DuPont™ Suva® 95

REFRIGERANT

Technical Information – ART-28

Replacements for R-503 and R-13: Properties and Operating Characteristics of DuPont™ Suva® 95 Refrigerant

DuPont has developed Suva® 95 as a non-ozone-depleting refrigerant to replace R-503 and R-13 in VLT (Very Low Temperature) applications using cascaded compressors. Both R-503 and R-13 are ozone-depleting refrigerants and will be phased out as mandated by the Montreal Protocol and other legislations. Suva® 95 is an excellent match to R-503 and can replace R-13 in most systems. This bulletin will discuss the general properties and operating characteristics of Suva® 95 in refrigeration applications.

Properties

Suva® 95 is an azeotropic mixture of non-ozone-depleting refrigerants. It is nonflammable and has zero ozone depletion potential. Because of these properties, Suva® 95 is an excellent refrigerant for applications in VLT refrigeration (less than –40°C/°F) where safety and consistency of performance are required.

DuPont recommends the use of a polyolester lubricant with Suva® 95; however, the original equipment manufacturer (OEM) should always be consulted for specific lubricant recommendations.

Table 1 lists the general proprties of Suva® 95.

Table 1
General Properties of DuPont™ Suva® 95

Boiling Point (1 atm)	–88°C (–126.5°F)
Critical Temperature	13.7°C (56.7°F)
Critical Pressure	3935 kPa (571 psia)
Latent Heat of Vaporization at Boiling Point	168.2 kJ/kg (72.4 Btu/lb)
Saturated Vapor Density at –73.3°C (–100°F)	13.25 kg/m^3 (0.83 lb/ft^3)
Ozone Depletion Potential (R-12 = 1)	0
Flammability	Nonflammable
Exposure Limit* (8- and 12-hour time weighted average)	1000 ppm

*The exposure limit is a calculated limit determined from the DuPont AEL of the individual components. It is an airborne exposure limit established by DuPont to which nearly all workers can be repeatedly exposed during a working lifetime without adverse effects.

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Operating Characteristics

Suva® 95 offers excellent operating characteristics when compared to R-503 and R-13. Capacity and efficiency values are nearly equivalent to R-503 and superior to R-13. The compressor discharge temperature is lower than the discharge temperature of compressors using R-23. Lower discharge temperatures may equate to longer compressor life and better lubricant stability.

The estimated operating values of a cascade system running with Suva® 95 are shown in **Table 2**. R-503, R-13, and R-23 performance parameters are shown for comparison.

Table 2
Theoretical Performance of a Cascade System Using R-13, R-503, R-23, or Suva® 95

	R-503	R-13	R-23	Suva® 95
Capacity (R-503 = 100)	100	71	74	98
Efficiency (R-503 = 100)	100	105	95	103
Discharge Pressure, kPa (psia)	999 (145)	717 (104)	848 (123)	1013 (147)
Suction Pressure, kPa (psia)	124 (18)	83 (12)	90 (13)	124 (18)
Discharge Temperature, °C (°F)	107 (224)	92 (198)	138 (280)*	85 (186)

Operating Conditions: –84.4°C (–120°F) evaporator; –35°C (–31°F) condenser; 5.6°C (10°F) subcooling; –17.8°C (0°F) suction temperature; 70% isentropic compression efficiency; 4% volumetric clearance.

*Field tests have shown that the discharge temperature can be as high as 149°C (300°F) in some hermetic and semihermetic compressor systems.

Commercial Availability

Suva® 95 components are TSCA (USA) and EINECS (Europe) listed. Contact DuPont at locations shown on the back page, or contact any DuPont Authorized Distributor for more information on commercial availability.

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(10/06) 244264 Printed in U.S.A.
[Replaces: H-60080-2]
Reorder No.: H-60080-3

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