File R15111
Project 11CA32512
Project SR10035034-T002

Issued: August 22, 2011
Revised: June 18, 2013

REPORT

on

FIRE EXIT HARDWARE (GXHX)

FIRE EXIT HARDWARE CERTIFIED FOR CANADA (GXHX7)

*__Fortress Industrial Co., Ltd.__
__Changhua Hsien__, Taiwan

*

GENERAL

This investigation was initiated for the sole purpose of determining the performance under a standard fire exposure test of the Series F7100R Rim Type Fire Exit Hardware.

The object of this investigation was to establish the fire rating of the Rim Type Fire Exit Hardware, Series F7100R in accordance with the Standards, “Standard for Positive Pressure Fire Tests of Door Assemblies”, ANSI/UL 10C (Second Edition, dated January 26, 2009), "Standard for Fire Tests of Door Assemblies", ANSI/UL 10B (Tenth Edition, revised date April 13, 2009), and Canadian National Standard, “Standard Method for Fire Tests of Door Assemblies”, CAN/ULC-S104 (Third Edition, dated July 01, 2010).

The fire exposure and hose stream tests were supplemented by other tests to furnish information regarding the mechanical characteristics of this hardware when tested in accordance with the Standard “Panic Hardware”, ANSI/UL 305, Canadian National Standard, "Standard Method of Tests for Emergency Exit and Emergency Fire Exit Hardware", CAN/ULC-S132, and “Exit Devices”, ANSI/BHMA A156.3, Grade 1 requirements. This testing was conducted under File SA8271, Vol. 1, Sec. 5.

TEST RECORD NO. 1

SAMPLES:

Sample of the Rim Type Fire Exit Hardware as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

The Model F7100R was used for test purposes and considered representative of the entire series.

The test assemblies consisted of two sets of single swinging door and frame assemblies. Each door was employed with a Model F7100R Rim Type Fire Exit Hardware.

The construction and size of the test assemblies, was representative of that for which Listing was desired.

CONSTRUCTION DETAILS:

DOOR

The double egress paired doors were designed for an opening of 1219 mm (48 in.) in width and 2438 (96 in.) in height.

Each door was constructed in accordance with Follow-Up Service Procedure R1952 and bore the UL Classification Mark. The doors incorporated the appropriate reinforcements for the mounting of the hardware.

FRAME

The frame in which each door was mounted was a pressed-steel type frame. The frame was constructed in accordance with Follow-Up Service Procedure R1984. The appropriate latch and hinge reinforcements along with the masonry strap type anchors were provided. The frame was capable of bearing the UL Listing Mark.

HARDWARE

Each door assembly incorporated the submitter’s Model F7100R rim type fire exit device. The rim type latch on each door had engagement of 12.50 mm and 13.10 mm into its respective strike.

Each door was provided with four mortise type steel hinges of the ball bearing type, 114.00 mm high and 3.40 mm thick. The hinges were attached to the doors and frames with four screws.

WALL

The door and frame assemblies were installed into a 310 mm thick masonry brick wall. The frames were secured to the wall with masonry strap type anchors.

INSTALLATION

The test assemblies were built into the masonry wall contained within the test frame.

The two single swinging assemblies were mounted so as to have one leaf open out of the furnace chamber and the remaining leaf was mounted so as to open into the furnace chamber.

The mounting of the door was such that it fit snugly within the frame. The mounting allowed free and easy operation of the test door.

The fire exit hardware were assembled and mounted to the door in accordance with the manufacturer's installation instructions except the installation height was set to 980mm above the sill to accommodate the Par. 4.2.1.2 described in CAN/ULC S104.

After installation, the average clearances for the single-swinging door were as shown below:

Door Location	Average Clearance, mm
Door Assembly #1 (Swinging away from furnace)	
Top of Door	3.04
Hinge Jamb	3.44
Latch Jamb	3.74
Bottom of Door	9.30
Door Assembly #2 (Swinging into furnace)	
Top of Door	3.74
Hinge Jamb	3.87
Latch Jamb	3.74
Bottom of Door	9.17

For each detail measured clearances, please refer to the attachment.

The appearance of unexposed side and the exposed side of the fire door and frame assemblies were shown as Figs. 1 and 2 respectively.

