Dry Chemical Systems

The following data is based on maximum anticipated area of spill or contained area of hazard and the fire fighters being experienced professionals. If the fire fighter is a novice, only 40% of the area of spill in square feet should be used for anticipated extinguishing capability.

The following data is based on using Purple-K (Potassium Bicarbonate) dry chemical agent. Capabilities of other agents will vary slightly in number of square feet.

UNIT MODEL NO.	CAPACITY IN POUNDS	AREA OF SPILL IN SQUARE FT.	NO. & SIZE HANDLINES
CDC200	200	640	(1)1" X 50'
CDC500	500	1600	(1)1" X 100'
CDC1000	1050	3200	(2)1" X 100'
CDC1500	1400	4500	(2)1" X 150'*
CDC2500	2300	7500	(2)1" X 150'**

Recommend optional 60 lb./sec. turret nozzle.

**Recommend optional 90 lb./sec. turret nozzle.*

Dry chemical is an excellent extinguishing agent due to its rapid flame suppressing capability on hydrocarbon, three-dimensional and natural gas pressure fires. Large skid mounted dry chemical units can be provided for fixed location handling operations or fixed systems installations. The fixed system units are provided without hose reels and with the nitrogen cylinders standing upright in a rack for accessibility. The handline units are provided with hose reels mounted on the unit, and the nitrogen cylinders lying horizontally underneath the reel(s). They can also be mounted on trucks or trailers if mobile capability is required.

TWIN AGENT UNITS

Should the fire hazard have Class "A" material or an excess amount of metal in the fire area, which may cause hot spots, it would be desirable to consider a twin agent unit to obtain the securing capability of a foaming agent. A Twin Agent Unit allows a single operator to apply dry chemical agent for rapid extinguishment and a foaming agent to secure the hazard simultaneously.

TWIN AGENT CAPABILITY

MODEL NO.	AREA OF SPILL IN SQ. FT.	NO. & SIZE HANDLINES
CTA500/50	1600 SQ. FT.	(1) 1"X 1"X100' HANDLINE
CTA500/100	1800 SQ. FT.	(1) 1"X 1"X100' HANDLINE
CTA1000/100	3200 SQ. FT.	(1) 1"X 1"X100' HANDLINE
CTA1000/150	3500 SQ. FT.	(2) 1"X 1"X100' HANDLINE
CTA1500/150	4800 SQ. FT.	(2) 1"X 1"X100' HANDLINE
CTA1500/250	5000 SQ. FT.	(2) 1"X 1"X100' HANDLINE*

∗ *Recommended Twin Turret Nozzle*

Applications for DC Units and Systems

- Compressor Stations
- Oil and Gas Well Servicing
- Drilling Operations
- Off-Shore Platforms
- Fuel Loading Racks
- Storage Tank Vents
- Electrical Transformers
- Chemical and Petro-Chemical
- Plants
- Storage Facilities
- Airports and Heliports
- Manufacturing Facilities

DETERMINING REQUIREMENTS

The first steps in determining the requirements for a Dry Chemical System is to identify the hazard, size of hazard and any conditions requiring special consideration such as wind exposure or objects blocking discharge of agent to the hazard.

COMMON TYPES OF FIRE HAZARDS

Spill Fires: Hydrocarbon and paint products from storage drums, transformers and processing and bulk storage tanks.

Liquid in Depth: Drip pans, dip tanks, cleaning solvent tanks and quench tanks.

Three Dimensional Fires: Ruptured containers, bulk storage tank overflows and broken piping.

<u>Pressure Fires</u>: Faulty seals or packing, broken flanges or piping, blown gaskets and operating pressure relief valves.

<u>Class "A" Fires</u>: Trash containers, pallets, tires, dust collectors and paint filters.

TYPE OF EQUIPMENT AND APPLICATION

The type of system required (handline application, total flooding, manual, semi automatic or full automatic) is normally a judgment call based on the following:

1. Is the facility manned full time?

2. Are experienced fire-fighting personnel available at all times?

3. Visibility of hazard in the event of fire.

4. Power source available for automatic system?

5. Hazard to personnel that might be in area during?

6. Discharge of equipment?

7. Obstacles which would prevent extinguishment using handlines.

WHEN HANDLINE PROTECTION IS USED

The unit must have the capacity to maintain flow through the handlines for a minimum of 30 seconds. A fixed system providing total flooding must maintain flow for a minimum time of 30 seconds (Ref: NFPA 17 Standard for Dry chemical Extinguishing Systems).

