



**GLIDING NEW ZEALAND INCORPORATED**

***ADVISORY CIRCULAR***  
***AC 2-07***

**CARRIAGE & USE OF OXYGEN**

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## **1 Introduction**

This Advisory Circular provides guidance on the requirements for the carriage and use of oxygen in gliders (reference CAR 91), charging of cylinders, and general safety precautions when handling oxygen equipment.

## **2 Rules on use of oxygen**

- 2.1 All persons in a glider are required to use supplemental oxygen during any time that the glider is being operated above 13,000 feet AMSL and during any period of more than 30 minutes that the glider is being operated between 10,000 feet and 13,000 feet AMSL.
- 2.2 Each glider operated at altitudes above 13,000 feet AMSL (or for more than 30 minutes between 10,000 feet and 13,000 feet AMSL) must be equipped with a means of indicating to the pilot the amount of oxygen available and whether the oxygen is being delivered.
- 2.3 Oxygen used in gliders must be of Aviation Oxygen Standard, which is gaseous oxygen with a minimum purity of 99%, maximum moisture of 0.0056 grams per cubic meter, and nil carbon monoxide. (The extreme dryness is to avoid the possibility of water freezing in the system at high altitudes.)
- 2.4 Crew members of a glider intended to be operated above 10,000 feet AMSL must have satisfactorily completed oxygen systems training (reference MOAP Appendix 2-C module “Hi Altitude Soaring”).
- 2.5 It is very important to observe the operating limitations specified by the manufacturer of the oxygen regulator.
- 2.6 Pilots intending to operate above 25,000 feet AMSL should take special care in ensuring that an adequate supply of oxygen is available, including some form of back-up system, such as an additional constant-flow mask independent of an EDS unit.

## **3 Charging oxygen cylinders – general safety precautions**

- 3.1 As a general rule, oxygen cylinders should not be completely discharged; otherwise condensation and consequent internal corrosion may occur.
- 3.2 Before charging an oxygen cylinder, check the markings for charging pressure (service or filling or working pressure) and the date on which it was last hydrostatically tested – see Appendix 1.
- 3.3 Before charging, cylinders and valves should be inspected to ensure that no contaminants are present, particularly oil or grease.
- 3.4 High pressure oxygen may cause or intensify fire and must be kept away from heat and open flames. Transport cylinders should be mounted securely on a portable cart or laid on their sides with chocks during storage or decanting.

- 3.5 Compressed gas cylinders can contain a lot of stored energy, so incorrect handling may cause ignition, sudden pressure increase and catastrophic rupture. Many materials normally non-flammable will burn fiercely in an oxygen-rich environment. **Valves should always be cracked open slowly.**
- 3.6 Cylinders will naturally heat up during charging, so slow decanting from the transport cylinder supply is not only safer but will result in the maximum amount of oxygen decanted from a given charging pressure.
- 3.7 Extreme care must be taken not to overcharge cylinders. Persons carrying out the charging process should be specifically trained to do so.

### Pressure Conversion Factors

Lb/in <sup>2</sup> (psi)	MPa	Bar
<b>1,000</b>	6.8948	68.948
<b>1,800</b>	12.4	124
<b>1,900</b>	13.1	131
<b>2,000</b>	13.8	138
<b>2,100</b>	14.5	145
<b>2,200</b>	15.2	152
<b>2,300</b>	15.9	159
1,740	12.0	<b>120</b>
1,813	12.5	<b>125</b>
1,885	13.0	<b>130</b>
1,958	13.5	<b>135</b>
2,031	14.0	<b>140</b>
2,103	14.5	<b>145</b>
2,176	15.0	<b>150</b>
2,248	15.5	<b>155</b>

# APPENDIX 1 TESTING AND MARKING OF OXYGEN CYLINDERS

## Testing

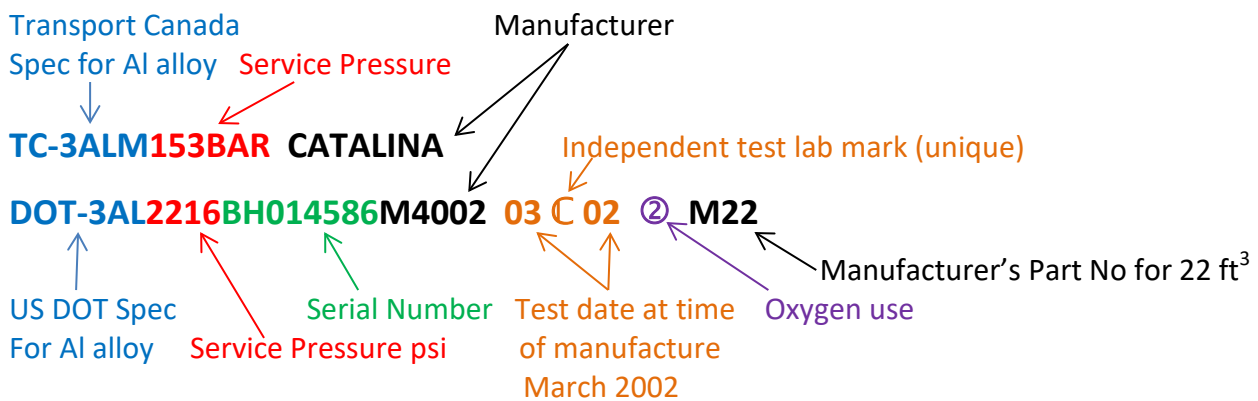
Testing of oxygen cylinders must be done by a laboratory approved by Worksafe New Zealand, and a cylinder must not be charged unless it has been so tested within 10 years, unless the cylinder is more than 40 years old, in which case the test must be within 5 years. Fibre-wrapped light aluminium or composite cylinders must have been tested within 3 years. GNZ form TECH 11 may be used to identify the cylinder to the testing laboratory so that it is treated as coming under the jurisdiction of the CAA.

## Marking

Cylinder permanent markings contain a lot of information. This is stamped on the cylinder shoulder (or on a permanently attached ring or plate for cylinders not having a thickened shoulder) and requires some knowledge to interpret. The information relevant to charging is the last test date and the charging or working pressure.

## Decoding of Markings

An example of a manufacturer's original cylinder marking, with decoding, follows:



An example of marking by an approved testing laboratory, with decoding follows:



Test date – May, lab mark, 2014 Dry gas

Water Capacity 3.94 kg (litres)

Tare Weight 3.67 kg

Test Pressure 25.5 MPa