TECHNICAL HANDBOOK A9

Heavy Duty ASME B73.1

WILFLEY®

Wilfley Sealing Technology

No Flush Water Required

WILFLEY SEALING TECHNOLOGY

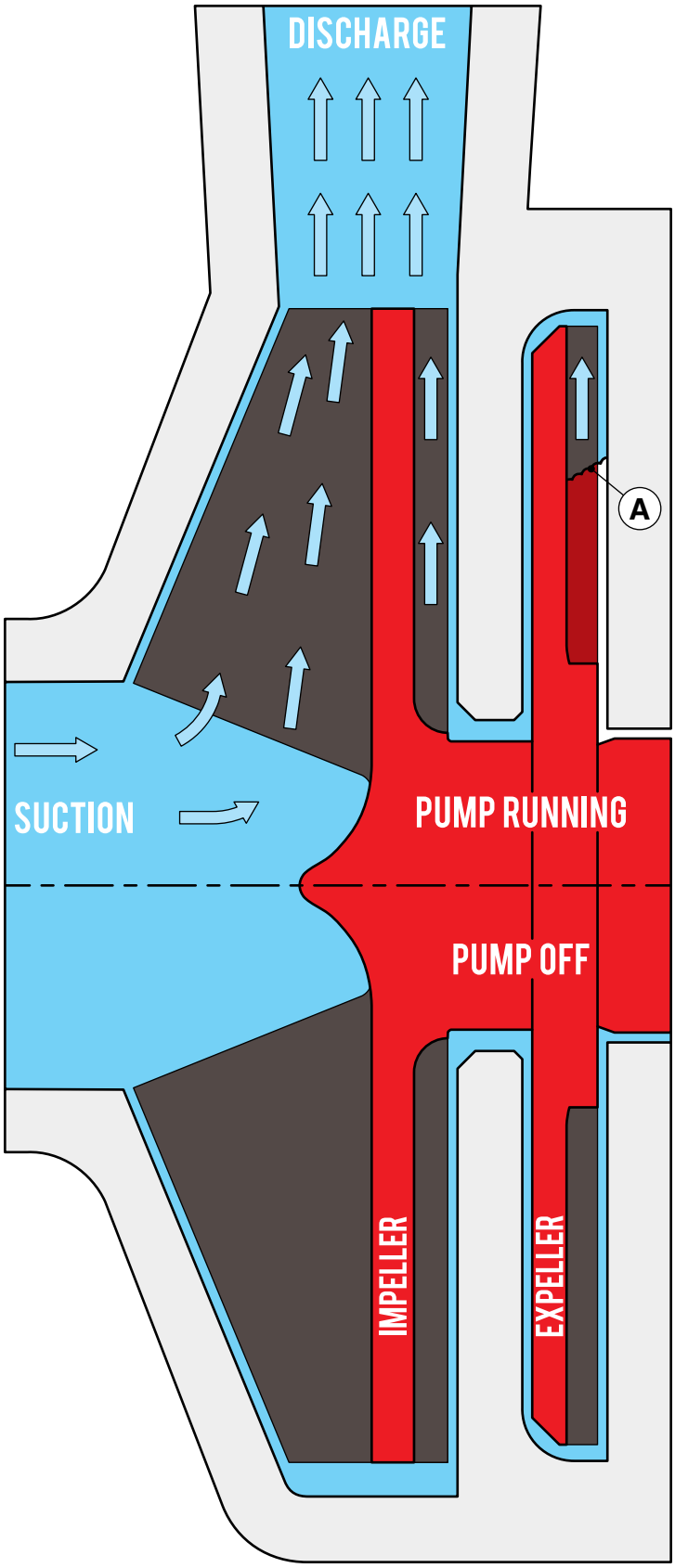
Wilfley Sealing Technology is the premier sealing solution for the toughest pumping applications and has proven to be a superior alternative to conventional sealing systems like mechanical seals and compression packing. It has been the foundation for every Wilfley pump design, dating back to the ground-breaking Model A slurry pump in 1919.

Wilfley Sealing Technology provides **leak free** operation at all times by partnering a dynamic seal (page 2) with a static seal (page 3). The dynamic seal prevents leakage while the pump is running and the static seal prevents leakage while the pump is off.

The harmony between the dynamic and static seal is what makes Wilfley Sealing Technology excel beyond conventional seals.

Wilfley Expellers

WILFLEY DYNAMIC EXPELLER SEAL



FEATURES & BENEFITS:

- A superior alternative to mechanical seals and associated flush systems
- Inherently safe without gland packing or frictional heat
- Product dilution is eliminated
- Operational abuse tolerant, e.g. cavitation and vibration
- Reduces maintenance costs and maximizes production time through increased mean time between maintenance (MTBM)
- Excellent solids handling capabilities
- Intermittent dry running capability

HOW THE WILFLEY DYNAMIC EXPELLER SEAL WORKS:

