

TECHNICAL DOCUMENTATION



PRECAST CONCRETE SYSTEMS | **TERWA PRECAST CONNECTOR**

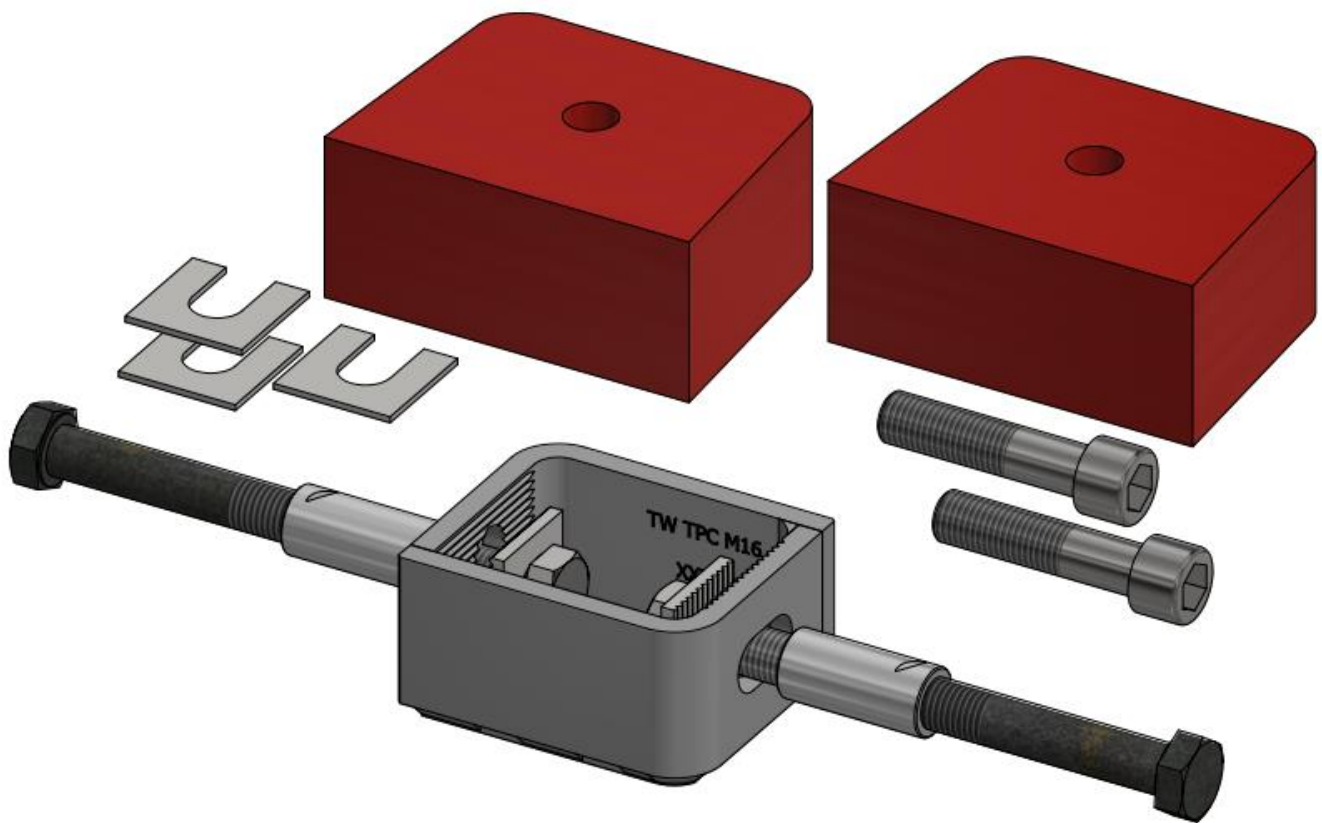


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TERWA PRECAST CONNECTOR – GENERAL INFORMATION

TERWA PRECAST CONNECTOR “TPC” is a connection system for precast concrete elements, such as walls and shafts, etc.

Advantages:

- Quick and efficient connection of precast elements. The installation of precast elements does not depend on the weather.
- Can be used in combination with threaded fixing anchor TKG, TGL, HSP, fixing bolt anchor BBB or BBP, fixing inserts HBU, HBUS.
- Simple connection solution without additional materials.
- Lightweight.
- Easy mounting in the precast factories and on site.
- Cost and time savings. The connections can be loaded to their maximum load capacities directly after installation.

TERWA PRECAST CONNECTOR “TPC” is made of steel S355 hot dip galvanized.

The product can be available for different load group range in function of the panel dimensions and the forces applied on the structure.

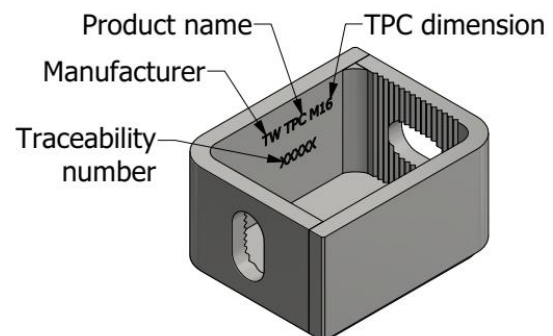
Quality

Terwa continuously controls the TPC production process in terms of strength, dimensional and material quality, and performs all the required inspections for a superior quality system. All the products are tracked from material acquisition to the final, ready-to-use product.

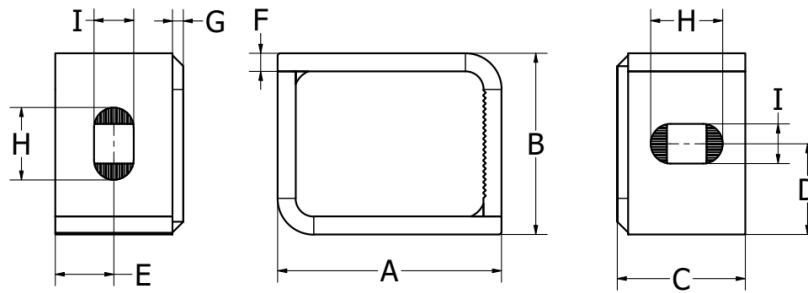


Marking and traceability

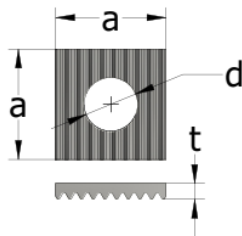
All systems have all necessary data for traceability, dimensions, and product name.



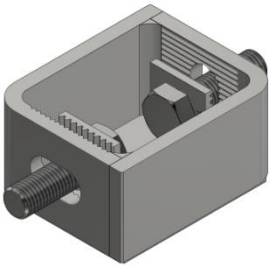
TPC Geometry



TPC	Article no.	A	B	C	D	E	F	G	H	I
Dimensions		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
TPC M16	65749	102	84	55	42	25	8	5	32	18
TPC M20	65750	124	100	71	50	32.5	10	6	40	22

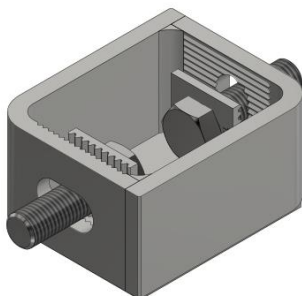


Serrated washer	Article no.	Dimensions		
		a [mm]	t [mm]	d [mm]
Serrated washer Ø17	67155	35	5	17
Serrated washer Ø21	67158	45	5	21

TERWA TPC - KIT							
	The TPC KIT consists of a Precast Connector TPC, two corresponding serrated washers and two screws.	Designation	Article no.	Components	Article no.		
		TPC-M16 KIT	68214	TPC-M16			65749
				Serrated washer Ø17			67155
				Screw ISO 4017 M16-50_8.8			26310
		TPC-M20 KIT	68215	TPC-M20			65750
				Serrated washer Ø21			67158
Screw ISO 4017 M20-65_8.8				26312			

TPC is placed in a cavity made in the concrete element around the anchor head. This recess is filled with fine concrete after mounting the TPC. For installing the fixing, two pair of screws ISO 4017 class 8.8 or 10.9 and two serrated washers are required.

