

Maintaining Your Pressure Cylinders

By Ocean Eye, Inc.'s **Chris Gabel**

Tanks, tanks, and more tanks. This issue we will go over some details and maintenance tips on scuba pressure cylinders. Look for a future article on high-pressure vessels. For now, I would like to concentrate on those colorful vessels that we throw on our backs for scuba or surface supply EGS (Emergency Gas System) diving. Some call them bailout bottles, or "come home bottles," as well. Mainly, they come in three flavors; aluminum, steel, and now composite.

Aluminum Tanks – These tanks have been a standard in the diving community for years. One of the most frequent concerns raised regarding aluminum tanks is that they have an apparent tendency to explode. Let me clarify that not all aluminum tanks possess the potential for the sustained-load cracking hazard. There was a problem with some tanks that were manufactured by Luxfer, Cliff-Impact Division of Parker Hannifin Corporation, Walter Kidde Company,

and any other US manufacturer, except Catalina (according to the US Department of Transportation) back in the 1970s and 80s, although the official DOT document states anything prior to 1990. (You can read the Department of Transportation document on the web at <http://hazmat.dot.gov/regs/notices/nprm/68fr-53314.htm>.)

Specifically, the issue concerns the necks of these cylinders and sustained-load cracking due to the use of an aluminum alloy known as 6351. To see if you own one of the 6351 cylinders, you can check your tanks for a 3AL stamp on the neck and observing the year of the first hydro stamp (in the US, look for a date of 1988 or earlier).

Should you have those two markings on your tank and it is not a Catalina brand cylinder, then you have a 6351 alloy tank. If the tank is one of the 6351 type, then you will need to get the neck checked with an Eddy Current device at least annually during its normal VIP cycle.



Diver with Interspiro pressure cylinders.

CARRILLO
Underwater Systems

Specializing in complete VHS/DVD & Hard Drive Combination Diver Video Recording Systems

New! Deep Blue Option

Record & Edit Direct to VHS, DVD & HDD!

Call • 888.728.2226
fax • 541.469.8009
info@CarrilloUnderwater.com
www.CarrilloUnderwater.com

WE'VE GOT YOUR SAFETY IN HAND

The S-K Series O-Ring Holder
U.S. Patent #4,522,536

The Consumable Diver-Held Safety Device That Prevents Injury to Divers' Hands

RTJ Flange Gasket Holder w/o "Skillet"
Diver holds O-Ring in place, risking finger injury.

RTJ Flange Gasket Holder with "Skillet"
O-Ring holder keeps fingers out of danger.

For any size or series RTJ Flange Gasket From 2" to 42"

FLANGESKILLETS® INTERNATIONAL

Joe Vidrine, President
Sandra Chapman, Sales
337-789-1680 (cell)
337-237-9778 • 337-236-8229
337-942-4639 (fax) • Email: skillets@eatel.net

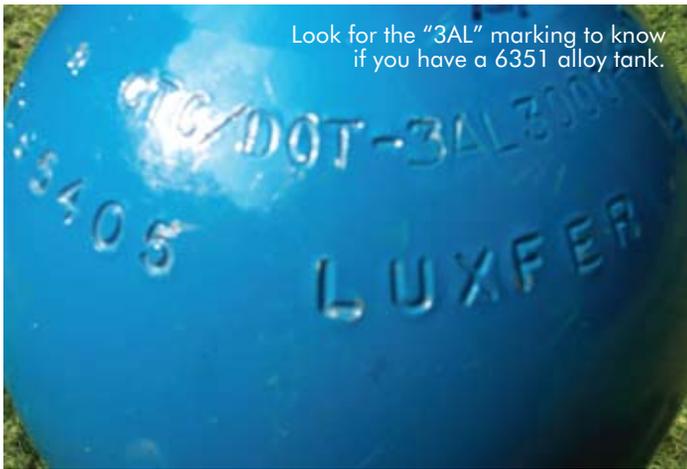
www.flangeskillets.com

PETROGEN

LIQUID FUEL CUTTING TORCH

- Fuel is regular gasoline
- Cuts to depths of over 600 feet
- Cuts through tongue and groove piling
- Cuts steel underwater comparable to topside speed
- Liquid fuel filled passages eliminate fuel line backflash

Phone: 719.596.1175 • Fax: 719.596.4721
Email: torch@petrogen.com
www.petrogen.com



Look for the "3AL" marking to know if you have a 6351 alloy tank.

