



Engineering Material Specification

Material Name

Specification Number

STEEL TUBING - TERNE COATED

ESA-M1A193-A

1. SCOPE

The material defined by this specification is a low carbon steel tubing, completely coated on the inside and outside with a terne alloy or a lead-tin composition applied by the hot dip process.

2. APPLICATION

This specification was released originally for materials used for fuel filler pipes and fuel vent tubes.

3. REQUIREMENTS

3.1 BASE METAL

The base metal shall be an uncoated low carbon steel tubing, capable of carrying a liquid.

3.2 TERNE COATING

Continuity and uniformity of the hot dip lead tin coating is of primary importance since pitting and corrosion of the base metal is objectionable. The quality of the terne coating shall be controlled by the following:

3.2.1 Coating Uniformity

While no specific values of weight or thickness are specified, the coating must be uniform in thickness, and free of runs, drips or surface coating irregularities which affect function or performance.

3.2.2 Coating Porosity Density

Parts for testing may be sectioned into convenient lengths, so that inside and outside surfaces can be inspected. Thoroughly clean (preferably vapor degrease with trichloroethylene) and totally immerse, vertically if possible in a nonagitated solution of distilled water pH 6-6.5 and maintain at a temperature of $93 \pm 2^{\circ}\text{C}$ for a period of six hours + 15 minutes. Parts with I.D. surfaces not readily visible shall be sectioned after immersion and visually examined.

Method of Evaluation: Both inside and outside surfaces shall be visually examined upon completion of the test for the maximum amount of porosity (red rust spots) present per sq. in (645 mm²). No sq. in (645 mm²) area shall contain more than 30 spots. No single spot shall be larger than 1/16 in (1.6 mm) in diameter.

Date	Para. No.	Revisions	Approval
1979 01 10		Metricated and Retyped	
1963 06 05		Released AS1-915	

1978 09 15
Eng Res
June 77 3948-a

EP Francis / JLT
Page 1 of 2

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3.3 SUPPLIER'S RESPONSIBILITY

Material supplied to this specification must be equivalent to that originally approved. Changes in formulation or processing shall not be made without prior approval as described in Supplier Procedure I-A.

4. APPROVAL OF SUPPLIERS

Suppliers to this specification must be approved by the affected Product Engineering Office. Procedure for gaining approval of a specific material to a new/existing ES-M specification is contained in Supplier Procedure I-A. For approved suppliers, see Engineering Materials Approved Source List.

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Eng Res
June 77 3948-b

Page 2 of 2

9009160 0000213 271