**INSTALLATION INSTRUCTION NO. 5**

FOR APPLICATION OF VAPOUR PERMEABLE MEMBRANES AS INITIAL COVERING MEMBRANES (ICM) ON ROOFS WITH LOW SLOPING ANGLES: 5º – 19º (8,7% – 34,43%).

**The scope of application of ICM on low angles was covered by separate (this) instruction, because such application demands including recommendations from this instruction in construction project. Such division of application techniques complies with Guidelines of Polish Association of Roofers.**

Initial Covering Membranes (ICM) in their basic application demand ventilation of the space over them (under the covering). Because the flow of ventilating air is caused by two types of forces: thermal draft and wind pressure, the efficiency of this flow depends on the roof slope.

By angles smaller than 20º, thermal draft during most days of the year is minimal, which makes ventilation worse. At the same time, by smaller slope, the possibility of appearance of cavities filled with water from melting snow, condensate or leakages in some places on the surface of membranes increases. Membranes are a flexible material that can be a subject to change of shape depending on: precision of construction of the roof structure and precision of membrane application, subsidence of thermal insulation and operation of suction power caused by the wind. On lower slopes, any gaps, overlaps and mounting holes can easily become a reason for leakages. The size of leakages and amount of condensate also depend on the tightness of final covering.

**Because of the above, there is a need to fulfill special conditions by application of membranes in the roofs with low sloping angles: 5º (3º) – 19º. These conditions need to be provided for in the stage of roof designing.**

In the first scope (5º– 9º), application of membranes is possible only under very tight coverings, e.g. under metal sheets connected on double seam. Some producers of those coverings allow their application together with membranes in roofs with 3º (5,24 %) slope.

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| **Scope of application 5º – 19º (8,7%** **– 34,4%)** |
| **Sloping scope** | 5º – 9º8,7% – 15,8 % | 10º - 15 º17,6% – 26,8 % | 16 º - 19 º28,7% – 34,4 % |
| **Construction requirements** | **Only** boarding,Sealed counter-batten;Sealed overlaps. | Sealed counter-batten;Sealed overlaps. | Sealed counter-batten;Sealed overlaps. |
| **Material requirements****soft base – wool**  | Membrane**DoP type 215 and type 265** | Membrane**DoP from type 185 to** **type 265** | Membrane**DoP from type 165 to** **type 265** |
| **Material requirements****hard base – e.g. PIR boards, boarding.**  | Membrane**DoP from type 185 to** **type 265** | Membrane**DoP from type 165 to** **type 265** | Membrane**DoP from type 150 to** **type 265** |
| **Height of the counter-batten** for rafter with length up to 10 m (if longer – bigger height) according to instruction no. 2  | Minimum 8 cm | Minimum 6 cm | Minimum 6 cm |
| **Additional remarks**  | Initial fixing **only by** means of self-adhesive double-sided tape sealed to the boards  | Initial fixing **only by** means of self-adhesive double-sided tape sealed to the rafters | Initial fixing by means of nails with flat head or staples  |

**Comments to table and pictures**

**Sealed counter-batten –** the best results are achieved by sealing foam self-adhesive tape (Marma K1) to the bottom side of the lath; it is also possible to attach membrane or wide self-adhesive tape to the top and sides of the counter-batten, so that it protects it from every side and the edges are attached to the basic membrane.

**Sealed overlaps –** overlaps of min. 15 cm, sealed from above by means of one-sided self-adhesive tape or inside (between touching stripes) by means of double-sided self-adhesive tape or glue.

**Boarding –** it is a sheathing made of regular one-inch boards (without tongue and groove) in width of max. 11 cm, by bigger width, the size of the gap between the boards needs to be increased (according to the instruction no. 4).

**Height of the counter-batten –** includes acceptableinequalities in roof construction and pushing of the membrane by thermal insulation.

In pic. 1, sloping angle is 20º, because the picture shows the air inlet recommended by such sloping for all kinds of coverings for sloping roofs laid on battens. Whereas in the pic. 2 showing the ridge, the sloping angle is 25º, because below this angle, metal coverings should have “high ridge”, i.e. additional structure under the ridge which would protect the ventilation gap outlet from being clogged by snow. On roofs with sloping lower than 20º, this regulation also applies by other types of final covering laid on battens.

Coverings made of tiles do not have such regulations and their producers very rarely allow their application on roofs below 25º sealed with flexible layers for initial covering (including ICM).

The above regulations **are not enough to obtain air tightness of the roofs** and their connections with other outer partitions of the building. The easiest way to obtain air tightness is by means of internal layers of vapour-insulation layers (e.g. made of vapour-insulation foils).

**Recommendations**

1. Inlet of the ventilation gap must be located on the end of counter-batten (pic. 1) and membrane must be laid on rafters (or corresponding beams) down to their end in the eaves. Inlet should be protected by drafty (in ca. 50%) tapes or protective nets and located behind the gutter, so that the snow does not cover it. The size of the active surface of the inlet should be performed in compliance with the regulations of roof ventilation – according to instruction no. 2 by Marma Polskie Folie.

2. Outlet of the ventilation gap on the ridge must go outside the surface of the covering, so that the height of outlet cover was not smaller than 15 cm (pic. 2).

3. Laths: battens and counter-battens can be impregnated only in vacuum by solvent preparations. It is forbidden to use salt impregnations.

4. All the other actions necessary for installation of ICM should be performed according to basic instruction no. 1.

5. All remarks and reservations enumerated in instruction no. 1 are also binding by installation of ICM according to this instruction which should be treated as a supplement to the basic one.

**Instruction written according to the state of knowledge from May 2019.**

It complies with the regulations specified in Guidelines of Polish Association of Roofers compiled on the basis of recommendations of IFD - International Federation for the Roofing Trade.



Additional information on websites :

[www.marma.com.pl](http://www.marma.com.pl) i [www.dachowa.com.pl](http://www.dachowa.com.pl) .