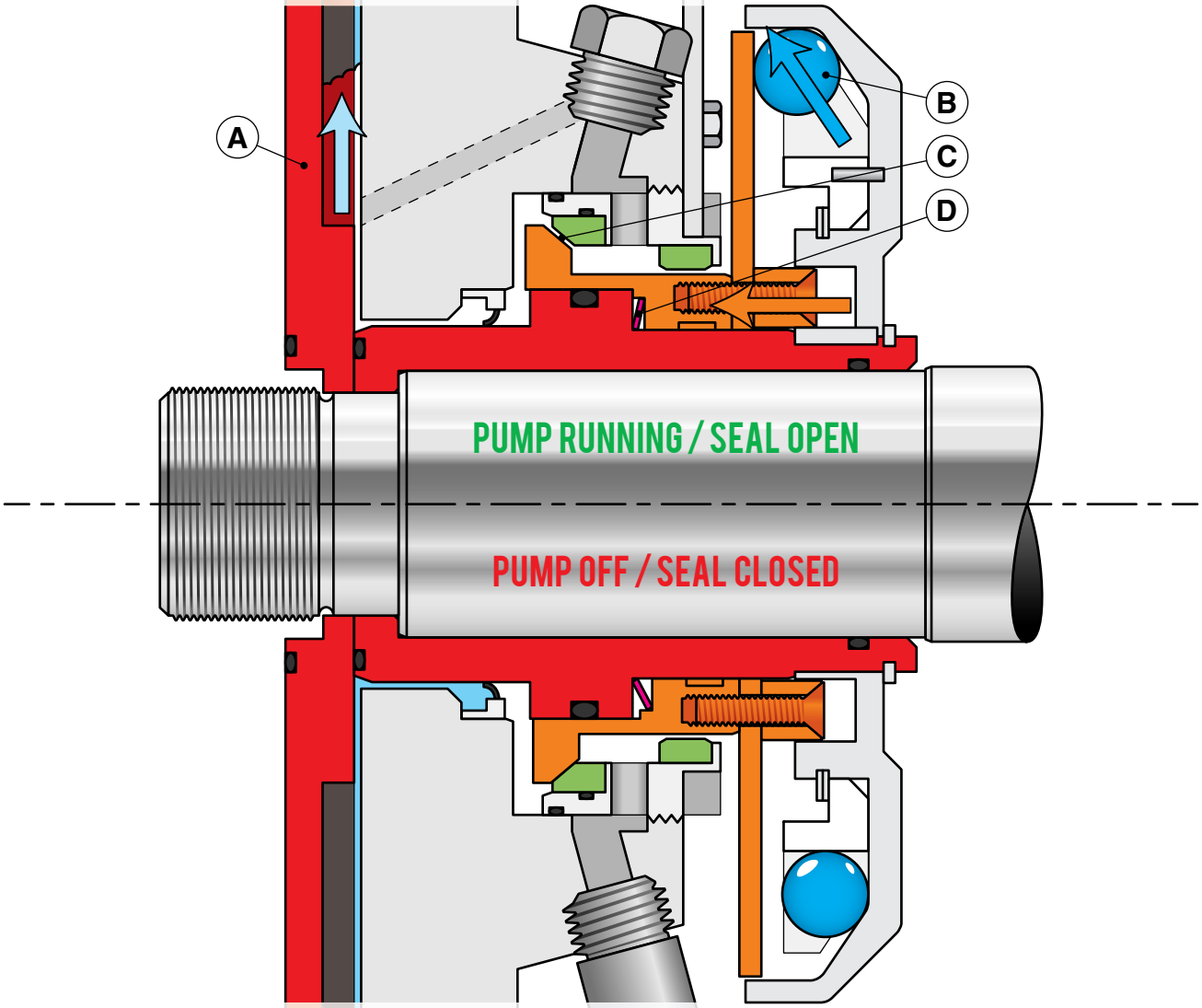
- A liquid interface **(A)** is established during pump operation by centrifugal forces generated by the expeller
- This liquid interface effectively isolates the pumped fluid from the shaft
- The DryLock® 2 static seal prevents any leakage when the pump isn't in operation

DryLock® 2 STATIC SEAL

HOW THE DryLock® 2 SEAL WORKS:

At start up, the expeller **(A)** establishes a liquid interface that pulls the pumped fluid away from the seal faces. As this happens, centrifugal force moves balls **(B)** outwards to open seal faces **(C)** and prevent any rubbing contact.

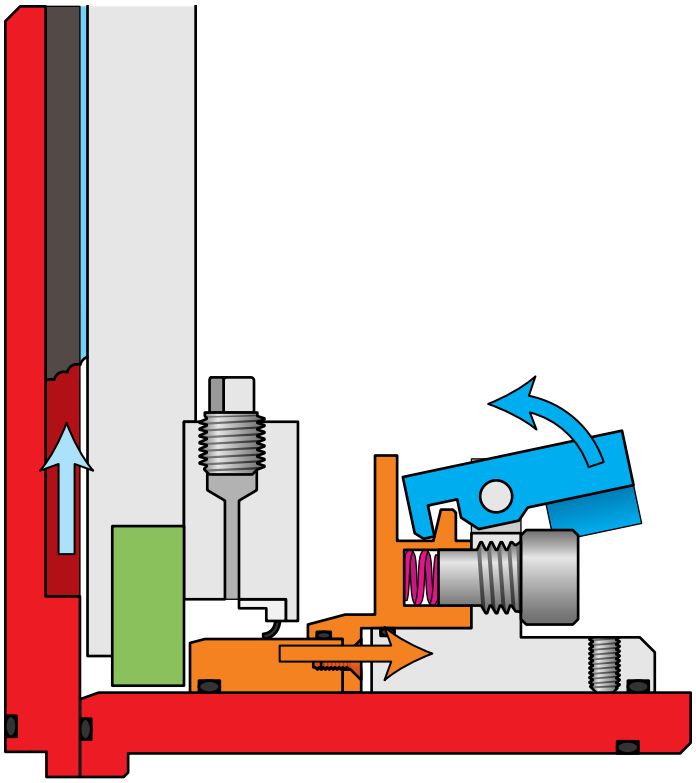
At shut down, the liquid interface collapses and the pumped fluid is pushed towards the seal faces. An isolated wave spring **(D)** forces the seal faces to close before any of the pump fluid can escape.



FEATURES & BENEFITS:

- **Leak free operation** - Small precise seal opening allows for rapid seal actuation
- **Reliable and repeatable static seal actuation** - The quantity of balls is specifically set for your application
- **Easy to install / maintain** - Simple and effective design, no special tools needed

SolidLock® STATIC SEAL



A TOUGH GOVERNOR-ACTUATED STATIC SEAL THAT IS IDEAL FOR:

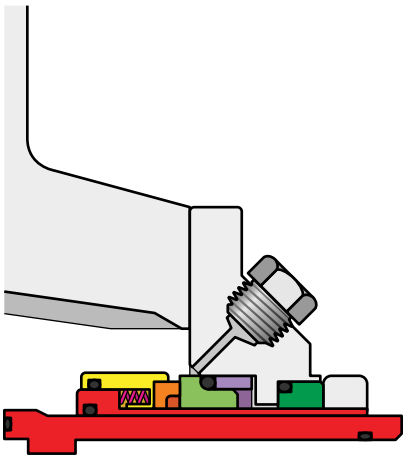
- Acid slurries
- Crystallizing liquids
- Efflorescents

