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REPORT

on

SPRINKLERS, AUTOMATIC AND OPEN

Viking Corporation  
Hasting, MI

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## GENERAL

## INTRODUCTION:

This Report describes the investigation of automatic sprinklers intended to be installed in accordance with the National Fire Protection Association Standard For The Installation of Sprinkler Systems, NFPA 13.

## OBJECT:

The object of this investigation was to determine compliance of the automatic sprinklers with the Standard For Automatic Sprinklers For Fire Protection Service, UL 199.

## PLAN:

The investigation of the automatic sprinklers consisted of conducting a product conformance evaluation and performance testing as described in UL 199.

## DESCRIPTION

## PRODUCT COVERED:

Model M, 3/8 and 1/2 in. orifice pendent and upright, Model M-5, 1/2 in. horizontal sidewall and extended coverage pendent and horizontal sidewall, Model M, 3/8 in. horizontal sidewall, high pressure sprinklers in the 135, 155, 175, 200 and 286°F temperature ratings for Quick Response Types 135, 155, 175, 200, 286 and 360°F for Standard Response Types and 135, 155 and 175°F for Quick Response Extended Coverage Types having 1/2 in. inlet threads, with rated pressure of 250 psig.

\*The Model M-5 (VK442), 5.6K quick response, horizontal sidewall will be identified as SIN VK305.

\*The Model M-5 (VK442), 5.6K quick response, extended coverage horizontal sidewall will be identified as SIN VK605.

## CONSTRUCTION DETAILS:

The devices have been examined and found to comply with the Standard for Automatic Sprinklers, UL 199, in effect as of the date of this Report.

## USE:

The products covered by this Report are for use in accordance with the National Fire Protection Association Standard for the Installation of Sprinkler Systems, NFPA 13, and the manufacturer's installation instructions (see Figs. 1, 5, 6 and 7).

## TEST RECORD INDEX

<u>Description</u>	<u>Test Record</u>
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Model M 3/8 and 1/2 in. SSU and SSP Standard Response and Model M 3/8 and 1/2 in. HSW Quick and Standard Response, High Pressure Sprinklers, rated 250 psi	2
Model M-5 1/2 in. Orifice Pendent and Horizontal Sidewall Quick Response Extended Coverage Sprinklers, rated 250 psi	3
Model M, 3/8 in. Orifice Horizontal Sidewall Sprinkler tested for compliance of the new and Revised Operation - Cold Soldering Test.	4
*Model M-5, 1/2 in. Orifice Pendent and Recessed Pendent Extended Coverage Sprinklers utilizing A modified deflector.	5

T E S T R E C O R D N O. 1

SAMPLES:

Models M, 3/8 and 1/2 in. orifice pendent and upright, \*Model M-5 1/2 in. horizontal sidewall, high pressure sprinklers in the 135, 155, 175, 200 and 286°F temperature ratings having 1/2 in. inlet threads, with rated pressure of 250 psig.

TEST METHOD REFERENCE:

The following tests were conducted in accordance with the requirements described in UL 199:

1. Examination Of Samples
2. Leakage
3. Hydrostatic Strength
4. 30-Day Leakage
5. Operation - Lodgement
6. Flow Endurance
7. Operation - Cold Soldering
8. Strength of Frame
9. Calibration
10. 16-Pan Distribution
11. 100-Pan Distribution - Sidewall Sprinklers
12. Fire

Based upon the similarities between the Models M, 3/8 and 1/2 in. orifice quick response high pressure sprinklers submitted under this investigation with the presently UL Listed Models M, 3/8 and 1/2 in. quick response sprinklers, only the tests described in Test Record No. 21 were judged necessary.

The sprinklers are identical to the Listed Models M, 3/8 and 1/2 in. orifice upright and pendent and 1/2 in. horizontal sidewall sprinklers except for the maximum pressure.

The manufacturer's installation instructions (Fig. 1) were used in the evaluation of the product to determine an appropriate investigation.

