



Control Valve Sizing in Aspen Hysys



Example 1: Size the control valve with the following conditions. The control valve acts as PV and is installed at the outlet of a methanol plant inlet K.O. drum.

Parameter	Value	Unit
Flow	133000	Kg/hr
Fluid	Methane	
Fluid Package	PR	
Pressure 1	52.9	bara
Pressure 2	51	bara
Temperature	40	C

Size the control valve in both Aspen Hysys and Fisher and compare the input provision and results.



Sizing in Aspen Hysys

Steps to be taken:

1. Add Methane to component list
2. Select Peng-Robinson as fluid package
3. Enter simulation environment and provide the process data.
4. Select a control valve and connect stream 1 to its inlet while connect stream 2 to its outlet.
5. Specify the pressure drop in control valve based on given table.
6. Go to rating tab, select universal gas sizing, specify the opening to be 100%. Also specify the characteristic to be linear.

Note:

Valve characteristics

A unique and simple procedure for valve characteristic determination for almost all Chemical Plants.

1. Use Equal Percentage if the valve functions as FV or TV
2. Use Linear if the valve functions as PV or LV
3. Use Linear if there is Split Range Control

Note: Due to process demands, above rules might not apply to some situations.





Valve: VLV-100

Design Rating Worksheet Dynamics

Rating

Sizing
Nozzles
Options
Flow Limits

Valve Operating Characteristics

Linear
 Quick Opening
 Equal Percentage
 User Table

Valve Vapor Flow Models

Universal Gas Sizing

Size Valve

Sizing Conditions — Current — User Input

Inlet Pressure [kPa]	5290
Molecular Weight	16.04
Valve Opening [%]	100.00
Delta P [kPa]	190.0
Flow Rate [kg/h]	1.330e+005

Sizing Methods — Cv — Cg

ANSI/ISA method
 Manufacturer specific methods
 Simple resistance equation

C1	33.5
Km	0.9000
Cv [USGPM(60F,1psi)]	610.5
Cg	20431

Delete OK Ignored

Now select Fisher as vapor flow model and size valve again.

Valve: VLV-100

Design Rating Worksheet Dynamics

Rating

Sizing
Nozzles
Options
Flow Limits

Valve Operating Characteristics

Linear
 Quick Opening
 Equal Percentage
 User Table

Valve Vapor Flow Models

FISHER

Size Valve

Sizing Conditions — Current — User Input

Inlet Pressure [kPa]	5290
Molecular Weight	16.04
Valve Opening [%]	100.00
Delta P [kPa]	190.0
Flow Rate [kg/h]	1.330e+005

Sizing Methods — Cv — Cg

ANSI/ISA method
 Manufacturer specific methods
 Simple resistance equation

C1	33.5
Km	0.9000
Cv [USGPM(60F,1psi)]	626.1
Cg	20955

Delete OK Ignored



Sizing in Fisher FSM

1.Data entry

The screenshot displays the Fisher Valve Specification Manager software interface. The window title is "Fisher™ Valve Specification Manager". The menu bar includes "File", "Edit", "Profile", "Contacts", "View", and "Help". The toolbar contains various icons for file operations and navigation. The left sidebar shows a project tree with "MyProjects" containing "PV-1006", which has sub-items "Tag1" and "PV-1006". The main area is titled "Installation Data:" and contains the following fields:

- Style:** Globe (dropdown), [D/E](#)
- Rating:** CL600 (dropdown), [D/E](#)
- Nominal Inlet Pipe Size:** 12 (dropdown), Inches (dropdown), [D/E](#). **Schedule:** (dropdown), **Thickness:** (input field)
- Nominal Outlet Pipe Size:** 12 (dropdown), [D/E](#). **Schedule:** (dropdown), **Thickness:** (input field)
- End Connection:** RTJ Flg (dropdown), [D](#)
- Allowable Noise:** 85 (input field), dB(A)
- Body to Bonnet bolt & nuts material:** Manufacturer Standard (dropdown), **Packing Flange Studs & Nuts:** Manufacturer Standard (dropdown)
- Design Pressure:** 60 (input field), bar(g) (dropdown)
- Design Temperature:** 85 (input field), deg C (dropdown)
- ANSI Shutoff:** (dropdown), [Help](#)
- Service Description:** (text input field)

At the bottom of the form, there are "Previous" and "Next" buttons.



