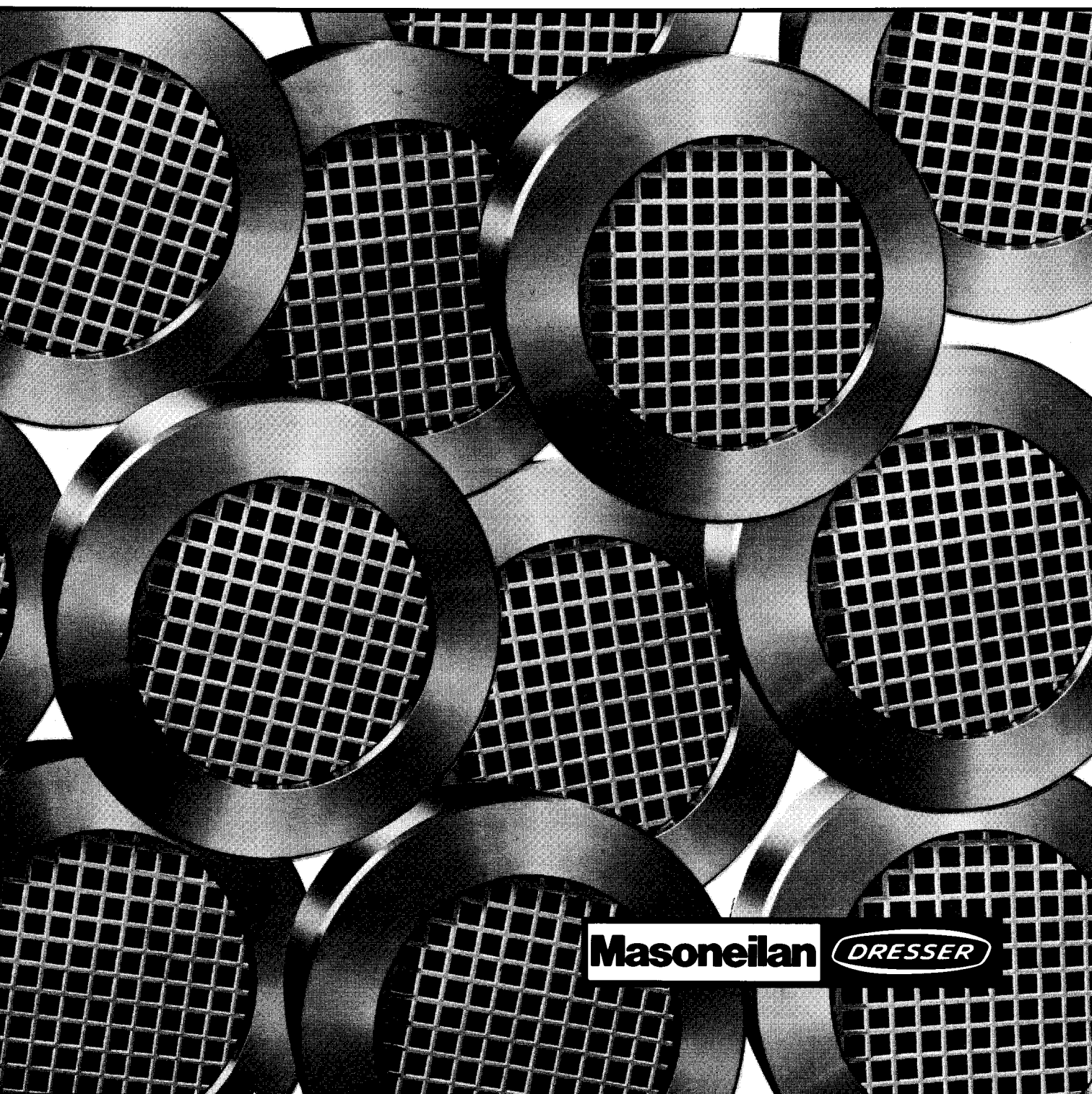


LO-DB® Cartridges



Masoneilan

DRESSER

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Foreword

Valve users are more frequently demanding a sound pressure level (SL) of less than 85-90 dbA measured one meter from the noise source. To meet this condition, especially when the pressure drop exceeds the critical limit, manufacturers now recommend adding to the valve one of two kinds of static device:

a) **silencers**, which produce only a low pressure drop (large C_v). (Unfortunately, silencers are usually heavy and cumbersome, and consequently costly.)

