

File Ex643  
Project 85NK22507  
Project 85NK15762  
Project 87NK23362  
Project 89NK28067  
Project 90NK24296  
Project 91NK6712  
Project 91NK19768  
Project 94NK6186  
Project 95NK6133  
Project 95NK9541  
Project 97NK8448  
Project 98NK5103  
Project 98NK20794  
Project 99NK21353  
Project 98NK40010  
Project 03NK09286  
Project 02NK14247  
Project 03NK08543  
Project 04NK13848  
**Project 04NK15031**

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REPORT

on

SPRINKLERS, AUTOMATIC AND OPEN

Viking Corporation  
Hastings, MI

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G E N E R A LOBJECT:

The object of this investigation was to determine the \*compliance of the Viking Model M utilizing the 3.0 mm glass bulb \*manufactured by GmbH Job with the Standard For Automatic Sprinklers For Fire Protection Service, UL 199, applicable requirements.

PLAN:

The following tests were conducted to evaluate the Model M \*glass bulb sprinkler with the 3.0 mm bulb as standard, quick response, and extended coverage sprinklers.

Since the Model M glass bulb sprinkler is currently Listed with an 8 mm glass bulb, only the following tests were conducted to evaluate the 135°F quick response, upright and pendent, standard and large orifice sprinklers and are recorded in Test Record No. 1.

1. Examination of Samples
2. Thermal Shock
3. Leakage and Hydrostatic Strength
4. 30 Day Leakage
5. Water Hammer
6. Operation, Bath
7. Operation, Air-Oven
8. High Temperature Uncoated
9. Impact Resistance
10. Vibration
11. Operation, Hang-Up
12. Sensitivity
13. Strength of Heat Responsive Element
14. Assembly Load

The following tests were conducted to evaluate the Model M, 135°F sprinkler with the 2.8 mm bulb as an extended coverage horizontal sidewall sprinkler. The tests and results are recorded in Test Record No. 2.

1. Examination of Samples
2. Distribution and Fire
3. Response
4. Operation, Hang-Up
5. Stress Corrosion Cracking
6. Endurance

The following tests were conducted to evaluate the Model M \*upright and pendent sprinklers as standard and large orifice sprinklers utilizing the 155°F rated 2.8 mm bulb. The tests and results are recorded in Test Record No. 3.

1. Examination of Samples
2. Thermal Shock
3. Operation, Bath
4. Operation, Air-Oven
5. High Temperature Uncoated
6. Strength of Heat Responsive Element
7. Assembly Load

The following tests were conducted to evaluate the Model M sprinkler with the 2.8 mm bulb rated 135 and 155°F as an extended coverage pendent sprinkler. The tests and results are recorded in Test Record No. 4.

1. Examination of Samples
2. Distribution and Fire
3. Response
4. Operating, Hang-Up
5. Endurance
6. Stress Corrosion Cracking

The Sensitivity test was conducted to evaluate the Model M sprinkler with the 2.8 mm bulb rated 155°F as a quick response sprinkler. The test and results are recorded in Test Record No. 5.

The following tests were conducted to evaluate the Model M, standard and large orifice, upright, pendent, and horizontal sidewall sprinklers utilizing a 2.8 mm glass bulb rated 175, 200, and 286°F. The tests and results are recorded in Test Record No. 6.

1. Examination of Samples
2. Thermal Shock
3. Operation Bath
4. Operation Air Oven
5. High Temperature Uncoated
6. Strength of Heat Responsive Element

The following tests were conducted to evaluate the Model M extended coverage pendent and horizontal sidewall sprinklers, standard and large orifice utilizing a 2.8 mm glass bulb rated 155 and 175°F. Since the Model M extended coverage pendent and horizontal sidewall sprinklers, standard and large orifice, are currently Listed with a 2.8 mm glass bulb rated 135 and 155°F, only the following tests were conducted. The tests and results are recorded in Test Record No. 7.

1. Examination of Samples
2. Response
3. Distribution and Fire

The following tests were conducted to evaluate the Model M \*quick response sprinkler utilizing the 2.8 mm glass bulb rated 135 and 155°F under the industry review program for compliance with the revised requirements for quick response sprinklers, adopted June 24, 1987. The tests and results are recorded in Test Record No. 8.

