SIZING OF ACTUATORS

Valve Torque:
The torque values published are breakaway torques from the closed position. Breakaway torques are caused by minute surface indications in the surface of the ball and the resultant cold flow of the seat material into these indications as a result of valve seat compression forces. Valve breakaway torques are the highest torques expected, without accounting for resultant dynamic forces caused by flow through the valve.

Seat Materials:
The type of seats used in a ball valve significantly influence operating torque. Low friction soft seats such as RTFE will exhibit lower operating torque vs. the harder high friction materials such as Delrin or Peek. This friction force is primarily a result of the seat material.

Floating or Trunion Valves:
With floating ball valves the ball moves to the downstream seat. Higher differential pressures result in higher valve torques. For small valves the effect of the differential pressure is minimal when compared to the assembly stress on the valve seats and stem seal. As a result the torque basically remains constant for the operating differential pressure of the valve body. Trunion ball valves are beneficial for higher operating pressures as the fluid load is carried by the trunion bearings. This in combination with the fact that the upstream seat surface area is much smaller than the ball surface area results in an overall lower torque.

Stem Seal:
The torque that results from the stem seal is a function of the packing chamber depth and the type of packing used. The affect of the packing seal is more dominant in smaller valves where its torque resistance proportion is larger.

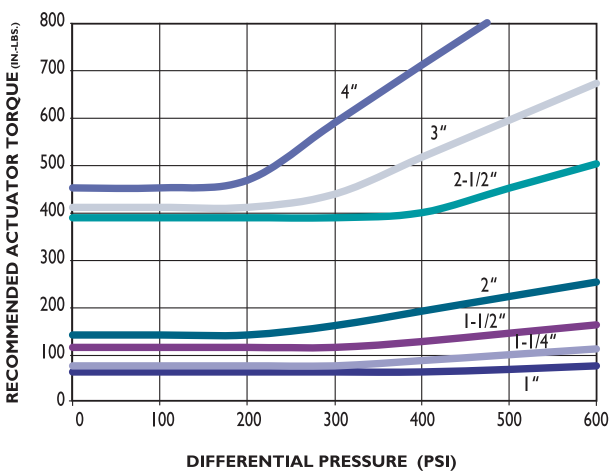
Frequency of Operation:
The frequency of the valve operation affects the resulting valve operating torque. Under low frequency operation the seat may flow into the minute surface roughness of the ball.

Line Media:
The service the valve is installed on can have a significant effect on the valve torque. High viscosity fluids transfer larger opposing forces to the valve ball during opening and closing and thus a higher operating torque results. Lubricating services such as oils tend to reduce the valve torque by minimizing the friction forces between the valve ball and seat, while dry services such as gas do not provide lubrication and as such result in higher operating torques.

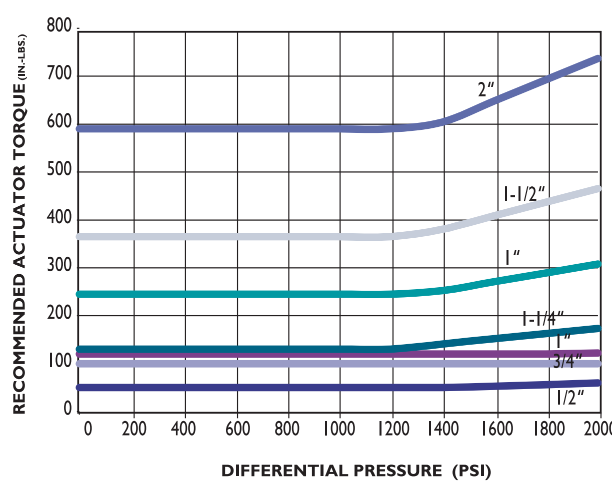
Operation Speed Limitations:
Resilient materials such as RTFE can be damaged by quick rotation of the valve ball. IFC recommends the following speed operation limits:

Valve Size	Max. Actuator Operating Speed Open to Close (Seconds)
1/4" - 2-1/2" (8-65 mm)	0.5 seconds
3" - 6" (80-150 mm)	1 second
8" - 12" (200-300 mm)	5 seconds

SERIES 2FB6 - SIZES 1" TO 4"



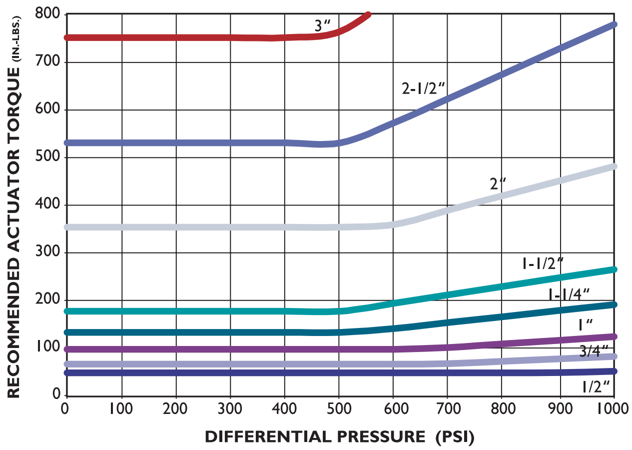
SERIES 1RB20 - SIZES 1/4" TO 2"



