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API RP 586 NDE Methods for Equipment Damage Mechanisms (draft)

1.0 Introduction

This recommended practice (RP) provides guidance on the selection and use of nondestructive evaluation (NDE) methods and techniques for in-service fixed equipment damage mechanisms. It supports the suite of API inspection standards and RP's.

This RP consolidates NDE methodologies, terminologies, definitions, and method selections and it is structured to provide a consistent and updatable format. The user of this standard should have a working knowledge of NDE fundamentals.

A general overview of NDE methods, techniques, essential variables for method selection and examples are provided within each Part. The individual parts of this RP are based on general or specific damage mechanisms or equipment types.

2.0 Scope

This RP provides general principles and guidance on the selection and use of NDE methods and techniques for in-service fixed equipment, such as pressure equipment, storage vessels, pipelines, fired heaters and structures. It includes both internal and external NDE methods and techniques. The RP guidance is based on generally accepted and recognized capabilities and limitations.

It is recommended for owner-users to specify the requirements for application of NDE methods as well as the operator certification, development and qualification procedures used in maintaining and/or servicing of equipment for the petroleum and natural gas industries.

This RP does not address specific NDE system effectiveness stemming from instrument and sensor performance, procedures or technician qualification. For NDE technician qualification, consideration should be given to the industry programs such as the API Individual Certification Programs, ASNT Industry Sector Qualification for the Oil and Gas Sector, or owner–users equivalent program that is applicable to the methods and techniques.

Document Parts (current and planned)

Part 1. Shell and Tube Heat Exchanger Tubing

Part 2. High Temperature Hydrogen Attack

Part 3. Contact Point Corrosion (planned)

- Part 4: Pressure Vessels (planned)
- Part 5. Piping (planned)
- Part 6. Storage Vessels (planned)
- Part 7. Pipelines (planned)
- Part 8. Fired Heaters (planned)
- Part 9. Pressure Relief Devices (planned)
- Part 10. Structures (planned)

3.0 References

Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For undated references, the latest edition of the referenced document (including any addenda) applies.

API Recommended Practice 571, Damage Mechanisms Affecting Fixed Equipment in the Refining Industry.

API Recommended Practice 941, Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants”, Eighth Edition, Addendum 1.

API 941 TR-A, The Technical Basis Document for API RP 941.

API, Recommended Practice 579-1 / ASME FFS-1, Fitness-For-Service, TBD Edition, Part 16, (Draft).

API 20D, Qualification of Nondestructive Examination Services for Equipment Used in the Petroleum and Natural Gas Industry

ASME *Boiler and Pressure Vessel Code (BPVC)* ¹, Section V: Pressure Vessels; Division 1.

4.0 Terms, Definitions, Acronyms and Abbreviations

Acoustic Emission Testing (AET)

Acoustic Pulse Reflectometry (APR)

Adaptive Total Focusing Method (ATFM)

Advanced Ultrasonic Backscatter Technique (AUBT)

Blister (B)

Birmingham Wire Gauge (BWG)

Combination of Volumetric, Blister, and Crack-like (CVBC)

Crack-like (C)

Eddy Current Testing (ECT)

Field Metallography and Replication (FMR)

Fissure (F)
Fitness-For-Service (FFS)
Full Matrix Capture/Total Focusing Method (FMC/TFM)
Full Saturation Eddy Current Testing (FS-ECT)
Heat Affected Zone (HAZ)
High Sensitivity Wet Fluorescent Magnetic Testing (HS WFMT)
High Temperature Hydrogen Attack (HTHA)
Inclusions (I)
Inside Diameter (ID)
Internal Rotating Ultrasonic Inspection System (IRIS)
Magnetic Flux Leakage Testing (MFL)
Near Field Testing (NFT)
Near Field Testing Array Testing (NFA)
Non-destructive Evaluation (NDE)
Optical Light Microscopy (OLM)
Outside Diameter (OD)
Lack of Fusion (LOF)
Lack of Penetration (LOP)
Laminations (L)
Localized Thin Area (LTA)
Partial Saturation Eddy Current Testing (PS-ECT)
Penetrant Testing (PT)
Phased Array Ultrasonic Testing (PAUT)
Positive Materials Identification (PMI)
Post Weld Heat Treatment (PWHT)
Radiographic Testing (RT)
Remote Field Eddy Current Testing (RFT)
Remote Visual Inspection (RVI)
Rotational Eddy Current Testing (R-ECT)
Scanning Electron Microscopy (SEM)
Segmented Eddy Current Array Testing (SECT)
Shielded Metal Arc Welding (SMAW)
Subject Matter Expert (SME)
Submerged Arc Welding (SAW)
Time of Flight Diffraction (TOFD)
TOFD Ultra Low Angle (TULA)

Ultrasonic Testing (UT)

Visual Testing (VT)

Volumetric (V)

Weld Overlay (WOL)

Wet Fluorescent Magnetic Particle Testing (WFMT)

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