



FIRESTANCE PROFESSIONAL SERVICES

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**Evaluation Report for
Sure-Board® Series 200/200W
Fire Rated Wood Framed Wall Assembly**

Prepared for:

Mr. Carleton Elliott

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Prepared by:

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Introduction

The objective of this report is to determine if the available test information confirms that conventional wood framed gypsum wallboard fire rated wall assemblies using International Materials Inc. Sure-Board® 200/200W in the wall construction will continue to provide 1 and 2 Hour Fire Resistance Ratings. Sure-Board® Series 200 and Series 200W are Listed by Intertek Testing Services, and other agencies. The Intertek Directory of Listed Products Lists four wall assembly designs that use Sure-Board®. The wall assembly rating is to be determined in accordance with the Codes and Standards stated in the referenced documents section of this report.

Referenced Documents

- The International Building Code (IBC) 2009
- The California Building Code (CBC) 2010
- The National Building Code of Canada (NBC) 2010
- ASTM E2032 “Standard Guide for Extension of Data from Fire Endurance Tests”
- CAN/ULC S101-07 “Standard Methods of Fire Endurance Tests of Building Construction and Materials”
- ASTM E-119-08a “Standard Methods for Fire Tests of Building Construction and Materials”
- NFPA 251-2006 “Standard Methods of Tests of Fire Endurance of Building Materials”
- UL 263 “Fire Tests of Building Construction and Materials”
- T.Z. Harmathy “Ten Rules of Fire Resistance Rating” Fire Tech., 1. P93 (1965)
- Intertek Test Report Number WHI 495 1687 dated 8/19/2002
- Intertek Test Report Number WHI 495 PSV 1590 dated 8/19/2002
- Intertek Test Report Number 3056688(a) and 3056688(b) dated May 2006
- Intertek Test Report Number 3101556-001 and 002 dated November 30, 2006
- Intertek Test Report Number 3197053COQ-004 EEV dated May 3, 2010
- City of Los Angeles Research Report RR 25576 (CSI # 06050) Wood Walls
- Intertek Directory Listings; CEM/MSF 60-01, CEM/MSF 60-02, CEM/MSF 120-01, CEM/MSF 120-02
- IAPMO Evaluation Reports
- City of New York, Department of Buildings: MEA 166-07M and MEA 216-07M

Qualifications and Experience

Mike van Geyn, A.Sc.T. , Principal, Firestance Professional Services - My qualifications include professional registration as an Applied Science Technologist, Mechanical Engineering Discipline, as well as a variety of additional training programs. My experience includes thirty years of conformity assessment, product certification, and fire testing experience acquired when working with Intertek Testing Services, a large International testing agency. Of this, twenty years being the manager of the fire laboratory, personally conducting hundreds of wall assembly, firestop assembly and fire door fire tests. I have extensive experience working on manufactured wood product floor/ceiling assembly and wall assembly testing and certification projects. I was the agency expert on fire resistance of manufactured wood products. The National Fire Protection Research Foundation Fire Door Fire Test Project was awarded to my laboratory in 1994. I am personally familiar with the testing conducted for International Materials Inc., having conducted and witnessed all of the tests performed in the Coquitlam, BC facility. I am involved in standards writing committees including the ASTM E-05 fire testing technical committee.

Product Description

A Sure-Board® Series 200/200W Structural Panel is designed to add shear stability to wall assemblies, and is composed of a substrate square-edged panel laminated with water soluble adhesive to a sheet steel. The substrate panels for Series 200W may be 1/8-1/2 inch thick medium-density fiberboard (MDF) or magnesium oxide (MgO) board, and for Series 200 may be 1/2-3/4 inch thick fire rated gypsum wallboard or cement board, depending on the application. The sheet steel is No. 22 gauge complying with ASTM A653 SS Grade 33, with a minimum G40 hot dipped galvanized coating conforming to ASTM 924. The panel lengths vary but panel width is typically 48 inches. The product is Listed by Intertek Testing Services, the City of Los Angeles, IAPMO, ICC Evaluation Services Inc., California DSA, New York City (MEA), State of Florida, and Miami-Dade County.

Product Application

For Series 200, the steel sheet is applied directly to fire rated 5/8" gypsum wallboard. It replaces the first layer of fire rated gypsum wallboard of the wall assembly. For Series 200W the sheet steel is applied to MDF, MgO, or cement board, it is used in addition to the gypsum wallboard or 7/8" thick cement plaster of the fire rated wall assembly, and attached directly to the studs before the wallboard is applied.

