

"FINAL DRAFT PUNJAB PRESSURE VESSELS REGULATIONS 2018"

Definitions:

Board means Punjab Boiler and Pressure Vessels safety Board.

Board of Examination means a board constituted by the Government for conducting examination for boiler engineers.

Competency Certificate means a certificate of competency issued by the Board of examination in prescribed format.

Code means ASME Boiler and Pressure Vessel Code, International code 2017 section VIII; updated time to time Rules for construction of pressure vessels or as approved by board.

Department means Department of industries, Commerce & Investment, Government of the Punjab.

Inspection authority means an agency approved by Board to carry out inspection of boilers and pressure vessels.

Inspection code means Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, and Alteration, API 510

Technician means a person who possesses good knowledge and experience of pressure vessels employed to look after its safe operation.

Pressure Vessel means a vessel, categorized as such in the rules installed in industrial units, in which pressure is obtained from an external source, or by the application of heat from a direct or indirect source other than boilers and generally contains fluid(s) with 15 psi or more is identified as a Pressure vessel.

NDT means Non-destructive testing procedure to test properties of pressure vessels.

Pressure Vessel Regulations

1. Standards for Design, Construction, Installation, Alteration and Repair:

- 1.1 All pressure vessels designed and constructed within the country will be according to the code as amended from time to time.
- 1.2 All pressure vessels imported to the country from anywhere will be according to codes/ standards of the country of origin where those were designed and manufactured with certification from the relevant organization.

1


Dy Chief Inspector of Boilers (Punjab)
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- 1.3 All pressure vessels designed and manufactured within or outside country according to any code will be called standard pressure vessels and any pressure vessel designed and manufacturing without taking into account any code will be called non-standard pressure vessel.

2. Identification and categorization of Pressure vessel:

2.1 A pressure vessel which bears the stamp of a code is a standard pressure vessel.

2.2 A pressure vessel that does not bear a stamp of a code is a non-standard pressure vessel.

2.3 Following are categories of Pressure vessels:

Sr. No.	Category	Minimum Capacity (liters)
A	Compressed Air receivers	100
B	Oxygen receiving tanks	40
C	Deaerator	300
D	Blow down tanks	100
E	CO ₂ tanks	100
F	Hydrogen Storage tanks	40
G	De-sulfurizing tanks	100
H	Urea Reactors	300
I	Thermo Oil Heaters/ Boilers	100
J	Any other approved by the Board	As per situation

3. Duration and Frequency of Inspection

3.1. Registration and inspection of pressure vessels is a mandatory requirement according to the provisions of Section-7 & 8 of the Ordinance. It includes inspections at all stages of manufacturing and also throughout their life cycle. A standard pressure vessel must have gone through the recommended tests and checks at the time of installation.

3.2. The owner of the pressure vessel is required to submit all necessary documents for the purpose of registration.

3.3. A pressure vessel must be inspected as following:

Item	Internal/On-stream Inspection Frequency	External Inspection Frequency
Compressed Air receivers	3 years	3 years
Oxygen receiving tanks	3	3
Deaerator	5	5
Blow down tanks	3	3
CO ₂ tanks	3	3
Hydrogen Storage tanks	5	5
De-sulfurizing tanks	5	5
Urea Reactors	3	3
Thermo-Oil Heaters/ Boilers	Annually	Annually
Any other approved by the Board	Will be decided as when required	Will be decided as when required

If the owner holds a valid certificate of authorization for a quality management system that applies to the pressure vessel, at the frequency specified in the quality management system.

