Advisory Circular

Subject: Carriage of Medical Oxygen Cylinders or Portable Oxygen Concentrators for Passenger Use on Board Aircraft

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1.0 INTRODUCTION

(1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

(1) The purpose of this document is to provide air operators with recommended procedures for the carriage of medical oxygen cylinders or portable oxygen concentrators for passenger use on board aircraft.

1.2 Applicability

(1) This document applies to commercial air operators conducting operations pursuant to Subpart 703, 704 or 705 of the Canadian Aviation Regulations (CARs).

1.3 Description of Changes

(1) This document is being updated to reflect additional portable oxygen concentrators that have been identified as acceptable for use on board aircraft.

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

(1) It is intended that the following reference materials be used in conjunction with this document:

(a) Transportation of Dangerous Goods Regulations (TDGRs);

(b) International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TIs);

(c) Paragraph 148(5)(b) of the Air Transportation Regulations – Terms and Conditions of Carriage of Persons: Services;

(d) Part V, Chapter 551 of the Airworthiness Manual – Aircraft Equipment and Installation;

(e) Part VI, Subpart 02 of the Canadian Aviation Regulations (CARs) – Operating and Flight Rules;

(f) Part VII, Subpart 03 of the CARs – Air Taxi Operations;

(g) Part VII, Subpart 04 of the CARs – Commuter Operations;

(h) Part VII, Subpart 05 of the CARs – Airline Operations;

(i) Commercial and Business Aviation Advisory Circular (CBAAC) 0260, 2007-03-20 – Potential for In-flight Fires Due to Lithium Battery Failure;

(j) Service Difficulty Alert AL 2009-06, 2009-08-13 – Procedures for Fighting Fires Caused by Lithium Type Batteries in Portable Electronic Devices;

(k) Canadian Transportation Agency, Decision no. 720-AT-A-2005, 2005-12-13 – Accessible transportation complaints by various complainants against Air Canada and one complaint against WestJet regarding persons who require that medical oxygen be available to them when travelling by air;
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<td>United States Federal Aviation Administration (FAA) Advisory Circular (AC) 91-21.1B, 2006-08-25 – Use of Portable Electronic Devices Aboard Aircraft; and</td>
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<td>United States FAA Information for Operators (InFO) 09006, 2009-05-01 – Department of Transportation (DOT) Final Rule “Nondiscrimination on the Basis of Disability in Air Travel” and the Use of Respiratory Assistive Devices on Aircraft.</td>
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### 2.2 Cancelled Documents

(1) Not applicable.

(2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

### 2.3 Definitions and Abbreviations

(1) The following **definitions** are used in this document:

(a) **Medical oxygen** means a gaseous oxygen cylinder or a portable oxygen concentrator that would be carried on board an aircraft by a passenger, rather than an oxygen cylinder that is furnished to the passenger by the air operator.
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(b) Oxygen, compressed and Oxygen, refrigerated liquid means a non-flammable, non-toxic (with oxidizing properties) compressed gas in a cylinder as defined in paragraph 2.14(b) of the Transportation of Dangerous Goods Regulations (TDGR).

(c) Portable oxygen concentrator means the medical device units approved pursuant to United States SFAR 106 – Rules for Use of Portable Oxygen Concentrator Devices On Board Aircraft, which include the following:

(i) AirSep Freestyle;
(ii) AirSep Lifestyle;
(iii) AirSep Focus;
(iv) AirSep FreeStyle 5;
(v) Delphi Medical Systems RS-00400;
(vi) DeVilbiss Healthcare’s iGo;
(vii) Inogen One;
(viii) Inogen One G2;
(ix) Inogen One G3;
(x) Inova Labs LifeChoice;
(xi) Inova Labs LifeChoice Activox;
(xii) International Biophysics Corporation’s LifeChoice;
(xiii) Invacare XPO2;
(xiv) Invacare Solo2;
(xv) Oxlife Independence Oxygen Concentrator;
(xvi) Oxus RS-00400;
(xvii) Precision Medical EasyPulse;
(xviii) Respironics EverGo;
(xix) Respironics SimplyGo;
(xx) SeQual Eclipse; and
(xxi) SeQual SAROS.

