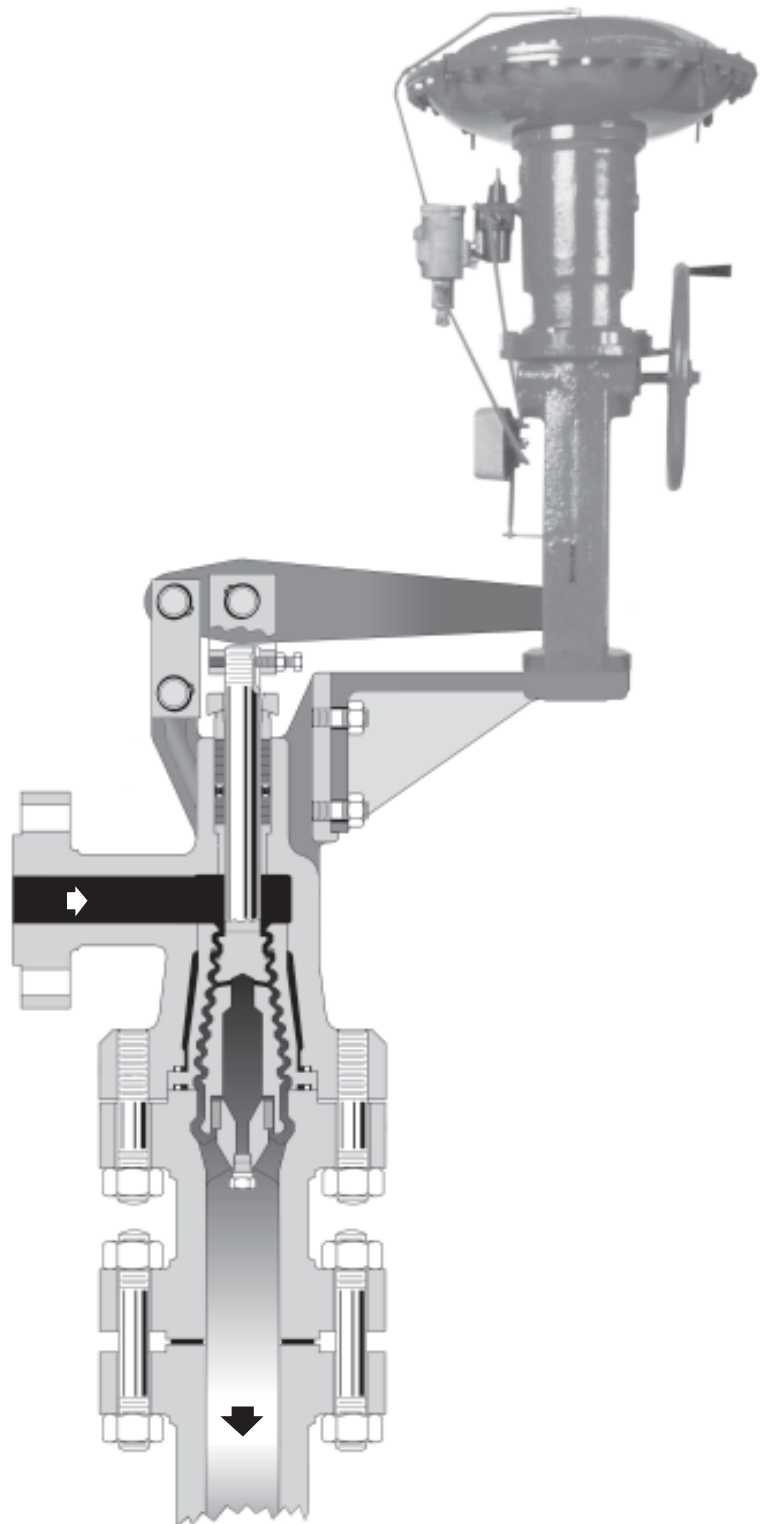


MIL 77000 High Pressure Drop Control Valves with Multiple Stage Labyrinth Lo-dB Trim



TABLE OF CONTENTS

Introduction	1
Model Numbering System	2
Available Sizes & Ratings	2
Cv Chart.....	2
Generala Data.....	3
Seat Leakage Class / Temp. Range ..	3
37-38 Series Actuator Selection.....	3
Construction	4-5
Dimensions	6
Typical Applications.....	6



FOREWORD

The 77000 Series Lo-dB valve is designed to reduce fluid velocities and the resultant noise generation to tolerable levels, while diminishing metal fatigue and erosion due to high fluid velocities and vibration, at low initial installation costs.