b) **expansion plates**, mounted downstream of the valve. Although their diameter is fairly large (due to their low capacity per unit surface area) expansion plates are less clumsy than silencers. Masoneilan has now considerably improved this type of device, with the design of the LO-DB® cartridge for which the capacity is increased, when compared with

existing types, for a given acoustical efficiency.

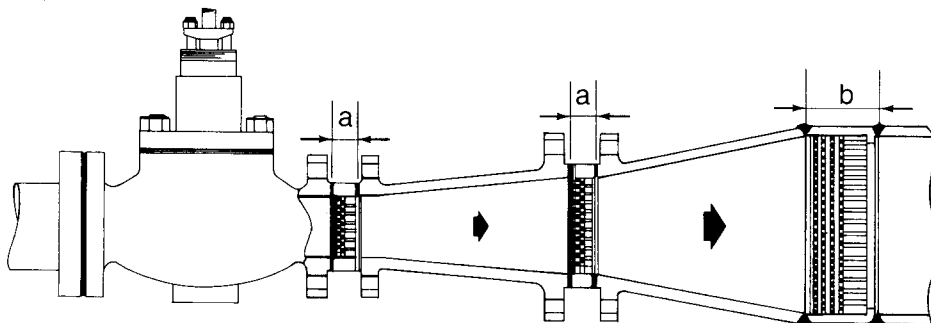
It is recommended that these cartridges be used either with LO-DB valves 21000, 41000, or 77000 Series, when the pressure ratio is higher than 4, or with standard valves when their SL is to be reduced by about 20 dbA only.

Tests were carried out on devices creating pressure drops in series (bent pipes, perforated plates, metal sponge, etc...). However the noise reduction was generally not sufficient and the metal sponges became choked very quickly. The Masoneilan LO-DB cartridge solves this problem by using grille layers which provide an optimum porosity. In addition, the usual foreign matter, driven along the pipes after start up, passes easily through these cartridges.

Principle of Operation

Principle: The LO-DB cartridge is a static device which produces a pressure drop in gas or steam piping where a high pressure reduction is expected. The number of reduction stages is 16. In addition to the progressive pressure reduction, the gas flow is divided into a number of interconnected flow passages which create a microturbulent flow. Thus,

not only the mean velocity, but also the velocity of the gas molecules in every point of the flow is lowered. The LO-DB cartridges act as a high porosity material offering great strength. On the other hand, this porosity is perfectly controlled, which enables the definition and reproduction of a given C_v .



Control valve with three cartridges provides a cost effective way of noise control when dumping high pressure gas or steam into a low pressure system.

General Data

flow direction: uni-directional—from element face to grate face

C_v range: 15 to 5900

maximum fluid temperature: + 750°F

minimum fluid temperature: - 20°F

connections: 2" through 36"—mount between line flanges up to ANSI Class 2500
16" through 36"—butt weld to schedule 40 ①

① Refer to ΔP versus Temperature graph, page 6 for maximum static ratings. Other standard pipe schedules can be accommodated. See page 7.

Materials

element: 304 stainless steel

grate: 304 stainless steel

retainer ring: 304 stainless steel

reducer ring (for reduced capacity only): 304 stainless steel

housing:

(flange mounted) ASTM A515 Gr 70 carbon steel
or
ASTM A240 Type 304 stainless steel

housing:

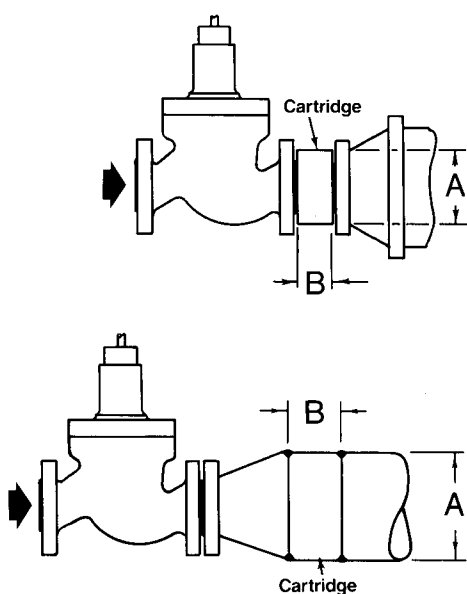
(butt welded) ASTM A106 GrB carbon steel
or
ASTM A312 Type 304 stainless steel

Flow coefficient—rated C_v ② for single support cartridges

$$C_v = 0.99$$

Capacity	Cartridge size (in)											
	2	3	4	6	8	10	12	16	20	24	30	36
Full	21	45	82	195	330	535	780	1200	1900	2700	4200	5900
0.9	19	40	74	175	300	480	700	1080	1710	2430	3750	5300
0.8	17	36	66	155	265	430	625	960	1500	2200	3350	4700
0.7	15	31	55	135	230	375	545	840	1330	1890	2900	4150

② Flow coefficients are based on mating to Schedule 40 pipe. For capacity limitations imposed by use with heavier pipe schedules, see table on Pg. 7.



Dimensions (in inches) for Single Support Cartridge

Size	Flange Mounted ANSI Class 150 through 2500		Butt Welded Schedule 40 Pipe	
	A	B	A	B
2	3.6	4.0	—	—
3	5.0	4.0	—	—
4	6.2	4.0	—	—
6	8.5	4.0	—	—
8	10.7	5.0	—	—
10	12.8	5.0	—	—
12	15.0	5.0	—	—
16	18.5	7.2	16.0	8.6
20	23.0	7.2	20.0	8.6
24	27.2	7.2	24.0	8.6
30	33.7	7.2	30.0	8.6
36	40.2	7.2	36.0	8.6

Application and Construction

Application

A Cartridge is generally sized to sufficiently decrease the pressure drop across the valve until it becomes subcritical. Since this has little effect on the capacity (but a significant effect on noise), it is usually not necessary to increase valve size. In general, proper application of a Cartridge requires a pressure ratio of at least 4 to 1.

Closed System

Cartridges are usually close coupled to the valve outlet in a closed system. Depending on the degree of noise reduction required, either single or multiple Cartridges are used with either standard or LO-DB valves. Cartridge sizing techniques are the same for LO-DB plates or control valves.

Vented System ①

Many open vent applications require large valve outlets and large downstream piping to eliminate noise generating high velocity. This can be unnecessarily

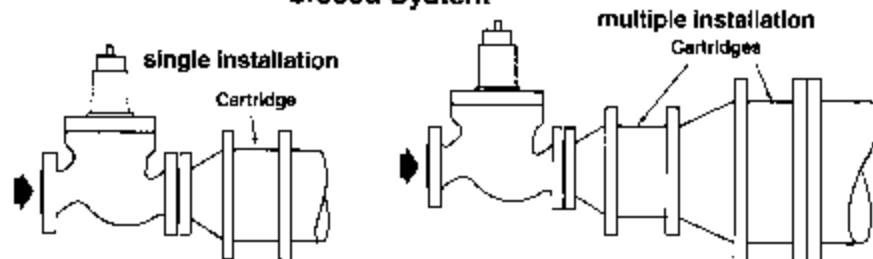
expensive. But, by introducing a Cartridge at the vent mouth or at some downstream location, both valve size and pipe diameter (between valve and Cartridge) can be reduced. That means a direct cost savings as well.

Choosing the right Cartridge for the right application is a simple procedure.

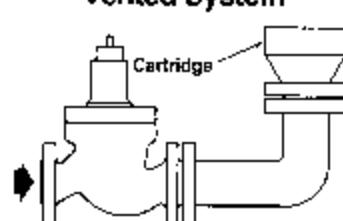
Masoneilan has developed universally accepted sizing and noise prediction techniques for valves as well as Cartridges. Our Handbook for Control Valve Sizing and our Noise Control Manual are excellent guides—just ask your Masoneilan representative for them.

