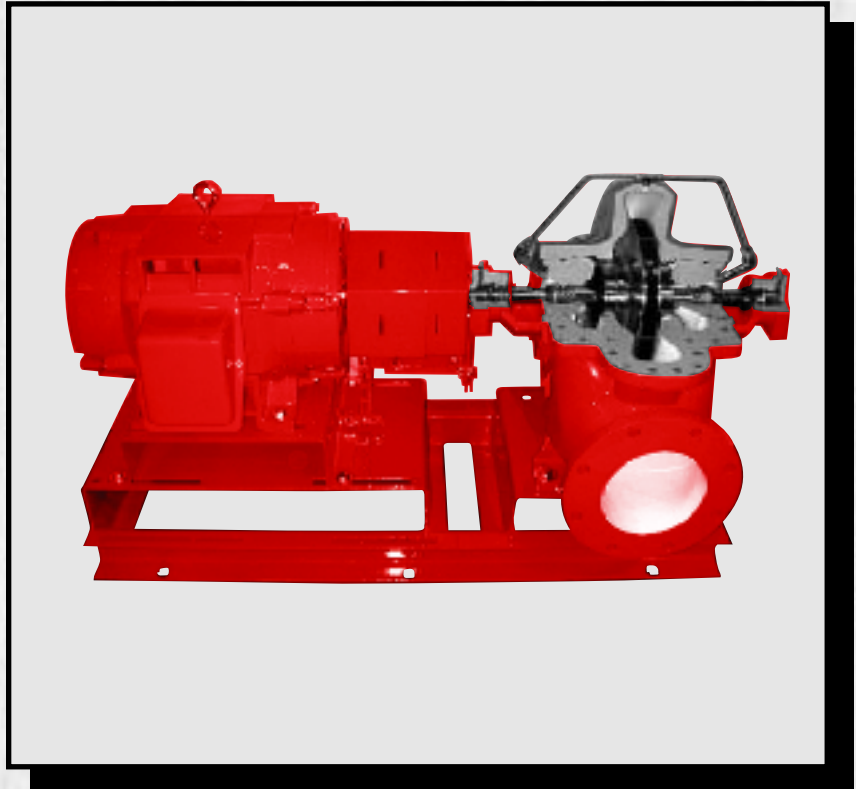




Bulletin B-512F

Bell & Gossett



Series HSC-S Pumps Technical Bulletin



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USEFUL PUMP FORMULAS

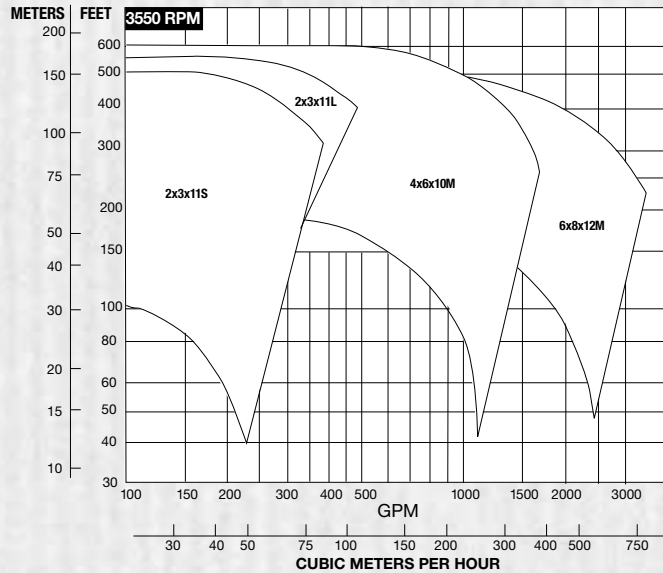
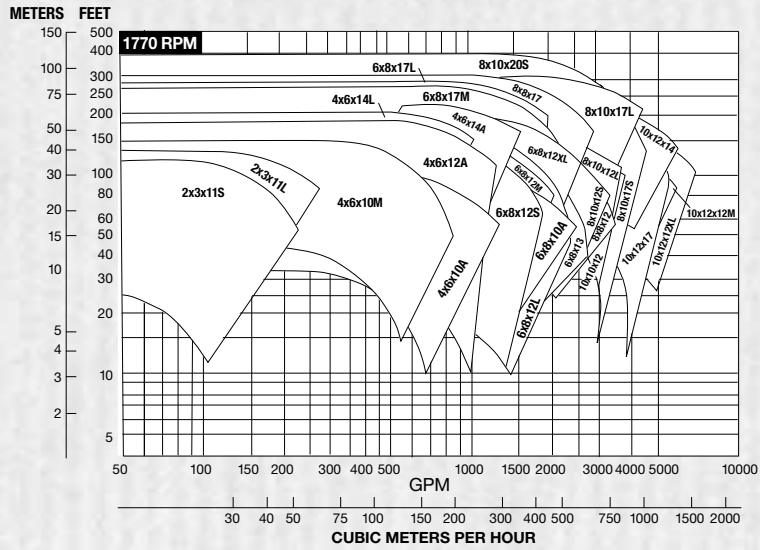
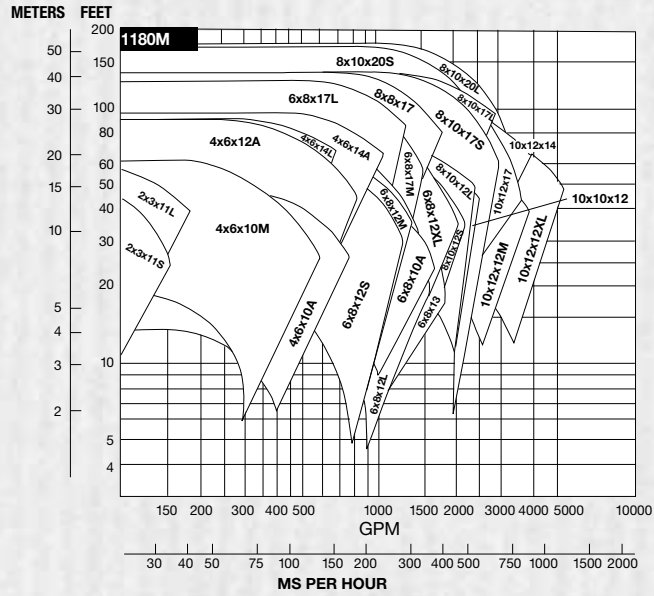
Pressure (PSI)	=	$\frac{\text{Head (Feet)} \times \text{Specific Gravity}}{2.31}$
Head (Feet)	=	$\frac{\text{Pressure (PSI)} \times 2.31}{\text{Specific Gravity}}$
Vacuum (Inches of Mercury)	=	Dynamic Suction Lift (Feet) x .883 x Specific Gravity
Horsepower (Brake)	=	$\frac{\text{GPM} \times \text{Head (Feet)} \times \text{Specific Gravity}}{3960 \times \text{Pump Efficiency}}$
Horsepower (Water)	=	$\frac{\text{GPM} \times \text{Head (Feet)} \times \text{Specific Gravity}}{3960}$
Efficiency (Pump)	=	$\frac{\text{Horsepower (Water)}}{\text{Horsepower (Brake)}} \times 100 \text{ Per Cent}$
NPSH (Available)	=	Positive Factors – Negative Factors

Affinity Laws: Effect of change of speed or impeller diameter on centrifugal pumps.