During the TPC installation, the concrete element must be aligned, and the screws must be tightened parallel and crosswise until the desired joint width has been reached.



TPC with screws gr. 8.8 or 10.9 and serrated washers mounted

System characteristic strength	Characteristic tensile force	Characteristic shear force
M16	64.1 kN	16.7 kN
M20	75.1 kN	20.7 kN

The minimum length of the screws is determined according to the distance between the panels and the minimum thread engagement.

TPC Material specifications

Specification	Dry conditions	Internal conditions with usual humidity
	Material types and surface protection required for use in structures subject to dry internal conditions except for usual humidity	Material types and surface protection required for use in structures subject to internal conditions with usual humidity
TPC Precast Connector M16	Steel S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm	Steel S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm
Serrated washer Ø17	Steel S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm	S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm
Hexagon headed screw M16-50*	Steel with mechanical properties class 8.8 or 10.9 EN ISO 898-1 Electrolytical galvanized ≥ 5 µm	Steel with mechanical properties class 8.8 or 10.9 EN ISO 898-1 Hot dip galvanized ≥ 50 µm
* The screw length depends on the minimum thread engagement of 1.5 times the bolt diameter, gap between precast elements, TPC dimensions		
TPC Precast Connector M20	S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm	S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm
Serrated washer Ø21	S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm	S355J2 EN 10025 Hot dip galvanized according to EN ISO 1461 ≥ 50 µm
Hexagon headed screw M20-65*	Steel with mechanical properties class 8.8 or 10.9 EN ISO 898-1 Electrolytical galvanized ≥ 5 µm	Steel with mechanical properties class 8.8 or 10.9 EN ISO 898-1 Hot dip galvanized ≥ 50 µm
* The screw length depends on the minimum thread engagement of 1.5 times the bolt diameter, gap between precast elements, TPC dimensions		

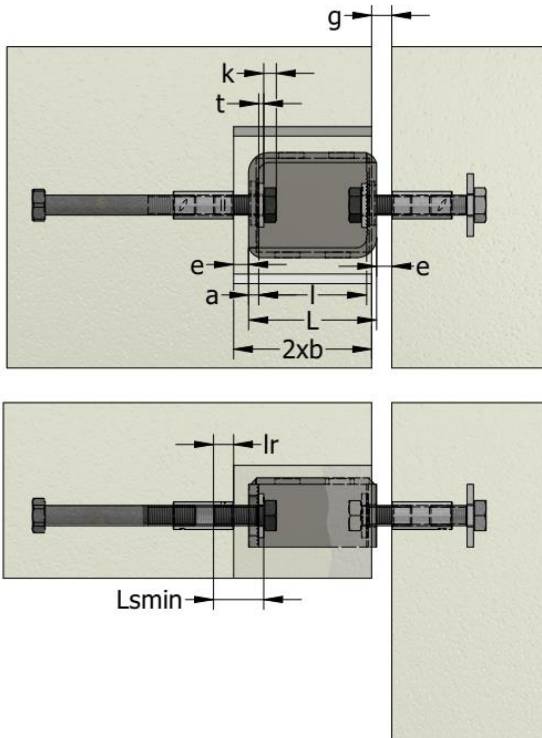
Screw length

The bolt should be of sufficient length to ensure a minimum thread engagement of 1.5 times the bolt diameter.

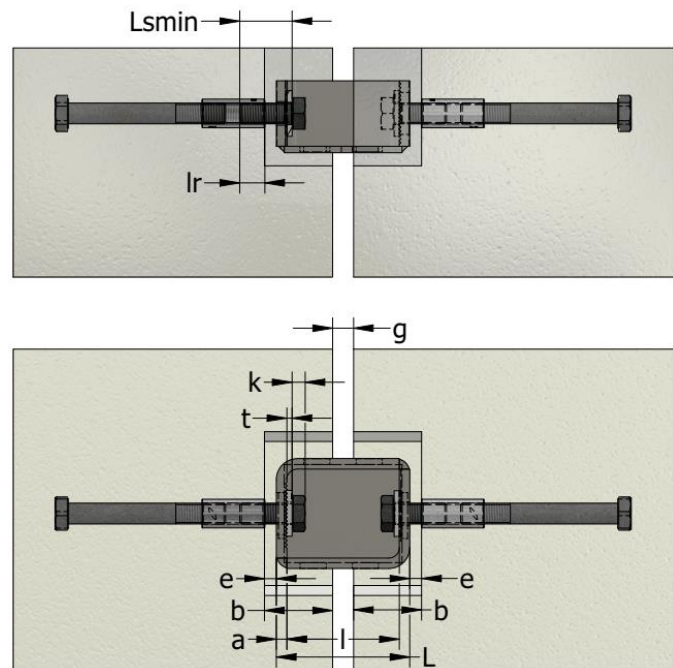
Thread	Required thread engagement. l_r mm
M16	24
M20	30

The screw length depends on the fixing anchor used and its minimum thread engagement.

CORNER APPLICATION

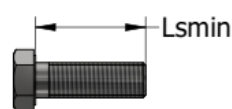


WALL - WALL APPLICATION



$$L_{smin} = l_r + e + a + t$$

$$e = (2 \times b + g - L) / 2$$

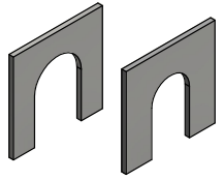


L_{smin} – Minimum screw length
 g – Gap between the precast elements
 a and L – TPC dimensions
 t – Washer thickness
 b – Recess former width

TPC	L_{smin}	l_r	e	g	a	L	t
	mm	mm	mm	mm	mm	mm	mm
TPC M16	50	24	14	16	8	102	4
TPC M16	50	24	11	10	8	102	4
TPC M16	45	24	9	6	8	102	4
TPC M16	45	24	6	0	8	102	4

TPC	L_{smin}	l_r	e	g	a	L	t
	mm	mm	mm	mm	mm	mm	mm
TPC M20	65	30	18	16	10	124	4
TPC M20	60	30	15	10	10	124	4
TPC M20	60	30	13	6	10	124	4
TPC M20	55	30	10	0	10	124	4

The gap “e” between TPC and the anchor can be filled with square slotted washers made of plates that are 2mm, 3mm or 5mm thick. They can be electrolytic galvanized, or hot dip galvanized.