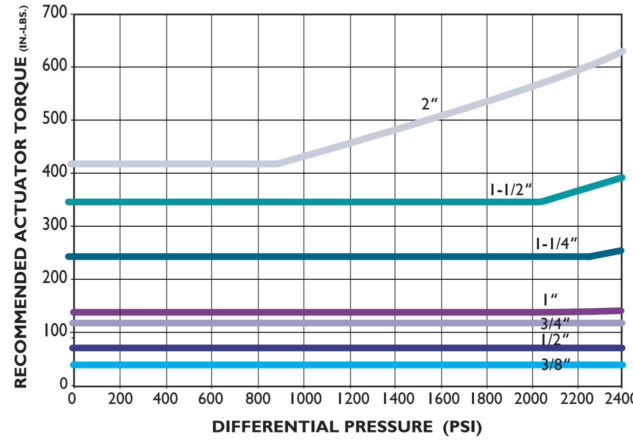
ISLIP FLOW CONTROLS Inc.

TECHNICAL DATA
VALVE TORQUE

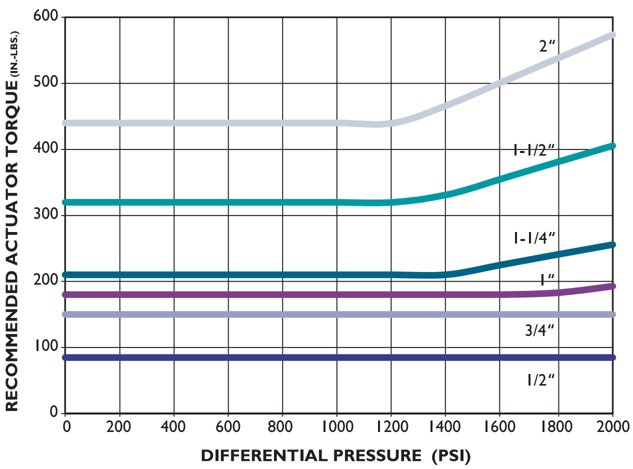
SERIES 2FB10 2PC AND SERIES 3FB10 3PC - SIZES 1/4" TO 3"



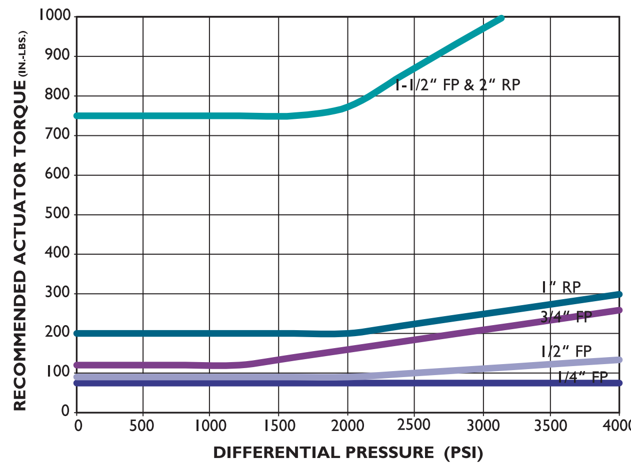
SERIES 2SB900 - SIZES 1/4" TO 2"



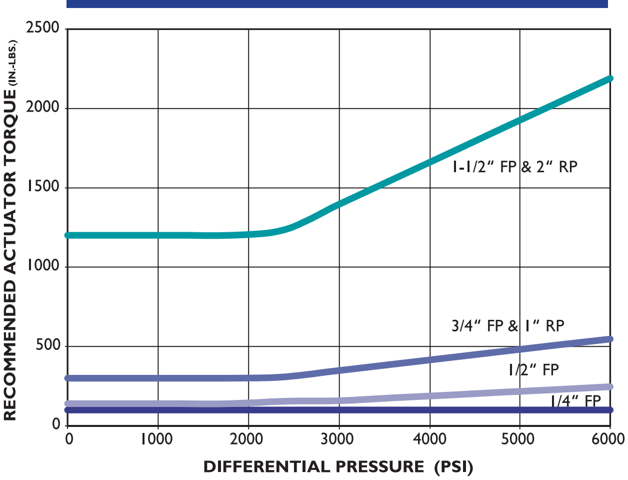
SERIES 3SB20 - SIZES 1/2" TO 2"



