CONTRACTOR'S GUIDE

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RECTOR FLOOR SYSTEMS — RECTOBETON AND RECTOLIGHT



The RECTOBETON and RECTOLIGHT floor systems are rib-and-slab, prefabricated beam and block type floors. The floors consist of pre-tensioned RS concrete beams and fillings, in the form of gravel concrete, hydraulically pressed filler blocks or filling panels made of compressed wood.













ASSEMBLY GUIDE







ASSEMBLY DRAWING





Scope of arranging the supporting rods type "A*14"

Bent supporting rods (14 x bar type "A" - see the list)

Type and quantity of beams: (6 pieces of RS 112 beam, length 320 cm)

Location of the mounting support: in the middle of the floor span (the load exerted on the support is approx. 879 kg/lin.m.)

Internal dimensions of the wall [cm]

RECTOBETON 16+6 floor (concrete block - 16 cm, concrete topping - 6 cm) Design load: 1.5 kN/m2 - usable 2.5 kN/m2 - flooring + partition walls

The load transferred from the rafter framing post is 16 kN

Bent supporting rods (12 x bar type "A" - see the list)

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LIST ATTACHED TO THE ASSEMBLY DRAWING

Each assembly drawing is accompanied by a list of materials: beams, RECTOLIGHT concrete blocks or panels, reinforcement rods, steel wire meshes, and prefabricated steel trimmer beams.







Unloading using a crane:

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- Spreader boom use spacers (e.g. a plank),
- Transport straps keep the minimum angle of 45° between the beam and the strap,
- When lifting pallets containing concrete blocks, use spacers that prevent the blocks from being damaged by the straps,
- Do not lift more than 1 pallet with concrete blocks at a time.

STORAGE:

- Place the beams on an even and hardened surface,
- Arrange the beams with their flanges facing down,
- Do not stack the beams without any spacers,
- Arrange the spacers in 1 row,
- Max. 10 beams per one layer,
- Max. 10 layers of beams,
- Max. beam extension 100 cm.





TRANSPORT AND STORAGE

The beams can be unloaded in the following ways:

- Manually,
- with a forklift truck,
- with a loader-excavator,
- with a crane.

■ Prevent the beams from hitting other objects or falling to the ground.

■ Extend the forks of the forklift truck//loader all the way for better support of the beams during transport.











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BEAM INSTALLATION



The beams should be arranged one next to another, supporting them against the opposite walls or mounting supports.

■ Observe the minimum depth for the supports.

■ To obtain a suitable beam spacing, place a single capped concrete block of the RECTOBETON system or a cap for the **RECTOLIGHT** panel.

FLOOR SUPPORT:





BOND BEAM BLOCK





LOWERED BOND BEAM

OLD WALL

■ 4 cm [CONCRETE]

■ 5 cm [CERAMICS, SILICATE]

DIRECTLY AGAINST THE WALL

■ 7 cm [AERATED CONCRETE]

L
min. 2 cm
BINDER



UPSTAND BEAM

NO PROPER SUPPORT AGAINST THE WALL:





PPR BINDER



CUTTING OF BEAMS:



- Beams can be cut along the perimeter with a mitre saw, in order not to damage the strands. Then, cut out the rest of the beam and, if necessary, cut the strands to a minimum length of 8 cm.
- * If the beam is cut together with the strands, make sure that the beam is supported along at least 10 cm.

MOUNTING SUPPORTS:

- The recommended cross-section of a wooden support flange is 7 cm x 14 cm or use a commercial wooden girder.
- The support should be supported by props, to obtain a negative maximum absolute deflection equal to L/500 (where L= span in the clear height of the walls).
- When assembling mounting supports, do not force a larger inverse maximum absolute deflection, than L/500. Do not use the beams showing a "positive" maximum absolute deflection value, before assembly.
- It is recommended to arrange the props on an even and hardened surface; if used to support lower floors, it is recommended to use planks as the ground beams.
- No mounting supports are required, if using a system without any supports.
- It is recommended to provide adequate support for the lower floors, when working on higher floors in multi-storey buildings.