	Thickness		
	2 mm	3 mm	5 mm
Square slotted washer M16 - EV	66926	66927	66928
Square slotted washer M16 - TV	67164	67165	67166
Square slotted washer M20 - EV	66929	66930	66931
Square slotted washer M20 - TV	67168	67169	67170

The required amount of square slotted washer M16 depending on the distance between the precast elements (g) is indicated in the following table.

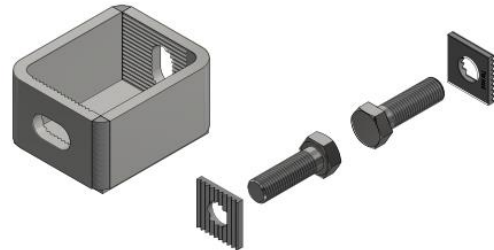
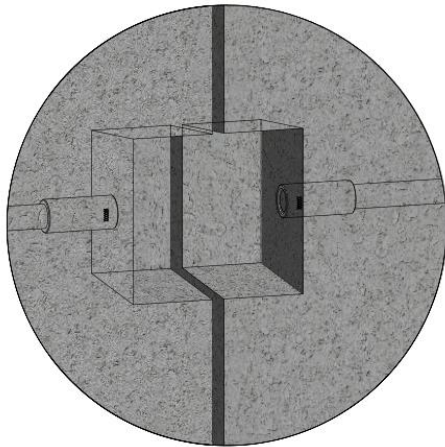
TPC	<i>L</i>	<i>g</i>	<i>e</i>	Square slotted washer M16 2 mm	Square slotted washer M16 3 mm	Square slotted washer M16 5 mm
	mm	mm	mm	qty	qty	qty
TPC M16	102	16	14	4	-	4
TPC M16	102	10	11	-	4	2
TPC M16	102	6	9	4	-	2
TPC M16	102	0	6	-	4	-

The required amount of Square slotted washer M20 depending on the distance between the precast elements (g) is indicated in the following table.

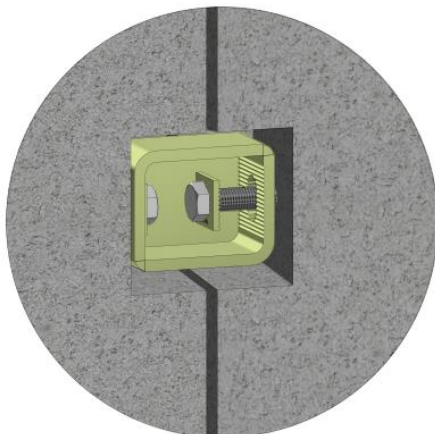
TPC	<i>L</i>	<i>g</i>	<i>e</i>	Square slotted washer M16 2 mm	Square slotted washer M16 3 mm	Square slotted washer M16 5 mm
	mm	mm	mm	qty	qty	qty
TPC M20	124	16	18	-	2	6
TPC M20	124	10	15	-	-	6
TPC M20	124	6	13	-	2	4
TPC M20	124	0	10	-	-	4

TERWA PRECAST CONNECTOR APPLICATIONS

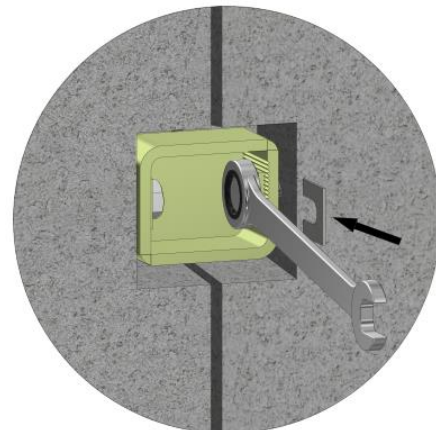
1. On the construction site, the concrete elements are placed in the installation positions. Terwa precast connector with two pair of hexagonal screws and serrated washers ready to be assembled.



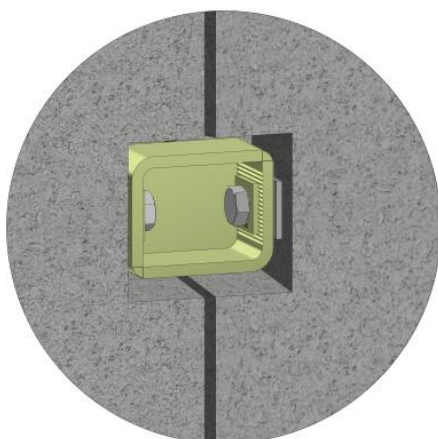
2. The Terwa precast connector is inserted into the panel cavity. Bolts must be properly aligned and screwed by hand.



3. The screws must be tightened parallel and crosswise by using a ratchet wrench until the planned joint width has been reached. Fill the gap between TPC and the anchor with the square slotted washer.



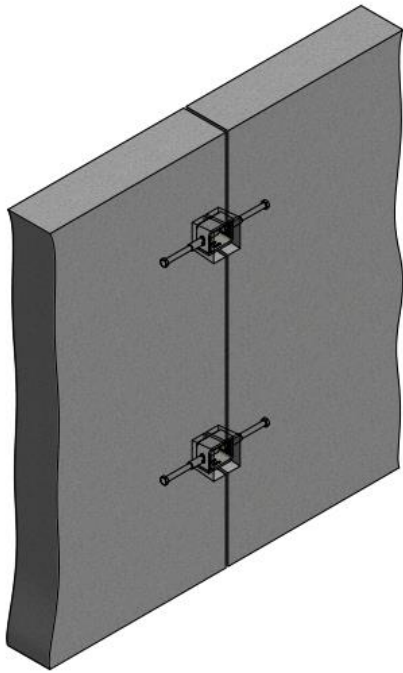
4. The joint cavity area can be filled with fine mortar or concrete caps to protect the connection against corrosion.


Important!

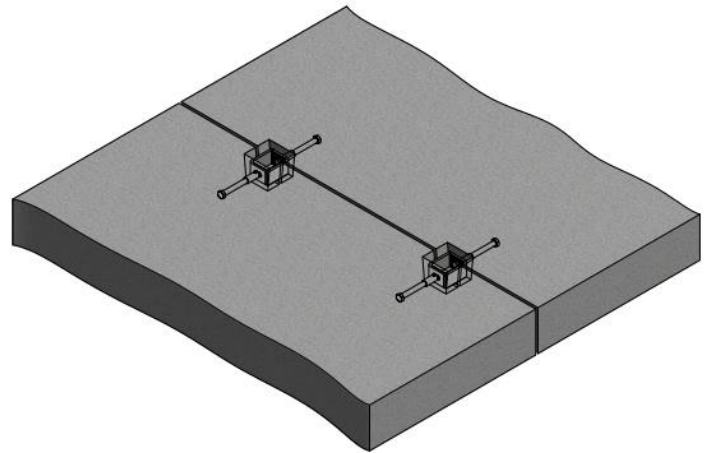
- The screws must be tightened parallel and crosswise to avoid tilting.
- The screw thread must not be damaged or deformed and without corrosion.
- Tightening torque must be according to fixing anchor material property.

