IDEST Torque

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Happy New Year!

Welcome to the first IDEST Torque of 2024. In this issue we discuss the importance of only testing within IDEST scope; The process and documentation to operate thread gauges on a 250 use / 3-year calibration; The need to report breathing gas cylinder failures; The reintroduction of the Red Quadrant Label; Hydrotest safety and the requirement for proof test apparatus to have screens to protect the operator; Guidance on the use of BSP G5/8 thread rather than M26 thread connections for nitrox and oxygen cylinders; Lessons learned from a fire extinguisher failure during pressure testing; and the importance of using the correct service parts with the AP progressive-opening oxygen cylinder valve.

Reports from the field include finding modified cylinder valves, and the importance of CE marking on new and replacement cylinder valves.

We also reveal the costs to IDEST of UKAS accreditation to ISO/IEC 17024 and the implications of using non-UKAS calibration.

And finally, we offer an opportunity for suitable individuals to join the IDEST Scheme Committee.

Know your scope for testing

We are investigating a complaint from a fire suppression company regarding a non-breathing gas cylinder that was allegedly tested by an IDEST centre. We will not comment further while the investigation is ongoing, but it is timely to remind all centres that:

IDEST is accredited for breathing and diving gas cylinders only.

Testing of other cylinders is outside of the IDEST scheme, and centres must not use the IDEST stamps or labels on cylinders tested outside of the scheme.

We frequently get asked if air-gun filling cylinders are within scope. The short answer is "it depends". Provided the air-gun filling system is based upon a 'scuba' cylinder then we consider it to within the scope of the scheme. Filling cylinders that do not carry the relevant cylinder manufacturer stamp markings (e.g. cheap imports) are certainly outside the scope of the scheme.

Please be aware, as the consequences of testing outside the scope of the scheme could be significant.

Cylinder failure reporting

Part of your agreement to be an IDEST certified centre is the recording and notification of cylinder and valve failures. Sadly very few centres seem to be on top of this.

Please use form D037 (Breathing Gas Cylinder Failures - Quarterly Return) to record cylinder and valve failures, and the total number of cylinders and valves tested. The completed forms should be returned to IDEST Admin every quarter.

IDEST collate this information, it is used to monitor for emerging trends and to inform the UK Dive Industry Committee during their annual risk assessment review. It has a useful and important role in safety of test centres and divers.

Expect to be asked for evidence of Breathing Gas Cylinder Failures during your next Inspection.

Red Quadrant Label re-introduced

Despite stony silence to our request for feedback, we have decided to reintroduce the red quadrant label for cylinder and valve combinations where there is a mismatch between the maximum working pressure of a cylinder and its valve.

Remember that it is HSE view that "*any mismatch between the maximum working pressure of a cylinder and its valve poses the risk of one or the other being over pressurised*" so care must be taken.

The overarching guidance remains that Technicians should only return safe cylinders to service; this includes evaluating whether the valve rating is appropriate.

A clear and obvious example is a 300 Bar valve fitted to a 232 Bar cylinder, we consider this to be at high risk of overfilling, and such combinations must not be returned to service.

A more plausible combination is a mismatched 232 bar valve on a 300 Bar cylinder. In this case the red quadrant sticker could act as a caution to the filler that additional attention is required.

We are sending out 6 x red quadrants with all Centre certificates to help increase awareness of these stickers.

And we would still value feedback from our Technicians and Centres on what you have seen and what combinations you think are acceptable or unacceptable?

Hydrotest Safety

While hydrostatic testing is essential for the safety of diving cylinders, it presents its own set of safety challenges. Adequate safety protocols are therefore crucial to ensure the well-being of everyone involved.

Common Hydrotest Hazards:

- Pressure-Related Risks - The primary hazard during hydrostatic testing is the potential for over-pressurisation. If equipment is subjected to pressures beyond its design limits, it can rupture, leading to hazardous releases of fluid.
- Air Entrapment - During the filling process, air can become trapped inside the equipment, leading to inaccurate test results and potential safety risks.
- Equipment Failure – Inappropriate, weak, or worn equipment can fail under the high pressures of testing, resulting in leaks, ruptures, ejection of material etc. Such failures can have severe consequences, including injuries, loss of life, and significant property damage.
- Failure of the Cylinder Under Test – this should be an expected part of testing and appropriate planning and mitigation put in place to ensure failures do not give rise to any hazards.