The most convenient sizing and noise prediction method is called the CVS-Pak. It's a complete set of pre-programmed magnetic cards packaged with step-by-step instructions in a compact binder. Whether it's valve sizing noise or cavitation calculations, the programmable calculator (HP 67-97 or HP 41CV) does most of the work.

Closed System



Vented System

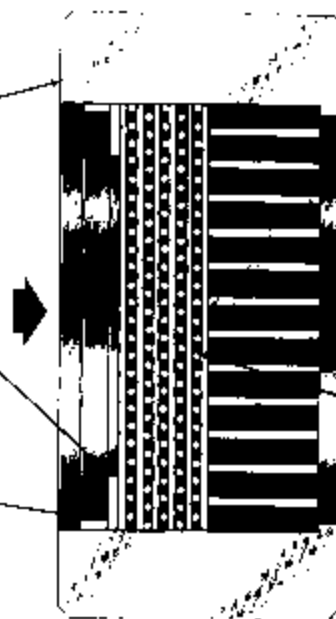


Construction

Housing: The housing is made of carbon or stainless steel. It is recessed in its downstream side to retain the support. A ring is set in the housing to fix the grilles in position. The positioning of one grille in respect to the next one is specially determined to reduce noise. During assembly the grille layers are compressed by the ring, which is then tack welded into the housing. Available for mounting between flanges or butt weld construction.

Reducer Ring Reduced capacity Cartridges require an additional 304 stainless steel Ring insert between the Multi-Stage Element and the Retainer.

Retainer Ring Both Multi-Stage Element and Support Grate are held in place by the 304 stainless steel welded Retainer Ring.



Support Grate This is made of interlocked 304 stainless steel bars and forms a trellis-work whose diameter is equal to that of grilles. Shouldered against the housing it supports the Multi-Stage Element. Double support grates are available for increased pressure drop.

Multi-Stage Element A series of resistance welded, 304 stainless steel grids are arranged in staggered layers.

Figure 4

① A LO-DB cartridge in combination with a vent silencer can lead to a significant cost reduction of the overall system.

Installation



Mounting is always downstream of either a conventional or a LO-DB control valve. For optimum noise reduction, Cartridges should be mounted as close to, and preferably at, the valve outlet. Installation further downstream can result in piping cost savings, but with less effective noise reduction.

Flow direction of the Cartridge is indicated by an arrow. Make certain that the Cartridge is installed in the proper direction. When mounting between flanges, loosely connect the lower bolts to act as a cradle for the cartridge (see photo above). After the Cartridge is aligned, add the remaining bolts and tighten.

NOTE:

A cost saving of one set of flanges can be achieved by selection of cartridge size equal to downstream block valve.

