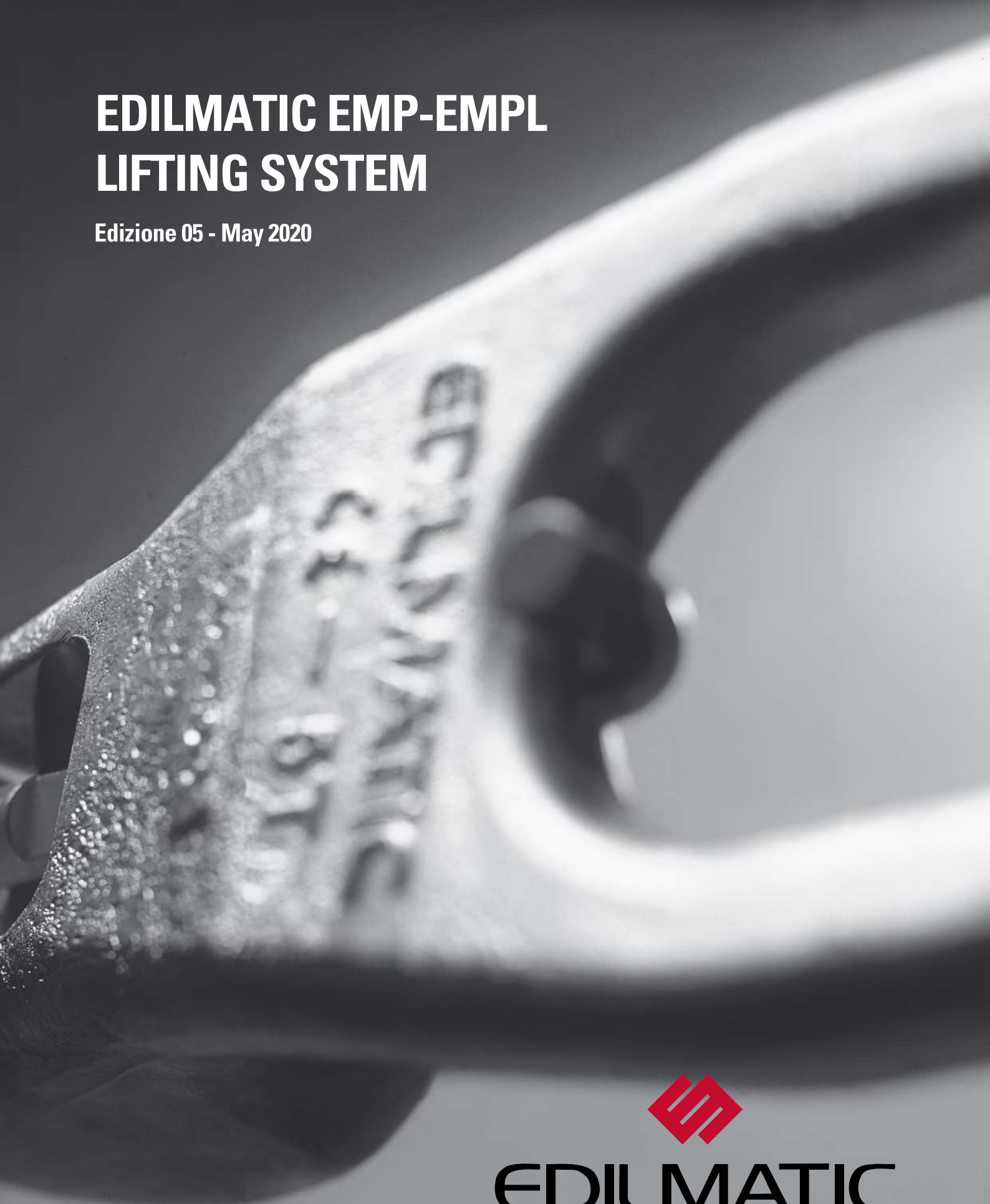
EDILMATIC EMP-EMPL LIFTING SYSTEM

Edizione 05 - May 2020



EDILMATIC

Anchorage, supporting and lifting system for prefabricated elements. Accessories, fasteners and metallic items.

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GENERAL

The **EMP Edilmatic** lifting system is an efficient, safe and user-friendly device, developed for the lifting and the handling of concrete articles. It can be used both in the factory for the handling of formworks, in the stockpiling procedures and in the building yard to position and assemble the elements.

It is made of an insert, a lifting **PEG**, which has to be placed in the formworks before the casting, and of a **HANDLE** for the peg connection during the handling, working as a junction between the “lifting devices” (cranes, gantry cranes etc.) and the insert in the concrete.

The Peg is delivered complete with **RESTRAINT COVER**, which is necessary to create the opening in the concrete; it enables the peg head to remain visible on the surface allowing the connection to the handle.

The **handle** is equipped with a safety sliding **PIN**, indicating the right connection of the two components.

This catalogue together with the User’s handbook (delivered inside the packing) has to be kept and made available in all places where the system is used, in order to guarantee its correct and efficient use.

The information contained in this catalogue about product performance and instruction of use refers to the technical standards listed in the following table.

Reference standards:

UNI CEN/TR 15728	Design and use of inserts for lifting and handling of precast concrete elements
2006/42/EC (Machinery directive)	Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
EN ISO 14121	Safety of machinery - Risk assessment
Norm CNR UNI 10025/98	Prefabricated concrete structure design, implementation and testing.
ETAG 001	Metal Anchors for Use in Concrete
EN 10021	General technical delivery conditions for steel products
UNI EN ISO 683	Heat-treatable steels, alloy steels and free-cutting steels

DESCRIPTION OF THE COMPONENTS

The EMP Edilmatic lifting system consists, as quoted above, of three main elements:

- **Peg**
- **Handle**
- **Restraint cover**

Lifting peg (P)

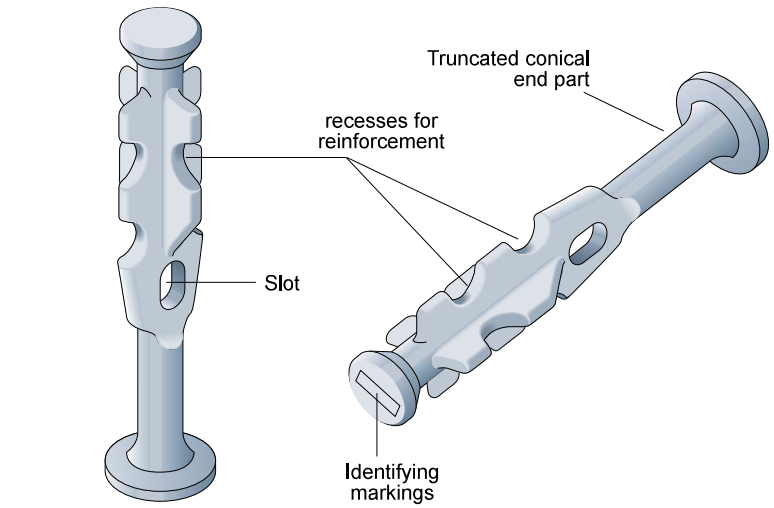
The insert has to be prepared in the element to be handled. It is made of special steel and has a cylindrical head with variable diameter depending on the capacity. In the head top part there are markings identifying the product with the producer acronym and the load capacity in different lifting configurations. The end part has a round-conical shape studied to increase the concrete bond. The most particular peg feature is the cross central body; the use of this shape enables the transmission of the stress to the peg avoiding bending. In the cross body there are slots and jointed channels, simplifying the positioning of additional reinforcement. The peg is delivered complete with restraint cover to put on the peg head during the casting preparation. On page 4 a detailed description of the steps to follow for the correct cover prearrangement is given.

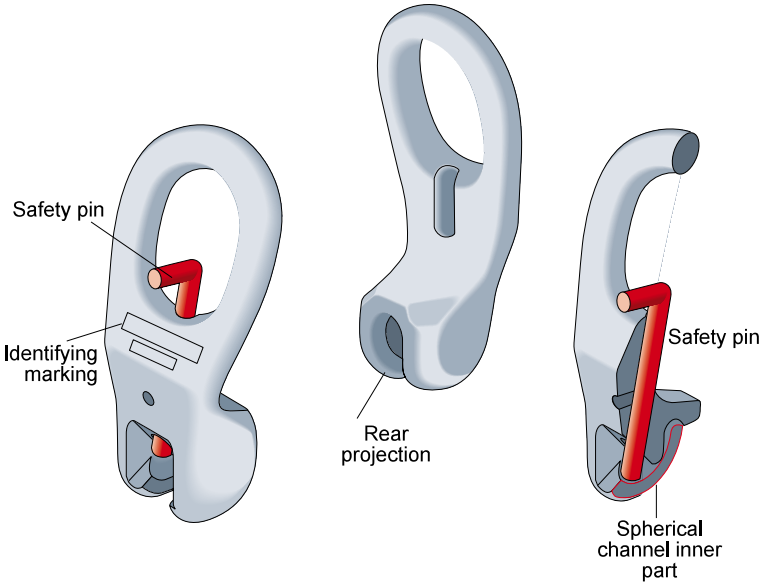
Lifting handle (M)

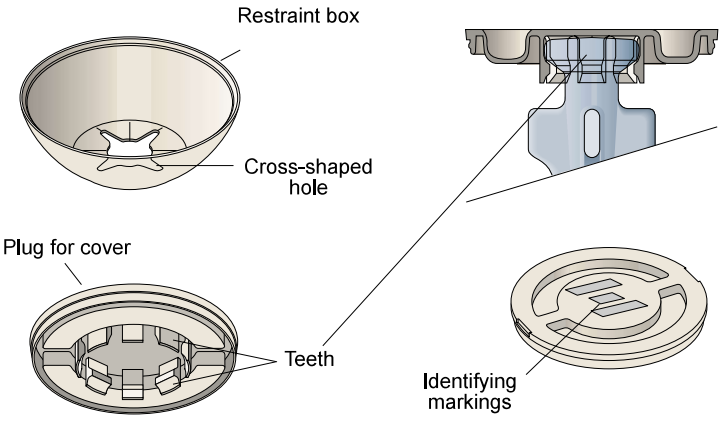
This is the hooking device for the pegs, working as connector between the lifting devices (cranes, gantry cranes etc…) and the peg. The end part is spherical with a hollow inner part resembling perfectly the peg cylindrical head shape. In the front part there are product identifying markings with the producer acronym, the EC marking and the load capacity. During the lifting from horizontal position, thanks to the back shoulder, the handle lies perfectly on the peg's body, avoiding an excessive rotation and contact with the concrete surface. The handle is equipped with a safety pin that ensure the correct coupling with the peg.

Restraint cover (C)

It is delivered together with the peg and must be attached to it during the preparation of the components for casting. It is obtained through the moulding of a special PVC and is made of two parts: restraint box and plug. The box has a truncated-spherical shape and a cross hole in the lower part, identical to the peg body shape, in order to avoid concrete infiltrations during casting. The plug has a cylindrical form with central toothing designed to have a perfect coupling with the peg's head. In the central part there are: the product's identifying markings with the company name, the EC marking and the peg type to which the cover is connected.







Lifting system

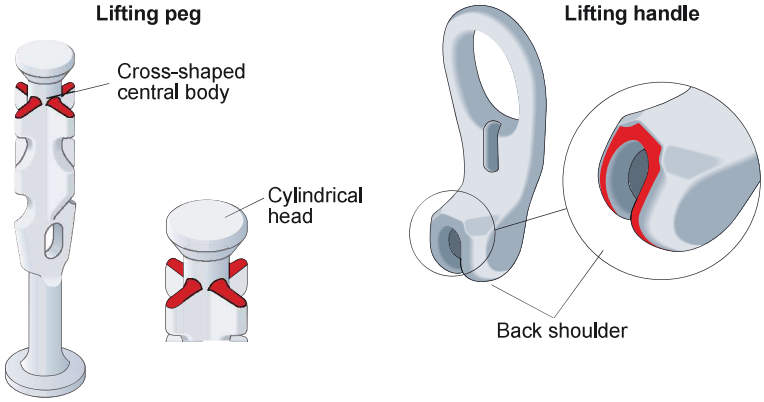
EDILMATIC EMP

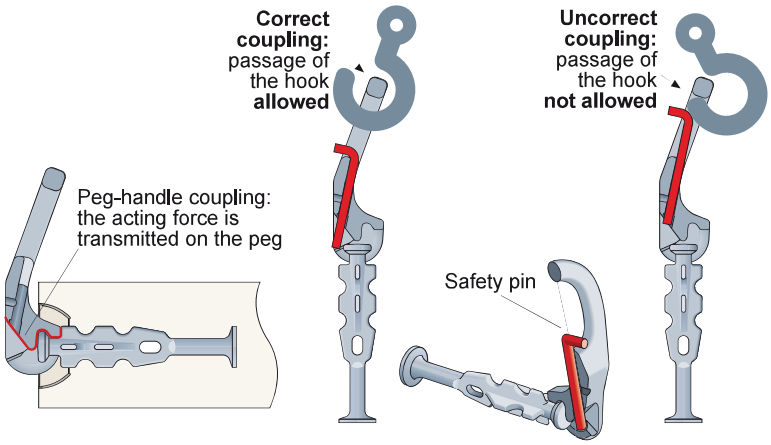
DESIGN PRINCIPLES

In the design of the Edilmatic EMP lifting system we introduced an innovative insert form, in order to join the advantages of the most successful forms present on the market (blades and nails). The result is a cross-shaped body with cylindrical head, offering both the advantages of a simple handle connection to the cylindrical head and of a stiff central body (similar to a blade reinforced in the centre). The insert's shape, together with the reinforcing back projection on the handle, enables to concentrate the forces acting on the peg during lifting from horizontal position, preventing the handle to touching the concrete and creating unaesthetic cracks.

Another important safety design detail of the system is the safety pin, through which the operators can immediately check (visually), also by means of the red colour, if the handle connection to the insert is correct. If the handle is not perfectly connected to the peg, the pin remains raised preventing the cranes lifting devices from connecting to the handle.

Great attention has been paid to the materials choice. After some researches and tests both for the lifting handle and the insert have been used two high quality and very reliable materials. For the handle we chose a Ni-Cr-Mo steel with high yield strength and resistance to cyclical loads. For the peg we used a "St" steel, whose main feature is the high resilience to low temperatures (up to –20°C), a good mechanical resistance and a good stretching. On page 6 a detailed description of the main features of the adopted materials is given.





Prearrangement of the cover on the peg

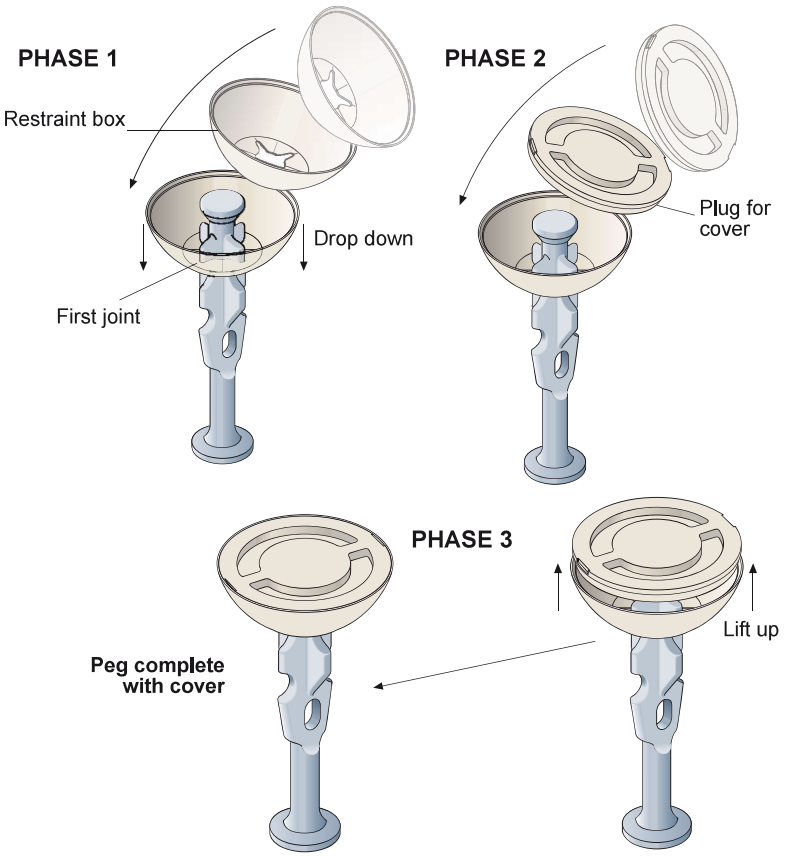
The cover prearrangement on the lifting peg is very simple and quick.

