



Safety Alert

No: 10/2017

Date: 27th October 2017

Cylinder Explosion During Charging

Introduction: An ADC member has reported a serious incident involving an ex-military 25 litre aluminium storage cylinder. The cylinder was in a bank of ten aboard a vessel on route to a project.

The cylinder involved was in test with a working pressure of 205 bar and test pressure of 300 bar. This style of cylinder is in common use across the industry sector.

Incident: Two cylinders were being charged at the time, this process being monitored by an experienced compressor operator.

Whilst the charging was underway it is believed that between approximately 180 bar and 200 bar the cylinder exploded causing any loose items in the vicinity to be propelled around the cylinder space and other parts of the vessel.

Personnel nearby were injured by flying debris and the rupture caused serious leg and hand injuries to the compressor operator.

Substantial damage was also caused to the vessel superstructure.



The remains of the cylinder.

Follow Up: The injured personnel were provided with first aid assistance on the vessel and later treated in hospital. The incident was reported in accordance with RIDDOR.

The HSE together with manufacturers and industry experts are looking into the cause of the cylinder failure and this may lead to future changes in testing and/or in-use requirements of this type of cylinder.

Age and use related fatigue cannot be ruled out as two of the primary factors leading to the explosion at this stage. Further clarity on the prime cause may follow.

UK ADC Ltd - The Association of Diving Contractors

The diving contractor involved has withdrawn and destroyed ALL similar cylinders of this type

Recommendations:

The following factors should be carefully weighed up when dealing with high Pressure cylinders of any type:

1. Consider the age of all your HP air cylinders.
(Although a cylinder may be in test and have good external and internal condition, they are still undergoing stress exposure on each filling and during the periodic hydrostatic testing. In keeping with all plant and equipment, cylinders should be considered for periodic replacement, rather than waiting for them to be failed during inspection or testing).
2. Understand the history of all bottles in your possession. (DO NOT procure second hand cylinders unless the previous history is known, and full certificate history is available)
3. Only allow trained/experienced / competent personnel to operate compressors.
4. Make sure you have a documented cylinder charging procedure and have completed appropriate risk assessments for the activity.
5. Ensure compressors are in good working order and have valid air purity test.
6. Ensure cylinders are **Clearly** marked with last test date and show max pressure.
7. Always minimise the personnel in the vicinity of cylinders being charged.
(Blast containment cabinets are available where cylinders can be placed during filling)
8. Where possible always charge cylinders in a dedicated safe area considering what the consequences would be if a cylinder failure occurred.
9. Remove any loose materials and tools, from around the cylinder area, as these can be propelled great distance in a cylinder rupture situation.
10. Ensure whip checks are fitted to charging hoses and manifold whips.
11. Make sure cylinders are well supported so that they cannot topple over.
12. Try and standardise the working pressures of cylinders between storage and bailout bottles to avoid the potential for over filling errors.
13. Do not charge cylinders in enclosed spaces, ensure good ventilation exists.
14. When on site charge well away from any public areas, other working personnel or any flammable storage areas.
15. Never over fill cylinders to allow for cooling. (Consider a ‘topping off’ procedure for cylinders once they have properly cooled.)
16. Consider the use of LP air for diving operations where possible, suitable or practical.
17. NEVER leave cylinders being charged unattended.

Summary : This incident could have easily resulted in multiple fatalities. Although cylinder charging is regarded as a ‘normal’ activity for most organisations in the diving industry it is potentially one of the more dangerous operations carried out and should be planned and conducted to mitigate the associated risks.

Taira Caton

ADC Secretary

If you have an incident or accident and have learnt lessons as a result, please advise the ADC Secretary so that the information can be compiled to remove specific reference to persons or organisation and distributed to all other members to mitigate the potential for similar incidents to occur elsewhere.

The Association of Diving Contractors

The Association represents diving contractors who are involved with inland or inshore diving operations in the UK and Ireland.