



Applus⁺

RTD

Together
beyond
standards



OSHA and ANSI/IIAR
Compliance

Mechanical Integrity

Applus RTD Solutions

Process Safety Management

Cold Storage, dairy, beverage and food processing facilities are continuously struggling with the best solution to meet the requirements of OSHA Process Safety Management (PSM) Standard 29 CFR 1910.119 and IIAR Bulletin 110 for ammonia piping and pressure vessels



OHSA Requirements

Ammonia refrigeration systems with 10,000 pounds or more of ammonia are a covered process subject to the requirements of the Process Safety Management Standard 29 CFR 1910.119

29 CFR 1910.119 (j)(2) States that the employer shall establish and implement all written procedures to maintain the on-going integrity of process equipment.

29 CFR 1910.119 (j)(4) States that inspections and tests shall be performed and documented as applicable to manufactures recommendations for process equipment



International Institute of Ammonia Refrigeration (IIAR) American National Standards Institute (ANSI)



IIAR Bulletin No. 110

- Guidelines for: Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems

ANSI/IIAR Standard 6 (2019)

- Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems. IIAR 6 establishes the minimum requirements for inspection, testing, and maintenance (ITM) applicable to safe closed-circuit ammonia refrigeration system. It is meant to aid in identifying what components should be inspected, tested, and maintained and how frequently these tasks should be performed. This standard is intended to be incorporated as part of a Mechanical Integrity (MI) Program as recognized and generally accepted good engineering practices (RAGAGEP). It can be used to perform a gap analysis for minimum safe requirements of an owner's existing ITM tasks as well as provide the minimum requirements for ITM record keeping responsibilities.

Mechanical Integrity

Mechanical Integrity (MI) can be defined as the management of critical process equipment to ensure it is designed and installed correctly, and that it operates and is maintained properly (i.e. no leaks and all elements are fit for service). A mechanical integrity program should take into account the inspection and testing of the equipment using procedures that are **recognized and generally accepted good engineering practices (RAGAGEP)**, and should also consider the suitability of newly-fabricated equipment for usage. Written procedures should be established and implemented, and employees tasked with maintaining the ongoing integrity of process equipment should be adequately trained.



Ammonia system equipment affected by mechanical integrity provisions of a PSM Program

Pressure Vessels	High-pressure receivers, low-pressure receivers, accumulators, intercoolers, thermosiphon pilot receivers, chillers, surge drums, transfer stations
Piping Systems	Refrigerant piping and valves, safety relief valves and vent systems
Emergency Systems	Fire protection system components, emergency shutdown systems, emergency ventilation, alarms and interlocks, ammonia detection systems
Equipment	Compressors, heat exchangers, evaporators, condensers, desuperheaters, pumps, refrigerant pumps, water pumps
Protective Systems	Insulation systems, vapor retarder, insulation media, jackets, protective coatings
Supports	Foundations, hangers, brackets, stands, anchor bolts, structural supports