1. Examination of Samples
2. High Temperature Uncoated
3. Impact
4. Vibration

\*The following tests were conducted to evaluate the Model M quick response recessed sprinkler utilizing the 2.8 mm glass bulb, standard and large orifice, rated 135 and 155°F. Since the sprinkler is only recessed to the wrench flat no further testing was necessary. The tests and results are recorded in Test Record No. 9.

1. Examination of Samples
2. Oven Sensitivity
3. Room Sensitivity

The following tests were conducted to evaluate the Model M sprinkler utilizing the 2.8 mm glass bulb rated 135, 155 and 175°F as an extended coverage, large orifice, pendent sprinkler. The tests and results are recorded in Test Record No. 10. Since the only difference between this sprinkler and the currently Listed Model M pendent large orifice sprinkler is the deflector, only these tests were necessary:

1. Examination of Samples
2. Operation (Lodgment)
3. Distribution
4. Fire

The Distribution and Fire tests were conducted in accordance with the revised requirements adopted September 20, 1988. The Response tests were covered under Test Record No. 4.

The room sensitivity test was conducted to evaluate the Model M sprinkler utilizing the 2.8 mm glass bulb rated 135 and 155°F as a pendent and horizontal sidewall quick response extended coverage sprinkler. The test and results are recorded in Test Record No. 11. Since there is no difference between this and the currently Listed Model M pendent and horizontal sidewall extended coverage sprinkler rated 135 and 155°F, only the above test was necessary.

The following tests were conducted on the Model M extended coverage horizontal sidewall, pendent, and recessed pendent sprinklers, and quick response extended coverage horizontal sidewall and pendent sprinklers. The sprinklers are 1/2 and 17/32 in. orifice sizes rated 135, 155, and 175°F. The tests were conducted under the industry review program to determine compliance with the revised Fire and Distribution tests for extended coverage sprinklers, adopted September 20, 1988. The tests and results are recorded in Test Record No. 12.

1. Examination of Samples
2. Extended Coverage Fire
3. Extended Coverage Distribution

The Sensitivity Room Heat tests and Response tests were conducted under Test Records 2, 4 and 11.

The following tests were conducted on the Model M pendent, recessed pendent, horizontal sidewall, and recessed horizontal sidewall sprinkler, utilizing the 2.8 mm glass bulb rated 175, 200, and 286, to evaluate it as a quick response sprinkler at the above intermediate and high temperature ratings in accordance with UL 199 effective May 2, 1989. The tests and results are recorded in Test Record No. 13. No other tests were necessary since the above temperature ratings were initially Listed under Test Record No. 6.

1. Examination of Samples
2. Sensitivity Oven Heat
3. Sensitivity Room Heat
4. High Temperature Uncoated

The following tests were conducted on the Model A-1 quick-response concealed sprinkler, 1/2 in. orifice, utilizing a 2.8 mm glass bulb rated 155°F and 155°F rated cover plate. The tests and results are recorded in Test Record No. 14. The tests were conducted under Project 87NK23362 and 89NK28067.

1. Examination of Samples.
2. Sensitivity Room Heat.
3. High Temperature Uncoated.
4. Operation Bath.
5. 10 Day Corrosion.
6. Distribution 10 and 16 Pan.

Since the results of the Distribution Tests compared favorably with the distribution results obtained on the currently Listed Model A-1 standard pendent concealed sprinkler, no fire testing was considered necessary.

Tests described in Items 3 to 6 were conducted on 155°F rated cover plate under Project 87NK23362 and results are presented in this report.

The following tests were conducted on the Model M 17/32 in. orifice recessed horizontal sidewall extended coverage sprinkler utilizing the Model E or the Model F recessed escutcheon. The tests and results conducted under project 90NK24296 are recorded in Test Record No. 15. Only Response Tests for Quick Response Extended Coverage Sprinklers were conducted on the Model M recessed pendent style sprinklers:

1. Examination of samples.

2. Response Test for Extended Coverage Sprinklers.
3. Response Test for Quick Response Extended Coverage Sprinklers.
4. Extended Coverage Distribution and Fire Tests.

