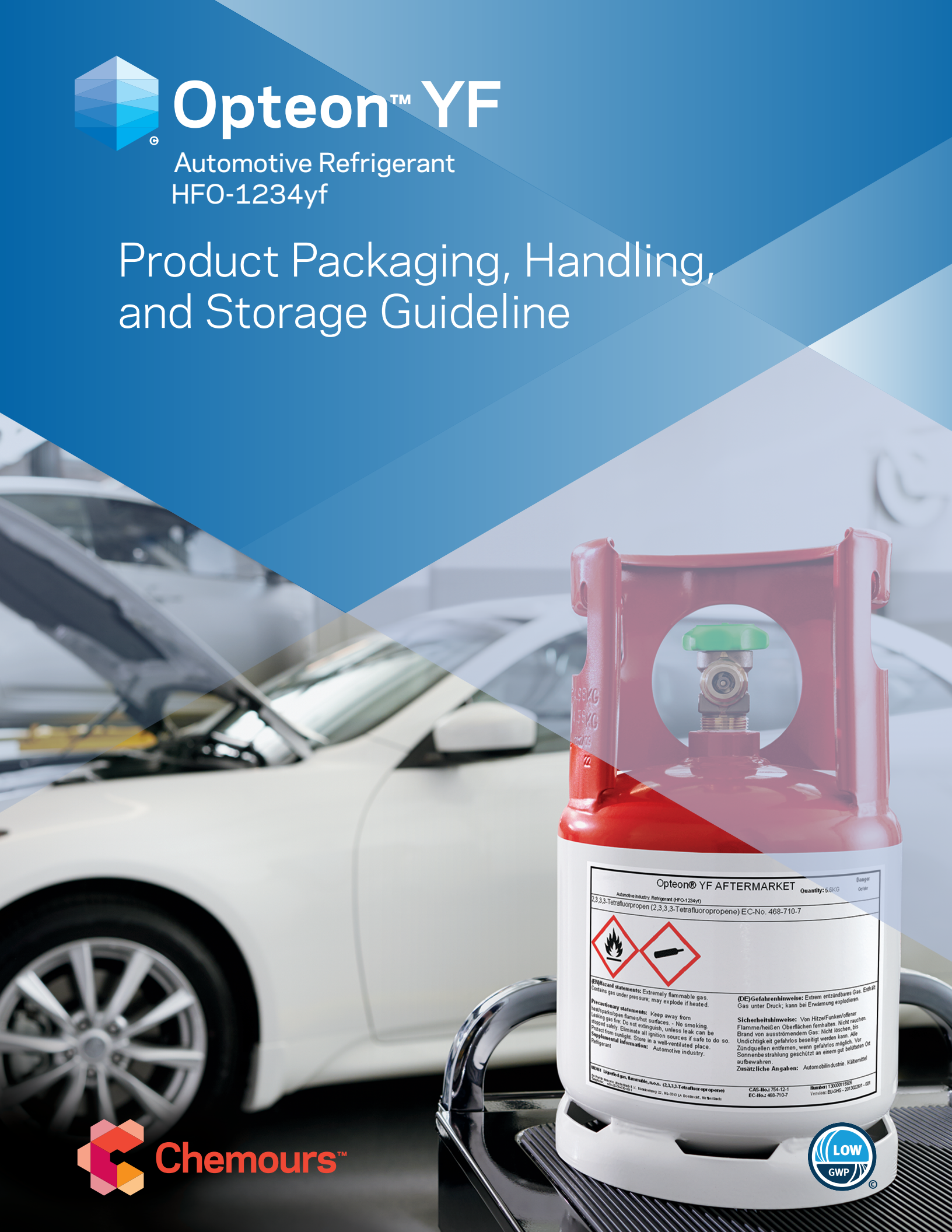
Opteon™ YF

Automotive Refrigerant
HFO-1234yf

Product Packaging, Handling, and Storage Guideline



Chemours™

Product Quality

Using best practices leads to the best quality product. Why do anything less than your best when packaging a premium product? Here is a quick update on information that can be found within the Opteon™ YF PUSH bulletin and Safety Data Sheet (SDS).

Chemours Opteon™ YF is manufactured, packaged, and tested to meet SAE J2844 Automotive standard. This industry-approved standard establishes the minimum required purity specification used in automotive applications. Proper bulk material storage, transfer, and cylinder packaging and cylinder storage will maintain product quality.

Best Practices

Product Bulk Storage

Purchased material may be transferred to a bulk storage tank before being used in the packaging process. Good storage practices will ensure that good incoming material will maintain its current high level of quality throughout the product packaging process.

Bulk storage tanks will need to meet required regulatory codes and standards. Conversion from an existing HFC-134a bulk storage tank to HFO-1234yf can require significant planning to meet the requirements needed for flammable material storage. Depending on the history of the bulk storage container shell, there will be a need to ensure there is no degradation of the interior shell surfaces (no pitting, gouges, etc.). The same issue will apply to the exterior of the bulk storage container. New or refurbished bulk tanks will need to be checked for possible manufacturing residue particle debris, including cleaning agents or solutions, that could negatively impact product quality.

