



the standard in safety

Underwriters
Laboratories

File EX3836
Project 04NK21104
Project 05CA24622
Project 06NK08727
Project 06NK23448
Project 06NK21375
Project 07CA49552
Project 07NK04786

Issued: March 18, 2005
Revised: December 30, 2008

REPORT

on

RESIDENTIAL SPRINKLERS

Viking Corporation
Hastings, MI

Copyright © 2005 Underwriters Laboratories Inc.

Underwriters Laboratories Inc. authorizes the above named company to reproduce this Report provided it is reproduced in its entirety.

GENERAL

INTRODUCTION:

This Report describes the investigation of residential sprinklers intended to be installed in accordance with the National Fire Protection Association Standard For Installation Of Sprinkler Systems For One- And Two-Family Dwellings And Mobile Homes, NFPA 13D, Installation Of Sprinkler Systems In Residential Occupancies Up To Four Stories In Height, NFPA 13R and Installation Of Sprinkler Systems, NFPA 13.

OBJECT:

* The object of this investigation was to determine compliance of the residential sprinklers with the Third Edition of the Standard For Residential Sprinklers For Fire Protection Service, UL 1626 , **the Outline Of Investigation For Fire Testing of Residential Sprinklers For Use With Smooth, Flat, Sloped Ceilings Having Pitches Not Exceeding 8/12, Subject 1626A, and the Standard For Residential Sprinklers For Fire Protection Service, ULC/ORD-C1626-03.**

PLAN:

The investigation of the residential sprinklers consisted of conducting a design parameter and installation instruction review, construction evaluation and performance testing as described in UL 1626 **4th Edition; Subject 1626A, Issue No.1; and ULC/ORD-C1626-03, 1st Edition.** See Fig. 1 & 2.

DESCRIPTION

PRODUCT COVERED:

VK452, VK453 and VK460, horizontal sidewall sprinklers, ½ in. recess, discharge coefficient "K" =4.0 and 5.8, (3 mm glass bulb type) heat responsive element, 155 and 175 °F temperature rated residential type sprinklers. These sprinklers have a maximum pressure of 175 psig for wet systems only for spacings and flow rates as indicated below:

FOR INSTALLATIONS WITH DEFLECTORS 4-6 IN. BELOW SMOOTH FLAT CEILING

| * | SIN | Style | Temperature Rating, °F | Nominal K-Factor | Maximum Sprinkler Spacing, ft. | Minimum Flow, gpm/Sprinkler | Flowing Pressure, psig |
|---------|-------|---------------|------------------------|------------------|--------------------------------|-----------------------------|------------------------|
| USL,CNL | VK452 | HSW, Rec. HSW | 155 | 4.0 | 12 by 12 | 11 | 7.6 |
| USL,CNL | VK452 | HSW, Rec. HSW | 175 | 4.0 | 12 by 12 | 12 | 9.0 |
| USL,CNL | VK452 | HSW, Rec. HSW | 155,175 | 4.0 | 14 by 14 | 12 | 9.0 |
| USL,CNL | VK452 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 16 | 15 | 14.1 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 12 by 12 | 11 | 7.6 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 14 by 14 | 12 | 10.6 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 16 | 16 | 16.0 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 18 | 16 | 16.0 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 20 | 23 | 33.1 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 18 by 18 | 19 | 22.6 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 18 by 20 | 24 | 36.0 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 20 by 20 | 25 | 39.0 |
| USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 12 by 12 | 16 | 7.6 |
| USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 14 by 14 | 16 | 7.6 |

Continued

FOR INSTALLATIONS WITH DEFLECTORS 4-6 IN. BELOW SMOOTH FLAT CEILING

| | | | | | | | |
|----------------|--------------|------------------------------|------------|------------|-----------------|-----------|-------------|
| *USL,CNL | VK460 | HSW, Rec. HSW | 155 | 5.8 | 16 by 16 | 20 | 11.9 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 175 | 5.8 | 16 by 16 | 21 | 13.1 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 16 by 18 | 22 | 14.4 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 16 by 20 | 26 | 20.1 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155 | 5.8 | 16 by 22 | 31 | 28.6 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 18 by 18 | 23 | 15.7 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 18 by 20 | 29 | 25.0 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 20 by 20 | 30 | 26.8 |
| USL,CNL | VK460 | HSW, Rec. HSW | 155 | 5.8 | 16 by 24 | 38 | 42.9 |
| USL,CNL | VK460 | HSW | 155 | 5.8 | 14 by 26 | 42 | 52.4 |

