A Fire Marshal’s View of IBC Chapter 7 & Sheraton Hotel Fire

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This presentation should only be used as a training guide and does not cover all requirements of 2015 IBC or any other specific state or local regulation.
Topics for Discussion

Design
Installation
Inspection
Maintenance
Issues

Sheraton Fire
The FCIA's mission is for member organizations to be recognized throughout the construction industry as preferred quality contractors of life safety firestop systems.

FCIA Member Contractors are committed to providing consistent, high quality firestop systems as a critical part of Effective Compartmentation. Through active participation in the FCIA and related forums, members contribute to the advancement of the firestop and compartmentation industry and maintain exceptional knowledge of this specialized trade.

Through this professional commitment to fire and life safety, member contractors bring considerable value to their customers by enhancing public safety and property protection.
FCIA Vision

FCIA's goals have been - and continue to be - focused on building reliability of Firestop Systems through the **DIIM of Firestopping**. Proper Design, Installation, Inspection, Maintenance and Management of Firestop Systems means reliability
Design
What do must Design Team show on construction drawing?

What do must AHJ do during plan review?

Does the Design Team and AHJ understand the fire test?
ASTM - UL

ASTM E 814 or UL 1479
ASTM E 119 or UL 263
ASTM E 2307
ASTM E 1960 or UL 2079

ASTM E 2393 - Joint
ASTM E 2174 - Penetration
Engineering Judgment

Does the Design Team and AHJ understand Engineering Judgment?

What is an Engineering Judgment?

When is one needed?

Who writes an Engineering Judgment?

Who submits an Engineering Judgment?

Who review and approves an Engineering Judgment?
Installation
What do must construction teams do during the construction phase?

What do must AHJ do during installation?

Are the design drawing the same as field condition?
Inspection
[BF] 1705.17 Fire-resistant penetrations and joints. In

*high-rise buildings* or in buildings assigned to *Risk Category III* or *IV*, *special inspections* for *through-penetrations*, membrane penetration firestops, *fire-resistant joint systems* and perimeter fire barrier systems that are *tested* and *listed* in accordance with Sections 714.3.1.2, 714.4.2, 715.3 and 715.4 shall be in accordance with Section 1705.17.1 or 1705.17.2.
[BF] 1705.17.1 Penetration firestops. Inspections of penetration firestop systems that are *tested* and *listed* in accordance with Sections 714.3.1.2 and 714.4.2 shall be conducted by an *approved agency* in accordance with ASTM E 2174.
[BF] 1705.17.2 Fire-resistant joint systems. Inspection of fire-resistant joint systems that are tested and listed in accordance with Sections 715.3 and 715.4 shall be conducted by an approved agency in accordance with ASTM E 2393.
RISK CATEGORY III

Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:

• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.

• Buildings and other structures containing Group E occupancies with an occupant load greater than 250.

• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.

• Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities.

• Group I-3 occupancies.
RISK CATEGORY III

- Any other occupancy with an occupant load greater than 5,000. \(a\)

- Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.

- Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:

  Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and are sufficient to pose a threat to the public if released. \(b\)
RISK CATEGORY IV

Buildings and other structures designated as essential facilities, including but not limited to:

• Group I-2 occupancies having surgery or emergency treatment facilities.
• Fire, rescue, ambulance and police stations and emergency vehicle garages.
• Designated earthquake, hurricane or other emergency shelters.
• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
• Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures.
RISK CATEGORY IV

- Buildings and other structures containing quantities of highly toxic materials that:

  Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and are sufficient to pose a threat to the public if released.

- Aviation control towers, air traffic control centers and emergency aircraft hangars.

- Buildings and other structures having critical national defense functions.

- Water storage facilities and pump structures required to maintain water pressure for fire suppression.
a. For purposes of occupant load calculation, occupancies required by Table 1004.1.2 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.
Maintenance
Issues

Training
- ASTM – UL
- Engineering Judgment
- Special Inspection
  - Risk Category

Code Changes
- Post C of O Inspection
  - Every 2 years
- Post Fire Event
- Risk Category
Sheraton Fire Recap
Basics

Saturday Oct 25th

Dispatched at 1036 hrs

E2 dispatched for water flow alarm.

While E2 enroute multiple calls to 911 regarding explosions and smoke.

Balanced to 1st alarm

Ended up a 2nd alarm
The Hotel

The Sheraton Downtown Phoenix is a City of Phoenix owned building.

The COP contracted with Starwood Hotels and Resorts to operate the facility as a Sheraton property.

Was built by the City as a result of the needed rooms from the Convention Center expansion.
The Hotel

Was opened in 2007/08
31 floors
1000 rooms
Largest hotel (# of rooms) in the State
3 basement parking levels

1st floor

- Lobby, restaurant and kitchen
The Hotel

2nd Floor
- Meeting Rooms

3rd Floor
- Ballrooms

4th Floor
- Gym and pool

4th thru 31st
- Guest rooms
The Hotel

Fully sprinklered, full alarm with 1 above 2 below evac, Fire Control room, stairwell and elevator shaft pressurization and emergency generator.

No battery back up lights inside. All run off the generator.

FACP and NACs had battery backup.

Smoke pressurization on generator.
Incident

Hotel was fully booked because of a very large convention at the Convention Center.

Believed to be ~600 – 800 persons inside at the time of the alarm.

Started as a water flow alarm with E2 dispatched.
Incident

911 receives multiple calls regarding expositions and smoke inside the building.

