

BLOWDOWN SEPARATORS



Boiler Book
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CONTENTS

FEATURES AND BENEFITS3

PRODUCT OFFERING3

ILLUSTRATIONS

Blowdown Separator Dimensions4

Automatic Drain Water Aftercooler (18DF) Dimensions7

Automatic Drain Water Aftercooler (16DS) Dimensions7

Automatic Drain Water Aftercooler (20AO) Dimensions8

Model 5D Dimensions9

Separator Floor Stand9

Separator Wall Bracket10

TABLES

Boiler Blowdown Separator Sizing5

Cooling Water Line and Valve Sizing8

FEATURES AND BENEFITS

- Fast, safe, low-cost way to separate steam and water and remove harmful dissolved solids
- Protects boiler surfaces from severe scaling or corrosion problems.
- Economical flash purification process for enhancing blowdown effectiveness
- Reduce drain water temperature to meet state and local requirements.
- Quiet design, with noise levels below 90 dBA, so no exhaust head is required
- CB blowdown separators are compact, and can be quickly installed with few connections
- Stainless steel striking plate greatly extends separator life.
- Momentum of water is speeded by spiral baffle centerwise to drain. Drain is completely filled - no center void.
- Tangential inlet and small diameter prompt high velocity spinning for release of steam.
- All interior surfaces slant toward drain, making unit self-draining, self-drying for longer life.
- Proven performance
- Demonstrated durability
- Universal adaptability

PRODUCT OFFERING

Boilers that supply steam for power, process or heating applications require periodic and more often, frequent, blowdowns to prevent buildup of harmful solids. Blowdown protects boiler surfaces from severe scaling or corrosion problems that would otherwise result.

Cleaver-Brooks blowdown separators use a safe, economical flash purification process for enhancing blowdown effectiveness. Steam is rapidly separated from blowdown water and vented out the top of the blowdown separator in a cyclonic spinning action. Water and dissolved solids are flushed out the bottom drain.

The design is quiet, with noise levels held below 90 dBA, so no exhaust head is required. Internal pressures do not exceed 5 psig. Blowdown water is cooled to 120 °F by a drain tempering device, designed to meet state and local codes.

Cleaver-Brooks blowdown separators are compact, and can be quickly installed with few connections. Accessories include leg or wall brackets, drain tempering fitting, strainer, temperature regulating valve, thermometer, pressure gauge and flanges.

Pressure ranges:

0 to 300 psig, standard.

301 to 1600 psig, special.

Available with ASME "U" stamp.

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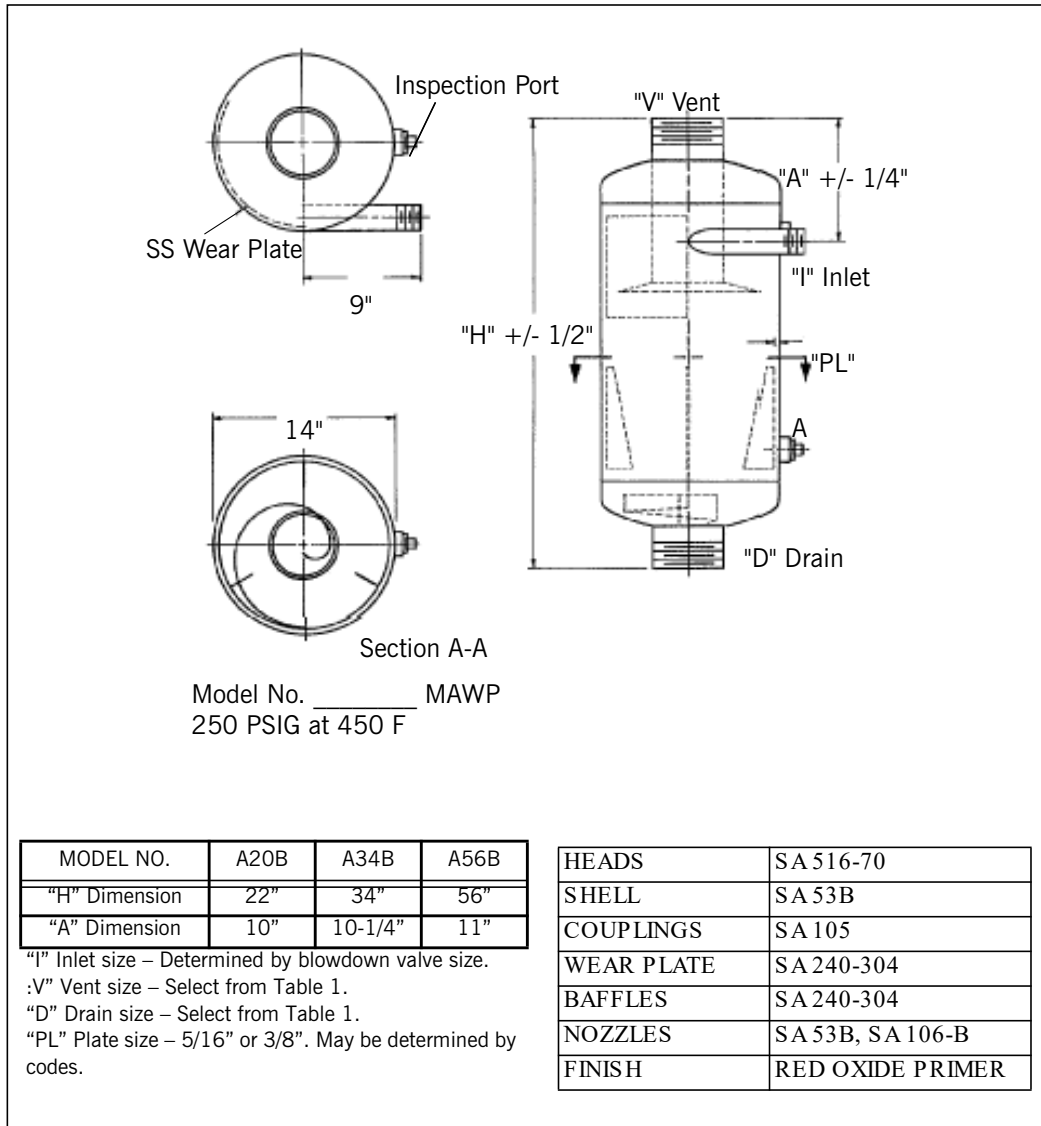


