



Advisory Circular

AC 92-05(0)

MAY 2011

USE OF COMPRESSED OXYGEN: CARRIAGE AND CONSIGNMENT OF LIVE AQUATIC ANIMALS FOR TRANSPORT BY AIR

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1. REFERENCES

- *Civil Aviation Act 1988* (the Act) Section 23 – Dangerous Goods
- *Civil Aviation Safety Regulations 1998* (CASR) Part 92 – Dangerous Goods
- International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods By Air DOC 9284 AN/905 (ICAO TIs)
- Supplement to the ICAO Technical Instructions for the Safe Transport of Dangerous Goods By Air DOC 9284 AN/905 (ICAO TIs SUPP)
- ICAO Emergency Response Guidance (ERG) for Aircraft Incidents Involving Dangerous Goods DOC 9284 AN/928
- Advisory Circular (AC) 92-04(0) – Applications for Permission to Carry or Consign Dangerous Goods under Section 23 of the Civil Aviation Act 1988
- Civil Aviation Advisory Publication (CAAP) 35-4(0) – Design and Maintenance of Containers: Transportation of Live Aquatic Animals Using Oxygen
- International Air Transport Association Dangerous Goods Regulations (IATA DGR)

Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material.

ACs should always be read in conjunction with the referenced regulations.

This AC has been approved for release by the Executive Manager Standards Development and Future Technology Division.

2. PURPOSE

2.1 The ICAO TIs permits, with appropriate approval, the carriage of compressed oxygen in cylinders with the valves open as a means of providing life support to aquatic animals during air transportation. This document provides guidance and information to persons requiring a Permission to carry or consign these dangerous goods with the information necessary to undertake such operations.

Note: This document will need to be read in conjunction with the ICAO TIs and/or the IATA DGRs, the ICAO TIs SUPP and, where relevant, AC 92-04(0) and CAAP 35-4(0)

3. STATUS OF THIS ADVISORY CIRCULAR

3.1 This is the first AC to be written on this subject. It is an update of the material that was provided in CAAP 262A-1(0), which was repealed upon publication of this AC.

4. ACRONYMS

AC	Advisory Circular
CAAP	Civil Aviation Advisory Publication
CAR	Civil Aviation Regulations 1988
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations 1998
DG	Dangerous Goods
DOC	Document (ICAO)
ERG	Emergency Response Guidance
IATA DGR	International Air Transport Association Dangerous Goods Regulations
ICAO	International Civil Aviation Organization
PI	Packing Instruction
SP	Special Provision
SUPP	Supplement to the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air
TIs	Technical Instructions for the Safe Transport of Dangerous Goods by Air
UN	United Nations

5. DEFINITIONS

5.1 For the purposes of this document:

Dangerous Goods means (a) explosive substances; and (b) things:

- (i) Which by reason of their nature are liable to endanger the safety of an aircraft or persons on board an aircraft; or

(ii) Which CASRs declare to be dangerous goods (DG).

Permission means an approval or exemption capable of being granted by the Civil Aviation Safety Authority (CASA).

State in the international context, and throughout this document, means a country.

Australian State means a State or Territory of Australia.

Technical Instructions means the ICAO TIs as amended and in force from time to time.

UN Number means a reference to the United Nations (UN) numbering system for DGs.

6. BACKGROUND

6.1 The term ‘aquatic animal’ has been used because it embraces the entire aquatic species, any of which may be carried.

6.2 Various entities in Australia have the opportunity to export quantities of live fish to world markets using compressed oxygen bubbled through water. Oxygenation of the transport tanks ensures survivability of the aquatic animals and makes air transport economic in terms of the relative volumes of product and water.

6.3 Oxygen as dangerous goods – Compressed Oxygen has been assigned the Proper Shipping Name and UN Number of **Oxygen, compressed, UN 1072**, and conforms to the DG classification criteria for non-flammable, non-toxic gas and oxidisers (hazard division 2.2 and subsidiary risk in hazard division 5.1). General packing requirements applicable to the carriage of compressed oxygen are contained in Part 4, Chapter 1 of the ICAO TIs with more specific requirements being in Part 4, Chapter 4, Packing Instruction (PI) 200.

