AWES

Advanced Well Equipment
Standards Group

AWES Recommended Practice For Interval Control Valves

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OTM Consulting Ltd

Contents

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Foreword

AWES (Advanced Well Equipment Standards) is a global industry JIP formed under the guidance of OTM Consulting. Invitation to this group has been extended to members of various branches of the oil and gas industry including oil and gas exploration and production companies, service companies and equipment vendors.

The main task of this technical committee is to prepare an international Recommended Practice (RP) based on the statement of requirements of the end users of said Interval Control Valves (ICV) equipment. This committee and the resultant RP will not be designed to hamper innovation of equipment developed by suppliers/manufacturers. Instead the focus has been dedicated to standardizing the qualification testing criteria of said equipment as per mutually agreeable conditions.

This document is only valid if it has been verified to be the latest revision.

Introduction

This RP has been developed by users/purchasers and suppliers/manufacturers of downhole instrumentation/sensors that are intended for use in the petroleum and natural gas industry worldwide. This RP is intended to provide requirements and information to both parties regarding qualification testing performed on the device to validate the functional specification.

Users of this RP should be aware that requirements above those outlined in this RP may be needed for individual applications. This RP is not intended to inhibit a supplier/manufacturer from offering, or the user/purchaser from accepting, alternative equipment or engineering solutions. This may be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the supplier/manufacturer should identify any variations from this RP.

1. Scope

The scope of this AWES ICV (Interval Control Valve) RP covers the best practices and establishes a clear framework to define performance characteristics and validation methods. For the purposes of this document an ICV is a component of an advanced well completion that is remotely actuated multiple times to control fluid flow from the exterior to the interior of the ICV (i.e. production) or from the interior to the exterior of the ICV (i.e. Injection). The ICV uses actuation means such as hydraulic, electric, wireless technologies or combinations thereof without use of mechanical intervention.

The scope of this RP includes a framework to specify and compare performance characteristics through:

a) Defining components of the ICV
b) Defining functional requirements
c) Defining technical specifications
d) Identifying critical design requirements for calculating/determining technical specification
e) Defining qualification tests and documentation to validate technical and functional specifications
    i. Defining methods to validate flow performance
    ii. Defining methods to validate design life
f) Defining design changes that require requalification
g) Recommended practices for system integration testing, including control architectures and external control modules that are not otherwise addressed in this document
h) Minimum required documentation

The following tests are covered in this RP:

Category 1 - testing of the flow regulation, including:
a) Differential pressure opening
b) Flow characterization
c) Maximum flowing differential pressure
d) Erosion when producing
e) Erosion when injecting

Category 2 - testing for pressure integrity and combined loading:
a) Pressure integrity
b) Function with applied load
c) Life and thermal cycle
d) Combined testing
e) Mechanical intervention

Category 3 - testing for storage and deployment:
a) Storage temperature
b) Bending

The following Items are excluded from the scope:

a) Manufacturing practices and methods
b) Safety valves
c) Mechanical sliding sleeves
d) Traditional and autonomous inflow control devices
e) Ball valves
f) Valves designed expressly to function a single time
g) Non-active flow control devices or devices that require physical intervention to function

Also beyond the scope of this document is the qualification of control architectures and external control modules that may be added to the ICV, whether implemented downhole or through surface controls.