Fire Ratings Explained: Part 1

ASTM E-119 Testing. Fire tests have been conducted on many masonry wall assemblies, so the behavior of masonry materials is well documented and predictable.

To help prevent building fires from spreading and protect lives and property, building codes require that walls, partitions, roofs and floor/ceiling assemblies in sensitive locations carry particular fire ratings. These ratings typically are expressed as 1, 2 or more hours and describe the rated assembly's relative ability to remain intact when exposed to fire, in a controlled test, for the specified period of time.

The greater the fire hazard assumed for a particular location (or the more crucial its role in protecting building occupants), the higher the required fire rating. So, for example, walls surrounding a boiler room or exit stairwells in a high-rise building would require a high rating, while walls between adjacent rooms in a private home would require none.

Fire ratings are based on ASTM E-119 tests ("Standard Test Methods for Fire Tests of Building Construction and Materials"). These tests usually are conducted by an independent testing lab such as Underwriters Laboratories, Inc., and paid for by the manufacturer whose products are being tested. When a partition assembly passes a 2-hour test, for example, that specific combination of products assembled exactly as tested receives a UL Classification number that can be used to designate it in project specifications.

In ASTM E-119 tests, specimens of tested assemblies are exposed to controlled heat until one of the following occurs: the average temperature measured on the unexposed side of the specimen increases by 250° F; heat, flame or gases escape to the unexposed side; or the specimen collapses under load. To qualify for fire ratings of 1 hour or more, specimens also must pass a hose stream test to simulate firefighting conditions. There are two options for the hose stream portion of the test—one using a duplicate specimen that has been exposed to heat for only half the required time and one using the specimen that has just passed the entire heat duration. Unlike most other systems, masonry is tested using the second option, with just one panel. Because they consist of noncombustible materials, masonry assemblies perform well in ASTM E-119 tests. Their fire ratings typically reflect the time it takes for the specified temperature increase to occur, not when the specimen is breached or collapses.

Because of this, and because testing every conceivable combination of unit size, shape and core area isn't feasible, the standard industry practice is to calculate the fire resistance of untested concrete or masonry walls by the equivalent thickness method. Using information manufacturers provide on the content and equivalent thickness of particular masonry units, designers can consult standard tables or perform simple calculations to determine a specific assembly's fire rating. See Part 2 of this guide for more on equivalent thickness calculations.