EXAMINATION OF SAMPLES:

METHOD

Representative automatic sprinkler samples were examined for compliance with the manufacturer's construction drawings and the applicable construction requirements of the Standard For Automatic Sprinklers For Fire Protection Service, UL 199. Also, the manufacturer's installation instructions were examined for conformance with the applicable requirements of UL 199.

RESULTS

The sample sprinklers were found to be in conformance with the manufacturer's drawings and UL 199. The installation instructions also complied with the applicable requirements of UL 199.

T E S T R E C O R D N O. 2

SAMPLES:

Representative samples of the Model M 3/8 and 1/2 in., upright, pendent, and horizontal sidewall standard response sprinklers and 3/8 in. horizontal sidewall quick response sprinklers were used in this investigation.

TEST METHOD REFERENCE:

The following tests were conducted in accordance with the requirements described in UL 199:

1. Examination Of Samples
2. Operation - Lodgement
3. Flow Endurance
4. 100-Pan Distribution - Sidewall Sprinklers

Based upon the similarities between the Model M sprinklers submitted under this investigation with the presently UL Listed Model M sprinklers, only the tests described in Test Record No. 2 were judged necessary.

The sprinklers are identical to the Listed Model M quick response high pressure sprinklers except for the pip cap and glass bulb.

The manufacturer's installation instructions Fig. 2 were used in the evaluation of the product to determine an appropriate investigation.

EXAMINATION OF SAMPLES:

METHOD

Representative automatic sprinkler samples were examined for compliance with the manufacturer's construction drawings and the applicable construction requirements of the Standard For Automatic Sprinklers For Fire Protection Service, UL 199. Also, the manufacturer's installation instructions were examined for conformance with the applicable requirements of UL 199.

RESULTS

The sample sprinklers were found to be in conformance with the manufacturer's drawings and UL 199. The installation instructions also complied with the applicable requirements of UL 199.

Test Record No. 2 Summary:

The results of the investigation covered by Test Record No. 2 indicate that the samples of Model M standard response, upright, pendent and horizontal sidewall high pressure sprinklers comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record No. 2 by:  
MICHAEL G. MCCORMICK  
Engineering Associate

Reviewed by:  
GEORGE E. LAVERICK  
Engineering Group Leader

T E S T R E C O R D N O . 3

SAMPLES:

Representative samples of the Model M-5, 1/2 in. orifice, pendent and horizontal sidewall extended coverage light hazard sprinklers were used in this investigation.

TEST METHOD REFERENCE:

The following tests were conducted in accordance with the requirements described in UL 199:

1. Examination Of Samples
2. Operation - Lodgement
3. Flow Endurance
4. Fire Test for Extended Coverage Sprinklers
5. Wall Wetting Tests for Extended Coverage Sprinklers

Based upon the similarities between the Model M-5, pendent and horizontal sidewall ECLH sprinklers submitted under this investigation with the presently UL Listed Model M-5, pendent and horizontal sidewall ECLH sprinklers, only the tests described in Test Record No. 3 were judged necessary.

The sprinklers are identical except for the maximum rated pressure.

The manufacturer's installation instructions (Fig. 7) were used in the evaluation of the product to determine an appropriate investigation.

EXAMINATION OF SAMPLES:

METHOD

Representative automatic sprinkler samples were examined for compliance with the manufacturer's construction drawings and the applicable construction requirements of the Standard For Automatic Sprinklers For Fire Protection Service, UL 199. Also, the manufacturer's installation instructions were examined for conformance with the applicable requirements of UL 199.

RESULTS

The sample sprinklers were found to be in conformance with the manufacturer's drawings and UL 199. The installation instructions also complied with the applicable requirements of UL 199.

Test Record Summary:

The results of this investigation indicate that the product(s) evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:  
MICHAEL G. MCCORMICK  
Senior Engineering Associate

Reviewed by:  
GEORGE E. LAVERICK  
Engineering Group Leader

C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:

Reviewed by:

MICHAEL G. MCCORMICK  
Engineering Associate

GEORGE E. LAVERICK  
Engineering Group Leader

T E S T R E C O R D N O. 4

SAMPLES:

Representative samples of the Listed Model M, 3/8 in. orifice horizontal sidewall sprinklers were used in this investigation.