Alarm upgrades the alarm indication call to a 1st alarm HR assignment.
E2 arrives and find smoke coming from the first floor car drop off area.
Incident is balanced to a 2nd alarm
Incident

Crews identify the white smoke as coming from the building’s electrical switch gear room directly adjacent to the Fire Control room and the APS sub-station.

Crews remain out of the room because of the possible electrical hazards.

A sprinkler head activated and the room had around 3 inches of water in it.
Incident.

At this time only the 2 lower parking levels, 1st floor and the 2nd floor have alarmed. and evacuated.

Some guests hearing the units arrive, and feeling the explosion, have self evacuated from their rooms.

Media reports people claim alarms didn’t sound inside.
Incident

Command orders an evacuation for the whole building.

This is done via a master pull station below the FACP on the Fire Control Room.

Security also makes voice over pages to evacuate via the address system.

Pregnant female on the 13 floor starts to have medical issues.
Incident

APS tells crews on scene that the emergency generator is feeding the damaged and wet switch gear.

APS pulls power feeds.

Crews decide to stop the generator.

Convention Center becomes a staging place for evacuees who are in the street.
Incident

When generator is stopped all lighting inside goes out. Stairwells have NO lights on. Floors 4-31’s hallways only have one window, at the North end, with sunlight.

All back of house areas are dark.

C957, via the FEMA stash, provides hundreds of glow sticks for the stairwells.

All PFD flash lights are rounded up onscene and taken to the stairwells.
Incident

C99 works to secure the activated sprinkler head in the switch gear room.

Valve is actually on floor below and a few hundred feet away from the room. This caused a delay.

With smoke pressurization system off smoke is allowed to enter the building and elevator shafts. System had no power.
Incident

1500 hours crews give an all clear on the building.

Elevator operation becomes an issue.

C99 works with RP and original building Electrical Engineer to restart the back up generator.

1630 hours emergency power is restored.

Now the fun begins
“Now the Fun Begins”

Fire pump

- An arc explosion traveled down the conduit and blew the controller doors open.
- Most of its electrical boards and replays were damaged or blown out/missing.
- Controller is not field repairable.
- No clue if pump is damaged or not.
“Now the Fun Begins”

Electrical Systems

- One of the four feeds completely destroyed.
- That feed also happens to supply the fire pump.
- Other three feeds may have water damage
“Now the Fun Begins”

High rise with no sprinkler supply above 3/4\textsuperscript{th} floor

Fire alarm is functional with a lot of troubles

Smoke control system comes back on with emergency power but panel is indicating there are issues.
Electrical Room
Fire Pump
Fire Alarm

Running on generator power. A lot of booster batteries have died and not recharging.

We require Climatec to respond with spare batteries and man power.
Generator

We require the Sheraton to call out their fuel supply company to top off the generator (was ay $\frac{3}{4}$)

We also require them to call their generator service company to inspect the unit.

This is because we know it will be running for a while.
Day 1 (Day of the Incident)

Before 2400 hrs we accomplished the following:

Established a fire watch for all floors. Hotel security and PPD/MCSO

Had fire pump contractor looking for a new controller

Fire alarm back to green, minus missing fire pump.

Generator serviced and fueled

Closed the building to any public entry
Day 1 (Day of the Incident)

Stopped any operations inside that used open flame, cooking, welding, cutting or grinding.

Requested a 8AM meeting with all P&D Inspectors, Sheraton, Fire Prevention, fire pump contractor, Climatec and the Electrical company
Day 1 (Day of the Incident)

The remaining three electrical feeds were found to be okay and dry.

All the systems from the damaged feed (minus the fire pump) were moved over to the other three.

Normal power was restored temporarily around 2400 hours.
Day 2 (Sunday)

Still looking for a fire pump controller.

Electrical crews were trying to pull the feed lines out of the conduit from the electrical room to the fire pump.

FP onscene all day as solutions come up and alternatives are discussed.

Still looking for a cause.
Day 2 (Sunday)

We conduct a floor by floor test of the fire alarm
- Find the stairwell speakers have no audio
- 10th floor had a bad amp
- Some AV devices not working

Smoke control was inspected and repaired by Climatec and a technical report created.
Day 2 (Sunday)

P&D did some inspections of their own.
  ◦ Found a lot of fire and smoke barrier penetrations not sealed.
  ◦ Some stairwells had large sections of drywall missing.

We told Sheraton management to plan on being closed for a few days.
Day 3 (Monday)

Might be a fire pump controller being finished up at TX plant.

Damaged electrical systems still being removed

Cable pulling company on site to try to pull damaged fire pump feed wires from conduit.

Unable to find electrical switch for fire pump feed
Day 3 (Monday)

Sheraton asks about a fire truck standby to allow them to open.

We start to talk about temporary generator to feed fire pump.

Building goes back onto emergency power for 24 hours to finish repairs to electrical systems.

Cause of arc explosion ??
Day 4 – 5 (Tue-Wed)

Fire pump controller shipped from TX plant.

Feed conduit damaged beyond use.

2 hour rated cable needed. Need 1100 ft at $140.00 a foot plus over night air freight. $$$$$$

Replacement switch gear issues

Old controller removed
Day 6 (Thursday)

Back on normal power

Electrical switch gear shipped from San Francisco.

Electrical cables found in Las Vegas

Fire pump controller arrives and is installed.

FP asks for a mobile power source to be provided as a back up for the pump.
Thursday Night / Friday Morning

Final electrical hookups are made.

Electrical work is temporary as it will need to be redone sometime next year.

Fire pump controller is energized

APS restores normal power for the third time

Fire pump acceptance test is done

Building is allowed to reopen around 8AM
Thank You

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