TCR Advanced Engineering P. Ltd

Experts in Metallography, Failure Investigation and RLA

Metallurgy for Industries

Power | Petrochemical | Fertilizer | Chemical | Refinery | Engineering | Automobile

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Visual inspection

A vital in-service inspection tool.

Visual inspection is an important nondestructive method for industries. It needs to be employed during fabrication; maintenance and servicing of vessels/equipment/piping and also during on-stream inspection. The goal of such testing programs is to achieve and maintain capacity production with safety. Owner/user teams and engineering staff use non-destructive test results to implement risk based inspection by planning their maintenance activities usually assessing the risks involved. Risk based inspection philosophies prioritize inspection, minimize failures and maximize the performance of equipment.

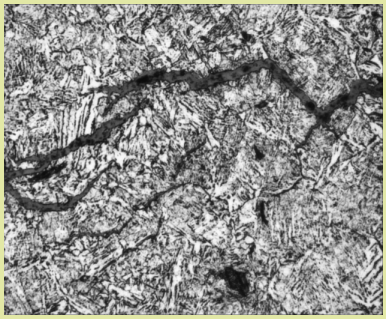
Visual inspectors should take following considerations for in-service inspection

1) Fabrication and service history of equipment
2) Past non-destructive test data (both during fabrication and prior in-service/maintenance schedule)
3) Scope of inspection (periodic in-service inspection, inspection during unplanned shutdowns etc)
4) Possible damage mechanism
5) Is the surface visible?
6) What is the surface condition before and after preparation for testing?
7) Does corrosion, scale, flaking or coating need to be removed?
8) How will the test object be used

When establishing the procedure for visual inspection, it may be difficult to correlate the materials with original procurement specifications. In many cases the acceptance criteria exceed those originally specified- resulting in to rejection of high quality material and acceptance of low quality materials. Well established procedures for visual testing with respect to inspection of product shall eliminate such confusions. The procedure for visual testing may include following.

1) Before joining or painting the surface, it shall be visually inspected for cleanliness; bevels and/or alignment joining

Microstructure of the Month



Magnification:*400X*

Component: *Weld joint between nozzle pipe of re-boiler*

MOC: *A516 Gr. 70*

Observation: Optical microscope image of weld indicates typical SCC filled with oxide scales.

Cause: The cracking at weld and HAZ region is on account of caustic stress corrosion cracking; substantiated by higher amount of sodium found in EDS analysis.

Useful Hint: It is advised to carry out precise hardness evaluation on weld and HAZ areas to find susceptibility of SCC. Areas having significant difference in hardness values between base metal to HAZ or weld should be subjected PWHT at an available opportunity.

surfaces shall meet required specification

2) Dimensional guaging can often be assigned to visual inspectors with a checklists, caliper gauges, and other devices to ensure that components are fabricated and installed as per requirement
3) Visual inspector is expected to detect surface conditions like corrosion or deformation that may lead to component failure
4) Components with expected damage mechanisms can be listed/logged with specified inspection interval to monitor damage phenomenon like strain, erosion and corrosion
5) The visual inspector is required to detect visible cracks and oil stains that may be caused by surface disruption.
6) Because of visual acuity concerns, additional method for inspection may be employed
7) Visual inspector may work with an array of instruments for direct or remote visual inspection. This technique shall be as simple as rigid boroscope or a sophisticated videoscope
8) Recommendation by inspector for subsequent nondestructive testing to evaluate material integrity
9) Visual inspector may need to maintain an archive of inspection images for quality assurance and/or training purposes.

Like other surface techniques visual inspection is also a qualitative technique and is dependent of training and experience of the inspector. Qualitative testing needs to be backed up with objective methods for quantification of discontinuity such as crack depth or wall loss.

Accept/reject decisions shall be reached by applying specific criteria.

TCR Advanced offers a remote visual inspection service with a state of art videoscope. Specification of the equipment is as under.

Specifications	
Image Sensor	High-Resolution color SUPER HAD CCD
Display Size	image
Zoom	5.0" (12.7cm) TFT VGA color LCD
Direction of	3.5X (Digital)
view	0^0 & 90^0 Field of View: 60^0, Depth of Field: from
Probe	5mm
diameter/length	8 mm/ 7.5 meters
Articulation	4-way & 360degree All-Way Tip articulation control
Illumination type	High-Power LED with high transmission fiber optics

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For Further details Contact us at testing@tcradvnaced.com , Ph: +91-265-2657233