

Car park, Austria

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1 GENERAL INFORMATION

Client:
Flughafen Wien AG, Austria

Planning of structural framework:
Goldbeck Rhomberg GmbH, Austria

Executive company:
Goldbeck Rhomberg GmbH, Austria

Fire protection expertise
Arcelor Sections Commercial, Luxemburg
Vienna University of Technology, Austria
IBS Institut für Brandschutztechnik und Sicherheitsfor-
schung GmbH, Austria

Processing time:
2005

Kind of building:
Multi storey car park

Total height:
16,4 m

Ground plan:
85 x 48,6 m

Total floor area:
4131 m²



Figures 1 and 2. Outside and inside views of the car park

2 INTRODUCTION

This car park is situated in the area of the airport of Vienna. Because of the increasing need of parking places an existing car park was expanded by a new enlargement with over 800 new parking places.

3 STRUCTURE

The building consists of 4 respectively 5 levels, with a typical storey height of 2,7 m. The structure is a system of steel frames with steel columns (HEA 200, HEA 240) and a floor of composite steel and concrete structure. The distance between adjacent frames is 2,5m. The floor is made of 10cm pre-fabricated concrete segments supported by steel beams (IPEA 400) with a main span of 16,0 m.



Figure 3: internal view with structure and ramp

The building is stabilized through the shear connection of the floors and vertical bracings. The ramps also act as a transverse stabilization. The concrete staircases are only self-supporting.

4 FIRE SAFETY CONCEPT

The normative requirements in fire safety for open car parks had, at this time, a big spectrum of different safety levels. They reached from no requirements at all to 30 resp. 90 minutes reminding time for the load bearing structure. In the end the fire safety of the car park was defined with a load bearing resistance of 90 minutes. There are no active protection measures installed.

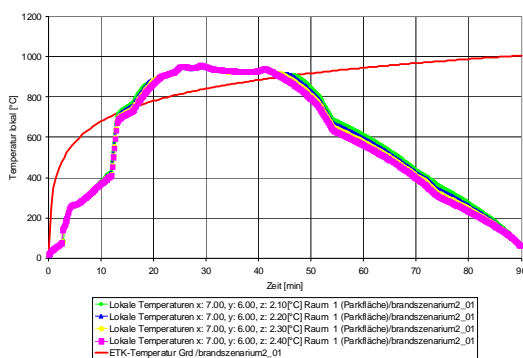


Figure 4: Results from the fire simulation. Gas temperatures at the structures compared to ETK

A set of calculations has been done to evaluate the relevant fire scenarios for this project. The local gas temperatures at the load bearing steel structure has been calculate

by a fire simulation program (MRFC Multi Room Fire Code). Figure 4 shows the gas temperature at the main beam for the relevant fire scenario.

Further calculations were done with CEFICOSS and SAFIR. The static load under fire conditions were applied according to EN 1991. Figure 5 shows the temperature gradients in the main beam at the relevant fire scenario.

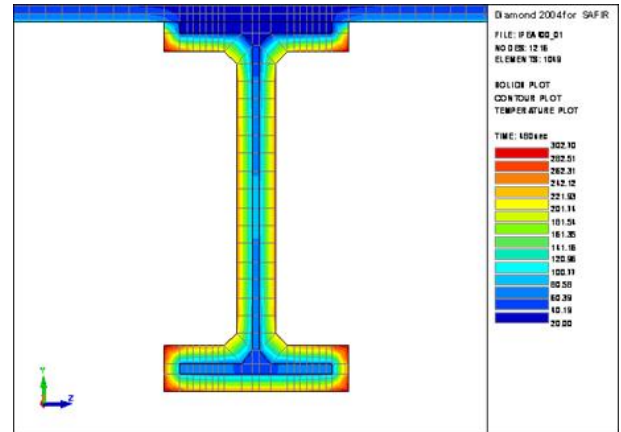


Figure 5: Temperature in the main beam structure at relevant fire scenario

The results of the fire engineering approach were an intumescent paint of 500 µm for the beams and the columns in the upper levels and of 1000 µm for the columns in the lower levels. The load bearing structure of the roof and the bracings will remain without any passive fire protection.

REFERENCES

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