

**Elastogran is
Polyurethanes**

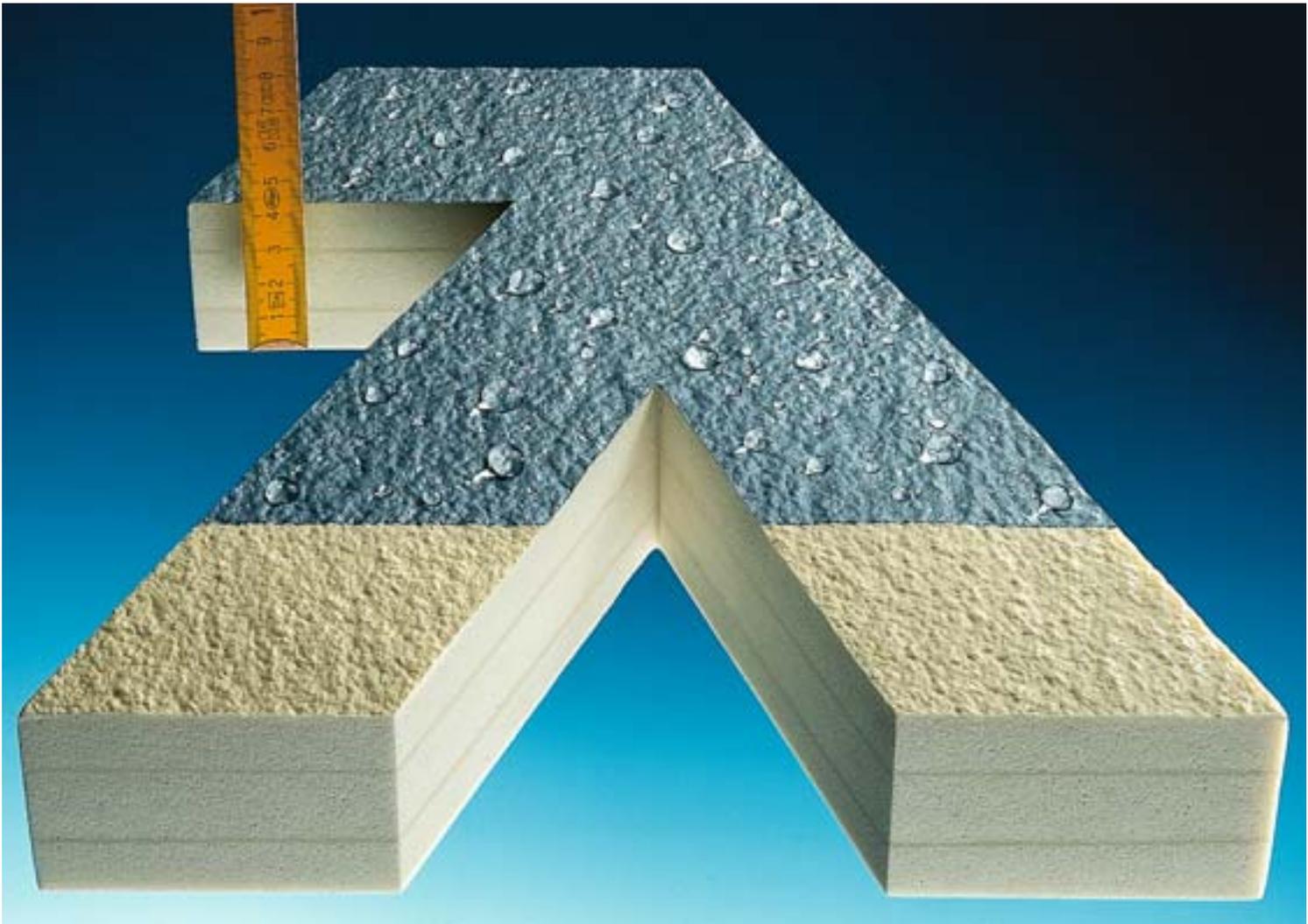
Elastogran



■ BASF Group

**Sealing and Insulation
with Elastopor® H
Spray Foam Systems**

This is Elastopor H



△ Because of their outstanding properties, since 1968 Elastopor H spray foam systems have held a strong position in the building and construction industry.

New buildings and renovation of old buildings will be characterized increasingly by the demands for energy-saving and environmental protection, both now and in the future. Here, special importance attaches to thermal insulation and the sealing of buildings and roofs. The latter are, in terms of civil engineering physics, the most highly loaded parts of a building. Roofs have to withstand heat and cold, dryness and moisture, storms and snow loading, whilst remaining impermeable for decades and providing reliable thermal insulation.

