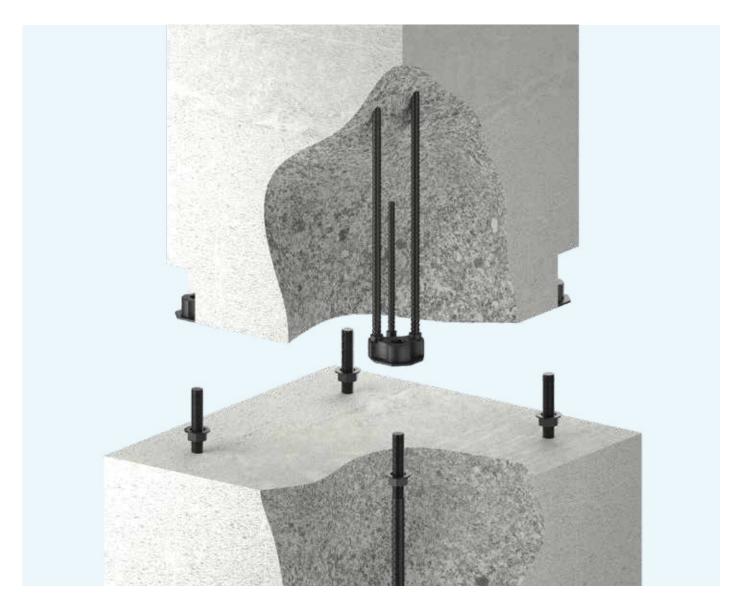




### **Moment MPS-T Precast Shoe**

For joining precast columns





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We imagine, model and make engineered products and innovative construction solutions that help turn architectural visions into reality and enable our construction partners to build better, safer, stronger and faster.

## Leviat is a world leader in connecting, fixing, lifting and anchoring technology.

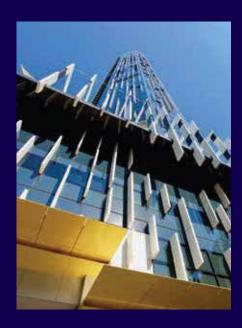
From the build of new schools, hospitals, homes and infrastructure, to the repair and maintenance of heritage structures, our engineering skills are making a difference around the world.

We provide technical design assistance at every stage of a project, from initial planning to installation and beyond.

Our technical support services range from simple product selection through to the development of a fully customised project-specific design solution.

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Systems to form robust, efficient connections, and continuity of concrete reinforcement as necessary, between walls, slabs, columns, beams and balconies, providing structural integrity as well as enhanced thermal and acoustic performance.

- Insulated balcony connectors
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- Floor Joint Systems
- Precast / Reinforced Columns
- Infrastructure Products
- Precast Connections
- Acoustic dowels and bearings
- Prestress

#### Other areas of expertise:



#### Lifting & Bracing

Systems for the safe and efficient transportation, lifting and temporary bracing of cast concrete elements and tilt-up panels before permanent structural connections are made,



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#### Leviat product ranges:

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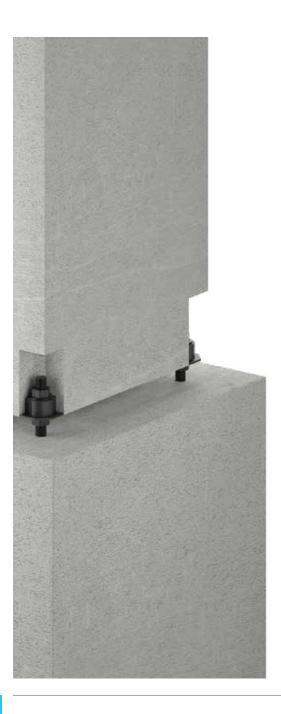
#### **Moment MPS-T Precast Shoe**

For easy, fast and safe columns connections

#### Introduction

The Moment MPS-T Precast Shoe provides a convenient solution for connection to foundations or for linking columns together. Its designed to be used in a prefabricated system, ensuring rapid assembly on site.

The product consist of a one piece metal body with embedded rebars. This assembly is casted inside the column at the precast factory. On site, the anchor bolt is casted onto the ground, acting as anchoring points. The precast column can then be lifted and placed in position. After levelling, high strength nuts are installed and secured, creating a secure mechanical connection which can already resist temporary loads. Grouting can take place at a later stage, and no bracing is required.