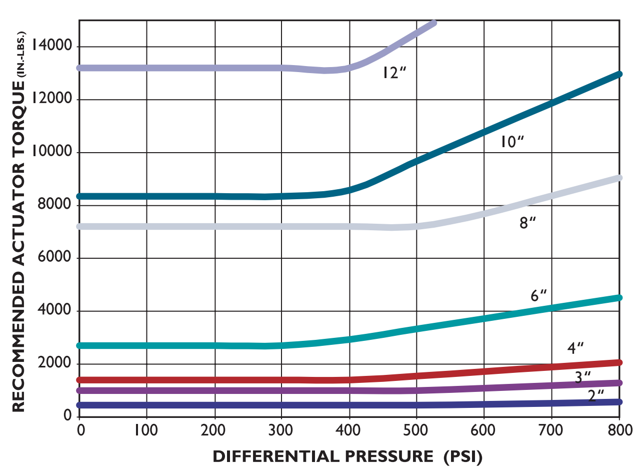
SERIES 2FB1500 AND 2SB1500 - SIZES 1/4" TO 2"



SERIES 2FB60 AND 2SB60 - SIZES 1/4" TO 2"



SERIES 2FB150/300 SPLIT BODY FLANGED BALL VALVES - SIZES 1/2" TO 12"



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ACTUATOR CALCULATIONS

The selection of an actuator is usually based on economical considerations. IFC strongly suggests that a valve used in a critical application be equipped with a larger actuator, thus utilizing a larger factor of safety in selection. IFC takes no direct or indirect responsibility for actuator selection. The following actuator selection procedure should be used as a guide only.

FLUID AFFECT	
Liquid	Factor (F1)
Clean particle-free, non-lubricating (e.g. water, alcohol or solvents)	1.0
Clean particle-free, lubricating oil	0.8
Slurry (Liquids carrying solids) or heavy corroded and contaminated system	1.5
Gas or saturated steam, clean and wet	1.0
Gas or superheated steam, clean and dry	1.3
Gas, dirty (I.e. Natural Gas)	1.5

SERVICE FACTORS	
Frequency	Factor (F2)
Once per day or greater	1
Once every couple of days	1.5
Throttling	1.2
Positioner Control	1.5
"Plant Critical" Operation	1.5

To obtain the torque requirements for an actuator follow the following example.

STEP 1: Determine the basic valve torque from the charts on page 27 and 28 for a particular size and maximum operating differential pressure.
Example: 2" Series 2FB10 at 500 psig differential pressure basic valve torque is 350 in.-lbs.

STEP 2: Determine the fluid factor (F1)

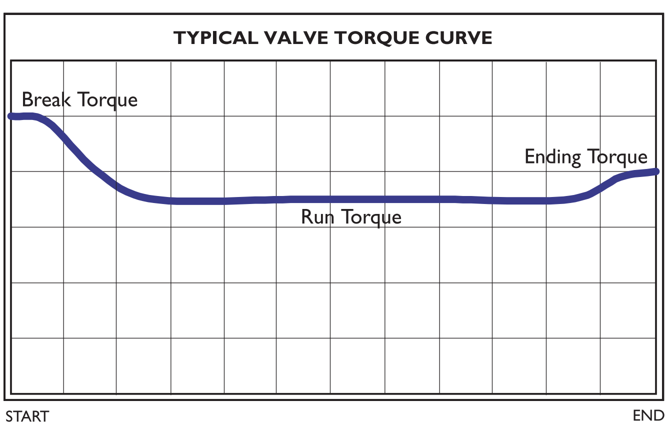
STEP 3: Determine the service factor (F2)
Example: For a valve operating less then once a day on clean particle-free, non-lubricating service F1 = 1.0 and F2 = 1.5

STEP 4: Determine the minimum recommended actuator torque by multiplying the basic valve torque obtained in step 1 by F1 and F2.
Example: 350 x 1.0 x 1.5 = 525 in.-lb.

SELECTION OF ACTUATOR CONSTANT TORQUE ACTUATORS (i.e. Double Acting Pneumatic and Electric)

As determined in the above example the minimum recommended actuator torque or minimum valve break torque is 525 in-lbs. With both the service factor and fluid affect taken into account additional safety factors are usually not required. However, it is good policy to apply a addition safety factor of 1.5 when selecting a pneumatic actuator. This will ensure smooth operation even in the case of occasional reduced actuator air supply pressure.

VARIABLE TORQUE ACTUATORS
(I.E. SINGLE ACTING AND SCOTCH YOKE PNEUMATIC)



With variable torque actuators the required valve torque across the valve stroke must be examined.

At the beginning of each stroke the valve torque is the largest. This is called the break torque, which are the torques outlined on the charts found on pages 27 and 28. As the ball is turned the torque decreases. This torque is known as the run torque. At the end of the stroke as the ball and seats are returned to full contact the torque again increases but to an amount less then the valve breakaway torque. This torque is known as the valve ending torque. Due to the variable operating torque of a ball valve when scotch yoke type or spring return actuators are used IFC recommends factoring the breakaway torque by 0.7 for the running torque and 0.8 for the valve ending torque.