Honeywell
THE POWER OF CONNECTED | Refrigerants

Solstice® 452A (R-452A)

Reduced GWP and Discharge Temperature for
Transport Refrigeration, Plug-Ins and Condensing Units

Low- and Medium-
Temperature Refrigeration

Characteristics

Solstice® 452A (R-452A) is a non-ozone-depleting, nonflammable, zeotropic blend designed to serve as a lower global-warming-potential (GWP) alternative to R-404A and R-507 for low- and medium-temperature applications in existing and new systems. A key feature of Solstice 452A is its matched compressor discharge temperature of R-404A and R-507 at both low- and medium-temperature conditions, helping to further minimize application and retrofit costs. Plus, it provides a close capacity match to R-404A and similar energy efficiency.

Applications

Solstice 452A is an excellent refrigerant option for direct expansion refrigeration low- and medium-temperature applications, including commercial and industrial refrigeration, condensing units, plug-ins and transport refrigeration like trucks and trailers, powered vans or reefer containers. With 45 % GWP reduction (IPCC 4) and close performance to R-404A, end-users can combine the same capacity and efficiency with more sustainable performance and lower environmental impact. In transport refrigeration, according to end users, R-452A has the same cooling capacity, fuel efficiency, reliability and refrigerant charge as R-404A.*

*Source: Carrier news, April 14th 2015

Physical Properties

Class/Type	Zeotropic blend
Formula	30 % / 11 % / 59 % R-1234yf / R-32 / R-125
Kind	HFC / HFO
Appearance	Colorless
ODP (ODP-R11=1)	0
GWP rev/4th IPCC (GWP rev/5th IPCC)	2.140 (1.945)
ASHRAE Std. 34 Safety Class	A1
REACH	Registered
Units	**SI**
Molecular weight	103.5 lbm / lbm
Boiling temperature	-52.6°F
Critical temperature	168.2°F
Critical pressure	582.29 psia
Critical volume	0.293 ft^3/lb
Critical density	31.64 lbm/ft^3
Vapor density at boiling point	0.3 lb/ft^3
Liquid density at 32°F	77.22 lb/ft^3
Liquid density at 77°F	70.26 lb/ft^3
Vapor density at 77°F	4.0 lb/ft^3
Liquid heat capacity at 77°F	0.3513 Btu/lb-°F
Vapor heat capacity at 77°F	0.2635 Btu/lb-°F
Vapor pressure at 77°F	172.3 psia
Liquid thermal conductivity at 77°F	0.039 Btu / h-ft-°F
Vapor thermal conductivity at 77°F	0.0009 Btu/h-ft-°F
Liquid viscosity at 77°F	0.3287 lb/ft-hr
Vapor viscosity at 77°F	0.031 lb/ft-hr

Safety and storage

Honeywell recommends reading the Safety Data Sheet (SDS) before using the product. Solstice 452A is a nonflammable refrigerant (ASHRAE class A1). Solstice 452A has similar storage and handling requirements to R-404A in bulk and cylinder, since according to the compressed gas classification it is nonflammable.

Leaks and leak detection

If a large release of Solstice 452A Vapor occurs, take the same measures as you would with R-404A. 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.**

Key benefits of Solstice 452A

- GWP of 1945 (IPCC 5), more than 45% reduction compared to R-404A
- Mimics R-404A performance
- Similar discharge temperature to R-404A/R-507
- Similar mass flow to R-404A/R-507
- Direct replacement for R-404A/R-507
- Known system technology
- Similar service standards as R-404A
- Same skills for technicians
- Similar storage and handling requirements to R-404A
- Approved and adopted by major components and equipment manufacturers

Desiccants

Desiccant driers compatible with Solstice 452A are commercially available. Contact individual drier manufacturers for specific recommendations.

Lubricants

POE (polyolester) oil is recommended for use with Solstice 452A. 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 452A 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.

