This TDS contains extracts from tests performed by Warnock Hersey under test report numbers 1308-4, 4156-2, 4156-3, 4156-4 and 4156-2. The original signed reports and stamped detail drawings are maintained on file with Technical Services, Ajax. Due to the proprietary nature of the design of these assemblies, detail drawings of the internal door construction have not been included. Copies of the original test reports are available on request.

INTRODUCTION

These reports cover testing of hollow metal security door, frame and window assemblies performed in WHI’s laboratory. The program included door static load and rack tests, door and frame assembly impact and window assembly removable glazing stop tests. These tests were performed in accordance with ANSI/NAAMM Standard HMMA 863-90, Sections 1.04, Test D and Section 1.06. Additional testing for removable glazing stops, using the methodology of ANSI/NAAMM HMMA 863-90, Section 1.04 was also conducted. The construction of the subject doors, frames and windows at Fleming’s Ajax facilities was witnessed by a Warnock Hersey inspector.

DESCRIPTION

Three 14 gage face sheet hollow metal doors measuring 35-13/16 inches by 83-1/8 inches, a 12 gage frame assembly to suit the above door size, and two 14 gage steel window assemblies measuring 32 inches by 37 inches (overall) glazed with 3/8 inch thick steel plate and removable glazing stops were fabricated. Copies of the construction details, stamped Warnock Hersey Professional Services, are included with the originals of these reports only.

PROCEDURES

The loads required for the door static load and rack test were applied using a calibrated hydraulic pump and ram set up, equipped with a pressure gauge. This set up was calibrated on a Baldwin Satec Universal Testing Machine.

A ram pendulum system was used to impact the door and frame assembly and the two window assemblies for removable glazing stop testing. Impacts were delivered using an 80 pound ram with a 4.0 square inch nose. The ram was raised to a height of 2’6” in order to strike the target area with 200 ft/lbs of energy with each impact.

For the door and frame impact test the ram struck the door within 6 inches of each of the top, middle and bottom hinges, 6 cycles of 25 hits per hinge, yielding 150 total blows per hinge. The ram also impacted within 6 inches of the lock bolt on the door a total of 400 times.

For the window assembly removable glazing stop tests the ram struck the 3/8” thick plate within 6 inches of one corner. A total of 400 impacts were delivered to the target area of each assembly.

Upon completion of the prescribed removable glazing stop test on one of the window assemblies, the ram height was raised to a height of 5’0” to develop 400 ft/lbs of energy impact. Ten additional impacts in the original target area were then delivered.

STATIC LOAD TEST

The door was mounted as indicated in S08(4), Figure 1. A centrally applied load of 14,000 lbs was applied at the quarter points, with the maximum mid-span deflection at the edge of the door being measured.

RACK TEST

The door was mounted as shown in S08(4), Figure 2. A concentrated load of 7,500 lbs was applied to the one unsupported corner of the door, with the deflection being measured at this point.
DOOR AND FRAME ASSEMBLY IMPACT TEST

The door and frame were mounted as shown in S08(5), Figure 3. The door was hung in the 12 gage frame using three stainless steel ball bearing hinges measuring 4-1/2 inches long by 4 inches wide. Eight flathead stainless steel screws (3/16 inches x 3/8 inch long) were supplied per hinge, four screwed into the frame, four into the door. The frame was bolted to a structural steel frame supported upright in its normal operating position for testing. The door was prepared for and provided with a high security Folger Adams Company Model 82 lock and Number 80 hollow metal lock mounting. The fully operable door and frame assembly was then impacted using the steel ram pendulum.

WINDOW ASSEMBLY REMOVABLE GLAZING STOP TESTS

Each window assembly was a 5-3/4 inch jamb depth with 1 inch high integral stop, fully welded at each corner intersection. The interior of the window rabbet was provided with a 1-1/2 inch wide, 12 gage continuous flat bar reinforcing, welded to the profile at 12 inches OC maximum. Refer to S08(5), Figure 4 for window elevation details.

Assembly Number 1, shown in S08(6), Figure 5, was provided with channel stops secured in place with 1/4-20 by 2 inch long screws, a total of six screws per stop, twenty four per window. It was subjected to 400 impacts of 200 ft/lbs energy within the same target area.

Upon completion of the above, Assembly Number 2 was then subjected to an additional 10 impacts of 400 ft/lbs energy within the identical target area.

Assembly Number 2, as shown in S08(6), Figure 6, was provided with a removable angle stop frame secured in place with 1/4-20 by 5/8 inch long screws, a total of six screws per side, twenty four per window. Steel backing plates were attached to each of the screws at the interior of the profile. The assembly was subjected to 400 impacts of 200 ft/lbs energy within the same target area.

