



***INSPECTORATE FOR DIVING  
EQUIPMENT  
SERVICING & TESTING***

**CODE OF PRACTICE**

**CP11:2022**

**For INSPECTING and TESTING Transportable Pressure Receptacles (Cylinders) for Breathing Gases manufactured from Steel and Aluminium to, BS EN ISO 18119:2018 +A1:2021, and Composite Materials to BS EN ISO 11623:2015**

**Version 2**

**ISSUE 1**



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## INTRODUCTION

It can be daunting when confronted with regulations requiring technicians to conform to directives and information drawn from many sources, rather than contained within the body of one, single document.

This Code of Practice tries to bring together the varied information that is available and tries to ensure that the technician is armed with the correct and most up-to-date information.

The Code of Practice is set out to assist the technician with guidance in the testing of steel, aluminium and steel-lined or aluminium-lined composite cylinders. It also assists him/her to maintain a uniform standard for testing and inspecting such cylinders when used for containing breathing gases under current National, European, and international legislation.

Rather than being prescriptive in this approach, IDEST understands that the many British and European standards required to complete this work competently, efficiently, and safely already exist and would refer the technician to these standards as a means of complying with good industry practice.

IDEST, the Inspectorate of Diving Equipment Servicing & Testing, works continuously to ensure that the changing face of retail support for diving is presented in a professional and easily understood manner. The officers of IDEST welcome recommendations for update and change at all times and treat all of our codes of practice as "living documents".

# 1 SCOPE

This document is produced to assist technical personnel who inspect TPRs (Transportable Pressure Receptacles), predominantly, but not limited to breathing gas cylinders, to work to a common Code of Practice.

TPRs - Breathing Gas Cylinders must undergo periodic inspection and testing (PIAT) to International Standards.

The following standards, BS EN ISO 18119:2018 +A1:2021 and BS EN ISO 11623:2015 are the major ones concerned with PIAT.

This document covers the requirements for a technician's training, the equipment required, and the methods employed when inspecting cylinders and the equipment and relevant working documentation. This document will be used as the basis for any routine audits using the IDEST check list.

The following bullet points must also be borne in mind:

- Users of this Code of Practice shall bear full responsibility when using the Code of Practice as a guide. IDEST officers and members or working parties can accept no proportion of responsibility or legal liability for the consequences of use, or misuse, of this Code of Practice.
- Much of the operation of this Code of Practice is based on experience, expertise, and judgment. If others need to make decisions that directly affect the operation of the Code of Practice this should be well documented as a company operating procedure and made available to technicians and inspectors.
- Rules that are applied to the workplace under statute law and local by-law must be applied in conjunction with the Code of Practice. This Code does not attempt to override your legal obligation to carry out those duties.
- Nothing in the Code of Practice shall be deemed to override manufacturer's requirements, proper supervision, and safe working practices or to replace the need for sound judgement by trained and qualified personnel.

- The code outlines the areas that need particular attention and those areas where further reading is needed, equipment purchased, or further training needed
  - It provides for one class of Cylinder Test Technician, which shall be: Certified Competent Person who can undertake full inspection and testing with the provisions of the above standards.
  - An individual who only in accordance has undergone a personal inspection by IDEST in order to ensure they conform with the requirements of this code of practice.

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## 2 TEST CENTRE ORGANISATION

- 2.1 There must be a suitably marked area for the safe discharge of gas from cylinders
- 2.2 There must be a receiving area and a bench area for working on the cylinders and valves with facilities for safe handling of all cylinder sizes to be inspected in the test centre. This should be treated as a "quarantine" area for work not completed and not to be released by other staff.
- 2.3 There must be an area for carrying out the hydrostatic testing of cylinders, safely, with access to and drainage for clean ("filtered") water.
- 2.4 There shall be a clean area for the servicing of cylinder valves.

### 3 PERSONNEL

- 3.1 A hierarchical organisation structure shall be in place, with personnel undergoing suitably correct training methods by a competent person or organisation, to enable them to carry out the required working in a responsible and safe manner.
- 3.2 Further training shall be carried out as required to keep abreast of new standards and practices.
- 3.3 A record of this training shall be kept for each technician. Certificates of competence should be displayed in the test centre.
- 3.4 A check on each technician(s) eyesight by a qualified optician at periods not greater than annually, will be required to comply with the scheme. A copy of the optician's certificate must be kept in their personnel file. All technicians must be able to show that their visual acuity can meet the standard 6/6 with correction if necessary



## 4 EQUIPMENT

The following equipment shall be required:

- 4.1 Personal Protective Equipment (PPE) shall be used, i.e. safety shoes, ear defenders, gloves and goggles/full facemask.
- 4.2 There shall be equipment, or a dedicated area, for enabling the safe discharge of gas from a full/partially full cylinder. This area should have warning notices clearly displayed
- 4.3 A method of clamping and immobilising the cylinder that does not mark it.
- 4.4 Equipment for emptying a cylinder with a blocked or damaged valve.
- 4.5 Equipment for checking a cylinder is empty.
- 4.6 A wire brush or similar device used to clean threads without the removal of metal.
- 4.7 Equipment such as a dial gauge or an ultrasonic thickness/test meter for measurement of any external defects. The instruments calibration must be seen to be checked before commencement of any thickness measurement.
- 4.8 Equipment to enable the valve to be removed safely and without damage.
- 4.9 Equipment for removal of debris, loose paint, old labels etc. from the external wall of a cylinder.
- 4.10 Lint free cloths or wipes to enable threads to be cleaned of dirt, oil, or other extraneous matter.
- 4.11 Are there facilities for in house internal cleaning of cylinders.
- 4.12 Equipment for illuminating and viewing the internals of a cylinder, safely, for inspection purposes.

- 4.13 Equipment for the external cleaning, if required, prior to inspection. If external contractors are used, letters of confirmation of standards to which internal/external cleaning will be carried out.
- 4.14 Equipment for measurement of any internal defects such as picks and cards or an Ultrasonic Thickness/Test meter for measurement of any external defects. The instrument calibration must be seen to be checked before commencement of any thickness measurement.
- 4.15 Equipment for measuring the depth of internal defects
- 4.16 Thread gauges to check both the valve and cylinder threads, the calibration of which is traceable to internationally accepted standards i.e. CIPM MRA. This can be assured by using a UKAS calibration laboratory or other ILAC calibration laboratory outside of the UK.
- 4.17 An acceptable method of measuring the coatings on cylinders manufactured to HOT standards if within the test centre's scope of work.
- 4.18 Scales to measure tare weight if within the test centres scope of work
- 4.19 Either a hydraulic test rig manufactured to comply with the requirements of, and capable of, testing cylinders in accordance with the relevant standards, (preferred method) or access to a non-volumetric test rig.
- 4.19.1 The rig must have a device fitted that can prevent the test pressure being exceeded by 10 bar or 3% whichever is the lower.
- 4.19.2 If Proof Testing is used it must conform to the requirements above, in addition a protective screen is required with transparent windows so that the test procedure can be viewed by the technician.
- 4.20 Pressure gauges manufactured and maintained in accordance with BS EN 837 or the superseded BS 1780 part 2 1971 Industry Class 1. Digital gauges with a performance level that exceeds the above requirement may be used but will need to comply with regards to calibration.

- 4.21 A chart to show results of increasing and decreasing comparison readings of the working gauge with the master gauge must be provided. It shall be visible from both gauges. These comparisons shall be carried out at a frequency of once a month. For Class 1, the total errors of indication at reference temperature 20 °C of the working gauge shall not exceed +/- 1% percentage of span. The master gauge should be calibrated to CIPM MRA. This can be assured by using a UKAS calibration laboratory or in the case of overseas test centres ILAC approved calibration laboratories, that are accredited for the relevant testing.
- 4.22 An acceptable method for crack testing in cylinders manufactured from Aluminium alloy AA6351 if within the test centre's scope of work.
- 4.23 A clearly visible and audible timing device guaranteed to cover the period specified by the relevant Standard for the cylinder to be under pressure.
- 4.24 Suitable facilities for handling and draining cylinders after completion of test.
- 4.25 Suitable temperature-controlled equipment to dry the cylinders after a hydraulic test.
- 4.26 General equipment/tools & manufacturers' spares to enable the valve to be dis-assembled and re-assembled.
- 4.27 Cleaning equipment, such as an ultrasonic bath, or other system, to enable valves to be cleaned satisfactorily.
- 4.28 A calibrated Torque wrench to enable the valves to be refitted with the correct Torque to the cylinder.
- 4.29 Metal letter and number punches to enable the permanent marking of the shoulder of the cylinder as specified by the relevant Standard.
- 4.30 A stamp carrying the unique IDEST registration symbol/code as an identifier of the "Test Centre" or appropriate resin and labels for composite cylinders.

## 5 ACCURACY AND CALIBRATION

- 5.19 The master Pressure gauge are equal to or better than required by BS EN 837 and have been calibrated within the calibration periods listed and are in date.
- 5.20 The working gauge has been compared with the master gauge during the last month and a comparison chart produced and is on display adjacent to the test rig.
- 5.21 Scales have been calibrated (if within the scope of test centre).
- 5.22 Coating thickness meter is serviceable and can maintain calibration (if within the scope of centre).
- 5.23 All items that require calibration will be sent to an ILAC or UKAS accredited test laboratory only calibration certification to BS EN ISO 17025 will be accepted.
- 5.24 Periodicity of calibrations. A list indicating the Items requiring calibration and the period between their calibration.

