

## 100 years Intze Gravity Dams - even today Indispensable Infrastructure Facilities

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### Summary

Prof. Intze, University of Aachen, was about 100 years ago the initiator and designer of nearly 30 masonry gravity dams in Germany, which are still in operation. According to the German dam standards all dams have to be monitored and rehabilitated to find any safety deficits. Nearly all dams were rehabilitated due to ageing and uplift problems. The methods used are described. Now these dams should be able to serve another 100 years for water supply, energy production, flood control and recreation.

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### 1. Intze Dams

Between 1895 and 1920 in Germany about 30 masonry dams were built under the direction of Professor Intze or were at least highly influenced by him. Prof. Intze (Fig. 1), born in 1843, was professor for structural and hydraulic engineering at the Technical University in Aachen, Germany, from 1870 to 1904. He developed structures for steel water towers, but his main lifework were dams. In these days the booming industries needed a constant feed with water as an energy source and for drinking water; so the spring's surplus water had to be stored for the dry summer months.



*Fig. 1: Prof. Intze*

The first dam he built was the Eschbach masonry dam [1] with a height of 25 m and a crest length of 160 m. The storage volume was about 1,1 Million m<sup>3</sup>. The principle of this dam type (Fig. 2) was used with all further Intze-dams.

The dams have a slight curvature in plan. The upstream side is nearly vertical, the downstream side is tilted at an angle of about 0.75:1.

The structure consists of rubble masonry with a mortar of lime and trass cement; the rubble was normally obtained from nearby quarries. The dam was founded on the rock, any clefts or fissures had been filled with mortar. The downstream surface was covered with smoothed stones. At the upstream face a sealing consisting of a tight trass plaster, covered by a so-called Siderosthen coating, was applied. The Siderosthen coating consisted of a mixture of asphalt and a special tar. In the upper part of the dam this sealing was protected by a masonry shell, which was connected to the dam by dovetail grooves in the dam body. The lower section was protected by the so-called Intze wedge. This backfill consisted of the excavated material; immediately adjacent to the dam surface a clay material was filled in. The walls generally have a vertical drainage curtain (vertically mounted clay pipes) near the water side, which was connected to a main drain in the wall. This drainage should collect any seepage which would penetrate through the dam's body.