Anti-Clog Design

The 77000 Series Lo-dB valves provide control of high pressure compressible fluids without the erosion, vibration and high noise levels associated with conventionally designed control valves. Because of their relatively large flow passages and a shearing action provided by their multiple step plug and seat ring designs, these valves are particularly well suited for applications involving gases with entrained liquids/solids or liquids with entrained solids.

Adiabatic Flow with Friction

The principle of "Adiabatic Flow with Friction" is to reduce pressure much like the pressure loss which occurs in a long pipeline. This effect is produced by letting the fluid pass through a number of restrictions providing a tortuous flow pattern dissipating energy through high head loss rather than through shock waves.

The flow area of the valve trim is gradually increased toward the downstream section. This compensates for expansion of the gas with pressure drop and insures a nearly constant fluid velocity throughout the complete throttling process.

The reduced velocity thus minimizes the impact erosion of entrained liquids. The acoustical performance of 77000 series valves is optimal when pressure ratio does not exceed 'trim expansion' ratio. For higher pressure ratios, Lo-dB cartridges in the outlet are recommended. For liquid service, special trim with multiple linear stages followed by expanding stages provides the optimum in cavitation and erosion control.

Installation Costs Minimized

The size of the outlet flange is purposely enlarged to reduce outlet velocity and to eliminate the need for pipe reducers between the valve and the larger downstream piping. The outlet flange connection is available in lower ratings (see specifications). Additional cost savings are found in the omission of expensive silencers.

Quiet Operation

The multiple step, labyrinth type plug and seat ring

incorporate a Stellite faced seating surface at the top to provide tight shut-off. The rest of the steps do not touch. The intermeshing flow pattern between the steps results in a large number of sharp turns for the fluid. This develops a high velocity "head loss" (pressure drop) and therefore a reduced velocity. The shape of the plug steps is designed to prevent the deposit and trapping of solids entrained in the liquid stream. Low velocity also ensures longer trim life due to less abrasion.

Low Cost Operation and Maintenance

The relatively short stroke of the Lo-dB valve keeps installation and operation costs low by permitting use of standard, pneumatic spring diaphragm actuators. These actuators, used with a ratio lever, provide sufficient force to close the valve at pressure drops up to 6000 psi with the spring alone.

Due to integral bonnets, the deep packing box is the only high pressure seal in the valve. The oversize stem and plug are welded together to form a sturdy, vibration-proof subassembly having a high natural frequency. The plug and stem are guided top and bottom for additional rigidity.

The removable seat ring is clamped against a shoulder in the valve body by the lower flange. Since the shoulder is near the bottom flange, the long seat ring is free to expand and contract with changes in fluid temperature. Leakage between the seat ring and body is prevented with a high pressure O-ring seal for near ambient temperature fluids and the lapped shoulder for high temperature applications. Raised lips are machined on the seat ring and body for a possible seal weld.

