

**International
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Äspö Hard Rock Laboratory

Temperature Buffer Test

Report for data acquisition equipment

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This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the author(s) and do not necessarily coincide with those of the client.

Abstract

This report is dealing with different acquisition units regarding the measuring system, computer for measuring and power supply. The TBT-project includes many different manufactures of data acquisition units, all with their own unique software. All software is installed in the three measuring computers.

Computer No. 1 (SKB computer) is connected to acquisition units for transmitters regarding temperature, moisture, and stress in rock and buffer. Computer No. 2 is co-ordinated by AITEMIN and is connected to the control system for heaters. Computer No. 3 is co-ordinated by DBE Germany and is connected to the fibre-optic measuring system.

Control system for Heaters

The Control system for Heaters consists of one computer with the HMI-system Fix installed. The application contents a control system for heaters. Thermocouples for canister temperature are transferred by an OPC-driver to the measuring system of SKB. This system is delivered by AITEMIN and the function is described in AITEMIN's report ID No 95.05.8.19-01.

Sammanfattning

Denna rapport behandlar mätsystemets insamlingsenheter, mät dator, strömförsörjning. I projekt TBT ingår flera olika fabrikat av datainsamlingsenheter med egen unik mjukvara, samtliga mjukvaror finns installerade i mät datorerna, som är 3 st till antalet.

Mät dator nr 1 (SKB-dator) är ansluten till insamlingsenheter för mätgivare till temperatur, fukt, tryck i berg och buffert. Dator nr 2, för reglerfunktionen av värmare koordineras av AITEMIN. Givare för temperaturmätningen överförs via OPC-driver till SKB-dator. Dator nr 3 koordineras av DBE Tyskland och är kopplad till det fiberoptiska mätsystemet.

Reglersystem Värmare

Systemet består av en dator med HMI systemet Fix installerat. Applikationen innehåller reglerfunktion för värmarestyrning. Givare för kapseltemperatur överförs via OPC-driver till SKB: mätsystem. Detta system levereras av AITEMIN och funktionen redovisas i AITEMIN's rapport, ID No 95.05.8.19-01.

Table of Contents

1	Introduction	4
2	Data acquisition	5
2.1	Hardware	5
2.2	Software	5
3	Distribution of power	6
3.1	Cabinet Cabinet is of manufacture Electric-enclosing and contains acquisition units and power supply for transmitters.	6

1 Introduction

The French organisation ANDRA is carrying out an experiment named “Temperature Buffer Test” (TBT) with international co-operation at Äspö Hard Rock Laboratory in Sweden.

The scientific background to the project is that the Swedish design of a repository for spent fuel (KBS-3) and the Japanese design for vitrified waste (‘H12’ report) both limit the surface temperature of the packages to 100 °C.

The French repository concept, with temperatures above 100 °C, requires detailed information on temperature distribution in dimensioning of the clay-engineered barriers. Two possible approaches have been investigated:

- allowing the temperature of the bentonite to exceed 100 °C temporarily
- use of composite sand / bentonite engineered barriers.

The TBT-test aims at evaluating the benefits of extending the current understanding of the behaviour of engineered barriers to include high temperatures above 100 °C and the experimental resources needed to achieve this.

2 Data acquisition

2.1 Hardware

The measuring computer shall (at least) have the following performance: Pentium clock-frequency with present standard, 256 Mbram. Large hard desk with approximately 20 G-byte and be equipped with Digiboardcards for 4 serial links. Datascan or Campbell manufactures the units for acquisition of data. The thermocouples for temperature, humidity, deformation etc, will be connected to the Datascan units. To the Campbell units, pressure thermocouples of a vibrating wire type, will be connected. The acquisition units will be connected to the measuring computer by an RS485- (Datascan) and a RS232 (Campbell).

The measuring computer is placed in the container in the D-Tunnel and will be connected to the data network at Äspö Hard Rock Laboratory. Äspö staff performs placement and connection to the network.

2.2 Software

Orchestrator standard software used by Äspö Hard Rock Laboratory was also used as software for the measuring computer mentioned in this report.

3 Distribution of power

This project is supplied with power from a reserve power station in the D-tunnel. A diesel generator that starts approximately 20 seconds after reduction of power is the back up for this power station.

3.1 Cabinet

Cabinet is of manufacture Electric-enclosing and contains acquisition units and power supply for transmitters.