H-BAU TECHNIK

ISOMAXX®

Thermal insulation units 120 mm
DIN EN 1992-1-1

Sealing ▪ Thermal insulation ▪ Formwork ▪ Sound insulation ▪ Reinforcement ▪ Connection ▪ Accessories

Forward constructing.

OUR MISSION:
FORWARD CONSTRUCTING.

It is our mission not only to provide the very latest building technology, but to also be one crucial step ahead of the game at all times. That is why we are constantly undertaking pioneering work in all product areas. Our employees consistently put their extensive practical experience and creativity to use in the interests of our customers. In constant dialogue with our target groups on a partnership basis, we are already developing the products today that will be needed tomorrow. Our momentum continues to set new benchmarks in structural engineering – yesterday, today and tomorrow, too. This is what we mean by "forward constructing".

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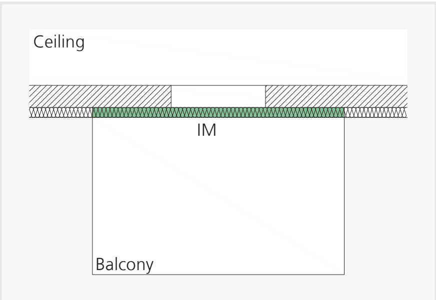
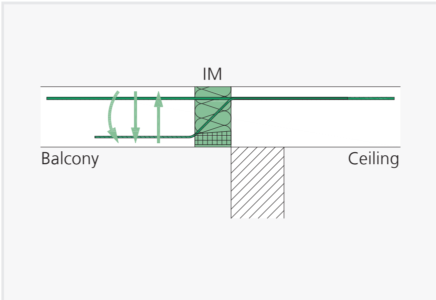
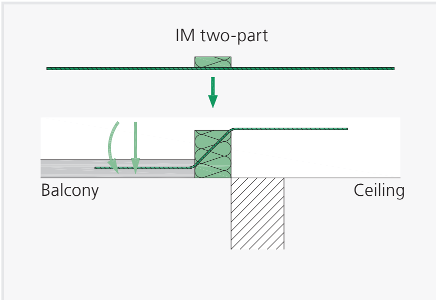
CANTILEVERED STRUCTURES





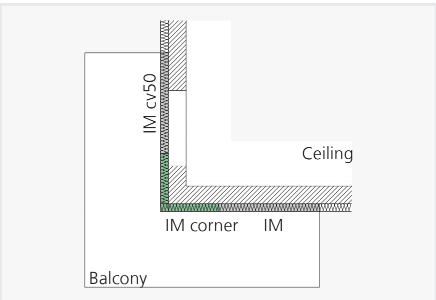
ISOMAXX® IM

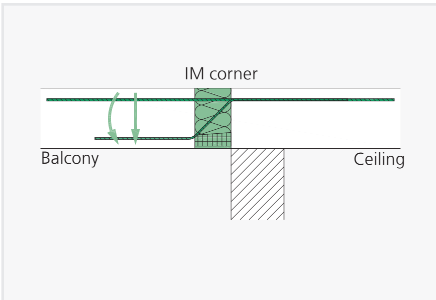
- Transfer of negative moments as well as positive and negative shearing forces with version IM QX
- Version with concrete compression bearings
- P. 26



ISOMAXX® IM TWO-PART

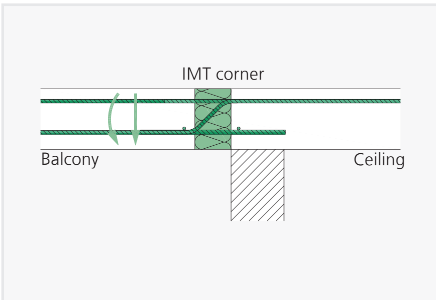
- Transfer of negative moments and positive shearing forces
- Version with concrete compression bea-rings
- Two-part version for prefab slabs
- P. 38





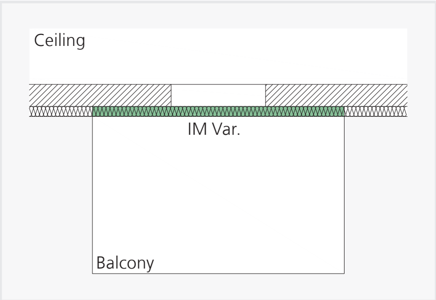
ISOMAXX® IM CORNER, IMT CORNER

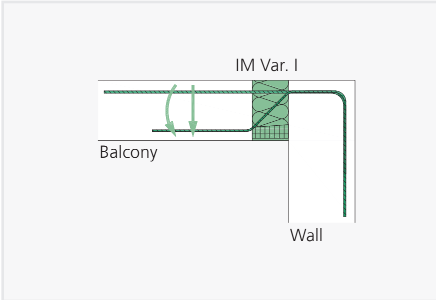
- Transfer of negative moments and positive shearing forces
- Version IM with concrete compression bearings
- Version IMT with steel pressure rods
- Solution for corner balconies
- P. 50



TYPE OVERVIEW

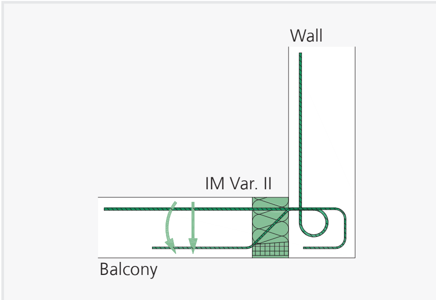
CANTILEVERED STRUCTURES AT WALL CONNECTIONS/VERTICALLY OFFSET CEILINGS





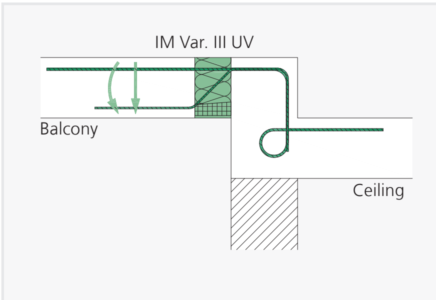
ISOMAXX® IM VAR. I

- Transfer of negative moments and positive shearing forces
- Version with concrete compression bearings
- Connection to a wall leading downwards
- P. 42



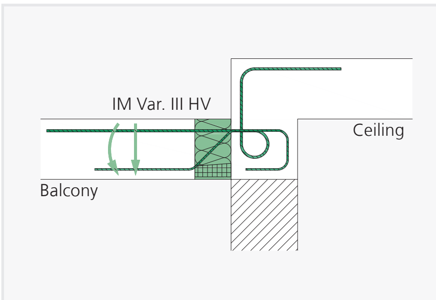
ISOMAXX® IM VAR. II

- Transfer of negative moments and positive shearing forces
- Version with concrete compression bearings
- Connection to a wall leading upwards
- P. 42



ISOMAXX® IM VAR. III UV

- Transfer of negative moments and positive shearing forces
- Version with concrete compression bearings
- Connection to a ceiling vertically offset downwards
- P. 42

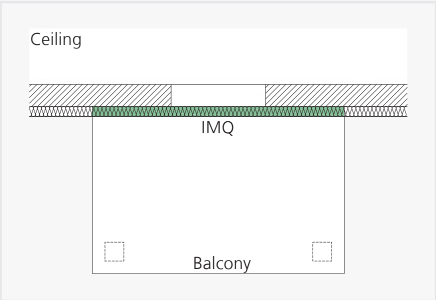


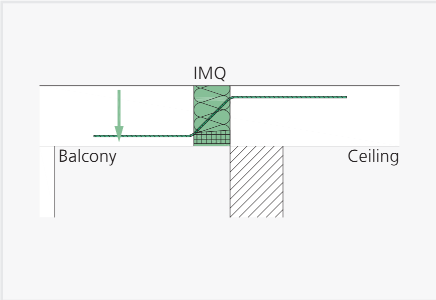
ISOMAXX® IM VAR. III HV

- Transfer of negative moments and positive shearing forces
- Version with concrete compression bearings
- Connection to a ceiling vertically offset upwards
- P. 42

TYPE OVERVIEW

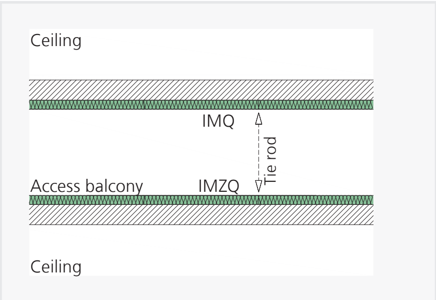
SUPPORTED STRUCTURES

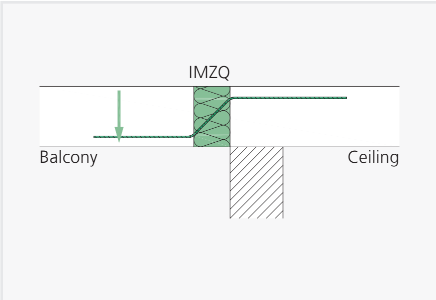




ISOMAXX® IMQ

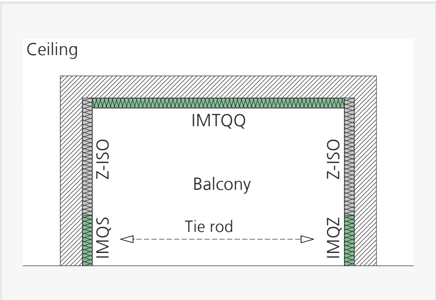
- Transfer of positive shearing forces
- Version with concrete compression bearings
- P. 58

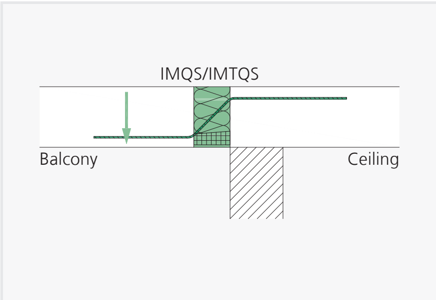




ISOMAXX® IMZQ

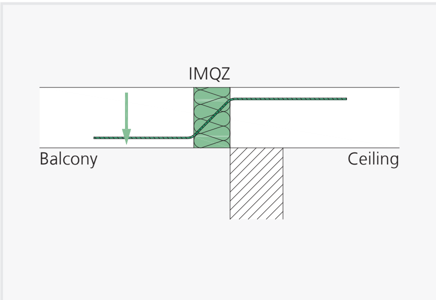
- Transfer of positive shearing forces
- Version without compression bearings for constraint-free connections
- P. 58





ISOMAXX® IMQS

- Transfer of positive shearing forces
- IMQS version with concrete compression bearings
- IMTQS version with steel pressure rods
- Short unit for bearing loads at specific points
- P. 58

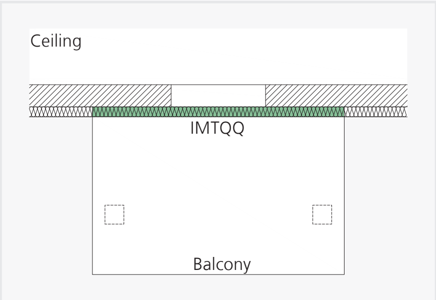


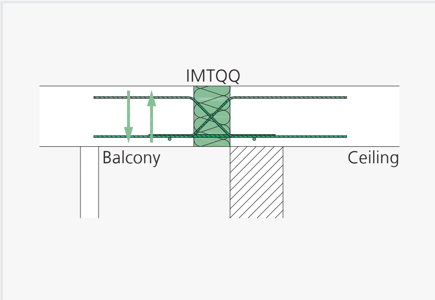
ISOMAXX® IMQZ

- Transfer of positive shearing forces
- Version without compression bearings for constraint-free connections
- Short unit for bearing loads at specific points
- P. 58

TYPE OVERVIEW

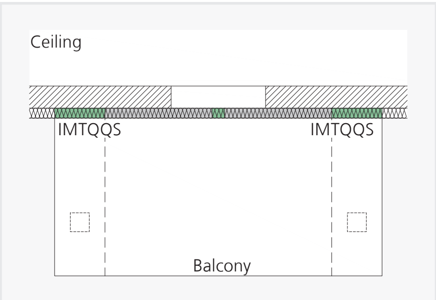
SUPPORTED STRUCTURES WITH LIFTING LOADS

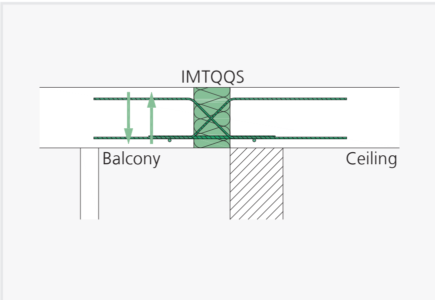




ISOMAXX® IMTQQ

- Transfer of negative and positive shearing forces
- Version with steel pressure rods
- P. 66

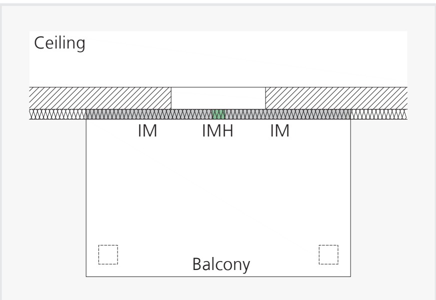


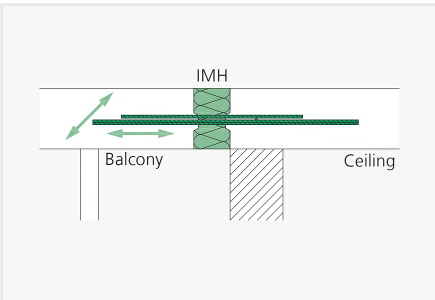


ISOMAXX® IMTQQS

- Transfer of negative and positive shearing forces
- Version with steel pressure rods
- Short unit for bearing loads at specific points
- P. 66

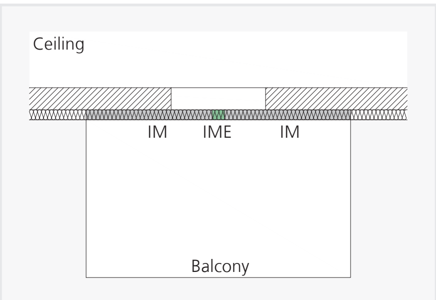
HORIZONTAL LOADS AND EARTHQUAKE LOADS

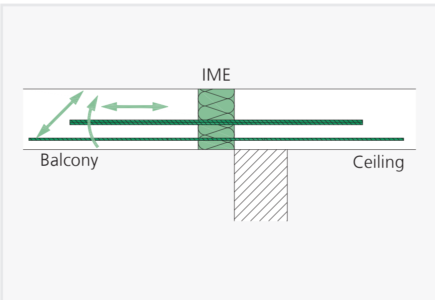




ISOMAXX® IMH

- Transfer of horizontal loads parallel and/ or perpendicular to the insulation plane
- P. 80



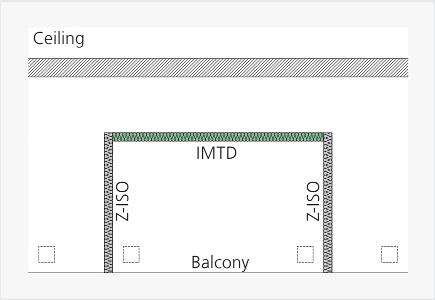


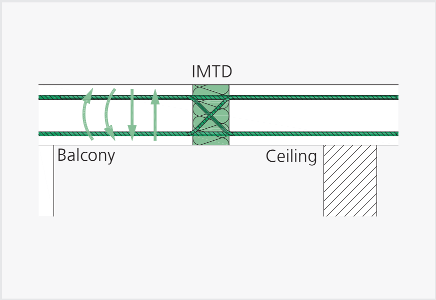
ISOMAXX® IME

- Transfer of horizontal loads parallel and perpendicular to the insulation plane
- In combination with ISOMAXX® units IM and IMTD: transfer of positive moments
- Used for earthquake
- P. 84

TYPE OVERVIEW

CONTINUOUS SLABS

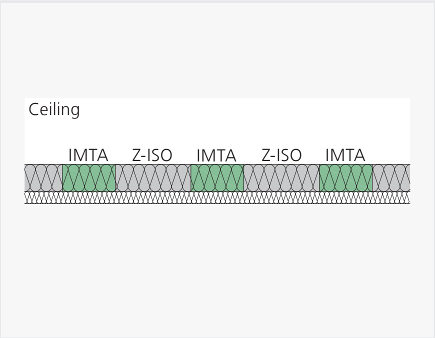


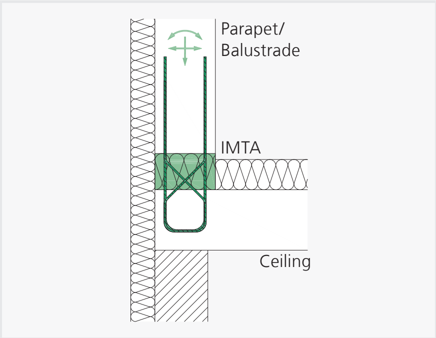


ISOMAXX® IMTD

- Transfer of positive and negative moments and shearing forces
- Version with tension/pressure rods
- P. 72

PARAPETS AND BALUSTRADES CONNECTED TO THE HORIZONTAL FACE

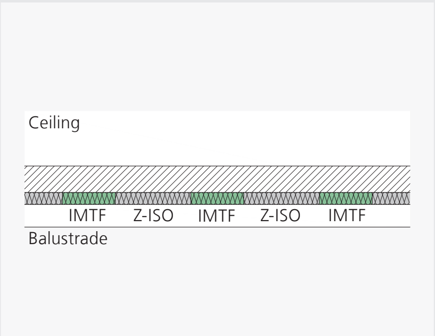


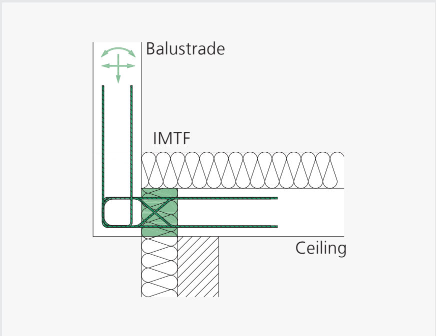


ISOMAXX® IMTA

- Transfer of moments, normal forces and horizontal forces
- Used at specific points
- P. 88

BALUSTRADE CONNECTED TO THE VERTICAL FACE

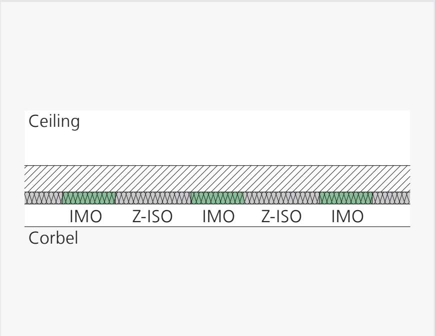


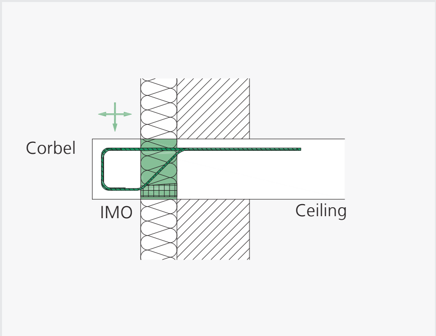


ISOMAXX® IMTF

- Transfer of moments, shearing forces and horizontal forces
- Used at specific points
- P. 92

CORBEL



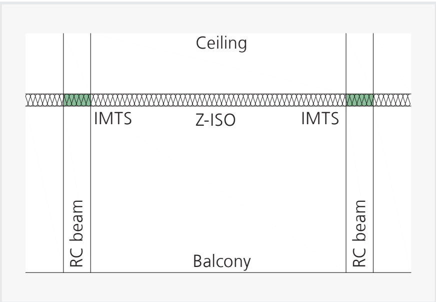


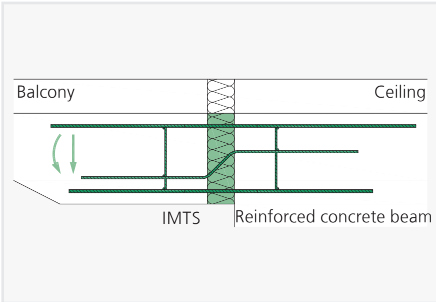
ISOMAXX® IMO

- Transfer of shearing forces and horizontal forces
- Used at specific points
- P. 96

TYPE OVERVIEW

BEAMS

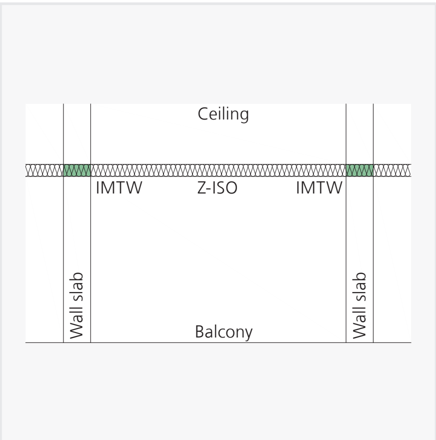


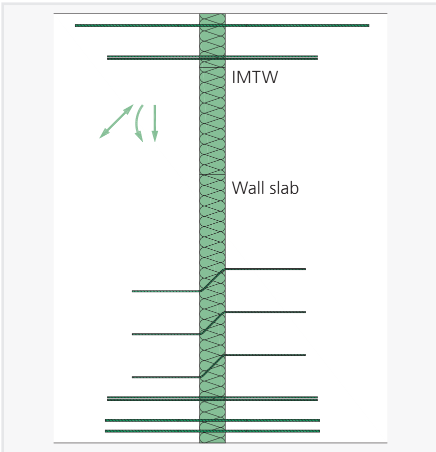


ISOMAXX® IMTS

- Transfer of negative moments and positive shearing forces
- Version with pressure rods
- P. 100

WALLS

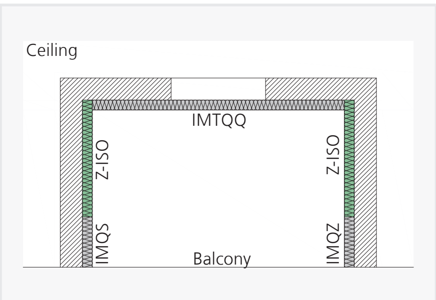


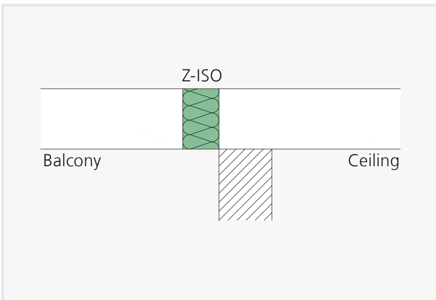


ISOMAXX® IMTW

- Transfer of negative moments, positive shearing forces and horizontal forces
- Version with pressure rods
- P. 104

INTERMEDIATE INSULATION





ISOMAXX® Z-ISO

- No structural function
- Intermediate insulation for support at specific points
- P. 110

PRODUCT INFORMATION

FUNCTION OF THE ISOMAXX® UNIT

As a load-bearing thermal insulation unit, ISOMAXX® undertakes the following functions:
- Thermal separation of reinforced concrete components to resolve structural problems at the transition between internal and external components
- Frictional connection of the reinforced concrete components across the insulating joint.

The load transfer across the joint is carried out by means of tension and shear rods as well as a pressure component. Depending on the ISOMAXX® type, the pressure component is designed as a pressure unit made of special concrete (IM unit) or as a steel pressure rod (IMT unit). For corrosion-protection reasons, and to reduce heat transition through the structural components, stainless steel reinforcement units are implemented in the area of the insulating body. The transition from stainless steel to carbon steel is carried out using a special welding method. In the area of the insulating body the tension rods of standard units are made of stainless steel and have a reduced diameter compared to the adjoining carbon steel rods.
The ISOMAXX® unit is available in different load-bearing capacities. With regard to the load-bearing capacities, the units vary in terms of the number of tension and shear rods, as well as the number of pressure components. In principle, the units are available in heights from 160 mm. However, depending on the diameter of the shear rod used, there may be restrictions in terms of the minimum height.
During installation it is crucial to respect the direction of installation indicated on the label. The direction of installation is marked clearly on each unit by the indication of the top and an arrow to the balcony side (of the cold area).

MATERIALS OF THE ISOMAXX® UNIT

Tension, shear, pressure rod:	Reinforcing steel B500B Stainless steel rebar according to general technical approval Material no. 1.4571, 1.4362 or 1.4482
Compression bearing:	High-performance special concrete
Insulating body:	NEOPOR®*, rigid polystyrene foam, $\lambda = 0.031$ W/mK
Fireproof panels:	Fibre-cement panels of building material class A1 Intumescent coating

GENERAL TECHNICAL APPROVALS

ISOMAXX®:	Z-15.7-243 and Z-15.7-244, DIBt Berlin

MATERIALS OF THE ADJOINING PARTS

Concrete:	Standard concrete acc. to DIN 1045-1 or DIN EN 206-1 with a raw density of 2000 to 2600 kg/m³
Concrete strength classes:	External components ≥ C25/30 Internal components ≥ C20/25
Reinforcing steel:	B500B

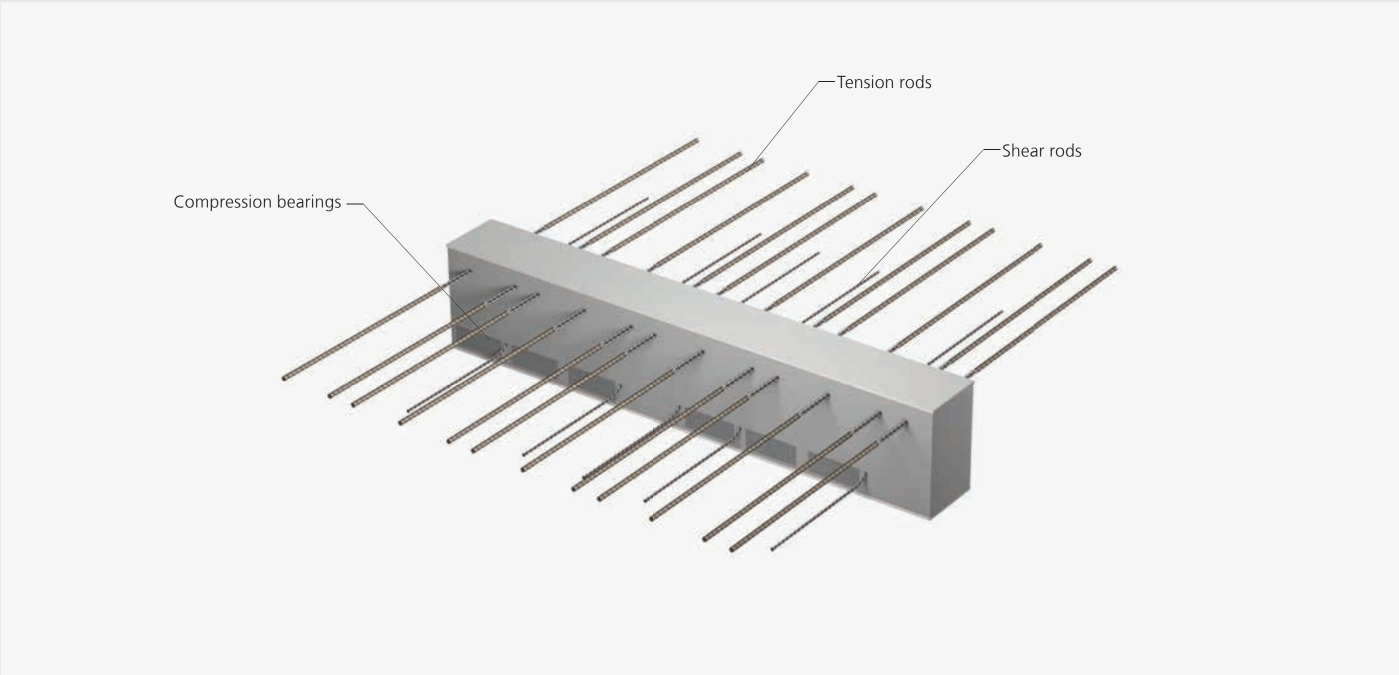
SUPPLEMENTARY REINFORCEMENT

The components adjoining the ISOMAXX® units are reinforced in accordance with the structural engineer´s design based on the structurally required reinforcement.

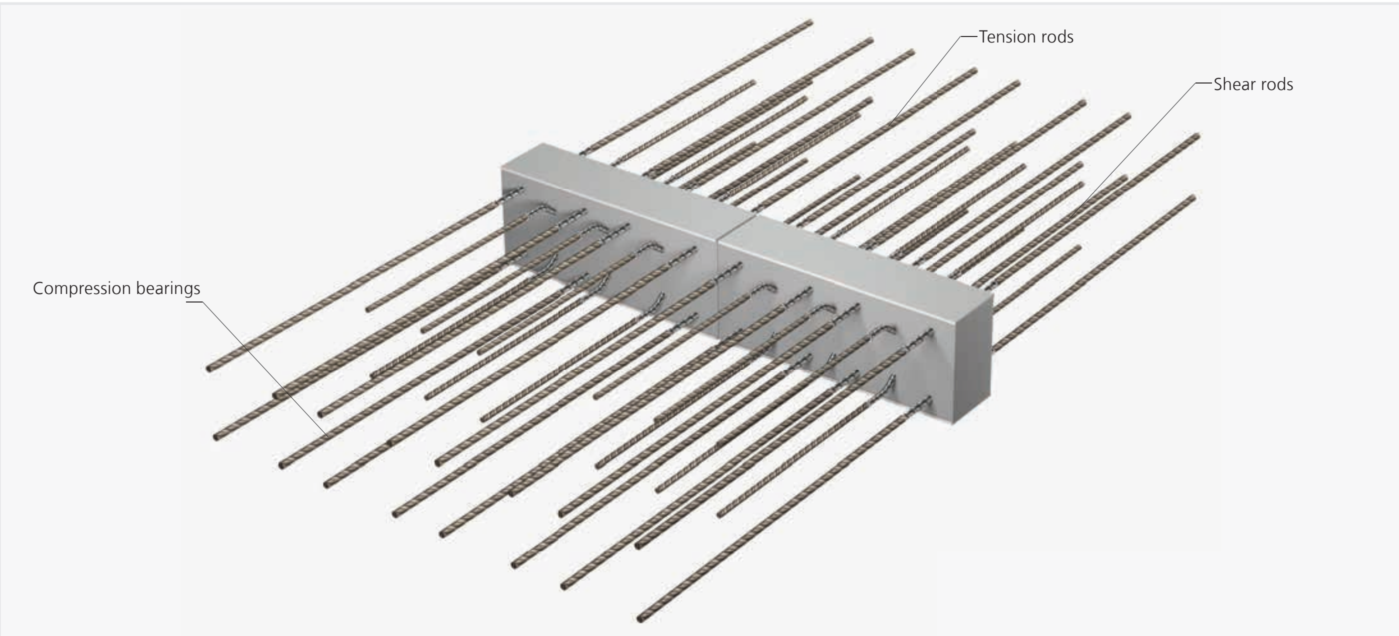
*Neopor® is a registered trademark of BASF, Ludwigshafen

PRODUCT COMPONENTS

ISOMAXX® IM



ISOMAXX® IMTD



Our Applications Technology department would be pleased to assist in finding further solutions.
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E-mail: technik@h-bau.de

CONCRETE COVERING

EXPOSURE CLASS AND CONCRETE COVERING

The minimum concrete strength for the components adjoining the ISOMAXX® units as well as the required concrete covering cv for the ISOMAXX® units are calculated according to the exposure class and the approval. The higher minimum concrete strength class is definitive in each case.

Reinforcement corrosion		Minimum concrete strength class			Concrete covering [mm]	
DIN EN 1992-1-1		DIN EN 1992-1-1/NA	Requirement internal components (acc. approval)	Requirement external components (acc. approval)	Components c_{nom}	ISOMAXX® cv
XC3	Moderate humidity, external components, wet areas	C20/25	C20/25	C25/30	35	30
XC4	Alternately wet and dry, external components directly exposed to rain	C25/30			40	35
XD1	Moderate humidity, spray zone from road surfaces	C30/37			55	50
XS1	Salty air, external compo-nents near coast	C30/37			55	50
XD1	Moderate humidity, spray zone from road surfaces	C30/37			55	50
XS1	Salty air, external compo-nents near coast	C30/37			55	50

ISOMAXX® CONCRETE COVERING

- In accordance with DIN EN 1992-1-1/NA, the cv dimension of the ISOMAXX® units may be reduced by Δc_{dev} = 5 mm using suitable quality measures during production.
- For ISOMAXX® types IM/IM two-part/IM Var., cv35 or cv50 can be selected for the tension rod concrete covering.
- The ISOMAXX® IM corner unit is available with the concrete covering of cv35/cv50 for the tension rods.
- For the shear units, the concrete covering at the top is cv35 to cv85, depending on the height.
- The concrete covering for pressure rods and shear rods at the bottom is generally cv30 (usually lower exposure compared to the top side of the balcony).
- ISOMAXX® IMTD units have a bottom concrete covering of cv30 for the selected top concrete covering of cv35, and a bottom concrete covering of cv50 for the selected top concrete covering of cv50.

DESIGN AND INSTALLATION

NOTES ON DESIGN

- The design for the reinforced concrete components adjoining the ISOMAXX® units is provided by the structural engineer.
- When there are different concrete qualities in the adjoining components (e.g. balcony C25/30; ceiling C20/25), the lower concrete quality is definitive for designing ISOMAXX® units.
- The specified table values for supplementary reinforcement apply to full utilisation of the ISOMAXX® units. A reduction by m_{Ed}/m_{Rd} or v_{Ed}/v_{Rd} is permissible.
- The specified minimum heights depending on the shearing force load-bearing capacity apply to concrete cover cv35. The minimum heights must be increased by 20 mm accordingly for cv50.
- To bear planned horizontal loads, the ISOMAXX® IM units must be combined with ISOMAXX® IMH and/or IME short units.
- ISOMAXX® units for cantilevered constructions without live load, but with an ordinary moment from a load not increasing the shear forces, must be proven separately by our application technology
- For reinforcement, please note ability for concrete pouring. This applies in particular to ISOMAXX® units with a high number of rods.

SPECIAL UNITS

- Beyond the standard units listed in this documentation, we also offer special structures tailored to the construction project, resultant forces and component geometry. Planning, design and production of special structures is carried out in compliance with the requirements of the approvals and according to DIN EN 1992-1-1 and DIN EN 1992-1-1/NA.

HANDLING AND INSTALLATION ON SITE

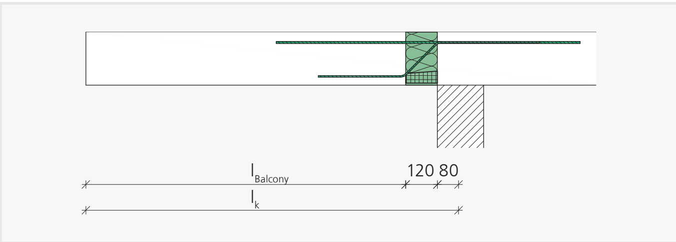
- When using ISOMAXX® units with concrete compression bearings, please ensure that the frictional connection between the compression bearing and the concrete of the component is guaranteed. When using prefab slabs, an in-situ concrete or grouting strip at least 100 mm wide must be taken into account.
- For simultaneous use of ISOMAXX® units with steel pressure rods and prefab slabs, it must be ensured that the width of the in-situ concrete strip is matched to the length of the pressure rods.
- When using ISOMAXX® units with fire protection version R 90/REI 120, please ensure that the fireproof panels are not damaged.
- Please note that subsequent bending of the reinforcement rods on site will render the approval and warranty by H-BAU Technik GmbH void.
- On site partition of ISOMAXX® metre units is possible – reduced load-bearing capacity and minimal edge distance of the ISOMAXX® components must be taken into consideration.
- In highly reinforced structures (e.g. joists) it should be considered to install the ISOMAXX® unit before the supplementary reinforcement.

DESIGN

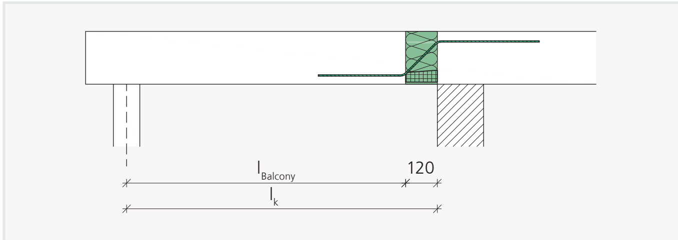
DESIGN OF ISOMAXX® UNITS – FEM CALCULATION/MANUAL CALCULATION

DEFINITION OF SYSTEM

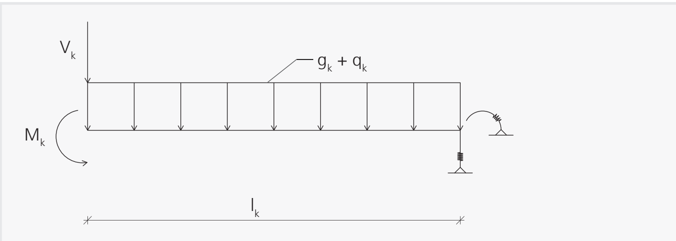
Cantilevered balcony

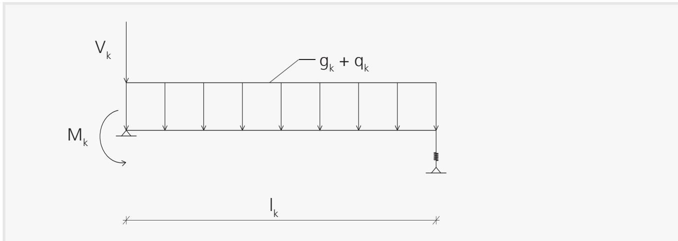


Supported balcony



System





SUPPORT CONDITIONS

	Cantilevered balcony		Supported balcony
Manual calculation:	Clamped		Hinged
FEM calculation:			
Torsion spring:	10,000 kNm/rad/m	Torsion spring:	–
Vertical spring:	250,000 kN/m/m	Vertical spring:	250,000 kN/m/m

LOAD ASSUMPTIONS

g_k: Permanent loads (dead load + superimposed load)
q_k: Live load
V_k: Edge load (railings, balustrade, plinth, etc.)
M_k: Edge moment (due to horizontal load on railings, balustrade, etc.)

METHOD FOR FEM CALCULATION

- Calculate the balcony slab as a separate system from the load-bearing structure of the building
- Define supports in the connecting area with the aforementioned rigidities
- Calculate resultant forces using linear-elastic approach
- Select ISOMAXX® units
- Set the calculated resultant forces as the edge load for the load-bearing structure of the building

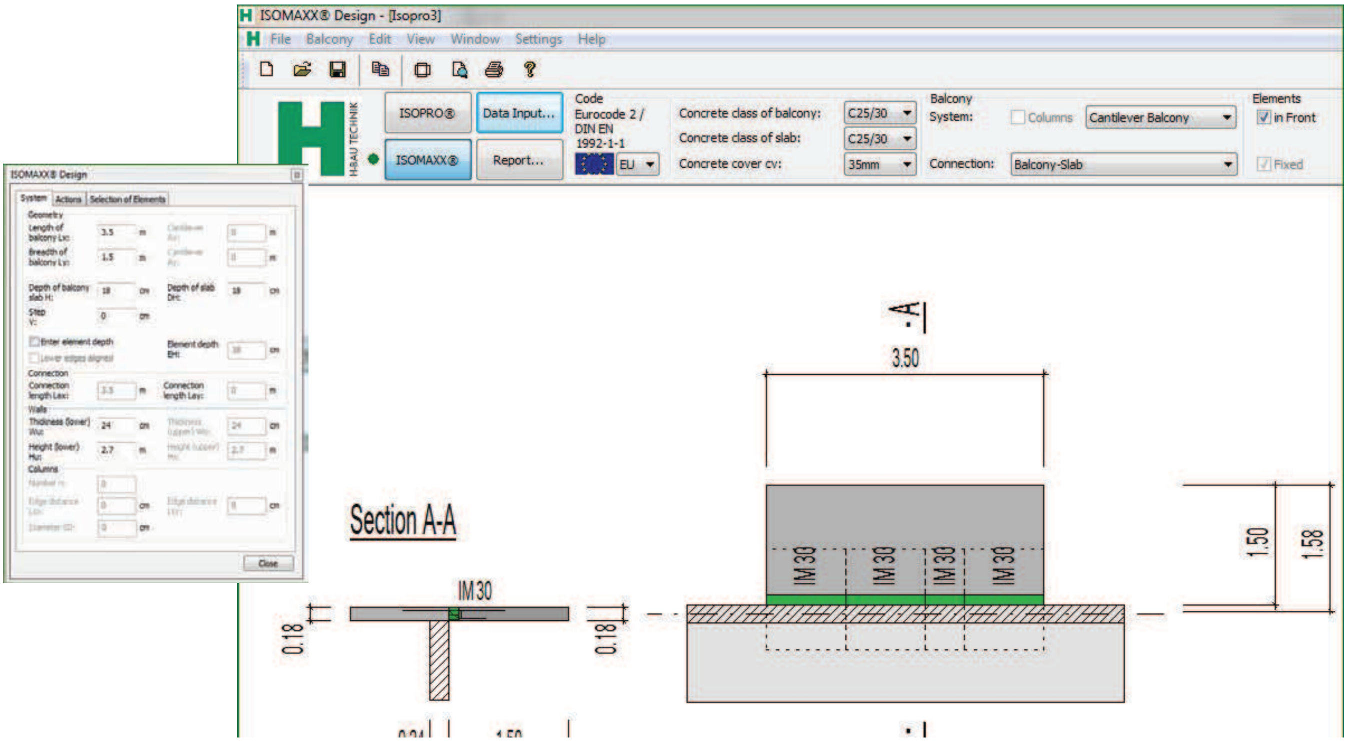
NOTE

If the rigidity ratios along the slab edge vary significantly (e.g. supports along the slab edge and no continuous wall), the balcony slab should not be calculated as a system separate from the building. In this case, a hinged line should be defined along the edge of the balcony slab, with the aforementioned rigidities. The ISOMAXX® units can be determined based on the joint forces.