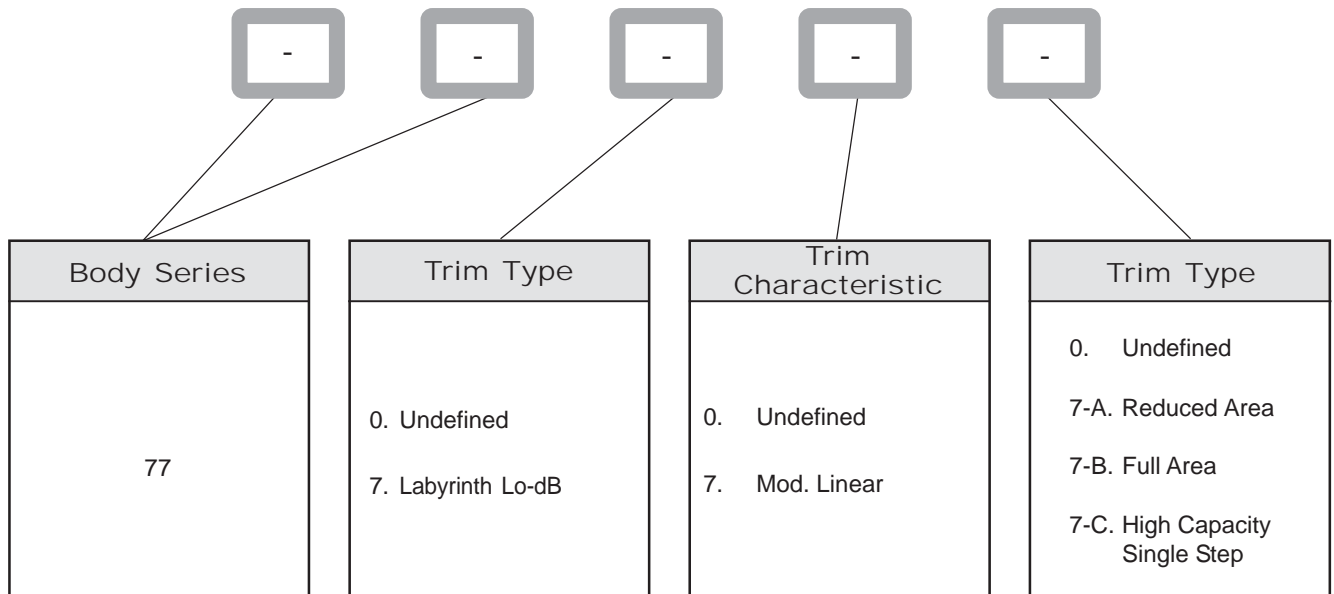
Smooth, Stable Control, Fail Safe Action

The high rangeability (100: 1) of the Lo-dB valve allows wide variations in controlled flow. Operation is stable because the low static unbalance is achieved by supporting the plug on the lower guide, which acts as a piston. By admitting a selected intermediate pressure through internal plug porting, a balance force exists within the plug which reduces the unbalance force to a minimum. The valve will fail in the proper direction by the actuator spring on air failure.

Auxiliary Equipment

A variety of optional pneumatic and electro-pneumatic positioners, solenoid valves, limit and position switches and handwheels are available to suit each process application.

NUMBERING SYSTEM



SIZES / RATINGS

VALVE SIZE (Inch) (nominal)	INLET		OUTLET	
	Size (inch)	Rating ANSI Class	Size (in)	Maximum Rating ANSI Class
2	2	1500# & 2500#	3	2500#
			4♦	900#
3	3	1500# & 2500#	4	2500#
			6♦	600#
4	4	1500# & 2500#	6	2500#
			8♦	600#
6	6	1500# & 2500#	8	2500#

♦ : Not available with 'C' Trim

FLOW COEFFICIENTS - RATED Cv

** C_f factor = 0.99

*** C_f factor = 0.9

VALVE SIZE (inch) (nominal)	Trim A (for lowest noise values)**		Trim B**		Trim C*** (single step)
	Area Ratio	Cv*	Area Ratio	Cv*	Cv*
2	4.2	15	1.9	25	45
3	3.4	35	1.8	50	110
4	4.0	60	2.4	80	185
6	3.5	85	2.0	125	260

* : Use in conjunction with C_y factor. Refer MIL Noise Control Manual.

*** : Use Standard Valve SPL prediction method with C_f factor = 0.9.



GENERAL DATA

Body

Type: Cast with Integral bonnet and bolted outlet flange

Recommended Flow Directions:

Side Inlet Connection - Bottom Outlet

Connections:

Flanged or Butt welded

Gland Packing

Type: With Teflon (<180° C) or Graphite (>180° C)

moulded split rings.

