



**DuPont™ ISCEON® 9 Series**  
REFRIGERANTS

**Technical Information**  
**ART-47**

# **Retrofit Guidelines for DuPont™ ISCEON® 9 Series Refrigerants**

**DuPont™ ISCEON® 39TC® (R-423A)**



*The miracles of science™*

# Retrofit Guidelines for DuPont™ ISCEON® 9 Series Refrigerants

## Table of Contents

	<i>Page</i>
<b>Introduction</b> .....	1
<b>Easy Steps to Retrofit</b> .....	1
<b>Important Safety Information</b> .....	1
<b>Lubricant and Filter Drier Information</b> .....	2
<b>General Retrofit Information</b> .....	2
System Modifications.....	2
System Oil Management.....	2
Refrigerant Recovery Information.....	2
Expected Performance After Retrofit.....	2
<b>Retrofit of R-12 Systems to ISCEON® 39TC®</b> .....	3
<b>How to Determine Suction Pressure and Subcool</b> .....	4
Suction Pressure.....	4
Subcool.....	4
<b>Appendix</b> .....	5
Retrofit Checklist.....	5
System Audit Sheet.....	6
System Data Sheet.....	9
Physical Properties and Composition of ISCEON® 39TC®.....	10
ENG Unit PT Charts.....	11
SI Unit PT Charts.....	13

## Introduction

DuPont™ ISCEON® 9 Series refrigerants have proven to be easy-to-use, reliable, and cost-effective non-ozone depleting retrofit refrigerants. ISCEON® 39TC® (R-423A) has been specifically developed to replace R-12 in centrifugal chillers. Unlike when converting this type of equipment to R-134a, ISCEON® 39TC® does not require expensive equipment changes such as gears or impellers to maintain system performance within acceptable limits. These retrofit guidelines will outline the conversion procedure and indicate what items require attention to achieve a successful conversion. It is recommended that only persons experienced in maintaining centrifugal compressor systems perform any retrofit of such systems. Conversion of an existing R-12 centrifugal chiller system to ISCEON® 39TC® allows the equipment to continue operating safely and effectively for the remainder of its useful life for a fraction of the cost of a fully engineered conversion to R134a.

## Retrofit Choice for R-12 Air-Conditioning and Medium Temperature Refrigeration Centrifugal Compressor Systems

ISCEON® 39TC® enables quick and cost-effective conversion of centrifugal compressor air-conditioning and medium temperature refrigeration systems currently using R-12 refrigerant to a zero ODP refrigerant.

**NOTE:** Prior to retrofitting equipment to ISCEON® 39TC®, contact your DuPont representative. A system audit (see appendix) is required to be registered with DuPont prior to any retrofit taking place.

## Easy Steps to Retrofit

The following provides a summary of the basic retrofit steps for ISCEON® 39TC®.

Use the Retrofit Checklist from the Appendix.

1. A system audit (see appendix) is required to be registered with DuPont prior to retrofit.
2. Complete the system data sheet to establish baseline performance with existing refrigerant.
3. Remove all refrigerant from the system into a recovery cylinder. Weigh the amount removed.
4. Remove the original oil from system components where the oil and refrigerant come into contact and replace with a single charge of polyol ester (POE) based lubricant of the same viscosity as the oil removed.

5. Replace the filter/drier.
6. Check system seals – replace old or worn seals.
7. Evacuate system and check for leaks.
8. Charge with ISCEON® 39TC®. Remove liquid only from charging cylinder. Typical charge weight is approximately the same as for the R-12 charge.
9. Start up system and check refrigerant levels in the evaporator and economizer (if present). Adjust the refrigerant charge and/or level controls if necessary.
10. Label system for the refrigerant and lubricant used.

***Retrofit is complete***

## Important Safety Information

Like CFCs and HCFCs, ISCEON® 9 Series refrigerants are safe to use when handled properly. However, any refrigerant can cause injury or even death when mishandled. Please review the following guidelines before using **any** refrigerant.