2.Process data entry

The screenshot displays the Fisher™ Valve Specification Manager software. The main window is titled "Fisher™ Valve Specification Manager" and contains a menu bar (File, Edit, Profile, Contacts, View, Help) and a toolbar. The interface is divided into several sections:

- Project Tree (Left):** Shows a hierarchy of projects: MyProjects > PV-1006 > Tag1 > PV-1006.
- Navigation Tabs (Top):** Includes "ISA Sheet", "1-Installation Data", "2-Valve Sizing" (active), "3-Valve Selection", "4-Valve Construction", "5-Actuator Selection", "6-Positioner", and "7-Additional Accessories".
- Main Data Entry Table:** A table with columns for Name, Units, Minimum, Normal, Maximum, and Others. It is divided into sections: "SIZING INPUTS" and "IEC NOISE INPUTS".

Name	Units	Minimum	Normal	Maximum	Others
SIZING INPUTS					
Gas					
Mass Flow Rate Gas	kg/h		133000.0000		
Inlet Pressure	bar(a)		52.90000		
Outlet Pressure	bar(a)		51.00000		
Inlet Temperature	deg C		40.0000		
Molecular Weight / Specific Gravity	M		16.700		
Dynamic viscosity	cP		0.013		
Ratio of specific heats			1.280		
Inlet Compressibility Factor		1.000	0.930	1.000	1.000
Pressure drop ratio factor (xt)			0.720		0.650
Recovery Factor (FI)			0.900		0.900
Valve style modifier (Fd)			1.000		0.350
Upstream pipe size	in		12		12
Upstream pipe schedule		STD	STD	STD	STD
Downstream pipe size	in		12		12
Downstream pipe schedule		STD	STD	STD	STD
Valve Diameter	in	12.000	12.000		12.000
IEC NOISE INPUTS					
Valve/Trim for aerodynamic noise		Globe/Angle	Globe/Angle		
Aerodynamic distance Rn	in	39.37	39.37	39.37	39.37
Valve Outlet Area	in ²		113.000		
Outlet temperature	deg C		40.0000		
Outlet Compressibility Factor		1.000	0.930	1.000	1.000
- Right-Hand Sidebar:** Contains configuration options for "Sizing For" (Liquid, Gas, Vapor, Steam, Fisher Real Gas, Water, Pulp, 2-phase liquid/gas, 2-phase liquid/vapor, Simple Cv), "Diffuser Model" (None), "Design Condition" (Minimum), "Solve For" (Cv, dP, Q (Flow)), "Piping" (Size/Schedule, Size/Thickness), "Insulation Credit" (Acoustic, Thermal, None), and "Estimate" (Compressibility).
- Buttons (Bottom):** "Add Condition", "Delete Condition", "Reset Condition", "Summary", "Config", "Sizing Assistant", "See Default Value Messages", "Maximum", "Kc Help", "Calculate", "Cancel Conditions", "Previous", "Next".
- Messages (Bottom):** "A value for variable 'Inlet Pressure' must be provided. Calculate for variable 'Flow Coefficient (Cv)' failed."



3.FSM Output

The screenshot displays the Fisher™ Valve Specification Manager software interface. The main window is titled "Fisher™ Valve Specification Manager" and shows a project tree on the left with "MyProjects" containing "PV-1006" and "Tag1". The main area is divided into several sections:

- SIZING OUTPUTS:** A table with columns for parameter, units, and values. The values are highlighted in yellow.
- IEC NOISE OUTPUTS:** A table with columns for parameter, units, and values. The values are highlighted in yellow.
- VELOCITY OUTPUTS:** A table with columns for parameter, units, and values. The values are highlighted in yellow.

On the right side, there are several configuration panels:

- Sizing For:** Radio buttons for Liquid, Gas (selected), Vapor, Steam, Fisher Real Gas, Water, Pulp, 2-phase liquid/gas, 2-phase liquid/vapor, and Simple Cv.
- Diffuser Model:** A dropdown menu set to "None".
- Design Condition:** A dropdown menu set to "Minimum".
- Solve For:** Radio buttons for Cv (selected), dP, and Q (Flow).
- Piping:** Radio buttons for Size/Schedule (selected) and Size/Thickness.
- Insulation Credit:** Radio buttons for Acoustic, Thermal, and None (selected).
- Estimate:** A checkbox for Compressibility, which is unchecked.

At the bottom, there are buttons for "Add Condition", "Delete Condition", "Reset Condition", "Summary", and "Config". Below these is a "Sizing Assistant" section with a checkbox for "See Default Value Messages", a "Maximum" label, a text input field containing "Maximum", and navigation arrows. A "Kc Help" link is also present. At the very bottom, there are "Previous" and "Next" buttons.



Result comparison

CV	Value
CV by Universal Gas Sizing	610
CV by Fisher in Aspen Hysys	626.1
CV by Fisher in FSM	596.2



Appendix

