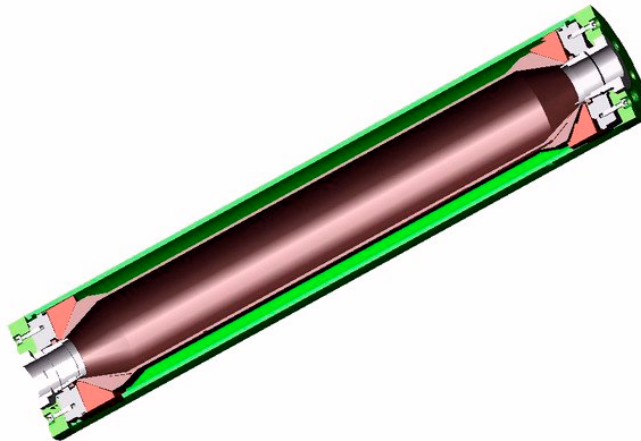


Flex Tube Pulsation Dampener for Sludge and Slurry

Elastomer Flex Tube Pulsation Dampener:

Flow-Thru. with hole diameters from 3" / 76mm, up to 305mm / 12", as standard. No obstruction, or direction changes in the flow path, ensures suitability for entrained solids and high viscosities. Removing flow reversal provides pressure stability for hose pump systems. "PumpGuard" as its name implies, is total protection for pump suction systems.



Design purpose

1. To provide pulsation dampeners that have 3" through 14" diam. Connections.
2. To provide with 1. (above) dampeners with stainless steel liquid contact metal parts at minimal cost.
3. To provide combined pulsation and flow fluctuation attenuating capability with a straight line "clear-flow" path from in to out, suitable for sludges, slurries, suspended particulate, and "food" liquids.
4. To provide for the use of low cost "vessel" outer, non liquid contact, carbon steel "vessel" housing shell.
5. To provide a pulsation dampener design capable of working at negative pressures without "hemorrhoiding", as well as use at elevated pressures.
6. To provide use in flanged systems with ease of "as a spool piece" removal for easy cleaning with a lance.

Ends

The ends are machined in accordance with ansi b16.5 or ec "dn-pn" norms. Having the flange face in corrosion resistant material. Provided with threaded stud bolt holes. Socket head cap screws are equi-spaced between holding the end cover plate to the end plug, which is retained by the segmental lock ring.

Flex-tube "bladder"

Integral seal ends enable sealing by push in tubes apart of stainless flange face component. This is preferable to leaking hose clamps. Thickest prevents both suck in, and blow out into the corner between end plug and shell. The flex tube support option that is perforated and has an internal cross, "collapse preventor", allows use with high per-fill pressures.

"PUG/--/--"

PumpGuard

"Clear-Flo"

106

P

Pulse Damper for viscous liquids & slurries in suction and LP discharge lines

Standard Raised Face Per ANSI B16.5
With tapped stud bolt holes. "RF"

10 Socket heads retain end cover

XL-RF
For extreme over-sized flange faces

Extra:
Where the moment applied by the pipeline to the PUMP GUARD is from a larger than normal flange, an external bolt ring is provided.

CONNECTION OPTIONS Extra:
Through hole bolting and addition of threads by flanged spools

150# only
+FLG
spool
Sch. 40

Where standard stud bolts must pass THROUGH additional flanges are provided

+TD
Thread only available Sch. 80 & up.

Where a thread is required, a flanged thread is bolted on.

L-RF

For Standard Discharge.

Length for a Support Tube

Support tube with internal cross for high pre-fill pressure discharge

RF
on section A.A.

For Standard Suctions.

