OXYGEN8

A2L

Installation, Operation, and Maintenance

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 Hazard Identification Information

This manual includes warning or caution messages with the following format to draw specific attention to safety hazards that must be reviewed prior to handling or servicing the product. Please ensure these are followed.

This manual includes important instructions for safe connection of the Energy Recovery Ventilator (ERV). Before connecting the unit, please read carefully and follow the instructions.

The manufacturer reserves the right to make changes, including changes in the technical documentation, without previous notification. Please keep this manual for future reference. Consider this manual a permanent part of the product.

This manual will show the manufacturers' recommended installation method. Please note that local codes and regulations may override these recommendations. The installation must follow local codes and standards.

The National Electric Code (NEC), the National Fire Protection Agency (NFPA), and the Canadian Electrical Code (CEC) must be followed. Installation of this product must be performed by a qualified and accredited professional in conformance with local and national codes, standards and licensing requirements.

Caution: This sign indicates apotentially hazardous situation, which may result in minor or moderate injury if not avoided. It may also alert against unsafe practices.

Warning: This sign indicates a situation that may result in equipment or property damage accidents.

Danger: This sign indicates a potentially hazardous situation, which could result in death or serious injury if not avoided.

Unit Nameplate:

The unit nameplate is located outside of the main control box door. It includes the unit model number, serial number, electrical characteristics.

Compliance Statements:

This unit is considered an APPLIANCE NOT ACCESSIBLE TO THE GENERAL PUBLIC and shall be installed in a secured location with restricted access
or in secured rooftop areas.

Appliances located at a level not less than 2.5 m shall additionally be located in a secured location or in secured rooftop areas.

Children should be supervised to ensure that they do not play with the appliance.

This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

The unit will come with a Non-Fused Disconnect and often a power block in cases where multiple sources of power are specified. Consult the Unit-Specific Electrical Schematics to determine the number of required sources of power.

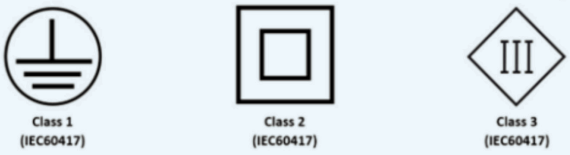
1.2 Unit Safety Labels

Potential safety hazards are alerted using the following symbols. The symbol is used in conjunction with terms that indicate the intensity of the hazard. It is the responsibility of the owner and the installer to read and comply with the safety information and the instructions accompanying these symbols

	WARNING - A2L low-burning velocity refrigerant present.
	WARNING - Flammable refrigerant present.
	WARNING - Flammable refrigerant present.
	Service indicator; read technical manual for service instructions carefully before servicing the unit.
	Operator's manual; Read the precautions in the technical manual carefully before operating the unit.
	Read the instructions in the technical manual carefully before operating the unit
	Pressurized medium present.
	Ultraviolet (UV) radiation present.

Please read instructions carefully for wiring connections marked with the symbols Figure 2 before performing any electrical work.

Figure 2. Connection Point Circuit Ratings



For Class 3 connection points, power connections must be made with power supply unit provided with the appliance. This includes, but is not limited to, field wiring of Daikin R32 integration kits mounted on decoupled coil modules.

Danger: RISK OF ELECTRIC SHOCK. CAN CAUSE INJURY OR DEATH.
System contains oversize protective earthing (grounding) terminal which shall be properly connected. Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater. Do not pierce or burn. Be aware that refrigerants may not contain an odour.

The following label, or similar, is applied on the coil module of all A2L-containing Oxygen8 units. Please read carefully before installing or servicing.