Ensuring Safe Hydrostatic Testing:

- Safety by Design - All equipment used for hydrostatic testing should meet or exceed the maximum planned test pressure. The system should be protected against over-pressure. Mitigation should be in place for failures of components of the system (e.g. whip checks on flexible hoses).
- Adequate Training and Expertise - Personnel involved in hydrostatic testing should be trained and competent on the equipment, procedures, and safety protocols.
- Effective Air Venting and Controlled Pressure Increase – The air vent should be provided at the highest elevation of the system. Pressure should be increased gradually during testing to reduce shock to the components and allow issues to be observed prior to sudden failure.
- Regular Inspection and Maintenance - Before testing, equipment must undergo a thorough inspection to identify any pre-existing defects or weaknesses. Any issues should be addressed before testing begins.
- Useful PPE and Safety Measures - Personnel should wear appropriate personal protective equipment (PPE) to safeguard against potential hazards. Safety measures such as screens, marked danger areas, warning signs etc should also be implemented to eliminate the risk of injury in the event of failure.
- Emergency Procedures and Contingency Plans - Clear emergency procedures and contingency plans should be established before testing. Personnel should know how to respond to unexpected events and quickly shut down the test if necessary.
- Continuous Safety Improvement - Safety is not a static concept, regular review of working practices, equipment design, safety measures and best practice is important to maintain and increase safety on an ongoing basis.

Importance of Documentation

- Test Procedures - Thorough documentation is crucial for hydrotest safety and compliance. Detailed test procedures should be available outlining the steps to operate the equipment safely and ensure consistency of results.
- Maintenance Plans - All equipment requires maintenance. Routine inspections should be formalised to ensure they happen in a timely manner, are comprehensive, and nothing is left to chance.
- Record Keeping - Accurate record keeping of test results, equipment checks and maintenance, general observations, and any deviations from normal is essential. These records provide valuable reference should an incident occur.

Whilst this is not an exhaustive list hopefully this short article provides some impetus to look again at your test system to see where you can increase your safety.

Screens for proof testing

UKAS have made references to shielding of hydraulic systems, and hoses used to pressurize cylinders to test pressure on two separate surveillance inspections now. Their focus is driven by an incident during a pressure test of a boiler involving life changing injuries to a verification witness. The subsequent HSE investigation imposed a fine exceeding £1 million on the three companies involved.

Such incidents are far too frequent E.g.

- *"A valve on a pressure test rig was pressurised above the safe working limit and failed, causing the hose and metal fitting assembly to whip round, striking the employee on the right leg, causing serious compound fractures. The injured person had his leg amputated from the knee down. If appropriate pressure relief had been fitted and the companies had put in place a system of work that was safe, then the operator would not have exposed to the harm he suffered."*
- *"A worker was struck in the face by a pressurised hose during a test, after a connector failed catastrophically. He suffered a broken jaw, multiple facial lacerations, and total blindness in his right eye. The test was carried out without segregating or safeguarding the test zone and the test connectors were not subject to maintenance or inspection."*
- *"An HP fitting failed at 200 bar. No damage was sustained other than to the fitting and the whip check and no injury was sustained. The failure was likely caused by worn threads and daily use exerted on a 20-year-old fitting that had been subjected to stretch as a normal part of daily use. The whip check cord failed due to the kinetic energy generated as the fitting blew, coupled with the fact that the whip check was not fully extended against the whip and had some slack in it."*

During recent inspections we have noted several Centres with Proof Test screens that give limited protection to the operator. A common issue are screens that only protect the lower body and leave a clear line of sight between the cylinder under test and the upper body and head of the operator.

We also see unretained flexible hoses used to connect the hydraulic pump to the cylinder under test, and the operator is located dangerously within reach of the flailing parts should the hose or couplings fail.

We were pleased when, during a recent inspection, one centre made the commitment to remove their ineffective screen and undertake future proof testing using an adjacent mothballed volumetric test chamber. This immediately resolved the matter and provided the operator with excellent protection.

We encourage everyone to undertake a fresh risk assessment of their hydraulic test systems. Check that the working pressures of all parts of your system are rated to at least the maximum pressure of your system; That you are using solid pipework wherever possible; Flexible hoses are restrained by whip-checks or other means; That the operator is outside of the arc of failure of any flexible hoses; Pumps and other parts of the pressurised system are shielded as much as possible; The cylinder under test is suitably restrained; That all parts of the system are in good working order and condition etc. Imagine the worst-case failures and then implement appropriate protection for the operator. Your life and/or financial wellbeing is at risk so take care!

New valves must be CE marked

Two centres recently sought our advice regarding some new valves they wanted to fit to cylinders.