- Ensure that the storage tank and transfer lines are clean before working with Opteon™ YF refrigerant. If the storage tank is not clean or suspected of being contaminated, clean the suspected contaminated tank and lines with mild detergent or warm water. Care should be taken to not use harsh detergents. Do not use detergents with phosphate cleaning materials, strong odors (even if cleaning agents have a pleasant odor, they may contain oxidizers that can degrade the product), or other harmful strong cleaning agents.
- Ensure that the storage tank and lines are dry before transferring refrigerant into them. Purge the tank and lines with dry nitrogen (99.99% purity), which has a maximum moisture specification of 10 ppm.
- Ensure that the storage tank and lines are evacuated to at least 5,000 microns or less vacuum prior to filling with refrigerant.

Packaging Equipment

There is a wide range of cylinder packaging equipment that can be used to package Opteon ™ YF from bulk containers into small packages.

Packagers need to ensure that any equipment used with flammable materials has the proper safety rating. Packaging equipment should be located in a properly classified location with good ventilation. Area monitors should be permanently mounted near packaging operations in case of leaks or line failures. Operators can wear personal monitors and/or use hand-held leak detectors too. Additional information on leak detections and monitors can be discussed with Chemours representatives at any time.

Additionally, gaskets, O-rings, and hoses that are used with Opteon™ YF should be compatible. Equipment packaging suppliers should be able to provide information on the relative compatibility of Opteon™ YF with these items. If packaging suppliers do not know or cannot provide this information, this may be an important point to discuss with them prior to purchasing equipment. Poor material compatibility can lead to unwanted residues and/or poor product quality. Some material compatibility can be found in the Opteon™ YF PUSH bulletin. However, it should be noted that many materials are denoted by a generic elastomeric and/or plastic category. Overall material compatibility can change from supplier to supplier based on product compounding methods. Therefore, it is a best practice to get the most recent material compatibility information directly from the material supplier and/or the packager supplying the equipment.

Thread locking agents can also lead to unwanted product degradation. While some thread locking agents (e.g., packaging equipment connections, valve attachments) are commonly used, they should be used sparingly and with caution. Some thread locking agents contain extremely harsh chemicals such as peroxides that can quickly lead to product quality degradation. Thread locking agents were never meant to come into direct contact with refrigerants or wetted components. However, overuse and poor application during assembly processes have increased the likelihood that these aggressive chemicals can be inadvertently introduced into liquid refrigerant and cause quality issues. Best practice is to reduce or eliminate these products in the packaging process. If these products must be used, it is critical that they are tested with Opteon™ YF and found to be compatible.

Here are some packaging guidelines:

- Ensure that refrigerant packaging equipment has the proper safety classification, is located in a properly classified location, and has adequate ventilation. Best practice is to have permanently mounted leak detectors that can ensure no product leakage during packaging.
- Ensure that all materials (e.g., gaskets, O-rings, hoses, etc.) used in packaging equipment with Opteon™ YF have good material compatibility.
- Do not use thread locking agents that are incompatible with Opteon™ YF in packaging equipment and/or cylinder valve attachment. Ensure that equipment packagers and cylinder manufacturers do not use thread locking agents that cause product degradation.
- Ensure that the refrigerant charging lines have been thoroughly prepared, cleaned, and do not introduce contaminants into cylinders.
- Ensure that refrigerant charging lines are free of leaks and can properly pull the desired level of vacuum during operation. (A hand-held leak detector can be used to confirm lines are leak-free.)
- Ensure that refrigerant charging equipment or operator properly closes the valve after packaging. Best practices are to use safety seals (i.e., shrink sleeves) after properly filling and closing valves.

Cylinder Packaging

- Do not repackage Opteon™ YF into cylinders that have a leaking valve or where the valve has been left open. Minute levels of rust or dirt within the package can negatively impact product quality. Therefore, it will be critical to properly clean compromised cylinders to ensure quality product after replacing leaking valves.
- Ensure that the cylinders used for packaging Opteon™ YF are clean and properly prepared for packaging refrigerant. Best practice is to develop an incoming inspection and cleaning plan for cylinder re-use.
- Do not fill refrigerant into Opteon™ YF cylinders with excessive amounts of air or moisture. This can lead to poor product quality and impact release specifications.
- Ensure that the cylinders have the proper relief valve (RV) design and pressure rating for refrigerant being packaged.
- Do not overfill cylinders. Do not re-fill disposable cylinders.
- Do attach safety seal (i.e., shrink sleeve) or cylinder dust cap once cylinder has been filled. These provide an extra level of protection to the cylinder valve and also help to keep the valve free from particulates during transportation.

Cylinder Storage

Storage of cylinders should follow guidelines as specified in the SDS. General guidance follows:

- Cylinders should be stored upright and firmly secured to prevent falling or being knocked over.
- Cylinders should be stored at temperatures no greater than 52 °C (125 °F).
- Separate full cylinders from empty cylinders.
- Keep in properly labeled cylinders.
- Keep cylinders in cool, well-ventilated place away from direct sunlight.
- Do not store cylinders in areas where salt or other corrosive materials are present.
- Do not store cylinders near combustible materials.
- Do not store cylinders in standing water or puddles.
- Always store cylinders in accordance with local or national requirements.

For more information on the Opteon™ family of refrigerants, or other refrigerants products, visit opteon.com or call (800) 235-7882.

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