

## RG 2

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# Accreditation for In-Service Inspection of Pressure Systems/Equipment

## Contents

1. Introduction	2
2. Scope - Inspection Services Covered by RG 2	3
3. Personnel	3
4. Training	4
5. Inspection Methods and Procedures	4
6. Subcontracting	5
References	6
Appendix 1 - Qualification Categories	8
Table 1 - Requirements for Qualifications and Supervision of Inspectors Performing Inspection of Pressure Systems	9

## Changes since last edition

ISO/IEC 17020 clauses referenced in document aligned with ISO/IEC 17020:2012 edition. Reference documents updated to latest revision. UKAS Guidance RG 7 replaced by EA-4/15 G.

### 1. Introduction

- 1.1 This publication has been produced by the United Kingdom Accreditation Service (UKAS) in conjunction with the UKAS Technical Advisory Committee for Engineering Inspection. It provides guidance to those requirements in ISO/IEC 17020 *Conformity assessment - Requirements for the operation of various types of bodies performing inspection* which need interpretation when applied by Inspection Bodies carrying out in-service inspection of pressure systems/pressure equipment. ISO/IEC 17020, as applied by UKAS in accordance with ILAC P15, remains the authoritative publication in cases of dispute or differences in interpretation.
- 1.2 The terms used in this publication have been drawn from ISO/IEC 17020 or defined within this publication. Where specific terms are drawn from other documents, such as the Pressure Systems Safety Regulations 2000 (PSSR), reference is made to those documents.
- 1.3 For the purposes of this publication the term **Inspection Body** shall be taken to mean an accredited Inspection Body.
- 1.4 For the purposes of this document the term pressure system/pressure equipment can also be taken to mean process systems/process equipment falling outwith PSSR.
- 1.5 Guidance for non-destructive testing performed by an Inspection Body to support the inspection of pressure systems/equipment is provided in EA-4/15 G *Accreditation for Non-Destructive Testing*.

## 2. Scope - Inspection Services Covered by RG 2

- 2.1 This publication covers the accreditation of in-service inspection of equipment operated under pressure or vacuum including all (mechanical, electrical and electronic) protective devices. It excludes prime movers and driven machines.
- 2.2 Accreditation of Inspection Bodies that develop and certify written schemes of examination for in-service inspection of pressure systems under PSSR or other relevant legislation may also be covered by this publication for that specific scope.
- 2.3 The pressure systems referred to in this publication will form part of installed or mobile plant including components that are temporarily attached to it and forming an integral part of that operational entity.
- 2.4 The field of in-service inspection for which accreditation is granted may be described in the accreditation schedule as major, intermediate, minor pressure systems as defined in Pressure Systems Safety Regulations 2000, Approved Code of Practice - L122 (Second edition) or by specific reference to the equipment (e.g. boilers, autoclaves etc).
- 2.5 The following activities can be included in the scope of accreditation for Inspection Bodies carrying out in-service inspections of pressure systems/equipment:
- (a) Development and certification of written schemes of examination;
  - (b) Examination of equipment to detect actual and potential defects and making judgements on the significance of such defects in the maintenance of fitness for purpose;
  - (c) Reporting the result of the examination and to specify any remedial action and/or recommendations;
  - (d) Commenting on the suitability of and any changes necessary to inspection methods/written schemes of examination/safe operating limits.

## 3. Personnel (ISO/IEC 17020 Clause 6.1)

- 3.1 The Inspection Body shall demonstrate that it has identified the competences required to undertake the range of inspection activities covered by its scope of accreditation and that it has processes in place to train, assess and monitor staff against those competences. UKAS Publication RG 0 *Guidelines on the Competence of Personnel Undertaking Engineering Inspections* provides a framework for a competence management system for inspection bodies. The qualification categories in Appendix 1 of this publication may also be used to develop competence criteria for inspection and supervision of inspection of pressure systems /equipment.
- 3.2 The Inspection Body shall have sufficient number of permanent management personnel with suitable experience in the design, manufacture, inspection, operation or maintenance of pressure systems and their parts, and have the technical knowledge to make professional judgements on the range of safety related problems likely to arise from the accredited scope of inspection.