Figure 1. Blowdown Separator Dimensions

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Table 1: Blowdown Separator Sizing

BDV	PRESS. PSIG	TANK SIZE	INLET	DRAIN	VENT	CWI	A	B	C	D	E
							FLASH PPH	COND GPM	BDV FLOW PPH [A+B]*	COLD WATER GPM	TOTAL DRAIN GPM [B+D]
1"	50	14"X 20"	1"	2"	2 1/2"	1/2"	360	12.17	6444	12.52	24.69
1"	100	14"X 20"	1"	3"	2 1/2"	1/2"	1252	21.18	11844	21.80	42.98
1"	125	14"X 34"	1"	3"	3"	1/2"	1823	23.56	13,604	24.25	47.81
1"	150	14"X 34"	1"	3"	3"	1/2"	2155	26.48	15394	27.25	53.72
1"	200	14"X 34"	1"	3"	4"	3/4"	3268	32.84	19690	33.80	66.64
1"	250	14"X 34"	1"	4"	4"	1"	4214	35.25	21838	36.27	71.52
1"	300	14"X 56"	1"	4"	4"	1"	5212	39.70	25060	40.85	80.54

1 1/4"	50	14"X 20"	1 1/4"	3"	4"	1/2"	754	25.44	13472	26.17	51.61
1 1/4"	100	14"X 34"	1 1/4"	4"	4"	3/4"	2448	39.67	22284	40.82	80.49
1 1/4"	125	14"X34"	1 1/4"	4"	4"	1"	3400	43.96	25379	45.23	89.19
1 1/4"	150	14"X 34"	1 1/4"	4"	4"	1"	4310	52.96	30792	54.50	107.46
1 1/4"	200	14"X 34"	1 1/4"	4"	5"	1 1/4"	6282	63.13	37848	64.96	128.09
1 1/4"	250	14"X 56"	1 1/4"	4"	5"	1 1/2"	8171	68.34	42339	70.32	138.65
1 1/4"	300	14"X 56"	1 1/4"	4"	5"	1 1/2"	10140	77.23	48754	79.47	156.70

1 1/2"	50	14"X 34"	1 1/2"	3"	4"	3/4"	1088	36.70	19437	37.76	74.46
1 1/2"	100	14"X 34"	1 1/2"	4"	4"	1"	3558	60.03	33573	61.77	121.80
1 1/2"	125	14"x34"	1 1/2"	4"	4"	1 1/4"	5209	67.33	38874	69.28	136.61
1 1/2"	150	14"X 34"	1 1/2"	4"	5"	1 1/4"	6184	76.88	44625	79.11	155.99
1 1/2"	200	14"X 56"	1 1/2"	5"	5"	1 1/2"	8946	89.89	53893	92.50	182.39
1 1/2"	250	14"X 56"	1 1/2"	5"	6"	2"	11765	98.39	60962	101.25	199.64
1 1/2"	300	14"X 56"	1 1/2"	5"	6"	2"	14517	110.56	69796	113.76	224.32