- **Do not work in high concentrations of refrigerant vapors.** Always maintain adequate ventilation in the work area. Do not breathe vapors. Do not breathe lubricant mists from leaking systems. Ventilate the area well after any leak before attempting to repair equipment.
- **Do not use handheld leak detectors to check for breathable air in enclosed working spaces.** These detectors are not designed to determine if the air is safe to breathe. Use oxygen monitors to ensure adequate oxygen is available to sustain life.
- **Do not use flames or halide torches to search for leaks.** Open flames (e.g., Halide detection torches, or brazing torches) can cause the release large quantities of acidic compounds in the presence of all refrigerants, and these compounds can be hazardous. Halide torches are not effective as leak detectors for HFC refrigerants; they detect the presence of Chlorine, which is not present in ISCEON® 39TC®, and consequently, these detectors will not detect the presence of these refrigerants. Use an electronic leak detector designed to find the refrigerants you are using.

If you detect a visible change in the size or color of a flame when using brazing torches to repair equipment, **stop work immediately and leave the area.** Ventilate the work area well and stop any refrigerant leaks before resuming work. These flame effects may be an indication of very high refrigerant concentrations, and continuing to work without adequate ventilation may result in injury or death.

**NOTE:** Any refrigerant can be hazardous if used improperly. Hazards include liquid or vapor under pressure, and frostbite from the escaping liquid.

Overexposure to high concentrations of refrigerant vapor can cause asphyxiation and cardiac arrest. Please read all safety information before handling any refrigerant.

### **Flammability**

ISCEON® 39TC® is non-flammable in air under normal conditions. However, mixtures of these products with high concentrations of air or oxygen at elevated pressure and/or temperature can become combustible in the presence of an ignition source. **These products should not be mixed with air to check for leaks.**

## **Lubricant and Filter Drier Information**

### **Lubricants**

When using ISCEON® 39TC® it is recommended that the oil in lubricated system components which are in contact with the refrigerant be changed to POE. Such components could include mechanical seals in open drive compressors, gear boxes, etc. In these components a single change to a POE based lubricant of equivalent viscosity as the lubricant being replaced is recommended.

### **Filter Drier**

Change the filter drier during the retrofit. This is a routine system maintenance practice. There are two types of filter driers commonly used, solid core and loose filled. Replace the drier with the same type currently in use in the system. The drier label will show which refrigerants can be used with that drier. Select a drier specified to work with HFC refrigerants. (Many driers sold today are “universal” – they will work with most fluorocarbon refrigerants.) Check with your DuPont distributor for the correct drier to use in your system.

## **General Retrofit Information**

### **System Modifications**

The compositions of the ISCEON® 9 Series refrigerants have been selected to provide performance comparable to the refrigerants they are replacing in terms of both capacity and energy efficiency. As a result, minimal system modifications

are anticipated with retrofitting. ISCEON® 39TC® is a near-azeotrope, therefore, the vapor composition in the refrigerant cylinder is different from the liquid composition. For this reason, ISCEON® 39TC® should be transferred from the container from the liquid phase during system charging (or when transferring from one container to another).

Retrofits of R-12 centrifugal compressor systems with non-ozone-depleting alternative refrigerant R-134a will require oil changes and more extensive modifications to the existing equipment such as gear ratios and impeller size in order to maintain an acceptable performance. The cost of these engineering changes can be very high (often up to 60–80% of the cost of a new unit). ISCEON® 39TC® provides the service contractor and equipment owner with a cost effective way to retrofit an existing system.

**NOTE:** ISCEON® 39TC® should NOT be mixed with other refrigerants or additives that have not been clearly specified by DuPont or the system equipment manufacturer. Mixing these refrigerants with CFC refrigerants, or mixing two different alternative refrigerants, may have an adverse effect on system performance. “Topping off” a CFC refrigerant with any Suva® or ISCEON® 9 Series refrigerant is strictly not recommended.

### **System Oil Management (See “Lubricants”)**

A single oil change to a suitable POE based lubricant of the same viscosity as the oil being replaced is recommended when using ISCEON® 39TC®.