Process Safety Management

Potential Areas of Concern

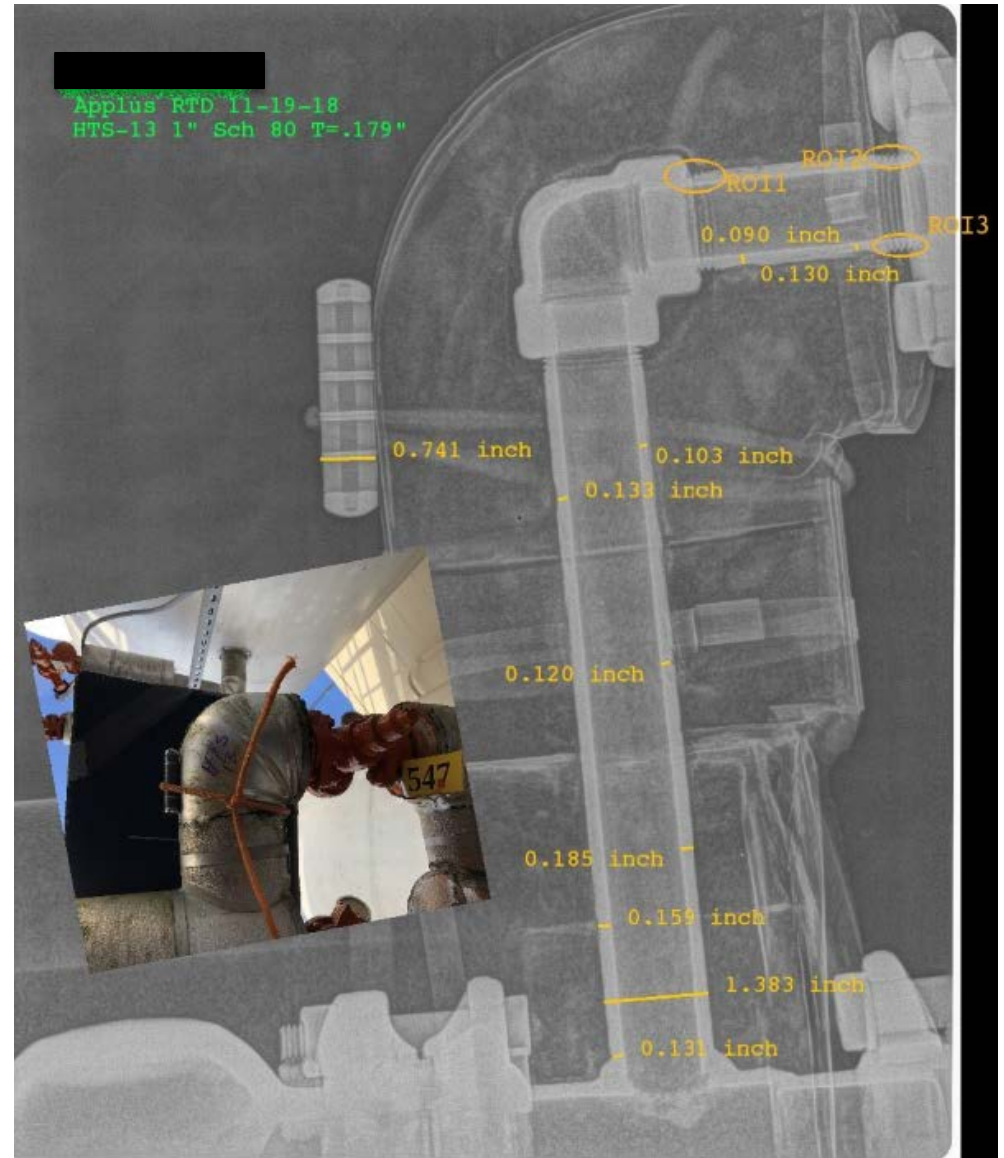
- ❑ Internal and external corrosion and pitting
- ❑ Touch point corrosion at pipe supports and the support condition
- ❑ Protective coating, insulation and/or vapor barrier deterioration
- ❑ Pressure safety and relief valves

Inspection Methods

- ✓ API 650/653/510/570 Inspections
- ✓ Visual Inspection
 - ✓ Certified Welding Inspectors (CWI)
 - ✓ API
- ✓ Ultrasonic Inspections
 - ✓ Thickness
 - ✓ Guided Wave
 - ✓ LORUS
 - ✓ Phased Array
- ✓ Computed Radiography
- ✓ Magnetic Particle Inspection
- ✓ Liquid Penetrant
- ✓ Pulsed Eddy Current (PEC)

Computed Radiography

- ✓ No Removal of insulation
- ✓ Profile view
- ✓ Detect corrosion areas in piping
- ✓ Corrosion Under Insulation (CUI) evaluations
- ✓ Calculate the thickness measurements of small bore piping



