

## Spraying instruction for making insulation with polyurethane foam – system ULTRAPUR RG 05/55

### PRODUCT DESCRIPTION

The two-component polyurethane system ULTRAPUR RG 05/55 is designed for production of polyurethane foam coating on the roofs of residential, commercial and industrial buildings. Spraying polyurethane foam can be used in both new and old buildings for renovation. The use of a foaming agent of a permanent nature in a structure consisting of closed foam cells ensures high thermal insulation and water resistance for many years.

The ULTRAPUR RG 05/55 system does not contain components that cause ozone layer destruction (ODP = 0) or affect global warming. The new generation foaming component used, the HFO type, has a very low global warming factor: GWP = 1.

The system components are:

ULTRAPUR RG 05/55 component A - a mixture of polyols, flame retardants, additives and foaming agents

ULTRAMER B - polymeric diphenylmethane diisocyanate, pMDI

### INDICATIONS FOR PROCESSING THE PRODUCT

- **Preparation for spraying.** The product is for professional use and should be processed by trained, competent employees. Before starting work with the product, familiarize with its documentation, technical information and material safety data sheets. In case of large surfaces to be sprayed, work should be planned in advance to ensure that the entire spray coating is carried out in the shortest possible time, without unnecessary interruptions.
- **The spraying machine.** The system is two-component and its proper processing requires the use of a high-pressure spraying machine designed for this purpose. The machine should ensure that the ratio of both components fed to the mixing head (spray gun) is in a specified mixing ratio and that both components are effectively mixed and shaped in the form of a correct stream of sprayed liquid. The apparatus should be equipped with a dual pump and filter system, heating of both components, heating of hoses supplying components to the spray gun. It is necessary to secure the efficient power supply, preferably independent as a power generator, and an independent source of compressed air, efficient enough to avoid pressure drop during spraying.
- **Preparation of the workplace.** Before spraying the object, the workplace should be arranged in such way that ensures good access to all surfaces which should be covered with insulation, while protecting adjacent surfaces (doors, windows, floors) to avoid accidental foam contamination. With unfavourable air movement, rising and settling dust of sprayed foam can damage glass and varnished surfaces (e.g. cars or house facades) at a distance of many meters from the place of spraying.

- **Preparation of the sprayed surface.** The surface of the roof to be sprayed should be carefully prepared before starting work. To ensure proper adhesion of the foam, the sprayed surface should be clean, dry, with a moisture content of no more than 3%, without oil residues, corrosion and dust. Loose fragments should be removed, major surface damage repaired (cracks above 2mm). Ensure proper flashing of chimneys, hatches and roof edges. After spraying the foam, rainwater should flow freely.

- **Ambient parameters when spraying.**

Ambient temperature +10 - 30°C.

Surface temperature +10 - 40°C.

Relative air humidity up to 70%.

Wind speed up to 20km / h.

- **Temperature and pressure of components.** Pressure and temperature control is closely related to the type of spray machine and gun used, so the following information should be considered as a starting guide. The machine operator corrects its settings by observing the spraying process and the appearance of the foam. The temperature of the raw materials is extremely important for effective mixing of both components and regular formation of the stream of sprayed liquid. Before starting work, components in drums should be brought to temperatures levelled throughout the drum volume - preferably at 25-30°C - by short circulation through the heaters and pump. Then, during work, the temperatures should be kept stable, observing the process of spraying and reacting to changes by regulating the heaters. Too low temperatures cause an increase in pressure on the pumps and an increase in the viscosity of the components, which makes difficult to mix them in the gun, poorer stream formation and uneven foam layers. This results in foams with big cells, poor adhesion and low output. One should raise the temperatures on the machine heaters. If the components temperatures are too high, the blowing agent may "degas" in the liquid stream, which causes the appearance of large bubbles in the foam and makes it difficult to achieve an even spray surface. The temperature settings of the machine depend on the efficiency of its heaters - usually the temperature of the heaters and hoses is set at 30 - 50°C (according to the machine's readings) and corrected depending on the effect obtained during spraying. The pressure of the components fed to the spray head during operation should be 80 -110 bar. It is important that the pressures of both components are as close as possible during spraying. Large differences in component pressures can indicate machine problems or blockage in the circuit of one or the other component. The level of pressure affects the degree of dispersion of the stream from the gun nozzle.

- **Mixing ratio of the components.** To achieve the correct foam structure, it is necessary to maintain a mixing ratio of 1: 1 by volume. Uniform consumption of both components can be controlled by observing the uniformity of the decline in the level of liquid in barrels. The correct foam structure is uniform, small cells distributed in even layers of foam. The foam structure determines the achievement of correct insulation and mechanical parameters.

- **Control of foam spray parameters.** Due to the variety of design solutions in the manufactured spraying devices, it is difficult to provide one exact set of parameters that would ensure a perfect effect in all conditions. The quality of the sprayed foam is significantly influenced by many variable factors - that's why it is important to test spray before starting the actual work and constantly control the parameters during spraying. The correct settings of the spray machine working parameters - the temperatures of the heaters, hoses, the type of mixing gun and the pressures on the pumps - and the correct spraying technique, which is affected by the distance of the gun from the sprayed surface, the angle of incidence of the liquid stream, the shape of the stream, the uniform movement of the operator's hand, determine the appearance of the rising foam. The foam should have an even surface, with a slightly sheepskin texture, without larger craters. The thickness of the surface should be controlled by measuring the thickness of the coating at several points with a steel pin. By cutting out a piece of foam from the test spray, you can assess the foam structure, size and uniformity of pores, as well as measure the coredensity of the foam. When tearing off a piece of foam, the adhesion to the surface can be assessed.

- **Foam spraying.** It is recommended to spray the foam in layers not thicker than 10-15 mm. This ensures a more even, more mechanically durable coating. The next layer should be sprayed after cooling the previous layer to avoid adverse heat accumulation as a result of the chemical reaction (depending on the ambient temperature, the next layer may be applied after 20-30 minutes). Spraying another layer on the hot foam can cause poor adhesion and delamination of the layers. Spraying all layers to achieve the desired thickness should be done in one day. Therefore, when planning to spray a larger area, it is worth dividing it into fragments that can be realized in one day.

- **Protective layer.** Polyurethane foam can darken and degrade when exposed to sunlight. Therefore, after making the foam insulation coating, it is recommended to protect the foam against sunlight by painting with a protective coating. Depending on your preferences, you can use approved paints or more mechanically resistant elastomer coatings. The coating should be applied according to the manufacturer's instructions.

## **PRINCIPLES OF SAFETY AND HANDLING OF THE PRODUCT**

Only trained employees may be allowed to work with the spray system. Employees who come into contact with the product should follow the principles detailed in the product documentation and material safety data sheets. Particularly important is the caution required when working with liquid chemical products such as system components. The resultant polyurethane insulation foam is a polymerized solid structure and does not pose a health risk.

During spraying, wear suitable protective clothing, gloves, overalls, glasses and respiratory protection masks.

All questions and doubts regarding the use of the product should be directed to ULTRAPUR employees.

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