In both cases the valve in question was made in Germany by Nautec. Both centres felt the valves were of good quality, and Nautec is a company of good standing so what could be the problem?

The issue encountered was that the valve has no CE (Pi or Rho) markings, and no CE documentation is available from the importer. The available documentation does imply BAM (German Federal Institute for Materials Research and Testing) requirements are "fulfilled".

We sought advice from the DfT (Department for Transport). Their reply as follows:

"The valves should be CE marked if they are to be used on breathing air cylinders. Either that or the whole cylinder/valve assembly has to be conformity assessed, type approved, and CE marked as a single unit.

If the valve is to be used with transportable cylinders for a gas other than breathing air it must be type approved by a UK body and Rho marked.

[It is] not lawful to supply them as suitable for breathing air cylinders or in the knowledge they might be used for that purpose. Fitting them as an aftermarket valve might also invalidate the cylinder approval."

This answer also brings into question whether the transportation to a dive site or launch point, by persons considered 'at work' could be in contravention of current road transport guidelines.

Just to be sure we double checked with HSE, and received the following answer:

"*Having investigated this matter HSE are of the opinion that cylinder valves used in diving cylinders should be CE marked.*

Breathing apparatus is to be considered as an assembly in the sense of the Pressure Equipment Directive, the items of which have to be conformity assessed according to their individual design pressure and other characteristics, and the assembly shall be subjected to a global conformity assessment.

Additionally, breathing apparatus is personal protective equipment and, as such, covered by the PPE Regulation (EU) No 2016/425. Because it is classed as PPE these valves should be tested in accordance with that directive.

BS EN 250 Respiratory equipment (Open-circuit self-contained compressed air diving apparatus - Requirements, testing and marking) is the relevant standard to provide a means of conforming to the essential requirements of the approach to Directive 89/686/EEC on Personal Protective Equipment (PPE) (subsequently EU 2016/425 and now UK 2016/425). This standard specifies minimum requirements for self-contained open-circuit compressed air underwater breathing apparatus and their sub-assemblies to ensure a minimum level of safe operation of the apparatus down to a maximum depth of 50m."

Regrettably we must therefore advise that until CE marked versions are available with appropriate documentation centres should not service or fit these valves.

Modified Cylinder Valves

One of our centres reported failing an airgun filling system recently because the thread of the MDE valve fitted appeared to have been machined from M25 down to M18.

At the time of the report the UK vendor of the equipment brought in for testing was still advertising the 300BAR MDE "Jubilee" Cylinder Valve (which is only available from MDE in M25) in M25 x 2 and M18 x 1.5 thread forms. In the past they have also listed it in 7/8"UNF thread with a burst disk fitted.

We spoke with MDE about this situation. It seems there is a common misconception about valves being produced to a single specification and then machined to either 232 or 300 bar formats. This was thrown out of the window, and it was stated quite categorically that the valves are all produced to different specifications.

A valve stem reduced to a smaller size, or any other material modification, especially by a third party without the manufacturer's prior knowledge and agreement, is changing the valve from the manufacturer's original specification. This almost certainly invalidates any certifications and approvals, including CE, and renders the valve unusable. It may also give rise to safety hazard.

If anything was to happen and HSE were to become involved, they would take a dim view of the situation.

Well done to the centre for spotting and rejecting this unauthorised modification, and for informing us here at IDEST. We do gather field reports of this type to inform HSE, Trading Standards and other government departments to foster official action against companies placing unregulated items onto the market.

In this case we are pleased that MDE had a productive conversation with the vendor who has removed the modified valve from sale and is now only offering the standard M25 thread.

If you see any suspicious equipment or modifications then please gather evidence, take lots of photographs, and let us know.

AP Progressive-Opening Oxygen Cylinder Valves

A short note regarding the AP Diving Progressive-Opening Oxygen Cylinder Valve, of relevance to both cylinder test technicians and filling station operators.

AP Diving advise *"As of October 2019 all AP Oxygen Rebreather Valves are fitted with a needle-valve seat which offers progressive-opening of the valve. When pressurising the oxygen system, for the first half turn or so it appears that nothing is happening. You should continue to open the valve a fraction at a time until the HP gauge needle just starts to move, if necessary, closing the valve slightly if the pressurisation rate is too fast, then stop and wait until it reaches full pressurisation."*

From a service perspective it is important to note that the original AP Cylinder Valve (both oxygen and diluent) use a different service kit from the new Progressive-Opening Oxygen Cylinder Valve.