RESULTS

STATIC LOAD TEST

<table>
<thead>
<tr>
<th>Load (lbs)</th>
<th>Deflection (inches)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,000</td>
<td>0.558</td>
<td>Max. Deflection - Passed</td>
</tr>
<tr>
<td>7,500</td>
<td>2.17</td>
<td>Max. Deflection - Passed</td>
</tr>
</tbody>
</table>

The maximum allowable mid-span deflection under HMMA 863-90 shall not exceed 0.58 inches. After release of the load, deformation shall not exceed 0.10 inches.

The measured mid-span deflection of 0.558 inches and the measured permanent deformation of 0.056 inches were both within the maximums permitted.

RACKING TEST

<table>
<thead>
<tr>
<th>Load (lbs)</th>
<th>Deflection (inches)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Pre-Test Condition</td>
</tr>
<tr>
<td>7,500</td>
<td>2.17</td>
<td>Max. Deflection - Passed</td>
</tr>
<tr>
<td>0</td>
<td>0.20</td>
<td>Max. Permanent Deformation - Passed</td>
</tr>
</tbody>
</table>

The maximum deflection at test load of 7,500 lbs at the unsupported corner under HMMA 863-90 shall not exceed 3.5 inches. There shall be no buckling or failure of welds.

The measured deflection of 2.17 inches was well within the limits permitted. There were no failure of welds or buckling of the door due to this loading.
DOOR AND FRAME ASSEMBLY IMPACT TEST

Upon receiving 150 blows to each of its three hinge areas, the door skin was considerably distorted in the impact areas. The screws holding the hinges to the door and frame had loosened and the door exhibited an inward bow. The hinges and the hardware did not fail as a result of the impact load test program. Operation of the door was however affected by the impact loading. Although the door was able to swing on its hinges, a slight binding was noticed as the door was opened and closed, requiring extra effort to operate the door. In the opinion of WHI the door met the intent of the standard.

Upon receiving 400 blows within six inches of the bolt, the lock could be opened with the aid of an adjustable wrench to assist in turning the key. The lock face on the non-impact side of the door had bowed as a result of the impacts and the screws holding the lock in place had loosened. As well, cracks were noted on the latch side door edge at the upper and lower corners of the bolt opening on the impact side.

The door skin in the impact area of the lock was considerably distorted, but the door skin was not penetrated. Following the impact testing a crow bar and hammer were unsuccessfully used to try to gain access through the door.

WINDOW ASSEMBLY REMOVABLE GLAZING STOP TEST

Upon receiving 339 blows in the target area of Assembly Number 1, one of the fasteners securing a horizontal channel stop behind the impact area broke off. One broken screw in the assembly is allowed after impact testing, as stated in Paragraph 1.06, Section D5 of the Standard. Following completion of the 400 impacts, four fasteners were found to be loose and two had pulled through the top of the stops. The stops had displaced inwards approximately 1/2 inch (12mm) at the corner where the impacts occurred. The removable glazing channels and the 3/8 inch plate did however, remain firmly in place so that removal could not be accomplished without removing the retaining screws.

Upon receiving the additional 10 blows of 400 ft/lb in the target area of Assembly Number 1, 2 of the 24 fasteners had loosened, but none had fallen out or been broken. The removable angle stop frame and the 3/8” plate remained firmly in place so that removal could not be accomplished without removing the retaining screws.

Upon receiving 400 impacts in the target area of Assembly Number 2, 13 of the 24 fasteners had loosened, but none had fallen out or been broken. The removable angle stop frame and 3/8” plate remained firmly in place so that removal could not be accomplished without removing the retaining screws.

CONCLUSIONS

The hollow metal security doors meet the performance requirements for the static load, rack and impact testing of ANSI/NAAMM Standard HMMA 863-90 when tested in basic accordance with the aforementioned standard.

The Detention Security Removable Glazing Stop Test Assemblies 1 and 2, met the requirements of the removable glazing stop test of ANSI/NAAMM Standard HMMA 863-90 when tested to same.

Tested and Reported By: David Wren, B.A.Sc.

Originally Signed by

David Wren, B.A. Sc.
Physical Testing Services

Vern W. Jones, CET
Assistant Manager
Physical Testing Services
FIGURE 1
Static Load Test

FIGURE 2
Rack Test
FIGURE 3
Door and Frame Assembly Impact Test

FIGURE 4
Window Elevation - Removable Glazing Stop Test
FIGURE 5
Window Assembly Number 1
Frame Section Details

A 3/8" thick steel plate
B 14 gage fully welded steel frame
C 12 gage steel, 1-1/2" wide, continuous flat bar reinforcing, welded to frame profile at 12" oc maximum
D 12 gage steel channel, 1" x 3/4" x 1", c'sunk for 12-24 x 2" FH MS at 6" oc max, 1-1/8" from each end max.
E 12 gage steel angle, 1" x 3/4", corner notched and welded into a 1 piece frame, drilled for 1/4-20 x 5/8" button head socket cap screws (alloy #2) at 8" oc, 1-1/2" from each end
F 3/4" x 1/2" threaded steel backing plate at each screw

FIGURE 6
Window Assembly Number 2
Frame Section Details