2"	50	14"X 34"	2"	4"	5"	1 1/4"	2108	70.69	37454	72.74	143.43
2"	100	14"X 34"	2"	5"	5"	2"	6416	108.24	60,536	111.38	219.62
2"	125	14"x34"	2"	5"	5"	2"	9496	122.79	70,893	126.36	249.15
2"	150	14"X 56"	2"	5"	6"	2"	11162	137.12	79721	141.09	278.21
2"	200	14"X 56"	2"	6"	6"	2"	15686	157.62	94496	162.19	319.81
2"	250	14"X 56"	2"	6"	8"	2 1/2"	21087	176.35	109261	181.46	357.81
2"	300	14"X 56"	2"	6"	8"	2 1/2"	25490	194.12	122550	199.75	393.87

251-300 psig U. Symbol Construction and Stamping is required.

To use this chart:

1. Select separator size from this table by matching operating pressure and blow-down valve size.
2. Select Plate Thickness (PL) as local regulations require or as desired for maximum pressure stamped on Separator. 3/16", 150 psig; 5/16", 225 psig; 3/8", 250 psig.
3. If local regulations require, indicate ASME or Standard. Separator size is now determined and discharge piping may follow these sizes with no calculation necessary. Separators are designed to exhaust at less than 5 psig.

*GPM = PPH/(8.33x60)

Standard and Optional Equipment Selection

For dimensions and sizing of blowdown separators, refer to Figure 1 and Table 1.

For manual drain water tempering, use Aftercooler model 5D and specify drain diameter.

For automatic control of drain water temperature, use 18DF or 20AO Aftercooler. 20AO Aftercooler is required in some areas to automatically regulate the temperature of the water to the drain. Check local codes to ascertain if it is required in your area.

A temperature regulating valve should be used when the blowdown temperature going to the drain needs to be less than 212 °F. (See Table 2 to select cooling water line and valve size.)

Use a solenoid valve and thermostat when the cooling water pressure exceeds 80 psig.

- Model 18DF Aftercooler (Figure 2) or Model 16DS (Figure 3) - Nonclogging automatic drain tempering fitting with stainless steel mixing tongue (on 4" and larger) to provide thorough mixing of influent cold water with drain water. The middle flange (Model 18DF) permits rotation for various pipe fitting requirements and also serves as a dismantling flange. Two bulb-wells for mounting control valve and thermometer are furnished. When ordering, state cold water inlet size.
- Model 20AO Jacket Type After Cooler (Figure 4) - Required in some areas. Has mixing holes corresponding to the cold water inlet size. The lower portion is designed with wells to accommodate automatic control bulb and thermometer. When ordering state cold water inlet size.
- Temperature Regulator Valves - Automatically control the flow of cold water by responding to temperature changes at the thermostatic bulb. The 6" capillary tube allows installation in the cold water line while the 11" bulb is mounted in the lower portion of the aftercooler. The valve size should correspond to the cold water inlet.
- Thermometer - Bi-metal, drawn steel case, rust resistant and finished in oven baked enamel. Six inch brass stem with 1/4" NPT bushing provided for use with Model 18DF and Model 20AO Aftercoolers.
- Solenoid Valve - Automatically controls cooling water to aftercooler. Non-magnetic stainless steel body; micro-finished, hardened pilot valve ball. Has two-wire control circuit (120/60). Well immersion hot water control provided for actuating solenoid valve.
- The Model 5D Drain Tempering Fitting (Figure 5) - Simple type of aftercooler for adding cooling water with manual control. It has a cold water inlet for adding cooling water to drain for tempering to 120 °F. Inlet is sized for minimum influent water conditions of 60 °F water at 40 psig pressure with 100 sq-ft of supply. When ordering, state Model 5D (drain diameter); i.e. for 4" drain use Model 5D 4.
- Armstrong Strainer - Cast iron with .045 stainless steel screen. Install in cold water line to protect temperature regulator valve or solenoid valve shown in adjacent column.
- Separator Floor Stand (Figure 6) - Provides an excellent means for supporting separators. Constructed of sturdy angle iron. They come attached to the separator to provide an easy and expedient means of installation. Standard height raises separator 18 inches from floor, or when aftercoolers are provided, additional height is provided.
- Separator Wall Brackets (Figure 7) - For wall mounting where floor space is limited, or where desired installation is at a level higher than leg height of 18 inches.

