

**FIFTH EXAMINATION FOR RECOGNITION OF
COMPETENT PERSONS FOR
INSPECTION & CERTIFICATION OF BOILERS**

16th DECEMBER 2018 (Sunday)



CENTRAL BOILERS BOARD
Ministry of Commerce and Industry
(Department of Industrial Policy and Promotion) Govt.
of India,
New Delhi.



Dr. Ambedkar Institute of Productivity
National Productivity Council
6, Aavin Dairy Road,
Ambattur Industrial Estate North, Ambattur,
Chennai – 600 050



**Secretary
Central Boilers Board
Ministry of Commerce and Industry
(Department of Industrial Policy
and Promotion)
Government of India, New Delhi.**

Foreword

The Indian Boilers Act was enacted in 1923 mainly to provide for safety of life and property from the danger of explosion of boilers and for achieving uniformity in registration and inspection during operation and maintenance of boilers throughout the country. Since then there had been no major amendments to the Act. The legislation required changes in consonance with the evolving developments and changes in the technology of fabrication, operation, testing and inspection of boilers.

The Indian Boilers (amendment) Act, 2007 which was passed in December, 2007, has introduced improvements in the provisions of the law to enhance safety norms, to ensure uniformity in standards of inspection, expediting inspections and reducing bureaucratic delays by decentralization of inspection of boilers during their manufacture, erection and use, by allowing inspection and certification by the independent inspecting authorities.

Notification containing regulations for implementing many provisions of the amendment Act including for implementing the inspection by the third party inspecting authorities and competent persons has been published in the Gazette of India on 7th October, 2010.

As per regulations notified on 7th October, 2010, four examinations were conducted on 24th April 2011, 7th October 2012, 11th October 2015 & 20th August 2017 respectively for recognition of competent persons for undertaking inspections & certification of boilers during manufacture, erection and use by the third party inspecting authorities in India. The fifth examination is scheduled on **16th December 2018**.

Central Boilers Board (CBB), Government of India has authorized National Productivity Council (NPC) to conduct the fifth examination for competent persons.

I invite you to register for the fifth examination for recognition of competent persons and wish you all very best for your success in the Examination.

T.S.G. Narayannen

S.NO	CONTENTS	PAGE
1	BACKGROUND	4
2	PROCEDURE FOR RECOGNITION OF COMPETENT PERSONS	4
3	CONDUCT OF A EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS	9
4	ELIGIBILITY CRITERIA FOR APPEARING IN THE EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS	9
5	SYLLABUS/CURRICULUM FOR THE EXAMINATION FOR COMPETENT PERSONS	10
6	REQUIREMENTS FOR PASSING THE EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS	11
7	EXAMINATION CENTRES	12
8	REFERENCE BOOKS FOR OPEN BOOK EXAMINATION	13
9	REGISTRATION PROCESS	13
10	ROLE OF NPC	13
11	CONDITIONS AND INSTRUCTIONS TO THE CANDIDATES	14
12	LIST OF ENCLOSURES TO BE ATTACHED WITH THE APPLICATION	16
13	ANNEXURE – 1 - SYLLABUS	17

1.0 BACKGROUND:

As per the Boilers Act, 1923 and the Indian Boiler Regulations, 1950 framed therein, a provision has been made for inspection and certification of boilers and boiler components during manufacture, erection & use in India by Inspecting Authorities recognized by the Central Boilers Board and for this purpose the Inspecting Authority in India is required to engage Competent Persons recognized by the Central Boilers Board (CBB). However, Competent Persons can undertake inspection and certification of boilers during use independently also without taking employment with the Inspecting Authority.

Central Boilers Board (CBB), Government of India has authorized National Productivity Council (NPC) to conduct the fifth examination for recognition of Competent Persons.

2.0 PROCEDURE FOR RECOGNITION OF COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS:

(1) Introduction:-

(a) This regulation provides the requirements for the uniform qualification, examination, issuance and renewal of Central Boiler Board authorisation to act as a competent person;

(b) Candidates meeting these requirements may be qualified to be issued a Central Boilers Board authorisation;

(c) Competent persons may be allowed to inspect and certify the boilers under the Boilers Act during manufacture, erection, operation and maintenance throughout India.