Such personnel shall be knowledgeable in the:

- (a) Problems likely to arise from the declared processes or mechanical conditions;
- (b) Mechanical design standards for pressure equipment;
- (c) Likely problems associated with various processes and fluids involved;
- (d) Effects of operating conditions on the mechanical integrity of systems including interactions with upstream and downstream plant;
- (e) Relevant legislative requirements and associated codes of practice; and
- (f) Inspection techniques associated with pressure systems/equipment.

3.5 The Inspection Body shall only use staff to carry out inspections of pressure systems/equipment that have the necessary competence for the inspections to be carried out. The Inspection Body shall maintain records of qualifications, training and experience, and records to show how, and when, each member of staff was issued authorisation to perform specific examination and testing activities. These records shall, as a minimum, indicate the type of pressure systems/equipment as defined in Table 1 in Appendix 1 of this publication considered to be within the competence of the staff.

3.6 Where the Inspection Body personnel carry out calibration or specialised types of testing (e.g. NDT or Metallurgical testing) in connection with the inspection of pressure systems, records of their training, qualifications and experience shall be maintained. The Inspection Body shall also record details of who is authorised to perform specific calibrations or tests and to evaluate the results obtained.

#### **4. Training (ISO/IEC 17020 Clause 6.1.3)**

4.1 The training provided by the Inspection Body shall provide a working knowledge of the plant, equipment and systems including design construction, operation, maintenance, significance of defects, typical problem areas and associated method of rectification.

4.2 The training shall include the safe conduct of the inspectors' duties, in particular safe practices applicable to pressure systems such as proper isolation of pressurised connections, certificates to enter confined spaces, permit to work systems, permit to use naked lights and similar safe methods.

#### **5. Inspection Methods and Procedures (ISO/IEC 17020 Clauses 7.1.2, 7.1.3, 7.1.4)**

5.1 The procedures and instructions used to develop/certify written schemes of examinations and inspection of pressure systems/equipment shall detail how the Inspection Body interprets and applies the appropriate regulations, codes of practice, standards, guidance documents and customer requirements.

5.2 Where risk-based inspection (RBI) techniques are used to establish the nature and frequency of inspections, the Inspection Body shall document the techniques used in procedures including a demonstrable justification for using the technique.

- 5.3 Reporting requirements including statutory requirements for reporting imminent danger shall be detailed in procedures.
- 5.4 Codes, Standards and other technical literature applicable to the design, construction, operation, inspection and repair of pressure systems and their components within the accredited scope shall be maintained up to date and be readily available to the staff.

## **6. Subcontracting (ISO/IEC 17020 Clause 6.3)**

- 6.1 Where the Inspection Body uses results of specialised testing techniques supplied by other organisations (e.g. Subcontractors) for making judgements on the integrity of the pressure system/equipment or for inclusion in inspection reports, the Inspection Body shall be able to demonstrate the competence of the testing organisation.
- 6.2 Inspection Bodies should endeavour to use results supplied by organisations that hold accreditation for those tests to ISO/IEC 17025 from an accreditation body that is an ILAC MRA signatory (e.g. UKAS).
- 6.3 Where the subcontractor is not an accredited organisation, the Inspection Body shall demonstrate that its subcontractors are competent in accordance with guidance provided in section 6.3 of ILAC P15.

## References

This list is not exhaustive, but the main legislation, standards, specifications and trade association codes pertinent to this document are listed below.

### 1 UK Legislation and Associated Codes of Practice and Guidance

- Statutory Instrument 2000 No 128 Pressure Systems Safety Regulations 2000
- Safety of Pressure Systems, Pressure Systems Safety Regulations 2000, Approved Code of Practice - L122 (Second edition)
- Written Schemes of Examination, Pressure Systems Safety Regulations 2000 - INDG 178 (2<sup>nd</sup> Revised edition)
- Pressure Systems - Safety and You - INDG 261
- HSE INDG 436 Safe Management of Industrial Steam and Hot Water Boilers
- BG01 Guidance on Safe Operation of Boilers
- Steam boiler blowdown systems - PM 60
- Guidelines for Users and Competent Persons Refrigeration Systems PSG 17
- Safety requirements for autoclaves - PM73
- Safety in Pressure Testing GS4 (Fourth Edition)
- A guide to the Health and Safety at Work etc Act 1974 - L1
- A guide to the Pipelines Safety Regulations 1996. Guidance on Regulations - L82
- Safe use of work equipment - PUWER 98 Approved Code of Practice and Guidance - L22
- Approved Code of Practice, Safe work in confined spaces. Confined Spaces Regulations 1997. Regulations and Guidance - L101
- Compressed Air Safety - HSG 39