SOFTWARE

DESIGN OF ISOMAXX® UNITS – SOFTWARE ISOPRO® DESIGN

The ISOPRO® DESIGN program allows us to pass on to you our many years of experience in designing our ISOPRO®/ISOMAXX® thermal insulation units for the most common balcony systems. You can choose between different balcony systems comprising a cantilevered balcony, balcony on supports, loggia, internal corner balcony and external corner balcony. After entering the geometric data and the applied loads, you can select the corresponding ISOMAXX® units.
The arrangement and geometric parameters of the ISOMAXX® units can be checked for feasibility in the layout and cross-section and, if necessary, can be printed out as a formwork drawing or exported as a DXF file for further editing.



ADVANTAGES

- All common balcony systems can be selected
- Design with FEM-module
- Log output including proof
- CAD export

Our Applications Technology department would be pleased to assist in finding further solutions.
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PROOF OF SERVICEABILITY

CAMBERS AND BENDING SLENDERNESS

CAMBERS

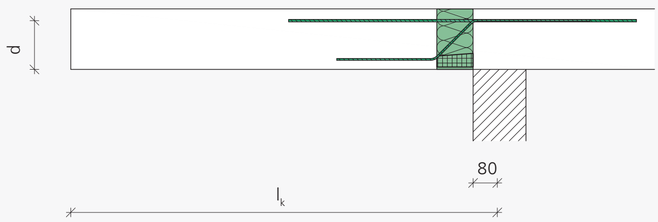
A cantilevered slab deforms under load, with the maximum deflection occurring at the end of the cantilever arm. If a cantilevered slab is connected to an ISOMAXX® unit, the share of deflection from the slab itself must be superimposed with that of the ISOMAXX® unit in order to calculate the maximum deflection.
The ISOMAXX® tension and pressure components behave in approximately the same way as a spring system that is stretched or compressed. The resulting angle of rotation α is used to calculate the maximum deflection by the ISOMAXX® unit.
We recommend providing proof of the limit state of serviceability for the quasi-permanent load case combination. To calculate the required camber of the cantilevered slab, the deflection should be rounded up or down according to the direction of the planned drainage.

For the calculation of the deflection of the ISOMAXX® units please refer to product chapters.

w_1 = deflection due to thermal insulation unit
w_2 = deflection due to slab

BENDING SLENDERNESS

The bending slenderness is defined as the ratio of the static height d of the balcony slab to the cantilever length l_k. The bending slenderness of a slab has an impact on its vibration characteristics. We therefore recommend limiting the bending slenderness. Limits for the bending slenderness are specified on page 33.

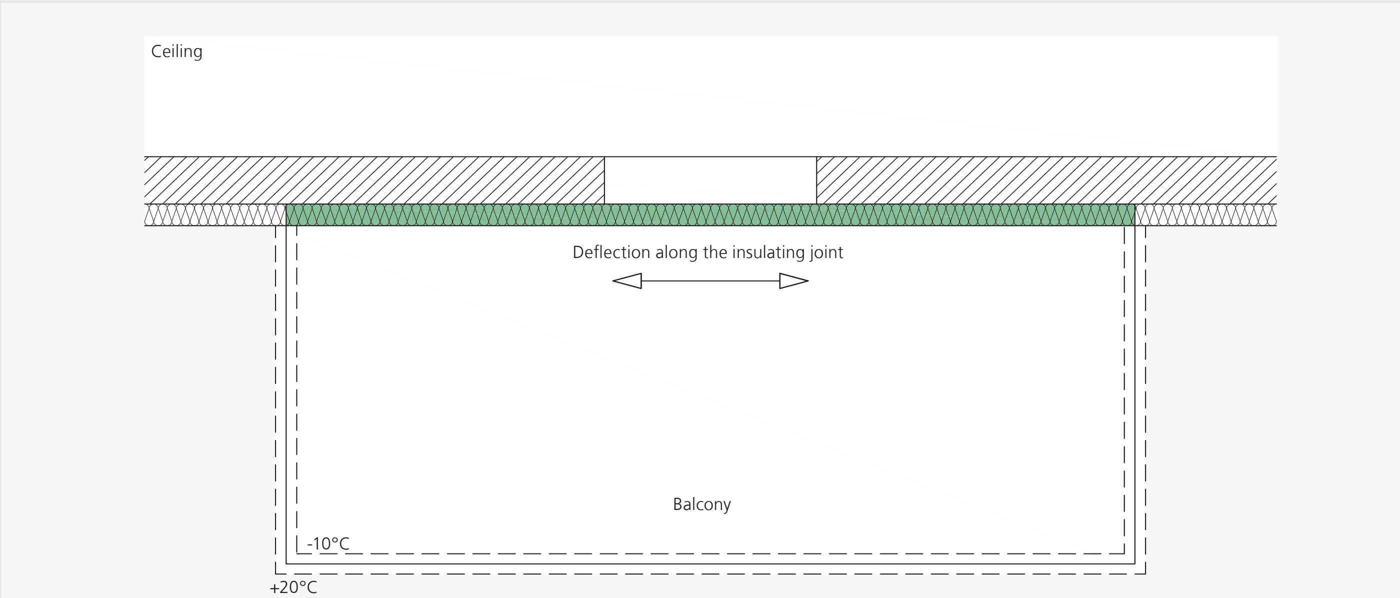


ISOMAXX® IM – Static system

DISTANCE BETWEEN EXPANSION JOINTS

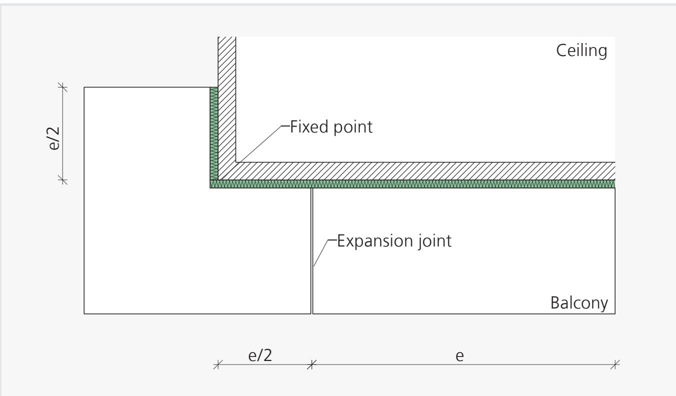
DISTANCE BETWEEN EXPANSION JOINTS

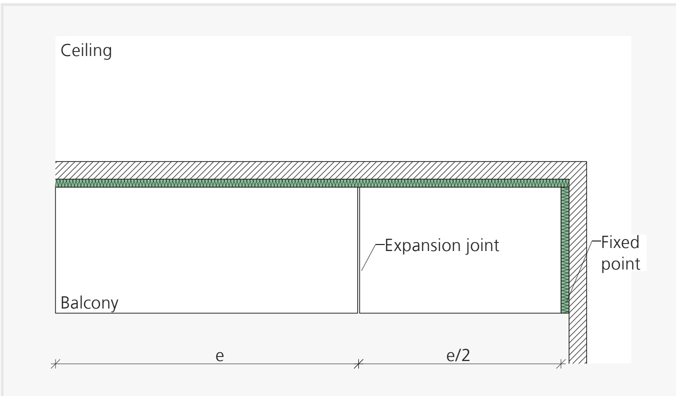
Due to the influence of temperature on external components such as balconies or canopies, deflection of reinforced concrete components can occur. These components expand when heated and contract when cooled. If the reinforced concrete components are thermally separated with ISOMAXX® units, then deflection of the ISOMAXX® components parallel to the insulating joint occurs due to the deflection of the reinforced concrete slab.



Balcony slab under influence of temperature

To limit the stress on ISOMAXX® units as a result of the influence of temperature, very long reinforced concrete components must be separated using expansion joints. The maximum permissible distance between expansion joints e is regulated in the technical approval. The maximum permissible distance between expansion joints e is dependent on the rod diameter and therefore on the ISOMAXX® types used. Details can be found in the respective product sections. The use of fixed points such as corner supports or the use of ISOMAXX® IMH or IME units results in increased constraints, which means the maximum permissible distance between expansion joints must be reduced to e/2.
To prevent uneven settlement of the structural components separated by expansion joints, we recommend connecting the slabs with longitudinally displaceable shear dowels type HED.





Expansion joint layout for different balcony systems

THERMAL INSULATION

THERMAL BRIDGES

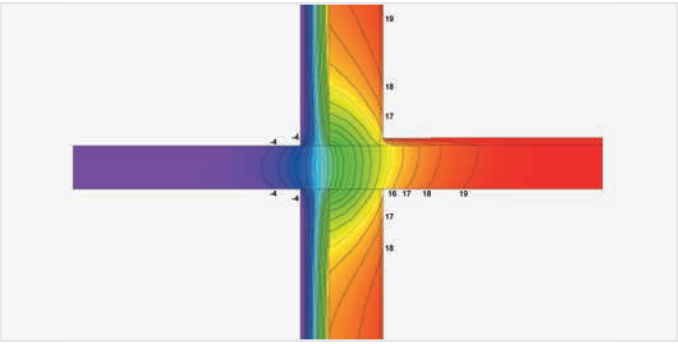
Thermal bridges are weak points in the heat-conducting building envelope, which result in a locally increased heat loss in comparison with standard components. We distinguish between thermal bridges caused by geometric factors, where there is a larger external surface opposite the thermal outflow of the internal surface, and thermal bridges caused by material factors, where an increased heat loss occurs due to local installation parts or material changeovers.

IMPACT OF THERMAL BRIDGES

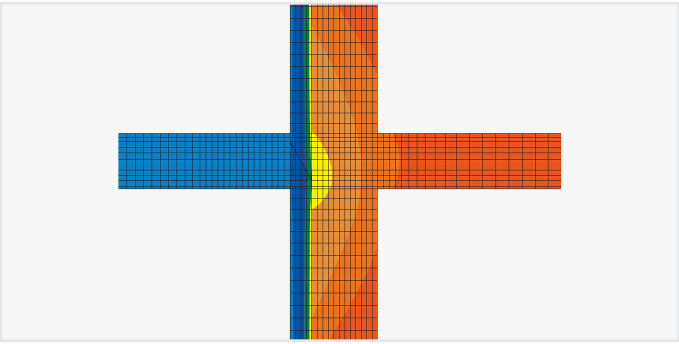
Thermal bridges have a significantly higher heat flow in comparison with the rest of the envelope surface. This increased heat flow causes the inside surface temperature to fall sharply in this area. The consequence is an increased heating energy requirement.
If a further drop in the surface temperature causes the temperature to fall below the dew point temperature, the humidity in the room air condenses, which causes condensation to form on the cold surfaces concerned. This can lead to the formation of mould and the resulting health burdens.

THE BALCONY THERMAL BRIDGE

A balcony designed as a projecting reinforced concrete slab is the classic example of a linear thermal bridge.
If a highly heat-conductive reinforced concrete slab penetrates the thermal insulation layer of the building, the effects of the thermal bridges – caused by geometric factors – are superimposed by the large external surface and the effects of the material-dependent thermal bridge. The results are a significant cooling of the ceiling in the rooms and, as a result, increased heating costs, condensation and mould formation.
If ISOMAXX® thermal insulation units are used in the connecting area between the reinforced concrete slabs and the building, thermal bridges are minimised.



Temperature distribution in continuous reinforced concrete slab



Temperature distribution in thermally separated reinforced concrete slab

THERMAL INSULATION

THERMAL INSULATION CERTIFICATE – THERMAL BRIDGES IN ACCORDANCE WITH EnEV

For the energy performance certificate according to the German Energy Saving Regulation EnEV, all losses caused by thermal bridges must be accounted for. There are three methods of recording the calculations.

If there is no documentation of thermal bridges or if their design does not comply with the construction examples in accordance with DIN 4108 supplementary sheet 2:2006-03, a penalty surcharge on the mean U-value of the entire building of ΔU_{WB} = 0.10 W/(m²K) must be taken into consideration. Further documentation is not necessary.

The thermal bridge surcharge may be reduced to ΔU_{WB} = 0.05 W/(m²K) if all thermal bridges in the building are implemented in compliance with DIN 4108 supplementary sheet 2:2006-03. Conformity of balcony insulation units with DIN 4108 supplementary sheet 2:2006-03 fig. 70 is regulated in the general technical approval. In accordance with approvals Z-15.7-243 and Z-15.7-244, ISOMAXX® units meet the requirements according to DIN 4108 supplementary sheet 2:2006-03, which enables use of the reduced thermal bridge surcharge ΔU_{WB} = 0.05 W/(m²K).

Another option for consideration of thermal bridges is providing detailed evidence of each individual thermal bridge present in the building, in accordance with DIN V 4108-6:2003-06. In this case, the thermal bridge coefficients of loss ψ for linear thermal bridges and χ for thermal bridges at specific points as well as the temperature factors $f_{RSi} \geq 0.7$ must be calculated for all thermal bridges in a building.

OVERVIEW OF THE METHODS ACCORDING TO EnEV

	Method 1	Method 2	Method 3
Description	The thermal bridges of the building are not documented individually and do not comply with the design according to DIN 4108 supplementary sheet 2	The thermal bridges of the building are designed in compliance with DIN 4108 supplementary sheet 2	The thermal bridges have been calculated in detail and documented according to DIN V 4108-6:2003-06 in connection with other recognised rules of technology (DIN EN ISO 10211)
Proof	No further proof	Regulated in the approvals for the balcony insulation units	Proven through detailed, three-dimensional thermal bridge calculation
Consideration	General: ΔU_{WB} = 0.10 W/(m²K)	General: ΔU_{WB} = 0.05 W/(m²K)	Detailed: $H_T = \sum U_i \cdot A_i \cdot F_{x,i} + \sum \psi_i \cdot l_i \cdot F_{x,i} + \sum \chi_i \cdot F_{x,i}$

NOTES

- It is not permissible to use a combination of the different methods.
- Object-related calculation of ψ values on request.

Our Applications Technology department would be pleased to assist in finding further solutions.
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THERMAL INSULATION - IMPACT SOUND PROTECTION

THERMAL INSULATION - STRUCTURAL - PHYSICAL CHARACTERISTICS

The general technical approval for ISOMAXX® units requires to assess the risk for the occurence of dew point temperature of a structure according to DIN 4108-2, section 6.2. For that the temperature factor at the least favorable location for the minimum requirement of $f_{RSi} \geq 0{,}7$ and $\theta_{si} \geq 12{,}6$ °C acc. DIN EN ISO 10211 has to be calculated.
All ISOMAXX® thermal insulation units meet the requirements by far. The table gives an example of the building physics characteristics of some ISOMAXX® units:

ISOMAXX® type	Insulation thickness EIFS [mm]	ψ-value [W/mK]	f_{RSi} [ ]	θ_{si} [°C]	λ_{eq} [W/mK]	R_{eq} [m²K/W]
IM 25 Q8 h180	200	0,138	0,928	18,2	0,136	0,882
IM 50 h200	200	0,174	0,920	18,0	0,158	0,759
IM 100 Q10 h240	200	0,254	0,900	17,5	0,205	0,585
IMQ 30 h200	200	0,112	0,936	18,4	0,100	1,200

The general technical approval also sets the consideration of the increased transmission heat loss according to DIN V 4108-6:
If no more detailed proof is done, the plate connection may be used as a thermally separated construction in the sense of DIN 4108 supplement 2. It may therefore be calculated with the reduced specific thermal bridge surcharge of ΔU_{WB} = 0,05 W/m²K for the entire enclosure area.

IMPACT SOUND PROTECTION - NORMATIVE FRAMEWORK

The revised version of DIN 4109 of January 2018 shows minimum sound insulation requirements for balconies of multi-family houses, office buildings and mixed-use buildings, as no requirements had been set for them earlier.
People on balconies cause noises that are transmitted to the adjacent, so-called vulnerable rooms if sound insulation is missing.For balconies connected with thermal insulation units the transmission of structure-borne noise to vulnerable rooms is lower in comparison to through-cast reinforced concrete slabs.
Noise levels are classified by the evaluated standard impact sound level $L'_{n,w}$. The reduction of impact sound by the use of thermal insulation units is measured by the assessed impact sound level difference $\Delta L_{n,v,w}$.

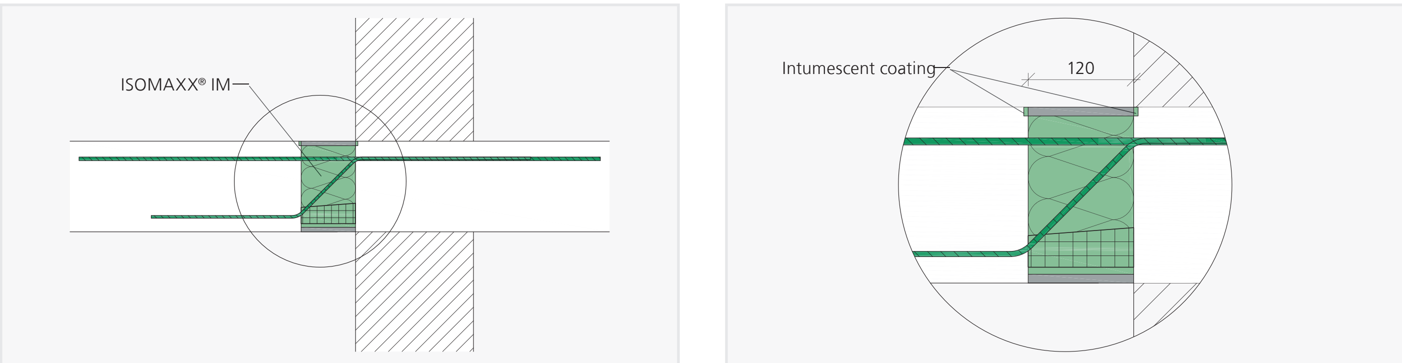
MEASUREMENT OF IMPACT SOUND OF ISOMAXX® UNITS

For three ISOMAXX® units the evaluated standard sound levels and the assessed impact sound level differences were determined by way of example at the Frauenhofer Institute for Building Physics in Stuttgart. The minimum requirements of DIN 4109 were met by the tested ISOMAXX® units. If there are higher sound insulation requirements for a construction project, the impact sound level can be further reduced by additional measures (such as the use of underlay mats).

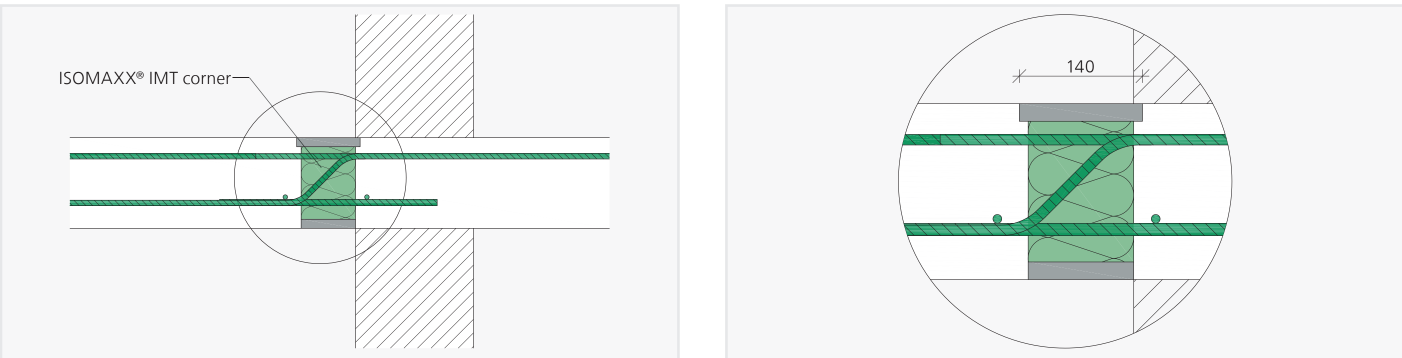
FIRE PROTECTION

FIRE RESISTANCE CLASSES R 90/REI 120

Where there are fire protection requirements regarding the fire resistance class of components, all ISOMAXX® units with concrete compression bearings are available in fire resistance class REI 120 and all ISOMAXX® units with a steel pressure plane are available in fire resistance class R 90.
To this end, the ISOMAXX® units are fitted with fireproof panels on the top and bottom ex works. The short units IMQS / IMQZ / IMTQQS / IMTA / IMTF / IMO as well as elements for beams and walls IMTS and IMTW are made circumferentially with fire protection boards. The unit lengths mentioned in this technical documentation increase in case of circumferential fire protection by the thickness of the fire protection boards.
The prerequisite for classification into R 90/REI 120 is that the adjoining components meet the requirements of the respective fire resistance class. If a physical barrier (E) and heat shielding (I) are also required in the event of fire, then it must be ensured that ISOMAXX® Z-ISO FP1 in EI 120 is used as the intermediate insulation where ISOMAXX® units are used at specific points.



ISOMAXX® unit with concrete compression bearings in REI 120 version with fireproof panels at the top and bottom, intumescent coating at the side



ISOMAXX® unit with steel pressure rods in R 90 version with fireproof panels overhanging at the top and flush at the bottom

FIRE RESISTANCE CLASSES OF ISOMAXX® UNITS

ISOMAXX® units achieve the following fire resistance classes:

ISOMAXX®	IM, IM two-part, IM corner, IM Var., IMQ, IMZQ, IMQS, IMQZ, IMH, IME, IMO	IMT corner, IMTQS, IMTQQ, IMTQQS, IMTD, IMTA, IMTF, IMTS, IMTW	IM Z-ISO FP1
Fire resistance class	REI 120	R 90	EI 120

FIRE PROTECTION

FIRE PROTECTION REGULATIONS FOR BALCONIES

According to DIN EN 13501-2:2010-02 (1a), balconies are considered to be load-bearing components without a separating function. Usually building codes do not place any specific requirements in terms of fire protection for balconies. As a result, the fire protection requirements must be checked in each individual case.

FIRE PROTECTION REGULATIONS FOR ACCESS BALCONIES

According to DIN EN 13501-2:2010-02 (1a), access balconies are considered to be load-bearing components without a separating function. To the extent that access balconies do not function as a "necessary corridor", the Model Building Regulation Section 31 does not set any specific requirements in terms of fire protection. Necessary corridors must be designed to be fireproof, highly fire resistant or fire resistant, depending on the building class. Whether or not the thermal insulation connection must be designed with a separating function must be checked in each individual case.

REQUIREMENTS OF ACCESS BALCONIES AS NECESSARY CORRIDORS:

Building class according to Model Building Regulation Section 2	Requirements of access balconies as necessary corridors		
	Model Building Regulation Section 31	DIN EN 13501-2	DIN 4102-2
1	Load-bearing and separating	N/A	N/A
2	Load-bearing and separating, fire-resistant	REI 30	F 30-B
3	Load-bearing and separating, fire-resistant	REI 30	F 30-AB (separating)
4	Load-bearing and separating, highly fire-resistant	REI 60	F 60-AB (separating)
5	Load-bearing and separating, fireproof	REI 90	R 90-AB (separating)

NOTE

For fire protection requirements, please note that even a possible insulation layer between individual ISOMAXX® units must also meet the fire protection requirements. This can be implemented with ISOMAXX® Z-ISO FP1 in EI 120.

FIRE BARRIERS

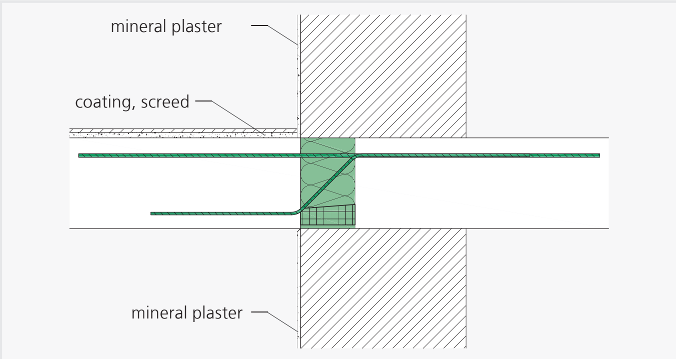
Fire barriers are required for buildings with a thermal insulation composite system made of EPS insulating materials with a thickness greater than 100 mm if there are more than three floors, in every second floor. This is achieved by the complete horizontal interruption of the insulation. Balconies, loggias and access balconies, which interrupt a ETCIS completely horizontally, can take over the function of a fire barrier, so that can be dispensed with in this area on the additional execution of fire barriers. However, the fire barrier must connect laterally to the cantilever slabs, so that the fire protection interruption of the insulation is continuous. In the situation described ISOMAXX® units in the fire protection versions REI 120 or R 90 must be used.

FIRE PROTECTION

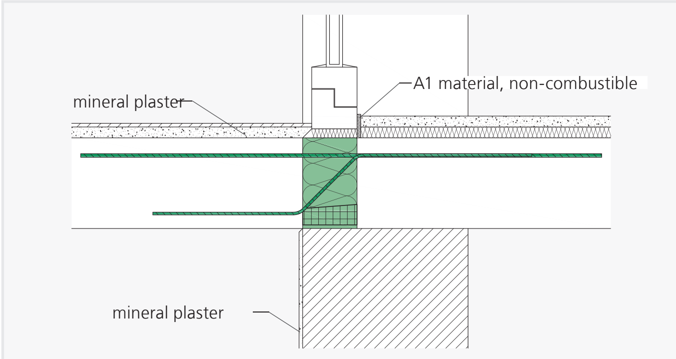
FIRE RESISTANCE CLASS REI 30

All ISOMAXX® standard units can be classified in fire resistance class REI 30 if the following requirements for the overall structure are met:

- The components adjoining the ISOMAXX® unit are clad with mineral protective layers on the surface or
- The components adjoining the ISOMAXX® unit are clad with protective layers made of non-combustible materials on the surface and
- The ISOMAXX® unit is embedded in the overall structure with protection against exposure to direct flames from above and below.

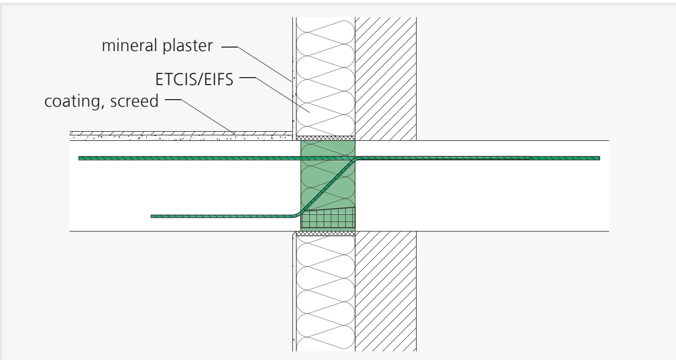


REI 30 formation in wall area

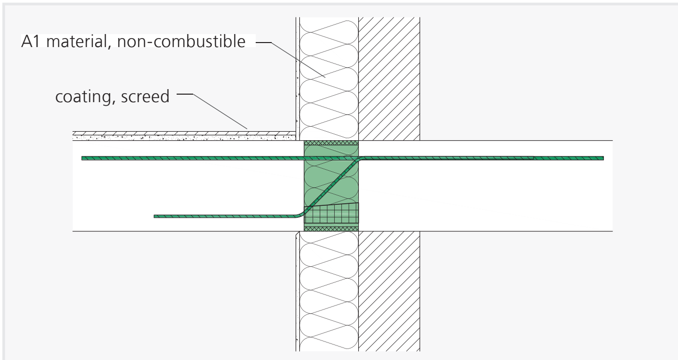


REI 30 formation in door area

FIRE RESISTANCE CLASS REI 120



REI 120 embedment of ISOMAXX® unit in thermal insulation composite system

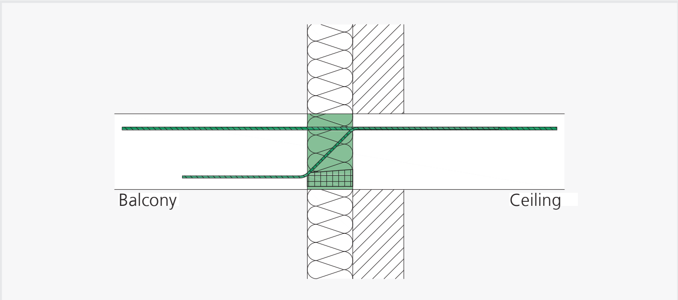


REI 120 embedment of ISOMAXX® unit in non-combustible insulation

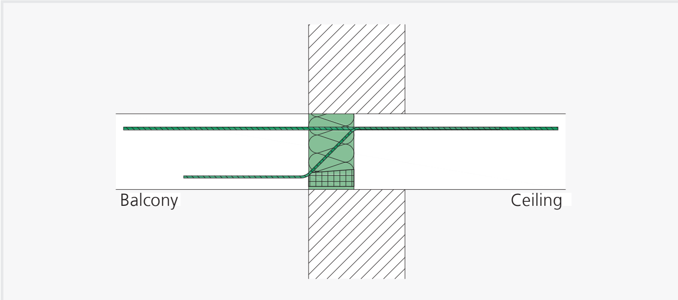
INSTALLATION INSTRUCTIONS

POSITION IN COMPONENT

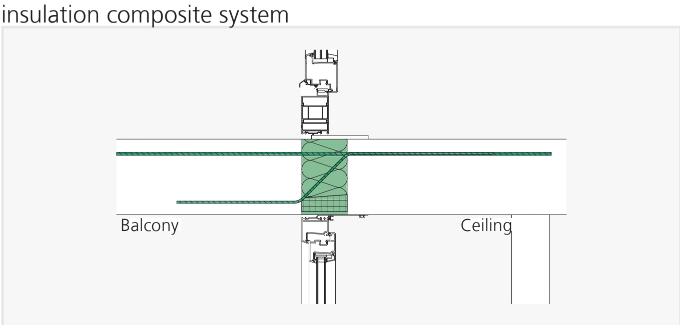
To reliably prevent thermal bridges, the ISOMAXX® units are installed in the insulation plane.



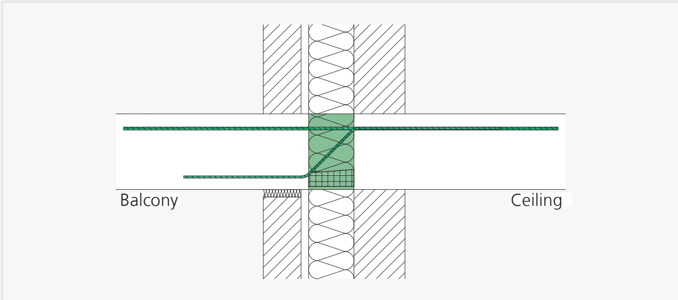
ISOMAXX® IM – Installation cross-section for external thermal insulation composite system



ISOMAXX® IM – Installation cross-section for single-leaf masonry



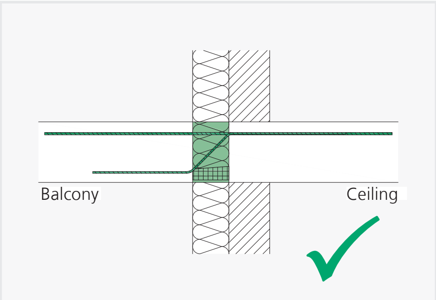
ISOMAXX® IM – Installation cross-section for glass façade



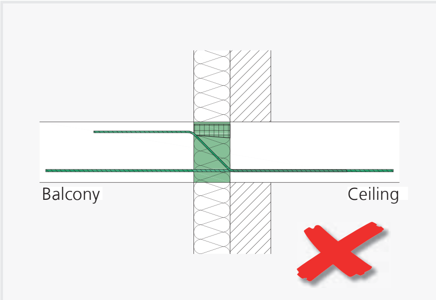
ISOMAXX® IM – Installation cross-section for double leaf masonry

DIRECTION OF INSTALLATION

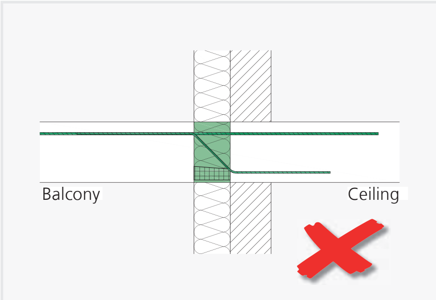
During installation, note the correct direction of installation on the balcony/ceiling as well as at the top/bottom. Ensure that the tension rods are at the top and the compression bearings/pressure rods are at the bottom. Starting at the bottom on the balcony, the shear rod runs diagonally through the ISOMAXX® unit and ends at the top of the ceiling.



ISOMAXX® IM – correct installation



ISOMAXX® IM – Incorrect installation, tension rod must be at the top

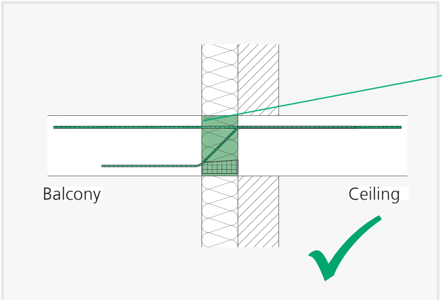


ISOMAXX® IM – Incorrect installation, shear rod must be on the bottom side of the balcony

INSTALLATION - PRESSURE JOINT

DIRECTION OF INSTALLATION

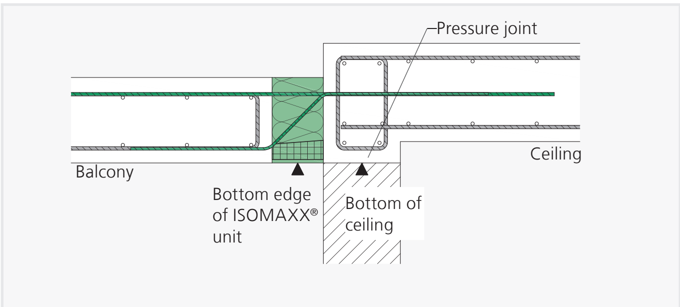
During installation it is crucial to note the direction of installation indicated on the label. The direction of installation is marked clearly on each unit by the indication of the top and an arrow to the balcony side (of the cold area).



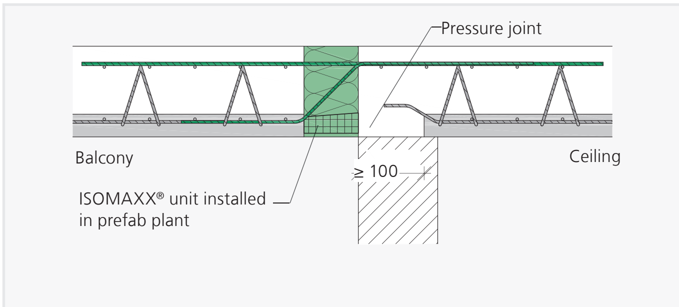
ISOMAXX® IM – correct installation

PRESSURE JOINT

Both when using prefabricated components and semi-finished components, i.e. also when installing ISOMAXX® units in an in-situ concrete structure, ensure that a form-fitting connection is produced between the compression bearing and the fresh concrete. A pressure joint of ≥ 100mm must be provided for this purpose.



ISOMAXX® IM – Pressure joint for in-situ concrete construction and vertically offset slabs



ISOMAXX® IM – Pressure joint for prefab slabs on the ceiling

ISOMAXX®
IM

UNITS FOR CANTILEVERED BALCONIES

ISOMAXX® IM

- For transferring negative moments and positive and negative shearing forces
- Pressure plane with concrete compression bearings
- Load-bearing capacities IM 15 to IM 100
- Shearing force load-bearing capacities, standard, Q8, Q10, Q12, Q8X and Q10X
- Concrete covering of tension rods cv35 or cv50
- Unit heights depending on the shearing force load-bearing capacity starting from h_{min} = 160 mm
- Fire resistance class REI 120 available

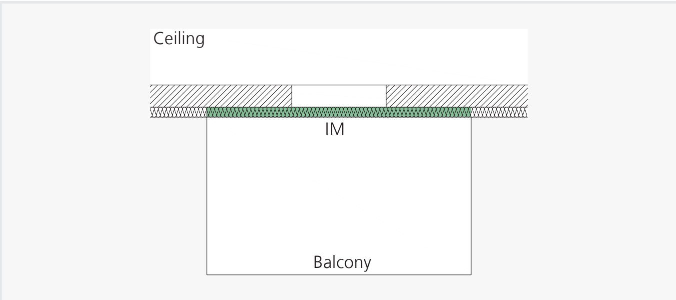
TYPE DESIGNATION

IM 65 Q8 cv35 h200 REI 120

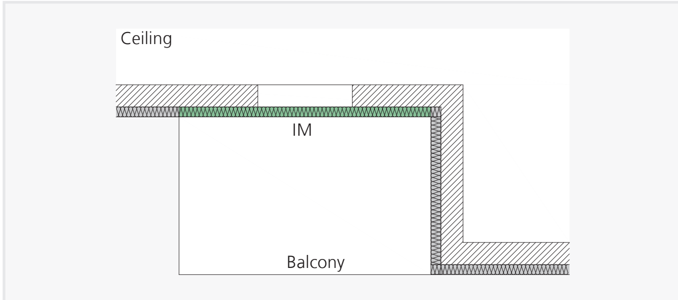
- REI 120 — Fire protection version
- h200 — Unit height
- cv35 — Concrete covering
- Q8 — Shearing force load-bearing capacity
- IM 65 — Type and load-bearing capacity

APPLICATION – UNIT ARRANGEMENT

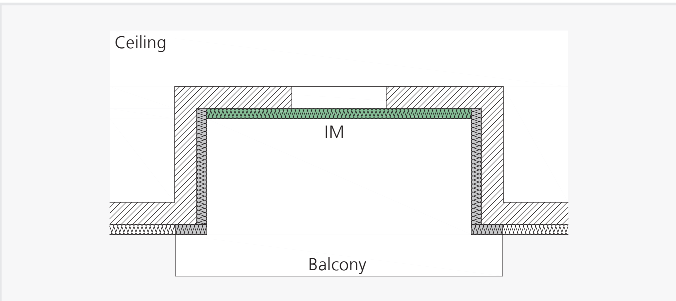
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



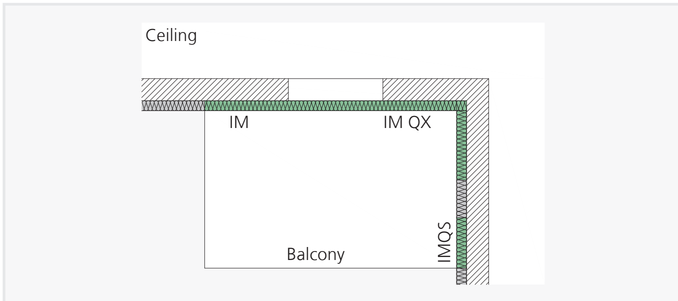
ISOMAXX® IM – Cantilevered balconies



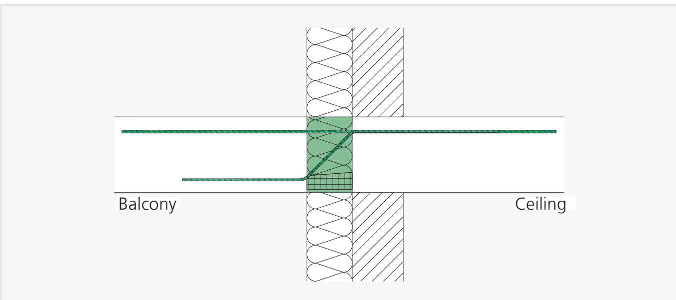
ISOMAXX® IM – Cantilevered balconies in façade extensions



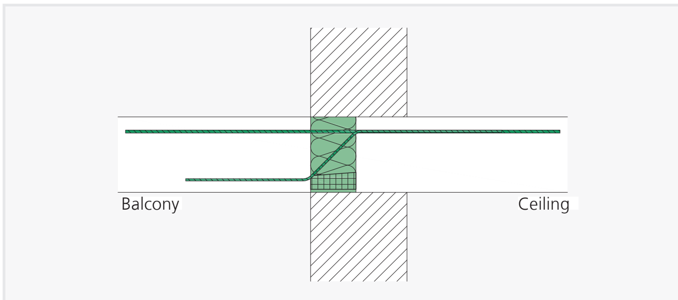
ISOMAXX® IM – Cantilevered balconies in façade recesses



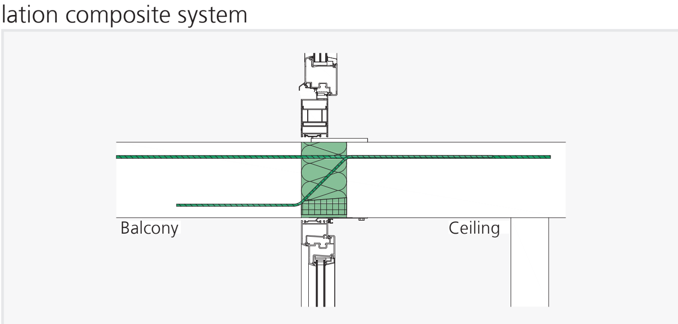
ISOMAXX® IM in combination with IM QX and IMQS for internal corner balconies



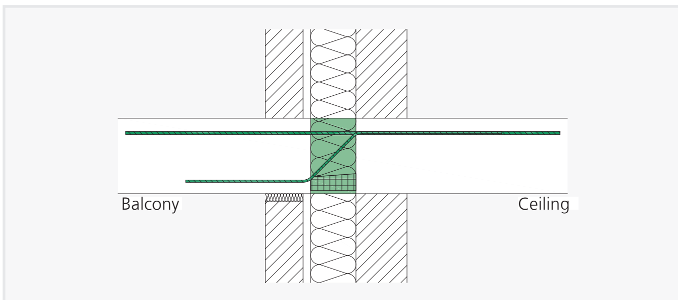
ISOMAXX® IM – Installation cross-section for external thermal insulation composite system



ISOMAXX® IM – Installation cross-section for single-leaf masonry



ISOMAXX® IM – Installation cross-section for glass façades



ISOMAXX® IM – Installation cross-section for double leaf masonry

DESIGN FOR CONCRETE C 20/25

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX® Concrete ≥ C20/25					
35	50	IM 15	IM 20	IM 25	IM 30	IM 40	IM 45
160	–	9,0	13,2	15,4	20,2	23,8	25,3
–	180	9,5	14,0	16,2	21,3	25,1	26,7
170	–	10,0	14,8	17,1	22,4	26,5	28,0
–	190	10,5	15,5	18,0	23,5	27,8	29,4
180	–	11,1	16,3	18,9	24,6	29,2	30,7
–	200	11,6	17,1	19,8	25,7	30,5	32,1
190	–	12,2	17,9	20,7	26,8	31,9	33,5
–	210	12,7	18,6	21,6	27,9	33,3	34,8
200	–	13,3	19,4	22,5	28,9	34,7	36,2
–	220	13,8	20,2	23,4	30,0	36,0	37,5
210	–	14,4	21,0	24,3	31,1	37,5	38,9
–	230	14,9	21,8	25,2	32,2	38,8	40,3
220	–	15,5	22,6	26,2	33,3	40,3	41,6
–	240	16,0	23,4	27,1	34,4	41,7	43,0
230	–	16,6	24,3	28,1	35,5	43,1	44,3
–	250	17,2	25,1	29,0	36,6	44,5	45,7
240	–	17,8	25,9	30,0	37,6	46,0	47,1
250	–	18,9	27,6	31,9	39,8	48,9	49,8

