Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

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ES Appendix 10.9 Container Refrigeration Unit Technical Specifications

Report Prepared by: Carrier Transicold

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Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

CONTAINER REFRIGERATION UNIT
TECHNICAL SPECIFICATIONS

Model 69NT40-541-500

Aug 2014

United Technologies
Building & Industrial Systems

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1. UNIT PERFORMANCE

1.1. Net R-134a Refrigeration Cooling Capacity

At 38°C (100°F) ambient temperature and 60 Hz Power Supply:

Air to Evaporator	Cooling Capacity		Power
-29°C (-20°F)	3,100 Watt	(10,600 Btu/h)	5.0 kW
-18°C (0°F)	6,010 Watt	(20,500 Btu/h)	6.4 kW
2°C (35°F)	10,250 Watt	(35,000 Btu/h)	10.8 kW

1.2. Evaporator Airflow (Downward)

High Speed: 5,437 m³/h @ 19.0 mm wg* (3,200 ft³/min @ 0.75 inch wg) @ 60 Hz
Low Speed: 2,379 m³/h @ 6.4 mm wg* (1,400 ft³/min @ 0.25 inch wg) @ 60 Hz
*Static pressure measured external to the unit.

1.3. Electric Resistance Heating

5,627 Watt (19,200 Btu/h) @ 460 V, 60 Hz (Including fan motor heat.)

1.4. Fresh Air Renewal - 50 Hz @ Zero Ext. Static Pressure (Standard position)

Flow rate: 0 - 180 cmh (106 cfm), Maximum rate meets the ATO requirement. Rate is also affected by the container design. Adjustable disc is located on upper left access panel

1.5. Condenser Airflow

4,757 m³/h (2,800 ft³/min) @ 60 Hz

1.6. Unit Air Leakage

0.142 m³/h @ 50.8 mm wg (5 ft³/h @ 2 inch wg)

1.7. Unit Heat Leakage

3.9 W/K (7.4 Btu/h/°F) calculated

1.8. Low Sound

Does not exceed 78 dB(A) 1.5 meter in front and 1.2 meter above lower corner castings @ 380 V, 50 Hz.

1.9. Bulkhead Resistance

13,000 kg (28,660 lbs)

2. UNIT PHYSICAL DATA

2.1. Unit Weight

481 kg (1060 lbs)

2.2. Dimensions and Drawing references (Standard)

Unit Height: ..... 2,235 mm (88.00 inch)
Unit Width: ..... 2,026 mm (79.75 inch)
Unit Depth: ..... 416 mm (16.38 inch)
Applicable Drawings:
98-02600, Rev B ..... Installation and Dimension
98-02601, Rev B ..... TIR Plan

2.3. Electrical

Operating Voltage Range..... 400 to 500 V, 3 ph @ 60 Hz ± 2.5%
360 to 460 V, 3 ph @ 50 Hz ± 2.5%
Power Cable (460V)..... 18 meter (59.4 ft) yellow 11/4 cable; 105°C (221°F) rating.
Power Plug ..... Type CEE17 with earth @ 3h position
Rated 32 A @ 440 VAC.
Circuit Breaker ..... Must hold 25 A. Must trip at 29 A

- Address system of wire marking on all wiring (except controller). Control wires to be white, power wires to be red, ground wires to be green with yellow stripe.
- Wire is tin plated multi-strand copper

2.4. Refrigeration Piping (Refer to Refrigeration Piping Diagram)

Refrigerant and Oil..... R-134a and POE oil
Refrigeration Circuits..... Solid copper tube
Service Ports ..... SAE J639 R-134a connections are used on compressor service valves and liquid line.
Receiver Assembly ..... Consists of receiver, brass service valve and fusible plug.
Receiver Vessel..... Aluminized coated Steel vessel with two brass sightglasses, one dry eye.
Control Components ..... Stepper modulation valve provides continuous capacity control and increased low temperature capacity, quench TXV for compressor cooling.
Heat Exchanger ..... Copper, suction-side

3. UNIT DESIGN

3.1. Guidelines

ISO 1496-2: 2008(E); ATP; ARI; TIR; AMCA

3.2. Operating Conditions

Ocean Environment	Salinity and high relative humidity, severe atmospheric conditions (temperature, wind, rain, spindrift variations).
Rolling	Amplitude of 30° on each side, period of 13 seconds
Pitching	Amplitude of 6°, period of 8 seconds
Permanent List	10° on each side
Shock	Acceleration, longitudinal of 2g; vertical of 5g
Vibration	As encountered by the following types of transport: naval, land (vehicular) and rail.
Ambient Range	-30°C to +50°C (-22°F to +122°F)

4. COMPONENT DESCRIPTION

4.1. Compressor

Model	Carrier 06DR241
Thermal Protection	Internal, automatic reset
Standard Speed	1,750 rpm @ 60 Hz
Gas Displacement @ 1750 rpm, 41 cfm	
Oil Pump	Reversible, gear
Finish	Shotblast, iron phosphate surface preparation, electrocoat polyester base, electrostatic polyester powder paint topcoat.

