



# Historical Bratislava Castle garden with HVAC basement

Observing the requirements on monument protection and on air conditioning and usage on historical grounds is quite demanding. At Bratislava Castle, a separate machinery floor for the air-conditioning and operational equipment was placed, along with an underground car park, below the historical gardens. This makes for good climatic conditions in the historical Baroque atmosphere and inside and around the building.

The castle, shiny white nowadays, is Bratislava's landmark that is visible from afar. However, in 1811, it burned down to its ground and the fire completely destroyed many adjacent buildings.

Following archaeological prospection, it turned out that it was not only the patrons of the Bratislava Castle who enjoyed the view from the 85-metre-high hill above the Danube River – first settlers came here already during the Neolithic period (approx. 2,500 BC) and left their mark on the hill that is home to the castle today. These findings resulted in the fact that monument protection was to play a far greater role than previously expected.

€126m were pledged for the fundamental and sustainable refurbishment that is now completed. But before the construction works could start, it was necessary to secure with the archaeological fragments of former settlements the cultural history, and to record earlier stages of the castle's construction.

## Overview

Business line:	HVAC
Application:	HVAC
Country/Region:	Slovakia/Bratislava
Fluid:	Ethylen/glycol solution
Product:	Güntner VERTICAL Vario GFV



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▲ The entire supply engineering of the castle was installed below ground level for optical reasons. The ambient air for the Güntner fluid coolers is taken in via one duct before the heated air is dissipated through the second duct.



▲ Altogether seven Güntner VERTICAL Vario GFV units with a total cooling capacity of 1,400 kW provide need-based refrigeration of the different rooms of the castle.

## Maria Theresia style

The destroyed castle was rebuilt almost 150 years after the fire, and the current refurbishment took place between 2008 and 2016. The outside facilities in Baroque style were completed in 2016. The objective of the government-funded refurbishment of the castle was to visually restore the historical group of buildings – rebuilt to its original appearance in the middle of the 20th century, including adjacent buildings and outside facilities – to its former state before it had caught fire. This means that today's castle architecture, after the completion of the reconstruction works, was influenced mainly by the expansion and restructuring during the Renaissance and Early Baroque periods and during the reign of Queen and Empress Maria Theresa.

Using the building and its different premises all year round as museum and event building requires an air-conditioning technology that is, on the one hand, adjusted to the exhibits of the museums and the partly unearthed historical foundations and, on the other hand, capable of air-conditioning the event rooms of different sizes in line with demand.

## Celtic traces at the underground parking access

Due to the stringent historic preservation demands, the persons in charge decided to build an underground car park below the former and future Baroque garden and to install the entire supply engineering also below ground level under future tree avenues. Several years of cultural and historical exploration work was carried out in the area of the former Baroque garden, the moat and the castle wall where traces of the Celts were detected and secured. But it was only upon completion of these works that the new construction section „L“ was cleared for creating the technical infrastructure and the underground car park which offers visitors with restricted mobility space for 220 cars that are accessible by lift.

## Güntner dry coolers below ground level

The new garden is based on the model of the previous one that had been created from 1778 – 1780. Below the western part of the garden that used to be the outside area of the riding hall during the Baroque period and where you will now find tree avenues, there are two rooms below ground level that are each over 60 meters long and arranged in parallel. These rooms are naturally ventilated via grids. In the first room, seven Güntner VERTICAL Vario GFV units in total with an overall cooling capacity of 1,400 kW are arranged directly at the wall.

The fans of the fluid coolers are virtually flush-mounted into the wall and project into the neighbouring room. From there, the heated air is dissipated to the environment via ceiling grids. The Güntner VERTICAL Vario fluid coolers cool a 34 per cent ethylen/glycol solution from 46 °C down to 41 °C. This ethylen/glycol solution supplies four water chillers (three from Carrier and one from Trane) that are installed in the engine room of the Orangery building.

## Tailored design

The Güntner dry coolers are characterised by an energy-efficient partial load operation that makes sense from an economic point of view whenever there are no visitors to the museum and no event guests inside the castle. Speed-controlled fans provide exactly the required energy consumption and offer a particularly low noise operation (50 dB at a distance of 10 m). Their operating noise can hardly be heard from above ground. The Güntner VERTICAL Vario GFV units were designed exactly in line with the requirements (max. noise of 50 dB in 10 m, free cooling in winter time, dimensional limitations) set by the customer. All fans are controlled by frequency converters from the superior system.

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Today, the castle houses the Historical Museum as well as the Slovak National Museum with temporary exhibitions. The former castle chapel now serves as concert hall and the former horse riding school is used as cultural and social event hall named „Orangery“. In addition to this, there are representative premises of the Slovak National Council inside the castle that were, for instance, used for informal ministerial meetings and conferences during the EU Council Presidency of Slovakia in 2016.