

Press Release

May 2017

Fire water tank made of FLOWTITE GRP for Neuschwanstein Castle

Important element in a modern fire protection concept

There is hardly another German tourist attraction that is as popular amongst foreign tourists as Neuschwanstein Castle. The contender for recognition as a UNESCO world cultural heritage site was built in 1869 for the Bavarian King Ludwig II as an idealised representation of a German knight's castle. Neuschwanstein has since not only survived Ludwig II's almost chronic lack of money but two devastating world wars. In contemporary times, a fire represents one of the largest risks to palatial buildings such as the castle in the south of Bavaria, which is why special importance is assigned to preventive fire protection and effective fire-fighting. An important element of the fire protection concept is the fast and sufficient supply with extinguishing water, and in the summer of 2016 the existing fire water supply was upgraded. An extinguishing water line from the Alpsee mountain lake to the Castle was completed with a new 475 m long section. Two fire water tanks, each with a capacity of 80 m³, were also built below the Castle in the area of the horse-drawn carriage square. In the case of a fire, secure and more intensive fire-fighting is now guaranteed. Work was commissioned by the Free State of Bavaria, represented by the Bavarian Ministry of Finances, the Bavarian Administration for State Castles, Gardens and Lakes, represented by the State Construction Office in Kempten. The Kempten-based Ingenieurbüro Planwerk GmbH was responsible for planning and site management; Josef Scheibel GmbH & Co. KG from Füssen was commissioned with the actual construction work. When selecting the material for the fire water tank, customers and planners decided in favour of the FLOWTITE GRP

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water storage system from Amiantit Germany GmbH.

Fire water tank made of FLOWTITE GRP – the right choice

The “fairy tale castle” is visited by 1.5 million tourists every year. In the summer months up to 6,000 visitors go there every day. The majority of visitors go to and from the Castle by foot along the Neuschwansteinstraße or take a horse-drawn carriage. “In view of the huge number of visitors, the building site vehicles were only allowed access before and after the Castle’s opening times”, explains Jochen Auer, regional manager at Amiantit. The planning therefore also had to keep the building site traffic as low as possible so as to disturb the flow of visitors as little as possible. In addition to the high strength of the pipes with comparatively low weight and the fact that the GRP material is extremely long-life and low maintenance, another factor in favour of the Amiantit solution was also the optimised transport arrangements. The choice of the DN 2400 dimension meant that the need for heavy transport was avoided. The elements for the two fire water tanks which had been prefabricated exactly in the factory were delivered to the building site on the evening before installation. Four trucks transported a total of four elements just-in time to the site of installation where they were unloaded by a mobile crane and positioned in the building pit in the morning before the first tourists arrived.

One system, many possibilities

A winding method is used to produce the GRP pipes using which pipes of (almost) any length and in nominal widths of up to 3,000 mm can be manufactured. The result is a high-tensile composite material, with great strength and low density resulting in a comparatively low weight per metre. The material properties mean that the product also has a very long life and needs little maintenance. The low weight combined with the long construction lengths permit fast construction progress. The good mechanical working properties of the material also permit individual and tailor-made designs. Stairs, ladders and foot grids make for safe accessibility, integrated connecting lines and fittings guarantee smooth water transportation. The water storage systems usually consist of an operating chamber and the water tank, which can have one or several chambers. A chamber system of this type can be extended practically without

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restriction. Storage pipes with a diameter of 2.50 m to 3.00 m are advisable merely for reasons of transportation and later accessibility, whereby the individual pipe lengths are usually between 6 m and 12 m. The desired storage volume determines the length of the chamber which is sealed by an end cap. The water chambers can be accessed via the upstream operating chamber. A pressure-proof, laminated GRP wall forms the separating wall.

Planning-related system adjustment

A volume of 160 m³ was required for the storage of extinguishing water for fire-fighting at the Neuschwanstein Castle. The volume was realised by two pipe tanks made of glass fibre reinforced plastic, each with a nominal width of DN2400 and a length of 18 m. The tanks were produced in two parts: in a 6 m long moulded pipe part including reinforced concrete wall and a 12 m long component with dished head. An eccentric shaft access DN 1000 was already provided in the factory and a pump sump DN 800 laminated to the pipe elements. All wall openings, flanges and transitions to stainless steel were prefabricated for the further installation. The tanks can be filled separately from each other via two feed lines and a valve. Extinguishing water can be removed separately for each tank via a suction pipe DN 125 which reaches up to 30 cm into the pump sump in the tank. Both tanks are connected to each other by a DN 250 bypass so that a corresponding water level is achieved on filling and emptying the tank. The bypass has a slider for servicing purposes. A DN 150 overflow pipe made of stainless steel runs from each tank. The tanks are ventilated and bled using a vapour hood on the manholes and a further ventilation chimney at the respective ends of the structure. The manholes are accessible via a paved path. All fittings for the withdrawal of fire water and the feed into the fire water line are integrated in a retaining wall and can be accessed from the area designated for the fire engines.

Outstanding collaboration

The foundation stone for a successful project was laid thanks to the excellent collaboration between manufacturer and engineering office. In view of the high degree of prefabrication and the simple assembly, the installation of the two fire water tanks took only six hours. "Everything went smoothly", summarised Jochen Auer. In addition to the positive material and system

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properties, this was attributable in particular to the professional collaboration of the construction partners and the excellent cooperation with the Bavarian Administration for State Castles, Gardens and Lakes.

Client: Free State of Bavaria, represented by the Bavarian Ministry of Finances, the Bavarian Administration for State Castles, Gardens and Lakes, represented by the State Construction Office in Kempten

Project management: State Construction Office Kempten

Planning / site management: Ingenieurbüro Planwerk GmbH, Kempten

Construction work: Josef Scheibel GmbH & Co. KG

Manufacturer: Amiantit Germany GmbH



The building pit for the two fire water tanks was excavated below the castle building in the area of the horse-drawn carriage square in the 45° inclined bank.

Photo: Amiantit Germany GmbH

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Unloading the 12 m long GRP pipes.

Photo: Amiantit Germany GmbH



The 6 m long pipe sections complete the FLOWTITE GRP water storage system totalling 18 m in length with a total capacity of 160 m³.

Photo: Amiantit Germany GmbH

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The high degree of prefabrication of the FLOWTITE GRP elements favour the fast construction progress.

Photo: Amiantit Germany GmbH



The pipes made of glass fibre reinforced plastic are the basic material for the manufacture of water storage tanks and complex modules for drinking water storage.

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The necessary entries, flanges, sleeves or pipe connections can already be fitted to the elements in the factory.

Photo: Amiantit Germany GmbH



After only a few hours the professionally assembled elements can be covered in the earth safe from frost.

Photo: Amiantit Germany GmbH

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Construction sign

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