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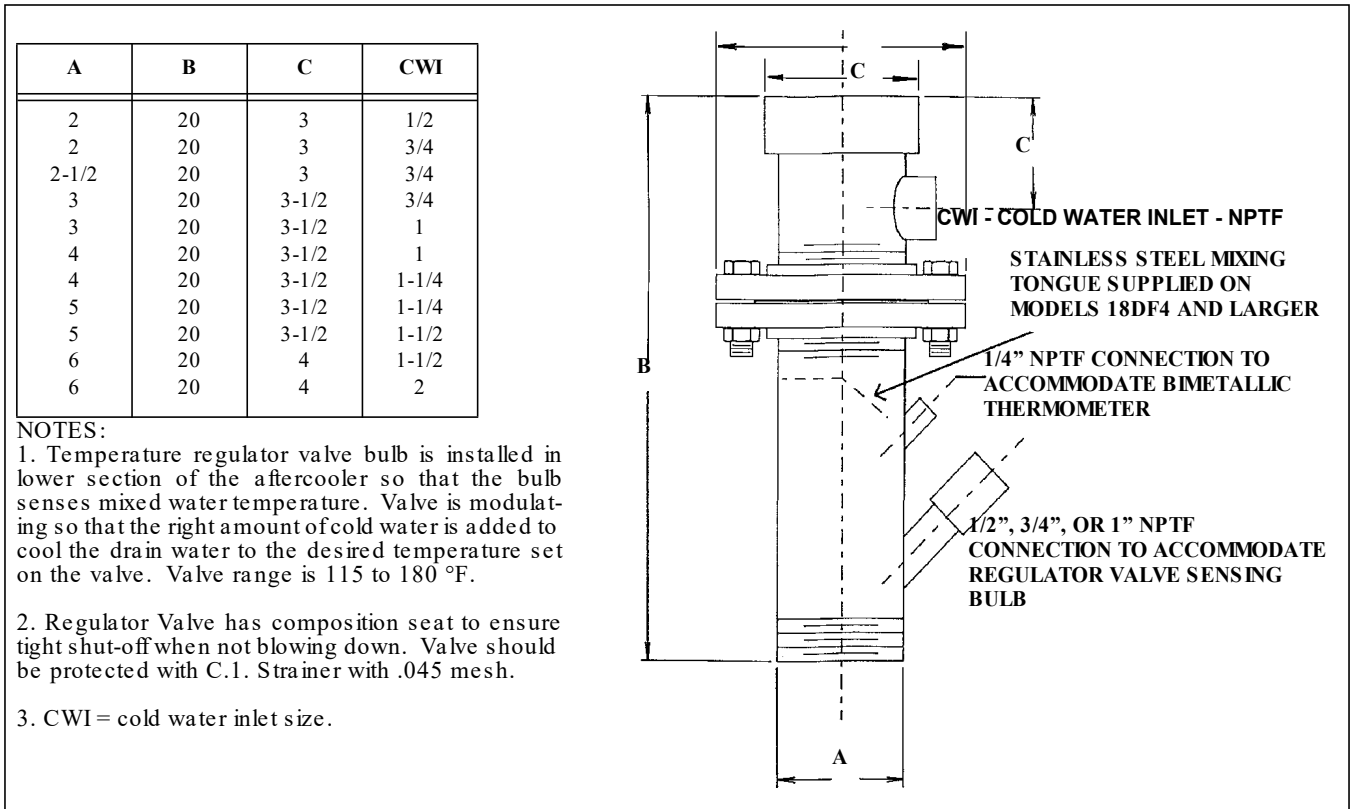


