

Refrigerator Testing Facility at CPRI

Central Power Research Institute (CPRI), Bangalore has State of the art Research and Test facility on par with other International Laboratories for the Performance Evaluation of Refrigerators upto 600 lts for Energy Efficiency Labeling and Star Rating as stipulated by Bureau of Energy Efficiency.

The Bureau of Energy Efficiency (BEE) was formulated by the Govt. of India with a Mission to-

- Institutionalize the energy efficiency services,
- Enable delivery mechanisms in the country and
- Provide energy efficiency in all energy intensive industry sectors in the country.

CPRI has established the above Research and Testing facilities to meet and implement the BEEs mission Standards and Labeling (S&L) implementing program.

Performance characteristic of electric refrigerating appliances up to 600 lts for both direct cooled and frost free versions can be tested as per AS/NZS4474.1:1997 standard. The lab has been accredited by NABL.

The facility consists of:

- DAS capable of logging electrical and thermal parameters continuously,
- Environmental chamber to simulate the required ambient conditions, and
- Facility for testing 4 refrigerators at a time.

The facility suitable for:

- Volume measurement
- Pull down test, and
- Energy consumption test.

Various Agencies like

- UL India Private Limited, Bangalore;



Walk in Chamber



Refrigerator with sensors

- Robert Bosch Engineering and Business Solutions Private Limited, Bangalore; and
- Bureau of Energy Efficiency, New Delhi have already utilized the facility.

In-situ Metallography (Replication) Technique for Remaining Life Assessment of High Temperature Power Plant Components

In-situ metallography (Replication) technique is used to assess the extent of metallurgical degradation and remaining life assessment of different high temperature power plant components.

In conventional laboratory method the metallurgical evaluation of a sample is carried out through cutting to the required size, moulding, surface preparation using different emery sheets, final polishing by diamond paste lapping, etching with suitable chemical and analyzing the structure under a light microscope. This is a destructive and laborious process.

The in-situ metallography (Replication) technique is a non destructive test method wherein the sample cutting is avoided as it is difficult to cut thick section plant components like boiler headers and piping, steam and gas turbine components, etc.

Hence this NDT method of in-situ metallography gains importance from the point of remaining life estimation as it is a quicker method of studying the microstructure.

The replication method involves preliminary preparation of the metal surface using portable grinding / polishing equipment.

The spots identified for study is first ensured that it is free from rust and scale followed by sequential grinding / polishing using abrasive papers of varying grit sizes such as 80, 120, 200, 400, 600, 800, 1000 and finally diamond paste lapping. In certain cases one has to resort to electro-polishing to get very fine finish by avoiding grinding/polishing using grit papers of sizes 800, 1000 and diamond paste lapping.

The polished region is then etched manually or electrolytically by appropriately choosing chemicals for that particular material under investigation.

To confirm the microstructure at that region one has to view through a portable microscope. Then the microstructure is transferred to a transparent special film by placing, applying mild load through a roller and drying the film on the etched region.

Then the film is removed and transfer to a glass slide for examination of the structure in the laboratory.

This technique has been extensively used by CPRI for analyzing the microstructure of the boiler



Fig 1

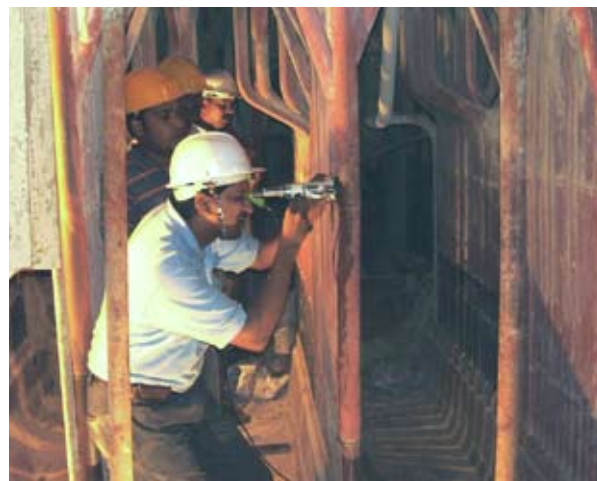


Fig 2

tubes, headers, piping, steam turbines, etc. in various thermal power plant boilers as a part of Residual Life Assessment / Health Assessment programmes.

The plant capacity covered under these programmes are 62.5MW, 120MW, 200/210 MW and 500MW.

The power plants covered under this are NTPC units such as Ramagundam, Rihand, Farakka, Korba, Tanda, Vindhyachal, Kahalgaon, Anta, etc.

Fig. 1 and 2 shows the photographs taken during the in-situ metallography measurements at NTPC sites.

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