

BA-150/150S

3/8"-3"

BRONZE BALL VALVE
TWO-PIECE, STANDARD-PORT
600 PSIG WOG / 150 PSIG SWP (1)
SOLDER ENDS

MSS SP-110

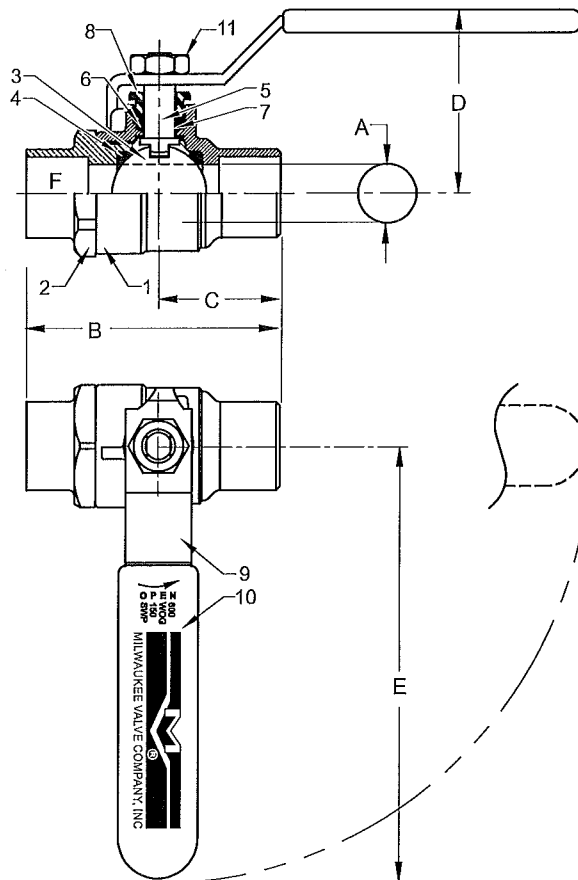
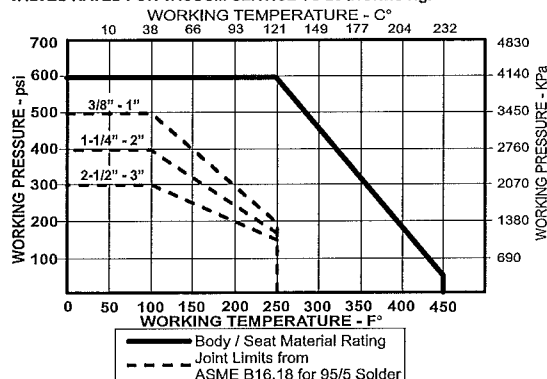
MATERIALS LIST

ITEM	PART	MATERIALS	ASTM SPEC.
1	Body	Cast Bronze	B584
2	Tailpiece	Brass (3)	B16
		Cast Bronze (1" & up)	B584
3	Ball	Brass w/ Hard Chrome Plating	B16
		316 Stainless Steel (2)	A276
4	Seat	RPTFE, 15% Glass Filled	
5	Stem	Brass	B16
		316 Stainless Steel (2)	A276
6	Thrust Washer	RPTFE, 25% Glass Filled	
7	Packing	PTFE	
8	Packing Nut	Brass	B16
9	Handle	Steel w/ Zinc Plating	Commercial
10	Hand Grip	Vinyl	
11	Handle Nut	Steel w/ Zinc Plating	Commercial

- (1) Please consult factory for more information regarding steam applications.
- (2) Ball and stem are stainless for BA-150S and 2-1/2"-3" BA-150.
- (3) All bronze construction available. Please consult factory for more information.

PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.