The actual manufacturing periods in the United States were from 1972 through mid-1988; in England from 1967 through 1995; and finally in Australia from 1975 through 1990. Again, the issue was that they used a different alloy labeled 6351 rather than the older, tried and true (and now used again) 6061 type. It's also suggested that you check the 6061 tanks with an Eddy Current device, but the 6061 tanks were not plagued with the same stress weaknesses as the 6351 cylinders were.

Any aluminum tank has corrosive resistant properties (meaning that they don't oxidize like steel and rust) and the fact that, for the most part, they are lighter than steel is a definite benefit to their design. But that comes at a price. The challenge has been trying to deal with the difference in buoyancy between the time you enter the water and the time you get to the surface. On average, you're looking at around four pounds lighter on the end of the dive than the beginning.

As for basic daily maintenance, make sure that you check for outer damage before use and keep at least 500 PSI of air in the cylinder at all times. Visually inspect any outer o-rings and make sure that the burst disk is in tact.

Steel Tanks – These are seeing a resurgence in popularity. Companies like PST and Worthington are seeing increased sales with their steel tanks. They are now using hot dipped galvanized steel, which takes care of most of the corrosion issues. The positive buoyancy issues, due to the weight of the cylinder which can plague aluminum, are non-existent.

PST makes tanks as small as 65 cubic feet, but none smaller that I could find in my research. Worthington X-Series come as small as 77 cubic feet, and they make a smaller XS series. Steel tanks, by their nature, are heavier than their aluminum counterparts for the most part.

One daily field test is to make sure that any outer corrosion is noted and frequently checked for pitting. Any deep pitting or

COMMERCIAL DIVING
 UNDERWATER WELDING
 DIVE MEDIC TECHNICIAN
 UNDERWATER BURNING
 NDT LEVEL I & II
 RIGGING AND CRANE SPECIALIST

- Accredited and Licensed.
- Financial Aid Available for those that Qualify.
- Approved for Montgomery GI Bill.
- 18 Week Program.
- On Campus Dorm and Meal Plan Available.

COMMERCIAL DIVING ACADEMY
 TOLLFREE 888-974-2232 WWW.COMMERCIALDIVINGACADEMY.COM

OCCUPATIONAL MEDICINE CLINICS OF SOUTH LOUISIANA
OMC Providing Complete Occupational Medicine Services to the Industrial Community

- Certified Diving Physicals
- Pre-Employment Physical Examinations
- Drug Screening • Travel Medicine
- X-Ray Facilities in House at Both Locations
- Pulmonary Function Testing
- Electrocardiograms • Audiograms
- Blood Testing for Exposure or Surveillance Monitoring
- Work Injury Treatment & Management
- On-Site Services Available
- Pre-Employment or Return to Duty Functional Testing Available Through Landry and Associates

Joseph Serio, MD
Tony Alleman, MD MPH

Two Locations:

3305 W. Pinhook Rd
Lafayette, LA 70508
 337.233.4480
 337.233.6334 (fax)

932 E. Admiral Doyle
New Iberia, LA 70562
 337-365-5484
 337-369-6365 (fax)

www.occmcd-sl.com

POLATRAK®
 CP Probes

CP Gun™

Diver Held Bathycorrometer

- Twin elements (Ag/AgCl)
- Twin voltage displays
- Contact probe
- Rated to 1000 fsw (305 m)
- 6 Months battery life