(2) The following abbreviations are used in this document:

(a) CARs: Canadian Aviation Regulations.
(b) CFR: Code of Federal Regulations is the codification of the general and permanent rules published in the United States Federal Register by the executive departments and agencies of the United States Federal Government.
(c) ICAO TIs: International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air.
(d) LPM: litres per minute.
(e) RTCA: Radio Technical Commission for Aeronautics, Inc.
(f) POC: portable oxygen concentrator.
(g) TCCA: Transport Canada Civil Aviation.
(h) TDGRs: Transportation of Dangerous Goods Regulations.
3.0 BACKGROUND

(1) Passengers who require medical oxygen are dependent upon the oxygen for medical reasons, are under a physician’s care, and require prescribed oxygen similar to a person requiring a prescribed drug.

(2) The CARs requirement to carry oxygen on an aircraft is for use during a decompression, for supplemental, and first aid purposes. There are no operational regulations pertaining to passenger use of oxygen for medical reasons or prohibiting the use of medical oxygen.

(3) In the absence of any CARs addressing operational requirements, there are variances amongst individual Canadian air operator policies regarding the carriage and operation of medical oxygen equipment for passenger use.

(4) A number of concerns have been expressed by passengers who require the use of medical oxygen on board an aircraft:
   (a) Passengers who require medical oxygen can experience difficulty in respiration due to such illnesses as chronic bronchitis, severe anaemia, chronic obstructive pulmonary disease, cardiac disease, emphysema, etc.
   (b) It is important that the oxygen equipment be capable of providing a variable flow rate as the passenger prescription is established for the individual’s medical condition. Air operator provided oxygen flow rates are generally a fixed flow rate of 2 or 4 litres per minute (LPM), versus the variable flow capability of the passengers own oxygen equipment.
   (c) Passengers requiring medical oxygen may encounter physical and physiological problems when their prescribed flow rate is not available on air operator provided oxygen equipment.
   (d) Further respiratory difficulties may also be encountered due to the environmental change from ground level to the lower partial pressure of oxygen present at cabin pressure altitudes of up to 8,000 feet (2,400 metres).
   (e) Many air operators do not provide a medical oxygen service for passengers and those that do provide the service often charge a fee.
   (f) It can be difficult to coordinate the provision of a medical oxygen service between the air operator and an oxygen supplier to ensure that the service is available both on board the aircraft and while the passenger is on the ground at enroute stops. This can result in the passenger travelling without medical oxygen due to service-related problems.

(5) In 1995, the National Transportation Agency, predecessor to the Canadian Transportation Agency (the Agency), Accessible Transportation Directorate initiated an investigation into the carriage and use of medical oxygen in passenger aircraft by persons with respiratory disabilities. This investigation followed concerns raised by users of medical oxygen through formal complaints and informal inquiries.

(6) As part of this investigation, the Agency established an Oxygen Forum to consider the carriage and use of passenger-supplied medical oxygen cylinders by persons with respiratory disabilities. The participants included medical experts on respiration, medical oxygen users, representatives from oxygen suppliers, the aviation industry (operational and medical), Transport Canada Civil Aviation (TCCA) (Cabin Safety, Aircraft Certification, Security, Aviation Medicine and Dangerous Goods) and the Agency.

(7) The Agency made no final decision as a result of the review conducted as part of the Oxygen Forum.
However, the Agency has continued to receive complaints from Canadian medical oxygen users regarding the lack of standardization amongst Canadian air operators related to the acceptance and use of medical oxygen on board aircraft. This lack of standardization may be seen as an obstacle to the mobility of persons who are dependent upon medical oxygen.

In 2005, the Agency determined, through Decision no. 720-AT-A-2005, that persons who may require medical oxygen when they travel by air do encounter obstacles to their mobility. The Agency conducted a further review to determine whether or not those obstacles are “undue” under the *Canada Transportation Act* and, if so, what corrective measures may be appropriate to address them. Through Decision no. 336-AT-A-2008, dated June 26th, 2008, the Agency published their findings in respect of two air operators.