SPACING OF SUPPORTS:

- The exact location of the supports is inscribed in the design.
- If using a single support, place it in the middle of the floor span.
- If using 2 mounting supports, they must be arranged at intervals of 1/3 1/3 1/3 or 2/5 1/5 2/5 of the span, as shown in the assembly drawing.
- Do not change the number and locations of supports.



RECTOBETON SYSTEM — start assembling the fillings with the extreme

caps.









Description of the support on the assembly drawing:



FLOOR FILLINGS



CUTTING OF FILLINGS

RECTOBETON:



FILLING A NON-STANDARD BEAM SPACING



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STEEL WIRE MESH

■ Welded wire meshes and support reinforcements are integral parts of the RECTOR system. They are used on the entire floor area with an overlap of at least one mesh (min. 15 cm), using small spacers. If used, they eliminate the need for carrying out a load distributing beam.





SUPPORTING RODS

ADDITIONAL FLOOR REINFORCEMENT

- Same as with all other beam and block type floors, the upper section of RECTOR floors must be additionally reinforced in the support area, against the impact of negative moments.
- In practice, it is usually done with bent rods installed at the extreme support or with straight rods installed above the intermediate support (the beams in the adjacent areas arranged in the same direction), with diameters ranging from Ø8 to Ø14 (depending on whether a simple-supported or a continuous system is used, and on the thickness of concrete topping), made of the A-IIIN steel. The rods are placed piece by piece (in justified cases, in pairs), above the ends of each beam, and then fixed to the welded wire mesh in at least 2 locations.



HOLES AND TRIMMER BEAMS IN THE FLOOR

Holes up to 49 - 50 cm in width are made by positioning the beams correctly and removing one or more concrete blocks.



• For larger holes, it is required to install trimmer beams (i.e. reinforced concrete beams concealed in the floor height).







Selection table for trimmer beam reinforcement]	Prefabricated steel trimmer beam				
	Trimmer beam width	Reinforcement parameters						Type of trimmer beam	
Hole width		Primary reinforcement		Chierrupe		Height of floor H [cm]	Width of opening L [cm]	W type (Supported on the	WM type (Supported on
		Upper rods	Bottom rods	Stirrups				beams on both sides)	the beams and tie beam)
[cm]	[cm]	[mm]	[mm]	[mm]]			[L/width-height]	[L/width-height]
< 120	20	2xØ12	3Ø12	Ø6 every 20 cm		16.10	80 - 120	W120/12-12	WM120/12-12
< 180	20	2xØ12	4Ø12	Ø6 every 20 cm		10-19	120 - 180	W180/15-12	WM180/15-12
180 ÷ 230	20	2xØ16	4Ø16	2Ø6 every	1	20-23	80 - 120	W120/12-16	WM120/12-16
				10 cm			120 - 180	W180/15-16	WM180/15-16
≥ 230*	* Please contact the design office of RECTOR					180-240	W240/15-16	WM240/15-16	
						24-27	80 - 120	W120/12-20	WM120/12-20





■ Balconies and other supporting elements can be made as cast-in-situ or using the RECTOR systemic solution.

■ Carry out a lowered area, using lower concrete blocks that the rest of the floor, in the area adjacent to the balcony, on the side of the RECTOR floor. This will increase the thickness of the concrete topping and improve covering of the rods, provide the required space for the correct anchoring of reinforcement, and also create a balanced area for a heavier balcony slab.



HEAT-INSULATING CONNECTOR FOR BALCONIES

REINFORCEMENTS FOR WALLS

■ In the case of walls the total weight of which is up to 3.0 kN/m² and height hs is below 2.65 m, it is not required to reinforce the walls (see the adjacent figure).



■ In the case of walls the total weight of which exceeds 3.0 kN/m², reinforce them as per the examples below.





REINFORCEMENTS FOR RAFTER FRAMING POSTS













STAIRCASE SUPPORT

The floor sections within the area of the staircase traditionally made as cast-in-situ can be made as a lowered zone, using the RECTOR system. It is acceptable to anchor the flight of stairs directly in the concrete topping of the RECTOR floor.



