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HEATING AND AIR CONDITIONING SECTION
BUILDING TECHNOLOGY DIVISION

THERMAL CONDUCTIVITY MEASUREMENTS
OF THREE RUBBER-LIKE MATERIALS

by

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to

Office of The Quartermaster General
Department of The Army



U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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I. INTRODUCTION

At the request of the Office of The Quartermaster General, reference File QMGRJ 095, letter dated September 28, 1953, thermal conductivity measurements were made on three rubber-like materials to determine their insulation value.

2. MATERIALS

<u>Sample No.</u>	<u>Size</u>	<u>Description</u>
1	Two 8x8x0.4 inch	Tan low density Arctic rubber
2	Two 8x8x0.5 inch	Green Ensolite 122523
3	Two 8x8x0.4 inch	Tan high density Arctic rubber

3. TEST METHOD AND PROCEDURE

The thermal conductivity of the specimens was measured in an 8-inch guarded hot-plate apparatus conforming with the requirements of Fed. Spec. MIL-P-321b and of ASTM C177-45.

4. RESULTS

A summary of the test data is given in Table 1 and a plot of thermal conductivity versus mean temperature is shown in Figure 1.

ARTICLE I

Section 1. All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SECTION 2

CLASSES	TERM	RE-ELECTION
1. The whole term	Two years	Yes
2. The whole term	Two years	No
3. The whole term	Two years	No

SECTION 3

Section 1. The Senate shall be composed of Senators chosen by the States for six years; but two shall be chosen in each State.

SECTION 4

Section 1. The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for Electors in that State.

A plot of thermal conductivity of the specimens at 30°F mean temperature (K_{30} , BTU/hrft² (deg F/inch) versus density lb/ft³ is shown in Figure 2. Data from NBS Report 2547 are included with the data of the present report, as a matter of interest. It is to be noted that the conductivity is approximately proportional to the density, especially at the lower densities.

TABLE 1

Specimen	Mean Temp. of spec., °F	Density as tested lb/ft ³	*Thickness as tested inch	Temp. gradient in spec. deg F/inch	Thermal Conductivity BTU/hr ft ² (deg F/inch)
1	63.5 29.9	10.0 10.2	0.415 .407	49.4 49.9	0.318 .310
2	62.6 29.7	11.6 11.6	.538 .536	35.0 37.1	.368 .356
3	63.6 30.1	23.9 23.9	.429 .428	47.0 48.1	.521 .499

* Thickness of specimens as tested necessary to obtain good thermal contact with the test plates. The same total pressure (about 10 pounds on 64 sq. in.) was applied on each specimen during the tests at high and low mean temperatures. The different thicknesses observed were apparently due to dimensional changes with mean temperature.