Since the Model M 17/32 in. orifice extended coverage Pendent and Horizontal Sidewall is currently Listed, only the tests noted above were necessary.

The following tests were conducted on Model M 1/2 in. \*orifice corrosion resistant sprinkler with Poly 99 polyester high solids baking enamel in white and black colors designated \*M/W and M/B respectively. The sprinklers are identical to the Listed Model M polyester painted sprinklers except for the paint formulation. The tests conducted and the results obtained are contained in Test Record No. 16.

1. Examination of Samples
2. Infrared Analysis
3. Coating Thickness Determination
4. Sensitivity - Oven Heat
5. 30 Day Corrosion

The 8 mm glass bulb Heat Responsive Element was considered representative of the 2.8 mm bulb for the purposes of this test since the bulb, pipe, cap, orifice, seating surface and compression screw are unpainted only the above testing was considered necessary.

The following tests were conducted on the Model A-1 concealed sprinkler utilizing varnish coated memory metal clips on the cover plate. The tests and results are recorded in Test Record No. 17.

1. Examination of Samples
2. 30 Day Corrosion
3. Sensitivity-Room Heat
4. Response for Ordinary Temperature Rated Ceiling Type Sprinklers
5. High-Temperature Uncoated
6. Qualitative Infrared Analysis

Since the Model A-1 concealed sprinklers are identical to the Listed A-1 concealed sprinklers except for the varnish coating on the memory metal clips, only the above tests were considered necessary.

The following tests were conducted on the Model M large orifice upright sprinkler utilizing a modified pip cap. The tests and results are recorded in Test Record No. 18.

1. Examination of Samples
2. Operation - Lodgment

Since the Model M large orifice upright sprinklers are identical to the Listed Model M large orifice upright sprinklers except for the pip cap, only the above tests were considered necessary.

The following tests were conducted to evaluate the Model M 1/2 and 17/32 in. orifice pendent and horizontal sidewall extended coverage light hazard sprinklers using the Part No. 8342 \*pip cap. The test and results are recorded in Test Record \*No. 19.

1. Examination of Samples
2. Operation - Lodgment

Since the sprinklers are identical to the Listed Model M extended coverage light hazard sprinklers and the pip cap is identical to that used on the Model M vertical sidewall sprinkler only the tests noted above were considered necessary.



The following tests were conducted to evaluate the Model M-5, 3 mm glass bulb 1/2 in. orifice horizontal sidewall ordinary hazard sprinklers using the stepped orifice and residential deflector. The test and results are recorded in Test Record No. 20.

1. Examination of Samples
2. Operation - Lodgment
3. Calibration
4. 100 - Pan Distribution - Sidewall Sprinklers
5. Fire 350 lb Crib

Since the sprinklers are identical for the Listed Model M, 1/2 in. orifice horizontal sidewall except for the stepped orifice, and the deflector only the above tests were considered necessary.

The following tests were conducted to evaluate the Decorative tungsten/nickel plating on the Model M sprinkler. The results are recorded in Test Record No. 21.

1. Examination of Samples
2. 30-Day Corrosion

Based upon the similarities between the Model M tungsten/nickel plated sprinklers submitted under this investigation with the presently UL Listed Model M chrome plated sprinklers, only the tests described above were considered necessary. The thickness of the plating is less than or equal to the chrome plated sprinklers. The Corrosion tests were conducted under Assignment 95NK13916 and reported by letter August 15, 1995.

\*The following tests were conducted on the Model M and M-5, 1/2 and 17/32 in. orifice pendent, recessed pendent, upright and horizontal sidewall quick response sprinklers utilizing a stainless steel pip cap insert. The tests and results are recorded in Test Record No. 22:

1. Examination of Samples
2. Water Hammer
3. Operation Lodgment

\*Since the sprinklers are identical to the Listed Model M and M-5, 1/2 and 17/32 in. orifice pendent, recessed pendent, upright and horizontal sidewall quick response sprinklers except for the use of the stainless steel pip cap insert, only the above tests were considered necessary.

