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What are Clean Agents?

- **NFPA 2001**: “Electrically nonconductive, volatile, or gaseous fire extinguishant that does not leave a residue upon evaporation”
  - No cleanup required
  - No business interruption
Automatic Sprinkler System Discharge

Water ≠ Clean Agent
Foam System Discharge

Foam ≠ Clean Agent
Dry Chemical System Discharge

Dry Chemical ≠ Clean Agent
Clean Agent System Discharge: After Discharge

Halon 1301: CF$_3$Br
- Total flooding applications

Halon 1211: CF$_2$BrCl
- Portable, local applications
Halons: Typical Applications

Protection of critical, sensitive & valuable assets

- Electronics facilities
- Computer rooms
- Communications equipment rooms
- Oil & gas industry
  - pipeline pumping stations
  - offshore platforms
- Shipboard machinery spaces
- Aircraft
- Military vehicles
- Museums
- Libraries
Ozone Depletion

1. CFCs released
2. CFCs rise into ozone layer
3. UV releases Cl from CFCs
4. Cl destroys ozone
5. Depleted ozone -> more UV
6. More UV -> more skin cancer

Source: U.S. EPA
DuPont FM-200®

CF$_3$CHFCF$_3$; HFC-227ea; 1,1,1,2,3,3,3-Heptafluoropropane

Zero Ozone Depletion Potential (ODP = 0)
Replacement for Halon 1301
High Risk Fire Protection Challenges
High-Rise Buildings

Typical Electronics Installations in High-Rise Buildings

- Electronics rooms
- Telephone rooms
- Low voltage rooms
- Datacenters
- Server rooms
- BMS rooms

Mission critical equipment
Sensitive equipment
Expensive equipment

Typically occupied by personnel
Electronics Installations in High-Rise Buildings: Fire Extinguishing System Requirements

- **Reliable Fire Extinguishment**
  - Proven track record of performance

- **Minimal equipment damage, data loss**
  - Rapid detection & extinguishment

- **No cleanup/business interruption**
  - Clean agent required

- **Electrically nonconductive agent**
  - Power shutdown may be undesirable
Electronics Installations in High-Rise Buildings: Fire Extinguishing System Requirements

- **Small System Footprint**
  - Floor/storage space is expensive
  - Minimum number of system cylinders

- **Chemically Inert Agent**
  - No reaction with assets
  - Usable in high humidity conditions

- **Safety in Use**
  - Best available safety in use
  - Low toxicity agent

- **Sustainability**
  - Agent availability for recharge following fire event
  - Agent with minimal environmental impact
DuPont FM-200®

Reliable Fire Protection

- Proven Track Record of Performance
- Hundreds of thousands of FM-200® systems installed worldwide
- Billions of dollars worth of assets protected by FM-200® systems
- More than 20 years of proven performance
  
  *World’s 1st clean agent system installation was FM-200®, in 1991*

- Perfect safety and performance record
DuPont FM-200®

- FM-200® systems employ rapid detection
  Fire detected in initial stage
- FM-200® systems employ rapid extinguishment
  Agent discharge time $\leq 10$ s
  - ensures rapid extinguishment and minimal damage
- FM-200® produces no residues or corrosive products
  No cleanup or downtime required
- FM-200® is electrically nonconductive

Minimal equipment damage
No cleanup / No business interruption
Safe for Electronics
FM-200® systems have a small storage footprint
Typical: 1 FM-200® cylinders vs 11 inert gas cylinders

FM-200® is chemically inert
- No chemical reaction with assets being protected
- FM-200® does not react with water under any conditions
  *No reaction with water to produce acids*
  *FM-200® systems operational under any conditions of humidity and to temperatures to and below 0 °C*
**DuPont FM-200®**

**Safety in Use**

- **FM-200®** is characterized by extremely low toxicity
  - More toxicological testing performed on FM-200® than any other clean agent

- **FM-200®** is employed in FDA-approved MDIs
  - FM-200® employed as propellant in metered dose inhalers
    - used to propel a medicament down the throat
    - worldwide approval for pharmaceutical use

- **FM-200®** does not react with water to produce acids when it is inhaled and crosses the lung-air interface
DuPont FM-200®