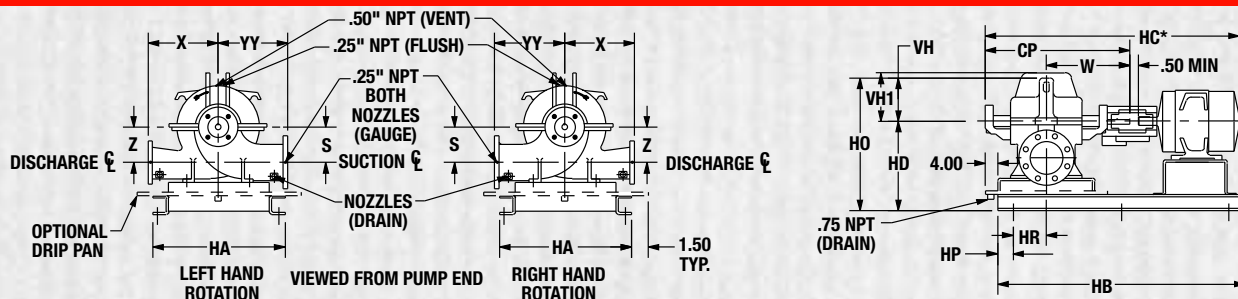
	GPM Capacity	Ft. Head	BHP
Impeller Diameter Change	$Q_2 = \frac{D_2}{D_1} Q_1$	$H_2 = \left(\frac{D_2}{D_1}\right)^2 H_1$	$P_2 = \left(\frac{D_2}{D_1}\right)^3 P_1$
Speed Change	$Q_2 = \frac{RPM_2}{RPM_1} Q_1$	$H_2 = \left(\frac{RPM_2}{RPM_1}\right)^2 H_1$	$P_2 = \left(\frac{RPM_2}{RPM_1}\right)^3 P_1$

Where Q = GPM, H = Head, P = BHP, D = Impeller Dia., RPM = Pump Speed

PERFORMANCE CURVES – SERIES HSC-S



SERIES HSC-S MODEL 150 DIMENSIONS



STANDARD: 125#FF ANSI FLANGE (ANSI A21.10, AWWA C110 & ANSI B16.1 CLASS 125)
 OPTIONAL: 250#FF ANSI FLANGE (ANSI B16.1 CLASS 250 EXCEPT FLANGES ARE FLAT FACED)
 VH1 APPLIES TO 280 & 400 PSIG RIBBED CASINGS
 DIMENSIONS ARE SUBJECT TO CHANGE. NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
 *MOTOR DIMENSIONS ARE APPROXIMATE FOR "T" FRAMES, VARY BY MANUFACTURER AND MOTOR TYPE.

