Weatherite
LIMITED

Weatherite Manufacturing Limited
Credenda Rd, West Bromwich
West Midlands, B70 7JE, England
Tel: 0121 665 2266 Fax: 0121 665 2277
www.weatherite-group.com

Air Conditioning & Air Handling Equipment Manufacturers

ISCR090/IRCR125 Rooftop Packaged Cooling Unit

Installation, Operation & Maintenance manual

Customer Site	ICELAND SWISS COTTAGE
Job No	212164
Unit Serial No	212164-1
Unit Serial No	212164-2
Unit Serial No	212164-3
Unit Serial No	212164-4
Unit Serial No	212164-5
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Introduction

ALL people involved in the installation and maintenance of the Environmental Control Equipment and its ancillaries, whether directly or indirectly, MUST read this notice and this complete document prior to the commencement of ANY work.

The following Information MUST also be read, fully understood and adhered to at ALL times:

1. The SAFETY of YOU and your fellow colleagues MUST be your main concern.

2. NEVER carry out a task until you fully understand what you are being asked to do and how to do it safely.

3. NEVER carry out a task that you feel could be dangerous to YOU or your fellow colleagues.

4. DO NOT carry out any task that you are not qualified to undertake.

5. If you have any question or concern over the safety of YOU or your fellow colleagues, you MUST consult your supervisor prior to the commencement of any task.

ALWAYS THINK SAFETY

Safety Requirements

It is essential that any operatives working on the unit are suitably experienced and/or qualified to undertake the various service and maintenance tasks. This is of particular importance with any work relating to the electrical items, refrigeration circuit and controls. Operative should be suitably qualified in accordance with relevant European Directives.

OFFLOADING AND POSITIONING

Each air-handling unit is delivered complete with a polythene vacuumed covering to provide a minimal form of protection.

The units are provided with four off lifting lugs situated along the base of the unit.
Weatherite recommends that the unit is lifted with appropriately sized nylon slings to prevent damage to the unit roof. The slings should be connected to the eyes via 'D' shackles and should not be less than 6m long. Alternatively, a spreader beam can be used to ensure the slings do not clash with the unit casework.

Each air handling unit must be offloaded and positioned by correctly trained personnel and thereafter adequately protected by the builder/HVAC contractor should additional construction work be carried out within the close proximity of the unit and its ancillaries.

A minimum clearance of 1m should be allowed on all sides for service/maintenance and airflow to the condenser coil. Additional clearance may be require on one of the sides to consider cooling coil change out if required.

SITE STORAGE GUIDE

General
The recipient of the product shall provide a suitable storage area to prevent damage or deterioration.

Painted Steelwork and Plastisol Surfaces
WARNING Use of tape to secure / seal the unit with Polythene or other materials should be kept to a minimum and when un-avoidable we recommend the use of ANCA product reference 3120, other products may damage the surfaces upon their removal.

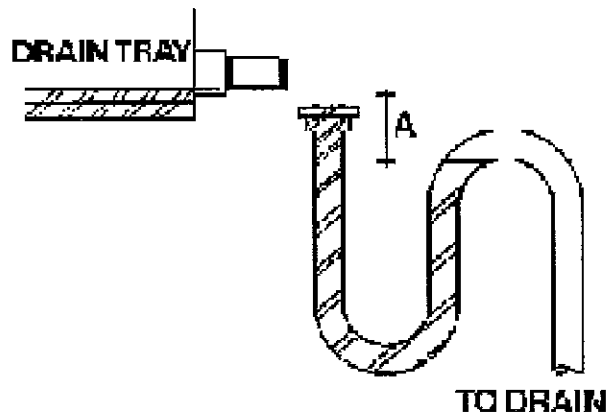
Siting
Units must be sited on a level base with sufficient support to adequately spread the load across the full width of the units.

Protection
All units should have access panels closed during storage to prevent the ingress of dust, dirt and moisture. The units should be left in their packing and with sites prone to dirt and damage, additional protection should be provided on site. Particular attention should be paid to protruding items such as pipe connections & isolators.

INSTALLATION GENERAL

Particular attention should be paid to the on-site support steelwork/concrete base, which should be designed to support the unit perimeter base steelwork of each section. It is important in all cases that the unit base **must** provide a rigid and level support, otherwise innumerable defects will occur.
A lightweight support structure is likely to resonate and will effect considerable component damage.
Care should be taken to ensure warm air from other equipment is not directed onto the condenser coil or the system outside air intake.
Sufficient space around the unit should be considered for airflow and service/maintenance.

CONDENSATE DRAIN TRAPPING



The proper sizing of condensate traps is shown indicating system run condition. When the system is off the height of the water seal column must be at least twice the maximum negative static pressure that can exist at the fan suction when the fan is operating i.e. the system pressure loss from atmospheric pressure to the fan inlet with an allowance for dirty filters. This is to prevent losing the water seal on fan start-up. Since this condition only exists for a few seconds, it should not present problems with a properly designed trap. Under normal operating conditions condensate will discharge down the water seal leg and fill both vertical sections until there is sufficient water to cascade to drain. When the fans stop the water levels will equalise causing the standing column A to discharge. After long shut down period's water seals may evaporate when it is necessary to either manually refill the trap prior to cooling system start up or temporarily seal the drain outlet either by plugging or by submerging the end in a pan of water until the trap is filled with water.

