Preso®
Differential Pressure Flow Meters

Differential Pressure Meter

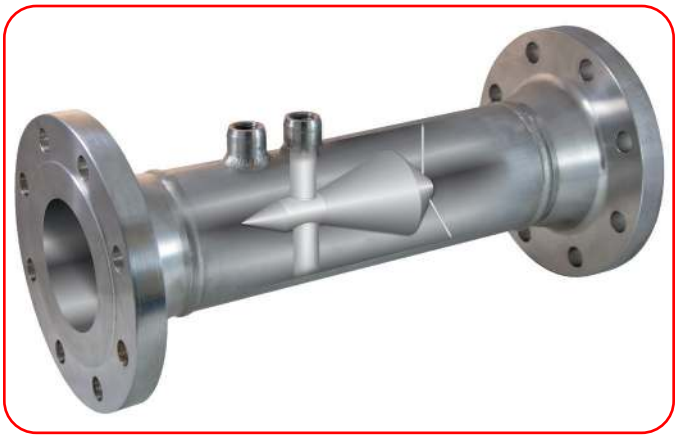
Cone

DESCRIPTION

The Preso Cone Differential Pressure Flow Meter has a cone-shaped element which shapes the flow profile ahead of the differential pressure (DP) measurement port without impacting the flow against a sharp surface, creating an extremely stable signal for measurement with minimal wear on the cone edge.

BENEFITS

- Precise accuracy and repeatability
- Cost effective
- Wide variety of fluids
- Little or no straight run piping requirements
- No additional flow conditioning devices needed
- Low maintenance and long life
- No moving parts
- Wide flow range
- Low head loss



OPERATING PRINCIPLE

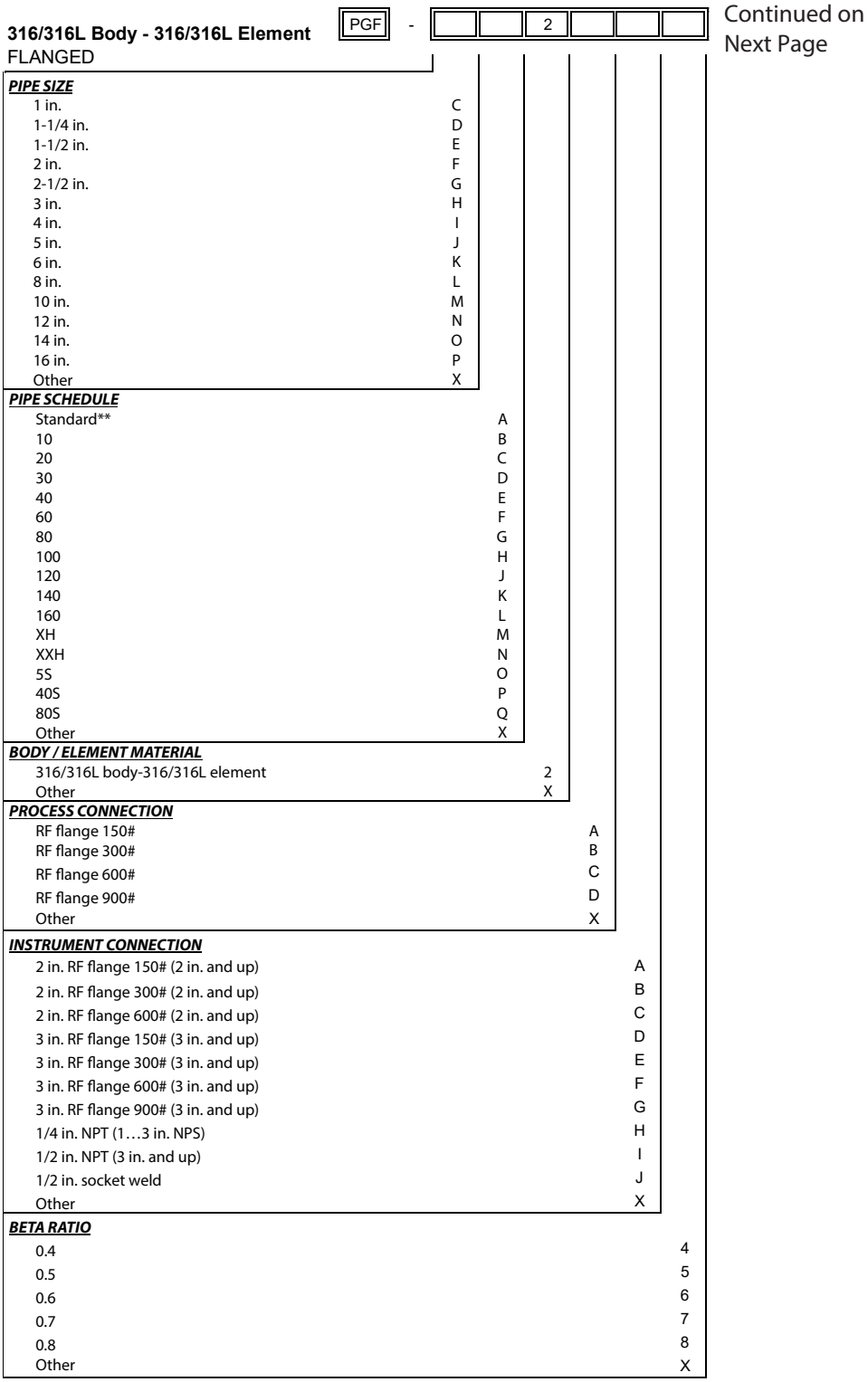
The Preso Cone differential pressure meter utilizes the center element to straighten the flow and create an ideal dynamic which allows differential pressure technology to be used in a unique way providing extensive flexibility in a wide variety of applications.

