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FOREWORD

A. This Outline of Investigation contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Outline of Investigation. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of these requirements by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Outline of Investigation will not necessarily be judged to comply with the Outline of Investigation if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Outline of Investigation may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Outline of Investigation.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Outline of Investigation is processed. UL shall not be responsible to anyone for the use of or reliance upon this Outline of Investigation by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of or reliance upon this Outline of Investigation.

F. Many tests required by the Outline of Investigations of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

Subject 852

November, 1989

May 31, 1990

Revision pages for

OUTLINE OF INVESTIGATION FOR

STEEL SPRINKLER PIPE FOR FIRE PROTECTION SERVICE

SUBJECT 852

Attached to this transmittal notice is a revision of the November, 1989 Outline of Investigation for Steel Sprinkler Pipe for Fire Protection Service.

A CHANGE IS INDICATED BY A VERTICAL LINE IN THE MARGIN ON PAGES DATED MAY, 1990.

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December 27, 1989

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SUBJECT 852

OUTLINE OF INVESTIGATION

FOR

STEEL SPRINKLER PIPE FOR
FIRE PROTECTION SERVICE

Issue Number: 1

NOVEMBER, 1989

(As Revised to May, 1990)

The following tentative requirements will be employed by Underwriters Laboratories Inc. as a guide in the investigation of a product of this type. However, it should be understood that these requirements are not to be considered complete or final in the determination of either UL's judgement or the manufacturer's development of this product. Additional tests or requirements may be necessary if features of construction or use are present which have not been anticipated by this Outline of Investigation. Certain tests included in these requirements may be omitted on the basis of previous recognition for particular materials and components.

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12. Tensile Tests

12.1 Test specimens are to be machined from steel pipe sidewalls and subjected to yield strength, tensile strength and elongation tests per the ASTM A370 test method. The values shall comply with the specified ASTM pipe standard or the requirements of the specification used by the manufacturer.

13. Corrosion Analysis

13.1 The corrosion resistance ratio (CRR) of steel pipe is to be determined by using the following formula:

$$CRR = \left(\frac{\text{Minimum Wall Thickness of the Test Pipe}}{\text{Thickness of Schedule 40 Pipe Under the First Exposed Thread}} \right)^3$$

13.2 The thickness of the test pipe used in the formula is to be the minimum wall thickness specified by the manufacturer under the first exposed thread, if threaded, or the thinnest wall section for unthreaded.

13.3 The thickness of Schedule 40 steel pipe used in the formula is to be the minimum calculated thickness of the pipe under the first exposed thread when threaded pipe ends are assembled into screwed fittings having ANSI B1.20.1 threads (see Appendix A).

MANUFACTURING AND PRODUCTION TESTS

14. Hydrostatic Test

14.1 Each length of pipe is to be subjected to a hydrostatic test at (1) two times the rated pressure for 1 minute, or (2) 1200 psig for 5 seconds. Pipe lengths are to be rejected if leakage or rupture are evident. The Eddy Current Test is an acceptable alternative to the hydrostatic test. Each length of steel pipe is to be subjected to the Eddy Current Test as described in ASTM E309 to determine flaws and inconsistencies of the pipe. The pipe is to be accepted based upon the reference calibration.

MARKING

15. General

15.1 Each length of pipe shall be legibly marked on the outside surface with the following:

A. Manufacturer's name, private labeler's name, or identifying symbol.

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t_{40} = minimum wall thickness of Schedule 40 pipe
under first exposed thread (see Table I).

TABLE 1

Nominal Pipe Size, Inches	Minimum Wall Thickness Under First Exposed Thread, of Schedule 40 Pipe, Inch
3/4	0.038
1	0.044
1-1/4	0.051
1-1/2	0.055
2	0.059
2-1/2	0.071
3	0.079

Example: Calculation for 1-1/4 inch pipe sample:

Step

- 1 Obtain ANSI B1.20.1, Table 2
 Manufacturer's specified minimum wall thickness = 0.080 inch
 Manufacturer's specified maximum OD = 1.653 inches
- 2 $E_2 = 1.60130$ inches (ANSI B1.20.1, 1-1/4 inches OD)
 thread depth = 0.06957 inch (ANSI B1.20.1, 1-1/4 inches thread depth)
- 3 $DE_2 = E_2 - \text{thread depth}$
 $DE_2 = 1.60130 - 0.06957 = 1.532$ inches
- 4 $ID = OD - 2t$
 $t = \text{Manufacturer's minimum thickness}$
 $ID = 1.653 - 2(0.080) = 1.493$ inches
- 5 $\frac{DE_2 - ID}{2} = \frac{1.532 - 1.493}{2} = 0.0195 = \text{minimum value of } t$

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$$CRR = \left(\frac{t_{\min}}{t_{40}} \right)^3 \left(\frac{0.0195}{0.051} \right)^3 = 0.05589 \text{ or, rounded, } 0.056 \text{ inch}$$

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