Alternatively, a waste valve trap may be used but must be positioned between 45 to 90 degrees from horizontal to allow sufficient water head above the valve trap.

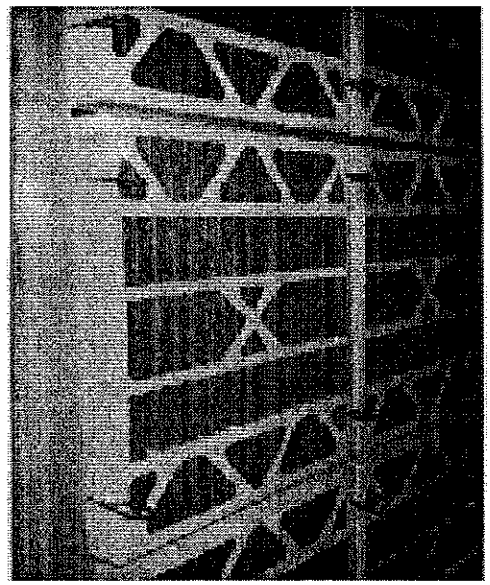
If the unit sits on a concrete base, it is good practice to extend the pipe away from the base to prevent water build up along the perimeter of the unit.

PRE-COMMISSIONING CHECKS (BY HVAC COMMISSIONING ENGINEER)

Examine the shell of the unit for damage to panelling, which may have occurred whilst the equipment was lying on site during the building construction period. Damaged panelling can lead to excessive air leakage and minor damage can usually be rectified. If panels have been badly damaged, it is preferable to have them replaced. Proper protection of the equipment whilst on site will minimise these problems.

Check that all ductwork connections are properly made and air-tight. In addition, study the fan discharge ducting to make sure that no excessive pressure losses will occur. Site dimensional problems often mean that there is little room for properly designed duct connections at this point. Also, in some cases, silencers are located too close to the fan outlet causing considerable turbulence on the front ends of the pods.

Filters
Ensure that the correct size is used and that they are correctly fitted against the support frame. Ensure that pad filters are fitted so that the pleats are in the vertical position wherever possible and that the filter air flow direction arrow is facing the right way.



Controller
Configure controller to the site application – Refer to IFF controller user guide.

Fans
Before running the fans, check that the fan section is clear of debris and that the impeller runs free. Check all fastenings are secure and undamaged. Check that the rotation of the fans is correct. This should be clockwise when viewing the fan from the inlet ring.
Check that the remote dampers are sequenced correctly and check unit air volumes with dampers in full recirculation and full fresh air modes. It is important that the remote return fan is operating when air volumes are set up.

If a velocity scan/air terminal volume scan is not practical, an estimation of fan volume can be made by measuring the air pressure drop across the supply fan intake ring. A pressure tapping is available on each fan and the pressure drop across the ring can be taken and the following formula used for volume assessment:
Volume (m3/Hr) = 480(k factor) x √ Pa (Pressure drop across inlet ring)
The design is 10800m3/hr for each fan hence the pressure drop should be about 500Pa.

Units have an air pressure sensing device which measures the average pressure drop across the fan inlet rings. This signal is input into the BMS controller and a direct read out of volume can be viewed from the controls display.
Note;
The fans are direct drive impeller type with an inbuilt AC/DC converter within the motor casework. The fan speed is varied by applying a 0 to 10 volt signal to the motor control signal terminals. This is generated from the BMS controller.

Electrical
Check all connections for tightness.
Check incoming voltage.

Condensate
Check that the drain line and trap is connected and primed.

Compressors
These should be isolated by their circuit breakers until a suitably qualified engineer is in attendance to run them. Prior to running, crankcase heaters should be energised for at least 1 hour and all safety devices set and checked. It is preferable to have a reasonable cooling load for the compressors to ensure sufficient operating pressures.

Heat Exchangers
Check that these are clear of any debris and any fin damage is combed out.

FAN SECTIONS

Action	Checked	Initial
1. Section free from dirt debris etc.		
2. Inside of fan scroll free from debris		
3. Impeller and bearings are undamaged		
4. Rotation direction is correct and is free and smooth		
5. Correct signal from controls		
6. Ductwork correctly connected		
7. Dampers operate freely (where fitted)		
8. Door locks functioning		
9. Door seals satisfactory		
10. Doors open and close freely		

ELECTRIC HEATER SECTION (where fitted)

Action	Checked	Initial
1. Section free from dirt, debris etc		
2. Door locks functioning		
3. Door seals satisfactory		
4. Doors open and close freely		

FILTER/COOLING COIL SECTION

Action	Checked	Initial
1. Section free from dirt, debris etc		
2. All filters fitted correctly and free from damage		
3. Condensate drain trap fitted		
4. Door locks functioning		
5. Door seals satisfactory		
6. Doors open and close freely		
7. Coils free from damage		
8. Condensate water flows freely from U/S coil block via tray and pipework ie. no restrictions		
9. Condensate trap primed with water		

REFRIGERATION SECTION

Action	Checked	Initial
1. Section free of dirt and debris		
2. Open on all valves		
3. Power to crankcase heaters		
4. Check for any damage to condenser coil		

Unit checked for air leaks and made good where necessary.