SPECIFICATIONS

Applications	Liquids, steam, air and industrial gases	
Pipe Sizes	Wafer	1…4 in. (25…102 mm)
	Threaded and Socket Weld	1/2…2 in. (12…51 mm)
	Flanged Mount	1…24 in. (25…609 mm)
	Butt Weld	1/2…24 in. (12…609 mm)
Repeatability	± 0.1% or better	
Flow Range	10:1 and greater	
Accuracy	± 0.5% of actual flow	
Standard Beta Ratio	0.40…0.80 (special betas available)	
Permanent Pressure Loss	Varies with beta ratio and DP	
Installation Piping Requirements	Typically 0…3 diameters upstream and 0…1 diameters downstream of the cone are required, depending on fittings or valves in the adjacent pipeline	
Construction Materials	304/304L, 316/316L stainless steel, A106 carbon steel, other materials on request	
End Fittings	Threaded (NPT), flange, wafer, socket, and butt weld, other end connections on request	
Approvals	CRN	

PART NUMBER CONSTRUCTION

Flanged – 316/316L



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INSTRUMENT VALVE							
1/4 in. Needle valve CS	A						
1/2 in. Needle valve CS	B						
1/4 in. Needle valve SS	C						
1/2 in. Needle valve SS	D						
1/2 in. Gate w/cross CS (steam)	E						
1/2 in. Gate w/cross SS (steam)	F						
Other	X						
Not Required	Z						
CALIBRATION							
Factory Calibration		1					
Special Calibration*		2					
Not Required		Z					
TRANSMITTER MOUNTING							
None			Z				
Remote Mount			1				
Mounting Bracket			2				
Three Valve Manifold			3				
Five Valve Manifold			4				
Other			X				
CERTIFICATIONS							
None				Z			
Tracable Material Certifications				1			
NACE MR0-103				2			
NACE MR0-175				3			
Items 1 and 2				4			
Items 1 and 3				5			
Other				X			
STANDARD NDE TESTING							
None					Z		
Hydrostatic Test Only (1/2…12 in. NPS 150# to 900# flange Others CF)					1		
5% Radiography of Butt Welds					2		
100% Radiography of Butt Welds					3		
5% Magnetic particle/dye penetrant					4		
100% magnetic particle/dye penetrant					5		
Items 2 and 4 (1/2…12 in. NPS Others CF)					6		
Items 3 and 4 (1/2…12 in. NPS Others CF)					7		
Items 3 and 5 (1/2…12 in. NPS Others CF)					8		
Other					X		
Note: Items 2-8 also include hydrostatic testing							
Other NDE Testing							
None						Z	
100% visual inspection with report						1	
PMI						2	
Post-Weld Hardness testing						3	
Items 1 and 2						4	
Items 1 and 3						5	
Other						X	
Note on Item 1: 100% visual inspection occurs on all product. This is a request for the report.							
Hardcoating							
None							Z
Tungsten Carbide (WC) on wedge							1
Tungsten Carbide (WC) on center 1/3 of meter							2
Chromium Carbode (CrC) on wedge							3
Chromium Carbode (CrC) on center 1/3 of meter							4
Other							X