### **Refrigerant Recovery Information**

Most recovery or recycle equipment used for R-134a can be used for ISCEON® 39TC®. Use standard procedures to avoid cross contamination when switching from one refrigerant to another.

In the United States, DuPont will take back (for reclaim) the ISCEON® 39TC®. In other regions contact your DuPont refrigerant distributor for details of the refrigerant reclaim program.

### **Expected Performance After Retrofit**

**Tables 1 to 3** show approximate system performance changes following a retrofit. These values are based on field experience and thermodynamic calculations, assuming equal compressor efficiency and are general guidelines for system behavior.

Cooling capacity and energy efficiency depend greatly on system design, operating conditions and the actual condition of the equipment. ISCEON® 39TC® has been shown to provide similar cooling capacity and energy efficiency to R-12 while operating at the same evaporating and condensing temperatures and system load. Systems operating with ISCEON® 39TC® will have significantly lower compressor discharge temperature and the same discharge pressure as R-12. Actual operating performance depends on system design and operating conditions and in some cases lower system capacity have been reported. We recommend that conversion be made on systems only where the application can withstand up to 10% lower peak capacity from the cooling system.

**Table 1**  
**ISCEON® 39TC® vs. R-12**  
**Discharge Temperature: °F (°C)**

R-12	174 (79)
ISCEON® 39TC®	154 (68)

**Table 2**  
**ISCEON® 39TC® vs. R-12**  
**Discharge Pressure: psia (kPa)**

R-12	161 (1110)
ISCEON® 39TC®	161 (1110)

System conditions: Tables 1 and 2:  
Condensing Temperature = 110°F (43°C)  
Evaporator Temperature = 40°F (4°C)

**Table 3**  
**ISCEON® 39TC® vs. R-12**  
**Cooling Capacity**

ISCEON® 39TC®	0–10% lower
---------------	-------------

### Retrofit of R-12 Air- Conditioning and Medium Temperature Centrifugal Compressor Refrigeration Systems to ISCEON® 39TC®.

A system audit (see appendix) is required to be registered with DuPont, through your DuPont Refrigerants distributor, prior to start of retrofit.

- 1. Establish baseline performance with current refrigerant.** While the old refrigerant is in the system, collect system data by completing the **System Data Sheet** at the back of these guidelines. Check for correct refrigerant charge and operating conditions. The baseline data

of temperatures and pressures at various points in the system (evaporator, condenser, compressor suction and discharge, subcool, etc.) at normal operating conditions will be useful when optimizing operation of the system with ISCEON® 39TC®.

- 2. Remove refrigerant from the system into a recovery cylinder.** The existing charge should be removed from the system and collected in a recovery cylinder using a recovery device capable of pulling 10–15 in Hg vacuum (35–50 kPa). If the recommended charge size for the system is not known, weigh the amount of refrigerant removed. The initial quantity of ISCEON® 39TC® to charge to the system can be estimated from this amount. (See step 7)

Ensure that any residual refrigerant dissolved in the oil is removed by holding the system under vacuum. Break the vacuum with dry nitrogen.

- 3. Make a single oil change. (See “Lubricants”, above).** Make a single oil change to a POE based lubricant of the same viscosity as the lubricant being replaced. It is not necessary to flush the system but drain off as much of the original oil as is practically possible.
- 4. Replace the filter/drier.** It is routine practice to replace the filter/drier during system maintenance. Replacement filter-dryers are available that are compatible with ISCEON® 39TC®. See Page 2 for additional information on dryers.
- 5. Check System Seals.** While the system is empty, there is an opportunity to check and replace any seals which may be near the end of their serviceable life. Even if they were not previously leaking, the change of swell characteristics with the new refrigerant and general disturbance to the system may cause worn seals to leak after conversion.
- 6. Evacuate system and check for leaks.** Use normal service practices. To remove air or other noncondensables and any residual moisture from the system, evacuate the system (29.6 in Hg vacuum [10 mbar] or 1 kPa), isolate the vacuum pump from the system and observe the vacuum reading. Pressurize the system with nitrogen taking care not to exceed the system design maximum pressure and check for leaks. **Do not use mixtures of air and refrigerant under pressure to check for leaks; these mixtures can be combustible.**

7. **Charge with ISCEON® 39TC®. Remove liquid only from charging cylinder.** Once liquid is removed from the cylinder, the refrigerant can be charged to the system as liquid or vapor as desired. Use the manifold gauges or a throttling valve to flash the liquid to vapor if required.