4.2. Condenser Fan Motor

Nominal Rating	270 Watt (0.36hp)
Electrical	Three phase
Type	Totally enclosed, non-vented
Speed	1,725 rpm @ 60 Hz
Shaft Material	Stainless steel type 303/304/316
Frame Size	48
Finish	Engineered marine finish of electrocoat epoxy paint.
Thermal Protection	Internal, automatic reset

4.3. Evaporator Fan Motors (2)

Nominal Rating (high/low)	470/60 Watt (0.63/0.08hp)
Electrical	Three-phase
Type	Totally enclosed
Speed (high/low)	3,450/1,725 rpm @ 60 Hz
Shaft Material	Stainless steel type 303/304/316

Frame Size	48
Thermal Protection	Internal, automatic reset

4.4. Condenser Coil

Number of Rows	2
Tube Material	Copper, patented enhanced internal cross-hatched surface.
Fin Material	Copper, patented wave design
Tube/Fin Coating	Patented Acrylic Electrocoat
Fin Spacing	18 per 25.4 mm (1 inch)
Face Area	0.45 m^2 (4.8 ft^2)
Fin Surface Area	23.8 m^2 (256 ft^2)
Tubesheets	Copper

4.5. Evaporator Coil

Attitude	30° from horizontal
Tube Material	Copper, patented enhanced internal cross-hatched surface.
Fin Material	Aluminum
Face Area	0.63 m^2 (6.73ft^2)
Fin Surface Area	48.5 m^2 (522 ft^2)
Number of circuits	16
Tube Sheets	Aluminum (mounting hardware is 300-series stainless steel).
Fin Spacing	8 per 25.4 mm (1 inch)
Tube/Fin Treatment	Parco Cleaner-PC2323

4.6. Condenser Fan

Type	Axial, 9 blade
Number	1
Drive	Direct via stainless steel motor shaft
Diameter	495 mm (19.5 inch)
Material	15% glass filled nylon

4.7. Evaporator Fans

Type	Vane axial, 7 blade
Number	2
Drive	Direct via stainless steel motor shaft
Diameter	339 mm (13.3 inch)
Material	15% glass filled nylon

4.8. Heaters (Defrost and Heating)

Main Heater Rods	Six U-shaped tubular with stainless steel sheath. Rated 750 Watt each @ 230 VAC.

4.9. Electrical Controls Circuitry

Control Circuit Transformer

Control Circuit Voltage ..... 24 VAC (1 ph. @ 460 VAC, 60 Hz)
(nominal) ..... 20 VAC (1 ph. @ 380 VAC, 50 Hz)
Rating ..... 205 VA (24 V) plus 105 VA (18 V x2).
Insulation ..... Class H

Indicator Lights

Function/Color:
Cool ..... Blue
Defrost ..... Orange
Heat ..... Orange
In-range ..... Green
Alarm ..... Red
Supply Air Control ..... Yellow
Return Air Control ..... Yellow

Contactors

Full load amp rating @ 600 VAC:
Condenser Fan ..... 12 A
Evaporator Fan ..... 12 A
Compressor ..... 30 A
Heater ..... 12 A

Main On-Off Switch

Location ..... External face of unit
Type ..... Toggle switch (bayonet)
Protection ..... O-ring sealed shaft
Rating ..... 10 A @ 115 VAC

4.10. Safety Devices

High pressure switch, settings:

Cut-out ..... 2,413 kPa ± 69 kPa (350 psig ±10 psig)
Cut-in ..... 1,724 kPa ± 69 kPa (250 psig ±10 psig)

Fusible Plug pressure relief device

Temperature setting ..... 99°C (210°F)

High temperature safety (HTT)

Temperature setting ..... 54°C (130°F)

Circuit Breaker (CB1)

Trips at ..... 29 amps

Fuses

Control Circuit

Rating ..... 7.5 A (x2)
Type..... Auto blade, SAE J1284
Microprocessor
Rating ..... 5 A (x2)
Type..... Auto blade SAE J1284

5. UNIT CONTROL SYSTEM

5.1. Temperature Controller/DataCorder

Manufacturer..... Division of UTC (USA)
Type..... ML3 Microprocessor
Controlling and
Recording Range ..... -30°C to +30°C (-22°F to +86°F)
Controller (2) and
Recording (2) Probes ..... Precision 10,000 Ohm Thermistor
Probe locations ..... Air entering the evaporator coil (return) and air leaving the evaporator coil (discharge).
Recorder memory ..... Minimum 1-year of trip information.
Interrogation..... 5-pin connector (Veam or equivalent), unit front.

