

The Thermomur-structural system is a:

- **energy conserving,**
- **highly rationalised, and**
- **cost-effective**

fireproof monolithic structural system which employs Thermomur-shuttering units made of rigid foam.

This monolithic structural system is a particularly effective and most economic solution, ideally suited to respond to energy conservation prerequisites and rapid construction demands.

The most outstanding features of this fireproof structural system are the following:

- Thermomur-shuttering units which can be either individually placed on top of each other or
- can be erected as prefabricated storey-high walling units with finished surfacing, in any conventional type of plastering, e.g. plastic finish or any kind of mineral plaster. The units can be filled with any desirable filling compound, combined in a manner which is pursuant to the particular conditions of statics, and serve as perfect load carrying core.

The monolithic fireproof bearing core is made of:

B25 concrete, up to 16,0 mm grain size, K2 plastic consistency.

The assembly of the walls can be made in two ways:

- Installation of the elements up to a height of max. 3m, then filling of concrete into the inner space by means of a pump with a special nozzle..
- Installation of several layers (e.g. 3 to 5) and manual filling of concrete.

In the first case an intermittent support for the installation has to be provided, if the wall is very long and not supported by an inner wall.

The person who builds the walls has to select which way he wants to make the installation. The THERMOMUR walls are connected to solid walls (chimneys, separation walls) by reinforcement bars, or steel tapes, which are installed during bricklaying. Openings for windows and doors are made by using corner elements and lintels. The lintel must be reinforced as per the specification of the architect. During the filling of the concrete the lintel must be supported, and at the same time the element for the lower portion of the window opening is sealed to avoid the evacuation of the concrete. The installation of a basement is made the same way as for higher walls, which are installed above the ground.

## The ceiling in the THERMOMUR-System

The ceiling in the THERMOMUR-System is of a typical construction with narrow ribs, using the normally available beams of type Teeriva, Fert, or of other manufacture according to the requirements of the project. The support of such a ceiling depends on the type of beams used and must be considered in the technical evaluation. The strength of the EPS elements allows pouring of concrete with a thickness of 7,5cm directly by the pump. Using a concrete of class 25 K-III containing additives of grain size 1 - 16mm assures a load bearing of 350 to 400 kg/m<sup>2</sup>.

A ceiling manufactured this way allows the fixation of a suspended ceiling, plastering or plaster boarding, application of ceiling paper, and painting. The reinforcement of the ceiling is made together with the reinforcement of the wall topping, in accordance with the technical design.

The single-span beam flooring is made of:

- Reinforced steel girders-steel type IV Bst 500/550 with very slight inherent load, 7 to 8 m span, and up to 12 m secondary reinforcement.  
or
- Steel plate girders with very slight inherent load, up to 12 m span, and up to 18 m secondary reinforcement.  
as well as
- a special Thermomur filler block made of EPS rigid foam, with 3,3 KN rupture load.  
and
- 6,5 cm flow concrete B25, grain size up to 8,0 mm K3 (at least 50 cm slump).

The load carrying capacity of such a construction amounts to approximately 5,5 KN per sq.meter. Corrosion protection in compliance with DIN 4115.

If a floating screed flooring is used, this type of floor construction can attain fire-resistance category F 90.

The footstep sound insulation of this type of floor construction with floating screed flooring, complies with the regulations specified in DIN 4109.

### **Note:**

The ceiling beams sit on the concrete of the wall to a maximum length of 7,5m in the standard design. The distance between the beam centers will be 76cm.

The very low weight of the elements facilitates the installation work in an excellent way and does not require any special equipment like hoists, etc.

## Sloped roof constructions

Available as wooden structures, specifically designed to satisfy particular statics demands, and as special Thermomur form units made of hardly inflammable rigid foam, to serve as roof insulating slabs.

With structural steel girders Bst 500/550, specifically designed to satisfy particular statics demands, rustproof and integrated into the special Thermomur form units, made of EPS rigid foam or Styro concrete with different types of roof cladding, e.g.