FEATURES & BENEFITS

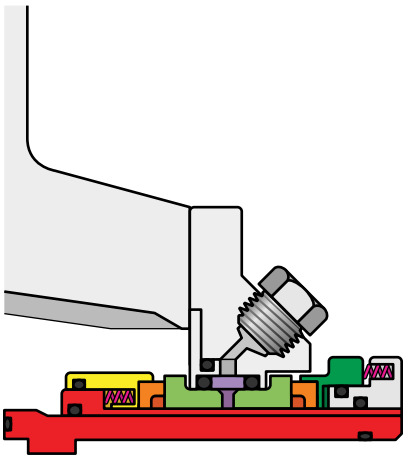
- Leak free operation
- Reliable and repeatable static seal actuation
- Heavy duty components for increased seal life
- Simple maintenance-friendly design
- Field adjustable

SEALING OPTIONS

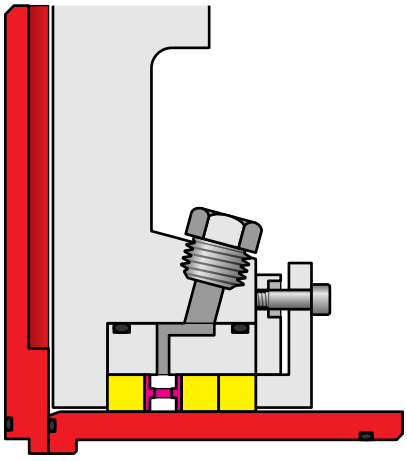
THE MODEL A9 CAN ALSO ACCOMMODATE A WIDE RANGE OF SEALING OPTIONS



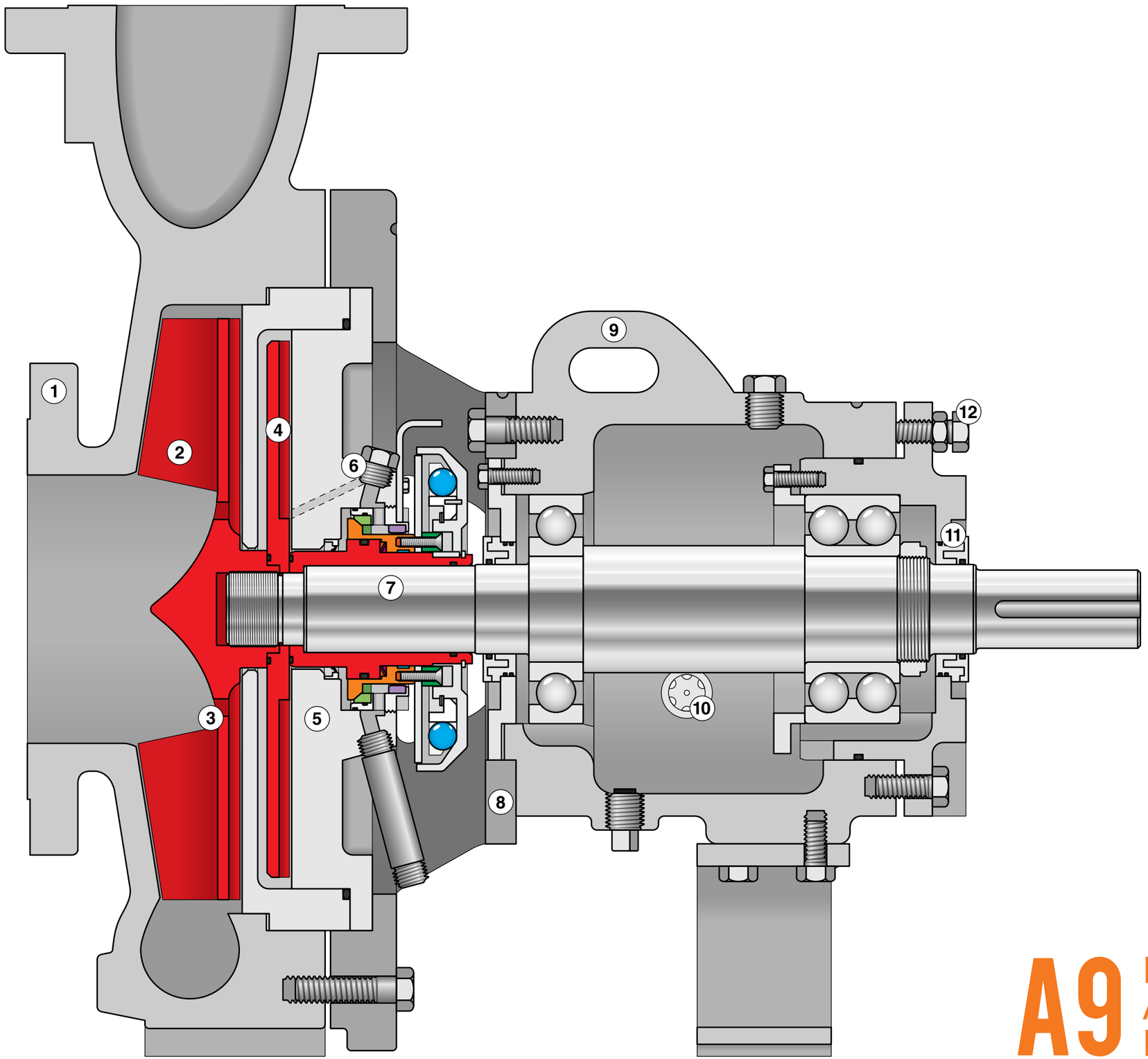
Single Mechanical Seals



Double Mechanical Seals



Expeller with Packing



MODEL A9 FEATURES & BENEFITS

WET END

1. Heavy duty case design with 150 lb. flanges (300 lb. flanges available)
2. Comprehensive hydraulics available to meet your needs
3. Pressure / temperature balance holes

