

Visual Inspection Guide

A summary of the Luxfer's tank visual inspection guide

By Anton Swanepoel

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Introduction

This is a free article compiled by Anton Swanepoel from text out of the Luxfer guide.

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Welcome to Visual Inspecting Tanks

About the Author



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Anton Swanepoel is a diving instructor for IANTD, TDI, NAUI and PADI. He is an OC Tri-Mix instructor and a Tri-Mix gas blender instructor. He has a passion for wreck, cave and deep diving.

Although he dives both CCR and OC, his passion is in OC. Working as a technical instructor in a busy dive center in the Caribbean, he gets to live his passion. He has dove OC in excess of 400 ft and loves to share his passion with all.

SUMMARY OF LUXFER'S SCUBA CYLINDER VISUAL INSPECTION GUIDE

Inspection frequency

For Normal use inspection should take place every twelve months.

For Heavy use inspection should take place every four months.

Definition of heavy use

- 1: Cylinders that are filled or "topped off" five or more times per week.
- 2: Rental cylinders in use during the 'season' and 'off-season' times.
- 3: Cylinders used wherever damage is more likely than in normal use.
- 4: Cylinders that have maintenance slightly below recommended care.

Definition of Unusual treatment

- 1: Dropped, fell, was struck, was in an accident, or when the care and maintenance of the cylinder are obviously poor, hard loading of cylinders.
2. The cylinder is stored improperly, cylinders need to be in a dry area away from salt water. Boats are a bad place to store cylinders.
3. Has a gouge, dent, scrapes, cut or dig in the sidewall.

When to condemn a cylinder:

-Altered numbers

Cylinders with altered, or unreadable serial numbers; first hydrostatic test date; current hydrostatic test date; and/or working pressure.

-Heat damage

Cylinders exposed to heat over 350°F or that have been exposed to fire, or that the inspector has reason to believe may have been exposed to a heat over 350°F.

Cylinders which exhibit any arc or torch burns, or fire damage.

Cylinders that were repainted and heated over 350°F to dry or cure the paint.

Any cylinder with hidden heat or physical damage that can't be visually inspected.

-Dents

Cylinders with dents 0.060 inches (1.53 mm) or greater in depth.

Cylinders with dents measuring less than two inches (50mm) in diameter.

Cylinders with definite visible bulges.

Cylinders with surface cuts, digs or gouges in the metal that are either longer than six inches (152mm), or deeper than 0.030 inches (0.76 mm).

-Corrosion

Exterior

Cylinders with one or more external corrosion pits over 0.060 inches (1.53 mm) deep in the sidewall, crown, and/or base.

Cylinders with external line or broadspread corrosion when one or more pits, or the broadspread corrosion, is over 0.030 inches (0.76 mm) deep in the sidewall or crown.

Cylinders with external line corrosion over 6 inches (152 mm) long.

Cylinders with external broadspread corrosion covering more than 25% (one fourth) of the cylinder.

Threads

All cylinders with corrosion in any thread that is a required continuous full thread identified in section in minimum thread count.

Interior

All cylinders with any interior sidewall, crown, or base isolated pit estimated to be over 0.060 inches (1.53 mm) deep.

All cylinders with an interior sidewall line or broadspread corrosion when one or more interior pit in the line corrosion is deeper than 0.030 inches (0.76 mm), and/or if the interior broadspread corrosion is deeper than 0.030 inches (0.76 mm).

All cylinders with interior sidewall line corrosion that is over 6 inches (152 mm) long.

All cylinders with internal broadspread corrosion covering more than 25% (one fourth) of the cylinder.

-Neck leaks

Cylinders where the leak at the valve connection is caused by a damaged cylinder, defective threads, or imperfections in the neck area.

-Cylinder threads

All 2015 to 3000 psi cylinders that have less than eight continuous full threads without imperfection, counting from the top.

All 3100 to 3300 psi cylinders that have less than nine continuous full threads without imperfection, counting from the top.

All 3400 to 3500 psi cylinders that have less than ten continuous full threads without imperfection, counting from the top.

All cylinders that show evidence of cracking in more than one continuous full thread.