**WARNING:** Do not charge liquid refrigerant into the compressor. This will cause serious irreversible damage.

In general, the refrigeration system will require approximately the same weight of the ISCEON® 39TC® as the original R-12 refrigerant. The optimum charge will vary depending on the system design and operating conditions.

When converting an R-12 system to ISCEON® 39TC® it is recommended that the initial charge of ISCEON® 39TC® should not normally exceed 90% of the standard charge weight of R-12, provided no changes to mechanical components of the system (which could significantly affect the system's internal volumetric capacity) will be made during the retrofit.

8. **Start up system, adjust charge size and/or refrigerant level controls.** Start the system and let conditions stabilize. If the system is undercharged (as indicated by low refrigerant levels or by the amount of sub-cool at the condenser exit) add more ISCEON® 39TC® in small amounts (still by transferring as liquid from the charging

cylinder) until the system conditions reach the desired level. See the pressure-temperature charts in this bulletin to compare pressures and temperatures in order to calculate evaporator temperature and subcooling for the refrigerant you are using.

9. Label the system to clearly and permanently identify the refrigerant and any oil(s) present in the system.

## How to Determine Suction Pressure and Subcool

### *Suction Pressure*

Determine the expected evaporator temperature using the R-12 column (from the baseline data you collected prior to the retrofit). Find the same expected evaporator temperature in the ISCEON® 39TC® Evaporator Temperature column. Note the corresponding pressure for this temperature. This is the suction pressure at which the system should operate.

### *Subcool*

Using the tables for ISCEON® 39TC® Condenser Temperature, determine the saturated liquid temperature (bubble point) for the measured discharge pressure. Measure the refrigerant liquid line temperature and subtract it from the previously determined bubble point temperature for ISCEON® 39TC® to give the amount of liquid subcool.

## Appendix

### Retrofit Checklist for Converting R-12 Centrifugal Systems to DuPont™ ISCEON® 39TC®

- \_\_\_\_\_ 1. A system audit (see below) is required to be registered with DuPont, through your DuPont Refrigerants distributor, prior to retrofit.
- \_\_\_\_\_ 2. Establish baseline performance with existing refrigerant.
- Use the System Data sheet given below.
  - Note the oil type including viscosity in use and system operating data (if system is operating properly).
  - Check for existing leaks and repair.
- \_\_\_\_\_ 3. Remove existing refrigerant charge from system. (Need 10–15 in. Hg [50–67 kPa] vacuum to remove charge.)
- Use recovery cylinder (*DO NOT vent to atmosphere*).
  - Weigh amount removed (if possible): \_\_\_\_\_.
  - Break the vacuum with dry nitrogen.
- \_\_\_\_\_ 4. Make a single oil change..
- Make a single change to a POE based lubricant of the same viscosity as the lubricant being replaced.
- \_\_\_\_\_ 5. Replace the filter dryer.
- \_\_\_\_\_ 6. Check elastomeric seals (O-rings, sight glasses, etc.).
- Old or worn seals should be replaced to reduce risk of leakage post retrofit.
- \_\_\_\_\_ 7. Evacuate system and check for leaks.
- Break vacuum with dry nitrogen—pressurize to below the system design pressure.
  - Check for any leaks.
- \_\_\_\_\_ 8. Charge system with ISCEON® 39TC® refrigerant.
- Remove liquid only from cylinder.
  - Initial charge of ISCEON® 39TC® – 90% by weight of original R-12 charge.
- \_\_\_\_\_ 9. Start-up, adjust the refrigerant charge, and check refrigerant levels. Adjust level controls if necessary.
- \_\_\_\_\_ 10. Label system clearly. Ensure System Data sheet is completed and filed securely.