3.4. The owner/user will contact the inspector / inspection authority one month prior to expiry of existing inspection certificate. The inspector / inspection authority will notify the date of inspection at least 7 days prior to inspection. The owner/user will be responsible to prepare each pressure vessel for inspection and perform the hydrostatic or pressure test. The preparation steps are as under:

- a) Complete removal of the filled fluid and thorough cleaning of the vessel
- b) Cooling of any source of heat and high temperature parts to room temperature
 - i. Removal of manhole and handhole plates, washout plugs and inspection plugs, as required by the inspector
 - ii. Removal of any insulation/lining to determine the condition of the part behind it, as required by the inspector

- iii. Removal of the pressure gauges for testing, as required by the inspector / inspection authority.
 - c) Prevention/stoppage of leakage of the fluid by an appropriate method, as required by the inspector
 - d) Making foolproof arrangements to make sure that there is no chance of any type of fluid supply during the process of inspection.
 - e) Affording all reasonable facilities for the purpose of inspection.
- 3.5. If a pressure vessel has not been properly prepared for inspection, or if the owner/user fails to comply with the requirements for a pressure test, as desired by the inspector / inspection authority, the inspector / inspection authority may decline to make the inspection or test and the inspection certificate shall be withheld or right-to-revoked, until the owner or user complies with the requirements.

The owner/user will meet all necessary requirements before re-applying for inspection. A fresh fee will be payable at the time of re-application.

- 3.6. The inspector / inspection authority will examine the drawings, design calculations, and specification control by:
- a) Verifying that all applicable design drawings, specifications, and instructions for each job, including revisions, are complete and accurately reflect the requirements imposed by the recommended code for the work to be performed.
 - b) Verifying that design calculations for each job are complete and meet the requirements of the recommended and the Certificate Holder's quality program.

c) Verifying that design calculations for each job are on file and available for review.

3.7. The inspector / inspection authority will examine the material specifications by:

a) Verifying that only specified material stated in the code is used.

b) Verifying that material is identified, documented, and remains traceable in accordance with the Certificate Holder's quality program and code requirements.

c) Verifying code-required documentation for material (partial data reports, material test reports, Certificate of Conformance) is available for review for each job. The inspector / inspection authority shall review material test reports, and/or other materials documentation required by the code to ensure the code compliance.

d) Reviewing and accepting the method and extent of material defect/repairs, prior to work being performed.

3.8. The inspector / inspection authority will perform pressure vessel inspection and examination by:

a) Designating inspection points at stages of construction that will provide meaningful results to verify code and quality program requirements are met.

b) Performing inspections at designated inspection points.

c) Performing internal inspections whenever access permits and when required by the code. When access is not afforded based on design, the inspector / inspection authority shall use other means to verify code compliance including the use of mirrors or fiber optics.

- d) Performing all external inspections to verify code compliance.
- e) Witnessing all pressure tests and proof tests as required by the code.

3.9. The inspector / inspection authority will examine the welding of the pressure vessel by:

- a) Verifying that welding/brazing procedure specifications, procedure qualification records, and welder/welding operator qualifications (including continuity records) are in compliance with Code requirements.
- b) Verifying welds are made using qualified procedures and qualified personnel. Verify that welders and welding operators are properly qualified for the welds being performed.
- c) Verifying, as appropriate, that the method and extent of weld repairs to welds and base material are in compliance with code requirements.
- d) Verifying, as appropriate, that weld joint preparation is in compliance with design and welding documents and code requirements.
- e) Verifying completed welds comply with code requirements.

3.10. The inspector / inspection authority will verify that only calibrated examination, measurement, and testing equipment are utilized during construction and that such equipment meets the requirements of the Certificate Holder's quality program.

3.11. The inspector / inspection authority will verify the heat treatment and nondestructive examination by:

- a) Verifying all Code-required heat treatment and nondestructive examinations are performed using accepted/approved procedures. Nondestructive examination procedures shall be demonstrated to the satisfaction of the Inspector / inspection authority.
- b) Verifying nondestructive examination personnel are qualified as required by Code and the Certificate Holder's quality program.
- c) Verifying nondestructive examination reports meet Code requirements.

3.12. The inspector / inspection authority will review and accept non-conformance dispositions and verify corrective actions performed. He will also, verify that non-conformances (NCRs) are closed in accordance with the Certificate Holder's quality program.

3.13. The inspector / inspection authority will verify that all records are complete, accurate, maintained, and retained as required by Code and the Certificate Holder's quality program.

