

DuPont™ Dymel®

AEROSOL PROPELLANTS

Flammability and Storage of Dymel® Propellants

Before using any of the Dymel® products, review the DuPont Material Safety Data Sheets (MSDS). They can be obtained from the DuPont Customer Service Center or your DuPont representative.

Flammability

Nonflammable Blends/Flammability Limits

Safe storage and handling of aerosol propellants, especially flammable aerosol propellants, has always been an important matter for the aerosol industry. Dymel® 134a is nonflammable and nonflammable blends can be formed with it and other Dymel® or hydrocarbon propellants when concentrations of the flammable component are controlled to specific limits. **Table 1** gives the maximum concentration of flammable propellant in nonflammable binary blends with Dymel® 134a. Nonflammable blends of Dymel® 134a and A or hydrocarbon propellants contain relatively low concentrations of the flammable component. In the event of a spill or leak, nonflammable blends may fractionate, i.e., the components may separate, producing compositions that are flammable.

Table 1
Flammability of Dymel® Blends

	Flammable Component	Maximum Concentration of Flammable Component (wt%)
Dymel® 134a and	Dymel® 152a	12.0
Dymel® 134a and	Dymel® A	3.5
Dymel® 134a and	Isobutane	3.0

Dymel® A and 152a are flammable propellants. Their upper and lower explosive limits are given in **Table 2**.

Table 2
Flammability Limits of Dymel® and Hydrocarbon Propellants (vol% in air)

	Lower Limit	Upper Limit
Dymel® 134a	Nonflammable	Nonflammable
Dymel® A	3.3	18.0
Dymel® 152a	3.9	16.9
Propane	2.2	9.5
Isobutane	1.8	8.4
n-Butane	1.9	8.4

Combustibility of Dymel® 134a

Although nonflammable at ambient temperatures and atmospheric pressure, Dymel® 134a is combustible at pressures above atmospheric and air concentrations greater than 60% by volume. This property of Dymel® 134a should not pose an explosion hazard from aerosol containers using it as propellant or during normal aerosol filling operations. However, as is common industry practice, air should be removed from aerosol containers before they are filled with Dymel® 134a.

Spills and Leaks

In the event of a large spill or leak, evacuate all personnel to minimize exposure to high concentrations of vapor. Personnel should wear a self-contained breathing apparatus if they must enter an area in which a spill or leak occurred. Ventilate the area using blowers or fans at floor level to circulate the air. **Caution: Do not use ordinary electric fans to ventilate areas containing flammable propellant vapors. They may produce sparks that could ignite the vapors.** Dymel® propellants have a slightly sweet, ethereal odor that can be difficult to detect. The best way to monitor the concentration of Dymel® vapors in air is with infrared monitoring devices.

Heat of Combustion

The heat of combustion of several flammable aerosol propellants are given in **Table 3**. Of the flammable propellants, the hydrocarbons release the largest amount of energy upon combustion and Dymel® 152a releases the smallest amount.

Table 3

Propellant	Heat of Combustion, kJ/g
Dymel® 152a	6.3
Dymel® A	26.5
Propane	44.0
Isobutane	42.8
n-Butane	43.3



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Storage and Handling

Storage Tanks

For maximum flexibility, it is desirable that storage tanks for Dymel® A, 152a, or 134a be rated at 250 psig but a rating of 185 psig is adequate. The tank should be rated for deep vacuum (20-25 inches of Hg). In general, tanks intended for propane service are adequate, but butane and isobutane tanks may not be.

The manways and other flanged openings of tanks used for flammable propellants storage should be equipped with an inert gasket having a melting point above 816°C (1500°F), e.g., a metal or an appropriate spiral wound or composite (graphite-based) gasket.

Pressure relief valves must be in accordance with ASME and CGA requirements for the specific propellant in storage.

Neoprene is recommended for all valve seats in Dymel® 134a and 152a service. For Dymel A service, Kalrez® perfluoroelastomer seats are recommended.

Always wear a self-contained breathing apparatus when entering tanks or other confined areas where high concentrations of Dymel® vapors might exist. Use the buddy system and a lifeline.

Electrical Equipment

Electrical equipment requirements for the Dymel® aerosol propellants are given in **Table 4**.

Table 4
Electrical Requirements

Propellant	Division 1 Location	Division 2 Location
Dymel® 134a	no rating	no rating
Dymel® A and blends with Dymel® 134a, 152a, and/or hydrocarbons	group C	nonsparking or group C
Dymel® 152a and blends with Dymel® 134a and/or hydrocarbons	group D	nonsparking or group D

The following points should be noted:

- Dymel® 134a is nonflammable when used alone and requires no explosion-proof equipment. However, when it is blended with flammable propellants, the blend should be handled in explosion-proof equipment.
- Dymel® A and all its blends require Class 1, Group C equipment in Division locations.
- Dymel® 152a and all its blends with Dymel® 134a or hydrocarbon propellants require Class 1, Group D equipment in Division 1 locations.
- In Division 2 locations, all spark-producing electrical equipment must be explosion-proof and rated for the specific propellant. Nonsparking motors need not be explosion-proof. When existing equipment requires conversion to explosion-proof service, it should be rated for a Class 1, Group C/D service to permit handling all possible blends.
- A separate loading (gassing) facility is recommended for flammable propellants. All electrical equipment in it must be explosion-proof and appropriately rated for service in a Class 1, Division 1 Location; the ventilation system should comply with the recommendations of the CSMA manual, "Hydrocarbon, Dimethyl Ether and Other Propellants: Considerations for Effective Handling in the Aerosol Plant and Laboratory."
- Flammable gas detectors are recommended. Infrared or sensing flame detectors can be used with all Dymel® propellants. Hot wire devices are not compatible with Dymel® 134a, 152a, or their blends.
- Adherence to the National Electrical Code is advised.

For further information on DuPont™ Dymel® propellants, please contact your local representative:

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