Length for a Support Tube

Support Tube For Extreme sub-atmospheric suction pressures

11 PERMA-CUSHION PEC No Nitrogen Pre-Fill required

ANSI B16.5 / DIN

Large Flange face
for use where pct of stud bolts causes circle round OD of tapped stud holes to fall outside step diameter of end plug

CONNECTION OPTION Extra:
Food & Drug "FD" combined Item 1 & 5 connection ends.

for use where pct of stud bolts causes circle round OD of tapped stud holes to fall within step diameter of end plug & UG34n

GENERATED SUPPORT TUBE Part Parting Tool runs by towards inside to sub plug corners away from Flange Tube wall

ITEM	PT. Nbr.	DESCRIPTION	MTRL HT / CAST Nbr.	CUSTOMER
1		TAPPED BOLT HOLE FLANGE / END CVR.	PVQ CS	CUSTOMER REF.
2		BODY PIPE WITH GROOVED ENDS	106B	3rd. PARTY QA. EXTRA
3		END PLUG WITH SEAL GROOVES	PVQ CS	DOCUMENTATION LEVEL. EXTRA
4		CORNER FILLING RING	Rubber	WELDING W: NONE
5		ANCHOR TUBE W/ SEAL & RAISED FACE	316SS	QUANTITY
6		FLEX-TUBE WITH THICKENED ENDS	Elastomer	SHOP / JOB Nbr.
7		ANCHOR TUBE "O" SEAL	E,N,orV	WEIGHT(Est.)
8		END PLUG "O" SEAL	Epdm	ISSUED BY M.P.
9		SEGMENTAL LOCK RING	106	ISSUED DATE Feb 2002
10		FLANGE / CVR. HOLDING SOCKET SCREW	Gr10	CHECKED BY D.B.
11		FOAM CUSHION FOR SUCTION JOBS	Urethane	FILE NAME PugVw.bmp
12		GAS CUSHION FILLING VALVE	304ss	SCALE Not To Scale.
13		PERFORATED SUPPORT TUBE	304Lss	Rev. # 0
14				DIMENSIONS ARE unless otherwise stated mm
15				

Reading the Pt Nbr. To Suit Specific Pump Type / PumpGuard / With PermaCushion / or / With Perforated Support Tube / Number of In3 capacitance Vol / or "Lbars / Lbs In2 design pressure / Connections / welded materials
105#Hoses, PROG-C=Progressive Cavity "PUG" / "PEC" / "M" / "PST" / 230 or 4.1L, 3485 or 57L5, 12250 or 205L3 / Example 550g = 550 gal / 10" 300# / 315# 315/315L 55

PULSE GUARD Inc.
For the Americas --01(1)910-270-2737
BW & Color Fax, --01(1)910-270-0320

Drawing / Pt. Nbr. PugDetail Typical
Pug/RF & LRF & XLRF & FD

IN ASSOCIATION WITH OTHER PIPER LICENSEES

Flange faces

The standard flange end is determined by the diameter of the pumpguard. The are larger flange face optional extras.

Specials

There are food, drug, and beverage, specials.

Pulsation dampener for systems containing high viscosity or sludge and slurry liquids.

Four variants

- A). For no prefill cushion at all - uses permacushion foam.
- B). For 0.5 bar to 3 bar cushion prefill cushion, uses no internal perf-tube support. Completely "clear-flow".
- C). For pre-fill cushion n2 pressure above 5 bar up to 70 bar - having internal flextube support by perf-tube.
- D). Only for liquids containing no particulate, a combination design, uses perftube packed with balls as in the waveguard pressure transient dispersal design. No limitation on pre-fill cushion pressure.

All variant designs use elastomer flaxtube "bladder" - to take liquid inside, and having corrosion resistant liquid wetted metal parts. Aka suction and discharge "dampners" -outlet "bottles" - pulsation suppression devices.

Construction, having

- 1. Dampener flex-tube bladder membrane of elastomer
 - A. Epdm, nitrile, hypalon, fluorocarbon or 20 other elastomers
 - B. That has been cross-linked by temperature, using cross linking plasticizer, that does not leach out.
 - C. With a surface area substantially the same as the vessel housing up to which it will swell by an increase of liquid pressure which feature prevents undue stretching and in the event of pumping Without first pre-filling with cushion gas .
 - D. Membrane (c. Above) provided with means to prevent the extrusion thereof into port or ports provided for liquid flow. Said prevention of extrusion provided by parts aka "thickened ends to prevent hemorrhoiding" .
 - E. Alignment of pre-fill cushion gas inlet - outlet point, with the anti-extrusion thickened ends, so that neither failure to pre-fill, nor pre-fill with cushion gas to too low a pressure does not cause damage by the forcing of the flex-tube into the cushion connection point.
 - F.
 - G. Pulsation Dampener flex-tube "bladder" peripheral end seal located within a groove in the damper end plug on the gas side.
 - H. Flextube end seals being caused to take effect by the insertion of tapered rings, said rings normally being integral with a "raised face", as of a flange.
 - I. Adjacent to & inward of said end seals, membrane wall being thinned, enabling flexing prior to thickened section that prevents hemorrhaging.