FOR INSTALLATIONS WITH DEFLECTORS 6-12 IN. BELOW SMOOTH FLAT CEILING

| * | SIN | Style | Temperature Rating, °F | Nominal K- Factor | Maximum Sprinkler Spacing, ft. | Minimum Flow, gpm/Sprinkler | Flowing Pressure, psig |
|---------|-------|---------------------|---------------------------|-------------------------|---|--------------------------------|------------------------------|
| USL,CNL | VK452 | HSW, Rec. HSW | 155,175 | 4.0 | 12 by 12 | 12 | 9.0 |
| USL,CNL | VK452 | HSW, Rec. HSW | 155,175 | 4.0 | 14 by 14 | 13 | 10.6 |
| USL,CNL | VK452 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 16 | 15 | 14.1 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 12 by 12 | 12 | 9.0 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 14 by 14 | 13 | 10.6 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 16 | 16 | 16.0 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155 | 4.0 | 16 by 18 | 17 | 18.1 |
| USL,CNL | VK453 | HSW, Rec. HSW | 175 | 4.0 | 16 by 18 | 18 | 20.3 |
| USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 16 by 20 | 24 | 36.0 |

Continued

FOR INSTALLATIONS WITH DEFLECTORS 6-12 IN. BELOW SMOOTH FLAT CEILING

| | | | | | | | |
|----------------|--------------|------------------------------|------------|------------|-----------------|-----------|-------------|
| *USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 18 by 18 | 19 | 22.6 |
| *USL,CNL | VK453 | HSW, Rec. HSW | 155,175 | 4.0 | 18 by 20 | 24 | 36.0 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 12 by 12 | 16 | 7.6 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 14 by 14 | 18 | 9.7 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 16 by 16 | 24 | 18.4 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 16 by 18 | 27 | 21.7 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 16 by 20 | 32 | 30.4 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155 | 5.8 | 16 by 22 | 37 | 40.7 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 18 by 18 | 29 | 25.0 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 18 by 20 | 35 | 36.4 |
| *USL,CNL | VK460 | HSW, Rec. HSW | 155,175 | 5.8 | 20 by 20 | 36 | 38.5 |
| USL,CNL | VK460 | HSW, Rec. HSW | 155 | 5.8 | 16 by 24 | 42 | 52.4 |
| USL,CNL | VK460 | HSW | 155 | 5.8 | 14 by 26 | 46 | 62.9 |

| FOR INSTALLATION UNDER SLOPED CEILING 2/12 TO 8/12 (IN./IN.) PITCH WITH DEFLECTORS 4-6 IN. BELOW THE CEILING DOWN THE SLOPE TESTED PER SUBJECT 1626A, ISSUE NO. 1 | | | | | | | |
|--|-------|---------------|---------------------------|---------------------|---|---|---|
| | SIN | Style | Temperature Rating, °F | Nominal K-Factor | Maximum coverage Area, Width by Length, ft | Minimum Required Flow, gpm/Sprinkler | Minimum Flowing Pressure, psig |
| USL | VK453 | HSW, Rec. HSW | 175 | 4.0 | 16 by 16 | 16 | 16 |
| USL | VK453 | HSW, Rec. HSW | 175 | 4.0 | 16 by 18 | 17 | 18.1 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 16 by 20 | 23 | 33.1 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 18 by 18 | 19 | 22.6 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 18 by 20 | 25 | 39.0 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 20 by 20 | 25 | 39.0 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 16 by 16 | 21 | 13.1 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 16 by 18 | 22 | 14.4 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 16 by 20 | 26 | 20.1 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 18 by 18 | 23 | 15.7 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 18 by 20 | 29 | 25.0 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 20 by 20 | 30 | 26.8 |

| FOR INSTALLATION UNDER SLOPED CEILING 2/12 TO 8/12 (IN./IN.) PITCH WITH DEFLECTORS 4-12 IN. BELOW THE CEILING DOWN THE SLOPE TESTED PER SUBJECT 1626A, ISSUE NO. 1 | | | | | | | |
|---|-------|---------------|---------------------------|---------------------|---|---|---|
| | SIN | Style | Temperature Rating, °F | Nominal K-Factor | Maximum coverage Area, Width by Length, ft | Minimum Required Flow, gpm/Sprinkler | Minimum Flowing Pressure, psig |
| USL | VK452 | HSW, Rec. HSW | 155 | 4.0 | 16 by 16 | 15 | 14.1 |
| USL | VK452 | HSW, Rec. HSW | 175 | 4.0 | 16 by 16 | 17 | 18.1 |
| USL | VK453 | HSW, Rec. HSW | 155 | 4.0 | 16 by 16 | 16 | 16.0 |
| USL | VK453 | HSW, Rec. HSW | 155 | 4.0 | 16 by 18 | 17 | 18.1 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 18 by 18 | 19 | 22.6 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 18 by 20 | 25 | 39.0 |

