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POTENTIAL APPLICATIONS OF SHOTCRETE TECHNIQUES IN HLW REPOSITORIES

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Abstract

Shotcrete may be used for different applications in an underground repository, and in some cases it can be more convenient and cost-effective than conventional concreting techniques. […]

1 Concrete uses in HLW repositories

Concrete, on its various forms, is being considered in most repository designs as the basic construction material for different purposes:

- Rock reinforcing in tunnels and caverns
- […]

1.1 Potential applications

Potential applications […]

1.1.1 Plugs

A first experience in this field has been the plug constructed in the FEBEX project after the partial dismantling carried out in the "in situ" experiment in 2002. In this case, a parallel plug, without any recess excavated in the rock, has been built, with a total length of 3 m (**Figure 1**). The plug was constructed in two phases: A first section with about 1 m thickness was built in 2002, and a second section of about 2 m was later one year later in 2003. The mix formulations were very similar in both cases, and are shown in **Table 1**.

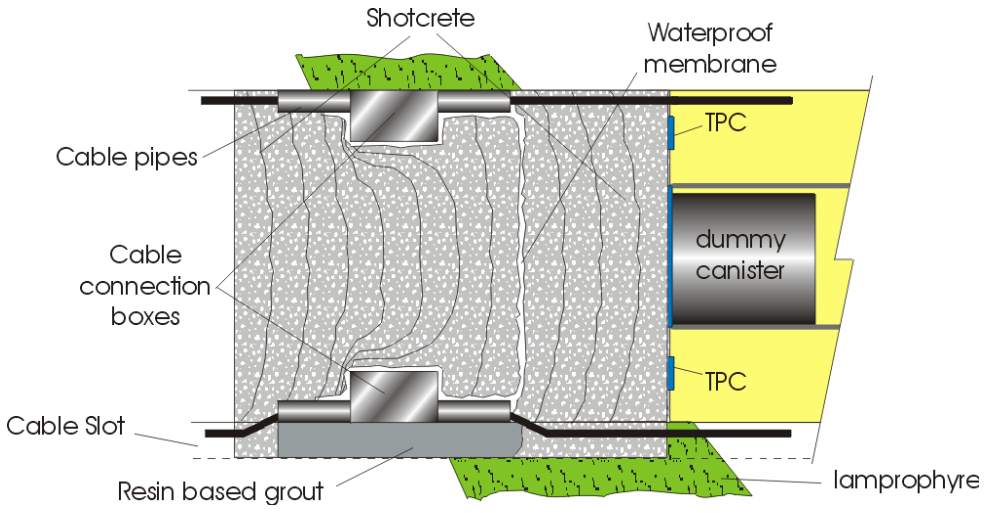

Figure 1: Design of the FEBEX II shotcrete plug

Table 1: Shotcrete characteristics in FEBEX II plug

Component	**Section 1**	**Section 2**
CEM II A-L 32,5 R	430 kg/m^3	475 kg/m^3
Nanosilica MEYCO MS 660	30 Kg/m^3	60 Kg/m^3
Steel fibres Dramix ZP 306	50 Kg/m^3	----
Polypropylene fibres	800 g/m^3	----
Superplasticizer GLENIUM T803	1.5 %	1.5 %
W/C	0.40	0.46
Aggregate 0-8 mm	1 700 Kg/m^3	1 700 Kg/m^3
Curing compound MEYCO TCC 735	1 %	1 %
Accelerant MEYCO SA 160 E	6 %	6 %

The main difference between both formulations is that in section 2 both steel and polypropylene fibres were eliminated, as it was considered that this type of materials would not be desirable in a real repository, because of the difficulty of assessing their behavior in the long term. The proportions of cement and silica fume were also modified in Section 2 to compensate some variations found in the grain size distribution of the aggregates /Fuentes-Cantillana, 2003/.

References

Adler M., 2001. Interaction of Claystone and Hyperalkaline Solutions at 30 ºC: A Combined Experimental and Modelling Study. PhD Thesis. Bern University.