## 6 DOCUMENTATION

All documentation, except standards and manufacturers' drawings, to be on Test Centre headed notepaper.

- 6.1 A copy of the completed Booking in form for the cylinder that the technician being assessed will complete the test procedure on. This form must contain sufficient information to enable the technician to make a sound risk-based assessment of future inspection and test strategy. A statement that the customer agrees to the destruction of cylinder in the event of failure, must be included and signed by the customer
- 6.2 A copy of the test centre's work-sheet completed during the technician's assessment. This should contain sufficient information to positively link it to both the booking in form and to the test certificate and must contain a list of tasks performed and what the results were, and contain a list of additional quality assurance steps were taken
- 6.3 A copy of the test certificate issued on completion of the inspection/ test
- 6.4 Set of the relevant standards required to comply with the BS applicable to the cylinder being tested.
- 6.5 Drawings of the types of cylinders to be inspected.
- 6.6 Drawings of types of valves to be inspected.
- 6.7 List of workshop equipment and inspection dates for all equipment as required.
- 6.8 Folder with "in date" calibration certificates for all thread gauges, pressure gauges and torque wrench (s) to be used.
- 6.9 Folder with previous year's master/working gauge comparison sheets.
- 6.10 Written procedures of how to carry out all the steps required to safely inspect cylinders as specified by the relevant BS for the cylinder type being inspected.

- 6.11 Documents to show destruction method of failed cylinders and valves.
- 6.12 Recording of inspection results and all other documents, by hardcopy (and/or if desired, electronic means, if backed up) for a mandatory period of 6 years.
- 6.13 Personal records for each Technician showing initial training by competent person/organisation and any subsequent training.
- 6.14 A document showing the test centre's customer relations and/or complaints policies.
- 6.15 A document confirming monthly checks on all general equipment used.

## 7 PROCEDURES

There must evidence that there is a suitable booking-in system and creation of a job worksheet for use with each cylinder tested.

- 7.1 A suitable booking-in form must be used to record the relevant cylinder and customer details. A job number will be entered onto this form. Centre personnel receiving the cylinder must ensure that the destruction section is completed, signed for and a receipt issued.
- 7.2 Details of the cylinder and valve must be recorded on a worksheet with the assigned job number and details of the work to be carried out.
- 7.3 The inspector must confirm that the technician is competent to complete the work within the scope through a practical demonstration of their skills. A record will be kept by the inspector as outlined in Section 8 that follows.

## 8 PRACTICAL ASSESSMENT

A practical assessment will be made, by the inspector, of each test centre technician in the following aspects:

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- 8.0 Eyesight; technician has passed an eye check within the last 1 years from a qualified optician.
- 8.1 Booking-in procedure.
- 8.2 risk-based assessment procedure.
- 8.3 Confirmation that the cylinder is empty.
- 8.4 Examination of exterior surface.
- 8.5 Removal of the cylinder valve.
- 8.6 Stripping of the cylinder valve, checking of threads and examination of valve component parts.
- 8.7 The checking of cylinder threads.
- 8.8 Internal examination of the cylinder.
- 8.9 The safe operation of the test rig.
- 8.10 The conduct of a hydraulic test, proof test or volumetric test, as appropriate.
- 8.11 Removal of the cylinder from the test rig, emptying and drying.
- 8.12 Cleaning of cylinder valve, rebuild and use of manufacturer's servicing kits.
- 8.13 The refitting of the cylinder valve and applying the appropriate torque.
- 8.14 The correct stamping and labelling of the tested cylinder.
- 8.15 The satisfactory completion of the work sheet and Booking-in Form, to include confirmation that a leak test has been done.
- 8.16 The completion and issue of an appropriate test certificate.
- 8.17 Supply of photocopies of the documents used during the testing of the cylinder.



8.18 Provision of photographic evidence of the following:

- premises' frontage
- test area
- technician

## 9 FAULTS, DEFICIENCIES AND ACTIONS

- 9.1 The inspector must provide a list of defects, deficiencies, and actions to be corrected. Notification of completion to be given to the inspector before approval can be recommended.
- 9.2 The inspector can also provide general comments about the set-up or systems, which are not required as a condition of approval.
- 9.3 The faults, deficiencies, and actions page (D022) must be dated and signed by the inspector and the technician being assessed.
- 9.4 A copy of this page must be provided (or immediately sent) to the technician

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