The **restraint cover** is made of 2 accessories:
- restraint box
- plug for cover.

1 - Insert the box on the peg through the cross-shaped hole and let the box slide down across the peg up to the first junction. In the passage pay attention to the orientation of the box cross from.

2 - Put the plug on the peg's head and make sure the teeth adhere correctly to the peg head.

3 - Lift the box again and with a light pressure lock the two parts.

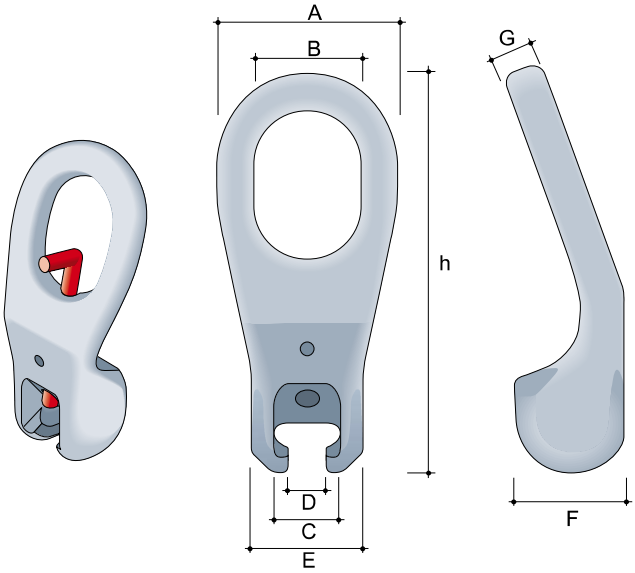


SIZES AND DIMENSIONS

Lifting handle

Handle type	A	B	C	D	E - F	G	h	Weight (kg)
Type 2.5	90	54	28	17.5	53	20	200	1.8
Type 5	110	66	39	22.5	68	25	250	3.5
Type 7.5	135	80	48	30	82	30	300	6.3
Type 10	135	80	48	30	82	30	300	6.3

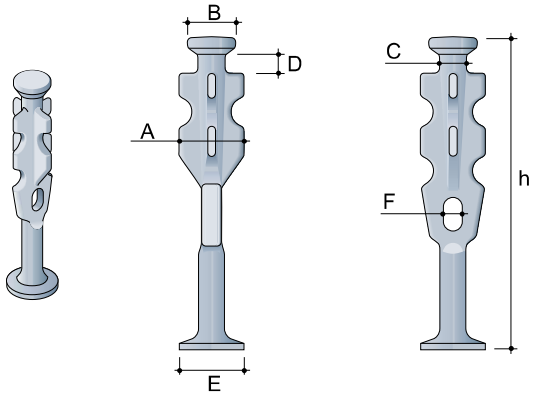
The dimensions in the table are indicated in mm



Lifting pegs

Pegs type	A	B	C	D	E	F	h	Weight (kg)
Type 2.5	28	26	16	9	28	11	180	0.35
Type 5	40	37	21	11	40	15	240	0.91
Type 7.5	50	46	25	13	50	18	300	1.65
Type 10	55	46	28	15	55	20	350	2.10

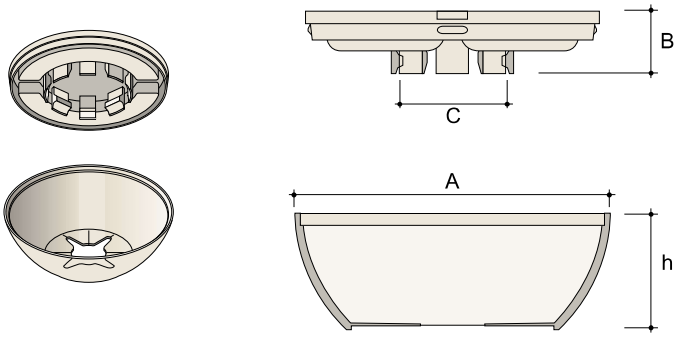
The dimensions in the table are indicated in mm



Restraint cover

Cover for Peg	A	B	C	h
Type 2.5	80	17	26	28
Type 5	100	20	37	38
Type 7.5	120	29	47	48
Type 10	120	29	47	48

The dimensions in the table are indicated in mm



Lifting system

EDILMATIC EMP

MATERIAL FEATURES

In the design of the EMP EDILMATIC lifting system, the choice of the materials for the various components has been very important. Through accurate studies in cooperation with important international research institutes, we analysed different material types and classes considering the main features the components should have had, such as:

- **High yield stress**
- **High toughness even at low temperatures**
- **Good weldability**
- **Suitability to moulding**

Thanks to the studies and to the tests carried out, we chose and used high quality steels guaranteeing the product reliability and at the same time the design performances.
Hereafter there is a brief description of the materials' main features, such as yielding stress, ultimate stress and toughness.

Lifting handles

39 NiCrMo3 (UNI EN 10083-1)	
R_m failure stress	1100 N/mm²
R_s yielding stress	900 N/mm²
K_v toughness at -20 °C	50 J

This is a nickel-chrome-molybdenum steel for quenching and tempering widely used for highly stressed mechanical parts (e.g. gears, gearwheels, shafts, etc.) and under static and cyclic loads. It possesses high mechanical features, high strength and an excellent plastic reserve (stretching) together with a good toughness and fatigue strength. Thanks to the alloy elements Ni, Cr and Mo, this steel can undergo tempering without becoming brittle.

Lifting Pegs

S355J2 (UNI EN 10025)	
R_m failure stress	510 N/mm²
R_s yielding stress	355 N/mm²
K_v toughness at -20 °C	50 J
Stretching **(A%)**	24%

Low alloy steel suitable for hot deformation. The particular chemical composition, with manganese, silicon, chrome and nickel increases its mechanical resistance with very high yield values.
The values of the alloying elements and of the carbon equivalent make the material weldable with not very deep positioning joints. The material is resilient also to low temperature with Kv values reaching 40/50J measured at -20°C, widely below the minimum level acceptable for the steels used for such applications (Kv>27J at 0°C - CNR 10025-98).

Restraint cover

Moplen	
Yield after compression (N/mm²)	40-70
Brittle temperature (°C)	150 °C
Vidal softening temperature (°C)	-35 °C

It is a special thermoplastic resin belonging to the group of polioleofines, which are commonly known as polypropylene (iso-tactic polymer). A high molecular density gives the material a high mechanical resistance, with a mean Vidal softening temperature of about 150°C. The resistance is very good also at low temperatures (even at –35°C), a very important chemical feature is the total chemical inertia, which makes it resistant to the most aggressive environments containing acids.

LIFTING CONFIGURATIONS

We indicate the maximum permissible loads (**Pu**) applicable to the **EMP System** for two different configurations:

1) **Lifting of concrete element from the vertical position.**

2) **Lifting of concrete element from the orthogonal position (overturning-tilting)**

For the vertical lifting we also distinguish two possible configurations:

1a) **Lifting and transport using vertical ropes**
1b) **Lifting and transport using inclined ropes**

In **Table 1** we summarize the max. permissible loads which can be applied on the system in these different configurations. In the side pictures we also schematized the lifting types and showed some excluded uses depending on particular features of the EMP system, but first of all on the used concrete type.

To determine the various capacities we considered two different factors influencing the system behaviour and its real capacity such as dynamical factors (acceleration forces determined by the used devices) and the **ropes inclination** (multiplication factors for the horizontal component).

The permissible loads (**Pu**) shown for the different pegs already include the increasing coefficients due to the factors indicated before.

To choose the peg we need to determine the article's weight (**Pe**) and the number of pegs (**pegs no.**) we want to use, considering the minimum distances from the elements borders and their minimum thicknesses.

To determine the article weight, it is very important to consider the friction between formwork and element when the two contact surfaces are detached, which increases its weight and influences the choice of the right peg.

On Page 8 we briefly describe how the real articles weights (**Pe**) and the bonds developing during the lifting horizontal position operations are determined.

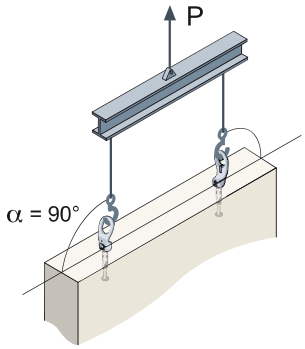
For the handles, the permissible loads to consider is always the one written on the handles itself, regardless of the lifting configuration.

VERTICAL LIFTING
with vertical ropes

Lifting of an element from the vertical position by means of vertical ropes.

It is allowed in all cases with fck,cube ≥ 15 N/mm²

Lower concrete classes are not allowed!



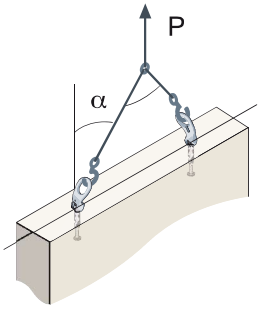
1

VERTICAL LIFTING
with inclined ropes

Lifting of an element from the vertical position by means of inclined ropes.

It is allowed only with fck,cube ≥ 20 N/mm²
The max rope inclination must not exceed 45°

Higher inclinations are not allowed!

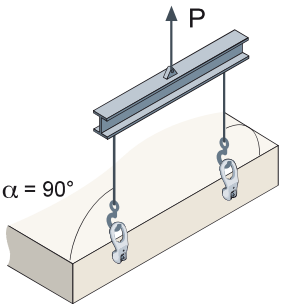


2

ORTHOGONAL LIFTING
with vertical ropes

Lifting of an element from the horizontal position by means of vertical ropes.
It is always allowed with fck,cube ≥ 15 N/mm²

Lower concrete classes are not allowed!

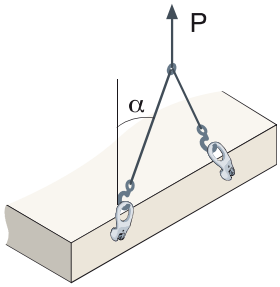


1a

ORTHOGONAL LIFTING
with inclined ropes

It is allowed with maximal ropes inclination of 45°.
It is always allowed with fck,cube ≥ 15 N/mm²

With higher inclination the maximum load capacity has to be conveniently reduced!



1b

Table 1 - Summary of the permissible loads for lifting pegs

Handle type	Peg type	Vertical lifting permissible load (kN)	Orthogonal lifting permissible load (kN)
M 2.5 ton	Type 2.5	25 kN	12.5 kN
M 5 ton	Type 5	50 kN	25.0 kN
M 7.5 ton	Type 7.5	75 kN	37.5 kN
M 10 ton	Type 10	100 kN	50.0 kN

Lifting system

EDILMATIC EMP

CHOICE OF THE PEG

Bond effects

To choose the lifting peg suitable for the required lifting configuration, it is necessary to determine the element's weight (P) and its real weight (Pe), depending on the friction forces acting during the formwork removal.
To determine the element's weight (P) it is necessary to know its volume (V) and the specific weight of the material. For elements made of reinforced concrete the specific weight is assumed to be **ps = 25 kN/m³**

The elements weight (P) is expressed by the formula
P = ps x V … where

ps = specific weight (kN/m³)
V = volume (m³)

To determine the element's real weight (Pe), depending on the adhesion effect, it is necessary to determine the area of the contact surface between element and formwork.

The elements real weight is expressed by the formula:
Pe = P + (A x D) … where

P = element weight, previously calculated (kN)
A = contact surface area (m²)
D = adhesion specific force (kN/m²)

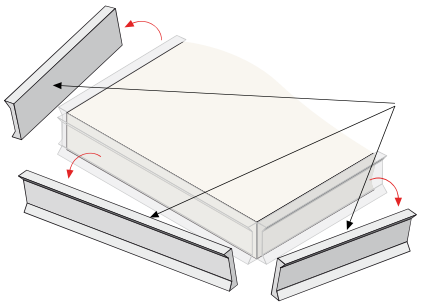
The intensity of the adhesion force acting between formwork and element (when the contact surfaces detach) depends on the formwork material and on the element sizes. The more extended the contact surface is, the higher the bond will be.

The "**D**" coefficient depends on the formwork surface. In **Table 1** we list some "**D**" values depending on the formworks used and on some particular element forms with a high contact surface extension.

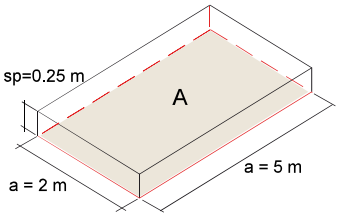
To minimize the bond effect you should remove so many restraint elements as possible from the formwork before going on with the handling and treat with adequate "striking materials" all formworks surfaces before the castings.

In the side pictures you find some examples how the articles real weight is determined depending on the formwork type and on some particular element forms with different "**D**" bond coefficients.

On page 9 of the catalogue you find some calculation examples to choose the peg, depending on the real weight and on the adequate lifting configuration for the handling.



Remove as many restraint elements as possible from the formwork.



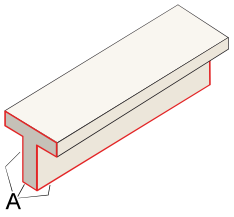
Example 1
Infill panel

Element weight (**P**):
P = V x ps = a x b x Sp x ps = **62.5kN**

Element real weight (**Pe**):

Metal formwork

Pe = P+(AxD) = P+(axb)xD =
62.5 + (10 x 1) = Pe = **72.5 kN**



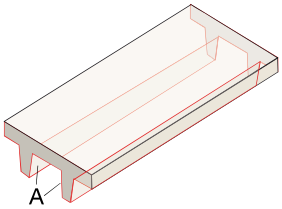
Example 2
"T" beam

Element weight (**P**): **P** = 40 kN

Real element weight **(Pe)**:

"**T**"beam **A = 16 m²** **D = 4 kN/m²**

Pe = P + (A x D) = **104 kN**



Example 3
"π" Bent tile

Element weight: **P = 100 kN**

Real element weight:

A = 40 m² **D** = 5 kN/m²

Pe = P + (A x D) = **300 kN**

Table 1 - Values of the adhesion specific force "D"

"D" values (kN/m²)	Formwork type & particular shapes
1.00	Steel covers treated with striking products
2.00	Painted wooden formworks
3.00	Raw wooden formworks
4.00	"T" beams
5.00	"π" bent tiles

CHOICE OF THE PEG

Practical examples

Example 1

Lifting and transport of an infill panel.

