
	<b>Accreditation Criteria for In-service Inspection of Pressure Systems/Equipments</b>	G-24/06 Issue Date: 08/07/08 Rev No: 00
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## 1. Introduction

- 1.1 This document has been produced by the Pakistan National Accreditation Council (PNAC) in conjunction with the PNAC Sectoral Committee for Inspection Bodies. It provides guidance to those requirements in ISO/IEC 17020 and Agreement between PNAC & IBs (F-01/13) that need interpretation when applied by Inspection Bodies carrying out in-service inspection of pressure systems / pressure equipment. It does not cover all of the requirements of ISO/IEC 17020-*General criteria for the operation of various types of bodies performing inspection* and Agreement between PNAC & IBs (F-01/13). Inspection Bodies are reminded of the need to comply with all of the requirements in these documents. Appeals concerning interpretation will be considered in accordance with the PNAC Appeals Procedure. Other PNAC documents may be referred to where relevant.
- 1.2 Non destructive testing performed by an Inspection Body to support the inspection of pressure systems / equipment covered by this document shall also be required to comply with the requirements specified in G-24/04 (Accreditation Criteria for Inspection Bodies Performing Non- Destructive Testing).
- 1.3 Accreditation of Inspection Bodies against the requirements of ISO/IEC 17020 and this document is intended to assist owners / users of pressure systems / equipment in the selection of inspection bodies to perform in-service inspections.
- 1.4 For the purposes of this document the term Inspection Body shall be taken to mean an accredited inspection body.

## 2 INSPECTION SERVICES COVERED BY (ISO/IEC 17020 CLAUSE 3.3)

- 2.1 This document 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 examination of transportable pressure receptacles at test stations is covered in another PNAC document (G-24/07).
- 2.3 The pressure systems referred to in this document 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 section 6.9 of this document or by specific reference to the equipment (e.g. boilers, autoclaves etc.).
- 2.5 When an Inspection Body accredited under this document provides inspection, the service may include the following:
  - a. development and certification of written schemes of examination;
  - b. examination of equipment to detect actual and potential defects and making judgments 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;

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- d. Commenting on the suitability of and any changes necessary to inspection methods/ written schemes of examination / safe operating limits.

**3. INDEPENDENCE, IMPARTIALITY AND INTEGRITY, (ISO/IEC 17020 CLAUSE 4)**

- 3.1 Inspection Bodies operating as Type A, B or C bodies as defined in ISO/IEC 17020 may be accredited for in- service inspection of pressure systems / equipment.
- 3.2 Organizational structure of Type B and/or Type C Inspection Bodies shall be such that the Inspection Body's management shall not report directly to the operational management responsible for the day to day operation of those pressure systems / equipment to be inspected.

**4.0 ORGANISATION AND MANAGEMENT- SUPERVISION, (ISO/IEC 17020 CLAUSES 6.4)**

- 4.1 For the inspection of pressure systems / equipment the requirements for supervision shown in Table 1 of this document shall be met.

**5. INTERNAL AUDIT, (ISO/IEC 17020 CLAUSE 7.7 AND 7.8)**


- 5.1 The internal audit programme shall include provision to include the on-site witnessing of inspections. Sections 6.4d and 6.4e of IAF/ILAC-A4: 2004 refer.

**6. PERSONNEL, (ISO/IEC 17020 CLAUSE 8)**

- 6.1 For major and intermediate pressure systems the Inspection Body shall have sufficient number of permanent management personnel of Graduate Engineer as defined by the Pakistan Engineering Council or equivalent level (e.g. appropriate degree with relevant experience) as defined in 6.7. They should have experience in the combined or single activities with design, manufacture, inspection, operation or maintenance of pressure systems and their parts with the technical knowledge to make professional judgments 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;
  - f). inspection techniques associated with pressure systems / equipment.
- 6.2 For minor pressure systems the Inspection Body shall have sufficient number of permanent management personnel of category 2 or equivalent level. They should have experience in the combined or single activities with design, manufacture, inspection, operation or maintenance of pressure systems and their parts with the technical knowledge to make professional judgments on the range of safety related problems likely to arise from minor pressure systems.
- 6.3 If staff are used to perform non-destructive testing in support of the inspection of pressure systems / equipment the Inspection Body shall be able to demonstrate that staff engaged in NDT of pressure systems / equipment have been trained and examined in accordance with a documented programme.

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- 6.4 The Inspection Body shall only use staff to carry out inspections of pressure systems /equipment who have the qualifications, training, experience and knowledge of the requirements of the inspections to be carried out. The Inspection Body shall maintain records of such qualifications, training and experience, and records to show how, and when, each member of staff was issued authorization 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 of this document considered to be within the competence of the staff.
- 6.5 The Inspection Body shall ensure that it only authorizes staff to carry out inspections of pressure systems/ equipment covered by this document if the inspections are within the designated competence of the staff and if the staff hold the Category of qualification shown in Table 1 and defined in Clause 6.7.
- 6.6 Where the staff of the Inspection Body carry out calibration or specialized types of testing such as NDT or Metallurgical testing, in connection with the inspection of pressure systems / equipment, records of their training, qualifications and experience shall be maintained together with details of who is authorized to perform specific calibrations or tests and to evaluate the results obtained.