STAIRS SUPPORTED ON A REINFORCED CONCRETE TIE BEAM:



Area of lowered concrete blocks

PPR prestressed binde

STAIRS SUPPORTED ON A PREFABRICATED PPR TIE BEAM:

STAIRS SUPPORTED ON A REINFORCED CONCRETE TIE BEAM FLUSH WITH THE FLOOR FROM UNDERNEATH:





FLOOR REINFORCEMENTS — MINING DAMAGE

The RECTOR floor system can be successfully used in areas, where mining damage occurred. Each time, the floor must be made in accordance with the technical documentation containing the following assumptions:

- Using at least 6 cm concrete topping slabs.
- Using a welded wire mesh embedded in the concrete topping, min. **Ø6, 15x15 cm** mesh.
- Additional support reinforcement made with U Ø8, L=160 cm rods, arranged on the beam flanges.
- Reinforcing the floor with support reinforcement rods arranged perpendicularly to the floor beams.
- Additional reinforcement installed along the edges of the openings.
- * The upper reinforcement of the trimmer beam / support reinforcement rods can be included as part the afore-mentioned reinforcement.



FIRE RESISTANCE — RECTOBETON FLOOR

RAW FLOOR

Classification issued by ITB (Institute of Building Technology): 03240.2/18/Z00NZP - raw floors (no plaster)



The fire resistance class REI depends on the following:

- stress ratio (40-100%),
- thickness of concrete topping (from 4 to 9 cm),
- number and type of beams.

Depending on the aforementioned parameters, requirements Depending on the aforementioned parameters, requirements for REI 30 - REI 120 criteria can be met. for REI 60 - REI 240 criteria can be met.

FIRE RESISTANCE — RECTOLIGHT FLOOR

RAW FLOOR

(regardless of the method of finishing the bottom surface)

According to the ITB Fire Testing Department's position, the RECTOLIGHT beam and block type floor system protected from Classification issued by ITB (Institute of Building Technology): underneath by an independent suspended ceiling of the class 649/17/Z00NZP. EI30-120 meets the fire resistance requirements in the REI 30 - REI 120 classes. Concrete levelling Concrete topping Polvstvrene



The fire resistance class REI can be achieved based on the following assumptions:

- 2 or 3 beams per rib,
- Ø12 rods arranged on the beam flanges, according to the drawing above,
- min. 5 cm of concrete topping,
- floating floor (min. 4 cm of expanded polystyrene and min. 4 cm of concrete levelling).

Depending on the aforementioned parameters, requirements for REI 30 - REI 60 criteria can be met.



WITH GYPSUM PLASTER

Classification issued by ITB (Institute of Building Technology):

648/17/Z00NZP — floors made with gypsum plaster (min. 15 mm) on a steel wire mesh (Rabitz or expanded wire mesh)



The fire resistance class REI depends on the following:

- stress ratio (40-100%),
- thickness of concrete topping (from 4 to 9 cm),
- number and type of beams.

WITH EI CLASS FLOOR FINISH



The fire resistance class REI can be achieved based on the following assumptions:

■ use of a suspended ceiling of the EI class.

Depending on the aforementioned parameters, requirements for REI 30 - REI 120 criteria can be met.



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FLOOR CONCRETING

Concreting is to be performed as a single operation.

The recommended concrete of class C25/30 (B30) or different, as specified in the design [not below C20/25 (B25)], is to be uniformly distributed and vibrated, starting from the points of support and ending at the centre.

- Avoid local concentrations of concrete mass.
- When pouring the concrete topping in stages, it is recommended to provide expansion joints at the axis of interrib filling or at the tie beam axis (see the adjacent figure).

CURING OF CONCRETE

A freshly laid concrete mix should be protected against the following:

- too low or too high temperature,
- wind (too rapid water evaporation),
- too low humidity (cover the floor or pour water over it),
- heavy rainfall (in the early phase of its setting).

REMOVAL OF SUPPORTS

It is recommended to dismantle mounting supports after 28 days from the concreting of the floor.



FINISHING THE FLOOR

- The floors made using the RECTOBETON system can be finished with any type of cast-in-situ plaster or a drywall system.
- The fire classification of plastered floors makes it necessary to 1.5 cm-thick gypsum plaster on a steel wire mesh (Rabitz or expanded wire mesh).