***Retrofit is complete!***

# DuPont™ ISCEON® 39TC® Refrigerants – Equipment Audit Report

(All fields must be completed and submitted to DuPont for review prior to retrofit.)

## 1. Auditor Details:

Name:	Position:
Company:	

## 2. Contractor Details:

Name and Address:
Contact Name: (participating at the conversion)
Specialize in Centrifugal Chillers? <input type="checkbox"/> Yes <input type="checkbox"/> No
Date of Audit:
How Long Have You Been Maintaining Unit? (Number of Years and Frequency – See Note 1)

## 3. User Details:

Name and Address:	
Contact Name:	Telephone Number:

## 4. Equipment Details:

Type of Equipment: (Manufacturer/Model/Serial Number)
System Charge:
Air or Water Cooled:
Heat Recovery: <input type="checkbox"/> Yes <input type="checkbox"/> No
Evaporator Level Control: <input type="checkbox"/> Yes <input type="checkbox"/> No If yes how? (Low or High Side Float)
Economizer: <input type="checkbox"/> Yes <input type="checkbox"/> No
Oil Type: <input type="checkbox"/> Mineral Oil <input type="checkbox"/> Alkylbenzene <input type="checkbox"/> Polyol Ester Manufacturer: Viscosity:
Age of System: Compressor Run Time:
Rotation Speed:



### ***ADDITIONAL NOTES to complete the AUDIT Form:***

Complete all information on form to ensure an accurate assessment of the system and recommendations intended to lead to a successful conversion.

1. It is important to know the engineer's level of experience with the system to be retrofitted and with centrifugal chillers in general. This information is required since expert knowledge is required in some systems (e.g., controls fitted to the system in order to optimize performance once converted).
2. Make an estimate of the system's real maximum working load (e.g. compressor run time, vane position at peak load times) as a % of the design maximum in order to assure the system is suitably sized for the load.
3. It is important to know the maintenance history of the system to help assess the suitability of the system for conversion to ISCEON® 39TC®.
4. Complete and Print completed Audit form and submit to your local DuPont representative through your DuPont distributor. Audit forms are available to download from the ISCEON® 39TC® product page on our website at [www.refrigerants.dupont.com](http://www.refrigerants.dupont.com).



**Table 4**  
**Physical Properties of ISCEON® 39TC®**

<b>Physical Property</b>	<b>Unit</b>	<b>ISCEON® 39TC®</b>	<b>R-12</b>
Boiling Point (1 atm.)	°C	-24	-30
	°F	-11	-22
Vapor Pressure at 25°C (77°F)	kPa abs	609	652
	psia	90	95
Liquid Density at 25°C (77°F)	kg/m <sup>3</sup>	1278	1311
	lb/ft <sup>3</sup>	79	82
Density, Satd. Vapor at 25°C (77°F)	kg/m <sup>3</sup>	35	37
	lb/ft <sup>3</sup>	2.21	2.32
Ozone Depletion Potential	CFC-11 = 1.0	0	1
Global Warming Potential	CO <sub>2</sub> = 1	2060	8500