6.4 Note 7 to the introductory notes of Part 4 of the ICAO TIs makes reference to the carriage of oxygen with aquatic animals with the appropriate authority of States of Origin, Destination and Operator.

6.5 The ICAO TI SUPP includes Special Provision (SP) A202 which prescribes the minimum ICAO requirements for the use of compressed oxygen in the air transportation of aquatic animals. The relevant sections of the ICAO TIs and ICAO TIs SUPP are shown in full at Appendix 1 of this AC.

Note: The IATA DGR does not contain all the information normally found in the ICAO TIs SUPP.

6.6 Compliance with SP A202 - SP A202 requires that the approval of the national authority of the State of Origin, State of Destination and State of the Operator be obtained **before** the consignment is carried on an aircraft.

6.7 Section 23 of the Act requires that DG be consigned and carried in accordance with CASR Part 92 or in accordance with a Permission issued by CASA. The carriage and consignment of operational oxygenation systems requires a permission issued by CASA. Guidance material (including application forms) on applying for these permissions can be found in AC 92-04.

6.8 Any person may apply to CASA for a Permission to carry on board an aircraft, or consign for carriage on board an aircraft, DG that would otherwise not be permitted for carriage or consignment under the ICAO TIs.

6.9 Mechanical Aeration and Water Circulation Systems – Some systems use mechanical aeration of cabin air through the water tanks in order to maintain the aquatic life. Electrically powered mechanical pumps to circulate water to ensure even distribution of oxygenated water throughout the tank are also used. These systems traditionally use non-spillable batteries (refer to SP A67 in the ICAO TIs for guidance about the physical characteristics of a non-spillable battery) and brushless motors and do not require special permission from CASA to enable their carriage, however, manufacturers and consignors will need to check with the aircraft operator as to whether the operator will accept these items for carriage. Where these circulation systems are carried in conjunction with a compressed oxygen system, then the safety considerations of the combined package and systems will need to be assessed.

6.9.1 Return of empty units – For the purposes of the ICAO TIs, return of empty aquatic units fitted with cylinders are to be consigned as DG in the usual manner.

7. RESPONSIBILITY FOR OBTAINING PERMISSION

7.1 Responsibility for obtaining a Permission will rest with each individual party; i.e. the shipper (permission to consign) or the operator (permission to carry); however, the shipper should liaise with prospective operators prior to making application to CASA.

7.2 Responsibility for obtaining approval from other States rests with the Shipper/Operator/Consignee. A Permission issued by CASA does not confer any rights on the operator, shipper or consignee over those of any other State; it will merely permit the consignment and/or carriage of approved DG in Australian Territory or on Australian Aircraft. Further information about the applicability of Australian Permissions can be found in AC 92-04.

7.3 Applicants should note that a considerable amount of time is required to conduct a proper assessment of a new containment system, identified in CAAP 35-4, and they should plan accordingly.

8. INFORMATION FOR CONSIGNORS

8.1 Manufacturers of oxygenation systems are required to produce systems of maintenance and maintenance documentation requirements which subsequent users of the oxygenating system have to comply with. The maintenance system will include such things as:

- pre-utilisation inspection the day before consignment make-up, including regulator calibration, maintenance and serviceability; current documentation and serviceable equipment components;
- inspection during consignment make-up;
- precautions and repairs in replacing and changing items such as oxygen bottles and tank damage; and

- mandatory inspection and maintenance.

Note: The manufacturer may also impose training requirements for users of the oxygenating system. This may be part of, or in addition to mandatory training under CASR 92.120 for Group F employees - shippers of dangerous goods.

8.2 The consignor will need to show that:

- packages meeting the legal requirements articulated in CAAP 35-4(0) will be used, including compressed gas/oxygen regulator certification;
- details of the maintenance program to ensure the ongoing serviceability of the systems;
- how the relevant requirements of ICAO SP A202 are complied with; and
- the form of training certification or maintenance training provider.