Name.....Signature.....Date.....

SERVICE AND MAINTENANCE INSTRUCTIONS

Refer to the project commissioning sheets to view the settings of safety and control devices.

Fan Section Maintenance

Before carrying out any work in the fan section, ensure the fan motor is properly isolated from the electrical supply and lock off the circuit breakers and/or mains isolator accordingly. Access doors are provided into the fan section from the side of the unit. For access to the fan motor terminals and to assist fan removal, access doors are located on the roof of the unit. For fan removal, threaded drop rods are fitted to allow the fans to be lowered down from inside the fan section.

Coils

Dirt build-up on the fin block can occur even with filters fitted and fins should be cleaned periodically with a proprietary cleaning solution to avoid loss of output of the battery, this applies to both condenser and cooling coils. Access doors on the side plates on the condenser housing section provide access to the air leaving face of the condenser coil.

Note . Check with the cleaning fluid supplier its suitability for the particular tube and fin finish.
Should any leaks occur in the return bends, element tubes or headers, these should be reported to the factory before any repairs take place.
Any fin damage should be combed out.
Drain trays beneath cooling coils should be cleaned periodically and the outlets checked to ensure they are not blocked.

Filters

Temperature limitations -118°C Continuous Exposure 93°C Intermittent Exposure
Where filter gauges are fitted or where a pressure drop check can be taken, the filters should be changed when the pressure drop reaches a maximum value of 240Pa (or sooner if the air volume drops by 10 to 15%). No guidelines can be given on filter life, as airborne dirt varies with location, prevailing winds and the season of the year, but operating experience over a period will indicate when replacements are likely to be needed. New buildings are dusty and will soil the first set of filters fairly quickly. Inspect visually each filter as a breakdown in the media due to dirt overload may result in a low pressure reading as air passes through holes in the filter. Spare filters should not be unpacked until required. The filters are Pleated non-woven reinforced cotton/synthetic fibre pad filters, when replacing ensure that the correct size is used that they but together correctly in the slides, and that the air direction arrow faces the correct way.

Handles and Hinges

Where units are mounted outdoors regular inspection of hinges and handles are required.
Hinges should be greased regularly, and handle movement checked.

Dampers (where fitted)

At least twice a year, dampers should be cleaned, linkages inspected & grub screws tightened where appropriate. Damper actuators should be checked for operation & re-tightened onto shaft if necessary. All bearings should be sprayed with light oil.

Electric Heaters (where fitted)
Ensure that fan run on operates and elements are cool prior to access. Check tightness of all main cables and condition of contactors.

REFRIGERATION
Warning: Only competent and qualified refrigeration service engineers should attempt the following work. Refrigerant should not be released to atmosphere; it should always be recovered by a refrigeration engineer qualified to C&G 2077 or equivalent.

Compressor
The compressor oil level should be checked by the use of the sight glass fitted within the compressor casing. Should the oil level be low, it will be necessary for additional oil to be added to the compressor. It is crucial to check the type of oil supplied with the system and a label is fixed to each compressor stating whether it has been charged with mineral oil or ester oil. Do Not Mix. Oil should be added via the tapping point on the low pressure compressor valve, taking care not to introduce air into the system. The required oil level should be between one third and half way up the oil sight glass.

Crankcase Heater
A crankcase heater is necessary to avoid accumulation of liquid in the compressor in cold weather. If the unit is switched on after a long shutdown in a cold environment then the crankcase heater should be energised for one hour prior to switching the compressor on. Please note, the crankcase heater will be energised when there is a supply to the unit.

T.E.V. (Thermostatic Expansion Valve)
The thermal expansion valve monitors the correct amount of refrigerant into the evaporator to suit the load conditions. It is operated in response to outlet pressure, suction line pressure (via a signal from the equalising line), bellows pressure (via the thermal bulb located on the evaporator outlet pipe) and spring pressure (via the superheat adjustment screw). It is set to maintain a superheat of between 4°C to 8°C at the suction inlet to the compressor.

Filter/Drier
A visual inspection only is required as part of the routine maintenance. If there is condensation appearing on the casing and frosting of the downstream piping or the refrigerant sight glass is indicating a wet condition, the filter/drier must be changed and a thorough evacuation adopted.
Before removing the drier, a refrigerant recovery system should be employed to ensure no gas loss to the atmosphere.
It is good practice to change the drier whenever a major component is replaced in the refrigeration circuit that require re-braising into the circuit.