⚠ WARNING	⚠ AVERTISSEMENT
RISK OF FIRE OR EXPLOSION. STORE IN A WELL-VENTILATED ROOM WITHOUT CONTINUOUSLY OPERATING FLAMES OR OTHER POTENTIAL IGNITION.	RISQUE D'INCENDIE OU D'EXPLOSION. ENTREPOSER DANS UNE PIÈCE BIEN VENTILÉE SANS FLAMMES CONTINUES OU AUTRE RISQUE D'ALLUMAGE.
⚠ WARNING	⚠ AVERTISSEMENT
RISK OF FIRE. FLAMMABLE REFRIGERANT USED. TO BE REPAIRED ONLY BY TRAINED SERVICE PERSONNEL. DO NOT PUNCTURE REFRIGERANT TUBING.	RISQUE D'INCENDIE. CONTIENT UN FRIGORIGÈNE INFLAMMABLE. CONFIER LA RÉPARATION À UNE PERSONNE QUALIFIÉE. NE PAS PERFORER LA TUBULURE CONTENANT LE FRIGORIGÈNE.
⚠ WARNING	⚠ AVERTISSEMENT
RISK OF FIRE. DISPOSE OF PROPERLY IN ACCORDANCE WITH FEDERAL OR LOCAL REGULATIONS. FLAMMABLE REFRIGERANT USED.	RISQUE D'INCENDIE. METTRE AU REBUT CONFORMÉMENT AUX RÈGLEMENTS FÉDÉRAUX OU LOCAUX. CONTIENT UN FRIGORIGÈNE INFLAMMABLE.
⚠ WARNING	⚠ AVERTISSEMENT
RISK OF FIRE. AUXILIARY DEVICES WHICH MAY BE IGNITION SOURCES SHALL NOT BE INSTALLED IN THE DUCTWORK, OTHER THAN AUXILIARY DEVICES LISTED FOR USE WITH THE SPECIFIC APPLIANCE. SEE INSTRUCTIONS.	RISQUE D'INCENDIE. LES DISPOSITIFS AUXILIAIRES POUVANT ÊTRE DES SOURCES D'INFLAMMATION NE DOIVENT PAS ÊTRE INSTALLÉS DANS LA CONDUITE, À L'EXCEPTION DES DISPOSITIFS AUXILIAIRES HOMOLOGUÉS POUR ÊTRE UTILISÉS AVEC L'APPAREIL SPÉCIFIQUE. VOIR LES INSTRUCTIONS.
⚠ NOTICE	⚠ AVIS
LEAK DETECTION SYSTEM INSTALLED. UNIT MUST BE POWERED EXCEPT FOR SERVICE.	**SYSTÈME DE DÉTECTION DE FUITES** INSTALLÉ. L'UNITÉ DOIT ÊTRE SOUS TENSION, SAUF EN CAS D'ENTRETIEN.

2.0 SAFETY INFORMATION

2.1 General Safety Information

Potential safety hazards are alerted using the following symbols. The symbol is used in conjunction with terms that indicate the intensity of the hazard. It is the responsibility of the owner and the installer to read and comply with the safety information and the instructions accompanying these symbols

Note: The appliance is designed to operate at ambient temperatures between -40°C to +40°C. Exposure to any ambient temperatures outside this range may result in failure of components and safety hazard risk. This appliance incorporates an earth connection for functional purposes only.

Warning: Before obtaining access to terminals, all supply circuits must be disconnected.

- The appliance shall be installed in accordance with national wiring regulations;
- The dimensions of the space necessary for correct installation of the appliance including the minimum permissible distances to adjacent structures is provided in SECTION 4? of this manual under “UNIT CLEARANCES”;
- For air handlers with supplementary heaters that are not intended to be coupled to or integrated with the appliance, the minimum clearance from the appliance to combustible surfaces is generally 3x the duct diameter. Consult the heater manufacturer installation instructions prior to installing in the ductwork.
- A wiring diagram with clear indication of the connections to external control devices and supply cord can be found in Section 16 of this manual.
- The appliance was tested for a range of external static pressures (ESP) that varies based on specific configuration of modules and voltage.
- The method of connecting the appliance to the electrical supply and interconnection of separate components is detailed in Section 16, WIRING DIAGRAMS.
- Some Oxygen8 units are designed for outdoor installations. Only those designated on the nameplate are allowed to be installed outdoors. For connected accessories, only those designated for outdoor installations, complete with standing-seam roof panels, can be installed outdoors. Follow the installation instructions closely to mitigate risk of fluid and thermal ingress. Ensure all duct connections to these appliances are suitable for outdoor environments.

- Details of type and rating of fuses, or rating of circuit breakers, can be found in Section 5, ELECTRICAL RATINGS
- Details of supplementary heating elements that may be used in conjunction with the appliance, including fitting instructions, can be found in Section 3 – ACCESSORY INSTALLATION
- Hydronic coils are rated to have water or brine operating temperatures with a maximum 180°F and minimum 40°F;
- Hydronic coils are rated to have water or brine operating pressures with a maximum 300 psig. to avoid air binding and to ensure proper system performance, the hydronic system shall be filled and charged such that a minimum positive static pressure of 3–5 psig exists at the highest point in the coil loop when cold.

These air handlers are versatile multi-positional unit with the following standard features: APPLICATION VERSATILITY: This unit is designed for use in upflow, downflow, horizontal left and horizontal right applications. Follow section 5 & 6 for installation and conversion instructions.

Warning: The coil is factory charged with dry nitrogen. Release the pressure through the valve test port prior to installation. If holding pressure is not present, return coil module to Oxygen8 for corrective measures

2.2 Safety Information - Units with A2L Refrigerant

Product design for use with A2L refrigerant are marked with R32 or R454B refrigerant specified on the nameplate, and the product will be marked with the following symbols:

Figure 1. Flammable A2L refrigerant safety labels.

