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AutoQuiz: How to Calculate the Pressure Recovery Factor for Valves

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AutoQuiz is edited by Joel Don, ISA's social media community manager.

This automation industry quiz question comes from the ISA Certified Automation Professional (CAP) certification program. ISA CAP certification provides a non-biased, third-party, objective assessment and confirmation of an automation professional's skills. The CAP exam is focused on direction, definition, design, development/application, deployment, documentation, and support of systems, software, and equipment used in control systems, manufacturing information systems, systems integration, and operational consulting. Click this link for more information about the CAP program.

A globe valve has a pressure recovery factor of 0.83; a butterfly valve has a pressure recovery of 0.61; a ball valve has a pressure recovery factor of 0.63; and an eccentric plug valve a pressure recovery factor of 0.79. Which valve will have the least overall pressure drop?

a) globe
b) butterfly
c) ball
d) eccentric plug
e) none of the above

Pressure recovery factor can be defined as “the increase in fluid static pressure that occurs as fluid moves through a valve from the vena

contracta to the valve's outlet and downstream piping." [ISA-RP75.23-1995]

Mathematically, pressure recovery factor can be expressed as: Cf = FL = √[(P1-P2) / (P1-Pvc)]

Where,

P1 = Upstream Pressure
P2 = Downstream Pressure
Pvc = Pressure, vena contracta

The pressure recovery factor is proportional to the square root of the overall pressure drop (P1-P2), so that the valve with the lowest recovery factor will have the lowest over pressure drop.

The correct answer is B, butterfly.

About the Author

Joel Don is the community manager for ISA and is an independent content marketing, social media and public relations consultant. Prior to his work in marketing and PR, Joel served as an editor for regional newspapers and national magazines throughout the U.S. He earned a master's degree from the Medill School at Northwestern University with a focus on science, engineering and biomedical communications, and a bachelor of science degree from UC San Diego.

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