#### **Features and Benefits**

#### Fast and simple to handle and install

- Threaded system instead of welded, enabling base okate and rebars to be installed separately onto formwork. Also, these items can be transported and stored separately.
- Built-in positioning feature on base plate assist installation to formwork.
- Markings for easy identification.
- Specially designed accessories complete product range.
- On site,
- Immediate load bearing; and grouting can be done at a later stage.
- No bracing required.

#### **Quality Materials**

- Rebar threads are made by cold forging and rolling technique which gives superior tensile performance.
- Product range including accessories are made from construction grade materials.

#### **Lower Cost**

- Can be used together with Moment Grout Couplers, creating Hybrid optimized connection.
- Less crane and worker time.

#### Flexibility in Design

- Comes in 5 different sizes.
- Rebar lenght and design is customizable.

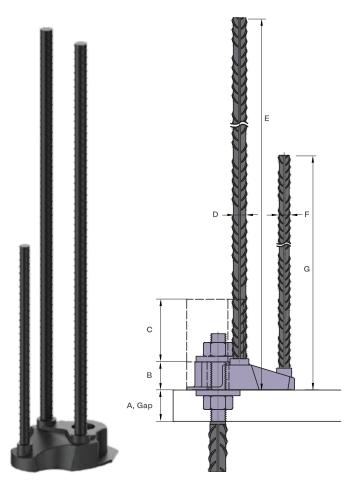
#### **Increased Safety**

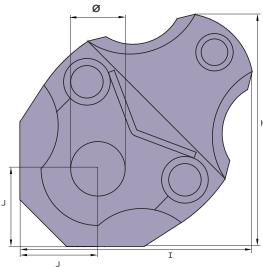
- Less usage of crane decreases chances of accidents.
- Area surrounding column can be free.
- Threaded connection instead of welding allows for quick site verification.

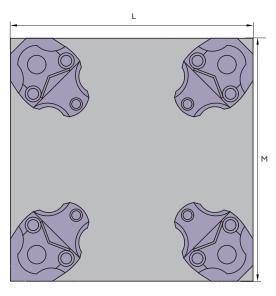
### Moment MPS-T Product Range

#### **Moment MPS-T Precast Shoe**

The Moment MPS-T Precast Shoe is casted inside the precast column. The single piece metal body has been optimally designed to resist calculated loads, with, minimal size and weight as possible. Threaded holes on then body allows for Tension and Compression B500b grade rebars to be screwed on. Rebar threadings are cold forged for added strength. 5 sizes are available.







Product Code	A, Gap (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	Ø (mm)	Min. Column Dimension, L x M (mm)
MPS-T16 Precast Shoe	50	28	100	12/13**	633	12/13**	325	128	128	50	27	300 x 300
MPS-T20 Precast Shoe	50	37	110	16	792	12/13**	380	149	149	50	31	32 5 x 325
MPS-T24 Precast Shoe	50	45	115	20	1000	16	485	151	151	50	35	350 x 350
MPS-T30 Precast Shoe	50	60	130	25	1265	20	490	173	173	50	40	3 75 x 375
MPS-T39 Precast Shoe	50	72	145	32	1577	25	595	248	248	62	55	52 5 x 525

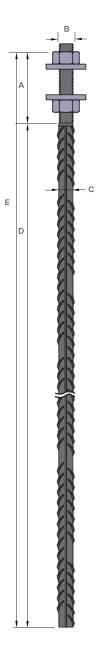
Notes: \*Column to foundation gap.

\*\*H13 rebar size is applicable to the Singapore market only.

#### **Anchor Bolt**

Anchor Bolts are anchoring points for the Moment MPS-T Precast Shoe. Made from B500b grade rebars, threaded on one end, using cold forged technique. Each Anchor Bolt comes with 2 custom structural steel grade washers, and 2 metric Grade 8 Nuts.



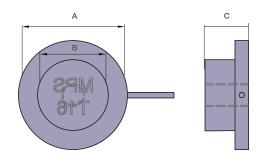


Product Code	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Washer OD/ID (mm)	Washer Thickness (mm)	Head Nut Size
MPS-T16 Anchor Bolt	110	M16 x P2,0	16	600	710	45/17	8	M16 x P2.0
MPS-T20 Anchor Bolt	125	M20 x P2,5	20	780	905	50/21	8	M20 x P2.5
MPS-T24 Anchor Bolt	135	M24 x P3.0	25	1010	1145	55/25	9	M24 x P3.0
MPS-T30 Precast Shoe	160	M30 x P3.5	32	1290	1450	65/31	10	M30 x P3.5
MPS-T39 Anchor Bolt	180	M39 x P4.0	40	1760	1940	75/40	12	M39 x P4.0

#### **Positioning Bolt**

The Positioning Bolts are used to mount the Moment MPS-T Precast Shoe onto the formwork, in the precast factory. The base is made from one piece machined steel. A Hexagon bolt and wing nut completes the assembly. This accessory is reusable.



