



# SIKA AT WORK

## LUDEKE DAM – CONSTRUCTION OF RARE EARTH CORE DAM IN MBIZANA, SOUTH AFRICA

SIKAPLAST TECHNOLOGY

BUILDING TRUST



# LUDEKE DAM – CONSTRUCTION

## PROJECT DESCRIPTION

Ludeke Dam, pump station and rising main form of the raw water components of the Mbizana Bulk Water Supply Scheme initiated by Umgeni Water. Stretching 240 m in length and standing almost 40m high, the dam will hold in excess of 14.5 million cubic meters, providing a much needed supply of water to surrounding communities consisting of 266,000 people. The budgeted cost of the project is R240 million. The new Dam is an earth core dam, of which there are few in South Africa – the dam wall comprising a clay-cored rockfill embankment with a concrete-lined side channel spillway. The clay dam was elected as it was the most cost efficient. It was stated that a concrete-faced dam design would have been less suitable for the site due to the markedly uneven strengths of the foundations on the two flanks indicated by the different geology. The clay-cored rockfill embankment is better able to take up any uneven settlement of the wall over time. The pump station will supply water through a 13.9 km

steel pipeline to an existing water treatment works. The estimated earthworks volume is approximately 600,000 m<sup>3</sup>. The project required 170 onsite employees where 73 employees had to be from the local community. This project started on the 23 September 2010.

## PROJECT REQUIREMENTS

Umgeni Water appointed Rumdel Cape as the main contractor and MBB Consulting agencies as the consultant. Sika put together a proposal for Rumdel Cape providing solutions on which products would best suit the mix design that they were looking for. Rumdel Cape then approved Sika's proposal to supply the concrete admixtures.

The concrete has to be designed for various applications:

- Base of intake towers
- Pillars
- Concrete Spillway





### CONCRETE REQUIREMENTS BASED ON APPLICATION:

A minimum of 0.5 water cement ratio was required with a minimum strength of 35 MPa. This is due to a large area needing to be covered and as there was a concern about heat of hydration. Blended cement was chosen due to the logistics of getting cement and to make the batching process easier. The cement that is being used is NPC Cimpor 32.5 N Cem III A (55% slag). There are two batch plants on site which each produce 80 cubes per hour. The mix design also had to be designed so that it could take both extremes of the temperature, from being extremely hot (42 degrees) to being really cold (-4 degrees).

One site challenge is that there is no river sand near to the site location, so river sand had to be brought in from three and a half hours away. This alone caused an increase in costs, so a mobile crushing plant was brought onsite to crush the balance of aggregates required for the concrete and crush the other materials required for the dam wall construction.



### SIKA SOLUTION

For the first phase of this project, Sika supplied SikaPlast-V210 as the concrete admixture used to construct firstly the base of the intake towers of the dam, then the entire structure of the intake towers, as well as all the spillways. The same mix design was used for both applications. SikaPlast-V210 is a mid range water reducer utilising Sika's "ViscoCrete" polycarboxylate polymer technology. Chosen for its qualities of versatility, good slump retention and optimised mix design, SikaPlast-V210 does not contain formaldehyde, calcium chloride or any other chlorides and will not initiate or promote the corrosion of steel present in the concrete.

Using SikaPlast-V210 allowed for a workability time of 2 hours at a dosage of 1%. In the extreme heats, this mix design resulted in having a workability time of an hour and a half and in the cold temperatures the concrete taking longer to set. A solution was proposed for extreme heats to chill the aggregates by irrigating water on them. The proposed mix designs have been fulfilling all the project requirements and have been successfully used in the project and this mix design will be used until the completion of the project. Sika supplied SikaPlast V210 as well as a number of their other high performance products, thereby assuring Umgeni Water of the highest quality of this crucial project upon completion.

### SIKA PRODUCTS

Furthermore the following Sika products have been used:

- Rugasol-2
- Separol ZA
- Sika Waterbars (0-22, 0-25, AR-25, AR-28, V24)
- Sikadur-32N
- Sika Primer-3N
- Sikafloor-156ZA Primer
- Sikagard-63 N
- Sikaflex PRO-3WF
- Antisol-E



# LUDEKE DAM – IN MBIZANA, SOUTH AFRICA



## PROJECT PARTICIPANTS

**Owner:** Umgeni Water  
**Project manager:** Deon van Rooyen (Rumdel Cape)  
**Project Designer:** Alick Rennie (MBB Consulting Engineers)  
**Main Contractor:** Rumdel Cape  
**Ready-mix producer:** Rumdel Cape

Our most current General Sales Conditions shall apply. Please consult the most current local Product Data Sheet prior to any use.



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