DIMENSIONS

	UNITS	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
		DN10	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80
A (DIA)	INCHES	0.38	0.50	0.76	0.88	1.06	1.31	1.56	2.00	2.31
	mm	9.7	12.7	19.3	22.4	26.9	33.3	39.6	51.0	58.7
B	INCHES	2.10	2.39	3.05	3.71	4.54	5.00	6.25	7.34	8.16
	mm	51.5	58.6	74.7	90.9	111.2	122.5	153.1	179.8	199.9
C	INCHES	0.90	1.07	1.56	1.76	2.27	2.50	3.13	3.67	4.07
	mm	22.1	26.2	38.2	43.1	55.6	61.3	76.7	89.9	99.7
D	INCHES	1.80	1.89	2.13	2.29	2.67	2.85	3.02	3.47	3.88
	mm	44.1	46.3	52.2	56.1	65.4	69.8	74.0	85.0	95.1
E	INCHES	3.81	3.81	4.56	4.56	6.31	6.31	7.19	7.19	7.19
	mm	93.3	93.3	111.7	111.7	154.6	154.6	176.2	176.2	176.2
F	TUBE SIZE Ø	.51	.63	.88	1.13	1.38	1.63	2.13	2.63	3.13
	Cv	7	13	35	38	61	87	121	228	305

Note: DN (Diameter Nominal) = Metric equivalent size.

Rev. 12

The information presented on this sheet is correct at the time of publication. Milwaukee Valve reserves the right to change design, and/or material specifications without notice. For the most current information access www.milwaukeevalve.com



BA-100/100S

1/4"-3"

BRONZE BALL VALVE
TWO-PIECE, STANDARD-PORT
600 PSIG WOG / 150 PSIG SWP (1)
THREADED ENDS

MSS SP-110

MATERIALS LIST

ITEM	PART	MATERIALS	ASTM SPEC.
1	Body	Cast Bronze	B584
2	Tailpiece	Brass (3)	B16
		Cast Bronze (1 1/4" & up)	B584
3	Ball	Brass w/ Hard Chrome Plating	B16
		316 Stainless Steel (2)	A276
4	Seat	RPTFE, 15% Glass Filled	
5	Stem	Brass	B16
		316 Stainless Steel (2)	A276
6	Thrust Washer	RPTFE, 25% Glass Filled	
7	Packing	PTFE	
8	Packing Nut	Brass	B16
9	Handle	Steel w/ Zinc Plating	Commercial
10	Hand Grip	Vinyl	
11	Handle Nut	Steel w/ Zinc Plating	Commercial

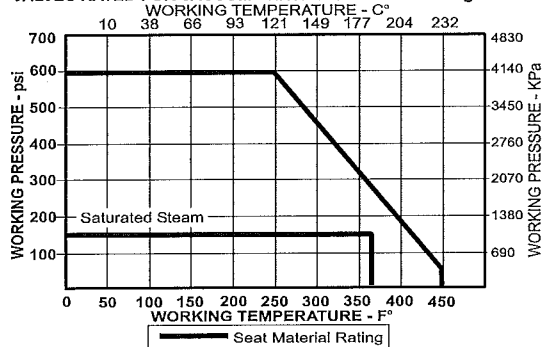
(1) Milwaukee Valve Company recommends the use of Stainless steel ball and stem for steam applications. Please consult factory for more information.

(2) Ball and stem are stainless for BA-100S and 2-1/2"-3" BA-100

(3) All bronze construction available. Please consult factory for more information.

PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.

