

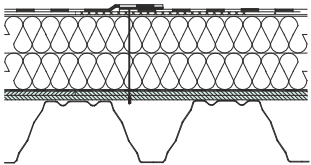
## 8.7 Light Composed Roofing

### 8.7.1 Introduction

Light composed roofing is a combination of materials with resulting high-standard parameters of use. The load-bearing construction is made by profiled trapeze sheet metal, fire resistance is provided by two layers of CETRIS® cement bonded particleboards, high thermal resistance is achieved by use of insulation boards of elasticised foam polystyrene. The composition also includes vapour barrier and hydro insulating layers with high resistance to weather effects. The test of fire resistance of this composition has been performed pursuant to EN 1365-2:2001 Fire resistance tests for load-bearing elements – Part 2: Floors and roofs. The assembled test sample (a beam with overlapped

end) was loaded with increased load for the inside forces and tensions to correspond to the values of a continuous beam with two equal fields. Direct application allows use of this composition for inclined roofs with the slant range from 0° to 25°. This roof construction meets the fire safety requirements also pursuant to the updated ČSN 73 0810: 2009 Fire Safety of Buildings, Common Provisions. Use of CETRIS® cement bonded particleboards assures high rigidity of the roofing. At the same time the boards form a firm flat base protecting the subsequently laid heat insulating and hydro insulating layers from damage – especially during assembly.

### 8.7.2 Fire Characteristics

Construction drawing	Description of the construction	Fire resistance
	<p>Hydro insulating foil Armouplan SM 120 – 180 (thickness 1.2 – 1.8 mm)</p> <p>Separation textile (non-woven glass fibre textile)</p> <p>Insulating boards EPS 100S – 2 layers, thickness 60 mm</p> <p>PE vapour barrier</p> <p>CETRIS® cement bonded particleboards Basic – 2 layers, thickness 10 mm</p> <p>Load-bearing trapeze sheet metal TR 150/280/0.75 (or other pursuant to structural assessment)</p>	REI 30

### 8.7.3 General Assembly Principles

- Trapeze sheet metal must be anchored in supports in every bottom wave with two screws with a minimum diameter of 5.5 mm with washers. The edge supports (steel or concrete beams) must be sufficiently stiff in crosswise bend and twist for transfer of horizontal membrane forces. Lengthwise connection of trapeze sheet metal pieces must be secured with self-tapping screws 4.8 × 20 mm with the maximum spacing of 500 mm.

The limit conditions for use of other types of trapeze sheet metals are:

- Maximum bend momentum above the support 3,554 Nm
- Maximum bend momentum in the field 2,000 Nm
- Maximum transverse strength 3,703 N
- Maximum bending tension above support 99.8 MPa

These values apply to trapeze sheet metal of steel class S 320 GD, yield limit  $f_y = 320$  MPa.

Technical and professional services for design of suitable trapeze sheet metal are provided by Kovové profily s.r.o.

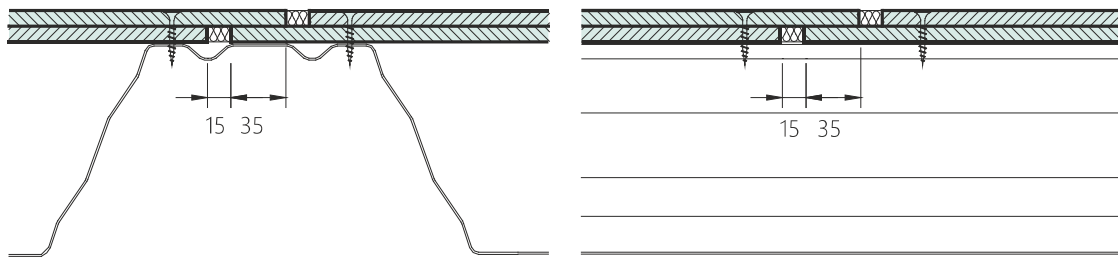
- The CETRIS® cement bonded particleboards are laid tightly in both layers, without gaps; when laying the second layer, the joint overlap must be minimum 625 mm. The CETRIS® boards are anchored with screws IR2-4.8 × 50 mm or SC3/35- PH2-4.8 × 45 mm. Both screws were tested and the supplier guarantees the minimum calculated value of 400 N for one element (safety factor 2.5). The maximum spacing of the screws in the longitudinal and transverse direction is 600 mm. The CETRIS® BASIC board are always laid tightly in one dilatation field (max. 6.70 × 6.70 m).

