RK11®

BUILT ON RELIABILITY

Spherical Head Lifting Systems Manual (Lifting System)

• Safe & Reliable Lifting • High Load Performance • Easy Engagement • Long-lasting Durability • Suitable For Angled Lifts

Welcome to RK11,

Your trust in our Spherical Head Lifting System drives us to deliver high-quality, certified lifting technology. This manual will guide you through proper usage, inspections, and maintenance practices designed to enhance safety and extend product life.

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Stronger Lifting Experience

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Where To Use

- Wall Panels
- Bridge Segments
- Heavy Concrete Blocks
- Tilt - Up Concrete Lifting
- Lintels & Facade Elements
- Retaining Wall Blocks

About The System

What is a Spherical Head Lifting System?

A Spherical Head Lifting System is a specially engineered lifting solution designed for the safe handling, transportation, and installation of precast concrete and heavy structural elements.
The system uses a spherical-shaped anchor head embedded in concrete, which allows a secure and positive connection with the lifting clutch. This design ensures controlled load transfer, minimizes stress concentration, and provides enhanced safety during lifting operations.

The spherical geometry enables multi-directional lifting, making the system suitable for both vertical and angled lifts, even in complex site conditions.

System Components

The Spherical Head Lifting System consists of precision-engineered components that work together to ensure safe and efficient lifting:

1. Spherical Head Anchor
Embedded into the concrete element during casting
Transfers load directly from the concrete to the lifting deviceDesigned for high load-bearing capacityAvailable in multiple sizes and load ratings

2. Lifting Link / Lifting Clutch
Connects securely to the spherical head anchorEnsures positive locking during liftingDesigned to prevent accidental disengagementSuitable for vertical and inclined lifting angles

3. Recess Former
Creates a recess in the concrete surface for anchor placement
Ensures correct anchor positioning
Allows easy access for clutch engagement
Can be removed after casting

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LIFTING ANCHOR

Material :

Spherical Head Lifting anchors are available in Following Material

Lifitings	Material	Material Type	Standard
ESB, ESBB, ESE	S355J2	Electro Zinced	EN 10025
ESBs, ESBBs, ESEs	1.4301	Stainless Steel	EN 10088
ESBa, ESBBa, ESEa	1.4401	Acid Resistant Steel	EN 10088

Components Recommendation

- Pipe
- Column
- Slab
- Balcony
- Wall
- Foundation
- Beam
- Manhole

Colour Coding System :

A colour coding system for different diameters of lifting insert is used for easy identification.

Colour Codes for Spherical Head Lifting System

Load Group (t)	Colour
1.3	Pale Green
2.5	Light Coral
4.0	Baby Blue
5.0	Plum

7.5	Khaki
10.0	Lucky Orange
15.0	Antique Steel
20.0	Burly Wood
32.0	Steel Blue

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LIFTING ANCHOR

Colour Codes for Spherical Head Lifting System

Color Code	Pale Green		Load Group		1.3t	
Size	1.3-40	1.3-50	1.3-65	1.3-85	1.3-120	1.3-204
H (mm)	40	50	65	85	120	240
D1 (mm)	18	18	18	18	18	18
D2 (mm)	25	25	25	25	25	25
d (mm)	10	10	10	10	10	10

Color Code	Light Coral		Load Group		2.5t	
Size	2.5-55	2.5-65	2.5-85	2.5-120	2.5-170	2.5-280
H (mm)	55	65	85	120	170	280
D1 (mm)	25	25	25	25	25	25
D2 (mm)	35	35	35	35	35	35
d (mm)	14	14	14	14	14	14

Color Code	Baby Blue		Load Group		4.0t	
Size	4.0-75	4.0-100	4.0-120	4.0-170	4.0-210	4.0-340
H (mm)	75	100	120	170	210	340
D1 (mm)	36	36	36	36	36	36
D2 (mm)	45	45	45	45	45	45
d (mm)	18	18	18	18	18	18

Color Code	Plum		Load Group		5.0t		
Size	5.0-85	5.0-95	5.0-120	5.0-180	5.0-240	5.0-340	5.0-480
H (mm)	85	95	120	180	240	340	480
D1 (mm)	36	36	36	36	36	36	36
D2 (mm)	50	50	50	50	50	50	50
d (mm)	20	20	20	20	20	20	20

