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NAVY DEPARTMENT  
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Report  
of  
Test of Mycalex Insulating  
Material.

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## AUTHORIZATION

1. This problem was authorized by Bureau of Engineering letter, reference (a). Other pertinent correspondence is listed as references (b) and (c).

Reference: (a) BuEng.ltr. S67/61 (8-29-W8) of 3 Sept. 1935.  
(b) Specifications RE 13A 317F.  
(c) NRL Report No. R-1117.

## OBJECT OF TEST

2. The object of the test was to determine if samples of Mycalex, submitted by the Mycalex Corporation of America, comply with specifications RE 13A 317F for grade F or G insulating material.

## ABSTRACT OF TEST

3. The loss factor of the materials was determined on samples after they had been soaked in water for 96 hours. The moisture absorption was determined on broken fragments by weighing them before and after they had been immersed in water for 100 hours.

CONCLUSION

(a) Mycalex complies with specifications, reference (b), as Grade F insulating material both with respect to loss factor and moisture absorption.

RECOMMENDATION

(a) It is recommended that Mycalex, manufactured by the Mycalex Corporation of America, be approved as Grade F ceramic insulating material as regards its electrical properties.

## DESCRIPTION OF MATERIAL UNDER TEST

4. Two samples of Mycalex 6-1/2 x 8 x 1/2" were tested. This material is said to employ a potassium iodide type of binder, whereas the General Electric Mycalex is said to employ a lead borate binder.

## METHOD OF TEST

5. Samples of Mycalex were soaked in distilled water for 96 hours after which their surfaces were wiped dry and the loss factor determined as detailed in paragraph 7(a) of reference (c). The measurements were made at frequencies of approximately 480 kcs., but the results do not differ from those which would be obtained at 300 kcs., which frequency is mentioned in paragraph 6-1 of reference (b).

6. Moisture absorption tests were carried out on fractured portions of both samples, as detailed in paragraph 6-2 of reference (b). The samples were first dried at 120°C for 24 hours and accurately weighed. They were then immersed in distilled water for 100 hours, during which time the water was boiled for a period of 1 hour at 4 intervals. The weight was again obtained within a few minutes after the material had been removed from the water and the surfaces wiped dry.

## DATA RECORDED DURING TEST

7. The data recorded during test are given in the appended table.

## PROBABLE ERROR IN RESULTS

8. The error in the determination of the loss factor is less than 10 per cent. The error in determination of the weight in the moisture absorption test is not more than .001 per cent.

## RESULTS OF TEST

9. The results of the test are given in tabular form in the appendix and may be summarized as follows:

This Mycalex, which should be distinguished from that manufactured by the General Electric Company under the same trade name, has a loss factor greater than one and less than seven, and therefore lies in Grade F, as defined in paragraph 6-1 of reference (b).

10. At the completion of the moisture absorption test, a fine, white sediment was observed in the bottom of the vessel in which the samples had been soaked for 100 hours and boiled for four hours. When the samples were weighed it was found that they had actually lost approximately .2 gram in about 35. The loss in weight was due to the loss in material represented by the sediment, which loss was greater than the weight of moisture remaining in the specimens. That some moisture was absorbed by the samples was obvious from the slightly darker shade of the material after being removed from the bath and the surface wiped dry. The material then became somewhat lighter in color as the moisture evaporated from the surfaces during the first 15 minutes of air drying. One sample was re-weighed ten minutes after the first weighing and was found to have lost .006 gram in weight in that time.

11. In addition to the tests on the samples submitted, test data obtained on four other samples of the same material are included in the table (samples 3 to 6). The loss factor of samples 3, 4 and 5 was determined twice while dry and once after the samples had been soaked for 96 hours. Of the two values for the dry condition, the higher was determined in each case at a time of rather high relative humidity (about 70%), and the lower value at a time of much lower relative humidity (about 40%).

12. From a comparison of the dry and the wet values of loss factor of samples 3 to 5, it appears that the loss factor after the material has been soaked in water as specified in paragraph 6-1 of reference (b), is approximately 2 or 3 times greater than when the material is dry.

#### CONCLUSIONS

13. Mycalex complies with specifications, reference (b), as Grade F insulating material both with respect to loss factor and moisture absorption.

TABLE NO. 1

Test Data on Mycalex Insulating Material.

Sample	Dielectric Constant		Power Factor in %		Loss Factor in %		Moisture Absorption		Per Cent Change
	Dry	Wet	Dry	Wet	Dry	Wet	Wt. before soaking (gms.)	Wt. After soaking (gms.)	
1	-	6.07	-	0.465	-	2.82	38.829	38.662	-.43*
2	-	6.27	-	0.810	-	5.08	33.632	33.432	-.59*
3	5.50	-	.191	-	1.05	-	-	-	-
3	5.51	5.53	.145	.381	.80	2.11	-	-	-
4	5.60	-	.37	-	2.07	-	-	-	-
4	5.61	5.54	.168	.417	.94	2.31	-	-	-
5	5.45	-	.383	-	2.09	-	-	-	-
5	5.58	5.72	.194	.725	1.08	4.15	-	-	-
5	-	5.72	-	.552**	-	3.16**	-	-	-
6	5.18	-	.182	-	.94	-	-	-	-

Notes: Samples 1 and 2 were those submitted for test.

Samples 3, 4 and 5 were 1/4" sheets obtained for test in conjunction with Bu.Eng.Prob.M1-4.

Sample 6 was received at least 3 years ago.

\*Loss in weight is due to sediment deposited during moisture absorption test.

\*\*Value obtained 5 minutes after one above, indicating rapid evaporation of moisture.