Element weight (**P**): a x b x sp x ps = 8 m x 2.5 m x 0.2 m x 25 kN/m^3 = **100 kN**

Adhesion effects, steel formwork: D = **1 kN/m^2**

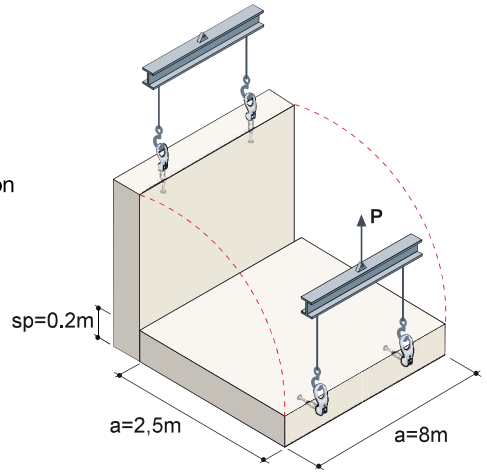
Real weight (Pe) = P + (A x D) = P + (axb)xD = 100 + 20 = **120 kN**

By using two pegs and by considering that during the lifting form horizontal position the panel remains leaned on one side, to choose the adequate peg it is necessary to consider:

Pu = (Pe/2) / 2 = 30 kN = **n°2 Pegs Type 7.5** to be used
(permissible load with orthogonal pull **Pu = 35 kN**)

For the following handling phases the pegs type 7.5 have been widely checked, they have a permissible load (Pu) with vertical pull equal to **Pu = 75 kN**

Attention! Never handle using inclined ropes with fck,cube < 20 N/mm^2



Example 2

Lifting and transport of a beam

Element weight = **P = 80 kN**

Adhesion effects, steel formwork: D = **1 kN/m^2**

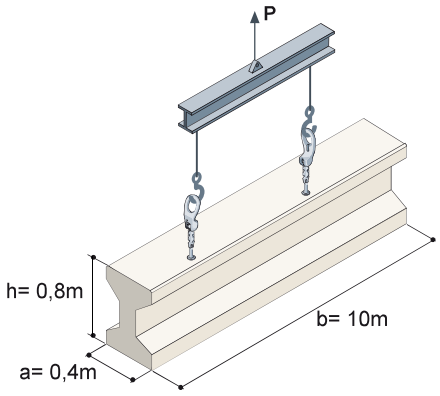
Real weight: **Pe** = P + (A x D) = P + (axb)xD = 80 + 8 = **88 kN**

If you want to use two pegs, the choice of the right peg depends on:

Pu = Pe / 2 = 44 kN = **2 Pegs Type 5** have to be used
(permissible load with vertical pull **Pu = 50 kN**)

For the following handling phases the type 5 pegs have been proofed

Attention! Never handle using inclined ropes with fck,cube < 20 N/mm^2



Example 3

Lifting and transport of a floor

Element weight: **P = 120 kN**

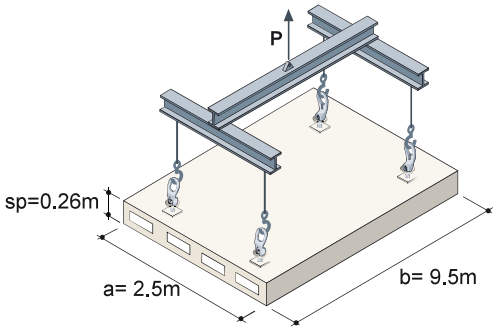
Adhesion effects, steel formwork: D = **1 kN/m^2**

Real weight: **Pe** = P + (A x D) = P + (axb)xD = 120 + 24 = **144 kN**

Considering the article low thickness it is absolutely necessary to use lowered pegs, in case you need to use 4 fastening points, the right peg results from:

Pu = Pe / 4 = 36 kN **4 Pegs Type 5** have to be used
(permissible load **Pu= 50 kN**)

Attention! Never handle using inclined ropes with fck,cube < 20 N/mm^2



Lifting system

EDILMATIC EMP

INSTRUCTIONS

Correct use of the pegs

The **EMP Edilmatic lifting system** must be used by qualified and experienced technicians, trained according to the norms contained in this catalogue and in the User's handbook. Always keep catalogue and User's handbook next to the system, to make sure it is correctly and safely used.

The pegs must be always symmetrically placed respect to the element's center of mass and the minimum distances from the edges must be respected. In case the pegs are not symmetric with respect to the element's center of mass, the load of each peg results from static calculations.

In case more than two lifting points are present, it is not possible to determine the load influence on any peg, as it is not certain how ropes and pegs will be placed. In such cases particular articulated lifting systems must be used (spring equalizing rocker arms spring, ropes with distributors etc...). In case of doubts, the system will be designed as if only two pegs had been used.

The pegs' permissible load (**Pu**) in the two possible configurations considered is indicated in their head top part (Picture 6).
Never use pegs with capacities lower than the loads indicated in the project.

The **restraint cover** must be correctly applied on the peg, following the rules of page 4, in order to avoid concrete infiltrations, which can compromise the operativity of the system.

Never use restraint covers clearly damaged or already used. Preserve the closing plugs to reuse again after the handling (Picture 3).

For the elements' tilting, provide always a U-bar as load distributor, as shown on page 13.
For the elements' lifting from vertical position, follow the norms related to the use of the reinforcement fork, as shown on page 11.

During the prearrangement in the formworks, the pegs must be placed as orthogonal as possible with respect to the element's edges (Picture 1 and Picture 2).

For a correct positioning, it is permissible to weld the pegs to the reinforcement (Picture 4 and Picture 5).

Fig.1

Central position for low-thickness elements

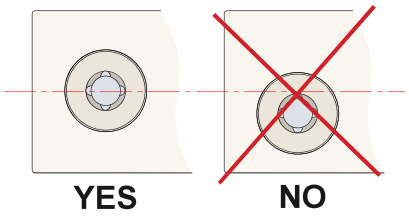


Fig.2

Orthogonal position with respect to an edge

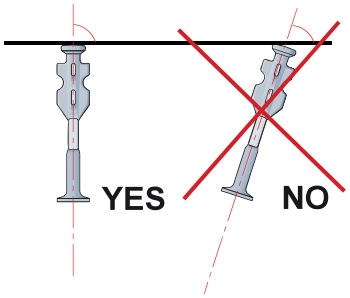


Fig.3

Plug to be reused to close the opening after use

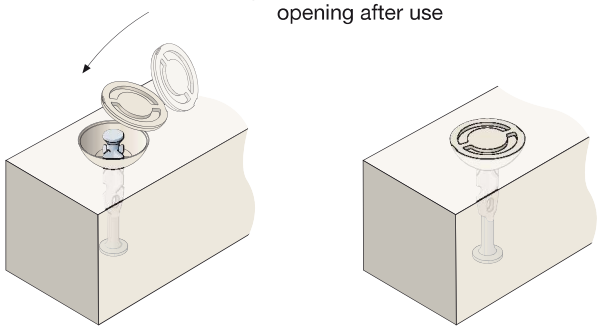


Fig.4

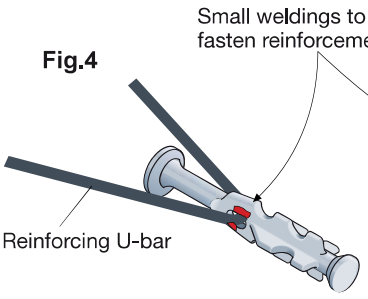
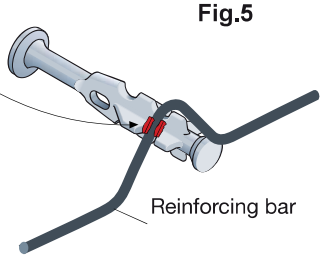


Fig.5



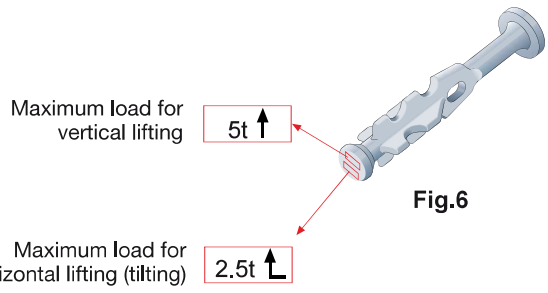


Fig.6

INSTRUCTIONS

Use and maintenance of lifting handles

By using the **EMP EDILMATIC** lifting system it is necessary to pay attention to the use and maintenance of the lifting handles.

The handle must always be in the right position with respect to the peg's head, with the ring inclined towards the applied force, in order to avoid locking and the resulting bending of the system (Picture 1 - Picture 2).

A handle must be coupled with a peg of the same load class; therefore a 2.5 tons. handle can be used only with type 2.5 pegs, handles for 5 tons. with type 5 pegs, etc.
The handles can be used up to 80000 lifting cycles and, anyway, not for more than 5 years.

During the operations of rotation of a concrete elements, it is necessary to use lifting devices equipped with double pulleys and ropes of the right length, in order to maintain an angle between the ropes smaller than 30°, as shown in Picture 3. To comply with this norm, the length (L) of the rope must be:

L > 4A ..... with

L = total length of the rope
A = distance between the two pegs

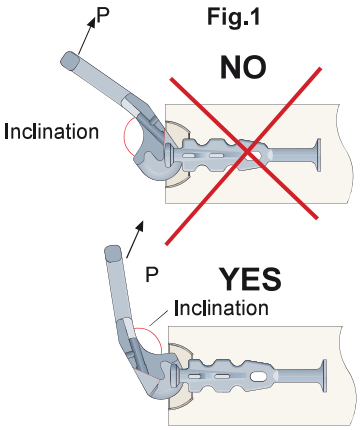
During the element's "tilting" phases it is not allowed to have a rotation over 90° as shown in Picture 4.

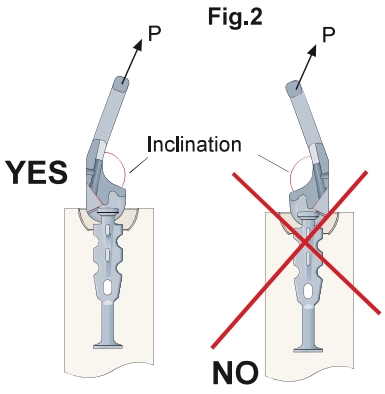
Regularly check the handles state, with particular attention to the safety pin and to the thickness of the leaning female screw. In case the safety pin reaches a deformation preventing it from sliding, the handle must be returned for the required checks.

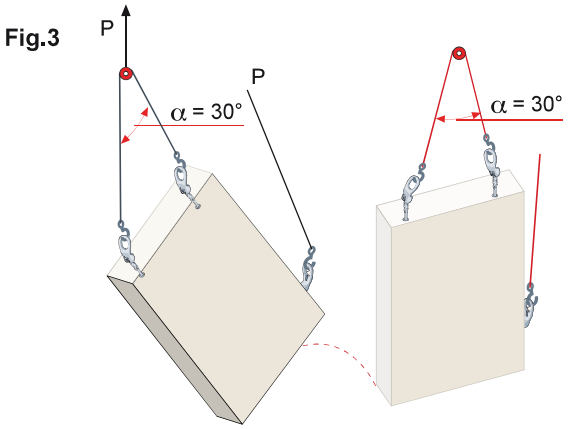
When the wear of the handle-peg contact zone reaches 2 mm and the wear of the inside throat reaches 2 mm, return to Edilmatic the handle for the checks. In Table 1 the permissible sizes of the contact zone and of the throat are reported; over such sizes the handle cannot be used.

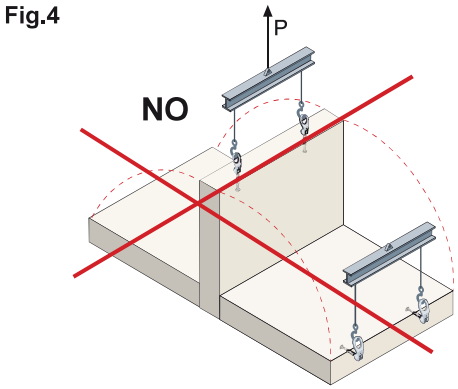
Table 1
Maximum allowed dimensions "h" and "D"

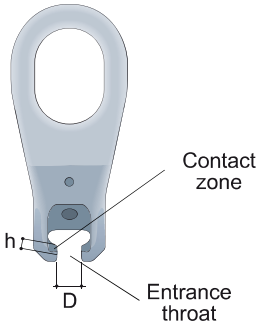
Handle type	Max "h" size (mm)	Max "D" size (mm)
Type M 2.5	7	19.5
Type M 5	7	24.5
Type M 7.5	9	32
Type M 10	9	32

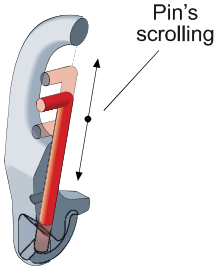










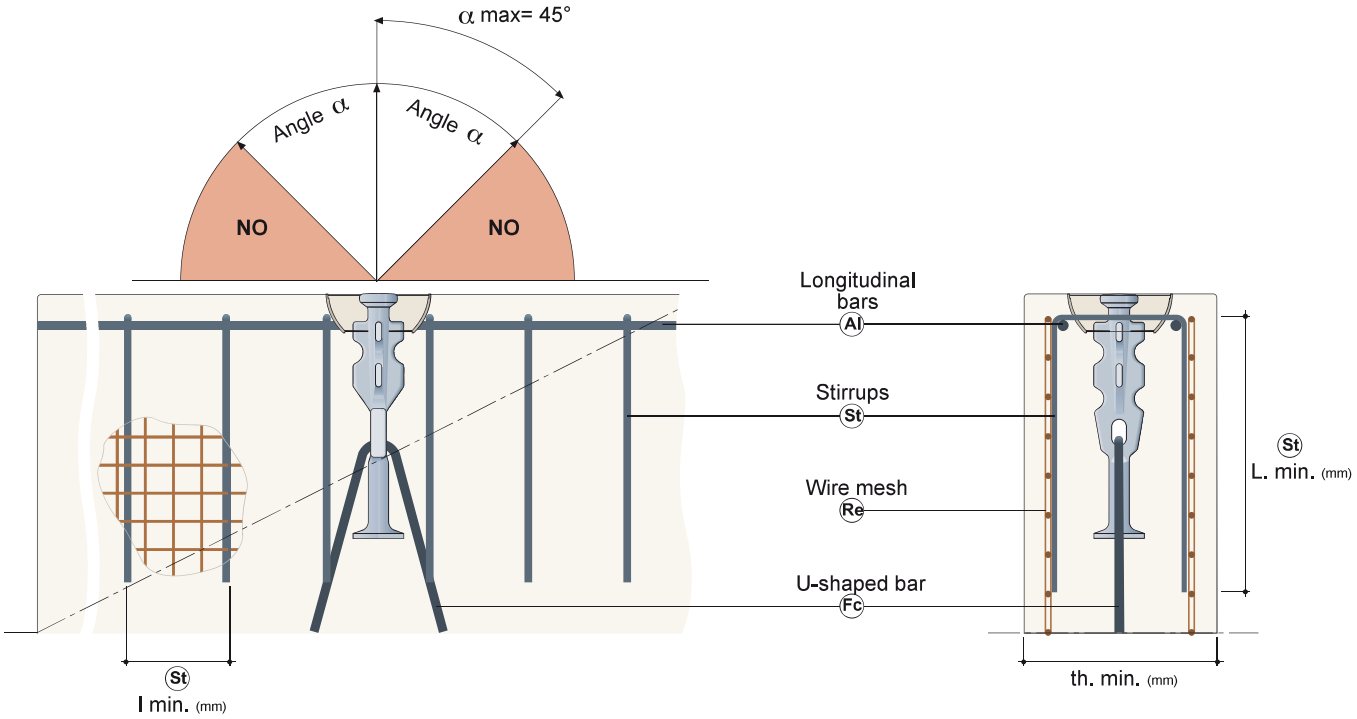


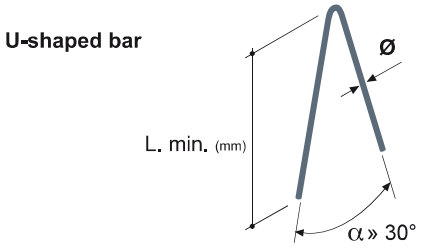
Lifting system

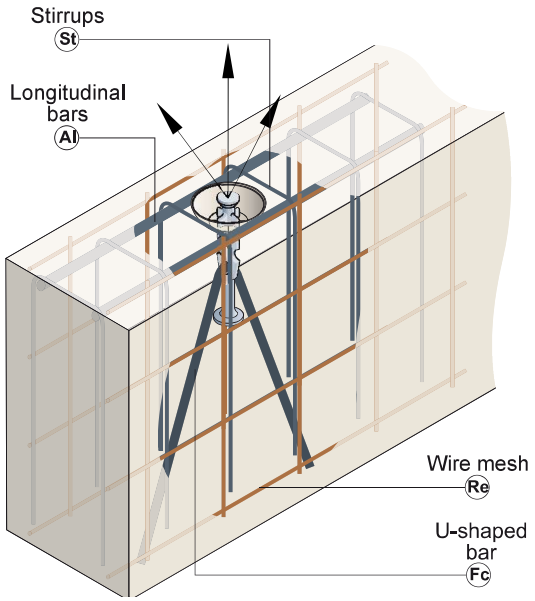
EDILMATIC EMP

LIFTING FROM THE VERTICAL POSITION

Instructions for the minimum reinforcing structure







Peg type	U-shaped reinforcement bar Fc Ø....x $L._{min}$ (mm)
Type 2.5	Ø 10 x 500
Type 5	Ø 12 x 600
Type 7.5	Ø 14 x 700
Type 10	Ø 14 x 1000

The reinforcement bracket must be a B450 bar of proper diameter.