Figure 2. Automatic Drain Water Aftercooler (18DF) Dimensions

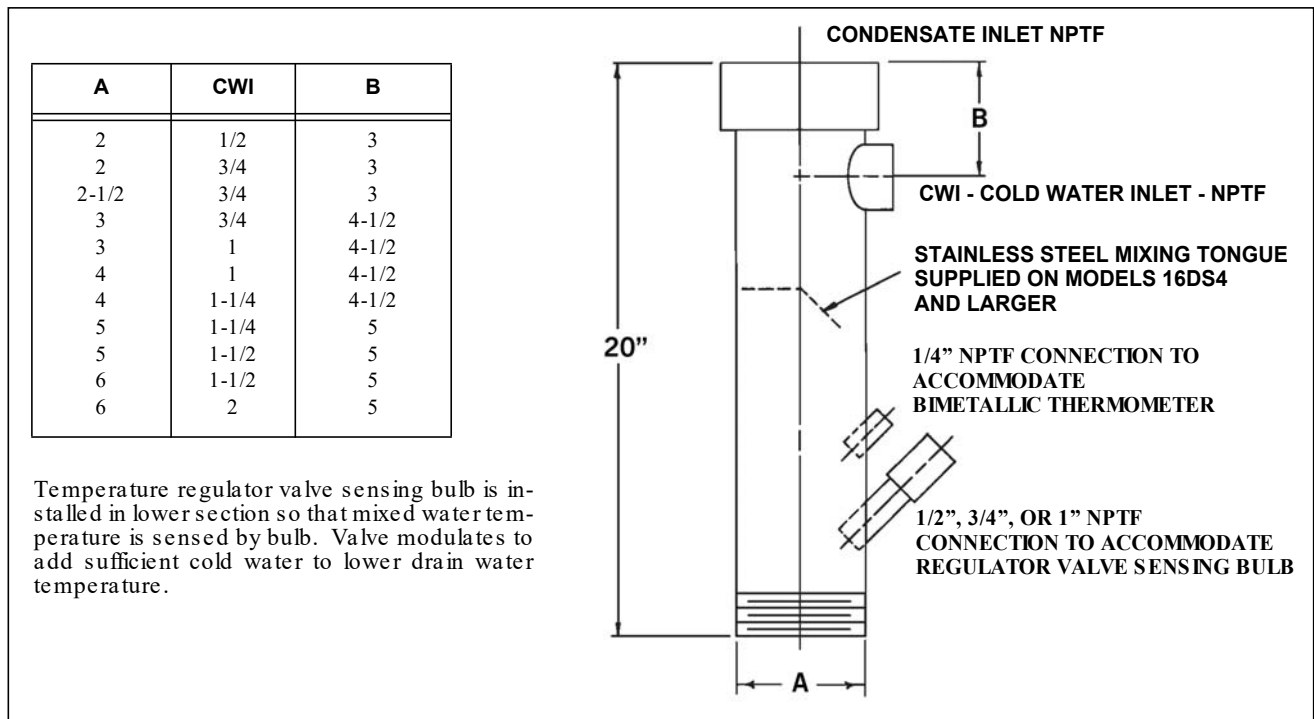


Figure 3. Automatic Drain Water Aftercooler (16DS) Dimensions

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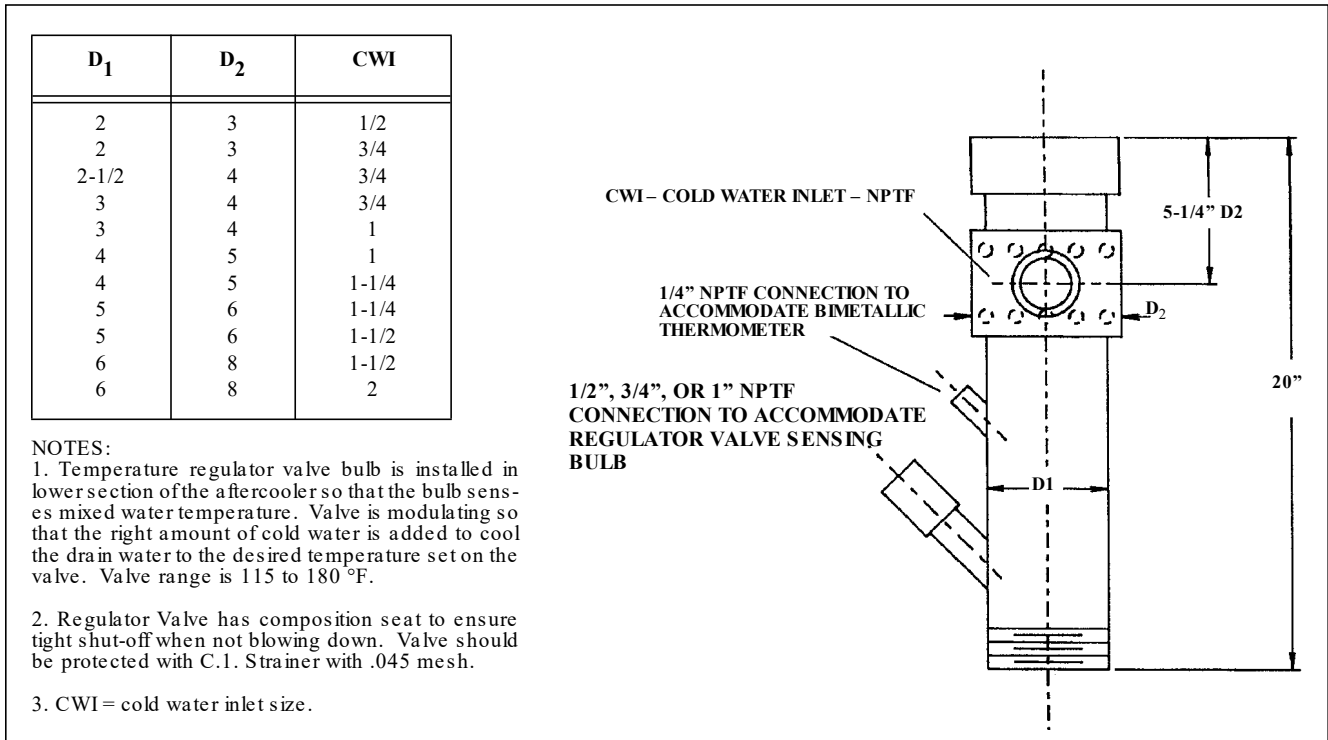