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN/m]

Capacity	h_{min} [mm]	IM 15	IM 20	IM 25	IM 30	IM 40	IM 45
Standard	160	34,8		43,5			
Q8	160	79,9					
Q10	170	124,9					
Q12	180	179,8					
Q8X	160	+53,3/-53,3					
Q10X	160	+93,2/-53,3					

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM 15	IM 20	IM 25	IM 30	IM 40	IM 45
Unit length [mm]	1000					
Tension rods	4 Ø 8	6 Ø 8	7 Ø 8	10 Ø 8	11 Ø 8	13 Ø 8
Tension rods QX	5 Ø 8	7 Ø 8	8 Ø 8	12 Ø 8	13 Ø 8	15 Ø 8
Compression bearings	4				5	
Shear rods standard	4 Ø 6		5 Ø 6			
Shear rods Q8	6 Ø 8					
Shear rods Q10	6 Ø 10					
Shear rods Q12	6 Ø 12					
Shear rods Q8X	4 Ø 8 + 4 Ø 8					
Shear rods Q10X	7 Ø 8 + 4 Ø 8					

DESIGN FOR CONCRETE C 20/25

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®					
		Concrete ≥ C20/25					Concrete ≥ C30/37
35	50	IM 50	IM 55	IM 65	IM 75	IM 90	IM 100
160	–	30,1	35,0	35,0	–	–	–
–	180	31,7	36,9	36,9	–	–	–
170	–	33,4	38,8	38,8	44,4	44,0	57,1
–	190	35,1	40,7	40,7	46,6	46,1	60,0
180	–	36,8	42,6	42,6	48,7	48,3	63,0
–	200	38,5	44,6	44,6	50,9	50,5	65,9
190	–	40,1	46,5	46,5	53,1	52,7	68,9
–	210	41,8	48,4	48,4	55,3	54,8	71,8
200	–	43,4	50,3	50,3	57,4	57,0	74,7
–	220	45,0	52,2	52,2	59,6	59,2	77,6
210	–	46,7	54,1	54,1	61,8	61,4	80,4
–	230	48,3	56,0	56,0	64,0	63,5	83,3
220	–	49,9	57,9	57,9	66,2	65,7	86,1
–	240	51,6	59,8	59,8	68,3	67,9	89,0
230	–	53,2	61,7	61,7	70,5	70,1	91,8
–	250	54,8	63,6	63,6	72,7	72,2	94,7
240	–	56,5	65,5	65,5	74,9	74,4	97,5
250	–	59,7	69,3	69,3	79,2	78,8	103,2

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN/m]

Capacity	h_{min} [mm]	IM 50	IM 55	IM 65	IM 75	IM 90	IM 100
Standard	160		43,5			–	
Q8	160		79,9			–	
Q10	170		124,9			124,9	
Q12	180		179,8			179,8	
Q8X	160		+53,3/-53,3			–	
Q10X	160		+93,2/-53,3			+93,2/-53,3	

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM 50	IM 55	IM 65	IM 75	IM 90	IM 100
Unit length [mm]		1000			500 + 500 (QX units: 1000 mm)	
Tension rods	14 Ø 8	11 Ø 10	12 Ø 10	13 Ø 10	10 Ø 12	12 Ø 12
Tension rods QX	16 Ø 8	12 Ø 10	13 Ø 10	14 Ø 10	11 Ø 12	12 Ø 12
Compression bearings	6	7			8	
Shear rods standard		5 Ø 6			–	
Shear rods Q8		6 Ø 8			–	
Shear rods Q10		6 Ø 10			6 Ø 10	
Shear rods Q12		6 Ø 12			6 Ø 12	
Shear rods Q8X		4 Ø 8 + 4 Ø 8			–	
Shear rods Q10X		7 Ø 8 + 4 Ø 8			7 Ø 8 + 4 Ø 8	

DESIGN FOR CONCRETE C 25/30

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®					
		Concrete ≥ C25/30					
35	50	IM 15	IM 20	IM 25	IM 30	IM 40	IM 45
160	–	9,0	13,2	15,4	21,7	23,8	28,0
–	180	9,5	14,0	16,2	22,9	25,1	29,5
170	–	10,0	14,8	17,1	24,1	26,5	31,1
–	190	10,5	15,5	18,0	25,3	27,8	32,7
180	–	11,1	16,3	18,9	26,6	29,2	34,3
–	200	11,6	17,1	19,8	27,8	30,5	35,9
190	–	12,2	17,9	20,7	29,1	31,9	37,5
–	210	12,7	18,6	21,6	30,3	33,3	39,1
200	–	13,3	19,4	22,5	31,6	34,7	40,7
–	220	13,8	20,2	23,4	32,9	36,0	42,3
210	–	14,4	21,0	24,3	34,2	37,5	44,0
–	230	14,9	21,8	25,2	35,4	38,8	45,6
220	–	15,5	22,6	26,2	36,8	40,3	47,3
–	240	16,0	23,4	27,1	38,0	41,7	48,9
230	–	16,6	24,3	28,1	39,4	43,1	50,6
–	250	17,2	25,1	29,0	40,6	44,5	52,2
240	–	17,8	25,9	30,0	42,0	46,0	53,9
250	–	18,9	27,6	31,9	44,7	48,9	57,3

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN/m]

Capacity	h_{min} [mm]	IM 15	IM 20	IM 25	IM 30	IM 40	IM 45
Standard	160	34,8		43,5			
Q8	160	92,7					
Q10	170	144,9					
Q12	180	208,6					
Q8X	160	+61,8/-61,8					
Q10X	160	+108,2/-61,8					

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM 15	IM 20	IM 25	IM 30	IM 40	IM 45
Unit length [mm]	1000					
Tension rods	4 Ø 8	6 Ø 8	7 Ø 8	10 Ø 8	11 Ø 8	13 Ø 8
Tension rods QX	5 Ø 8	7 Ø 8	8 Ø 8	12 Ø 8	13 Ø 8	15 Ø 8
Compression bearings	4				5	
Shear rods standard	4 Ø 6		5 Ø 6			
Shear rods Q8	6 Ø 8					
Shear rods Q10	6 Ø 10					
Shear rods Q12	6 Ø 12					
Shear rods Q8X	4 Ø 8 + 4 Ø 8					
Shear rods Q10X	7 Ø 8 + 4 Ø 8					

DESIGN FOR CONCRETE C 25/30

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®					
		Concrete ≥ C25/30					Concrete ≥ C30/37
35	50	IM 50	IM 55	IM 65	IM 75	IM 90	IM 100
160	–	30,1	36,3	39,5	–	–	–
–	180	31,7	38,3	41,7	–	–	–
170	–	33,4	40,4	44,0	47,6	51,1	57,1
–	190	35,1	42,4	46,2	49,9	53,6	60,0
180	–	36,8	44,6	48,5	52,4	56,1	63,0
–	200	38,5	46,6	50,7	54,8	58,6	65,9
190	–	40,3	48,7	53,0	57,3	61,2	68,9
–	210	42,0	50,8	55,3	59,7	63,7	71,8
200	–	43,7	52,9	57,6	62,2	66,2	74,7
–	220	45,5	55,0	59,8	64,7	68,8	77,6
210	–	47,2	57,2	62,2	67,2	71,3	80,4
–	230	49,0	59,2	64,4	69,6	73,8	83,3
220	–	50,8	61,4	66,8	72,2	76,3	86,1
–	240	52,5	63,5	69,1	74,6	78,9	89,0
230	–	54,3	65,7	71,5	77,2	81,4	91,8
–	250	56,1	67,8	73,8	79,7	83,9	94,7
240	–	57,9	70,1	76,1	82,3	86,5	97,5
250	–	61,5	74,4	80,5	87,4	91,5	103,2

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN/m]

Capacity	h_{min} [mm]	IM 50	IM 55	IM 65	IM 75	IM 90	IM 100
Standard	160		43,5			–	
Q8	160		92,7			–	
Q10	170		144,9			144,9	
Q12	180		208,6			208,6	
Q8X	160		+61,8/-61,8			–	
Q10X	160		+108,2/-61,8			+108,2/-61,8	

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM 50	IM 55	IM 65	IM 75	IM 90	IM 100
Unit length [mm]		1000			500 + 500 (QX units: 1000 mm)	
Tension rods	14 Ø 8	11 Ø 10	12 Ø 10	13 Ø 10	10 Ø 12	12 Ø 12
Tension rods QX	16 Ø 8	12 Ø 10	13 Ø 10	14 Ø 10	11 Ø 12	12 Ø 12
Compression bearings	6	7			8	
Shear rods standard		5 Ø 6			–	
Shear rods Q8		6 Ø 8			–	
Shear rods Q10		6 Ø 10			6 Ø 10	
Shear rods Q12		6 Ø 12			6 Ø 12	
Shear rods Q8X		4 Ø 8 + 4 Ø 8			–	
Shear rods Q10X		7 Ø 8 + 4 Ø 8			7 Ø 8 + 4 Ø 8	

DEFLECTION AND CAMBER

DEFLECTION

During their construction, cantilevered reinforced concrete structures are elevated to take into account the anticipated deflection. If these structures are thermally separated with ISOMAXX® units, when calculating the pre-set, the deflection due to the ISOMAXX® unit itself is superimposed with the deflection due to flexion of the slab in accordance with DIN EN 1992-1-1/NA. It must be ensured that the required pre-set is rounded up or down, according to the planned drainage direction. If a drainage system is installed at the building façade, the value must be rounded up, but for drainage at the end of the cantilever arm, it must be rounded down. We recommend providing proof of suitability for use in the serviceability limit state for the quasi-continuous load combination (γ_G = 1,0, γ_Q = 1,0, ψ_2 = 0,3). The tables below show the deflection factors tan α for calculating the deflection due to ISOMAXX®.

DEFLECTION DUE TO THE ISOMAXX® CANTILEVER SLAB CONNECTION

$$w = \tan\alpha \cdot (m_{Ed}/m_{Rd}) \cdot l_k \cdot 10$$

With
w = Deflection at the end of the cantilever arm [mm]
tan α = Deflection factor, see product sections
m_{Ed} = Bending moment for determining the camber as a result of the ISOMAXX® unit. The definitive load combination for the serviceability limit state is determined by the structural engineer
m_{Rd} = Resistance moment of the ISOMAXX® unit, see product section
l_k = System length [m]

DEFLECTION FACTOR TAN α FOR CONCRETE C 20/25

ISOMAXX®	Concrete covering cv [mm]	Height h [mm]									
		160	170	180	190	200	210	220	230	240	250
IM 15 to IM 50	35	0,73	0,66	0,61	0,56	0,52	0,48	0,45	0,43	0,40	0,38
	50	–	–	0,69	0,63	0,58	0,54	0,50	0,47	0,44	0,42
IM 55 to IM 90	35	0,80	0,72	0,65	0,60	0,55	0,52	0,48	0,45	0,43	0,40
	50	–	–	0,76	0,68	0,63	0,58	0,53	0,50	0,47	0,44

DEFLECTION FACTOR TAN α FOR CONCRETE ≥ C 25/30

ISOMAXX®	Concrete covering cv [mm]	Height h [mm]									
		160	170	180	190	200	210	220	230	240	250
IM 15 to IM 50	35	0,75	0,68	0,62	0,58	0,53	0,50	0,47	0,44	0,42	0,40
	50	–	–	0,71	0,65	0,60	0,55	0,52	0,48	0,46	0,43
IM 55 to IM 90	35	0,87	0,79	0,72	0,66	0,62	0,57	0,54	0,51	0,48	0,45
	50	–	–	0,83	0,75	0,69	0,64	0,59	0,55	0,52	0,49

DEFLECTION FACTOR TAN α FOR CONCRETE ≥ C 30/37

ISOMAXX®	Concrete covering cv [mm]	Height h [mm]									
		160	170	180	190	200	210	220	230	240	250
IM 100	35	–	0,87	0,80	0,73	0,68	0,63	0,59	0,55	0,52	0,49
	50	–	–	0,92	0,83	0,76	0,71	0,65	0,61	0,57	0,54

BENDING SLENDERNESS – DISTANCE BETWEEN EXPANSION JOINTS

BENDING SLENDERNESS

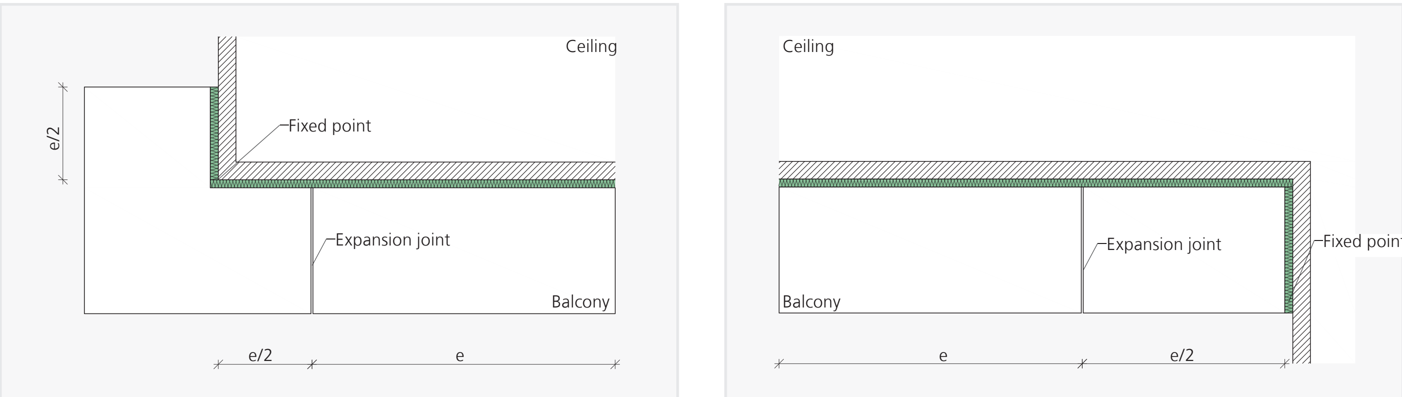
The bending slenderness is defined as the ratio of the static height d of the balcony slab to the cantilever length l_k. The bending slenderness of a slab has an impact on its vibration characteristics. We therefore recommend limiting the bending slenderness for cantilevered reinforced concrete structures in accordance with DIN EN 1992-1-1 to a maximum value of $l_k/d = 14$. This results in the following maximum recommended cantilever lengths l_k:

Concrete covering [mm]	max. l_k [m] depending on unit height h [mm]									
	160	170	180	190	200	210	220	230	240	250
cv35	1,68	1,82	1,96	2,10	2,24	2,38	2,52	2,66	2,80	2,94
cv50	1,47	1,61	1,75	1,89	2,03	2,17	2,31	2,45	2,59	2,73

DISTANCE BETWEEN EXPANSION JOINTS

If the component dimensions exceed the maximum permissible distance between expansion joints, expansion joints must be arranged perpendicular to the insulation plane. The maximum permissible distance between expansion joints e is dependent on the maximum rod diameter guided across the expansion joint and is thus type-dependent.

The use of fixed points such as corner supports or the use of ISOMAXX® IMH or IME units results in increased constraints, which means the maximum permissible distance between expansion joints must be reduced to e/2. Half of the maximum distance between expansion joints is always measured from the fixed point.



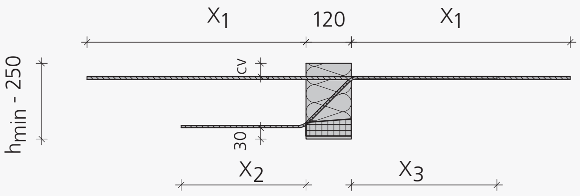
Expansion joint layout for different balcony systems

MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IM 15 to IM 75		IM 90 to IM 100
Shear force capacity	Standard to Q10, Q8X, Q10X	Q12	Q10 to Q12, Q10X
Distance between joints e [m]	21,7	19,8	19,8

UNIT STRUCTURE

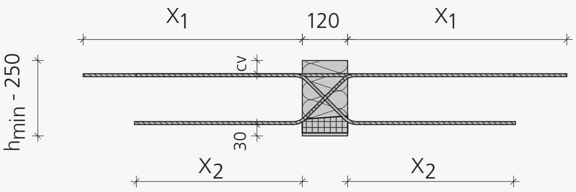
ISOMAXX® IM 15 TO IM 100 - POSITIVE SHEAR FORCES



Length tension rod [mm]	IM 15 to IM 50	IM 55 to IM 75	IM 90 to IM 100
X_1	580	720	840

Length shear rod [mm]	Shear force load-bearing capacity			
	Standard	Q8	Q10	Q12
X_2	335	450	560	670
X_3	≤ 435	≤ 490	≤ 600	≤ 705
h_{min}	160	160	170	180

ISOMAXX® IM 15 TO IM 100 - POSITIVE AND NEGATIVE SHEAR FORCES



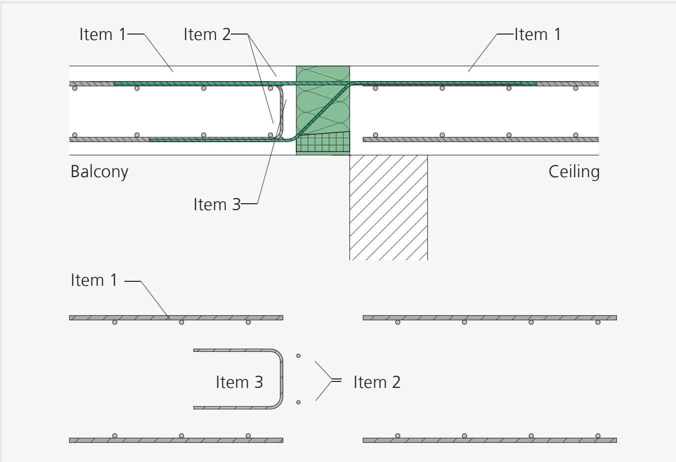
Length tension rod [mm]	IM 15 to IM 50	IM 55 to IM 75	IM 90 to IM 100
X_1	580	720	840

Length shear rod [mm]	Shear force load-bearing capacity
	Q8X and Q10X
X_2	≤ 450
h_{min}	160

SUPPLEMENTARY REINFORCEMENT

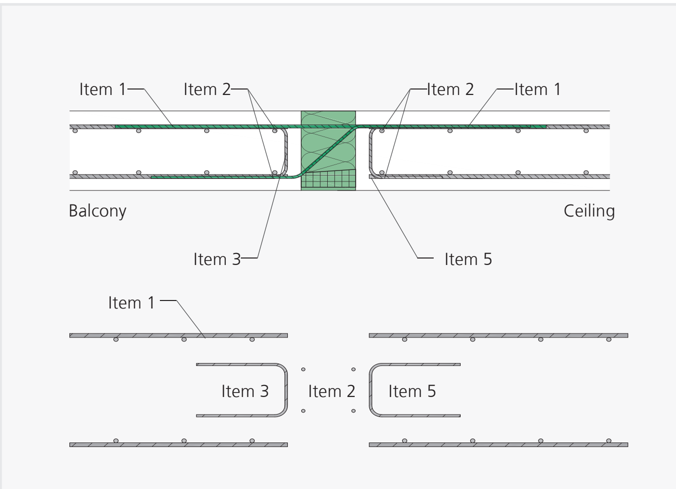
ISOMAXX® IM 15 TO IM 100

DIRECT SUPPORT



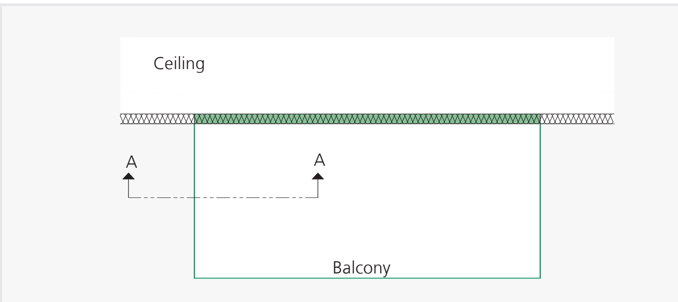
- Item 1 connection reinforcement for the ISOMAXX® unit – p. 36
- Item 2 spacing bar 2 Ø 8 balcony side
- Item 3 structural edging parallel to the ISOMAXX® IM unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)

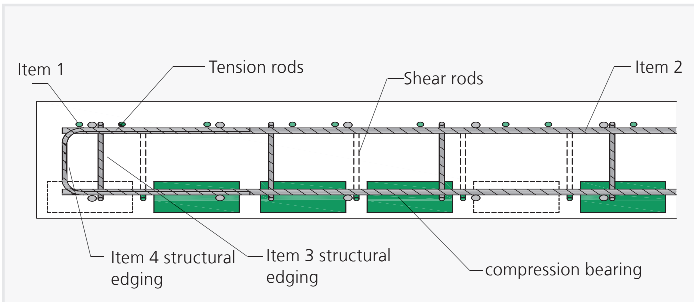
INDIRECT SUPPORT



- Item 1 connection reinforcement for the ISOMAXX® IM unit – p. 36
- Item 2 spacing bar 2 x 2 Ø 8 balcony and ceiling side
- Item 3 structural edging parallel to the ISOMAXX® IM unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 edging or supplementary stirrup - p. 36

EDGING STIRRUP AT THE FREE BALCONY EDGE





ISOMAXX® IM – Section A-A

SUPPLEMENTARY REINFORCEMENT

CONNECTION REINFORCEMENT ITEM 1

ISOMAXX® IM 15 TO IM 100

ISOMAXX®	$a_{s,erf}$ [cm²/m]	Reinforcing steel B500B
IM 15	2,37	5 Ø 8
IM 20	3,47	7 Ø 8
IM 25	4,00	8 Ø 8
IM 30	5,62	12 Ø 8
IM 40	6,14	13 Ø 8
IM 45	7,20	10 Ø 10
IM 50	7,73	10 Ø 10
IM 55	9,40	12 Ø 10
IM 65	10,17	13 Ø 10
IM 75	11,04	14 Ø 10
IM 90	11,62	11 Ø 12
IM 100	13,11	12 Ø 12

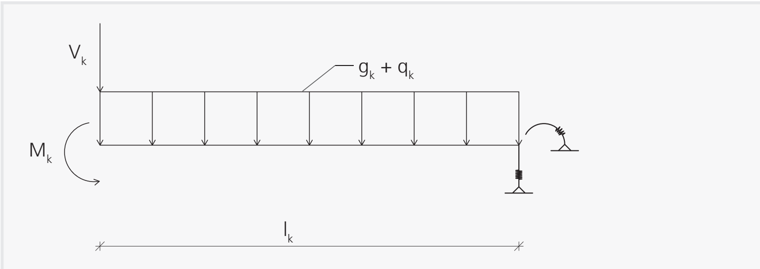
EDGING / SUPPLEMENTARY STIRRUPS FOR INDIRECT SUPPORT ITEM 5

ISOMAXX® IM 15 TO IM 100

Shear force capacity	ISOMAXX®		
	IM 10 to IM 20	IM 25 to IM 65	IM 75 to IM 100
	$a_{s,erf}$ [cm²/m]	$a_{s,erf}$ [cm²/m]	$a_{s,erf}$ [cm²/m]
Standard	1,13	1,00	–
Q8	2,13	2,13	–
Q10	3,33	3,33	3,33
Q12	4,79	4,79	4,79
Q8X	1,42	1,42	–
Q10X	2,22	2,22	2,48

DESIGN EXAMPLE

SELECTION OF ISOMAXX UNIT, DEFLECTION AND CAMBER



SYSTEM:

Cantilever arm
Length of cantilever l_k = 2,0 m
Slab thickness balcony = 180 mm
Concrete cover cv35
Concrete class C25/30 balcony and ceiling

LOAD ASSUMPTIONS:

Dead load g_k = 4,50 kN/m²
Superimposed load g_k = 1,50 kN/m²
Live load q_k = 4,00 kN/m²
Edge load/railing V_k = 1,50 kN/m
Edge moment M_k = 0,00 kNm/m

RESULTANT FORCES:

$m_{Ed} = (g_k \cdot 1{,}35 + q_k \cdot 1{,}5) \cdot l_k^2 /2 + (G_k \cdot 1{,}35) \cdot l_K$
$v_{Ed} = (g_k \cdot 1{,}35 + q_k \cdot 1{,}5) \cdot l_k + (G_k \cdot 1{,}35)$
$m_{Ed} = (6{,}00 \cdot 1{,}35 + 4{,}00 \cdot 1{,}5) \cdot 2{,}00^2 /2 + (1{,}5 \cdot 1{,}35) \cdot 2{,}00 = \underline{32{,}25 \text{ kNm/m}}$
$v_{Ed} = (6{,}00 \cdot 1{,}35 + 4{,}00 \cdot 1{,}5) \cdot 2{,}00 + (1{,}5 \cdot 1{,}35) = \underline{30{,}23 \text{ kN/m}}$

DESIGN:

Chosen: IM 50 cv35 h = 180 mm $m_{Rd} = 36{,}80$ kNm/m ≥ 32,25 kNm/m (see page 31)
$v_{Rd} = 43{,}50$ kN/m ≥ 30,23 kN/m

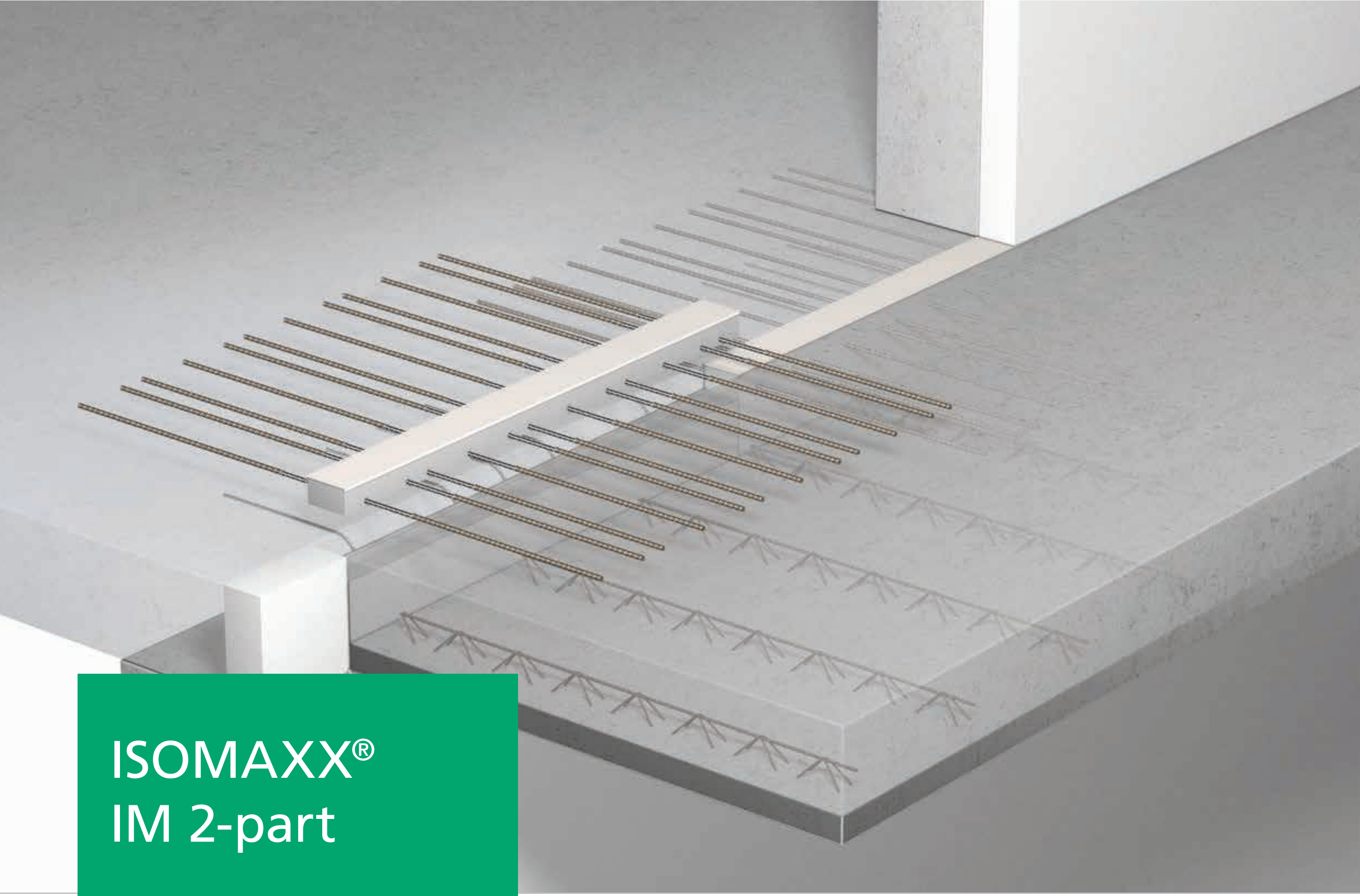
DEFLECTION DUE TO THERMAL INSULATION UNIT:

Quasi-permanent load-combination $\Psi_2 = 0{,}30$, $\gamma_G = 1{,}00$, $\gamma_Q = 1{,}00$
$m_{Ed,perm} = m_{gk} + m_{qk} \cdot \Psi_2$
$m_{Ed,perm} = (g_k + q_k \cdot \Psi_2) \cdot l_k^2 /2 + G_k \cdot l_K$
$m_{Ed,perm} = (6{,}00 + 4{,}00 \cdot 0{,}3) \cdot 2{,}00^2 /2 + 1{,}50 \cdot 2{,}00 = \underline{17{,}40 \text{ kNm/m}}$
$w_1 = \tan \alpha \cdot (m_{Ed,perm}/m_{Rd}) \cdot l_k \cdot 10$
$\tan \alpha = 0{,}79$ (see page 32)
$w_1 = 0{,}79 \cdot (17{,}40 / 36{,}80) \cdot 2{,}00 \cdot 10 = \underline{7{,}47 \text{ mm } (\sim 7{,}00 \text{ mm})}$*

*) w_1 = deflection due to thermal insulation unit. Factor w_2 due to slab deflection has to be added to w_1 by the structural designer. w_2 is in general much smaller than the deflection from the thermal insulation units.
(Rough rule of thumb: $w_2 \sim 0{,}25 \cdot w_1$)

CAMBER:

Case 1) Dewatering towards end of cantilever
chosen: camber 7,00 mm **(rounded off)**
Case 2) Dewatering toward building **(rounded up)**
chosen: camber 10,00 mm



ISOMAXX®
IM 2-part

UNITS FOR CANTILEVERED BALCONIES

ISOMAXX® IM TWO-PART

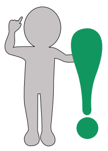
- Two-part units for installing the bottom section in prefab slabs in the prefabricated parts factory and fitting the upper section on the construction site
- For transferring negative moments and positive shearing forces
- Pressure plane with concrete compression bearings
- Load-bearing capacities IM 15 two-part to IM 100 two-part
- Shearing force load-bearing capacities standard, Q8, Q10 and Q12
- Concrete covering of tension rods cv35 or cv50
- Unit heights depending on the shearing force load-bearing capacity starting from h_{min} = 160 mm
- Fire resistance class REI 120 available

TYPE DESIGNATION

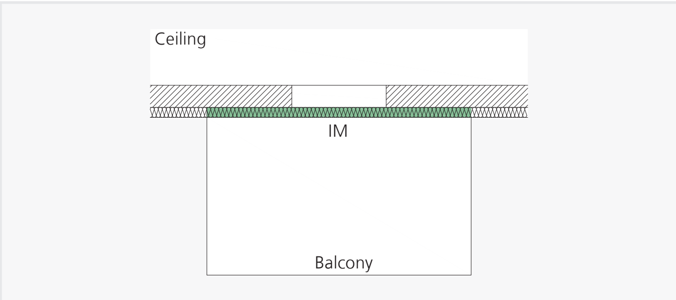
IM 65 Q8 cv35 h200 REI 120 two-part

- two-part: Two-part design
- REI 120: Fire protection version
- h200: Unit height
- cv35: Concrete covering
- Q8: Shear force load-bearing capacity
- IM 65: Type and load-bearing capacity

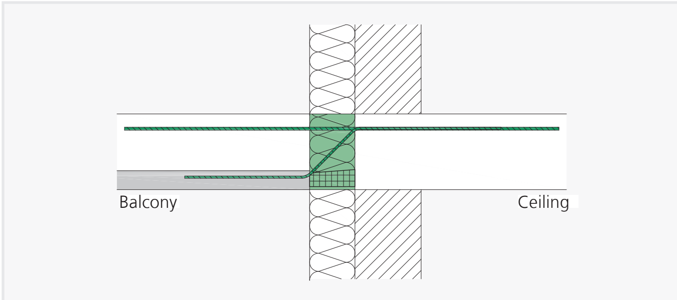
APPLICATION – UNIT STRUCTURE



This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.

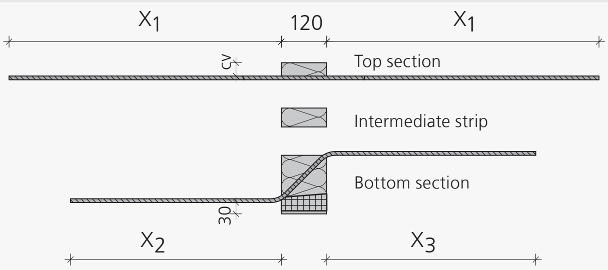


ISOMAXX® IM two-part – Cantilevered balconies



ISOMAXX® IM two-part – Installation cross-section thermal insulation composite system

UNIT STRUCTURE ISOMAXX® IM 15 TWO-PART TO IM 100 TWO-PART



Length tension rod [mm]	IM 15 to IM 50	IM 55 to IM 75	IM 90 to IM 100
X_1	580	720	840

Length shear rod [mm]	Shear force load-bearing capacity			
	Standard	Q8	Q10	Q12
X_2	335	450	560	670
X_3	≤ 435	≤ 490	≤ 600	≤ 705
h_{min}	160	160	170	180

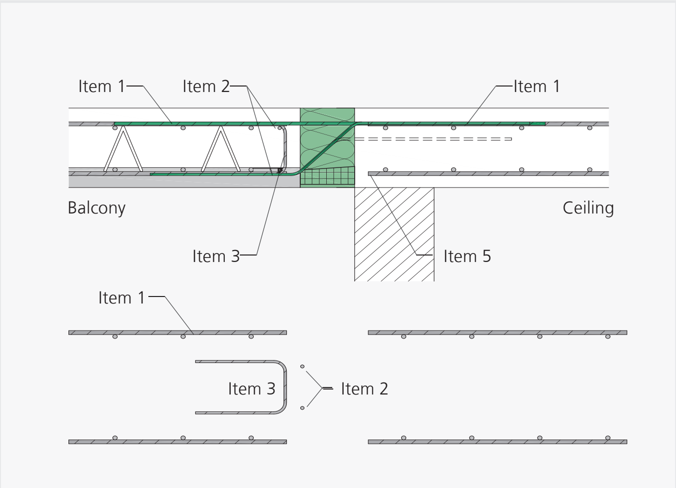
DESIGN AND UNIT STRUCTURE OF THE TWO-PART UNITS

- Design, unit structure and assignment of the units is identical to the corresponding one-part units – p. 26 to 37
- Design of the insulating body comprising a bottom section and a top section.
- Prefabricated parts factories have the option of ordering units in most current heights and doubling them as needed to create additional heights by adding intermediate strips. The shear rod is designed for the basic height and is not raised into the tension plane of the unit.
- Camber, bending slenderness and maximum permissible distance between expansion joints – p. 32 to 33.

SUPPLEMENTARY REINFORCEMENT

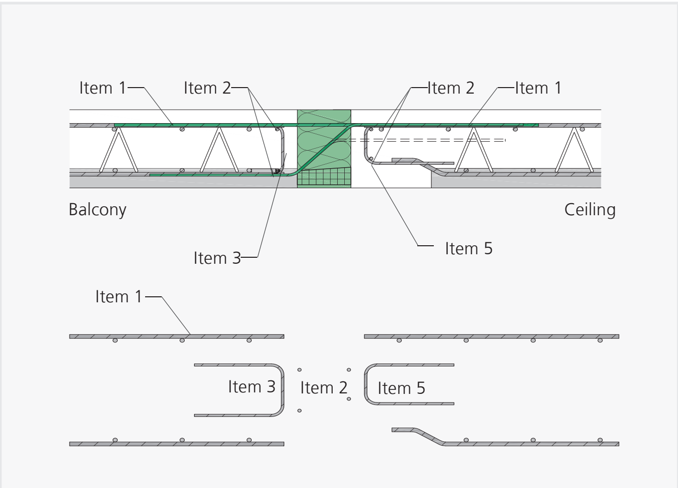
ISOMAXX® IM 15 TWO-PART TO IM 100 TWO-PART

DIRECT SUPPORT



- Item 1 connection reinforcement for the ISOMAXX® unit – p. 41
- Item 2 spacing bar 2 Ø 8 balcony side
- Item 3 structural edging parallel to the ISOMAXX® IM unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)

INDIRECT SUPPORT



- Item 1 connection reinforcement for the ISOMAXX® unit – p. 41
- Item 2 spacing bar 2 x 2 Ø 8 balcony side
- Item 3 structural edging parallel to the ISOMAXX® IM unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 edging or supplementary stirrup - S. 41

SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IM 15 TWO-PART TO IM 100 TWO-PART

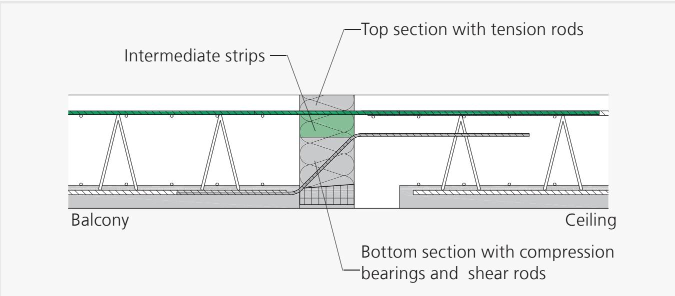
CONNECTION REINFORCEMENT ITEM 1

ISOMAXX®	$a_{s,erf}$ [cm²/m]	Suggestion Reinf. steel B500B
IM 15	2,37	5 Ø 8
IM 20	3,47	7 Ø 8
IM 25	4,00	8 Ø 8
IM 30	5,62	12 Ø 8
IM 40	6,14	13 Ø 8
IM 45	7,20	10 Ø 10
IM 50	7,73	10 Ø 10
IM 55	9,40	12 Ø 10
IM 65	10,17	13 Ø 10
IM 75	11,04	14 Ø 10
IM 90	11,62	11 Ø 12
IM 100	13,11	12 Ø 12

EDGE / SUPPLEMENTARY REINFORCEMENT ITEM 5

Shear force load-bearing capacity	ISOMAXX®		
	IM 15 to IM 20	IM 25 to IM 65	IM 75 to IM 100
	$a_{s,erf}$ [cm²/m]	$a_{s,erf}$ [cm²/m]	$a_{s,erf}$ [cm²/m]
Standard	0,80	1,00	–
Q8	2,13	2,13	–
Q10	3,33	3,33	3,33
Q12	4,79	4,79	4,79

INSTALLATION TOP SECTION



- The two-part ISOMAXX® unit consists of a top section and a bottom section. The bottom section is concreted into the prefab slab in the prefabricated parts factory.
- The top section is installed on the construction site.
- The top section and bottom section are labelled to be combined correctly. Please make sure you use the right combination on the construction site.
- When fitting the top section, ensure the correct direction of installation is observed.
- Without the top section, the load-bearing capacity of the connection is not guaranteed.

ISOMAXX®
IM Variants

UNITS FOR CANTILEVERED BALCONIES

ISOMAXX® IM VAR.