Flanged – Carbon Steel

PGF	-			1			

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Carbon Steel
FLANGED

PIPE SIZE							
1 in.	C						
1-1/4 in.	D						
1-1/2 in.	E						
2 in.	F						
2-1/2 in.	G						
3 in.	H						
4 in.	I						
5 in.	J						
6 in.	K						
8 in.	L						
10 in.	M						
12 in.	N						
14 in.	O						
16 in.	P						
Other	X						
PIPE SCHEDULE							
Standard**		A					
10		B					
20		C					
30		D					
40		E					
60		F					
80		G					
100		H					
120		J					
140		K					
160		L					
XH		M					
XXH		N					
5S		O					
40S		P					
80S		Q					
Other		X					
BODY / ELEMENT MATERIAL							
CS body-316/316L element			1				
Other			X				
PROCESS CONNECTION							
RF flange 150#				A			
RF flange 300#				B			
RF flange 600#				C			
RF flange 900#				D			
Other				X			
INSTRUMENT CONNECTION							
2 in. RF flange 150# (2 in. and up)					A		
2 in. RF flange 300# (2 in. and up)					B		
2 in. RF flange 600# (2 in. and up)					C		
3 in. RF flange 150# (3 in. and up)					D		
3 in. RF flange 300# (3 in. and up)					E		
3 in. RF flange 600# (3 in. and up)					F		
3 in. RF flange 900# (3 in. and up)					G		
1/4 in. NPT (1…3 in. NPS)					H		
1/2 in. NPT (3 in. and up)					I		
1/2 in. socket weld					J		
Other					X		
BETA RATIO							
0.4						4	
0.5						5	
0.6						6	
0.7						7	
0.8						8	
Other						X	

Continued from Previous Page

INSTRUMENT VALVE

1/4 in. Needle valve CS	A
1/2 in. Needle valve CS	B
1/4 in. Needle valve SS	C
1/2 in. Needle valve SS	D
1/2 in. Gate w/cross CS (steam)	E
1/2 in. Gate w/cross SS (steam)	F
Other	X
Not Required	Z

CALIBRATION

Factory Calibration	1
Special Calibration*	2
Not Required	Z

TRANSMITTER MOUNTING

None	Z
Remote Mount	1
Mounting Bracket	2
Three Valve Manifold	3
Five Valve Manifold	4
Other	X

CERTIFICATIONS

None	Z
Tracable Material Certifications	1
NACE MR0-103	2
NACE MR0-175	3
Items 1 and 2	4
Items 1 and 3	5
Other	X

STANDARD NDE TESTING

None	Z
Hydrostatic Test Only (1/2…12 in. NPS 150# to 900# flange Others CF)	1
5% Radiography of Butt Welds	2
100% Radiography of Butt Welds	3
5% Magnetic particle/dye penetrant	4
100% magnetic particle/dye penetrant	5
Items 2 and 4	6
Items 3 and 4	7
Items 3 and 5	8
Other	X

Note: Items 2-8 also include hydrostatic testing

Other NDE Testing

None	Z
100% visual inspection with report	1
PMI (stainless steel only)	2
Post-Weld Hardness testing (Carbon Steel Only)	2
Items 1 and 2	3
Other	X