In Canada, air operators are not required to permit the use of medical oxygen on board but may elect to either provide a medical oxygen service or permit the carriage of medical oxygen for passenger use. An air operator that does choose to permit the use of medical oxygen may accept it for carriage on board aircraft in two forms:

(a) Contained within a compressed oxygen cylinder (either supplied by the air operator or supplied by the passenger as further described in Section 4.0 of this AC); or

(b) Provided by a portable oxygen concentrator.

### 4.0 MEDICAL OXYGEN CYLINDERS

1. The Canadian TDGRs and the International Civil Aviation Organizations (ICAO) TIs regulate the transport of oxygen to, from and within Canada and on board Canadian registered aircraft outside Canada.

2. As dangerous goods, Oxygen comes in two forms:
   (a) Refrigerated liquid (Oxygen, refrigerated liquid); or
   (b) Compressed gas in a cylinder at a pressure greater than or equal to 280 kPa (Oxygen, compressed).

3. **Oxygen, refrigerated liquid** is forbidden for air transport at all times.

4. **Oxygen, compressed** may be transported by air if in compliance with the packaging, marking, documentation and handling requirements specified in the TDGRs and the ICAO TIs.

5. However, the air operator may transport **Oxygen, compressed** for medical use by a passenger under specified exemptions:
   (a) In Canada and on board Canadian registered aircraft outside Canada, under section 1.27 of the TDGRs.
   (b) Internationally and domestically, small cylinders of **Oxygen, compressed** required for medical use are exempt from the TDGRs and ICAO TIs with the prior approval of the air operator. Each cylinder must not exceed 5 kg gross mass.

6. Although the carriage of medical oxygen cylinders may be permitted by dangerous goods exemption, authority to use the oxygen in flight depends upon the approval of the air operator. Consideration must be given to the integrity of the cylinder and regulator, maintenance and conditions of carriage including restraint of the cylinder in the cabin. Consequently, the air operator must determine whether they will permit the carriage of medical oxygen cylinders and, if so, whether they will supply the medical oxygen or permit the passenger to use their own.

7. In addition, Transport Canada, the United States’ Department of Transportation and other regulatory bodies are attempting to harmonize regulations and policies to the greatest extent possible. Currently the United States’ aviation and hazardous materials regulations forbid the
use of passenger-supplied medical oxygen cylinders and the changing of a regulator on board an aircraft for reasons of safety.

(8) TCCA has safety concerns regarding the carriage and use of passenger-supplied medical oxygen cylinders without restrictions. These concerns include maintenance of the equipment, passenger handling of equipment until it is boarded, the quantity of oxygen boarded, stowage and restraint of equipment and in-flight operational concerns, particularly the changing of the regulator in-flight.

(9) As noted, the CARs do not address the operational requirements for the use of passenger-supplied medical oxygen cylinders on board aircraft. However, the United States authorities only permit the carriage of oxygen cylinders for medical use by passengers where the air operator provides the equipment. Therefore, any Canadian air operator operating into the United States would not be permitted to allow the passenger to use his or her own medical oxygen cylinder on board the aircraft.

(10) Where an air operator permits the carriage and use of medical oxygen cylinders, whether passenger-supplied or supplied by the air operator, the onus is on the air operator to develop safety procedures to ensure the collective safety of all occupants.

4.1 Safety Considerations of Passenger-Supplied Medical Oxygen Cylinders

(1) There are three readily identifiable areas affecting safety regarding the use of passenger-supplied medical oxygen cylinders on board aircraft. These fall within the areas of equipment, training and operational considerations.

4.1.1 Equipment Considerations

(1) Medical oxygen equipment that is supplied by the air operator is maintained as per the operator’s approved maintenance program, in accordance with the manufacturer’s instructions for equipment maintenance and includes rigorous testing of the equipment. The air operator has no assurance the passenger-supplied medical oxygen cylinder has been maintained in accordance with prescribed standards or that all required cylinder testing has actually been carried out.

