



SF6 Transportation Frequently Asked Questions

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What is the purpose of this document?

The primary purpose of this document is to provide users of SF6 with the basic knowledge of current DOT regulations regarding the safe and legal transportation of SF6. Because SF6 is a DOT-classified hazardous material, specific transportation issues apply of which many drivers and users may not be aware. Please note that the interpretations of the cited DOT regulations are just that – interpretations. Because DILO does not possess the necessary legal expertise or authority, you are strongly encouraged to further research the various regulations utilizing your transportation and legal departments.

Is SF6 a DOT regulated gas?

Yes. As a Class 2.2 (non-poisonous, non-flammable, compressed gas), the transportation of SF6 is regulated. This means it must meet certain packaging, shipping, documentation, and driver-licensing requirements.



What containers can be used to transport SF6?

According to 49CFR173.115(b), any SF6 at pressures less than 25PSIG @ 68°F can be transported in a non-DOT approved container – without any further transport requirements. However, at pressures of 25PSIG @ 68°F or greater, the container must bear DOT approval numbers, and have a working pressure of at least 1000 PSIG. Per 49CFR173.304a(2) (liquefied, compressed gases), SF6 may transported in cylinders with DOT approval numbers: DOT-3A1000; DOT-3AA1000; DOT-AAX2400; DOT-3; DOT-3AL1000; DOT-3E1800; DOT-3T1800. The four digit number is the *minimum* working pressure of the vessel.

How do I confirm that a vessel is DOT approved?

Many vessels bear DOT approval numbers. To confirm if they are applicable, refer to the CFR stated under “*What containers can be used to transport SF6?*”

Who can transport SF6?

This depends on how much gas is being transported. In smaller quantities, anyone can transport SF6. However, above certain quantities, specific licensing and document requirements apply.

Are there limits on how much gas can be transported?

Yes. Any references to weight limits INCLUDE the weight of the cylinder and cap. Or, in the case of gas filled equipment (i.e. circuit breakers), the weight of the breaker must be included in the total. If the weight of any single package (gas and packaging) being transported is more than 220lbs gross, or total weight of all gas and cylinders exceeds 440lbs, the driver must have a material safety data sheet (MSDS) and a shipping manifest (49CFR172.602). Further, if the quantity of gas and packaging exceeds 1001 lbs, the driver must have a placarded vehicle (49CFR172.504(c)). Per the Federal Motor Carrier Safety Administration’s FMCSA383.93(b), any vehicle requiring placarding requires that the operator of the vehicle obtain a State-issued hazardous materials endorsement on his CDL driver’s license.

Please note: if the pressure in the vessel (cylinder, breaker, or other packaging) is less than 25 psig, the vessel can be considered “residual”. Regardless of weight, residual vessels are exempt from any placarding or hazmat requirements.

What are the penalties for transporting gas illegally?

They are pretty severe. Any person, who knowingly violates a requirement of the Federal hazardous material transportation law, is liable for civil penalties up to \$27,500 (but not less than \$250). Further, any person unlawfully removing, altering or destroying placarding, or labeling of hazardous material – or willfully violates a provision of the Federal hazardous material transportation law, or an order or regulation issued thereunder, may be imprisoned for up to 5 years (49CFR171.1)



Are there any exemptions?

Yes. 49CFR173.6(a)(2) provides a “Materials of Trade” exemption. Basically the regulations allow users of SF6 to carry a minimum amount of gas on the vehicle for day-to-day operations. This amount is limited to 220lbs gross weight (including the weight of the cylinder and cap). Any more than 220lbs, the operator will be required to have paperwork – see “*Are there limits on how much gas can be transported?*”

I have a gas cart that uses a large welded tank. Can this be used to transport SF6?

It depends. Because the large, single tanks of refrigerated systems are not DOT approved, if the pressure is 25PSIG or greater (49CFR173.115(b)), then the cart would be illegal to transport. However, by reducing the pressure to below 25 PSIG, the unit could be transported without any issues.

Can a gas cart with cylinders for storage be used to transport SF6?

Yes. Because the cylinders are DOT approved, it is perfectly legal to transport the cart completely full. However, be aware that specific licensing and documentation requirements must be observed. See “*Are there limits on how much gas can be transported?*”

Do cylinders require caps to be transported?

Not necessarily. 49CFR173.301(g) states that the valves on any manifolded cylinders must be protected from damage by “framing, a cabinet or other method”. No specific requirements for cylinder caps are listed.

Can cylinders be transported in a horizontal position?

Yes. 49CFR173.301(g) requires that manifolded cylinders be supported and held together by a structurally adequate means. “Pressure relief devices on manifold *horizontal cylinders*...must be arranged to discharge unobstructed...”

What are placarding requirements?

Any vehicle which carries a combined gross weight of hazardous materials of 1001 lbs. or more, will require placarding (49CFR172.504(c)). Keep in mind that any vehicle which is placarded can only be driven by an operator with a hazardous materials endorsement (FMCSA383.93(b))



Do any other gases count towards the 1001 pound limit?

Yes. 49CFR172.504(c) states that any other gases which are classified as hazardous material (i.e. nitrogen) must be included in the total gas weight – including the weight of the bottle. For example, if 4 full bottles of SF6 are on a vehicle (920lbs. gross weight), and one full bottle of N2 is added, the combined weight will be above 1001 lbs – requiring placarding and a hazmat endorsed driver.

Do empty cylinders or bottles with residual gases count towards the 1000 pound limit?

It depends. According to 49CFR173.29(b)(2)(iv)(b), a cylinder is considered “residual” if the class 2.2 gas in the cylinder is at pressures less than 25PSIG @ 68°F. Any vessel with less than this pressure, regardless of weight, is considered “residual”. 49CFR173.29(c)(1) states that any non-bulk vessels containing residual gas do not have to be included in determining placarding requirements. Thus, four full bottles of SF6 (920lbs) plus 10 empty/residual bottles would still only count as 920 lbs, and no placarding would be required.

Who can fill cylinders?

While anyone can fill any cylinder, only cylinders that have been filled by the rightful owner, or someone with permission from the rightful owner (49CFR173.301(e)) may be offered for transportation.

What are the minimum standards for filling cylinders?

All DOT-approved cylinders must bear a hydrostatic test date. For typical SF6 cylinders, this test period is valid for 5 years after the most recent date found on the bottle. Cylinders which pass the test with superior results may be re-certified for 10 years. Such cylinders will bear a star (★) immediately after the two-digit year. Cylinders may not be offered for transportation if they have been filled after the expiration of the test date. However, cylinders may be transported after the expiration, so long as they were filled prior to the requalification date (49CFR180.209(b)). Please note that the qualifiers for extending the retest date to 10 years include physically removing each cylinder from a rack and performing a hammer test. Since this is neither practical nor likely to happen, cylinders located in DILO gas carts should be considered valid for only 5 years – regardless of the 10 year star.

How can I contact the Federal DOT to verify these issues?

There are three ways to verify these issues addressed in this document:

- 1) The HazMat website: <http://hazmat.dot.gov/>
- 2) HazMat CFR database: <http://www.myregs.com/dotrspa/>
- 3) Call them with a specific question 1-800-467-4922