3.14. The inspector / inspection authority will issue certification and stamping by:

- a) Verifying that the Certificate Holder's representative has accurately completed and certified the Manufacturer's Data Report form prior to inspector / inspection authority certification.
- b) Verifying that all Code requirements have been met before authorizing code symbol stamping.

7




- c) Verifying that the stamping meets code, is correct, and has been applied to the correct item, including proper attachment of nameplates.

4. Determination of Fee for inspection and its disposal.

- 4.1 Pressure vessels can be inspected for registration and/or renewal of registration either by Govt. Inspector or by Inspection authority.
- 4.2 The department will charge fee from the owner/user of a vessel as prescribed by the Board from time to time, in case inspection is carried out by the department.
- 4.3 Owner/user of pressure vessels can also get their vessels inspected by Inspection authority as per his own requirement. In that case the inspection fee will be agreed mutually between Owner/user and Inspection Authority. Inspector of Inspection authority shall submit a copy of inspection certificate to the department.

5. Method of Identification of Already Installed Pressure Vessel

- 5.1. To qualify as a standard pressure vessel, it is a mandatory code requirement for each vessel to be labelled with a certified nameplate, carrying information about maximum allowable working pressure (internal/external), working temperature, manufacturer's name, address and serial number, year of build, certification authority.
- 5.2. An operator's manual should also accompany a standard pressure vessel, yielding information such as capacity, type of fluid for which vessel is designed and manufactured, and standard operating procedures of the pressure vessel.
- 5.3. A vessel with pressure rating of 15 PSI or above is categorized as a pressure vessel installed in the industrial units, and is subject to abide by all the rules and regulations applicable to pressure vessels.

- 5.4. If a pressure vessel is not labelled with a certified nameplate, it will be categorized as a non-standard pressure vessel.
- 5.5. If a pressure vessel does not accompany necessary documents and certificates mentioned in various sections of pressure vessel regulations, it will be categorized as a non-standard pressure vessel. Any act of tampering a nameplate will be violation of ordinance, rules and will be treated under legal jurisdiction.
- 5.6. Non-standard pressure vessels shall be re-evaluated for its fitness and residual life by the Inspection authority.
- 5.7. Upon successful and satisfactory completion of these requirement, the inspector shall submit the report to the chief inspector of boilers for registration and shall certify the pressure vessel as a standard pressure, that is, authorized to operate at specified conditions.

6. Materials and Manufacturing requirements for Maximum allowable working pressure:

- 6.1 Material, manufacturing and all related requirements to determine maximum allowable working pressure for standard pressure vessels will be determined in accordance with the applicable provisions of ASME if designed and manufactured within country and for those pressure vessels which are imported from other countries will be in accordance with the relevant internationally accepted standard/code from where a pressure vessel is imported.
- 6.2 The maximum allowable working pressure of a nonstandard pressure vessel shall be determined by the strength of the weakest section computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint, the inside diameter of the course, and the factor of safety set by these rules.

$$\frac{TStE}{RFS} = \text{maximum allowable working pressure, psig}$$

where:

TS = specified minimum tensile strength of shell plate material, psi (When the tensile strength of carbon steel plate is not known, it may be taken as 55,000 psi for temperatures not

exceeding 650°F. For other materials, use the lowest stress values for that material from Section VIII of the ASME Code.)

t = minimum thickness of shell plate of weakest course, inches

E = efficiency of longitudinal joint depending upon construction

Use the following values: for riveted joints – calculated riveted efficiency;

for fusion welded and brazed joints.

	Percentage
Single lap weld	40
Double lap weld	50
Single butt weld	60
Double butt weld	70
Forge weld	70
Brazed steel	80

R = Inside radius of weakest course of shell (inches) provided the thickness does not exceed 10 percent of the radius. If the thickness is over 10 percent of the radius, the outer radius shall be used