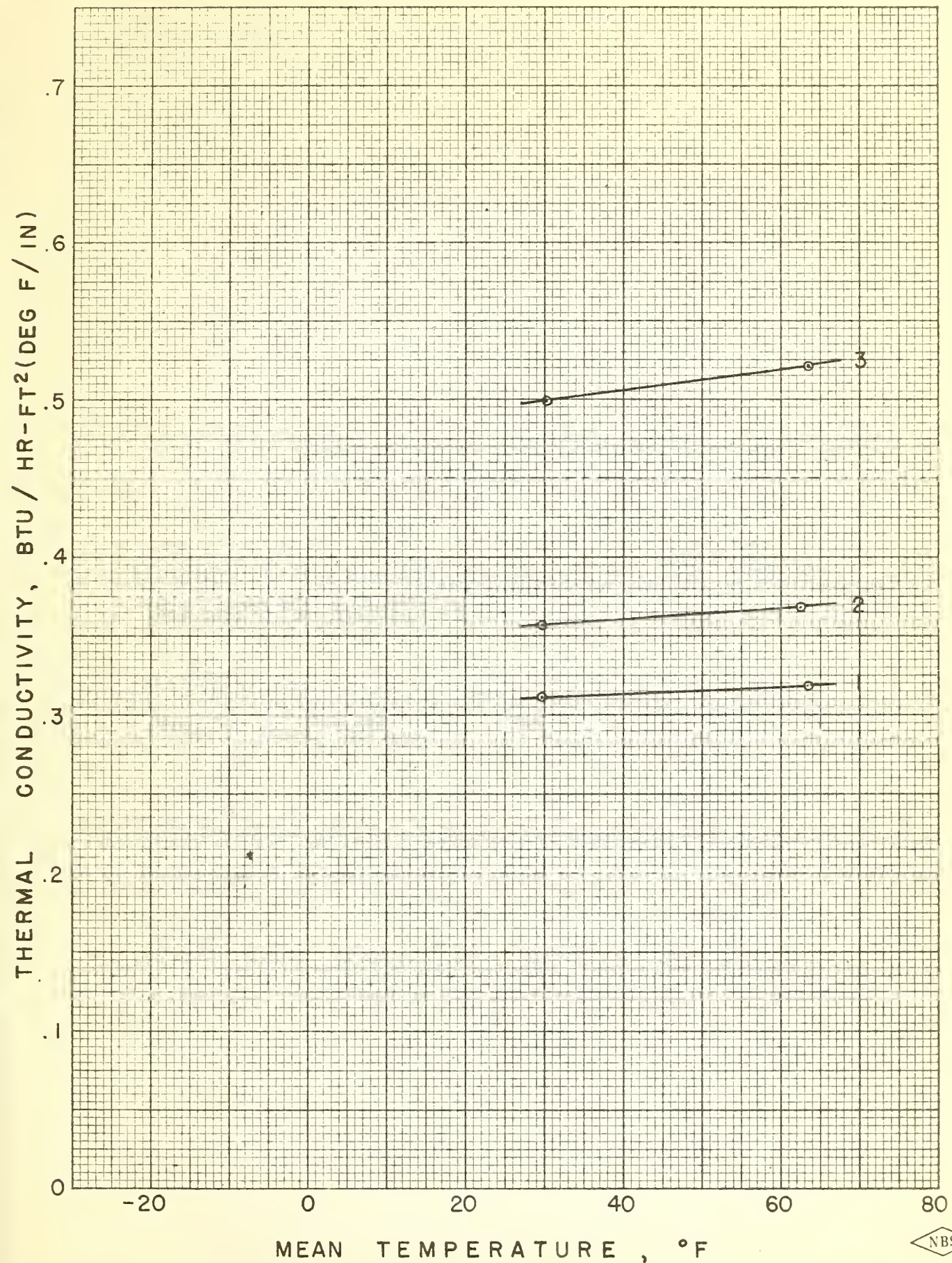


FIGURE 1



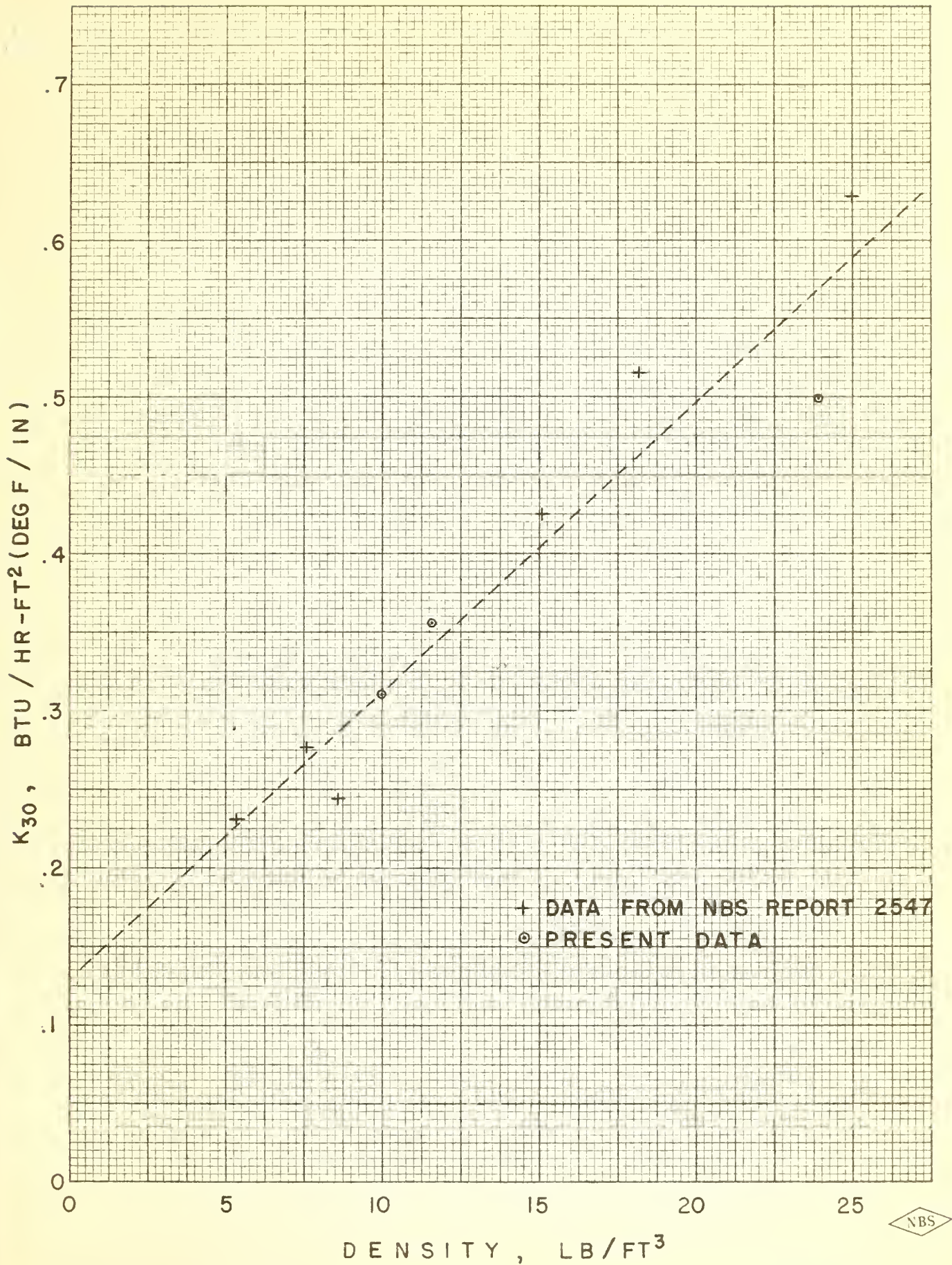


FIGURE 2



