

This is an extract from IOGP Report 577 - Fabrication site construction safety recommended practice - Hazardous activities, version 1.2 published November 2018. IOGP Reports are subject to regular review and update. In all cases only the current version of Report 577 is authentic.

12. System testing

(e.g. Pressure testing, electrical testing, radiography)

System testing is typically conducted during the pre-commissioning phase of fabrication activities to verify the integrity or functionality of process and control systems prior to commissioning or transportation. Tests may be conducted on individual subsystems prior to integration and/or on the overall integrated system. Radiography is also covered in this section.

Pressure testing

- 1) Due to the potential for catastrophic release of energy associated with pneumatic testing, the procedures, size of the test system and the barrier management for this type of test are pre-approved by the client.
- 2) Minimize the number of people in the area either by restricting access or by performing testing activities during times when the general workforce is not present, such as at night.
- 3) Provide a work procedure on the system preparation and test that include:
 - Permit to Work requirements
 - safety meetings/toolbox talks
 - risk assessment expectations and controls (e.g. Job Safety Analysis, equipment/ required Personal Protective Equipment, training, safe operational procedures, valve verification, blind isolation sheets, etc.)
 - an approved test plan with required inspections and verification of hazard controls (i.e. pressure testing, energy isolation, permit systems, fluid containment, etc.)
- 4) System testing controls to consider simultaneous activities.
- 5) All personnel involved in system testing are trained and competent for their role including understanding the hazards involved, the control steps and the Personal Protective Equipment required.
- 6) Pre-test Verification checkpoints:
 - Ensure that a pre-meeting is performed to review the scope of test, risks involved, equipment and tools required and mitigation actions are taken.
 - Ensure that all testing equipment is rated for expected service
 - Inspect all piping, valves, and/or electrical controls prior to the test to verify condition and proper orientation (open/close, energized/de-energized, isolated/not isolated)
 - Check that all temporary hoses, couplings, and gauges are of the correct type, securely fastened, free from damage, suitable for the maximum pressure and temperature of the test, and functioning
 - Ensure escape route(s) are established and not obstructed by test equipment or other material in the area.

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- Ensure Safety Data Sheets are available
 - Verify that the Permit to Work is approved and system ready before testing begins.
- 7) Systems or areas subject to testing are marked with unique and recognizable signs, tags or labeling in local language which cannot be mixed up with other markings or signs.
 - 8) The area is inspected, barricading is placed and no-entry signage is displayed at a safe distance around the testing zone with consideration of hazards such as rupture issues, projectiles, or energized equipment. Take into consideration best engineering practices and procedures.
 - 9) Authorized people's risk exposure from line of fire of potential leaks, or from being too close to the testing equipment, is minimized (e.g. by using cameras or extension mirrors).
 - 10) There is an effective means of communication (two-way radio, hand signals, etc.) and/or alarm system that allows any crew member to quickly alert others of system failures or emergencies. Emergency response equipment is available and trained and competent emergency responders are on standby.
 - 11) Post-test verification checkpoints:
 - Establish means to ensure system is isolated, de-pressurized, and/or de-energized prior to removing blind flanges or accessing electrical control panels.
 - Develop corrective action plan(s) for addressing system failures and identify needs for retesting.
 - Establish means of safely capturing, disposing, and/or discharging and test fluids or gases in compliance with good industry practice and applicable laws, regulations and permits.
 - 12) Only once the test has been completed and the area verified safe are barriers and signage removed.

Radiography

- 13) The site has a radiography operations plan that includes the following:
 - Identifies a Person In Charge such as a licensed Radiation Safety Officer. They are responsible for ensuring the management, safe use and security of sources, and for compliance of radiation work.
 - Field work is performed by a radiography crew that consists of a minimum of two people
 - Training (general awareness and specific training for radiation workers).

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- Radiation source handling, including procurement, receiving, storage, inventory, inspection, emergency response and notification, and disposal procedures.
 - Specific radiation warning signs and labels identifying the location of radiation sources and areas
 - Use of personal dosimetry monitoring, area surveys, and leak testing, and documentation to ensure that equipment is operable, calibrated.
- 14) Site Management is responsible to verify to the Client Team the competence, qualification and training of the radiography crew. Only the radiography workers are permitted to perform activities and work involving radiography. They have in their possession at all times a copy of their radiography ID card.
 - 15) The Site establishes barricades and other protective measures to keep general workers away from exposure levels of 20 microsieverts per hours (2 millirems per hour). The barricaded area is continuously monitored and documented.
 - 16) A system is in place to monitor exposure that includes personal badge use, personal dosimeters, records of testing and doses and follow-up requirements on anomalies.
 - 17) Radioactive sources are not left unattended by the work crew unless the sources are locked in a shielded storage container (<2 millirems per hour at the surface).

Relevant IOGP Life-Saving Rules, Report 459



Work with a valid permit when required