Products designed for use with A2L / Flammable Refrigerants are equipped with a refrigerant leak detection system (which includes an A2L Sensor, an RDS Control Board, and Wiring Harnesses) which must be wired to as specified in the Wiring Diagrams. Refer to Section 14 (RDS) of this manual wiring and operation instructions.

Warning: Total system charge exceeding 3.9 lbs (R454B) or 4.1 lbs (R32) requires a refrigerant detection sensor. Total system charge = outdoor unit + indoor unit charge adder + refrigerant field piping adder.

Warning: When the symbol IEC 60417-6412 (2019-03) is used, the appliance shall be installed, operated and stored in a room with a floor area not less than the minimum room area indicated.

2.3 Inspection

Upon receiving the unit, carefully examine it for any significant damage that may have occurred during shipping. Any shipping-related damages are the responsibility of the carrier. Also, check the product labels to confirm that the model number and features match your order. The manufacturer will not process claims for damages resulting from incorrectly shipped products.

2.4 General Information and Installation Preparation

Read all the instructions in this guideline carefully while paying special attention to the **WARNING** and **CAUTION** alerts. If any of the instructions are unclear; clarify with certified technicians. Gather all the tools needed for successful installation of the unit prior to beginning the installation.

Warning: Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury, or death.

Warning: When using FLAMMABLE REFRIGERANTS, LEAK DETECTION SYSTEM installed. Unit must be powered except for service.

Warning: Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded

Warning: Only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

Warning: RISK OF FIRE! Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 700°C and electric switching devices.

2.5 Refrigerant Piping Installation Preparation

Warning: Ducts connected to the appliance shall not contain a potential ignition source or open flame.

NOTICE: Ensure external zoning or shutoff dampers are functioning correctly prior to charging the unit to ensure mechanical ventilation response is uninhibited as part of the refrigerant leak detection response sequence.

- The refrigerant line sizes should be selected according to the recommendations of the outdoor unit manufacturer.
- Care must be taken to ensure all connection joints are burr-free and clean. Failure to do so may increase chances of a leak. It is recommended to use a pipe cutter to remove the spun closed end of the suction line.

2.6 Electrical Modifications

Warning: Electrical enclosures are rated IP54 or greater. Field additions of penetrations and cable glands must be done in a way that doesn't compromise the IP rating. Wires must be paired with cable gland fittings to ensure at least IP54 seal throughout. Field adjustments that compromise the integrity of this rating may result in flammability risk by exposing potential ignition sources.

When installing additional penetrations in electrical series enclosures, consider the following best practices:

- Use Appropriate Cable Glands: Select cable glands that match the enclosure's IP rating. Ensure they are installed correctly to prevent compromising the enclosure's integrity.
- Seal Unused Openings: Any unused openings should be sealed with appropriate plugs or covers that maintain the enclosure's IP rating.

2.7 General (Connecting A2L Refrigerant Piping)

Warning: Some coils may include a Schrader valve on the suction manifold. Ensure that the Schrader valve and valve core (where present) are protected from heat during brazing and installation to prevent leakage. Use a core removal tool to temporarily remove the core when brazing. Replace the core once brazing is completed.

NOTICE: Refrigerant tubing must be routed to allow accessibility for service and maintenance of the unit.

For spaces where refrigerant pipes are allowed, pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

Warning: For coils using A2L FLAMMABLE REFRIGERANTS, when installed in a room with an area less than that outlined in in Table 1 for a given releasable charge of the A2L refrigerant, that room shall be without continuously operating open flames (for example, an operating gas appliance) or other potential ignition sources (for example, an operating electric heater, hot surfaces). A flame providing device may be installed in the same space if the device is provided with an effective flame arrest.

NOTE: The Total System Charge in Table 1 is the total system charge which is marked on the system as specified in the outdoor unit manufacturer's instructions.

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:

- The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
- Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected; REFER TO SECTION 13 FOR SYSTEM CHARGING INSTRUCTIONS.
- Where addition of charge is required to complete installation, instructions on how to determine the additional REFRIGERANT CHARGE and how to complete the REFRIGERANT CHARGE on the label provided on the outdoor unit can be found in Section DD.10 Charging Procedures.

2.8 General Safety Information - Partial Units

The Oxygen8 unit can be AHRI matched with various brands of air conditioner or heat pump outdoor units with R32 or R454B REFRIGERANT when proper expansion valve kit is used.

Caution: Ensure that the unit is adequately sized. The tonnage of the outdoor unit should never exceed the tonnage of this unit.