Figure 4. Automatic Drain Water Aftercooler (20AO) Dimensions

Table 2: Cooling Water Line and Valve Sizing

SEPARATOR INLET SIZE	1"			1-1/4"			1-1/2"			2"			2-1/2"		
	40	50	60	40	50	60	40	50	60	40	50	60	40	50	60
GENERATOR OPERATING PRESSURE (50 TO 70 °F COOLING WATER TEMPERATURE)															
0-50	1/2	1/2	1/2	1	1	1	1-1/4	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/2
51-100	1	3/4	3/4	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2	2	2
101-125	1	3/4	3/4	1-1/4	1	1	1-1/4	1-1/4	1-1/4	2	2	1-1/2	2	2	2
126-175	1	1	1	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2-1/2	2-1/2	2
176-225	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2	2	2	2-1/2	2-1/2	2
226-250	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2	2	2	2-1/2	2-1/2	2
251-300	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2	2	2	2-1/2	2-1/2	2-1/2
GENERATOR OPERATING PRESSURE (71 TO 80 °F COOLING WATER TEMPERATURE)															
0-50	3/4	1/2	1/2	1	1	1	1-1/4	1	1	1-1/4	1-1/4	1-1/4	2	2	1-1/2
51-100	1	3/4	3/4	1-1/4	1	1	1-1/4	1-1/4	1-1/4	2	2	1-1/2	2	2	2
101-125	1	1	3/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2	2-1/2	2-1/2	2
126-175	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2	2	2	2-1/2	2-1/2	2
176-225	1	1	1	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2	2	2	2-1/2	2-1/2	2-1/2
226-250	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	1-1/4	2-1/2	2-1/2	2	2-1/2	2-1/2	2-1/2
251-300	1-1/4	1-1/4	1-1/4	1-1/2	1-1/4	1-1/4	2	2	1-1/2	2-1/2	2-1/2	2	2-1/2	2-1/2	2-1/2

Use the chart as follows:

- Depending upon the temperature of the cooling water used, locate the section of the chart which applies, 50-70 °F or 71 - 80 °F.
- At the top of chart locate Separator inlet size and in left column under the section selected in step one, locate Boiler Operating pressure. You now have a selection of three valve sizes.
- From the top of chart select the cooling water line pressure either 40, 50 or 60 and read the desired valve and line size.