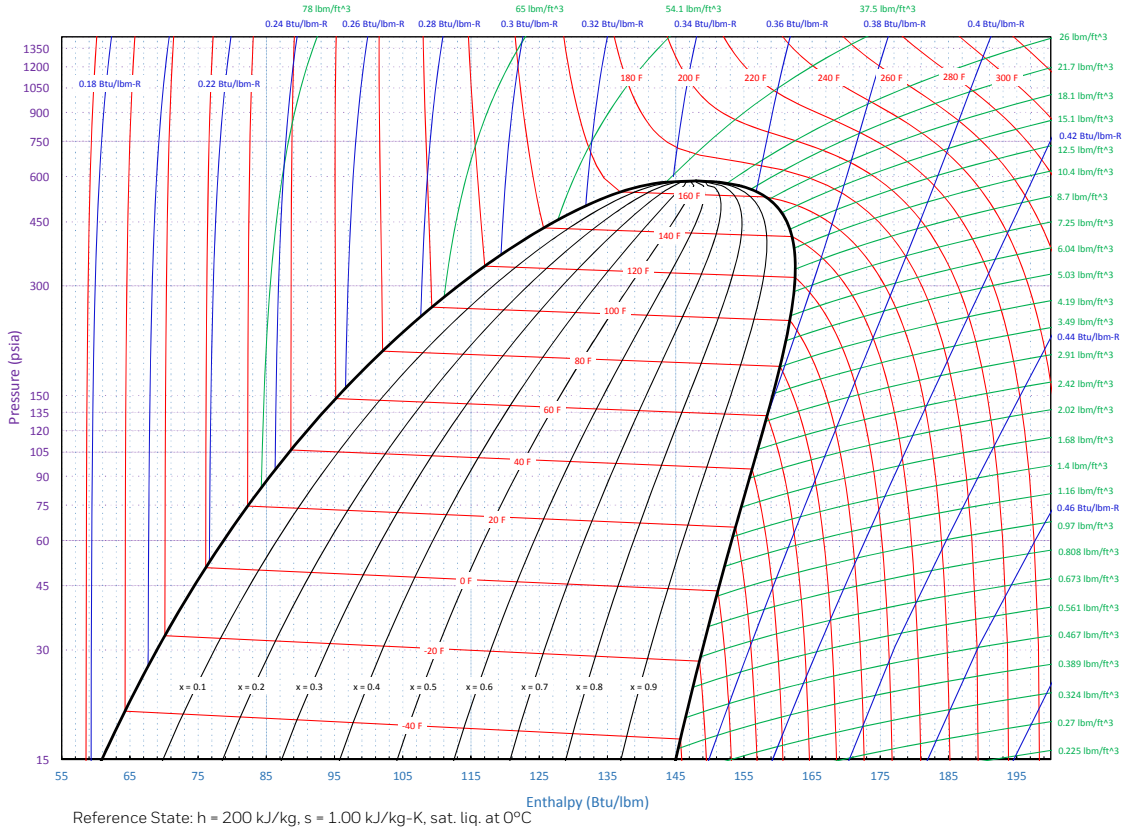
Independent verification

Solstice 452A has been extensively tested by components and equipment manufacturers. Equipment trailer refrigeration units and condensing units have been launched with R-452A. The use as direct drop-in to R-404A or R-507-based systems in direct expansion has been endorsed by several compressors manufacturers, whose tests have demonstrated similar capacity, efficiency and discharge temperature to R-404A.

Retrofit guidelines

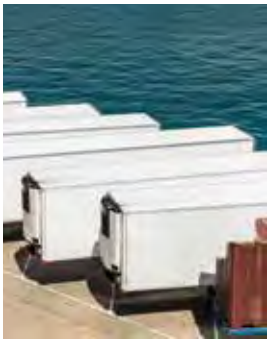
Solstice 452A has similar capacity, efficiency, mass flow and discharge temperature to R-404A. It can be retrofitted to direct expansion systems using R-404A/R-507 without change of components and without expansion valves adjustment. As it closely matches characteristics and performance of R-404A/R-507, using Solstice 452A as a replacement for R-404A/R-507 results in time and cost savings during a retrofit. Solstice 452A has a moderate temperature glide of approximately 6 °F, depending upon pressure. Solstice 452A must be only liquid charged into a system to ensure proper refrigerant composition and system performance.

Pressure and enthalpy



Pressure and temperature

Pressure (psig)	Avgerage Temperature (°F)	Liquid (Bubble) Temperature (°F)	Vapor (Dew) Temperature (°F)
0	-49.1	-52.5	-45.7
5	-37.8	-41.3	-34.4
10	-28.7	-32.2	-25.2
15	-20.9	-24.4	-17.4
20	-14.0	-17.5	-10.5
25	-7.9	-11.4	-4.4
30	-2.3	-5.8	1.2
35	2.8	-0.7	6.3
40	7.5	4.0	11.1
45	11.9	8.4	15.5
50	16.1	12.6	19.6
55	20.0	16.5	23.5
60	23.7	20.2	27.2
65	27.2	23.7	30.7
70	30.6	27.0	34.1
75	33.8	30.2	37.3
80	36.8	33.3	40.3
85	39.8	36.3	43.3
90	42.6	39.1	46.1
95	45.4	41.9	48.9
100	48.0	44.6	51.5
105	50.6	47.1	54.1
110	53.1	49.6	56.5
115	55.5	52.1	58.9
120	57.8	54.4	61.3
125	60.1	56.7	63.5
130	62.3	58.9	65.8
135	64.5	61.1	67.9
140	66.6	63.2	70.0
145	68.7	65.3	72.1
150	70.7	67.3	74.1
155	72.7	69.3	76.0
160	74.6	71.3	77.9
165	76.5	73.2	79.8
170	78.3	75.0	81.6
175	80.1	76.8	83.4
180	81.9	78.6	85.2
185	83.6	80.4	86.9
190	85.3	82.1	88.6
195	87.0	83.8	90.2
200	88.7	85.5	91.9
205	90.3	87.1	93.5
210	91.9	88.7	95.0
215	93.4	90.3	96.6
220	95.0	91.8	98.1
225	96.5	93.4	99.6
230	98.0	94.9	101.1
235	99.4	96.4	102.5
240	100.9	97.8	104.0
245	102.3	99.3	105.4
250	103.7	100.7	106.7
255	105.1	102.1	108.1
260	106.5	103.5	109.5
265	107.8	104.8	110.8
270	109.1	106.2	112.1
275	110.4	107.5	113.4
280	111.7	108.8	114.6
285	113.0	110.1	115.9
290	114.3	111.4	117.1
295	115.5	112.7	118.4
300	116.8	113.9	119.6
305	118.0	115.2	120.8
310	119.2	116.4	121.9
315	120.4	117.6	123.1
320	121.5	118.8	124.3
325	122.7	120.0	125.4
330	123.8	121.2	126.5
335	125.0	122.3	127.6
340	126.1	123.5	128.7
345	127.2	124.6	129.8
350	128.3	125.7	130.9
355	129.4	126.8	131.9
360	130.5	127.9	133.0
365	131.5	129.0	134.0
370	132.6	130.1	135.0
375	133.6	131.2	136.1
380	134.6	132.2	137.1
385	135.7	133.3	138.1
390	136.7	134.3	139.0
395	137.7	135.3	140.0
400	138.7	136.4	141.0
405	139.6	137.4	141.9
410	140.6	138.4	142.9
415	141.6	139.4	143.8



For more information

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