PU foams

INTRODUCTION TO PU FOAMS

Polyurethane foam (PU foam) is a versatile chemical product used in many common construction applications which require adhesive bonding, filling, sealing, and insulation. Its high thermal and acoustic insulation properties makes it an excellent product for applications such as insulation of water pipes, bonding and sealing of roofs and walls, and installation of door and window frames.

SOUDAL PU FOAMS

Soudal is Europe's leading independent manufacturer of sealants, PU Foams and adhesives, serving professionals in construction, retail channels and industrial assembly. With 45 years of experience, 11 manufacturing sites on 4 continents and 35 subsidiaries all over the world, Soudal products are highly regarded by end-users in over 130 countries worldwide.

Soudal's PU foams are one-component, self-expanding foams in pressurized aerosol cans, and can be applied using either a straw, or a foam gun. With its many years of experience in manufacturing and technical expertise, Soudal foams are of very high quality, with high stability and excellent foam structure.

Some properties of Soudal PU foams:

- Forms semi-rigid structure with closed cells (>70%)
- Excellent **adhesion** on most common materials and between different materials
- Excellent **filling** capacities, expands to 65 times its original volume
- Strong **bonding** characteristics
- Excellent thermal and acoustic **insulation**
- Can be **trimmed, sanded and painted** after full cure

Some application areas:

- Fills cavities between pipes and walls
- Installs doors and window frames
- Seals and fills connection joints
- Fills joints between walls and wall panels
- Fills gaps between walls and corrugated roofs
- Installs and seals air-conditioning units
- Thermal insulation of panels
- Filling of openings in walls and partitions
- Installation of electrical wiring

ADVANTAGES OF USING PU FOAM IN WINDOW INSTALLATION

- Easy to use – saves time and labour
- Convenient application – Using professional application tools creates less mess
- Excellent insulation properties – much better than cement
- Movement capability – will not crack after time from building movement / material expansion

PU foams

GUN AND STRAW FOAMS

Soudal's foam are mostly one-component foams which needs either a gun or a straw for application. These two types of foams are commonly known as "Gun foams" and "Straw foams". While both will achieve the same purpose and the same end product, there are some critical differences between the two.

Gun Foam	Straw Foam
Uses a gun for application. This gun can be reused as long as it is taken care of properly. Guns are a separate cost.	Uses a straw for application. Each can of straw foam comes with a straw. No additional cost.
After application, guns must be cleaned with cleaner, or left attached on the can with its screw control fully tightened. In this state, guns can last up to one month before it starts to cure inside.	Once a can is finished, the straw may be disposed together with the can. If a can is used halfway, straw foams cannot store properly, nor for too long.
Gun foams have typically much higher yield.	Straw foams have high yield, but less than guns.
Gun foams are of lower density (which allows it to attain higher yield). Note that density has effects on many properties, but generally lower density is considered better.	Straw foams are of medium density.
A user can have better control of the application of a gun foam, as foams are extruded in an expanded state. After extrusion, the foam usually expands 30 to 80%, so it is easier to estimate and dose the correct amount to fill a joint.	Straw foams are extruded in smaller beads, hence must expand more, between 70 to 150%. This makes it harder to estimate how much foam is needed to fill a joint.

Application with gun foam

Application with straw foam

PU foams

PU FOAM YIELD PER CAN

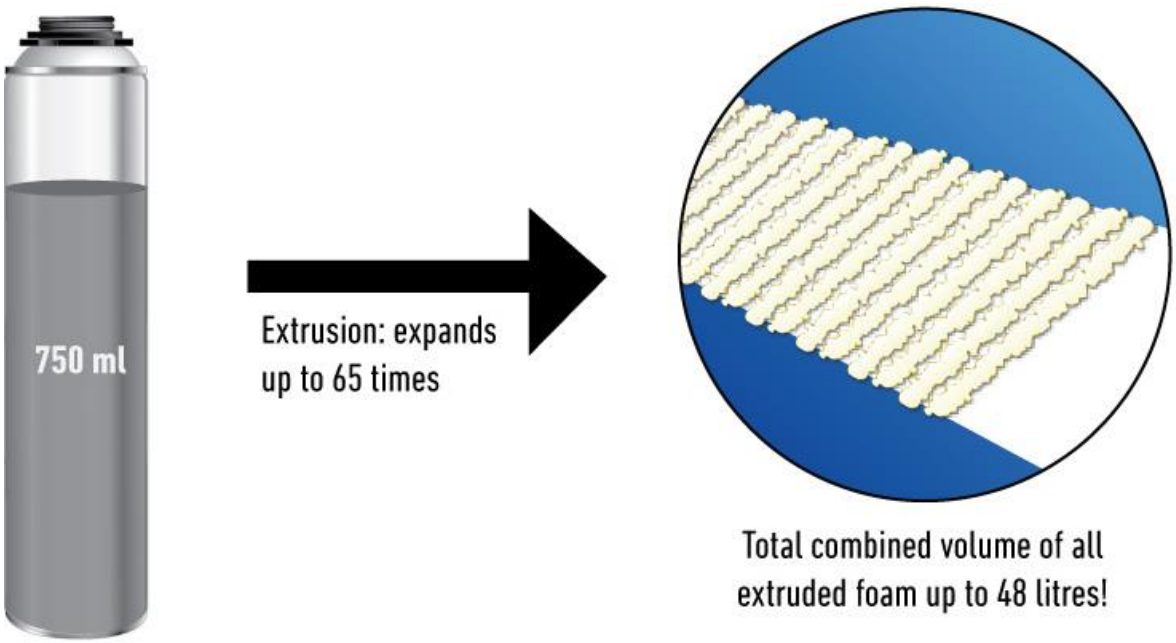
Soudal's PU foam products are filled to a standard 750 ml, with strict quality checks during the manufacturing process that ensures each can has enough volume. Note that there are many unethical manufacturers out there who underfill their foam cans, and it may have as little as 350 ml in a product that states 750 ml.