Color Code	Khaki		Load Group		7.5t		
Size	7.5-100	7.5-120	7.5-140	7.5-165	7.5-200	7.5-300	7.5-540
H (mm)	100	120	140	165	200	300	540
D1 (mm)	46	46	46	46	46	46	46
D2 (mm)	60	60	60	60	60	60	60
d (mm)	24	24	24	24	24	24	24

LIFTING ANCHOR

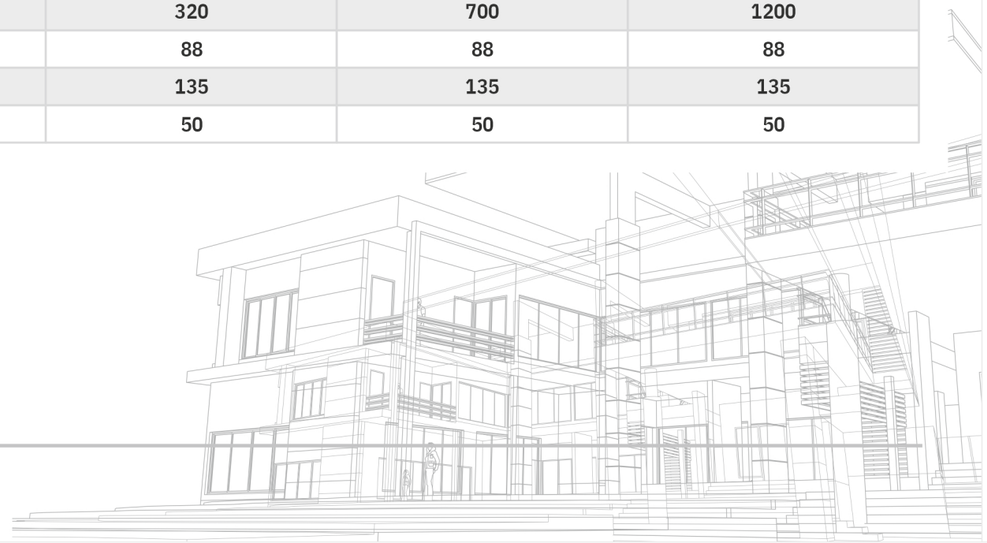
Colour Codes for Spherical Head Lifting System

Color Code	Lucky Orange		Load Group			10.0t	
Size	10.0-115	10.0-135	10.0-150	10.0-170	10.0-250	10.0-340	10.0-680
H (mm)	115	135	150	170	250	340	680
D1 (mm)	46	46	46	46	46	46	46
D2 (mm)	70	70	70	70	70	70	70
d (mm)	28	28	28	28	28	28	28

Color Code	Antique Steel		Load Group		15.0t	
Size	15.0-140	15.0-165	15.0-200	15.0-300	15.0-400	15.0-840
H (mm)	140	165	200	300	400	840
D1 (mm)	69	69	69	69	69	69
D2 (mm)	85	85	85	85	85	85
d (mm)	34	34	34	34	34	34

Color Code	Burly Wood		Load Group		20.0t	
Size	20.0-200	20.0-240	20.0-250	20.0-340	20.0-500	20.0-1000
H (mm)	200	240	250	340	500	1000
D1 (mm)	69	69	69	69	69	69
D2 (mm)	98	98	98	98	98	98
d (mm)	38	38	38	38	38	38

Color Code	Steel Blue	Load Group	32.0t
Size	32.0-320	32.0-700	32.0-1200
H (mm)	320	700	1200
D1 (mm)	88	88	88
D2 (mm)	135	135	135
d (mm)	50	50	50



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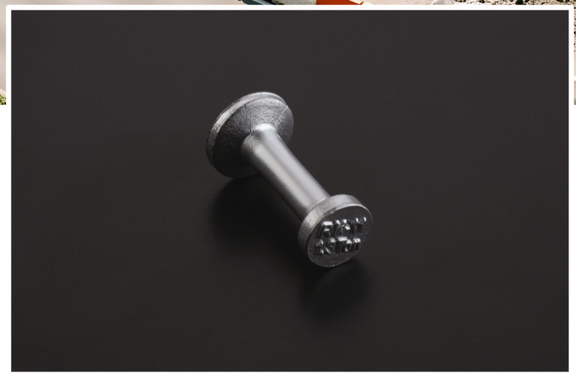
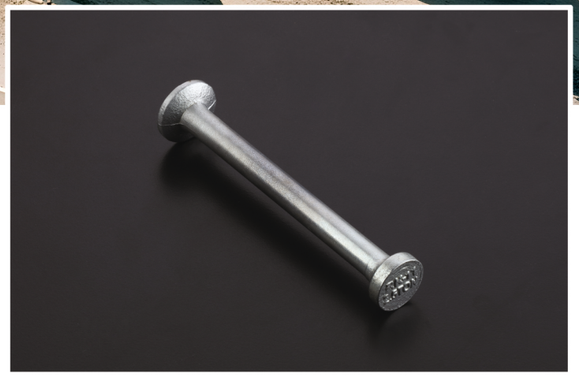