The following tests were conducted on the Listed Model M, 1/2 and 17/32 in. orifice and Model M-5, 1/2 in. orifice horizontal sidewall sprinklers for compliance of the new and revised Operation-Cold Soldering test:

1. Examination of Samples
2. Operation-Cold Soldering

The tests and results are contained in Test Record No. 23.

The following tests were conducted on the VK614, 5.6 K-Factor and VK616, 8.0 K-Factor Concealed Pendent Extended Coverage sprinklers. These sprinklers are identical to the currently Listed VK600 and VK602 Extended Coverage Pendent and Recessed Pendent sprinklers except for the addition of the concealed cup assembly. The results for the following tests are recorded in Test Record No. 24.

1. Examination of Samples
2. Operation - Lodgment
3. Response for EC Sprinklers
4. Operation Cold - Soldering
5. Wall Wetting for EC Sprinklers
6. Fire Test for EC Sprinklers

The following tests were conducted on the Listed VKXXX sprinklers utilizing a Inconel spring, Norbulb glass bulbs, and die cast frames as alternate materials. The results of the following tests are recorded in Test Record No. 27.

1. Construction
2. Leakage Test
3. Hydrostatic Strength Test
4. 30-Day Leakage Test
5. Water Hammer Test
6. Operation - Lodgement Test
7. 10-Day Corrosion Test
8. Stress-Corrosion Cracking Of Stainless Sprinkler Part Test

The following tests were conducted on the Listed Model M, 1/2 and 17/32 in. orifice and Model M-5, 1/2 in. orifice horizontal sidewall sprinklers for compliance of the new and revised Operation-Cold Soldering test:

1. Examination of Samples
2. Operation-Cold Soldering

The tests and results are contained in Test Record No. 23.

The following tests were conducted on the Model VKXXX sprinklers employing ND Industries anaerobic adhesives in accordance with the Standard for Automatic Sprinklers, UL 199. The results are recorded in Test Record No. 28.

1. Sample Examination
2. High Temperature Exposure (Uncoated)
3. Vibration
4. Qualitative Infrared Analysis

The following tests were conducted on the VK606, 8.0 K-Factor Horizontal and Recessed Horizontal Sidewall Extended Coverage sprinklers. These sprinklers are identical to the currently Listed VK606, 8.0 K Horizontal and Recessed Horizontal Sidewall Extended Coverage sprinklers except for the modified deflector. The results for the following tests are recorded in Test Record No. 29.

1. Examination of Samples
2. Operation - Lodgment
3. Sensitivity-Room Heat for EC Sprinklers
4. Operation Cold - Soldering
5. Wall Wetting for EC Sprinklers
6. Fire Test for EC Sprinklers
7. Flow Endurance
8. Stress Corrosion Cracking - Brass Parts

The following tests were conducted on representative samples of the SIN VK300, VK302, VK304, VK305, VK325, VK329, and VK556 sprinklers utilizing an alternate sand cast frame. The results for the following tests are recorded in Test Record No. 30.

1. Examination of Samples
2. Stress Corrosion Cracking - Brass Parts

D E S C R I P T I O NPRODUCT COVERED:

Models M, M-5 and A-1 sprinklers, utilizing the 3.0 mm glass \*bulb manufactured by Job GmbH for a maximum pressure of 175 psig for wet systems as follows:

<u>Model</u>	<u>Description</u>	<u>Rating, °F</u>
M	Standard, 1/2 in. orifice in the upright and pendent positions for use as a quick response sprinkler	135, 155, 175, 200, 286
M	Large, 17/32 in. orifice in the upright and pendent positions for use as a quick response sprinkler	135, 155, 175, 200, 286
M	Chrome or nickel plated to be installed as indicated by deflector, for use as a quick 1/2 in. orifice	135, 155, 175, 200, 286
M	Vertical and horizontal sidewall, 1/2 in. orifice, for use as a quick response sprinkler	135, 155, 175, 200, 286
M	Wax coated (corrosion resistant) for use as a standard sprinkler	135, 155, 175, 200, 286
M-5	Horizontal sidewall, 1/2 in. orifice, ordinary hazard quick response sprinkler	135, 155, 175, 200, 286

(Table Cont'd)