TEST METHOD REFERENCE:

The following tests were conducted in accordance with the requirements described in UL 199:

1. Examination of Samples
2. Operation - Cold Soldering

The tests and results are contained in Test Record No. 4.

EXAMINATION OF SAMPLES:

METHOD

Representative automatic sprinkler samples were examined for compliance with the manufacturer's construction drawings and the applicable construction requirements of the Standard For Automatic Sprinklers For Fire Protection Service, UL 199. Also, the manufacturer's installation instructions were examined for conformance with the applicable requirements of UL 199.

RESULTS

The sample sprinklers were found to be in conformance with the manufacturer's drawings and UL 199. The installation instructions also complied with the applicable requirements of UL 199.

OPERATION COLD-SOLDERING TEST:

METHOD

An open automatic sprinkler was installed on piping at the minimum spacing specified by the manufacturer from an automatic, ordinary temperature rated automatic sprinkler, both sprinklers being installed in the horizontal sidewall position to discharge water perpendicular to the pipe line. The sprinkler was placed 4 in. below a flat ceiling and 6 in. away from the back wall. Water was discharged from the open sprinkler at a service pressure of 175 psig.

Under these conditions, the automatic sprinkler was exposed to the heat and flame from a 1 ft<sup>2</sup> pan, 4 in. deep, containing 1 pt of heptane. The top of the pan was located 6 in. below the heat responsive element of the sprinkler. For each test the heptane was ignited and the time of operation of each sprinkler was recorded.

Test Record Summary:

The results of this investigation indicate that the product(s) evaluated comply with applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:  
STEVEN J. WISNIEWSKI  
Eng. Assoc.

Reviewed by:  
GEORGE E. LAVERICK  
Eng. Group Leader

T E S T R E C O R D N O . 5

SAMPLES:

Representative samples of the Model M-5, 1/2 in. orifice recessed pendent extended coverage light hazard sprinklers, were used in this investigation.

GENERAL:

Test results relate only to the items tested.

TEST METHOD REFERENCE:

The following tests were conducted in accordance with the requirements described in UL 199:

1. Examination Of Samples
2. Flow Endurance Test
3. Operation Cold-Soldering Test
4. Stress Corrosion Cracking Test of Brass Sprinkler Parts
5. Fire Test for Extended Coverage Sprinklers (light hazard)
6. Wall Wetting Test for Extended Coverage Sprinklers (light hazard)

Based upon the similarities between the Model M-5, 1/2 in. orifice pendent extended coverage sprinkler with a modified deflector submitted under this investigation with the presently UL Listed Model M-5, 1/2 in. orifice pendent extended coverage sprinkler, only the tests described in Test Record No. 5 were judged necessary.



EXAMINATION OF SAMPLES:

METHOD

Representative automatic sprinkler samples were examined for compliance with the manufacturer's construction drawings and the applicable construction requirements of the Standard For Automatic Sprinklers For Fire Protection Service, UL 199. Also, the manufacturer's installation instructions were examined for conformance with the applicable requirements of UL 199.

RESULTS

The sample sprinklers were found to be in conformance with the manufacturer's drawings and UL 199. The installation instructions also complied with the applicable requirements of UL 199.

Test Record Summary:

The results of this investigation indicate that the product(s) evaluated comply with applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:  
STEVEN J. WISNIEWSKI  
Engineering Associate

Reviewed by:  
GEORGE E. LAVERICK  
Engineering Group Leader

C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:

Reviewed by:

MICHAEL G. MCCORMICK  
Engineering Associate

GEORGE E. LAVERICK  
Engineering Group Leader

File Ex643  
Project 78NK8884  
Project 91NK1369  
Project 91NK8921  
Project 91NK6712  
Project 91NK20429  
Project 97NK23564  
Project 97NK23619  
Project 97NK32051  
Project 98NK5103  
Project 98NK17623  
Project 98NK11873  
Project 99NK21033  
Project 99NK25817  
Project 99NK36385  
Project 99NK40795  
Project 00NK24313  
Project 00NK39796  
Project 00NK36004  
Project 00NK26085  
Project 01NK6252  
Project 01NK33  
Project 01NK09243  
Project 01NK46248  
Project 01NK14642  
Project 03NK09286  
Project 02NK14247  
Project 03NK08543  
Project 04NK15031  
Project 07NK06815  
Project 07NK13042  
Project 09CA37128

