

## Gallileo Tower, Dresdner Bank Frankfurt am Main



*View of Gallileo from from the old  
Dresdner Bank tower*

The new Dresdner Bank tower, named "Gallileo", was built on the same site at Gallusanlage 7 on which Frankfurt's first tower, the "Zinßerturm" was erected in 1947. The transparent complex consists of two glass towers, 113 m and 130 m high, which are coupled by a 136 m high connecting building, and an L-shaped six-storey base.

The higher tower has 36 above-ground floors, plus a mezzanine and ground floor. It is located on the northern part of the site, directly on Neckarstraße. The second tower, with its 32 floors (including the ground floor), is located between the connecting building and the base.

Gallileo is stiffened by four cores; each pair of cores is connected by a lintel, and the two pairs of cores are coupled by two beams. This results in a tower that is very stiff in a north-south direction and very slim in an east-west direction. The cores house two staircases, both groups of elevators, the additional fire services elevator and a variety of utility ducts and sanitary areas.



*View of Gallileo from Gallusanlage*

The quality of the material used for the stiffening walls varies from top to bottom, from B35 concrete to B55 (ground floor) to B85 high-strength concrete in the below-ground floors. The choice of concrete quality and of the thickness of the core walls was primarily determined by the need to fulfill the deformation and comfort criteria for wind loads in an east-west direction. The core walls remain under high pressure, partly because of the wide spans of the flat slabs.

To optimize the construction period, the cores were constructed three floors in advance, and the slabs subsequently connected with the cores using reinforcement connections.

All standard floors were constructed with 30 cm thick flat slabs with spans of up to 9,50 m. Since the slabs are used for cooling this part of the building, additional cooling elements with plastic tubes were installed on the underside of the slabs. Water flows through these tubes - cold in summer and warm in winter.

### Owner / Client

Dresdner Bank AG,  
Jürgen Ponto Platz 1,  
Frankfurt am Main

### Architect

Novotny, Mähner  
Assoziierte, Offenbach

### Construction period

1998 - 2003

### Construction costs

Ca. 90 million EUR

### Project data

Gross floor area:

- above ground ca. 48.000 m<sup>2</sup>
- below ground ca. 10.000 m<sup>2</sup>

Enclosed volume:

- above ground ca. 176.000 m<sup>3</sup>
- below ground ca. 55.000 m<sup>3</sup>

Supporting structure and construction:

- Height 137 m
- 38 floors above ground
- 3 floors below ground
- Combined pile / slab foundations
- Stiffening by means of four cores coupled with each other
- Flat and composite slabs
- Columns and cores in reinforced concrete, partly using high-strength concrete



*Entrance hall (computer animation)*

## Gallileo Tower, Dresdner Bank Frankfurt am Main



Shortly before completion of the last slab



Walls of the construction pit

In addition to electrical conduit lines, the sprinkler distribution lines were also installed in the slabs, so that suspended ceilings in the office areas were not necessary. As a result, the minimum gross standard floor height of 3,40 m could be achieved together with a maximum number of floors for the specified building height.

The six-storey base building, a steel and composite construction, has no separate stiffening but is connected with the tower via connecting bridges. The load-bearing structures of the base building and tower are dimensioned for fire resistance class F120-A.

All columns from the 7th floor upwards are cylindrical with a diameter of 60cm. Larger columns are not necessary until the base floors. The columns were constructed in reinforced concrete using normal strength concrete with high-strength concrete (B95) where necessary, and in some cases as composite columns.

Because of the floor-to-ceiling glazing, the columns are needed for cooling purposes and have cooling elements on their upper surface which were laid in the formwork.

To minimize settling and to optimize the thickness of the ground floor slabs, a combined pile and slab foundation with a slab thickness of 2,50 m - 3,50 m and a total of 89 foundation piles was chosen. The lower slab and foundation were constructed as a waterproof concrete basement (tank). Geothermic warmth is exploited by means of energy piles.

To accommodate the foundation and the underground parking floors of the tower, a construction pit 18 m deep was required. The sole of the pit is ca. 13 m below ground water level, resulting in very high hydrostatic pressure. To reduce the water pressure and limit interference with the ground water system, slanted stress-relieving lances were installed through the walls of the construction pit into the surrounding Frankfurt clay.

The wall of the construction pit was designed as an overlapping bored pile wall with a pile diameter of 90 cm. To support the wall, grouted anchors were installed in four layers, and re-grouted several times. Conventional underpinning measures were necessary for the directly adjacent buildings.



Views of the construction pit

### Krebs und Kiefer services

- Project planning and structural design of the construction pit, HOAI fee phases 1-4
- Object supervision on behalf of the architect
- Structural design of the building, HOAI fee phases 1-8