<u>Model</u>	<u>Description</u>	<u>Rating, °F</u>
M	Lead coated (corrosion resistant) for use as a 135,155,175,200,286 quick response sprinkler	
M	Polyester coated (corrosion resistant) for 135,155,175,200,286 use as a quick response sprinkler	
M	Teflon coated (corrosion resistant) for use as a quick response sprinkler	135,155,175,200,286
M	Extended coverage horizontal sidewall 1/2 and 17/32 in. orifice sizes, for area coverages, flow rates, and installations outlined on Page 3A	155
M	Extended coverage pendent 1/2 and 17/32 in. orifice sizes, for area coverages, flow rates, and installations outlined on Page 3A	155, 175
M	Recessed pendent for use as a quick response sprinkler utilizing the F-1 escutcheon	135, 155
M	Extended coverage recessed pendent, 1/2 and 17/32 in. orifice, sizes for area coverages, flow rates, and installation, outlined on Page 3A.	135, 155, 175
M	Quick response extended coverage horizontal sidewall, 1/2 and 17/32 in. orifice, for room sizes and flow rates outlined on Page 3B	135, 155
M	Quick response extended coverage pendent, and recessed pendent 1/2 and 17/32 in. orifice, for room sizes and flow rates outlined on Page 3B	135, 155
A-1	Concealed for use as a quick-response sprinkler, 1/2 in. orifice	155
M	Extended Coverage recessed horizontal sidewall 17/32 in. orifice size, for area coverages, flow rates, and installations as outlined on Page 3A	155, 175
M	Quick Response extended coverage recessed horizontal sidewall 17/32 in. orifice size, for area coverages, flow rates, and installations as outlined on Page 3B	135, 155, 175

GENERAL:

The devices are automatic sprinklers of the glass bulb type consisting of a frame, deflector, cap assembly and releasing mechanism.

The Model M may be wax coated, but the bulb will be left uncoated. The wax is designated: 1-22682 manufactured by the Stevenson Company.

Lead coating may be applied to the deflectors and frames of the Model M. The pip cap and compression screw may be tin coated. After the lead coated deflector and frame are reattached, the top of the sprinkler may be painted, and the color of paint will indicate the temperature rating of the sprinkler.

The Model M recessed pendent quick response sprinkler utilizes the F-1 escutcheon and is recessed approximately 1/4 in. to the wrench flat. The Model M extended coverage recessed pendent sprinkler utilizes the F-1 escutcheon described above or the E-1 escutcheon which recesses the sprinkler approximately 3/4 in.

The Model A-1 quick-response sprinkler utilizes a mounting base and cover plate constructed of UNS-G10080 steel. The cover plate is manufactured to a thickness of 0.0149 in. and is equipped with a "memory metal" clip constructed of ternary CuZnAl \*alloy that fastens to the deflector. The memory metal clips may \*utilize a varnish coating manufactured by Guardsman Chemical Co. Upon operation the memory metal expands enabling the cover plate to drop away from the sprinkler. See Figs. 748. 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.

<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	Upright	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
VK606	M	HSW	8.0	QR

The teflon and polyester coatings are applied to the frame and deflector after the two parts are assembled. The pip cap and compression screw will be tin plated, then the head end of both will be teflon or polyester coated. The teflon is manufactured by Weilburger (North America) Inc., and the polyester is manufactured by Valspar Inc.

RATINGS:

The sprinkler is produced in the following temperature rating:

*Color Identification	
Rating, °F	Bulb
135	Orange
155	Red
175	Yellow
200	Green
286	Blue

MARKINGS:

Location	Marking
Wrench Flat	"Viking" and year of manufacturing
Frame Boss	"M"
Deflector Pendent	"Pendent, temperature rating °F and °C, control number, UL trademark"
Deflector Upright	"Upright, temperature rating °F and °C, control number, UL trademark"
Deflector HSW & VSW	"Sidewall," "Top," "Flow" with arrow, temperature rating °F and °C, control number, UL trademark
Deflector Pendent EC	"Pendent," temperature rating °F and °C, control number, UL trademark, "EC," and "QR-EC"
Deflector HSW EC	"Sidewall," "Top," "Flow" with an arrow, temperature rating °F and °C, control number, UL trademark, "EC," and "QR-EC"