While 750 ml sounds very little theoretically, it is important to note that these foams expand through reactions with the propellant during extrusion from the can, and reactions with the environment after extrusion. The final product of foam may be up to 65 times the original polymer mixture inside the can itself.

This is achieved through two expansion processes.

1) When the foam is extruded from the can, the propellant gases act as a frothing agent to mix the PU pre-polymers with air, as well as the propellant gases themselves, creating a frothy, foamy mixture.

2) After the product has been extruded from the can and is left to react with the environmental humidity and gases, it continues expanding as it cures. During this stage, it can expand between 30 to 150%.



Based on the above picture, one can of foam can extrude many "beads" of product as shown in the right. Adding up the volume of all these beads of foam, we are able to achieve almost a total of 48 litres volume.

PU foams

EXAMPLE YIELD FROM ONE CAN OF FOAM

The following photo is a real life yield of one can of Soudafoam Classic gun foam. The width of the paper and of each bead is 90 cm, and there is a yield of 32 beads of foam. Using simple multiplication, we can calculate that one can of Soudafoam yielded a total of 28.8 metres of PU foam. Each bead is roughly 6 cm wide and 5 cm tall after all expansion.

32 beads of foam from a single can of Soudafoam Gun, in their final, fully expanded state.

The process of extruding foam to measure the yield. This picture shows the foam before it expands to the fully cured state.

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PU FOAM STRUCTURE

In many applications, excess PU foam is cut away with a knife. Doing so will reveal the structure of the foam, as seen in the photos below.

As you can see, PU foam is made up of countless little cells of air trapped in the substance itself. These pockets of air acts as excellent insulators of heat and sound.

PU foams

PU FOAM EXPANSION

When filling a gap or a joint, it is advisable to fill only a portion of the joint to minimize waste, as the foam will continue to expand even after extrusion. If a gap or joint is filled entirely by foam, further expansion may create a lot of excess foam which will have to be cut and disposed.

Gun foams generally expand less than straw foams, so the joint should be filled even less using a straw foam.

Below is an experiment done in the laboratory with an artificial joint. This joint is filled almost completely with a gun foam, as seen on the photo on the left, taken immediately after foam extrusion. The photo on the right shows the foam two hours later, after it has further expanded out of the joint. In most applications, this expanded, excess foam will be cut away, and hence is wastage.

1. Taken immediately after application.

2. Foam has expanded out of the joint, two hours later.

PU foams

APPLICATION INSTRUCTIONS FOR INSTALLATION OF DOOR AND WINDOW FRAMES (ONE-COMPONENT FOAMS)

This section serves as a general guideline in the use of PU foams for the installation of door and window frames. PU foam is generally used to fill the joints between the wall and the frame; this is to increase the insulation properties of the building and avoiding a “bridge” in which heat can be transferred freely.

This guide also assumes that the door or window frame has been attached mechanically, and strongly supported with all fittings in place (including spacers).

1. Cans should be used in their recommended operating temperature as specified in the can. If the environmental temperature is too high or too low, keep foam cans at the optimal temperature for at least 4 hours.
2. Wear gloves, goggles, and other protective equipment.
3. Ensure that the substrate is free of dust, grease and oil.
4. If possible, it is almost always recommended to spray mists of water into the joint to promote adhesion and a faster curing rate. This is not recommended in temperatures below 5 degrees.
5. Shake the foam can well, for at least 30 seconds. The more, the better.
6. For gun foams, fix the gun onto the can. For straw foams, fixed the provided straw onto the can.
7. The can should be **turned upside down** for foaming.
8. Extrude the foam into the joint from bottom-to-top. There should not be holes or voids in the joint without foam, as this will compromise insulation. For gun foams, fill three-quarters of the joint. For straw foams, fill one-half of the joint. This will allow space for the foam to expand, and to minimize wastage.
9. For best results, water can be sprayed into the joint, onto the foam, so that it cures faster.
10. Foam should be left to cure, for approximately 1 hour.
11. After curing, excess foam coming out of the joint should be cut away. DO NOT press half-cured foam back into the joint as this destroys the foam structure.
12. The exposed foam should be covered up or sealed with insulating tape or other sealants.

PU foams

PFE TECHNOLOGY'S PU FOAM PRODUCTS

PFE Technologies is Soudal's authorized and exclusive distributor in the region, and we carry the following PU foam products.

Foams

Fill & Fix Foam Polyurethane foam		• Self-expanding, one component foam • **Includes straw applicator** • High yield, medium density • Expands ~65 times • Excellent thermal and acoustic insulation properties • High quality, high dimensional stability • Moderate, controlled expansion • Excellent foam structure with open-cell technology • 750 ml, 12 cans / box • Colour: champagne
Soudafoam Gun Polyurethane foam		• Self-expanding, one component foam • **Requires PU foam gun for application** • Very high yield (higher than Fill & Fix), low density • Expands ~65 times • Excellent thermal and acoustic insulation properties • High quality, high dimensional stability • Moderate, controlled expansion • Excellent foam structure with open-cell technology • 750 ml, 12 cans / box • Colour: champagne

Accessories

Soudal PU foam gun *Compact*		• Made in Europe • To be used with gun-based PU foam products • Excellent durability ,superior performance
PU foam gun		• To be used with gun-based PU foam products
Soudal Gun & Foam Cleaner		• Cleans and partially dissolves uncured PU foam • Has gun-adapter to clean PU foam gun internals • Has spray attachment to clean foam cans and other areas