SEALING

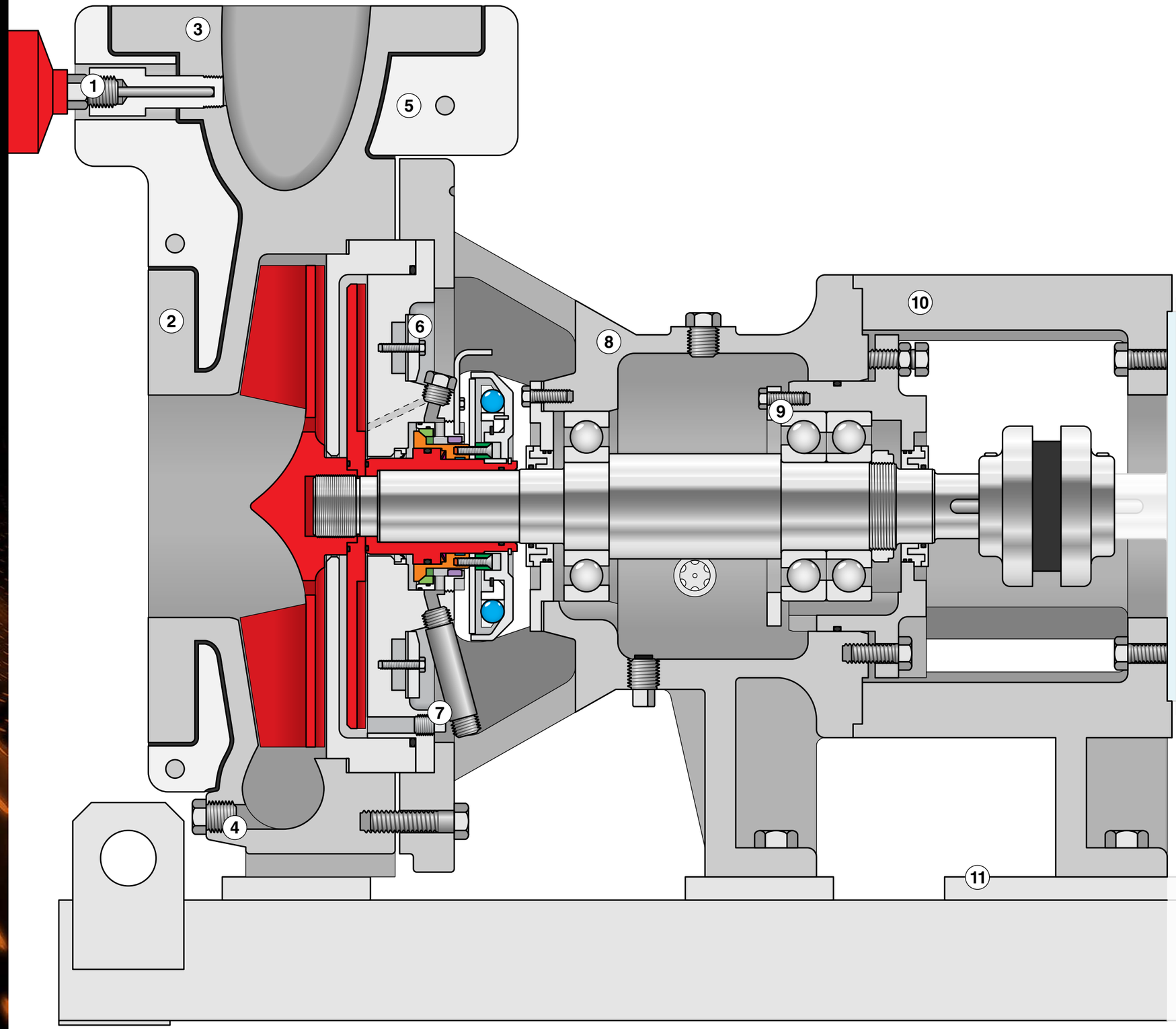
4. Opti-expeller provides superior dynamic sealing with zero operational leakage
5. DryLock® 2 seal engineered for reliable static sealing
6. Expeller / seal wash out capability
7. Robust shaft with **low** L^3/D^4 ratios minimizes deflections and increases seal life and reliability

Other sealing options available including mechanical seals and packing

POWER END

8. Frame bracket designed to protect bearing unit from pumpage (duplex stainless steel optional)
9. Convenient lifting point
10. Large sight glasses on both sides to easily verify oil level
11. 303SS labyrinth seals prevent oil contamination
12. Easy clearance adjustments via external adjustment bolts

A9 HEAVY DUTY ASME B73.1 PROCESS PUMP



MODEL A9 OPTIONS

WET END

1. Dry thermowell at casing discharge
2. 300 lb. flanges
3. Flat face flanges
4. Casing drain
5. Casing steam jacket

Recessed (vortex) impeller (not shown)

Barske impeller (not shown)

DIN flanges (not shown)

Suction / discharge pressure gauge taps (not shown)

SEALING

6. Seal housing steam jacket
7. Expeller cavity drain

Dry thermowell at seal housing (not shown)

Dry thermowell at expeller cavity (not shown)

POWER END

8. One-piece bearing frame
9. Extreme duty bearings
10. C-face adapter

Dry thermowell at bearing housing (not shown)

Condition monitoring (not shown)

BASE PLATE

11. Fabricated base plate

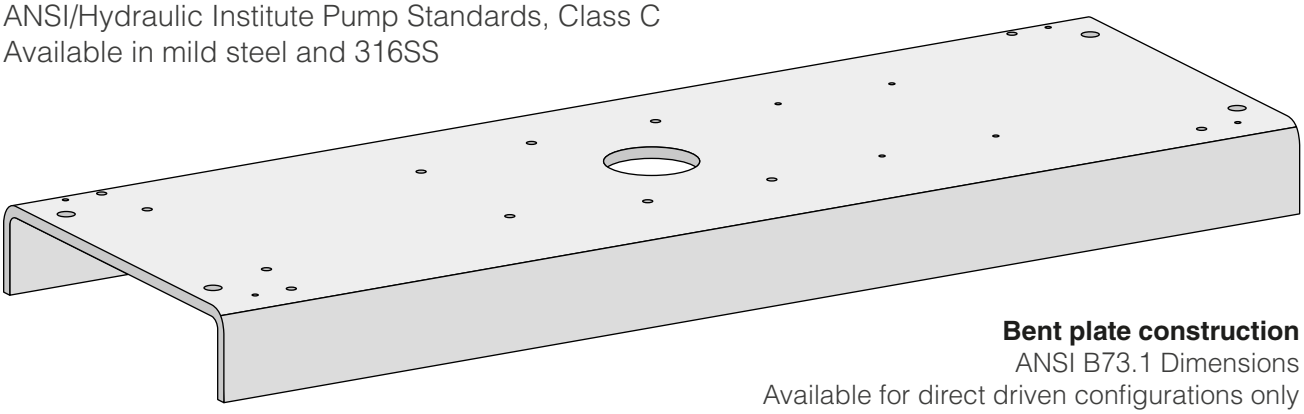
Channel base plate (not shown)