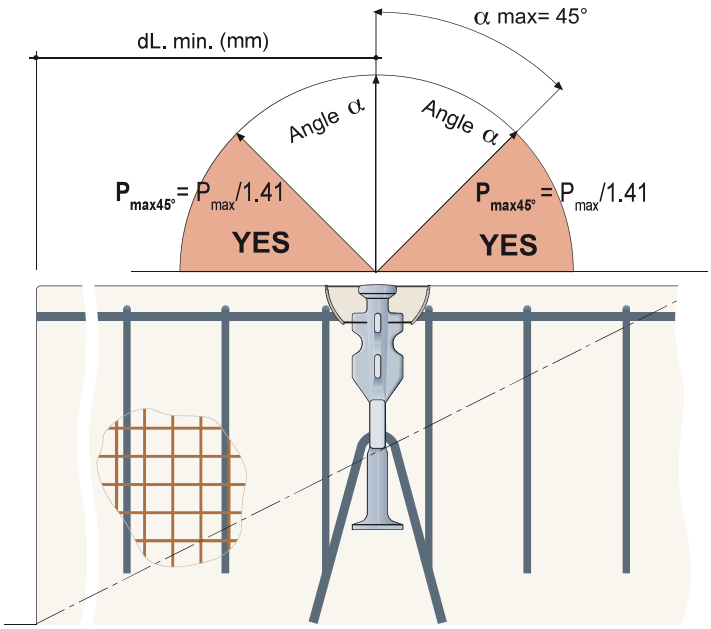
For concrete elements with concrete class fck,cube ≥ 25 N/mm2 the bracket is not necessary.

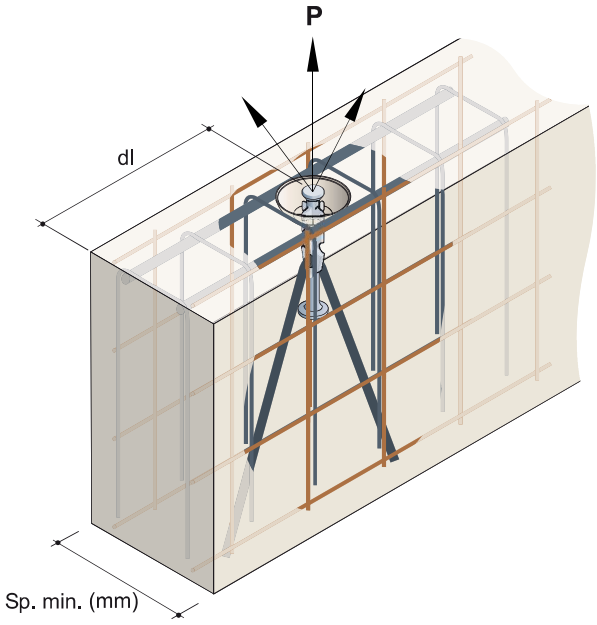
For elements with minimum thickness greater than 300 mm the bracket is not necessary.

Peg type	Reinforcement stirrupps St Ø....x $L._{min}$ (mm)	Longitudinal reinforcement Al $Ø_{min}$ (mm)	Wire mesh Re $Ø_{min}$ (mm)	Stirrups spacing l $l._{min}$ (mm)
Type 2.5	Ø 8 x 500	2 x Ø 10	Ø 5 (200x200)	150
Type 5	Ø 10 x 600	2 x Ø 12	Ø 5 (150x150)	150
Type 7.5	Ø 10 x 700	2 x Ø 14	Ø 6 (200x200)	150
Type 10	Ø 10 x 700	2 x Ø 16	Ø 6 (200x200)	150

VERTICAL LIFTING

Nominal capacities and geometric norms





The permissible loads shown in the Table refer to concrete elements with **fck,cube ≥ 15 N/mm²** at the time of handling.

Lower concrete resistance classes are not allowed.

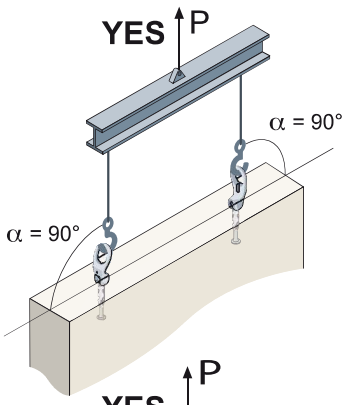
The lifting ropes inclination is allowed up to 45° with respect to the element level and with class concrete **fck,cube ≥ 20 N/mm²** at the time of handling.

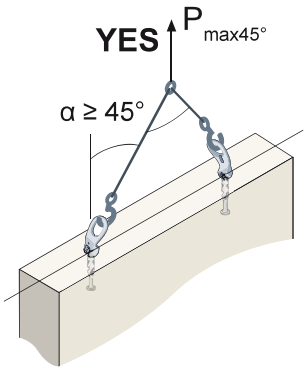
For concrete classes with **fck,cube ≤ 20 N/mm²** only the vertical lifting is allowed. In such cases we absolutely recommend to use a specific **"spring equalizing rocker arm"** making the heave direction perfectly vertical.

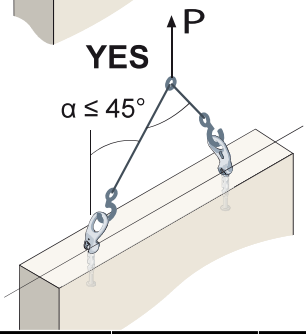
The permissible loads shown in the table are guaranteed only by using the recommended reinforcement as reported at page 12.

The permissible loads, shown in the Table, for the elements lifting procedures from the vertical position already includes the reductions caused by the **dynamical coefficients** developing during the elements transport and from the multiplication factor for inclined pull which has been set at **I=1.41**, considering a max. applicable inclination on the ropes of α = 45°.

Ropes inclinations with α > 45° are not allowed (30° only in rotation processes - Ref. page 11).







In elements movement from vertical position with ropes inclination of α <45° the maximum load capacity must be conveniently reduced with:

$$P_{max45°} = P_{max} / 1.41$$

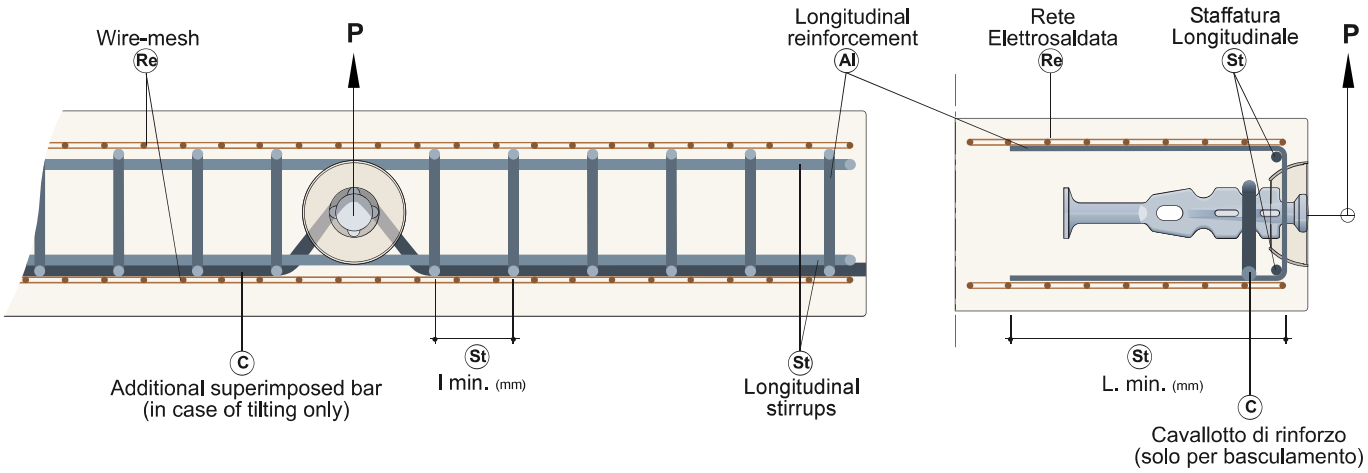
Peg type	Permissible loads P max (kN)	Element's minimum thickness Sp. min (mm)	Minimum edge distance dL min. (mm)
Type 2.5	25 kN	120	550
Type 5	50 kN	140	750
Type 7.5	75 kN	160	950
Type 10	100 kN	160	950

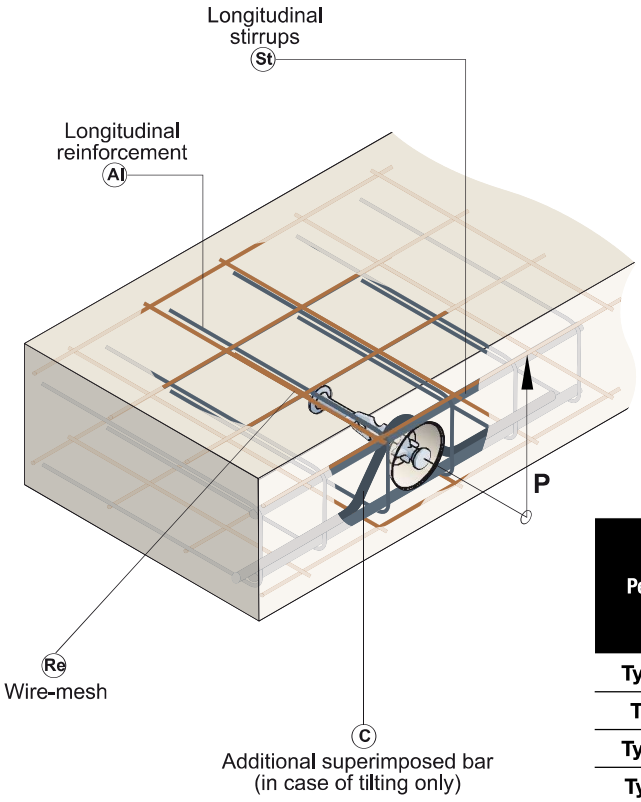
Lifting system

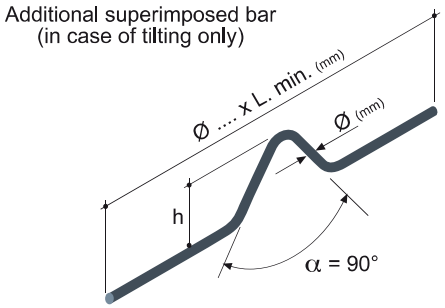
EDILMATIC EMP

LIFTING FROM THE HORIZONTAL POSITION

Instructions for the minimum reinforcing structure







Peg type	Reinforcing bar C Ø....x L.$_{min}$ (mm)
Type 2.5	12 x 500
Type 5	14 x 1000
Type 7.5	16 x 1000
Type 10	16 x 1000

The horizontal U-bar must be in B450 steel of adequate diameter.

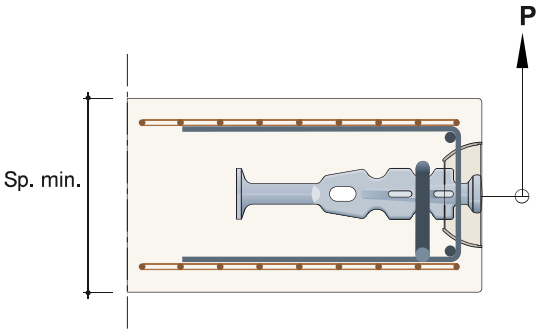
The horizontal parts of the additional reinforcement must be placed inside the wire-mesh.

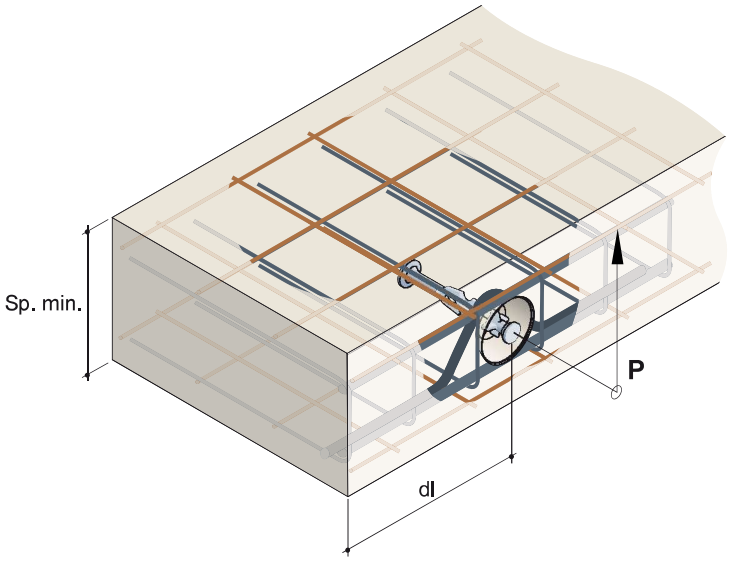
The height "**h**" must be determined according to the element thickness.

Peg type	Longitudinal stirrupps St Ø....x L.$_{min}$ (mm)	Longitudinal reinforcement Al 2 x Ø$_{min}$ (mm)	Wire-mesh Re Ø$_{min}$ (mm)	Stirrups spacing I I.$_{min}$ (mm)
Type 2.5	Ø 8 x 500	2 x Ø 10	Ø 5 (200x200)	150
Type 5	Ø 10 x 600	2 x Ø 12	Ø 5 (150x150)	150
Type 7.5	Ø 10 x 700	2 x Ø 14	Ø 6 (200x200)	150
Type 10	Ø 10 x 1000	2 x Ø 16	Ø 6 (200x200)	150

LIFTING FROM THE HORIZONTAL POSITION

Nominal capacities and geometric norms





The permissible loads shown in Table refer to concrete elements with **fck,cube ≥ 15 N/mm²** at the time of handling.

Lower concrete resistance classes are not allowed.

The nominal capacities shown in Table can be used only for vertical lifting.

During the lifting procedures from the horizontal position no inclination of the lifting ropes is allowed.

Therefore is required the use of an adequate **"spring equalizing rocker arm"** making the lifting stress direction perfectly vertical.

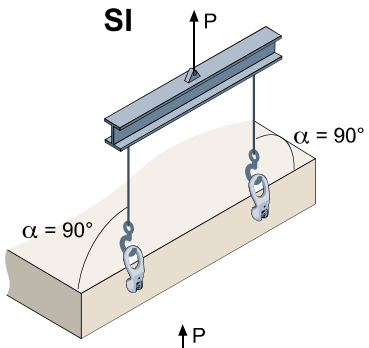
The permissible loads shown in the table are guaranteed only in presence of **"U-bar reinforcement"**, see page14.

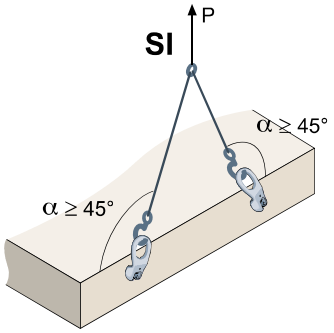
The permissible loads, shown in Table, for the elements lifting from the horizontal position already includes the reductions caused by the **dynamic coefficients** developing during the elements lifting.

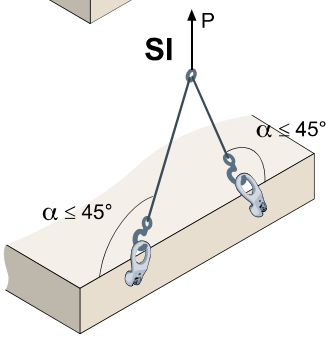
We would like to stress that the design weights of the articles to lift have to be increased considering the friction coefficients developing between formwork and the elements to handle.

Such coefficients depend first of all on the sizes of the elements which have to be handled, on the formwork type and the treatment they undergo before the casting.

On page 8, the reference values of the friction coefficient, depending on the formwork type, are reported; it must be considered to increase the element's weight to determine its real weight (**Pe**).







In elements movement from HORIZONTAL to VERTICAL position with ropes inclination of α>45° the maximum load capacity must be conveniently reduced with:

$$P_{max45°} = P_{max} / 1.41$$

Peg type	Permissible load P max (kN)	Element's minimum thickness Sp.min (mm)	Minimum edge distance dL min. (mm)
Type 2.5	12.5 kN	120	550
Type 5	25 kN	140	750
Type 7.5	37.5 kN	160	950
Type 10	50 kN	160	950

Lifting system

EDILMATIC EMP

LOWERED PEGS FOR SMALL THICKNESSES

Dimensions and instructions for the minimum reinforcing structure

For special applications requiring the handling of very thin elements (such as thin slaba with surface reinforcement, panels and shell-beams) it is possible to use **special lowered Edilmatic pegs.**

They are pegs with a small "**h**" height, obtained with the same procedure and the same standard materials, with a distribution plate at the base in the required size. The geometrical lowered peg features are shown in **Table 1**.