LIFTING CLUTCH

Key Dimensions :

Safe Working Load (WLL) :

This is the most critical factor, ranging from under a ton to over 10 tons or more.

Overall Length :

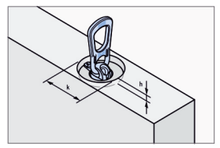
This dimension is crucial for compatibility with your lifting equipment and concrete anchor pin head.

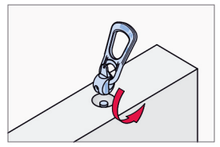
Width :

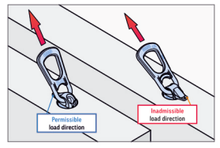
This is another important physical measurement, especially for larger units.

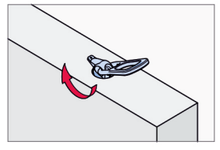
Anchor Pin Head Size :

The clutch must fit the anchor pin head, with sizes ranging from 17mm up to 49mm or more depending on the clutch's capacity.









RUBBER RECESS FORMER WITH NUT & BOLT

Reusable and Cost-Effective :

Due to their durable material and design, these formers can be used multiple times (often 30-40 times or more with proper maintenance), making them an economical choice over time.

Precise Positioning :

They ensure the accurate and secure location of the lifting anchor, forming a clean, bowl-shaped recess in the concrete that allows the lifting clutch to engage correctly.

Protection :

The former protects the anchor head from the wet concrete during casting, ensuring it remains clean and ready for the lifting clutch connection after demolding.

Load Group Identification :

To minimize the risk of error, the formers are often color-coded or permanently marked with the compatible anchor's Working Load Limit (WLL) or load group.

Easy Removal :

After the concrete has cured, the former is designed for easy stripping. Rebar or removal tools can be inserted into designated openings to leverage the plug out of the cured concrete without damage to the concrete or the former itself.

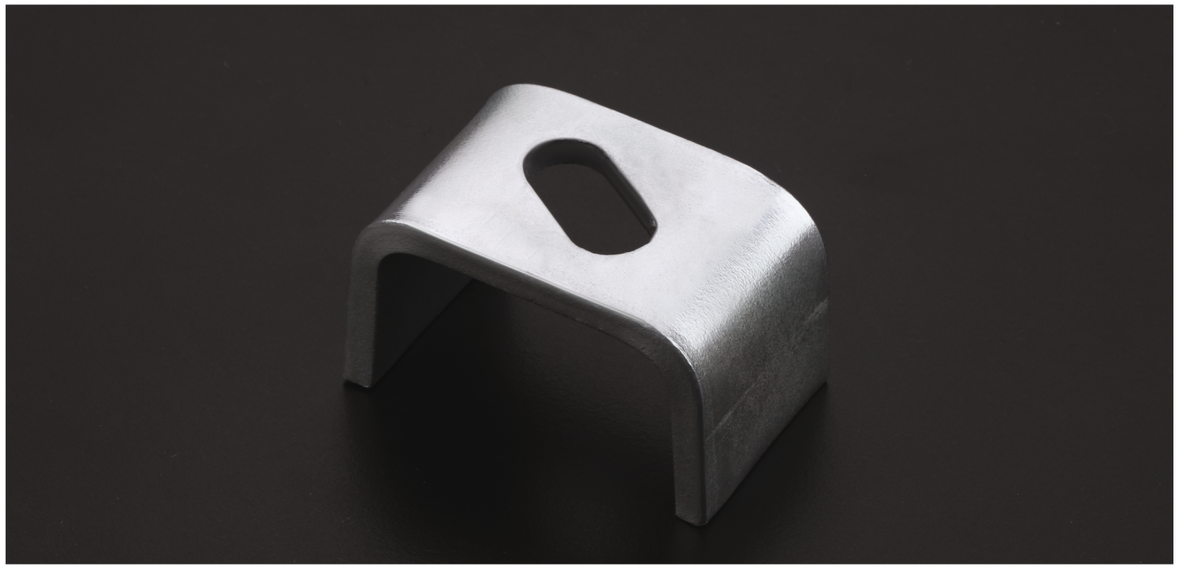
Versatile Application :