Non-metallic base plate (not shown)

BASE PLATE OPTIONS

CHANNEL

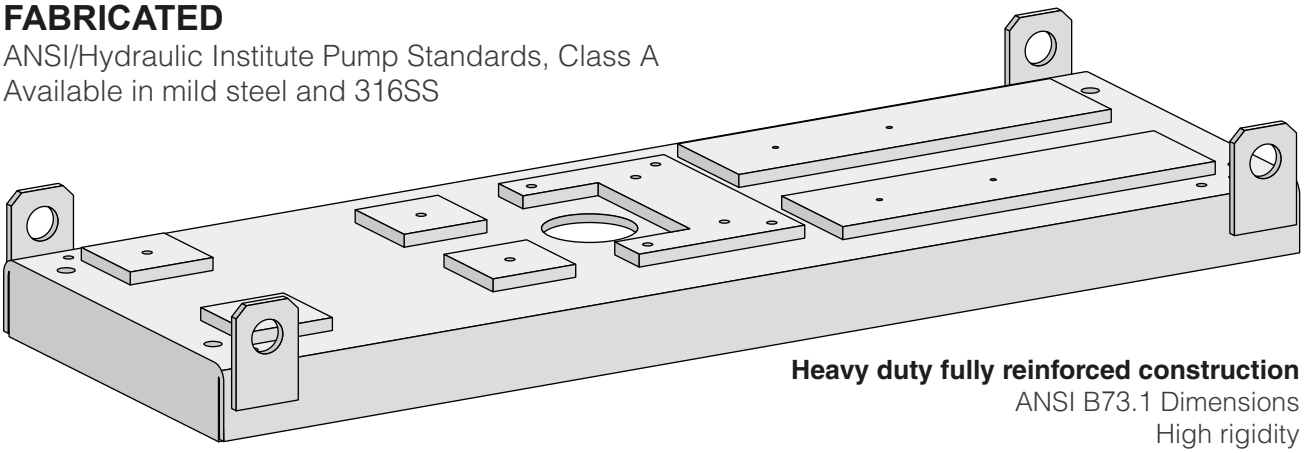
ANSI/Hydraulic Institute Pump Standards, Class C
Available in mild steel and 316SS



Bent plate construction
ANSI B73.1 Dimensions
Available for direct driven configurations only

FABRICATED

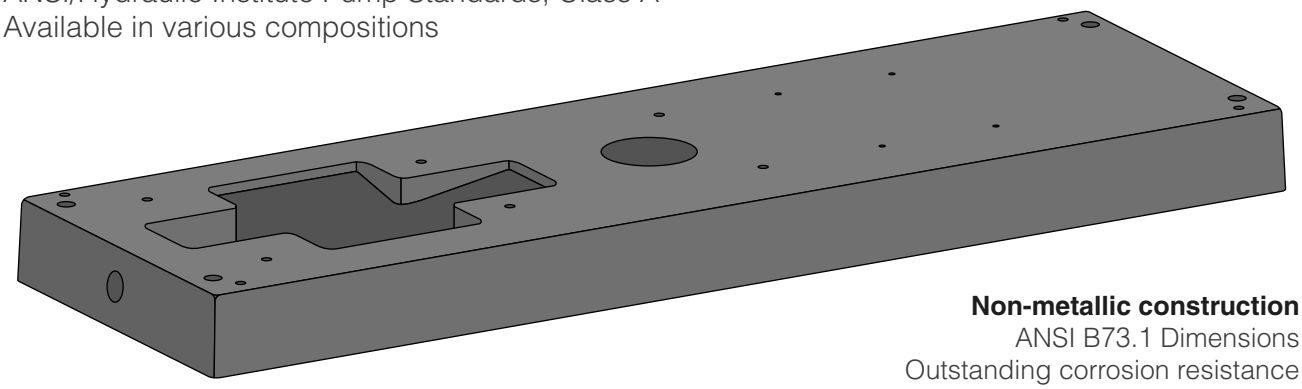
ANSI/Hydraulic Institute Pump Standards, Class A
Available in mild steel and 316SS



Heavy duty fully reinforced construction
ANSI B73.1 Dimensions
High rigidity
Available for direct and overhead belt driven configurations

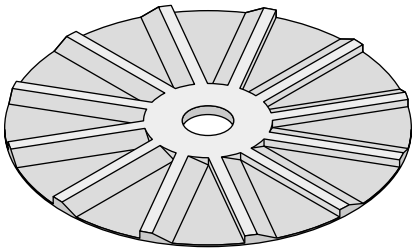
NON-METALLIC

ANSI/Hydraulic Institute Pump Standards, Class A
Available in various compositions



Non-metallic construction
ANSI B73.1 Dimensions
Outstanding corrosion resistance
Superior vibration damping
Available for direct and overhead belt driven configurations

WILFLEY OPTI-EXPELLER

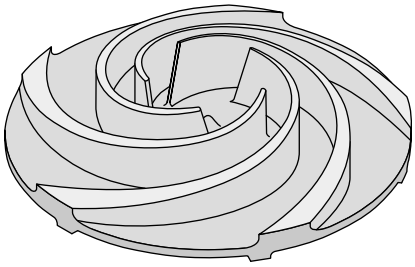


THE OPTI-EXPELLER IS THE LATEST GENERATION OF THE WILFLEY EXPELLER

- Increased intake head capability
- Less horsepower consumption
- Solids handling capability