The width of the individual dilatation joints must be 15 mm that shall be filled with mineral wool tape. If there is no requirement for fire resistance, a single layer of CETRIS® boards of minimum thickness 16 mm will suffice – even in this case the minimum rated value of load-bearing capacity 400 N is guaranteed (shearing of the screw).

- A vapour barrier must be laid pursuant to the instructions of the supplier with an overlap of about 150 mm.
- Polystyrene foam insulation boards must be laid in two layers, with the minimum thickness of each individual layer 60 mm. The joints of the upper layer of insulation boards must have an overlap of min. 250 mm.
- Separation layer – unwoven glass fibre textile 200 gr/m<sup>2</sup>. Folding with an overlap of about 150 mm.
- Hydro insulation foil type Armourplan SM 120 (thickness 1.2 mm) to Armourplan SM 180 (thickness 1.8 mm). The foil overlap is about 150 mm, and in the overlays the foil is anchored mechanically – telescope R45 × 105 and screw IG-C-6 × 60 mm (supplied by SFS intec spol. s r.o.). The anchor spacing is circa 400 mm. The screw supplier guarantees the minimum rated value of 400 N per element (safety factor 2.5). Mutual adhesion of the foils is provided by heating with a hot air gun and mechanical pressing together (with a roller).

Technical and professional design services for a suitable type of vapour barrier, separation foil and hydro insulation is provided by the company Coleman S.I., a.s. Details by the through passes, roof gullies, skylight, attics etc. must be lined with mineral wool, thickness min. 40 mm, on the side across the full height of the heat insulation layer of EPS.

## Implementation of dilation joint between CETRIS® boards



## Materials for assembly of fire resistant roofing

Description	Visualisation	Note
CETRIS® BASIC board Cement bonded particleboard, smooth surface, cement grey. Basic format 1,250x3,350 mm, density 1320±70 kgm <sup>-3</sup>		Thickness and number of layers according to the fire resistance requirements. One layer of minimum thickness 16 mm will suffice where no fire resistance is required.
IR2-4.8x50 or SC3/35-PH2-4.8x45 mm screws (supplied by SFS intec spol. s r.o.). Counter-sunk, self-tapping screws		The load capacity of the screws was tested – the guaranteed min. calculated capacity is 400 N.
Membrane – PE foil (supplied by Coleman S.I., a.s.)		Can be replaced by a different type, if the thickness ≤ 2 mm and heating capacity H ≤ 15 MJ/m <sup>2</sup> . Permissible I Al foil with a thickness of up to 1 mm.
Insulation boards – foam polystyrene EPS 100S, th. 60 mm (supplied by Rigips s.r.o.)		Insulation boards used must show compressive strength of min. 100kPa, declared coefficient of thermal conductivity λ = 0.036 W/mK, fire reaction class E, max. bulk density 30 kg/m <sup>3</sup> .
Separation glass fibre textile – 200 gr/m <sup>2</sup> (supplied by Coleman S.I., a.s.)		
Hydro insulating foil type Armourplan SM 120 (thickness 1.2 mm) to Armourplan SM 180 (thickness 1.8 mm) (EUROTEC Praha a.s.)		In the composition with classification DP1 it is necessary to use hydro insulation in combination with EPS for class BROOF <sub>(B)</sub> .
Isofast IG and telescope R45 fasteners		