To determine the unit size required for a fixed system on a hydrocarbon spill fire, multiply the number of square feet to be protected times .039.

For ABC fires use 500 pounds of dry chemical per 2,000 cubic feet.

TABLE I

PERFORMANCE DATA FOR CHEMGUARD DRY CHEMICAL UNITS
METHOD OF FIGURING DRY CHEMICAL AGENT REQUIREMENTS FOR SPECIFIC HAZARDS

Unit Size	Capacity (lbs.) BC	Capacity (lbs.) PK/ABC	Max Flow Rate (lbs./sec.) BC	Max Flow Rate (lbs./sec.) PK/ABC	DISCHARGE OPENING (INCHES)
CDC200	230	200	7.5	6.5	1-1/2
CDC500	600	500	20	16	2
CDC1000	1200	1050	40	35	2-1/2
CDC1500	1550	1400	50	45	2-1/2
CDC2000	2100	1850	70	60	3
CDC2500	2600	2300	85	75	3
CDC3000	3000	2750	100	90	3
CDC3500	3500	3100	115	100	3
CDC4000	4000	3750	140	125	4
CDC4500	4500	4050	150	135	4
CDC5000	5000	4500	170	150	4

TABLE II

CHEMGUARD DRY CHEMICAL UNITS FIXED SYSTEM
PERFORMANCE ON HYDROCARBON FIRES
NFPA 17 REQUIRES MINIMUM OF 30 SECOND DISCHARGE TIME

Unit Size	PK DRY CHEMICAL			BC DRY CHEMICAL		
	DC Qty. lbs.	Enclosed Max Area sq. ft.	Exposed Max Area sq. ft.	DC Qty. lbs.	Enclosed Max Area sq. ft.	Exposed Max Area sq. ft.
CDC200	200	850	650	230	630	580
CDC500	500	2130	1630	600	1660	1260
CDC1000	1050	4480	3430	1200	3330	3030
CDC1500	1400	5980	4575	1550	4300	3910
CDC2000	1850	7900	6040	2100	5830	5300
CDC2500	2300	9800	7510	2600	7200	6560
CDC3500	3100	13250	10130	3500	9720	8830

PERFORMANCE DATA FOR CHEMGUARD DRY CHEMICAL UNITS

Equations Required To Figure Dry Chemical
Flow Rate and Capacity
For
Hydrocarbon Spill Fires

A	= Projected area of hazard – square feet
T	= Extinguishing time -seconds
W	= Flow rate per unit area (lbs./sec.)/ft^2. (From Figure 1.)
W_t	= Total flow rate required to extinguish hazard – lbs./sec. =(W)(A)
*Q_i	= Quantity of agent to extinguish hazard under ideal conditions –Pounds =$(W_T)(t)$
SF	= Flow safety factor, accounts for non-ideal conditions, pressure fires, re-ignitions hazards, Class A material should be between 2.5 & 3 dimensionless.
**Q_T	= Total quantity of agent needed – pounds =(Qi)(SF).

EXAMPLE:

(1) Assume t = 10 sec., then W = .013 lbs./sec./Ft$^{2.}$
(2) W_T = AW = .013A.
(3) Q_i = W_Tt = (.013A) (10) = .13A.
(4) Q_T =(Q_i) (SF) = (.13A) (3) = .39A.
(5) Select a unit(s) from Table 1, which will match as close as possible to W_T and Q_T.
(6) Replace W T with unit(s) flow rate and solve for new W.
(7) Read new t from curve.
(8) Solve for new Q_i and Q_T.
(9) New Q_T should be less than capacity of unit(s).

NOTES:

1. For ABC fires use 500 lbs. dry chemical per 2,000 cu. ft.

2. For total flooding volume application, use .0385 lbs./cu. ft. to determine dry chemical required and .00125 lbs./sec./cu. ft. to determine minimum flow rate.

*For BC use:	Enclosed Q_i = .12A	Exposed .132A
*For PK use:	Enclosed Q_i = .078A	Exposed .102A
**For BC use:	Enclosed Q_T = .36A	Exposed .396A
**For PK use:	Enclosed Q_T = .234A	Exposed .306A