Evaluation

There are two key technical issues to address when evaluating the performance of Sure-Board® Series 200/200W in wood stud wall assemblies. The first is determining if specific test information supports a fire resistance rating when Series 200/200W is used, and secondly the effect that Series 200/200W has on wall fire resistance in general.

Intertek Test Report WHI 495 PSV 1590 dated 8/19/2002 supports a 1 Hour rating of a wood framed wall assembly using Sure-Board® Series 200 W. This test report describes the small scale fire test of a nominal 2X4 framed wall assembly with 5/8" type X gypsum wallboard on each face. Fiberglass batt insulation was used in the stud cavities, and Sure-Board® Series 200W (1/8" MDF substrate) was installed on one side of the studs under the gypsum wallboard. The wall assembly lasted 98 minutes before reaching the maximum allowable surface temperature. No flaming or burn through had occurred. At the conclusion of the fire test, the wall was subjected to the hose stream tests, and the sample met the requirements of the hose stream test by preventing the passage of a stream of water through the assembly. The typical wall would not be expected to last more than about 70 minutes before reaching the maximum allowable temperature limit, and would not be expected to pass the hose stream test after more than 45 minutes of fire exposure.

This test shows that a wood framed wall assembly using Type X gypsum wallboard over Series 200W would be expected to achieve a 1 hour fire resistance rating. It also shows that the use of Series 200W adds to the fire resistance of the wall assembly.

Intertek Test Report No. 3101556-001 and 002 dated November 30, 2006 supports a 2 Hour rating of a wall assembly where one layer of gypsum wallboard is replaced by Sure Board Series 200W made with 1/4" MgO board. The test achieved the rating even though the wall was 3/8" thinner than a conventional wall, and also passed the hose stream test after the full fire test duration. Conventional 2 Hour rated gypsum wallboard walls will pass the hose stream after only 1 Hour of fire exposure. This shows that the Series 200W MgO board product has increased fire resistance compared to 5/8" Type X gypsum wallboard when tested in a 2 Hour rated wall assembly.

The next technical question is determining the effect of Series 200/200W on wall fire resistance. Intertek Report 3197053 COQ-004 EEV dated May 3, 2010 states the following;

The primary function of the Sure-Board® steel sheets is to provide shear stability to the wall assembly, and hence improve the structural performance. In buildings required to be of non-combustible construction, Sure-Board® Series 200 is used, in buildings of combustible construction, Sure-Board® Series 200 or 200W may be used. The Series 200 steel sheet is supplied adhered to Type X or Type C gypsum wallboard or cement based sheathing for ease of application. The gypsum wallboard screws used to fasten the wallboard also fasten the steel sheets to the studs. Hence once the product is installed, the adhesive between the board and the gypsum is no longer needed. Our test program revealed that the presence of the Series 200 and 200W steel sheet products improved fire resistance of the wall assembly. The steel tended to even out the unexposed side temperatures, and the wall assemblies tested passed the hose stream tests after the full fire exposure rating period, which is unusual for conventional gypsum wallboard assemblies. The steel sheets provided a solid barrier, and hence prevented the passage of a stream of water through the assemblies. The MDF of the 200W improved the fire resistance of the wall assemblies, as is expected according to the "Ten Rules of Fire Resistance Rating" by T.Z. Harmathy, which states that adding materials to an assembly will add fire resistance.

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The steel sheets also add lateral stability to reduce the ability for the studs to buckle under load, hence improving the load bearing characteristics. For these reasons, the addition of Sure-Board® products described should not reduce the fire resistance of the assemblies described in the Gypsum Association Fire Resistance Design Manual.

