

WRS Infrastructure Disaster Response Sector - Plant Disaster Challenge Method of Reproducing Abnormalities

1. General Features

- Multiple pieces of inspection objects (test piece) board (200 mm squared) will be attached using magnets to the tank walls and ancillary equipment (spiral staircase).
- Every base board will contain a different type of inspection object.
- Inspection object area number will demonstrate the areas of abnormalities.

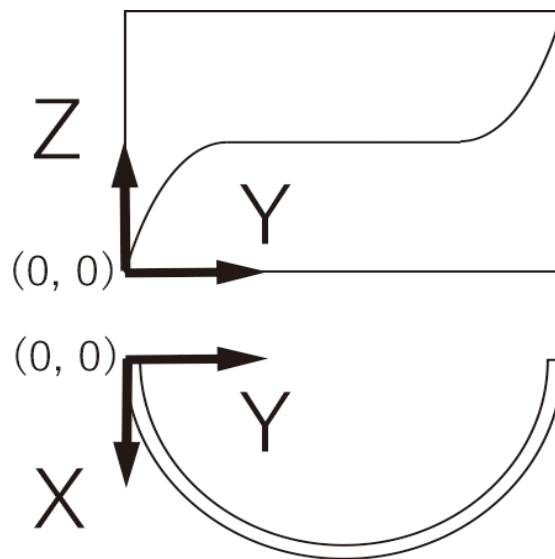


Figure 1: Tank Coordinate Origin and Coordinate System



Figure 2: Example of an Installed Board Test Piece - Tank

2. Method of Reproducing Abnormalities

2.1 Crack

- Predicting visual inspection and NDI (non-destructive inspection) (PT: Penetrant Testing).
- Report the presence/absence of a crack, the width, and the length of the crack.
- Pre-soak the crack area beforehand with penetrant solution.
- The crack will be linear, with a width of 0.1mm~0.5mm, and length of 20mm~200mm).
- The cracks oriented vertically, horizontally, and diagonally (45 degree angle) will be prepared.
- The material of the base board used will be aluminum.

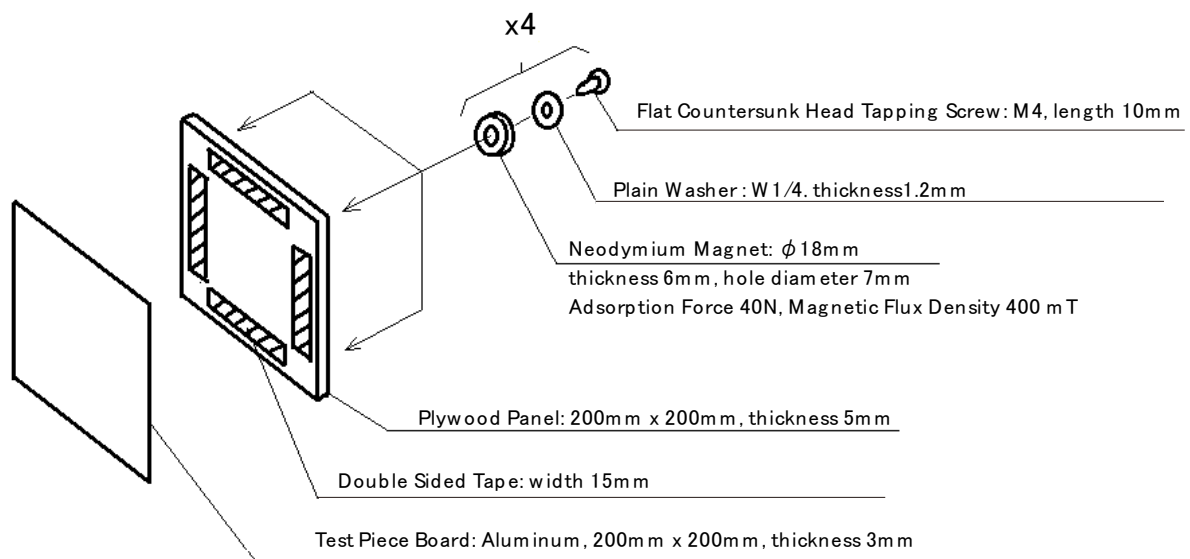


Figure 3: Prepping a Crack Piece Test Board

2.2 Metal Loss

- Predict pipe-wall thinning inspections done with UT, Ultrasonic Testing.
- Report the presence/absence of metal loss, the thickness of the metal loss.
- Reproduce thinning caused by corrosion of the tank interior
- The material for the inspection object board will be stainless steel.
- The surface will be sandblasted.
- The inside of the inspection object board will be scraped to create a difference in wall thickness.
- An ultrasonic thickness gauge (27MG, Olympus) and probe (D799, Olympus) will be available to borrow.
- Mantle the measuring devices and probes on the robot before the start of the tournament.
- Figure 4 demonstrates an area with metal loss.

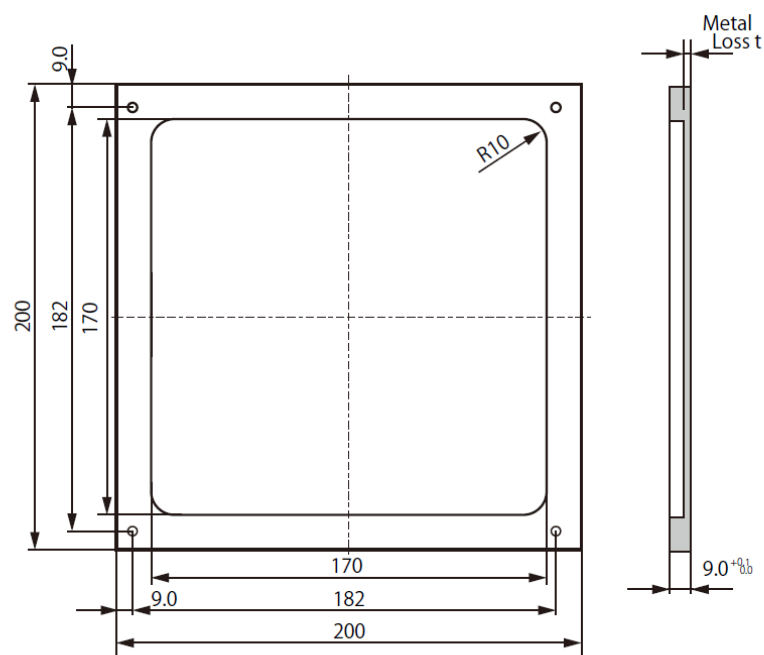


Figure 4: Reproducing Metal Loss