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The Use of Synthetic Inorganic Fibres

To Replace Asbestos in FROPAX

By: K.M. McGrath.

22nd. February.

CONFIDENTIAL

TECHNICAL DIVISION

NECHELLS

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SYNOPSIS

This report gives a full analysis of the technical properties cost and availability of inorganic synthetic fibres for the replacement of asbestos in side-insulators.

Many of these materials are too costly to use at the present time. The results show however, that certain synthetic fibres of the slag wool type are economically viable and bestow other technical improvements upon the product as well as the all important removal of the risk of asbestosis.

INTRODUCTION

The two industrial diseases, silicosis and asbestosis, have been recognised by both Foseco and Sandviken as the major disadvantages of Profax since its inception. For a number of years considerable research and development effort has been devoted to their elimination. Olivine Profax was the result of Sandviken efforts to eliminate silicosis and many hundreds of tons of the product have been sold. This product was rapidly followed by Chamotte filled Profax - a development of Foseco, dictated by the individual needs of some operating companies, this material also has a very low silicosis risk.

During these early days, although asbestosis was known to result from continued use of asbestos, it was thought that the risk was very low because of the low asbestos content in Profax. At the instigation of Foseco International Ltd., meetings and discussions took place with the leading respiratory disease authorities in England. It slowly became apparent that the "Blue Asbestos" (Crocidolite), which we were then using, was hazardous not only because of the normal asbestosis risk, but also because it contained a carcinogenic substance. Health statistics were beginning to show that lung tissue carcinoma could occur after only one exposure to CROCIDOLITE. Foseco International Ltd. immediately warned the whole group of this danger and, because of very rapid and detailed work, by Foseco (F.S.) Ltd. were able to recommend an alternative grade of asbestos that avoided this carcinoma risk. We were now in a position to sell a product of very low silicosis risk and, we thought, insignificant asbestosis risk.

As respiratory disease research has progressed, it has become more apparent that asbestosis is a very serious complaint that can result from very low exposure levels. Establishing the true data has been very difficult. In many cases asbestos suppliers still refuse to accept the data as valid, and claim little or no risk from the use of their material. Foseco, as a large responsible supplier of industrial products, must however, recognise the significance of the medical statistics and take all steps to ensure that its product is not only useful and economic, but also safe to use.

Work has been carried out therefore by Sandviken, Foseco (F.S.) LTD., Foseco S.A. France and Foseco International Ltd. to replace asbestos. During the early period of this work, glass fibre was thought to be the

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most likely replacement and was tested by all the above companies. This gave a product of reasonable appearance, but the manufacture was difficult and the performance in the steelworks not ideal. Foseco (F.S.) Ltd. were forced to manufacture this product in quantity for one customer but were always dissatisfied about the associated scrap rates.

Later work involved various slag and mineral wools. While these gave, in the main, reasonable results in the customers works, considerable doubts were cast on the adequacy of the green strength.

The advent of wheatflour bonded Profax gave considerable hopes of eliminating asbestos without replacing it. The Australian Company went ahead with this recipe and have never used asbestos since. The Group as a whole however was unmoved by the cost advantages of wheatflour and therefore unlikely to be able to take advantage of the asbestos removal potentialities of this bonding systems.

As a result of research on 100% fibre sleeves and filled fibre sleeves by the Foundry Division of Foseco International Ltd., attention returned to slag wools but at much higher addition levels than previously used. In particular, Foseco (F.S.) Ltd. made and tested slabs containing up to 15% of slag wool. Eventually they settled upon 3% content as being reasonable and having sufficient green strength.

Because the testing was frequently of an AD HOC nature and many details needed to be filled in, Foseco International Ltd. started a special research project to establish clearly the properties of Profax tiles with various contents of synthetic inorganic fibres. (PROJECT 500/2).

This present report contains sufficient data to enable all companies in the Group to replace asbestos in their product without sacrifice of properties. A later report will investigate the advantages or disadvantages of increasing the content of fibre. All companies should note that exceeding the percentages beyond 10%, particularly if the fibre is not quite equivalent to those specified, could lead to penetration and other problems and is therefore not recommended until our research is complete.

OBJECTIVES

1. To make a systematic study of synthetic inorganic fibres with a view to establishing basic physical and chemical properties.

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2. To investigate the effects resulting from substitution of synthetic fibres for asbestos in Profax.

3. To utilise the above data for the preparation of recommendations to all operating companies on how to avoid using asbestos in Profax.

EXPERIMENTAL PROCEDURE

Types of Fibre Examined

The fibres chosen for examination, fell into two categories:

1. Mineral wools (generally expensive and high melting point).

2. Slag wools (generally cheap and low melting point).

Appendix 1 gives precise chemical and physical data on the various fibres tested. It also shows the economic and supply position in England.

Standard Foseco (F.S.) Ltd. cost for Profax 10 and Profax 50 are shown for comparison purposes.

Mixing

Throughout these experiments it has been found advisable to add the inorganic fibre immediately after the paper is pulped and before any other additions are made. This gives maximum opportunity for a proper fibre suspension to form. If the fibre addition is made in a similar manner to the practice normally observed with asbestos there is a tendency for "balling up" to occur.

Recipe

Two recipes were chosen to be as representative of normal production as possible. One recipe utilised a standard resin bonding system, the other a wheatflour system. Initially a fibre content of 10% was used for tests. This level was chosen after careful examination of Foseco (F.S.) Ltd. initial results. (See Figure 1 Appendix 3), subsequently levels of 2% and 7% of X1987 in the resin bonded system were also examined. As indicated earlier, higher fibre levels will be the subject of a further report.

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