## STANDARD RESPONSE - (SR) - EXTENDED COVERAGE SPRINKLERS - LIGHT HAZARD

SIN	Type	Max Width (A) Ft	Max Length (B) Ft	Min Flow GPM	Nom K-Factor	Distance Below Ceiling In.	System Operating Pressure, psig	Temp Rating, °F
VK625*#	Conc. Pendent	20	20	40	5.6	-	175	165
VK627*#,+	Conc. Pendent	20	20	40	8.0	-	175	165
VK186	Dry Pendent	20	20	40	5.6	-	175	155,175
VK605**	HSW, Rec. HSW	16	20	32	5.6	6 to 12	250	155
VK600	Pendent	20	20	40	5.6	-	175	155,175
VK604	Pendent, Rec. Pendent	20	20	40	5.6	-	250	155,175**
VK602	Pendent, Rec. Pendent	20	20	40	8.0	-	175	155,175
VK608	Pendent, Rec. Pendent	20	20	40	11.2	-	175	155
VK188	Rec. Dry HSW	16	20	32	5.6	4 to 6	175	155,175
VK186	Rec. Dry Pendent	20	20	40	5.6	-	175	155,175
VK196*	Dry Concealed Pendent	18	18	33	5.6	-	175	155
VK196*	Dry Concealed Pendent	20	20	40	5.6	-	175	155

\*Utilizes 135°F coverplate.

#Utilizes 165°F coverplate.

\*\*Utilizes E-1 escutcheon only.

+Available with 1/2 or 3/4 in. N.P.T.

(A)-Dimension of wall on which sprinkler is installed.

(B)-Dimension perpendicular to wall on which sprinkler is installed.

**QUICK RESPONSE (QR) - EXTENDED COVERAGE SPRINKLERS - LIGHT HAZARD****Sloped Ceilings**

SIN	Type	Max Width (A) Ft	Max Length (B) Ft	Min Flow GPM	Nom K-Factor	Maximum Ceiling Incline In./Ft	Distance Below Ceiling In.	Temp Rating, °F
VK605+	HSW, Rec. HSW	16	16	26	5.6	4/12	4 to 6	155
VK605+	HSW, Rec. HSW	16	18	29	5.6	4/12	4 to 6	155
VK605+	HSW, Rec. HSW	16	20	32	5.6	4/12	4 to 6	135,175
VK612+	HSW, Rec. HSW	16	16	26	5.6	4/12	4 to 6	155
VK612+	HSW, Rec. HSW	16	18	29	5.6	4/12	4 to 6	155
VK612+	HSW, Rec. HSW	16	20	32	5.6	4/12	4 to 6	135,175

+For use below smooth, flat, sloped ceilings with pitches between 2/12 to 4/12 (in./in.) at the minimum flow rates specified. The calculation to determine the design area in accordance with NFPA 13 shall not be credited for the quick response feature and not be debited for installation with slopes with pitches greater than 2/12 (in./in.).

**Smooth Horizontal Ceilings (Pitches Not Greater Than 2/12 in./in.)**

SIN	Type	Max Width (A) Ft	Max Length (B) Ft	Min Flow GPM	System Working Pressure, psig	Nom K-Factor	Distance Below Ceiling In.	Temp Rating, °F
VK625*#	Conc. Pendent	16	16	26	175	5.6	-	165
VK625*#	Conc. Pendent	18	18	33	175	5.6	-	165
VK627*#, ++	Conc. Pendent	16	16	26	175	8.0	-	165

