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Guidelines for the Specification of Heavy Duty Pneumatically Powered Quarter Turn Scotch Yoke Valve Actuators

Approved 3 February 2020

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1 Scope

This standard provides general requirements for the development of specifications for pneumatic scotch yoke actuators.

This document applies to actuators with a maximum allowable operating pressure (MAOP) of 250 psig with a compressed gas (i.e., instrument air).

2 Purpose

The purpose of this standard is to provide guidance to assist the user in specifying pneumatic scotch yoke actuators.

3 Definitions

For the purpose of the definitions below it is assumed that yoke rotation at start stroke is clockwise when viewed from the top of the actuator (i.e., looking down at valve stem).

3.1
scotch yoke actuator
an actuator that employs a scotch yoke mechanism to convert the linear motion of a piston into part-turn rotational motion

3.2
scotch yoke mechanism
a device that employs a sliding pin in a yoke such that the effective moment arm is constantly changing. The moment arm is longest at the start and end of each part-turn motion.

3.2.1
symmetrical scotch yoke
symmetric yokes allow for produced equal torque at both the start (break) and end positions

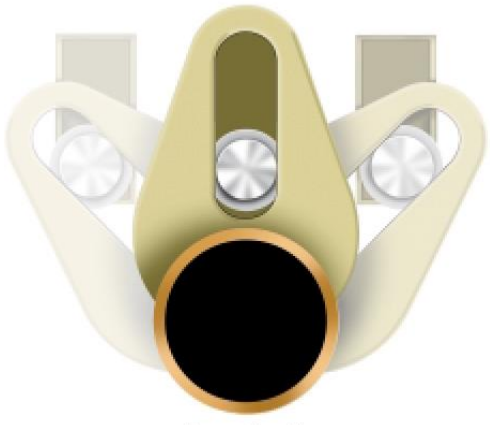

Figure 1 – Symmetric yoke

3.2.2
canted scotch yoke
canted yokes are a variation where the actuator is biased to deliver more torque at one extremity of stroke. Use of canted torque arms can reduce the cost, weight, and size of the actuator, where the valve torque demand is highest at one end of stroke (i.e., break to open and/or reseat to close).