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NAVY DEPARTMENT

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Report of Test

on

Condensers - 0.45 Mfd.

Submitted by

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Date of Test: April, 1941.

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BuShips (5)

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AUTHORIZATION FOR TEST

1. This test was authorized by reference (a), and another reference pertinent to this test is listed as reference (b).

Reference: (a) BuShips ltr. S65-5(DYs-3) of 2 April 1941.
(b) Specification RE-13A-488C of 22 August 1936.

OBJECT OF TEST

2. The object of the test was to determine conformance of the sample condensers with specification, reference (b), and their suitability as suppressors for contacts used in connection with the reversing windings of the Barber-Colman shaded-pole induction motor frequently used as a follow-up motor in Julien P. Friez & Sons Wind Indicating Equipment.

3. The sample condensers were subjected to tests to ascertain compliance with the specification relative to accuracy of capacity ratings, direct current leakage, and the efficiency of their seals.

Conclusions

(a) The subject condensers failed to meet the specification in the following respects:

- (1) Paragraph 3-5: Containers are not hermetically sealed.
- (2) Paragraphs 3-6 and 3-7: Terminals are not provided.
- (3) Paragraph 3-11: Cases are not marked with capacitance, Navy type number, and d.c. working voltage.
- (4) Paragraph 4-6: Leakage exceeded that allowed following the immersion tests.

(b) The voltage across the reversing windings of a Barber-Colman motor is approximately 20 volts with 115 volts, 60 cycles, on main motor winding. However, in order to obtain high quality condensers, it is believed that no condenser rated at less than 400 volts, d.c. working voltage at 200°F., should be considered for this application.

Recommendations

(a) The subject condensers are considered **NOT SATISFACTORY** for Naval use because of their failure to comply with the specification, given under "Conclusions," paragraph 11.

DESCRIPTION OF MATERIAL

4. The subject condensers manufactured by Sprague Products Company and submitted by Julien P. Friez and Sons, Baltimore, Maryland, are of the block type, and are provided with three (3) lead wires extending through a bushed hole in one side of the tinned sheet-steel case.

5. They are rated at 0.45 microfarad with taps at midpoints of their capacities. The d.c. working voltage rating was not given.

6. Further details of the construction of the samples are shown by photograph, Plate 1.

METHOD OF TEST

7. The capacities of the condensers were measured by a 1000-cycle capacitance bridge.

8. The direct current leakages of the condensers were measured by a microammeter, at a direct potential of 220 volts, the minimum voltage at which accurate measurements could be made.

9. The samples were immersed in a solution of saturated salt water at 65°C. for two hours, followed by immersion in a similar solution at 0°C. for two hours. This procedure was repeated for 5 complete cycles. The samples were next immersed in a solution of saturated salt water at 20°C. for twenty-four hours. After removal from this solution, they were washed with fresh water, allowed to dry for one hour, and the leakage was again measured.

RESULTS OF TEST

10. The test results were as follows:

<u>Requirements</u>	<u>Test Values</u>	
	<u>Sample No. 1</u>	<u>Sample No. 2</u>
Containers (Para.3-4): Shall be constructed of non-ferrous, non-corrosive metal or provided with an approved protective non-corrosive coating.	Metal containers with protective coating provided for both samples.	
Containers (Para.3-5): Shall be hermetically sealed in such manner as to remain moisture-proof and air-tight over a temperature range of minus 32°C. to plus 65°C.	*Neither of the samples is hermetically sealed. (See Plate 1).	

Requirements

Terminals (Para. 3-6 and 3-7): Lug type, mounted in non-hygroscopic insulating material, shall be provided and so secured as to permit soldering and support of a No. 14 B and S gauge solid wire.

Marking (Para. 3-11): Shall be permanently marked with Navy type number, rated capacitance, and continuous working voltage, d.c.

Capacitance variation (Para. 4-2): Shall not vary from rated value at 20°C. more than +10 or -3 per cent.

Temperature coefficient (Para. 4-3.)

Leakage prior to immersion (Para. 4-4): Shall not exceed 0.2 microampere per microfarad at the rated d.c. working voltage.

Flash test (Para. 4-5): Shall withstand twice the d.c. working voltage between terminals, and terminals and case.

Leakage following the immersion test (Para. 4-6): Shall not exceed 2.0 microamperes per microfarad.

Test Values

Sample No. 1

Sample No. 2

*None provided on either sample. Lead wires used instead.

*Capacity, Navy type number and continuous d.c. working voltage not marked on cases.

Complied.	Complied
Rated: 0.45 mfd.	0.45 mfd.
Measured: 0.46 mfd.	0.48 mfd.

Not conducted - Not desired by Bureau.

Both samples complied. (See Table 1). Note: As the d.c. working voltage was not given, both samples were tested at 220 volts, d.c., the minimum voltage at which accurate leakage measurements could be made.

Both samples satisfactory at 220 volts, d.c. This potential chosen in the absence of any information on rated d.c. working voltage.

*Both samples unsatisfactory. (See Table 1).

CONCLUSIONS

11. The subject condensers failed to meet the specification in the following respects:

- (a) Paragraph 3-5: Containers are not hermetically sealed.
- (b) Paragraphs 3-6 and 3-7: Terminals are not provided.
- (c) Paragraph 3-11: Cases are not marked with capacitance, Navy type number, and d.c. working voltage.
- (d) Paragraph 4-6: Leakage exceeded that allowed following the immersion tests.

12. The voltage across the reversing windings of a Barber-Colman motor is approximately 20 volts with 115 volts, 60 cycles, on main motor winding. However, in order to obtain high quality condensers, it is believed that no condenser rated at less than 400 volts, d.c. working voltage at 200° F., should be considered for this application.

TABLE I

Measured Capacities and Leakages

Sample No.	<u>Capacity in Mfd.</u>			<u>Leakage in Microamperes at 220 V.DC</u>				<u>*Approximate Resistance in Ohms</u>				
	<u>Terminals</u>			<u>Before Immersion</u>				<u>Following Immersion</u>				
	<u>White to Red</u>	<u>White to Blue</u>	<u>White to Red & Blue</u>	<u>White to Red</u>	<u>White to Blue</u>	<u>White to Red & Blue</u>	<u>Terminals</u>		<u>Terminals</u>		<u>Terminals</u>	
							<u>to Case</u>	<u>to White</u>	<u>White to Blue</u>	<u>White to Red & Blue</u>	<u>to Case</u>	<u>to White</u>
1	0.23	0.23	0.46	0.012	0.028	0.035	0	1000	900	700	400	
2	0.24	0.24	0.48	0.012	0.012	0.020	0	800	1000	800	300	

*Measured at 4.5 volts, d.c. because leakage was too great to be measured in accordance with paragraph 5-5 of the specification. Leakage expressed as resistance in ohms because of extremely high leakage.