(2) There is no assurance that the exterior of the passenger-supplied medical oxygen cylinder is free of flammable contaminants and has not been handled by a person with grease, butter, etc., on their hands. There are hazards associated with inadvertent spillage or transfer of grease (from salad dressing, butter on hands from a roll, grease on hands from a croissant or cheese, petroleum based cosmetics, etc.) onto the regulator and the possible disastrous consequences of a fire during flight due to contamination.

(3) Currently, there is no method to verify that the passenger-supplied medical oxygen cylinder and regulator were protected from damage between the time they left the supplier, up to and including the time of use on the aircraft. The weak spot of the cylinder/regulator is the connection point of the regulator on the cylinder. The cylinder could become a missile on board the aircraft if the regulator was knocked against a solid object. There may also be differences in the sizes of connections on the cylinders and regulators, the materials used to construct the cylinders (e.g. metal or composite) as well as the handling and maintenance of these cylinders although the same manufacturers produce them.

4.1.2 Training Considerations

(1) The passenger may be using oxygen equipment at home that may not be acceptable for carriage on board aircraft and be required to obtain equipment from a supplier for on board use. The passenger may be unfamiliar with the use of equipment obtained for flight, especially if it is different from the type used at home. There is no method to verify the adequacy and consistency of training provided to the passenger by respiratory therapists respecting the use of the passenger-supplied medical oxygen cylinder. The content of training relating to safety precautions and the physical hands-on operation of the specific equipment being used during the flight are unknown.
Another concern involves the transfer of the regulator during flight. The instructions from manufacturers often require training on the proper use of the regulator or that the person is to be under competent supervision. The “competent supervision” may fall upon a crewmember if a person who has been trained on the use of this equipment does not accompany the passenger. However, crewmembers would not be trained on passenger-supplied equipment due to the large variety of equipment types and configurations that are available.

### 4.1.3 Operational Considerations

1. There are no assurances a passenger-supplied medical oxygen cylinder can be adequately restrained or that there will be adequate restraint systems provided with the equipment as oxygen suppliers do not normally furnish a protective carrying case for the safe transport of cylinders that will be carried and used on board an aircraft. A means of restraint must be provided that has been designed for the restraint of each oxygen cylinder to prevent it from shifting during the taxi, take-off, descent and landing phases of flight, during periods of in-flight turbulence and an emergency landing. This means of restraint should be approved by TCCA, National Aircraft Certification prior to use on board an aircraft.

2. There is no method to verify that the same level of safety is maintained when a medical oxygen cylinder is replenished by a supplier outside of Canada for passenger use when returning to Canada on aircraft operated by a Canadian operator.

3. The size of the medical oxygen cylinder must permit it to be stowed and restrained in an approved location on board the aircraft. While medical oxygen may be available in cylinders of different dimensions, the ICAO TIs require that each cylinder must not exceed 5 kg gross mass.

4. Subpart 705 air operators, those utilizing aircraft with 20 or more passenger seats, have indicated that “D” size cylinders will be the maximum size of oxygen cylinder permitted on board. However, the “D” size cylinder may not be suitable for acceptance on smaller aircraft where approved stowage areas are limited in size and quantity. In addition to the issue of acceptable cylinder size on smaller aircraft, there are safety concerns about the transfer of the regulator in-flight. The flight crew cannot leave the aircraft controls to supervise the transfer of the regulator to any additional cylinders.

### 4.2 Air Operator Procedures

1. Passengers requiring the use of medical oxygen on board the aircraft may carry and use their own medical oxygen cylinder provided the air operator approves and has established appropriate procedures.