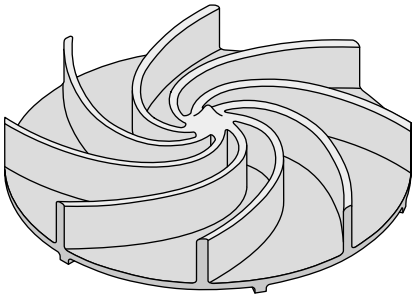
MODEL A9 IMPELLER OPTIONS

STANDARD



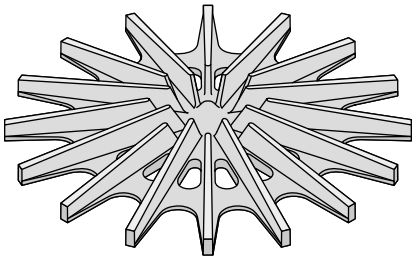
Robust impeller
for difficult solutions

RECESSED (VORTEX)



For solutions with larger
particle sizes or fibers

BARSKE



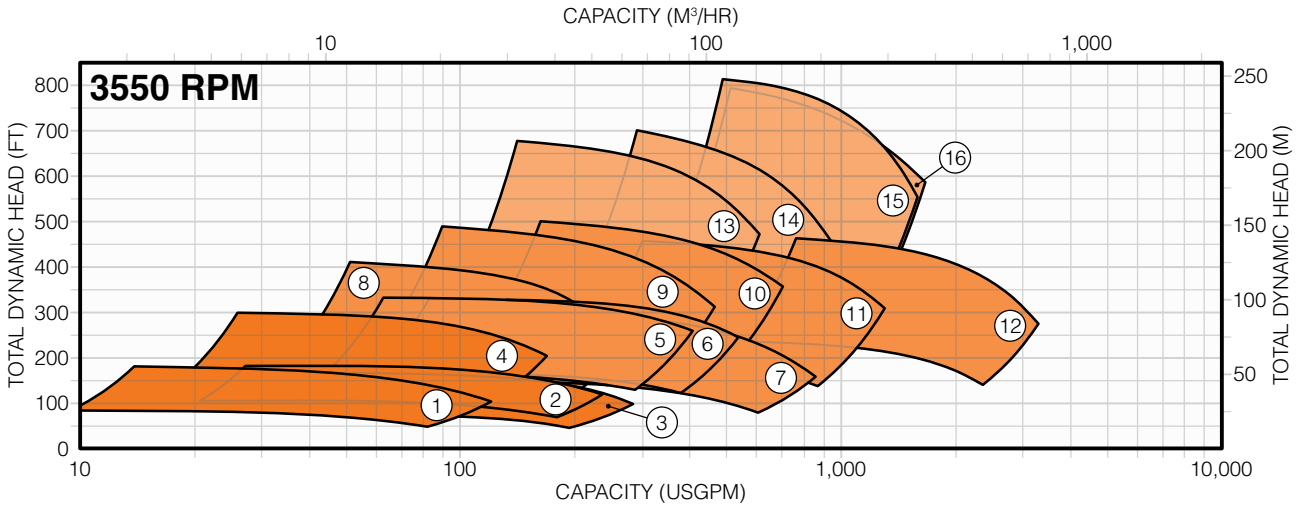
For low-flow high-head
applications

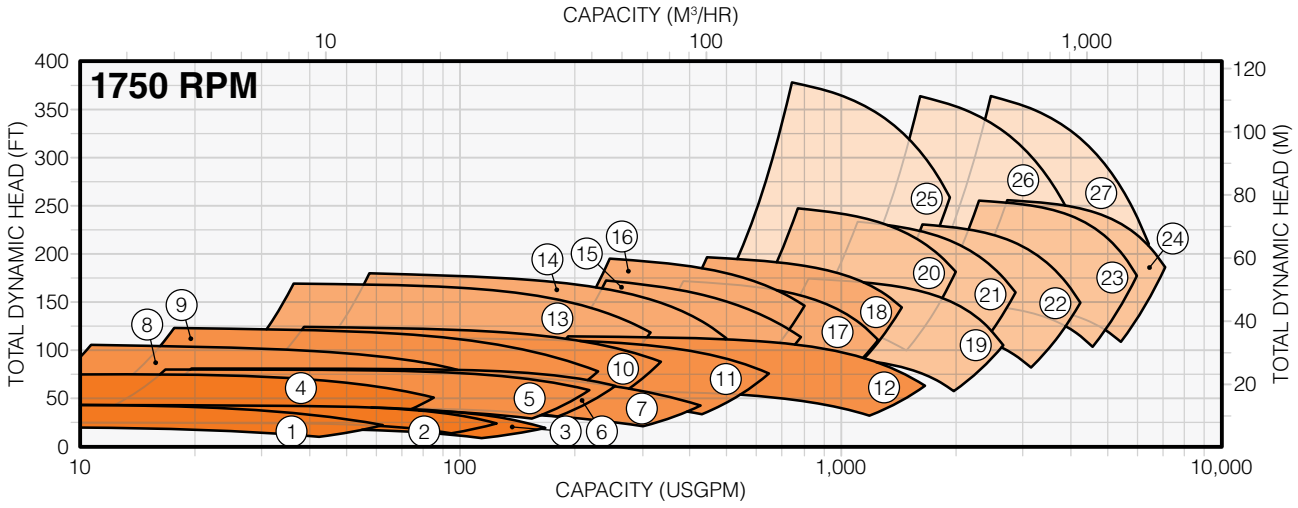
MODEL A9 SHAFT

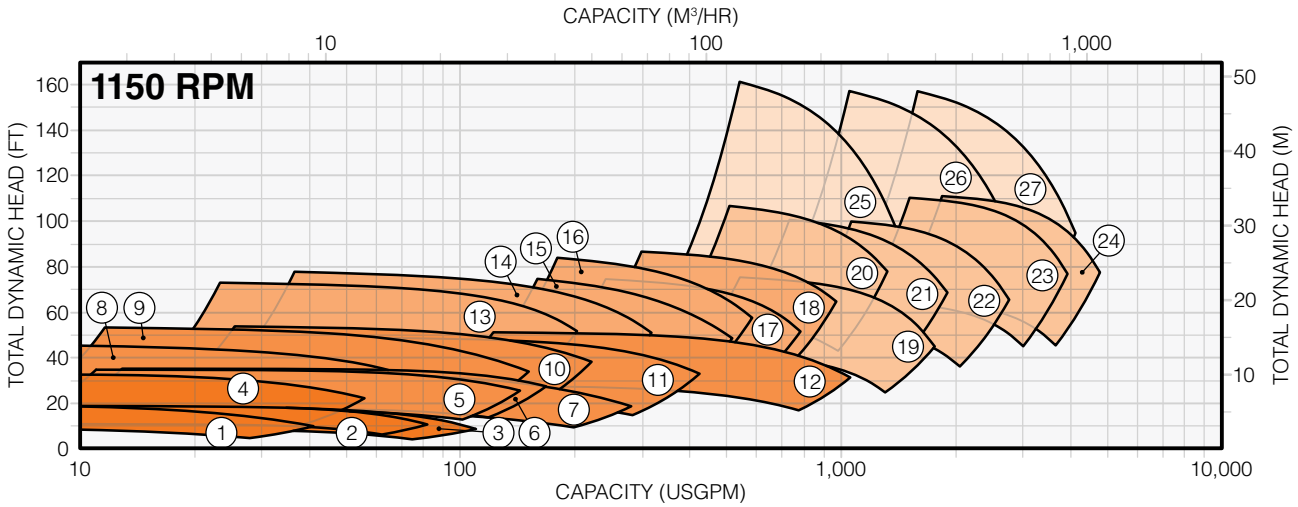