### 2 Relevant EU Directives and Associated UK Legislation

- Pressure Equipment Directive 2014/68/EU
  - Statutory Instrument 2016 No. 1105 The Pressure Equipment (Safety) Regulations 2016
- Simple Pressure Vessel Directive 2014/29/EU
  - Statutory Instrument 2016 No. 1092 The Simple Pressure Vessels (Safety) Regulations 2016

### 3 Standards and Related Documents

- ISO/IEC 17020:2012 Conformity assessment - Requirements for the operation of various types of bodies performing inspection
- ILAC P15:07/2016 Application of ISO/IEC 17020:2012 for the Accreditation of Inspection Bodies
- ILAC P10:01/2013 ILAC Policy on Traceability of Measurement Results
- ILAC-G27:06/2017 Guidance on measurements performed as part of an inspection process
- ISO 9712:2012 Non-destructive testing - Qualification and certification of NDT personnel
- EA-4/15 G:2015 Accreditation for Non-Destructive Testing

#### 4 Industry Guidance/Publications

- Safety Assessment Federation (SAFed) PSG1 Pressure Systems: Guidelines on Periodicity of Examinations
- Joint HSE/CEA/SAFed Guidance BG01 Safe Operation of Boilers
- Safety Assessment Federation (SAFed) PSG3 Guidelines for the Operation of Hot Water Boilers
- Safety Assessment Federation (SAFed) PSG4 Guidelines for the Production of Written Schemes of Examination and the Examination of Pressure Vessels Incorporating Openings to Facilitate Ready Internal Access
- Safety Assessment Federation (SAFed) SBG1 Shell Boilers: Guidelines for the Examination of Shell-to Endplate and Furnace-to Endplate Welded Joints
- Safety Assessment Federation (SAFed) SBG2 Shell Boilers: Guidelines for the Examination of Longitudinal Seams of Shell Boilers
- Engineering Equipment and Materials Users Association (EEMUA) Publication 159, Users' Guide to the Inspection, Maintenance and Repair of Above Ground Flat Bottomed Storage Tanks
- Engineering Equipment and Materials Users Association (EEMUA) Publication 188, Guide for Establishing Operating Periods for Safety Valves
- Engineering Equipment and Materials Users Association (EEMUA) Publication 193, Managing competence assurance for personnel undertaking in-service inspection of pressure equipment
- Engineering Equipment and Materials Users Association (EEMUA) Publication 195, Compendium of EEMUA Information Sheets on Topics Related to Pressure Containing Equipment
- Energy Institute/Institute of Petroleum, Model Code of Safe Practice Part 12: Pressure vessel examination
- Energy Institute/Institute of Petroleum, Model Code of Safe Practice Part 13: Pressure piping systems examination
- LP Gas Association (LPGA), Code of Practice 1, Bulk LPG Storage at Fixed Installations: Part 3: Examination and Inspection
- LP Gas Association (LPGA), Code of Practice 14 Hoses for the Transfer of LPG in Bulk. Installation, Inspection, Testing and Maintenance
- UKLPG User Information Sheet 015 Inspection and Maintenance of LPG Pipework at Commercial and Industrial Premises
- British Compressed Gases Association (BCGA) Code of Practice 39 - In-service requirements of pressure equipment (gas storage and gas distribution systems)

## Appendix 1 - Qualification Categories

**Category 1.** Chartered Engineer as defined by the Engineering Council or equivalent (e.g. appropriate degree with relevant experience, NVQ Level V Engineering) including at least 3 years' experience within an engineering discipline associated with in-service inspection of pressure systems.