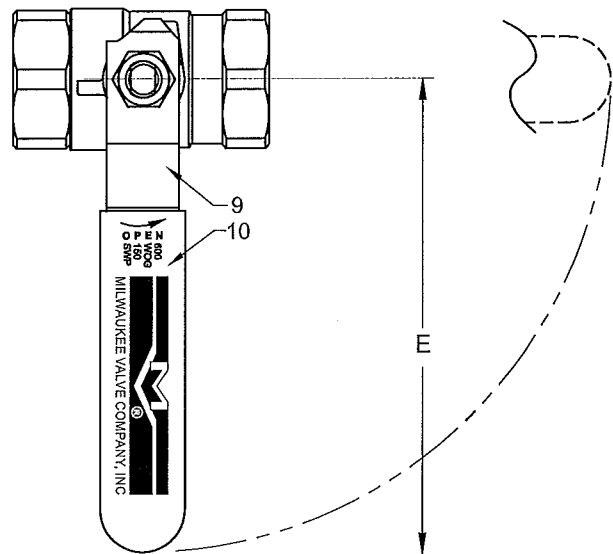
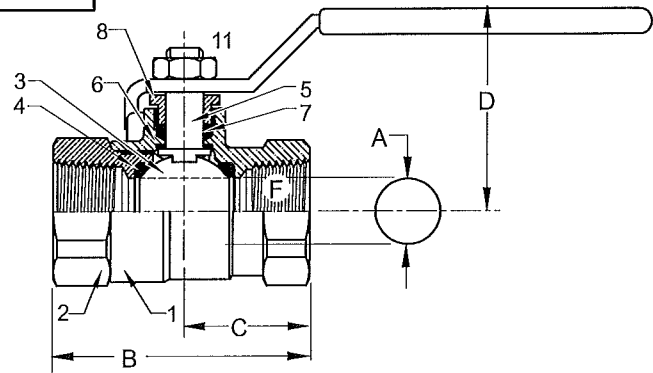


DIMENSIONS

	UNITS	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
A (DIA)	INCHES	DN6	DN10	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80
	mm	0.38	0.38	0.50	0.76	0.88	1.06	1.31	1.56	2.00	2.31
B	INCHES	9.7	9.7	12.7	19.3	22.4	26.9	33.3	39.6	51.0	58.7
	mm	1.86	1.86	2.19	2.64	3.17	3.50	3.96	4.30	5.56	6.20
C	INCHES	45.6	45.6	53.7	64.7	77.7	85.8	97.0	105.4	136.2	151.9
	mm	1.00	1.00	1.10	1.30	1.58	1.74	1.97	2.15	2.79	3.10
D	INCHES	24.5	24.5	27.0	31.9	38.7	42.6	48.3	52.7	68.4	76.0
	mm	1.78	1.81	1.91	2.08	2.25	2.66	2.84	3.00	3.47	3.90
E	INCHES	43.6	44.3	46.8	51.0	55.1	65.2	69.6	73.5	85.0	95.6
	mm	3.81	3.81	3.81	4.56	4.56	6.31	6.31	7.19	7.19	7.19
F	INCHES	93.3	93.3	93.3	111.7	111.7	154.6	154.6	176.2	176.2	176.2
	mm	THREAD	THREAD	THREAD	THREAD	THREAD	THREAD	THREAD	THREAD	THREAD	THREAD
F	SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT	3" NPT
	SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT	3" NPT
Cv		7	7	13	30	38	61	87	121	228	305

Note: DN (Diameter Nominal) = Metric equivalent size.

Rev.11



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BA-400/400S

1/4"-2"