Check that when the RDS system maintains the purge cycle airflow at or above Qmin from Table 1 and that the condensing unit compressor and any electric heaters or electrostatic filters are powered off for at least 5 min after the RDS has reset.

2.9 General Safety Information - Matched System ETRS Units

The following section includes Releasable System Charge tables for ETRS systems. Includes condensing unit (where applicable), field piping (downstream of SSOV only if used), and Oxygen8 unit charge.

Caution: Ensure that the unit is adequately sized. For heat pump units, the tonnage of the outdoor unit should never exceed the tonnage of this unit. For Heat Recovery units, refer to the VRV system diagram to ensure the system tonnage is within Daikin requirements.

Check that when the RDS system maintains the leak response airflow at or above 240 m^3/h or 142 cfm and that the condensing unit compressor and any electric heaters or electrostatic filters are powered off for at least 5 min after the RDS has reset.

Warning: For appliances using A2L refrigerants, only auxiliary devices approved and provided by Oxygen8 or Daikin or declared suitable with the refrigerant shall be installed in connecting ductwork.

For duct connected appliances, false ceilings or drop ceilings may be used as a return air plenum if a REFRIGERANT DETECTION SYSTEM is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

For Oxygen8 units that do not provide a return air pathway from the connected spaces, the installer must confirm the extract air path is sufficient to balance the supply airflow from the Oxygen8 unit during normal operation and when a leak response is triggered

2.9.1 Safety Shut-off Valves

For Oxygen8 units connected to Daikin R32 systems utilizing SAFETY SHUT-OFF VALVES in the field piping to minimize the releasable charge mREL inside the Oxygen8 appliance, each Oxygen8 unit shall have heating or cooling nominal capacity not exceeding 5 tons (17.5 kW) based on the latest ASHRAE Standard 15 or 10 tons (35 kW) based on UL 60335-2-40 limitations. It is up to the engineer of record to confirm adherence to local codes and standards for the application of SSOVs to reduce mREL. This reduced mREL can be used as the system charge in Table 1 to determine the minimum room area and minimum ventilation airflow. Consult the Daikin technical manuals to determine the resulting system charge when utilizing SSOVs. SSOVs are sized and supplied by others.

2.10 Hydronic Water Coil - Water Supply Requirements

2.10.1 Water Quality

For proper operation and to ensure the longevity of the hydronic coil, the circulating water shall meet the following quality requirements:

- **pH:** 7.0 – 9.0 (typical range for closed-loop HVAC water systems)
- **Hardness:** < 300 ppm (as $CaCO_3$ equivalent) to minimize scaling
- **Chlorides:** < 50 ppm to prevent corrosion of copper or stainless steel components
- **Conductivity:** < 500 µS/cm (for closed loops; consult water treatment specialist if higher)
- **Treatment:** Water shall be treated with a corrosion inhibitor and biocide appropriate for HVAC closed-loop hydronic systems.
- **Glycol Solutions (if applicable):** Only inhibited propylene glycol or ethylene glycol formulated for HVAC use shall be used. Concentration and freeze protection levels shall be per project specification.

2.10.2 Potable Water Source Protection

If the coil water supply is connected directly to a potable water system (for example, during initial filling or makeup water connection), the potable water supply must be protected against back siphonage from the equipment. This shall be accomplished by installing a suitable backflow prevention device (e.g., double check valve assembly or reduced pressure zone device) in accordance with local plumbing codes and regulations.

NOTE: The hydronic coil and associated piping are designed for closed-loop systems only. Continuous connection to potable water sources is not recommended without approved backflow protection and water treatment measures

2.11 Qualifications of Workers

Only technicians who have completed training through national training organizations or manufacturers accredited to deliver relevant national competency standards—when required by legislation—are authorized to work on this equipment. Proof of competence must be provided with a certificate. Refer to the Daikin outdoor unit manual for any specific requirements technicians installing or servicing VRV systems.

NOTE: Servicing of the unit shall be performed only as recommended by Oxygen8. For appliances using A2L REFRIGERANTS, connected via an air duct system to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings shall not be used as a return air duct.

2.12 A2L Refrigerant Leak Detection System (RDS)

Warning: Refrigerant sensors for refrigerant detection systems shall only be replaced with sensors specified by the appliance manufacturer.

Product design for use with A2L refrigerant are equipped with an A2L refrigerant detection system (RDS), which includes A2L Sensor including Mitigation Control Board, Distech DDC, and Wiring Harnesses. Refer to Section 14 of this manual for wiring and operation instructions.

The A2L Sensor must be installed and powered for service.

