

Rion-Antirion Bridge

- *Location* Greece
- *Client* Ministry of Public Works
- *Contractor* Gefyra
- *Design* Gefyra
- *Installation* 2002, 2003, 2004



- *Type of structures* Multi-span cable-stayed bridge (Main bridge)
Precast concrete deck (Antirion approach viaducts)
Composite deck (Rion approach viaducts)
- *Overall length* 2252 m (Main bridge)
229 m (Antirion approach viaducts)
986 m (Rion approach viaducts)
- *Seismic devices*

Type and quantity 20 transverse viscous dampers (Main bridge)
44 longitudinal and transverse dampers (Antirion approach viaducts)
124 longitudinal and transverse dampers (Rion approach viaducts)

Characteristics Maximum Force 3500 kN, stroke up to ± 2600 mm
(Main Bridge)

Maximum Force from 800 to 1200 kN, stroke up to ± 250 mm
(Antirion approach viaducts)

Maximum Force from 300 to 2400 kN, stroke up to ± 420 mm
(Rion approach viaducts)

- *Description*

The Rion-Antirion Bridge, located in the Gulf of Corinth, an area prone to strong seismic events and windstorm, comprises a cable stayed bridge and two approach viaducts (986 m long on the Rion side and 228 m long on the Antirion side).

The critical factor in the design of the main bridge was its resistance to earthquakes with a 2000 years return period and PGA of 0.48 g.

The protection system of the Main Bridge comprises viscous dampers and fuse restraints installed in parallel with the dampers, so the deck, is linked rigidly to the substructure when subjected to lateral loads not exceeding their design capacity, and after their failure it leaves the deck free to swing coupled to the dampers. The fluid viscous dampers used are non linear, thus guaranteeing an almost constant reaction within a wide velocity range and a very high energy



dissipation capacity. A major design complication with the fuse restraints arose from the need to minimize the internal forces of the laterally restrained deck induced by slow tectonic movements originating from a seismic fault located under the bridge.

The seismic isolation system used for the protection of all the approach viaducts comprises a combination of low damping elastomeric isolators and non linear fluid viscous dampers. The isolators provide the bearing function as well as the horizontal flexibility required to increase the fundamental period of the structure and thus reduce energy input. Viscous dampers are set up in both the longitudinal and transverse directions between the deck and the pier heads so as to dissipate energy and limit relative displacement.

- *References*

Infanti S., Papanikolas P., Benzoni G., Castellano M.G. (2004) *Rion-Antirion bridge: design and full-scale testing of the seismic protection devices*, 13th World Conference on Earthquake Engineering Vancouver, B.C., Canada, August 1-6, 2004.

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