**BRONZE BALL VALVE
TWO-PIECE, FULL-PORT
600 PSIG WOG / 150 PSIG SWP (1)
THREADED ENDS**

FED. SPEC. WW-V-35C, II, BZ, 3
MSS SP-110

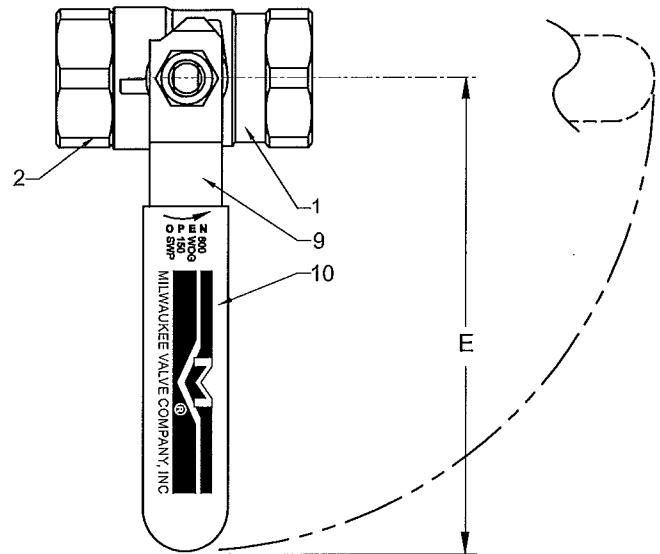
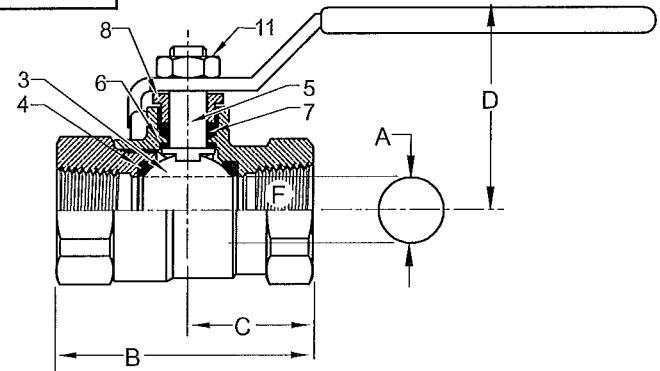
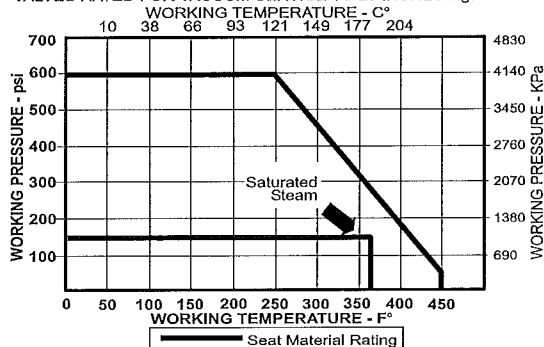
MATERIALS LIST

ITEM	PART	MATERIALS	ASTM SPEC.
1	Body	Cast Bronze	B584
2	Tailpiece	Brass	B283
		Cast Bronze (1 1/4" & up)	B584
3	Ball	Brass w/ Hard Chrome Plating	B283
		316 Stainless Steel (2)	B276
4	Seat	RPTFE, 15% Glass Filled	
5	Stem	Brass	B16
		316 Stainless Steel (2)	B276
6	Thrust Washer	RPTFE, 25% Glass Filled	
7	Packing	PTFE	
8	Packing Nut	Brass	B16
9	Handle	Steel w/ Zinc Plating	Commercial
10	Hand Grip	Vinyl	
11	Handle Nut	Steel w/ Zinc Plating	Commercial

- (1) Milwaukee Valve Company recommends the use of stainless steel ball and stem for steam applications. Please consult factory for more information.
- (2) Ball and stem are stainless for 400S.
- (3) For steam service, specify stainless trim and multi-fil seats, maximum stem pressure 150.

PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.



DIMENSIONS

	UNITS	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A(DIA)	INCHES	0.38	0.38	0.50	.76	1.06	1.31	1.56	2.00
	mm	9.7	9.7	12.7	19.3	26.9	33.3	39.6	51.0
B	INCHES	1.86	1.86	2.19	2.59	3.32	3.77	4.28	5.10
	mm	45.6	45.6	53.7	65.8	84.3	95.8	108.7	129.5
C	INCHES	1.00	1.00	1.10	1.30	1.59	1.81	2.06	2.37
	mm	24.5	24.5	27.0	33.0	40.4	46.0	52.3	60.2
D	INCHES	1.78	1.81	1.91	2.32	2.68	2.82	3.00	3.36
	mm	43.6	44.3	46.8	58.9	68.1	71.6	76.2	85.3
E	INCHES	3.82	3.82	3.82	4.55	6.33	6.33	6.33	7.19
	mm	93.6	93.6	93.6	115.6	160.8	160.8	160.8	182.6
F	THREAD SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT
Cv		7	7	13	30	61	110	185	360

Note: DN (Diameter Nominal) = Metric equivalent size.