- RB13E - Rebreather Cylinder Pillar Valve Service Kit (M25 thread), with new Oxygen AP38C Needle valve
- RB13D - Rebreather Cylinder Pillar Valve Service Kit (M25 thread), with original oxygen and diluent AP38 Moulded Insert

Based on this comment on an internet forum, mistakes have been made… *"One thing to watch with the AP slow turn on O2 valves: if when testing and servicing your cylinders the highly trained IDEST technician decides to fit a generic service kit to the valve rather than the correct AP parts the valve will snap to fully open with a fraction of a turn. Not quite what was intended."*

Manufacturers of diving equipment continually make changes and improvements, have you seen anything to share with other centres?

[Source: The Dive Forum]

Fire extinguisher failure

While fire extinguishers are not within our scope we were interested to see a recent 'Safety Flash' by the International Marine Contractors Association (IMCA) regarding the failure of a 5kg CO2 fire extinguisher during hydrostatic pressure testing.

The extinguisher, rated to 200bar, was being tested to a pressure of 300bar. The incident occurred when the test pressure reached 196 bar and the main body of the extinguisher failed. The extinguisher was 13 years old. As the failure occurred under test conditions no personnel were nearby to get injured.

The failure serves as a reminder of the importance of regular inspection, maintenance, and age considerations when dealing with critical safety equipment.

IMCA's member took the following actions:

- Reviewed the current inspection and maintenance program to ensure it is implemented correctly and is rigorous enough for inspection and maintenance of fire extinguishers;
- Considered the age of fire extinguishers when planning hydrostatic tests. Older extinguishers may require more frequent testing or replacement to ensure their safety and reliability;
- Ensured detailed records of inspections, maintenance, and hydrostatic testing are kept for all fire extinguishers. These records can provide valuable insights into the condition of your equipment over time;
- Ensured that personnel involved in handling and testing fire extinguishers are adequately trained and aware of the potential risks associated with aged or damaged equipment.

Excellent to see lessons learned from hydrostatic pressure testing being communicated.

M26 Connection Guidance

By and large the use of M26 connections within the UK does not seem to have gained much traction. The majority connection used for cylinders and regulators for nitrox and oxygen steadfastly remains the BSP G5/8 thread. Every so often we are approached for comment on the continued use of BSP G5/8 for such connections, so we are pleased to pass on some recent guidance from HSE, summarised as follows:

"European Standard BS EN 144-3 introduced the M26 connection for "respiratory equipment for diving containing breathable nitrox gas with an oxygen content greater than 22% or oxygen". It was

published in 2003 but allowed a 5-year transition period before its implementation date of August 2008.

The aim of BS EN 144-3 is to reduce the potential hazards posed by the high oxygen content in Nitrox (> 22% 0xygen) and pure oxygen by ensuring the clear identification of equipment intended for use with these gases. The Standard's status as a harmonised Standard means that it has been accepted (by majority decision) across the EU as one accepted means of meeting the safety requirements of the applicable European Directives in relation to that type of equipment.

Such Standards are not mandatory but observing them provides a means of demonstrating that appropriate risk controls have been applied - this may of course be achieved in other equally effective ways.

After August 2008, those at work involved in diving or the filling of diving cylinders may choose to continue to use the connections that were made to other standards. However, whichever connections are employed, those at work will still need to be able to demonstrate that any safety arrangements they use are adequate."

We recommend review of your 'safety arrangements' when testing or filling a nitrox or oxygen cylinder which is not fitted with an M26 valve. Is the labelling of the cylinder clear for its purpose; are the actual gas contents marked correctly; how does the user acknowledge the contents / analysis when they take the cylinder; are your records adequate? etc.

Thread gauge 250 uses / 3-years

For infrequently used thread gauges IDEST have a procedure that allows Centres to operate based on 250 uses or 3-years (whichever is reached sooner) between calibrations, rather than the normal annual calibration.

Recent centre inspections have identified a lack of understanding and/or missing documentation in relation to this reduced calibration process.

Putting thread gauge on 3-year or 250 uses requires permission from the IDEST Chief engineer via a D067 application form. If approved, you will receive a D047 permission letter in return which you must retain in your records. You must also then maintain the related D043 thread gauge usage tracker sheet.

If you have gauges on 3-year or 250 uses and do not have a D047 permission letter, then please complete and submit a D067 application form as soon as possible.

You must be able to show both the D047 permission letter and D043 thread gauge usage tracker sheet during your inspection.

Scheme Committee seeks members

You may not have heard of the IDEST Scheme Committee, but they have an essential monitoring and advisory role in the oversight of IDEST.