- For transferring negative moments and positive shearing forces
- Pressure plane with concrete compression bearings
- Load-bearing capacities IM 25 Var., IM 30 Var., IM 50 Var., IM 65 Q8 Var.
- Concrete covering of tension rods cv35 or cv50
- Unit heights depending on the shearing force load-bearing capacity starting from h_{min} = 160 mm
- Fire resistance class REI 120 available

CONNECTION GEOMETRY

- Var. I – Connection to a wall, downwards
- Var. II – Connection to a wall, upwards
- Var. III HV – Connection to a ceiling vertically offset upwards
- Var. III UV – Connection to a ceiling vertically offset downwards

TYPE DESIGNATION

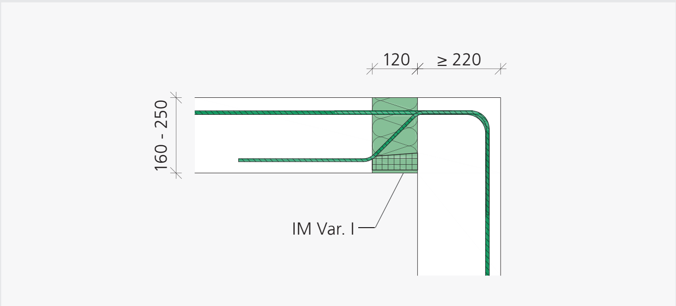
IM 65 Q8 cv35 h200 Var. I REI 120

- REI 120 – Fire protection version
- Var. I – Variant version
- h200 – Unit height
- cv35 – Concrete covering
- Q8 – Shearing force load-bearing capacity
- IM 65 – Type and load-bearing capacity

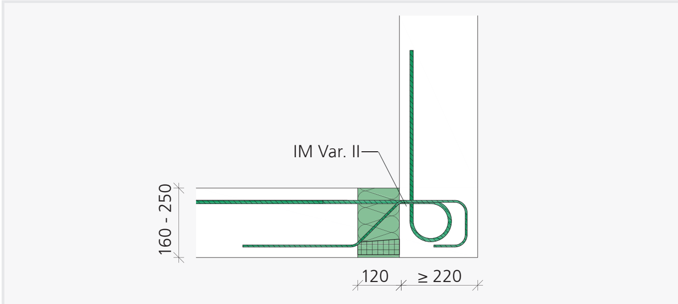
APPLICATION

CONNECTION TO A WALL

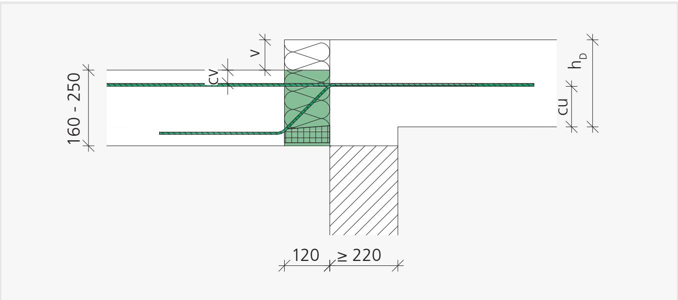
WALL CONNECTION DOWNWARDS – IM VAR. I



WALL CONNECTION UPWARDS – IM VAR. II



CONNECTION TO A SLIGHTLY OFFSET CEILING WITH A STANDARD ISOMAXX® UNIT



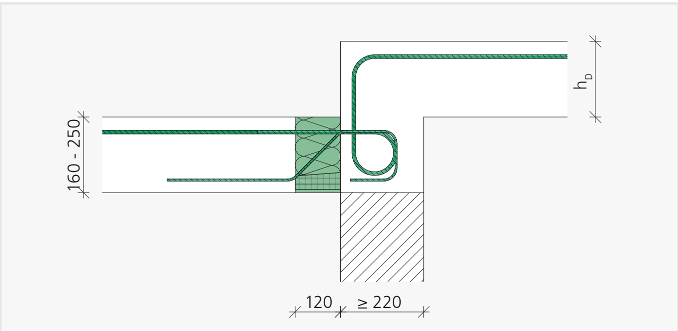
$v \leq h_D - cv - d_s - cu$

With

- v – Height offset
- h_D – Ceiling thickness
- cv – Concrete covering of the tension rods of the ISOMAXX® unit
- d_s – Diameter of the tension rods of the ISOMAXX® unit
- cu – Concrete covering of the tension rods of the ISOMAXX® unit at the bottom edge of ceiling

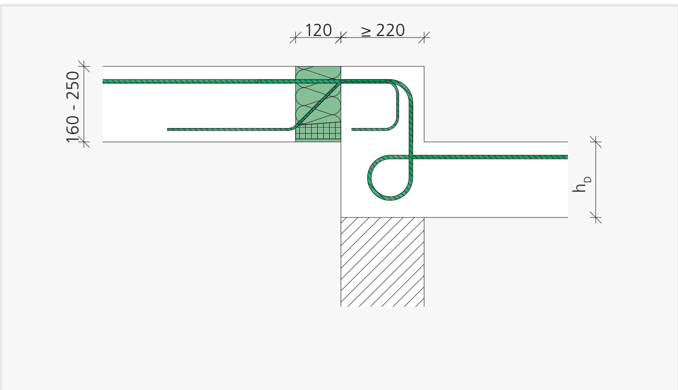
CONNECTIONS TO CEILINGS WITH AN OFFSET OF 90 TO 240 MM

HIGHER CEILINGS – IM VAR. III HV



Var. III HV	Height offset [mm]
HV 100	90 - 149
HV 150	150 - 199
HV 200	200 - 240

LOWER CEILINGS – IM VAR. III UV



Var. III UV	Height offset [mm]	Var. III UV	Height offset [mm]
UV 80	≤ 80	UV 150	141 to ≤ 150
UV 90	81 to ≤ 90	UV 160	151 to ≤ 160
UV 100	91 to ≤ 100	UV 170	161 to ≤ 170
UV 110	101 to ≤ 110	UV 180	171 to ≤ 180
UV 120	111 to ≤ 120	UV 190	181 to ≤ 190
UV 130	121 to ≤ 130	UV 200	191 to ≤ 200
UV 140	131 to ≤ 140		

DESIGN FOR CONCRETE C20/25

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®			
35	50	IM 25 Var.	IM 30 Var.	IM 50 Var.	IM 65 Q8 Var.
160	–	16,9	20,0	29,8	35,0
–	180	17,8	21,1	31,5	36,9
170	–	18,8	22,2	33,2	38,8
–	190	19,8	23,3	34,9	40,7
180	–	20,8	24,4	36,6	42,6
–	200	21,8	25,5	38,2	44,6
190	–	22,8	26,5	39,8	46,5
–	210	23,8	27,6	41,5	48,4
200	–	24,8	28,7	43,1	50,3
–	220	25,8	29,8	44,7	52,2
210	–	26,8	30,9	46,3	54,1
–	230	27,8	32,0	48,0	56,0
220	–	28,9	33,1	49,6	57,9
–	240	29,9	34,2	51,2	59,8
230	–	30,9	35,3	52,9	61,7
–	250	32,0	36,3	54,5	63,6
240	–	33,0	37,4	56,1	65,5
250	–	35,2	39,6	59,4	69,3

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN/m]

Shear force	h_{min} [mm]	IM 25 Var.	IM 30 Var.	IM 50 Var.	IM 65 Q8 Var.
	160	43,5	52,2	52,2	79,9

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM 25 Var.	IM 30 Var.	IM 50 Var.	IM 65 Q8 Var.
Unit length [mm]	1000			
Tension rods	5 Ø 10	6 Ø 10	9 Ø 10	12 Ø 10
Compression bearings	4	4	6	7
Shear rods	5 Ø 6	6 Ø 6	6 Ø 6	6 Ø 8

DESIGN FOR CONCRETE C20/25

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®			
35	50	IM 25 Var.	IM 30 Var.	IM 50 Var.	IM 65 Q8 Var.
160	–	16,9	20,1	29,8	39,5
–	180	17,8	21,3	31,5	41,7
170	–	18,8	22,4	33,2	44,0
–	190	19,8	23,6	34,9	46,2
180	–	20,8	24,8	36,7	48,5
–	200	21,8	25,9	38,4	50,7
190	–	22,8	27,1	40,1	53,0
–	210	23,8	28,3	41,8	55,3
200	–	24,8	29,5	43,6	57,6
–	220	25,8	30,7	45,3	59,8
210	–	26,8	31,9	47,1	62,2
–	230	27,8	33,1	48,8	64,4
220	–	28,9	34,3	50,6	66,8
–	240	29,9	35,5	52,4	69,1
230	–	30,9	36,8	54,2	71,5
–	250	32,0	38,0	55,9	73,8
240	–	33,0	39,3	57,8	76,1
250	–	35,2	41,8	61,4	80,5

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN/m]

Shear force	h_{min} [mm]	IM 25 Var.	IM 30 Var.	IM 50 Var.	IM 65 Q8 Var.
	160	43,5	52,2	52,2	92,7

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM 25 Var.	IM 30 Var.	IM 50 Var.	IM 65 Q8 Var.
Unit length [mm]	1000			
Tension rods	5 Ø 10	6 Ø 10	9 Ø 10	12 Ø 10
Compression bearings	4	4	6	7
Shear rods	5 Ø 6	6 Ø 6	6 Ø 6	6 Ø 8

This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.

DEFLECTION AND CAMBER

DEFLECTION

During their construction, cantilevered reinforced concrete structures are elevated to take into account the anticipated deflection. If these structures are thermally separated with ISOMAXX® units, when calculating the camber, the deflection due to the ISOMAXX® unit itself is superimposed with the deflection due to flexion of the slab in accordance with DIN EN 1992-1-1/NA. It must be ensured that the required camber is rounded up or down, according to the planned drainage direction. If a drainage system is installed at the building façade, the value must be rounded up, but for drainage at the end of the cantilever arm, it must be rounded down. We recommend providing proof of suitability for use in the serviceability limit state for the quasi-continuous load combination (γ_G = 1,0, γ_Q = 1,0, ψ_2 = 0,3). The tables below show the deflection factors tan α for calculating the deflection due to ISOMAXX®.

DEFLECTION DUE TO THE ISOMAXX® CANTILEVER SLAB CONNECTION

$$w = \tan\alpha \cdot (m_{Ed}/m_{Rd}) \cdot l_k \cdot 10$$

With

w = Deflection at the end of the cantilever arm [mm]

tan α = Deflection factor, see product sections

m_{Ed} = Bending moment for determining the camber as a result of the ISOMAXX® unit. The definitive load combination for the serviceability limit state is determined by the structural engineer

m_{Rd} = Resistance moment of the ISOMAXX® unit, see product section

l_k = System length [m]

DEFLECTION FACTOR TAN α FOR CONCRETE C 20/25

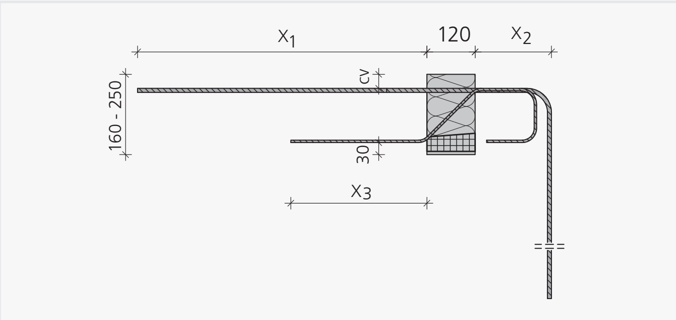
ISOMAXX®	Concrete covering cv [mm]	Height h [mm]									
		160	170	180	190	200	210	220	230	240	250
IM 25 Var. to IM 65 Q8 Var.	35	0,83	0,75	0,69	0,63	0,58	0,54	0,51	0,48	0,45	0,43
	50	–	–	0,79	0,72	0,66	0,61	0,56	0,52	0,49	0,46

DEFLECTION FACTOR TAN α FOR CONCRETE ≥ C 25/30

ISOMAXX®	Concrete covering cv [mm]	Height h [mm]									
		160	170	180	190	200	210	220	230	240	250
IM 25 Var. to IM 65 Q8 Var.	35	0,86	0,78	0,71	0,65	0,61	0,57	0,53	0,50	0,48	0,45
	50	–	–	0,81	0,74	0,68	0,63	0,59	0,55	0,52	0,49

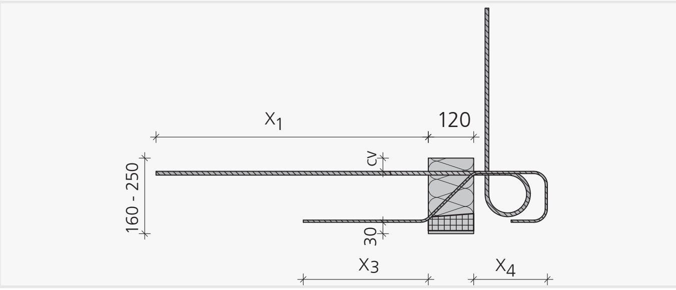
UNIT STRUCTURE

IM VAR. I



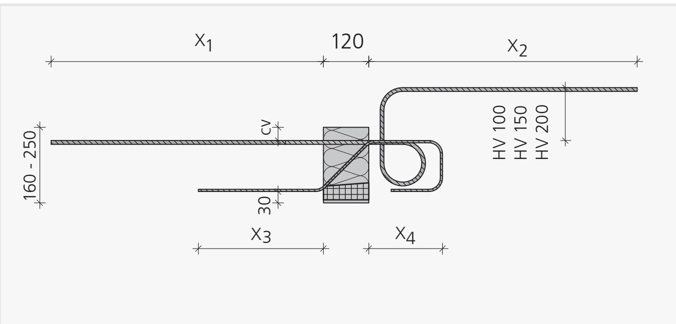
Tension rod [mm]	IM 25 to IM 65 Var. I	
X1	720	
X2	190	
Length shear rod [mm]	Shear force load-bearing capacity	
	Standard	Q8
X3	340	450
X4	150	190

IM VAR. II



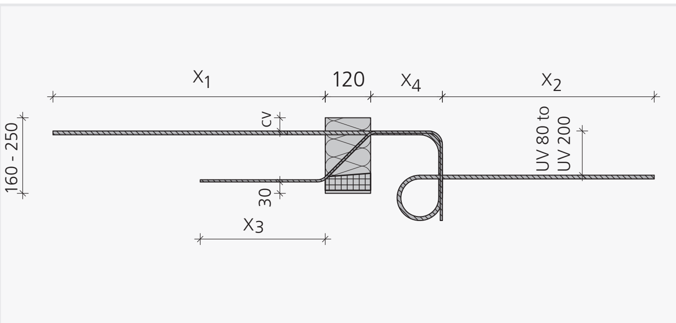
Tension rod [mm]	IM 25 to IM 50 Var. II	IM 65 Var. II
X1	760	720
Length shear rod [mm]	Shear force load-bearing capacity	
	Standard	Q8
X3	340	450
X4	150	190

IM VAR. III HV



Tension rod [mm]	IM 25 to IM 65 Var. III HV	
X1	720	
X2	710	
Length shear rod [mm]	Shear force load-bearing capacity	
	Standard	Q8
X3	340	450
X4	150	190

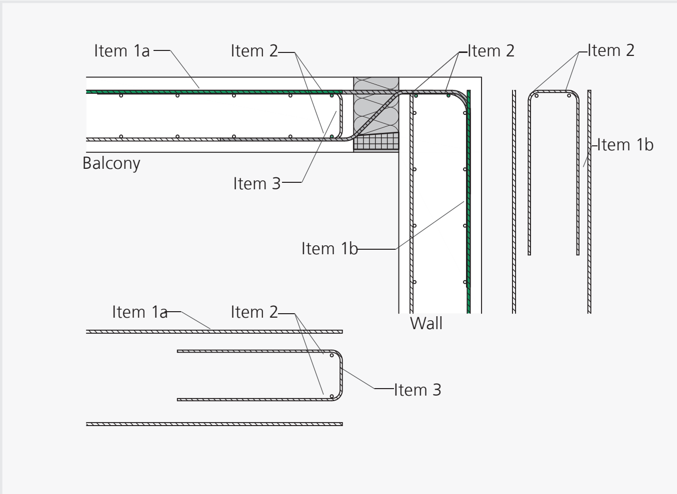
IM VAR. III UV



Tension rod [mm]	IM 25 to IM 65 Var. III UV	
X1	760	
X2	695	
Length shear rod [mm]	Shear force load-bearing capacity	
	Standard	Q8
X3	340	450
X4	150	190

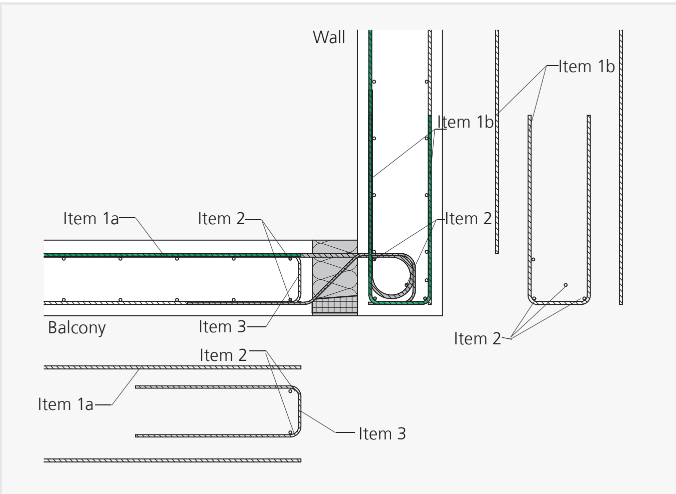
SUPPLEMENTARY REINFORCEMENT

CONNECTION TO A WALL, DOWNWARDS – IM VAR. I



- Item 1a connection reinforcement on the balcony for the ISOMAXX® unit – see table
- Item 1b connection reinforcement for the ISOMAXX® unit to bear the connection moment in the wall in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 Ø 8 on the balcony, 2 Ø 8 in the wall
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 (not shown here) slab and wall reinforcement in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- The ISOMAXX® unit ideally is installed before the wall reinforcement is fitted.

CONNECTION TO A WALL, UPWARDS – IM VAR. II



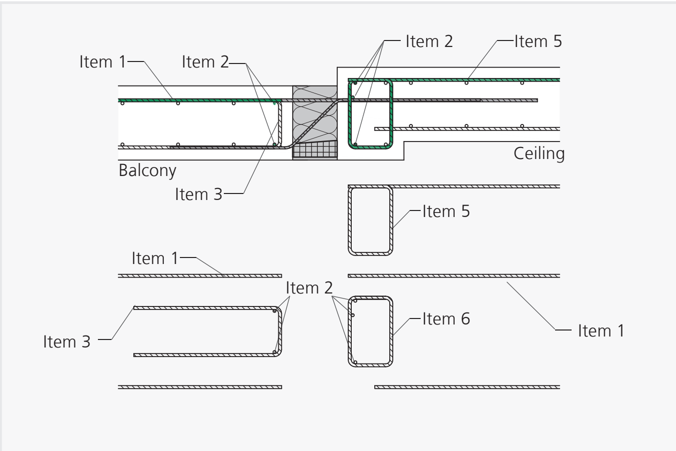
- Item 1a connection reinforcement on the balcony for the ISOMAXX® unit – see table
- Item 1b connection reinforcement for the ISOMAXX® unit to bear connection moment and shear force in the wall in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 Ø 8 on the balcony, 3 Ø 8 in the wall
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 (not shown here) slab and wall reinforcement in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- The ISOMAXX® unit ideally is installed before the wall reinforcement is fitted.

CONNECTION REINFORCEMENT ITEM 1

ISOMAXX®	IM 25 Var. I	IM 30 Var. I	IM 50 Var. I	IM 65 Q8 Var. I
$a_{s,erf}$ [cm²/m]	4,45	5,28	7,76	10,17
Suggestion	6 Ø 10	7 Ø 10	10 Ø 10	13 Ø 10

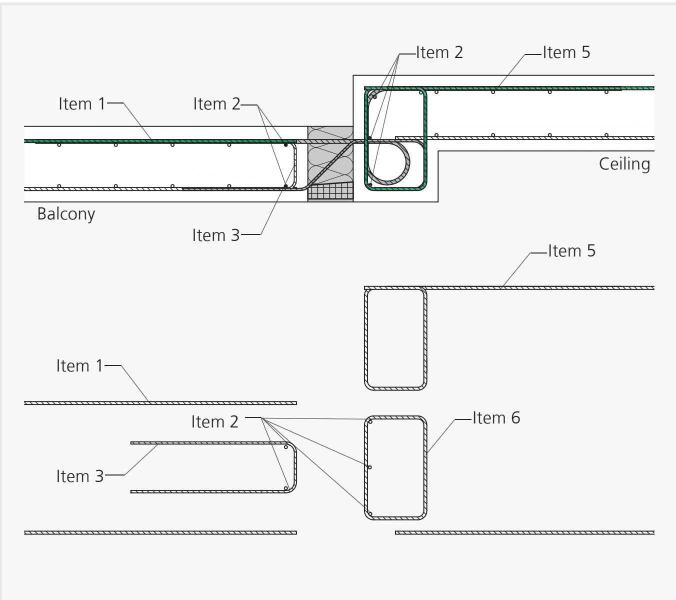
SUPPLEMENTARY REINFORCEMENT

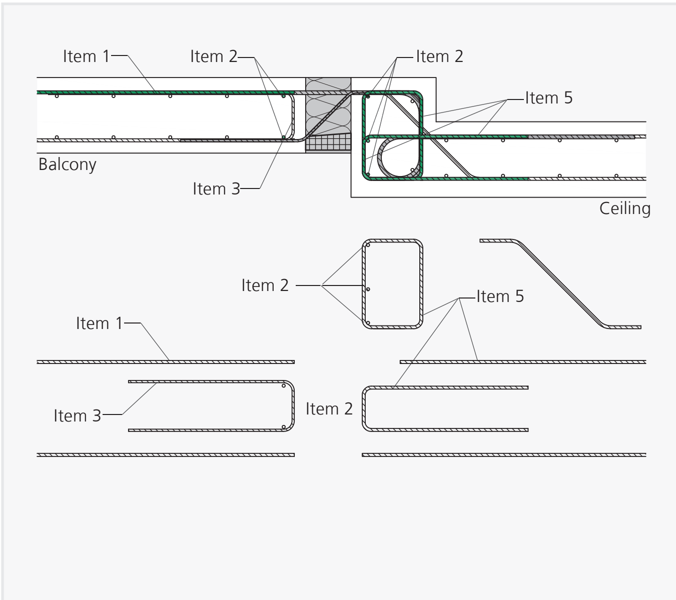
CONNECTION TO A SLIGHTLY VERTICALLY OFFSET CEILING WITH A STANDARD ISOMAXX® UNIT



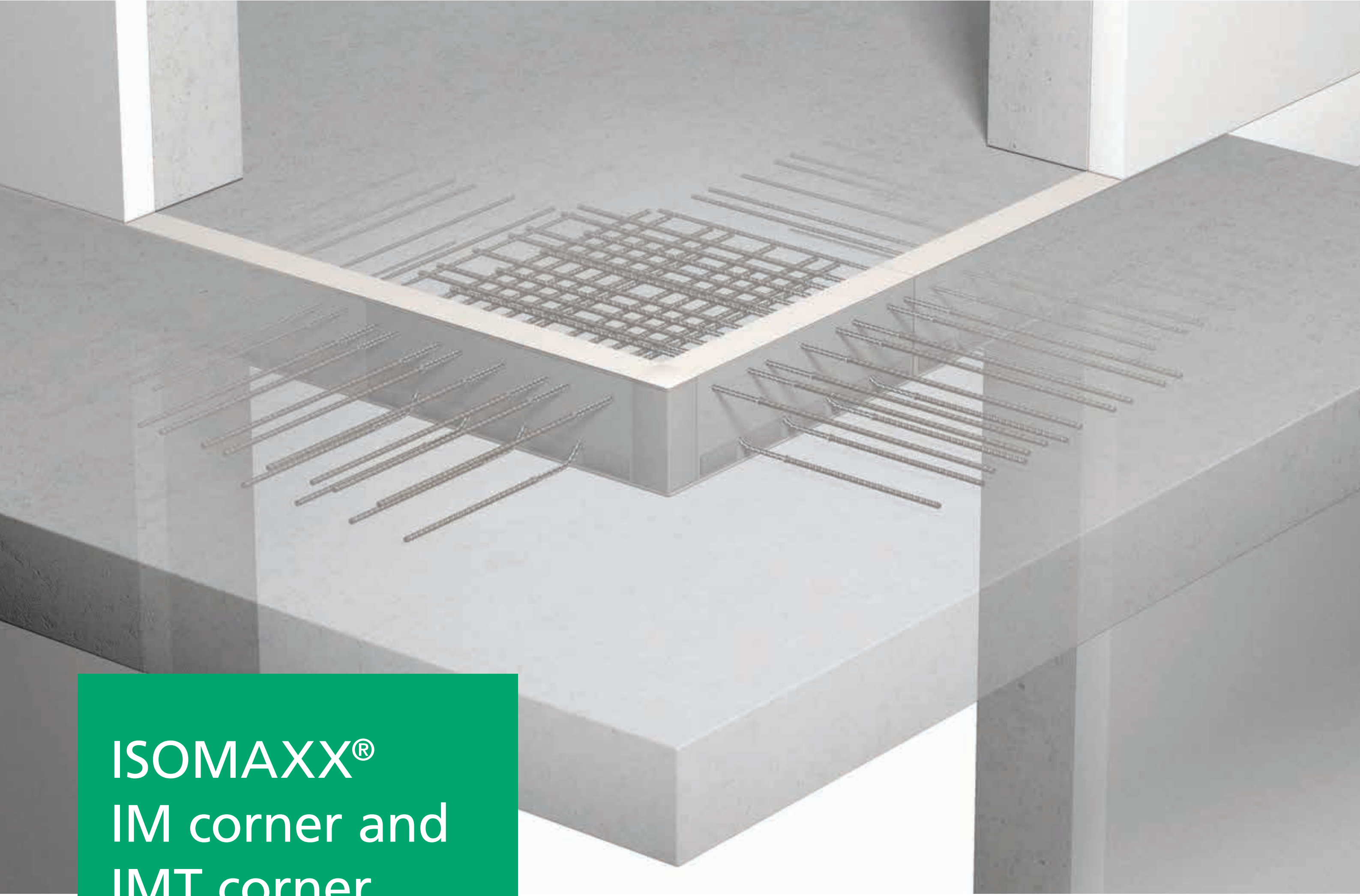
- Item 1 connection reinforcement for the ISOMAXX® unit - p. 36
- Item 2 spacing bar 2 Ø 8 on the balcony, 3 Ø 8 on the ceiling
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 stirrup for deflecting the tensile force in the joist to the upper tensile reinforcement in accordance with the structural engineer's specifications. The overlap length with the tensile reinforcement must be guaranteed.
- Item 6 shear reinforcement of the joist in accordance with the structural engineer's specifications.
- The ISOMAXX® unit must be installed before the joist reinforcement is fitted.

CONNECTION TO VERTICALLY OFFSET CEILINGS – IM VAR. III





- Item 1 connection reinforcement for the ISOMAXX® unit - see table
- Item 2 spacing bar 2 Ø 8 on the balcony, 3 Ø 8 on the ceiling
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 stirrup for deflecting the tensile force in the joist to the upper tensile reinforcement in accordance with the structural engineer's specifications. The overlap length with the tensile reinforcement must be guaranteed.
- Item 6 shear reinforcement of the joist in accordance with the structural engineer´s specifications.
- The ISOMAXX® unit must be installed before the joist reinforcement is fitted.



ISOMAXX®
IM corner and IMT corner

UNITS FOR CANTILEVERED CORNER BALCONIES

ISOMAXX® IM CORNER AND IMT CORNER

- IM corner – Pressure plane with concrete compression bearings
- IMT corner – Pressure plane with steel pressure rods
- Load-bearing capacity IM corner 20 and 30, IMT corner 50, shear force load-bearing capacity Q8, Q10 and Q12
- A corner unit comprises an EL unit (left corner) in cv35 and an ER unit (right corner) in cv50 arranged to the left and right of the ceiling viewpoint and a corner insulation body 120 x 120 mm
- Unit heights starting from 180 mm
- Fire resistance class REI 120 available for IM corner, R 90 available for IMT corner

ISOMAXX® IM(T) SUB-UNIT EL/ER

- Sub-unit IM EL/ER – Pressure plane with concrete compression bearings
- Sub- unit IMT EL/ER – Pressure plane with with steel pressure rods
- Load-bearing capacities IM EL and IM ER 20 and 30, IMT EL 50 and IMT ER 50, shear force load-bearing capacities Q8, Q10 and Q12
- Concrete covering of tension rods cv35 (EL) or cv50 (ER)
- Unit heights starting from 180 mm
- Fire resistance classes: IM EL and IM ER available in REI 120, IMT EL and IMT ER available in R 90

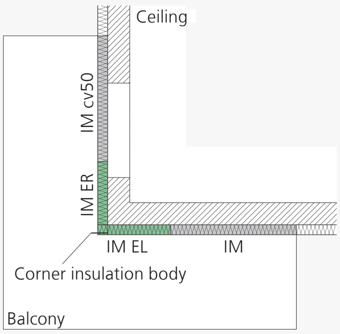
TYPE DESIGNATION

IM corner 20 cv35 h200 REI 120

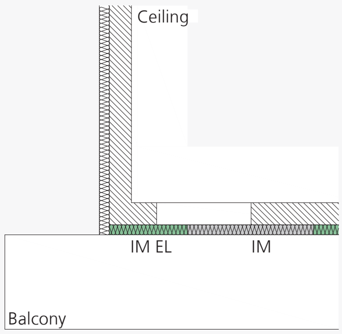
- Fire resistance class
- Unit height
- Concrete covering
- Type and load-bearing capacity

APPLICATION – UNIT ARRANGEMENT

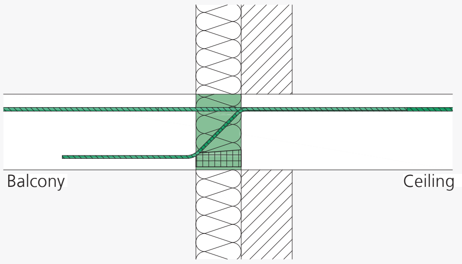
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



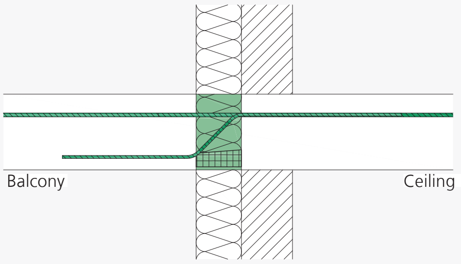
ISOMAXX® IM corner – Cantilevered external corner balcony



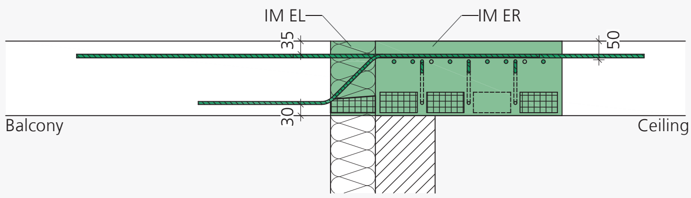
ISOMAXX® IM EL – Cantilevered balcony with slab protruding over the support



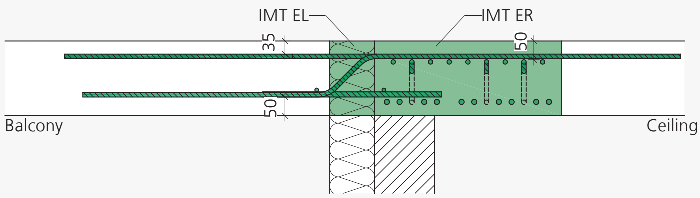
ISOMAXX® IM EL/ER – Installation cross-section cv35



ISOMAXX® IM EL/ER – Installation cross-section cv50



ISOMAXX® IM corner – Cross-section through the corner situation



ISOMAXX® IMT corner – Cross-section through the corner situation

PRODUCT DETAILS

DESIGN VALUES OF ALLOWABLE MOMENTS M_{RD} [kNm] PER SUB-UNIT EL/ER

Unit height [mm] depending on cv [mm]	ISOMAXX®					
	IM corner 20		IM corner 30		IMT corner 50	
35/50	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30
180	14,1	14,1	21,1	21,4	21,3	24,7
190	15,6	15,6	23,3	23,7	23,9	27,7
200	17,1	17,1	25,5	26,0	26,5	30,8
210	18,7	18,7	27,6	28,4	29,2	33,8
220	20,3	20,3	29,8	30,8	31,8	36,9
230	21,9	21,9	32,0	33,2	34,4	39,9
240	23,6	23,6	34,2	35,7	37,0	42,9
250	25,2	25,2	36,3	38,1	39,7	46,0

DESIGN VALUES OF ALLOWABLE SHEARING FORCES v_{Rd} [kN] PER SUB-UNIT EL/ER

Shear force	h_{min} [mm]	IM corner 20		IM corner 30		IMT corner 50	
		C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30
Q8	180	62,4	72,4	62,4	72,4	62,4	72,4
Q10	200	89,9	104,3	89,9	104,3	89,9	104,3
Q12	210	–	–	120,9	142,1	120,9	142,1

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IM corner 20	IM corner 30	IMT corner 50
Unit length [mm]	500 + 500		
Tension rods	6 Ø 8	6 Ø 10	5 Ø 14
Compression bearings CB/ steel pressure rods PR	3 CB	4 CB	PR 10 Ø 14
Shear rods Q8	3 Ø 10	3 Ø 10	3 Ø 10
Shear rods Q10	3 Ø 12	3 Ø 12	3 Ø 12
Shear rods Q12	–	3 Ø 14	3 Ø 14

NOTES

- With small cantilever arm lengths, a combination of a standard ISOMAXX® IM unit in cv35 and an ISOMAXX® IM unit in cv50 can also be used instead of the ISOMAXX® IM corner unit.
- Sub-units of the corner unit are also available individually for use where high moments and shearing forces occur at specific points
- With an ISOMAXX® IM/IMT corner, the IM EL unit is always produced in cv35 and the IM ER unit in cv50. Arranged to the left and right of the ceiling viewpoint.
- Adjoining the ER unit, an ISOMAXX® IM unit in cv50 is required when using a corner unit. It is then possible to proceed in cv35 or cv50. The reinforcement can be simplified by continuing in cv50.

DEFLECTION – DISTANCE BETWEEN EXPANSION JOINTS

DEFLECTION

The required camber of the reinforced concrete components is calculated in the same way as for the ISOMAXX® units on page 32 using the deflection factors below.

DEFLECTION FACTOR TAN α FOR CONCRETE C 20/25

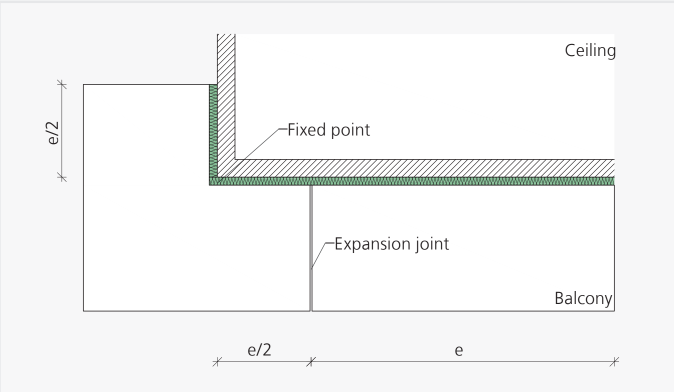
ISOMAXX®	concrete covering cv [mm]	180	190	200	210	220	230	240	250
IM corner 20	35/50	1,07	0,98	0,90	0,84	0,78	0,73	0,69	0,66
IM coner 30	35/50	1,24	1,13	1,03	0,95	0,88	0,82	0,77	0,72
IMT corner 50	35/50	1,38	1,23	1,11	1,01	0,92	0,85	0,79	0,74

DEFLECTION FACTOR TAN α FOR CONCRETE ≥ C 25/30

ISOMAXX®	concrete covering cv [mm]	180	190	200	210	220	230	240	250
IM corner 20	35/50	1,07	0,98	0,90	0,84	0,78	0,73	0,69	0,66
IM corner 30	35/50	1,26	1,14	1,05	0,97	0,91	0,85	0,80	0,76
IMT corner 50	35/50	1,60	1,42	1,28	1,17	1,07	0,99	0,92	0,86

DISTANCE BETWEEN EXPANSION JOINTS

For balconies that overhang corners, it must be taken into consideration that the corner is a fixed point. This reduces the maximum permissible distance between expansion joints to e/2. If the component dimensions exceed the maximum distance between expansion joints, expansion joints must be arranged perpendicular to the insulation plane.



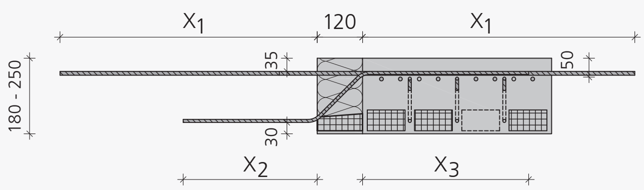
Expansion joint layout for corner balconies

MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IM corner 20		IM corner 30		IMT corner 50	
Shear force load-bearing capacity	Q8	Q10	Q10	Q12	Q10	Q12
Distance btw. joints e/2 [m]	10,8	9,9	9,9	8,5	8,5	8,5

UNIT STRUCTURE

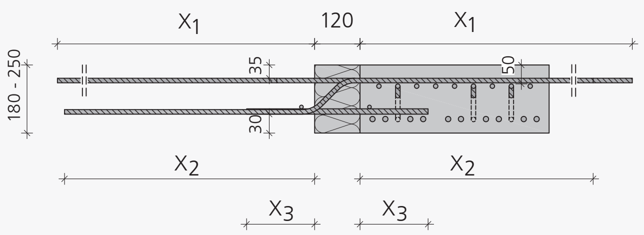
ISOMAXX® IM CORNER



Length tension rod [mm]	IM corner 20	IM corner 30
X_1	580	720

Length shear rod [mm]	Shear force load-bearing capacity		
	Q8	Q10	Q12
X_2	560	670	780
X_3	≤ 600	≤ 705	≤ 815
h_{min}	180	190	200

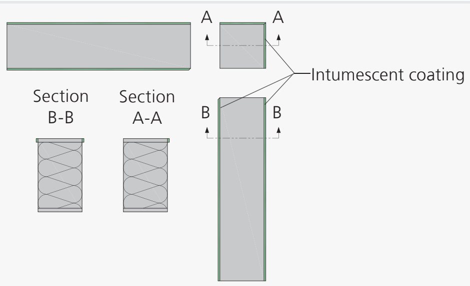
ISOMAXX® IMT CORNER



Length tension rod [mm]	IMT corner 50
X_1	980

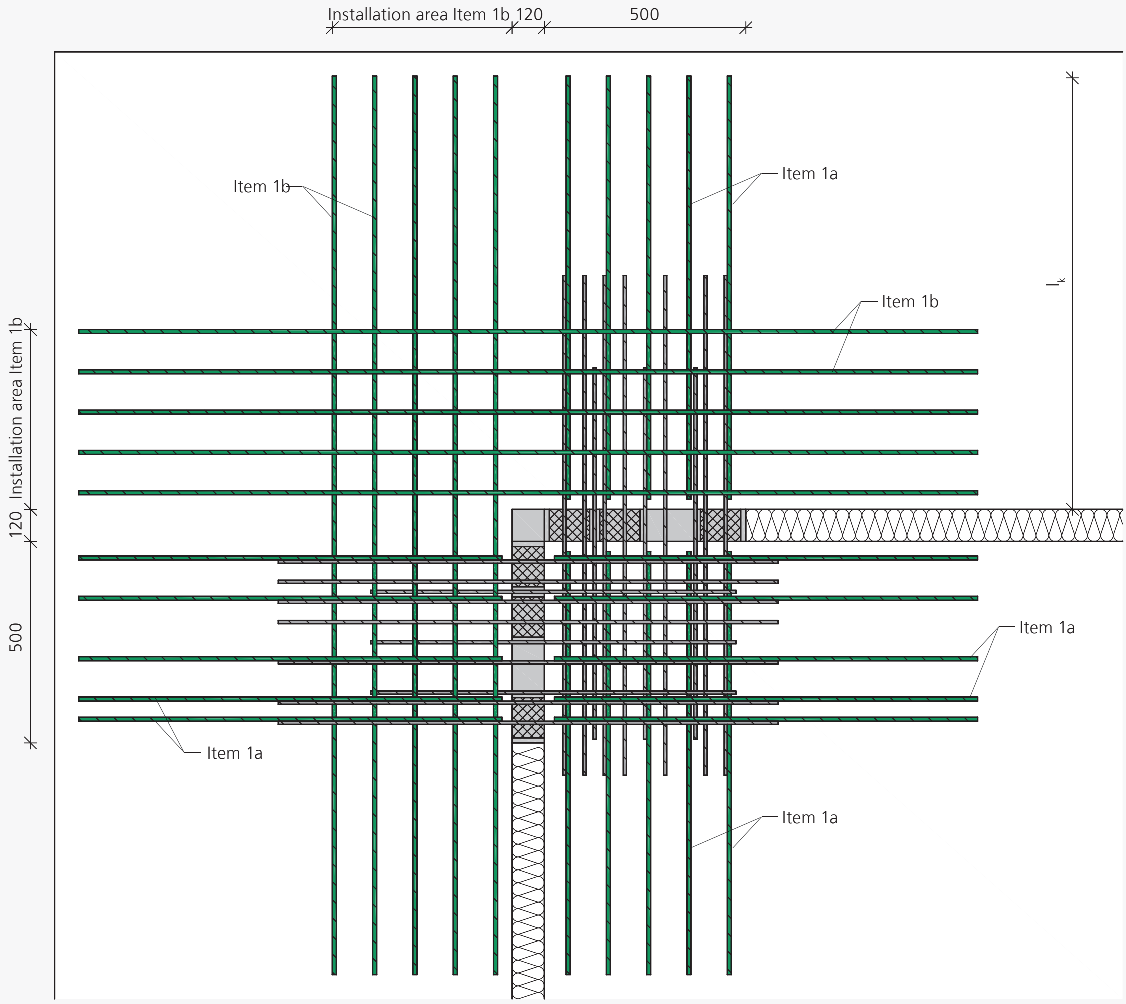
Length shear rod [mm]	Shear force load-bearing capacity	
	Q10	Q12
X_2	560	670
X_3	≤ 640	≤ 745
h_{min}	200	210

ISOMAXX® IM CORNER - FIRE PROTECTION VERSION, SCHEMATIC DESCRIPTION OF INSULATION



SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IM CORNER

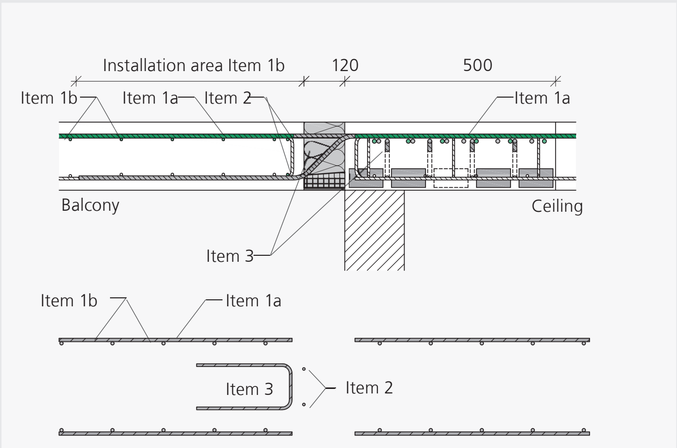


ISOMAXX® IM corner – Plan view of supplementary reinforcement, example illustration IM corner 20