Not an easy task – but a job for Elastopor H. Elastopor H is the name for Elastogran's PU roof spray foam systems for up-to-date, environmentally- and energy-conscious and economical

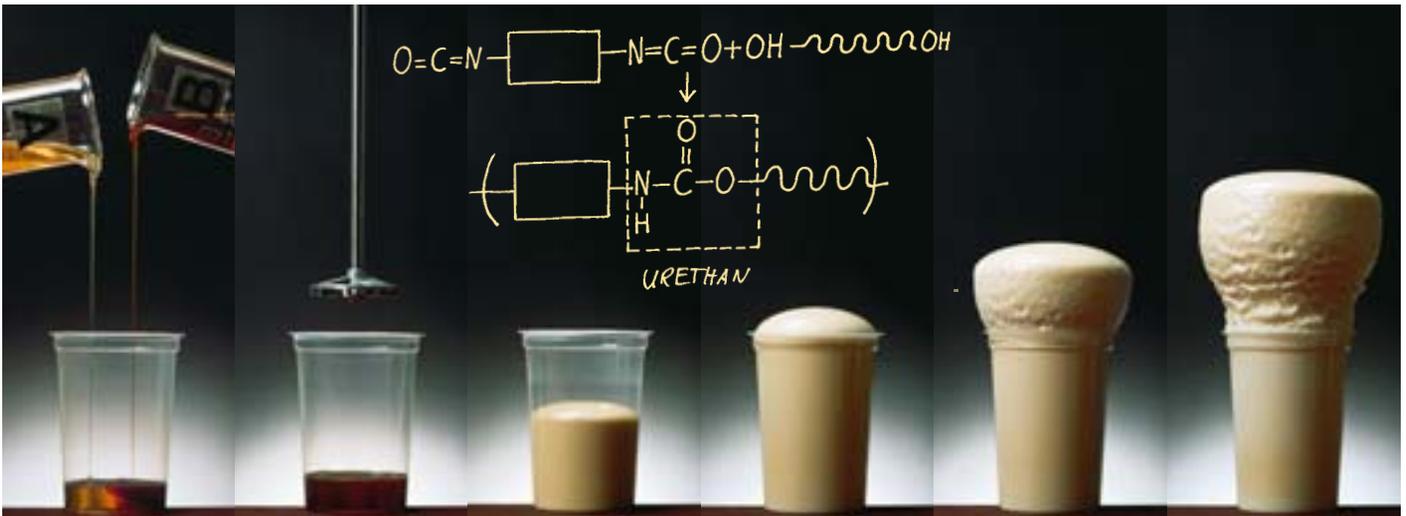
insulation and sealing of roofs of all kinds. Due to the strength of its properties, Elastopor H has since 1968 established a firm place in the building and construction industry.

To date, over 27 million m² of roof surfaces at home and abroad have been coated with Elastopor H. And the application is not confined to exterior roof surfaces. Other building surfaces such as ceilings, walls and floors can also be insulated economically with Elastopor spray foam. Spray foam has been proved successful not only for use in new construction work but also in particular in the renovation of old buildings.

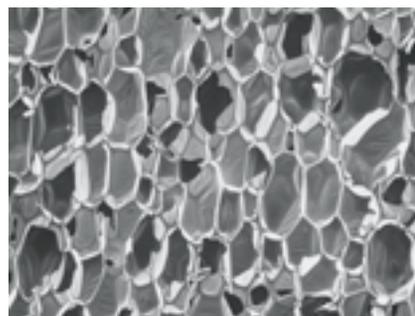
Elastopor H roof spray foam is a polyurethane rigid foam with up to around 95% closed cell content. It is produced through the mixing of 2 initially liquid components, namely the A-component (polyol) and the B-component (diphenylmethane diisocyanate, known



◁△ Jointless insulation and sealing with Elastopor H for buildings old and new.



△ A reactive PU mixture is produced by stirring the two components together.



◁ Made visible under the scanning electron microscope: the structure of Elastopor H polyurethane rigid foam with up to around 95% closed cell content.

as MDI for short). The mixing of the two components produces a reactive mixture which foams under heat evolution. At the end of the reaction phase the foams starts to solidify and cure. Applied by spray gun in several layers, Elastopor H ensures reliable thermal protection and provides a seamless join.

Elastopor H roof spray foam systems have received approval under building supervisory regulations from the

highest authority in this field, the German Institute for Constructional Engineering (Deutsches Institut für Bautechnik) in Berlin. In other European countries too, approvals have been granted by the responsible authorities.

