

Asbestos free hot-tops

Hot-tops with mineralwool in place of asbestos and wheat flour
replacing part of the standard resin

Assumption

In the development work of an asbestos free hot-top one of the ways tried is to replace asbestos with mineral wool. This report shows the result of trials performed in the steelworks at Sandviken. All the recipes contain mineral wool and wheat flour.

Summary

All hot-tops with mineral wool and wheat flour in place of blue asbestos and part of the standard resin gave more pipe than the standard E-box. The result corresponds with the Amitec tests. The largest difference in pipe between standard E-box and mineral wool E-box was 0.9 % at a pipe level of about 7-8 %. When using mineral wool and wheat flour, the degree of erosion is greater than normally.

The present trials confirm the results of our earlier trials with mineral wool hot-tops performed during the last three years, and the results so far are also in agreement with the experiences reported in a Profax Newsletter of December 1967.

The only really positive substitute for asbestos that we have found up to now is fibre glass, which was shown already in 1965. This material has a prohibitive price, however.

Further trials with mineral wool E-box with standard resin are under performance.

Trial performance and result

All hot-tops used were manufactured by AB E-box. The ingot weight was about 2500 kg and the steel grades were carbon steel with 0.30 or 0.35 % C.

The recipes are shown in table No. 1 and also the testminutes for the hot-top slabs, the Amitec-tests and the pipe levels.

The analysis of the mineral wool is shown in table No. 2. The diameter of the fibres was about 5 μ .

The pipe levels were determined ultrasonically after preheating



The hot-tops were observed during teeming and cracking did occur more on the mineral wool hot-top than on the standard E-box.

When examining cold ingots it was observed that the stripping properties were not as good as normally. However, the marks on the heads from steel penetration into the slabs were not severe and hardly any difference between mineral wool hot-tops and standard E-box as to the surface finish after preroll of the ingots to 260 mm ϕ was observed. Using mineral wool hot-tops on stainless steel would probably result in bad surfaces on the blooms, because of the smaller sealing effect in the soaking pits.

Sandviken 19th March 1968

Ralf Ageborg

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AB E-box 2 copies Rosenc Int. Lit. 4 copies

Oing. Forsman

TM

Ing. Grünbaum

TMT/G

Table No. 3. Recipes, test minutes, antitect test results and pipe levels

Order number	Recipe, %				Number of melts	Number of ingots per melts	Total number of ingots	Test minutes for hot	
	organic matter	acid	lime	asbestos wool				Breaking strength kg/cm ²	Permeability cm ³ /s
10	86.8	6.0	0.7	2.5	4	4	16	17.6	14
11	86.8	6.0	0.7	2.5	5	4	20	15.1	17
12	87.5	4.0	3.5	1.0	5	3	15	9.1	29
13	87.5	4.0	2.5	2.0	4	3	12	10.6	16
14	87.5	5.0	3.5	1.0	4	3	12	9.3	20
15a	87.5	5.0	2.5	2.0	4	3	12	12.7	15
15b	"	"	"	"	4	4	16	17.5	16
16	87.5	6.0	3.5	1.0	4	3	12	10.4	16
17	87.5	6.0	2.5	2.0	4	3	12	13.0	12
18	87.3	6.0	1.2	2.5	5	3	15	17.2	10
Standard box	87.74	5.45	5.32	1.49	4, 5, 5	3, 3, 4	47	13.5, 11.0	10, 15

n) Antitec slab in two pieces

Top slab	Weight by unit of volume g/cm ³	Slab thick- ness, mm	Water test Total heat loss (4cm ²) cal/cm	Pipe %	Pipe % Standard E-box	Pipe % minus pipe % Standard E-box
1.0	19	2150	6.7	6.1	0.6	
1.04	18	2090 ^(x)	6.7	8.3	0.4	
1.05	17	-	7.5	7.2	0.3	
1.17	17	2030	7.9	7.0	0.9	
1.05	16	1500 ^(x)	7.3	7.0	0.3	
1.16	17	2160	7.5	7.0 [*]	0.5	
1.03	17	-	8.5	8.3	0.2	
1.05	17	2000	7.3	7.0	0.3	
1.14	17	2110	7.3	7.0	0.3	
1.12	19	2205	7.7	7.2	0.5	
1.09; 1.11	17; 17	1820; 1805	-	6.1; 7.0; 7.2; 6.3	-	

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Table 2 Mineral wool analysis

SiO ₂	43.5 %
Al ₂ O ₃	15.5 %
FeO	7.7 %
Fe ₂ O ₃	1.3 %
MnO	3.4 %
CaO	17.6 %
MgO	8.5 %
Heating loss	0.35%