

Storage, Handling and Use Guidelines for Solstice® L41y (R-452B) Refrigerant

Before handling the refrigerant, it is essential that you read the Safety Data Sheet (SDS) for Solstice L41y refrigerant. Special attention should be given to section 2 on hazards identification and section 4 on first aid measures.

Risk assessment and risk minimization in facilities typically requires evaluation on a case-by-case basis, since facilities may vary from one another in many ways. A number of general guidelines can be applied, in order to assist the end-user for the assessment and minimization of risks associated with the use of Solstice L41y.

PRODUCT INFORMATION

The ASHRAE name for Solstice L41y is R-452B. It is a mildly flammable (A2L) zeotropic blend, with glide less than 1 K.

Solstice L41y is a potential replacement for R-410A for stationary air-conditioning applications. Therefore, it is compared with R410A and, another refrigerant for similar applications.

CYLINDER STORAGE

- Store cylinders in a cool, well-ventilated area with low risk of fire and out of direct sunlight. Ensure that cylinders are properly strapped into place. Avoid dropping, denting or physically damaging containers.
- When moving cylinders within the work site, they must be firmly strapped onto an appropriate wheeled device. Never roll a cylinder on its base or lay it down to roll on its side.
- Within site, a fork lift truck should be used to move large containers of refrigerant on pallets. Never strap or lift cylinder by the valve or valve cover.
- Store on elevated or concrete floors to avoid tank corrosion. Protect cylinders from moisture and rusting during storage.
- Do not store Solstice L41y cylinders near sources of open flames and do not allow containers to exceed 50°C.
- Smoking, eating and drinking should be prohibited in storage, handling, and servicing areas where Solstice L41y is used.

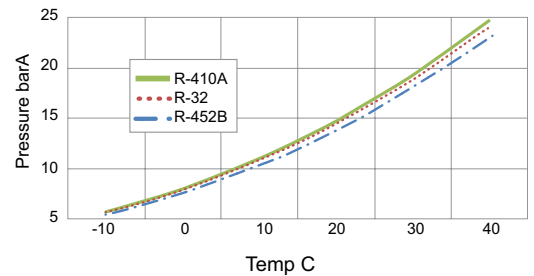
ACCIDENTAL SPILLAGE

Solstice L41y is a compressed liquefied gas with a boiling temperature of -51oC. In case of accidental spillage, use non-combustible absorbent materials, e.g. sand, earth, vermiculite, diatomaceous earth to contain and collect spillage (refer to SDS section 13). Place spilled material in an appropriate container for disposal, according to local regulations. In case of a spillage, evacuate the area immediately if not equipped with respiratory protection. Return to the area with adequate respiratory PPE to handle the spillage.

Solstice L41Y Properties

Molar mass	63.5 kg/kmol
Normal Boiling point	-51 °C
Critical temperature	79.7 °C
Critical pressure	55 bar
Critical density	438.6 kg/m ³

P-T Curves



	Molar Mass kg/kmol	Critical T [°C]	Normal BP [°C]	GWP
R-410A	72.6	71.3	-48.5	1924
R-32	52	78.1	-50.5	677
R-452B	63.5	79.7	-51.0	675

HANDLING

Personal Protective Equipment (PPE)

Gloves

- Avoid cloth gloves (possible frostbite in contacting liquid)
- Incidental liquid contact: wear PVA or neoprene gloves
- Avoid repeated exposure or prolonged contact

Eye wear

- Safety glasses for normal operations
- If liquid contact is probable wear chemical safety goggles

Respiratory Protection

- None for adequately ventilated work areas
- For accidents or non-ventilated work situations, wear self-contained breathing apparatus

PERSONNEL TRAINING

- Personnel should know product hazards and have access to SDS.
- Personnel should be trained to handle refrigerants and hold appropriate certifications.
- A written emergency response plan should be in place, and each person should be properly trained and know his/her responsibility in case of an emergency.

OFF-LOADING PROCEDURE – GENERAL INDICATIONS

- Make sure you always operate in a clean safe area:
 - ensure enough clearance to walk around the container
 - ensure connections are visible, to allow visual leak check
 - keep ambient noise low, to allow leaks to be heard
 - do not leave connection hoses suspended
 - do not step over pressurized hoses
 - Monitor pressure values during the whole process
- Always use PPE: chemical resistant goggles (eyes) and gloves (hands) are the minimum recommended set.

