



Solingen 'light tower' - the metamorphosis of a historic building

Name of project:	Light tower in Solingen-Gräfrath www.lichtturm-solingen.de	Building owner/ Overall design:	Johannes Dinnebier, Jule Dinnebier, Daniel Klages www.dinnebier-licht.de
Typology:	Special construction, exhibition and event location	Architects:	Friedrich W. Figge, Wuppertal www.figge-architekten.de Jochen Jansen, A3 Architekten, Berlin www.a3architekten.eu
Location:	Lützowstraße 340, 42653 Solingen-Gräfrath, Germany	Facilities planners:	Supporting structure planning: Stefan Polónyi, Cologne Fire prevention concept: SV Zahn Sachverständigenbüro für Brandschutz, Mönchengladbach Light planning: Dinnebier Licht, Wuppertal Lighting products: Licht im Raum, Düsseldorf www.licht-im-raum.de
Completion:	1905: Commissioning 1997: Completion of first construction project, glass dome construction, conversion to a communications location 2010: Expansion with innovative heating and building technology	Copyright:	Dinnebier Licht GmbH
Area:	Surface area: 250 m ² Tower height: 38 m Dome diameter: 11 m		
Energy concept:	Geothermics: geoTHERM geothermal pump		

The good feeling of doing the right thing.

The old Gräfrath water tower was converted into an example of visionary light architecture based on an idea of Johannes Dinnebier. The formerly listed historic building is now an innovative studio with event rooms for Dinnebier Licht GmbH and Licht im Raum. Like the concept of the conversion, the integration of state of the art building technology and the use of regenerative energy are future-oriented. **The light tower is heated with geothermal probes, which supply a Vaillant geoTHERM geothermal pump.**

Visionary 'light tower project'

The Gräfrath water tower built in 1904 was used for regional household water supply until 1983. The 'supply technology' was overhauled and the dilapidated tower fell into a state of disrepair. The decision to list the property as a historic building did not solve the problem of finding a worthwhile use. In 1993 light designer Johannes Dinnebier envisioned a metamorphosis of the water tower into an innovative light object as an exhibition and event location. The project was carried forward and implemented by Jule Dinnebier and Daniel Klages. The Wuppertal-based firm Figge Architekten was entrusted with the planning and supervision of the conversion work, and Berlin-based A3 Architekten implemented a new fire prevention concept in the final construction stage. The extraordinary location is a forward-thinking place, which fosters creativity. The designs from lamp manufacturer Dinnebier Licht are perfectly integrated and incorporated here.

Transformation

The development and design of the new, glazed interior and exterior dome and the tower in combination with the earthwork were an artistic and technical challenge. The conversion of the water tower into the 'light tower' took four years. In close coordination with legal authorities, the building's historic listing was removed in order to replace the masonry water tank with a transparent glass and steel dome with surrounding balustrade. The resulting glass event room now holds up to 50 people. Four storeys have been incorporated in the shaft of the tower, which was originally completely open. A steel 'spiral staircase' on the outer wall connects a library, office, a small kitchen, and an exclusive lounge area on the respective levels.

Heat from below

The idea to create a future-oriented location was not limited to the architectural and platform implementation. Innovative energy supply and heating technology were also incorporated into this idea. **Three geothermic probes drilled to a depth of approximately 80 metres supply a geoTHERM brine/water heat pump with energy. In this manner, about 75 per cent of the maximum heat output of 14 kW can be generated in a resource-saving manner.** Thanks to the 'old' Intze design principle, only 14 kW are sufficient to heat the voluminous building structure with a surface area of 250 square metres, and despite the unfavourable, exposed position on the hill. The original water tower supported the water tank on an upwardly tapering masonry tower. The convex floor of the tank contains a steel circular beam. As a result, the forces of the water were distributed evenly and vertically to the tower masonry. After the replacement of the tank with a glass dome, 200 cubic metres of concrete, which now serves as a mass capable of heat storage, were poured for the dome floor in order to compensate for the original structural support provided by the water load discharged to the tower walls. The solid exterior masonry also assumes this function. With a thickness between 50 and 70 centimetres, it assures minimal heat transmission losses, and so an average temperature level is maintained in the 'light tower' with only minor fluctuations.

The use of surface heaters on the intermediate levels also helps maintain a comfortable climate. Their consistent heat distribution with consistently low supply temperatures provides significantly higher efficiency than conventional radiators with convection heating. A comparison of key data shows just how energy-saving this new heating combination actually is in comparison with the original arrangement: Instead of an earlier boiler output of 45 kW, only 14 kW are currently used; instead of a supply temperature of up to 80 °C, a maximum of just 40 °C is currently required. With the so-called 'natural cooling' function, the geothermal pump can also operate in reverse mode via the surface heaters to discharge the warm room air through the geothermal probes. As a result, the heating effect of the glass dome is counteracted without the need for additional air conditioning. In order to compensate for the inherent sluggishness of the heating system in exceptional situations, the glass dome also has a small gas heater.

Future from the past

The Gräfrath water tower converted into a 'light tower' is an excellent example of the great potential hidden within historic architectural landmarks. The project also demonstrates the necessity of an interdisciplinary approach incorporating architecture and purposeful use, efficiency and sustainable building technology in an overall concept. The conversion of the water tower into a light tower can clearly be categorised as a 'best practice property' in every respect. With its unique location, design, lighting, and view, the light tower studio is currently used for a variety of artistic, cultural, commercial, and social events.

Vaillant GmbH

Berghauser Str. 40 ■ 42859 Remscheid, Germany
Phone +49 21 91/18-0 ■ www.vaillant.com