Recommended torque wrench – see page 8

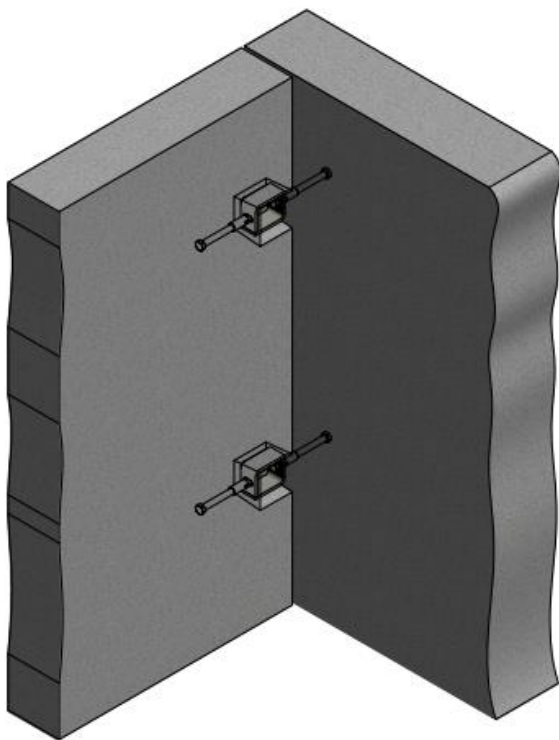
TPC	Tightening torque [Nm]
M16	55
M20	90



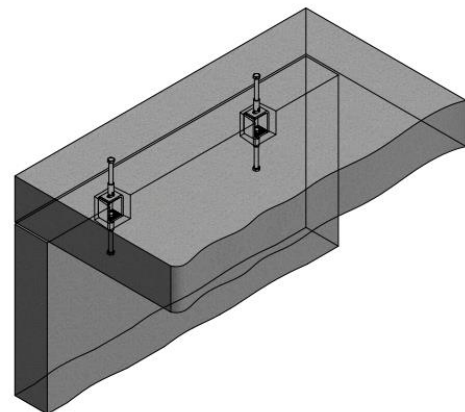
WALL – WALL



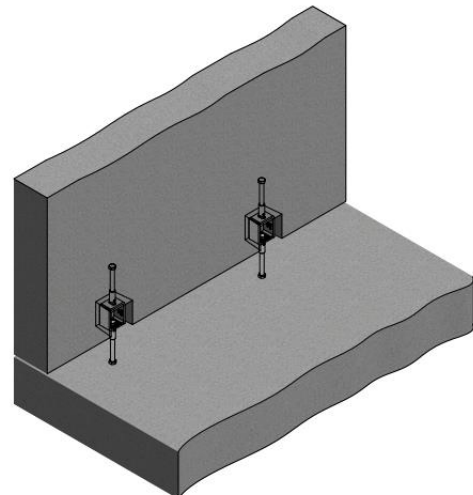
FLOOR SLAB – FLOOR SLAB
CEILING PANEL – CEILING PANEL



CORNER WALLS CONNECTIONS

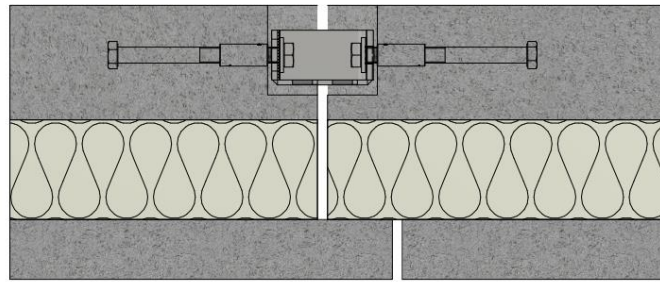


WALL – CEILING PANEL

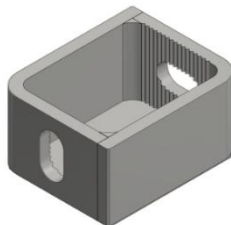


FLOOR SLAB - WALL

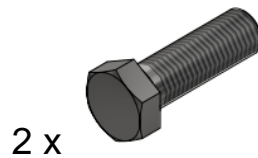
TPC precast connector can also be used to connect two concrete sandwich panels.



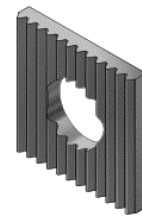
TERWA PRECAST CONNECTOR SETS FOR CONSTRUCTION SITE



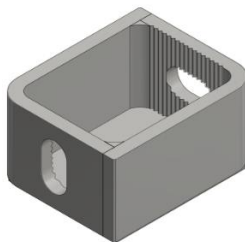
65749 - TPC-M16



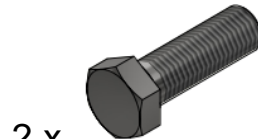
2 x
 SCREW ISO 4017 M16 x L



2 x
 SERRATED WASHER Ø17



65750 - TPC-M20



2 x
 SCREW ISO 4017 M20 x L



2 x
 SERRATED WASHER Ø21

Recommended tool for construction site:



Interchangeable torque spanner

Torque: 40 – 200 Nm



Interchangeable Head torque spanner

14x18

Metric	Size
M16	24
M20	30

RECOMMENDED FIXING ANCHORS AND FIXING INSERTS FOR THE PRECAST PLANT

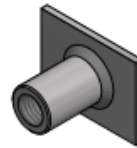
- FIXING ANCHORS**



TGK



TGL



HSP

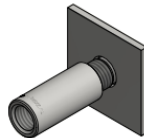


HSB

- FIXING INSERTS**



BBB



BBP



HBU



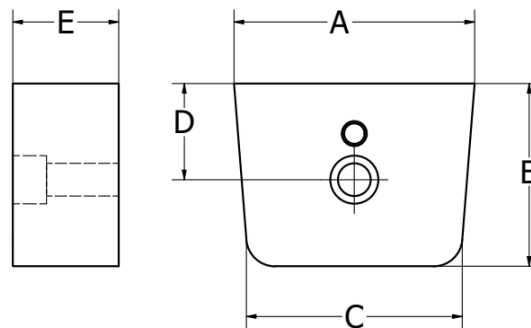
HBUS

The TPC precast connector, fastening screw and the fixing anchor must each be individually verified. Edge distances, centre distances are given in the EN 1992-4 (Eurocode 2).

