Summary of Fire Resistance Testing

Technical Bulletin

5.5.1.1
Sept. 2003

Introduction

Underwriters' Laboratories and its affiliate Underwriters' Laboratories of Canada provide testing, certification and quality assessment of products, systems and services.

Arxx Building Products has completed extensive testing to achieve 2hr and 4 hr fire resistance rated wall assemblies utilizing the Arxx High Performance Wallsystem.

UL/ULC Follow-Up Service Agreement

As part of the UL classification and the ULC listing services UL/ULC conduct ongoing plant inspections under the Follow-Up Service Agreement to confirm that Arxx Building Products forms have not been modified in any way which would negatively impact the Fire Resistance Rating of the wall assembly.

Testing Procedures

Method:

The furnace is fired in accordance with the Time-Temperature Curve shown in the Standards CAN/ULC-S101-M89 and ASTM E119-95a.

1000° F	at 5min.
1300° F	at 10min
1550° F	at 30min
1700° F	at 1hr
1850° F	at 2h
2000° F	at 4hr

Load Bearing:

The test assembly was loaded by means of a hydraulic loading system along the assembly, i.e. total superimposed load for the 6" form was 1348 kN (303 kips).

Fire Resistive Properties:

The transmission of heat through the assembly was not sufficient to raise the temperature of the unexposed surface in excess of the permitted rise of 284°F (140° C) average or 356° F (180° C) individual above the initial temperature of the assembly during the rating period. The wall assembly sustained the applied load without passage of flame through the assembly for the period required. The assembly also withstood the impact, cooling and eroding effects of the hose stream.

Hose Stream Exposure:

The hose stream applied on the test assembly immediately after the fire endurance test. The pressure and duration of the hose stream is determined by the length of the exposure in the furnace, i.e. the 4hr-fire resistance test, the water pressure was maintained at 310 kPa for 5 min and 25 second duration.

The test assembly withstood the hose stream test without developing any through-wall openings, or penetrations from the water stream.

American Testing Report –Table 1

4" ARXX FORM (4" Concrete thickness)				
DESIGN NUMBER	**FIRE RATING**	**CONCRETE MIXTURE**	**REINFORCING GRID**	**TEST STANDARDS**
U928	2hr	Normal Weight Concrete 145 + or – 5 lb per cubic ft density, 2900 psi non-compressive strength. The concrete shall include 0.6 lb or ½" long polypropylene fibre reinforcement per cubic yd of concrete	# 4 steel rebar horizontally @ 16-3/4" o/c # 4 steel rebar vertically @ 12" o/c	ANSI/UL 263 & ASTM E119
6" ARXX FORM (Minimum 6.25" Concrete thickness)				
U927	2hr & 4hr*	Normal Weight Concrete 145 + or – 5 lb per cubic ft density, 2900 psi non-compressive strength. * For a 4hr rating the concrete shall include 0.6 lb of ½" long polypropylene fibre reinforcement per cubic yd of concrete	# 4 steel rebar horizontally @ 16-3/4" o/c # 4 steel rebar vertically @ 16" o/c	ANSI/UL 263 & ASTM E119

Gypsum Board Wall Finish

U928 - ½" thick, 48" wide gypsum board (classified or unclassified), fastened to the flanges of the polypropylene webs with 1" long drywall screws at 16" o.c. vertically and 8" o.c. horizontally. Minimum weight 1.6 psf. Joints covered with joint compound, covered with joint tape and covered with an additional two coats of joint compound. Screwheads covered with joint compound.

U927 - ½" thick, 48" wide gypsum board (classified or unclassified), fastened to the flanges of the polypropylene webs with 1" long drywall screws at 16" o.c. vertically and 16" o.c. horizontally. Minimum weight 1.6 psf. Joints covered with joint compound, covered with joint tape and covered with an additional two coats of joint compound. Screwheads covered with joint compound.

Canadian Testing Reports - Table 2

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4" FORM TESTING (4" Concrete thickness)

DESIGN NUMBER	FIRE RATING	CONCRETE MIXTURE	REINFORCING GRID	TEST STANDARDS
W009	2hr	Sand-Limestone Concrete – 2300 +/- 50 kg/m^3 density, 20 MPa nominal compressive strength. The water-to-cement ratio shall fall between 0.72:1 and 0.76:1. 12.7 mm long polypropylene fibres shall be added at a minimum rate of 1.0 kg/m^3 of concrete.	-10M steel bars horizontally @ 300mm o/c -10M steel bars vertically @ 300mm o/c	CAN/ULC-S101 & ASTM E119

6" FORM TESTING (Minimum 6.25" Concrete Thickness)

DESIGN NUMBER	FIRE RATING	CONCRETE MIXTURE	REINFORCING GRID	TEST STANDARDS
W008	4hr & 2hr*	Sand-Limestone Concrete – 2300 +/- 50 kg/m^3 density, 20 MPa nominal compressive strength. The water-to-cement ratio shall fall between 0.72:1 and 0.76:1. The concrete shall included 1.0 kg of 12.7 mm long polypropylene fibres per meter of concrete. * Fibres not required, concrete – 2300 kg/m^3 density, 20 MPa nominal strength.	-10M steel bars horizontally @ 425mm o/c -10M steel bars vertically @ 400mm o/c	CAN/ULC-S101 & ASTM E119

(All testing documentation is available from Arxx or access these webs sites: www.ul.com www.ulc.ca)

Polypropylene Fiber Additive

For both UL and ULC tested assemblies include 1/2" (12.7mm) long polypropylene fibers in the concrete. The amount is specified as per the assembly. .

Refer to the Arxx Technical Bulletin 5.5.1.2 – Polypropylene Fiber Additive for more detail on this product.