

AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

AMS2560A

Issued 6/13/40

Revised 3/1/42

IMPREGNATION OF CASTINGS

Page 1 of 3 pages

1. ACKNOWLEDGEMENT: A vendor must mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. OBJECT: To make porous castings pressure tight.

3. APPLICATION: All parts shall be pressure tested with water or air. Those which leak equivalent to more than 25 drops of water per minute on a local area shall be rejected. Those which leak equivalent to a rate of 5 to 25 drops of water per minute may be impregnated. Those which leak equivalent to less than 5 drops of water per minute are acceptable without impregnation unless the leakage would be into the induction system, or through an external surface, or through the walls of the coolant jacket, in which case they must be impregnated. The purchaser's Inspection Department may vary this requirement after giving consideration to the use of the part, the location of the leaks, and other pertinent factors.

4. PROCESS: Consists of suitable cleaning of the castings, extraction of air from the porous sections by vacuum, pressure filling the evacuated pores with tung oil, and subsequent polymerization and swelling of the oil retained by the pores.

OPTIONAL PROCESS: An equivalent process may be substituted for the one outlined above, if approved by the purchaser.

6. MATERIALS: (a) The tung oil shall be the best grade possible with water content at the very minimum. The oil shall conform to the requirements specified in A.S.T.M. Specification D12-33.

(b) The mineral oil shall be equivalent to the grade known as Bright Stock, which has a viscosity of 140-160 S.U.V. at 210°F and a minimum flash point of 500°F, or to Pennsylvania Refined Steam Cylinder Stock No. 600 or 610.

(c) The oil for intermediate cooling shall be a commercial paraffin oil having a viscosity of 100 S.U.V. at 100°F.

(d) The kerosene shall be the regular commercial grade.

(e) Hydroquinone, in the proportion of one ounce to a gallon of tung oil, may be used as an inhibitor.

7. PREPARATION OF CASTINGS: (a) Rough Castings.- Shall first be thoroughly cleaned by the customary foundry clean-up methods and then proceed through two or all of the following operations, as applicable:

(1) All rough castings shall be cleaned by spraying with a suitable organic solvent which does not attack the metal, or by vapor degreasing.

(2) After the cleaning in (1), rough magnesium alloy castings, whether or not treated to resist corrosion, shall be pickled in a sulphuric acid (H_2SO_4) bath to remove 0.002 inch from each surface. A 15-second pickle in a fresh 2% sulphuric acid solution should be sufficient but the time will vary with change in temperature and acid concentration. The pickling operation shall be followed by rinsing in running tap water and then in hot water to facilitate rapid drying with a clean, dry air blast.

(3) All castings shall be dried at 300°F for 2 hours immediately preceding the impregnating operation.

(b) Finished and Semi-Finished Castings.- Shall proceed through the following operations:

(1) They shall first be washed to remove adhering dirt and chips and thoroughly dried.

(2) They shall then be degreased by vapor degreasing or a similar process which will accomplish equivalent results.

(3) All castings shall be dried at 300°F for 2 hours immediately preceding the impregnating operation.

8. IMPREGNATION PROCEDURE: (a) The clean, dry castings shall be transferred directly from the drying oven to the empty impregnator, without cooling to below 200°F. The impregnator shall be at 200°-210°F before introduction of the castings and shall be maintained at this temperature during subsequent operations. The air shall be exhausted from the impregnator and castings until a vacuum of not less than 27 inches Hg is attained.

(b) The tung oil shall be preheated to 200°-210°F either in an auxiliary tank specially provided for that purpose or in another impregnator. The hot oil shall then be sucked into the evacuated impregnator, at such a rate that the high vacuum will be maintained, until the contained castings are completely covered. The vacuum shall be released and an air pressure of 75-100 lb per sq in. applied for not less than 15 minutes. Re-impregnation is generally more effective than increasing the time of the pressure stage and therefore it is expedient to restrict this stage to the minimum time consistent with satisfactory arrest of leakage in the majority of castings.

(c) After the pressure-impregnation stage, the hot oil shall be forced from the operated impregnator into an auxiliary tank, if one is provided for preheating and/or storing the oil, or into an empty impregnator, or sucked into an impregnator which has been heated, loaded and evacuated preparatory to another cycle.

Note: Tung oil oxidizes rapidly and becomes viscous and gummy when held at elevated temperatures for extended periods of time and therefore it should not be kept at heat when castings are not being processed. When the oil in use reaches a viscosity of 130 S.U.V. at 210°F it shall be discarded and a new supply introduced.