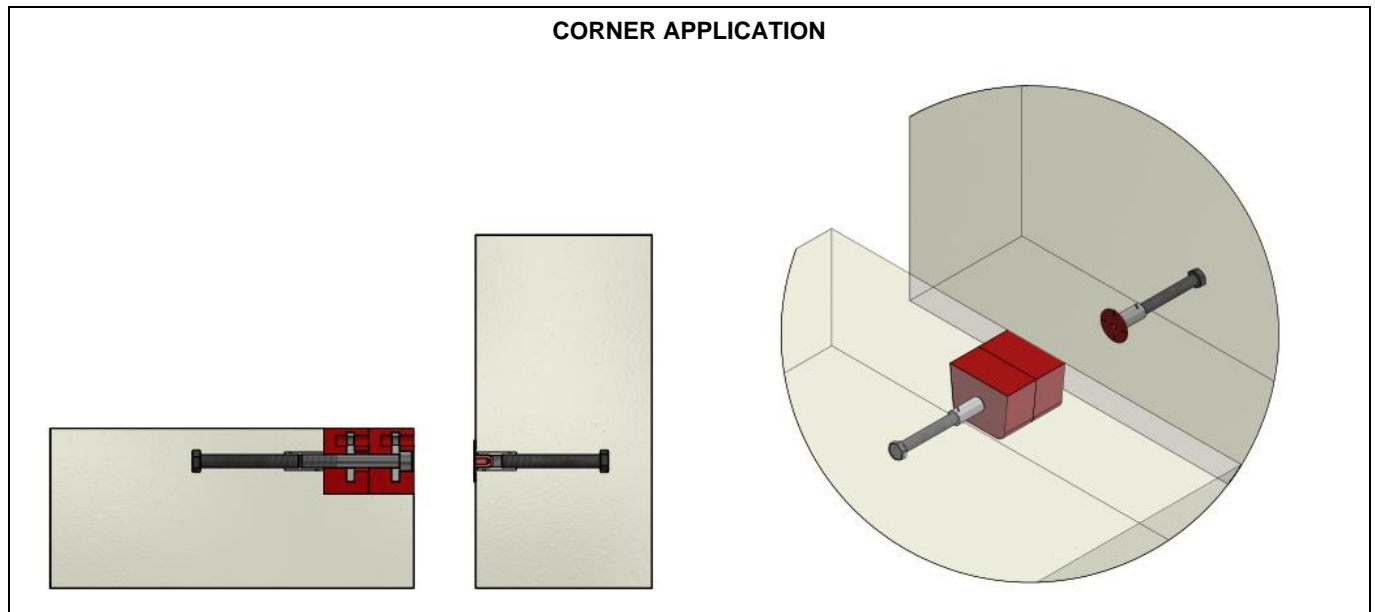
The minimum required edge distances and centre distances are according to the fixing anchors used in precast panels.

The characteristic strength of the system is guaranteed only if components manufactured by Terwa are used.

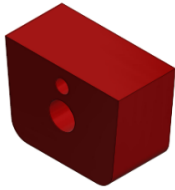
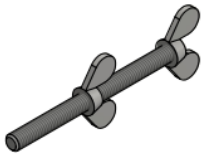
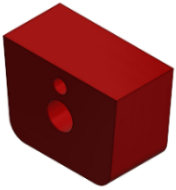
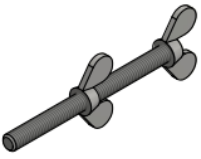
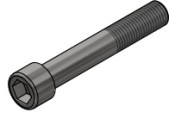

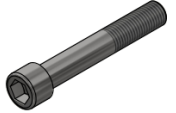

TPC Recess former - Geometry



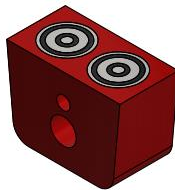

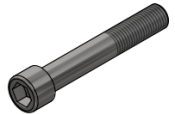

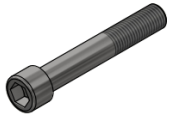

TPC Recess former	Article no.	A	B	C	D	E
Dimensions		[mm]	[mm]	[mm]	[mm]	[mm]
Recess former for TPC M16	66153	125	95	110	50	57
Recess former with magnets for TPC M16	68165	125	95	110	50	57
Recess former for TPC M20	66154	150	127	132	70	72
Recess former with magnets for TPC M20	68166	150	127	132	70	72

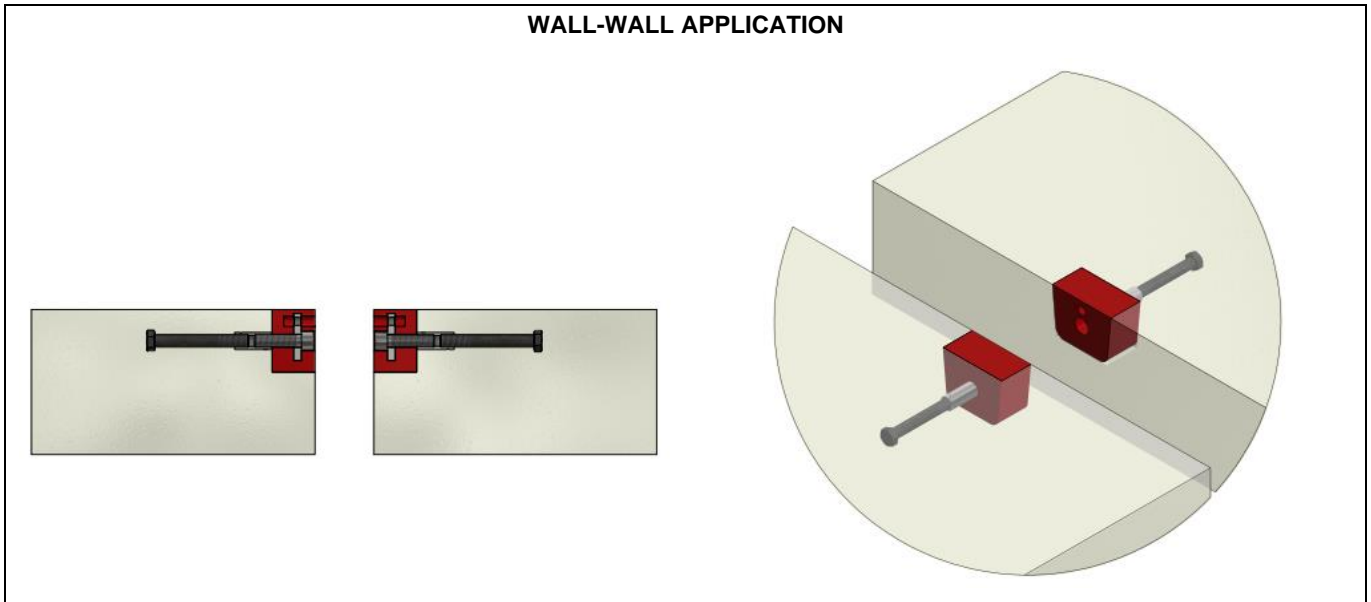
TERWA PRECAST CONNECTOR ACCESSORIES FOR PRECAST PLANT


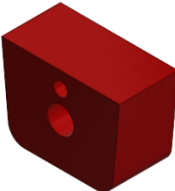
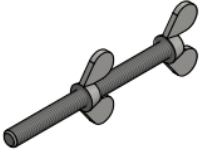
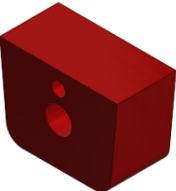
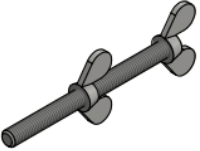




ACCESSORIES - CORNER APPLICATION – WOOD FORMWORK







TPC M16		TPC M20	
2 x  66153 – TPC Recess former M16	 44577 – TDV 100 – M12	2 x  66154 – TPC Recess former M20	 44577 – TDV 100–M12
1 x  Screw ISO 4762 M16 - 120	 47113 – KU-02 – M16	1 x  Screw ISO 4762 M20 - 140	 47114 – KU-02 – M20

ACCESSORIES - CORNER APPLICATION – STEEL FORMWORK

TPC M16		TPC M20	
2 x  67423 - TPC Recess former with magnets M16	67423 - TPC Recess former with magnets M16	2 x  67424 - TPC Recess former with magnets M20	67424 - TPC Recess former with magnets M20
1 x  Screw ISO 4762 M16 - 120	 47113 – KU-02 – M16	1 x  Screw ISO 4762 M20 - 140	 47114 – KU-02 – M20



