

Awarded Contracts for External Experts to Support the NIST World Trade Center (WTC) Disaster Investigation

Contract No.	Awarded to	Date Awarded
SB1341-03-W-0850	Underwriters Laboratory, Inc.	7/10/2003

FIRE ENDURANCE TESTING OF THE WORLD TRADE CENTER FLOOR SYSTEM

Under solicitation number SB1341-03-Q-0281, a firm fixed-price purchase order has been awarded to Underwriters Laboratory Inc. for the testing of the steel joist-supported floor system of the World Trade Center towers under the fire conditions prescribed in ASTM E119. The results of the testing will provide the fire endurance ratings of typical floor construction to evaluate three primary factors, 1) test scale, 2) fireproofing thickness, and 3) thermal restraint.

Underwriters Laboratories Inc. (UL) is an independent, not-for-profit corporation dedicated to the testing, certification and quality assessment of products, systems and services. UL has been in operation since 1894 and today is a worldwide company with approximately 6000 employees. UL provides conformity assessment services for a wide range of products, equipment and construction materials, including determination of fire resistance ratings. Fire ratings are based upon the test method and acceptance criteria in ANSI/UL 263 (ASTM E119 and NFPA 251), "Fire Tests of Building Construction and Materials."

Under this solicitation, three ASTM E119 tests of the WTC floor construction will be performed as follows:

- 1) 17 ft (5.2 m) span assembly, thermally restrained
- 2) 35 ft (10.7 m) span assembly, thermally restrained
- 3) 35 ft (10.7 m) span assembly, thermally unrestrained.

The first test represents current US practice for establishing a fire endurance rating of a building construction. The test assembly, fabricated to meet the design of the World Trade Center steel joist-supported floor system, will have a span of 17 ft (5.2 m). This span is typical of the floor assembly test furnaces used by the US testing laboratories that routinely conduct the ASTM E119 test for the construction industry. As is common practice, the floor assembly will be tested in the thermally restrained condition. This test will be conducted at UL's Northbrook, Illinois fire test facility.

The second test will be at twice the scale of the first test, or a span of 35 ft (10.7 m). Note that this span represents a full-scale assembly of the 35 ft floor panel. The floor assembly for this test will be thermally restrained as in the first test thereby allowing direct comparison for the determination of the effect of test scale on fire endurance rating. In addition, individual structural members of the steel joist with varying thickness of spray-on fire protection will be exposed to the standard fire environment and temperatures will be recorded. This will allow comparison of results for various amounts of fireproofing based on the end point criteria for steel temperatures. This and the third assembly will be tested at the UL Canada fire test facility.

The third test will also span 35 ft and will be thermally unrestrained. The behavior of this test assembly will be compared with that of the second test allowing a determination of the effect of thermal restraint on fire resistance rating. Additionally, results from the second and third tests will bound behavior of an indeterminately restrained floor system.

The key personnel at UL who are responsible for designing and conducting the fire resistance testing under this solicitation are listed here.

Robert Berhinig, PE, Senior Staff Engineer - Mr. Berhinig has over 35 years of experience in the testing and evaluation of fire resistive building assemblies. Mr. Berhinig represents UL on NFPA Technical Committees on Building Construction and Fire Protection Features and has participated in the development of NFPA 5000 - Building Construction and Safety Code. In addition, he represents the United States as Technical Expert on ISO TC92 (Fire Safety) WG1 (Fire Resistance) and WG4 (Ventilation and Dampers).

Joseph Treadway, Manager-Fire Resistance and Containment – Mr. Treadway has 13 years of experience in the testing of protection materials for structural steel in accordance with ANSI/UL 263, “Fire Tests of Building Construction and Materials,” and ANSI/UL 1709, “Rapid Rise Fire Tests of Protection Materials for Structural Steel.”

Fred Hervey, Engineering Team Leader – Mr. Hervey has experience in testing and related work on structural steel protected with spray-applied fire resistive materials and mastic and intumescent coatings.