Option: Teflon 'V' Rings, Eco-Lock (Low Emission)

Trims

Plug & Seat Type : Expanding Labyrinth

Rangeability : 100 : 1

Characteristic :

Standard : Modi. Linear

Special Application : Customised

Actuator

Type: 37/38 Series Pneumatic Spring Diaphragm Actuators with optional Hand Wheels.

Options: Electrical, Piston Cylinder

LEAKAGE CLASS / TEMPERATURE RANGE

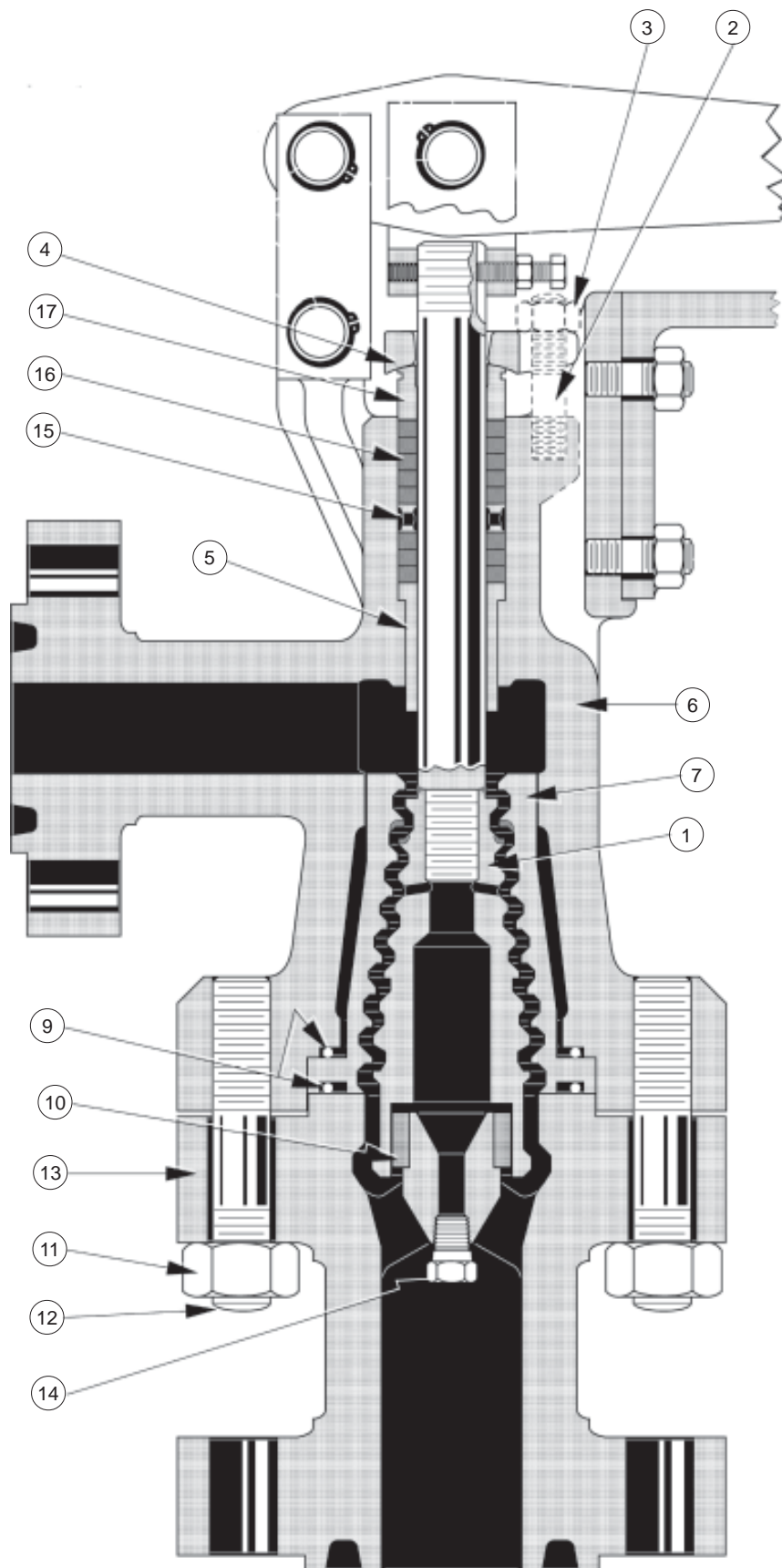
VALVE TYPE	SEAT TYPE	TEMPERATURE RANGE (°C)		SEAT LEAKAGE (As per ANSI/FCI 70.2)	
		Min.	Max.	Standard	Optional
2" - 6"	Metal	-27	566	IV	V
	Soft Seat	-27	149	VI	