As stated, the lowered pegs are made of the same materials of the standard pegs, while the base plate is made of steel S355JR UNI EN 10025.

They can be delivered zinc-plated with electrolytic UNI ISO 2081 cold zinc-plating or "black" without surface coating. They are delivered complete with protection cover (identical to the one of the standard pegs) to apply following the same rules explained on page 4 of the catalogue.

For a correct use of these pegs, considering the very low thickness of the elements in which they will be placed, it is necessary to use additional reinforcement in order to redistribute the induced forces on a wide concrete area.

The additional reinforcement positioning and dimensions are shown in **Table 2.**

The materials the lowered pegs are made of enable to apply the additional reinforcement also through small weldings.

Also as for the lowered pegs we indicate a permissible load and the element's weight and sizes and the formworks type used to determine the "D" bond have to be evaluated. The D bond is required to determine the weight increase of the article which has to be handled.

The correct use of the lowered peg requires the strict compliance with the norms about minimum distances from the borders and minimum elements thicknesses, as shown on page 17 in the **Table 2.**

Table 1 - Sizes and dimensions

Peg type	A x B (mm)	h (mm)	Sp. (mm)
Type 2.5-R	100 x 100	80	8
Type 5-R	120 x 120	105	10
Type 7.5-R	150 x 150	130	12
Type 10-R	150 x 150	150	15

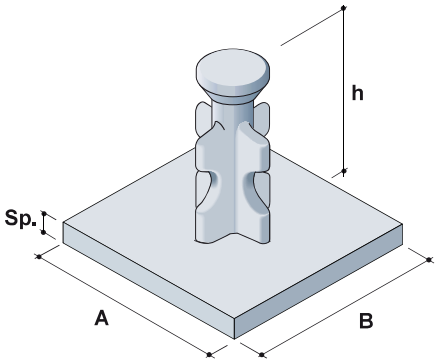
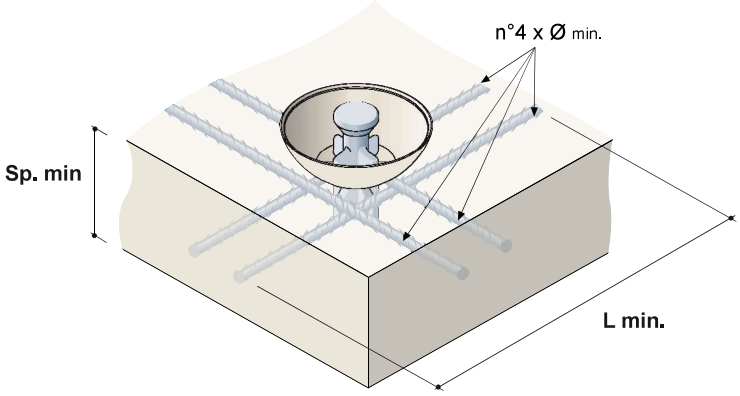


Table 2 - Minimum reinforcement

Peg type	4 x Ø (mm)	L min. (mm)	Sp. min. (mm)
Type 2.5-R	4 x Ø 12	500	120
Type 5-R	4 x Ø 14	500	140
Type 7.5-R	4 x Ø 16	700	160
Type 10-R	4 x Ø 16	1000	180



LOWERED PEGS FOR SMALL THICKNESSES

Nominal capacities and geometric norms

The use of **lowered pegs** is allowed only during the elements' lifting procedure from the vertical position. Their use is not allowed for the overturn/tilting procedures.

As for the standard pegs, the permissible load (Pu) indicated in **Table 1** already includes the reductions due dynamic effects and to rope's inclination. To choose the right lowered peg it is necessary to determine the real element's weight by considering the adhesion coefficient developing between article and formwork during the handling.

As shown on page 8, to determine the element's real weight and the peg type to use, apply the formula:

Pe = (V x ps) + (A x D) ..... where

Pe = real weight to handle
V = element's volume
ps = specific weight
A = contact surface between formwork and element
D = friction coeff. depending on the formwork type

By considering the element real weight, the permissible loads of the peg will result from the formula:

Pu = Pe / n. of pegs ..... where

Pu = permissible pegs' load
Number of pegs = number of pegs to use

Lifting of elements with lowered pegs can performed using concrete with fck,cube ≥ 15 N/mm^2

In the choice of the number of pegs to use, check that the loads are symmetrically distributed and as homogenous as possible. In case of doubts always consider the worst conditions assuming to use only 2 lifting pegs as specified on page 10.

Always follow the geometric norms as for the article minimum thickness (Page 16) and the minimum distances from its edges (Table 2).

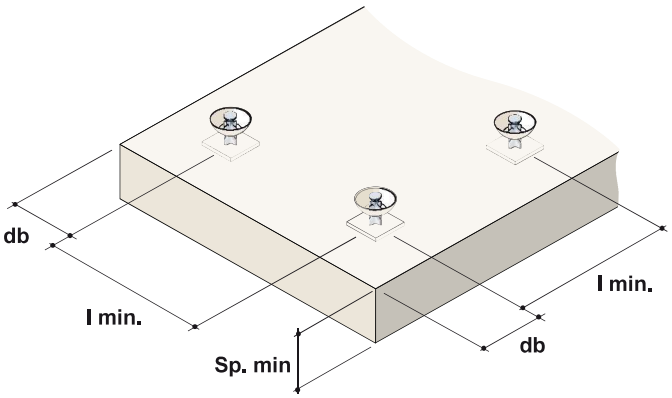
In the lifting procedures with lowered pegs the ropes inclination angle must never exceed 45°.

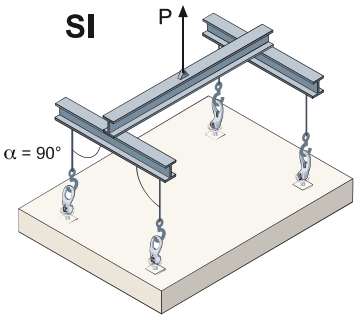
It is not allowed to use lowered pegs with multiple suspensions creating a double rope inclination angle ("beta" angle). In such cases the use of adequate devices to hoist and distribute the loads is compulsory (spring equalizing rocker arms etc...).

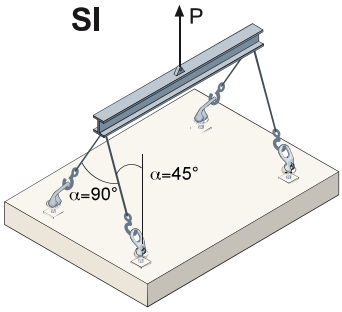
The use of additional reinforcement is mandatory, as shown on page 16.

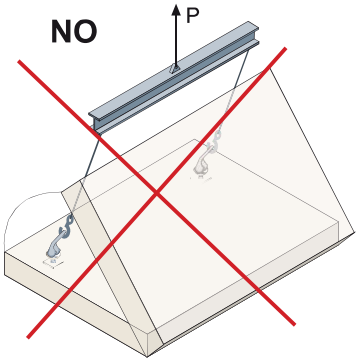
Table 1 - Permissible loads - Edge distances

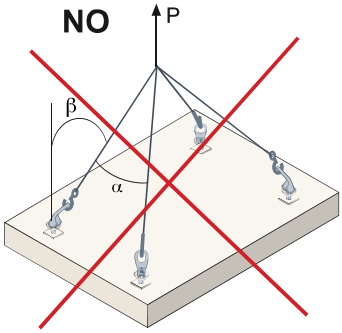
Peg type	Permissible loads Pu (kN)	dB (mm)	l min. (mm)	Sp. (mm)
Type 2.5-R	25 kN	250	500	120
Type 5-R	50 kN	250	500	140
Type 7.5-R	75 kN	300	700	160
Type 10-R	100 kN	400	700	180











Lifting System

EDILMATIC EMPL

GENERAL FEATURES

The **EMPL system** is the new range of Edilmatic Lifting System, offered for the handling of concrete products; it can be used in factory as well as in construction site for the positioning and assembling of precast elements.

The system is composed of an insert, the **Lifting Peg**, to be placed in the formwork before the elements' casting, and of a **Handle** for the peg's connection during lifting phases.

The **EMPL system Peg** is totally **smooth** (without cross reinforced sections like EMP system) and it can be used exclusively with lifting cables inclined until a maximum of $\alpha \geq 45°$.

The Peg is provided complete with the restraint cover, needed for the cavity creation inside the product, as to allow the consequent "coupling" with the Handle.

The system is offered with 4 Pegs' types according to the needed Load Capacity, with related restraint covers and handles.

SIZES & SPACES

Table 1 - Types and sizes of the pegs

Type Pegs	A	D	C	h (available)
Type 2.5	35	26	14	120 170 280
Type 5	50	36	20	240 340 480
Type 7.5	60	46	24	200 300 540
Type 10	70	46	28	170 340 680

The sizes are indicated in mm.

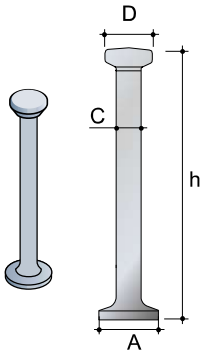


Table 2 - Types and sizes of the covers

Type Pegs	A	B	C	h
Type 2.5	80	17	27	28
Type 5	100	20	37	38
Type 7.5	120	29	47	48
Type 10	120	29	47	48

The sizes are indicated in mm.

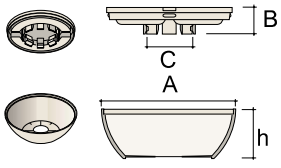
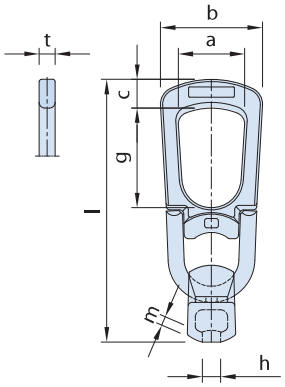
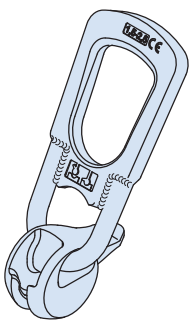


Table 3 - Types and sizes of Handles

Handle type	b	a	h	g	m	t	i	Weight (kg)
Type 2.5	75	47	11	86	7	12	188	0.9
Type 5	91	59	16	88	8.5	14	230	1.4
Type 7.5	118	70	21	115	10	16	283	3.4
Type 10	160	88	30	1150	14	25	401	9.1

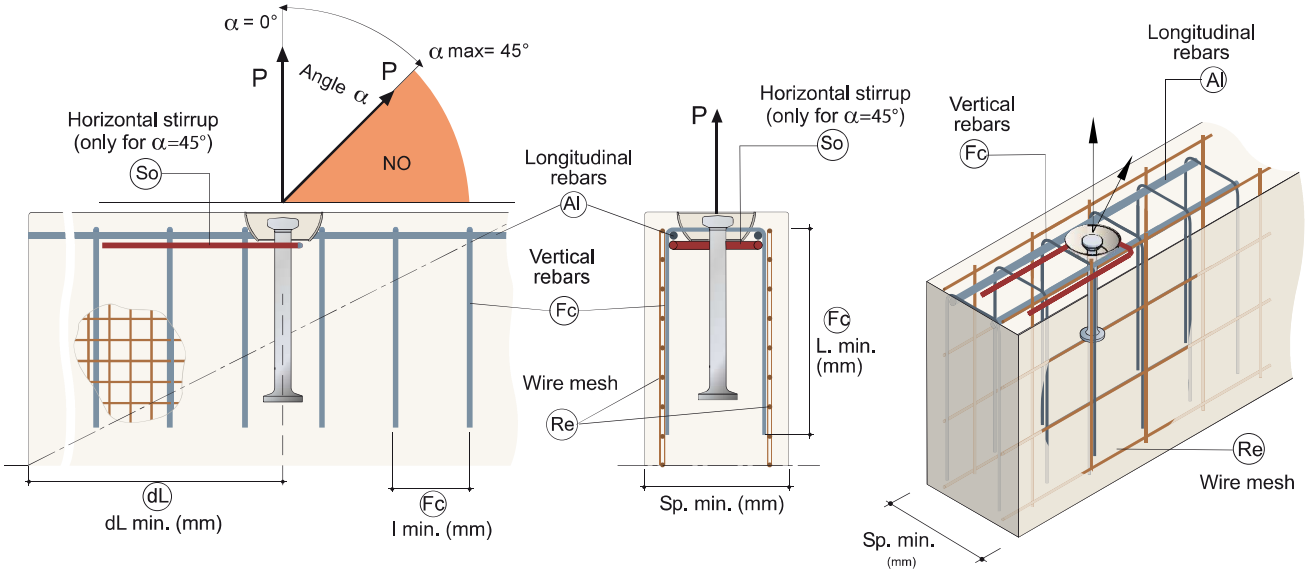
The sizes are indicated in mm.



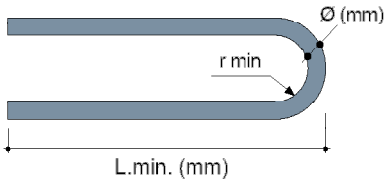


EDILMATIC EMPL

INSTRUCTIONS FOR THE MINIMUM REINFORCING STRUCTURE



Vertical Fork rebars (Fc)
Must be used structural steel B450 or higher grade
Respect the minmum curvature radius (r.min = 3 Ø)



Horizontal Stirrup (So)
Must be used only with cables' inclination α=45°
Must be used structural steel B450 or higher grade

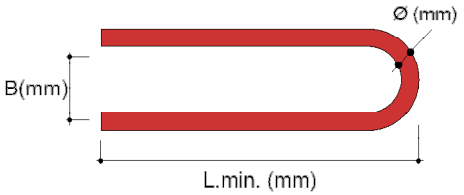


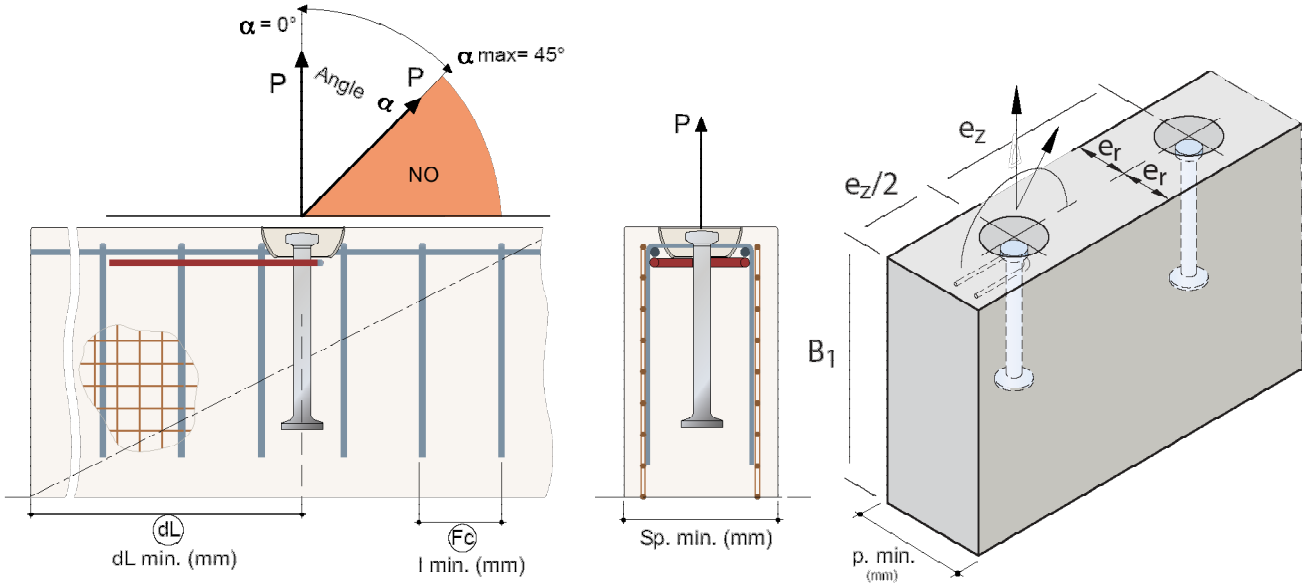
Table 4 - Application Data

Kind Of Peg	Electro-welded Net (Re) n° x $Ø_{min}$ (mm)	Vertical Fork (Fc) n° x Ø.x L. (mm)						Longitudinal rebars (Al*) $Ø_{min}$ (mm)	Horizontal Stirrup (So) Ø.x L.x B (mm)			Stirrups distance (I) I_{min} (mm)
		With vertical pull ≤ 30° (β)			With vertical pull ≤ 30° (β)			(on both sides)				
	(mm²/m)	No. of stirrups	d_s (mm)	l_1 (mm)	N° staffe	d_s (mm)	l_1 (mm)	d_{s2} (mm)	d_{s1} (mm)	d_{br1} (mm)	l_{s1} (mm)	
Type 2.5	2 x 131	2	Ø8	610	4	Ø8	610	Ø10	Ø10	25	1500	---
Type 5	2 x 188	2	Ø10	720	4	Ø10	720	Ø12	Ø14	35	2000	---
Type 7.5	2 x 188	4	Ø10	720	6	Ø10	720	Ø12	Ø16	40	2300	---
Type 10	2 x 188	4	Ø10	720	8	Ø10	720	Ø14	Ø20	50	2600	125

Lifting System

EDILMATIC EMPL

NOMINAL CAPACITIES & GEOMETRIC NORMS



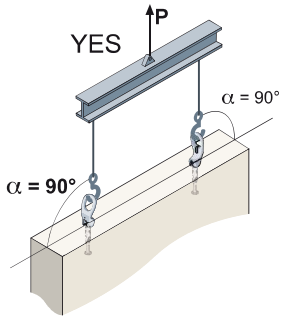
EMPL system can be used in handling with lifting cables inclined for $\alpha \leq 45°$.