FIRE ENDURANCE TEST: ANSI/UL 10C, Section 11
CAN/ULC-S104-10, Section 5.2

METHOD

After the wall had seasoned, the fire test was conducted in accordance with the standard for "Positive Pressure Fire Tests of Door Assemblies" ANSI/UL 10C (Second Edition, dated January 26, 2009) and "Standard Method For Fire Tests of Door Assemblies", CAN-ULC-S104-10 (Third Edition, dated July, 2010).

Throughout the fire test, observations were made on the character of the fire, the condition of the unexposed face and all developments pertinent to the performance of the door as a fire retardant with special reference to stability and flame passage.

RESULTS

The fire was luminous and well distributed during the fire test. The temperatures within the furnace chamber were controlled in accordance with the Standard Time-Temperature Curve. The neutral plane of the furnace was maintained at approximately 1 m (40 in.) from the bottom of the test assembly.

The observations on the unexposed face during the fire exposure were as follows:

Time, Hr:Min:s	Fire Test Observations
0:00:00	Gas on. Test started at 13:45:00
0:02:00	Both door panels are bowing inward furnace.
0:02:34	Popping noises are audible.
0:06:24	Top edge of right door is discoloring blue.
0:07:34	Smoke is emitting from top edge of left door.
0:10:00	Hinge side and latch side of right door are discoloring blue.
0:12:35	Door face of right door is discoloring blue.
0:13:48	Smoke is emitting from latch side of right door.
0:20:00	Smoke from top edge of left door has ceased.
0:25:10	Bottom edge of left door is discoloring blue.
0:41:10	Smoke from latch side of right door has ceased.
0:55:25	Flaming occurred from top latch side of left door. Flaming length is approximately 4 in.
1:04:05	Flaming occurred from top latch side of right door. Flaming length is approximately 3 in.
1:40:00	No significant change.
2:13:46	No significant change.
2:59:00	No significant change.
3:00:00	Gas off. Test terminated at 16:45:00. No flaming occurred at the latch location of the fire exit hardware. All hardware was secured. No through openings. Latches still engaged. The test results were considered in compliance with the requirements.

No flaming occurred on the unexposed surface during the Classification period of 3 h.

The door frame remained securely fastened to the wall on all sides and did not permit through openings between frame and door or between frame and adjacent wall.

The door assemblies remained closed and in its opening during the fire endurance test.

The hardware held the doors closed in accordance with the conditions of acceptance for an exposure period of 3 h. The latch bolt on each door appeared to remain projected and engaged with its respective strike.

The test assemblies withstood the fire endurance test, without developing openings through the assemblies.

HOSE STREAM TEST: ANSI/UL 10C, Section 12
CAN/ULC-S104-10, Section 5.3

METHOD

Immediately after the 3 h fire exposure, the assembly was withdrawn from the furnace and subjected to the impact and cooling effects of the 45 psi hose stream for 228 seconds; or 32 s/m^2 of exposed test area, as specified in the Test Standard UL 10C for a 3 h fire exposure.

RESULTS

The door assemblies withstood the hose stream test and remained in the opening after the hose stream test.

The Model F7100R Rim Type Fire Exit Hardware withstood the hose stream without developing openings through the assemblies.

The opening between the bottom edge of the doors and sill was 12.2 mm maximum.

The movement of the door did not result in any portion of the edges of the door moving more than 1-1/2 times the door thickness after the hose stream test.

The frame remained securely fastened to the wall on all sides. No through openings were observed between the frame and adjacent wall.

The general appearance of unexposed side and the exposed side of the fire door and frame assembly after fire and hose stream tests were shown as Figs 3 and 4 respectively.

INDEX OF FIGURES

ENGINEERING CONSIDERATIONS:

The swinging door and frame assemblies described in this Report had flaming during the fire test, which did not meet the "Conditions of Acceptance" specified in Par. 15.1 of Standard for "Positive Pressure Fire Tests of Door Assemblies", UL 10C (Second Edition, dated January 26, 2009); and in Par. 6.1.3 of "Standard Method for Fire Tests of Door Assemblies" CAN/ULC-S104-10 (Third Edition, dated July, 2010).

The swinging door and frame assemblies described in this Report had clearance between the bottom edge of the door and sill more than 9.5 mm, which did not meet the "Conditions of Acceptance" specified in Par. 14.2 of Standard for "Positive Pressure Fire Tests of Door Assemblies", UL 10C (Second Edition, dated January 26, 2009); and in Par. 6.1.2 of "Standard Method for Fire Tests of Door Assemblies" CAN/ULC-S104-10 (Third Edition, dated July, 2010).