Rev. 11

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BA-450/450S

3/8"-2"

BRONZE BALL VALVE
TWO-PIECE, FULL-PORT
600 PSIG WOG / 150 PSIG SWP (1)
SOLDER ENDS

MSS SP-110

MATERIALS LIST

ITEM	PART	MATERIALS	ASTM SPEC.
1	Body	Cast Bronze	B584
2	Tailpiece	Brass	B16
		Cast Bronze (1 1/4" & up)	B584
3	Ball	Brass w/ Hard Chrome Plating	B16
		316 Stainless Steel (2)	A276
4	Seat	RPTFE, 15% Glass Filled	
		Multi-Fil (3)	
5	Stem	Brass	B16
		316 Stainless Steel (2)	A276
6	Thrust Washer	RPTFE, 25% Glass Filled	
7	Packing	PTFE	
8	Packing Nut	Brass	B16
9	Handle	Steel w/ Zinc Plating	Commercial
10	Hand Grip	Vinyl	
11	Handle Nut	Steel w/ Zinc Plating	Commercial

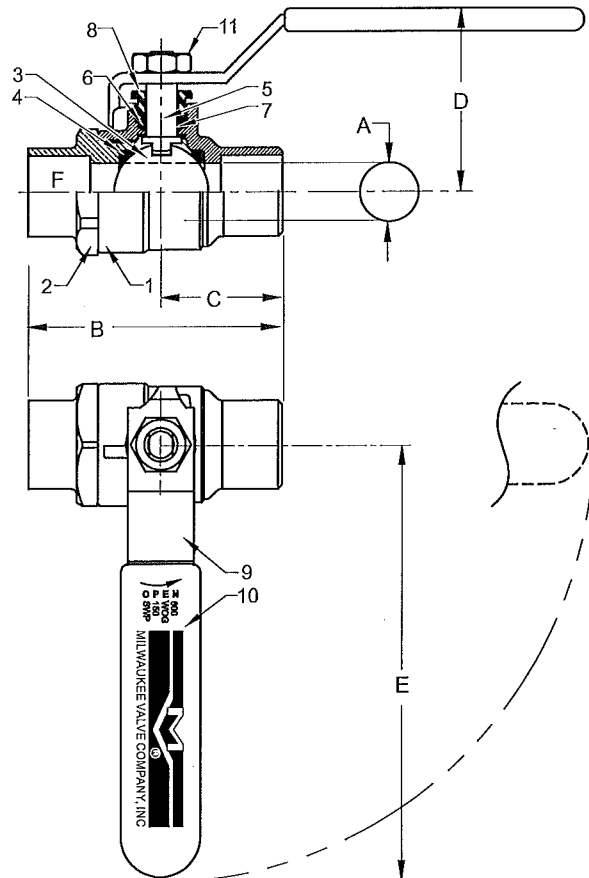
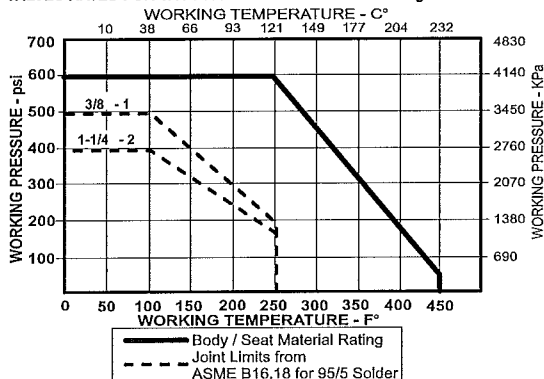
(1) Please consult factory for more information regarding steam applications.

(2) Ball and stem are stainless for 450S.

(3) For steam service, specify stainless trim and multi-fil seats, maximum stem pressure 150.

PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.