Elastogran: a Company Profile

Based at Elastogran's main centre in Lemförde are Production, Sales & Marketing, Development and Applications Engineering departments, providing a comprehensive and widely-diversified service in the field of PU plastics.



The Elastogran Group is one of the world-wide leaders in polyurethanes (PU). The BASF subsidiary has over 40 years of polyurethane expertise. Our company headquarters at Lemförde in Lower Saxony plays host to the global Technology Centre for BASF polyurethanes worldwide.

Elastogran's European Business Management Rigid Foam develops, produces and markets high-grade PUR foam systems for the production of quality finished products for many industries throughout the world.

In developing our innovations, we take full account of market direction and impetus. We develop new products and services in close collaboration with our

clients, entering into cooperative research and development ventures with them in order to ensure shared success.

Worldwide cooperation allows us to be close to our customers wherever they are: Elastogran companies and BASF sales organisations maintain close partnerships contacts with our customers around the globe.

As a pioneer in the field of thermal insulation and the sealing of buildings using PU spray foam systems, Elastogran was the first company, way back in 1978, to be granted approval for Elastopor H roof spray foam systems by the Institute for Constructional Engineering in Berlin under German build-

ing supervisory regulations. Forward-looking developments made by Elastogran in the field of spray foam systems have also been granted building supervisory approval in subsequent years.

This also shows how Elastogran, in all its efforts to solve problems through innovative solutions, is aware of its obligation to act responsibly in applying its technical expertise, especially in the area of environmental protection.



△△ The drum storage area with Elastopor H foam systems ready for despatch.

△ Ultra-modern test instruments are used in testing the chemical and physical properties of Elastopor H systems. Here, bending strength is under test.

△ The properties and processing parameters of new Elastopor H formulations are checked out in the pilot plant.

△ Flammability test to DIN 4102, Part 1. Laboratory testing to determine the fire behaviour of foam specimens.

Quality assurance through internal monitoring

- Certified according to DIN EN ISO 9001, ISO/TS 16949:2002 and DIN EN ISO 14001
- Before delivery, each batch of a PU spray foam system having received building supervisory approval is processed by machine in the pilot plant. This involves testing for the stipulated properties which are documented in a plant test certificate:
 - Cup test
 - Density
 - Reaction times
 - Closed cell content
 - Compressive strength
 - Fire behaviour.



Elastopor H – Typical Applications



△ 44,000 m² of roofing of the airport building at Abu Dhabi, United Arab Emirates, coated with Elastopor H and protected with a UV resistant paint.

◁ The pyramidal skylights of the air terminal were seamlessly sealed to the flat roof with Elastopor H.

◁ Because of its short reaction time Elastopor H is also suitable for curved and vertical surfaces.

Whether flat roof, profiled metal sheeting roof, corrugated sheeting roof, steep pitched roof, sloping roof, duo-pitch roof, mono pitch roof, barrel roof, north light roof – PU roof spray foam systems from Elastogran are to be found, since they provide outstanding sealing and insulation and represent an economic solution. Elastopor H roof spray foam systems have been developed by Elastogran to meet the specific demands of the market for sound yet value-for-money coatings for different types of roof. The widely-diversified range of applications of Elastopor H systems and their reliable processing properties satisfy these requirements.

Talking of applications: the possible uses of Elastopor H are not confined solely to industrial roofing. Public buildings too, such as sports centres



△△ 7,000 m² duo-pitch roofs and flat roofs renovated with Elastopor H. Hypermarket in Teltow, near Berlin.

△ 6,400 m² flat roof of a clothing manufacturer in Limbach-Niederfrohna, near Chemnitz, coated with Elastopor H.

and indoor swimming pools, also private housing, benefit from the heat-saving insulation combined with jointless sealing. At the same time Elastopor H is particularly suitable for subsequent renovation of damaged and insufficiently well-insulated roofs of older buildings. It is often extremely expensive to rectify material fatigue, faults in workmanship, air permeability or thermal bridges in such buildings, and to bring them up to present-day standards. Elastogran spray foam systems help to keep down costs.

Renovation of old buildings – a sphere of application for Elastopor H and a viable choice for the customer. To date more than 27 million m² of roof surfaces at home and abroad have been jointly sealed and permanently insulated with Elastopor H; this also includes countless critical points such as domelights, connections, rows of windows, parapets and pipe ducts, to give just a few examples. Elastopor H also provides long-term resistance to development of condensation. The ability of the PU spray foam to grip to



△ Altogether 12,000 m² flat roofs with allround parapets and coated with Elastopor H. Holiday apartments in Bodrum, Southern Turkey. In southern climates, the thermal properties of Elastopor H ensure an agreeably cool room temperature.

complex shaped surfaces gives the architect the assurance that the insulation even of unconventional roof designs can be planned and implemented without difficulty. Elastopor H spray foam systems: for every application.