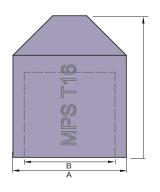


Product Code	A (mm)	B (mm)	C (mm)	Wing Nut Size	Hexagon Bolt Size	Hexagon Bolt Length (mm)
MPS-T16 Positioning Bolt	40	26	16	M10 x P1.5	M10 x P1.5	60
MPS-T20 Positioning Bolt	55	30	20	M12 x P1.75	M12 x P1,75	80
MPS-T24 Positioning Bolt	60	34	25	M16 x P2.0	M16 x P2.0	90
MPS-T30 Positioning Bolt	75	39	35	M16 x P2.0	M16 x P2.0	100
MPS-T39 Positioning Bolt	95	54	45	M16 x P2.0	M16 x P2.0	100

#### **End Cap**

Once the Anchor Bolts are casted on site, the End Caps protect the upper threads from damage. It is made from one piece machined steel. This accessory is reusable.





Product Code	A (mm)	B (mm)	C (mm)
MPS-T16 End Cap	20	16	25
MPS-T20 End Cap	24	20	30
MPS-T24 End Cap	28	24	33
MPS-T30 End Cap	34	30	38
MPS-T39 End Cap	43	39	45



#### **Recess Former**

In precast factory, the Recess Formers are used to create access hole within the precast column. On site, this hole will then be accessed to insert and tighten the Anchor Bolt Nuts and Washers. Recess Formers are made from Polystyrene. Depending on the position of the Moment MPS-T Precast Shoe on the precast column, both Edge and Corner Recess formers are available.

#### **Edge Recess Former**

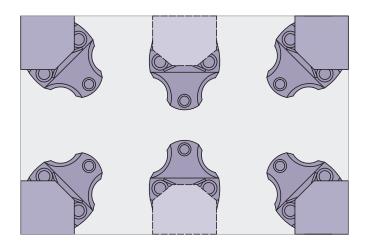


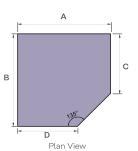
Size	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
T16	88	88	61	61	100
T20	92	92	62	62	110
T24	98	98	63	63	115
T30	106	106	65	65	130
T39	136	136	83	83	145

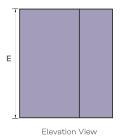
Top Part

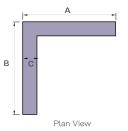
Size	A (mm)	B (mm)	C (mm)	D (mm)
T16	88	88	15	28
T20	92	92	15	37
T24	98	98	15	45
T30	106	106	15	60
T39	136	136	15	72

Bottom Part



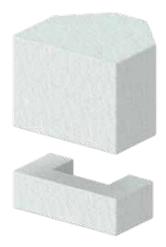








#### **Edge Recess Former**

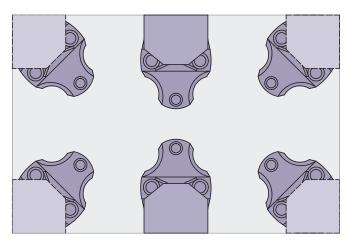


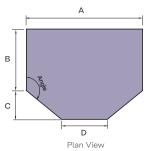
Size	A (mm)	B (mm)	C (mm)	Angle (Deg)	D (mm)	E (mm)
T16	93	62	23	122	22	100
T20	98	62	24	128	37	110
T24	117	62	29	130	46	115
T30	135	64	40	130	40	130
T39	168	90	43	132	72	145

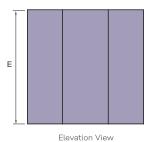
Top Part

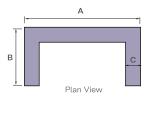
Size	A (mm)	B (mm)	C (mm)	D (mm)
T16	93	56	15	28
T20	98	56	15	37
T24	117	59	15	45
T30	135	62	15	60
T39	168	83	15	72