FS = factor of safety allowed by these rules

- B. The minimum factor of safety shall in no case be less than 5 for existing installations. The working pressure shall be decreased when deemed necessary by the inspector to ensure the operation of the vessel within safe limits. The condition of the vessel and the particular service to which it is subject will be the determining factors.
- C. The maximum allowable working pressure permitted for formed heads under pressure shall be determined by using the appropriate formulas from ASME Code Section VIII, Div. 1, and the tensile strength and factors of safety given in Paragraphs EPV-1 and EPV-2(A) and (B).
- D. The maximum allowable working pressure for nonstandard pressure vessels subjected to external pressure shall be determined by the rules of Section VIII, Div.1, of the ASME Code.
- 7. **Qualification, Skills, and experience of attendant/ operational staff/ technician.**

Any organizations having/using pressure vessel shall have a full time technician with a minimum educational qualification of matric, two year

experience and good understanding of operation and inspection of pressure vessels.

8. **Criteria and procedure for registration of manufacturer of boilers and pressure vessels.**

8.1 No individual or company shall engage in the business of designing, constructing, installing, altering or repairing boilers and pressure vessels, fittings, pressure piping systems unless he/it holds a valid manufacturer license issued by the Punjab Boilers and pressure vessels safety Board.

8.2 A manufacturer may be granted a license, upon applying and making prescribed payment to the department if it holds a valid manufacturer's license issued by any internationally accepted body engaged in boilers and pressure vessel standard/code (e.g; ASME, API, ISO, JIS, GB etc.)

Or

A manufacturer may be granted a license by the Punjab Boilers and pressure vessels safety Board upon application from a manufacturer. The application must provide details of the scope of the work being carried out by the manufacturer. All activities carried out by the manufacturer should be in compliance with ASME code Section VIII provisions as updated time to time.

8.3 A manufacturer may first be granted a provisional and then regular manufacturing license.

8.4 A manufacturer who wants to be recognized as boilers and pressure vessels manufacturer shall first apply to the board with following documents:

- a. Application on letter head.
- b. CNIC copy of owner
- c. Company registration (individual, partnership etc.)
- d. List of manufacturing equipments available
- e. Technical Staff list
- f. Registration certificate with chamber of commerce.
- g. catalogue, brochures of company providing company details of activities.
- h. Pakistan Engineering Council registration
- i. License processing fee
- j. boilers and Pressure vessel codes

8.5 The Board may submit all documents to CIB to access status of applicant establishment and will report to the Board within 15 days.

- 8.6 After receiving report from CIB, the Board may form a committee of minimum 3 members taken from the Board for physical checking/ inspection of establishment. On receipt of the committee report, the chairman may recognize provisionally or refuse under intimation to the applicant within 15 days.
- 8.7 Provisional license may be valid only for manufacturing of 5 boilers or 25 pressure vessels, after which, the applicant shall apply to the Board for inspection submitting following documents:
- Complete files of boilers or pressure vessels manufactured by the applicant
 - satisfaction report by the purchaser
 - Quality control plan during manufacturing of boilers and pressure vessels.
 - CV of engineers, technicians, designers, welders and other related staff.
- 8.9 After receiving application, the Board will constitute a 3 member committee to re-evaluate the whole manufacturing process from material procurement to product delivery. The committee may also visit/ inspect minimum 2 boiler or 5 pressure vessels manufactured by the applicant and will submit a final report to the chairman of the Board who may recognize permanently as pressure vessel manufacturer or extend the provisional license or refuse to recognize the manufacturer.
- 8.10 In case of any complaint/irregularity pointed out on the part of any provisional or regular license holder manufacturer, the Board shall form a committee comprising of three members to investigate complaint/ irregularity. The committee will provide an opportunity of defense to the manufacturer and will submit a report to the Board which may withdraw provisional/ regular license or allow the manufacturer with or without any recommendation.

9. Minimum Safety Requirements for Safe Operation of Pressure Vessels

- 9.1 The materials used for manufacturing the pressurized parts of the vessel must be—
- capable of being welded;
 - ductile and tough, so that a rupture at minimum working temperature does not give rise to either fragmentation or brittle-type fracture;

(c) not adversely affected by ageing.

9.2 For steel vessels, the material must in addition meet the requirements mentioned in sub-section 9.4 and for aluminum or aluminum-alloy vessels, those set out in sub-section 9.5.