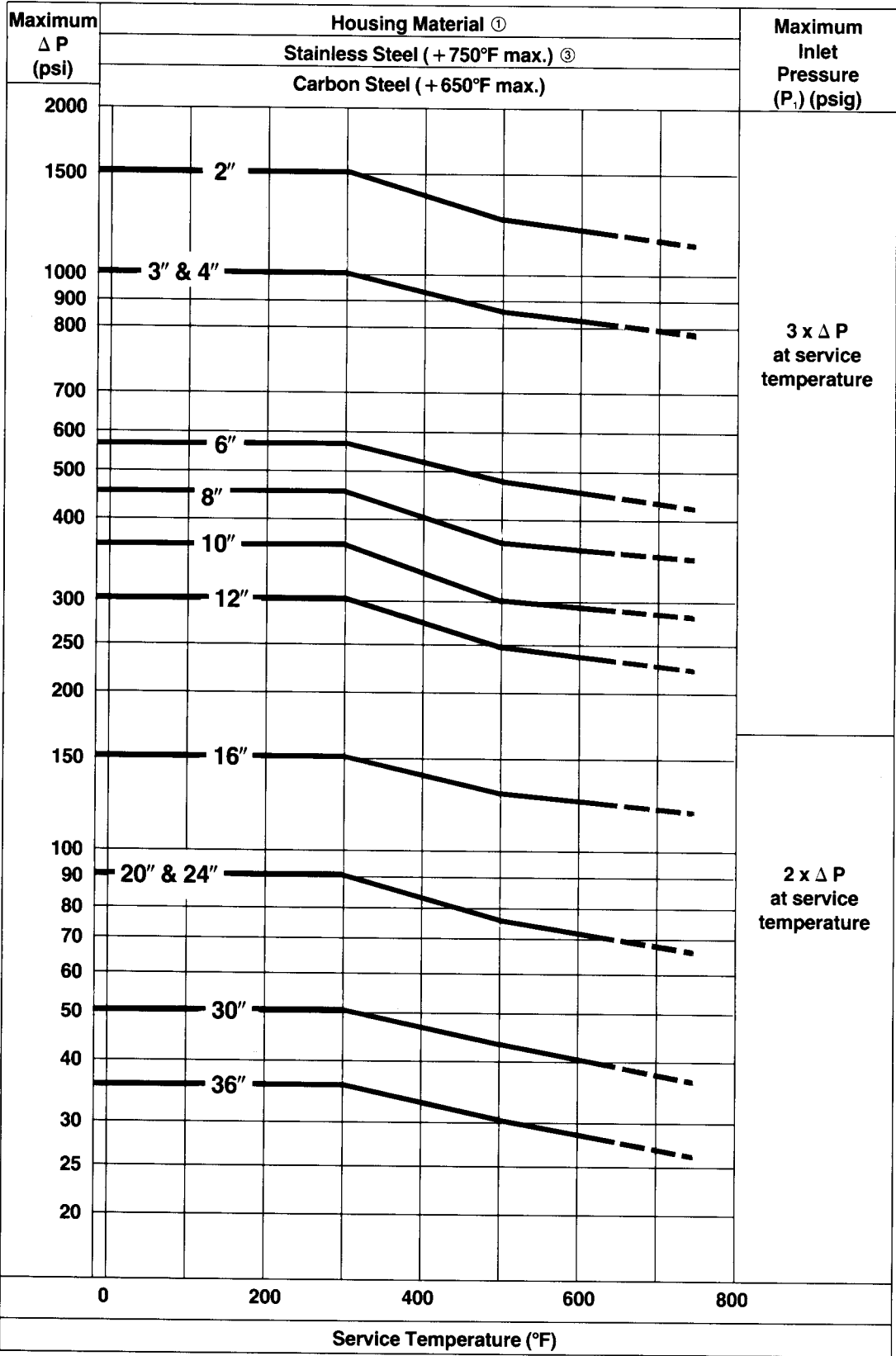
Butt welded Cartridges are installed by normal welding techniques according to housing material. Consult your local Masonite Sales Office for weld end preparation details.

Large Cartridges are supplied with an eye bolt for hoisting into position.

As in any low-noise device, the cleanliness of the system should be insured before use.

Specifications

Pressure Drop vs. Temperature ② ③



① Consult Masoneilan for other temperature services.
② Double cross bar reinforcement elements can be provided for sizes 12 thru 36 inch, to enhance the maximum allowable pressure drop up to a factor of 2. Consult Masoneilan for application assistance. A factor of 4 on pressure drop can be achieved by use of a cast super support.
③ For cyclic applications with temperatures exceeding 650°F contact your Masoneilan Representative.

Capacity Limitations for Standard LO-DB Cartridges

LO-DB Cartridge Size	Mating Pipe Options		Max. Capacity (Fact.)	Max. (CV)
	Size	Schedule		
2"	2"	40/ST	Full	21
		80/XS	.9	19
		160	.7	15
		XX	.5	11
3"	3"	40/ST	Full	45
		80/XS	.9	40
		160	.7	31
		XX	.5	25
4"	4"	40/ST	Full	82
		80/XS	.9	74
		160	.7	55
		XX	.6	50

LO-DB Cartridge Size	Mating Pipe Options		Max. Capacity (Fact.)	Max. (CV)
	Size	Schedule		
6"	6"	40/ST	Full	195
		80/XS	.9	175
		160	.7	135
8"	8"	40/ST	Full	330
		80/XS	.9	300
10"	10"	40/ST	Full	535
		80/XS	.9	480
12"	12"	40/ST	Full	780
		80	.9	700