(2) Minimum qualifications and experience:-

(a) Must be a graduate in Mechanical or Production or Power plant or Metallurgical Engineering from a recognized institution; and

(b) Minimum five years post qualification experience singly or cumulatively in the following fields related to boilers,-

- (i) Design;
- (ii) Manufacture;
- (iii) Commissioning;
- (iv) Operation and maintenance;
- (v) Inspection and certification during manufacture or operation and maintenance;
- (vi) High Pressure Welding-Inspection;

and

- (c) Valid Level-II NDT Certificates from ISNT or any other professional body recognised by ISNT in Non Destructive methods of testing in radiography and ultrasonic testing.

(3) Central Boilers Board Examination Process:

- (i) an examination shall be conducted by the Central Boilers Board Examination Standing Committee or an agency or Regional Examination Standing Committees authorised by it, as per the following methods namely:-
 - (a) Written Examination consisting of design, manufacture, operation and maintenance of the boiler, Non Destructive Testing Techniques, inspection and certification of boilers during manufacture and use as per Indian Boiler Regulations;
 - (b) Viva-voce on the above (30 % weightage shall be given for viva-voce);
 - (c) The Central Boiler Board will issue a passing grade certificate to the candidate after passing the examination;
 - (d) Candidate shall secure at least 60 % marks in written examination (minimum 45% marks shall be required in each paper with aggregate of minimum 60 % in two papers) as well as viva-voce in order to pass the examination;
- (ii) application for appearing in the Central Boiler Board Examination Process shall be made in the format as provided by the Central Boilers Board Examination Standing Committee at such place and time as decided by the Central Boilers Board Examination Standing Committee or an agency or Regional Examination Standing Committees authorised by it.

(4) Central Boilers Board Authorisation Process:-

- (i) the Competent Person shall perform the work without conflict of interest;
- (ii) an applicant for a Central Boiler Board Authorisation shall meet the following requirements, namely:-
 - (a) the applicant shall be in regular employment of, and exclusively engaged by a Central Boilers Board recognised Inspecting Authority:
Provided that for inspection and certification of boilers during use under section 8 of the Boilers Act, 1923, applicant can work independently also without taking employment with the Central Boilers Board recognised Inspecting Authority;
 - (b) the applicant shall meet the minimum qualification and experience requirements as referred in sub-regulation 2 of this regulation;
 - (c) the applicant shall have taken and passed the Central Boilers Board examination as referred to in sub-regulation 3 of this regulation;
 - (d) the applicant shall apply for an authorisation not later than three years after passing the Central Boilers Board Examination and a person whose authorisation has not been issued within the three year period shall be required to take the Central Boiler Board Examination and receive a passing grade; and
 - (e) the maximum age for the Competent Person shall be sixty-five years provided the person is medically fit;
- (iii) (a) when the applicant has met the eligibility requirements as referred to in clause (ii) of sub-regulation 4 and at the request of the applicants employer; a Central Boilers Board authorisation card and a certificate shall be issued:

Provided that the request for authorisation card, only for undertaking inspection and certification of boilers during use under section 8 of the Boilers Act, 1923, can also be made by the applicant;

- (b) the application for an authorisation shall be on forms obtained from the Central Boilers Board; and
- (c) a Competent Person may possess only one valid authorisation card;
- (iv) (a) the validity of an authorisation certificate shall be three years from the date of issue or in co-terminus with the validity period of

recognition of employing Inspecting Authority (wherever applicable), whichever is earlier;

- (b) for undertaking inspection and certification of boilers during manufacture and erection, the Competent Person must be in regular employment of the Central Boiler Board recognised Inspecting Authority failing which the authorisation lapses;
- (c) where the Competent Person leaves the employment, Central Boilers Board Authorisation Card shall be surrendered by the Inspecting Authority to the Secretary, Central Boilers Board within a period of seven days from the date of such leave;
- (d) the request for renewal shall be made by Competent Persons employer and the request shall certify that the Competent Person maintained inspection proficiency by performing or supervising inspection activity and that the individual has met the continuing updation requirement as laid down in clause (f) of this sub-regulation:

Provided that request for renewal of authorisation, only for undertaking inspection and certification of boilers during use under section 8 of the Boilers Act, 1923, can also be made by the Competent Person, giving details of inspections undertaken in the last three years and confirming that he has met the continuing updating requirement as given in clause (f) of this sub-regulation;