8.3 Consignors are advised that operators may impose additional requirements to those listed in CASA Permissions. Advice from the operator should be sought in this regard.

8.4 Consignors should also note that the limitation in ICAO SP A202 regarding the number of oxygen cylinders permitted in a particular cargo hold volume may affect the number of live fish transport units that can be accepted by an operator on any particular flight.

8.5 CASA may approve consignment and carriage in a manner different to that shown in CAAP 35-4(0) and the ICAO TIs under certain circumstances. For example, where an unpressurised cargo aircraft is being used, then the requirements relating to the ratio of cylinders to cargo hold volume may be varied.

8.6 CASA may approve a variation to the prescribed standards only where the operator/shipper provides adequate justification. Note that any variation to the standards approved by CASA may make subsequent approval by another State more difficult.

8.7 Training for employees of consignors

8.7.1 In addition to the generic mandatory training for Group F employees – shippers of DG; the employees of consignors of oxygenating systems will need to undergo additional CASA approved training that relates to:

- instruction in the dangers associated with oxygen, including the need for components and materials used to be compatible with oxygen;
- instruction on the system of maintenance for the equipment;
- instruction in the preparation and assembly of the equipment; and
- preparation of air transport documentation for the consignments.

8.7.2 It is recommended that the consignor also maintains training records for any training that is given to employees in respect of inspection of, or maintenance or repairs to the transportation equipment or in respect of consignment make-up.

8.8 The additional information which a consignor should provide when applying to CASA for a Permission to consign the DG is listed in Appendix 2 of this AC.

8.9 **The application must be made to dg@casa.gov.au.** Alternative arrangements can be made by contacting a DG inspector on 131 757.

9. INFORMATION FOR OPERATORS

9.1 Upon receipt of an application CASA may approve carriage of the DG. The approval will be in the form of a Permission issued under Section 23 of the Act. Where Australia is also the State of the Operator this permission will constitute State of Origin and State of Operator approval. As the conditions for carriage will primarily be the same regardless of the identity of the consignor, a Permission for a particular operator may be valid for any number of consignments by any number of approved consignors on any aircraft listed in the Permission.

9.2 Permissions may be issued only to the operator of the aircraft on which the goods are to be carried. That operator is required, under Section 23 of the Act, to meet the conditions of the Permission. Where an operator contracts a second operator to conduct some or all of the operation on behalf of the first operator, an application to carry the DG must be submitted by the second operator.

9.3 The applicant operator will need to show that:

- procedures are in place to ensure packages carried meet the legal requirements articulated in CAAP 35-4(0);
- the appropriate requirements of ICAO SP A202 are complied with; and
- appropriate instructions are included in the DG or Operations manual in respect to the transportation of live aquatic animals. In particular, instructions that cover the acceptance, checking and loading of containers served by compressed oxygen as well as appropriate emergency response information must be included in the relevant manual(s).

Note: Acceptance checks should include the items in Appendix 3 – Acceptance requirements of this AC, which are likely to be mandated in a Permission issued to the operator.

9.4 Training for employees of operators - There is no additional training to the mandatory courses required under CASR 92.095 – Employees of an Operator.

9.5 Application for Permission - Before applying for a Permission via the application form in AC 92-04 (Form 361) the applicant should ensure that their manuals either contain, or are being amended to contain, necessary processes and procedures and requisite forms and checklists.

9.6 The application must be made to the CASA office responsible for the Safety Oversight of the Air Operator Certificate of the aircraft operator.

9.7 The application can be submitted by mail, facsimile or email. A list of CASA offices and contact details may be found on the CASA Website at: <http://www.casa.gov.au>. To expedite assessment of the application, a copy of the application may be submitted to dg@casa.gov.au.

9.8 A Permission will not be issued to an Operator who does not have a DG Manual as part of its Operations Manual suite under CAR 215. Similarly, those operators whose Operations Manual states that their company does not carry DG will not be issued a Permission.

