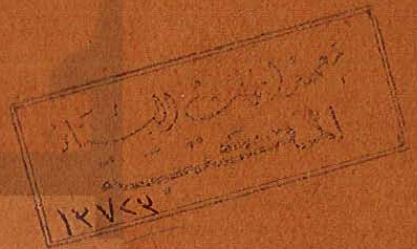


Building Research Center  
Division of Construction Physics

# INSULATING MATERIALS FOR BUILDINGS THEIR PROPERTIES, USES, AND ECONOMICS

with special reference to materials  
available in the U. A. R.



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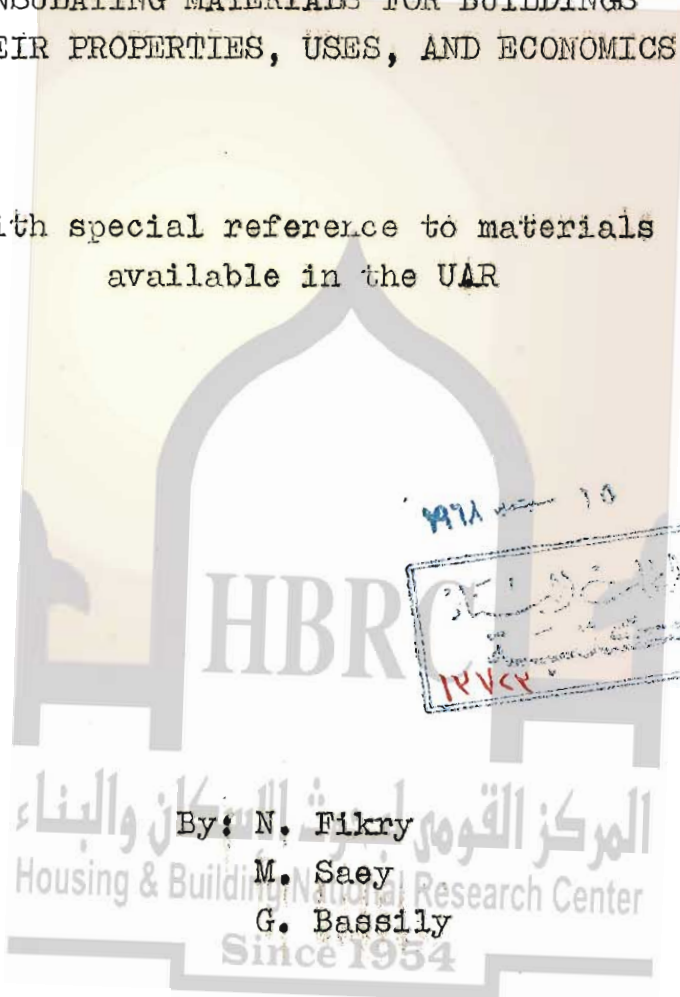
Dr. A. Saleh

AUG. 1968

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Since 1954

## INTRODUCTION

One of the most important problems that faces both the designer and the inhabitant of a building, beside its size, locality, etc., is the control of its interior temperature to make it more useful and comfortable. This problem is practically reduced to that of insulation.

The problem is usually that of insulating the building thermally from the surrounding atmosphere. In cold climates, this is done to prevent the loss of the heat generated within the building to heat it, to the outside. In hot climates, the reverse is true, i.e. the buildings are thermally insulated to prevent the outside heat from affecting the interior. In temperate climates, such as ours, during a large part of the year, the temperature by day is usually too hot to be tolerable, while the weather is relatively cool at night. Usually, our problem is that of protecting the interior of the building by day because the heat in summer is sometimes unbearable.

The designer is usually interested in insulating the building against the hot weather by using thick walls and roofs that contain the appropriate insulator. However, a new problem is raised. A large insulating wall of large heat capacity stores heat energy during the day and releases a part of it at night. This may result in uncomfortable conditions in the building during this period. For reasons of comfort the walls and roofs should be of such construction that they <sup>would</sup> cool rapidly at night.

The object of this report is to discuss and compare the qualities and cost of the various insulating materials particularly those available in the U. A. R.

## CLASSIFICATION OF INSULATING MATERIALS

Insulating materials may be classified according to the temperature range in which they are employed, or according to their physical structure.

In classifying the materials according to the temperature range of application, it should be noted that these temperature ranges are rather arbitrary and not very well defined. Further, many insulating materials could be used in quite a large range of temperatures and hence, could be used in more than one of the temperature ranges listed below.

a) Extremely Low-temperature Insulation. ( $< 0^{\circ}$ )

These materials are used to insulate low-temperature refrigeration systems, e.g. ice making plants, freezing rooms, etc. In this case the insulators are subject to freezing and sweating<sup>(\*)</sup>. The materials are manufactured so as to have low thermal conductivity and durable structure when wet. The problem of keeping moisture away from the cold surfaces and the interior of the insulation itself is of paramount importance in the choice and construction of low temperature insulation. Cattle hair, wool felt, cork and various combinations of these are used extensively as raw materials. Cork is used as sheets or blocks. Glass wool and cork are used as insulating materials for this purpose. Cork is <sup>Sometimes</sup> used <sup>as in</sup> granulated <sup>form</sup>. These materials are manufactured so as to have a low thermal conductivity.

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(\*) Sweating means the condensation of moisture on a surface whose temperature is below the dew point of the surrounding atmosphere.