- (e) on change of employment, a request for authorisation card shall be made by the Competent Persons current employer on forms obtained from the Central Boilers Board;
- (f) each Central Boilers Board authorised Competent Person, at least once every three years, shall either attend a Central Boilers Board seminar or receive other instruction related to inspections and the instruction may be in any format, e.g., classroom, home study, or web-based; the topics may include any subject of relevance to the inspection process, such as new methods, products, materials, technology or changes to construction or repair codes;
- (g) a person whose authorisation has not been renewed for five years or less may, on proper application, have the authorisation reinstated;
- (h) the employer or Competent Person, if working independently, as the case may be, shall provide verification of continuing updation as mentioned in clause (f) ; and

- (i) a person whose authorisation has not been renewed for more than five years shall be required to take the Central Boilers Board Examination and receive a passing grade;
- (v) (a) a Central Boilers Board authorisation may be revoked by the Secretary, Central Boilers Board for falsification of any statement contained in any application however the person may request reconsideration by the Secretary, Central Boilers Board;
- (b) when an evaluation reveals that a Central Boilers Board authorised Competent Person has been negligent in his duty or has made false statements on forms used for documentation of his duties, a Central Boilers Board Committee formed for the purpose may examine the evaluation and recommend to the Secretary, Central Boilers Board, a suitable action against such Competent Person. The Secretary, Central Boilers Board shall take the final decision;
- (c) if any person is aggrieved by a decision of the Secretary, Central Boilers Board, he may prefer an appeal against such decision within thirty days from the date of the decision, to the Central Boilers Board;
- (d) the decision of the Central Boilers Board shall be binding; and
- (e) any person aggrieved by,-
 - (i) an order made or purported to be made by a Competent Person in the exercise of any power conferred by or under the Act; or
 - (ii) a refusal of a Competent Person to make any order or to issue any certificate which he is required or enabled by or under the Act to make or issue;May, within thirty days from the date on which such order or refusal is communicated to him, prefer an appeal against the order or refusal, to the Chief Inspector of Boilers of the State in which the boiler is located;
- (vi) fee fixed by the Central Boiler Board Examination Standing Committee shall be paid for each authorisation issued, renewed or reinstated.

3.0 CONDUCT OF A EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS:

Central Boilers Board (CBB) has nominated National Productivity Council (NPC) as the Agency to conduct the examination for competent person.

The fifth examination for recognition of competent persons will be held on 16th December, 2018. The examination would be conducted for two papers viz. paper 1 & 2 and viva-voce would be held subsequently for those who qualify in the examination.

4.0 ELIGIBILITY CRITERIA FOR APPEARING IN THE EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS:

(a) Must be a graduate in Mechanical (or) Production (or) Power Plant (or) Metallurgical Engineering from a recognized institution.

(b) Minimum five years of post-qualification experience singly or cumulatively in the following fields related to boilers,-

- (i) Design
- (ii) Manufacture
- (iii) Commissioning
- (iv) Operation and Maintenance
- (v) Inspection and certification during manufacture or operation and Maintenance
- (vi) High Pressure Welding-Inspection

(c) Valid Level-II NDT Certificates (both during application cut-off date and during viva-voce) from ISNT or any other professional body recognized by ISNT in Non Destructive methods of testing in radiography and ultrasonic testing.

Note: (1) Applicants employed in Central Govt. / State Govt. / PSU's have to inform their employer in writing before applying and proof of the same to be submitted along with the application.

- (2) Maximum age for the applicants is 65 years as on 25th October, 2018 provided the person is medically fit.
- (3) Training period will not be considered as experience.
- (4) Work experience till 25th October 2018 will be taken to calculate the total work experience for those persons who are employed currently and the last date of their previous employment for those persons unemployed currently.

5.0 SYLLABUS/CURRICULUM FOR THE EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS:

- a) The examination will be consisting of the following two papers:
 - (i) Paper – I (150 marks) would consist of Open book, Multiple Choice Questions (MCQ) & Descriptive Examination on Boiler Act and Indian Boiler Regulations and their compliance & Boiler Design Engineering
 - (ii) Paper - II (150 marks) would consist of Open book, Multiple Choice Questions (MCQ) & Descriptive Examination on Boiler Design, Manufacturing, Materials, Erection, Commissioning, Operation & Maintenance, Inspection & Certification during manufacture or operations and High Pressure Welding Inspection.
- b) Viva-Voce 130 marks. The candidate should obtain a minimum of 45% in each paper with aggregate of 60% in two papers in the written examination in order to be eligible for viva-voce. The pass marks for viva-voce examination is 60%
- c) The Central Boiler Board will issue a passing grade certificate to the candidates after passing the examination

6.0 REQUIREMENTS FOR PASSING THE EXAMINATION FOR RECOGNITION OF COMPETENT PERSONS FOR INSPECTION AND CERTIFICATION OF BOILERS:

A candidate shall secure at least 45% in each paper and 60% aggregate marks in written examination as well as viva-voce in order to pass the examination.