PUMP SIZE	MOTOR FRAME	DIMENSIONS - INCHES (MM)														
		HA	HB	HP	HR	CP	HC* MAX	HD	HO	S & Z	VH	VH1	W	X	YY	
2x3x11	143-215	20.00	48.00 (1219)	6.00	2.25	28.25	47 (1194)	15.25(388)	22.05 (560)	5.50 (140)	6.80 (173)	-	16.00 (406)	9.00 (229)	10.00 (254)	
	S, L	254-365	(508)	54.00 (1372)	(152)	(57)	(718)									61 (1549)
4x6x10A	182-215	21.50	48.00 (1219)	6.00	2.88	30.06	60 (1524)	18.25 (464)	25.94 (659)	7.00 (178)	7.69 (195)	-	17.25 (438)	11.50 (292)	12.00 (305)	
		254-324	(546)	60.00 (1524)	(152)	(73)	(764)									69 (1753)
4x6x10M	182-215	24.00	48.00 (1219)	6.00	4.62	33.12	53 (1346)	18.25 (464)	26.12 (664)	6.50 (165)	7.88 (200)	-	18.50 (470)	11.50 (292)	13.00 (330)	
			254-326				58.00 (1473)									63 (1600)
			364-405				64.00 (1626)									72 (1829)
			444-445				76.00 (1930)									78 (1981)
4x6x12A	215	24.00	48.00 (1219)	6.00	4.62	33.12	53 (1346)	18.25 (464)	26.12 (664)	6.50 (165)	7.88 (200)	-	18.50 (470)	11.50 (292)	13.00 (330)	
			254-326				58.00 (1473)									63 (1600)
			364-365				64.00 (1626)									66 (1677)
			215-256				50.00 (1270)									55 (1397)
4x6x14A	284-365	24.00	58.00 (1473)	6.00	3.25	30.75	64 (1626)	19.52 (489)	28.50 (723)	7.75 (197)	9.20 (234)	-	17.50 (445)	11.50 (292)	13.00 (330)	
			404-405				68.00 (1727)									70 (1788)
			444				76.00 (1930)									74 (1880)
			182-256				50.00 (1270)									55 (1397)
4x6x14L	284-365	24.00	58.00 (1473)	6.00	3.25	30.75	64 (1626)	19.25 (489)	28.87 (733)	7.75 (197)	9.62 (244)	-	17.50 (445)	11.50 (292)	13.00 (330)	
			215				58.00 (1473)									60.25 (1530)
			254-326				64.00 (1626)									69.25 (1759)
			364-365				68.00 (1727)									71.25 (1810)
6x8x10A	182-215	24.00	48.00 (1219)	6.00	10.75	40.00	51 (1296)	21.25 (540)	30.50 (775)	8.25 (210)	9.25 (235)	-	23.00 (584)	12.50 (318)	12.50 (318)	
			254-326				54.00 (1372)									61 (1549)
			364-365				60.00 (1524)									64 (1626)
			215				58.00 (1473)									63 (1600)
6x8x12	254-326	21.50	48.00 (1219)	6.00	3.25	30.75	51 (1296)	21.25 (540)	30.85 (784)	9.00 (229)	9.60 (244)	-	17.50 (445)	14.00 (356)	14.00 (356)	
			254-326				54.00 (1372)									61 (1549)
			364-365				60.00 (1524)									64 (1626)
			254-326				58.00 (1473)									63 (1600)
6x8x12M	364-405	24.00	64.00 (1626)	6.00	4.63	33.12	72 (1829)	21.25 (540)	30.85 (783)	9.00 (229)	9.60 (244)	-	18.50 (470)	14.00 (356)	14.00 (356)	
			444-447				76.00 (1930)									81 (2058)
			254-326				58.00 (1473)									63 (1600)
			364-405				64.00 (1626)									72 (1829)
6x8x13	444-447	24.00	76.00 (1930)	6.00	5.63	36.87	81 (2058)	23.25 (591)	32.85 (834)	9.00 (229)	9.60 (244)	-	18.50 (470)	14.00 (356)	14.00 (356)	
			254-326				62.00 (1575)									67 (1702)
			364-405				68.00 (1727)									76 (1930)
			284-326				62.00 (1575)									67 (1702)