DIMENSIONS

		3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
	UNITS	DN10	DN15	DN20	DM25	DM32	DN40	DN50
A(DIA)	INCHES	0.38	0.50	0.76	1.06	1.31	1.56	2.00
	mm	9.7	12.7	19.3	26.9	32.1	39.6	51.0
B	INCHES	2.05	2.39	3.17	3.75	5.00	6.00	6.75
	mm	52.0	58.6	80.5	95.3	127.0	152.4	171.5
C	INCHES	.91	1.07	1.50	1.79	2.49	3.00	3.37
	mm	23.1	27.2	38.1	45.5	63.3	76.2	85.6
D	INCHES	1.80	1.87	2.19	2.67	2.82	2.99	3.51
	mm	44.1	46.3	55.6	67.8	71.6	75.9	89.2
E	INCHES	3.80	3.80	4.56	6.31	6.31	6.31	7.19
	mm	96.5	96.5	115.8	160.3	160.3	160.3	182.6
F	TUBE							
	SIZE Ø	.51	.63	.88	1.13	1.38	1.63	2.13
Cv		7	15	35	60	110	185	360

Note: DN (Diameter Nominal) = Metric equivalent size.

Rev. 5

The information presented on this sheet is correct at the time of publication. Milwaukee Valve reserves the right to change design, and/or material specifications without notice. For the most current information access www.milwaukeevalve.com





PIPING SPECIFICATION

Rev. A

Date: 5-24-16

No.	PIPE SYSTEM	SIZE	PIPE MATERIAL	CONNECTION TYPE	FITTING MATERIAL	FITTINGS					VALVES							NOTES
						UNIONS	JOINT COMPOUNDS	FLANGES	GASKETS	BOLTS AND NUTS	BALL	BUTTERFLY	CHECK	DIAPHRAGM	GATE	GLOBE	PLUG	
1	CHILLED , HEAT RECOVERY (GLYCOL), AND HEATING WATER	2" and Under	Copper, Type L, (ASTM B88)	Press	Wrought Copper (ASTM B584)	N/A	N/A	N/A	EPDM	N/A	Milwaukee BA-480B		Milwaukee 509-P2		Milwaukee 148	Milwaukee 502		14
													MilwaukeeSilent Check 548T-P2		Apollo 101TLF-PR (threaded)	Apollo 120TLF-PR (threaded)		
													Apollo 163TLF-PR (threaded)					
		2" and Under	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Threaded	Malliable Iron, Class 150 (ASTM A47)	Acceptable	TFE Tape	Class 150; Raised Face; Forged Carbon Steel Threaded (ASTM A105)	N/A	N/A	Milwaukee BA-400s		Milwaukee 509Y					1, 14
													Milwaukee Silent Check 548T		Milwaukee 148	Milwaukee 502		
		2-1/2" to 12"	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Butt-Weld	Carbon Steel, Sch 40, Seamless, (ASTM A234-WPB)	Flanges	N/A	Class 150; Raised Face; Forged Carbon Steel Weld Neck (ASTM A105)	Garlock 2900	SAE J429 Grade 5 bolts and SAEJ5 Grade 5 Hex	Milwaukee F201CSN2	Milwaukee CL Series (Import)2-12 Figure# CL223E Lever Handle, Figure# CL323E	Milwaukee 2974A (Domestic) 2-12"		Milwaukee 2885M (Import) 2-12"	Milwaukee 2981A (Domestic) 2-10"		1, 14
													Milwaukee 2974M (Import);		Milwaukee 2885A (Domestic) 2-12"	Milwaukee 2981M (Import) 2-10"		
												Milwaukee ML Series (Domestic) 2-12 Figure # ML233E Lever Handle; Figure ML333E Gear, Operated	Milwaukee Silent Check Fig # 1800			Armstrong Circuit Balancing Valves		
		2-1/2" to 12"	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Grooved	Ductile Iron (ASTM A 536)	N/A	N/A	Flange Adapter Avalliable	EPDM	Galvanized Carbon Steel ASTM A 183 and ASTM A 563	Gruvlok Fig # 7500		Milwaukee Silent Check Fig # 1800		Milwaukee 2885M (Import) 2-12"	Milwaukee 2981A (Domestic) 2-10"		1,2, 14
												Gruvlok Fig # 7700	Milwaukee 2974M (Import);		Milwaukee 2885A (Domestic) 2-12"	Milwaukee 2981M (Import) 2-10"		
													Milwaukee 2974A (Domestic) 2-12"					
													Gruvlok Fig # 7800					
2	COOLING COIL DRAINS	2" and Under	Copper, Type M, (ASTM B88)	Press	Wrought Copper (ASTM B584)	N/A	N/A	N/A	EPDM	N/A	Milwaukee BA-480B		Milwaukee 509-P2		Milwaukee 148	Milwaukee 502		1
													MilwaukeeSilent Check 548T-P2		Apollo 101TLF-PR (threaded)	Apollo 120TLF-PR (threaded)		
													Apollo 163TLF-PR (threaded)					

