

Solstice[®] N13 (R-450A)



Characteristics

Solstice N13 (R-450A) is a zeotropic blend of R-134a and HFO-1234ze (Solstice[®] ze) designed to serve as an alternative to R-134a, offering similar performance but with a lower global warming potential of only 547 (a reduction of almost 60% of GWP).

Applications

Solstice N13 (R-450A) is an excellent medium pressure, low GWP, high efficiency and non-flammable refrigerant. It is an energy-efficient alternative to R-134a in different medium temperature systems:

- Heat pumps
- Air-cooled and water-cooled chillers
- District heating and cooling
- Vending machines and beverage dispensers
- High stage of CO2 cascade systems
- High stage of cascade CO2 systems.
- DX medium temperature refrigeration, etc.

Physical properties

| Solstice [®] N13 (R-450A) | |
|---------------------------------------|------------------------------|
| Class/Type | Zeotropic blend |
| Formula | 42%/58% (R-134a/R-1234ze) |
| Kind | HFC / HFO |
| Appearance | Colourless |
| ODP (ODP-R11=1) | 0 |
| GWP rev 3rd/4th/5th IPCC | 546 / 604 / 547 |
| ASHRAE Std. 34 Safety Class | A1 |
| ATEL/ODL (kg/m ³) | 0.330 |
| Practical limit kg/m ³ | 0.320 |
| LFL (% vol) | Non flammable |
| REACH | Registered |
| Units | SI |
| Molecular weight | 108.6 kg/mol |
| Boiling temperature | -23.1°C |
| Critical temperature | 104.4°C |
| Critical pressure | 38.2 bar |
| Critical volume | 0.002032 m ³ /kg |
| Critical density | 492.2 kg/m ³ |
| Vapour density at boiling point | 5.443 kg/m ³ |
| Liquid density at 0°C | 1257.7 kg/m ³ |
| Liquid density at 25°C | 1175.1 kg/m ³ |
| Vapour density at 25°C | 29.6 kJ/kg °K |
| Liquid heat capacity at 25°C | 1.404 kJ/kg °K |
| Vapour heat capacity at 25°C | 1.000 kJ/kg °K |
| Heat of vaporisation at boiling point | 203.64 kJ/kg |
| Vapour pressure at 25°C | 584.4 kPa |
| Liquid thermal conductivity at 25°C | 76.4 W/m °K |
| Vapour thermal conductivity at 25°C | 13.9 W/m °K |
| Liquid viscosity at 25°C | 194.2 µPa sec |
| Vapour viscosity at 25°C | 12.2 µPa sec |

Thermodynamic Performance

- Offers a 60% reduction of GWP
- Shows 87% capacity with similar efficiency (100%)
- Small glide (0.4°C) can be easily addressed during system design

Pressure and temperature

| Pressure (absolute)kPa | Liquid (bubble) Temperature°C | Vapor (Dew) Temperature°C |
|------------------------|-------------------------------|---------------------------|
| 100 | -23.7 | -23.0 |
| 200 | -7.0 | -6.3 |
| 300 | 4.1 | 4.7 |
| 400 | 12.6 | 13.2 |
| 500 | 19.6 | 20.2 |
| 600 | 25.6 | 26.2 |
| 700 | 30.9 | 31.5 |
| 800 | 35.6 | 36.2 |
| 900 | 39.9 | 40.6 |
| 1000 | 43.9 | 44.5 |
| 1100 | 47.6 | 48.2 |
| 1200 | 51.0 | 51.7 |
| 1300 | 54.3 | 54.9 |
| 1400 | 57.3 | 57.9 |
| 1500 | 60.2 | 60.8 |
| 1600 | 63.0 | 63.6 |
| 1700 | 65.6 | 66.2 |
| 1800 | 68.1 | 68.7 |
| 1900 | 70.5 | 71.1 |
| 2000 | 72.9 | 73.4 |
| 2100 | 75.1 | 75.6 |
| 2200 | 77.2 | 77.8 |
| 2300 | 79.3 | 79.8 |
| 2400 | 81.3 | 81.8 |
| 2500 | 83.3 | 83.7 |
| 2600 | 85.2 | 85.6 |
| 2700 | 87.0 | 87.4 |
| 2800 | 88.8 | 89.2 |
| 2900 | 90.5 | 90.9 |
| 3000 | 92.2 | 92.6 |
| 3100 | 93.8 | 94.2 |
| 3200 | 95.4 | 95.7 |
| 3300 | 96.9 | 97.3 |
| 3400 | 98.5 | 98.7 |
| 3500 | 99.9 | 100.2 |
| 3600 | 101.4 | 101.6 |
| 3700 | 102.8 | 102.9 |
| 3800 | 104.1 | 104.2 |

Materials compatibility

Honeywell does not recommend the use of chlorinated solvents to clean refrigeration systems or components.