Refrigerant Charge
The refrigerant charge can be checked by measuring the sub cooling in the liquid line adjacent to the sight glass. This is done by taking the actual pipe temperature and the liquid high pressure gauge temperature. The pipe temperature should be approximately 4°C to 8°C below the gauge temperature.

Sight Glass/Moisture Indicator
This device is located in the refrigerant liquid line and is an aid to detect moisture in the system via a colour coded band (Yellow indicated moisture, green is dry). The clear glass indicator should be filled with liquid (appearing clear) when the system is re-charging.

Please note that with R407C, there may be some bubbles appearing in the sight glass even when the system is fully charged. Liquid line sub cooling should be measured & if this is between 4 to 8°C at full load then the system is charged correctly.

High/Low Pressure Switches/Transducers
These are safety devices, which protect the refrigeration system. A mechanical HP trip is a manual re-set switch and if this device trips then an inspection of the refrigeration circuit should be undertaken by a suitably qualified engineer.
Pressure control and safety functions are also achieved by HP and LP pressure transducer inputs into the BMS controller. The resultant pressure can be viewed on the BMS display. The following safety functions are monitored by the BMS system:
HP trip – Auto re-set for 3 attempts before manually tripping- If this device trips then an inspection of the refrigeration circuit should be undertaken by a suitably qualified engineer.
HP set back – Switches off 1 compressor stage in the event of unusually high operating pressures to keep the plant running.
LP trip – Auto re set – Trips out both compressors in the event of operating pressures being too low.
LP set back – Switches off 1 compressor stage in the event of unusually low operating pressures to keep the plant running.

Condenser Fan Speed Controller
The condenser fan is speed controlled by an inverter controller operating from an input signal from a BMS output. This helps to maintain a reasonable head pressure at all conditions to ensure proper expansion valve operation.

Control Panel
Isolate electrical supply to the unit and check all terminals for tightness.

COMPRESSOR BURNOUT

DETERMINING IF A BURNOUT HAS OCCURRED

If the compressor will not start it does not necessarily follow that a 'burnout' has occurred. The failure may be due to a fault in the electrical system external to the compressor or due to a mechanical failure or seizure in the compressor. It is therefore essential to initially establish if a burnout has actually occurred by using the following procedure.

Electrical Checks

Switch off the main supply, remove the main fuses or switch off MCB and disconnect the motor leads on the motor side of the control panel or starter.
Now check the following:-

1. All fuses or MCB
2. The contactors for pitting and/or burning.
3. The control panel for sticking contactors etc.
4. The main supply voltage by energising the control panel and checking the phase voltage.
5. The motor windings for open circuit or earthing.

EITHER

Refrigerant Check

By using a 'Total test' kit instrument, fit it to suction side Schrader fitting or suction valve gauge port, first wiping the connection clean of moisture, grease or dirt. Leave instrument connected for a maximum of ten minutes.

Note: Do not exceed ten minutes as this may indicate a problem when one does not exist.

Disconnect instrument from Schrader/gauge port, remove test tube and compare tube to chart provided on tube pack this will indicate the acidity level.

OR

Compressor Oil Check

Obtain a sample of oil from the compressor crankcase and determine its acidity by testing with an oil acid test kit.

When using both these kits the manufacturers instructions must be strictly adhered to.

System Cleaning Procedure

Having determined the degree of burnout and, thus, the degree of contamination the most suitable cleaning procedure can now be applied. These procedures are as follows:-

1. Remove the refrigerant from the whole of the system with the aid of a recovery machine and recovery bottles.
2. Disconnect all electrical wiring to the compressor.
3. Remove the burnt out compressor.
4. Install a new compressor.
5. Replace the original liquid line filter/drier with a 'clean up' filter/drier. The liquid line filter/drier should be one size larger than that normally fitted as part of the installation.
6. Install a suction line 'clean up' filter/drier.

7. Pressure test system with nitrogen (OFN).

8. Evacuate system using a suitable vacuum pump and gauge, to a pressure of 0.5 mm Hg. having obtained this vacuum isolate the vacuum gauge and pump and stop the pump. Break the vacuum by charging with nitrogen (OFN) to 0 psig. Re-evacuate to 0.5mm Hg isolate the vacuum gauge and pump, stop the pump and break the vacuum by charging with refrigerant.

9. Re-connect the motor wiring and check the electrical system operation.

10. Start up compressor and fully charge system with refrigerant.

11. Check the pressure drop across the liquid line and suction line filter/drier and change if the value exceeds 2 psig.

12. After 168 Hrs running, carry out a acidity test using one of the methods mentioned earlier.

13. If the acidity level is still high replace both clean up filters/driers in the liquid line and suction line. Run for a further 168 Hrs and repeat procedure until acidity level is acceptable.

14. When the oil sample or refrigerant acid test proves to be acceptable then the clean up filter/driers in the liquid and suction lines can be removed.