9.3 The materials must be accompanied by an inspection slip as defined in paragraph 21(b) of Schedule 2, drawn up by the producer of the materials.

9.4 Non-alloy quality steels must meet the following requirements—

- (a) they must be non-effervescent and supplied after normalization treatment, or in an equivalent state;
- (b) the content per product of carbon must be less than 0.25% and that of sulphur and phosphorous must each be less than 0.05%
- (c) they must have the following mechanical properties per product—
 - (i) the maximum tensile strength R_m , max must be less than 580 N/mm²;
 - (ii) the elongation after fracture must be:
 - if test pieces are taken parallel to the direction of rolling:
 - thickness ≥ 3 mm: $A \geq 22\%$,
 - thickness < 3 mm: $A_{80\text{ mm}} \geq 17\%$,
 - or, if test pieces are taken perpendicular to the direction of rolling:
 - thickness ≥ 3 mm: $A \geq 20\%$,
 - thickness < 3 mm: $A_{80\text{ mm}} \geq 15\%$,

Where,

"A" means elongation after fracture ($L_0 \leq 5.65\sqrt{S_0}$) in %;

" $A_{80\text{ mm}}$ " means elongation after fracture ($L_0 = 80\text{ mm}$) in %;

"KCV" means bending rupture energy in J/cm^2

" $R_{m, \text{max}}$ " means maximum tensile strength in N/mm^2

- (iii) the average bending rupture energy (KCV) for three longitudinal test pieces at minimum working temperature must not be less than 35 J/cm^2 . Not more than one of the three figures may be less than 35 J/cm^2 , with a minimum of 25 J/cm^2 . In the case of steels intended to be used in the manufacture of vessels the minimum working temperature of which is lower than -10°C and the wall thickness of which exceeds 5 mm , this property must be checked.

9.5(1) Non-alloy aluminum must have an aluminum content of at least 99.5% and the alloys referred to in regulation 2(1)(b) (interpretation) must display adequate resistance to inter crystalline corrosion at maximum working temperature.

(2) Moreover, these materials must satisfy the following requirements—

- (a) they must be supplied in an annealed state;
- (b) they must have the following mechanical characteristics per product—
- (i) the maximum tensile strength $R_{m, \text{max}}$ must be no more than 350 N/mm^2 ,
- (ii) the elongation after fracture must be—
- $A \geq 16\%$ if the test piece is taken parallel to the direction of rolling;
- $A \geq 14\%$ if the test piece is taken perpendicular to the direction of rolling.

The welding materials used to manufacture the welds on or of the vessel must be appropriate to and compatible with the materials to be welded.

9.6(1) Accessories contributing to the strength of the vessel (for example bolts and nuts) must be made—

- (a) of a material specified in paragraphs 2 to 6; or
- (b) of other kinds of steel, aluminum or an appropriate aluminum-alloy compatible with materials used for the manufacture of pressurized parts.

(2) The materials referred to in sub-paragraph (1)(b) must, at minimum working temperature, have an appropriate elongation after fracture and bending rupture energy.

9.7 All unpressurised parts of welded vessels must be of materials which are compatible with that of the components to which they are welded.

9.8(1) A manufacturer must, when designing a vessel, define the use to which it will be put, and select—

- (a) the minimum working temperature T_{min} ;
- (b) the maximum working temperature T_{max} ; and
- (c) the maximum working pressure PS.

(2) Where a minimum working temperature exceeding -10°C is selected, the qualities required of the materials must be satisfied at -10°C .

9.9 A manufacturer must also take account of the following provisions—

- (a) it must be possible to inspect the inside of vessels;
- (b) it must be possible to drain the vessels;

- (c) the mechanical qualities must be maintained throughout the period of use of the vessel for the intended purpose;
- (d) the vessels must, bearing in mind their prescribed use, be adequately protected against corrosion.

9.10 A manufacturer must take account of the fact that under the conditions of use envisaged—

- (a) the vessels must not be subjected to stress likely to impair their safety in use;
- (b) internal pressure must not permanently exceed the maximum working pressure PS. However, it may momentarily do so by up to 10%.