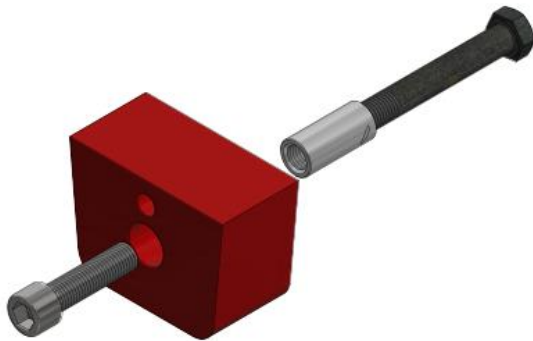
ACCESSORIES – WALL-WALL APPLICATION – WOOD FORMWORK			
TPC M16		TPC M20	
 2 x 66153 – TPC Recess former M16	 44577 – TDV 100 – M12	 2 x 66154 – TPC Recess former M20	 44577 – TDV 100–M12
 2 x Screw ISO 4762 M16 - 60	 47113 – KU-02 – M16	 2 x Screw ISO 4762 M20 - 70	 47114 – KU-02 – M20

ACCESSORIES - WALL-WALL APPLICATION – STEEL FORMWORK			
TPC M16		TPC M20	
 2 x 67423 - TPC Recess former with magnets M16		 2 x 67424 - TPC Recess former with magnets M20	
 2 x Screw ISO 4762 M16 - 60	 47113 – KU-02 – M16	 2 x Screw ISO 4762 M20 - 70	 47114 – KU-02 – M20

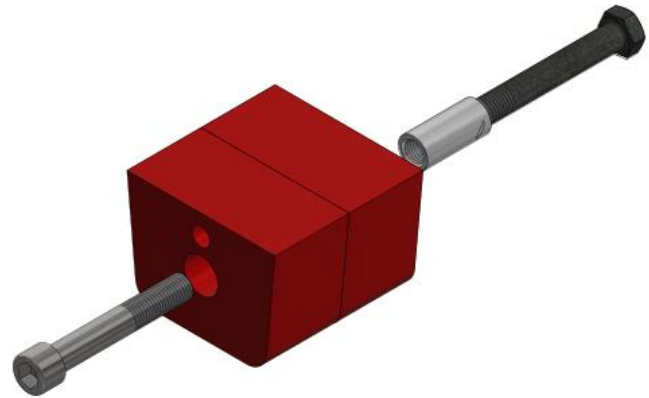
ANCHOR INSTALLATION – FORMWORK MADE OF WOOD

Before fixing in the formwork, assemble the anchor with appropriate recess former using a corresponding screw ISO 4762 according to the required type of connection.

Wall-wall connection – wood formwork

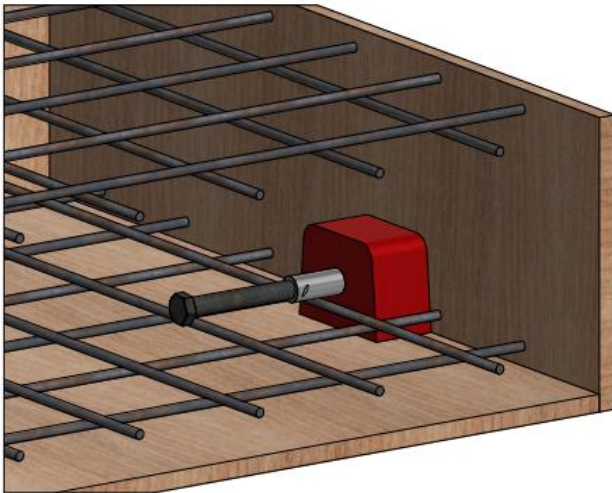


Corner connection – wood formwork



<i>TPC Recess former M16 KIT-wall 68575</i>			<i>TPC Recess former M16 KIT-corner 68574</i>		
Component	Article no.	Qty	Component	Article no.	Qty
Recess former for TPC M16	66153	1	Recess former for M16	66153	2
Screw ISO 4762 M16 - 60	25357	1	Screw ISO 4762 M16 - 120	26309	1
TDV-100-M12	44577	1	TDV-100-M12	44577	1

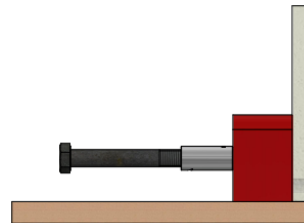
<i>TPC Recess former M20 KIT-wall 68577</i>			<i>TPC Recess former M20 KIT-corner 68576</i>		
Component	Article no.	Qty	Component	Article no.	Qty
Recess former for TPC M20	66154	1	Recess former for TPC M20	66154	2
Screw ISO 4762 M20 - 70	26308	1	Screw ISO 4762 M20 - 140	26311	1
TDV-100-M12	44577	1	TDV-100-M12	44577	1



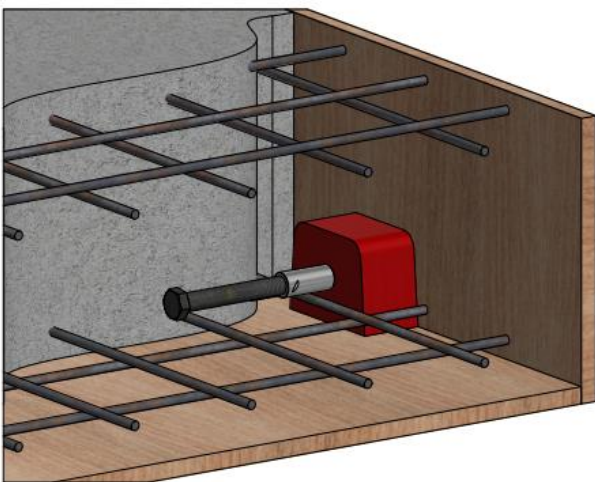
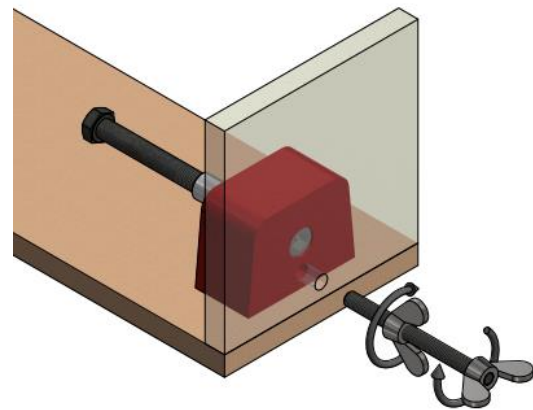
The first layer of reinforcement mesh is placed in the formwork. The recess former mounted with BBB anchor is fixed to the formwork. Then, the second layer of reinforcement mesh is installed.

Important!

The recess former must be in contact with the bottom of the formwork. By using forming wax on the recess former, it is easier to remove it from the concrete.