Bottom Part











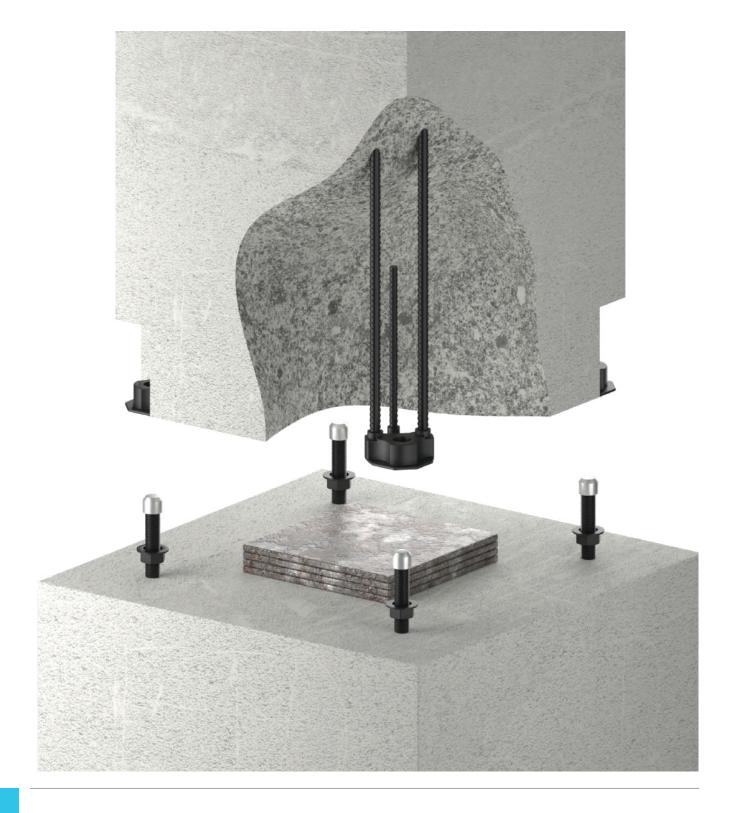
Elevation View

### Design Capacities

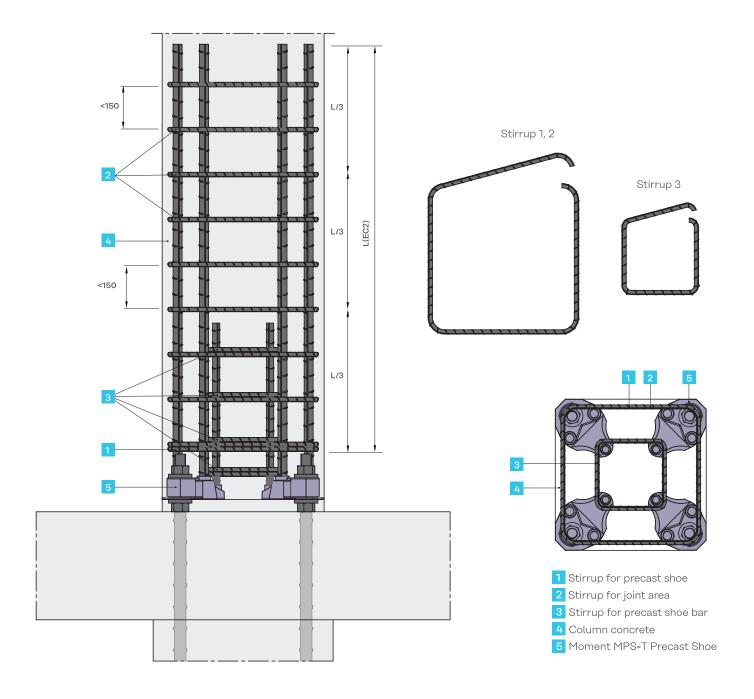
#### **Product Testing**

The Moment MPS-T Precast Shoe and Anchor Bolts are tested to verify the design capacities.

Product Code	Tension Load (kN)
MPS-T16	61.7
MPS-T20	96.3
MPS-T24	138.7
MPS-T30	220.4
MPS-T39	383.4



### Reinforcement Requirement



Precast Shoe	Anchor Bolt	1	2	3
MPS-T16	MPS-T16 Anchor Bolt	1ø8	ø 8	3 ø 10
MPS-T20	MPS-T20 Anchor Bolt	1 ø 10	ø 10	4 ø 10
MPS-T24	MPS-T24 Anchor Bolt	1 ø 10	ø 10	3 ø 12
MPS-T30	MPS-T30 Anchor Bolt	1 ø 12	ø 12	4 ø 12
MPS-T39	MPS-T39 Anchor Bolt	2 ø 12	ø 12	5 ø 12