Executive Manager
Standards Development and Future Technology

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APPENDIX 1**SPECIAL PROVISION A202
TRANSPORT OF LIVE AQUATIC ANIMALS IN WATER FILLED
TANKS USING COMPRESSED OXYGEN****Technical Instructions – Part 4, 'Introductory' Notes**

Note 7. - Carriage of aquatic animals with oxygen: With the approval of the appropriate authority of the States of origin, destination and of the operator, for the purpose of providing life support to aquatic animals during transport, a cylinder containing oxygen, compressed, UN 1072, may be carried to oxygenate the water in accordance with the provisions of Table S-3-1 and Special Provision A202 (which appear in the ICAO TIs SUPP).

Supplement to the Technical Instructions, Special Provision A202

For the purpose of providing life support for aquatic animals during transport, the appropriate national authority of the States of Origin, of Destination and of the Operator may approve the carriage of a cylinder containing oxygen, compressed, UN 1072, with the valve(s) open to supply a controlled quantity of oxygen through a regulator into water containing the aquatic animals. The cylinder or cylinder valve must be fitted with a self-sealing device to prevent uncontrolled release of oxygen should the regulator malfunction or be broken or damaged. The oxygen cylinder must meet those parts of Packing Instruction 200, which apply, except for the need for valves to be closed. In addition, the following conditions apply as a minimum:

- The water container with the attached oxygen cylinder (transportation unit) must be engineered and constructed to withstand all anticipated loads.
- The water container must be tilt tested to an angle of 45 degrees in four directions from the upright for a 10 minute minimum duration in each direction, with the oxygen supply operating, without leakage of water.
- The oxygen cylinder and regulator must be restrained and protected within the equipment.
- The oxygen regulator used must have a maximum flow rate of not more than 5 litres per minute.
- The oxygen flow rate to the container shall be limited to that sufficient to provide life support to the aquatic animals.
- The quantity of oxygen provided must not exceed 150% of the oxygen required for the normal duration of air transport, and
- Only one cylinder may be carried for each 15 cubic metres of gross cargo hold volume. In no circumstances may the rate of oxygen flow from the cylinder exceed 1 litre per minute per 5 cubic metres of gross cargo hold volume.

APPENDIX 2

INFORMATION TO BE INCLUDED IN CONSIGNOR APPLICATION

- Name of Company, name of contact within company and contact details.
- Name of Operator(s), Aircraft type(s) and registration number(s) or aircraft type(s) and flight number(s).
- Verification of compliance with relevant requirements of CAAP 35-4(0) and Special Provision A202.
- Completed Form 361 – Application for a Permission to Carry, and/or Consign for Carriage, Dangerous Goods on an Aircraft.
- Full technical specifications of the units to be shipped together with any permission numbers already issued by CASA or other appropriate national authority.
- How the requirements of SP A202 will be met.
- Details of the maintenance program applicable to the units.
- Evidence of completion of relevant training.
- A copy of the users process and procedures relating to the preparation of the units for transport including a consignor's 'checklist for live aquatic animals with oxygen cylinders'.

The checklist must, as a minimum include the following checklist items:

Dangerous goods transport document

- Two copies in English;
- Full name and address of shipper and consignee;
- Airwaybill number (if known);
- Number of pages;
- Full name of airport/city of departure and destination;
- UN number, Proper Shipping Name, Hazard Division and subsidiary risk;
- Number and type of packages;
- Quantity and unit of measure per package;
- Packing instruction number;
- Special provision number;
- Permission numbers from States of Origin, Destination and Operator (and copies attached to each copy of the Dangerous Goods Transport Document; and
- Additional handling information:
 - Certification statement for the Regulator and Oxygen System;
 - Certification Statement for servicing and maintenance;
 - Training certification;
 - Approved container/assembly certification; and
 - All State and operator variations are complied with (e.g. 24 hour emergency response phone number).