OFF-LOADING FROM A CYLINDER

- Cylinders should be stored in a covered environment, no direct sunlight
 - Weigh the cylinder to verify initial value (gross weight can vary slightly)
 - Position the cylinder in the work area
 - An internal dip tube reaches the lowest point inside the cylinder, to extract all liquid
- (Note: No dip tube for 5 kg cylinder type)
- Connect the transfer hoses to the valve outlet and the pump inlet, and install a pressure gauge

Package specification	Cylinder type 1
Product weight	4.5 kg
Gross weight	10 kg
Cylinder dimensions	34 cm x 23 cm
Outlet connection	DIN 477-1

- Install a sight glass on the line to process (or pump outlet)
- Open the liquid phase valve, start the pump, and perform a leak check
- If liquid flow stops, check the following:
 - The cylinder may be empty. This can be confirmed by verifying the weight
 - Check pressure difference (cylinder compared to process)
 - Check the pump for cavitation
- Once the product is transferred completely, close the valve on cylinder
- Depressurize liquid line from cylinder valve to pump
- DO NOT leave liquid filled piping blocked with no pressure relief
- Disconnect hoses
- Store the cylinder in a suitable storage area
- Once empty, return the cylinder to Honeywell



Package specification	Cylinder type 2
Product weight	50 kg
Gross weight	78.5 kg
Cylinder dimensions	115 cm x 30 cm
Outlet connection	CGA 670

OFF-LOADING FROM A VERTICAL DRUM

- VDs should be stored in a covered environment, no direct sunlight
- Weigh the VD on a scale to verify initial value (gross weight can vary slightly)
- Position the VD in the work area
- Identify the valves. The liquid phase valve has an internal dip tube that reaches the lowest point inside, to extract all liquid.
- Connect the transfer hose to the liquid valve outlet and the pump inlet, and install a pressure gauge. Depending on the application, a vapor return line can be connected to the vapor side valve (loop setup)
- Install a sight glass on the liquid line to process (or pump outlet)
- Open the liquid phase valve and start the pump, to start the outlet flow to process (perform a leak check)



- If liquid flow stops, check the following:
 - The VD may be empty. This can be confirmed by verifying the weight
 - Check pressure difference (VD compared to process line)
 - Check pump for cavitation
- Depressurize liquid line from VD to pump
- DO NOT leave liquid-filled piping blocked with no pressure relief
- Disconnect hoses
- Store the VD in a suitable storage area
- Once empty, return the VD to Honeywell



Package specification	Vertical Drum (VD)
Product weight	785 kg
Gross weight	1323.5 kg
Cylinder dimensions	223 cm x 80 cm
Outlet connection	CGA 670

LEAK DETECTION

- Periodic leak checks are advisable during storage period.
- Constant monitoring for leaks is required during offloading operations
- Continuous refrigerant leak detection equipment
 - Continuous monitoring systems provide alerts to respond in a timely fashion.
 - Detection levels of 1.5 vol% (15,000 ppm) are acceptable.
 - Most continuous monitoring equipment detect very low levels
 - Leak detector performance may vary. Consult the manufacturer.
- Handheld or Portable Leak detectors
 - Valuable for maintenance operations and assembly line workers
 - Detect at extremely low levels (<4 g/year leak sizes)
- Add to scheduled routine maintenance operations
 - Check storage containers for leaks
 - Check piping for leaks

In the event of a leak exceeding 1.5 vol%, remove personnel and ventilate the area.

TROUBLESHOOTING GUIDE

Inability to empty container

- Insufficient pressure in the container will cause the liquid flow to stop.
- Excessive pressure in the container leads to expansion across outlet valve
- High pressure in the receiving vessel to which the refrigerant is being transferred will oppose the flow.
- Very low ambient temperatures will increase the liquid density, and make the liquid transfer more difficult
- High ambient temperatures will generate possible expansion through the outlet valve
- Pump cavitation, generated by expansion (high temperature) or density increase (low temperature) may stop the flow
- Attempting to achieve excessive flow rate: dip tubes in the containers, as well as the orifice in the valve, have small diameters. Excessive flowrate leads to expansion across the valve..

Pressure-Temperature-Density Table

Temp	Liquid Pressure	Vapor Pressure	Liquid Density]	Vapor Density
°C	barA	barA	kg/m ³	kg/m ³
-10	5.51	5.31	1126.77	17.60
0	7.67	7.40	1091.99	24.48
10	10.42	10.07	1054.89	33.48
20	13.86	13.42	1014.86	45.23
30	18.07	17.54	970.98	60.62
40	23.18	22.56	921.78	81.11
50	29.31	28.62	864.56	109.25
60	36.60	35.88	793.44	150.48
70	45.23	44.62	690.34	221.97

For more information

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3078 FP REF EU A4 v3 | September 2018

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