#### Installation

### In Precast Factory - Moment MPS-T Precast Shoe Installation



Figure 1: Assembly of positioning bolt and recess formers

- 1 Drill holes onto the column bottom formwork, corresponding to the location of the Moment MPS-T Precast Shoe, Refer table below for hole size.
- 2 Secure the Moment MPS-T Precast Shoe onto the formwork, using Position Bolt. First, unscrew the bolt and wing nut from the base. Then, place the Moment MPS-T Precast Shoe onto the bottom formwork, corresponding to the earlier hole location. Place the Position Bolt base inside the Precast Shoe hole, such that the threads are facing the formwork. From the opposite side of the formwork, screw in the bolt, and tighten using wing nut, as shown in Figure 1.
- 3 Place top and bottom Recess Formers inside the Precast Shoe cavity, and secure using galvanized wire or tape. This prevents the recess former from moving during concrete pour.

Precast Shoe Size	Position Bolt Thread Size	Formwork Hole Diameter (mm)
MPS-T16	M10 x P1.5	11
MPS-T20	M12 x P1.75	13
MPS-T24	M16 x P2.0	17
MPS-T30	M16 x P2.0	17
MPS-T39	M16 x P2.0	17

#### On Site - Anchor Bolt Installation



Figure 2: Assembly of positioning bolt and recess formers

- 1 The Anchor Bolts are delivered pre-assembled with nuts and washers
- 2 A purpose built reusable frame as shown in Figure 2 is recommended for positioning of the Anchor Bolt, prior to concrete pour. The Anchor Bolts can then be screwed onto this frame.
- Refer to table below for reusable frame recommended clearance hole diameter to house the Anchor Bolts.

Precast Shoe Size	Clearance Hole Diameter (mm)
MPS-T16	18
MPS-T20	22
MPS-T24	26
MPS-T30	33
MPS-T39	42

#### On Site - Column Installation



Figure 3: Positioning of shims, bottom nut, washer and end caps during column installation

- 1 Adjust and set the bottom nuts and washers of the anchor bolts to the required height, (Figure 3).
- 2 Positioning and subsequent adjustment of heavy columns is facilitated with shims which are placed dead centre under the column.
- 3 When moving column by crane the anchor bolts threads must be protected using End Caps.
- 4 Maneuver the precast column over the anchor bolts with a crane and slowly lower into the correct position.



Figure 4: Tighten upper and lower nuts using suitable wrench

- 5 Fix the upper washers and nuts to the anchor bolts and tighten by hand.
- For small, lightweight columns: steel shims are not required; the weight of the column rests on the bottom nuts. The column can be adjusted vertically in both directions by tightening the bottom nuts using a wrench and mallet.

- 7 For large heavy columns: the weight of the column is rested on a stack of steel shims in the central point under the column, the bottom nuts are adjusted to a level 5 mm lower. The column weight rest only on the shims.
- 8 By turning the upper nuts using a wrench and mallet, the column is vertically adjusted in both axes.
- 9 Tighten the upper and lower nuts by using a wrench and mallet, (Figure 4).



Figure 5: Grouting process from side

- 10 The joint between the column, the foundation and the recess must be filled with an appropriate high-strength low-shrink mortar according to manufacturer's specification.
- 11 Filling may be done from the side (Figure 5) or with acast-in pour-pipe, (Figure 6).

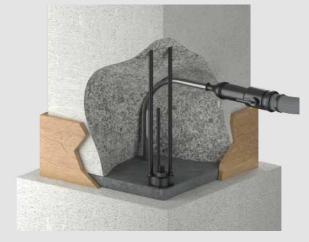


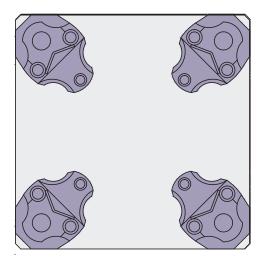
Figure 6: Grouting process from cast-in pour-pipe

12 The process must be carefully monitored to ensure all cavities are completely and evenly filled with mortar and the finish flush with the column.