Desiccants

Desiccant driers compatible with Solstice N13 are commercially available.

Individual drier manufacturers should be contacted for specific recommendations.

Lubricants

POE (polyol ester) oil is recommended for use with R-450A.

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 N13 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.

Safety and Storage

Honeywell recommends reading the Material Safety Data Sheet (MSDS) before using the product. Solstice N13 (R-450A) has similar storage and handling requirements to R-134a in bulk and cylinder, since according to the compressed gas classification it is nonflammable.

Package Sizes

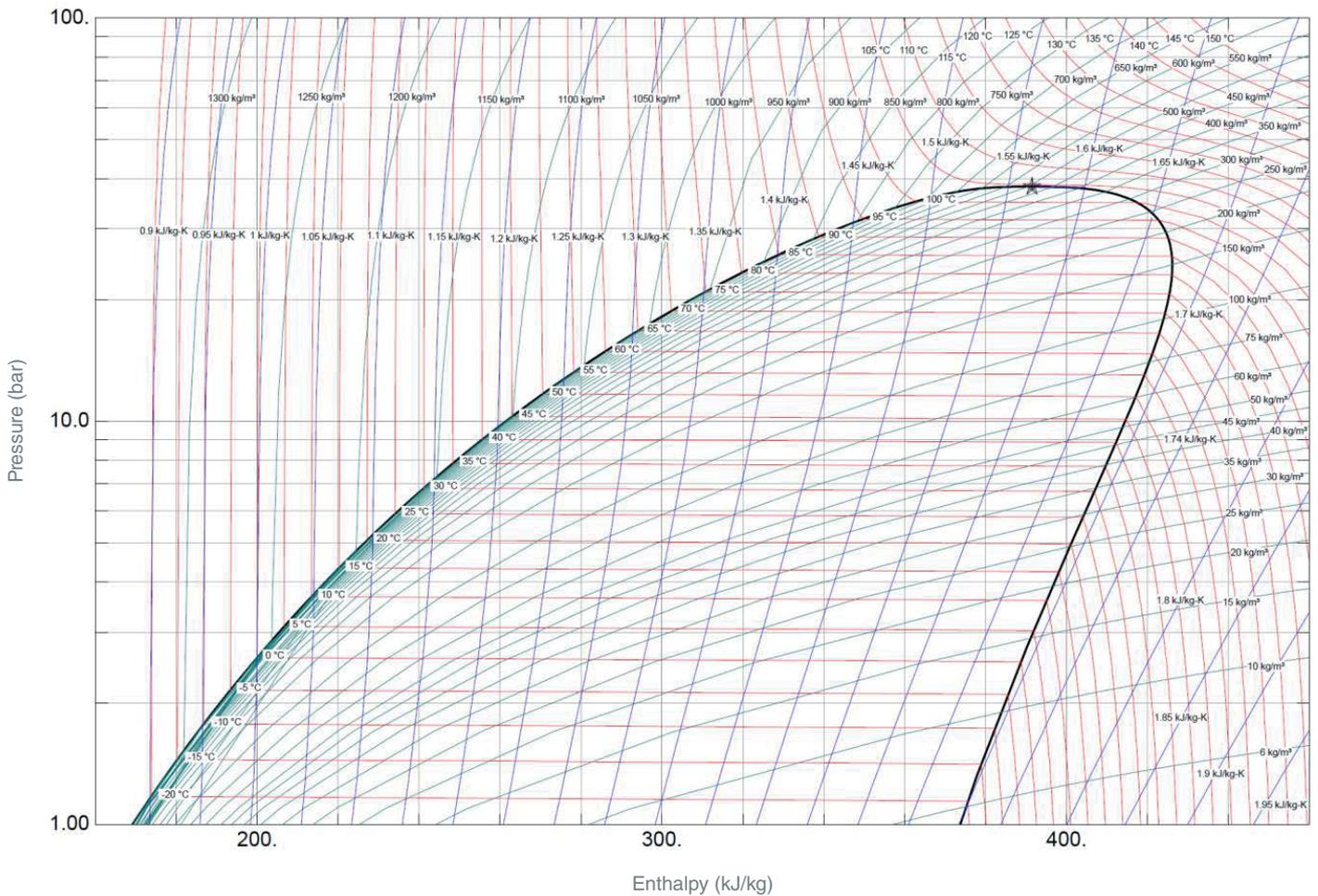
Solstice N13 is available in 950 kg vertical rolldrum and ISO bulk. For other packing sizes please contact Honeywell distribution network.