PRESSURE DROP LIMITATION (Spring - Diaphragm Actuator)

VALVE SIZE	STROKE (inch)	ACTUATOR SIZE	AIR - TO - OPEN			AIR - TO - CLOSE		
			SPRING RANGE (psi)	ALLOWABLE PRESSURE DROP		Spring Range (psi)	ALLOWABLE PRESSURE DROP	
				(psi)	(bar)		(psi)	(bar)
2	1.5	15	11-30	5000	345	3-15	5000	345
3	2.5	18L	12-30	4000	275	3-15	6000	415
4	3.5	24	9-30	3000	205	3-15	5000	345
6	3.5	24	19-46	4000	275	3-15	4000	275

Note: Supply pressure 35 psig for all sizes except 50 psig required with 6" valve





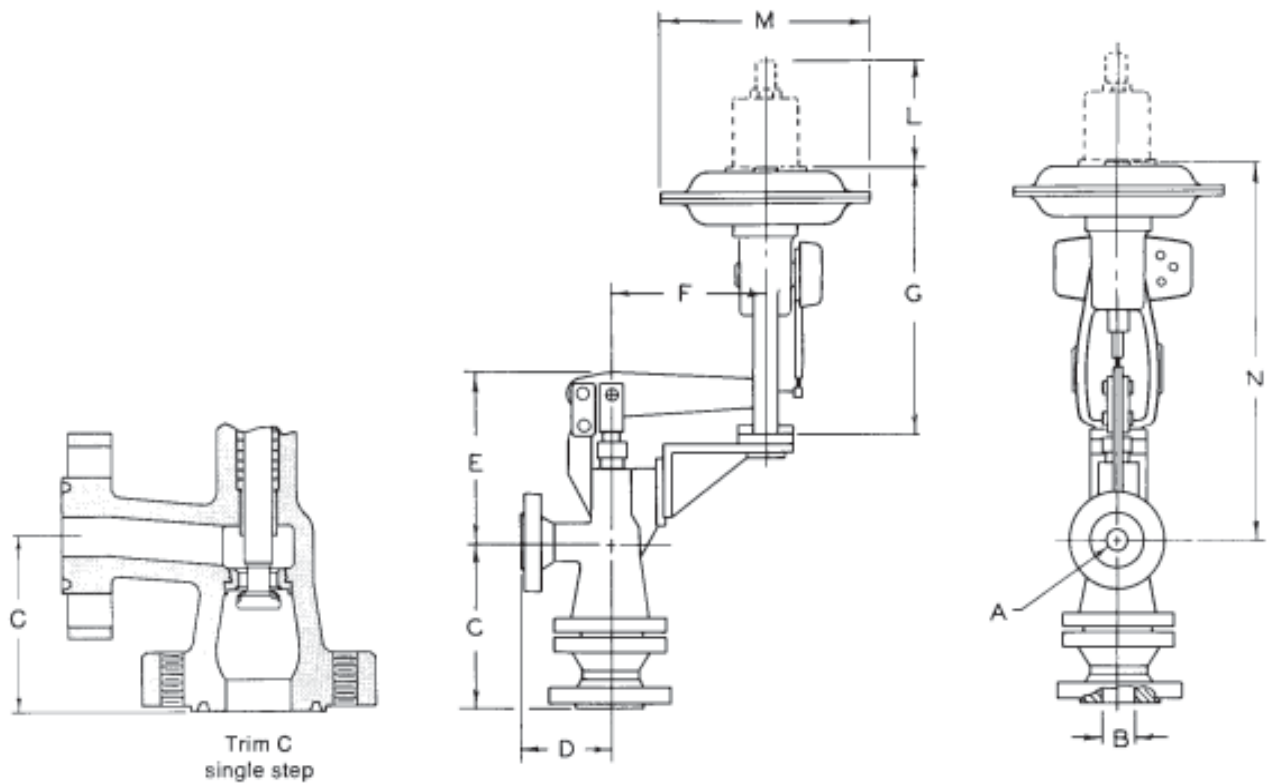
MIL 77000 STANDARD CONSTRUCTION

MATERIAL OF CONSTRUCTION

DRAWING REF. NO.	TEMPERATURE ➤	-29°C	+232°C	+427°C	+566°C	
		STANDARD MATERIAL				
1	Valve Plug & Stem	17-4 PH St.St. ASTM A564 Gr 630 Condition H1075				
		316 St. St. ASTM A479 TP 316 with hard faced guiding area				
2	Packing Flange Stud	Alloy Steel ASTM A 193 Gr B7				
3	Packing Flange Nut	304 St. St. ASTM A 194 Gr B				
4	Packing Flange	Carbon Steel ASTM A668 Cl B Cadmium Plated				
5	Guide Bushng	440 C St.St. ASTM 276 TP 440 C Heat Treated				
		316St. St. ASTM A479TP 316 W hardfacing				
6	Body	Carbon Steel ASTM A216 Gr WCC				
		316 St. St. ASTM A351 Gr. CF8M.				
		Chrome Molybdenum Steel ASTM A 217 Gr. C5				
7	Seat Ring	316 St.St. ASTM A 351 Gr CF8M W hardfacing				
9	O-Ring Upper & Lower	Inconel X750 Silver Plated				
10	Guide Bushing Plug	Solid Stellite No.6				
		440C St. St. ASTM 276 TP 440 C Heat Treated				
11	Body Nut	Carbon Steel ASTM A 194 Gr 2H				
