MARSH

SOLUTIONS...DEFINED, DESIGNED, AND DELIVERED.

FIRE FIGHTING FOAM

Information from Jerry Krijn/Chubb was used in this presentation

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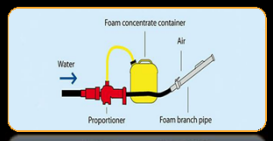
MARSH & McLENNAN COMPANIES

WHAT IS FOAM?

- Mixture of foam forming concentrate, water and air
- The water /foam concentrate mixture is called PREMIX
- Foam is generated by mixing the water and expanding it with air



PURPOSE OF APPLYING FOAM

- The fire can be quickly controlled when foam is applied to a burning liquid after which the fire can be fully extinguished by building a foam blanket
- Foam can also be applied to prevent ignition of a flammable liquid. The foam suppresses the generation of vapor

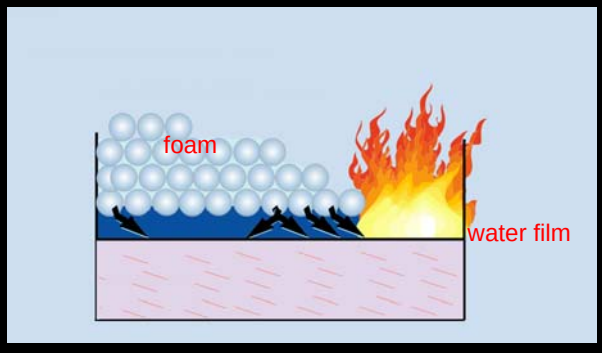
EFFECTS OF FOAM

- Foam is 94-99% water. Water cools and therefore affect sustainability of fire
- Suffocating the by avoiding contact with air
- Change equilibrium between flammable vapor and oxygen
- Cover flammable liquid with foam

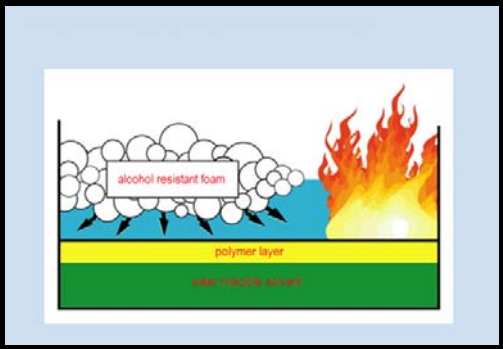
SOME FOAM TYPES

- Protein foam
  - Standard protein
  - Fluor protein (FP)
  - Film forming Fluor protein (FFFP)
- Standard synthetic foam
- High Temperature synthetic foam (HTF1000)
- Fluor-synthetic foam (AFFF)
- Alcohol resistant Fluor-synthetic foam (AFFF-AR)
- Fluor free (alcohol resistant) foam (FF-AR)

FOAM FOR NON-POLAR SOLVENT FIRE



FOAM FOR WATER MISCIBLE SOLVENT FIRE



APPLICATION RATE & APPLICATION DUUR

Application rate

- The required amount (in liters) of foam per time unit (minutes) applied on each square meter (m^2) surface area to extinguish the fire

Application time

- Minimum time (minutes) to apply foam to the surface to successfully extinguish the fire
- Video of test

SUITABILITY FOAM & APPLICATION CONDITIONS

- NFPA advises
- Controlled test with actual real products to determine suitability/application rate/application time expansion ratio
- Foam concentrates get rating based on test results EN 1568

EN 1568 FIRE EXTINGUISHING MEDIA FOAM CONCENTRATES

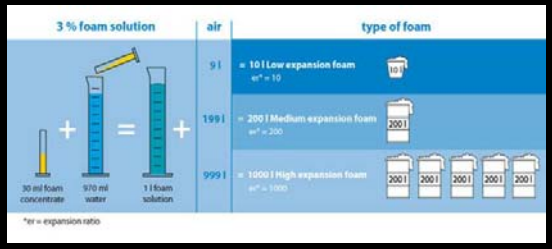
1. Part 1
   Specification for medium expansion foam concentrates for surface application to water-immiscible liquids
2. Part 2
   Specification for high expansion foam concentrates for surface application to water-immiscible liquids
3. Part 3
   Specification for low expansion foam concentrates for surface application to water-immiscible liquids
4. Part 4
   Specification for low expansion foam concentrates for surface application to water-miscible liquids

EXAMPLE: RATING FOAM FOR HEXANE

		Gentle application test		Forceful application test	
Extinguishing performance	Burnback resistance	Extinction time not more than	Burnback time not less than	Extinction time not more than	Burnback time not less than
I	A	Not applicable		3	10
	B	5	15	3	Not applicable
	C	5	10	3	
	D	5	5	3	
II	A	Not applicable		4	10
	B	5	15	4	Not applicable
	C	5	10	4	
	D	5	5	4	
III	B	5	15	Not applicable	
	C	5	10		
	D	5	5		

EXPANSION RATIO

- Low expansion = expansion 20 X
- Medium expansion = expansion 20 to 200 X
- High expansion = expansion ≥200 and above



HIGH EXPANSION FOAM

Hazardous warehouses
Aero plane hangers
Controlled burn of liquefied gasses

MEDIUM EXPANSION

Pump sites, sewers, waste bunkers, tunnels

LOW EXPANSION FOAM (1)

- Tank fires
- Bund fires
- Storage area

CODES AND STANDARDS (1)

- NFPA 11: Standard for Low-, Medium, and High-Expansion Foam
  Chapter 5: Low-Expansion System Design
- NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection
- NFPA 16: Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
- NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection

CODES AND STANDARDS (2)

- NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- NFPA 30: Flammable and Combustible Liquids Code
  Chapter 22: Storage of Liquids in Tanks - Aboveground Storage Tanks

CODES AND STANDARDS (3)

- NFPA 1911: Standard for the Inspection, maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus
- IP-19: Fire precautions at petroleum refineries and bulk storage installations
- API RP 2021: Management of Atmospheric Storage Tank Fires
- API RP 2030: Application of Fixed Water Spray Systems for Fire Protection in the Petroleum and Petrochemical Industries

QUESTIONS