Update-Clean Agent Fire Protection Systems
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Agenda for Today

• Water vs. Clean Agents
• Clean Agents
  – Halon
  – Man Made
  – Natural
• Agent Comparisons & Approvals
• Global Warming Impact
• What Happens During a Discharge
• Q & A
Types of Fire Systems

Sprinklers = Building Protection

- Minimum Code Requirement
- Cause water damage
- Electrically conductive
- Heat detection = slow response
- Business interruption
- Types of Sprinkler Systems:
  - Wet Pipe
  - Pre-action
  - Water Mist/HIFOG
Wet Pipe Sprinkler System

- Pipe filled with water at all times.
- Heat opens sprinkler
- Water discharges immediately (18 – 35 gpm per head)
- If a pipe or sprinkler breaks, water discharges immediately.
Pre-Action Systems: Needs to Consider

• Why Choose a Pre-Action System?

• System Components:
  – Requires detection and releasing control system
  – Requires Floor Drain/Outside Wall
  – Requires 120Vac Dedicated 20amp Power Source
    • Releasing Control Panel
    • Air Compressor

• Single Interlock Valve
  • Alarm Input

• Double Interlock Valve
  – Alarm Input
  – Loss of Air Pressure
How much water?

Sprinkler flow time of 30 minutes
Each sprinkler discharging 18 to 35 gpm of water

That’s 540 to 1,050 gallons of water on your valuable assets!

Discharge of two sprinkler heads is common – that’s 1,080 to 2,100 gallons of water!!
Fire Control vs. Fire Extinguishment

- Sprinkler activation
- Clean Agent system activation
- Detection
  
- Fire Extinguishment (Clean Agents)
  
- Fire Control (Sprinklers)

Heat Release Rate vs. Time

- 30s
- ~3 min
Clean Agent Solutions
What is better?

Misconception: Sprinklers are just as good as Clean Agents for Asset Protection

Truth: Clean agent systems are far superior to fire sprinklers for asset & business continuity protection!
Critical Infrastructure Design

Where Downtime is Unacceptable…

The Desired Clean Agent Characteristics Are:

✓ PERFORMANCE
✓ SAFETY
✓ COST
✓ ENVIRONMENT
Halon 1301

- Production Ceased in countries that signed the Montreal Protocol in 1994
- Safe for people inside room
- No longer sold for new systems
- Only sold as recycled/reclaimed agent that is used for recharging existing systems
Halon 1301

Agent Characteristics

- Chemical name – Bromotrifluoromethane
- Vapor Pressure – 235 psi
- Molecular Weight – 148.9
- Boiling Point – -72°F
- Design Concentration, occupied spaces 5% - 7%
- Ozone Depleting Potential - 16
Halon 1301

EXTINGUISHING METHOD

According to the Halon Research Institute: "Three things must come together at the same time to start a fire.
• First ingredient is fuel (anything that can burn)
• Second is oxygen (normal breathing air is ample)
• Last is an ignition source (high heat can cause a fire even without a spark or open flame).
• Traditionally, to stop a fire you need to remove one side of the triangle - the ignition, the fuel or the oxygen. Halon adds a fourth dimension to fire fighting - breaking the chain reaction. It stops the fuel, the ignition and the oxygen from dancing together by chemically reacting with them."
Fundamentals of Fire Extinguishment

Fire Triangle

- Fuel
- Heat
- Chemical Reaction
- Oxygen
What do we use now?
INNOVATIVE SOLUTIONS
FOR LIFE SAFETY AND BUSINESS CONTINUITY

ECARO25

INERGEN®

HFC-227ea

Sapphire®

Novec™

IG-55

IG-541

FORCE500®

IG-55

FK-5-1-12

Argonite®

PROINERT®

HFC-125

FM-200®

FK-5-1-12

HFC-125
Clean Agent ASHRAE Designations

**Waterless Gas:**
- HFC-227ea (FM-200®/FE-227™)
- HFC-125 (ECARO-25®/FE-25™)

**Inert Gas:**
- IG-55 (Prolnert², Agronite®)
- IG-541 (Inergen®)

**Liquid:**
- FK-5-1-12 (Novec™1230, Sapphire®, FORCE500®)
Two Categories of “Clean Agents”

Man-Made Agents

✔ ZERO-Ozone Depleting
✔ LOW- Global Warming Potential (GWP)

• Waterless HFC Flash Gases
  - FM-200® 1994
  - ECARO-25® 2003

• Fluids – Fluoroketones
  - Novec™ 1230 2005

Naturally Occurring Gases

✔ ZERO-Ozone Depleting
✔ ZERO-Global Warming Potential (GWP)

• Inert Gases
  - 1st Generation: Inergen® 1994
  - 2nd Generation: ProInert2 Agronite® 2009
Clean Agents: How they Work

• **System Components:**
  – Requires detection and releasing control system
  – Clean agents stored in pressurized containers

• **Man Made Gases: 10 Second Discharge**
  – Active extinguishing agent
  – Removes heat - molecular heat absorption
  – No oxygen reduction

• **Inert Gases: 60 Second Discharge**
  – Oxygen reduction
  – Safe for most people
  – \( \text{CO}_2 \) (*not used as it is deadly even at low concentrations*)
Clean Agent Systems
Primary Advantages

- Ability to extinguish shielded, obstructed, 3-D fires
  - Water is non-permeating will not fill enclosure.
- Ability to rapidly extinguish fires
- Significantly reduces collateral smoke and water damage caused by delayed extinguishment and Sprinklers
WATERLESS CLEAN AGENTS