15. New filters/dryers of the same size as those originally installed in the system should now be fitted.

16. The system can now be left to operate normally.

WARNING

The discharge of refrigerant to the atmosphere contravenes Section 33 of the Environmental Protection Act, whenever it is necessary to remove refrigerant from the system a suitable reclaim system should be utilised.

Fault Finding

SYMPTOMS	POSSIBLE CAUSE	ACTION
Low Pressure	Undercharged	Check for leak. Repair as necessary and re-charge.
	Low air temp onto Evaporator	Unit working outside operating range Re-set controls. Check damper positions.
	Insufficient air flow on evaporator coil face	Check for air bypass around Evaporator coil face. Access panels on fan section not fitted or secure.
	Blocked main air filter	Replace with new filter
	Supply fan air volume low	Check fan rotation and reverse if necessary. Check all three phases are healthy onto fan motor. Check for obstructions/blockages on fan impeller. Check for obstructions in supply duct (loose insulation, closed damper etc.) Check operation of return air fan.
	Refrigeration	Orifice blocked/iced up in expansion valve. Liquid line shut off valve not fully opened. Refrigerant filter drier blocked.
	Over condensing	Check operation of head pressure controller. Check setting against commissioning sheet. Adjust/replace as necessary
High Pressure.	Overcharged	Check refrigerant charge by measuring sub cooling on liquid line. If this exceeds 10°C during full load operation, reduce gas charge accordingly.
	High air temp onto air intake.	Check for re-circulation of hot air exhaust back to condenser coil intake
	Insufficient air flow on condenser coil face	Check for air bypass around coil or access panels on fan section not fitted, or not secured.
	Blocked condenser	Check for dirt on coil face and thoroughly clean.
	Condenser fan air volume low	Check fan rotation and reverse if necessary. Check for supply voltage onto fan motor. Check for obstructions/blockages in fan section.
	Under condensing	Check operation of head pressure controller. Check setting against commissioning sheet. Adjust/replace as necessary

SYMPTOMS	POSSIBLE CAUSE	ACTION
Compressor Overload	Air temp onto evaporator too high	Check to see that on coil temperature does not exceed design.
	Superheat too high Excessive head pressure Motor seizure	Adjust accordingly. See High H.P. section. Check oil level and add oil if necessary.
	Low voltage	Check mains.
	Loss of refrigerant Loose electrical connections.	Check for leaks, trace, repair and re-charge Trace and repair.
Fan Thermal Trip	Too much airflow	Check volumes, ensure fan access door is closed. Check voltage onto fan and ensure all three phases are healthy.
Fan Overload	High current	As for Fan Thermal Trip
Fan Airflow Switch	Low air flow	Check filters and replace if necessary. Check ductwork for obstructions. Check fan rotation and check all three phases are healthy. Check operation of switch replace as necessary.
Crankcase Cold	Crankcase heater faulty	Check circuit breaker and test crankcase heater for open/close circuit. Replace as necessary.
Flood	Water level too high	Check for blockage in drain line Clean as necessary.

APPENDIX 1

R407C

These units contain fluorinated gases covered by the Kyoto Protocol.
These units are charged with R407C refrigerant. These are identified by labels on the compressor and refrigerant charge points.
Packaged units have a hermetically sealed refrigeration circuit.
R407C

R407C is an ozone friendly HFC refrigerant, which has similar properties to R22. It is a blended refrigerant and is made up of R32, R125 and R134a and has a boiling point ranging from -34.7°C to -41.9°C (R22 -40.8°C).

CHARGING

As R407C is a blended refrigerant, each constituent has a different boiling point. It is therefore essential that if any refrigerant is added to the system it is introduced in liquid form into the receiver. Do not vapour charge into the system as this could affect the constituent make up of the refrigerant.

OIL

R407C is not compatible with conventional compressor mineral oils. The compressor has been charged with a polyolester synthetic lubricant. If a compressor is replaced, then the compressor must be purchased having a compatible oil charge. The new synthetic lubricants have a great affinity for moisture and systems should only remain open for the very minimum of time to prevent moisture ingress.

LEAKS

The molecule size within R407C are much smaller than those in R22. It is therefore wise to pay close attention to leak detection particularly around flared connections. Any major leaks may give rise to the refrigerant constituents leaking at different rates. If more than 50% of the design charge has been lost then the remaining charge should be reclaimed and returned for reclamation. The leak source should be traced and repaired and an evacuation procedure adopted to remove any moisture from the system. The system should then be re-charged with new refrigerant.

SAFETY

The synthetic lubricants have a chemical make-up which forms acid when it comes into contact with moisture. Appropriate gloves and goggles should be used when handling these oils.

F gas Regulations: Notes for end-users and operators.

The European Union's F-gas Regulation No 842/2006 is now law. Here is a brief indication of its impact on operators and users (F-gases include all HFC refrigerants, such as R134a, R407C, and R410A.).

If you operate stationary refrigeration or air conditioning systems, you must take steps to prevent refrigerant leakage and repair any leaks as soon as possible. You must also arrange proper refrigerant recovery during service and maintenance and at the end of the plant's life by certified personnel.