**Table 5**  
**Composition of ISCEON® 39TC® (wt %)**

	<b>HFC-134a</b>	<b>HFC-227ea</b>
ISCEON® 39TC®	52.5	47.5

**Table 6**  
**Evaporator Pressure–Temperature Chart (ENG Units): R-12 and ISCEON® 39TC®**

<b>Pressure (psig)</b>	<b>R-12 Saturated Temperature (°F)</b>	<b>ISCEON® 39TC® Evaporator Temperature (°F)</b>
20 in.Hg	-63.2	-51.0
15 in.Hg	-48.9	-37.4
10 in.Hg	-38.0	-27.1
5 in.Hg	-29.1	-18.6
0	-21.6	-11.4
1	-18.7	-8.8
2	-16.1	-6.3
3	-13.5	-3.9
4	-11.1	-1.6
5	-8.8	0.7
6	-6.5	2.8
7	-4.3	4.8
8	-2.3	6.8
9	-0.2	8.7
10	1.7	10.5
11	3.6	12.3
12	5.5	14.1
13	7.2	15.7
14	9.0	17.4
15	10.7	19.0
16	12.3	20.5
17	13.9	22.0
18	15.5	23.5
19	17.1	25.0
20	18.6	26.4
21	20.0	27.8
22	21.5	29.1
23	22.9	30.4
24	24.2	31.7
25	25.6	33.0
26	26.9	34.2
27	28.2	35.5
28	29.5	36.7
29	30.8	37.8
30	32.0	39.0
31	33.2	40.1
32	34.4	41.3
33	35.6	42.4
34	36.7	43.4

<b>Pressure (psig)</b>	<b>R-12 Saturated Temperature (°F)</b>	<b>ISCEON® 39TC® Evaporator Temperature (°F)</b>
35	37.9	44.5
36	39.0	45.6
37	40.1	46.6
38	41.2	47.6
39	42.3	48.6
40	43.3	49.6
41	44.4	50.6
42	45.4	51.6
43	46.4	52.5
44	47.4	53.4
45	48.4	54.4
46	49.4	55.3
47	50.4	56.2
48	51.3	57.1
49	52.3	58.0
50	53.2	58.8
51	54.1	59.7
52	55.0	60.6
53	56.0	61.4
54	56.8	62.2
55	57.7	63.1
56	58.6	63.9
57	59.5	64.7
58	60.3	65.5
59	61.2	66.3
60	62.0	67.0
61	62.8	67.8
62	63.7	68.6
63	64.5	69.3
64	65.3	70.1
65	66.1	70.8
66	66.9	71.6
67	67.6	72.3
68	68.4	73.0
69	69.2	73.7
70	70.0	74.4

**Table 7**  
**Condenser Pressure–Temperature Chart (ENG Units): R-12 and ISCEON® 39TC®**

<b>Pressure (psig)</b>	<b>R-12 Saturated Temperature (°F)</b>	<b>ISCEON® 39TC® Condenser Temperature (°F)</b>
70	70	73
75	74	77
80	77	80
85	81	83
90	84	86
95	87	89
100	90	92
105	93	95
110	96	98
115	99	100
120	102	103
125	104	105
130	107	107
135	109	110
140	112	112
145	114	114
150	117	116
155	119	119
160	121	121
165	123	123
170	126	125
175	128	127
180	130	128
185	132	130
190	134	132
195	136	134
200	138	136
205	140	137
210	141	139
215	143	141
220	145	142
225	147	144
230	149	146
235	150	147
240	152	149

<b>Pressure (psig)</b>	<b>R-12 Saturated Temperature (°F)</b>	<b>ISCEON® 39TC® Condenser Temperature (°F)</b>
245	154	150
250	155	152
255	157	153
260	159	155
265	160	156
270	162	158
275	163	159
280	165	160
285	166	162
290	168	163
295	169	164
300	171	166
305	172	167
310	174	168
315	175	170
320	176	171
325	178	172
330	179	173
335	180	175
340	182	176
345	183	177
350	184	178
355	186	179
360	187	180
365	188	182
370	189	183