RECTOBETON:



Gypsum plaster, cement-lime

Suspended ceiling

Installation of a galvanized steel wire mesh (for REI floors):



■ The floors made using the RECTOLIGHT system are to be finished with a system of suspended ceilings, in order to finish the lower surface.

RECTOLIGHT:



Without finishing

Suspended ceiling

A RECTOLIGHT floor before making a drywall ceiling:



FIXING TO THE FLOOR



1 — DRILLING IN A BEAM

- Drill only in 2 cm-wide strips (the hatched area), outside the beam axis and away from its edge, as shown in the figure Drill through the concrete topping and insert a threaded rod above, in such a way as to eliminate the possibility of drilling into the hollow space of the concrete block finished at the through the beam's reinforcement present in its axis. top with a wide washer and a nut.
- Drill using a drill bit with a diameter of ≤ 8 mm.
- It is acceptable to use nylon anchors, concrete screws or steel anchors.

2 — FIXING TO THE BOTTOM PART OF A HOLLOW CONCRETE BLOCK

- It is acceptable to use nylon anchors, concrete screws ■ Anchor load $P \le 5$ kg - max. 2 anchors / hollow concrete block. or steel anchors.
- Anchor load 5 kg < P < 25 kg, max. 1 anchor / hollow concrete block.
- The maximum permitted diameter of opening is 10 mm.
- Perform drilling without impact (it is recommended to use holesaws, diamond drills, or single widia bits).
- Use anchors intended for hollow spaces (swivel fastenings, e.g. wing anchors).
- For smaller loads, e.g. only the floor itself without any installations, it is acceptable to use concrete screws, steel and chemical anchors and nylon anchors.
- 3 DRILLING INTO UPPER THE beams, i.e. loosening of pre-stressed concrete and to uncover pre-stressed strands. SECTION OF CONCRETE TOPPING. WITHIN THE WIDTH OF THE HOLLOW ■ This solution is not acceptable, if there is an additional CONCRETE BLOCK passive reinforcement applied in the rib.
- Drill into the space of concrete topping, using the commonly applied anchors up to 16 mm in diameter.
- The acceptable elements are fixing nylon anchors, concrete screws and steel anchors.
- 4 DRILLING THROUGH THE CONCRETE TOPPING.

PLEASE ALSO BEAR IN MIND THAT INCORRECTLY DRILLED HOLES IN THE FLOOR BEAMS MIGHT REDUCE THE LOAD CAPACITY OF THE BEAM. WE RECOMMEND EXERCISING DUE CARE AND DILIGENCE WHEN DRILLING.



The suggested locations for expansion joints:

WITHIN THE WIDTH OF THE HOLLOW CONCRETE BLOCK

5 - DRILLING INTO THE SIDE SECTION OF THE CONCRETE TOPPING IN THE LOAD BEARING RIB

■ Drill into the space of concrete topping, using the commonly applied anchors up to 12 mm in diameter and up to 60 mm in length.

SOLUTIONS NO. 3-5 INVOLVE THE NEED TO CRUSH THE BOTTOM PARTOF THE HOLLOW CONCRETE BLOCK CHAMBER BUT THEY ARE CAPABLE OF TRANSFERRING GREATER LOADS, DEPENDING ON THE LOAD CAPACITY OF THE RIB AND THE APPLIED ANCHOR. IT IS POSSIBILE TO ANALYSE THE LOAD CAPACITY OF THE RIB, WHEN PROVIDING SPECIFIC DATA AND PARAMETERS OF ANCHORING.

6 — DRILLING AT THE CONTACT POINT BETWEEN TWO PRESTRESSED BEAMS (2x RS, 3x RS)

- Fixing directly to the load bearing rib with anchors up to 8 mm in diameter. Take care not to damage the load-bearing
- It is possible to use nylon anchors and steel anchors.
- Additional passive reinforcement for the load-bearing rib, which can result from the REI criterion.

7. FIXING STEEL WIRE MESH

■ Fix the steel wire mesh with large-headed anchors and hold the wire mesh for the duration of plastering.