Leaks and leak detection

If a large release of Solstice N13 vapour occurs, the same measures as with R-134a 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.

| Substrate | Comments |
|---|----------------|
| ABS | Satisfactory |
| Delrin® Acetal | Satisfactory |
| HDPE | Satisfactory |
| NYLON 66 | Satisfactory |
| ULTEM® Polyetherimide | Satisfactory |
| Teflon® | Satisfactory |
| HIPS | Satisfactory |
| PET | Satisfactory |
| SBR/CR/NBR | Satisfactory |
| Buna-Nitrile | Satisfactory |
| EPDM | Satisfactory |
| Epichlorohydrin | Satisfactory |
| Silicone | Satisfactory |
| Natural Rubber (Gum) | Satisfactory |
| Texin® (Thermoplastic) Polyurethane 390 | Satisfactory |
| Butyl Rubber | Satisfactory |
| PVC-TYPE 1 | Marginal |
| Polycarbonate | Marginal |
| Polypropylene | Marginal |
| Kynar® PVDF | Marginal |
| Neoprene | Marginal |
| Viton® B COMM. GRADE | Marginal |
| Kalrez® 6375 | Unsatisfactory |
| Acrylic | Unsatisfactory |

Pressure and enthalpy



Available tools

Simulation software

Simulation software Honeywell's refrigerants modelling software is a free-download software program that eliminates the guesswork involved in selecting a refrigerant by allowing refrigeration engineers to run simulations based on actual data. The tool runs property calculations of refrigerants, conducts thermodynamic evaluations of air conditioning and refrigeration cycles, and provides a first principle thermodynamic comparison of new alternative refrigerants for retrofit applications or new system designs. The software models systems from simplified basic cycles to large, complex refrigeration systems. The results can be exported to Microsoft Excel, where the data can be manipulated in a variety of ways. The software also creates typical Mollier diagrams (Pressure-Enthalpy, Temperature- Entropy). You can download the Genetron Refrigerants Modelling Software at

<https://www.honeywell-refrigerants.com/europe/genetron-refrigerants-modeling-software-download/>

Smart phones apps

Download **Honeywell PT chart ruler application** for **iOS** and **Android** free



Literature

Honeywell has a wide range of literature available on Solstice N13 including case studies, customers references, etc.

Information and contact

For information and support on new applications, contact your local

Honeywell representative, visit

www.honeywell-refrigerants.com/europe

or send us an email at

fluorines.europe@honeywell.com

Honeywell Belgium N.V.

Interleuvenlaan 15i

3001 Heverlee, Belgium

Phone: +32 16 391 212

Fax: +32 16 391 371

E-mail: fluorines.europe@honeywell.com

Please visit us at

www.honeywell-refrigerants.com/europe

Disclaimer

Although all statements and information contained herein are believed to be accurate and reliable, they are presented without guarantee or warranty of any kind, express or implied. Information provided herein does not relieve the user from the responsibility of carrying out its own tests and experiments, and the user assumes all risks and liability for use of the information and results obtained. Statements or suggestions concerning the use of materials and processes are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all toxicity data and safety measures are indicated herein or that other measures may not be required.



RESPONSIBLE CARE[®]
OUR COMMITMENT TO SUSTAINABILITY

RESPONSIBLE CARE

Honeywell Performance Materials and Technologies, as a member of the American Chemistry Council, has adopted Responsible Care[®] as the foundation of health, safety, and environmental (HS&E) excellence in our business. Responsible Care is the chemical industry's global voluntary initiative under which companies, through their national associations, work together to continuously improve their health, safety and environmental performance, and to communicate with stakeholders about their products and processes.

Our commitments:

The safety of our employees

The quality of our products

Being responsible stewards for the protection of the environment, the communities in which we operate and our customers

Honeywell