PU FOAM INTRODUCTION

GUN FOAMS • STRAW FOAMS • APPLICATIONS • PROPERTIES • ACCESSORIES


Basic information for one-component Polyurethane (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.

This document is a basic introduction on the different types of one-component foams, and fundamental terms to better understand PU foams and how their properties matter in applications.

ABOUT US

PFE Technologies Pte Ltd is an established manufacturer, supplier, and distributor of high quality abrasives, sealants, adhesives, and PU foams, amongst other products. PFE is the exclusive distributor of European brands such as Soudal and Klingspor, and has its own range of Pereseal sealants.

Established in Singapore in 1978, PFE Technologies has since gained a reputation for quality, reliability and outstanding value. PFE's mission is to deliver a superior level of services and products to achieve enduring, life-long customer satisfaction and relationships. We pride ourselves on our product quality, customer service, and technical expertise and support. Our engaging and experienced sales team is always ready to assist with any sales or technical queries.

PFE Technologies is a pioneer of PU foam technology in Singapore, and now carries stock and distributes Made-in-Belgium Soudal PU foam products islandwide. We welcome any enquiries. More information is available at our website www.pfetec.sg

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
- Easy to transport – no more carrying big bags of cement
- Ready to use – does not require any mixing
- 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

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.

Difference	Gun Foam	Straw Foam
Application / Delivery	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.
Storage after use	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.
Yield	Gun foams have typically much higher yield.	Straw foams have high yield, but less than guns.
Density	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.
Expansion / Control	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

As a general rule, Gun Foams are more suitable for users or applications requiring a large number of foam (i.e. more than 3 boxes to be used within a short time). This will maximise the value to the user due to better yield, control, and storage.

On the other hand, Straw Foams are more suitable for small users only using a few cans each time.

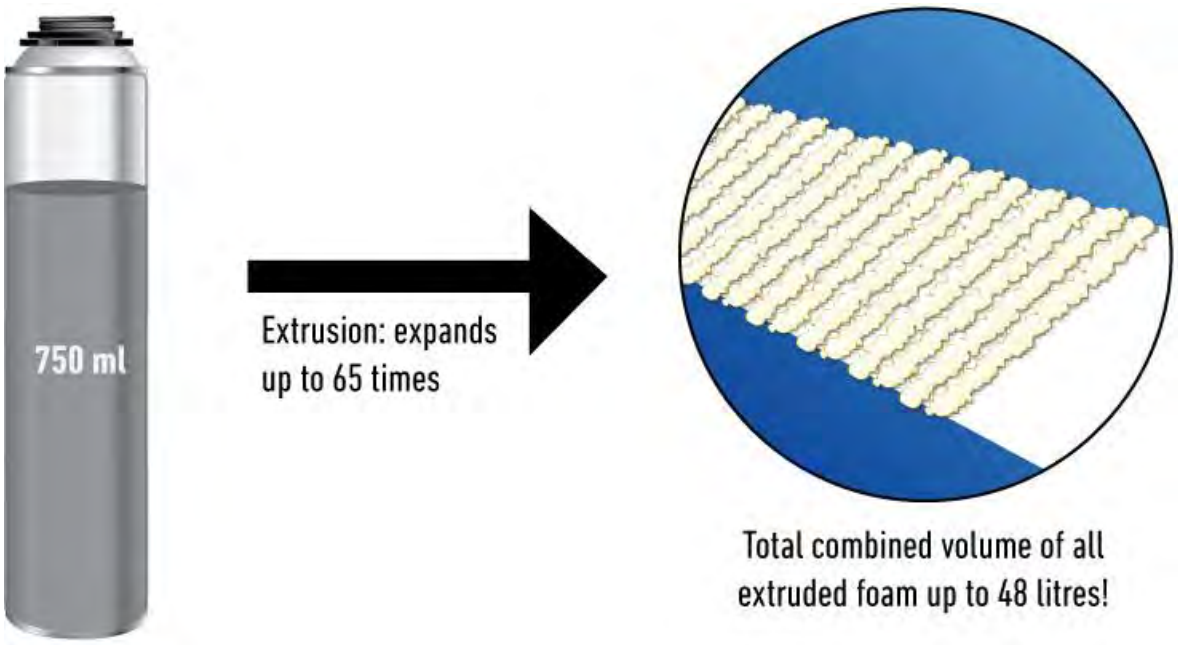
PU FOAM YIELD PER CAN

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.

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.

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 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.

PFE TECHNOLOGY'S PU FOAM PRODUCTS

SOUDAL SEALANTS, FOAMS, AND ADHESIVES

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SOUDAL PROFESSIONAL POLYURETHANE FOAMS

Soudal is a pioneer in the development of PU foams, creating quality foams with advanced open-cell technology, and is now one of the world's largest producers of PU foams.

- Excellent thermal and acoustic insulation properties
- High quality, high dimensional stability
- Excellent foam structure with open-cell technology
- Made in Belgium

SOUDAL FILL & FIX Polyurethane Foam with Manual Straw Applicator

Professional PU foam with high insulation value. Fills cavities, seals openings in roof constructions and creates acoustic screens.

- Self-expanding, one component foam — 750 ml can, 12 / box — Champagne
- Includes straw applicator
- High yield
- Expands ~50 times
- Moderate, controlled expansion

SOUDAL SOUDAFOAM GUN B3 Professional Gun-type Polyurethane Foam

Professional gun applied PU foam which allows for very precise applications. Especially designed for large scale projects. Fitted with regular threaded adapter for foam guns.

- Self-expanding, one component foam — 750 ml can, 12 / box — Champagne
- Requires PU foam gun for application
- Very high yield
- Expands ~50 times
- Moderate, controlled expansion

SOUDAL SOUDAFOAM FR Fire-rated PU Foam with Manual Straw Applicator

Fire-rated PU foam for applications where fire-rated characteristics are required. Fire rating of up to 360 minutes. International test certificates in many countries for a wide range of configurations.

- Self-expanding, one component foam — 750 ml can, 12 / box — Pink
- Includes straw applicator
- High yield
- Expands ~50 times
- Moderate, controlled expansion
- Fire-rating certified

SOUDAL GUN & FOAM CLEANER

Solvent based cleaner for the removal of fresh PU foam stains and for the cleaning and maintenance of PU foam guns.

- Cleans and partially dissolves uncured PU foam — 500 ml can, 12 / ctn — Clear
- Has gun adapter to clean PU foam guns
- Has spray attachment to clean other areas

POLYURETHANE FOAM APPLICATOR GUNS

SOUDAL COMPACT FOAM GUN

Easy-to-clean, lightweight foam gun for professional applications requiring precise dosing and best cell structure. Made in EU.

PROFESSIONAL FOAM GUN (028)

Professional grade, heavy duty PU foam gun with a long service life.

HEAVY DUTY FOAM GUN (019)

Heavy duty PU foam gun with metal adapter.

COMPACT FOAM GUN (030)

Good quality PU foam gun that is easy to use and easy to clean.