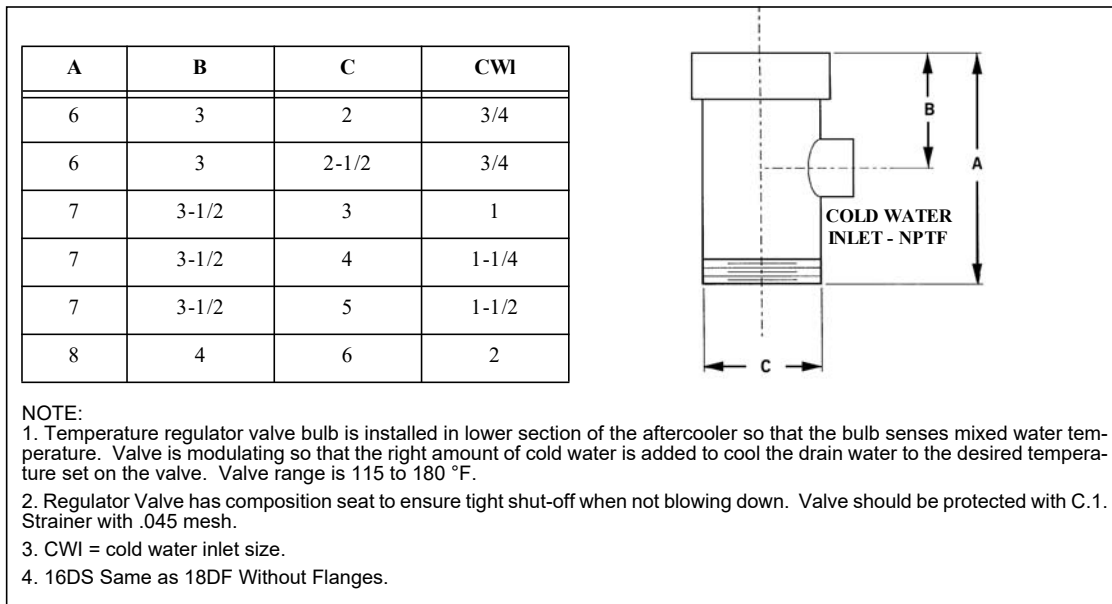


Figure 5. Model 5D Dimensions

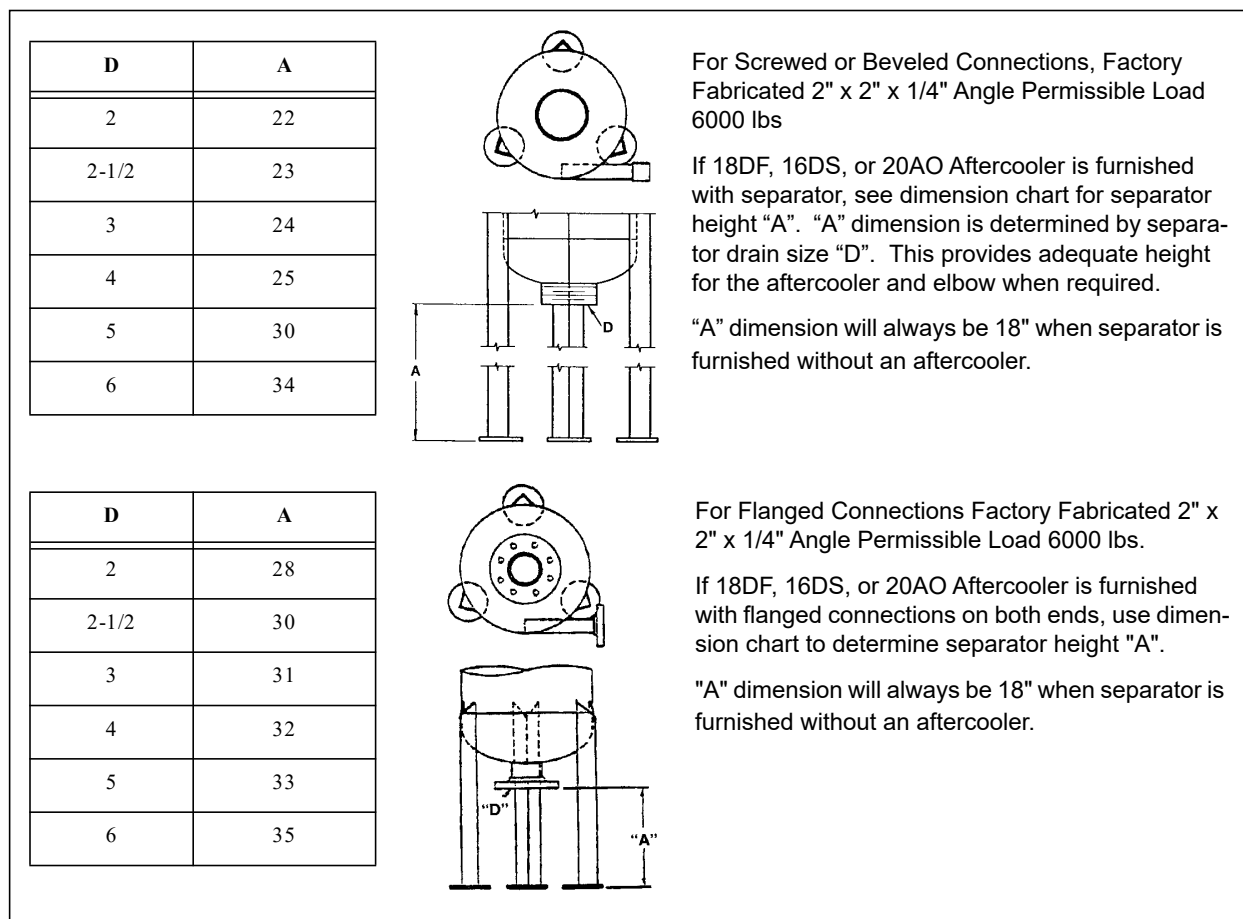


Figure 6. Separator Floor Stand