-O-ring surface

All cylinders with O-ring gland or face cracks.

All cylinders with O-ring gland or face damage.

-Valleys and folds

All cylinders with valleys that reduce the number of defect-free, continuous full threads below the minimum, counting from the top.

All cylinders with a fold which enters into more than one thread.

All cylinders with thread imperfections which reduce the number of continuous full threads below the limits defined.

All cylinders with one or more folds in the interior crown area deeper than 0.060 inches (1.53 mm).

-Cracks

All cylinders that show evidence of cracking.

All cylinders that show any cracks or metal distortions in the interior sidewall and base.

-Distortion

All cylinders with metal distortions in the crown other than allowable valley and fold imperfections.

When to hold a cylinder

Take out of service and tank that have not been hydrostatically tested within the last five years.

What to do when condemning a cylinder.

If the cylinder is condemned during inspection make the cylinder unusable by destroying the threads.

Servicing tips

Valve and o-ring lubrication

The application of a small quantity of lubricant to the valve threads is essential for the proper care of the valve and cylinder. Only a very small amount of the lube is needed, and only applied at the bottom of the valve threads. The lubricant will ride up the threads as it is installed and helps prevent galvanic corrosion. Never use any kind of tape wrap, oils, vaseline or petroleum products on valves installed into high-pressure gas cylinders.

Valve torque

Luxfer recommends that all straight thread valves be installed in high-pressure aluminum scuba cylinders with a torque recommended by the valve manufacturer. If no torque value is given from the valve manufacturer, torque valves to 50 lbf-ft, plus or minus 10 lbf-ft. All torquing should be done such that valve, valve components and cylinder are not damaged.

Cylinder fill rate

WARNING: Do not fast fill (1,000 psi or higher) scuba cylinders. A fill rate of between 300 - 600 psi/minute is recommended.

Cylinder handling

Cylinders should never be dragged, dropped, or roughly handled. When transporting cylinders, take steps to ensure that the valve is protected and that the cylinder is well secured. Scuba cylinders should never be allowed to roll around loose, tip or fall during transport. Secure cylinders in a protected position (never valve down) so that the valve and cylinder will not be subject to damage during transport.

Cylinder tumbling

Tumble cylinders for 10 to 15 minutes with a wet detergent aluminum oxide chip combination (use solution as given below). Reuse tumbling chips after strained and rinsed. Rinse cylinder three times with warm water and then blow dry with e-air while tanks are upside down to allow particles to fall out. Do not use the same tumble material for air and O₂ tanks unless the tumbling chips have been rinsed.

Extend or repeat tumbling procedure on cylinders heavily contaminated. All tanks to be used for O₂ service must be tumbled first. Hydrocarbons cling to the sidewall of the cylinder that will not be removed with only a rinse, the hydrocarbon bonds first need to be broken. Glass beads are the recommended tumble material for O₂ cleaning.

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Tumbling solution

The tumbling solution is made by adding two to three cups of aluminum oxide tumbling chips to two quarts of soft water. Additionally add one teaspoon of a liquid dishwashing detergent (hydrocarbon free) to the cylinder. Simple green can be used in place of dishwashing detergent.

For odors

Rinse the tank thoroughly with a solution of baking soda (one cup baking soda to one gallon of tap water) followed by a rinse with warm water. Repeat rinse with a solution of vinegar (one half (1/2) cup of household vinegar to one gallon of water) followed by three rinses with warm water and drying with e-air.

Cylinder rinsing

Use warm to hot water on aluminum cylinders to rinse so as to dissolve any oils still in the tank. Use only warm water on steel tanks as hot water can cause flash points.

Purge cylinder

Cylinders for O₂ service need to be purged after assembly. Normal air has entered the cylinder before the valve was replaced and needs to be removed before O₂ is added to the cylinder. Fill and drain the cylinder several times to 100psi.

End note

Hope this helps you in your visual inspections

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For an in-depth study into gas blending including how nitrox, heliox, helair and tri-mix partial pressure gas blending is done, you can purchase my book '*The Art of Gas Blending*' available in print and digital version.
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All the best with your course and happy diving

Anton Swanepoel