SUPPLEMENTARY REINFORCEMENT

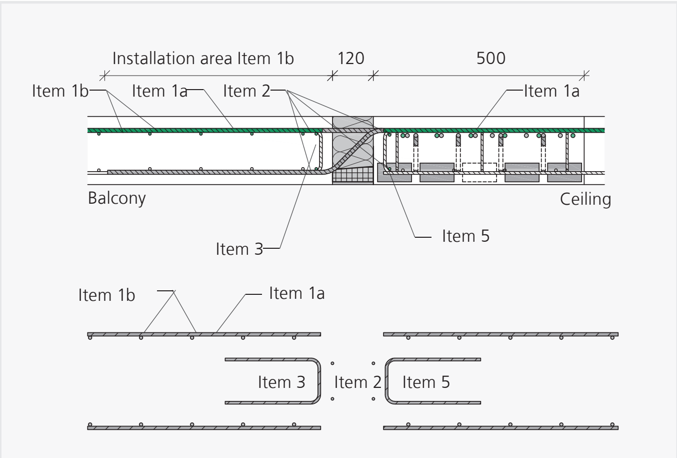
ISOMAXX® IM CORNER AND IMT CORNER

DIRECT SUPPORT



- Item 1a connection reinforcement and Item 1b additional reinforcement for the ISOMAXX® unit – see table
- Item 2 spacing bar 2 Ø 8 on the balcony
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)

INDIRECT SUPPORT



- Item 1a connection reinforcement and Item 1b additional reinforcement for the ISOMAXX® unit – see table
- Item 2 spacing bar 2 x 2 Ø 8 on the balcony
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 supplementary reinforcement for the ISOMAXX® unit - see table

CONNECTION AND ADDITIONAL REINFORCEMENT

ISOMAXX®	IM corner 20	IM corner 30	IMT corner 50
Connection reinforcement Item 1a	7 Ø 8	7 Ø 10	5 Ø 14
Rod length Item 1a	l_k - 70	l_k - 70	l_k - 70
Additional reinf. Item 1b	2 x 7 Ø 8/100	2 x 7 Ø 10/100	2 x 5 Ø 14/100
Rod length Item 1b	2 x l_k	2 x l_k	2 x l_k
Installation area Item 1b	640	640	440
Suppl. reinforcement Item 5	–	–	3 Ø 12

ISOMAXX® IMQ and IMZQ, IMQS/IMTQS and IMQZ

UNITS FOR SUPPORTED BALCONIES

ISOMAXX® IMQ, IMZQ

- For transferring positive shearing forces
- Unit length 1.0 m
- ISOMAXX® IMQ pressure plane with concrete compression bearings
- ISOMAXX® IMZQ for constraint-free support without pressure components
- Unit heights depending on the load-bearing capacity starting from h_{min} = 160 mm
- Fire resistance class REI 120 available

ISOMAXX® IMQS/IMTQS, IMQZ

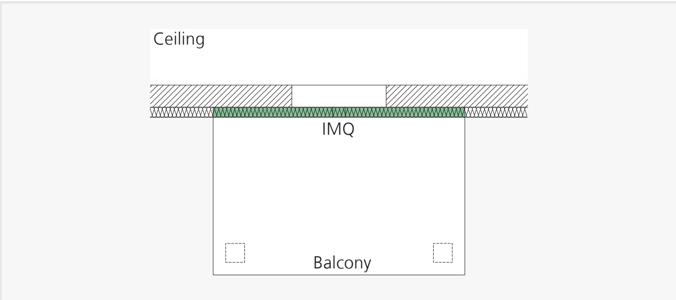
- Short units for load peaks at specific points
- Unit length depending on the load-bearing capacity 0.3 m, 0.4 m or 0.5 m
- ISOMAXX® IMQS pressure plane with concrete compression bearings
- ISOMAXX® IMTQS pressure plane with steel pressure rods
- ISOMAXX® IMQZ for constraint-free support without pressure components
- Unit heights depending on the load-bearing capacity starting from h_{min} = 160 mm
- Fire resistance class REI 120 available for IMQS and IMQZ, R 90 available for IMTQS

TYPE DESIGNATION

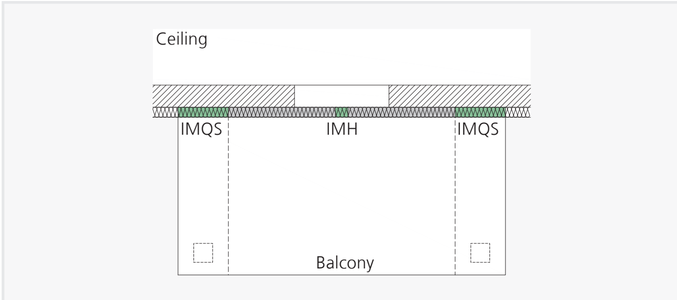
IMQ 20 h200 REI 120

- REI 120 – Fire protection version
- h200 – Unit height
- IMQ 20 – Type and load-bearing capacity

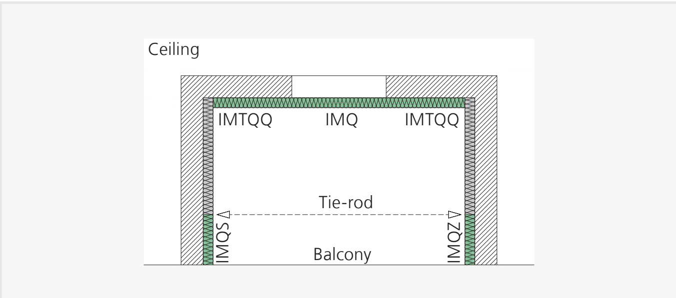
APPLICATION – UNIT ARRANGEMENT



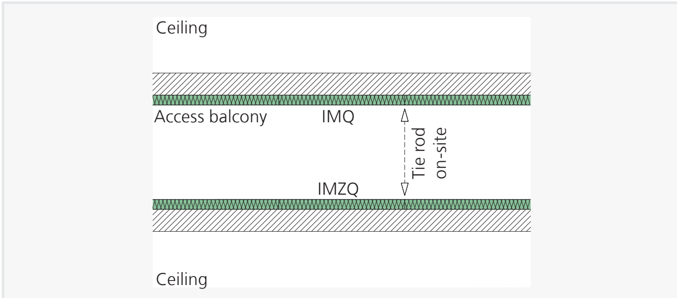
ISOMAXX® IMQ – supported balcony



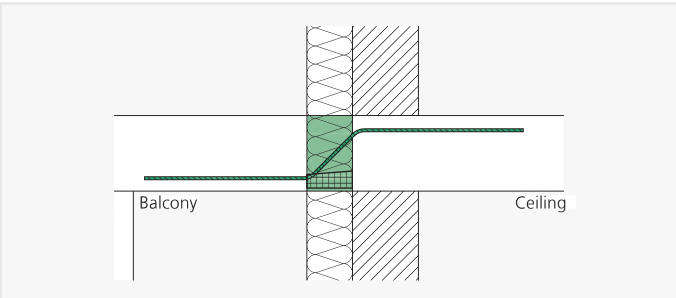
ISOMAXX® IMQS – supported balcony with joist and support at specific points with ISOMAXX® IMQS



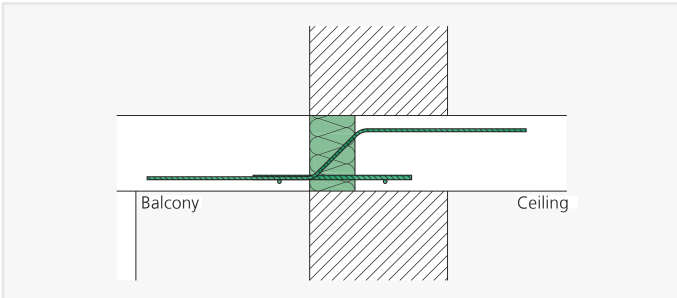
ISOMAXX® IMQ, IMTQQ, IMQS/IMTQS, IMQZ – Loggia balcony with load peaks at specific points and constraint-free support at the front



ISOMAXX® IMQ, IMZQ – Access balcony with constraint-free support

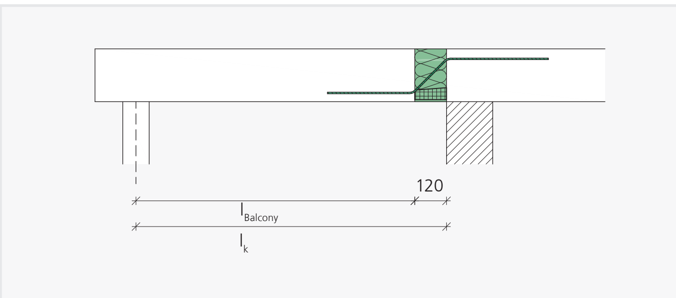


ISOMAXX® IMQ, IMQS – Installation cross-section of thermal insulation composite system

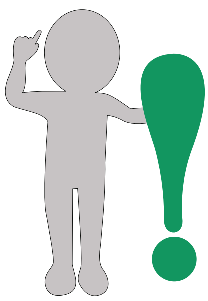


ISOMAXX® IMTQS – Installation cross-section of single-leaf masonry

STATIC SYSTEM



ISOMAXX® IMQ – Static system



For balconies connected with shear units, appropriate support must be provided in all construction conditions. Temporary supports may only be removed if the permanent supports, which may have been installed at a later date, are sufficiently strong and frictionally connected to the balcony.

DESIGN

ISOMAXX® IMQ – DESIGN VALUES OF ALLOWABLE SHEARING FORCE v_{RD} [kN/m]

ISOMAXX®	Shearing force v_{Rd} [kN/m]		Unit height [mm]	Unit length [mm]	Shear rods	Compression bearings (CB)
	C20/25	≥ C25/30				
IMQ 10	30,0	34,8	≥ 160	1000	4 Ø 6*	4 CB
IMQ 20	37,5	43,5	≥ 160	1000	5 Ø 6*	4 CB
IMQ 25	44,9	52,2	≥ 160	1000	6 Ø 6*	4 CB
IMQ 30	52,4	60,8	≥ 160	1000	7 Ø 6*	4 CB
IMQ 40	59,9	69,5	≥ 160	1000	8 Ø 6*	4 CB
IMQ 45	67,4	78,2	≥ 160	1000	9 Ø 6*	4 CB
IMQ 50	74,9	86,9	≥ 160	1000	10 Ø 6*	4 CB
IMQ 60	79,9	92,7	≥ 160	1000	6 Ø 8	4 CB
IMQ 70	93,2	108,2	≥ 160	1000	7 Ø 8	4 CB
IMQ 80	106,5	123,6	≥ 160	1000	8 Ø 8	4 CB
IMQ 90	133,2	154,5	≥ 160	1000	10 Ø 8	4 CB
IMQ 95	145,7	169,0	≥ 170	1000	7 Ø 10	4 CB
IMQ 100	166,5	193,2	≥ 170	1000	8 Ø 10	4 CB
IMQ 110	187,3	217,3	≥ 170	1000	9 Ø 10	4 CB
IMQ 120	208,1	241,5	≥ 170	1000	10 Ø 10	4 CB

ISOMAXX® IMZQ – DESIGN VALUES OF ALLOWABLE SHEARING FORCE v_{RD} [kN/m]

ISOMAXX®	Shearing force v_{Rd} [kN/m]		Unit height [mm]	Unit length [mm]	Shear rods	Compression bearings
	C20/25	≥ C25/30				
IMZQ 10	30,0	34,8	≥ 160	1000	4 Ø 6*	-
IMZQ 20	37,5	43,5	≥ 160	1000	5 Ø 6*	-
IMZQ 25	44,9	52,2	≥ 160	1000	6 Ø 6*	-
IMZQ 30	52,4	60,8	≥ 160	1000	7 Ø 6*	-
IMZQ 40	59,9	69,5	≥ 160	1000	8 Ø 6*	-
IMZQ 45	67,4	78,2	≥ 160	1000	9 Ø 6*	-
IMZQ 50	74,9	86,9	≥ 160	1000	10 Ø 6*	-
IMZQ 60	79,9	92,7	≥ 160	1000	6 Ø 8	-
IMZQ 70	93,2	108,2	≥ 160	1000	7 Ø 8	-
IMZQ 80	106,5	123,6	≥ 160	1000	8 Ø 8	-
IMZQ 90	133,2	154,5	≥ 160	1000	10 Ø 8	-
IMZQ 95	145,7	169,0	≥ 170	1000	7 Ø 10	-
IMZQ 100	166,5	193,2	≥ 170	1000	8 Ø 10	-
IMZQ 110	187,3	217,3	≥ 170	1000	9 Ø 10	-
IMZQ 120	208,1	241,5	≥ 170	1000	10 Ø 10	-

DESIGN

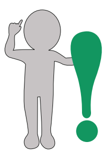
ISOMAXX® IMQS – DESIGN VALUES OF ALLOWABLE SHEARING FORCE V_{RD} [kN]

ISOMAXX®	Shearing force V_{Rd} [kN]		Unit height [mm]	Unit length [mm]	Shear rods	Compr bear. CB/ Pressure rods PR
	C20/25	≥ C25/30				
IMQS 5	26,6	30,9	≥ 160	300	2 Ø 8	1 CB
IMQS 10	41,6	48,3	≥ 170	300	2 Ø 10	1 CB
IMQS 15	53,3	61,8	≥ 160	500	4 Ø 8	2 CB
IMQS 20	62,4	72,4	≥ 170	400	3 Ø 10	2 CB
IMQS 30	83,2	96,6	≥ 170	500	4 Ø 10	2 CB
IMQS 40	54,4	63,2	≥ 180	300	2 Ø 12	1 CB
IMQS 50	62,4	72,4	≥ 170	400	3 Ø 10	2 CB
IMTQS 60	71,6	84,0	≥ 190	300	2 Ø 14	PR 3 Ø 14
IMQS 70	89,9	104,3	≥ 180	400	3 Ø 12	2 CB
IMTQS 75	119,3	140,0	≥ 190	400	3 Ø 14	PR 5 Ø 14
IMQS 80	119,9	139,1	≥ 180	500	4 Ø 12	3 CB
IMTQS 100	143,0	167,9	≥ 190	500	4 Ø 14	DS 6 Ø 14

ISOMAXX® IMQZ – DESIGN VALUES OF ALLOWABLE SHEARING FORCE V_{RD} [kN]

ISOMAXX®	Shearing force V_{Rd} [kN]		Unit height [mm]	Unit length [mm]	Shear rods	Compression bearings
	C20/25	≥ C25/30				
IMQZ 5	26,6	30,9	≥ 160	300	2 Ø 8	–
IMQZ 10	41,6	48,3	≥ 170	300	2 Ø 10	–
IMQZ 15	53,3	61,8	≥ 160	500	4 Ø 8	–
IMQZ 20	62,4	72,4	≥ 170	400	3 Ø 10	–
IMQZ 30	83,2	96,6	≥ 170	500	4 Ø 10	–
IMQZ 40	54,4	63,2	≥ 180	300	2 Ø 12	–
IMQZ 50	62,4	72,4	≥ 170	400	3 Ø 10	–
IMQZ 60	71,6	84,0	≥ 190	300	2 Ø 14	–
IMQZ 70	89,9	104,3	≥ 180	400	3 Ø 12	–
IMQZ 75	119,3	140,0	≥ 190	400	3 Ø 14	–
IMQZ 80	119,9	139,1	≥ 180	500	4 Ø 12	–
IMQZ 100	143,0	167,9	≥ 190	500	4 Ø 14	–

* Units with shear rods Ø 6 have a looped rod on the ceiling side. For all other units, the shear rod on the ceiling side is straight (see also page 63)



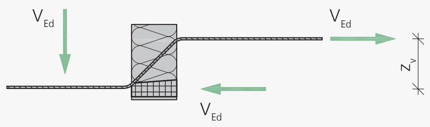
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.

DESIGN - EXPANSION JOINTS

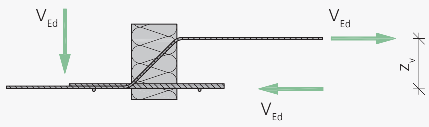
MOMENTS RESULTING FROM ECCENTRIC CONNECTIONS

When designing the connection reinforcement on the ceiling for shear units, a moment resulting from eccentric connections must also be considered. This moment is to be superimposed on the moments resulting from the planned loads if the moments are both positive or both negative. The moment is calculated ΔM_{Ed} on the basis of the assumption that the units are fully utilised.

$$\Delta M_{Ed} = V_{Ed} \cdot z_v$$



ISOMAXX® IMQ, IMQS – Units with concrete compression bearings
z_v – Lever arm for determining the offset moment



ISOMAXX® IMTQS – Units with steel pressure rods
z_v – Lever arm for determining the offset moment

OFFSET MOMENTS IMQ, IMZQ

ISOMAXX®	Δm_{Ed} [kNm/m]	
	h < 200 mm	h ≥ 200 mm
IMQ/IMZQ 10	3,3	4,7
IMQ/IMZQ 20	4,1	5,8
IMQ/IMZQ 25	4,9	7,0
IMQ/IMZQ 30	5,7	8,2
IMQ/IMZQ 40	6,5	9,3
IMQ/IMZQ 45	7,4	10,5
IMQ/IMZQ 50	8,2	11,6
IMQ/IMZQ 60	8,6	12,3
IMQ/IMZQ 70	10,1	14,4
IMQ/IMZQ 80	11,5	16,4
IMQ/IMZQ 90	14,4	20,6
IMQ/IMZQ 95	15,6	22,3
IMQ/IMZQ 100	17,8	25,5
IMQ/IMZQ 110	20,0	28,7
IMQ/IMZQ 120	22,2	31,9

OFFSET MOMENTS IMQS/IMTQS, IMQZ

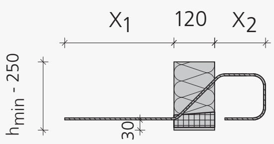
ISOMAXX®	ΔM_{Ed} [kNm]	
	h < 200 mm	h ≥ 200 mm
IMQS/IMQZ 5	2,9	4,1
IMQS/IMQZ 10	4,4	6,4
IMQS/IMQZ 15	5,7	8,2
IMQS/IMQZ 20	6,7	9,6
IMQS/IMQZ 30	8,9	12,7
IMQS/IMQZ 40	5,8	8,3
IMQS/IMQZ 50	6,7	9,6
IMTQS/IMQZ 60	6,8	10,1
IMQS/IMQZ 70	9,5	13,7
IMTQS/IMQZ 75	11,3	16,9
IMQS/IMQZ 80	12,7	18,2
IMTQS/IMQZ 100	13,6	20,3

MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IMQ/IMZQ 10 to 120 IMQS/IMQZ 5 to 30 and 50	IMQS/IMQZ 40, 70, 80	IMTQS 60, 75, 100
Distance btw. joints e [m]	21,7	19,8	17,0

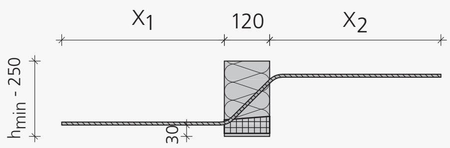
UNIT STRUCTURE

ISOMAXX® IMQ, IMQS, IMZQ*, IMQZ*, SHEAR ROD Ø 6



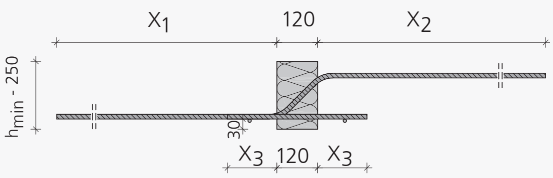
Length shear rod [mm]	IMQ 10 to IMQ 50 IMZQ 10 to IMZQ 50
	Ø 6
X_1	340
X_2	150
hmin	160

ISOMAXX® IMQ, IMQS, IMZQ*, IMQZ*, SHEAR ROD ≥ Ø 8



Length shear rod [mm]	IMQ 60 to 90 IMZQ 60 to 90 IMQS/IMQZ 5 and 15	IMQ 95 to 120 IMZQ 95 to 120 IMQS/IMQZ 10, 20, 30, 50	IMQS/IMQZ 40, 70, 80
	Ø 8	Ø 10	Ø 12
X_1	450	560	670
X_2	≤ 530	≤ 640	≤ 745
hmin	160	170	180

ISOMAXX® IMTQS, SHEAR ROD ≥ Ø 12



Length shear rod [mm]	IMTQS 60, 75, 100 IMQZ 60, 75, 100
	Ø 14
X_1	780
X_2	≤ 815
hmin	190

Length shear rod [mm]	IMTQS 60, 75, 100
	Ø 14
X_3	165

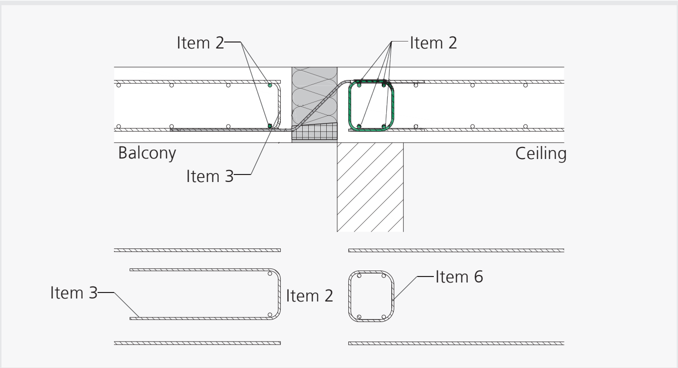
* IMZQ and IMQZ units do not have a pressure plane

NOTES

- The concrete covering of the shear rods at the bottom is generally 30 mm.
- The concrete covering of the shear rods at the top is cv35 to cv85 depending on the height and the rod diameter.

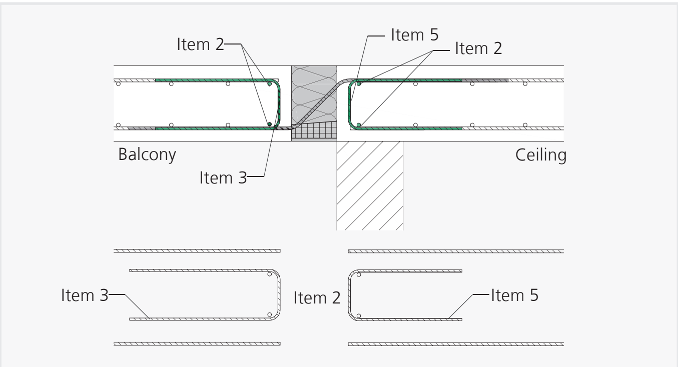
SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IMQ, IMZQ, IMQS, IMQZ WITH SHEAR ROD Ø 6 – LOOPED ON THE CEILING SIDE



- Item 1 slab reinforcement in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 Ø 8 on the balcony, 4 Ø 8 on the ceiling
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 6 stirrup (edge beam) Ø 6/200. For indirect support, a supplementary reinforcement must be arranged on the ceiling side (see table, item 5).

ISOMAXX® IMQ, IMZQ, IMQS, IMQZ – SHEAR ROD STRAIGHT ON THE CEILING SIDE



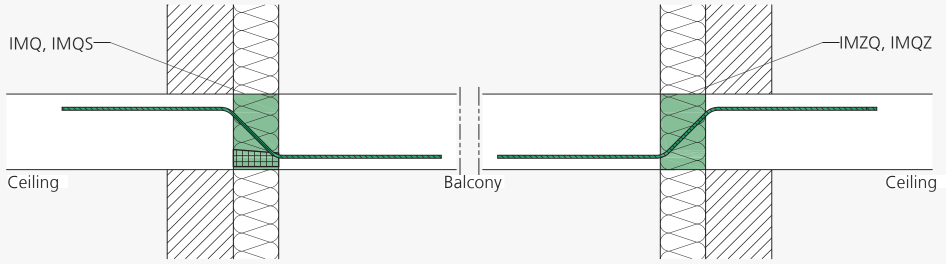
- Item 1 slab reinforcement in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 x 2 Ø 8 on the balcony and ceiling
- Item 3 structural edging parallel to the ISOMAXX® unit in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 supplementary reinforcement with indirect support on the ceiling side (see table)

ISOMAXX®	Suppl. reinforcement Item 5 $A_{s,erf}$ [cm²]	
	C20/25	C25/30
IMQ/IMZQ 10	0,69	0,80
IMQ/IMZQ 20	0,86	1,00
IMQ/IMZQ 25	1,03	1,20
IMQ/IMZQ 30	1,20	1,40
IMQ/IMZQ 40	1,38	1,60
IMQ/IMZQ 45	1,55	1,78
IMQ/IMZQ 50	1,72	2,00
IMQ/IMZQ 60	1,84	2,13
IMQ/IMZQ 70	2,14	2,49
IMQ/IMZQ 80	2,44	2,84
IMQ/IMZQ 90	3,06	3,55
IMQ/IMZQ 95	3,35	3,89
IMQ/IMZQ 100	3,83	4,44
IMQ/IMZQ 110	4,31	5,00
IMQ/IMZQ 120	4,78	5,55

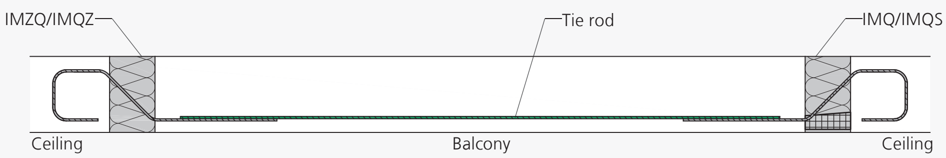
ISOMAXX®	Suppl. reinforcement Item 5 $A_{s,erf}$ [cm²]	
	C20/25	C25/30
IMQS/IMQZ 5	0,61	0,71
IMQS/IMQZ 10	0,96	1,11
IMQS/IMQZ 15	1,22	1,42
IMQS/IMQZ 20	1,43	1,66
IMQS/IMQZ 30	1,91	2,22
IMQS/IMQZ 40	1,25	1,45
IMQS/IMQZ 50	1,43	1,66
IMTQS/IMQZ 60	1,65	1,93
IMQS/IMQZ 70	2,07	2,40
IMQS/IMQZ 75	2,74	3,22
IMTQS/IMQZ 80	2,76	3,20
IMTQS/IMQZ 100	3,29	3,86

SUPPLEMENTARY REINFORCEMENT

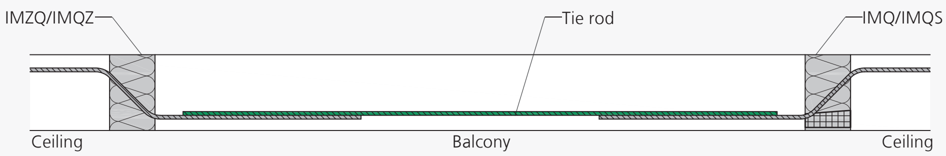
SUPPLEMENTARY REINFORCEMENT WITH CONSTRAINT-FREE SUPPORT



ISOMAXX® IMQ/IMZQ, IMQS/IMQZ – Installation cross-section with opposite types of same load bearing capacity



ISOMAXX® IMZQ/IMQ, IMQZ/IMQS – On-site tie rod in the bottom layer of reinforcement – Shear rod Ø 6 on the ceiling, looped



ISOMAXX® IMZQ/IMQ, IMQZ/IMQS – On-site tie rod in the bottom layer of reinforcement – Shear rod on the ceiling, straight

For constraint-free support with an ISOMAXX® IMZQ or IMQZ unit, a corresponding IMQ or IMQS unit must be used opposite. A tie rod must be installed between the two units in accordance with the shear reinforcement of the ISOMAXX® units.

TIE ROD ISOMAXX® IMZQ

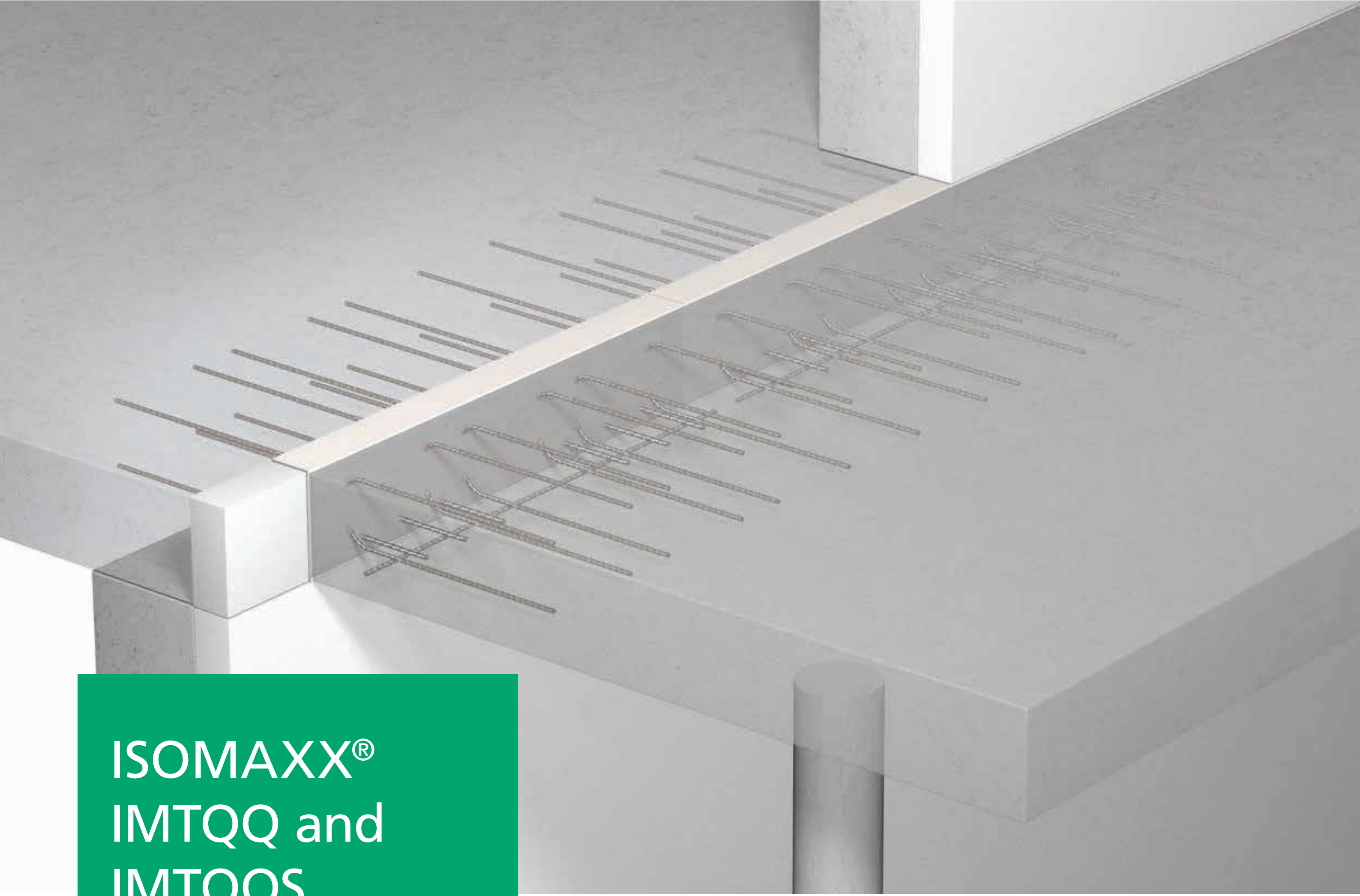
ISOMAXX®	IMZQ 10	IMZQ 20	IMZQ 25	IMZQ 30	IMZQ 40	IMZQ 45	IMZQ 50
Tie rod	4 Ø 6	5 Ø 6	6 Ø 6	7 Ø 6	8 Ø 6	9 Ø 6	10 Ø 6

ISOMAXX®	IMZQ 60	IMZQ 70	IMZQ 80	IMZQ 90	IMZQ 95	IMZQ 100	IMZQ 110	IMZQ 120
Tie rod	6 Ø 8	7 Ø 8	8 Ø 8	10 Ø 8	7 Ø 10	8 Ø 10	9 Ø 10	10 Ø 10

TIE ROD ISOMAXX® IMQZ

ISOMAXX®	IMQZ 5	IMQZ 10	IMQZ 15	IMQZ 20	IMQZ 30	IMQZ 40
Tie rod	2 Ø 8	2 Ø 10	4 Ø 8	3 Ø 10	4 Ø 10	2 Ø 12

ISOMAXX®	IMQZ 50	IMQZ 60	IMQZ 70	IMQZ 75	IMQZ 80	IMQZ 100
Tie rod	3 Ø 10	2 Ø 14	3 Ø 12	3 Ø 14	4 Ø 12	4 Ø 14



ISOMAXX® IMTQQ and IMTQQS

UNITS FOR SUPPORTED BALCONIES WITH LIFTING LOADS

ISOMAXX® IMTQQ

- Unit length 1.0 m
- pressure plane with steel pressure rods
- Load-bearing capacities IMTQQ 10 to IMTQQ 100
- For constraint-free support there are also IMZQQ units without steel pressure rods available
- Unit heights depending on diameter of shear rod starting from h_{min} = 160 mm
- Fire resistance class R 90 available

ISOMAXX® IMTQQS

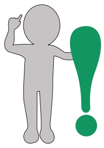
- Unit length depending on the load-bearing capacity 0.3 m, 0.4 m or 0.5 m
- pressure plane with steel pressure rods
- Load-bearing capacities IMTQQS 10 to IMTQQS 100
- For constraint-free support there are also IMQQZ units without steel pressure rods available
- Unit heights depending on diameter of shear rod starting from h_{min} = 160 mm
- Fire resistance class R 90 available

TYPE DESIGNATION

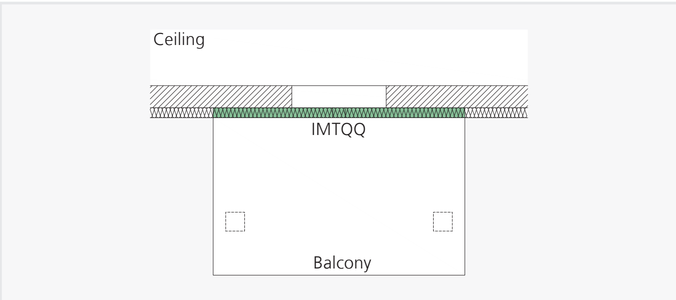
IMTQQ 20 h200 R 90

- R 90: Fire protection version
- h200: Unit height
- IMTQQ 20: Type and load-bearing capacity

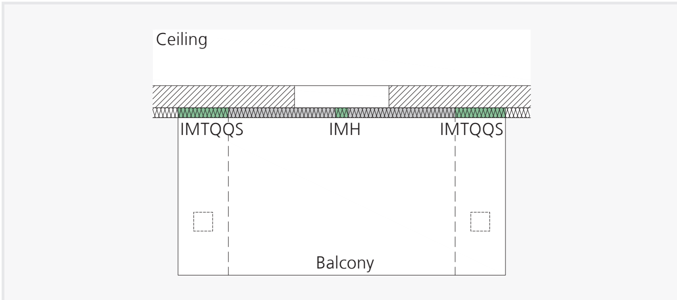
APPLICATION – UNIT ARRANGEMENT



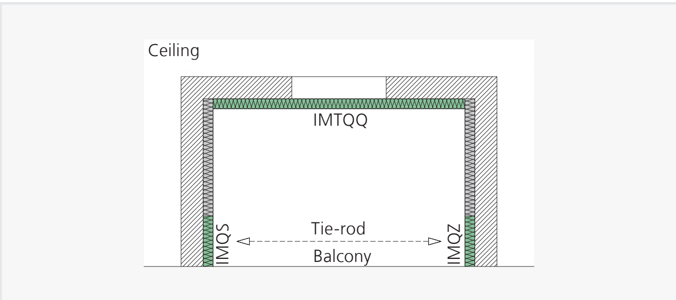
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



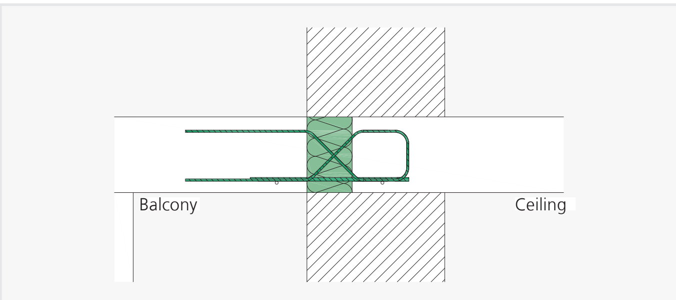
ISOMAXX® IMTQQ – Supported balcony with recessed support position



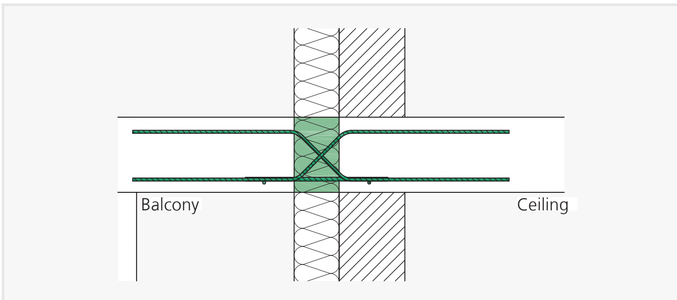
ISOMAXX® IMTQQS – Supported balcony with joists and support at specific points with ISOMAXX® IMTQQS units



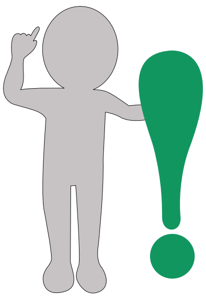
ISOMAXX® IMTQQ, IMQS, IMQZ – Loggia balcony with load peaks at specific points at the front and lifting loads in the rear corner area



ISOMAXX® IMTQQ – Installation cross-section of single-leaf masonry – Shear rod on the ceiling, looped



ISOMAXX® IMTQQ, IMTQQS – Installation cross-section of thermal insulation composite system – Shear rod on the ceiling, straight



For balconies connected with shear units, appropriate support must be provided in all construction conditions. Temporary supports may only be removed if the permanent supports, which may have been installed at a later date, are sufficiently strong and frictionally connected to the balcony.

DESIGN

ISOMAXX® IMTQQ – DESIGN VALUES OF ALLOWABLE SHEARING FORCE v_{RD} [kN/m]

ISOMAXX®	Shear force v_{Rd} [kN/m]		Unit height [mm]	Unit length [mm]	Shear rods	Pressure rods
	C20/25	≥ C25/30				
IMTQQ 10	± 29,6	± 34,8	≥ 160	1000	2 x 4 Ø 6*	4 Ø 10
IMTQQ 20	± 37,1	± 43,5	≥ 160	1000	2 x 5 Ø 6*	4 Ø 10
IMTQQ 30	± 52,4	± 60,8	≥ 160	1000	2 x 7 Ø 6*	4 Ø 10
IMTQQ 40	± 59,2	± 69,5	≥ 160	1000	2 x 8 Ø 6*	4 Ø 10
IMTQQ 50	± 74,0	± 86,9	≥ 160	1000	2 x 10 Ø 6*	5 Ø 10
IMTQQ 60	± 79,0	± 92,7	≥ 160	1000	2 x 6 Ø 8	6 Ø 10
IMTQQ 70	± 92,2	± 108,2	≥ 160	1000	2 x 7 Ø 8	6 Ø 10
IMTQQ 80	± 103,0	± 120,9	≥ 170	1000	2 x 5 Ø 10	7 Ø 10
IMTQQ 90	± 123,4	± 144,9	≥ 170	1000	2 x 6 Ø 10	8 Ø 10
IMTQQ 100	± 144,1	± 169,2	≥ 170	1000	2 x 7 Ø 10	10 Ø 10

* Units with shear rods Ø 6 have a looped rod on the ceiling side. For all other units, the shear rod bar on the ceiling side is straight (see also page 70)

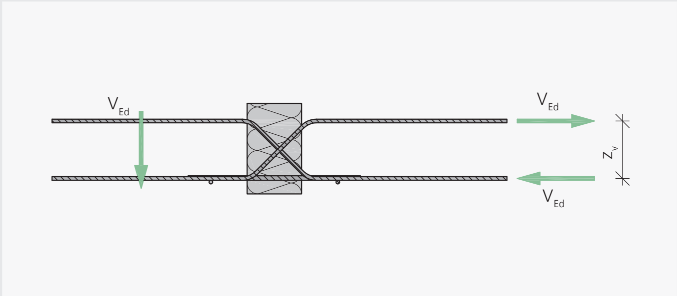
ISOMAXX® IMTQQS – DESIGN VALUES OF ALLOWABLE SHEARING FORCE V_{RD} [kN]

ISOMAXX®	Shear force V_{Rd} [kN]		Unit height [mm]	Unit length [mm]	Shear rods	Pressure rods
	C20/25	≥ C25/30				
IMTQQS 5	± 26,3	± 30,9	≥ 160	300	2 x 2 Ø 8	2 Ø 10
IMTQQS 10	± 40,9	± 48,0	≥ 170	300	2 x 2 Ø 10	3 Ø 10
IMTQQS 15	± 39,5	± 46,4	≥ 160	400	2 x 3 Ø 8	3 Ø 10
IMTQQS 20	± 61,3	± 72,0	≥ 170	400	2 x 3 Ø 10	4 Ø 10
IMTQQS 30	± 81,8	± 96,0	≥ 170	500	2 x 4 Ø 10	6 Ø 10
IMTQQS 40	± 59,2	± 69,5	≥ 180	300	2 x 2 Ø 12	3 Ø 14
IMTQQS 50	± 81,8	± 96,0	≥ 180	400	2 x 3 Ø 12	4 Ø 14
IMTQQS 60	± 71,6	± 84,0	≥ 190	300	2 x 2 Ø 14	3 Ø 14
IMTQQS 70	± 89,9	± 104,3	≥ 180	400	2 x 3 Ø 12	4 Ø 14
IMTQQS 75	± 119,3	± 140,0	≥ 190	400	2 x 3 Ø 14	5 Ø 14
IMTQQS 80	± 118,5	± 139,1	≥ 180	500	2 x 4 Ø 12	5 Ø 14
IMTQQS 100	± 143,0	± 167,9	≥ 190	500	2 x 4 Ø 14	6 Ø 14

DESIGN

MOMENTS RESULTING FROM ECCENTRIC CONNECTIONS

When designing the connection reinforcement on the ceiling for the ISOMAXX® IMTQQ and IMTQQS shear units, a moment resulting from eccentric connections must also be considered. This moment is to be superimposed on the moments resulting from the planned loads if the moments are both positive or both negative. The moment is calculated ΔM_{Ed} on the basis of the assumption that the units are fully utilised.