4	REFRIGERANT	2" and Under	Copper, Type ARC, (ASTM B280)	Socket, Brazed	Wrought Copper (ASTM B584)	N/A	Stay-Brite Solder	N/A	N/A	N/A								14
5	MAKEUP WATER; CHEMICAL FEED	2" and Under	Copper, Type L, (ASTM B88)	Press	Wrought Copper (ASTM B584)	N/A	N/A	N/A	EPDM	N/A	Milwaukee BA-480B		Milwaukee 509-P2		Milwaukee 148	Milwaukee 502		1,14
													MilwaukeeSilent Check 548T-P2		Apollo 101TLF-PR (threaded)	Apollo 120TLF-PR (threaded)		
													Apollo 163TLF-PR (threaded)					

7	RELIEF VENTS	2" and Under	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Threaded	Malliable Iron, Class 150 (ASTM A47)	Acceptable	TFE Tape	Class 150; Raised Face; Forged Carbon Steel Threaded (ASTM A105)	N/A	N/A								1, 15
		2-1/2" to 12"	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Butt-Weld	Carbon Steel, Sch 40, Seamless, (ASTM A234-WPB)	Flanges	N/A	Class 150; Raised Face; Forged Carbon Steel Weld Neck (ASTM A105)	Garlock 2900	SAE J429 Grade 5 bolts and SAEJ5 Grade 5 Hex								1, 15
8	NATURAL GAS	2 1/2" and Under	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Threaded	Malliable Iron, Class 150 (ASTM A47)	N/A	N/A	Adapter Available	EPDM	SAE J429 Grade 5 bolts and SAEJ5 Grade 5 Hex	Milwaukee 22CSOR-02-LL						Nordstrum 142	1, 16
											Apollo 80-100 Series							
		3" to 12"	Carbon Steel, Sch 40, Electric Resistance Weld ERW, Black (ASTM A53)	Butt-Weld	Carbon Steel, Sch 40, Seamless, (ASTM A234-WPB)	Flanges	N/A	Class 150; Raised Face; Forged Carbon Steel Weld Neck (ASTM A105)	Garlock 5500	SAE J429 Grade 5 bolts and SAEJ5 Grade 5 Hex	PBV C4510-31-2236-FY-NL						Nordstrum 143	1, 16

**NOTES**

1. Use flat faced flanges (ASTM A105) in raised face flange piping systems where required for mating with flat faced valves and equipment.
2. Use grooved valves for piping 6" and less or where required based on cost.
3. Only use AGS Victaulic connections for chilled water piping systems over 14". N/A
4. Use 14" and over pipe size grooved piping systems only in low risk location such as basements. N/A
5. Threaded connections allowed where required for equipment connection.
6. Medical gas fittings will be oxygen cleaned, capped and bagged.
7. The maximum operating pressure for PVC pipe is 140°F. The allowable working pressure is reduced by a de-rating factor above 73°F.
8. The maximum operating pressure for CPVC pipe is 200°F. The allowable working pressure is reduced by a de-rating factor above 73°F.
9. The maximum operating pressure for PP pipe is 200°F. The allowable working pressure is reduced by a de-rating factor above 73°F.
10. The maximum operating pressure for HDPE pipe is 140°F. The allowable working pressure is reduced by a de-rating factor above 73°F.
11. Use Solon washers where thermal cycling is a significant issue.
12. Use fire and smoke rated materials for piping in soffits.
13. Use di-electric nipples Gruvlok Figures 7088, 7089 or 7090 to address galvanic action for dissimilar materials.
14. Use silent check valves in pump discharge applications.
15. Relief valves and rupture discs, pressure regulator vents and gas pressure switch vents shall be piped full size of valve outlet to atmosphere outside building. For multiple valve installations common discharge pipe shall have cross-sectional area equal to the sum of the outlet area of the connected valves.
16. Gas piping installed in mechanical room plenums or in ceiling plenums or where concealed in inaccessible plenums and chases shall have welded joints and fittings and shall not have valves installed within the spaces.