Hardcoating

None	Z
Tungsten Carbide (WC) on wedge	1
Tungsten Carbide (WC) on center 1/3 of meter	2
Chromium Carbode (CrC) on wedge	3
Chromium Carbode (CrC) on center 1/3 of meter	4
Other	X

Flanged – 304/304L

304/304L Body - 316/316L Element
FLANGED

PGF	-			3			

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PIPE SIZE							
1 in.	C						
1-1/4 in.	D						
1-1/2 in.	E						
2 in.	F						
2-1/2 in.	G						
3 in.	H						
4 in.	I						
5 in.	J						
6 in.	K						
8 in.	L						
10 in.	M						
12 in.	N						
14 in.	O						
16 in.	P						
Other	X						
PIPE SCHEDULE							
Standard**		A					
10		B					
20		C					
30		D					
40		E					
60		F					
80		G					
100		H					
120		J					
140		K					
160		L					
XH		M					
XXH		N					
5S		O					
40S		P					
80S		Q					
Other		X					
BODY / ELEMENT MATERIAL							
304L/304L body - 316/316L element				3			
Other				X			
PROCESS CONNECTION							
RF flange 150#					A		
RF flange 300#					B		
RF flange 600#					C		
RF flange 900#					D		
Other					X		
INSTRUMENT CONNECTION							
2 in. RF flange 150# (2 in. and up)						A	
2 in. RF flange 300# (2 in. and up)						B	
2 in. RF flange 600# (2 in. and up)						C	
3 in. RF flange 150# (3 in. and up)						D	
3 in. RF flange 300# (3 in. and up)						E	
3 in. RF flange 600# (3 in. and up)						F	
3 in. RF flange 900# (3 in. and up)						G	
1/4 in. NPT (1…3 in. NPS)						H	
1/2 in. NPT (3 in. and up)						I	
1/2 in. socket weld						J	
Other						X	
BETA RATIO							
0.4							4
0.5							5
0.6							6
0.7							7
0.8							8
Other							X

Continued from Previous Page

INSTRUMENT VALVE

1/4 in. Needle valve CS	A
1/2 in. Needle valve CS	B
1/4 in. Needle valve SS	C
1/2 in. Needle valve SS	D
1/2 in. Gate w/cross CS (steam)	E
1/2 in. Gate w/cross SS (steam)	F
Other	X
Not Required	Z

CALIBRATION

Factory Calibration	1
Special Calibration*	2
Not Required	Z

TRANSMITTER MOUNTING

None	0
Remote Mount	1
Mounting Bracket	2
Three Valve Manifold	3
Five Valve Manifold	4
Other	X

CERTIFICATIONS

None	0
Tracable Material Certifications	1
NACE MR0-103	2
NACE MR0-175	3
Items 1 and 2	4
Items 1 and 3	5
Other	X

STANDARD NDE TESTING

None	0
Hydrostatic Test Only	1
5% Radiography of Butt Welds	2
100% Radiography of Butt Welds	3
5% Magnetic particle/dye penetrant	4
100% magnetic particle/dye penetrant	5
Items 2 and 4	6
Items 3 and 4	7
Items 3 and 5	8
Other	X

Note: Items 2-8 also include hydrostatic testing

Other NDE Testing

None	0
100% visual inspection with report	1
PMI (stainless steel only)	2
Post-Weld Hardness testing (Carbon Steel Only)	2
Items 1 and 2	3
Other	X

Note on Item 1: 100% visual inspection occurs on all product.
This is a request for the report.

Hardcoating

None	0
Tungsten Carbide (WC) on wedge	1
Tungsten Carbide (WC) on center 1/3 of meter	2
Chromium Carbode (CrC) on wedge	3
Chromium Carbode (CrC) on center 1/3 of meter	4
Other	X

*Standard calibration is performed at Badger Meter with five data points (0.5 percent accuracy)
** Pipe schedule "Standard" is schedule 40 up to 10" and 3.75" wall at 12" and larger.

