Technical data

Type of building:
Industrial premises with a constructed surface area of 11,655 m2, dividable into 4 modules, without columns, each measuring 2,914 m2. The structure is made of concrete, with a pitched roof consisting of 4-cm polyurethane sandwich panels.

Year of construction:
1999

Location:
Polígono Industrial Norte de San Agustín de Guadalix (Madrid), C/ Valdeoliva, 9.

Insulation and spraying:
Construchem Impermeabilizaciones S.L.

Material:
Closed-cell spray polyurethane with Honeywell Enovate 245FA blowing agent in compliance with the UNE 92120-1 Standard.
Lambda 0.028 w/km and >90% closed cell.

Sobre Honeywell - Enovate

Honeywell Internacional is a leading manufacturer of a broad range of technologies, supplying its customers around the world with products and services for the aerospace industry, control technologies for buildings, homes and industry, automotive products, turbochargers, and speciality materials.

Honeywell develops high-performance speciality materials that can be found in all aspects of everyday life: advanced fibres, additives and special films, resins, photographic dyes, reactants and refrigerants, organic and inorganic products and oil refinery technology.

Among these high-performance materials, the Enovate® 245FA Foaming Agent deserves special mention. It is a fluorocarbonate-based foaming agent used to make high-performance insulating foams. It is non-ozone depleting, non-flammable, and has superior blowing characteristics, thus making an important contribution to environmental protection.

About Construchem Impermeabilizaciones S.L.

Construchem is an ancillary company in the rehabilitation, building and maintenance industry that performs waterproofing, thermal insulation, resin-based industrial flooring treatment and joint-sealing work on facades, buildings and floors.

The company employs application technicians and teams with more than 25 years of experience, and enjoys great prestige in the market, as endorsed by the numerous projects it has implemented. The specific characteristics of each project are studied and a careful analysis is done to guarantee that the most efficient and top-quality materials currently available are used.

The best solution is chosen for each case to offer good value for money based on products that provide the necessary guarantees. Construchem only uses products that are compliant with the different quality standards, ETAs and UNE EN ISO 9000 quality assurance standards.

www.construchem.com

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OUR COMMITMENT TO SUSTAINABILITY

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INSULATION AND WATERPROOFING TO IMPROVE ENERGY EFFICIENCY IN BUILDINGS

Rehabilitation with spray foam of an industrial roof in San Agustín de Guadalix (Madrid)

Application of spray foam on roofing

Spray foam insulation system

Picture of roofing elements after spraying foam

Sloping roof with spray foam

- **The industrial premises of the Norte Industrial Estate of San Agustín de Guadalix, which is the location of the rehabilitation project in question, were built in 1999 and to date have been used by a chemical product manufacturing company.**
- **The building has a sandwich-type, 9000-m2 sloping roof which had been progressively deteriorating for some time, with approximately 250 leaks caused by different factors, including major installation faults.**
- **To solve and curb the deterioration of the roof, spray foam was chosen by virtue of its waterproofing capacity. Spray foam provides the ideal solution to the requirements of DB-HS1 of the Spanish Technical Building Code (CTE) on watertightness, resistance to the appearance of possible cracks, adherence and stability.**

Factors triggering the problem

The combination of material wear of the roof and the existence of evident installation faults caused the anchorings joining the different elements (panels, skylights, chimneys, gutters and vents) to fail to provide proper watertightness. Moreover, these same anchorings had rusted and subsequently expanded, thus accelerating degradation of the roof.

As an example of the poor quality of the previous installation, incorrect gutter placement had caused the gutters to block off water runoff, causing overflowing. This was an additional factor that eventually led to water filtering through into the industrial premises.

As a result of this deterioration process, the joints, which were the main focal point of the problem, gave way and the roof sheeting therefore moved during storms or in heavy rain compounded by wind, thus causing a suction effect and the subsequent filtration of water inside, even though the roof was sloping.

The main roof elements are:

- **62 vents, automatic smoke evacuation systems in case of fire.**
- **12 chimneys that form the natural ventilation system of the industrial premises.**
- **12 and 4 metre-long sandwich-type metal panels with a thickness of 4 cm.**
- **Gutters that run along the roof to drain the water.**
- **Translucent sheets that allow light into the industrial premises.**

The solution: closed-cell spray foam

Three basic reasons explain why the owners of the industrial premises chose spray foam to rehabilitate the roof.

First of all, the time taken to do the spray foam placement work. As the surface area was so large - 9,000 m2 - two teams, each with three professionals, worked consecutive shifts to cover a surface area of 800 to 900 m2 a day. In this way, the spraying of the material, performed in summer and with different factors, such as heat and wind, which limited daily application, took only 14 days. This period of time would have been unthinkable had another material been used to waterproof the roof.

A second favourable factor is the costs of use. Spray foam, thanks to its rapid application rate, is a highly competitive product. In the specific case of the industrial premises at Guadalix, the spray foam was sprayed directly onto the lacquered panel, without having to apply primer or an adhesive product.

The end result is that the cost per m2 of surface area treated with spray foam is less than 20 Euros. Taking into account its durability, this cost makes it one of the best solutions on the market.

Thirdly, and fundamentally, the watertightness and water barrier properties of spray foam. It is a material that has no joints and is easy to apply continuously, thus guaranteeing a maximum level of waterproofing and a very long service life. Proof of the reliability of this material is that the company that did the roof renovation - Construchem - guarantees the quality of the work for ten years.

Roofing elements before rehabilitation

Picture of the condition of the joints before rehabilitation

Moreover, polyurethane avoids thermal changes, thus delivering three additional advantages, such as preventing damage to the roof since its components are not subject to temperature variations and therefore will not move from their original location; moreover, it delivers substantial energy savings, and finally, it improves the comfort of workers during their working day.

Its versatility, by combining insulating properties with properties such as mechanical resistance, sealing, impact strength, weight and space saving and ease of maintenance make spray foam the optimal solution for industrial roof improvement work or rehabilitation projects that must also fulfil the requirements provided for by the new Spanish Technical Building Code (CTE).

The mean working density on the roof of the industrial premises was 45-50 kg/m3, with a thickness of 4 cm for the layer of sprayed foam.

Picture of the gutters before rehabilitation

General picture of the roofing rehabilitation process

Contrast between spray foam and acrylic polymer final finish

Picture of the pitched roof with final finish

In conclusion, and thanks to indispensable preparatory work, namely a joint evaluation by the owners of the industrial premises, the applier (Construchem) and Honeywell, the best rehabilitation solution for this roof was identified and effectively implemented. The objective, as is usual in a project of such characteristics, was to satisfy the client's requirements as successfully as possible.

Finally, this case shows how initiative and a genuine, all-encompassing rehabilitation project plays a fundamental role in improving comfort conditions, energy saving and, moreover, generating business and employment openings in the building sector.

Project implementation phases

a) Preliminary diagnosis: Visit and analysis of roof problems.

b) Action proposal: Specific solutions were proposed for each problem (problems with joints between the sandwich panels and skylights, vents and chimneys).

c) Action before spraying: The roof was totally repaired first. Although the problem of filtrations was widespread all over the roof, different parts were treated differently. Thus, by way of example, EPDM elastomeric sheeting was used to seal areas that were difficult to reach. The top of skylights was also replaced.

d) Proyección: Finalmente se proyectó la espuma de poliuretano, y se le aplicó un acabado con una base de polímeros acrílicos para proteger el poliuretano de los efectos de la radiación solar.