



SAFETY ASSESSMENT  
FEDERATION

# Guidance

## In-Service Inspection Procedures

### NDT of 'D' Patch Repairs to Shell-type Boilers

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## SITUATION

This document provides guidance on the preparation for and execution of non-destructive tests of 'D' patch repairs to shell boilers so as to ensure a sufficiently high and uniform standard of workmanship. Non destructive testing of the 'D' patch repairs should be to the satisfaction of the Competent Person.

## GUIDANCE

- The weld cap on the butt welded part of the repair weld (not the 'T' configuration part) should be removed on completion of welding and this should be required to be included in the repair contractor's method statement. The reasons for this are:
  1. To permit adequate ultrasonic examination of the root of the repair weld immediately on completion of the repair work.
  2. To ensure that ultrasonic examination of the respective attachment weld, in accordance with guidance document SBG 1 is not unduly impeded when next applied.
- NDT of a 'D' patch repair should comprise the application of both ultrasonic and magnetic particle inspection (MPI) methods, to, respectively BS EN ISO 17640 or BS EN ISO 9934-1 as amended, to fully examine the entire weld and heat affected zones.
- The acceptance criteria to be applied should be as follows:
  1. Cracking is NOT acceptable.
  2. Planar flaws, such as incomplete penetration, lack of fusion are not generally acceptable and where applicable shall be assessed to the original code of construction, such as BS 2790, BS EN 12953, etc.
  3. Other types of flaw, shall be assessed to the original code of construction, such as BS 2790, BS EN 12953, etc.
- All accessible fusion faces should be examined ultrasonically. Therefore, where it is practicable, the respective tube plate should be prepared so as to enable ultrasonic scanning from it. This should be included in the repair contractor's method statement.
- The respective original attachment weld should be ultrasonically examined over a circumferential extent of 150 mm on each side of the repair weld to test for the possible extension of defects remaining from before, or new defects caused by, the repair work.

- In the case of ‘D’ patch repairs to furnace-to-tube plate attachment welds, MPI should be applied during the repair to test for cracking in the tube plate. This should be in accordance with SAFed Guidance SBG1 and should be required to be included in the repair contractor’s method statement.
- When encountering an old undocumented ‘D’ patch repair during periodic NDT in accordance with SAFed Guidance SBG 1, the NDT practitioner should also perform an ultrasonic examination of the butt welded part of the repair. The reason for this is to test for welds of inadequate quality that may have been produced in the past.

Ref: PSG 15 Guidelines for Competent Person – Repairs or Modifications to Pressure Systems