**Table 8**  
**Evaporator Pressure–Temperature Chart (SI Units): R-12 and ISCEON® 39TC®**

Pressure (bar, g)	R-12 Saturated Temperature (°C)	ISCEON® 39TC® Evaporator Temperature (°C)
-0.7	-54.2	-47.4
-0.6	-48.9	-42.4
-0.5	-44.6	-38.3
-0.4	-40.9	-34.7
-0.3	-37.7	-31.7
-0.2	-34.8	-28.9
-0.1	-32.2	-26.4
0.0	-29.8	-24.1
0.1	-27.5	-22.0
0.2	-25.4	-20.1
0.3	-23.5	-18.2
0.4	-21.6	-16.5
0.5	-19.9	-14.8
0.6	-18.2	-13.3
0.7	-16.7	-11.8
0.8	-15.1	-10.3
0.9	-13.7	-9.0
1.0	-12.3	-7.7
1.1	-11.0	-6.4
1.2	-9.7	-5.2
1.3	-8.4	-4.0
1.4	-7.2	-2.9
1.5	-6.1	-1.8
1.6	-4.9	-0.7
1.7	-3.8	0.3
1.8	-2.7	1.3
1.9	-1.7	2.3
2.0	-0.7	3.3
2.1	0.3	4.2
2.2	1.3	5.1

Pressure (bar, g)	R-12 Saturated Temperature (°C)	ISCEON® 39TC® Evaporator Temperature (°C)
2.3	2.2	6.0
2.4	3.2	6.8
2.5	4.1	7.7
2.6	4.9	8.5
2.7	5.8	9.3
2.8	6.7	10.1
2.9	7.5	10.9
3.0	8.3	11.7
3.1	9.1	12.4
3.2	9.9	13.1
3.3	10.7	13.9
3.4	11.4	14.6
3.5	12.2	15.3
3.6	12.9	16.0
3.7	13.6	16.6
3.8	14.3	17.3
3.9	15.0	18.0
4.0	15.7	18.6
4.1	16.4	19.2
4.2	17.1	19.9
4.3	17.8	20.5
4.4	18.4	21.1
4.5	19.0	21.7
4.6	19.7	22.3
4.7	20.3	22.9
4.8	20.9	23.4
4.9	21.5	24.0
5.0	22.1	24.6

**Table 9**  
**Condenser Pressure–Temperature Chart (SI Units): R-12 and ISCEON® 39TC®**

Pressure (bar, g)	R-12 Saturated Temperature (°C)	ISCEON® 39TC® Condenser Temperature (°C)
5.0	22.1	23.9
5.2	23.3	25.0
5.4	24.5	26.1
5.6	25.6	27.1
5.8	26.7	28.2
6.0	27.8	29.2
6.2	28.8	30.1
6.4	29.9	31.1
6.6	30.9	32.0
6.8	31.9	32.9
7.0	32.9	33.9
7.2	33.8	34.7
7.4	34.8	35.6
7.6	35.7	36.5
7.8	36.6	37.3
8.0	37.5	38.1
8.2	38.4	38.9
8.4	39.3	39.7
8.6	40.1	40.5
8.8	40.9	41.3
9.0	41.8	42.1
9.2	42.6	42.8
9.4	43.4	43.5
9.6	44.2	44.3
9.8	45.0	45.0
10.0	45.7	45.7
10.5	47.6	47.4
11.0	49.5	49.1
11.5	51.2	50.7
12.0	52.9	52.3

Pressure (bar, g)	R-12 Saturated Temperature (°C)	ISCEON® 39TC® Condenser Temperature (°C)
12.5	54.6	53.8
13.0	56.2	55.3
13.5	57.8	56.8
14.0	59.4	58.2
14.5	60.9	59.6
15.0	62.4	60.9
15.5	63.8	62.2
16.0	65.2	63.5
16.5	66.6	64.8
17.0	67.9	66.0
17.5	69.2	67.2
18.0	70.5	68.4
18.5	71.8	69.5
19.0	73.1	70.7
19.5	74.3	71.8
20.0	75.5	72.9
20.5	76.7	73.9
21.0	77.8	75.0
21.5	79.0	76.0
22.0	80.1	77.0
22.5	81.2	78.0
23.0	82.3	79.0
23.5	83.3	80.0
24.0	84.4	80.9
24.5	85.4	81.9
25.0	86.5	82.8



**For Further Information: (800) 235-SUVA**

**www.refrigerants.dupont.com**

**DuPont Fluorochemicals  
Wilmington, DE 19880-0711**

**Europe, Middle East, and Africa**

DuPont de Nemours  
International S.A.  
2 Chemin du Pavillon  
P.O. Box 50  
CH-1218 Le Grand-Saconnex  
Geneva, Switzerland  
41-22-717-5111