6.7 Qualification categories:

- Category 1.** Graduate Engineer holding membership of Pakistan Engineering Council (PEC) with at least 4 years experience in a relevant engineering discipline of which at least two years shall have been spent working in an engineering discipline associated with the in-service inspection of pressure systems.
- Category 2.** Bachelor of technology from respective Board of Technical Education with at least 5 years experience in a relevant engineering discipline of which at least two years shall have been spent working within an engineering discipline associated with in-service inspection of pressure systems.
- Category 3.** Person having three years diploma of Associate Engineers as defined by PEC with at least 6 years of experience in a relevant engineering discipline of which at least three years shall have been spent working in an engineering discipline associated with in-service inspection of pressure systems.
- Category 4.** Person having two years vocational technical training as defined by PEC with at least 7 years of experience in a relevant engineering discipline of which at least three years shall have been spent working in an engineering discipline associated with in-service inspection of pressure systems.
- Category 5.** Person having three years apprenticeship training as defined by PEC with at least 9 years of experience in a relevant engineering discipline of which at least 5 years shall have been spent working in an engineering discipline associated with in-service inspection of pressure systems.
- Category 6.** Person employed prior to the date of application for accreditation in the inspection of pressure systems with less than tradesman's apprenticeship but having minimum Matriculation qualification with a minimum of 10 years spent working with an industry associated with relevant field of inspection and has knowledge of relevant field of inspection and its operating environment.

*Note 1: All qualifications shall be from Higher Education Commission (HEC), Inter Board Committee Chairman (IBCC) & Board of Technical Education approved Universities, Colleges & Institutes.*

*Note 2: The persons from category 1-6 shall have training on relevant standard including the ISO/IEC 17020.*




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**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 recognized 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 authorized 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.

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	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

## 6.8 Definition of supervision

### 6.8.1 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.

### 6.8.2 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.

## 6.9 Definition of Pressure System

Definition of major, intermediate and minor pressure system are given in HSE's Approved Code of Practice Reference L122, which accompanies PSSR or defined any where in the relevant legislative and associated codes of practice.

## 7.0 TRAINING, (ISO/IEC 17020 CLAUSE 8.2)


- 7.1 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.
- 7.2 The training shall include the safe conduct of the inspector practices applicable to pressure systems such as proper isolation of pressurized connections, certificates to enter confined spaces, permit to work systems, permit to use naked lights and similar safe methods.

## 8.0 FACILITIES & EQUIPMENT, (ISO/IEC 17020 CLAUSE 9)

- 8.1 The facilities and equipment used for safety valve testing, pressure testing, non destructive testing or any other testing where the results are critical to the conclusion of the examination shall comply with the relevant requirements of ISO/IEC 17020 and IAF/ILAC-A4: 2004 in respect of suitability, identification, maintenance, calibration status and traceability to national or international standards.

## 9 INSPECTION METHODS AND PROCEDURES, (ISO/IEC 17020 CLAUSE 10.2, 10.3, 10.4)

- 9.1 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.

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- 9.2 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.
- 9.3 Preparation and approval of non-destructive testing methods used by the Inspection Body shall comply with appropriate requirements of G-24/04.
- 9.4 Reporting requirements including statutory requirements for reporting imminent danger shall be detailed in procedures.
- 9.5 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.

## **10 SUB-CONTRACTING, (ISO/IEC 17020 CLAUSE 14 AND IAF/ILAC A4:2004 CLAUSE 14)**

- 10.1 Where the Inspection Body uses results of tests including non destructive testing, supplied by other organizations (e.g. Sub Contractors) for making judgments 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 organization.
- 10.2 Where the Inspection Body sub contracts certain specialized activities they shall have access to personnel sufficiently knowledgeable in those technical activities being subcontracted, to be able to:
- a. define the problem adequately to enable the sub contractor to offer appropriate services, personnel and equipment;
  - b. choose an appropriate sub contractor and to assess its technical competence (e.g. methods, personnel and facilities);
  - c. interpret the results supplied by the sub contractor and relate those results properly to the service originally requested or problem originally defined.
- 10.3 Inspection Body shall be responsible for all sub-contracted parts of inspection.

### **1.0 REFERENCES**

- I. ISO/IEC 17020, *General Criteria for the Operation of Various Types of Bodies Performing Inspection*
- II. IAF/ILAC-A4: 2004, *Guidance on the Application of ISO/IEC 17020*
- III. G-24/04-*Accreditation Criteria for Non-Destructive Testing Laboratories*