

Valve Inspection Procedure

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Winter 2020

Live Online Level One

Introduction

This document outlines the basis of a Standard Operating Procedure to be used by ExxonMobil and its contractors for the inspection of critical and dirty service valves.

Ultrasound can be used to identify the presence of four Failure Modes on valves:

1. Passing
2. Blocked
3. Cavitating
4. Flashing

These failure modes can cause significant problems to related processes and can be key Reliability problems in terms of causes of valves failing to reach their expected design life.

It is recommended that any inspector carrying out this task should have “SDT Level 1 Airborne and Structure-borne Ultrasound Certification” as their minimum level of competency in the use of this type of Ultrasound inspection

Preparation

A detailed asset database is required with the following information:

1. Name of valve
 - a. Duty
 - b. Fluid in valve
 - c. Operating temperature of fluid (ambient/cold/hot)
 - d. Type of valve (e.g. non-return, control)
 - e. Valve body type (ball, butterfly, etc.)
 - f. Manufacturer and model number
2. Is the direction of flow on the pipe clearly identifiable?
3. Is the valve installed for flow in the right direction?
4. Walk through the assets and group them into logical lists which will become surveys – the survey should consist of small groups of valves – typically less than 100 – note the walking time between valves in order to develop a time allocation for the inspection task.
5. A system must be in place by the asset owners such that on any given day, for any survey that is due, the operational status of each valve in the survey is available to the inspector before the survey commences.

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Inspection

1. Do you have the correct PPE in case you encounter a leak/spray from any of the valves in this survey?
2. Connect your SDT270DU or SDT340 to your computer, run the UAS software and synchronise your device with the Tree containing the Survey you are required to perform.
3. Is the valve operation status known? If not, do not proceed without assistance of a crew member with detailed operational knowledge for today's operation conditions.
 - a. Operation: check for blockage, cavitation or flashing
 - b. Nominally closed: check for passing and cavitation
4. You will need a Survey worksheet (paper or digital) which contains the asset numbers of the valves to be tested, and checkboxes
 - a. to confirm inspection, (Y/N)
 - i. reason for No
 - b. OK or suspect
 - i. reason for suspect
 - b. Recording made (Y/N)

Procedures

1. Connect the RS2NL100 needle sensor to your SDT270DU or SDT340 data collector. Turn up the amplification and headset volume to the maximum. (remember that SDT devices will not exceed the allowable dBA output of 80dB in order to protect your hearing.)
2. Passing: The valve should appear to be closed. Listen on the valve stem for the sound of flow. If there is the sound of flow, the valve may be passing, record a 10s Dynamic record and store it in the SDT270/340 data tree location for this valve.
3. Blocked: May require you to turn down the Amplification to avoid Clipping. The valve should appear to be open. Listen on the valve stem for the sound of flow. If there is no sound, the valve may be blocked. Listen upstream, is there flow?
4. Cavitation and Flashing: You hear random clicks and pops as well as flow when listening on the valve stem. Listen upstream to establish if that cavitation is from a different source. Listen downstream, take 2 or 3 readings. Do the clicks and pops remain or fade away 1 or 2 metres downstream? Fading suggests Cavitation, no fading suggests Flashing. Record a 10s Dynamic record and store it in the SDT270/340 data tree location for this valve.
5. At the end of the survey upload your data into UAS and compile your report.

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