Get the industry standard for CP measurement



DEEPWATER

DEEPWATER CORROSION SERVICES, INC.
 +1 713 983 7117
 WWW.STOPRUST.COM

creasing should be noted and the tank taken out of service until inspected by a qualified technician. Make sure that pressure is kept in the tank, preferably at or above 500 PSI. If the tank is completely drained, then appropriate procedure is to have the tank immediately visually inspected. I've seen tanks that have been drained and not inspected. The inside walls of the tank had rusted and the risk of pitting was high. Moisture had entered the vessel in this case. I know I can't speak for you, but personally I wouldn't want to breathe air from a rusty cylinder.

Example of corrosion in a steel tank.



Composite Tanks: The current company to look at for composites is Interspiro. They've introduced a series of tanks to the United States called the Divator Lite Cylinder Pack, which are now approved by the DOT for use in

the US. According to Interspiro, they are authorized for use with compressed air to 166 feet (50m).

They are manufactured with a carbon fiber filament and an outer wrap of glass fibers. The other fittings are made of acid-proof stainless. It's reported that the working pressure is 300 BAR, or 4,350 PSI. They have a test pressure of 450 BAR (6526.71 PSI) and a minimum burst pressure of 900 BAR (13053.42 PSI). If you fill a tank to over 13,000 PSI, then you've got to know that something bad is about to happen.

They also have Non-Limited Life approval. So unlike some composite SCBA units, there is no established lifetime for the cylinders to be in service. Interspiro has developed an interesting solution to the issue of varying buoyancy from full to empty. They use a counterweight that attaches directly to the tank system. Admittedly, I have not been able to see one of these units for myself outside of pictures and technical sheets nor have I been able to dive one. Bengt Kjellberg of Interspiro was trying to get me a unit to test, but unfortunately that didn't happen before this issue went to press. Perhaps in a future issue I can give you additional details on this newer technology.

Basic Maintenance

No matter which type of tank you chose, there are a few things to take note of. As you already know, any tank (including composite) needs to have a visual inspection at least once a year and a hydro every five years.

Please avoid putting any decals on your tanks, other than evidence of inspection stickers. According to PSI inspector standards, any decals are to be removed so that the entire tank can be inspected for corrosion. The same can be said about repainting. Any repainting of a cylinder means that either the tank needs to be completely stripped of paint or decommissioned. Again, the inspector can't tell if there is any corrosion under the new paint.

Another thing to make sure of is that the burst disk is changed at least every five years. Also, as you are well aware, the o-ring in the valve that mates with the first stage can blow at anytime, so be sure to keep a few spare o-rings in your spares kit. That seems to be one of the biggest pain points. One humble suggestion I have is to avoid using tank boots. They can trap water and promote corrosion underneath the plastic/rubber devices.

So in conclusion, there are three current choices of tanks. According to PSI, there are at least eight, and perhaps more, US cylinder manufacturers. So no matter what brand name you purchase, for the most part, they will be manufactured by only a handful of companies. Interspiro may be a good choice to explore, taking advantage of their lightweight.

Make sure that you inspect your tanks before every dive and if in doubt, have them re-inspected. I know this is an expense, but your life and health are worth it. Dive safe. **uw**



DOWN DEEP

...Divers must be confident that their topside gas is safely stored in rugged dive modules.

Since 1958, FIBA has pioneered the design and construction of dive modules that are certified for global, offshore gas storage.

Our commitment to the Gulf and world markets is evident by multiple facilities, including Rayne, Louisiana, where we offer manufacturing and testing.

8 to 12-Tube, 20' or 40' Modules



New 8-Tube, 9' Mini Module



FIBA Technologies, Inc.
1535 Grafton Road
Millbury, MA 01527 USA
Tel: 1.508.887.7100
Fax: 1.508.754.2254
www.fibatech.com

