Fire Safety with Concrete Products

Rich Walke
UL Codes and Advisory Services
Fire Protection Triad

1. Automatic Detection Systems (Alarms)
2. Automatic Sprinkler Systems (Sprinklers)
3. Compartmentation - (Fire Resistive Construction)
Independent support and breakaway connectors to allow collapse of adjacent construction.
Firewall Performance
Firewall Performance
Firewall Performance
Consequence of No Fire Walls
Use of Masonry to Create Protected Means of Egress

- Egress Protection
- Rated Walls
- Stair and Elevator Shafts
Concrete Fire Ratings Based on Testing

ASTM E119 / UL 263

Three methods for determining fire-resistance ratings:
1. Fire Testing
2. Listing Service
3. Calculation/Other Methods
Concrete Fire Ratings
Based on Listing Services

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UL 618:
UL Standard for Safety for Concrete Masonry
Concrete Fire Ratings
Based on Calculation Methods

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3. Calculation/Other Methods
Available Resources

- National Concrete Masonry Association – www.ncma.org
- American Concrete Institute – www.aci.org
- Portland Cement Association – www.cement.org
- The Masonry Society – www.masonrysociety.org
Available Resources Cont.

• International Building Code – Prescriptive Fire Resistance, Section 720
• International Building Code – Calculated Fire Resistance, Section 721
• International Existing Building Code – Resource A
Available Resources Cont.

- American Insurance Services Group, Inc. (210) 469 – 3922 – Fire Resistance Ratings
National Concrete Masonry Association

TEK Notes

• **TEK 5-8B**: Detailing Concrete Masonry Fire Walls
• **TEK 7-1C**: Fire Resistance Rating of Concrete Masonry Assemblies
• **TEK 7-2**: Balanced Design Fire Protection
• **TEK 7-3A**: Firestopping for Concrete Masonry Walls
• **TEK 7-4A**: Foam Plastic Insulation in Concrete Masonry Walls

All available free online – See [www.ncma.org](http://www.ncma.org) Solutions Center – ETEK
Applicable NCMA TEK on Fire Resistance

- **TEK 7-1C**: Fire Resistance Rating of Concrete Masonry Assemblies
- **TEK 7-3A**: Firestopping for Concrete Masonry Walls
- **TEK 7-5B**: Evaluating Fire Exposed Concrete Masonry Walls
- **TEK 7-6**: Steel Column Fire Protection

All available free online – See [www.ncma.org](http://www.ncma.org)
Calculated Fire Resistance Method

- Fire ratings for concrete products are a function of:
  - Aggregate type
  - Equivalent thickness
Equivalent Thickness, $T_e$, is the solid thickness that would be obtained from the same volume of concrete without cores.

$$T_e = \% \text{ solid} \times \text{actual thickness}$$
ACI 216.1 / TMS 0216

Applicable to:

• Concrete
• Concrete masonry
• Clay brick and tile masonry
• Effects of finish materials on fire resistance
• Incorporated into the I-Codes
Filling Cores

When the hollow cores of concrete masonry are filled, the equivalent thickness is considered to be the actual thickness of the concrete masonry unit.

Thus all filled 8-inch and many 6-inch CMU have 4 hour ratings.
Finishes are an excellent way of increasing the fire resistance rating of existing assemblies.
Glazed Units

The calculated fire-resistance rating procedure for a glazed unit is the same as for conventional units.

- Same charts based on equivalent thickness and aggregate type
The IBC and ACI/TMS 216 Standard have tables for determining the calculated fire resistance rating for masonry and concrete lintels, beams and columns as well as for concrete floors.
Clay Brick & Tile

The IBC and ACI/TMS 216 Standard also address calculated fire resistance rating for clay brick and tile masonry wall assemblies (very similar to the concrete masonry tables and procedures)
Control Joints

Joint reinforcement, as required

Vertical reinforcement, as required

Stop joint reinforcement at control joint

Preformed gasket

Concrete masonry sash unit

Sealant

Backer rod

2-Hour Fire Resistance Rating
Summary

• Concrete products are inherently fire resistive
• Fire ratings are easily determined by the various methods available
• Compartmentation with concrete product is effective
Questions / Comments
Thank You for Attending!!!

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