Only candidates passing the written examination shall be allowed to appear for Viva-Voce.

Examination will contain the following papers:

Paper – I	Open Book (IBR, 1950 & the Boilers Act, 1923) Multiple Choice Questions (MCQ) & Descriptive Examination on Boiler Act and Indian Boiler Regulations and their compliance & Boiler Design Engineering	3 Hours Duration	150 Marks
Paper – II	Open Book, Multiple Choice Questions (MCQ) & Descriptive Examination on Boiler Design, Manufacturing, Materials, Erection, Commissioning, Operation & Maintenance, Inspection & Certification during manufacture or operations and High Pressure Welding Inspection	3 Hours Duration	150 Marks
	Viva – Voce		130 Marks

Schedule of Examination:

Date/Day	Paper	Timings	Examination	Marks
16/12/2018 Sunday	Paper – I	Morning Session 09.30 to 12.30 (3 Hours)	Open book, Multiple Choice Question & descriptive examination on Boiler Act and Indian Boiler Regulations and their compliance & Boiler Design Engineering	150
16/12/2018 Sunday	Paper – II	Afternoon Session 14.00 to 17.00 (3 Hours)	Open book, Multiple Choice Question (MCQ) & Descriptive examination on Boiler Design, Manufacturing, Materials, Erection, Commissioning, Operation & Maintenance, Inspection & Certification during manufacture or operations and High Pressure Welding Inspection	150
To be decided Later			Viva-voce	130
Total Marks				430

7.0 EXAMINATION CENTRES:

The examination centres are as follows:-

S. No.	Centre
1.	Chennai
2.	Mumbai
3.	Kolkatta
4.	New Delhi
5.	Hyderabad

The applicants will have to give three choices of examination centre in order of their preference. If the number of applications for a particular centre is found to be less than the minimum required number, the examination centre for those applicants can be shifted to their next preferred centre at NPC own discretion. NPC reserves the right to cancel any centre at its discretion.

EXAMINATION FEE:

Rs.4,000/- (Rupees Four thousand only) plus GST @ 18% for General Category candidates and Rs.2,000/- (Rupees Two thousand only) plus GST @ 18% for SC/ST candidates.

Presently, the GST rate is 18%. However, Goods and Services Tax prevailing will be applicable based on notification by Government of India at the time of payment of fee.

The fee shall be paid by Demand Draft favouring **National Productivity Council, payable at New Delhi** or through ECS: Indian Overseas Bank, 70, Golf Link, New Delhi – 110003 SB A/c No.: 026501000009207 (IFS Code: IOBA0000265) (Kindly indicate your name in the transaction remarks and UTR No. & date in the application form. This information should be send to NPC by email).

8.0 REFERENCE BOOKS FOR OPEN BOOK EXAMINATION

The candidates will refer the book on Indian Boilers Regulation for their open book examination. The candidates should bring their own current edition of IBR Book without any notes / marks and any other book is not allowed.

The necessary technical data sheets if required would be supplied to the candidates during the examination.

9.0 REGISTRATION PROCESS

Registration for the Certification Examination will be done on receipt of the filled-in application form along with requisite fees from the candidates

The candidates have to download the application form and send the filled in forms with all necessary enclosures. Once we receive the physical form the same will be scrutinized and if found eligible, a Registration No. will be allotted and acknowledgement would be sent by e-mail.

Fees once paid would not be refunded under any circumstances.

The Hall Tickets would be sent one/two weeks before the commencement of the examination.

Only the qualified candidates of the written examination would be displayed on NPC website and also communicated to qualified candidates.

10.0 ROLE OF NPC

The Central Boilers Board has retained the National Productivity Council (NPC) to conduct the examination for Competent Persons and declare the results.