The use with higher inclined angles is not allowed (ex pull out from the formwork).

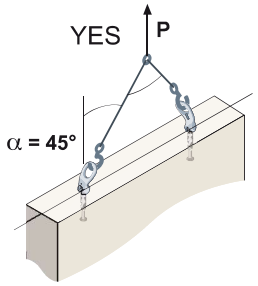
The use with cables inclined up tp $\alpha = 45°$ is allowed only with concrete fck,cube $\geq$ 25 N/mm^2.

The minimum fck,cube of such products at handling time must be fck,cube $\geq$ 15 N/mm^2.

fck,cube = 15 N/mm²



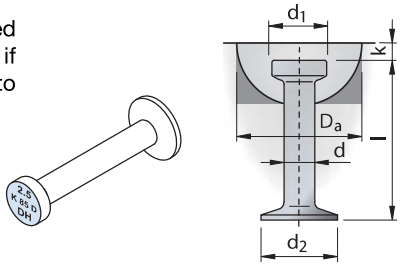
fck,cube > 25N/mm²

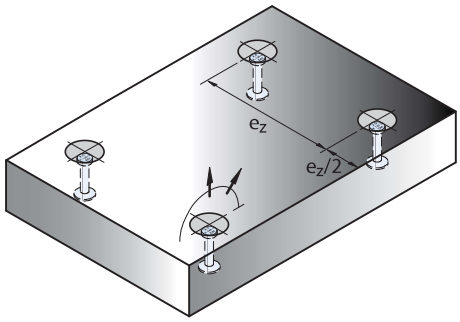


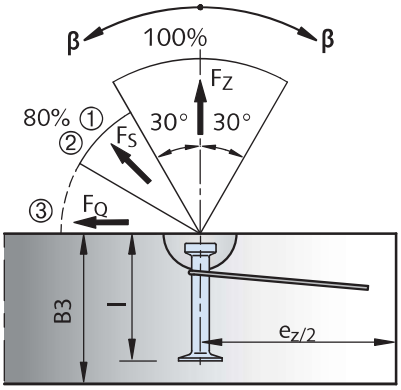
Kind of Peg	Lenght l (mm)	Min. Height element B_1 (mm)	Minimal Thickness 2 x e_r (mm)	Allowable load in kN Concrete class Vertical pull $\alpha \leq 30°$ 15 N/mm²	Inclined pull $\alpha \leq 45°$ 15 N/mm²	Vertical and Inclined pull $\alpha < 45°$ 25 N/mm²	Vertical and Inclined pull $\alpha < 45°$ 35 N/mm²	Interaxis Pegs e_z (mm)
2.5	120	248	120 140 160	18.1 20.3 22.4	14.5 16.2 17.9	23.3 25.0 25.0	25.0 25.0 25.0	375
	170	348	100 120 140	20.7 23.7 25.0	16.5 19.0 21.3	25.0 25.0 25.0	25.0 25.0 25.0	525
	280	568	80 100 120	18.4 23.0 25.0	18.4 23.0 25.0	23.8 25.0 25.0	25.0 25.0 25.0	855
5	240	490	200 220 240	45.7 49.1 50.0	36.5 39.2 41.9	50.0 50.0 50.0	50.0 50.0 50.0	735
	340	690	160 180 200	50.0 50.0 50.0	40.6 44.4 48.0	50.0 50.0 50.0	50.0 50.0 50.0	1035
	480	970	140 160 180	46.1 50.0 50.0	46.1 50.0 50.0	50.0 50.0 50.0	50.0 50.0 50.0	1455
7.5	200	410	240 260 280	45.1 47.8 50.6	36.0 38.3 40.5	58.2 61.8 65.3	68.8 73.1 75.0	610
	300	610	200 220 240	54.1 58.1 62.2	43.3 46.5 49.7	69.9 75.0 75.0	75.0 75.0 75.0	910
	540	1090	160 180 200	63.2 71.1 75.0	58.4 63.8 69.1	75.0 75.0 75.0	75.0 75.0 75.0	1630
10	170	340	300 350 400	46.4 52.1 57.6	37.2 41.7 46.1	60.0 67.3 74.4	70.9 79.6 88.0	520
	340	680	280 300 320	76.6 80.7 84.7	61.3 64.5 67.7	98.9 100.0 100.0	100.0 100.0 100.0	1030
	680	1360	160 180 200	73.7 83.0 92.2	70.0 76.5 82.8	95.2 100.0 100.0	100.0 100.0 100.0	2050
			350	81.3	65.0	104.9	124.2	

REDUCED SMOOTH PEG FOR PLATES AND BASES

The reduced smooth Peg is suggsted for thin elements of normal sizes, if the Standard peg results too long to be inserted inside the element.







Load Group	l (mm)	d (mm)	d_1 (mm)	d_2 (mm)	k (mm)	Da (mm)
2.5	55	14	26	35	11	74
	65					
	85					
5.0	85	20	36	50	15	94
	95					
	120					
7.5	120	24	46	60	15	118
	140					
	165					
10	135	28	46	70	15	118
	150					
	170					

Inclined pull with 30° < β ≤ 60° without additional reinforcement, allowable only with:

fck,cube ≥ 15 N/mm² and thickness of the element = 3 times the minimal thickness (3 × B3)

fck,cube ≥ 25 N/mm² and element's thickness of at least 2,5 times the minimal thickness (2,5 × B3)

fck,cube ≥ 35 N/mm² and element's thickness of at least 2 times the minimal thickness (2 × B3)

With concrete class of
fck,cube ≥ 23 N/mm² it is FZ = FS = FQ

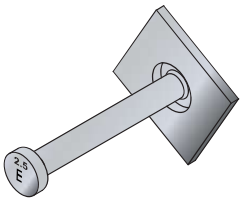
For inclined pull, horizontal stirrup s must be used (So), according to the prescriptions indicated at page 19, according to the Loading Group of the Peg.

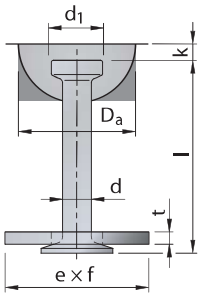
Load Group	Lenght Nail l B min. (mm)	Thickness Plate B3 (mm)	Allowable Load kN Concrete Class			Minimal Pegs Interaxis e_z
			15 N/mm²	25 N/mm²	35 N/mm²	(mm)
2.5	55	120	13	17	20	180
	65	140	17	22	25	110
	85	180	25	25	25	265
5.0	85	180	25	33	39	270
	95	200	30	39	46	300
	120	290	42	50	50	375
7.5	120	245	41	53	63	370
	140	285	52	67	75	430
	165	335	67	75	75	505
10	135	175	270	48	62	410
	150	190	300	57	73	455
	170	210	340	69	89	515

Lifting System

EDILMATIC EMPL

LOWERED SMOOTH PEG (WITH DISTRIBUTION PLATE)





The lowered smooth peg with plate is suggested for concrete thin elements of great sizes, to be lifted at 90° if the Standard pegs cannot be used.

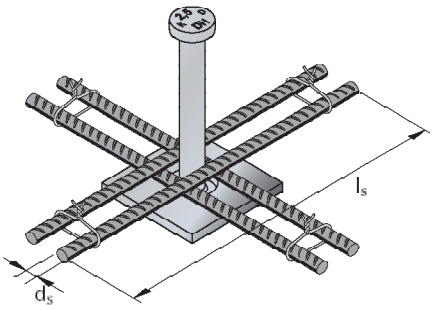
The base minimal thickness (Bmin) results from the peg's lenght (l), from the covering head sizes (k) and from the concrete cover required.

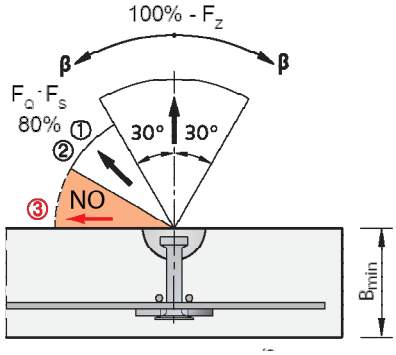
Is necessary to adopt adequate precautions as to grant that the concrete can drain under the plate as to grant a correct protection against corrosion.

As to reach the complete loading capacity of the peg is strictly necessary to position the plate under the building scaffold.
In case it's not possiblethe scaffold must be applyed over/on the plate (not under).

Table 1 - Sizes of the lowered smooth peg with plate

Kind of Peg	l (mm)	d (mm)	d_1 (mm)	e x f (mm)	t (mm)	k (mm)
2.5	55 120	14	26	70x70	6	10
5.0	65 110	20	36	90x90	8	15
7.5	100	24	46	90x90	10	15
10.0	115 150	28	46	90x90	10	15





Inclined pull with 30° < β ≤ 60° without additional scaffold allowable only with:

fck,cube ≥ 15 N/mm² and element's thickness of at least 3 times the minimal thickness (3 × Bmin)

fck,cube ≥ 25 N/mm² and element's thickness of at least 2,5 times the minimal thickness (2,5 × Bmin)

fck,cube ≥ 35 N/mm² and element's thickness of at least 2 times the minimal thickness (2 × Bmin)

With concrete class of
RcK ≥ 23 N/mm² it is FZ = FS = FQ
Pull angles of β > 60° are NOT allowed!

Gruppo di carico	Thickness Plate B min. (mm)	Interaxis Pegs e_z (mm)	Scaffold size		Allowable load kN Class of concrete		
			D_s	l_s	15 N/mm²	25 N/mm²	35 N/mm²
2.5	55	14	26	70x70	10.8	13.9	16.5
	120				25.0	25.0	25.0
5.0	65	20	36	90x90	16.1	20.8	24.6
	110				33.9	43.7	50.0
10.0	115	28	46	57	34.6	44.7	52.8
	150				55.9	72.1	85.3

PEG WITH HOLE

The **Pegs with Hole** is mainly used in concrete thin precast elements, for instance in beams or tiles TT.
The load is transferred to the concrete by a rebar, that must be in contact with the lower extremity of the peg's hole.
The size of the additional rebar are reported below in **Table 1**.
Steel rebars should to be bent with a 30° angle.
There is no necessity of terminal hooks.

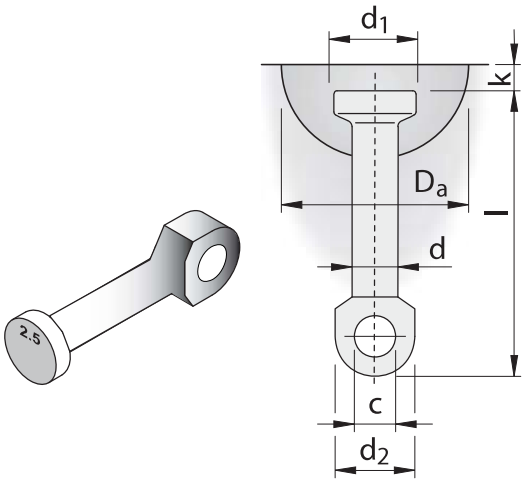
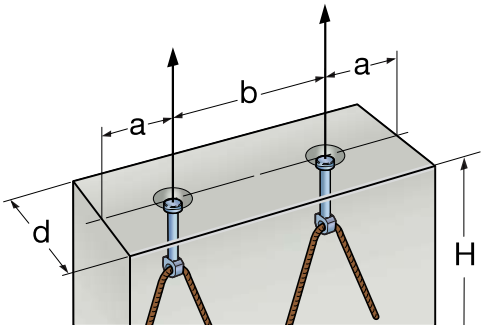
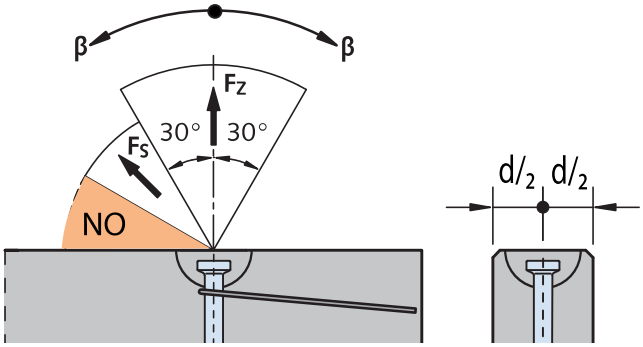


Table 1 - Sizes of the Peg with hole

Kind of Peg	l (mm)	d (mm)	d_1 (mm)	d_2 (mm)	c (mm)	k (mm)	D_a (mm)
1,3	65	10	19	19	10	10	60
2,5	90	14	26	27	13	11	74
5,0	120	20	36	42	20	15	94
10,0	180	28	46	57	25	15	118
20,0	250	39	69	76	37	15	160





- Inclined pull with 30°<β≤60° and without additional rebar is allowable only for:
  fck,cube ≤ 15 N/mm² and element's thickness of at least 3 times the minimum (2 x e_r)
  fck,cube ≤ 25 N/mm² and element's thickness of at least 2,5 times the minimum (2 x e_r)
  fck,cube ≤ 35 N/mm² and element's thickness of at least 2 times the minimum (2 x e_r)
- With concrete class fck,cube ≤ 23 N/mm² it is $F_Z = F_S$
- Pull angles β > 60° are not allowed.

Table 2 - Reinforcement and load capacity of Pegs with holes

Kind of Peg	Minimal Thickness 2 x e_r (mm)	Pegs Interaxis e_z (mm)	Wall armour on both sides mm²/m	d_{s3} (mm)	Additional armour concrete class 15 N/mm² | 25 N/mm² | 35 N/mm² l_{s3} (mm)			Allowable load in kN Concrete class Vertical pull until 30° (β) 15 N/mm²	Inclined pull until 45° (β) 15 N/mm²
1,3	80	500	188	10	650	510	420	13,0	10,2
2,5	80	600	188	12	1000	800	650	25,0	20,0
5,0	100	750	188	16	1700	1350	1100	50,0	40,0
10,0	140	1200	188	20	2000	1600	1300	100,0	80,0
20,0	180	1500	188	32	3000	2400	1950	200,0	160,0

Lifting System

EDILMATIC EMPL

PEG B450C-D - DIMENSIONS AND SIZES

The **Peg B450C-D** is particularly suited for very thin precast elements.

The loads are transmitted to the concrete through the bond stress acting on the rebar.

