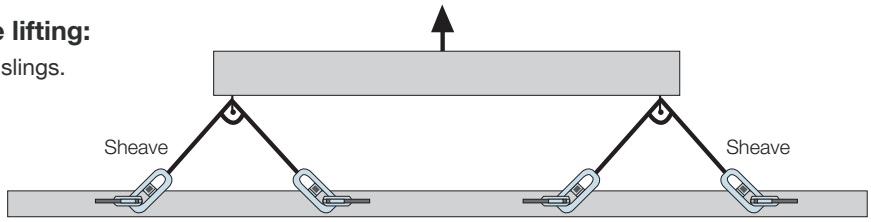
**2 point edge lifting:**

For tilting up panels by their long edge, e.g. from the casting bed. For typical 150mm thick panels less than 5 metres long.



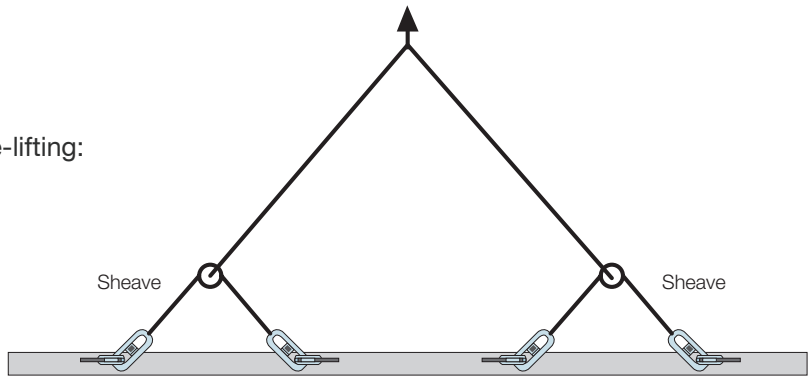
**Preferred 4 point equalised edge lifting:**

With load equalising beam and sheaved slings. For typical 150mm thick panels 5 - 10 metres long.




**Non-preferred** 4 point equalised edge-lifting:

With sheaved slings



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