#### 4.2.1 Acceptance and Maintenance of the Equipment When Oxygen Is Provided By The Passenger

1. The air operator should establish procedures for the acceptance of gaseous medical oxygen cylinders required for medical use that include:

   a. Verification of the content of the cylinder (type of oxygen and confirmation that liquid oxygen is not accepted);

   b. Verification that each medical oxygen cylinder conforms with the manufacturing, packaging, marking and labelling requirements of the TDGRs;

   c. Verification that each medical oxygen cylinder provided by the passenger has been maintained by a Canadian supplier in accordance with applicable standards, or the oxygen equipment has been maintained by the air operator in accordance with the air operator’s approved maintenance program;

   d. Verification that each medical oxygen cylinder provided by the passenger has been hydrostatic tested by a Canadian supplier in accordance with applicable standards;
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(e) Verification that each medical oxygen cylinder gauge does not exceed the rated cylinder pressure;

(f) Visually checking the cylinders, valves, fittings and gauges for signs of damage;

(g) Verification that all exterior surfaces of the cylinder are free of flammable contaminants; and

(h) Verification that the size of the oxygen cylinder can be stowed on the aircraft type and configuration, or combination of aircraft types and configurations on which it will be transported.

(2) The air operator should notify the passenger that the regulator on a gaseous medical oxygen cylinder should not be changed while any passenger is on board the aircraft. This may require that each additional cylinder will require its own regulator.

4.2.2 The Quantity of Oxygen Boarded

(1) The air operator should establish procedures to ensure that:

(a) The oxygen equipment is capable of providing a variable flow rate of oxygen that meets the passenger’s prescription;

(b) The oxygen equipment provided by the passenger is capable of providing the total quantity of oxygen required for the duration of the flight at the prescribed flow rate; and

(c) The amount of oxygen to be boarded in the passenger cabin is required for use by the passenger during flight.

(2) Additional medical oxygen cylinders, required by the passenger at their destination or for the return flight, should be transported as checked baggage in the cargo area only and in accordance with the restrictions and limitations of the TDGRs.

4.2.3 Documentation

(1) Passengers requiring the use of medical oxygen cylinders should be requested to provide documentation signed by a licensed physician or other licensed health professional such as a respiratory therapist that indicates the maximum flow rate, maximum quantity of oxygen per hour and the maximum quantity of oxygen required for the flight(s).

(2) Factors that should be taken into consideration to determine the adequacy of oxygen supply are the prescribed flow rate of litres per minute (LPM), impact of cabin pressure altitude on the flow rate, duration of flight(s), ground time, connecting flights, and an appropriate reserve in the event of unforeseen operational circumstances.

(3) Where applicable, confirmation of medical clearance with the air operator’s medical advisor, in consultation with the passenger’s licensed physician or other licensed health professional such as a respiratory therapist may be sought.

4.2.4 Operational Procedures

(1) The air operator should establish operational procedures:

(a) To confirm that the passenger has been trained on the operation and proper use of the passenger-supplied medical oxygen cylinder;

(b) That permits a passenger to use a nasal cannula rather than an oxygen mask, if applicable;

(c) That permits a passenger to use a humidifier that is attached to the medical oxygen cylinder, if applicable;
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(d) To verify that passengers, who require additional medical oxygen cylinders enroute, have made arrangements with an oxygen supplier to have the additional oxygen equipment delivered to the passenger;

(e) To verify the passenger requiring medical oxygen is seated in a location:
   (i) Where the oxygen equipment will not restrict access to, or use of, any emergency/safety equipment, or access to any aisle or exit; and
   (ii) That in the event of an emergency landing requiring an evacuation, access to an aisle would not be obstructed by the hose of the medical oxygen cylinder in use;

(f) To advise the pilot-in-command prior to flight that medical oxygen will be in use during the flight, the number of medical oxygen cylinders that have been boarded and their stowage location; and

(g) To provide the passenger with an individual pre-flight safety briefing that includes the following:
   (i) In the event of an on-board fire within 3 meters of the passenger using oxygen, or the location of additional medical oxygen cylinders, the passenger and additional cylinders should be moved to a location away from the fire, and
   (ii) In the event of an emergency requiring an evacuation, the oxygen equipment should remain on board the aircraft.

