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SUBJECT

Test on Insulating Material Body No. 2532

Submitted by

The General Ceramic Company

DECLASSIFIED: By authority of
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AUTHORIZATION

1. This problem was authorized by BuShips letter reference (a). References (b) to (d) are also pertinent.

References: (a) BuShips ltr. S67/61 (480V) January 6, 1942
(b) Specifications Re 13A 317-F
(c) NRL Report R-1693 of 10 February 1941
(d) Proc. I.R.E. Vol. 26, pp. 1466-1497 Dec. 1938 by D.B. Sinclair.

OBJECT OF TEST

2. The object of this test was to determine whether the nine samples of Steatite Body 2532, submitted by the General Ceramic Co., comply with Specification, reference (b) as Grade F or G insulating material.

ABSTRACT OF TEST

3. The samples were tested for wet and dry loss factor and moisture absorption as required in reference (b).

DESCRIPTION OF MATERIAL UNDER TEST

4. Six samples, numbered 367 to 372 inclusive by NRL, measuring approximately 6" square and 1/4" thick and three circular samples numbered 358 to 360 inclusive by NRL measuring approximately 4" in diameter and 1/4" thick were submitted for test by the General Ceramic Company.

METHOD OF TEST

5. The dry loss factor was determined, after drying the samples in an oven for an hour at 100°C., by applying foil to both surfaces with petroleum oil and substituting this capacity for a similar amount of variable air capacity, (Precision quartz insulated G.R. type 722F-Q serial no. 460), in a standard LC circuit. This standard LC circuit was loosely coupled to a 1000 Kc. crystal controlled master oscillator power amplifier and the shape of resonance determined with a vacuum tube voltmeter, (GR type 726-A serial no. 1483). The dielectric constant, power factor, loss factor and capacity were determined from the physical dimensions, conductance and difference in standard condenser setting with and without the sample. This is known as the susceptance variation method of measurement described in reference (d). The samples were then soaked in distilled water at room temperature for 48 hours after which their surfaces were wiped dry and the wet loss factor determined in accordance with paragraph 6-1 of reference (b).

6. Moisture absorption tests were carried out on newly fractured pieces as detailed in paragraph 6 of reference (b), where the newly fractured surface was approximately 50% of the unfractured surface of each sample. The samples were first dried in an oven at 120°C. for 24 hours, then accurately weighed. They were then immersed in distilled water at room temperature for 100 hours during which time the water was boiled for a period of one hour during the first 25, 49, and 74th hours. At the end of 100 hours all samples were removed from the water, carefully dried with filter paper and weighed immediately.

CONCLUSIONS

7. It is concluded that Steatite Body No. 2532 submitted by the General Ceramics Company complies with these Specifications, reference (b) for Grade G insulating material, in respect to moisture absorption, and loss factor.

RECOMMENDATIONS

8. It is recommended that this Steatite Body No. 2532 submitted by the General Ceramic Company be approved as Grade G insulating material.

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DATA RECORDED DURING TEST

9. Data recorded during the test are given in appended tables numbered 1 and 2.

PROBABLE ERROR IN RESULTS

10. The probable error in the determination of loss factor is 3%. The error in determination of weight for moisture absorption is not more than .00125%. This does not include any error assumed in the indicated loss in weight of the sample tested.

RESULTS OF TEST

11. The results given in Tables No. 1 and 2 indicate that all test samples are Grade G insulating material. The loss in weight indicated during the moisture absorption test can not be accurately accounted for unless dust and dirt particles, which had been collected from the air, or small pieces of the sample escaped when the water was drained. Loss in weight indicated in past measurements was attributed to the boiling out of some of the originally weighed materials.

CONCLUSIONS

12. It is concluded that Steatite Body No. 2532 submitted by the General Ceramics Company complies with these Specifications, reference (b) for Grade G insulating material, in respect to moisture absorption, and loss factor.

TABLE I

General Ceramics Co.,

Dielectric Properties of Steatite Body No. 2532

Square Samples

Sample No.	Dielectric Constant		Power Factor %		Loss Factor %		Grade Letter
	Dry	Wet	Dry	Wet	Dry	Wet	
367	6.16	6.01	0.118	0.108	0.776	0.648	G
8	5.80	5.75	.118	.111	.685	.639	G
9	5.88	5.76	.112	.115	.660	.662	G
70	5.94	5.94	.112	.115	.665	.684	G
1	5.96	5.96	.128	.153	.760	.911	G
372*	Used for Moisture absorption test.						

Circular Samples

358	6.05	6.72	0.095	0.111	.575	0.672	G
9	6.05	6.72	.110	.111	.726	.672	G
360*	6.05	6.72	.100	.111	.605	.672	G

The Loss Factor must not exceed 1% to qualify for Grade G insulating material.

TABLE II

Moisture Absorption

Sample No.	Weight in grams		Gain %
	Dry	Wet	
372	40.3796	40.3776	- 0.005
360	39.9462	39.9661	+ 0.05 (Loss of weight)

The gain in weight must not exceed 0.1%

*Used for Moisture Absorption Test.

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