- gravel-surfaced roof cladding with roll roofing
- roof shape stone cladding
- roof shingles
- all types of metal roof cladding

Flat roof are available with the same bearing structure as the flat roof form and with a flat room system which best suited to the relevant climatic conditions and best serves the purpose intended for the building, e.g.

- promenade roofing
- terraces etc.

A roof made by the THERMOMUR system is very warm. The heat conductivity figure is only  $U=0.20 \text{ W/m}^2 \text{ °K}$ . This kind of roofs can be used in buildings made by EPS elements as well as in buildings made by the traditional building technologies. Using these roofs allows:

- Improvement of the outside architecture of an available building,
- the erection of an attractive and very warm inhabitable loft.

The THERMOMUR Technology allows modifications of the roof construction, i.e. from a flat roof to a ridge roof, or modernization (heat insulation) of an existing ridge roof. The roof proposed by us is of a wooden construction with a distance of 60cm between the individual rafters and a pitch of min. 20°. The distance between the rafters allows the use of various kinds of roof windows. The interior works of the inner rooms depends solely on the individual taste of the building owner. We propose wallpaper, dry plaster, and wooden panelling. The THERMOMUR roof elements are fixed with nails to the rafters. Special interlocking connections assure an excellent tightness under all conditions. On the outer surface double-S roman flat concrete roof tiles are layed on (without fixation). The side surfaces and the eaves are covered with boards or metal sheets.

Thermomur shuttering units are available as hollow-blocks: 25 cm width, 25 cm height and 120 cm length. The programme also includes the following:

- L-shaped corner units - 90 degrees
- T-shaped wall junction units - 90 degrees
- Two-way units - 90 degrees
- Lintel units
- Cantilevering units/Console units
- Supporting units
- Floor supporting units and blocks for arched or designed walls.

The construction of 1 square meter wall, type 25, requires 134-150 litres concrete B25. the expansion of a wall constructed in the afore mentioned manner, and exposed to Central European temperature fluctuations is approximately 0,2 mm/m.

The diffusion resistance of Thermomur shuttering units is identical with the diffusion resistance of concrete; consequently the filled wall dries out just as quickly as any solid concrete wall.

The condensate precipitation of a type 25 Styro-Styro-wall, plastered on both sides, in the winter season is 89 g/sq. m, which takes place in the sommer season is 299 g/sq. m.

The phase displacement of a type 25 Styro-Styro-wall is 7,5 hours.

The fire resistance category of a type 25 Thermomur-wall, as specified by DIN 4102, is as follows:

- (a) enclosure of space F 90
- (b) structural stability F 120

The static calculation for the concrete core is accomplished in compliance with the standards applicable to precast concrete constructions and reinforced concrete constructions. Thermomur-shuttering units require no special authorisation, since the rigid foam units are included in the group of standardised building materials.

## Conclusion

1. EPS is a material easy to handle, therefore the main tool at the building site is a wood saw with a thin blade. If a cut is not precise enough to a required dimension this can be corrected with polyurethane foam.
2. For persons looking for untypical solutions, e.g. wishing to have arches above the window and door openings, we have the solution. After installing the walls and before filling the concrete, we draw the arches above the windows and the doors, and then cut the arch with the saw. We then put a metal strip of about 1 mm thickness into the saw gap. After filling with concrete we remove the metal strip and the elements from the light area of the window or the door (which are used as a support during filling with concrete). These elements can be used for the next building phase.
3. Installation drawings helping to shorten the building time essentially, have proven to be very useful for the builder.
4. Ductings and channels can be incorporated in the inside of the wall elements. Passages in the walls can be kept by putting in a little piece of EPS of a given size and shape before pouring the concrete.

5. Roofs made by the THERMOMUR-System may also be covered with other materials, like profile sheets, etc.
6. The architectural possibilities of the THERMOMUR-System are unlimited. With the THERMOMUR elements any project for one- and multi-storey homes, economic and industrial buildings (cooling and storage rooms for fruit and vegetable) as well as other buildings for public use can be realized. The THERMOMUR-System can also be combined with other traditional building technologies, e.g. for suspended curtain walls in the large surface plate technology.