**Canada**

DuPont Canada, Inc.  
P.O. Box 2200, Streetsville  
Mississauga, Ontario  
Canada  
L5M 2H3  
(905) 821-3300

**DuPont México, S.A. de C.V.**

Homero 206  
Col. Chapultepec Morales  
C.P. 11570 México, D.F.  
52-55-57 22 11 00

**South America**

DuPont do Brasil S.A.  
Alameda Itapecuru, 506  
Alphaville 06454-080 Barueri  
São Paulo, Brazil  
55-11-4166-8263

**DuPont Argentina S.A.**

Casilla Correo 1888  
Correo Central  
1000 Buenos Aires, Argentina  
0 800 33 38766

**Asia Pacific**

**Philippines**

DuPont Fareast Inc Philippines  
19th floor Gt Tower International  
6815 Ayala Avcorner Hv Costast  
Makati City  
Philippines  
1227  
63-2-8189911  
63-2-8189659

**Thailand**

DuPont (Thailand) Co.,Ltd  
6-7th Floor, M. Thai Tower, All Seasons Place,  
87 Wireless Road, Lumpini, Phatumwan  
Bangkok  
Thailand  
10330  
66-2-6594000  
66-2-6594001-2

**Malaysia**

DuPont Malaysia Sdn Bhd  
6th Floor, Bangunan Samudera,  
No.1 Jalan Kontraktor U1/14  
Sek U1, Hicom-Glenmarie Industrial Park  
Shah Alam  
Selangor  
40150  
60-3-55693006  
60-3-55693001

**Singapore**

DuPont Company (Singapore) Pte Ltd  
1 HarbourFront Place #11-01  
HarbourFront Tower One  
Singapore  
098633  
65-65863688  
65-62727494

**Indonesia**

PT DuPont Indonesia  
Menara Mulia 5th Floor  
Jl Jend. Gatot Subroto Kav. 9-11  
Jakarta  
Indonesia  
12930  
62-21-5222555  
62-21-5222565

**Taiwan**

DuPont Taiwan Ltd.  
13Fl., No. 167, Tun Hwa N. Rd.,  
Taipei  
Taiwan, R. O. C.  
105  
886-2-27191999  
886-2-25457098

**India**

E I DuPont India Private Ltd  
DLF Cyber Greens, Tower "C" 7th Floor  
Sector 25A, DLF City  
Phase III  
Gurgaon 122002  
INDIA  
91-124-2540900  
91-124-2540891

**Korea**

DuPont(Korea) Inc.  
4th Floor, Asia Tower  
#726, Yeoksam-dong, Kangnam-Ku  
Seoul, Korea  
135-719  
82-2-22225207  
82-2-22225483

**Hong Kong**

DuPont China Limited  
26/F., Tower 6, Gateway  
Canton Road  
Tsimsha tsui  
HongKong  
852-27345345  
852-23683516

**Australia/New Zealand**

DuPont (Australia) Ltd  
168 Walker street North Sydney  
PO Box 930 North Sydney  
Sydney  
NSW  
2060  
61-2-99236111  
61-2-99236135

**China**

DuPont China Holding Co.,Ltd.  
15th Floor, Shui On Plaza,  
333 Huai Hai Road (Central)  
Shanghai  
200021  
86-21-63866366  
86-21-63853542

Copyright © 2006 DuPont or its affiliates. All rights reserved. The DuPont Oval Logo, DuPont™, The miracles of science™, Suva® and ISCEON®, are registered trademarks or trademarks of E. I. du Pont de Nemours and Company or its affiliates.

NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT PERMISSION OF DUPONT.

The information set forth herein is furnished free of charge and is based on technical data that DuPont believes to be reliable. It is intended for use by persons having technical skill, at their own discretion and risk. The handling precaution information contained herein is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards. Because conditions of product use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any material, evaluation of any compound under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.