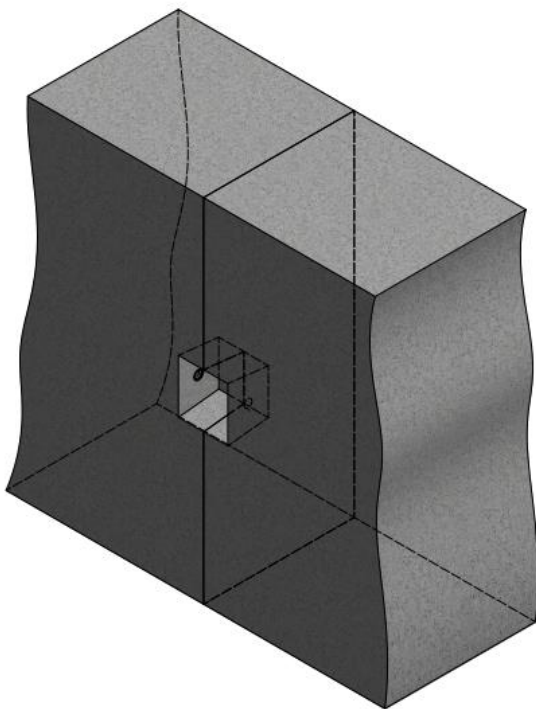
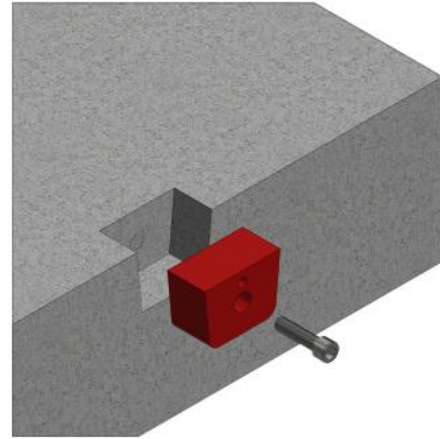


Drill the formwork and push the TDV into the designated hole and screw the TPC recess former in with the anchor mounted. Pull to formwork and tighten against the formwork using the second nut.



Pour the concrete.

After the concrete has hardened and the formwork is removed, the screw used to fix the recess former to the anchor can be unscrewed.
Then, the recess former can be removed by using a plastic or rubber hammer.
To ensure that these recess formers can be reused, it is recommended to remove the concrete residues from them and from the formwork.
Do not use sharp or pointed object to remove the recess former from the formwork.

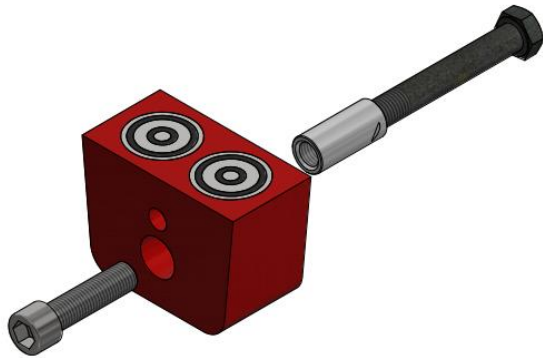


On site, two precast concrete elements ready to be assembled with the Terwa precast connector.

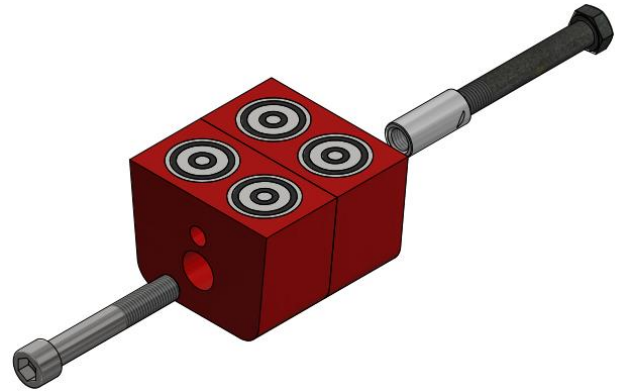
ANCHOR INSTALLATION – FORMWORK MADE OF STEEL

Before fixing in the formwork, assemble the anchor with the appropriate recess former with magnets using a corresponding screw ISO 4762 according to the required type of connection.

Wall-wall connection – steel formwork

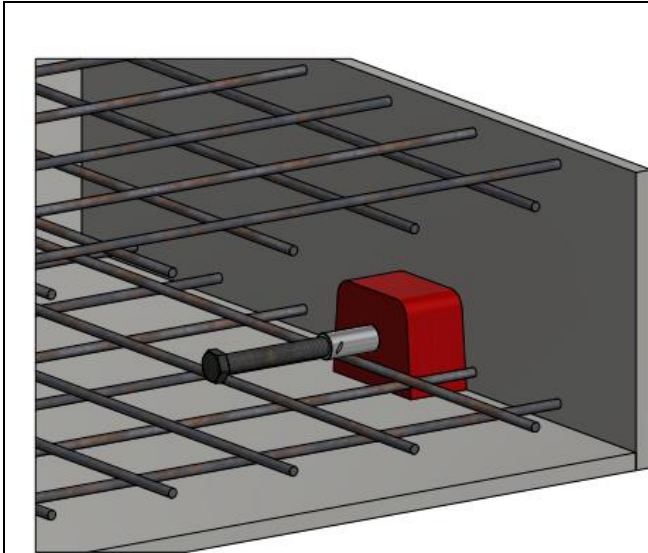


Corner connection – steel formwork



<i>TPC Magnetic Recess former M16 KIT-wall 68579</i>			<i>TPC Magnetic Recess former M16 KIT-corner 68578</i>		
Component	Article no.	Qty	Component	Article no.	Qty
Recess former with magnets for TPC M16	68165	1	Recess former with magnets for M16	68165	2
Screw ISO 4762 M16 - 60	25357	1	Screw ISO 4762 M16 - 120	26309	1

<i>TPC Recess former M20 KIT-wall 68581</i>			<i>TPC Recess former M20 KIT-corner 68580</i>		
Component	Article no.	Qty	Component	Article no.	Qty
Recess former with magnets for TPC M20	68166	1	Recess former with magnets for TPC M20	68166	2
Screw ISO 4762 M20 - 70	26308	1	Screw ISO 4762 M20 - 140	26311	1

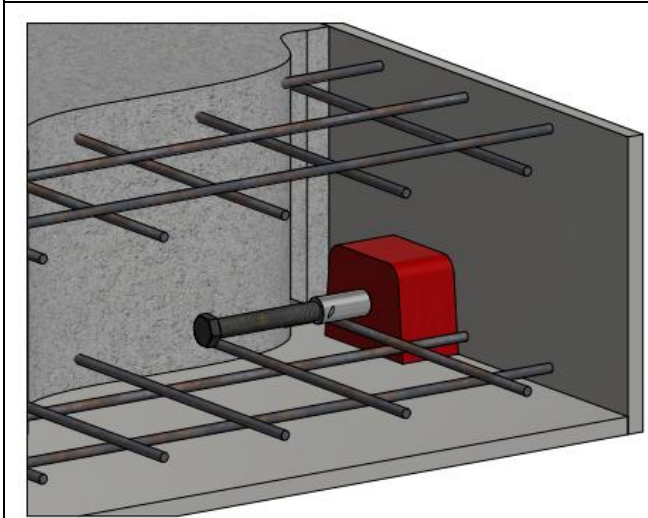
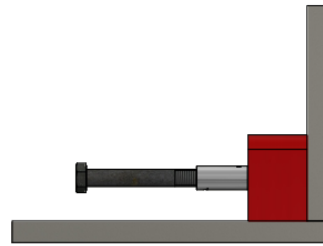


The first layer of reinforcement mesh is placed in the formwork. The recess former with magnets mounted with BBB anchor is placed into the formwork. Then, the second layer of reinforcement mesh is installed.