A2L RDS sensors are installed and factory-wired in the indoor unit. The A2L sensor is not intended for service or repair. If the sensor is not functioning properly, mitigation mode will engage, and the sensor must be replaced by removing the sensor assembly from the drain pan and replacing with a new sensor. The sensor requiring replacement can be observed by looking inside coil cabinet while the unit is powered to observe which sensor does NOT have a green light illuminated. Disconnect unit power prior to disconnecting and replacing A2L sensor

Warning: Refrigerant sensors for refrigerant detection systems shall only be replaced with sensors specified by Oxygen8

2.12.1 RDS: A2L Mitigation Control Verification

Verification: Running the RDS test is required for every installation. Do not complete HVAC system commissioning until you have successfully performed all installation steps specified in this manual.

Important: Never connect/disconnect the sensor to the mitigation control board while the board is powered on. Use only the designated port for connections. Always turn off system power before connecting the sensor. If the sensor is not attached before powering on, the system will automatically enter leak mitigation mode. Once this mode is activated, the system will remain in mitigation for a minimum of 5 minutes. To avoid this delay, connect the sensor prior to powering up.

Carry out the following A2L Mitigation Control refrigerant leak test for each mode of operation individually—Cooling (for air conditioners and heat pumps), Heating (for heat pumps), Dehumidification (Heat Recovery), Electric Heating, and Fan modes.

1. Open the contact connected to one RDS sensor.
2. Verify fans ramp up to minimum airflow
3. Verify heaters are disengaged

For Units in 3-phase VRV systems considered as Matched-Pair ETRS, the additional steps apply:

4. Visually confirm no Leak Signal to Daikin Integration Kit Controller has been transmitted with no reaction or feedback from the Daikin Integration Kit Controller.

2.12.2 RDS with ETRS

For Matched Pair ETRS appliances, the Daikin integration kit controller relays the RDS signal to shut off the compressor. Refer to Daikin's installation guidelines for properly connecting the control wiring between the integration controller and the outdoor unit.

2.13 A2L System Sizing Tables

Table 1 includes Releasable System or Releasable Charge tables for ETRS systems. Includes condensing unit (where applicable), field piping (downstream of SSOV only if used), and Oxygen8 unit charge. Be sure to use the value of releasable charge provided by the Daikin software based on the presence and position of the SSOV.

Table 1. System or Releasable Charge Limits for R32 Enhanced Tightness Refrigerating Systems matched with Daikin VRV.

R32		**Connected Room Ceiling Height**								
Connected Room Area [TA]		**7.22 ft / 2.2 m**			**8 ft / 2.44 m**			**8.5 ft / 2.59 m**		
		Max. R32 System or Releasable Charge [max]								
(ft^2)	**(m^2)**	**(lbs)**	**(oz)**	**(kg)**	**(lbs)**	**(oz)**	**(kg)**	**(lbs)**	**(oz)**	**(kg)**
50	4.65	3.46	55	1.57	3.84	61	1.74	4.08	65	1.85
58	5.39	4.02	64	1.82	4.45	71	2.02	4.73	76	2.15
60	5.57	4.16	67	1.89	4.61	74	2.09	4.90	78	2.22
65	6.04	4.50	72	2.04	4.99	80	2.26	5.30	85	2.41
70	6.50	4.85	78	2.20	5.38	86	2.44	5.71	91	2.59
80	7.43	5.54	89	2.51	6.14	98	2.79	6.53	104	2.96
90	8.36	6.24	100	2.83	6.91	111	3.14	7.34	118	3.33
100	9.29	6.93	111	3.14	7.68	123	3.48	8.16	131	3.70
110	10.22	7.62	122	3.46	8.45	135	3.83	8.98	144	4.07
125	11.61	8.66	139	3.93	9.60	154	4.35	10.2	163	4.63
150	13.94	10.4	166	4.71	11.5	184	5.23	12.2	196	5.55
175	16.26	12.1	194	5.50	13.4	215	6.10	14.3	228	6.48
200	18.58	13.9	222	6.29	15.4	246	6.97	16.3	261	7.40
225	20.90	15.6	249	7.07	17.3	276	7.84	18.4	294	8.33
250	23.23	17.3	277	7.86	19.2	307	8.71	20.4	326	9.25
275	25.55	19.1	305	8.64	21.1	338	9.58	22.4	359	10.18
300	27.87	20.8	333	9.43	23.0	369	10.45	24.5	392	11.10
325	30.19	22.5	360	10.21	25.0	399	11.32	26.5	424	12.03
350	32.52	24.3	388	11.00	26.9	430	12.19	28.6	457	12.95
375	34.84	26.0	416	11.79	28.8	461	13.06	30.6	490	13.88
400	37.16	27.7	443	12.57	30.7	492	13.93	32.6	522	14.81
425	39.48	29.4	471	13.36	32.6	522	14.81	34.7	555	15.73
450	41.81	31.2	499	14.14	34.6	553	15.68	36.7	588	16.66
475	44.13	32.9	527	14.93	36.5	584	16.55	38.8	620	17.58
500	46.45	34.6	554	15.72	38.4	614	17.42	40.8	653	18.51
525	48.77	36.4	582	16.50	40.3	645	18.29	42.8	685	19.43
550	51.10	38.1	610	17.29	42.2	676	19.16	44.9	718	20.36
575	53.42	39.8	637	18.07	44.2	707	20.03	46.9	751	21.28
600	55.74	41.6	665	18.86	46.1	737	20.90	49.0	783	22.21
650	60.39	45.0	721	20.43	49.9	799	22.64	53.0	849	24.06
700	65.03	48.5	776	22.00	53.8	860	24.39	57.1	914	25.91