4.2.5 Boarding, Stowage and Restraint of Oxygen Equipment

(1) The air operator should specify who is responsible for the boarding of passenger-supplied medical oxygen cylinders, including any additional medical oxygen cylinders that may be required by the passenger during the flight.

(2) The air operator should establish procedures to verify the restraint of passenger-supplied medical oxygen cylinders reflects the following:
   (a) Each medical oxygen cylinder provided by the passenger should be protected in a rigid carrying case that is lined by a means that ensures the cylinder does not shift during movement of the aircraft. The means of restraint should be designed for the restraint of medical oxygen cylinders and be approved or accepted for use on board an aircraft; or
   (b) The air operator should provide a means of restraint for each medical oxygen cylinder that has been designed for the restraint of that equipment to prevent it from shifting during the taxi, take-off, descent and landing phases of flight, during periods of in-flight turbulence and an emergency landing. The means of restraint for each medical oxygen cylinder should be approved by TCCA, National Aircraft Certification and used to restrain each oxygen cylinder.

(3) The medical oxygen cylinder for use during flight and any oxygen accessories should be stowed under a passenger seat equipped with a forward and sideward means of restraint, and restrained by the means referred to in 4.2.5(2) of this AC.

(4) Oxygen cylinder carts should not be accepted for use on board unless the oxygen cylinder and cart is secured to the fuselage wall or a bulkhead that is not located in an emergency exit row. The means of restraint used to secure the oxygen cylinder and cart should be approved by TCCA, National Aircraft Certification.

(5) Only the medical oxygen cylinders needed for the duration of the flight, or duration of the flight and a connecting flight, in conjunction with the stowage and restraint capacity on that particular aircraft, should be carried on board.

(6) Additional medical oxygen cylinders intended for use during the flight should be restrained under a passenger seat equipped with a forward and side means of restraint in accordance with section
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551.500 of the CARs. Alternatively, the medical oxygen cylinders may be transported within a compartment that has been approved for the stowage of carry-on baggage if restrained with a supplementary means to prevent the medical oxygen cylinder from shifting during the taxi, take-off, descent and landing phases of flight, during periods of in-flight turbulence and in an emergency landing.

(7) The air operator should verify that the medical oxygen cylinder(s) and equipment does not exceed the maximum weight limitations approved for the area where the equipment is stowed.

(8) Where applicable, the air operator's carry-on baggage control program, required pursuant to section 705.42 of the CARs, should contain provisions for oxygen equipment and accessories that are provided by the passenger and acceptance of such equipment is within the parameters of the air operator's approved carry-on baggage control program.

(9) The air operator should have procedures to ensure that any additional medical oxygen cylinders or equipment delivered to the passenger enroute is boarded, stowed and restrained in accordance with the requirements specified in this section.

4.2.6 Publication of Established Procedures

(1) The air operator should publish established procedures in its company operations manual, flight attendant manual and any other appropriate location that will provide information to persons who require such information for the performance of their assigned duties.

(2) The air operator should make available to the public information on the process for acceptance, limitations or restrictions related to the carriage of passenger-supplied medical oxygen cylinders on board their aircraft.

5.0 PORTABLE OXYGEN CONCENTRATORS

(1) Unlike Oxygen, compressed, which is classified as a dangerous good, portable oxygen concentrators (POCs) do not contain oxygen.

(2) A POC is an electronic device used to provide oxygen at a substantially higher concentration (≈ 90%) than that of ambient air and is an alternative to using compressed oxygen cylinders. POCs do not have the safety concerns associated with the use of medical oxygen cylinders on board aircraft, as there is no oxygen present in the device itself.

(3) Rather, POCs function by filtering nitrogen from ambient air and delivering oxygen in concentrated form to the user. The simplest oxygen concentrator is capable of continuous delivery of oxygen and has internal functions consisting of two containers, filled with a zeolite material, which selectively adsorb the nitrogen in the air.

