Honeywell
THE POWER OF CONNECTED

Refrigerants

Solstice® L41y (R-452B)

Comfort air cooling and reversible heating applications

Reduced GWP, Discharge Temperature and Pressure for High Pressure Chillers, Heat Pumps and Air-Conditioning

Characteristics

Solstice® L41y (R-452B) is a non-ozone-depleting, zeotropic blend designed to serve as a low global warming potential (GWP) alternative to R-410A in positive displacement comfort air cooling and reversible heating applications. A key feature of Solstice L41y is its 67 % lower GWP with similar efficiency and matching capacity to R-410A, helping to further minimize the re-design costs and capital expenditures. The design compatibility of Solstice L41y enables OEMs to transition their R-410A equipment to a lower GWP alternative faster. Solstice L41y discharge temperature is much lower than R-32 and very close to R-410A indicating that discharge temperature mitigation may not be required. Solstice L41y has lower mass flow rate than R-410A, which leads to a lower pressure drop and eliminates potential design cost increase in the heat exchanger.

Applications

Solstice L41y is the most optimized R-410A replacement that provides the best energy performance and lowest A2L flammability characteristics. Even though both R-32 and Solstice L41y are classified as A2L "mildly flammable", lower flammability properties of Solstice L41y become important especially in product selection process for larger charge size equipment such as rooftop units, VRF systems, etc. Thanks to its higher critical temperature (77.1 °C) and broader operating envelope in low evaporating temperatures, Solstice L41y outperforms other alternatives such as R-32 in heating mode and in high ambient conditions in a variety of applications such as:

- Direct expansion (DX) chillers
- High pressure heat pumps (lower case air source and ground source)
- Split Air-Conditioning units
- Commercial packaged systems (such as rooftop units, VRF)

Physical Properties

Class/Type	Zeotropic blend
Formula	67 %/7 %/26 % R-32/R-125/R-1234yf
Kind	HFC/HFO
Appearance	Colourless
ODP	0
GWP (AR4/AR5)	698/676
ASHRAE Std. 34 Safety Class	A2L
ATEL/ODL (kg/m³)	0.467
Practical Limit kg/m³	0.062
LFL (% VOL)	11.9
Units	**SI**
Molecular weight	63.5 kg/kmol
Boiling temperature	-51.0 to -50.3 °C
Critical temperature	77.1 °C
Critical pressure	52.2 bar
Critical volume	0.00225 m³/kg
Critical density	443.77 kg/m³
Vapour density at boiling point	3.62 kg/m³
Liquid density at 0 °C	1092.0 kg/m³
Liquid density at 25 °C	993.5 kg/m³
Vapour density at 25 °C	52.4 kg/m³
Liquid heat capacity at 25 °C	1.79 kJ/kg-K
Vapour heat capacity at 25 °C	1.44 kJ/kg-K
Vapour pressure at 25 °C	1537.4 kPa
Liquid thermal conductivity at 25 °C	103.5 mW/m-K
Vapour thermal conductivity at 25 °C	15.0 mW/m-K
Liquid viscosity at 25 °C	114.9 µPa sec
Vapour viscosity at 25 °C	12.9 µPa sec

Key benefits of Solstice L41y

- GWP of 698 (IPCC 4), 67 % reduction vs. R-410A
- Closest match to R-410A with minimal changes
- Mimics R-410A performance both in heating/cooling
- Capacity matches R-410A with positive displacement
- Similar discharge temperature to R-410A
- Lower mass flow than R-410A
- Higher critical temperature provides excellent performance in high ambient conditions

Safety and storage

Honeywell recommends reading the Safety Data Sheet (SDS) before using the product. Solstice L41y is a mildly-flammable refrigerant (ASHRAE class A2L). Solstice L41y is registered under the European Union's REACH program (Registration, Evaluation, Authorisation and Restriction of Chemicals).

Leaks and leak detection

If a large release of Solstice L41y vapour occurs, the same measures as with R-410A need to be taken. Hand-held leak detectors can be used for pinpointing leaks. For monitoring an entire room on a continual basis, leak monitors are available. Leak detection is important for protection of those in proximity of the system, refrigerant conservation, equipment protection and performance, and reduction of emissions. Customers should consult the equipment manufacturer for appropriate detectors.

Material compatibility

Honeywell does not recommend the use of traditional chlorinated solvents, such as trichloroethylene, dichloroethylene, etc., to clean refrigeration systems or components. Honeywell strongly recommends the use of either Solstice EZ Flush or Solstice PF-C/Ekoflush™ system for this job. More information regarding Honeywell's flush solutions can be found at www.honeywell-solvents.com.

Desiccants

Desiccant driers compatible with Solstice L41y are commercially available. Individual drier manufacturers should be contacted for specific recommendations.