Sustainability

- FM-200® has no affect on stratospheric ozone
  - Does not deplete ozone
  - FM-200® ozone depletion potential (ODP) = 0

- The contribution of FM-200® use in fire extinguishing applications to climate change is minuscule
Case Study:

Tiffany Tower, May 2010

Fire in a capacitor bank rapidly extinguished with a NAFFCO installed FM-200® system

- Rapid extinguishment
- Minimal damage
- No business interruption
A Selection of Notable Clean Agent Installations Protecting High Risk Challenges
Anechoic Chamber Protection

- Echo-free chambers; designed to stop reflections of sound or electromagnetic waves
- Electronics testing
- Microwave oven to aircraft hangar size
- RAMs
  - Radiation absorbent material
  - Cover all surfaces of chamber
  - Rubberized foam impregnated with Fe and C

Pyramidal RAMS
US Air Force Research Laboratory (AFRL) Anechoic Chamber

Wright-Patterson AFB
Fenwal FM-200® System

AFRL Building 620 RYOne
Sensor Lab Anechoic Chamber – 114 nozzles total
National Security Agency (NSA) Comprehensive National Cybersecurity Initiative

Protection of the USA’s most critical data related to national security

Camp Williams, Utah
$1.5 billion
Completion in 2013

FM-200® System

Most important, critical US Government datacenter
Latin America – Recent FM-200® Projects

Application Areas:
Control systems
Nuclear power plants
Oil and Natural Gas Production

Panama Canal, Panama
CEMEX Venezuela
Atucha II Nuclear Power Plant, Argentina
Jorge Chavez International Airport, Peru
PetroBras / Shell FPSO, Brazil
Notable Projects in Asia

Samsung Korea
Mumbai Metro
New Delhi Metro
Mumbai Stock Exchange
Tata Communications

Metros – HK, Singapore, Bangkok, Taiwan
Airports – India, Korea, Thailand,
Singapore, Vietnam, Indonesia,
Philippines, Malaysia,
Europe

Some notable projects

Haribo (Gummy Bears) Austria
Moscow Metro
Museo del Prado
Apple Computers - Ireland
Middle East

Some notable projects

- Burj Khalifa
- Dubai Metro
- du Telecommunications
- Dubai Int’l Airport
- du Telecom
- Mecca Railway
- DOKAAE Project
- STC Telephone
- Madinah Hilton Hotel
The Rumor:

“FM-200® and other HFCs are scheduled to be banned from use in fire suppression”

What are the Facts?
The Fire Protection Industry Has Acted Responsibly

- US EPA estimated U.S. HFC emissions for 2010 in Tg of CO₂ equivalents
  - Fire Extinguishing 0.9
  - Refrigeration and air conditioning 97.6

Reported FE Emissions Are Even Lower

FACT:

Fire Protection emissions of HFCs are very small and are not increasing significantly with time

Data from HARC 2012
## Impact of Emissions of HFCs from Fire Protection Applications on Climate Change: Historical

|---|---|

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<th>Tg of Carbon Dioxide Equivalents</th>
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<td>R-22 manufacture</td>
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<td>17</td>
<td>13.6</td>
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<td><strong>Total HFCs</strong></td>
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<td><strong>115.9</strong></td>
<td><strong>120.1</strong></td>
<td><strong>117.4</strong></td>
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<td><strong>Total All GHGs</strong></td>
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**FACT:** The impact of fire protection emissions of HFCs on climate change is minuscule and is not increasing significantly with time.
Regulatory Status of HFCs in Fire Extinguishing

- No regulatory proposals targeting HFCs in Fire Protection
- Emissions of HFCs from fire protection are very small and are not increasing with time
- The effect of emissions of HFCs from fire protection on climate change/global warming is very small and is not increasing
  - 0.01% of climate change effect due to HFCs in fire protection
  - 85% of climate change effect due to CO₂ emissions
DuPont™ FM-200®
Falcon Customer Protection Program
For the Middle East

Future proof your Investment in fire protection
What is The Falcon Customer Protection Plan?

- A commitment from DuPont to protect your investment in a FM-200® System for 20 Years.
- Peace of mind that environmental legislation will not affect your FM-200® System.
- The final piece of the package that makes FM-200® the most cost effective clean agent fire suppressant choice.
QUESTIONS ?