The Packages

- Oxygen Cylinder:
 - Date last tested (within 10 years);
 - Valve suitably protected;
 - No visible signs of structural damage; and
 - If aluminium cylinder – then equipped only with brass or stainless steel valves and cleaned in accordance with ISO 11621:1997 and not contaminated with oil;
- The Regulator:
 - Regulator flow rate is less than or equal to 5 litres/min;
 - Record actual flow rate;
 - Valve number stamped on the regulator;
 - Tamper-proof sticker attached to regulator; and
 - Regulator Maintenance Certificate;
- Mechanical Aerations Systems:
 - Battery is a non-spillable type meeting provisions of SP A67;
 - Battery terminals and electrical connection points:
 - protected from short circuit; and
 - sealed from water;
 - Water/air intake points – filtered and unblocked; and
 - Motor/battery system is securely installed, restrained and protected;
- The Tank:
 - No visible signs of cracking, damage or leakage;
 - No unauthorised or unapproved repairs or modifications;
Note: Should a 1000 litre tank rupture – then the liquid will move freely in the hold of an aircraft, causing critical problems with weight and balance and aircraft controllability resulting in potentially catastrophic consequences.
 - Markings for UN number, proper shipping name, full name and address of shipper and consignee; and
 - Appropriate labels – Hazard division 2.2 and 5.1 and liquid orientation labels;
- The Package:
 - Packaging and tank conforms with PI 200 and is free from damage or leakage;
 - Oxygen cylinder and Regulator is restrained and protected within the equipment; and
 - DataPlate attached with relevant markings including ‘Manufacturer’, ‘Owner’, CASA or other appropriate State Approval Number and unique Serial number.

APPENDIX 3

INFORMATION TO BE INCLUDED IN OPERATOR CHECKLIST FOR ACCEPTANCE OF LIVE AQUATIC ANIMALS WITH OXYGEN CYLINDERS

In addition to the items required to be checked in the ICAO TIs Part 7, Chapter 1, the following items are considered to be necessary. Operators may choose to impose additional requirements.

The Dangerous Goods Transport Document

- Special authorisations include:
 - SP A202; and
 - Copies of approvals from States of Origin, of Destination and of Operator;
- Additional handling information:
 - Certification statement for the Regulator and Oxygen System;
 - Certification Statement for servicing and maintenance;
 - Training certification;
 - Approved container/assembly certification; and
 - All State and operator Variations are complied with (e.g. 24 hour emergency response phone number).

The Packages

- Oxygen Cylinder:
 - Date last tested (within 10 years);
 - Valve suitably protected;
 - No visible signs of structural damage; and
 - If aluminium cylinder – then equipped only with brass or stainless steel valves and statement of cleaning in accordance with ISO 11621:1997; nil evidence of contamination with oil;
- The Regulator:
 - Regulator flow rate is less than or equal to 5 litres/min;
 - Record actual flow rate;
 - Record the valve number stamped on the regulator;
 - Tamper-proof sticker attached to regulator; and
 - Regulator Maintenance Certificate;
- Mechanical Aerations Systems:
 - Battery is a non-spillable type meeting provisions of SP A67;
 - Battery terminals and electrical connection points:
 - protected from short circuit; and
 - sealed from water;

- Water/air intake points – filtered and unblocked; and
- Motor/battery system is securely installed, restrained and protected;
- The Tank:
 - No visible signs of cracking, damage or leakage;
 - No unauthorised or unapproved repairs or modifications (i.e. Silicon sealant has not been used to repair cracks);
 - In good condition;
 - Lid securely attached;
 - Markings for UN number, proper shipping name, full name and address of shipper and consignee; and
 - Appropriate labels – Hazard division 2.2 and 5.1 and two liquid orientation labels;
- The Package:
 - Packaging and tank conforms with PI 200 and is free from damage or leakage;
 - Oxygen cylinder and Regulator is restrained and protected within the equipment;
 - DataPlate attached with relevant markings including ‘Manufacturer’, ‘Owner’, CASA or other appropriate State Approval Number; and unique Serial number; and
 - Conforms to the type indicated by State Approval documents.

In assigning the DG onto an aircraft, the operator should take into account:

- Number of open oxygen cylinders does not exceed Company Operations manual limits;
- Calculation of load to contact surface area and determination of need for load spreading for the assigned aircraft; and
- NOTOC (Notification to Captain) generation including ERG code of ‘2X’.