(4) POCs are categorized as a medical portable electronic device (M-PED). In order to be acceptable for use on board aircraft, they should be designed and tested by the manufacturer in accordance with Section 21, Category M, of RTCA/DO-160E (or later versions) – Environmental Conditions and Test Procedures for Airborne Equipment. POCs that are certified by the manufacturer as falling within the emission levels contained in this document, in all modes of operation, may be used on board the aircraft without any further testing by the air operator.

(5) A POC that has not been certified by the manufacturer as falling within the emission levels contained in RTCA/DO-160E (or later versions) – Environmental Conditions and Test Procedures for Airborne Equipment should be evaluated by the air operator to determine that the unit does not cause interference with the electrical, navigation or communication equipment on board the air operator's aircraft.

(6) The United States permits passengers to use POC units on board commercial aircraft, with the approval of the aircraft operator. The acceptable devices are identified in Special Federal Aviation Regulation (SFAR) 106. It should be noted that the SFAR itself does not require an
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Aircraft operator to allow passengers to use these devices on board. However, if an aircraft operator chooses to grant approval for a passenger to operate these devices on board an aircraft, then the conditions of the SFAR must be met.

(7) Section 14 CFR 382.133 does impose a requirement on Canadian air operators to permit any individual with a disability to use a ventilator, respirator, continuous positive airway pressure machine, or POC (of a kind equivalent to those specified in SFAR 106) in the passenger cabin during air transportation to, from or within the United States, on all aircraft originally designed to have a maximum passenger capacity of more than 19 seats, subject to certain exceptions. It is recommended that Canadian air operators familiarize themselves with the requirements of section 14 CFR 382.

5.1 Safety Considerations of Spare Batteries

(1) POCs typically operate using either rechargeable batteries or AC/DC electrical power via an external power cord. As it may be necessary for passengers to carry a number of spare batteries to provide power to the POC for the duration of the flight(s), certain precautions are necessary to address emerging safety issues associated with the carriage of batteries.

(2) Incident data and safety studies related to the potential hazard posed by battery abuse and short circuits during the transportation of batteries indicate that preventive measures are necessary to mitigate the potential risk of injury and on board fire posed by damaged batteries.

(3) Although the POC units themselves are not considered as dangerous goods, the lithium or lithium ion batteries often used to power these units are dangerous goods. Therefore, when transported as cargo with the battery installed, the POC would be fully regulated and shall be transported in compliance with the packaging, marking, documentation and handling requirements specified in the TDGRs and ICAO TIs.

(4) When carried by passengers in the cabin of the aircraft or as checked baggage, the provisions of the TDGRs and ICAO TIs do not regulate the POC units. Rather, with the approval of the air operator and in accordance with specified quantity limitations, they are eligible for an exemption related to the carriage of portable medical electronic devices, where the device contains lithium or lithium ion cells or batteries.

(5) Spare batteries should be individually protected to prevent short-circuits. This may be achieved with batteries incorporating recessed terminals, insulation of exposed terminals, or packaging that will prevent the terminals from contacting any metal objects.

5.2 Air Operator Procedures

(1) Passengers requiring the use of medical oxygen on board the aircraft may carry and use their own POC unit as described in this document provided the air operator approves and has established appropriate procedures.

(2) The air operator procedures should normally include the following:

(a) An evaluation to determine that the POC does not cause interference with the electrical, navigation or communication equipment on board the air operator’s aircraft;

(b) Where applicable, confirmation of medical clearance with the air operator’s medical advisor, in consultation with the passenger’s licensed physician or other licensed health professional such as a respiratory therapist;

(c) A process for the acceptance of POC containing lithium batteries (as carry-on or checked baggage) and for the carriage of spare lithium batteries;

(d) The boarding, stowage and restraint of the POC conforms with the following:

(i) The POC and any accessories are stowed under a passenger seat equipped with a forward and sideward means of restraint, or in another approved stowage
location, during movement on the surface, take off, landing and at other times
carry-on baggage is required to be stowed;

(ii) The POC and any accessories do not exceed the maximum weight restrictions
approved for the area where the equipment is required to be stowed; and