△ 4,900 m² corrugated sheet and flat roof of a paint factory in Oberhausen coated with Elastopor H.

◁ 28,000 m² corrugated sheet roof of a textile mill in Neugersdorf (near Dresden) coated with Elastopor H. In this example the finish in red not only provides UV protection but blends in harmoniously with the surrounding red tiled roofs.

◁ 22,000 m² pitched roof of a car factory in Eisenach coated with Elastopor H.

Renovation with Elastopor H



△△ The old fibre production in Premnitz, near Berlin, was renovated one roof after another. The economic solution for insulating and weatherproofing: Elastopor H. The roof in the foreground is already completely coated with Elastopor H and already partly covered with a protective coating against UV light.

△ Both the smaller photographs show how the old worn out roof sealing is brittle, incomplete, not watertight and insufficiently insulated. Such a roof can be renovated economically and quickly with Elastopor H.

Renovation with Elastopor H roof spray foam:

- Thermal insulation and sealing in a single operation
- Usually no break-up of the old roof surface
- No restrictions on working during renovation
- Low weight; this means no static problems
- Short installation time (average rate per day around 1,000 m² per machine)
- Individual surface protection by coatings with and without slate cladding/silica sand
- Competent advice and execution by specialized companies being subject to quality control.

Processing of Elastopor H Spray Foam Systems



△ Preparation stage: after cleaning the roof one can spray over the old bitumenised roofing felt. Large blisters or loose areas must be glued down to provide a firm substrate.



Experience shows that roof sealing with Elastopor H spray foam systems gives savings in time of up to 80% and savings in cost of up to 50% as compared with conventional methods. An experienced processing team can cover more than 1,000 m² of roof surface per day with one machine under favourable conditions.

Elastopor H systems are processed with mobile high-pressure spraying units. With these, the A- and B-components are pumped through heated high-pressure hoses to the spray gun where they are completely mixed by counter-flow injection. Trained and tested skilled operators of processing contractors spray the reactive mixture from the gun, jointlessly and precisely metered, on to the dry, dust-free substrate. The building supervisory/building regulations approval prescribes at least three layers of spray foam with a total minimum overall thickness of 30 mm. Just a few minutes after coating, Elastopor H has

△ Roof coating with Elastopor H foam system. Three layers of Elastopor H, each 10 to 15 mm thick, ensure durable insulation and sealing. Elastogran spray foam systems fit jointlessly to the substrate like a second skin.

cured and is hard enough to walk on. This permits time- and cost-saving working.

Finally the UV protective coating is applied. The varied range of approved UV protective products gives architects and clients the opportunity to select an ideal solution in terms of colour from a silver reflective coating to a thick coating with a protective surface or even



△△△ Critical points such as parapets, domelights or, as shown here, ventilators, are sealed without difficulty using Elastopor H.

△△ The mobile spraying unit for Elastopor H spray foam systems.

△ Final UV protective coating of the roof surface.

△▷ Coated with Elastopor H and provided with a UV protective coating: all finished. A roof treated in this way is sealed for years to come and will conserve energy.

How it's done. Roof insulation and sealing with Elastopor H spray foam systems:

- Cleaning of the roof surface
- Repair work
- Application of primer where necessary
- Spraying-on of at least three layers of Elastopor H
- UV protective coating/surface protection.

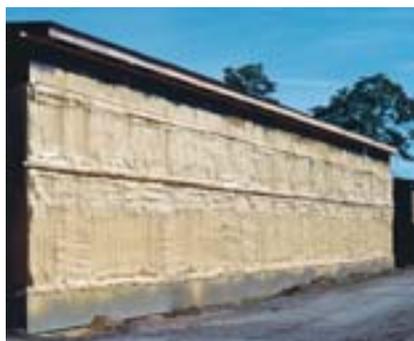
with additional slate cladding/silica sand. Certainly, a conventional layer of gravel as surface protection is possible as well.

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The Adaptability of Elastopor H



△ Elastopor H systems are suitable for many kinds of surface such as here with corrugated fibrous concrete, trapezoidal sheet or wood.



◁△ The adaptability of Elastopor H is displayed here by spraying on to a vertical surface. The concrete panels of this cold store in Sweden were seamlessly insulated with Elastopor H. An exterior curtain of trapezoidal panels forms the facade of the building.