They are suitable for various precast concrete components like wall panels, beams, pipes, and manholes, enabling safe lifting and transportation.

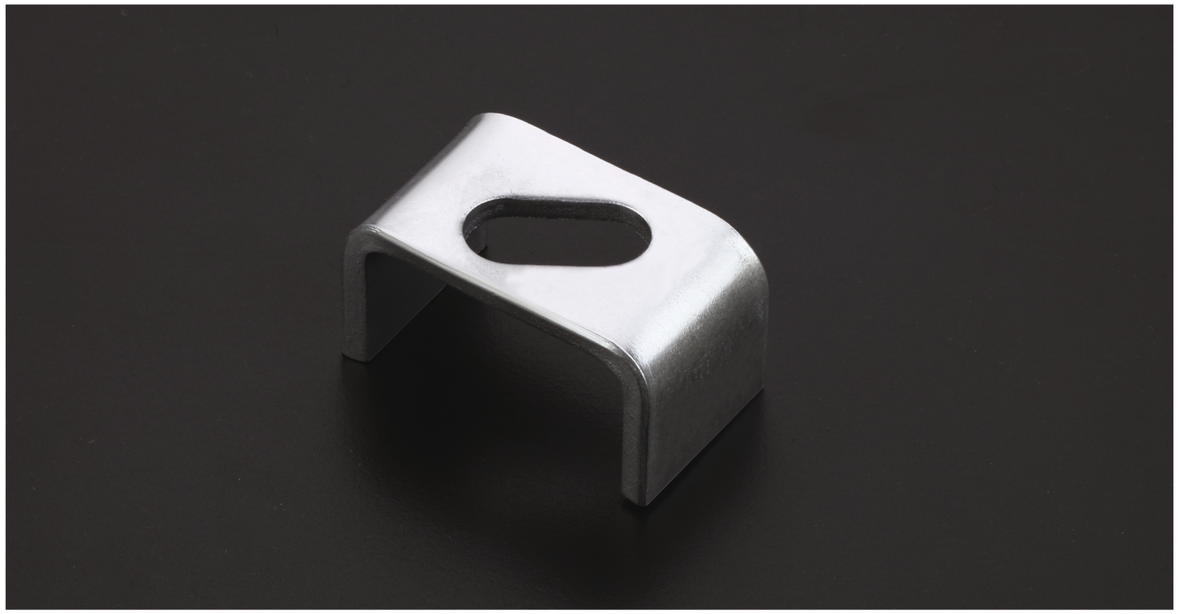
Usage and Installation :

To use, the rubber former is placed over the anchor head, closed securely, and then the assembly is fixed to the formwork via the nut and bolt. Lubricating the former and anchor with formwork oil before use is recommended to ease the demolding process.

C - Clam (MS)



Items Description	Material
40mm x 6mm	M.S.



Items Description	Material
50mm x 10mm	M.S.