You must ensure that only certified competent personnel carry out leakage checks, and that these are done to the laid down schedule. On equipment supplied by Weatherite Manufacturing Ltd we recommend that this is carried out at least annually (see *Maintenance* Section).

At the time of writing, the user is required to maintain records of all refrigerant systems with a charge of 3kg or more, and check for leakage in all systems with a charge of 3kg (in hermetic equipment 6kg) or more, although we strongly recommend that ALL units be included, to avoid omissions. The user is also required to maintain service records of all refrigerant systems with a charge of 3kg or more. This regulation is now in force, but is being monitored for its impact on the UK's contribution to the Kyoto Agreement. It will therefore almost certainly be subject to amendment post-publication of this document. Our comments above are recommendations only, and are by no means binding, definitively up to date, or intended to be exhaustive. Current and/or further details may be obtained direct from Defra/DTI which issues a guidance document at http://www.defra.gov.uk , currently available under the address http://www.defra.gov.uk/environment/air-atmos/fgas/index.htm. A copy of the regulation itself can also be downloaded from this site.

APPENDIX 2

EMC - ELECTROMAGNETIC COMPATIBILITY

In order to maintain compliance with the above directive and to ensure the equipment operatives without spurious interference, it is essential that the following recommendations are adopted.

1. **Do not site the equipment adjacent to radio transmitters, TV transmitters, radar transmitters or any other device that radiates at a radio frequency.**

2. **Ensure that all connecting electrical cables are run in a manner such that it will not compromise the EMC integrity of the installation.**

   This is of particular importance to any signal wiring to control devices or remote communication ports. In all instances these should be run separately to mains cables and may require specific segregation and/or shielding. Please refer to Weatherite Electrical Design Office with any queries.

3. **On modular units, if the wiring run between the compressor/control section and the condenser fan is more than 20m, please contact Weatherite Electrical Department for advice on the condenser fan inverter location.**

Appendix 3

Control Operation

Iceland – IFRDE060L1095

Please refer to IFF Carrel controller user manual regarding controller operation and interrogation from controller keypad.

Appendix 4

Modular Solutions

In some instances, a rooftop package is not suitable due to certain site restrictions. Weatherite have designed some modular solutions using the same main component parts but in modular caseworks to allow for split internal mounting with remote condenser section. The list below shows the model numbers and descriptions. Note: The list below is not exhaustive -other variations have been produced for special site applications.

IFRDE060L1095	Roof Top Package (standard)
IFRDE060L1095TD	Roof Top Package-(As standard but with top fan discharge
IFRDE060L1095AX	Roof Top Extended Package all access on Control Panel side of Unit
IFRFDE060L1095	Roof Top Package with inbuilt mixing box with axial return fan -Top discharge supply
IFRFXD060L1095	As above but without axial return fan
IFRD060L1095	Filter,dx coil,fan,compressor/control unit
IFRD060L1095TD	As above but with top discharge
IFRD060L1095ST	As above but with straight through fan discharge
ISCR090	Compressor / Control unit for internal mounting
ID060	Cooling DX Coil Module
IRCR125	Air Cooled Condenser for external mounting
IFEC3	Single fan box unit
MB250 and MB975	Fan make up plenum 250mm/975mm

Where interconnecting pipework is required, please refer to the following guidelines:

SPECIFICATION FOR REFRIGERATION PIPEWORK INSTALLATION

Refrigeration pipework should be installed by suitably qualified engineers.

PIPEWORK DESIGN

Pipe specification and layout shall be designed in accordance with good practice ie:-

a) Minimum velocities for good oil return – 8 to 12 m/s in vertical risers – 4 m/s on horizontal runs.
b) Maximum pressure drop equating to 1°C change in saturation temperature in all lines.
c) U traps should be fitted at the bottom of all risers and every 3m on vertical risers.

d) Copper tube and fittings should be refrigeration grade quality. It should be clean and de-hydrated.
e) Brazed fitting should be used wherever possible in place of flared connections.
f) Horizontal suction lines should slope back slightly towards the compressor.
g) Suction lines should be insulated to minimise the effects of superheating and to prevent condensation formation.
h) Where condensers are located above the compressor, pipework should be trapped to the top of the condenser coil or a non return valve fitted in the discharge line to prevent liquid refrigerant from draining back into the compressor during off periods.
i) Properly sized expansion valve, sight glass/moisture indicator and filter drier should be installed in liquid lines.
j) Pipework should be supported using a propriety clipping system to ensure stability and prevent vibration transmission. Where pipework runs through a wall or bulkhead it should be sleeved or grommeted to prevent wear.
k) Tubing should be kept clean and dry during installation and sealed at both ends.
l) Cut copper should be de-burred prior to fitting.
m) Oxygen free nitrogen must be purged through the system during any brazing process to prevent oxidisation within the pipework.

SPECIFICATION FOR REFRIGERATION PIPEWORK LEAK/PRESSURE TEST, EVACUATION & CHARGING PROCEDURE (R407C)

These procedures should only be done by suitably qualified engineers.