INSTALLATION OF CEILINGS SUSPENDED FROM THE RECTOLIGHT FLOOR

The floors made using the RECTOLIGHT system require using suspended ceilings, in order to finish the lower surface. Suspended ceilings can be fixed directly to the RECTOLIGHT floor, using RECTOR systemic spreader beams or any other commercially available drywall systems.

INSTALLATION BY MEANS OF THE RECTOR SYSTEMIC SPREADER BEAMS:

- Consumption approx. 1.5-3.5/m², depending on the fastening elements applied in a drywall system;
- Load capacity equal to 30 kg/piece



FIXED DIRECTLY TO THE RECTOLIGHT FLOOR:







HOLES FOR A SHEFT

METAL SCREW

CATCH FOR HANGER

RECTOR hanger + mushroom-shaped suspension member

Steel anchor

Wire holder

FIXING A WALL TO RECTOR FLOORS

WALLS MADE USING THE DRYWALL SYSTEM

Drywalls should be installed using soundproof tapes.





BRICK WALLS

■ Provide an expansion joint filled with a flexible material, e.g. polyurethane foam or mineral wool, between the floor and the masonry wall.







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ASSEMBLY CAVITIES

Start installing the floor by making cavities in the load-bearing a) walls, in accordance with the span specified in the assembly drawing. Cavity depth min. 15 cm.

BEAM INSTALLATION

- a) Pour the concrete mix into the assembly cavities, up to the elevation of the floor bottom (it can be helpful to use a measuring staff fixed to the wall, which shows the correct bottom level of the floor), and them support the beams on the previously prepared foundation.
- b) Arrange the mounting supports located along the wall, according to the designed elevation of the floor bottom (the concrete mix must fill the whole cavity, when pouring concrete topping).
- The beams must be supported on the wall by at least 7 cm.
- The mounting supports must be made, before the floor filling is laid out.
- The mounting supports should be supported on an existing floor using wooden ground beams (to distribute the load).
- In special cases, it possible to work without any supports. The maximum floor span for an assembly without supports is 5.5 m for RECTOBETON and 5.6 m for RECTOLIGHT. Please contact the RECTOR design office to help you select the beams for this type of assembly.

RECESSED TIE BEAM

■ To eliminate the need to make grooves along the entire length of the wall, make a tie beam within the thickness of the floor formed in the lowered section with a row of RECTOLIGHT concrete blocks or fillings, the width of which is min. 1 concrete block or 20 cm (a Rectolight panel re-cut to length).





REFURBISHMENTS — FLOOR REPLACEMENT

METHODS OF SUPPORTING:



Reinforcement of the tie beam should consist of at least two ø12 rods laid out in the lowered section of the concrete block (min. width 20/25 cm), bonded structurally with ø6 pins/ stirrups applied every 25 cm.









- The repetitive form of the RECTOLIGHT panels makes it possible to stack them. The low weight of the elements facilitates their storing inside a building, which requires minimum storage space.
- RL 12 4.6 kg/piece, 598 kg/pallet (130 pieces)
- RL 16 4.8 kg/piece, 576 kg/pallet (120 pieces)
- **RL 20** 6.4 kg/piece, 448 kg/pallet (70 pieces)

DETAILS:







- The PPR prestressed binder constitutes a pre-tensioned prestressed concrete beam with an embedded steel truss, which is an alternative solution to the standard reinforced-concrete binders. ■ The PPR binders constitute a load-bearing element of
- the structure and are intended for use with an additional layer of concrete topping poured on site.

LENGTHS OF THE PPR BINDERS:



STORAGE

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- A steel truss must be located in the top section of the binder, during transport, storage, and assembly.
- When in storage, use spacers applied within a distance of 20 cm from the edge of the binder.
- Spacers should be arranged vertically to one another.

SUPPORT:



ASSEMBLY:

- The PPR beams are used in double-wall systems based on 24 cmthick walls or reinforced concrete posts.
- During the assembly phase, support the binder until the floor has reached the correct strength.
- If the PPR beam is supported along less than 7 cm, apply extreme mounting supports.
- It is not allowed to re-cut the truss protruding from the PPR beam, when assembling the floor.