Wafer Mount

PGW - [ ][ ][ ][ ][ ][ ]

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316/316L Body - 316/316L Element

WAFER MOUNT

PIPE SIZE								
1 in.	C	150#	C	1				
1 in.	C	300#	C	2				
1 in.	C	600#	C	3				
1 in.	C	900/1500#	C	4				
1-1/4 in.	D	150#	D	1				
1-1/4 in.	D	300#	D	2				
1-1/4 in.	D	600#	D	3				
1-1/4 in.	D	900/1500#	D	4				
1-1/2 in.	E	150#	E	1				
1-1/2 in.	E	300#	E	2				
1-1/2 in.	E	600#	E	3				
1-1/2 in.	E	900/1500#	E	4				
2 in.	F	150#	F	1				
2 in.	F	300#	F	2				
2 in.	F	600#	F	3				
2 in.	F	900/1500#	F	4				
2-1/2 in.	G	150#	G	1				
2-1/2 in.	G	300#	G	2				
2-1/2 in.	G	600#	G	3				
2-1/2 in.	G	900/1500#	G	4				
3 in.	H	150#	H	1				
3 in.	H	300#	H	2				
3 in.	H	600#	H	3				
3 in.	H	900#	H	4				
3 in.	H	1500#	H	5				
4 in.	I	150#	I	1				
4 in.	I	300#	I	2				
4 in.	I	600#	I	3				
4 in.	I	900#	I	4				
4 in.	I	1500#	I	5				
Other			X	X				
SCHEDULE								
Standard**					A			
10					B			
20					C			
30					D			
40					E			
120					J			
160					L			
XH					M			
XXH					N			
5S					O			
40S					P			
80S					Q			
Other					X			
BODY / ELEMENT MATERIAL								
CS body-316/316L element						1		
316/316L body-316/316L element						2		
304L/304L body - 316/316L element						3		
Other						X		
INSTRUMENT CONNECTION								
1/4 in. NPT (1…3 in. NPS)							H	
1/2 in. NPT (3 in. and up)							I	
1/2 in. socket weld							J	
Other							X	
BETA RATIO								
0.4								4
0.5								5
0.6								6
0.7								7
0.8								8
Custom								X

Continued from Previous Page

INSTRUMENT VALVE

1/4 in. Needle valve CS	A
1/2 in. Needle valve CS	B
1/4 in. Needle valve SS	C
1/2 in. Needle valve SS	D
1/2 in. Gate w/cross CS (steam)	E
1/2 in. Gate w/cross SS (steam)	F
Other	X
Not Required	Z

CALIBRATION

Factory Calibration	1
Special Calibration*	2
Not Required	Z

TRANSMITTER MOUNTING

None	Z
Remote Mount	1
Mounting Bracket	2
Three Valve Manifold	3
Five Valve Manifold	4
Other	X

CERTIFICATIONS

None	Z
Tracable Material Certifications	1
NACE MR0-103	2
NACE MR0-175	3
Items 1 and 2	4
Items 1 and 3	5
Other	X

STANDARD NDE TESTING

None	Z
Hydrostatic Test Only	1
5% Radiography of Butt Welds	2
100% Radiography of Butt Welds	3
5% Magnetic particle/dye penetrant	4
100% magnetic particle/dye penetrant	5
Items 2 and 4	6
Items 3 and 4	7
Items 3 and 5	8
Other	X

Note: Items 2-8 also include hydrostatic testing

Other NDE Testing

None	Z
100% visual inspection with report	1
PMI (stainless steel only)	2
Post-Weld Hardness testing (Carbon Steel Only)	2
Items 1 and 2	3
Other	X

Hardcoating

None	Z
Tungsten Carbide (WC) on wedge	1
Tungsten Carbide (WC) on center 1/3 of meter	2
Chromium Carbode (CrC) on wedge	3
Chromium Carbode (CrC) on center 1/3 of meter	4
Other	X