NPC will carry out the following activities: -

1. Dr. Ambedkar Institute of Productivity, NPC, Chennai will receive and process the applications from the candidates and register them as per the laid down procedures.
2. NPC will send all necessary instructions in respect of the Examination and other details such as hall ticket, the venue of examination, timings, code of conduct for the candidates who are registered for the examination.
3. NPC will administer the examination in five centres subject to the availability of minimum number of candidates.

11.0 CONDITIONS AND INSTRUCTIONS TO THE CANDIDATES

1. Candidates are advised to go through the prospectus before filling the application form & all entries should be correctly filled.
2. Attach proof of work experience certificate as per the eligibility criteria duly certified by the competent authority.
3. Attach an self-attested Photostat copy of Degree certificate as per the eligibility criteria
4. Valid Level-II NDT Certificates from ISNT or any other professional body recognized by ISNT in Non Destructive methods of testing in radiography and ultrasonic testing.
5. Affix three recent passport size photographs (one self-attested in the application form, one in the hall ticket and one in the Examination centre check form).
6. Enclose Demand Draft towards the fees in favour of **National Productivity Council, payable at New Delhi** or indicate your name in the transaction remarks and UTR No. & transaction date in the application form. The NEFT information should be send by email to NPC.
7. Candidates belonging to SC/ST category will be required to submit the self-attested copies of the necessary supporting documents as mentioned in the prospectus and as per the **formats applicable for Govt. of India**. Other formats issued in local languages will not be accepted strictly.
8. Candidates should have an E-mail ID (If you don't have an email account please create one in free sites)
9. Self addressed cover (24 cm x10cm) with duly affixed Indian postal stamp of Rs.40/- with candidates name & address in "To" column.
10. Candidates fulfilling the eligibility criteria only need to apply with necessary enclosures.

11. Filled-in application form with self-attested/attested copies of enclosure along with requisite fee should reach the following address on or before 25th October, 2018

Director, CBB Exam Cell,
Dr. Ambedkar Institute of Productivity
National Productivity Council
6, Aavin Dairy Road, Ambattur Industrial Estate North,
Ambattur, Chennai – 600 050
Tel. No. 044 – 26245629 / 26254904
Mobile: 91- 9994889948
Fax No. 044 – 26254904
Email: rpmgchn.boiler@gmail.com
Website: www.npcindia.gov.in

Note: All correspondence related with Examination should be made to the above address preferably on e-mail.

12. The fees paid by a candidate, shall not be refunded or adjusted under any circumstances on the basis of medical or any other ground including the rejected applications & applications received after due date. Hence, candidates are required to ensure themselves in all aspects before sending the application.
13. The candidates will have the responsibility to cross check the information on allotted examination centres, issue of hall tickets and other instructions issued from time to time, from the above mentioned website.
14. Any candidate, who does not receive or loses the hall ticket, shall report to the allotted examination centre with documentary evidence of having registered for Examination. Information about allotted examination centres may be seen at the web-site mentioned in the prospectus.
15. (a) Request for revaluation & re-evaluation of Answer Books will not be entertained.
(b) Photocopies of evaluated Answer Books will not be made available to candidates.
16. Central Boilers Board Examination Standing Committee reserves the right to change and cancel the examination dates / centres due to some unforeseen reasons and reasons beyond its control.

17. Applications received after the last date OR in any other format other than the prescribed one OR incomplete will be summarily rejected. Delays in transit due to any reason and applications without relevant enclosures would be rejected without assigning any reason.
18. In all subsequent correspondence make sure that invariably you quote the registration number, which you will receive in your acknowledgment by email.
19. For any clarification. Contact us at rpmgchn.boiler@gmail.com
20. For Examination updates visit website: www.npcindia.gov.in
21. The decision of the Central Boiler Board Examination standing committee in all matters related to the above examination will be final and binding on the candidates and no enquiry/correspondence will be entertained in this regard.

