Barcelona has long been regarded as the architectural capital of Europe. The city now has a new landmark: the Torre Agbar, a spectacular high-tech tower. French star architect Jean Nouvel drew his inspiration from the natural curves of the Montserrat Mountains near Barcelona. The organic appearance is both in honour of the client for whom the tower was built, Barcelona’s water company (Aguas de Barcelona, “Agbar” for short), and also Nouvel’s tribute to Spain’s most famous architect, Catalonian Antoni Gaudí. After a construction period of four years, the 130-million-euro project was officially inaugurated on 17 September in the presence of the Spanish royal couple.

An explosion of light and colours
With 35 floors above ground and four below ground the Agbar Tower reaches a height of 142 m and is crowned by a glass dome. The building has a total floor space of 39,000 m², 30,000 m² of which are used for offices.

The construction itself is spectacular; the tower appears to “grow” out of the earth up into the sky like a plant. Each floor has a different ground plan; the position of the windows is arbitrary. This meant that the structural calculations for the whole tower had to be carried out repeatedly during the construction process. The building consists of two non-concentric, oval cylinders. Stairs, service lifts and the building service installations are located in the core of the skyscraper. The open-plan offices are situated between the inner and outer cylinder. The concrete façade is covered with polished aluminium and painted in 40 different colours. This façade is sheathed in a skin consisting of almost 60,000 louvres of clear and translucent glass. Seen close up the façade shimmers like the skin of a reptile. From a distance it appears to be a liquid mass, which changes colour depending on the light. The play of light is at its most fascinating at night when the tower glows in a multitude of possible colour combinations.

Bioclimatic architecture
What is also unique about the Agbar Tower is the consistent realization of energy-efficient, sustainable architecture. The architectural team made use of the advantages of the climatic conditions to keep the energy requirements as low as possible and increase the living quality. The orientation of the building is such that the sun shining through the 4,500 windows contributes to heating. At the same time the windows provide natural ventilation. A chamber of air is formed between the outer wall and the glass skin, providing the building with natural air-conditioning. Some of the glass louvres on the south side have photovoltaic surfaces to generate electricity. The most energy-efficient technologies were used also in the case of the building services. For the air-conditioning and heating of the building, a VRV system was installed with 27 different “climate zones” per floor. A central system regulates and optimizes the air-conditioning and heating needs depending on the outdoor temperatures and the occupation of the offices.

Good room climate thanks to Armaflex
To keep energy losses on pipes and airducts as low as possible, the choice of insulation played a great role and the material had to fulfil exacting requirements. The technical insulation materials had to comply with the Spanish regulation on
technical installations in buildings (RITE), the fire performance had to be classified as M1 (low flammability) and the thermal conductivity of the products must not exceed 0.040 W/m·K at 20 °C. The Armacell products Armaflex and Armaduct fulfil these requirements. The air-ducts of the air-conditioning system were insulated with 15,000 m² of Armaduct in insulation thicknesses of 10, 15 and 30 mm.

On the cooling-water pipes of the air-conditioning system, which have a temperature of 6 °C, 7,000 m of Armaflex tubes in the insulation thicknesses 30 mm (for pipes up to DN 90) and 40 mm (for pipe diameters ranging from DN 100 to DN 200) were used. The hot-water pipes of the air-conditioning systems with a temperature of 50 °C were insulated as well with Armaflex. Here 7,000 m of tubes were installed in the dimensions 30 mm (pipes with a diameter of up to DN 100) and 40 mm (pipes with diameters between DN 125 and DN 200). Using Armaflex and Armaduct insulation allows considerable energy savings to be achieved.