

**MSS SP-93-2014**

**Quality Standard for Steel Castings  
and Forgings for Valves, Flanges,  
Fittings, and Other Piping  
Components**

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**Liquid Penetrant  
Examination Method**

**Standard Practice**  
Developed and Approved by the  
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## **| FOREWORD |**

This MSS Standard Practice, SP-93, *Quality Standard for Steel Castings and Forgings for Valves, Flanges, Fittings, and Other Piping Components – Liquid Penetrant Examination Method*, was originally adopted in 1982 for the purpose of providing a uniform method of Liquid Penetrant Examination. It was specifically developed for the valve/piping industry but may be used in any application where this type of examination is suitable.

This Standard Practice was reaffirmed in 1987 with essentially no changes.

The Third edition was reaffirmed in 1992 with essentially no changes.

The 1999 edition included minor revisions and was re-formatted to conform to MSS publication practices.

The 2008 edition included minor revisions and was re-formatted to conform to MSS publication practices.

This 2014 edition includes editorial corrections, a clarification to Scope in Section 1, update of Section 7 and Table 1, and an update of Annex A references. It was also re-formatted to conform to current MSS publication practices.

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## QUALITY STANDARD FOR STEEL CASTINGS AND FORGINGS FOR VALVES, FLANGES, FITTINGS, AND OTHER PIPING COMPONENTS

### LIQUID PENETRANT EXAMINATION METHOD

#### 1. SCOPE

1.1 This Standard Practice provides methods and acceptance standards for liquid penetrant examination of steel castings and forgings for valves, flanges, fittings and other piping components. It is applicable to examination of repairs as well as to initial examination of castings and forgings.

1.2 The methods contained in this Standard Practice provide uniform procedures that will produce satisfactory and consistent results upon which the Acceptance Standards of Table 1 may be used.

1.3 This Standard Practice includes the examination of pressure containing castings and forgings.

#### 2. REFERENCES

ASTM E165/E165M, *Standard Practice for Liquid Penetrant Examination for General Industry*

ASNT SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*

#### 3. DEFINITIONS

3.1 **Pressure Containing Part** – A part whose failure would permit the contained fluid to escape to the atmosphere. For valves, the body and bonnet (cover) and end pieces (of multi-piece valve bodies, e.g., ball valves) shall be considered the pressure containing parts.

3.2 **Indication** – The visible bleedout of liquid from a discontinuity.

3.3 **Linear Indication** – An indication in which the length is three or more times the width.

3.4 **Rounded Indication** – An indication which is circular or elliptical, with its length less than three (3) times its width.

#### 4. PROCEDURE

4.1 All exterior and accessible interior surfaces of the pressure containing parts shall be examined by the liquid penetrant method. Interior surfaces not accessible because of configuration, such as small holes or bores, need not be examined. Examination may occur prior to machining or after machining at the manufacturer's option.

4.2 Liquid penetrant examination procedure shall be in accordance with ASTM E165/E165M.

#### 5. ACCEPTANCE STANDARDS

5.1 Acceptance Standards for liquid penetrant indications shall be as shown in Table 1.

5.2 Broad areas of pigmentation which would mask indications of defects are unacceptable.

#### 6. EVALUATION OF INDICATIONS

6.1 All indications shall be examined in terms of the Acceptance Standards of Table 1.

6.2 Any indications which exceed the Acceptance Standards in Table 1 shall be regarded as representing discontinuities and shall be re-examined to verify whether or not actual discontinuities are present. Surface conditioning may precede the re-examination.

6.3 An indication may be larger than the discontinuity which causes it. However, the size of the indication and not the size of the discontinuity is the basis of acceptance or rejection.