12.0 LIST OF ENCLOSURES TO BE ATTACHED WITH THE APPLICATION

- 1 Proof for requisite educational qualification including NDT Certificate.
- 2 Proof for requisite experience duly certified by the employer.
3. DD in favour of National Productivity Council payable at New Delhi or in case of NEFT payment, indicate your name in the transaction remarks and UTR No. & transaction date in the application form. The NEFT information should be send by email to NPC.
- 4 Three recent passport size photographs (one self-attested in the application form, one in the hall ticket and one in the Examination centre check form).
- 5 Proof of SC/ST certificates as per Govt. of India format in case of claiming fee concession. **Certificates issued in local languages will not be accepted.**
- 6 Duly filled Hall Ticket & examination centre check form along with photograph
- 7 Proof of age.
- 8 Self-addressed cover (24 cm x10cm) with duly affixed Indian postal stamp of Rs.40/-.

13.0 SYLLABUS

Paper: 1 - Boiler Act, Indian Boiler Regulations and their compliance and Boiler Design Engineering
(Three hours, Open Book (IBR, 1950 & the Boilers Act, 1923), Multiple Choice Question & Descriptive Examination)

Boiler Act and Indian Boiler Regulations:

Salient Features of Boiler Act 1923 (as amended) and Indian Boiler Regulations, 1950 (as amended).

Water tube boilers: Classification of boilers- Natural circulation, Forced circulation, Fluidized Bed Combustor Boiler (FBC), Circulating Fluidized Bed Combustor Boiler (CFBC), Waste heat boiler, Chemical recovery boilers, Cycles for Steam Power Plants.

Once through boilers, Supercritical boiler and Ultra-supercritical boiler functions and differences, advantages and disadvantages.

Solar Boilers, unfired boilers including thermic fluid boilers

Water circuit and steam circuit.

Fire tube boiler: Shell type boilers – Horizontal and Vertical boiler, Various types of furnaces, Furnace heat release rates for solid fuel and Oil fired Boilers, Methods of various attachments in Shell and furnaces.

Boiler Design and Engineering :Design calculation methods – factors to be considered in designing a boiler, boiler layout, pressure part arrangement, pressure and temperature drops across the boiler - temperature control methods, High temperature properties (Hot yield, creep) of steel and design criteria for ascertaining permissible stress and maximum temperature for use of each grade of steel - Design calculation to ascertain maximum working pressure of parts, tubes exposed to hot gases connecting pipes, headers, pipes and drums, ligament efficiency, method of compensation for opening, method of attachment of tubes and branch pipes, Longitudinal Stress, bending moment etc., weld coefficient.

Elements of feed water heaters –Design and construction including tube expansion methods.

Design & working pressure calculations for shell type boilers, ligament efficiency, end plates / tube plates, tube design, furnace design, method of compensation for openings, stay rods, gussets, stiffeners, pressure circle calculations etc.

Various boiler mountings and auxiliaries like fusible plugs, safety valves, safety valve selection criteria and capacity calculation, electromatic safety valves, drum level indicators, selection of feed water pumps etc.

Boiler components, piping, fitting, steam receivers, valves, steam traps, new materials.

Criteria for adopting Pressure reducing and desuperheating stations (PRDS), Feed water control system, Tees, elbows, bends and fittings.

Metal temperature calculations for various sections of boiler.

Paper – 2 - Boiler Design, Manufacturing, Materials, Erection, Commissioning, Operation and Maintenance, Inspection & Certification during manufacture or operations and High Pressure Welding Inspection

(Three hours, Open Book (IBR, 1950 & the Boilers Act, 1923), Multiple Choice Question & Descriptive Examination)

Boiler Design

All aspects of boiler design included.

Materials

Classification of materials, Classification of steels, boiler materials, basic metallurgy, weldability of materials, plates , pipes, tubes, casting and forgings of boiler quality and welding electrodes, process of steel manufacturing, chemical composition, mechanical properties, tolerances, knowledge on equivalent international materials used in boiler manufacture ,well known steel /forge/foundry/ pipe / tube maker etc requirements, procedures, inspection and testing to be done in the absence of well known recognitions, new materials.

Construction and workmanship

Welding- Welding procedure, Welders Qualification, Initial Qualification & renewal for welders, Conditions under which requalification test is required, tests to be done on plate/Pipe & Tube for Initial and requalification, Essential variables.

Welding processes : SMAW, GTAW, SAW, FCAW, GMAW, Combination welding, Plasma, Flash butt welding, Induction Pressure welding, etc., welding consumables and their classification, welding engineering (joint design, fit-up, weld & welding symbols), reinforcement requirements, weld defects unique to each weld-fit-up process and their acceptance norms, methods & norms for weld repairs.