6x8x17	364-405	24.00	68.00 (1727)	6.00	5.63	36.87	76 (1930)	21.25 (540)	33.00 (838)	9.00 (229)	11.75 (299)	-	21.25 (540)	14.00 (356)	16.00 (406)	
			444-445				76.00 (1930)									82 (2083)
			254-326				62.00 (1575)									67 (1702)
			364-405				68.00 (1727)									76 (1930)
8x8x12	444-445	24.00	76.00 (1930)	6.00	5.63	36.87	82 (2083)	20.00 (508)	30.25 (768)	8.00 (203)	10.25 (260)	11.75 (299)	21.25 (540)	14.00 (356)	16.50 (419)	
			254-326				62.00 (1575)									67 (1702)
			364-405				68.00 (1727)									76 (1930)
			324-365				66.00 (1676)									72 (1829)
8x8x17	404-445	24.00	76.00 (1930)	6.00	7.00	39.56	85 (2159)	21.75 (553)	33.75 (857)	9.50 (241)	12.00 (305)	13.50 (343)	22.56 (573)	15.00 (381)	16.50 (419)	
			447-449				86.00 (2184)									93 (2362)
			404-445				76.00 (1930)									85 (2159)
			254-286				62.00 (1575)									67 (1702)
8x10x12	324-365	24.00	66.00 (1676)	6.00	7.00	39.56	72 (1829)	21.50 (546)	32.00 (813)	8.50 (216)	10.50 (267)	12.00 (305)	22.56 (573)	14.00 (356)	17.00 (432)	
			404-445				76.00 (1930)									85 (2159)
			324-365				66.00 (1676)									72 (1829)
			404-445				76.00 (1930)									85 (2159)
8x10x17	447-449	24.00	86.00 (2184)	6.00	7.00	39.56	93 (2362)	23.25 (591)	36.06 (916)	10.00 (254)	12.81 (325)	14.31 (363)	22.56 (573)	16.00 (406)	18.00 (457)	
			324-365				66.00 (1676)									72 (1829)
			404-445				76.00 (1930)									85 (2159)
			447-449				86.00 (2184)									93 (2362)
8x10x20	447-449	26.00	86.00 (2184)	6.00	7.00	39.56	93 (2362)	27.25 (692)	49.50 (1257)	14.00 (356)	15.44 (392)	22.25 (565)	22.56 (573)	18.00 (457)	20.00 (508)	
			324-365				66.00 (1676)									72 (1829)
			404-445				76.00 (1930)									85 (2159)
			447-449				86.00 (2184)									93 (2362)
10x10x12	447-449	24.00	86.00 (2184)	6.00	8.50	42.56	93 (2362)	22.50 (572)	33.69 (856)	9.00 (229)	11.19 (284)	-	24.06 (611)	16.00 (406)	18.00 (457)	
			284-365				68.00 (1727)									75 (1905)
			404-445				80.00 (2032)									96 (2438)
			284-365				68.00 (1727)									75 (1905)
10x12x12	404-445	24.00	80.00 (2032)	6.00	8.50	42.56	96 (2438)	24.50 (622)	36.00 (914)	10.00 (254)	11.50 (292)	-	24.06 (611)	16.00 (406)	19.00 (483)	
			324-365				66.00 (1676)									72 (1829)
			404-445				76.00 (1930)									85 (2159)
			447-449				86.00 (2184)									93 (2362)
10x12x14	447-449	24.00	86.00 (2184)	6.00	7.00	39.56	93 (2362)	25.25 (641)	38.69 (983)	11.00 (280)	13.44 (341)	14.94 (380)	22.56 (573)	18.00 (457)	20.00 (508)	
			324-365				66.00 (1676)									72 (1829)
			404-445				76.00 (1930)									85 (2159)
			447-449				86.00 (2184)									93 (2362)
10x12x17	447-449	24.00	86.00 (2184)	6.00	7.00	39.56	93 (2362)	25.25 (641)	38.69 (983)	11.00 (280)	13.44 (341)	14.94 (380)	22.56 (573)	18.00 (457)	20.00 (508)	
			324-365				66.00 (1676)									72 (1829)
			404-445				76.00 (1930)									85 (2159)
			447-449				86.00 (2184)									93 (2362)