The current Intertek report states in the Conclusions the following statement;

Intertek is conducting an engineering evaluation for International Materials, Inc., on Sure-Board® 200 and 200W, to evaluate fire resistance. The evaluation is being conducted to determine if wall assemblies using Sure Board® will provide 1 and 2 hour ratings in accordance with ASTM E119 -08 and CAN/ULC S101-07 “Standard Methods for Fire Tests of Building Construction and Materials”. Based on the information contained and referenced herein, it is Intertek’s professional judgment based on sound engineering principles that the following is true:

- The Sure-Board® Series 200 and 200W are eligible for Listing, and the following Listings were developed; CEM/MSF 60-01, CEM/MSF 60-02, CEM/MSF 120-01, and CEM/MSF 120-02.*
- The addition of Sure-Board® Series 200 and 200W will not reduce the fire resistance of the wall assemblies described in the Gypsum Association Fire Resistance Design Manual.*

Firestance Professional Services is in complete agreement with the above assessment provided by Intertek based on a review of the test reports. Based on this information, a standard wood framed wall assembly designs were developed to provide 1 and 2 Hour rated assemblies (see appendix A).

Conclusion

The documentation clearly supports the conclusion that the use of International Materials Inc. Sure-Board® Series 200/200W adds to the structural properties and the fire resistance of a wood framed wall assembly. For this reason, typical wood framed fire rated wall construction designs incorporating Series 200/200W are shown in Appendix A. Design No. CEM/WSF 60-01 provides a 1 Hour fire resistance rating, and Design No. CEM/WSF 120-01 provides a 2 Hour fire resistance rating in accordance with the Codes and standards Listed in the referenced documents.

Signature

Report Prepared by:

Mike van Geyn

Mike van Geyn, A.Sc.T.

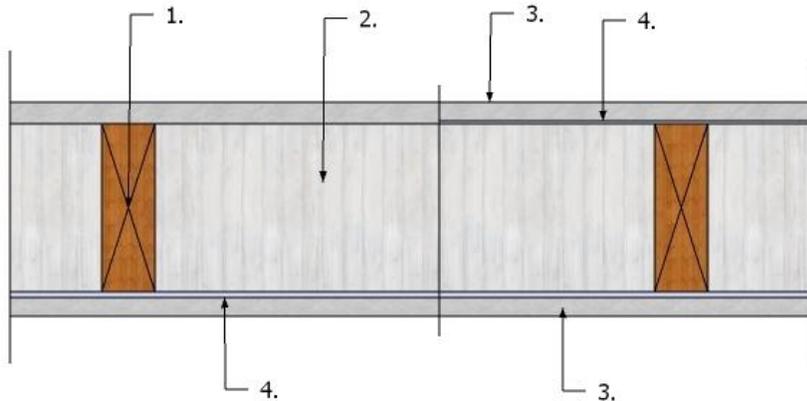
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Appendix A

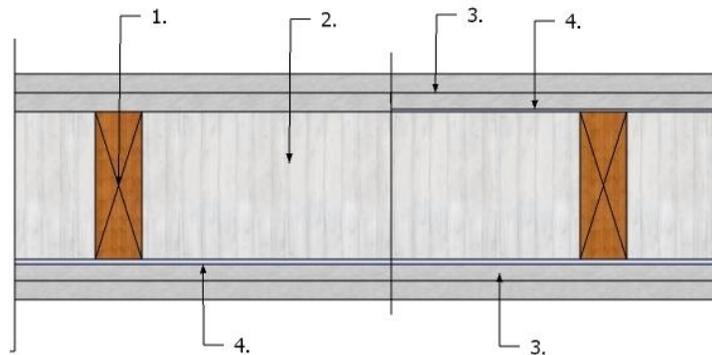
Wall Assembly Design No. CEM/WSF 60-01
Wall Assembly Design No. CEM/WSF 120-01

DESIGN NO. CEM/WSF 60-01
NON-SYMMETRICAL LOAD-BEARING WALL ASSEMBLY; FULL DESIGN LOAD
SYMMETRICAL LOAD-BEARING WALL ASSEMBLY; FULL DESIGN LOAD
1 Hour Rating