Thermomur-shuttering units can be directly refined with the most different types of facade linings such as facing clay bricks, as well as with any desirable facing shell or building material.

All units are extraordinarily flexible as far as their scope of application is concerned and allow for a linear measure tolerance as slight as 5 cm, thus facilitating the implementation of any kind of building project.

The integration of the physical and bearing characteristics of the units and materials to be processed, allows for the easy implementation of unconventional building structures and offers a very high degree of rationalisation as far as.

- handling of structural units and
- execution of work

are concerned.

To a great extent, it is also possible to execute the work without the intervention of experts or specialised personnel. In view of the rationalised structural system, adequately trained workers are perfectly capable of performing the construction in question with extreme accuracy.

The implement and equipment park (cranes, transporters etc.) can be kept to a minimum. The building units are light in weight, easy to transport and easy to store.

The special building methods made possible by Thermomur-shuttering allow for extremely rapid construction of building units.

The excellent workability of all shuttering units, allows for design and construction of the most different building structures with a minimum of effort. The same applies to electrical and sanitary installations, both can be accomplished with the most elementary set of tools

## **FIELDS OF APPLICATION**

- Single-family home units and multifamily housing
- Multi-storey buildings with a maximum of 10 storeys
- Commercial buildings
- School buildings
- Laboratories
- Industrial buildings
- Hospital buildings
- Farm and agricultural buildings
- Hotels constructions etc.

## Application technology advantages of the THERMOMUR buildingsystem

### Generally

- prefabrication of Thermomur can be done in the factory or direct on the building-site;
- ecologically beneficial in the production and processing;
- easy processing on the building-site without heavy machines;
- free design of the buildings for the architect;
- bigger net living space opposite to the comparable wall;
- monolithic structural buildingsystem;
- earthquake-proof building;
- save the resources as a result of the high isolation;
- up to 70% energy saving while heating or cooling;
- skilled or unskilled laborer can assemble the buildings, (cutting costs);
- accidents are lower for workers due to the light weight of the material;
- subsequential work is faster, such as installing doors, windows, electrical ducting, and water piping;
- plasterfixation adheres to Thermomur through our patented design;
- 4 times more walls can be built versus conventional wall building;
- bigger savings with specific logistic.

### Wallelemente

- optimal utilization of the feed surfaces in the case of truck feed by the external dimensions co-ordinated with it;
- Flexible screen line dimension of 5cm in the length and width. Height measurement can be non-standard adapted;
- by the simultaneous manufacturing of the corner elements with the normal wall elements you don't close at the building site the open elements at the corners or door/window terminations;
- Adjustment of the reinforcing irons for the concrete are patented. The reinforcing iron is not encased by the special shaping completely with concrete and it to form any bubbles which the corrosion to promote itself;
- From the constructional shaping on the insides of the elements a positive network of the concrete with the elements results;
- Patented plaster mounting plate at the exterior surfaces of the items. By the special recesses the plaster can connect itself with the elements and become the different expansion coefficients of the different materials (Thermomur and Plaster) balanced on the one hand. The plaster can't damaged and you don't use net and glue for the plaster. Directly mineral or plastic finishes can be applied;
- In the case of inappropriate processing tolerances up to 5mm can become balanced around warming or avoid cooling bridges.

## Ceilingelemente

- light filling materials with enormously high carrying capacity;
- by the design of the ceiling elements no warming or cooling bridges results;
- a smooth lower surface of the finished cover. You can begin directly with the subsequent treatment, likewise the concrete can't ooze;
- no supports to 6 mtr. Span forces. Thus the interior work can take place immediately in the spaces which are under it. No waiting periods to the concrete dried and the supports far away are which usually four weeks last can;

## Roofelemente

- no special sub-constructions need and directly on the roof rafters are applied;
- absolutely even and smooth lower surface of the finished roof;
- The design on the top side serves to accommodate roofing tiles or solar elements;
- Special conduit-type sewers lead penetrating water, if for example the roofing tiles are damaged, downward into the gutter. None penetrate from water into the building inside.