| FOR INSTALLATION UNDER SLOPED CEILING 2/12 TO 8/12 (IN./IN.) PITCH WITH DEFLECTORS 6-12 IN. BELOW THE CEILING DOWN THE SLOPE TESTED PER SUBJECT 1626A, ISSUE NO. 1 | | | | | | | |
|---|-------|---------------|---------------------------|---------------------|---|---|---|
| | SIN | Style | Temperature Rating, °F | Nominal K-Factor | Maximum coverage Area, Width by Length, ft | Minimum Required Flow, gpm/Sprinkler | Minimum Flowing Pressure, psig |
| USL | VK453 | HSW, Rec. HSW | 175 | 4.0 | 16 by 16 | 18 | 20.3 |
| USL | VK453 | HSW, Rec. HSW | 175 | 4.0 | 16 by 18 | 18 | 20.3 |
| USL | VK453 | HSW, Rec. HSW | 155/175 | 4.0 | 16 by 20 | 24 | 36 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 16 by 16 | 24 | 17.1 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 16 by 18 | 27 | 21.7 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 16 by 20 | 32 | 30.4 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 18 by 18 | 29 | 25.0 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 18 by 20 | 35 | 36.4 |
| USL | VK460 | HSW, Rec. HSW | 155/175 | 5.8 | 20 by 20 | 36 | 38.5 |

*

GENERAL:

The devices are automatic residential sprinklers of the glass bulb element type consisting of a brass frame, flow shaper, pip cap and insert, compression screw, yoke, Teflon coated Belleville spring washer, and a 3mm heat responsive element.

CONSTRUCTION DETAILS:

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

USE:

The residential sprinklers are for use in their intended operating position only in accordance with the National Fire Protection Association Standards For Installation Of Sprinkler Systems, NFPA 13D, NFPA 13R, and NFPA 13; and the manufacturer's installation instructions.

RATING:

The sprinklers are produced in the following temperature ratings:

| <u>Temperature Rating, °F</u> | <u>(Glass Bulb) Color Identification</u> |
|-------------------------------|--|
| 155 | Red |
| 175 | Yellow |

TEST RECORD INDEX

| DESCRIPTION | TEST RECORD NO. |
|--|-----------------|
| SIN VK452, 4.0 K-Factor Horizontal and Recessed Horizontal Sidewall Sprinklers | 1 |
| SIN VK453, 4.0 K-Factor Horizontal and Recessed Horizontal Sidewall Sprinklers | 2 |
| SIN VK453, 4.0 K-Factor Horizontal and Recessed Horizontal Sidewall Sprinklers, Additional Coverage Area | 3 |
| SIN VK453, 4.0 K-Factor Horizontal and Recessed Horizontal Sidewall Sprinklers, Additional Coverage Area | 4 |
| SIN VK460, 5.8 K-Factor Horizontal and Recessed Horizontal Sidewall Sprinklers | 5 |
| SIN VK460, 5.8 K-Factor Horizontal and Recessed Horizontal Sidewall Sprinklers - Additional Coverage Areas | 6 |
| SIN VK452, VK453, and VK460 horizontal and recessed horizontal sidewall sprinklers utilized in 8/12 in./in. pitch slope ceilings; Subject 1626A, Issue No. 1 effective May 22, 2009 | 7 |

Test Record Summary:

The results of this investigation indicate that the product(s) evaluated comply with applicable requirements in the Standard For Residential Sprinkler For Fire Protection Service, UL1626, 4th Edition and the Outline of Investigation For Fire Testing of Residential Sprinklers For Use With Smooth, Flat, Sloped Ceilings Having Pitches Not Exceeding 8/12, Subject 1626A and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

Test Record by:

Reviewed by:

SCOTT S. DANKERT
Senior Engineering Associate

Mike McCormick
Engineering Associate Lead

CONCLUSION

Samples of the product covered by this Report have been found to comply with the requirements and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the UL 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 UL Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:

Steven J. Wisniewski
Senior Engineering Associate

Reviewed by:

Michael G. McCormick
Engineering Team Leader