TYPICAL SPECIFICATIONS FOR SERIES HSC-S HORIZONTAL SPLIT CASE PUMPS

SPECIFICATIONS

2.01 DOUBLE SUCTION, HORIZONTAL SPLIT CASE PUMPS (BASE MOUNTED)

A MANUFACTURER:

Contractor shall furnish and install new double suction horizontal split case pumps for chilled water and hot water heating systems as indicated on the drawings. Pumps shall be model HSC-S as manufactured by Bell & Gossett under base bid. Equivalent units may be submitted as deduct alternates. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule drawings.

B DOUBLE SUCTION, HORIZONTAL SPLIT CASE PUMP (BASE MOUNTED) :

1. The pumps shall be long coupled, base mounted, single stage, double suction, horizontally split case design, in cast iron bronze fitted construction specifically designed and guaranteed for quiet operation. Suitable standard operations at 225°F and 175 psig working pressure or optional operations at up to 250°F and 280 or 400 psig working pressures. Working pressures shall not be de-rated at temperatures up to 250°F. The pump internals shall be capable of being serviced without disturbing piping connections or electrical motor connections.
2. A bearing housing shall supply support for a pair of heavy-duty regreaseable ball bearings. An inboard single row bearing will absorb thermal expansive forces while an outboard double row bearing will be clamped in place to absorb both radial and thrust loads and keep the rotating element in proper axial alignment. Bearings shall be replaceable without disturbing the system piping and shall be regreaseable without removal of the bearings from the bearing housing.
3. The impeller shaft shall be a solid 416 stainless steel shaft.
4. Pump shall be equipped with a pair of externally flushed mechanical seal assemblies in direct contact with the pump shaft. Seal assemblies shall be a Type 21 having a stainless steel housing, Buna bellows and seat gasket, stainless steel spring, and be of a carbon-ceramic design with the carbon face rotating against a stationary ceramic face.
5. Impeller shall be of the enclosed double suction type made of bronze, both hydraulically and dynamically balanced to ANSI/HI 1.1-1.5-1994, section 1.4.6.1.3.1, figure 1.106, balance grade G6.3 keyed to the shaft and fixed in the axial position.
6. A center drop-out type coupling, capable of absorbing torsional vibration, shall be employed between the pump and motor. On variable speed applications the coupler sleeve should be constructed of an EPDM material to maximize performance life.
7. The coupling shall be shielded by a dual rated ANSI B15.1, Section 8 and OSHA 1910.219 compliant coupling guard and contain viewing windows for inspection of the coupling.
8. Pump volute shall be of a cast iron (rated for 175 psig Max WP) or ductile iron (rated for 280 or 400 psig Max WP) axially-split design with flanges (175 psig drilled for 125# ANSI companion flanges or optional 280 and 400 psig working pressures are drilled 250# flange drilled) and mounting feet integral cast into the bottom half of the casing. 280 and 400 psig 6x8x10A's are cast iron. Suction and discharge flanges shall be on a common centerline in both the horizontal and vertical planes, and the volute shall include Bronze Casing Wear Rings, priming port, gauge ports at nozzles, and vent and drain ports. The upper half casing shall be capable of being removed without disturbing piping connections or electrical motor connections.
9. Pump seal flushing lines shall be mounted on the upper half pump casing. Sealing from an external source shall be possible for lubrication and/or cooling.
10. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pump and motors shall be factory aligned, and shall be realigned after installation by the manufacturer's representative. Motors shall be non-overloading at any point on the pump curve and shall meet NEMA specifications and conform to the standards outlined in EPACT 92.
11. Base plate shall be of structural steel or fabricated steel channel with fully enclosed sides and ends, and securely welded cross members. Grouting area shall be fully open. The combined pump and motor base plate shall be sufficiently stiff as to limit the susceptibility of vibration. The minimum base plate stiffness shall conform to ANSI/HI 1.3.4-1997 for Horizontal Baseplate Design standards.
12. Base shall be capable of being field grouted.
13. The pump(s) selected shall conform to ANSI/HI 9.6.3.1 standards for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pump NPSH shall conform to the ANSI/HI 9.6.1-1997 standards for Centrifugal and Vertical Pumps for NPSH Margin.
14. Pump rotation shall be righthand or lefthand as viewed from the pump end.
15. Pump manufacturer shall be ISO-9001 certified.
16. The seismic capability of the pump shall allow it to withstand a horizontal load of 0.5g, excluding piping and/or fasteners used to anchor the pump to mounting pads or to the floor, without adversely affecting pump operation.
17. Each pump shall be factory hydrostatically tested per Hydraulic Institute standards and name-plated before shipment. It shall then be thoroughly cleaned and painted with at least one coat of high-grade paint prior to shipment.
18. Pumps shall be Series HSC-S as manufactured by ITT Bell and Gossett or approved equal.

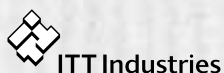
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