The purpose of the committee:

- to oversee, discuss, give feedback, and ratify decisions regarding the operation of IDEST as a Certification Body under ISO/IEC 17024
- management review of the operation of the certification scheme in accordance with IDESTs policies and procedures.
- to ensure the certification body is run in a professional manner and can support the cylinder test technicians it certifies.

The Scheme Committee meet a minimum of once a year and up to four times a year to review the activities and performance of IDEST. This includes an annual management report from the Chairman and Chief Engineer.

Ideally the Scheme Committee will include representative technicians and/or owners from IDEST Training, Test or Inspection Centres and directors of IDEST Ltd. & SITA.

Membership of the Scheme Committee has waned over the past few years, and we are looking for people to come forward. If you know anyone who may be interested, then please let us know.

UKAS accreditation of IDEST

We probably don't give enough of a fanfare to our UKAS accreditation, especially given the effort and costs involved.

UKAS
A world of confidence

ISO/IEC 17024 is the International Standard relating to the conformity assessment for bodies operating certification of persons against specific requirements.

Accreditation and standards play an important role in the UK's National Quality Infrastructure (NQI). The NQI makes a significant contribution to the UK economy, health and safety, and the environment. It also has global impact through World Trade Organization rules on regulatory equivalence across national borders.

The United Kingdom Accreditation Service (UKAS) is the sole national accreditation body recognised by the British government to assess the competence of organisations that provide certification.

Accreditation of IDEST by UKAS provides independent assurance of our technical competence to assess Centres. This in turn means that Centre clients can have confidence in the personnel we certify to undertake cylinder testing.

As you might imagine such a regulatory framework comes with significant burden. UKAS audit IDEST multiple times a year, they also witness at least one Inspection a year. The cost of our UKAS accreditation in 2023 was over £12,500 in fees alone.

In short, UKAS accreditation gives your IDEST Centre and Technician certifications international recognition for competence. We think it's worth it!

Non-UKAS Calibration anyone?

Amazingly, even after all the information and requests we have put out over the past few years we are still receiving calibration certificates that do not evidence the necessary UKAS/ILAC ISO 17025 laboratory accreditation.

From January **we will be rejecting these outright** and you will need to pay for the gauges to be recalibrated again with a laboratory that holds the correct accreditation. Your IDEST certification may be suspended, and cylinder stamp withdrawn until the necessary certificates are in place.

Even worse, sometimes these non-conforming certificates come from laboratories that do hold the necessary UKAS accreditation, but the Centre has forgotten to specify "*certification to BS EN ISO 17025*" on their purchase order. We must **reject these too** and you may have to pay again if the laboratory will not replace your certificates with correct ones.

So please remember to use calibration laboratories that hold UKAS ISO 17025 accreditation for the relevant measurement AND to specify "*certification to BS EN ISO 17025*" on your purchase orders.

Centres sometimes also request to use non-UKAS laboratories because they've "been using them for years". Sadly, there are no grandfather rights on this topic. If you do not use a UKAS accredited laboratory, then IDEST must visit the calibration company and verify first hand their ability to perform calibrations to the required standard.

We conducted a trial with one non-UKAS accredited laboratory and visited them to undertake the required checks. The result of the exercise was an additional £700 annual bill for the Centre. Please only use UKAS/ILAC accredited laboratories!

Missing Torque?

Have you missed any edition of Torque? Don't worry, all of the past issues can be downloaded from the members section of the **IDEST website**. Take a look!

IDEST Test Centre Update

We have had the following changes to the IDEST Test Centre listing since the last issue of Torque.

New centres

AB Cylinders, Linlithgow, West Lothian [B6]
Bournemouth University (private inspection centre) [3XX]
Clubsub Limited, Stoke-on-Trent [B4]
Go-Dive, Derby [B5]
Scuba Equipment Servicing Centre, Accrington [B7]

Leaving centres

C&C Marine Services, Ayrshire [5G], retirement

Temporarily suspended centres

Apeks Marine Equipment Ltd [8K]
East Coast Diving [7C]
Galaxsea Divers [8G]
Malakoff [6T]
Sub-Aqua Services [9K]

Suspended centres

Rec2Tec [6R]
Sabre Safety [8T]
Scuba Scene [7Y]
Xambor Water Sports Ltd [9Y]

The use of blue or green quadrants or the IDEST stamp to validate a cylinder test or inspection at any suspended centre is not recognised. Temporary suspension indicates that active dialog is underway in the hope of resuming testing in due course.

A final thought…

We hope you've enjoyed reading this issue of Torque. Please let Alison have your feedback on this issue and suggestions for topics in upcoming editions. Thank you!

E&OE