LEAK/PRESSURE TEST

On completion of the pipework installation, the unit should be pressurised with dry nitrogen to approximately 7 Bar.

Test for leaks with soap and water and repair as necessary.

When the system is proved leak tight, the system should be pressurised to the Maximum Allowable Pressure (±1 bar tolerance) (isolating any components in the system that will not accept this pressure). NB. If it is not possible to isolate components then the pressure test should be done at 24 Bar (-1 bar tolerance) which is the maximum for pressure testing on the low side of the compressors. Leave the system for a minimum of 2 hours as a proof of pressure testing and after this time, the final pressure should again be witnessed. If the pressure has dropped, repeat from the beginning.

EVACUATION

When the system has proved to be leak tight, continue as follows:

1. Connect vacuum pump and gauge and evacuate to a pressure of 5 Torr (5mm Hg) or lower. This should be held for a minimum of 2 hours with the vacuum pump running. The Torr reading should then be taken and witnessed. Isolate pump and gauge and break vacuum with oxygen free nitrogen to a pressure above 0 bar.

2. Re-connect pump and gauge and repeat 1 above with a minimum period of 2 hours. Again witnessing of final Torr reading should be done.

3. Repeat 1 above with a minimum period of 4 hours and a pressure of 2 Torr (2mm Hg) or lower. When a final Torr reading has been witnessed, the pump should be isolated and stopped and the gauge isolated. The vacuum should then be broken with R407C refrigerant (in liquid phase) in liquid line only.

NOTE: If at any of the three evacuation stages the minimum evacuation pressure can not be achieved the system should be re-checked for leaks as detailed above and evacuation repeated from stage 1.

CHARGING

An approximate charge weight should be weighed into the system when the final vacuum is broken.
A record of the final charge weight should be made and logged on a label at the charge point of the system.

Final charging can be done at commissioning and should be done with design air flow rates passing over the DX cooling coil. The full charge is achieved when the sub cooling in the liquid line at the expansion valve is between 2°C to 6°C. Superheat on the suction line should also be measured and the TEV set to maintain a superheat of between 5 to 10C.

On systems with long pipework runs, the oil level in the compressor sight glass should be viewed to ensure it is between ¼ to ¾ on the sight glass. If the oil level is low, additional oil needs to be added. Oil type should be identical to the description on the compressor labels.

VALVES

When units are provided in modular format, the expansion valve, drier and sight glass are free issued to the installer to be fitted in the site pipework system.

Appendix 5

Warranty

TERMS – A **parts only** warranty is given on all items with the exception of consumables such as filters. The warranty period is 36 months starting from the date of commissioning or 38 months from the day of delivery – whichever the sooner.
- For warranty to be valid, copies of the relevant commissioning sheets (fully completed) should be available for inspection from IFF head office if deemed necessary.
- The equipment should be properly maintained and documentary evidence may be requested as proof of work undertaken.
- If the failed item is not a result of a manufacturing defect/failure, Weatherite Manufacturing reserves the right to invoice all relevant costs attributable.

PROCEEDURE

- In the event of a component failure, Weatherite Manufacturing contracts department should be notified stating the unit serial number, site name, component details (including component serial number where applicable) and the nature of the component failure.
- On request, the installer/maintenance contractor should raise an order for the faulty component and return this back to Weatherite Manufacturing.
- Weatherite Manufacturing will issue an order acknowledgment to the contractor and copy IFF, identifying component availability.
- Following inspection of the component, a credit note will be raised if the failure is found to be a genuine warranty replacement.
- A replacement component should be delivered to the installers requested UK location the next working day if the request is made before 2pm. After this time, delivery should be the next but one working day.
- If the part is not available from Weatherite stock, Weatherite will advise the contractor and IFF of availability period.
- As the warranty is for parts only, Weatherite will not accept any costs for removal or replacement of the faulty part together with any consequential costs.

NOTE - A spares/component list can be found in Appendix 6 of the O & M manual.