R32		Connected Room Ceiling Height								
Connected Room Area [TA]		7.22 ft / 2.2 m			8 ft / 2.44 m			8.5 ft / 2.59 m		
		Max. R32 System or Releasable Charge [max]								
(ft^2)	(m^2)	(lbs)	(oz)	(kg)	(lbs)	(oz)	(kg)	(lbs)	(oz)	(kg)
750	69.68	52.0	831	23.57	57.6	922	26.13	61.2	979	27.76
800	74.32	55.4	887	25.14	61.4	983	27.87	65.3	1044	29.61
850	78.97	58.9	942	26.72	65.3	1044	29.61	69.4	1110	31.46
900	83.61	62.4	998	28.29	69.1	1106	31.35	73.4	1175	33.31
950	88.26	65.8	1053	29.86	73.0	1167	33.09	77.5	1240	35.16
1000	92.90	69.3	1109	31.43	76.8	1229	34.84	81.6	1306	37.01
1100	102.2	76.2	1220	34.57	84.5	1352	38.32	89.8	1436	40.71
1200	111.5	83.1	1330	37.72	92.2	1475	41.80	97.9	1567	44.42
1300	120.8	90.1	1441	40.86	99.8	1597	45.29	106	1697	48.12
1400	130.1	97.0	1552	44.00	108	1720	48.77	114	1828	51.82
1500	139.4	104	1663	47.15	115	1843	52.25	122	1958	55.52
1600	148.6	111	1774	50.29	123	1966	55.74	131	2089	59.22
1700	157.9	118	1885	53.43	131	2089	59.22	139	2220	62.92
1800	167.2	125	1996	56.57	138	2212	62.70	147	2350	66.62
1900	176.5	132	2106	59.72	146	2335	66.19	155	2481	70.32
2000	185.8	139	2217	62.86	154	2458	69.67	163	2611	74.03
2100	195.1	146	2328	66.00	161	2580	73.16	171	2742	77.73
2200	204.4	152	2439	69.15	169	2703	76.64	180	2872	81.43
2300	213.7	159	2550	72.29	177	2826	80.12	188	3003	85.13
2400	223.0	166	2661	75.43	184	2949	83.61	196	3133	88.83
2500	232.3	173	2772	78.58	192	3072	87.09	204	3264	92.53

NOTE: The installer must verify activation of the leak mitigation procedure and confirm airflow performance per the provided specifications. Refer to the product line performance table for accurate unit-specific values.

Table 2 includes Minimum Mitigation Airflow values for Partial Units based on Total System Charge values for split systems that are not certified as a Matched Pair Enhanced Tightness Refrigerating System. Includes condensing unit, field piping, and Oxygen8 unit charge.

Table 2. Minimum Mitigation Airflow for Partial Units based on Total System Charge in a Split System with R32 or R454B

System Charge [mc]			**Min. Mitigation Airflow [Qmin]**			
			R32		**R454b**	
(lbs)	**(oz)**	**(kg)**	**(CFM)**	**(m^3/h)**	**(CFM)**	**(m^3/h)**
4.0	64.0	1.8	104	177	108	184
4.5	72	2.0	117	199	122	207
5.0	80	2.3	130	222	135	230
6.0	96	2.7	157	266	162	276
7.5	120	3.4	196	332	203	345
9.0	144	4.1	235	399	244	414
10.5	168	4.8	274	465	284	483
12.0	192	5.4	313	532	325	552
13.5	216	6.1	352	598	365	621
15.5	248	7.0	404	687	419	713
17.5	280	7.9	457	776	474	805
19.5	312	8.8	509	864	528	896
21.5	344	9.8	561	953	582	988
23.5	376	10.7	613	1,042	636	1,080
26.0	416	11.8	678	1,152	704	1,195
28.5	456	12.9	744	1,263	771	1,310
31.0	496	14.1	809	1,374	839	1,425
33.5	536	15.2	874	1,485	906	1,540
36.0	576	16.3	939	1,596	974	1,655
39.0	624	17.7	1,017	1,729	1,055	1,793
42.0	672	19.1	1,096	1,862	1,136	1,931
45.0	720	20.4	1,174	1,995	1,218	2,069
48.0	768	21.8	1,252	2,128	1,299	2,207
51.0	816	23.1	1,331	2,261	1,380	2,345
54.5	872	24.7	1,422	2,416	1,475	2,505