9.11 Circumferential and longitudinal seams must be made using full penetration welds or welds of equivalent effectiveness and convex ends, other than hemispherical ones, must have a cylindrical edge.

9.12 (1) If the product of PS x V is not more than 3 000 bar.L, the manufacturer must select one of the methods described in paragraphs 16 (calculation method) and 17 (experimental method) for determining vessel wall thickness.

(2) If the product of PS x V is more than 3 000 bar.L, or if the maximum working temperature exceeds 100°C, such thickness must be determined by the method described in paragraph 16 (calculation method).

(3) The actual wall thickness of the cylindrical section and ends must, however, be not less than 2 mm in the case of steel vessels and not less than 3 mm in the case of aluminum or aluminum alloy vessels.

9.13 (1) The minimum thickness of pressurized parts must be calculated having regard to the intensity of the stresses and to the following provisions---

- (a) the calculation pressure to be taken into account must not be less than the maximum working pressure P_S selected;
- (b) the permissible general membrane stress must not exceed the lower of the values $0.6 R_{eT}$ or $0.3 R_m$ and the manufacturer must use the R_{eT} and R_m minimum values guaranteed by the producer of the material in order to determine the permissible stress.

Where

" R_{eT} " means the yield strength in N/mm^2 , which is the value at the maximum working temperature T_{max} of any of the following—

- (i) the upper yield point R_{eT1} in N/mm^2 , for a material with both a lower and an upper yield point;
- (ii) the 0.2% proof strength $R_{p0.2}$ in N/mm^2 ;
- (iii) the 1.0% proof strength $R_{p1.0}$ in N/mm^2 , in the case of non-alloy aluminum;

" R_m " means tensile strength in N/mm^2 .

- (2) Where the cylindrical portion of the vessel has one or more longitudinal welds made using a non-automatic welding process, the thickness calculated as referred to in subparagraph (1) must be multiplied by the coefficient 1.15.

9.14 Wall thickness must be so determined as to enable the vessels to resist at ambient temperature a pressure equal to at least five times the maximum working pressure, with a permanent circumferential deformation factor of no more than 1%.

- 9.15 Vessels must be constructed and subjected to production checks in accordance with code.
- 9.16 Preparation of the component parts (for example forming and chamfering) must not give rise to surface defects or cracks or changes in the mechanical characteristics likely to be detrimental to the safety of the vessels.
- 9.17 The characteristics of welds and adjacent zones must be similar to those of the welded materials and must be free of any surface or internal defects detrimental to the safety of the vessels.
- 9.18 Welds must be performed by qualified welders or operators possessing the appropriate level of competence, in accordance with approved welding processes, where
- (a) "qualified" means qualified by means of tests carried out by a notified body; and
 - (b) "approved" means approved by a notified body.
- 9.19 The manufacturer must also, during manufacture, ensure consistent weld quality by conducting appropriate tests using adequate procedures. These tests must be the subject of a report.
- 9.20 Vessels must be accompanied by the instructions and safety information. The owner will write Standard Operating Procedure (SOP) with the help of operator manual, get it approved by the inspector, and mount it on a prominent place near the pressure vessel.
- 9.21 Least requirement of safety devices is as under:
- Mechanical relief valves: 02
 - Pressure switch: 01



Temperature gauges: 02

Pressure gauges: 02

Gauge glass

10. **Quality Management System:**

10.1 An organization having a pressure vessel is recommended to prepare a manual that sets out in detail the quality management system that it proposes to implement.

10.2 The quality manual must contain:

- (a) a title page and table of contents;
- (b) an organization chart that identifies all positions involved in the quality management system and the reporting relationships to senior management with respect to the quality management system;
- (c) a statement, signed by the most senior official at the site, that describes the authority of the person who is responsible for the implementation of the quality management system to carry out those responsibilities;
- (d) a description of the qualifications and responsibilities of the inspection personnel and other persons involved with the administration of the quality management system;
- (e) a comprehensive list and description of the equipment to which the quality management system applies and the location of the equipment.