Welding Consumables - initial/periodic check tests on consumables as per IBR.

Preheating, Post heating and Post weld heat treatment, Criteria for application of PWHT for Shells, Drums, Headers, piping, Tubular products, method of loading, calibration of furnaces and measuring instruments, soaking temperature / time, Rate of heating / cooling .

Different process adopted in welding of tubes, pipes, Shells, Visual Inspection of welds, reinforcement requirements, acceptance norms for weld defects, norms & method for weld repairs.

Non-destructive Testing: Mandatory NDT requirements for various welds on tubes, pipes, headers and drums, Qualification of NDE personnel.

PT- Liquid Penetrant Testing

Principles of liquid penetrant process, Lighting for liquid penetrant testing Materials for liquid penetrant testing, Testing of materials, Interpretation/Evaluation, Factor affecting indications, Indications from discontinuities, Procedures, Codes/Standards/Specifications. Non relevant indications.

MT- Magnetic Particle Testing

Characteristics of magnetic fields and equipments, Technique/Calibrations, Selecting the proper method of magnetization, Magnetic particle test indications and interpretations, Procedures, Codes/Standards/Specifications. Non relevant indications.

RT-Radiographic Testing

Principles Radiographic imaging, Sources for radiation, Techniques / Calibration, Imaging considerations, Image Quality Indicator (IQI), Density of material, Viewing of radiographs, Judging radiographic quality, Interpretation and Evaluation: Radiographic appearance of discontinuities, Non-relevant indications, Film artifacts, Film identification and correlation of the weld, Procedures, Codes/Standards/Specifications.

UT-Ultrasonic Testing

Principles, Equipment/Materials, Pulse/echo instrumentation, Calibration blocks, Techniques/Calibrations, Use of all types of probes, Calibration(electronic and functional), Interpretation and Evaluations: Evaluation of base metal, product forms, Evaluation of weldments, Variables affecting test results, Procedures, Codes/Standards/Specifications.

Radioscopy Test (Fluoroscopy).

Field installation and registration

Review of document of boiler parts as received and correlation to the corresponding part - Verifying the qualification of welders, NDE personnel etc, review and remedial action, Inspection during field installation w.r.t parts identification, Weld setups, Welding and non destructive examination. Evaluation of field welds by RT, UT, HT or PT or by combination.

Heat Treatment where applicable method for local HT and controls - Witnessing final Hydraulic test before thermal insulation, water quality and temperature, Safety Valve set / reset pressure, discharge capacity, Safety valve set pressure and discharge capacity for waste Heat Boiler with auxiliary firing, Water level indicator and use of remote Water level indicator, Steam pipe lines cold / hot condition flexibility and hanger settings, Verification of instruments to measure metal temperature, Steam temperature and pressure, Protection of boilers through burner management system (Fuel cut off systems, flame scanner and trips , interlocks etc.).

Documentation for registration of boilers.

Inspection & Certification:

Stages of Inspection during manufacture of Boiler/Boiler Components, erection and use of different IBR forms and their applicability, Memorandum of Inspection or registration Book (Form I) and its salient features.

Requirements for Registration of boilers.

Repair and Renewal of Certificate for use of Boilers:

Procedure for Inspection and repair of Installed Boilers & Steam pipes.

Boiler Operation and Maintenance

Chemical requirements of feed water, Boiler water, steam quality for low, medium pressure, high and super-critical Boilers, sampling methods, test method, Carryover, scale and sludge, scaling of fireside of heating surfaces, steam contamination and its control, prevention of deposit formation in boiler units, corrosion of heating surfaces, Start & stop sequence, operation procedure, critical boiler parameters, alarms and annunciators, contingency action plan, safety precautions.

Boiler emergencies – How to handle

Boiler explosions – Reasons and Preventions

Boiler repairs – Methods and procedure, Failure analysis

Thick walled component repair at site – Precautions and limitations, Preheating and post heating, Post Weld Heat Treatment

Maintenance schedule – shutdown maintenance, procedure, safety precautions, work permit system, restarting procedure, acid cleaning, hydraulic test, light up of boiler, commissioning