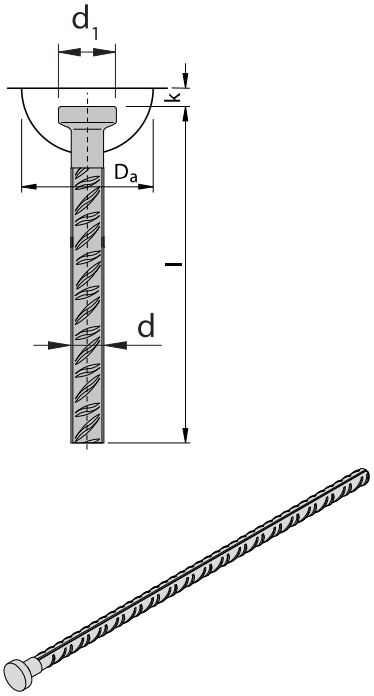
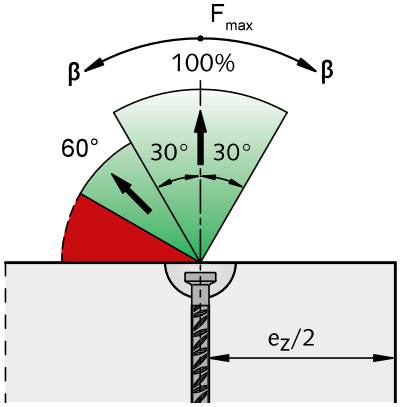


Table 1 - Dimensions and sizes

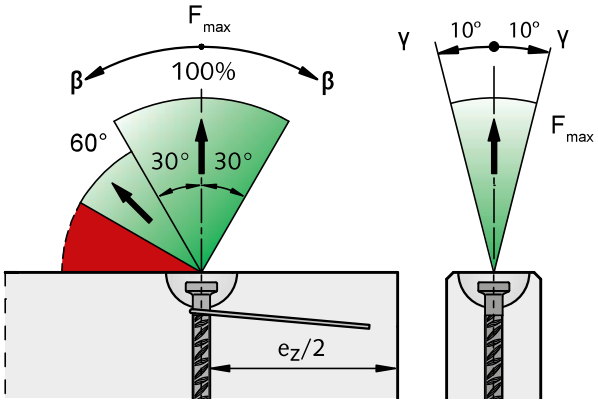
Pegs type (t)	l (mm)	d (mm)	d_1 (mm)	k (mm)	D_a (mm)
2,5	400	14	26	11	74
	520				
5,0	580	20	36	15	94
	900				
7.5	750	25	47	15	118
	1150				
10.0	870	28	47	15	118
	1300				
15.0	1080	32	70	15	160
	1050				

PEG B450C-D - INSTRUCTIONS FOR THE APPLICATION OF LOADS

Without rebars for diagonal pull



With rebars for diagonal pull



Diagonal pull with 0°≤ ß ≤ 60°, without additional reinforcement, is allowed only if:

fck,cube ≤ 15 N/mm² and the element's thickness is greater than 3,0 times the minimum thickness (2 x e_r)

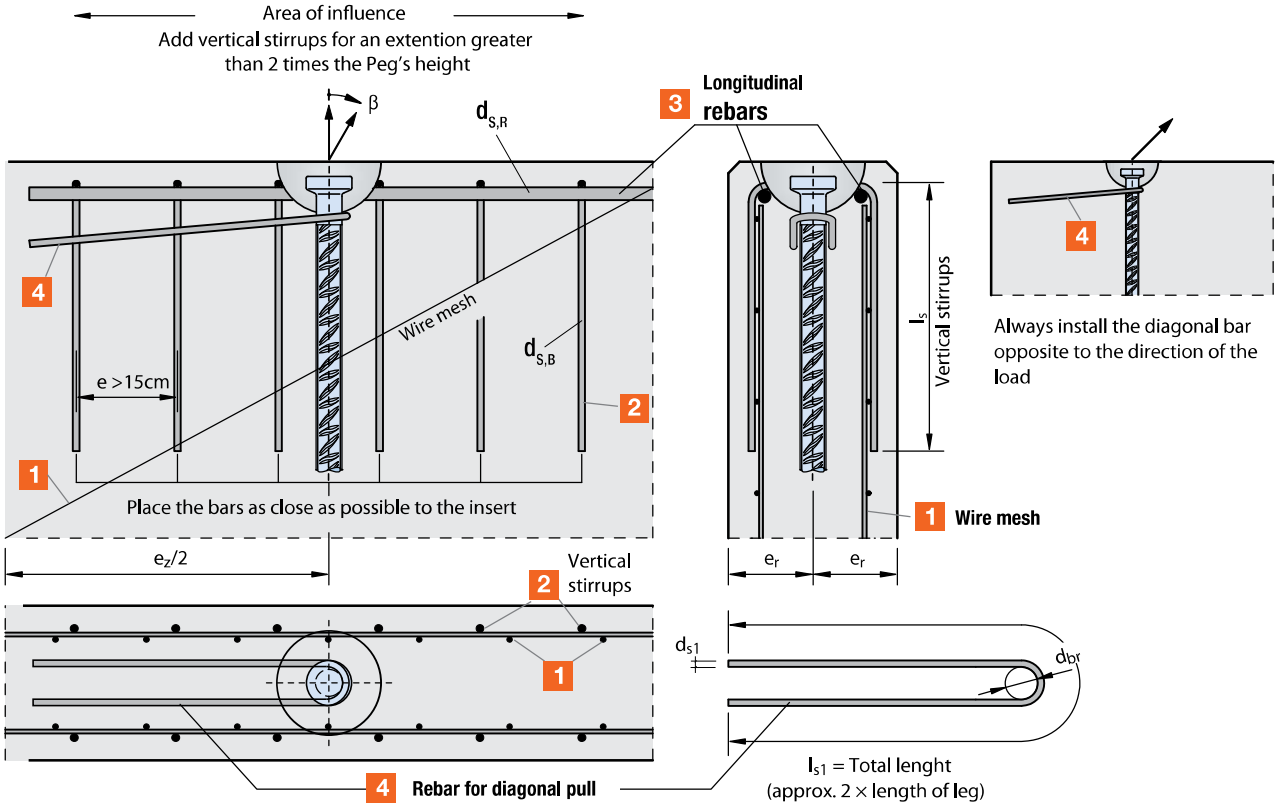
fck,cube ≤ 25 N/mm² and the element's thickness is greater than 2,5 times the minimum thickness (2 x e_r)

fck,cube ≤ 35 N/mm² and the element's thickness is greater than 2,0 times the minimum thickness (2 x e_r)

Diagonal pull with angle ß > 60° is not allowed

EDILMATIC EMPL

PEG B450C-D - LOAD CAPACITY AND ADDITIONAL REINFORCEMENT

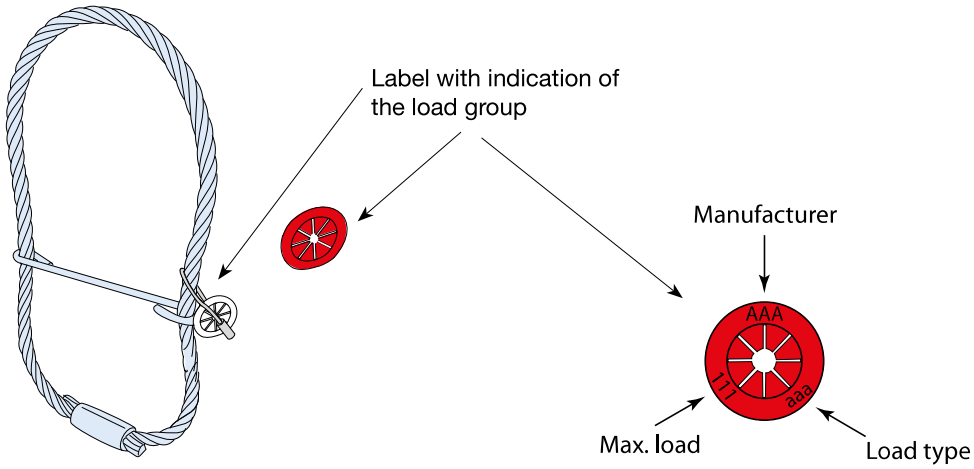


Load group (t)	l (mm)	2 x e_r (mm)	e_z (mm)	1 Wire mesh	2 Longitudinal stirrups			0° ≤ ß ≤ 30° - y ≤ 10°			30° ≤ ß ≤ 60° - y ≤ 10°				
								3 Long. rebars	Fmax [kN]		4 Stirrup for diagonal pull			Fmax [kN]	
				A_s mm²/m	$n°_{min}$	$d_{S,B}$ mm	l_s mm	$d_{S,R}$ mm	fck,cube ≥15 MPa	fck,cube ≥25 MPa	ØP mm	d_{s1} mm	l_{s1} mm	fck,cube ≥15 MPa	fck,cube ≥25 MPa
2.5	400	80	360	2 x 100	4	8	610	-	25.0	25.0	24	10	600	20.0	25.0
		100			-	-	-		25.0	25.0				20.0	25.0
		120			-	-	-		25.0	25.0				20.0	25.0
	520	100			-	-	-		25.0	25.0				20.0	25.0
5.0	580		540	2x140	4	10	720	2 xØ12	40.9	50.0	34	12	1000	32.7	50.0
					4	10	720		44.2	50.0				35.4	50.0
					-	-	-		47.1	50.0				37.7	50.0
	900				4	10	920		50	50.0				40.0	50.0
7.5	750	120	610	2x160	4	10	720	2 xØ12	66.1	75.0	41	20	1000	52.9	75.0
		140			-	-	-		70.1	75.0				56.1	75.0
		160			-	-	-		75.0	75.0				60.0	75.0
	1150	140			4	10	880		75.0	75.0				60.0	75.0
10.0	870	160	720	2x180	6	10	800	2 xØ14	100.0	100.0	49	20	1100	80.0	100.0
	1300	140			6	10	920								
15.0	1080	200	900	2x240	6	12	1020	2 xØ14	150.0	150.0	70	25	1100	120.0	150.0
	1550	160			6	12	1200								

Lifting System

EDILMATIC EMPL

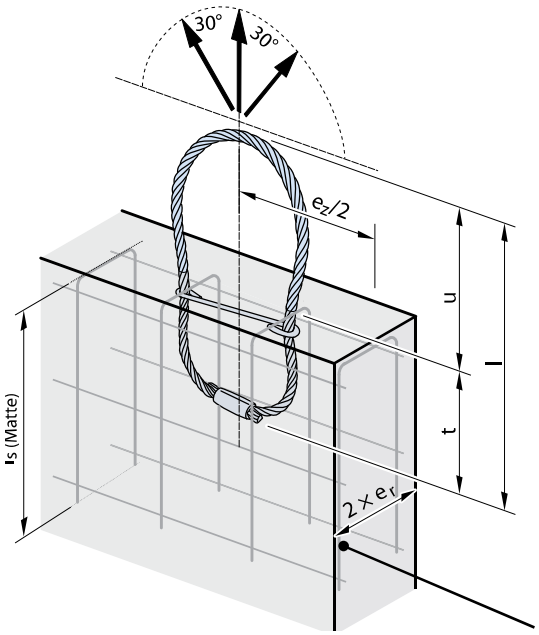
LIFTING LOOP - DIMENSIONS AND SIZES



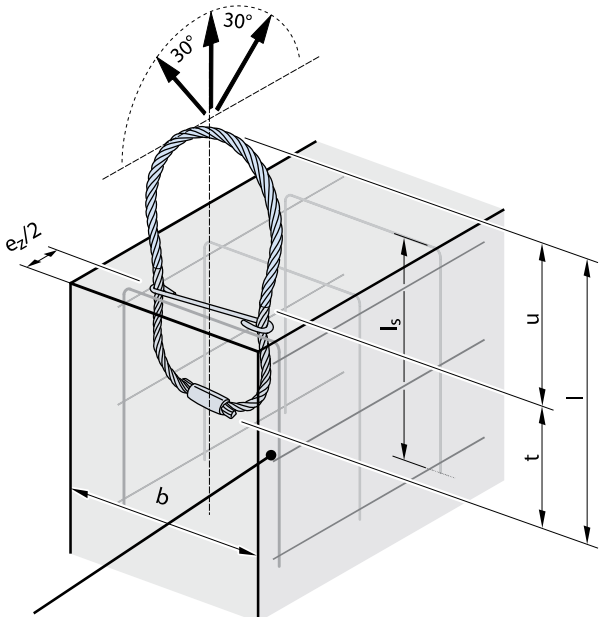
Dimensions and distances

Color	LOAD GROUP		Ø loop [mm]	l [mm]	t [mm]	u [mm]	b_{min} [mm]	$2 \times e_{r\,min}$ [mm]	e_z [mm]
	0,8	LIGHT YELLOW	6	205	145	60	120	70	270
	1,2	WHITE	7	230	165	65	140	80	310
	1,6	BLACK	8	250	180	70	150	90	350
	2,0	LIGHT GREEN	9	300	220	80	160	100	420
	2,5	LIGHT BLUE	10	325	235	90	180	110	450
	4,0	VIOLET	12	370	270	100	200	120	500
	6,3	YELLOW	16	425	315	110	230	140	580
	8,0	LIGHT BROWN	18	480	370	110	250	160	650
	10,0	ORANGE	20	525	405	130	280	180	730
	12,5	DARK GRAY	22	590	450	140	300	200	810
	16,0	VIOLA	24	670	510	160	350	240	390
	20,0	BROWN	28	750	580	170	380	260	1060
	25,0	DARK GREEN	32	850	660	190	400	280	1210

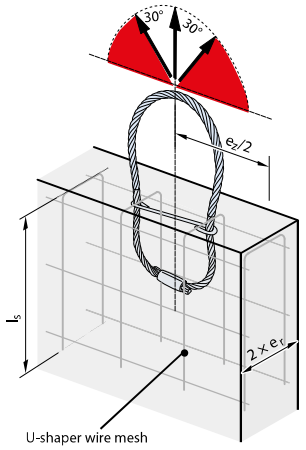
Longitudinal placement



Transversal placement



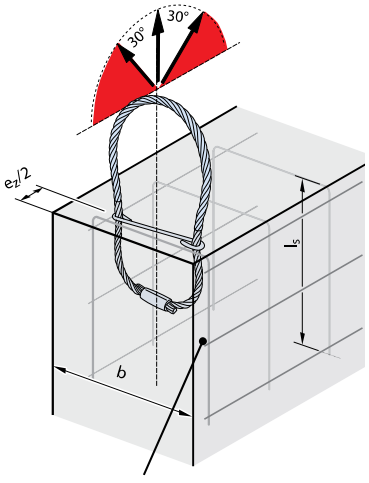
LIFTING LOOP - INSTRUCTIONS AND LOAD CAPACITY



U-shaper wire mesh

Londitudinal Pull

Color code		LOAD GROUP	Min. reinforcement		Size and position fck,cube= 15 N/mm²		Max. load	Size and position fck,cube= 35 N/mm²		Max. load
			Wire mesh [mm²/m]	l_s [mm]	$2 \times e_r$ [mm]	$e_z/2$ [mm]	[kN]	$2 \times e_r$ [mm]	$e_z/2$ [mm]	[kN]
	0,8	LIGHT YELLOW	131	300	70	270	8.0	50	270	8.0
	1,2	WHITE	131	350	90	310	12.0	60	310	12.0
	1,6	BLACK	131	350	120	350	16.0	80	350	16.0
	2,0	LIGHT GREEN	188	450	140	420	20.0	100	420	20.0
	2,5	LIGHT BLUE	188	500	160	450	25.0	110	450	25.0
	4,0	VIOLET	188	550	220	500	40.0	150	500	40.0
	6,3	YELLOW	188	600	320	580	63.0	220	580	63.0
	8,0	LIGHT BROWN	188	700	400	650	80.0	280	650	80.0
	10,0	ORANGE	221	800	440	730	100.0	310	730	100.0
	12,5	DARK GRAY	221	900	560	810	125.0	390	810	125.0
	16,0	PURPLE	221	1000	620	930	160.0	430	930	160.0
	20,0	BROWN	377	1115	680	1060	200.0	480	1060	200.0
	25,0	DARK GREEN	377	1300	750	1210	250.0	530	1210	250.0



U-shaped wire mesh

Transversal pull

Color code		LOAD GROUP	Min. reinforcement		Size and position fck,cube= 15N/mm²		Max. load	Size and position fck,cube= 35N/mm²		Max. load
			Wire mesh [mm²/m]	l_s [mm]	b [mm]	$e_z/2$ [mm]	[kN]	b [mm]	$e_z/2$ [mm]	[kN]
	0,8	LIGHT YELLOW	131	300	135	270	8.0	135	270	8.0
	1,2	WHITE	131	350	140	310	12.0	140	310	12.0
	1,6	BLACK	131	350	170	350	16.0	170	350	16.0
	2,0	LIGHT GREEN	188	450	175	420	20.0	175	420	20.0
	2,5	LIGHT BLUE	188	500	180	450	25.0	180	450	25.0
	4,0	VIOLET	188	550	220	500	40.0	220	500	40.0
	6,3	YELLOW	188	600	320	580	63.0	275	580	63.0
	8,0	LIGHT BROWN	188	700	400	650	80.0	280	650	80.0
	10,0	ORANGE	221	800	440	730	100.0	310	730	100.0
	12,5	DARK GRAY	221	900	560	810	125.0	390	810	125.0
	16,0	PURPLE	221	1000	620	930	160.0	430	930	160.0
	20,0	BROWN	377	1115	680	1060	200.0	480	1060	200.0
	25,0	DARK GREEN	377	1300	750	1210	250.0	530	1210	250.0

Lifting System

EDILMATIC EMPL

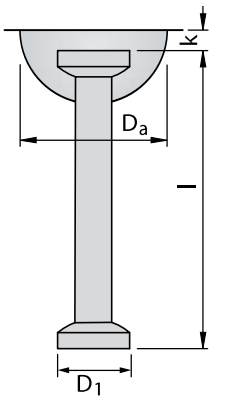
DOUBLE-HEAD PEGS

The **Double-Head Peg** is best suited for thin precast elements with important height as, for example, for prestressed beams.