10.3 A quality management system must include a system for preparing, revising, approving and controlling documents and data required to implement the quality management system.

10.4 A quality management system must include a system for calibrating and controlling the accuracy of equipment used in any measurements or tests to be carried out as part of any inspection process.

10.5 A quality management system must include a system for the inspection of new pressure equipment and its installation to ensure that the requirements of any applicable standard are met before the equipment is put into service.

- 10.6 A quality management system must include a system for servicing pressure relief devices at regular intervals and governing the removal and replacement of pressure relief devices. The system required must include a system for establishing safe maximum intervals for the servicing of pressure relief devices.
- 10.7 A quality management system must include a system for the periodic inspection of any pressure equipment in service to ensure that the equipment continues to meet the requirements of any applicable standard while it is in service.
- 10.8 A quality management system must include a system for the inspection of any pressure equipment that has been repaired or altered to ensure that the repaired or altered equipment meets the requirements of any applicable standard before it is put back into service.
- 10.9 A quality management system must include procedures for rectifying any problem found as a result of the operation of the quality management system or otherwise or any non-conformity with an applicable standard and preventing the recurrence of any similar problem or non-conformity.
- 10.10 A quality management system must include a system for ensuring that personnel who perform activities that are part of the quality management system have adequate training.
- 10.11 A quality management system must include a system for conducting an internal audit of the quality management system from time to time by designated persons to verify the effectiveness of the quality management system.

11. Criteria and qualification of outsourcing inspection / registration of pressure vessels.

- 11.1 Inspection of Pressure vessel can be outsourced to an organization which can carry out inspection according to inspection Code. The inspection agency shall report to the department in the form of inspection reports to provide details of the pressure vessels inspected who may register the pressure vessels upon recommendation of inspection agency.
- 11.2 Every retired Chief Inspector, Deputy Chief Inspector and Inspector of Boilers having 10 years experience is empowered to work as Inspection Authority.
- 11.3 The Inspection Agency shall have no commercial interest in pressure vessels to be inspected. Its staff shall be free from or

commercial, financial, and other pressures that might influence their judgment or the results of their work.

11.4 The inspection agency applying for recognition should have following:

- a. permanent office in Punjab
- b. be engaged in performing shop or field inspections for quality control of materials, design and construction of pressure vessels.
- c. be equipped with computers for design appraisals and be staffed with qualified engineers and technicians
- d. a suitably equipped workshop for preparing metallurgical samples for tests according to requirements of inspection code.
- e. a laboratory in Punjab for carrying out tensile, bending, elongation and other specified tests for determining physical strength of materials required in the code and for NDT of materials and weldments. It should possess two types of equipment for laboratory and field use (ultrasonic thickness meter, flaw detector, hardness tester etc.). The agency should have collaboration with any well-known laboratory in Pakistan or abroad for carrying out comprehensive testing for chemical and mechanical properties of materials and for NDT testing of materials.
- f. should have documentation center where updated national/ international codes and specifications for inspection and testing of pressure vessels be available.

11.5 A documented Quality Program shall be established, implemented, and maintained by inspection Agency which shall provide for the planning, control, and accomplishment of activities affecting the quality of Inspection Agency's implementation of duties and activities. The quality program should include different components like Organization, Program Description, Document Control, Training, Records management, Corrective Actions etc.

11.6 The Inspection Agency shall provide inspection services through Inspectors who meet the following qualifications.

- a. A Bachelor of Science degree in engineering or technology, plus Two year of experience in supervision of inspection activities.

