1 Scope and limitations

This standard defines the testing and reporting of step response of control valves that are used in throttling closed loop control applications. A control valve consists of the complete, ready-to-use assembly of the control valve body, actuator, and any required accessories. The most probable accessory is a valve positioner. For background, refer to technical report ISA-TR75.25.02-2000 (R2010), Control Valve Response Measurement from Step Inputs.

If this standard is used for evaluation or acceptance testing, the parties may agree to documented variations from these requirements.

This standard does not define the acceptable control valve performance for process control nor does it restrict the selection of control valves for any application.

This standard defines methods and criteria for performing response tests and evaluating test results for three alternative environments – “bench testing”, “laboratory testing”, and “in-process testing”. “Bench testing” is testing without flow such as in a plant instrument shop, laboratory, or control valve manufacturing site. “Laboratory testing” is testing with flow in a laboratory. “In-process” testing is performed in a plant during normal plant operation with process flow.

2 Purpose and limitations

The purpose of this standard is to define how to test, measure, and report control valve response characteristics. This information can be used for process control applications to determine how well and how fast the control valve responds to the control valve input signal. It does not define acceptable process control, or restrict the selection of control valves to any application, since process requirements and user objectives vary widely.

The information is specifically applicable to closed loop feedback control but may have some application to open loop control applications. It does not address valves used in on-off control service.

Tests specified in this standard may not be sufficient to measure the performance required for all applications. Not all control valve applications will require this testing.

3 Definitions

The technical report ISA-TR75.25.02-2000 (R2010) explains applicable terms and explores control valve static and dynamic response characteristics important for process control. That information will aid correct interpretation and application of the test results obtained from the tests defined in this standard. Other relevant standards are included in Clause 8.

This standard and ISA-TR75.25.02-2000 (R2010) make use of terms as defined in ISA-51.1-1979 (R1993), Process Instrumentation Terminology, and some of the essential terms are repeated here for convenience. In the specific area of nonlinear dynamics, it was determined that some terms defined in ISA-51.1-1979 (R1993) lacked the precision desired for these documents. Others were inconsistent with the terminology used in the nonlinear control literature. A common set of definitions is used in this standard and ISA-TR75.25.02-2000 (R2010). Those used only in ISA-TR75.25.02-2000 (R2010) are marked with (*).

3.1 backlash:*
in process instrumentation, a relative movement between connected mechanical parts, resulting from looseness when motion is reversed [ISA-51.1-1979 (R1993)]. Sometimes also referred to as slop, lost motion, or free play.