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REPORT  
on  
SPRINKLERS, AUTOMATIC AND OPEN

Viking Corp.  
Hastings, MI

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## GENERAL

\*

## PRODUCT COVERED:

Automatic sprinklers incorporating frangible 3, 5, and 3mm XS glass bulbs manufactured by Job GmbH and Norbulb, of the following models, types and temperature ratings.

Sprinklers rated 360°F utilize the 5 mm glass bulb only.

	<u>SIN #</u>	<u>DESCRIPTION</u>
USL, CNL,	VK001, VK002, VK003, VK004, VK100, VK102, VK118, VK120, VK200, VK202, VK550, VK560	2.8, 4.2, 5.6, and 8.0 K. Standard Response Upright, Pendent, Conventional, Concealed and Intermediate
USL, CNL,	VK300, VK302, VK310, VK325, VK327, VK329, VK331, VK350, VK352, VK354, VK556, VK566	2.8, 4.2, 5.6 and 8.0 K. Quick Response Upright, Pendent, Conventional, Concealed and Intermediate
USL, CNL	VK104	5.6 K. Standard Response Horizontal Side Wall
USL, CNL	VK304, VK305, VK333	2.8 and 5.6 K. Quick Response Horizontal Sidewall
USL, CNL	VK600, VK602, VK604, VK605, VK606, VK610, VK612, VK614, VK616	5.6 and 8.0 K. Quick Response and Standard Response Extended Coverage
USL, CNL	VK015, VK021, VK023, VK116, VK122, VK124, VK315, VK317, VK319, VK340, VK342, VK344, VK558	2.8 and 5.6 K. High Pressure Quick Response and Standard Response
USL, CNL	VK130, VK132	5.6 K. Stainless Steel
USL, CNL	VK550, VK556, VK560, VK566	5.6 and 8.0 K. Upright Intermediate Level Standard and Quick Response
USL, CNL	VK338, VK339	5.6 K. Stainless Steel Quick Response

(Table Cont'd)

\*

<u>SIN #</u>	<u>DESCRIPTION</u>	<u>REMARKS</u>
USL, CNL	VK910	5.6 K SR Pendent
All Models	Chrome plated, Bright Brass and Nickel plated quick response.	Ratings - 135, 155, 175, 200 and 286°F, installation indicated by deflector.
All Models	Wax coated. Standard Response Only.	Ratings - 135, 155, 175, 200 and 286°F+.
All Models	Lead coated.	Ratings - 135, 155, 175, 200 and 286°F. Installation, pendent and upright.
All Models	IVC Poly 99 Polyester coated.	Ratings - 135, 155, 175, 200 and 286°F. Installation indicated by deflector.
All Models	IVC Poly 99 Polyester coated. Quick Response.	Ratings - 135, 155, 175, 200 and 286°F. Installation, upright and pendent only.
All Models	Teflon coated.	Ratings - 135, 155, 175, 200 and 286°F. Installation as indicated by deflector.
All Models	Teflon coated quick response.	Ratings - 135, 155, 175, 200 and 286°F. Installation, upright and pendent only.
All Models	IVC Poly 99 Polyester coated quick response corrosion resistant in all colors.	Ratings - 135, 155, 175, 200 and 286°F. Installation as indicated by deflector.
VK910		Ratings-135,155,175,200,286, 360°F

+ - Uses 200°F wax for installation where ambient temperature does not exceed 150°F.

**OBJECT:**

The object of this investigation was to determine compliance of the sprinklers with Underwriters Laboratories Inc., Standard for Automatic Sprinklers for Fire Protection Service, UL 199-1981.