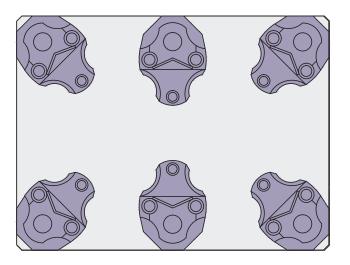


### **Application**

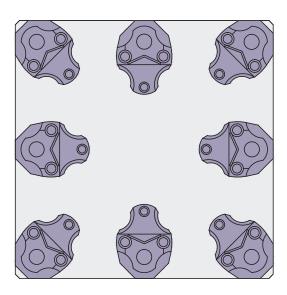
The Precast Shoe can be arranged several different ways in a column, depending on the column design requirements:



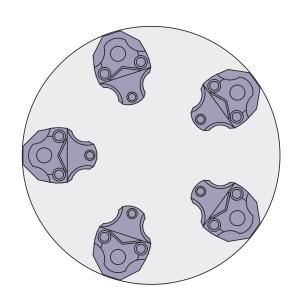
Square column



Rectangular column



Highly stressed square column



Round column
\*requires customized recess formers

### Hybrid Technology

The Hybrid Precast Connection is a construction method that combines the use of Moment MPS-T Precast Shoe with Moment Grout Couplers to connect precast elements. Using these two products in combination offers many advantages over other build techniques, including substantial savings in cost and time, and improvements in site safety.

#### **Moment MPS-T Precast Shoe**

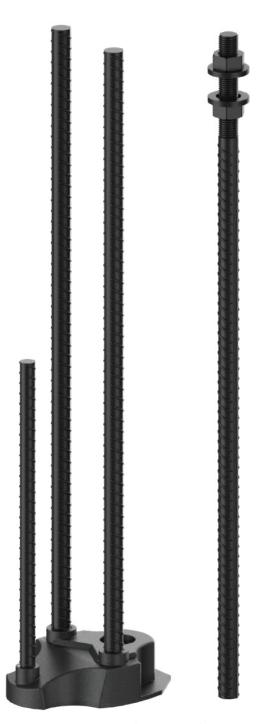
The bolted Moment MPS-T Precast Shoe connection with its unique 'dry joint' feature, enables the precast element to be assembled and become immediately load-bearing without propping. This reduces crane use, installation time and improves site safety.

#### **Moment MPS-T Half and Full Grout Couplers**

Grout Couplers offer shorter development lengths (compared to traditional grout tubes), reducing the installation time in the precast factory by eliminating the need for confinement steel and enabling connections in much thinner elements.

These two products offer excellent advantages separately; When used together as the Moment Hybrid Precast Connection they provide the perfect combination.



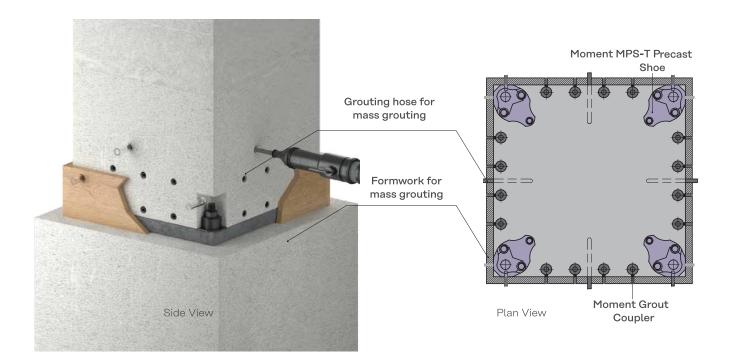


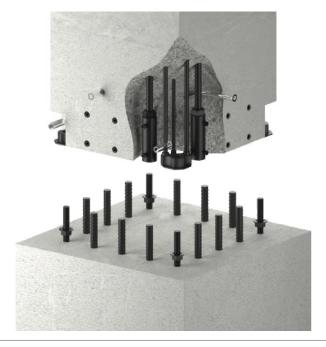
Moment MPS -T Precast Shoe



#### Reduce Costs and Improve Safety

- Using Moment MPS-T Precast Shoe in conjunction with Moment Grout Couplers offers substantial cost saving (up to 50%), compared to a full precast shoe solution.
- Our Grout Couplers use much fewer confinement rebars compared to traditional solutions such as corrugated ducts.
- With no props needed, surrounding area can be free.
- Construction tolerances are accommodated, resulting in less rework and saving time on site.
- The precast section can be lifted, placed, levelled and secured in less than 30 minutes. Once the Moment MPS-T Precast Shoes are secured, it is immediately load-bearing. Work can continue on the next precast element and later more than one assembly can be grouted, reducing both worker and crane time.
- With less worker and crane time, and the absence of props reducing site access, site safety is immediately improved.





The grouting of the Moment MPS-T Precast Shoe, Grout Coupler and the base takes place in one operation. This unique method saves considerable time on site. With additional grouting hoses cast and formwork secured on-site, grout is poured into the base, filling all voids including the Moment MPS-T Precast Shoes and Grout Couplers.



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