FIRE ENDURANCE R:

- The PPR binders meet the R 60 criterion, if their stress ratio is up to 70%, resulting from their bending in the ultimate limit state.
- If the stress ratio of the binders is higher, the R 60 criterion will be satisfied by using additional reinforcement rods laid in the beam truss (1 piece per each PPR), or by using gypsum plaster on a steel wire mesh.
- The minimum diameter of the additional reinforcement rods is Ø12 and their length is at least the same as the length of the binder.
- The floor supported on the PPR binders must meet the REI criteria for a given class, independently.



PPR PRESTRESSED BINDER





Reinforced concrete post - min. 2 cm

, 2 cm

2 cm



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A DETAIL SHOWING AN ADDITIONALLY REINFORCED BINDER (A VERSION WITHOUT LOWERED CONCRETE BLOCKS):



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STORAGE / TRANSPORT:

■ Reinforcement must remain in the bottom area of the lintel's cross-section, during transport, storage and assembly.



■ Store using spacers applied within a distance of 15 cm from the edge of a lintel.



■ Spacers should be arranged vertically to one another.



■ Do not store lintels of different lengths arranged in one ■ Dismantle the props after 21 days from the date of assembling column. the floor.

TOTAL SPAN OF THE FLOORS BASED ON LINTELS (A+B)

FLOOR WEIGHT ≤ 300 kg/m² WIDTH OF THE FLOOR OPENING [cm] MAX SPAN FLOOR [m] 150 120 180 210 2.0 2.5 3.0 4.0 4.5 5.0 5.5 6.0 6.5 7.0 8.0 8.5 9.0 9.5 10.0 10.5 11.0 12.0 height of the superstructure = 15 cm (2 rows of bricks) height of the superstructure = 22.5 cm (3 rows of bricks) height of the superstructure = 30 cm (4 rows of bricks)

* The following total characteristic load of the floor has been assumed: 3.75 kN/m



INSTALLATION GUIDELINES:



- Minimum support on the wall: 15 cm;
- 1.20 and 1.50 m lintels assembled without supports;
- 1.80 m, 2.10 m and 2.40 m lintels assembled using a single support;
- Lowered tie beam: min. 24x24 cm, 4 x Ø12 rods, stirrups installed above the lintel - Ø6 every 20 cm, concrete class min. C20/25;
- Minimum height of the superstructure: 15 cm: solid material;
- During the assembly phase, the floor must remain supported, until it has achieved adequate strength (it does not rest directly on the lintels);



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CONCRETE BLOCKS



KZE block



KWE block



FORMWORK ELEMENT OF THE TIE BEAM



BOND BEAM BLOCKS

INSTALLATION GUIDELINES:

- Length of a block 60 cm.
- Floor height from 16 to 34 cm.
- The fittings must be plastered up to 7 cm below the elevation of the floor bottom (to provide additional base thickness).
- Cut the corner fittings at a 45° angle.
- Punch out rectangular notches in the base, if there are protruding reinforcement rods.
- The blocks feature spacers for reinforcement rods.
- A block is made of C30/37 concrete.

Designation	Available base widths (A)	Block height (H)	Floor height	в	с
KZE H-410		410	340		
KZE H-370	180	370	300		
KZE H-310	240,	310	240		
KZE H-290	300,	290	220		
KZE H-270	or	270	200		
KZE H-250	360	250	180	600	70
KZE H-230		230	160		
KWE L-180	180				
KWE L-240	240				
KWE L-300	300	_	_		
KWE L-360	360				

INSTALLATION GUIDELINES:

- Thickness of the XPS board 35 mm,
- Width of the fibre-cement board 7 cm, thickness 4 mm,
- Install on the elevation of the floor bottom,
- Install using:
- quick-fit anchors,
- fitting foam.
- Blocks (exceeding the height of 16 cm) should be additionally secured with plastic catches,
- Tie the catches to the tie beam reinforcement, using a binding wire,
- Consumption of plastic catches min. 2 pieces/lin.m. (for multiple use).

Height of element [cm]	Quantity in linear metres on 1 pallet	Weight [kg/lin.m.]		
16	324	0.59		
20*	270	0.60		
25*	224	0.69		
30*	180	0.76		
* Use additional stabilizing catches				



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