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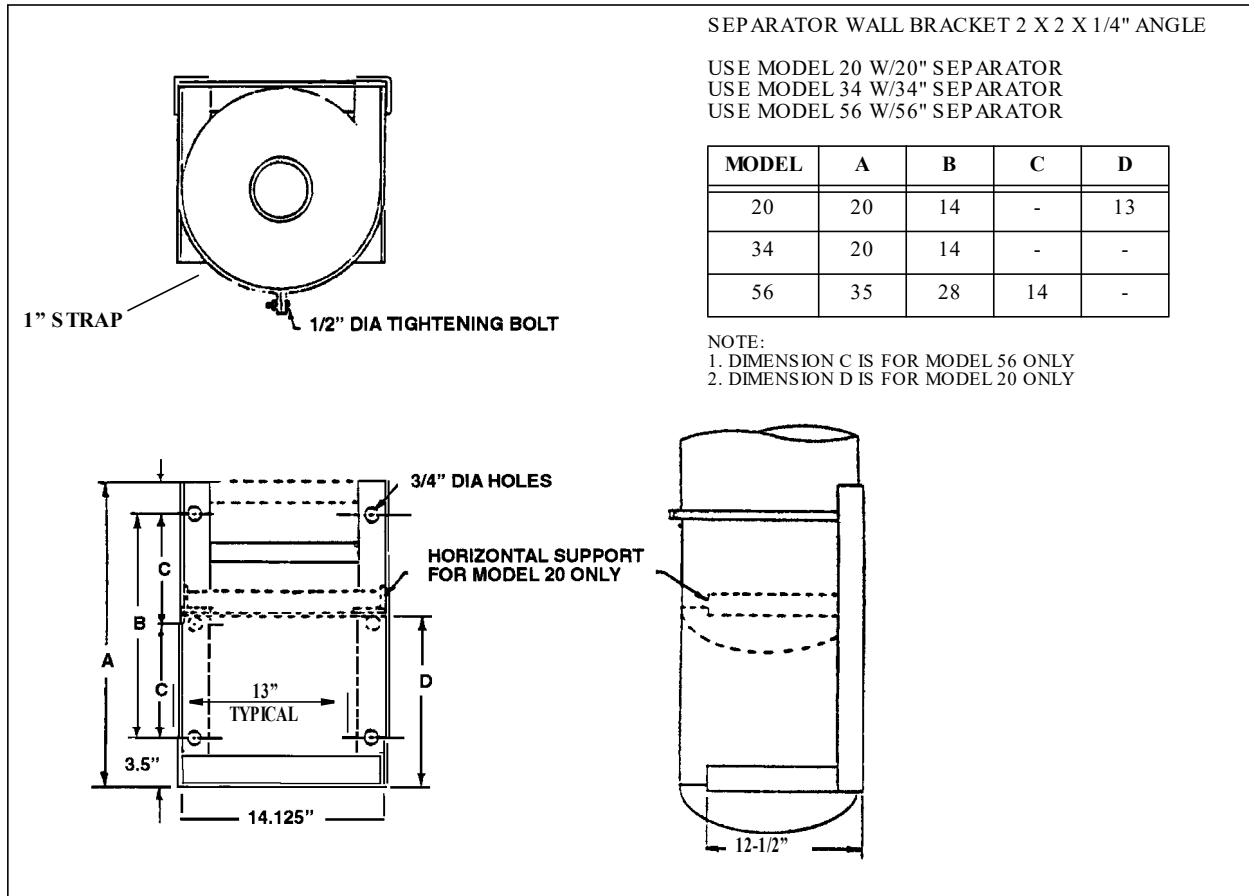


Figure 7. Separator Wall Bracket