An investigation was opened to determine if the Rim Type Fire Exit Hardware Model F7100R in this test result could be comply with the requirements covering the category and to be eligible for Listing and Follow-Up Service.

Based upon an engineering review of the test results, the following items could be found.

1. The hardware held the doors closed in accordance with the conditions of acceptance for an exposure period of 3 h. The door latch bolts appeared to remain projected and engaged within strikes.

2. The flaming at the door assembly was due to out-gassing of the furnace flame through the door edge. No flaming occurred from the test fire exit hardware samples during the 180 minutes fire endurance test.

3. No through openings during the fire endurance and host stream tests.

4. The excessive clearance at the bottom edge was due to partial collapse of the concrete sill under the doors.

Based upon the above items, it is judged that the Model F7100R Rim Type Fire Exit Hardware constructed and described herein could be comply with the requirements covering the category and to be eligible for Listing and Follow-Up Service.

TEST RECORD SUMMARY:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the following standards and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Standard	Title	Edition or Publication Date	Latest Revision Date
ANSI/UL 10C	Standard for Positive Pressure Fire Tests of Door Assemblies	2nd Edition	January 26, 2009
ANSI/UL 10B	Standard for Safety for Fire Tests of Door Assemblies	10th Edition	April 13, 2009
CAN/ULC-S104	Standard Method for Fire Tests of Door Assemblies	3rd Edition	July, 2010
ANSI/UL 305	Standard for Panic Hardware	5th Edition	May 25, 2011
CAN/ULC-S132	Emergency Exit and Emergency Fire Exit Hardware	2nd Edition	August, 2007
ANSI/BHMA A156.3	ANSI Standard for Exit Devices	2008 Edition	September 24, 2008

TEST RECORD NO. 2

Test results relate only to the items tested.

SAMPLES:

Samples of Model F7100R fire exit hardware, as indicated below and constructed as described herein, were submitted by the manufacturer for examination and test.

ENGINEERING CONSIDERATIONS:

The purpose of this investigation was determined the acceptance of adding the alternate construction of Model F7100R fire exit hardware.

No testing of the above panic hardware was considered necessary based on following investigations.

1. The alternate construction of the Model F7100R is identical to the currently Listed fire exit hardware Model F7100R expect for the head cover profile.

2. The material of alternate head covers are the same and the securement method is not changed. Latch opening of head cover is at the same position and have the same dimensions.

3. Client also changed the all drawing number to accommodate the current management.

Based on the above investigations, UL Follow-Up Service Procedure File R15111, Volume 1, Section 5 will be revised for adding alternate head covers of Model F7100R.

TEST RECORD SUMMARY:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with applicable requirements in the standards noted below and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Standard	Title	Edition or Publication Date	Latest Revision Date
ANSI/UL 10C	Standard for Positive Pressure Fire Tests of Door Assemblies	2nd Edition	January 26, 2009
ANSI/UL 10B	Standard for Safety for Fire Tests of Door Assemblies	10th Edition	April 13, 2009
CAN/ULC-S104	Standard Method for Fire Tests of Door Assemblies	3rd Edition	July, 2010
ANSI/UL 305	Standard for Panic Hardware	5th Edition	May 25, 2011
CAN/ULC-S132	Emergency Exit and Emergency Fire Exit Hardware	2nd Edition	August, 2007
ANSI/BHMA A156.3	ANSI Standard for Exit Devices	2008 Edition	September 24, 2008

Test Record by:

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CONCLUSION

Sample of the product covered by this Report has been found to comply with the requirements covering the category and the products are found to comply with UL's applicable requirements. The description and test result in this Report are only applicable to the sample investigated by UL and does not signify UL certification or that the product described are covered under UL's Follow-Up Service Program. When covered under UL's Follow-Up Service Program, the manufacturer is authorized to use the UL Listing Mark on such products which comply with UL's Follow-Up Service Procedure and any other application requirements of Underwriters Laboratories Inc. The Listing Mark of Underwriters Laboratories Inc. on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method to identify products investigated by UL to published requirements and manufactured under UL's Listing and Follow-Up Service.

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