THE MODEL A9 HAS ONE OF THE STRONGEST SHAFTS IN THE INDUSTRY WITH INCREDIBLY LOW L^3/D^4 STIFFNESS RATIOS

FRAME 1	FRAME 2	FRAME 3	FRAME 4	FRAME 5
68	62	28	17	14

WILFLEY MODEL A9 CAPACITIES







FRAME 1

1. 1.5x1-6
2. 3x1.5-6
3. 3x2-6
4. 1.5x1-8

FRAME 2

5. 3x1.5-8
6. 3x2-8
7. 4x3-8
8. 2x1-10
9. 3x1.5-10
10. 3x2-10
11. 4x3-10
12. 6x4-10

FRAME 3

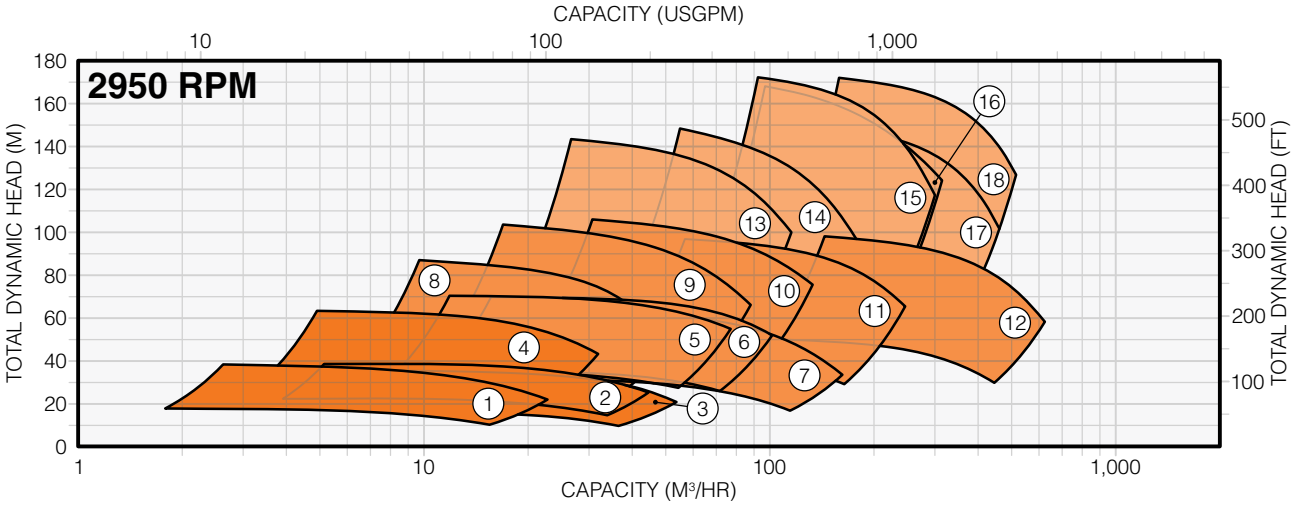
13. 3x1.5-13
14. 3x2-13
15. 4x3-13
16. 4x3-13H
17. 6x4-13
18. 6x4-13H