ISOMAXX® IMTQQ, IMTQQS – Units with pressure steel rods
z_v – Lever arm for determining the offset moment

$$\Delta M_{Ed} = V_{Ed} \cdot z_v$$

OFFSET MOMENT FOR TYPE IMTQQ

ISOMAXX®	Δm_{Ed} [kNm/m]	
	h < 200 mm	h ≥ 200 mm
IMTQQ 10	3,03	4,42
IMTQQ 20	3,79	5,53
IMTQQ 30	4,54	6,63
IMTQQ 40	6,05	8,83
IMTQQ 50	7,56	11,04
IMTQQ 60	7,97	11,68
IMTQQ 70	9,31	13,63
IMTQQ 80	11,49	15,11
IMTQQ 90	13,77	18,11
IMTQQ 100	16,07	21,15

OFFSET MOMENT FOR TYPE IMTQQS

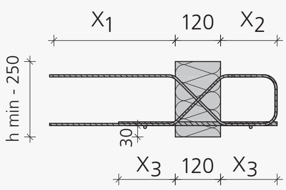
ISOMAXX®	ΔM_{Ed} [kNm]	
	h < 200 mm	h ≥ 200 mm
IMTQQS 5	2,66	3,89
IMTQQS 10	4,56	6,00
IMTQQS 15	3,99	5,85
IMTQQS 20	6,84	9,00
IMTQQS 30	9,12	12,00
IMTQQS 40	7,09	8,48
IMTQQS 50	9,79	11,71
IMTQQS 60	9,32	10,16
IMTQQS 70	10,64	12,73
IMTQQS 75	15,54	16,94
IMTQQS 80	14,19	16,97
IMTQQS 100	18,64	20,32

MAXIMUM PERMISSIBLE JOINTS BETWEEN EXPANSION JOINTS

ISOMAXX®	IMTQQ 10 to 100 IMTQQS 5 to 30	IMTQQS 40, 50, 70, 80	IMTQQS 60, 75, 100
Distance between joints e [m]	21,7	19,8	17,0

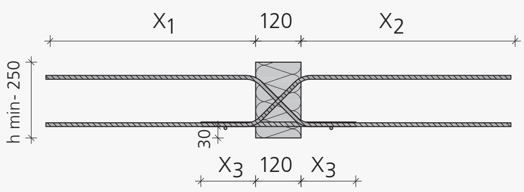
UNIT STRUCTURE

ISOMAXX® IMTQQ - SHEAR ROD Ø 6



Length shear rod [mm]	IMTQQ 10 to IMTQQ 50
	Ø 6
X_1	340
X_2	150
h_{min}	160
Length pressure rod [mm]	IMTQQ10 to IMTQQ50
	Pressure rod Ø 10
X_3	150

ISOMAXX® IMTQQ, IMTQQS - SHEAR ROD ≥ Ø 8



Length shear rod [mm]	IMTQQ 60 IMTQQ 70 IMTQQS 5 IMTQQS 15	IMTQQ 80-100 IMTQQS 10, 20, 30	IMTQQS 40, 50, 70, 80	IMTQQS 60, 75, 100
	Ø 8	Ø 10	Ø 12	Ø 14
X_1	450	560	670	780
X_2	≤ 490	≤ 600	≤ 705	≤ 815
h_{min}	160	170	180	190

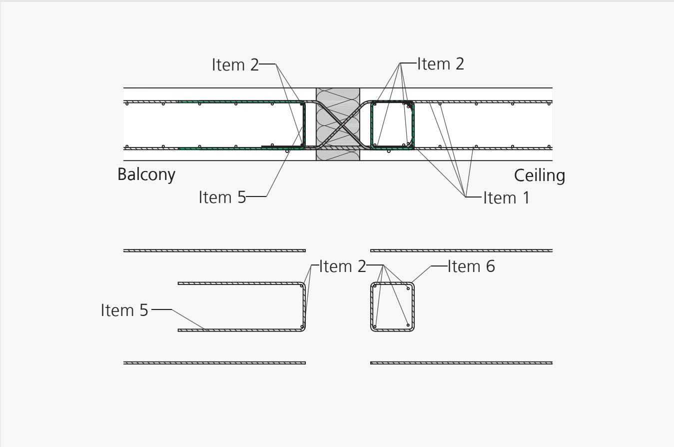
Length pressure rod [mm]	IMTQQ 10 to 100 IMTQQS 5 to 30	IMTQQS 40 to 100
	Ø 10	Ø 14
X_3	150	165

NOTES

- The concrete covering of the shear rods at the bottom is generally 30 mm.
- The concrete covering of the shear rods at the top is cv35 to cv85 depending on the height and the rod diameter.

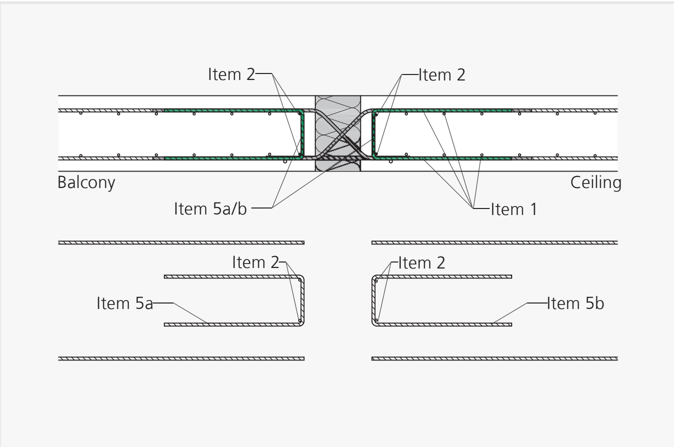
SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IMTQQ 10 TO 50 WITH SHEAR ROD Ø 6 – LOOPED ON THE CEILING SIDE



- Item 1 slab reinforcement and edging in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 Ø 8 on the balcony, 4 Ø 8 on the ceiling
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 supplementary reinforcement – see table below
- Item 6 stirrup (edge beam) Ø 6/200

ISOMAXX® IMTQQ 60 TO 100, IMTQQS 5 TO 100 – SHEAR ROD STRAIGHT ON CEILING SIDE

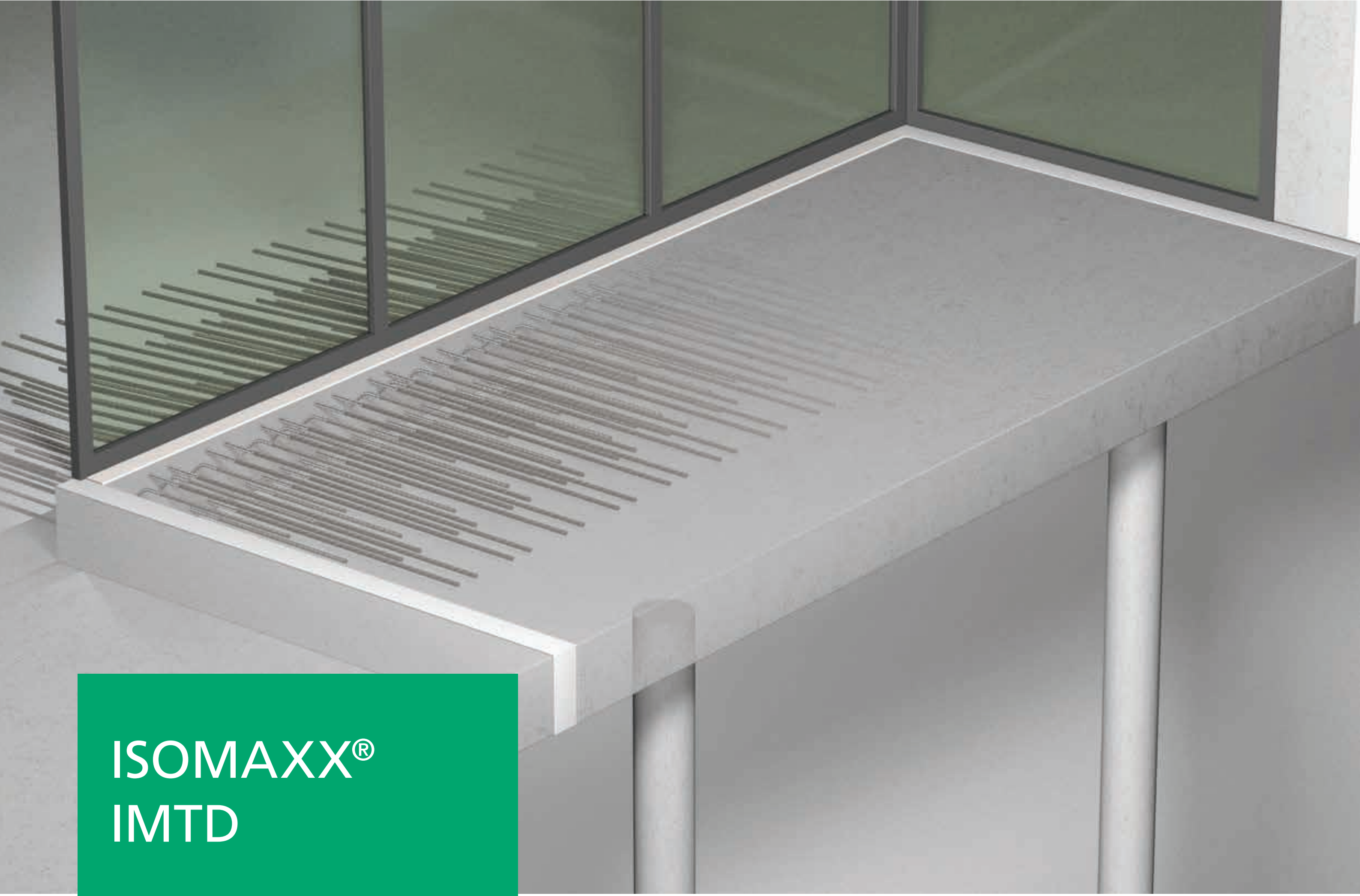


- Item 1 slab reinforcement and edging in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 x 2 Ø 8 on the balcony and ceiling
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5a supplementary reinforcement balcony side – see table below
- Item 5b supplementary reinforcement with indirect support on the ceiling side (see table)

SUPPLEMENTARY REINFORCEMENT

ISOMAXX®	Item 5, $a_{s,erf}$ [cm²/m]	
	C20/25	≥ C25/30
IMTQQ 10	0,68	0,80
IMTQQ 20	0,85	1,00
IMTQQ 30	1,02	1,20
IMTQQ 40	1,36	1,60
IMTQQ 50	1,70	2,00
IMTQQ 60	1,82	2,13
IMTQQ 70	2,12	2,49
IMTQQ 80	2,37	2,78
IMTQQ 90	2,84	3,33
IMTQQ 100	3,31	3,89

ISOMAXX®	Item 5, $A_{s,erf}$ [cm²]	
	C20/25	≥ C25/30
IMTQQS 5	0,61	0,71
IMTQQS 10	0,94	1,10
IMTQQS 15	0,91	1,07
IMTQQS 20	1,41	1,66
IMTQQS 30	1,88	2,21
IMTQQS 40	1,36	1,60
IMTQQS 50	1,88	2,21
IMTQQS 60	1,65	1,93
IMTQQS 70	2,07	2,40
IMTQQS 75	2,74	3,22
IMTQQS 80	2,72	3,20
IMTQQS 100	3,29	3,86



ISOMAXX® IMTD

UNITS FOR
CONTINUOUS SLABS

ISOMAXX® IMTD

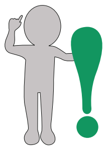
- For transferring positive and negative moments and positive and negative shearing forces
- Tension and pressure plane with steel tension/pressure rods
- Load-bearing capacities IMTD 20 to IMTD 100
- Shearing force load-bearing capacities standard, Q8, Q10
- Concrete covering of tension rods cv35 or cv50
- Concrete covering of the pressure rods at the bottom 30 mm for cv35 and 50 mm for cv50
- Unit heights depending on the shearing force load-bearing capacity starting from h_{min} = 160 mm
- Fire resistance class R 90 available

TYPE DESIGNATION

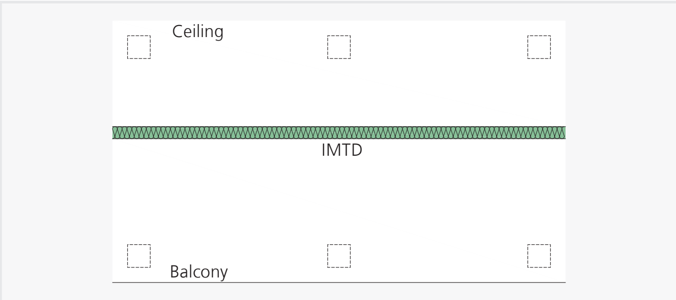
IMTD 50 Q8 cv35 h200 R 90

- R 90 – Fire protection version
- h200 – Unit height
- cv35 – Concrete covering
- Q8 – Shear force load-bearing capacity
- IMTD 50 – Type and load-bearing capacity

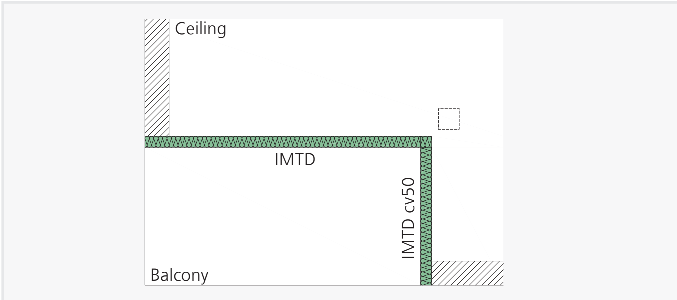
APPLICATION – UNIT ARRANGEMENT



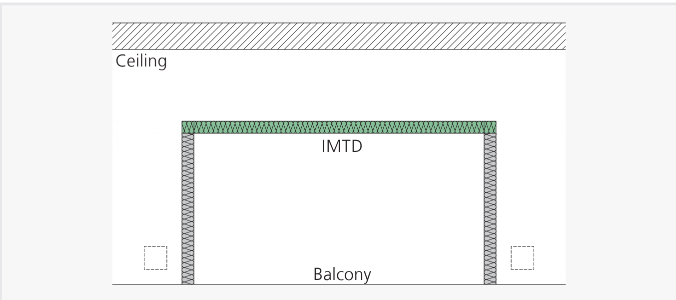
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



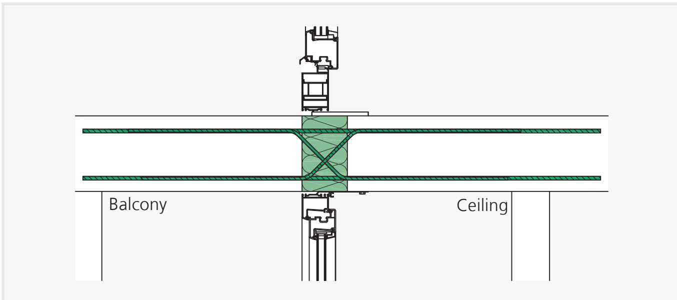
ISOMAXX® IMTD – Continuous slab with a glass façade



ISOMAXX® IMTD – Internal corner balcony with large dimensions and loads



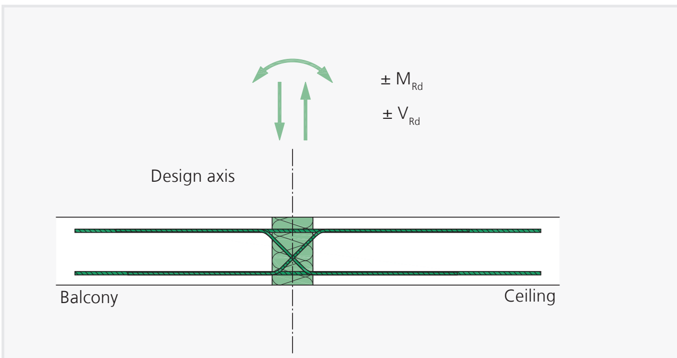
ISOMAXX® IMTD – Inset balcony with glass façade, without direct support



ISOMAXX® IMTD – Installation cross-section of glass façade

NOTE FOR DESIGN

- The gap between the balcony and the ceiling slab must be taken into account for the calculation in the FEM program
- With the ISOMAXX® IMTD units only bending moments perpendicular to the insulation joint can be transferred
- When calculating the resultant forces, the spring stiffness of the ISOMAXX® IMTD units must be iteratively included in the calculation. First, an assumption is made for the spring stiffness of the thermal insulation unit. A unit is then selected via the resulting static design values. In the next step, the definitive spring stiffness of the selected unit is included in the calculation. Possibly another iterative step is required to come to final solution.
- To transfer forces parallel and perpendicular to the joint, the IMTD units can be combined with ISOMAXX® IME units.



ISOMAXX® IMTD – Static system

DESIGN FOR CONCRETE C 20/25

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®								
35	50	IMTD 20	IMTD 20 Q8	IMTD 20 Q10	IMTD 30	IMTD 30 Q8	IMTD 30 Q10	IMTD 50	IMTD 50 Q8	IMTD 50 Q10
160	–	± 12,7	± 11,2	–	± 20,5	± 19,0	–	± 27,9	± 26,5	–
–	200	± 13,5	± 11,9	–	± 21,7	± 20,2	–	± 29,6	± 28,1	–
170	–	± 14,2	± 12,6	± 10,9	± 23,0	± 21,3	± 19,7	± 31,3	± 29,7	± 28,1
–	210	± 15,0	± 13,2	± 11,5	± 24,2	± 22,5	± 20,8	± 33,0	± 31,3	± 29,6
180	–	± 15,7	± 13,9	± 12,0	± 25,4	± 23,6	± 21,8	± 34,7	± 32,9	± 31,1
–	220	± 16,5	± 14,5	± 12,6	± 26,7	± 24,8	± 22,9	± 36,4	± 34,5	± 32,6
190	–	± 17,2	± 15,2	± 13,2	± 27,9	± 25,9	± 23,9	± 38,0	± 36,1	± 34,1
–	230	± 18,0	± 15,9	± 13,8	± 29,1	± 27,1	± 25,0	± 39,7	± 37,7	± 35,6
200	–	± 18,7	± 16,5	± 14,3	± 30,4	± 28,2	± 26,1	± 41,4	± 39,3	± 37,1
–	240	± 19,5	± 17,2	± 14,9	± 31,6	± 29,4	± 27,1	± 43,1	± 40,9	± 38,6
210	–	± 20,2	± 17,8	± 15,5	± 32,8	± 30,5	± 28,2	± 44,8	± 42,5	± 40,1
–	250	± 21,0	± 18,5	± 16,1	± 34,1	± 31,7	± 29,2	± 46,5	± 44,0	± 41,6
220	–	± 21,7	± 19,2	± 16,6	± 35,3	± 32,8	± 30,3	± 48,1	± 45,6	± 43,1
230	–	± 23,2	± 20,5	± 17,8	± 37,8	± 35,1	± 32,4	± 51,5	± 48,8	± 46,2
240	–	± 24,7	± 21,8	± 18,9	± 40,2	± 37,4	± 34,5	± 54,9	± 52,0	± 49,2
250	–	± 26,2	± 23,1	± 20,1	± 42,7	± 39,7	± 36,7	± 58,2	± 55,2	± 52,2

DESIGN VALUES OF ALLOWABLE SHEAR FORCES v_{Rd} [kN/m]

ISOMAXX®	IMTD 20	IMTD 20 Q8	IMTD 20 Q10	IMTD 30	IMTD 30 Q8	IMTD 30 Q10	IMTD 50	IMTD 50 Q8	IMTD 50 Q10
Shear force v_{Rd} [kN/m]	± 45,0	± 80,0	± 115,0	± 45,0	± 80,0	± 115,0	± 45,0	± 80,0	± 115,0

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTD 20	IMTD 20 Q8	IMTD 20 Q10	IMTD 30	IMTD 30 Q8	IMTD 30 Q10	IMTD 50	IMTD 50 Q8	IMTD 50 Q10
Unit length [mm]	500 + 500								
Tension / pressure rods	6 Ø 10			6 Ø 12			8 Ø 12		
Shear rods	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10

DESIGN FOR CONCRETE C 20/25

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®								
35	50	IMTD 70	IMTD 70 Q8	IMTD 70 Q10	IMTD 90	IMTD 90 Q8	IMTD 90 Q10	IMTD 100	IMTD 100 Q8	IMTD 100 Q10
160	–	± 35,4	± 33,9	–	± 42,9	± 41,4	–	± 46,2	–	–
–	200	± 37,5	± 36,0	–	± 45,4	± 43,9	–	± 49,1	–	–
170	–	± 39,7	± 38,0	± 36,4	± 48,0	± 46,4	± 44,8	± 51,9	± 50,4	–
–	210	± 41,8	± 40,1	± 38,4	± 50,6	± 48,9	± 47,2	± 54,8	± 53,1	–
180	–	± 43,9	± 42,1	± 40,3	± 53,2	± 51,4	± 49,6	± 57,7	± 55,9	± 54,0
–	220	± 46,1	± 44,2	± 42,3	± 55,8	± 53,9	± 52,0	± 60,5	± 58,6	± 56,7
190	–	± 48,2	± 46,2	± 44,2	± 58,3	± 56,4	± 54,4	± 63,4	± 61,4	± 59,4
–	230	± 50,3	± 48,3	± 46,2	± 60,9	± 58,9	± 56,8	± 66,2	± 64,2	± 62,0
200	–	± 52,5	± 50,3	± 48,2	± 63,5	± 61,4	± 59,2	± 69,1	± 66,9	± 64,7
–	240	± 54,6	± 52,4	± 50,1	± 66,1	± 63,8	± 61,6	± 71,9	± 69,7	± 67,4
210	–	± 56,7	± 54,4	± 52,1	± 68,7	± 66,3	± 64,0	± 74,8	± 72,5	± 70,1
–	250	± 58,9	± 56,4	± 54,0	± 71,2	± 68,8	± 66,4	± 77,6	± 75,2	± 72,7
220	–	± 61,0	± 58,5	± 56,0	± 73,8	± 71,3	± 68,8	± 80,5	± 78,0	± 75,4
230	–	± 65,3	± 62,6	± 59,9	± 79,0	± 76,3	± 73,6	± 86,2	± 83,5	± 80,8
240	–	± 69,5	± 66,7	± 63,8	± 84,2	± 81,3	± 78,5	± 91,9	± 89,1	± 86,1
250	–	± 73,8	± 70,8	± 67,7	± 89,3	± 86,3	± 83,3	± 97,6	± 94,6	± 91,5

DESIGN VALUES OF ALLOWABLE SHEAR FORCES v_{Rd} [kN/m]

ISOMAXX®	IMTD 70	IMTD 70 Q8	IMTD 70 Q10	IMTD 90	IMTD 90 Q8	IMTD 90 Q10	IMTD 100	IMTD 100 Q8	IMTD 100 Q10
Shear force v_{Rd} [kN/m]	± 45,0	± 80,0	± 115,0	± 45,0	± 80,0	± 115,0	± 80,0	± 115,0	± 152,0

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTD 70	IMTD 70 Q8	IMTD 70 Q10	IMTD 90	IMTD 90 Q8	IMTD 90 Q10	IMTD 100	IMTD 100 Q8	IMTD 100 Q10
Unit length [mm]	500 + 500								
Tension / pressure rods	10 Ø 12			12 Ø 12			12 Ø 14		
Shear rods	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 6 Ø 8	2 x 6 Ø 10	2 x 6 Ø 12

DESIGN FOR CONCRETE ≥ C25/30

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®								
35	50	IMTD 20	IMTD 20 Q8	IMTD 20 Q10	IMTD 30	IMTD 30 Q8	IMTD 30 Q10	IMTD 50	IMTD 50 Q8	IMTD 50 Q10
160	–	± 12,4	± 10,7	–	± 20,2	± 18,5	–	± 27,6	± 26,0	–
–	200	± 13,1	± 11,4	–	± 21,4	± 19,7	–	± 29,3	± 27,6	–
170	–	± 13,8	± 12,0	± 9,9	± 22,6	± 20,8	± 18,8	± 30,9	± 29,1	± 27,1
–	210	± 14,6	± 12,6	± 10,5	± 23,8	± 21,9	± 19,8	± 32,6	± 30,7	± 28,6
180	–	± 15,3	± 13,3	± 11,0	± 25,0	± 23,0	± 20,8	± 34,3	± 32,3	± 30,0
–	220	± 16,0	± 13,9	± 11,5	± 26,2	± 24,1	± 21,8	± 35,9	± 33,8	± 31,5
190	–	± 16,8	± 14,5	± 12,0	± 27,4	± 25,2	± 22,8	± 37,6	± 35,4	± 33,0
–	230	± 17,5	± 15,1	± 12,6	± 28,7	± 26,4	± 23,8	± 39,3	± 37,0	± 34,4
200	–	± 18,2	± 15,8	± 13,1	± 29,9	± 27,5	± 24,8	± 40,9	± 38,5	± 35,9
–	240	± 18,9	± 16,4	± 13,6	± 31,1	± 28,6	± 25,8	± 42,6	± 40,1	± 37,3
210	–	± 19,7	± 17,0	± 14,1	± 32,3	± 29,7	± 26,9	± 44,2	± 41,7	± 38,8
–	250	± 20,4	± 17,7	± 14,7	± 33,5	± 30,8	± 27,9	± 45,9	± 43,2	± 40,3
220	–	± 21,1	± 18,3	± 15,2	± 34,7	± 31,9	± 28,9	± 47,6	± 44,8	± 41,7
230	–	± 22,6	± 19,6	± 16,2	± 37,2	± 34,2	± 30,9	± 50,9	± 47,9	± 44,6
240	–	± 24,0	± 20,8	± 17,3	± 39,6	± 36,4	± 32,9	± 54,2	± 51,1	± 47,5
250	–	± 25,5	± 22,1	± 18,3	± 42,0	± 38,6	± 34,9	± 57,6	± 54,2	± 50,5

DESIGN VALUES OF ALLOWABLE SHEAR FORCES v_{Rd} [kN/m]

ISOMAXX®	IMTD 20	IMTD 20 Q8	IMTD 20 Q10	IMTD 30	IMTD 30 Q8	IMTD 30 Q10	IMTD 50	IMTD 50 Q8	IMTD 50 Q10
Shear force v_{Rd} [kN/m]	± 53,0	± 92,0	± 135,0	± 53,0	± 92,0	± 135,0	± 53,0	± 92,0	± 135,0

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTD 20	IMTD 20 Q8	IMTD 20 Q10	IMTD 30	IMTD 30 Q8	IMTD 30 Q10	IMTD 50	IMTD 50 Q8	IMTD 50 Q10
Unit length [mm]	500 + 500								
Tension / pressure rods	6 Ø 10			6 Ø 12			8 Ø 12		
Shear rods	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10

DESIGN FOR CONCRETE ≥ C25/30

DESIGN VALUES OF ALLOWABLE MOMENTS m_{Rd} [kNm/m]

Unit height [mm] depending on cv [mm]		ISOMAXX®								
35	50	IMTD 70	IMTD 70 Q8	IMTD 70 Q10	IMTD 90	IMTD 90 Q8	IMTD 90 Q10	IMTD 100	IMTD 100 Q8	IMTD 100 Q10
160	–	± 35,1	± 33,4	–	± 42,5	± 40,9	–	± 45,7	–	–
–	200	± 37,2	± 35,5	–	± 45,1	± 43,4	–	± 48,6	–	–
170	–	± 39,3	± 37,5	± 35,5	± 47,6	± 45,8	± 43,8	± 51,4	± 49,4	–
–	210	± 41,4	± 39,5	± 37,4	± 50,2	± 48,3	± 46,2	± 54,2	± 52,2	–
180	–	± 43,5	± 41,5	± 39,3	± 52,8	± 50,8	± 48,5	± 57,0	± 54,9	± 52,6
–	220	± 45,6	± 43,5	± 41,2	± 55,3	± 53,2	± 50,9	± 59,9	± 57,6	± 55,2
190	–	± 47,7	± 45,5	± 43,1	± 57,9	± 55,7	± 53,3	± 62,7	± 60,3	± 57,8
–	230	± 49,9	± 47,6	± 45,0	± 60,5	± 58,2	± 55,6	± 65,5	± 63,0	± 60,4
200	–	± 52,0	± 49,6	± 46,9	± 63,0	± 60,6	± 58,0	± 68,3	± 65,7	± 63,0
–	240	± 54,1	± 51,6	± 48,8	± 65,6	± 63,1	± 60,3	± 71,2	± 68,5	± 65,6
210	–	± 56,2	± 53,6	± 50,7	± 68,1	± 65,5	± 62,7	± 74,0	± 71,2	± 68,2
–	250	± 58,3	± 55,6	± 52,6	± 70,7	± 68,0	± 65,0	± 76,8	± 73,9	± 70,8
220	–	± 60,4	± 57,6	± 54,6	± 73,3	± 70,5	± 67,4	± 79,6	± 76,6	± 73,4
230	–	± 64,6	± 61,7	± 58,4	± 78,4	± 75,4	± 72,1	± 85,3	± 82,0	± 78,6
240	–	± 68,9	± 65,7	± 62,2	± 83,5	± 80,3	± 76,8	± 90,9	± 87,5	± 83,8
250	–	± 73,1	± 69,7	± 66,0	± 88,6	± 85,3	± 81,5	± 96,6	± 92,9	± 89,1

DESIGN VALUES OF ALLOWABLE SHEAR FORCES v_{Rd} [kN/m]

ISOMAXX®	IMTD 70	IMTD 70 Q8	IMTD 70 Q10	IMTD 90	IMTD 90 Q8	IMTD 90 Q10	IMTD 100	IMTD 100 Q8	IMTD 100 Q10
Shear rods v_{Rd} [kN/m]	± 53,0	± 92,0	± 135,0	± 53,0	± 92,0	± 135,0	± 92,0	± 135,0	± 180,0

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTD 70	IMTD 70 Q8	IMTD 70 Q10	IMTD 90	IMTD 90 Q8	IMTD 90 Q10	IMTD 100	IMTD 100 Q8	IMTD 100 Q10
Unit length [mm]	500 + 500								
Tension / pressure rods	10 Ø 12			12 Ø 12			12 Ø 14		
Shear rods	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 4 Ø 8	2 x 6 Ø 8	2 x 6 Ø 10	2 x 6 Ø 8	2 x 6 Ø 10	2 x 6 Ø 12

DESIGN - UNIT STRUCTURE

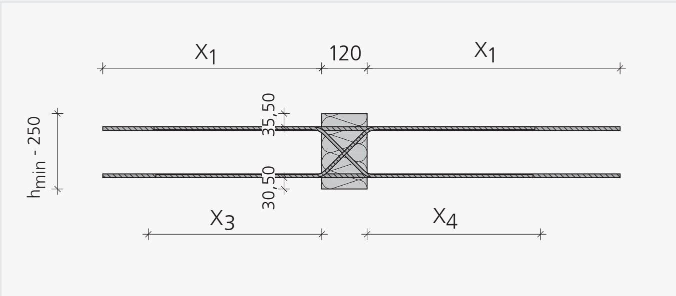
DISTANCE BETWEEN EXPANSION JOINTS

If the component dimensions exceed the maximum permissible distance between expansion joints, expansion joints must be arranged perpendicular to the insulation plane. The maximum permissible distance between expansion joints e is dependent on the maximum rod diameter guided across the expansion joint and is thus type-dependent.
The use of fixed points such as corner supports or the use of ISOMAXX® IMH or IME units results in increased constraints, which means the maximum permissible distance between expansion joints must be reduced to e/2. Half of the maximum distance between expansion joints is always measured from the fixed point.

MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IMTD 20	IMTD 30 to IMTD 90	IMTD 100
Distance btw. joints e [m]	21,7	19,8	17,0

UNIT STRUCTURE ISOMAXX® IMTD

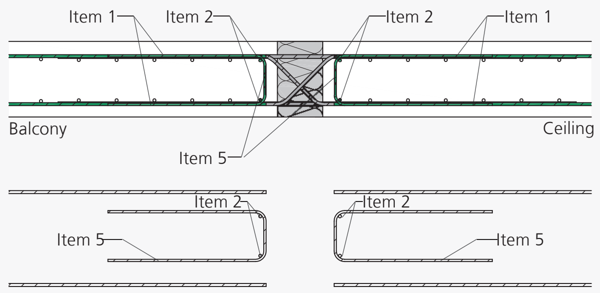


Length tension rod / Length pressure rod [mm]	IMTD 20	IMTD 30	IMTD 50	IMTD 70	IMTD 90	IMTD 100
X_1	720	840	840	840	840	960

Length shear rod [mm]	IMTD 20 to IMTD 90 Shear force load-bearing capacity			IMTD 100 Shear force load-bearing capacity		
	Standard	Q8	Q10	Standard	Q8	Q10
X_3	450	450	560	450	560	670
X_4	≤ 490	≤ 490	≤ 600	≤ 490	≤ 600	≤ 705
h_{min}	160	160	170	160	170	180

SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IMTD



- Item 1 connection reinforcement for the ISOMAXX® unit – for negative moments at the top, for positive moments at the bottom – see table
- Item 2 spacing bar 2 x 2 Ø 8 on balcony and ceiling side
- Item 4 structural edging at the free balcony edge in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications (not shown here)
- Item 5 supplementary reinforcement on balcony and ceiling side – see table below

SUPPLEMENTARY REINFORCEMENT ITEM 1

ISOMAXX®	IMTD 20	IMTD 30	IMTD 50	IMTD 70	IMTD 90	IMTD 100
$a_{s,erf}$ [cm²/m]	4,71	6,79	9,05	11,31	13,57	18,47
Suggestion	6 Ø 10	6 Ø 12	8 Ø 12	10 Ø 12	12 Ø 12	12 Ø 14

SUPPLEMENTARY REINFORCEMENT ITEM 5

ISOMAXX®	IMTD 20 to IMTD 90			IMTD 100		
	Standard	Q8	Q10	Standard	Q8	Q10
$a_{s,erf}$ [cm²/m]	1,21	2,13	3,10	2,13	3,10	4,14
Suggestion	Ø 6/200	Ø 8/200	Ø 10/200	Ø 8/200	Ø 10/200	Ø 10/150

ISOMAXX® IMH

UNITS FOR PLANNED HORIZONTAL LOADS

ISOMAXX® IMH

- Load-bearing capacities IMH 1, IMH 2 and IMH 3
- ISOMAXX® IMH 1 for transferring horizontal forces parallel to the insulating joint
- ISOMAXX® IMH 2 for transferring horizontal forces perpendicular to the insulating joint
- ISOMAXX® IMH 3 for transferring horizontal forces parallel and perpendicular to the insulating joint
- Clearly defined concrete covering, see product details
- Unit heights starting from h_{min} = 160 mm
- Fire resistance class REI 120 available

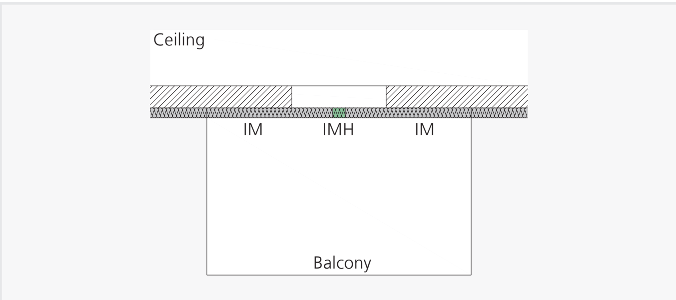
TYPE DESIGNATION

IMH 2 h200 REI 120

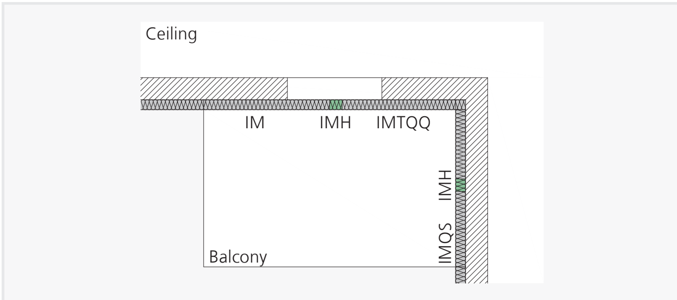
- REI 120 – Fire resistance class
- h200 – Unit height
- IMH 2 – Type and load-bearing capacity

APPLICATION – UNIT ARRANGEMENT

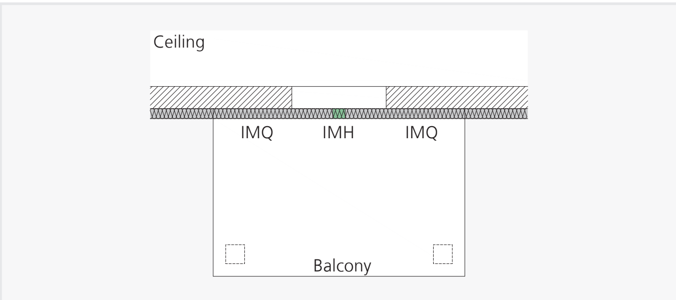
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



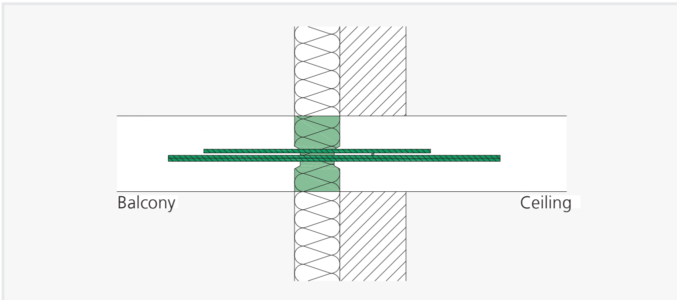
ISOMAXX® IMH – Cantilevered balcony with planned horizontal loads



ISOMAXX® IMH – Supported internal corner balcony with planned horizontal loads



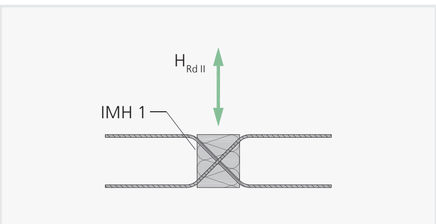
ISOMAXX® IMH – Balcony on hinged supports with IMH structural units



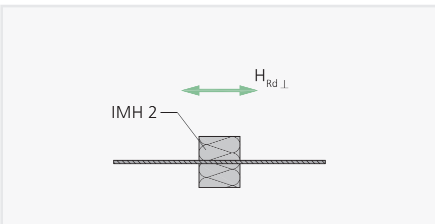
ISOMAXX® IMH 3 – Installation cross-section of thermal insulation composite system

DESIGN VALUES OF ALLOWABLE HORIZONTAL LOADS H_{Rd} [kN]

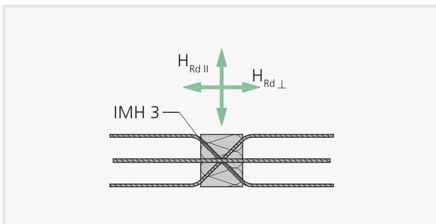
ISOMAXX®	IMH 1		IMH 2		IMH 3	
Concrete quality	C 20/25	≥ C 25/30	C 20/25	≥C 25/30	C 20/25	≥ C 25/30
Horizontal force, parallel $H_{Rd\,II}$ [kN]	± 7,4	± 8,6	–	–	± 7,4	± 8,6
Horizontal force, vertical $H_{Rd\,\perp}$ [kN]	–	–	± 18,1	± 20,9	± 18,1	± 20,9



IMH 1



IMH 2



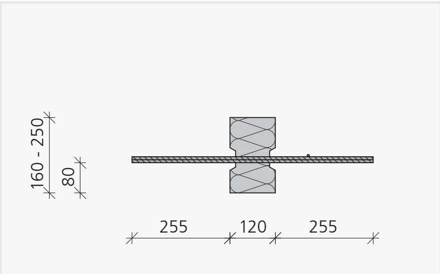
IMH 3

DESIGN

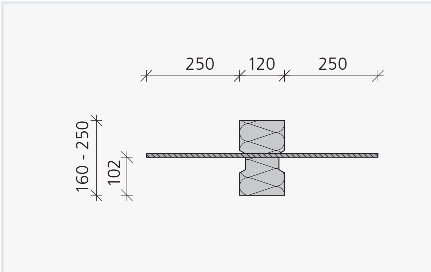
NOTES ON DESIGN

- The quantity and position of the ISOMAXX® IMH units are in accordance with the structural engineer's specifications.
- When using ISOMAXX® IMH units, it must be ensured that the length and therefore also the load-bearing capacity of the linear connection is reduced by the proportion of the IMH units used.
- The steel rods of the ISOMAXX® IMH units are anchored on both sides of the insulaton joint. Therefore there is no connection reinforcement required.

