

THE ENGINEERING EQUIPMENT AND MATERIALS USERS ASSOCIATION

SPECIFICATION FOR QUALITY LEVELS FOR CARBON STEEL VALVE CASTINGS

PUBLICATION No. 167 : 1991

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THE ENGINEERING EQUIPMENT AND MATERIALS USERS ASSOCIATION

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1. FOREWORD AND SCOPE

1.1 Foreword

This specification arose from valve users' need to rationalise the quality level requirements for steel valve castings in the petroleum, chemical and allied industries, to:

- a) formalise manufacturers normal practice ('BASIC' quality)
- b) introduce a new category of valve casting quality ('WARRANTED' quality), intended for lower pressure/size valves on potentially hazardous process duties. This category has its quality controlled by controlling foundry procedures, rather than by detailed NDT of finished castings.
- c) try to rationalise users' special (additional) NDT requirements and so avoid minor, often arbitrary, differences in different users' 'in-house' specifications.

BS 5998: Specification of quality levels for steel valve castings, has had limited acceptance and use by industry in which valves to ASTM, API and other standards are also used. This EEMUA specification is generally applicable and sets out clearly defined categories for quality, primarily to improve the clarity of agreements between the foundry and the manufacturer.

1.2 Scope

The specification covers NDT quality control procedures for the casting of valve bodies, bonnets etc. None of these procedures will however guarantee that the casting is leak tight. It will therefore also be necessary to hydrostatically pressure test the completed valve in accordance with the requirements of the applicable valve standard. The purchaser may also request an air under water test at the design pressure, or a helium leak test e.g. as in the ASME Boiler and Pressure Vessel Code Section V: Nondestructive Examination. In that event permissible leakage rates should be agreed between the manufacturer and the purchaser. Note that any such additional testing is excluded from this specification.

Three quality levels of valve castings are specified: Basic, Warranted and Special. Guidance is included on the application of these quality levels with due regard to the nature of the service.

Prototype testing and ongoing production quality testing are both covered.

Requirements to be approved by the purchaser are listed in the Appendix.

2. APPLICATION OF THE CASTING QUALITY LEVELS

The quality level required shall be determined and specified by the purchaser, taking account of the nature of the hazard associated with the service and with due regard to current legislation.

The following suggested application of quality levels is given as guidance:-

- a) Basic quality: for non-hazardous services in the pressure ranges/sizes given in clause 4.1.
- b) Warranted quality: for duties within the pressure ranges/sizes given in clause 5.1 when the consequences of a leak are unacceptable.
- c) Special quality: for any other duty

3. CASTING STANDARDS

3.1. Specification

All castings shall be to BS 1504 grade A or B to ASTM A216 (WCB) or A352 (LCB, LCC) as appropriate but additionally the following supplementary material requirements shall apply:-

3.2. Chemical Composition (Ladle Analysis)

Carbon 0.25% max

Carbon + Mn/6 0.42% max

In addition, for butt-weld end valves, the foundry shall be required to confirm that regular routine production checks show that the carbon equivalent does not exceed 0.50% when calculated in accordance with the following formula:

$$\text{Carbon} + \text{Mn}/6 + (\text{Cr} + \text{Mo} + \text{V})/5 + (\text{Ni} + \text{Cu})/15$$

3.3. Tensile Strength

The actual tensile strength shall not exceed the minimum required by the relevant material specification by more than 150 N/sq mm.