		Alloy Steel ASTM A 194 Gr8				
12	Body Stud	Alloy Steel ASTM A 193 Gr B7				
		ASTM A 320 Gr B8				
13	Bottom Flange	Same as Body Material				
14	Pipe Plug	316 St. St. ASTM A 479 TP 316				
15	Packing Spacer/Lantern Ring	304 St. St. ASTM A 479 TP 304				
16	Packing	PTFE Graphite				
17	Packing Follower	304 St.St. ASTM A479 TP 304				

For other material or NACE compliant Material, consult MIL, MIL reserves right to provide superior material, owing to constant product upgradation.

APPROXIMATE DIMENSIONS (mm) FOR MIL 77000



VALVE INLET A	VALVE OUTLET B	C		D	E	F	G	L	M	N
		TRIM A & B	TRIM C							
2	3	460	215	241	365	352	565	280	445	880
	4		-							
3	4	570	300	292	410	430	838	485	526	1120
	6		-							
4	6	730	395	368	540	475	851	478	686	1210
	8		-							
6	8	954	508	406	641	560	1050	450	686	1450

TYPICAL APPLICATIONS

MIL 77000 Series Multi-stage Control Valve is designed primarily for high-pressure Compressible Fluid Application. These valves effectively controls erosion, vibration and high noise conditions and also allows entrained particles to pass through. This makes 77000 series, an ideal solution for High Pressure, High Temperature, Flashing Liquid Hydrocarbons.

High Pressure Superheated Steam

- Turbine Bypass
- Steam Vent

Oil & Natural Gas Production

- Gas Pressure Reduction
- Choke Valves

Hydro Carbon processing

- High Pressure Hot-Separator Letdown of Flashing Liquid Hydrocarbons



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