

# Bilbao Exhibition Centre, Spain

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## 1 GENERAL INFORMATION

### Client:

Bilbao Exhibition Centre (BEC). BEC counts with the support of the Basque Government (47.7%), Bizkaia Regional Government (47.7%), Barakaldo Town Council (1.4%), Bilbao Chamber of Commerce (1.6%) and Bilbao International Exhibition Centre (1.6%) as partners in the project.

### Architect:

César Azcarate (IDOM)  
Esteban Rodríguez (SENER)

### Planning of structural framework:

SENER-IDOM

### Executive company:

Companies co-operating in temporal venture:

- Balzola S.A.
- Dragados
- Eraiker 2000
- Ferrovial Agroman
- URSSA

### Fire protection expertise:

LABEIN Technological Centre

### Processing time:

Initiation: September 2001

Inauguration: April 2004

### Kind of building:

Exhibition centre with six halls and a 18.000 square metre conference centre.

### Maximum height:

18 m

### Ground-plan:

Rectangular:

- Arena hall (30.000 m<sup>2</sup>)
- Other halls (5): 21.000 m<sup>2</sup> + 4x15.000 m<sup>2</sup>



Figure 1. Aerial view of Bilbao Exhibition Centre



Figure 2. Internal view of Hall n°5

## 2 INTRODUCTION

BEC is an initiative designed to offer the best possible service for exhibitors, visitors and the general public in a modern, convenient, practical and highly functional trade fair facility.

### 3 STRUCTURE

24.300 tons of steel for the structure of the halls and 19.200 tons of corrugated steel in the foundations were used.

The box trussed beams of the halls are 125÷167 m long. The roof tubular spatial structure consists of 60 panels (37x37m).

The concrete walls are covered with a "steel skin" to prevent an aggressive impact of the building with the surrounding landscape.

#### 3.1 Loads

The loads are specified by the National Annex NBE-AE-88. The magnitude of loads depends on the use of each area:

- Car parks use load: 400 kg/m<sup>2</sup>
- Lorries accesses: 4.000 kg/m<sup>2</sup> (national regulation: 1.000 kg/m<sup>2</sup>)
- Hall areas: 4.000 kg/m<sup>2</sup>
- Pedestrian zones and accesses: 400 kg/m<sup>2</sup>
- Office areas: 300 kg/m<sup>2</sup>
- Restaurants: 300 kg/m<sup>2</sup>
- Roof (only for maintenance purposes): 100 kg/m<sup>2</sup>

These loads are supported in the different areas with the following structural elements:

#### Car park:

The columns and beams of the car park are made of reinforced concrete and the floors consist of pre-fabricated concrete alveolar plates with a compression layer of concrete.

#### Lorries accesses and hall floors:

Prefabricated concrete alveolar plates with a compression layer of concrete.

#### Hall structure:

The columns are of reinforced concrete. The box beams are composed of four trussed beams and are made of structural steel.



Figure 3. Hall structure during erection

### 4 FIRE SAFETY CONCEPT

The fire protection national standard in Spain is the NBE-CPI-96. The characteristics of the structure of BEC allow an alternative study to determine if a lower protection than the specified in the regulations gives the same level of security and is, therefore, allowed by the NBE-CPI-96.

Those characteristics are:

- Low fire load
- Good ventilation
- Large diaphanous spaces with high thermal dissipation
- Presence of active protection measures (automatic sprinklers, for example)

An additional objective of this alternative study was to verify the smoke control to allow the safe evacuation of the building.

The final conclusions of this study were:

- The smoke curtains and smoke vents allow the correct extraction of smoke and the safe evacuation of the building.
- The columns in the restaurant and the lattice behind it remained unprotected because their structural stability was not threatened.
- On the other hand, in the Arena Hall, the lattice supporting the mezzanine and the parts of the box trussed beams exposed to the studied fire had to remain protected.



Figure 4. Plan drawing of BEC

### REFERENCE

InfoBEC–Bilbao Exhibition Centre Newsletter, Issues 1-4, Year 2003. Published by BEC.