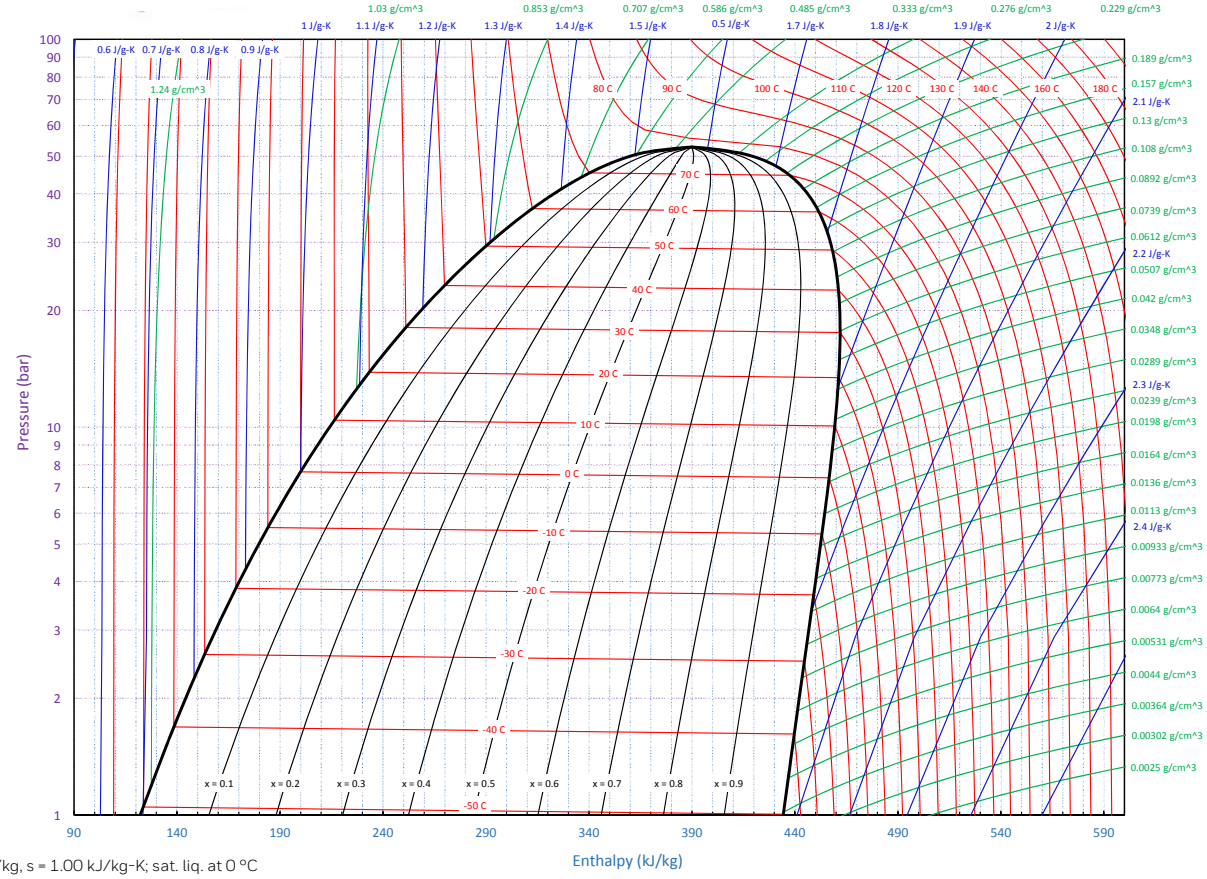
Lubricants

POE (polyolester) oil is recommended for using Solstice L41y. Compressor manufacturers typically qualify specific lubricants for use with their products. Users should check with the equipment manufacturer for the recommended lubricants for their system.

Plastics and elastomers

Solstice L41y is compatible with most common materials. Since there are many different grades and formulations of these materials, we recommend that compatibility testing be performed on the specific grade of materials under consideration and at the conditions of use when designing new systems. Customers should consult the manufacturer or conduct further independent testing.

Pressure and enthalpy



Reference State: h = 200 kJ/kg, s = 1.00 kJ/kg-K; sat. liq. at 0 °C

Pressure and temperature

Pressure (bar)	Bubble Temperature (°C)	Dew Temperature (°C)
1	-50.93	-50.07
2	-36.14	-35.20
3	-26.40	-25.40
4	-18.92	-17.88
5	-12.76	-11.70
6	-7.49	-6.40
7	-2.84	-1.73
8	1.33	2.45
9	5.12	6.26
10	8.61	9.76
11	11.84	13.00
12	14.86	16.02
13	17.70	18.86
14	20.38	21.54
15	22.92	24.08
16	25.33	26.50
17	27.64	28.80
18	29.84	31.00
19	31.96	33.11
20	33.99	35.14
21	35.95	37.09
22	37.84	38.97
23	39.67	40.79
24	41.44	42.55
25	43.15	44.25

Pressure (kPa)	Bubble Temperature (°C)	Dew Temperature (°C)
26	44.82	45.90
27	46.43	47.51
28	48.00	49.06
29	49.53	50.58
30	51.02	52.05
31	52.47	53.48
32	53.89	54.88
33	55.27	56.25
34	56.62	57.58
35	57.95	58.88
36	59.24	60.15
37	60.50	61.39
38	61.74	62.60
39	62.95	63.79
40	64.14	64.95
41	65.31	66.09
42	66.45	67.20
43	67.57	68.29
44	68.67	69.35
45	69.75	70.40
46	70.82	71.42
47	71.86	72.41
48	72.88	73.39
49	73.89	74.34
50	74.88	75.26

The pressure values on this table are shown in $P_{absolute}$

For more information

www.honeywell-refrigerants.com/europe

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