# SIKA AT WORK
# WATERPROOFING AND CRACK SEALING INJECTION SOLUTIONS

FOR THE SANTO ANTÔNIO DAM, BRAZIL

BUILDING TRUST

# THE SANTO ANTÔNIO DAM

## Hydroelectric Power Plant

**PROJECT DESCRIPTION**

The Santo Antônio Dam is part of a major 'Run-of-the-river' hydroelectric power plant development on the Madeira River, in the West of Brazil. The dam will have 50 turbines in 4 Power Houses, with a total capacity of 3,150.4 MW, enough to supply the needs of more than 45 million people to live, work and play in the region.

Construction began in September 2008, and the first power house turbines began commercial energy production ahead of schedule in March 2012; with the 4$^{th}$ and final power house due to be completed and commissioned in late 2016. The huge project is divided into eight phases over a eight year period and includes two spillways, shipping locks, log interceptor systems and unique fish transposition systems to support operation of the power generating turbines in this environmentally sensitive region.

The 2.6 million m$^3$ of concrete and steel used to build the Santo Antônio Hydroelectric Plant would be enough to build 40 Maracanã Stadiums and 18 Eiffel Towers. The total investment is approximately $8 billion.

**PROJECT REQUIREMENTS**

Due to the importance and location of the below ground and underwater reinforced concrete structures, plus the high value 'state-of-the-art' electronics and electrical equipment inside, durable waterproofing solutions were required.

This included the need for secure back-up and remedial waterproofing systems for the expansion and construction joints should water infiltration and leaks occur i.e. during or post-construction due to loading, ground movement and changes in the water table or hydrostatic pressure conditions.

As with any below ground or water retaining reinforced concrete structures, it was also necessary to design and have available, systems to repair and reliably seal and waterproof any other cracks, damage or construction defects such as honeycombing and damage due to displaced waterbars etc.

**SIKA SOLUTIONS**
After extensive evaluations the project engineers selected a complete Sika System Solution for the remedial waterproofing that was fast, efficient and proven to be very effective.

The Sika Solution primarily used Sika Injection Technologies with a combination of 4 products:

- For leaks in areas under high hydrostatic water pressure Sika® Injection-101 RC is first used for temporary water stopping and this is followed by Sika® Injection-201 CE to provide the permanent sealing and waterproofing.
- For cracks and potential leaks in areas with low water pressure and dry concrete surfaces, only the Sika® Injection-201 CE is used, as the water pressure is not sufficient to displace the material before it cures inside the crack.
- For leaks and cracks in sections with significance for structural integrity SikaFix®-210 is used to waterproof and bond the sides of the cracks together at the same time.
- Minor and non-structural cracks are sealed and waterproofed with Sika® Injection-304.

The Sika injection products were installed by a specialist consortium CSAC (Consórcio Santo Antônio Civil). Engineers and site operatives were trained in the theory and practical aspects of injection materials and equipment by Sika Technical Services.
The specialists used one-component injection pumps for the single component polyurethane resin products (Sika® Injection-101 RC and Sika® Injection-201 CE), and a two-component pump for the very fast curing polyacrylate injection product (Sika® Injection-304), and the two-component polyurethane resin products (SikaFix®-210).

**SIKA PRODUCTS USED**
SikaFuko® Eco 1
Sika® Waterbar
Sika® Injection-201 CE
Sika® Injection-101 RC
Sika® Injection-304
SikaFix®-210

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**PROJECT PARTICIPANTS**
The main companies that participate in the construction of the hydro-electric project were Odebrecht and Andrade Gutierrez.
Odebrecht is the biggest and most important Brazilian main contractor, this company works in different Latin American countries such as Venezuela, Peru, Ecuador and others.

A concessionaire (Odebrecht & Andrade) was created with a challenge: installing one of the largest hydroelectric plants in the Legal Amazon area, taking maximum advantage of the Madeira River's hydro-power potential while respecting local communities and the environment.



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