The sizes of the minimum required reinforcement are reported in the figure below.

The design reinforcement must fulfill the minimum requirements.

This Peg can be used only in concrete with fck,cube ≥ 40 N/mm²



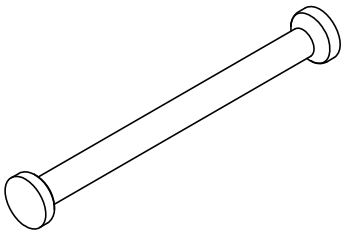
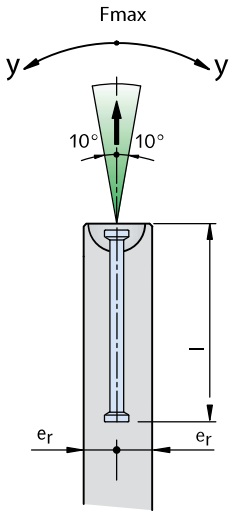
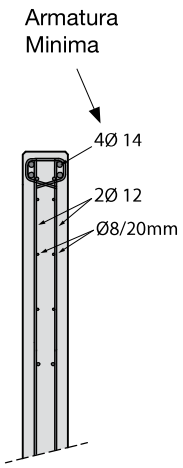
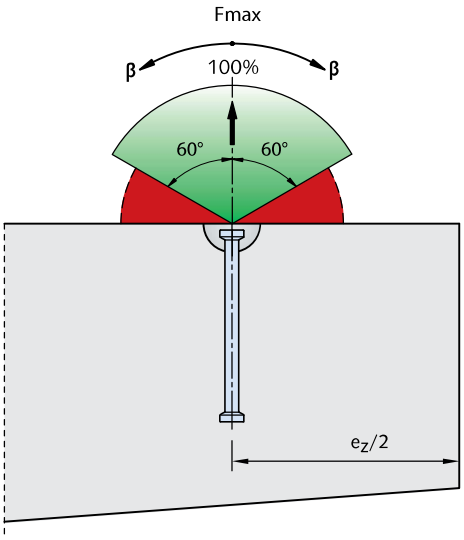


Table 1 - Dimensions of the Double-Head Peg

Peg type (t)	l (mm)	D1 (mm)	d_a (mm)	k (mm)	Weight (kg)
10.0	340	46	118	15	2.01
15.0	400	69	160	15	3.5
20.0	500	69	160	15	5.6
32.0	700	88	214	23	14.3
	1200				21.1







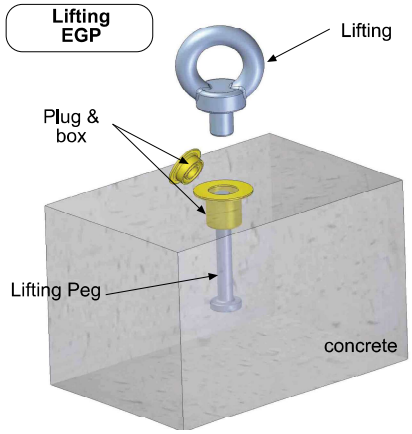
Peg type (t)	Minimum thickness D (2xe_r) (mm)	Pegs' spacing l (e_z) (mm)	Load capacity [kN] fck,cube 45 N/mm²	Load capacity [kN] fck,cube 50 N/mm²
10.0	120	1350	88.0	98.0
	140		100.0	100.0
15.0	120	1600	130.0	145.0
	140		150.0	150.0
20.0	120	2000	136.0	151.0
	140		173.0	192.0
	160		197.0	200.0
32.0	120	2800	197.0	210.0
	140		189.0	245.0
	160		220.0	280.0
	180		282.0	315.0

Lifting with ß ≥ 60° - y ≥10° is not allowed

EDILMATIC EGP

GENERAL FEATURES

The **EGP system** is a new model of Edilmatic lifting systems, offered for the handling of small-size concrete elements. It can be used for the positioning and assembly of concrete elements in both factories and building sites. The system is composed by an insert, the **Lifting Linchpin**, to arrange in advance in the formworks before the casting, and by a Special **Lifting Eye for the anchoring of the insert during working phases. The Linchpin is threaded** in both extremities and with a terminal as to increase the resistance in the concrete. The special Lifting Eye is a variation of classic commercial Lifting Eye (UNI ISO 3266) and it has been designed with a ending threaded bushing for the coupling with the Linchpin. This Special Linchpin is given complete with the related Box and Protection Cover (yellow color), necessary to create the cavity in the concrete element, as to allow the consequent coupling with the Lifting Eye. The **EGP System** is offered in one single type and different load capacities applied, according to the use configuration.



DIMENSIONS AND SIZES

Table 1 - Box and Standard Peg features

Sizes (mm)	d	D	M	H
Lifting Peg	32	16	16	128
Plug & Box	45	60	---	42
	Material Features			
Lifting Peg	30MnB3 - Class 8.8 (Hardened) UNI EN 10083			
	Tensile stress 800 N/mm²			
Plug & Box	**Moplen** - PP (Repsol)			
	Compression (Cm) < 70 N/mm²			

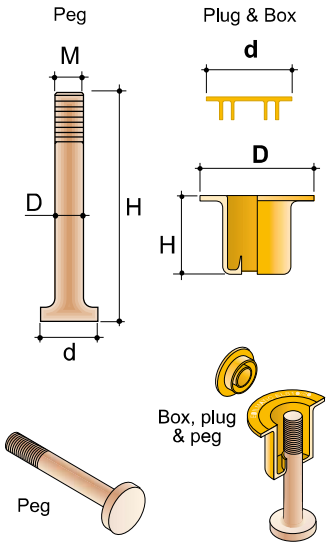
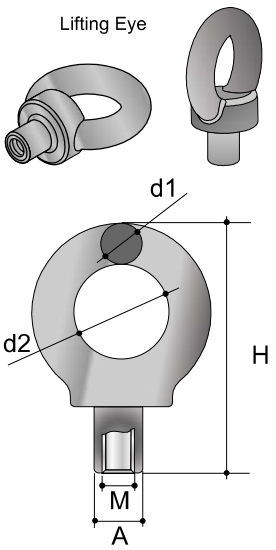


Table 2 - Special Lifting Eye Features

Sizes (mm)	A	H	M	d1	d2
Lifting Eye	24	125	16	20	50
	Characteristics of the material				
Type	C40 (Hardened) UNI EN 10083				
Tensile stress (N/mm²)	> 600 N/mm²				
Elongation (A5 %)	min. 22				



Lifting System

EDILMATIC EGP

STANDARD PEG ARRANGEMENT

The lifting linchpin is given with Box and Cover already assembled. Linchpin's position inside the concrete elements can be reached in different ways, according to the shapes and sizes of the element. It always has to be considered that the functioning of this lifting sytem is granted only if distances from edges as well as the concrete minimal resistant (**fck,cube** ≥ **20 N/mm²**) are respected.

1) The Linchpin can be fixed to the scaffold, using a steel line/wire (**Fig.1**).

2) The Linchpin can be inserted from the top inside the formwork, with a semi-fluid concrete that must correctly adhere to all the insert.It's suggested to little vibrate the concrete in the near area of the proctection box, as to simplify the adherence (**Fig.2**).

3) The linchpin can be fixed to existing staffolds inside the concrete element through small weldings (**Fig.3**).

Fig.1 - Fixing with steel wire

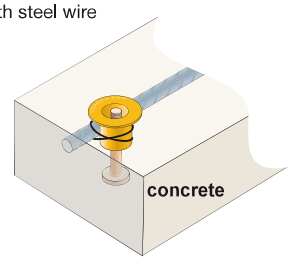


Fig.2 - Placement into semi-fluid concrete

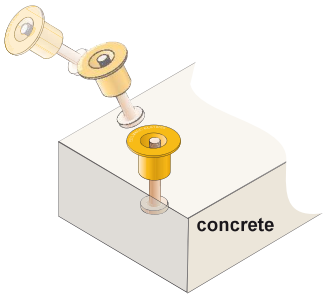
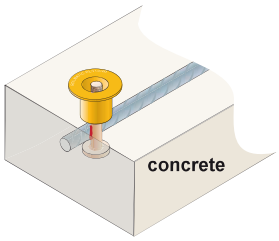


Fig.3 - Fixing with small welding



CONDITIONS OF USE

Once the protection box is fixed inside the concrete, remove the cover and make sure the threaded part of the linchpin is clean (**Fig.1**).

For the hooking of the Special Lifting Eye to the peg inside the concrete, fasten it inside the concrete moving along the all available lenght of the threaded bar (**Fig.2**).

Once arrived at stroke end, it is possible to unscrew the Lifting Eye for 1 or 2 half-rotations if it must oriented in the "pull" direction (**Fig.3**).

The maximum load capacities are calculated by considering the most unfavorable position of the lifting eye with respect to the pull direction. Once the handling is finished, it is usefull to close the box with the cover to safeguard the linchpin's intergrity according to next needed uses.

Fig.1 - Remove the plug and screw the lifting eye

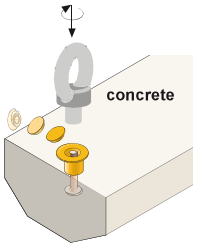
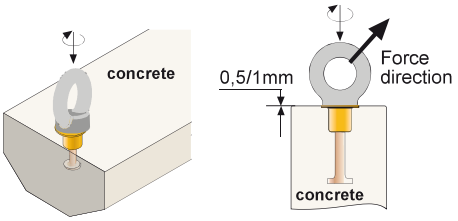


Fig.2 - Screw the lifting eye along all the thread length



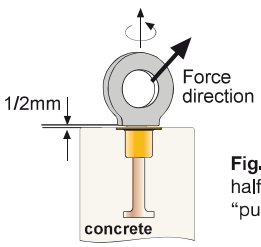


Fig.3 - Unscrew for 1 or 2 half-rotations to rotate along the "pull" direction

MINIMAL DISTANCES FROM BORDERS

For a correct use of **EGP Lifting System** please strictly respect the distances from edges of linchpins **(Fig.2)** and the minimal thickness **(Fig.1)**. The maximum load capacities and minimal distances from borders are prescribed by considering the Concrete with **fck,cube ≥ 20 N/mm²**. In case of use in elements with thickness or Concrete class lower than the minimum, please contact the **Edilmatic Technical Department.**

Fig.1 - Element's minimum thickness

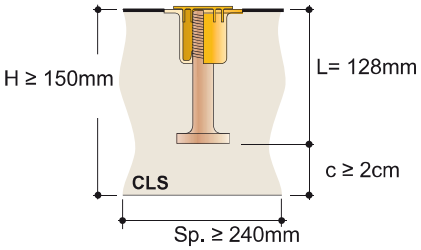
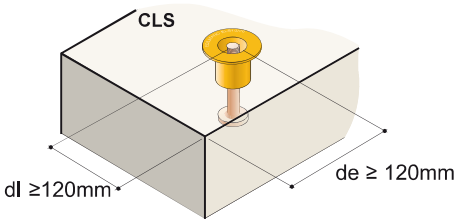


Fig.2 - Minimum edge distances



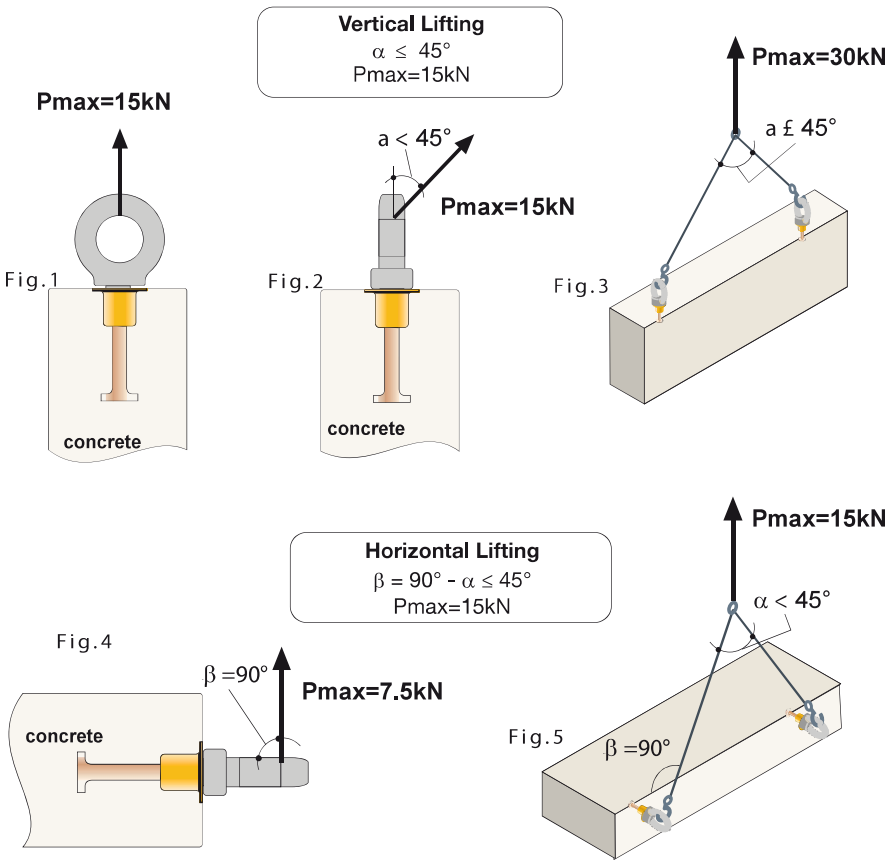
ALLOWABLE MAXIMAL LOAD CAPACITIES

Maximal allowable Load Capacities for EGP lifting system are determined considering the lifting process and the inclination corners of used wires. We have considered 2 different lifting configurations:

- **Vertical Lifting** (**Fig.1-2-3**) with Maximal wires inclnation until 45°
- **Horizontal Lifting** (**Fig. 3-4**) with linchpin corner of 90° and wires inclination until 45°.

For both configurations, please note maximal applicable loads, considered in the worst position of the Lifting Eye, creating an unfavourable lever action.

It is anyway suggested, as already stressed before, to screw the Lifting Eye until the limit and then unscrew it for some "half-rotation" as to bring it in a better position in respect to the "pull" corner.



Note

Note

EDILMATIC

Anchorage, supporting and lifting systems
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Accessories, fasters and metallic items.

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CERTIFIED IQNet QUALITY SYSTEM

ICMQ
UNI EN ISO 9001 REGULATION
QUALITY SYSTEM CERTIFICATION
N. 93048 CERTIFICATION