2. Pressure housing / vessel for pulsation dampener - bottle "snubber" pulsation suppression device - accumulator:

- A. Comprising two parts, a damper "body" cylinder with one end integral or otherwise permanently closed, and having the opposite end of said cylinder open, then sealably closed by a plug of generally 3.5 times the thickness of the cylinder wall.
- B. Said dampner cylinder wall thickness determined by the formula :-

Design pressure x internal radius
Thickness = -----
Allowable working stress x factor (- 0.6 design pressure)

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Dampener design pressure being established by an addition, to max working pressure, of 10% - on the basis that a direct acting rv set pressure is 10% above max working pressure. Plus that said rv has a 15% accumulation pressure to fully open. *

In which the factor above is determined by the degree of surety of the cylinder wall being perfect, for example: a "snubber" seamless wall of hot rolled or drawn pipe, a punch forged cup, a forged billet machine bored to form a hollow, the factor is 1

A "suppression device" cylinder formed by any longitudinal welding or joining method the factor is 0,7 where there is a longitudinal joint that has been certified as free of all imperfections by xray, the factor may be 0,9

Said "allowable working stress" for the dampner material being determined by the lesser of yield strength x 0,625 , or the ultimate tensile strength x 0,25. No allowable working stress shall be determinable unless the ductility of the material and any jointing is at least 20% elongation at break. Said dampener jointing procedure shall have been proven by root, side, and cap bend tests. Further assurance of a jointing method may also be indicated by xray, but failure to pass tight radius bend tests is the only acceptable criteria for application to dampner manufacture

Because they are by definition for a cyclic stress duty, hence ductility for the avoidance of work hardening is of paramount importance. *

Nota bene : application of the European static pressure vessel weld procedures which allow only 14% ductility, and qualification by xray alone, is not safely useable in cyclic duty dampfner manufacture. *

Both "yield strength" and "ultimate tensile strength" here in above, being taken from tables asme ii d, of issue not later than 1995 . Note - allowable working stress levels established for vessels for static pressure duty, and published in codes that are not at least 20 year proven for cyclic duty, as applicable to "pulsation snubber - pulse dampers, dampners, dampeners - etc; said stress levels shall not be allowed. *

C. Retention, against dampener internal pressure, of said end plug within said cylinder, by means that can not be removed without first the depressurization of the cylinder; aka "tamper proof means" .

D. Said damper tamperproofing means so arranged that the seal of sealably located end plug will cause the escape of the seal at a pressure above 4x design pressure, and below destruction pressure - thusly ensuring "fail safe" *
Goto "segmental lock ring safety difference" .

E. Having pulsation dampener pre-fill cushion gas filling and venting point that enables both without the use of any special tools. Typically said filling and venting being operable to open and close with a 3/4" af wrench.

F. Said end plug of the dampener, manufactured from carbon steel pvq plate to sa grade gr. .

G. End plug having a central hole sized for the capture of the flextube end

H. Cylindrical housing to contain n2 cushion gas, of sa 106 of grade gr 60 unless for low temperature application .

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Generally

- A. Dampeners as shown in the accompanying cross sectional / cut view
- B. This pulsation suppression device bearing a stainless steel data plate, stamped with the vessel / shop / work order number, that enables the traceability to file containing all materials and physical property certification.

Features

- A. Sufficient compressible gas volume of the damper to enable the discharge from a specific pump to deliver its liquid flow in a fluctuating manner without generating not more than a specified amount of acceleration head
- B. So arranged that - without additional cost - pressure pulsation is intercepted by the dampers in order to isolate the forcing action of a pump, or valve, from the acoustic response of a system to the residual pressure change.
- C. Improved dampener in place flushibility, greater first in first out performance for more constant temperature, more suitability for fluids that require constant agitation.
- D. Also for suction mass acceleration head loss, and preventing negative pressure spikes from instantaneous suction valve opening, from traveling the suction supply line.