\*

GENERAL:

The Viking Model M bulb type sprinklers consist of a brass frame, copper pip-cap, teflon covered belville spring, and a heat responsive element. The heat responsive element consists of a glass bulb filled with a temperature sensitive liquid. Sprinkler frames are color coded in accordance with the requirements of UL 199 and NFPA 13. In addition the bulb color code reported under "Ratings" applies.

The Model M intermediate level glass bulb sprinkler may utilize the Model B-1 sprinkler guard (upright) and the Model C-1 sprinkler guard (pendent).

The Model A-1 concealed sprinkler utilizes a mounting base and cover plate constructed of UNS-G10080 steel. The cover plate is equipped with a "memory metal" clip constructed of ternary CuZnAl alloy that fastens to the deflector. Upon operation the memory metal expands enabling the cover plate to drop away from the sprinkler (See Figs. 1 and 2). Also, the cover plate may be factory painted using an alkyde paint manufactured by Automotive Finishes Inc. to a thickness not exceeding 0.008 in. thick.

RATINGS:

<u>Rating</u> Deg F	<u>Color Identification</u>	
	<u>Frame</u>	<u>Bulb</u>
135	Uncolored	Orange
155	Uncolored	Red
175	White	Yellow
200	White	Green
286	Blue	Blue
360	Red	Mauve
500	Orange	Black

USE:

These sprinklers are intended for use with automatic sprinkler equipment as covered by the Standard of the National Fire Protection Association for the Installation of Sprinkler System, NFPA 13.

MARKING:

The manufacturer's name, Viking, and issue designation are cast on the sprinkler frame. The year of manufacture is cast in the sprinkler frame and the temperature rating is stamped on the sprinkler deflector. The Listing Mark is stamped on the deflector. The words "Do Not Paint" shall be stamped on the cover plate for concealed sprinklers.

## FOR ENGINEERING CONSIDERATIONS ONLY:

Table 1

<u>SIN</u>	<u>OLD MODEL</u>	<u>STYLE</u>	<u>K-FACTOR</u>	<u>RESPONSE TYPE</u>
VK100	M	Upright	5.6	SR
VK200	M	Upright	8.0	SR
VK001	M	Upright	2.8	SR
VK002	M	Upright	4.2	SR
VK102	M	Pendent	5.6	SR
VK202	M	Pendent	8.0	SR
VK003	M	Pendent	2.8	SR
VK004	M	Pendent	4.2	SR
VK104	M	HSW	5.6	OR
VK116	M-5	HSW	5.6	SR
VK015	M	HSW	2.8	SR
VK104	M	HSW	5.6	SR
VK106	M	VSW	5.6	SR
VK118	M	Conventional	5.6	SR
VK120	M	Conventional	8.0	SR
VK124	M High Pressure	Pendent	5.6	SR
VK021	M High Pressure	Upright	2.8	SR
VK122	M High Pressure	<b>Pendent</b>	5.6	SR
VK023	M High Pressure	Pendent	2.8	SR
VK536	M	Pendent	11.5	SR
VK300	M	Upright	5.6	QR
VK325	M	Upright	2.8	QR
VK327	M	Upright	4.2	QR
VK350	M	Upright	8.0	QR
VK302	M	Pendent	5.6	QR
VK329	M	Pendent	2.8	QR
VK331	M	Pendent	4.2	QR
VK352	M	Pendent	8.0	QR
VK333	M	HSW	2.8	QR
VK304	M	HSW	5.6	QR
VK442	M-5	HSW	5.6	QR
VK306	M	VSW	5.6	QR
VK310	M	Conventional	5.6	QR
VK354	M	Conventional	8.0	QR
VK130	N-2	Upright	5.6	SR
VK132	N-2	Pendent	5.6	SR

TEST RECORD INDEX	
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Model M, horizontal side wall, 3/8 and 1/2 in. orifice, utilizing modified pip cap and 5 mm glass bulb	12
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**Table Continued**



<u>Description</u>	<u>Test Record</u>
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## C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:

Reviewed by:

EDWARD J. KAMINSKI  
Project Engineer  
Fire Protection Department

GEORGE E. LAVERICK  
Engineering Team Leader  
Fire Protection Department