- | | |
|----|--|
| 1. | Wood Studs: Nominal 2" by 4" solid sawn wood studs located 24" oc. Maximum. With two top plates and a single bottom plate. Studs may be fire retardant treated. |
| 2. | Insulation: Minimum 3" thickness, fibreglass insulation, conforming to ASTM-C665 Type I, friction fit in joist cavities. |
| 3. | Gypsum Wallboard: One layer applied to each side of wall studs; 5/8" Type X or Type C fire rated gypsum wallboard installed horizontally or vertically, alternately, Sure-Board® Series 200, installed horizontally or vertically, or 7/8" cement plaster. Sure-Board® Series 200 is fastened with minimum #8 by 2" long wood screws, located 6" OC maximum at board perimeter and 12" OC maximum in field areas of boards. Where gypsum wallboard is applied directly to wall it may be fastened with 1 1/2" Type W drywall screws at similar spacing. When Sure-Board® Series 200W is used the gypsum wallboard or cement plaster is applied over the Series 200W. The gypsum wallboard may be fastened to the Series 200W, by running the screws through the steel sheet backing. The gypsum wallboard need not be fastened to the structural members when Sure-Board® is present. |
| 4. | Sure-Board® Series 200/ 200W: Gypsum wallboard or cement plaster is installed over Sure-Board® 200W; Series 200 replaces gypsum wallboard on one or both sides of wall as described above. For Symmetrical wall designs, Sure-Board® may be applied to both sides of wall. When Series 200W is used it is applied directly to studs, on one side or on both sides of wall, applied horizontally or vertically and fastened with minimum No. 10 by 2 1/4" plywood nails located 6" OC maximum along board perimeter and in field areas of boards. When Series 200W is used,, the gypsum wallboard or 7/8" cement plaster must be applied over the top of the Sure-Board® and may be fastened to the steel sheet only, for easier installation. The gypsum wallboard or cement plaster lath need not be attached to the structural members when Sure-Board® is present. |

DESIGN NO. CEM/WSF 120-01
NON-SYMMETRICAL LOAD-BEARING WALL ASSEMBLY; FULL DESIGN LOAD
SYMMETRICAL LOAD-BEARING WALL ASSEMBLY; FULL DESIGN LOAD
2 Hour Rating



- | | |
|----|--|
| 1. | Wood Studs: Nominal 2" by 4" solid sawn wood studs located 24" oc. Maximum. With two top plates and a single bottom plate. Studs may be fire retardant treated. |
| 2. | Insulation: Minimum 3" thickness, fiberglass insulation, conforming to ASTM-C665 Type I, friction fit in joist cavities. |
| 3. | Gypsum Wallboard: Two layers applied to each side of wall studs, with face layer end and edge joints staggered from those of base layer ; Base Layer - 5/8" Type X or Type C fire rated gypsum wallboard or Sure-Board® Series 200/200W, base layer installed horizontally or vertically. Base layer Sure-Board® Series 200W boards fastened with minimum #10 by 2 1/4" plywood nails, or for Series 200 minimum # 8 by 2" long wood screws , or for gypsum wallboard use 1 1/2" long Type W drywall screws; located 6" OC maximum at board perimeter and at 12" OC maximum in field areas of boards. Face layer is 5/8" Type X or Type C fire rated gypsum wallboard, installed horizontally or vertically, or 7/8" cement plaster. Face layer boards fastened with minimum 2 1/4" long Type W drywall screws, located 6" OC maximum at board perimeter and at 12" OC maximum in field areas of boards. When Sure-Board® Series 200 or 200W is used the gypsum wallboard layers are applied over the Sure-Board®. The additional gypsum wallboard may be fastened to the Series 200/200W, by running the screws through the steel sheet backing. The gypsum wallboard need not be fastened to the structural members when Sure-Board® is present. |
| 4. | Sure-Board® Series 200/ 200W: Series 200 replaces the base layer of gypsum wallboard on one or both sides of wall as described above. For symmetrical wall designs, Sure-Board® is applied to both sides of wall. When Series 200W is used it is applied directly to studs, on one side or on both sides of wall, applied horizontally or vertically and fastened with minimum #10 by 2 1/4" plywood nails, located 6" OC maximum along board perimeter and in field areas of boards on first layer only. When the first layer of Sure-Board® is Series 200, the fasteners are #8 X 2" wood screws at the required spacing for lateral support, and panels may be installed horizontally or vertically.
Over Series 200 one layer of 5/8" Type X or Type C fire rated gypsum wallboard or 7/8" cement plaster must be properly installed. Over Series 200W two layers of 5/8" Type X or Type C fire rated gypsum wallboard or 7/8" cement plaster in place of the face layer of gypsum wallboard must be properly installed, on one or both sides of the wall. When either Sure-Board® Series 200 or 200W are used, the additional layers of gypsum wallboard or cement plaster lath may be fastened to the steel sheet backing. The gypsum wallboard or cement plaster lath need not be attached to the structural members when Sure-Board® is present. |