5.2. Cooling Capacity Control

Chilled Mode, Set Point Above -10°C (14°F)

Type of Capacity Control..... Suction modulation
Control logic..... PID control algorithm
Control range ..... ±0.25°C (± 0.45°F)
Heating: energize ..... 0.5°C (0.9°F) below set point
de-energize ..... 0.2°C (0.36°F) below set point

Frozen Mode, Set Point Below -10°C (14°F)

Type of Capacity Control..... Compressor on/off
Heating ..... Locked out

5.3. Defrost

Type..... Electrical heating
Intervals .....Selectable, timed or automatic
Selected intervals.....3, 6, 9, 12 or 24 hours
Automatic.....If selected, the unit microprocessor will determine the defrost interval based on the previous defrost length and previous defrost interval. Minimum defrost interval will be 3 hours and maximum 24 hours.
Defrost termination.....(DTS) coil temperature sensor
Manual initiation .....Press the manual defrost key on the unit keypad for (5) seconds.

Time delay maintains the in-range light energized throughout the defrost cycle and for 30 minutes after termination of defrost.

6. MATERIALS AND COATINGS

6.1. Materials

Main frame	5000 and 6000 aluminum
Evaporator Compartment	Riveted, formed 3000 or 5000 Aluminum
Motor mounts/stators	A380 series die cast aluminum
Control box	"Weather tight" design
Door	Aluminum, includes treated polycarbonate window
Gasket	Closed cell neoprene
Access Panels	Two aluminum faced, insulated and gasketed panels. The upper left (cable side) panel houses the air exchange assembly.
Insulation (Foam)	Non-CFC blown (R-134a)
Average thickness	57.2 mm (2.25 inch)
Nominal density	32 kg/m^3 (2 lbs/ft^3)
Peripheral Air Seal	Flat PVC wiper.
Machine screws, hinges	ASTM type 300 stainless steel bolts/nuts/washers, and rivets.
Self-tapping screws	ASTM type 410 stainless steel with proprietary coating
Charging/ service valves	Brass
Exposed dissimilar metals	Fitted with mylar 0.25 mm (0.010 inch) thick

6.2. Coatings

Main frame, compressor base and compartment, control box and door, fan venturi and grill, panels	Chemical cleaning, Chromate conversion coating, One coat of (triglycidylisocyanurate) polyester paint, electrostatically applied powder process, oven baked.
Filter drier	Baked powder paint
Pressure relief device, high pressure switch, exposed refrigerant lines, liquid line charging valve, service valves, quench TXV	Hand applied vinyl or polyurethane protective coating.

7. FEATURES FOR POST-PRODUCTION INSTALLATION

Some options, not included during the original production, can be added in the field. The unit is designed to simplify installation of the following kit options unless the provision is specifically omitted.

*Vent position sensing

*Dehumidification

*USDA

8. LISTING OF OPTIONS INCLUDED AND INSTALLED IN THE UNIT

Power-Up Rechargeable Battery

A rechargeable battery pack is provided to allow access to the microprocessor operator-adjustable parameters when no mains power is present. This allows the user to adjust parameters such as set point, defrost interval and current limit. User can also retrieve DataCorder data when not connected to mains power. The battery pack includes the battery housing which fits into the controller module and Ni-Cad batteries that recharge when the unit is on.

The DataCorder will wake up and record information on a regular (selectable) interval when in the USDA cold treatment mode. Battery provides a minimum of 72 hours of service from full charge when operating at -18°C (0°F) at 1 hour logging intervals.

Dehumidification Control

The unit is equipped with the ability to dehumidify. The function is selected via code select method, and indicated by the flashing of the supply probe indicator light. The set point range is 60% to 95%. The sensor is located near the evaporator fan motor (right side facing unit). Sensor accuracy is +/-3% from 20 to 90% relative humidity and +/-4% from 90 to 100% humidity. Dehumidification is achieved by energizing the heaters during the cool mode. Heaters are not energized when out of the control temperature set point range.

USDA Cold Treatment

The unit is prepared for the recording of three pulp temperatures for the purpose of meeting the USDA cold treatment criteria. An optional fourth probe can be added, but is not included as a USDA cold treatment requirement. For the connection of the USDA pulp probes, Deutsch HD10-3-96 P style receptacles are provided. The optional probes are thermistor type. Connectors are mounted on the controller side of the evaporator sheet metal.

TransFresh Port Provision

For ease of field installation of the TransFresh system, unit penetrations for the purge port are included.

XtendFRESH Provision

The unit has the XtendFRESH provision. For ease of field installation of the XtendFRESH modified atmosphere system, essential wiring, and sensor connections are included.

Enhanced Stainless Steel Fasteners

To prevent discoloration due to corrosion, stainless steel 316 fasteners are used.

Evaporator Tubing Coating

External copper tubing on the evaporator coil will be coated with a varnish.

QUEST Power-Saving Mode (with default setting: OFF)

QUEST power-saving mode maintains cargo temperature based on setpoint protocols for perishable cargoes. QUEST cycles the compressor on/off and fans from high to low speeds according to the specific protocol for the setpoint.

Power Line Remote Monitoring Provision

Unit is *provisioned* to install ISO high data rate Remote Communicating Device, (RCD) in the field. Buyer agrees that Seller warranty does not include PPG devices.

9. REFRIGERATION PIPING DIAGRAM