

**NOTICE OF  
CHANGE**

**INCH-POUND  
MIL-STD-271F(SH)  
NOTICE 1  
21 June 1993**

**MILITARY STANDARD  
REQUIREMENTS FOR NONDESTRUCTIVE  
TESTING METHODS**

**TO ALL HOLDERS OF MIL-STD-271F:**

1. The following attached pages of MIL-STD-271F(SH) have been revised and supersede the pages listed.

<b>New Page</b>	<b>Date</b>	<b>Superseded Page</b>	<b>Date</b>
34	1 May 1993	34	27 June 1986
35	1 May 1993	35	27 June 1986
35A	1 May 1993	--	--

2. **RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.**

3. Holders of MIL-STD-271F(SH) will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or canceled.

**Preparing Activity:  
Navy - SH  
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5.4 General requirements. Penetrant testing shall be performed in accordance with a written procedure. Group I penetrant material shall be used for all welds, except casting inspections and weld repairs to casting where an appropriate group listed in 5.3.1 may be used. The use of other than group I penetrant materials for welds not stated herein shall require approval by NAVSEA authorized representative.

5.4.1 Equipment requirements. The test equipment operated by qualified nondestructive test personnel shall be capable of consistently obtaining results of specified level of sensitivity.

5.4.2 Procedure. The liquid penetrant inspection procedures shall contain, as a minimum, the following information:

- (a) Brand name and specific group type, number and letter designation, or both, of penetrant, emulsifier, penetrant remover, and developer.
- (b) Details of method of precleaning and drying, including brand name and type of cleaning materials used, drying temperature requirements, and time allowed for drying.
- (c) Details of method of penetrant application, the length of time that the penetrant remains on the surface, and the temperature of the surface and penetrant during penetration.
- (d) Details of method of removing excess penetrant from the surface, and of drying the surface before applying the developer.
- (e) Details of the method of applying the developer and the length of developing time before inspection.
- (f) Method of post-test cleaning.
- (g) The applicable acceptance standards.

5.4.2.1 Change of penetrant materials. When the brand or type of precleaner, penetrant, penetrant remover (solvent) or developer differs from that specified in the procedure, a new procedure shall be prepared which includes all the information required by 5.4.2.

## 5.5 Surface preparation.

5.5.1 General requirements. Surfaces to be inspected shall be free from scale, slag and adhering or imbedded sand or other extraneous materials. With the exception of undercuts which are within specification allowances, the contour of welds shall blend smoothly and gradually into the base metal. Weld surface irregularities shall be removed to the extent that they will not interfere with interpretation of the test results. The final liquid penetrant inspection shall be performed in the final surface condition as specified in 1.4 herein. Peening; shot, sand, grit, and vapor blasting shall not be performed on surfaces which are to be liquid penetrant inspected unless specifically approved by the authorized representative of NAVSEA.

5.5.2 Finished surfaces. Surfaces, for which a specific finish is required, shall be given such surface finish prior to the final liquid penetrant inspection prescribed by the applicable specifications. Inspection at intermediate stages of fabrication shall be as specified in the applicable specification.

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5.6 Test procedures.

5.6.1 Pre-test cleanliness. Prior to liquid penetrant inspection, the surface to be tested and any adjacent area within 1 inch of the surface to be tested shall be dry and free of dirt, grease, lint, scale and salts, coatings, or other extraneous matter that would obscure surface openings or otherwise interfere with the test. In addition, all liquid penetrant tests shall be performed prior to ultrasonic inspections on the same surfaces to avoid interference between the penetrant dye and any residual couplant. All surfaces being tested shall be thoroughly cleaned of extraneous material. If a nonvolatile liquid is used for cleaning, the surface shall be heated or dried with hot air to assure complete removal of the cleaner. As a final cleaning operation each surface shall be dipped, sprayed, wiped, or brushed with acetone, denatured ethanol (ethyl alcohol), isopropanol (isopropyl alcohol), or cleaner/removers supplied by penetrant manufacturers which meet the requirements of MIL-I-25135. Surfaces shall then be thoroughly dried by removing the excess with a clean dry cloth or absorbent paper, and allowing the remainder to evaporate for a minimum drying time as established below (5 minutes is adequate for acetone). In no case shall the minimum drying time be less than 5 minutes. Other precleaners may be used for the final cleaning operation provided they meet the halogen and sulfur requirements of 5.3.1 and are qualified as follows:

- (a) The performance of the proposed cleaner and associated drying time/temperature combination shall be compared to the performance of acetone through the use of three MIL-I-25135 Type I penetrant sensitivity test panels (aluminum quench crack panels) and a test piece(s) which includes discontinuities representative of those anticipated in the parts to be examined. The test piece(s) shall include discontinuities of approximately the same size, or smaller, as the applicable acceptance standards and discontinuities of a larger size such that the effect of pooling of the precleaner can be adequately evaluated. The panels and specimens shall be soaked in an oil-based cutting fluid for twenty-four hours prior to the evaluation.
- (b) The acceptability of the proposed precleaner and drying time/temperature combination shall be based on a comparison of the results obtained with the candidate procedure (using the minimum drying time/temperature combination) versus acetone using a five minute drying time. All of the other procedure parameters shall be the same for the two trials. The minimum penetrant dwell time and the minimum development time allowed by the procedure shall be used. If, in the opinion of the Level III Examiner, the indications obtained with the proposed precleaner and associated drying time/temperature combination are essentially the same as those obtained with the acetone, the precleaner and associated drying time/temperature is qualified for use.
- (c) Documentation of the qualification shall include the signature of the Level III Examiner and shall be provided to the Government Inspector upon request.

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5.6.2 Temperature. Maximum penetration into extremely small openings requires that the penetrant and the test surface be maintained at the temperature recommended by the penetrant manufacturer but shall in no case be less than 50 degrees Fahrenheit (°F). The temperature of the penetrant and the test surface shall not exceed 100°F, except that for group I materials the temperature of the test surface may be a maximum of 150°F or the maximum temperature recommended by the manufacturer, whichever is less. Due to the flammable nature of liquid penetrant inspection materials, the use of an open flame for heating purposes shall be prohibited. Special conditions requiring deviation from the above requirement require approval by an authorized representative of NAVSEA.

5.6.3 Penetration time. The surface to be tested shall be thoroughly and uniformly coated with penetrant by flooding, brushing, immersion, or spraying. Unless otherwise recommended by the manufacturer, and approved by the authorized representative of NAVSEA, or when specified in the applicable material or equipment specification, the penetrant dwell time for the various penetrant groups shall be as follows:

Penetrant (group)	Minimum penetration time (minutes)	Maximum penetration time (minutes)
I	15	20
II	15	20
III	25	30
IV	25	30
V	15	20
VI	10	15
VII	15	20

5.6.3.1 Application of emulsifier (groups II, V and VI). The emulsifier shall be applied in accordance with the manufacturer's instruction and in accordance with .