System Charge [mc]			Min. Mitigation Airflow [Qmin]			
			R32		R454b	
(lbs)	(oz)	(kg)	(CFM)	(m^3/h)	(CFM)	(m^3/h)
58.0	928	26.3	1,513	2,571	1,569	2,666
61.5	984	27.9	1,604	2,726	1,664	2,827
65.0	1040	29.5	1,696	2,881	1,759	2,988
68.5	1096	31.1	1,787	3,036	1,853	3,149
72.5	1160	32.9	1,891	3,214	1,962	3,333
76.5	1224	34.7	1,996	3,391	2,070	3,517
80.5	1288	36.5	2,100	3,568	2,178	3,701
84.5	1352	38.3	2,204	3,745	2,286	3,885
88.5	1416	40.1	2,309	3,923	2,395	4,069
93.0	1488	42.2	2,426	4,122	2,516	4,275
97.5	1560	44.2	2,544	4,322	2,638	4,482
102.0	1632	46.3	2,661	4,521	2,760	4,689
106.5	1704	48.3	2,778	4,721	2,882	4,896
111.0	1776	50.3	2,896	4,920	3,003	5,103
116.0	1856	52.6	3,026	5,142	3,139	5,333
121.0	1936	54.9	3,157	5,363	3,274	5,563
126.0	2016	57.2	3,287	5,585	3,409	5,792
131.0	2096	59.4	3,418	5,807	3,545	6,022
136.0	2176	61.7	3,548	6,028	3,680	6,252
141.5	2264	64.2	3,692	6,272	3,829	6,505
147.0	2352	66.7	3,835	6,516	3,978	6,758
152.5	2440	69.2	3,979	6,760	4,126	7,011
158.0	2528	71.7	4,122	7,003	4,275	7,264
163.5	2616	74.2	4,266	7,247	4,424	7,516
169.5	2712	76.9	4,422	7,513	4,586	7,792
175.5	2808	79.6	4,579	7,779	4,749	8,068

Table 3 includes Total System Charge limits [mmax] for split systems that are not certified as a Matched Pair Enhanced Tightness Refrigerating System. Includes condensing unit, field piping, and the charge of the Oxygen8 Partial Unit, and all other connected appliances. This is based on the smallest connected room area [TA] in the system and is not directly related to the Oxygen8 unit if there are multiple appliances connected in the system.

Room Area [TA]		**Max. System Charge [mmax]**					
		R32			**R454b**		
(ft^2)	**(m^2)**	**(lbs)**	**(oz)**	**(kg)**	**(lbs)**	**(oz)**	**(kg)**
58	5.39	4.01	61.9	1.82	3.87	61.9	1.75
60	5.57	4.15	64.0	1.88	4.00	64.0	1.81
70	6.50	4.84	74.7	2.20	4.67	74.7	2.12
80	7.43	5.53	85.4	2.51	5.34	85.4	2.42
90	8.36	6.22	96.0	2.82	6.00	96.0	2.72
100	9.29	6.92	107	3.14	6.67	107	3.02
110	10.2	7.61	117	3.45	7.34	117	3.33
120	11.1	8.30	128	3.76	8.00	128	3.63
135	12.5	9.34	144	4.24	9.00	144	4.08
150	13.9	10.4	160	4.71	10.0	160	4.54
175	16.3	12.1	187	5.49	11.7	187	5.29
200	18.6	13.8	213	6.27	13.3	213	6.05
225	20.9	15.6	240	7.06	15.0	240	6.81
250	23.2	17.3	267	7.84	16.7	267	7.56
275	25.5	19.0	293	8.63	18.3	293	8.32
300	27.9	20.7	320	9.41	20.0	320	9.07
325	30.2	22.5	347	10.2	21.7	347	9.83
350	32.5	24.2	373	11.0	23.3	373	10.6
375	34.8	25.9	400	11.8	25.0	400	11.3
400	37.2	27.7	427	12.5	26.7	427	12.1
425	39.5	29.4	453	13.3	28.3	453	12.9
450	41.8	31.1	480	14.1	30.0	480	13.6
475	44.1	32.9	507	14.9	31.7	507	14.4
500	46.5	34.6	534	15.7	33.3	534	15.1
525	48.8	36.3	560	16.5	35.0	560	15.9
550	51.1	38.0	587	17.3	36.7	587	16.6
575	53.4	39.8	614	18.0	38.3	614	17.4
600	55.7	41.5	640	18.8	40.0	640	18.1
650	60.4	45.0	694	20.4	43.3	694	19.7