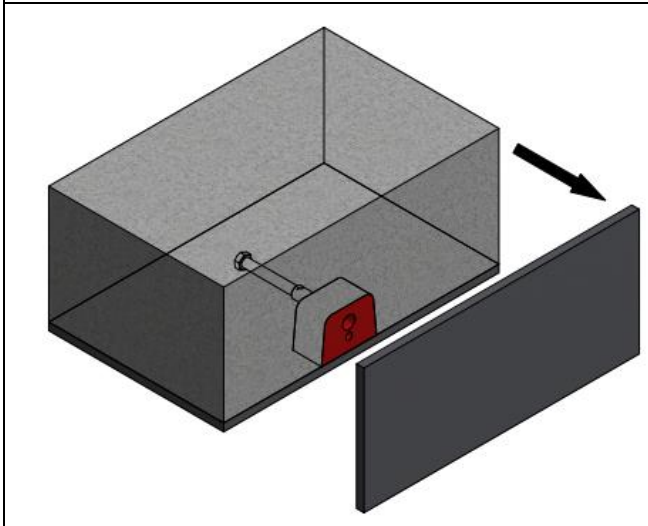
Important!

The recess former must be in contact with the bottom of the formwork.

By using forming wax on the recess former, it is easier to remove it from the concrete.

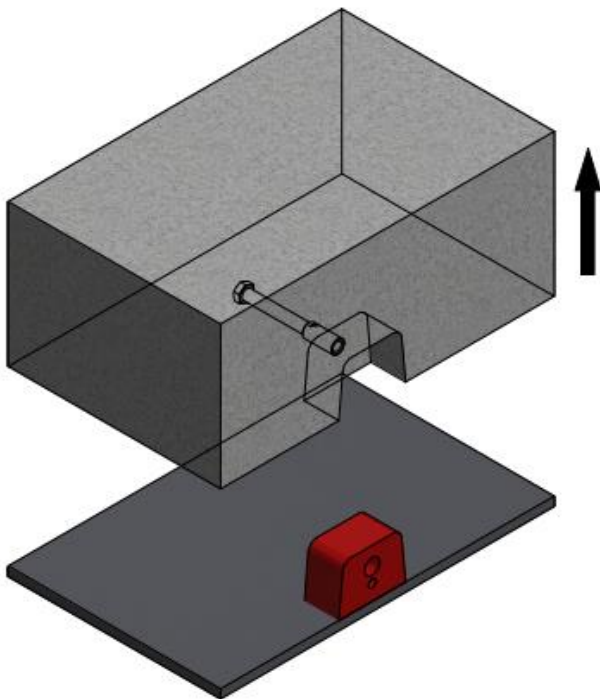
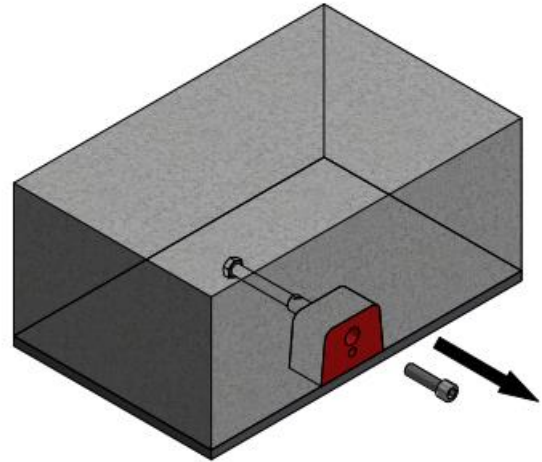


Pour the concrete



After the concrete has hardened, the lateral part of the formwork can be removed.

Remove the screw used to fix the recess former with magnets to the anchor.

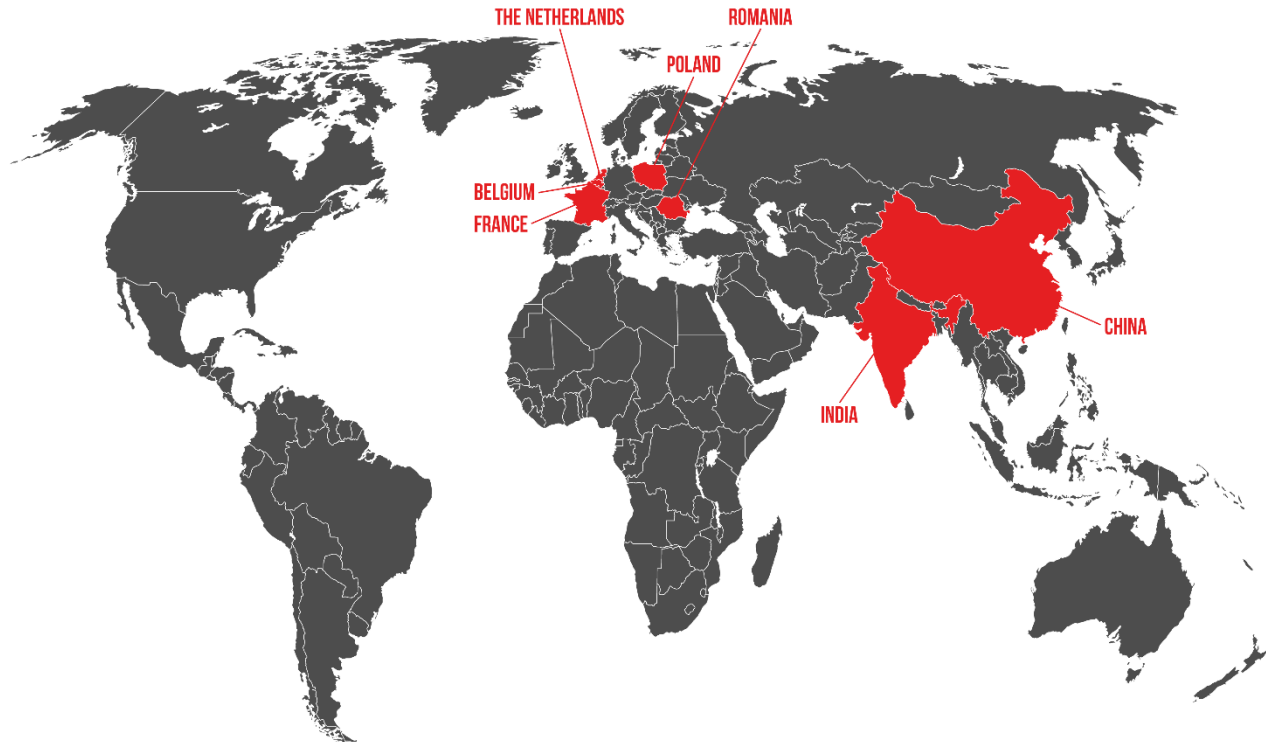


Now, the precast panel can be lifted. By using forming wax on the recess former, it is easier for this to remain fixed on the lower part of the formwork.

The recess former can be removed by using a plastic or rubber hammer.
 To ensure that this recess former can be reused, it is recommended to remove the concrete residues from them and from the formwork.
 Do not use sharp or pointed objects to remove recess former from the formwork.



CONTACT



TERWA is the global supplier for precast and construction solutions with multiple offices around the world. With all our staff, partners and agents, we are happy to provide all construction and precast companies who work in the building industry with full service and 100% support.

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