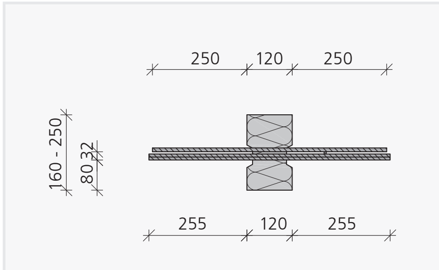
UNIT STRUCTURE ISOMAXX® IMH



IMH 1



IMH 2



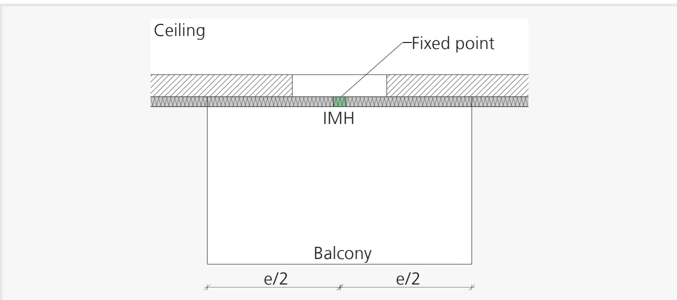
IMH 3

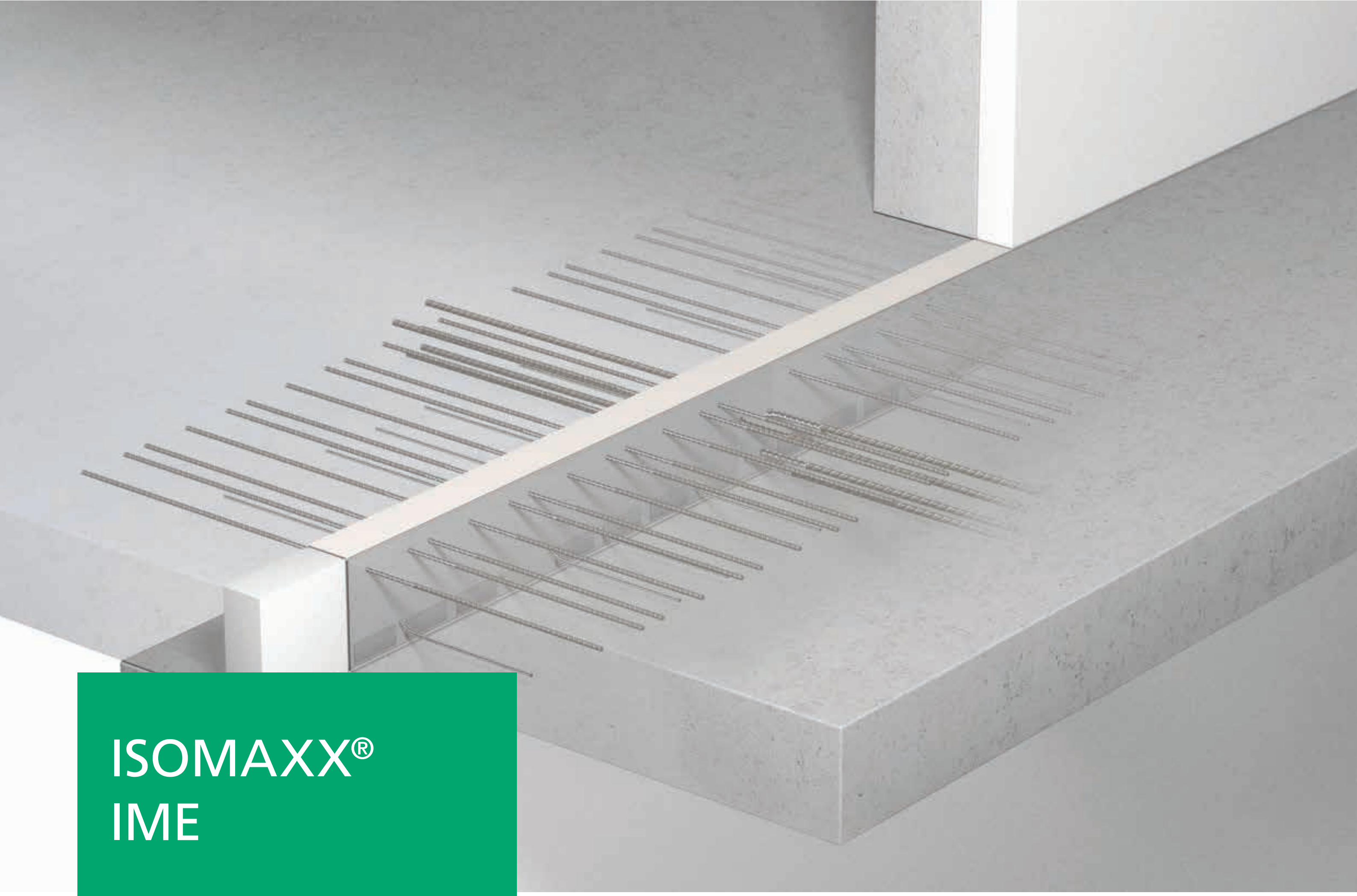
UNIT LENGTH AND ASSIGNMENT

ISOMAXX®	IMH 1	IMH 2	IMH 3
Unit length [mm]		150	
Shear rods	2 x 1 Ø 8	–	2 x 1 Ø 8
Tension / pressure rods	–	1 Ø 10	1 Ø 10

DISTANCE BETWEEN EXPANSION JOINTS

By using ISOMAXX® IMH units, a fixed point is created, resulting in increased constraints. The maximum permissible distance between expansion joints is therefore reduced to e/2 when ISOMAXX® IMH units are used. Half of the maximum distance between expansion joints is always measured from the fixed point.





ISOMAXX®
IME

UNITS FOR EARTHQUAKE LOADS

ISOMAXX® IME

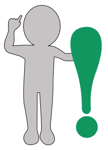
- For cantilevered, continuous or supported slabs as a supplement
- For transferring horizontal forces parallel and perpendicular to the insulating joint and lifting (positive) moments in connection with an ISOMAXX® IM unit
- Load-bearing capacities IME 1 and IME 2
- Clearly defined concrete covering, see design section
- Unit heights starting from h_{min} = 160 mm
- Fire resistance class REI 120 available

TYPE DESIGNATION

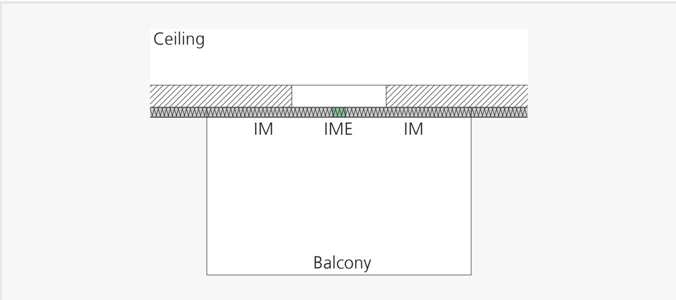
IME 2 h200 REI 120

- REI 120 – Fire protection version
- h200 – Unit height
- IME 2 – Type and load-bearing capacity

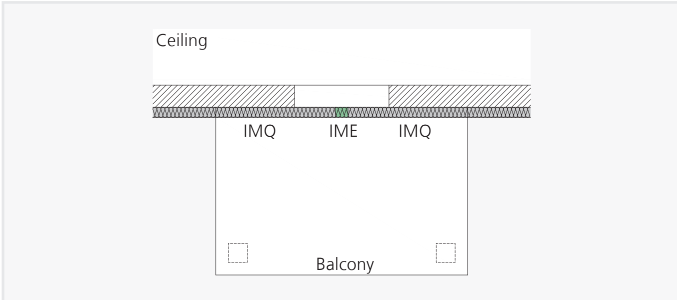
APPLICATION – UNIT ARRANGEMENT



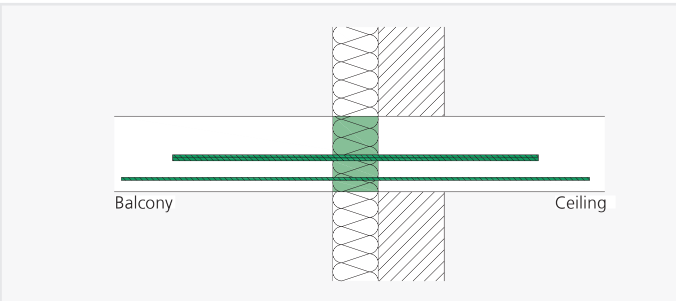
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



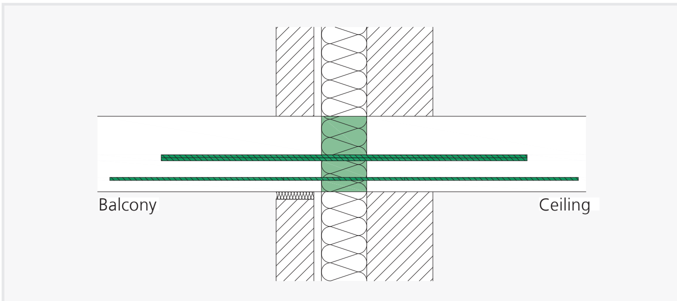
ISOMAXX® IME – Cantilevered balcony with lifting moments



ISOMAXX® IME – Supported balcony with high horizontal forces

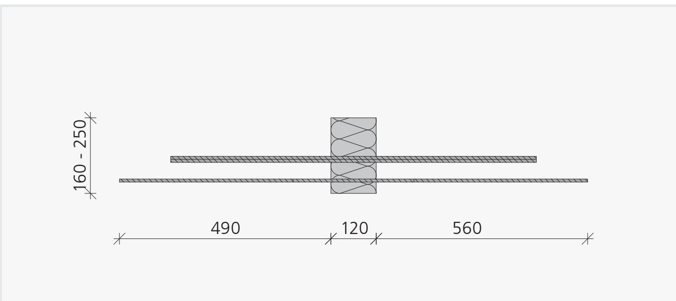


ISOMAXX® IME – Installation cross-section of thermal insulation composite system

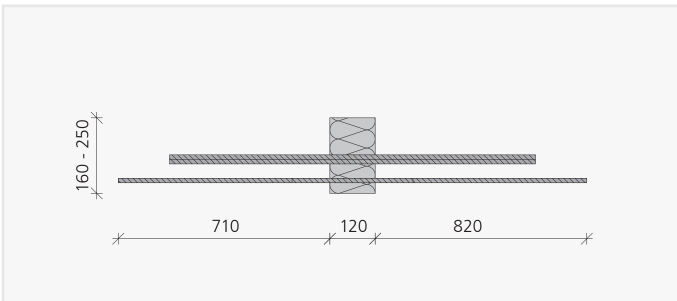


ISOMAXX® IME – Installation cross-section of two-leaf masonry

UNIT STRUCTURE



ISOMAXX® IME 1

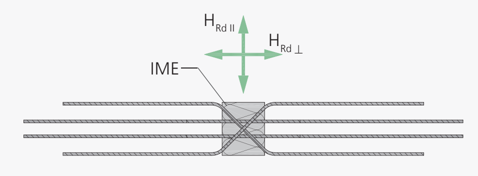


ISOMAXX® IME 2

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IME 1	IME 2
Unit length [mm]	150	
Shear rods	2 x 1 Ø 8	2 x 1 Ø 12
Tension rods	2 Ø 8	2 Ø 12

DESIGN



DESIGN VALUES OF ALLOWABLE HORIZONTAL FORCES H_{Rd} [kN]

ISOMAXX®	IME 1		IME 2	
Concrete quality	C 20/25	≥ C 25/30	C 20/25	≥ C 25/30
Horizontal force parallel $H_{Rd\,II}$ [kN]	± 13,3	± 15,4	± 29,9	± 34,7
Horizontal force vertical $H_{Rd\,\perp}$ [kN] for M_{Rd} = 0	± 40,6	± 40,6	± 97,2	± 97,2

DESIGN VALUES OF ALLOWABLE LIFTING MOMENTS M_{Rd} [kNm] FOR CONCRETE ≥ C20/25

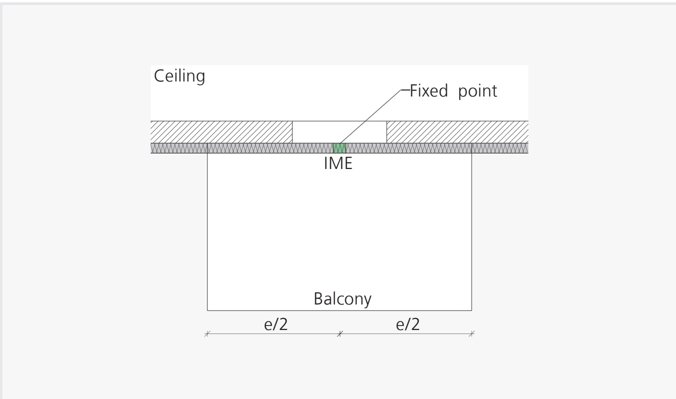
Unit height [mm] depending on cv [mm]		ISOMAXX®	
35	50	IME 1	IME 2
160	–	3,7	8,2
–	180	3,9	8,7
170	–	4,1	9,1
–	190	4,4	9,6
180	–	4,6	10,1
–	200	4,8	10,6
190	–	5,0	11,1
–	210	5,2	11,6
200	–	5,5	12,1
–	220	5,7	12,6
210	–	5,9	13,1
–	230	6,1	13,6
220	–	6,3	14,1
–	240	6,5	14,6
230	–	6,8	15,0
–	250	7,0	15,5
240	–	7,2	16,0
250	–	7,6	17,0

DESIGN – EXPANSION JOINTS

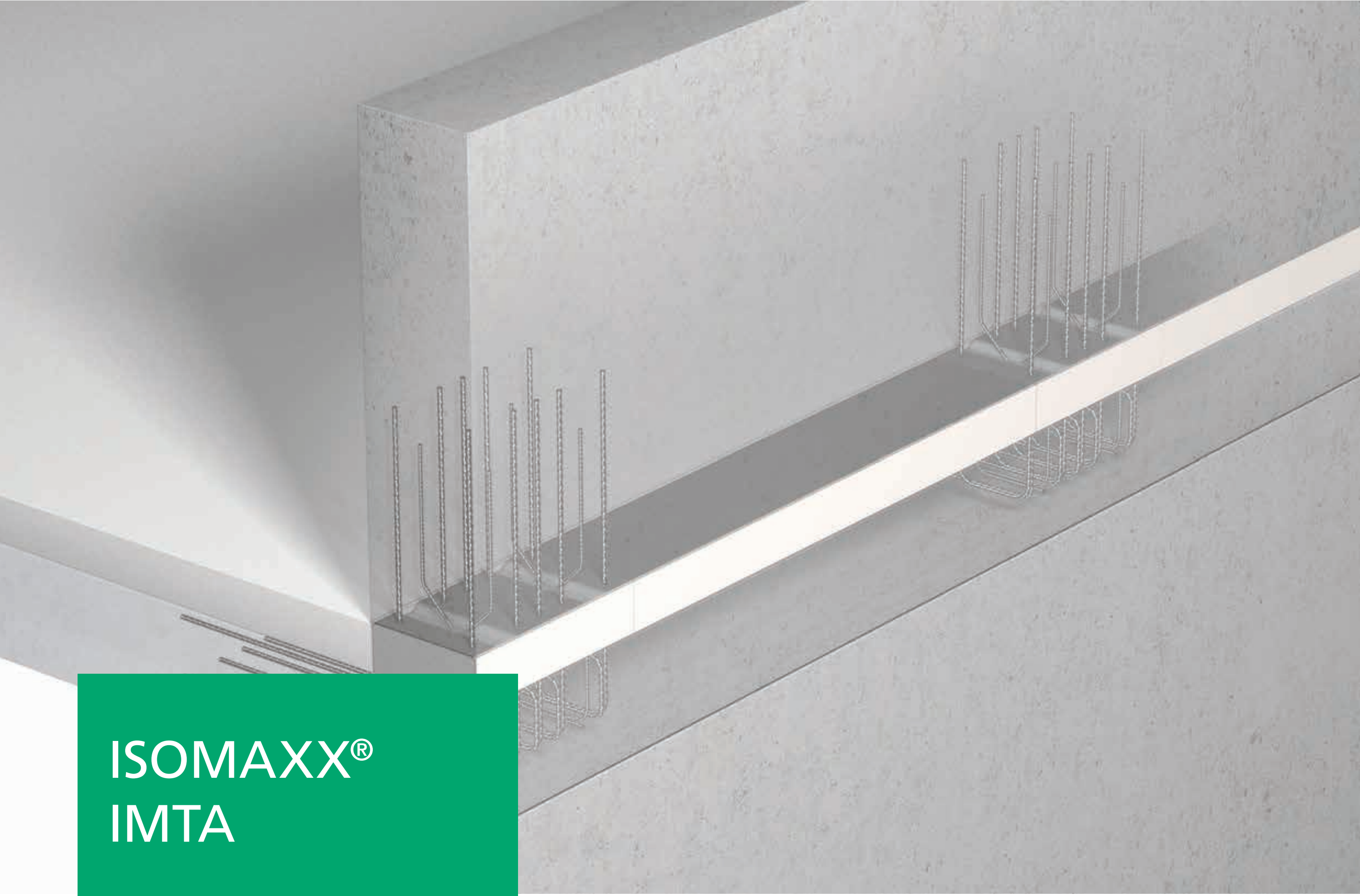
NOTES ON DESIGN:

- Moments can only be transferred in connection with adjoining ISOMAXX® IM units.
- To transfer the positive moments indicated in the table, the tension rods of the ISOMAXX® IM units adjacent to the ISOMAXX® IME are activated as pressure rods. To ensure this, at least the following adjacent units are recommended:
  When using IME 1 at least ISOMAXX® IM 40, when using IME 2 at least ISOMAXX® IM 55.
- For the design, either $H_{Rd\perp}$ or M_{Rd} can be applied. This means that either a tensile force or a moment can be transferred with the unit; not both at the same time.
- The quantity and position of the ISOMAXX® IME units is in accordance with the structural engineer's specifications.
- When using ISOMAXX® IME units, ensure that the load-bearing capacity of the linear connection is reduced by the proportion of the length of the IME units in relation to the total connection length.
- The tension rods at the bottom are to be overlapped with rods of the same diameter. The shear rods are anchored and require no further connection reinforcement.

DISTANCE BETWEEN EXPANSION JOINTS



If the component dimensions exceed the maximum permissible distance between expansion joints, expansion joints must be arranged perpendicular to the insulation plane. The maximum permissible distance between expansion joints e is dependent on the maximum rod diameter across the expansion joint and is thus type-dependent. The maximum permissible distance between expansion joints for the ISOMAXX® units is specified in the respective individual sections.
By using ISOMAXX® IME units, a fixed point is created, resulting in increased constraints. The maximum permissible distance between expansion joints is therefore reduced to e/2 when ISOMAXX® IME units are used. Half of the maximum distance between expansion joints is always measured from the fixed point.



ISOMAXX® IMTA

UNITS FOR PARAPETS AND BALUSTRADES

ISOMAXX® IMTA

- For transferring normal forces, positive and negative moments and horizontal forces
- Load-bearing capacity IMTA 1 and IMTA 2
- Unit length 350 mm
- Parapet/balustrade width 150 to 250 mm
- Concrete covering varies depending on parapet thickness – see unit structure
- Ceiling thickness ≥ 160 mm
- Fire resistance class R 90 available

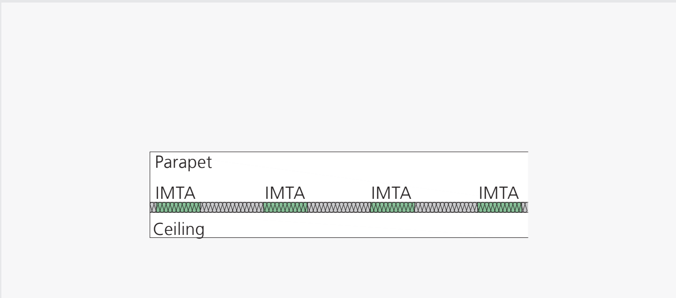
TYPE DESIGNATION

IMTA 1 b200 R 90

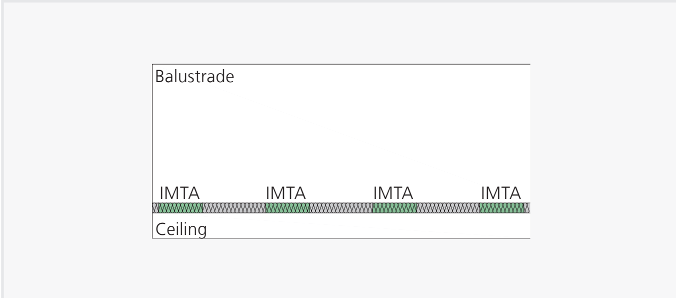
- R 90: Fire protection version
- b200: Parapet/balustrade width
- IMTA 1: Type and load-bearing capacity

APPLICATION – UNIT ARRANGEMENT

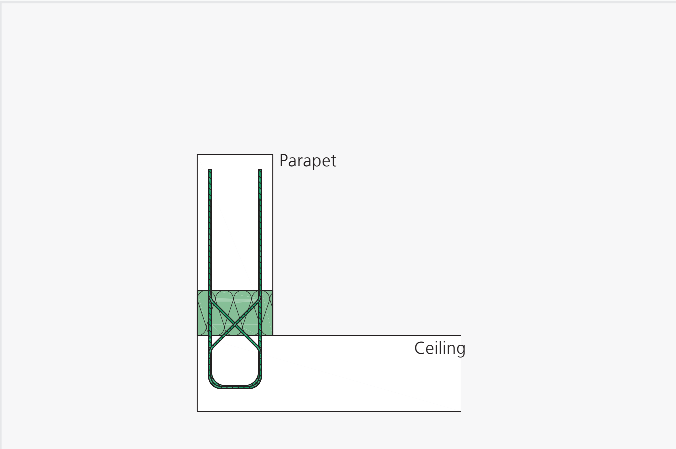
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



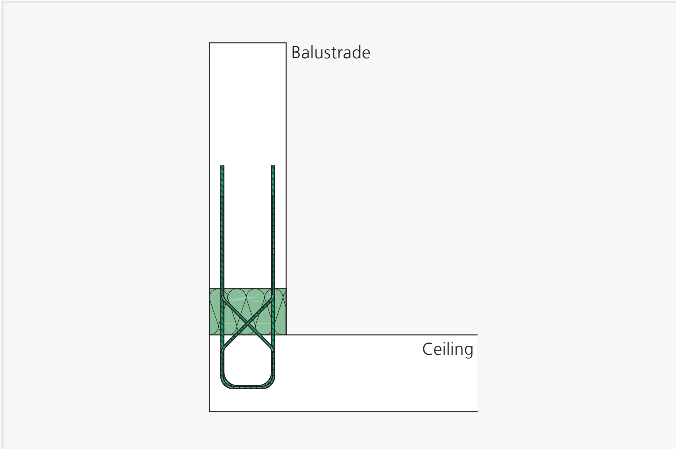
ISOMAXX® IMTA – View of parapet connected to the horizontal face



ISOMAXX® IMTA – View of balustrade connected to the horizontal face

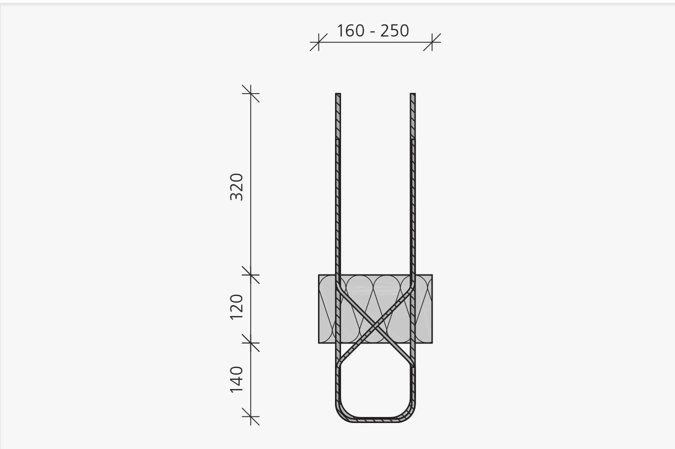


ISOMAXX® IMTA – Installation cross-section of parapet

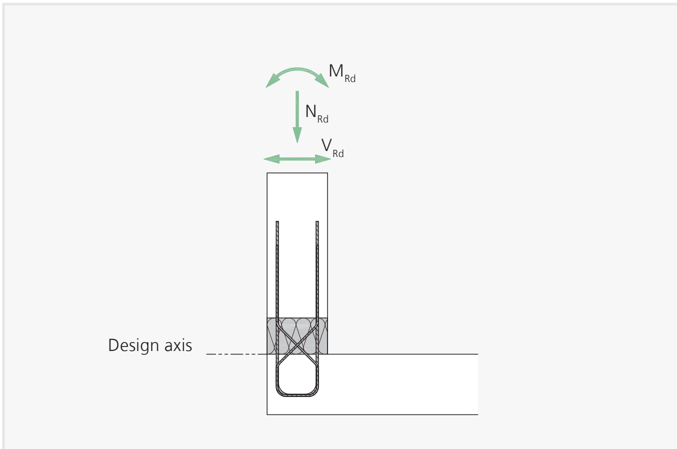


ISOMAXX® IMTA – Installation cross-section of balustrade connected to the horizontal face

UNIT STRUCTURE



SIGN REGULATION/STATIC SYSTEM



DESIGN

DESIGN IMTA 1

ISOMAXX®		IMTA 1 – b < 200 mm		IMTA 1 – b ≥ 200 mm	
Concrete quality		C20/25	≥ C25/30	C20/25	≥ C25/30
Moment M_{Rd} [kNm]	N_{Ed} = 0 kN	± 1,49	± 1,75	± 2,1	± 2,5
	N_{Ed} > 0 kN	±(1,49 - N_{Ed}/2 · 0,092)	±(1,75 - N_{Ed}/2 · 0,092)	±(2,1 - N_{Ed}/2 · 0,132)	±(2,5 - N_{Ed}/2 · 0,132)
Normal force N_{Rd} [kN]	M_{Ed} = 0 kNm	32,4	38,0	32,4	38,0
	M_{Ed} ≠ 0 kNm	32,4 - |M_{Ed}|/0,092 · 2	38,0 - |M_{Ed}|/0,092 · 2	32,4 - |M_{Ed}|/0,132 · 2	38,0 - |M_{Ed}|/0,132 · 2
Horizontal force V_{Rd} [kN]		± 12,0	± 12,0	± 12,0	± 12,0

* As normal force only pressure can be transferred (no tensile force)

DESIGN IMTA 2

ISOMAXX®		IMTA 2 – b < 200 mm		IMTA 2 – b ≥ 200 mm	
Concrete quality		C20/25	≥ C25/30	C20/25	≥ C25/30
Moment M_{Rd} [kNm]	N_{Ed} = 0 kN	± 3,7	± 4,4	± 5,3	± 6,3
	N_{Ed} > 0 kN	±(3,7 - N_{Ed}/2 · 0,092)	±(4,4 - N_{Ed}/2 · 0,092)	±(5,3 - N_{Ed}/2 · 0,132)	±(6,3 - N_{Ed}/2 · 0,132)
Normal force N_{Rd} [kN]	M_{Ed} = 0 kNm	80,8	95,0	80,8	95,0
	M_{Ed} ≠ 0 kNm	80,8 - |M_{Ed}|/0,092 · 2	95,0 - |M_{Ed}|/0,092 · 2	80,8 - |M_{Ed}|/0,132 · 2	95,0 - |M_{Ed}|/0,132 · 2
Horizontal force V_{Rd} [kN]		± 12,0	± 12,0	± 12,0	± 12,0

CONCRETE COVERING

Width of parapet / balustrade b [mm]	concrete covering cv [mm]
150	25
160	30
170	35
180	40
190	45
200	30
210	35
220	40
230	45
240	50
250	55

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTA 1	IMTA 2
Unit length [mm]	350	
Width of parapet/balustr. b	150 - 250	
Tension / pressure rods	2 Ø 8	5 Ø 8
Horizontal force rods	2 x 2 Ø 6	2 x 2 Ø 6

Our Applications Technology department would be pleased to assist in finding further solutions.
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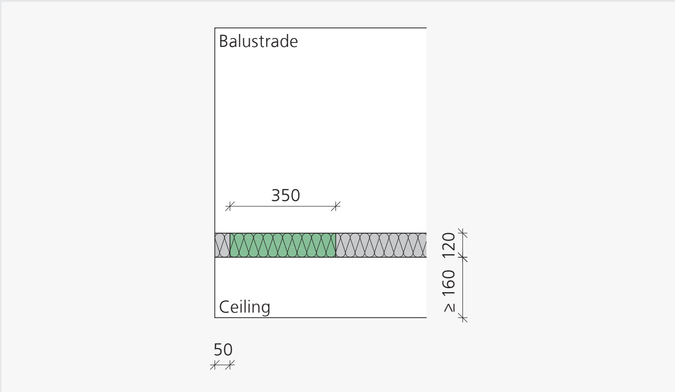
EXPANSION JOINTS - SUPPL. REINFORCEMENT

MAXIMUM PERMISSIBLE DISTANCE OF EXPANSION JOINTS

ISOMAXX®	IMTA 1 and IMTA 2
Distance of joints e [m]	21,7

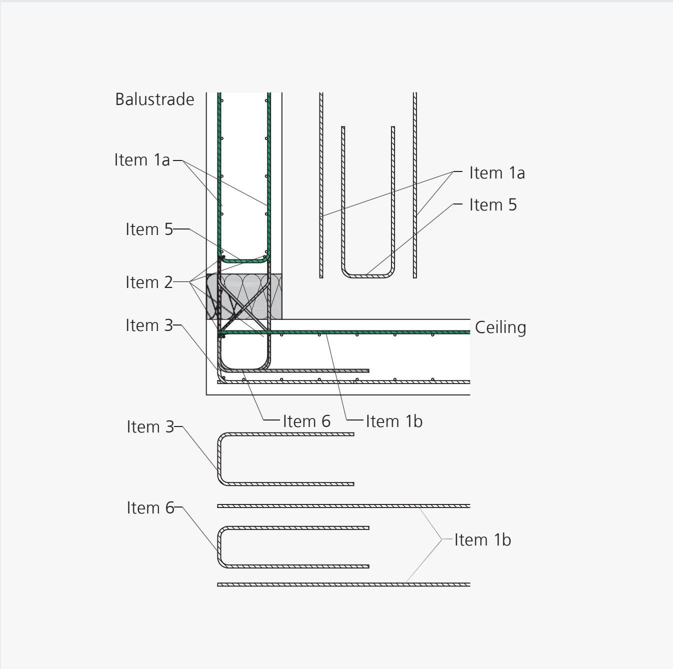
EDGE DISTANCE



The following distances must be maintained around the edges of ceilings or balustrades and around expansion joints

- Distance from the edge is not required around balustrades.
- A 50 mm distance from the edge must be maintained around ceilings.

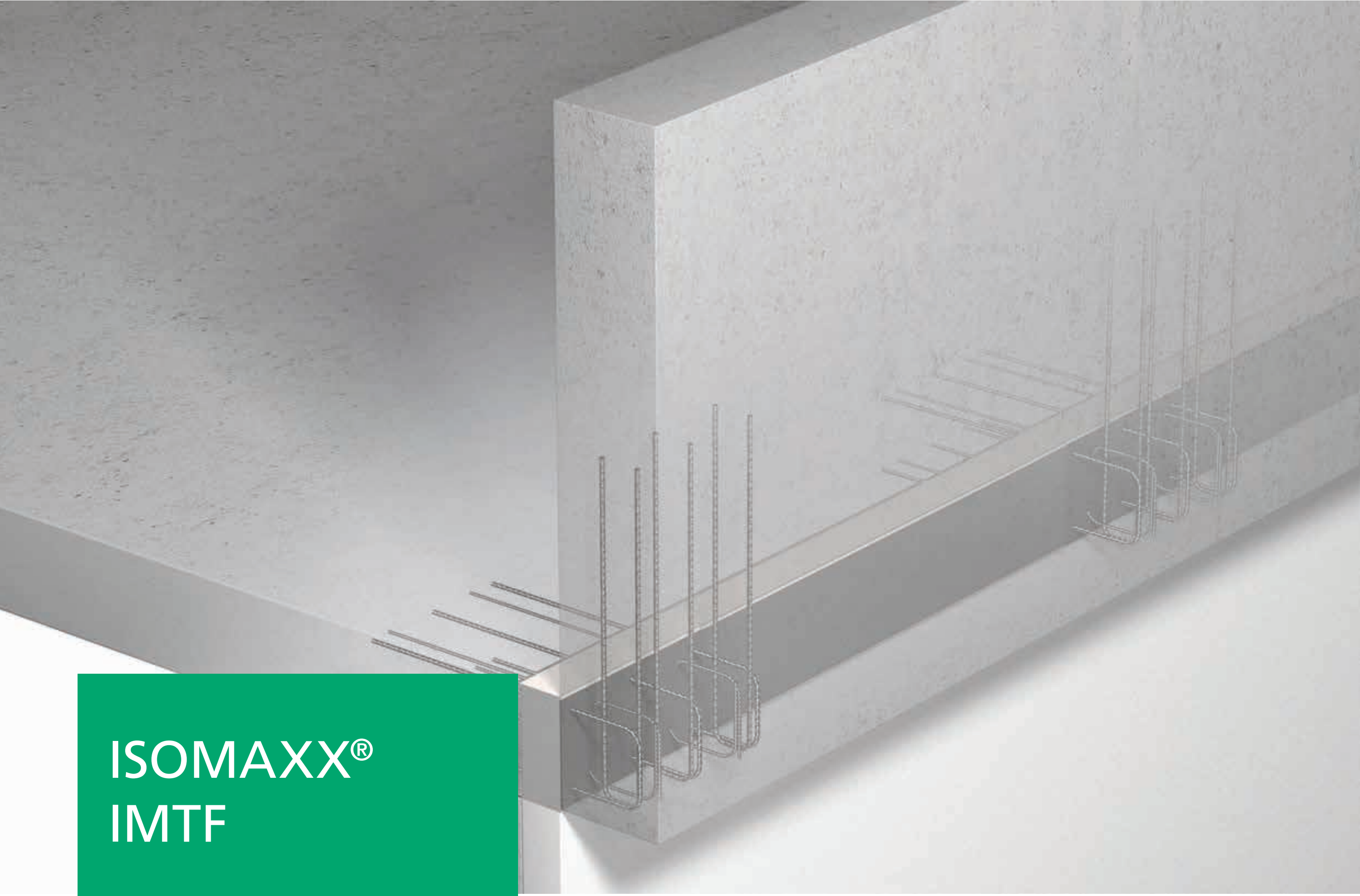
SUPPLEMENTARY REINFORCEMENT IMTA 1 AND IMTA 2



- Item 1a connection reinforcement for the ISOMAXX® unit in the balustrade in accordance with the structural engineer's specifications
- Item 1b connection reinforcement for the ISOMAXX® unit in the ceiling in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 x 2 Ø 8 on balustrade and ceiling side
- Item 3 structural edging in accordance with DIN EN 1992-1-1 min. Ø 6/250 respectively in accordance with the structural engineer's specifications
- Item 5 supplementary reinforcement for the ISOMAXX® unit in the balustrade – see table
- Item 6 connecting stirrup supplied ex works – see table
- For ISOMAXX® IMTA units with parapet/balustrade widths of 150, 160 and 200 mm, the supplementary reinforcement of the parapet/balustrade must be arranged within the unit reinforcement, as this has a concrete covering of cv < 35 mm.

CONNECTION AND SUPPLEMENTARY REINFORCEMENT

	Suppl. reinforcement Item 5	Connection stirrup ceiling Item 6	
ISOMAXX®	IMTA 1 and IMTA 2	IMTA 1	IMTA 2
$a_{s,erf}$ [cm²/m]	0,30	1,00	2,51
Suggestion	Ø 6/250	2 Ø 8	5 Ø 8



ISOMAXX® IMTF

UNITS FOR BALUSTRADES CONNECTED TO THE VERTICAL FACE

ISOMAXX® IMTF

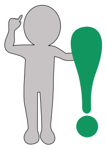
- For transferring positive shearing forces, positive and negative moments and horizontal forces
- Unit length 350 mm
- Unit heights 160 to 250 mm
- Concrete covering depending on the unit height – see unit structure
- Balustrade width ≥ 150 mm
- Fire resistance class R 90 available

TYPE DESIGNATION

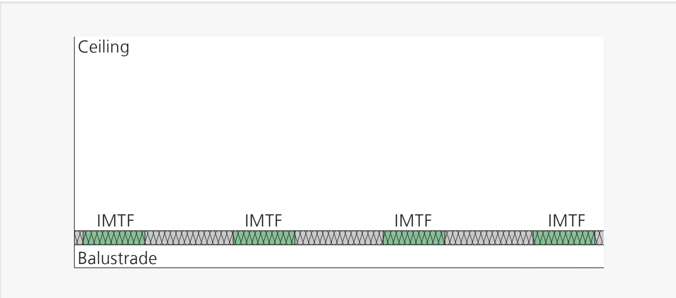
IMTF h200 R 90

- R 90: Fire protection version
- h200: Unit height
- IMTF: Type

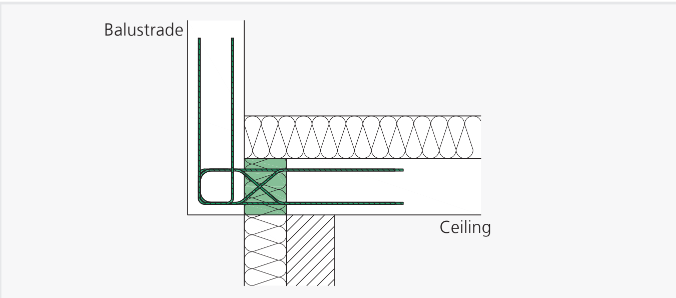
APPLICATION – PRODUCT DETAILS



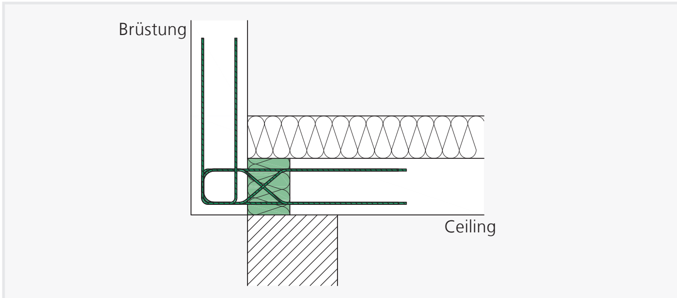
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



ISOMAXX® IMTF – Plan view of balustrade connected to the vertical face



ISOMAXX® IMTF – Installation cross-section of a balustrade connected to the vertical face with a thermal insulation composite system

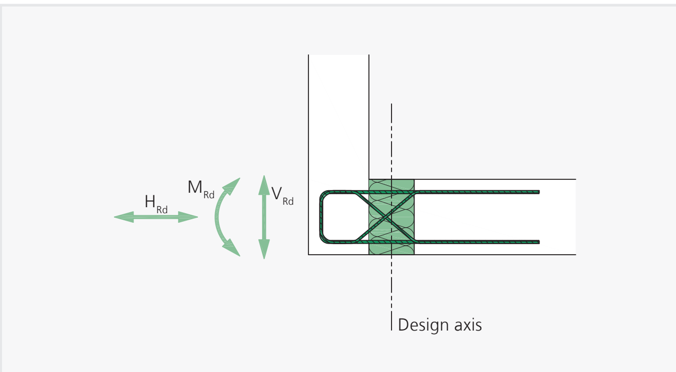


ISOMAXX® IMTF – Installation cross-section of a balustrade connected to the vertical face with thermally insulating masonry

DESIGN FOR CONCRETE ≥ C20/25

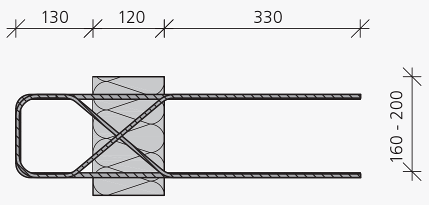
ISOMAXX®	IMTF h < 200 mm	IMTF h ≥ 200 mm
Moment M_{Rd} [kNm]	± 2,1	± 3,0
Horizontal force N_{Rd} [kN]	± 3,5	± 3,5
Shear force V_{Rd} [kN]	± 12,0	± 12,0

SIGN REGULATION/STATIC SYSTEM



UNIT STRUCTURE - EXPANSION JOINTS

ISOMAXX® IMTF



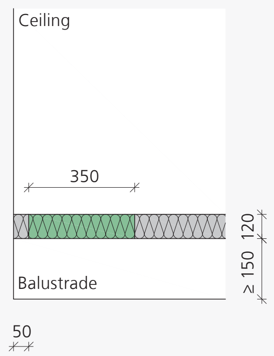
ASSIGNMENT AND DIMENSIONS

ISOMAXX®	IMTF
Unit length [mm]	350
Unit height [mm]	160 - 250
Tension / pressure rods	3 Ø 8
Shear rods	2 x 2 Ø 6

MAX. PERMISSIBLE DISTANCE BTW. EXP. JOINTS

ISOMAXX®	IMTF
Distance btw. joints e [m]	21,7

DISTANCE FROM THE EDGE



CONCRETE COVERING

Unit height h [mm]	Concrete covering cv [mm]
160	30
170	35
180	40
190	45
200	30
210	35
220	40
230	45
240	50
250	55

The following distances must be maintained around the edges of ceilings or balustrades and around expansion joints

- Distance from the edge is not required around balustrades.
- A 50 mm distance from the edge must be maintained around ceilings.

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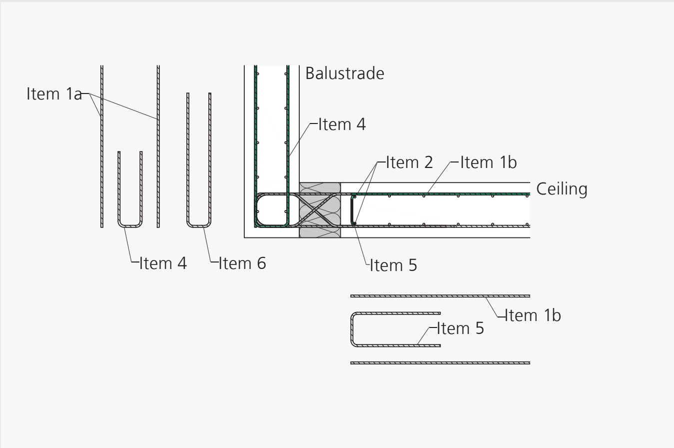
SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IMTF



- Item 1a connection reinforcement for the ISOMAXX® unit in the balustrade in accordance with the structural engineer's specifications
- Item 1b connection reinforcement for the ISOMAXX® unit in the ceiling in accordance with the structural engineer's specifications
- Item 2 spacing bar 2 x 2 Ø 8 on balustrade and ceiling side
- Item 4 connecting stirrup for the ISOMAXX® unit in the balustrade – see table
- Item 5 supplementary reinforcement for the ISOMAXX® unit
- Item 6 connecting bars supplied ex works 3 Ø 8

CONNECTION AND SUPPLEMENTARY REINFORCEMENT

ISOMAXX®	Suppl. reinf. Item 5	Connecting stirrup Item 4
$a_{s,erf}$ [cm²/m]	1,13	1,51
Suggestion	Ø 6/250	3 x Ø 8

NOTES

- For the reinforcement and selection of distances between the ISOMAXX® IMTF units, note the ability for concreting.
- For ISOMAXX® IMTF units with parapet/balustrade widths of 130 to 160 mm, item 4 can be omitted, as this is covered by item 6.