Appendix 6

Parts list

Weatherite Part Number	Model number-Description/Location	Qty Per Assembly
	CONTROL PANEL ENCLOSURE	
07-072-575	Danfoss KP5 HP Manual reset - HP refrigerant safety switch/control enclosure	1
07-073-000	1/4S x 1/4"F Stepped SOV - Refrigerant shut off valve/control enclosure	2
07-073-005	3/8S x 3/8"F Stepped SOV - Refrigerant shut off valve/control enclosure	1
07-073-035	Ball Valve 7/8" Solder - Refrigerant shut off valve/control enclosure	1
07-074-035	Sight Glass 7/8" Solder - Refrigerant sight glass & moisture indicator/control enclosure	1
07-076-060	Drier 7/8" DML417S - Refrigerant liquid line drier/ control enclosure	1
14-141-075	Compressor Scroll SZ185-4RD/ control enclosure	2
14-142-010	C/case heater 7773107 65kw- compressor crankcase heater/compressor	2
31-310-000	MCB 5SY6104-7 4a1p - Crankcase Heater MCB / Control Panel Backplate	2
31-310-005	MCB 5sy6204-7 4a2p - Transformer Primary MCB / Control Panel Backplate	1
31-310-010	MCB 5sy6206-7 6a2p - Transformer Secondary MCB / Control Panel Backplate	1
31-310-035	MCB 5sy6106-7 1p6a - Control Circuit MCB / Control Panel Backplate	1
31-310-065	MCB Combined 4.5-6.3A S00 3RV10111G - Supply Fans & Return Fan / Control Panel Backplate	3
31-310-070	MCB Combined 7-10A S00 3RV10111JA10 - Condenser Fans & Perimeter Fan / Control Panel Backplate	2
31-310-080	MCB Combined 14-20A S00 3RV10214BA10 - Heater MCB / Control Panel Backplate	2
31-310-085	MCB Combined Busbar 3RV19151A - MCB Busbar / Control Panel Backplate	4
31-310-105	MCB Combined 22-32A S2 3RV10314EA10 - Compressor MCB / Control Panel Backplate	2
31-310-110	MCB Combined Aux 1xNO 1xNC 3RV19011 - MCB Auxiliary Contact / Control Panel Backplate	6
31-310-115	MCB Combined Connector S00-S00 3RA1 - MCB Connector / Control Panel Backplate	2
31-310-120	MCB Combined Connector S0-S02 3RA192 - MCB Connector / Control Panel Backplate	2
31-310-125	MCB Combined Connector S2-S2 3RA193 - MCB Connector / Control Panel Backplate	2
31-311-010	Contactor 4kw 24v 3RT10161AB01 S00 - Return & Perimeter Fan Contactor / Control Panel Backplate	2
31-311-035	Contactor 3RT10261AP00 11kw 230v S0 - Heater Contactor / Control Panel Backplate	2
31-311-040	Contactor 3RT10341AP00 15kw 230v S2 - Compressor Contactor / Control Panel Backplate	2
31-311-045	Contactor Auxiliary NC 3RH19211CA01 - Contactor Auxiliary Contact NC / Control Panel Backplate	2
31-311-050	Contactor Auxiliary NO 3RH19211CA10 - Contactor Auxiliary Contact NO / Control Panel Backplate	4
31-314-010	Relay 24v 14pin 4PDT Minipwr - Control Relay / Control Panel Backplate	5
31-314-020	Relay240v 14pin 4PDT minipwr - Control Relay / Control Panel Backplate	5
31-314-030	Relay base 14pin IP20 55srs - Control Relay base / Control Panel Backplate	10
35-352-020	Transformer 240/24v 200va - Control Circuit Transformer / Control Panel Backplate	1
35-350-480	Inverter 4.0kW Danfoss Micro IP20 - Condenser Fan Inverter / Control Enclosure*	1
36-360-045	Isolator 100A 4 Pole - Mains Isolator / Outside of Control Enclosure	1
36-361-045	Switch Pressure Becks 930-83 - Fan DP Switch / Control Enclosure*	1
38-382-070	Sensor Pressure Diff. DSG1000 - Supply Fans Pressure Transducer / Control Enclosure*	1
07-075-025	TDEZ26 068H8252- Refrigerant expansion valve/Control Enclosure	1
31-317-300	Iceland Controller Package - DDC Controller / Control panel Backplate	1
31-317-300-1	Transducer / Suction Pressure Transducer / Control Enclosure	1

31-317-300-2	Transducer / Liquid Pressure Transducer / Control Enclosure	1
31-317-300-3	Return Air Temp Sensor/ Supplied loose	1

	FILTER SECTION	
11-110-075	DX 1332P3004220025EO130- DX cooling coil/filter access section	1
09-090-030	595 x 595 x 48mm G4 - Air filter/Filter access section	8
31-317-300-4	Coil Temp Sensor/ Air filter/Filter access section	

	SUPPLY FAN SECTION	
31-317-300-5	Supply Air Temp Sensor /supply fan chamber	1
31-317-300-6	Outside Air Temp Sensor/supply fan chamber	1
10-105-010	EBM EC R3G630AB0603M04- Supply fan/supply fan chamber	2

	CONDENSER SECTION	
10-106-035	S&P HRST/6-800/28 BZ -= Condenser fan/condenser section	2
11-111-055	Cond 1332P4604215021CO223 - Condenser coil/condenser section	1

	DOOR FURNITURE	
15-150-025	Hinge 9/01381 moulded LH- Access door hinge/access doors	4
15-150-030	Hinge 9/01380 moulded RH-Access door hinge/access doors	4
15-152-030	T-bar lockable E3-18-05-Access door hinge/access doors	4
15-152-035	T-bar non-lockable E3-11-05-Access door hinge/access doors	4
15-152-040	Southco Hard ware pack E3-10-7-1-Access door catches/access doors	8

*Note: On modular units, items marked with an asterisk will be mounted adjacent to the equipment they are associated with, i.e. Condenser Fan Inverter will be mounted on the condenser fan coil frame.