Socket Weld Mount

SOCKET WELD MOUNT | PGS | - | | | 2 | G | | | Continued on Next Page

PIPE SIZE						
1 in.	C					
1-1/4 in.	D					
1-1/2 in.	E					
2 in.	F					
Other	X					
SCHEDULE						
Standard**		A				
10		B				
20		C				
30		D				
40		E				
120		J				
160		L				
XH		M				
XXH		N				
5S		O				
40S		P				
80S		Q				
Other		X				
BODY / ELEMENT MATERIAL						
CS body-316/316L element			1			
316/316L body-316/316L element			2			
304L/304L body - 316/316L element			3			
Other			X			
PROCESS CONNECTION						
Socket Weld				G		
Other				X		
INSTRUMENT CONNECTION						
1/4 in. NPT (1…3 in. NPS)					H	
1/2 in. NPT (3 in. and up)					I	
1/2 in. socket weld					J	
Other					X	
BETA RATIO						
0.4						4
0.5						5
0.6						6
0.7						7
0.8						8
Custom						X

Continued from Previous Page

INSTRUMENT VALVE

1/4 in. Needle valve CS	A
1/4 in. Needle valve SS	C
Other	X
Not Required	Z

CALIBRATION

Factory Calibration	1
Special Calibration*	2
Not Required	Z

TRANSMITTER MOUNTING

None	Z
Remote Mount	1
Mounting Bracket	2
Three Valve Manifold	3
Five Valve Manifold	4
Other	X

CERTIFICATIONS

None	Z
Tracable Material Certifications	1
NACE MR0-103	2
NACE MR0-175	3
Items 1 and 2	4
Items 1 and 3	5
Other	X

STANDARD NDE TESTING

None	Z
Hydrostatic Test Only	1
5% Radiography of Butt Welds	2
100% Radiography of Butt Welds	3
5% Magnetic particle/dye penetrant	4
100% magnetic particle/dye penetrant	5
Items 2 and 4	6
Items 3 and 4	7
Items 3 and 5	8
Other	X

Note: Items 2-8 also include hydrostatic testing

Other NDE Testing

None	Z
100% visual inspection with report	1
PMI (stainless steel only)	2
Post-Weld Hardness testing (Carbon Steel Only)	2
Items 1 and 2	3
Other	X

Hardcoating

None	Z
Tungsten Carbide (WC) on wedge	1
Tungsten Carbide (WC) on center 1/3 of meter	2
Chromium Carbode (CrC) on wedge	3
Chromium Carbode (CrC) on center 1/3 of meter	4
Other	X

Threaded NPT

PGT	-			2	F		

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THREADED NPT

PIPE SIZE							
1 in.	C						
1-1/4 in.	D						
1-1/2 in.	E						
2 in.	F						
Other	X						
SCHEDULE							
Standard**		A					
10		B					
20		C					
30		D					
40		E					
120		J					
160		L					
XH		M					
XXH		N					
5S		O					
40S		P					
80S		Q					
Other		X					
BODY / ELEMENT MATERIAL							
CS body-316/316L element			1				
316/316L body-316/316L element			2				
304L/304L body - 316/316L element			3				
Other			X				
PROCESS CONNECTION							
NPT				F			
Other				X			
INSTRUMENT CONNECTION							
1/4 in. NPT (1…3 in. NPS)					H		
1/2 in. NPT (3 in. and up)					I		
1/2 in. socket weld					J		
Other					X		
BETA RATIO							
0.4						4	
0.5						5	
0.6						6	
0.7						7	
0.8						8	
Custom						X	

Continued from Previous Page

INSTRUMENT VALVE

1/4 in. Needle valve CS	A
1/4 in. Needle valve SS	C
Other	X
Not Required	Z

CALIBRATION

Factory Calibration	1
Special Calibration*	2
Not Required	Z

TRANSMITTER MOUNTING

None	Z
Remote Mount	1
Mounting Bracket	2
Three Valve Manifold	3
Five Valve Manifold	4
Other	X

CERTIFICATIONS

None	Z
Tracable Material Certifications	1
NACE MR0-103	2
NACE MR0-175	3
Items 1 and 2	4
Items 1 and 3	5
Other	X

STANDARD NDE TESTING

None	Z
Hydrostatic Test Only	1
5% Radiography of Butt Welds	2
100% Radiography of Butt Welds	3
5% Magnetic particle/dye penetrant	4
100% magnetic particle/dye penetrant	5
Items 2 and 4	6
Items 3 and 4	7
Items 3 and 5	8
Other	X