Data acquisition and analysis – Broad idea, importance

Boiler inspection periodicity, methods, procedure

In service periodic inspection

Review mandatory requirements of operating boilers, Procedures for conducting periodic hydraulic test of operating boilers, Elements of mode of failures of metals, Assessment of condition of boilers: - Review past record of boilers w.r.t. failures, outages, repairs / replacements of pressure parts, Visual inspection of external & internal surfaces for visible damages, loss of metal by erosion/corrosion, condition of tube supports, spacers etc., fire side scaling, ash/slag fouling, Boilers with record of frequent failures may require detailed investigation by conducting NDE using Dye penetrant / magnetic particle test for detecting cracks or UT to determine thickness of tubes or cracks in dissimilar welds / fillet / butt weld cracking or RT insitu metallurgical examination, Conducting laboratory examination on tube samples for erosion / corrosion, creep damage, hydrogen embrittlement, Stress Corrosion Cracking, Oxygen pitting, Oxidation, fire side fouling, water side deposits and need for chemical cleaning etc., Authorization for repairs & replacement, Verifying the condition of safety valves, water level gauges and other mounting, instruments for measuring temperature and pressure and fire protection systems and interlocks, Isolation of steam and water circuits in battery of boilers and other safety measures.

Remnant Life Assessment (RLA) of boilers

Criteria for R L A – Tests required for various boiler components, Evaluation methods for remaining life.

Fuel – Air – Gas system

Basics knowledge in the areas like Primary fuels, principles of combustion, chemistry of combustion, pulverized coal fired furnaces, fuel oil and gas fired furnaces, controls and instrumentation and their effect on boiler functioning. Isolation of Fuel/Flue Gas during inspection.

Layout and Sketches

Layout and Sketches of boilers & boiler components, steam & feed water circuits and their parameters.

ABOUT NATIONAL PRODUCTIVITY COUNCIL

NPC is a national level organization to promote productivity culture in India. Established as a registered society by the Government of India, it is an autonomous tripartite, non-profit organization with equal representation from the government, employers and workers organizations apart from the technical and professional institutions on its governing council. NPC provides consultancy, training and undertakes research in the area of productivity, besides implementing the productivity promotion of the Tokyo based Asian Productivity Organization, an inter-governmental body of which the Government of India is a founder member.

SPECTRUM OF SERVICES

NPC has more than five decades of experience deploying the best practices, preferred methods & standards and advanced productivity software across a spectrum of industries and services. The organization specializes in a wide range of services to promote productivity, competitiveness and cost effectiveness through.

Awareness Generation: Propagating productivity quality and competitiveness through seminars, workshops, publications and other suitable methods.

Consultancy: Improving productivity for competitiveness through consultancy work of the private and public corporate sectors. SMEs, Governments and other client groups.

Training: Training of executive managers, workers, supervisors and others

Research: Conducting research studies and surveys on productivity and related matters.

ENTERPRISE LEVEL:

Process Management: Total Quality management, ISO 9000 certification, Business Process Re-engineering, KAIZEN, Benchmarking, Customer Relations Management (CRM).

Information Technology: Management Information System, E-governance, IT Infrastructure Planning.

Energy Management: Energy Audits, Co-operation, Demand side Management, Renewable and Green Energy Sources, Process Optimization and Energy Conservation.

Environment Management: Integrated Environment Planning, Environment Audit, Cleaner Production Techniques, Hazardous Waste Management, Waste Minimization and Utilization, Green Productivity, ISO 14000 & OSHAS 18000.

Economic Services: Policy Research and Consultancy, Productivity Audit.

Human Resources Development: Work Culture, Participative Group Activities, Work Load Assessment, Organization Redesign, Productivity Linked Reward/Wages Scheme, Training needs Assessment.

Technology Management: Condition Monitoring, Safety Audit, Assessment, Total Productivity Maintenance.

World Class Manufacturing: Flexible/Cellular Manufacturing, Time Reduction, Six Sigma.

Agribusiness: Food Processing, Soil and Water Conservation.

“What we know is only a handful

What we don't know is an ocean

- Avvaiyar, Tamil poet, 2 AD.

For any further details, please contact

Director,
CBB Exam Cell,
Dr. Ambedkar Institute of Productivity
National Productivity Council
6, Avin Dairy Road,
Ambattur Industrial Estate North, Ambattur,
Chennai – 600 050
Tel. No. 044 – 26245629 / 26254904
Mobile: +91 - 9994889948
Fax No. 044 – 26254904
Email: rpmgchn.boiler@gmail.com
Website: www.npcindia.gov.in