(iii) Where applicable, the air operator’s carry-on baggage control program, required
pursuant to section 705.42 of the CARs, contains provisions for oxygen
equipment and accessories that are provided by the passenger and such
equipment is within the parameters of the approved air operator carry-on
baggage control program;

(e) The passenger requiring medical oxygen is seated in a location:

(i) Where the POC will not restrict access to, or use of, any emergency/safety
equipment, or access to any aisle or exit; and

(ii) That in the event of an emergency landing requiring an evacuation, access to an
aisle would not be obstructed by the hose of the POC;

(f) The pilot-in-command is advised prior to flight that a POC will be in use during the flight;

and

(g) The passenger is provided with an individual pre-flight safety briefing that includes the
following:

(i) In the event of an on-board fire, the passenger and POC should be moved to a
location away from the fire; and

(ii) In the event of an emergency requiring an evacuation, the POC should be left on
board the aircraft.

(3) Prior to travelling, the air operator should inform passengers requiring the use of a POC while on
board the aircraft of their responsibilities as follows:

(a) The passenger should ensure that the unit is in good condition, free from contamination
(such as oil and grease) and has no visible signs of damage or abuse;

(b) The passenger should have the cognitive and sensory capacity to detect any alarm
indications associated with the operation of their POC and be capable of responding to
problems with the operation of the unit;

(c) The passenger should ensure that they have sufficient battery power to provide an
adequate supply of oxygen for the duration of their travel time. Factors to take into
consideration to determine the adequacy of oxygen supply are whether oxygen is
medically necessary for all or a portion of the travel time, the duration of the flight
(including connecting flights), the duration of time spent on the ground (prior to departure,
during enroute stops and following arrival at destination) as well as an appropriate
reserve in case of unforeseen operational circumstances; and

(d) The passenger should ensure that spare batteries for the POC are carried as carry-on
baggage and are individually packaged to protect them from damage or short-circuit.

(4) The air operator should publish established procedures in its company operations manual, flight
attendant manual and any other appropriate location that will provide information to persons who
require such information for the performance of their assigned duties.

(5) The air operator should make available to the public information on the process for acceptance,
limitations or restrictions related to the carriage of POCs and lithium batteries on board their
aircraft.
5.3 **Documentation**

(1) In order to conform with the United States regulatory requirement specified in SFAR 106 and 14 CFR 382, it is recommended that air operators request the POC user to provide a written statement, which should be kept in that person's possession, signed by a licensed physician or respiratory therapist that:

(a) States whether the user of the device has the physical and cognitive ability to see, hear and understand the device's aural and visual cautions and warnings and is able, without assistance, to take the appropriate action in response to those cautions and warnings;

(b) States whether or not oxygen use is medically necessary for all or a portion of the duration of the trip; and

(c) Specifies the maximum flow rate corresponding to the pressure in the cabin of the aircraft under normal operating conditions.

6.0 **CONCLUSION**

(1) Air operators should take the content of this AC into account when developing or amending procedures related to the carriage and use of medical oxygen cylinders or POCs for the provision of medical oxygen on board their aircraft.

7.0 **INFORMATION MANAGEMENT**

(1) Not applicable.

8.0 **DOCUMENT HISTORY**

(1) Advisory Circular (AC) 700-002 **Issue 02**, RDIMS 5536874 (E), 5766646 (F), dated 2011-06-29 — *Carriage of Medical Oxygen Cylinders or Portable Oxygen Concentrators for Passenger Use on Board Aircraft*.

(2) Advisory Circular (AC) 700-002 **Issue 01**, RDIMS 2128776 (E), 2249054 (F), dated 2007-05-07, — *Carriage of Portable Oxygen Concentrators for Passenger Use on Board Aircraft*.

(3) Commercial and Business Aviation Advisory Circular (CBAAC) 0257, RDIMS 4444 (E), 4444 (F), dated 2006-12-11 – *Carriage of Medical Oxygen Cylinders for Passenger Use on Board Aircraft*. 
9.0 CONTACT OFFICE

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Transport Canada documents or intranet pages mentioned in this document are available upon request through the Contact Office.