Note: Items 2-8 also include hydrostatic testing

Other NDE Testing

None	Z
100% visual inspection with report	1
PMI (stainless steel only)	2
Post-Weld Hardness testing (Carbon Steel Only)	2
Items 1 and 2	3
Other	X

Hardcoating

None	Z
Tungsten Carbide (WC) on wedge	1
Tungsten Carbide (WC) on center 1/3 of meter	2
Chromium Carbode (CrC) on wedge	3
Chromium Carbode (CrC) on center 1/3 of meter	4
Other	X

Butt Weld

PGB	-			2	E		

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BUTT WELD MOUNT

PIPE SIZE							
1 in.	C						
1-1/4 in.	D						
1-1/2 in.	E						
2 in.	F						
2-1/2 in.	G						
3 in.	H						
4 in.	I						
5 in.	J						
6 in.	K						
8 in.	L						
10 in.	M						
12 in.	N						
14 in.	O						
16 in.	P						
Other	X						
PIPE SCHEDULE							
Standard**		A					
10		B					
20		C					
30		D					
40		E					
60		F					
80		G					
100		H					
120		J					
140		K					
160		L					
XH		M					
XXH		N					
5S		O					
40S		P					
80S		Q					
Other		X					
BODY / ELEMENT MATERIAL							
CS body-316/316L element			1				
316/316L body-316/316L element			2				
304L/304L body - 316/316L element			3				
Other			X				
PROCESS CONNECTION							
Butt Weld				E			
Other				X			
INSTRUMENT CONNECTION							
2 in. RF flange 150# (2 in. and up)					A		
2 in. RF flange 300# (2 in. and up)					B		
2 in. RF flange 600# (2 in. and up)					C		
3 in. RF flange 150# (3 in. and up)					D		
3 in. RF flange 300# (3 in. and up)					E		
3 in. RF flange 600# (3 in. and up)					F		
3 in. RF flange 900# (3 in. and up)					G		
1/4 in. NPT (1…3 in. NPS)					H		
1/2 in. NPT (3 in. and up)					I		
1/2 in. socket weld					J		
Other					X		
BETA RATIO							
0.4						4	
0.5						5	
0.6						6	
0.7						7	
0.8						8	
Other						X	

Continued from Previous Page

INSTRUMENT VALVE

1/4 in. Needle valve CS	A
1/2 in. Needle valve CS	B
1/4 in. Needle valve SS	C
1/2 in. Needle valve SS	D
1/2 in. Gate w/cross CS (steam)	E
1/2 in. Gate w/cross SS (steam)	F
Other	X
Not Required	Z

CALIBRATION

Factory Calibration	1
Special Calibration*	2
Not Required	Z

TRANSMITTER MOUNTING

None	Z
Remote Mount	1
Mounting Bracket	2
Three Valve Manifold	3
Five Valve Manifold	4
Other	X

CERTIFICATIONS

None	Z
Tracable Material Certifications	1
NACE MR0-103	2
NACE MR0-175	3
Items 1 and 2	4
Items 1 and 3	5
Other	X

STANDARD NDE TESTING

None	Z
Hydrostatic Test Only	1
5% Radiography of Butt Welds	2
100% Radiography of Butt Welds	3
5% Magnetic particle/dye penetrant	4
100% magnetic particle/dye penetrant	5
Items 2 and 4	6
Items 3 and 4	7
Items 3 and 5	8
Other	X

Note: Items 2-8 also include hydrostatic testing

Other NDE Testing

None	Z
100% visual inspection with report	1
PMI (stainless steel only)	2
Post-Weld Hardness testing (Carbon Steel Only)	2
Items 1 and 2	3
Other	X

Hardcoating

None	Z
Tungsten Carbide (WC) on wedge	1
Tungsten Carbide (WC) on center 1/3 of meter	2
Chromium Carbode (CrC) on wedge	3
Chromium Carbode (CrC) on center 1/3 of meter	4
Other	X

Control. Manage. Optimize.

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