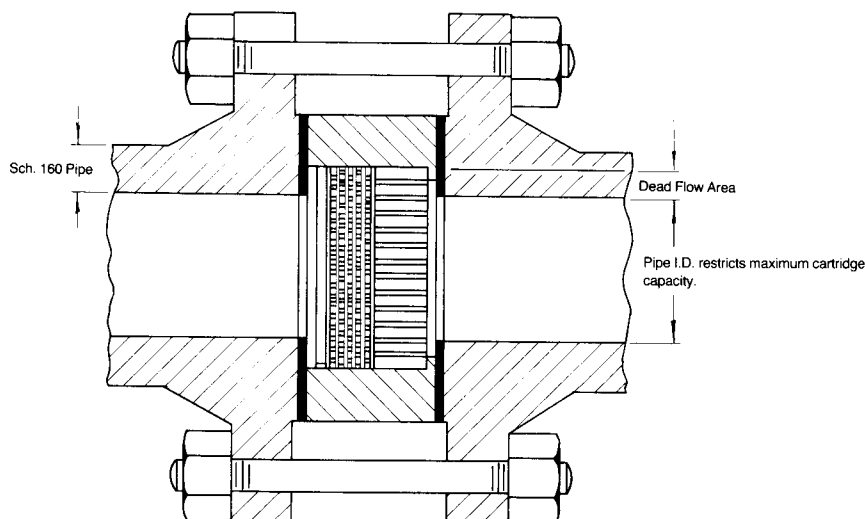
The above table lists capacity limits for 2" thru 12" cartridges when installed in common heavy wall piping. For other cartridge sizes and pipe schedules, contact your Masoneilan Representative.

Refer to page 6 for maximum pressure and temperature limits.

See below for typical examples.

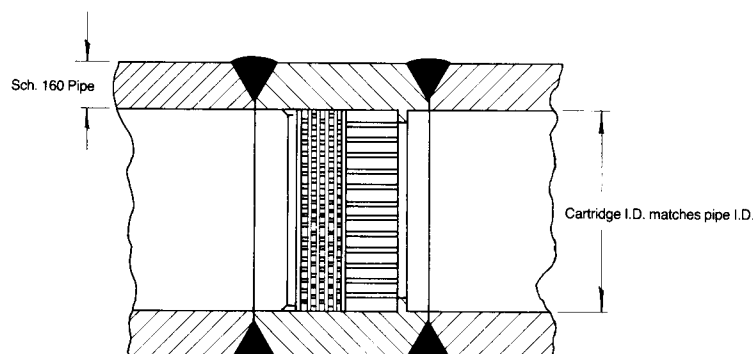
Installation Examples

Example No. 1: 6" LO-DB Cartridge, Flanged Mounted in 6" Sch. 160 Pipe




A 6" full capacity (rated Cv 195) LO-DB Cartridge installed between ANSI 2500 lb. Schedule 160 weld neck flanges, will have a capacity restriction equivalent to a 0.7 factor (rated CV 135) LO-DB Cartridge.

Example No. 2: 6" LO-DB Cartridge, Butt Welded in 6" Sch. 160 Pipe



A 6" LO-DB Cartridge designed for a butt welded installation in a 6" schedule 160 pipe line will require a reduced capacity LO-DB element equivalent to a 0.7 factor (rated Cv 135) LO-DB Cartridge.

PIPE DATA: _____ SIZE _____ SCHEDULE _____



			A			B			C				
P ₁	C _v	SPL	P _A	C _v	SPL	P _B	C _v	SPL	P _C	C _v	SPL	P ₂	SPL TOT

1/2 FLOW

--	--	--	--	--	--	--	--	--	--	--	--	--	--

VALVE DATA: SIZE _____ TYPE _____

C_v RATED _____ C_f _____

LO-DB CARTRIDGE: A SIZE _____ FULL / REDUCED AREA

C_v RATED _____

B SIZE _____ FULL / REDUCED AREA

C_v RATED _____

C SIZE _____ FULL / REDUCED AREA

C_v RATED _____