Room Area [TA]		Max. System Charge [m_{max}]					
		R32			R454b		
(ft^2)	(m^2)	(lbs)	(oz)	(kg)	(lbs)	(oz)	(kg)
700	65.0	48.4	747	22.0	46.7	747	21.2
750	69.7	51.9	800	23.5	50.0	800	22.7
800	74.3	55.3	854	25.1	53.4	854	24.2
850	79.0	58.8	907	26.7	56.7	907	25.7
900	83.6	62.2	960	28.2	60.0	960	27.2
950	88.3	65.7	1014	29.8	63.4	1014	28.7
1000	92.9	69.2	1067	31.4	66.7	1067	30.2
1100	102.2	76.1	1174	34.5	73.4	1174	33.3
1200	111.5	83.0	1280	37.6	80.0	1280	36.3
1300	120.8	89.9	1387	40.8	86.7	1387	39.3
1400	130.1	96.8	1494	43.9	93.4	1494	42.3
1500	139.4	103.7	1601	47.1	100.0	1601	45.4
1600	148.6	110.7	1707	50.2	106.7	1707	48.4
1700	157.9	117.6	1814	53.3	113.4	1814	51.4
1800	167.2	124.5	1921	56.5	120.0	1921	54.4
1900	176.5	131.4	2027	59.6	126.7	2027	57.5
2000	185.8	138.3	2134	62.7	133.4	2134	60.5
2100	195.1	145.2	2241	65.9	140.0	2241	63.5
2200	204	152.2	2347	69.0	146.7	2347	66.5
2300	214	159.1	2454	72.2	153.4	2454	69.6
2400	223	166.0	2561	75.3	160.1	2561	72.6
2500	232	172.9	2668	78.4	166.7	2668	75.6

Mitigation requirements for evaporator coils that utilize A2L refrigerants are determined based on sea level conditions. If the installation site is located at an altitude above 750 meters, you must adjust the minimum conditioned area using the altitude adjustment factor (AF) provided in the Table 4. After determining the maximum system charge and minimum mitigation airflow, multiply that corresponding room area by the multipliers in Table 4 depending on installation site altitude to determine the final room area required.

Table 4. Minimum Room Area Multipliers by Altitude

Altitude (Meters)	Minimum Room Area Multiplier
0	1.00
300	0.96
500	0.93
750	0.90
1000	0.87
1250	0.84
1500	0.81
1750	0.79
2000	0.76
2250	0.74
2500	0.72
2750	0.70
3000	0.68
3250	0.66
3500	0.65

3.0 OPERATION & MAINTENANCE

3.1 Checks to the Area

Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.

3.2 Work Procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

3.3 General Work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

3.4 Checking for Presence of Refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

3.5 Presence of Fire Extinguisher

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

3.6 No Ignition Sources

No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “NO SMOKING” signs shall be displayed.

3.7 Ventilated Area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

3.8 Checks to the Refrigerating Equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- The ventilation machinery and outlets are operating adequately and are not obstructed;
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

3.9 Checks to Electrical Devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.

3.10 Repairs to Sealed Components

Sealed electrical components shall be replaced if they are not functioning correctly or as specified. Do not attempt to repair sealed components on site.

3.11 Repair to Intrinsically Safe Components

Intrinsically safe components must be replaced if they are not functioning correctly or as specified. Do not attempt to repair intrinsically safe components on site. One example of an intrinsically safe component is a refrigerant detection system leak sensor.

3.12 Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

3.13 Detection of Flammable Refrigerants

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. Examples of leak detection fluids are:

- Bubble method.
- Fluorescent method agents.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be carefully carried out according to the following guidance.

3.14 Removal and Evacuation

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

Safely remove refrigerant following local and national regulations;

- Evacuate;
- Purge the circuit with inert gas (optional for A2L);
- Evacuate (optional for A2L);
- Continuously flush or purge with inert gas when using flame to open circuit; and
- Open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

3.15 Charging Procedures

Refer to the outdoor condensing unit manual for instructions on charging the refrigerating system.

4.0 DECOMMISSIONING

4.1 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure, ensure that: mechanical handling equipment is available, if required, for handling refrigerant cylinders;
   - All personal protective equipment is available and being used correctly;
   - The recovery process is supervised at all times by a competent person;
   - Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80 % volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

4.2 Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

4.3 Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

OXYGEN 8

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135001-001