Ultrasonic Inspections

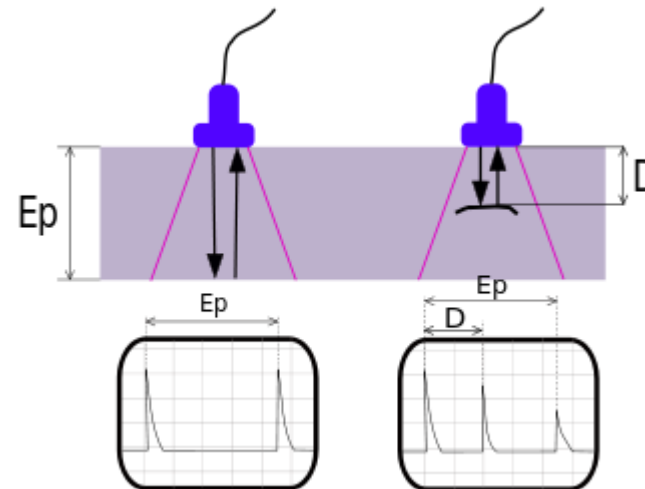
Phased Array

- ✓ Covers a wider area
- ✓ Corrosion mapping
- ✓ Weld inspection



Ultrasonic Thickness

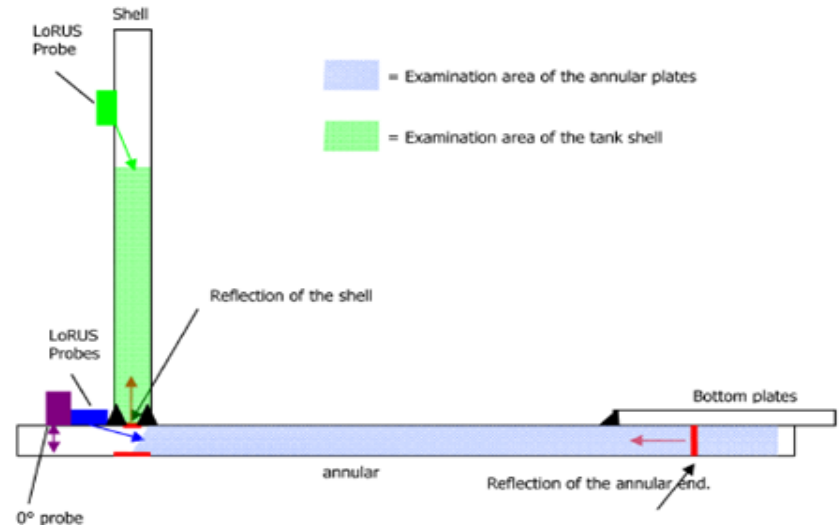
- ✓ Traditionally the preferred inspection method
- ✓ Wall Thickness Measurements
- ✓ Provides limited data of the entire asset



LORUS

Short / Medium Range Ultrasonic

- ✓ Touch Point Corrosion at Supports
- ✓ In-Service Critical Area Chime Inspection
- ✓ Wall and roof penetration



Pulsed Eddy Current – RTD INCOTEST

Pulsed Eddy Current (PEC)

- ✓ Based on Eddy Current Principle
- ✓ Data Digitally Stored
- ✓ Detection of Remaining Average Wall Thickness (AWT)
- ✓ No Contact Needed for the Measurement
- ✓ No Special Surface Preparation Needed
- ✓ Measurement Through Insulation and Fireproofing

<https://www.youtube.com/watch?v=wA27RFZEizU>



PEC Applications

- ✓ Structural Members (CUF)
- ✓ Tower Skirts
- ✓ Pressure Vessels (CUI)
- ✓ Insulated Piping (CUI)
- ✓ Heat Exchanger Shells
- ✓ Insulated Tanks
- ✓ Boilers



Together Applus is

- ✓ Providing value to your PSM program
- ✓ Sharing common interest in the safe operation of your assets
- ✓ Not just the service provider, but a part of the team.

Contacts



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