

# Australian Standards

## On Pressure Regulators for use with Medical Gases

---

As these Standards are Copyright by Standards Australia we cannot provide a copy of them here. Legal originals with all fees paid can be purchased from us. What we have provided here is an attempt to explain some critical elements of the standards in plain English with some pictures.

---

### DISCLAIMER AND WARNING

This web page is provided as an aid to users. It does not purport to give advice or endorsements. Before using any or all elements of this document its currency and accuracy must be checked with experts other than employees of this company.

As standards and practices change constantly, this document can be used as a guide for information only before using any information contained on these pages please email this office at [sales@rappaaustralia.com.au](mailto:sales@rappaaustralia.com.au)

---


### Australian Standard 3840.1-1998 Pressure Regulators for use with Medical Gases

Part 1: Pressure regulators and pressure regulators with flow-metering devices

\* Note: Not all clauses are outlined only those that are topical and of interest, clauses such as definitions, scope, references etc are not included.


# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
1 Scope 2 Referenced Documents 3 Definitions 4 Terminology, Notation & Units	Not discussed here apart from when applicable.*	
<b>5 Materials and Cleanliness</b>		
5.1 Materials	<p>This clause outlines that the materials used for construction of a regulator must be of a type that it is suitable for use with the gas to be controlled. It highlights that extreme care must be used when selecting materials for use with oxygen and oxidising gases. They state that materials that react benignly in normal air may become explosive in oxygen enriched atmospheres and that both the chemical and thermodynamic behaviours of the gas must be considered when selecting the materials to be used.</p> <p>The clause also points out that springs should not be plated.</p>	<p>This photo shows three items.</p> <p>Most people could not tell that the O-Ring in the middle would catch fire in a high pressure oxygen enriched atmosphere.</p> <p>Springs must not be plated as plating can flake and eventually enter a patients airway.</p> 
5.2 Alternative Construction	Not discussed here.*	




# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
5.3 Cleanliness	The clause states that all parts in contact with medical gases shall be cleaned as for oxygen service.	<p>This photos shows two nipples, one is cleaned for oxygen use. Which one is it? Its the one on the left. Visually there is very little difference. The one on the right whilst being almost identical to the one on the left was purchased at a air and hydraulics hose supplier. It would catch fire in high pressure 100% oxygen. It has hydrocarbon residue all over it.</p> 



# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
<b>6 Requirements for Bourdon Tube Pressure Gauges</b>		
6.1 General	Clause states that the gauges must comply to AS 1349	<p>Page 15 Clause 3.8.1 of AS 1349-1986 states that gauges for use with high pressure gas above 2500 kPa (Oxygen cylinders have 16000+ kPa) must be of a safety pattern with the following features.</p> <ul style="list-style-type: none"> <li>a) A solid securely attached baffle must be between the bourdon tube and the dial.</li> <li>b) A blow out device shall be positioned so as to not blow out towards the front of the gauge.</li> <li>c) A non splintering clear cover shall be used (typically this is plastic).</li> </ul>
<p>This shows a AS 1349-1986 compliant gauge. Note how the bourdon tube is not visible in the right hand gauge and how the tube is behind a baffle on the opened gauge. The gauge on the left is opened for demonstration purposes only.</p> 	<p>This shows the back of the same two compliant gauges the left gauge has the blow out device removed to demonstrate how it will, if an internal rupture occurs, will move away from the front, and protect the eyes and face of an observer.</p> 	<p>This is non compliant, note the blow out device, (its the disk in the middle of the gauge) is at the front and will hit an observer if rupture occurs. PLUS it does not have a baffle between the dial and the bourdon tube</p> 

# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
<p>This is a compliant gauge.</p> 		<p>This is a typical non compliant gauge. It is the same gauge as one shown above with a rubber boot over it.</p> 
<p>6.3 Scale Reading 6.3.1 Dimensions 6.3.2 Scale Markings</p>	<p>Not discussed here.*</p>	

# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
<b>7. General Requirements for Pressure Regulators</b>		
7.1 Inlet Connection 7.11 Cylinder Connection	All inlets must comply to Australian Standard AS 2472	AS 2472 describes the pin indexed system based on the standards: <ul style="list-style-type: none"> <li>• ISO 407:1991 and ANSI/CSA/CGA V-1:1987</li> <li>• AS 2472 refers to another standard AS 2473 which covers threaded connectors for cylinders with a capacity over 5kg of water.</li> </ul>
7.1.2 Terminal Unit Connection	Not discussed here.*	
7.1.3 Removal of Inlet Connection	States that all inlet connectors if threaded must be tightened to a torque of 30 N.m.	
7.2 Outlet Connections	Must conform to AS 2896. They must be securely retained against accidental connection. The torque required to remove a threaded connection shall be at least 20 N.m. and for hose nipple connections it shall be at least 7 N.m.  Alternative means of attachment are acceptable if they demonstrate an equivalent level of safety.	We have found a huge variation in the field of so called "Australian Standard" fittings. Some when matched together leak if they are from different manufacturers.  We have raised this with each manufacturer as we have come across the issue. Some photos are shown below for discussion.



# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
<p>Note how this outlet has a short sleeve with the end of the threaded stem exposed.</p> <p>The sleeve must be level or no more than 0.6mm higher, but not lower. This fitting leaks with other manufactures compliant fittings.</p> <p>The manufacturer as been advised.</p> 	<p>This Australian Standard Sleeve Indexed Outlet is correct.</p> <p>The sleeve is level or 0.6mm longer than the internal threaded stem.</p> 	<p>This is a compliant regulator with Australian Standard diameter indexed fitting conforming to AS 2896</p> 

# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
7.3 Pressure Relief Valve 7.3.1 General	A pressure relief valve will be provided on the low pressure side of the regulator. A burst disc must not be used.	
7.3.2 Pressure Limit 7.3.3 Discharge Quantity	Not discussed here.*	
7.4 Filtration	A filter of with openings of no more than 100 um will be on the high pressure inlet. A stainless steel mesh filter is not allowed with oxygen.	
<p>This is a compressed brass filter it complies with the standard and has openings smaller than 100um. This filter is now used on all Allied regulators distributed in Australia, Europe and the USA.</p> 		<p>This photo shows a small disc of stainless steel mesh that is non compliant. We took this photo of a regulator high pressure inlet, to stop it coming unscrewed it was glued in with a highly flammable compound. Our Oxygen Workshop is seeing lots of these scary examples of tampering by untrained people.</p> 



# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
7.5 Resistance to Ignition 7.5.1 General 7.5.2 Ignition of Non Metallic Components	This clause outlines that the regulators must be tested in a prescribed way. Very few places in the world can do these tests as they are dangerous and very explosive.	Our regulators have all been tested in France.
7.6 Outlet Valve 7.6.1 General	See 7.2 above.	
7.6.2 Control Knob and Valve Spindle	A control knob may not be removed with the use of a tool	
7.7 Pressure Adjusting Device 7.7.1 General 7.7.2 Pressure Setting 7.8 Mechanical Resistance 7.8.1 High Pressure Performance Requirement 7.8.2 Low Pressure Performance Limitation Requirement 7.8.3 High-Pressure Rupture Limits 7.8.4 Low-Pressure Chamber Pressure Retention	Not discussed here.*	

# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
7.9 Gas Tightness	A leak of less than 5 ml/hr is permitted	
7.10 Flow Characteristics	Flows above 2 litres per minute must be within +/- 10% manufacturers published values.	
7.11 Regulators for High Pressure Cylinders 7.12 Pressure Gauges and Flow Gauges 7.12.1 Torque Requirements	Not discussed here.*	

# Australian Standards

## On Pressure Regulators for use with Medical Gases

Clause	Outline/Key Points	Comment/Discussion
<b>8 Environmental Temperatures</b>		
8 Environmental Temperatures 8.1 Storage Temperature	Not discussed here.*	
8.2 Operating Temperature	The operating range must be at least -20 and +60 degrees C	
8.3 Temperature Testing through to 15.3.5 Symbols and Definitions	Not discussed here.*	