Shop Drawing Submittal Review

Transmitted To: Cannon Design

Date: August 17, 2016

Attention: stl-cac@cannondesign.com

Contact Person / WTA Field Inspector:
Patrick Garner

Project Name: Webster University-**ISB**

Reviewed by: Mark Schaefer

Project No. WT 14127.01

☐

UPS

☐

Courier

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Email

Copies	No.	Description
1 PDF	230600M01	(Submittal No.'s) (R&B CxSRC)
		(Cannon #230600-004) - (Paric #15051-0181) – (WES #607)
		• HVAC Piping Product Data

***Submittal Review Comments**

3 inch and larger elbows shall be long radius as specified in section 230600.

c: Kelvin Patel
Kpatel@cannondesign.com

☐ Furnish as Submitted

☒ ***Furnish as Noted**

☐ Rejected

☐ Revise & Resubmit

☐ Reviewed

☐

Corrections or comments made on shop drawings during this review do not relieve contractor from compliance with requirements of drawings and specifications. This check is only for review of general conformance with the design concept of project and general compliance with information given in contract documents. Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.



77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0181

Paric Corporation

PROJECT: 15051-Webster University Interdisciplinary Science Building

DATE: 08/09/2016

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

RE: HVAC Piping Product Data

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☒ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	SENT VIA:	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☒ Other: Product Data	☐ Separate Cover Via:	☐ Due Date:

Item	Package	Code	Rev.	Copies	Date	Description	Status
Submittal		230600-004	1		08/09/2016	HVAC Piping Product Data	Submitted

NOTES:

CC:

Signed: _____
Devin Gates



Mechanical

LETTER OF TRANSMITTAL

TO: Paric Corporation

77 West Port Plaza #250

St. Louis, MO 63146

ATTN: Jason Szachnieski, Devin Gates

DATE: 8/8/16

JOB #: 5768

RE: Webster ISB

We are sending you

☒

Shop drawings

☐ Attached

☐ Prints

☐ Under separate cover

☐ Plans

☐ Samples

☐ Specifications

☐ Copy of letter

☐ Change order

☐ Other

COPIES	DATE	NO.	DESCRIPTION
1	8/8/16	230600	Piping

These are transmitted as checked below:

☐ For signature

☐ For your use

☐ As requested

☐ For bids due

☒

For review and comment

☐ Approved as submitted

☐ Approved as noted

☐ Returned for corrections

☐ Prints returned after loan to us

☐ Other

☐ Resubmit

☒

Submit

☐ Return

☐ copies for approval

☐ copies for distribution

☐ corrected prints

Remarks: Please return by 8/18/16

COPY TO: file

SIGNED:

Alex Chambers



Mechanical

Webster University ISB Webster Groves, MO

Submittal #:

230600

Submittal Description:

Piping

Return By:

8/18/16

Please Note: To avoid scheduling delays and equipment release delays, please submit by the "Return By" date.

CHECKED BY:			
DESIGNER:		ENGINEER:	
☒	NO EXCEPTION TAKEN	☐	MAKE CORRECTIONS NOTED
☐	SUBMIT SPECIFIED ITEM	☐	REVISE AND RESUBMIT
☐	REJECTED	☐	
Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Equipment supplier is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and satisfactory performance of his work.			
		Job #:	5768
		Date:	8/8/16
		By:	ARC