

# Basics of Control Valves (Instructor-Led Training)

## Course Description

This course introduces the basics of control valves to technicians new to the natural gas industry.

## Course Prerequisites

- GTA Web-Based Training
  - Basics of Control Valves
- Instructor-Led Training
  - Basic PLCs

## Course Objectives

Upon completion of this course, the student will have received instruction designed to assist him/her in the following:

- Explain the theory of operation for control valves found in natural gas pipelines.
- Describe the various types of control valves used in natural gas systems.
- Discuss the different styles of valve actuators.
- Discuss the different styles of valve positioners.

## Course Outline

1. Control Valve Theory
  - a. Control Loop
  - b. Deadband
  - c. Process Variability
  - d. Actuator-Positioner Design
  - e. Valve Response Time
  - f. Valve Style and Characterization
  - g. Valve Sizing
2. Valve Types
  - a. Ball Valves
  - b. Butterfly Valves
    - i. Conventional Butterfly Valves
    - ii. Lined Butterfly Valves
    - iii. High-Performance Butterfly Valves
  - c. Plug Valves
  - d. Globe Valves
  - e. Valve Bodies
  - f. Bonnets
  - g. Packing
  - h. Globe Valve Trim
  - i. Stem and Post-Guided Valves
  - j. Double-Port
  - k. Single-Port
  - l. Economy Design
  - m. Bar Stock
  - n. Chemical Service
  - o. High-Pressure
  - p. Cage-Guided Valves
  - q. Massive Guiding

- r. Unbalanced Trim
  - s. Balanced Trim
  - t. General Valve Installation Requirements
3. Valve Actuators
- a. Valve Actuators
  - b. Terms
  - c. Spring and Diaphragm Actuators
  - d. Direct-Acting Spring and Diaphragm Actuators
  - e. Reverse-Acting Spring and Diaphragm Actuators
  - f. Electro-Hydraulic Actuators
  - g. Manual Actuators
  - h. Rack and Pinion Actuators
  - i. Electric Actuators
  - j. Actuator Accessories
  - k. Travel Stops
4. Valve Positioners
- a. Basic Positioner Operation
  - b. Valve Positioner Applications
  - c. Static Considerations
  - d. Dynamic Considerations
  - e. Electro-Pneumatic Positioners
  - f. Positioners for Rotary Shaft Valves
  - g. Digital Valve Positioner

## Recommended Resources

- GTA Basic Basics of Control Valves Participant Guide
- GTA Basics of Control Valves Instructor Presentation.
- Internet sites related to industrial control valves.
- Textbooks or other publications related to industrial control valves.