Elastopor H for Internal Insulation



△ Interesting applications for Elastopor H coatings can be found on the interior of buildings. In the course of renovating several building complexes in Lübbenau, near Berlin, 12,600 m² of roofing was insulated from underneath and made permanently airtight.



◁ Insulating the ceiling of a potato store with Elastopor H.

▽ Interior insulation of warehouses and stores, cold stores and agricultural buildings reduces heating and cooling energy demands drastically.





△▷ This 16,000 m² grain store in Essen, Oldenburg, with an external steel skeleton construction is thermally insulated from the inside and made airtight: with Elastopor H.



The possible applications for Elastopor H spray foam systems are far from confined to the external coating of roofs. Because of its processing properties Elastopor H is also suitable for use on the interior surface underneath the roof and also on vertical surfaces such as walls and for floor insulation.

The processing technique and hence the economics of interior applications is the same as for the external coating

of roofs. Comparisons with conventional walling materials make it clear: Walls insulated with Elastopor H cost less to construct and have, for the same thickness (depending on the insulant) a thermal transmission coefficient two to four times better. Seamless insulation with Elastopor H gives cold bridges and draughts no chance. Airtight buildings enable an optimal climate control.

The coating of walls with Elastopor H is not confined to communal, industrial and agricultural applications but is also used in shipbuilding and the construction of industrial plants and facilities.

When used for interior applications Elastopor H does not require a UV protective layer.

Facts and Figures

Foam properties of Elastopor

H 1622/1
H 1622/9

H 1622/6
H 1622/10

Test	Unit	Measured value	Measured value	Standard	Remarks
Density	kg/m ³	60	40	DIN EN ISO 845	average density
Compressive strength	N/mm ²	0.42	0.21	DIN 53421	at 7% compression
Thermal conductivity λ_R	W/mK	0.030	0.030		calculated value
Thermal conductivity $\lambda_{10, tr}$	W/mK	0.021	0.022	DIN 52612	measured value
Water absorption	Vol. %	1.4	2.1	DIN 53428	after 7 days storage in water
Diffusion resistance value	μ	110	60	DIN 52615	
Closed cell content	%	96	96	ISO 4590	
Blowing agent		CO ₂ + R 365mfc CO ₂ + R 245fa	CO ₂ + R 365mfc CO ₂ + R 245fa		

Approval for roof spray foam systems is granted by the German Institute of Constructional Engineering (Deutsches Institut für Bautechnik, DIBt), Berlin, only after extensive practical trials and long-term tests, together with evaluation of specimen roofs, have been positively concluded.

In 1978, Elastopor H was the first roof spray foam system to receive building supervisory authority approval in Germany. In the years which followed, Elastopor H was constantly improved, with updating and extension of the approval granted by the German Institute for Constructional Engineering in Berlin.

The debate about CFC's made new developments essential. Elastogran has faced up to its environmental responsibilities and developed new environment-friendly systems.

Elastopor H spray foam systems are blown by chemical (CO₂) or chemical/physical (CO₂ + HFC) means. That is to say, during the isocyanate-water reaction, gaseous carbon dioxide is formed, or additionally, due to the high exothermic heat, a physical blowing agent is brought to evaporation. These gases expand the reaction mixture into a rigid foam with high closed cell content and hard enough to be walked on.

The advantages of Elastopor H roof spray foam systems at a glance:

- Building supervisory/building regulations approval (Elastopor H 1622/1)
- Maximum energy-saving due to optimal insulation with no joints or thermal bridges
- Fire behaviour to DIN 4102, Part 1, building materials class B2, with and without UV protective coating
- Simultaneous sealing, since over 95% closed cell content
- Resistant to flying cinder and radiant heat (conforming to DIN 4102, Part 7)
- Recognized by buildings insurers as hard roofing
- Permanent insulation
- Can be walked upon
- Chemical resistance against weak acids and bases, sea water, industrial waste gases, also aliphatic hydrocarbons (mineral oil, petrol, diesel fuel)
- Heat-, frost- and temperature-resistant from -50°C to +100°C
- Low weight, hence hardly any additional loading on building structures
- Rot-resistant
- Economical
- Individual surface protection by UV protective coating with or without slate cladding/silica sand.

The outstanding thermal insulation properties of the spray foam combined with its sealing function give it excellent prospects in the future as energy costs continue to rise.

Elastogran is Polyurethanes

Advice, service, responsibility

Elastogran and Elastopor H – that means competent advice and service, environmental responsibility, conservation of natural energy resources and lengthy experience with a superior product for sound and economical insulation and sealing of construction.

Elastogran specialists are at your disposal at any time. We would be pleased to advise on the application and processing of Elastopor H spray foam.

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