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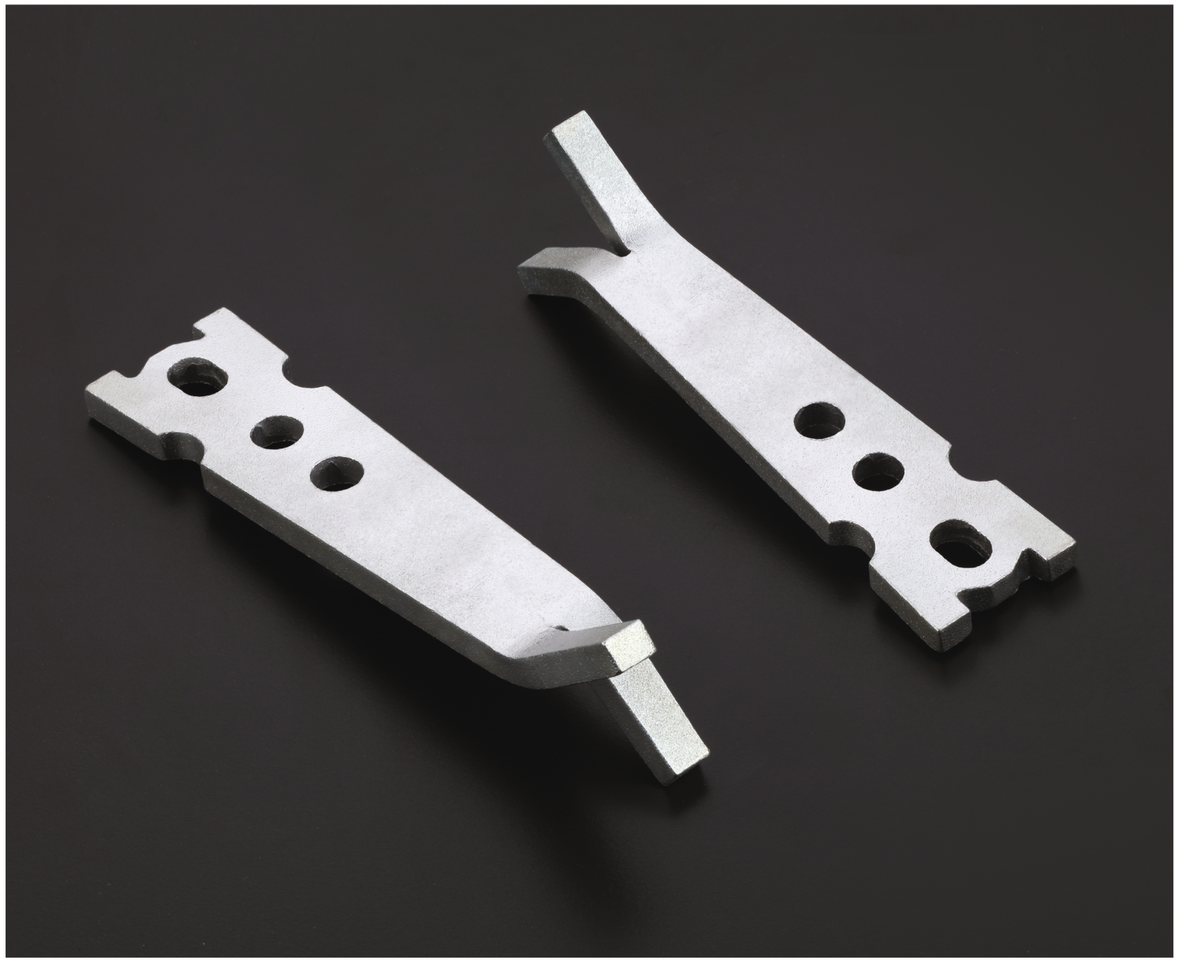
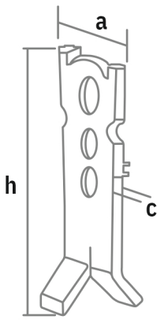
ERECTION ANCHOR





Load Rate (Ton)	Size	Dimensions (mm)				Weight
		h	a	b	c	kg.
1.4	1.4T - 200	200	55	14	6	0.37
2.5	2.5T - 230	230	55	14	10	0.69
4.0	4.0T - 270	270	70	18	12	1.30
5.0	5.0T - 290	290	70	18	15	1.66
7.5	7.5T - 320	320	95	26	15	2.42
10.0	10.0T - 390	390	95	26	20	3.95
12.5	12.5T - 500	500	148	35	20	6.64
17.0	17.0T - 500	500	148	35	25	8.18
22.0	22.0T - 500	500	148	65	30	9.84

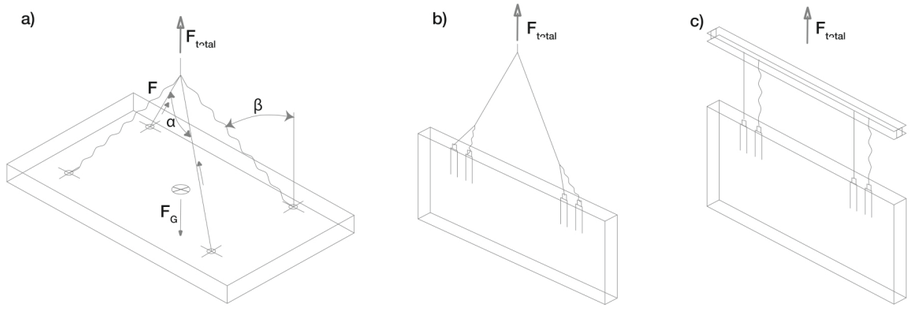
ACTIONS ON LIFTING ANCHOR

The loads acting on a lifting insert shall be determinedconsidering the following factors:

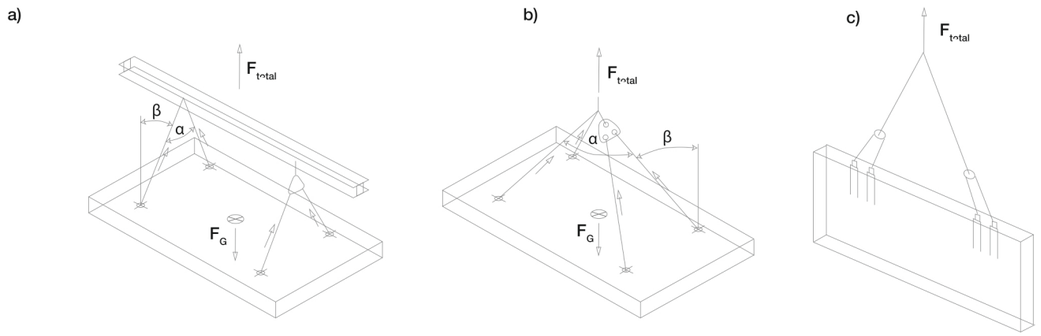
- Statical system
- Element self-weight
- Adhesion and form friction
- Dynamic effects
- Position and number of lifting inserts and type of lifting equipment

Statistical System :

The lifting equipment shall allow a statically determinate load distribution to all present lifting inserts and lifting insert systems. Figures below give examples of statically indeterminate systems where only two lifting inserts carry the load. The load distribution is not clearly defined in these applications. Therefore, statically indeterminate systems shall be avoided.

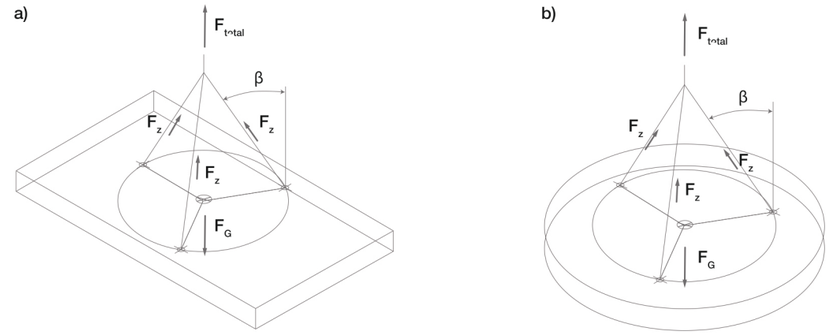


To ensure a statically determinate system and that all lifting inserts carry their required part of the load in case of applications with more than two lifting inserts transport aids such as sliding or rolling couplings or balancing beams shall be used.
In below figure, more transportation aids for slabs and wall elements are illustrated.



ACTIONS ON LIFTING ANCHOR

In case of inclined lifting slings the lifting inserts are loaded by combined tension and shear loads. The inclination β according to figure above (on previous page) governs the level of combined tension and shear loads to be taken into account in the design. In the special case of three lifting inserts located in a slab located and situated in a star pattern with the same distance to the centre of gravity with equal inclinations of 120° it is ensured that all three lifting inserts experience the same load.



Element Self-Weight

The weight FG of precast elements shall be determined as given by equation below

FG = V · ρG where,

FG Weight of the precast element, in kN

V Volume of the precast element, in m3

ρG Density of the concrete, in kN/m3

Adhesion and Form Friction

Adhesion and form friction are assumed to act simultaneously during the lifting of the precast element from the formwork.

The actions for demoulding situations shall be determined from equation below

$F_{adh} = q_{adh} \cdot Af$ where,

F_{adh} Action due to adhesion and form friction, in kN

q_{adh} Basic value of combined adhesion and form friction as per table below, in kN/m2

A_f Contact area between concrete and formwork, in m2

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