**Category 2.** Incorporated Engineer as defined by Engineering Council or equivalent (e.g. appropriate HNC with relevant experience, NVQ Level IV Engineering) including at least 5 years' experience within a relevant engineering discipline of which at least one year\*\* shall have been spent working within an engineering discipline associated with in-service inspection of pressure systems.

**Category 3.** Engineering Technician as defined by Engineering Council or equivalent (e.g. appropriate ONC with relevant experience, NVQ Level III) having a minimum of 5 years' experience within a relevant discipline of which at least one year shall have been spent working within an engineering discipline associated with the in-service inspection of pressure systems or,

**Category 4.** Person trained\* in a relevant engineering discipline with a recognised and documented engineering apprenticeship with a minimum of 5 years' experience within a relevant discipline of which at least one year shall have been spent working within an engineering discipline associated with the in-service inspection of pressure systems.

**Category 5.** Person with less than tradesman's apprenticeship but with a minimum of 5 years\*\*\* spent working with or within the industry associated with pressure systems and has general knowledge of pressure systems and its operating environment. Personnel shall be placed on recognised training courses with appropriate documented tests in in-service inspection of pressure systems. The minimum age for this Category is 21 years.

\* Persons in Categories 4 and 5 shall pass a qualifying test, established by the Inspection Body, associated with the particular inspection activities relating to pressure systems/equipment and this should cover relevant knowledge of the law, codes of practice and inspection techniques.

\*\* Where a person meets the minimum requirement for a specific discipline and is to be trained in a second discipline, it may not be necessary to have experience of at least one year in the second discipline provided that the required competence can be demonstrated.

\*\*\*For some routine, well-monitored activities this period may not be necessary.



**Table 1 - Requirements for Qualifications and Supervision of Inspectors Performing Inspection of Pressure Systems**

Pressure System	Qualification Category	Supervision	Constraints
Major systems (including steam)	1	Occasional	Inspection or associated activities in technology outside the field of competence is prohibited except by formally documented consultation.
	2	Occasional	The above constraint plus prohibition on any non-routine repairs, modifications, changes to operating parameters, changes to inspection methods, calculations not defined in recognised standards except with specific approval by an appropriately qualified person. (e.g. Metallurgist, Designer, Process Engineer)
	3	Occasional	Permitted only for testing and examination to identify defects, within the limits specified by Category 1 or 2 person. Any decisions involving limits of acceptability, repairs or modifications shall be approved by authorised persons qualified to Category 1 or 2.
Intermediate systems (excluding steam)	1, 2, 3	Occasional	Same constraints as for major systems stated above for respective categories.
	4, 5	Frequent	Permitted only for carrying out routine, repetitive and well-defined examinations on a specific range of storage installations.
Intermediate systems (steam only)	1, 2, 3	Occasional	Same constraints as for major systems stated above for respective categories.
Minor systems (excluding steam and pipelines)	1, 2	Occasional	Same constraints as for major systems stated above for respective categories.
	3	Occasional	Same constraint as for Category 2 person stated above under major systems.
	4	Frequent	Same constraint as for category 3 persons stated above under major pressure systems.
	5	Frequent	Permitted only for carrying out routine, repetitive and well-defined examinations on a specific range of storage installations.
Minor systems (steam only)	1, 2	Occasional	Same constraints as for major systems stated above for respective categories.
	3	Occasional	Same constraint as for Category 2 person stated above under major systems.
	4	Frequent	Same constraint as for Category 3 persons stated above under major pressure systems.

### **Definition of Supervision**

**Occasional** - Formal, direct contact to review work with Supervisor at least annually. More frequent direct contact with Supervisor may be necessary. Authoritative technical support from personnel qualified to Category 1 or 2 to be readily available. For example, an Inspector working from home who has little direct contact with his Head Office.

**Frequent** - Direct contact with Supervisor at least weekly. Authoritative technical support from personnel qualified to Category 1, 2 or 3. For example, an Inspector whose work is based from a depot or office where the Supervisor is available.

**Definition of Pressure Systems** - Definitions of major, intermediate and minor pressure systems are given in HSE's Approved Code of Practice Reference L122, which accompanies PSSR.

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