VK627*#, ++	Conc. Pendent	18	18	33	175	8.0	-	165
VK188	Dry HSW	16	16	26	175	5.6	4 to 6	155,175
VK188	Dry HSW	16	18	29	175	5.6	4 to 6	155,175
VK188	Dry HSW	16	20	32	175	5.6	4 to 6	155,175
VK186	Dry Pendent, Rec. Pendent	16	16	26	175	5.6	-	155,175
VK186	Dry Pendent, Rec. Pendent	18	18	33	175	5.6	-	155,175
VK605	HSW, Rec. HSW	16	16	26	175	5.6	6 to 12	155
VK612	HSW, Rec. HSW	16	16	26	250	5.6	6 to 12	155
VK605	HSW, Rec. HSW	16	18	29	175	5.6	6 to 12	155
VK612	HSW, Rec. HSW	16	18	29	250	5.6	6 to 12	155
VK605	HSW, Rec. HSW	16	20	32	175	5.6	6 to 12	135,175
VK612	HSW, Rec. HSW	16	20	32	250	5.6	6 to 12	135,175
VK606	HSW, Rec. HSW	16	16	26	175	8.0	4 to 12	135,155,175
VK606	HSW, Rec. HSW	16	18	29	175	8.0	4 to 12	135,155,175
VK606	HSW, Rec. HSW	16	20	32	175	8.0	4 to 12	135,155,175
VK606	HSW, Rec. HSW	16	22	36	175	8.0	4 to 6	135,155,175
VK606	HSW, Rec. HSW	16	22	38	175	8.0	6 to 12	135,155,175

VK600	Pendent	20	20	40	175	5.6	-	135
VK602	Pendent	20	20	40	175	8.0	-	135
VK600	Pendent, Rec. Pendent	16	16	26	175	5.6	-	135,155,175
VK604	Pendent, Rec. Pendent	16	16	26	250	5.6	-	135,155,175
VK600	Pendent, Rec. Pendent	18	18	33	175	5.6	-	135,155,175
VK604	Pendent, Rec. Pendent	18	18	33	250	5.6	-	135,155,175
VK604	Pendent, Rec. Pendent	20	20	40	250	5.6	-	135,175
VK602	Pendent, Rec. Pendent	16	16	26	175	8.0	-	135,155,175
VK602	Pendent, Rec. Pendent	18	18	33	175	8.0	-	135,155,175
VK608	Pendent, Rec. Pendent	16	16	30	175	11.2	-	135,155,175
VK608	Pendent, Rec. Pendent	18	18	33	175	11.2	-	135,155,175
VK608	Pendent, Rec. Pendent	20	20	40	175	11.2	-	135,175

VK196*	Dry Concealed Pendent	16	16	26	175	5.6	-	135, 155
VK196#	Dry Concealed Pendent	16	16	26	175	5.6	-	175
VK196*	Dry Concealed Pendent	18	18	33	175	5.6	-	135
VK196#	Dry Concealed Pendent	18	18	33	175	5.6	-	175
VK196*	Dry Concealed Pendent	20	20	40	175	5.6	-	135
VK196#	Dry Concealed Pendent	20	20	40	175	5.6	-	175

++Available with 1/2 or 3/4 in. N.P.T.

\*Utilizes 135 °F cover plate.

#Utilizes 165°F coverplate.

\*\*Model F1 escutcheon only.

(A)-Dimension of wall on which sprinkler is installed.

(B)-Dimension perpendicular to wall on which sprinkler is installed.

<u>Fig. No.</u>	<u>Model</u>	<u>Description</u>
1	M	Standard orifice, 1/2 in., pendent, quick response sprinkler
2	M	A. 1/2 in. frame with deflector
	M	B. Belleville spring, teflon coated
	M	C. Pip cap
	M	D. Compression screw
	M	E. Glass bulb, 2.8 mm
3	M	Standard orifice, 1/2 in., upright, quick response sprinkler
4	M	Large orifice, 17/32 in. frame with pendent deflector for use in quick response sprinkler
5	M	Large orifice, 17/32 in. frame with upright deflector for use in quick response sprinkler
6	M	Extended coverage sprinkler frame, horizontal sidewall type
7	A-1	1. Mounting bracket
	A-1	2. Memory metal clip
	A-1	3. Cover plate
	A-1	4. Sprinkler
8	A-1	Installation instructions
*9	M/M-5	Extended coverage horizontal sidewall extended coverage installation instructions

C O N C L U S I O N

Samples of the product covered by this Report have been found to comply with the requirements covering the category and the products were 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.

\*TEST RECORD NOS. 1 THRU 13

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\*TEST RECORD NOS. 14 THRU 20

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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

Issued: September 4, 1981  
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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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## 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.

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