- b. A three-year DAE diploma in engineering or technology and 1st Class Boiler Engineer plus two years of experience in the design, construction, repair, inspection, or operation of pressure vessels.
- 11.7 Any organization which wants to be recognized as an inspecting agency shall apply to the Board with following documents:-
- Application on letter head.
 - CNIC copy of owner
 - List of manufacturing equipment available
 - Technical Staff list
 - Registration certificate with chamber of commerce (optional)
 - catalogue, brochures of company providing company details of activities.
 - Pakistan Engineering Council registration (optional)
 - Inspection agency registration processing fee
 - Pressure vessel code
- 11.8 The Board shall form a committee of a minimum of 3 members for physical checking/ inspection of the establishment which will submit a report to the Board which may recognize provisionally an agency to work as an inspection agency.
- 11.9 After satisfactory completion of certification of a minimum of 25 boilers and/or pressure vessels. An inspection agency may apply for a regular recognition to the Board. The Board will form a committee of at least 3 members for physical checking/ inspection of inspection agency for its working procedures. On receipt of the report of the committee, the Board may recognize inspection agency as regular inspection agency.
- 11.10 In case of any irregularity, mis-conduct or gross negligence reporting from anywhere against an inspection agency, the Board will form a committee of a minimum of 3 members to investigate in the matter. The committee shall afford reasonable opportunity to inspection agency to explain its position and shall submit a report to the Board which will be discussed in a general meeting in which majority of members will decide the matter on merit. The Board may withdraw the recognition of inspection agency temporarily/ permanently or allow the agency to continue working as inspection agency.

12. Proposed options for conducting examination of boiler engineers.

- 12.1 The Department (Industries, Commerce & Investment) shall constitute a Board of Examination for examining boiler engineers. Which consist of a chairman and the following:-



- a. The chief inspector of boilers
- b. One member from Thermal Power House industry having B.Sc. Mechanical Engg. Degree and at least 15 years of high capacity & high pressure boilers.
- c. One member having sound knowledge of Boilers with minimum 15-years relevant experience and author of at least three books / publications in professional journals regarding boilers.
- d. One member from retired / serving chief inspector or deputy chief inspectors of boilers provided he possesses BSc Engg degree or equivalent.
- e. The Director General Industries, Prices, Weights and Measures, Punjab shall be the chairman and the Chief Inspector of Boiler shall be the secretary of board of examination.
- f. The chairman of the Board shall fill any vacancy of the member of the Board of examination which may fall vacant temporarily.
- g. The decision will be made in the Board of examination with a quorum of at least 3 members.

12.2 The Board of examination shall:

- a. conduct the examination of boiler engineers competency certificates consisting of four papers and practical tests and any such other examinations as determined by the Punjab Boilers and pressure vessels safety Board of examination.
- b. Prescribe courses of study for its examination.
- c. Outline conditions for admission for its examination.
- d. Determine eligibility of candidates and to admit them to such examinations.
- e. Grant certificate of competency to successful candidates.
- f. Receive examination fee as prescribed by the Board of examination.
- g. Determine the equivalence of certificates of boiler engineers obtained from other provinces or abroad.
- h. Has power to appoint a panel of experts as question paper setter, assessor/ examiner for any examination.



- 12.3 The question paper setter, assessor and examiner will be entitled to remuneration for their services as determined by the Board of examination time to time.
- 12.4 The Board of examination may register suitable institutes for the purpose of preparation and skills development of boiler engineers examination candidates according to the syllabus prescribed. The candidates who successfully complete syllabus credit hours shall be given appropriate relaxation in the service period requirement for the respective examination. The Board of examination shall prepare criteria and procedure for the registration of institutes.
- 12.5 The Punjab Boilers and Pressure vessel Safety Board is empowered to make regulations regarding the conduct of examination, fee for examination and its disposal, subjects/ question papers for examination, eligibility criteria for competency of boiler engineer or technician pressure vessel technicians, Board's bank account, annual report and any other matter related thereto.
- 12.6 The Board of examination is empowered to regulate its own procedures and conduct of all business to be transacted by it, the constitution of committees and sub-committees of members and the delegation to them of any of powers and duties of the Board of examination.
- 12.7 Any person aggrieved of the decision of the Board of examination may file review appeal before the Board of examination.
- 12.8 Any appeal against the final decision of the Board of examination may be filed in the Punjab Boilers and pressure vessels safety board.

Dy Chief Inspector of Boilers (Punjab)
Directorate General
Industries, Prices, Weights & Measures

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(Prof Dr Tauseef Aized)
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