ISOMAXX®
IMO

UNITS FOR CORBELS

ISOMAXX® IMO

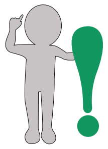
- For corbels that are used to support masonry or prefabricated units
- For transferring positive shearing forces, the resulting negative moments and horizontal forces
- Load-bearing capacities IMO 16 and IMO 20
- Unit length 350 mm
- Unit heights 180 to 250 mm
- Concrete covering varies depending on the unit height – see unit structure
- Corbel width IMO 16 ≥ 160 mm – IMO 20 ≥ 200 mm
- Insulation thickness 120 mm
- Fire resistance class REI 120 available

TYPE DESIGNATION

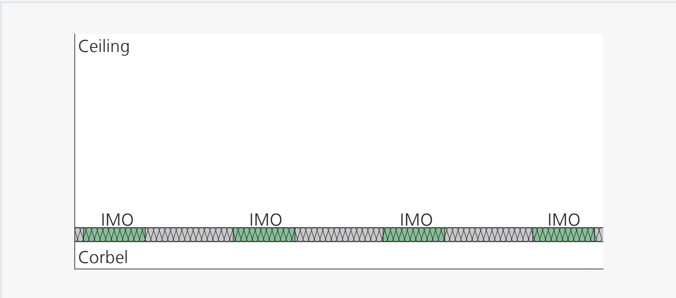
IMO 20 h200 REI 120

- REI 120: Fire protection version
- h200: Unit height
- IMO 20: Type and load-bearing capacity

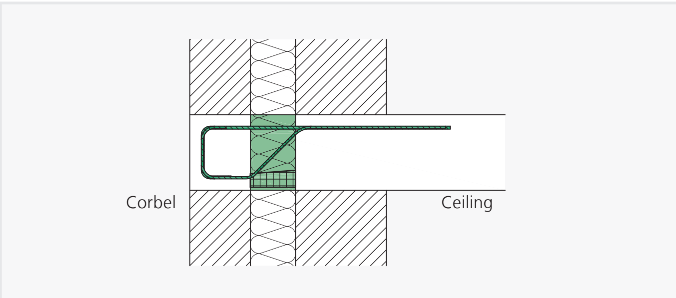
APPLICATION – PRODUCT DETAILS



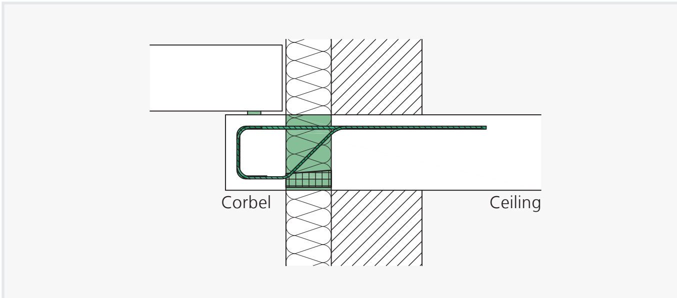
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



ISOMAXX® IMO – Plan view of corbel

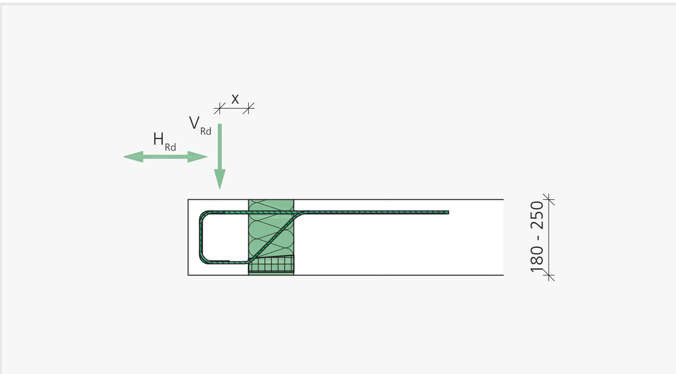


ISOMAXX® IMO – Corbel with facing masonry



ISOMAXX® IMO – Corbel as support for a prefabricated component, support with centring bearing

SIGN REGULATION/STATIC SYSTEM



DESIGN

DESIGN IMO 16

ISOMAXX®		IMO 16					
Concrete quality		C20/25			≥ C25/30		
Load transfer point x [mm]		60 - 90	100	110	60 - 90	100	110
Shear force V_{Rd} [kN] depending on unit height h [mm]	180	23,3	23,3	17,3	26,9	25,9	17,3
	200	23,3	23,3	20,3	26,9	26,9	20,3
	220	23,3	23,3	23,3	26,9	26,9	23,3
	240	23,3	23,3	23,1	26,9	26,9	23,1
	250	23,3	23,3	22,9	26,9	26,9	22,9
Horizontal force H_{Rd} [kN]		± 2,5			± 2,5		

DESIGN IMO 20

ISOMAXX®		IMO 20						
Concrete quality		C20/25			≥ C25/30			
Load transfer point x [mm]		60 - 130	140	150	60 - 120	130	140	150
Shear force V_{Rd} [kN] depending on unit height h [mm]	180	23,3	18,5	12,7	29,1	25,2	18,5	12,7
	200	23,3	21,7	14,9	29,1	29,1	21,7	14,9
	220	23,3	23,3	17,1	29,1	29,1	24,9	17,1
	240	23,3	23,3	16,9	29,1	29,1	24,8	16,9
	250	23,3	23,3	16,8	29,1	29,1	24,6	16,8
Horizontal force H_{Rd} [kN]		± 2,5			± 2,5			

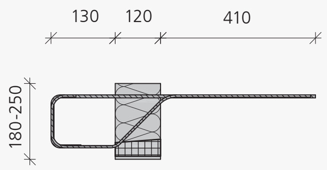
ASSIGNEMENT AND DIMENSIONS

ISOMAXX®	IMO 16 and IMO 20
Unit length [mm]	350
Unit height h [mm]	180 - 250
Tension rods	2 Ø 8
Shear rods	3 Ø 8
Compression bearings	2

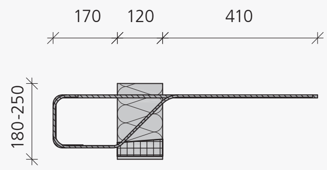
CONCRETE COVERING

Unit height h [mm]	Concrete covering at top cv [mm]	Concrete covering at bottom cv_u [mm]
180	30	30
190	40	30
200	30	30
210	40	30
220	30	30
230	40	30
240	40	40
250	50	40

UNIT STRUCTURE IMO 16



UNIT STRUCTURE IMO 20

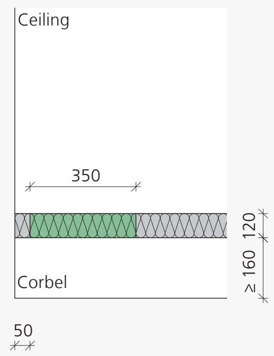


EXPANSION JOINTS - SUPP. REINFORCEMENT

MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IMO
Distance btw. joints e [m]	21,7

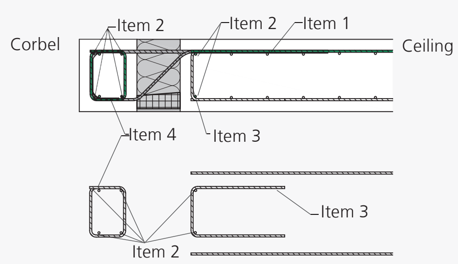
EDGE DISTANCE



The following distances must be maintained around the edges of ceilings or balustrades and around expansion joints:

- Distance from the edge is not required around balustrades.
- A 50 mm distance from the edge must be maintained around ceilings.

SUPPLEMENTARY REINFORCEMENT IMO



- Item 1 connection reinforcement for the ISOMAXX® unit 3 Ø 8
- Item 2 spacing bar 2 Ø 8 on the ceiling and at least 4 Ø 8 in the corbel
- Item 3 structural edging in accordance with DIN EN 1992-1-1 min. Ø 6/250
- Item 4 closed bar in the corbel in accordance with the structural engineer's specifications

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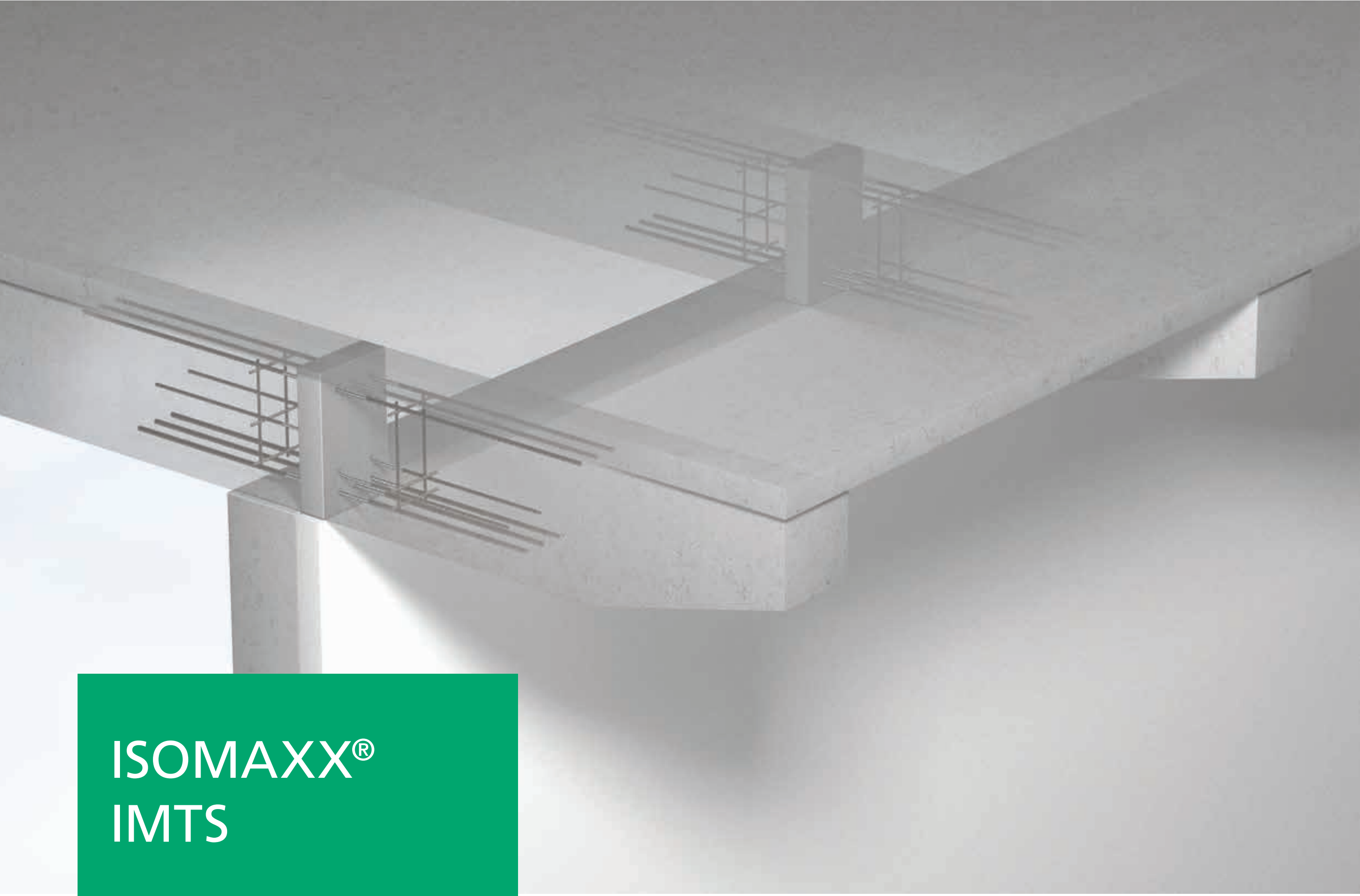


ISOMAXX®
IMTS

UNITS FOR CANTILEVERED JOISTS

ISOMAXX® IMTS

- For transferring negative moments and positive shearing forces
- Load-bearing capacities IMTS 1 to IMTS 4
- Unit widths 220 to 300 mm
- Unit heights 300 to 600 mm
- Anchoring length of the tension rods is designed for bonding area 1, "good bonding conditions"
  Design for "moderate bonding conditions", bonding area 2 upon request
- Concrete covering cv 50 mm at the top, bottom and side
- Fire resistance class R 90 available

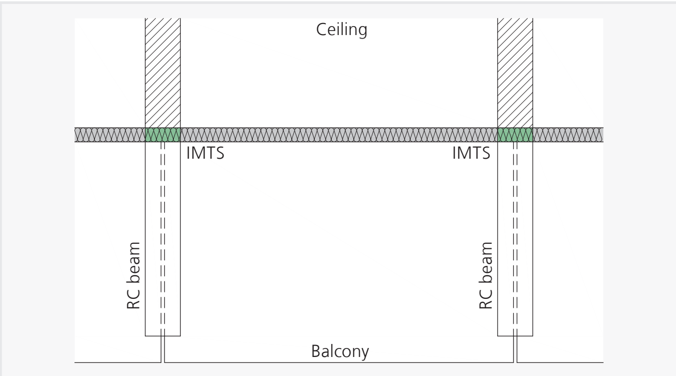
TYPE DESIGNATION

IMTS 2 b/h = 220/400 R 90

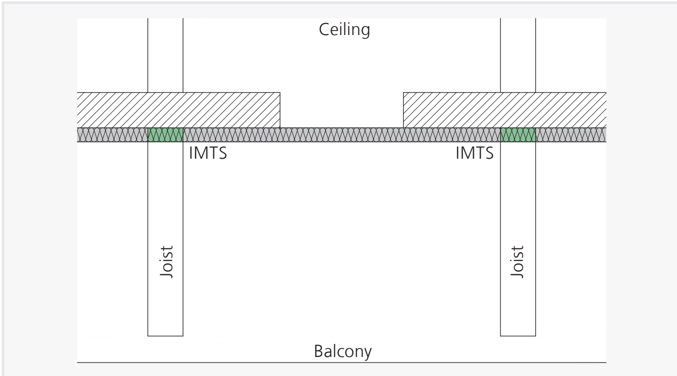
- R 90 — Fire protection version
- b/h = 220/400 — Unit dimensions
- IMTS 2 — Type and load-bearing capacity

APPLICATION – PRODUCT DETAILS

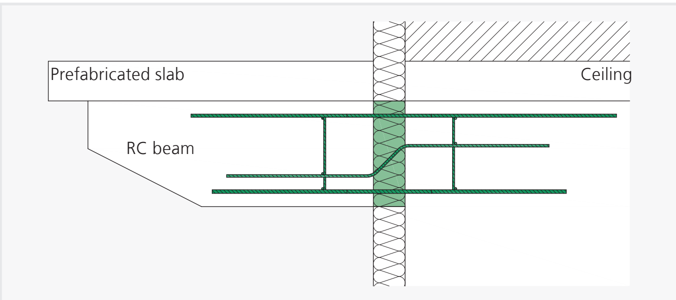
This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



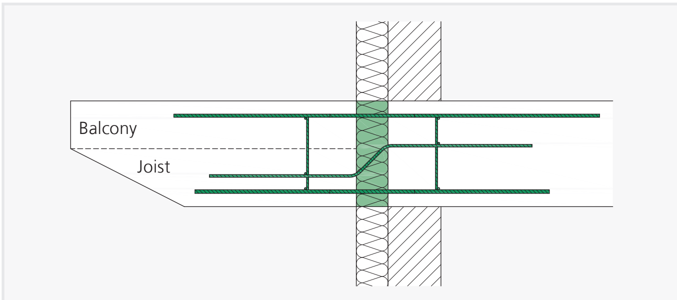
ISOMAXX® IMTS – Balcony structure with prefabricated slabs joined by a non-static connection, and load-carrying joists



ISOMAXX® IMTS – Balcony structure with joists connected to the balcony slab monolithically



ISOMAXX® IMTS – Installation cross-section with prefabricated slabs



ISOMAXX® IMTS – Installation cross-section with joists connected to the balcony slab monolithically

DESIGN

DESIGN VALUES OF ALLOWABLE MOMENTS M_{Rd} [kNm]

Unit height [mm]/ Concrete quality	ISOMAXX®							
	IMTS 1		IMTS 2		IMTS 3		IMTS 4	
	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30
300	16,5	19,4	23,5	24,0	31,6	33,4	40,6	47,7
350	20,8	24,5	29,8	30,5	40,2	42,4	51,8	60,8
400	25,2	29,6	36,0	36,9	48,7	51,4	63,0	73,9
600	42,7	50,1	61,2	62,6	82,9	87,5	107,6	126,4

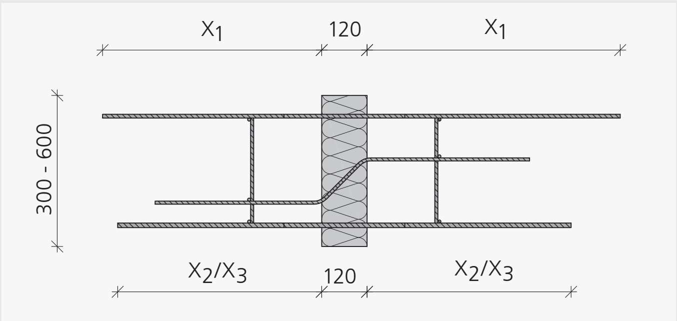
DESIGN VALUES OF ALLOWABLE SHEARING FORCES V_{Rd} [kN]

ISOMAXX®	IMTS 1		IMTS 2		IMTS 3		IMTS 4	
Concrete quality	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30
Shear force V_{Rd} [kN]	26,3	30,9	41,1	48,3	59,2	69,5	80,6	94,6

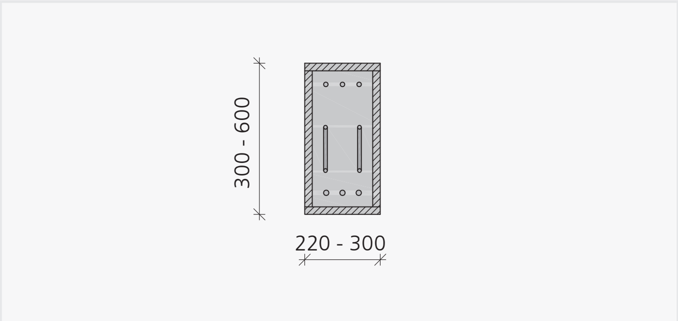
DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTS 1	IMTS 2	IMTS 3	IMTS 4
Unit width [mm]	220 - 300			
Unit height [mm]	300 - 600			
Tension rods	3 Ø 10	3 Ø 12	3 Ø 14	3 Ø 16
Shear rods	2 Ø 8	2 Ø 10	2 Ø 12	2 Ø 14
Pressure rods	3 Ø 12	3 Ø 14	3 Ø 14	3 Ø 20

UNIT STRUCTURE



ISOMAXX® IMTS



ISOMAXX® IMTS – Fire protection version – R 90

ISOMAXX®	IMTS 1	IMTS 2	IMTS 3	IMTS 4
Length tension rod X_1	740	860	860	860
Length shear rod X_2	420	530	630	740
Length pressure rod X_3	580	650	785	955

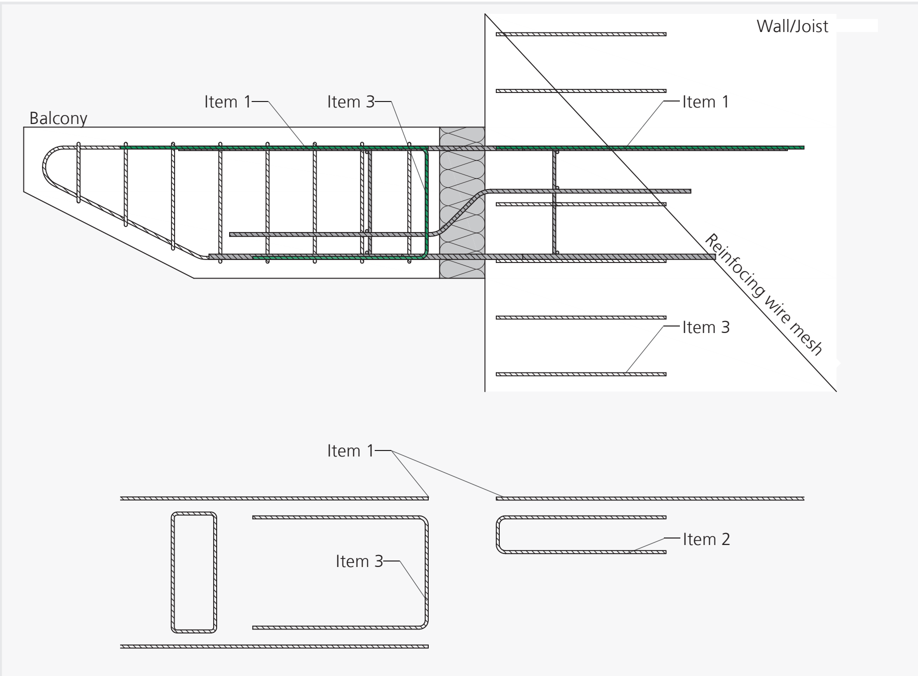
* The anchoring length of the tension rods is designed for bonding area 1, "good bonding conditions". On request, the anchoring length of the tension rods can also be designed for bonding area 2, "moderate bonding conditions".

EXPANSION JOINTS – UNIT STRUCTURE

MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IMTS 1	IMTS 2	IMTS 3	IMTS 4
Distance btw. joints e [m]	19,8	17,0	17,0	13,5

ISOMAXX® IMTS SUPPLEMENTARY REINFORCEMENT



- Item 1 connection reinforcement for the ISOMAXX® unit – see table
- Item 2 structural edging in accordance with DIN EN 1992-1-1 min. Ø 6/250
- Item 3 supplementary reinforcement for the ISOMAXX® unit – see table

CONNECTION REINFORCEMENT

ISOMAXX®	IMTS 1	IMTS 2	IMTS 3	IMTS 4
$a_{s,erf}$ [cm²/m]	2,35	3,39	4,61	6,03
Suggestion	3 Ø 10	3 Ø 12	3 Ø 14	3 Ø 16

SUPPLEMENTARY REINFORCEMENT

ISOMAXX®	IMTS 1	IMTS 2	IMTS 3	IMTS 4
$a_{s,erf}$ [cm²/m]	0,71	1,11	1,59	2,17
Suggestion	2 Ø 8	2 Ø 10	2 Ø 10	2 Ø 12

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ISOMAXX®
IMTW

UNITS FOR CANTILEVERED RC WALLS

ISOMAXX® IMTS

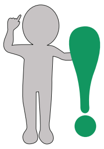
- For transferring negative moments, positive shearing forces and horizontal forces
- Load-bearing capacities IMTW 1 to IMTW 4
- Unit widths 150 to 250 mm
- Unit heights 1.500 to 3.500 mm
- Anchoring length of tension rods for bonding area 2 – „moderate bonding conditions"
- Concrete covering cv 50 mm at the top and bottom and cv 25 to cv 50 at the side, depending on the unit width
- Fire resistance class R 90 available
- Delivery of the units in at least three sub-units – bottom section with pressure and shear rods, intermediate section and top section with tension rods. For large unit heights, additional intermediate sections are added.
- Fire resistance class R 90 available

TYPE DESIGNATION

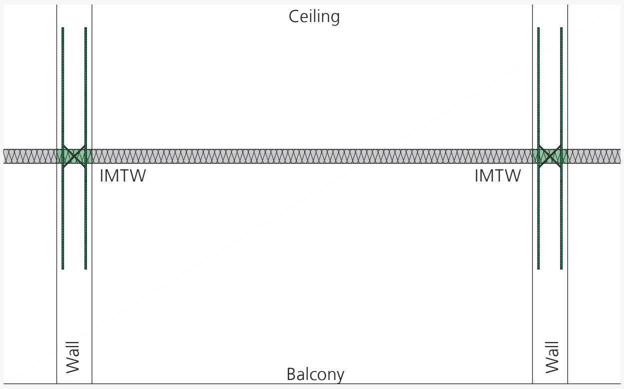
IMTW 2 b/h = 220/2.000 R 90

- R 90 – Fire protection version
- b/h = 220/2.000 – Unit dimensions
- IMTW 2 – Type and load-bearing capacity

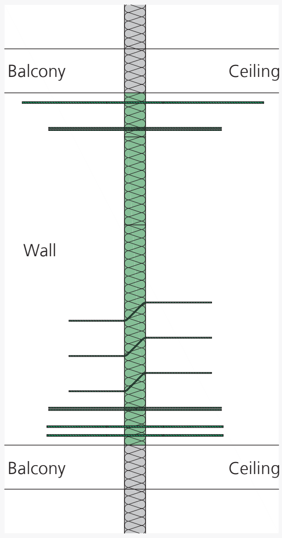
APPLICATION – UNIT ARRANGEMENT



This chapter provides planning aids and specific information about this product. In addition, the general information on materials, design, building physics, installation on site, etc. on pages 10 - 25 has also to be considered.



ISOMAXX® IMTW – Arrangement of units in the floor plan in combination with a balcony slab



ISOMAXX® IMTW – Installation cross-section with wall slab connected to the balcony slab monolithically

DESIGN

DESIGN VALUES OF ALLOWABLE MOMENTS M_{Rd} [kNm]

Unit height [mm]/ Concrete quality	ISOMAXX®			
	IMTW 1	IMTW 2	IMTW 3	IMTW 4
	≥ C20/25	≥ C20/25	≥ C20/25	≥ C20/25
≥ 1.500	64,7	127,0	178,7	178,7
≥ 1.750	76,6	150,7	212,7	212,7
≥ 2.000	88,4	174,4	246,8	246,8
≥ 2.250	100,3	198,1	280,8	280,8
≥ 2.500	112,1	221,8	314,8	314,8
≥ 2.750	124,0	245,5	348,8	348,8
≥ 3.000	135,8	269,2	382,9	382,9

DESIGN VALUES OF ALLOWABLE SHEARING FORCES V_{Rd} [kN] AND HORIZONTAL FORCES H_{Rd} [kN]

ISOMAXX®	IMTW 1		IMTW 2		IMTW 3		IMTW 4	
Concrete quality	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30	C20/25	≥ C25/30
Shear force V_{Rd} [kN]	44,4	52,1	79,0	92,7	131,6	154,5	205,6	241,3
Horizontal force H_{Rd} [kN]	± 14,8	± 17,4	± 14,8	± 17,4	± 14,8	± 17,4	± 14,8	± 17,4

DIMENSIONS AND ASSIGNMENT

ISOMAXX®	IMTW 1	IMTW 2	IMTW 3	IMTW 4
Unit width [mm]	150 - 250			
Unit height [mm]	1.500 - 3.500			
Tension rods	2 Ø 10	4 Ø 10	4 Ø 12	4 Ø 12
Shear rods	6 Ø 6	6 Ø 8	10 Ø 8	10 Ø 10
Horizontal rods	2 x 2 Ø 6			
Pressure ros	4 Ø 10	6 Ø 10	6 Ø 12	6 Ø 14

NOTES ON DESIGN

- The anchoring length of the tension rods is designed for connection area 2, "moderate connection conditions".
- Moments from wind loads perpendicular to the wall slab cannot be borne by the ISOMAXX® IMTW unit. These loads are transferred through the stiffening effect of the monolithically connected balcony slabs. If this is not possible, the ISOMAXX® IMTW unit can be supplemented with an ISOMAXX® IMTD unit. This then replaces the intermediate component.

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DISTANCE BETWEEN EXPANSION JOINTS

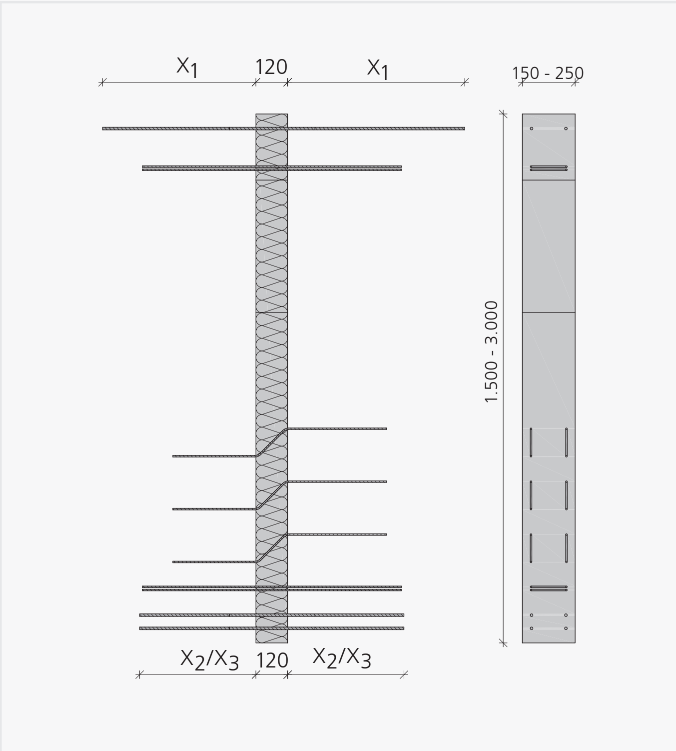
DISTANCE BETWEEN EXPANSION JOINTS

If the component dimensions exceed the maximum permissible distance between expansion joints, expansion joints must be arranged perpendicular to the insulation plane. The maximum permissible distance between expansion joints e is dependent on the maximum rod diameter guided across the expansion joint and is thus type-dependent.
Fixed points, such as support above a corner, result in increased constraints. As a result, the maximum permissible distance between expansion joints must be reduced to e/2. Half of the maximum distance between expansion joints is always measured from the fixed point.
If walls joined using ISOMAXX® IMTW have a rigid connection with long balcony slabs, the maximum distances between expansion joints specified below shall apply.

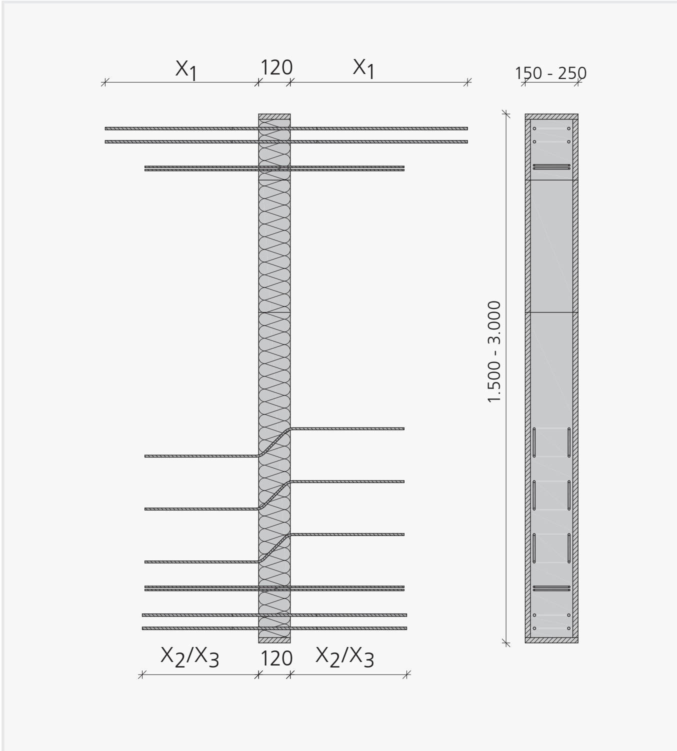
MAXIMUM PERMISSIBLE DISTANCE BETWEEN EXPANSION JOINTS

ISOMAXX®	IMTW 1 and IMTW 2	IMTW 3	IMTW 4
Distance btw. joints e [m]	21,7	19,8	17,0

UNIT STRUCTURE ISOMAXX® IMTW



ISOMAXX® IMTW – Fire protection version – R 90

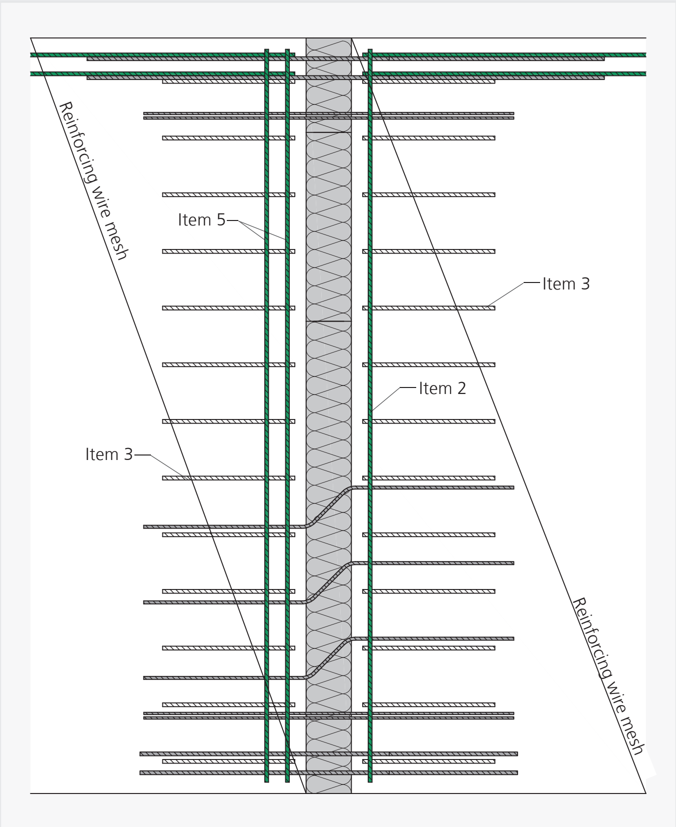


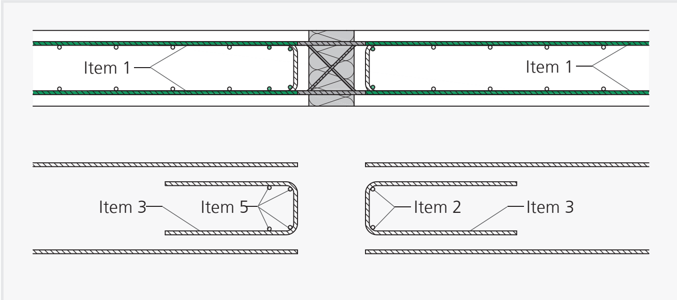
ISOMAXX® IMTW – Fire protection version – R 90

ISOMAXX®	IMTW 1	IMTW 2	IMTW 3	IMTW 4
Length tension rod X_1	740	740	860	860
Length shear rod X_2	310/370	420	420	530
Length horizontal shear rod	450	450	450	450
Length pressure rod X_3	480	480	570	650

SUPPLEMENTARY REINFORCEMENT

ISOMAXX® IMTW





- Item 1 connection reinforcement for the ISOMAXX® unit – see table
- Item 2 spacing bar 2 Ø 8
- Item 3 structural edging in accordance with DIN EN 1992-1-1 min. Ø 6/250
- Item 5 supplementary reinforcement for the ISOMAXX® unit, anchored with stirrups – see table
- During concreting, even filling and compression on both sides must be ensured, as well as secure positioning.

CONNECTION REINFORCEMENT ITEM 1

ISOMAXX®	IMTW 1	IMTW 2	IMTW 3	IMTW 4
$a_{s,erf}$ [cm²/m]	1,57	3,14	4,5	4,5
Suggestion	2 Ø 10	4 Ø 10	4 Ø 12	4 Ø 12

SUPPLEMENTARY REINFORCEMENT ITEM 5

ISOMAXX®	IMTW 1	IMTW 2	IMTW 3	IMTW 4
$a_{s,erf}$ [cm²/m]	1,19	2,13	3,55	5,54
Suggestion	2 x 2 Ø 8	2 x 2 Ø 10	2 x 2 Ø 12	2 x 2 Ø 14

ISOMAXX® Z-ISO

UNITS AS INTERMEDIATE INSULATION

ISOMAXX® Z-ISO

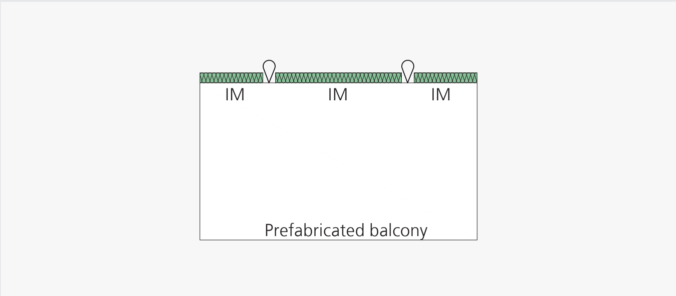
- No structural function
- Length 1000 mm
- Unit heights starting from 160 mm
- Short units and units up to a height of 280 mm available on request.
- Fire resistance class FP 1 with fireproof panels available

TYPE DESIGNATION

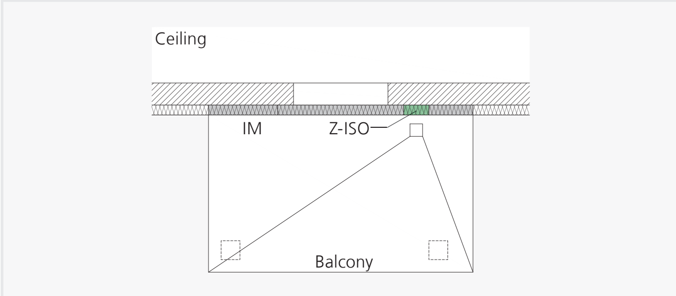
IM Z-ISO h200 FP1

- FP1 — Fire protection version
- h200 — Unit height
- IM Z-ISO — Type and load-bearing capacity

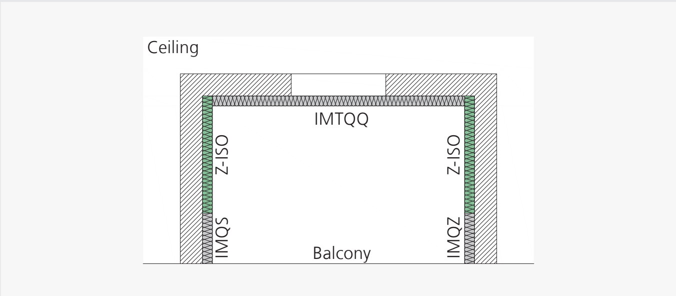
APPLICATION – UNIT ARRANGEMENT



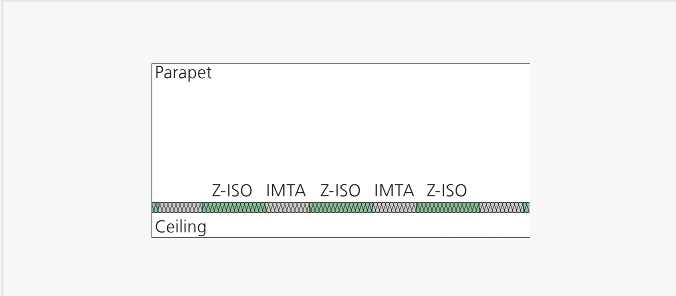
ISOMAXX® Z-ISO – Balcony as prefabricated component with transport anchor – the Z-ISO units are added on site



ISOMAXX® Z-ISO – Balcony on supports – Z-ISO units in the drainage recess area

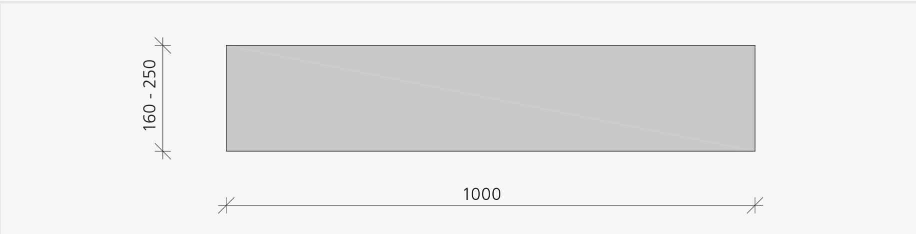


ISOMAXX® Z-ISO – Loggia with support at specific points with IMQS/IMQZ

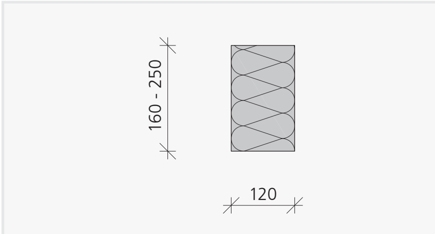


ISOMAXX® Z-ISO – Use of parapet units ISOMAXX® IMTA at specific points

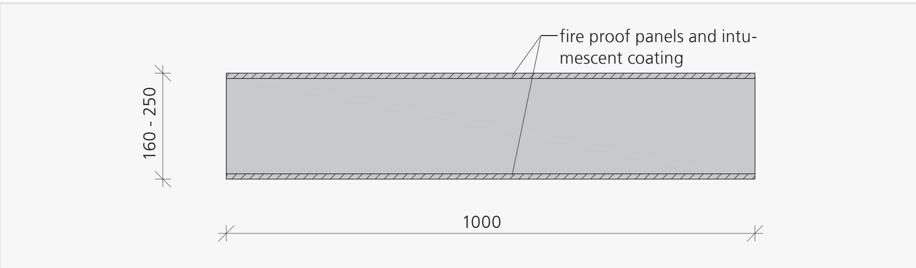
UNIT STRUCTURE



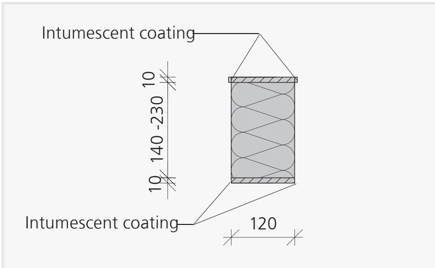
ISOMAXX® Z-ISO – Product view



ISOMAXX® Z-ISO – Product cross-section



ISOMAXX® Z-ISO FP1 – Product view with fireproof panels at the top and bottom



ISOMAXX® Z-ISO FP1 – Product cross-section

NOTE

- When using ISOMAXX® Z-ISO units, please consider that the length and thus also the load capacity of the line connection is reduced by the percentage of the length of the Z-ISO units relative to the total connection length.
- The fire protection class of the Z-ISO FP1 unit corresponds to the maximum fire protection class of the statically supporting ISOMAXX® units used in the line connection. E.g. Z-ISO in combination with ISOMAXX® units with compression bearings - REI 120; Z-IS0 in combination with ISOMAXX® units with pressure rods - R 90.

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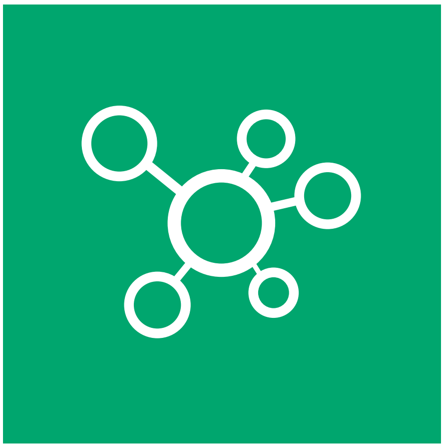

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