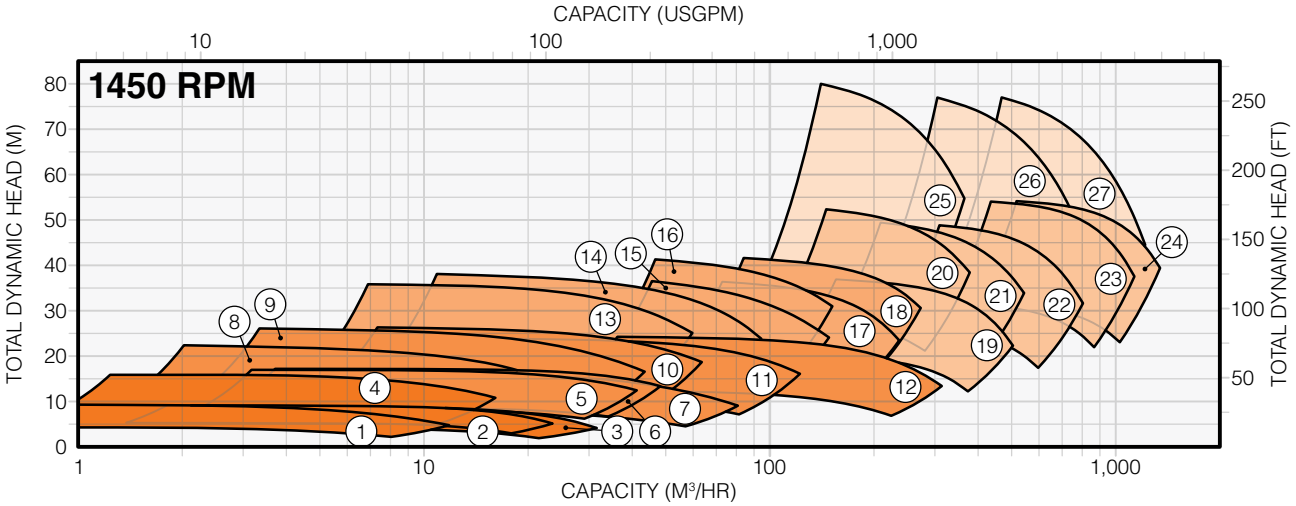
FRAME 4

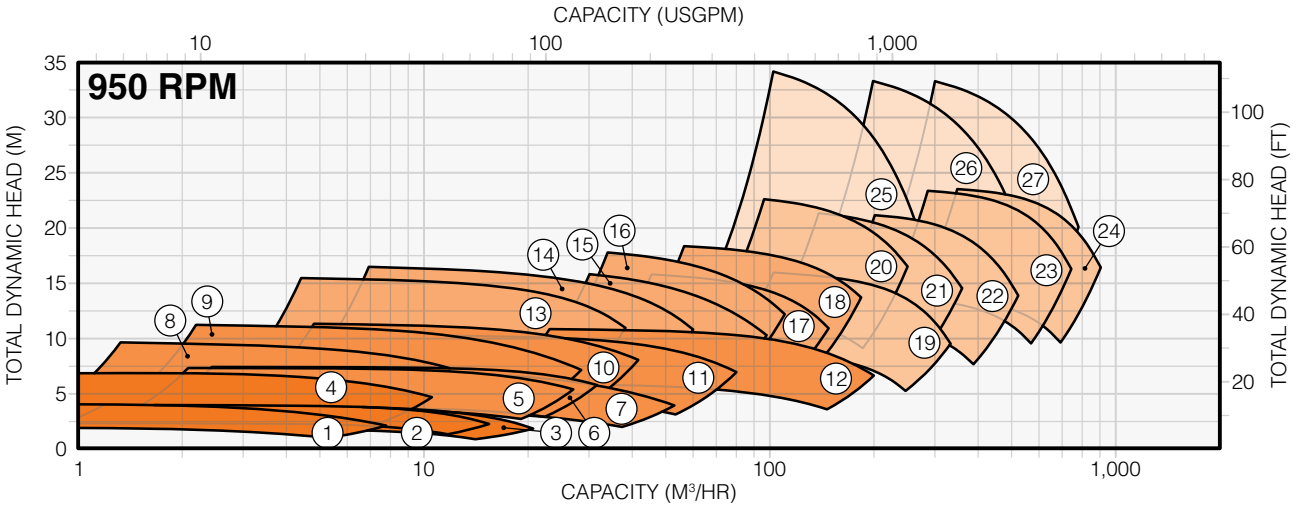
19. 8x6-13
20. 6x4-15
21. 8x6-15
22. 8x6-15H
23. 10x8-17
24. 10x8-17H

FRAME 5

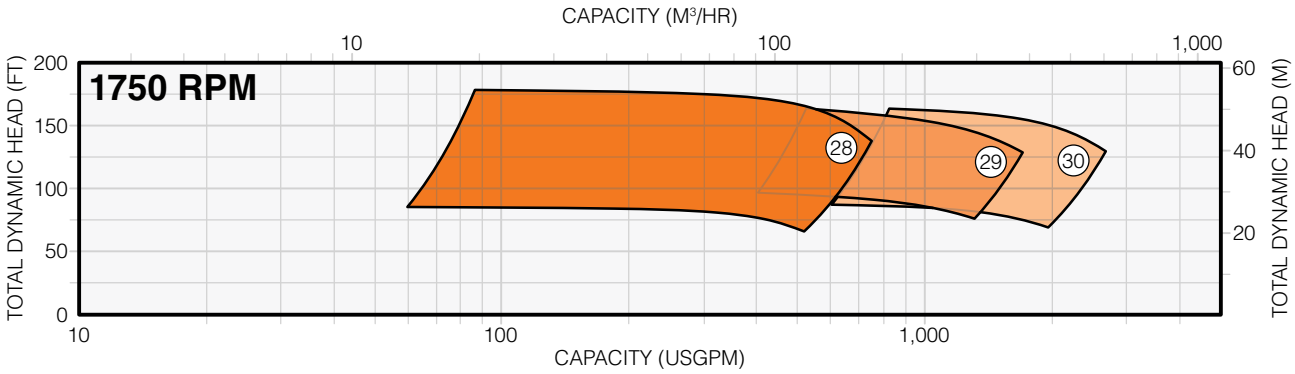
25. 6x4-19
26. 8x6-19
27. 10x8-19

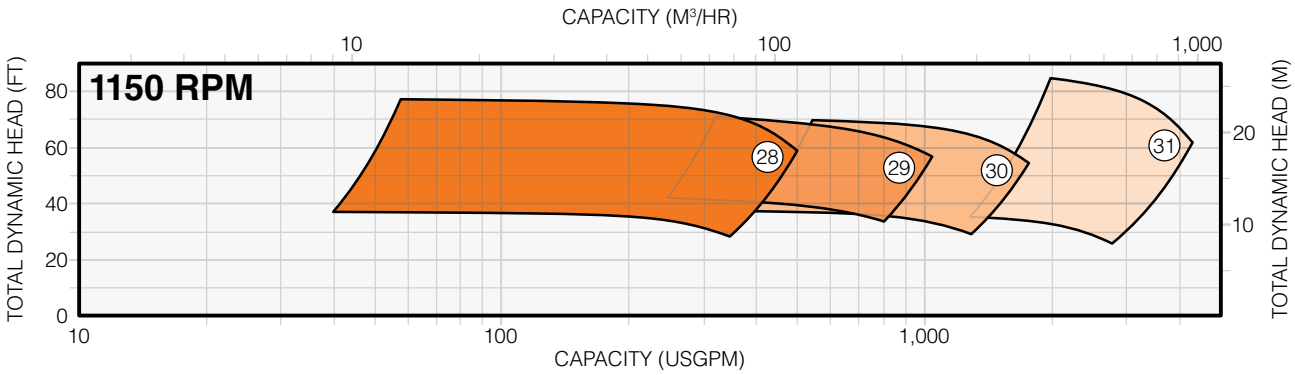


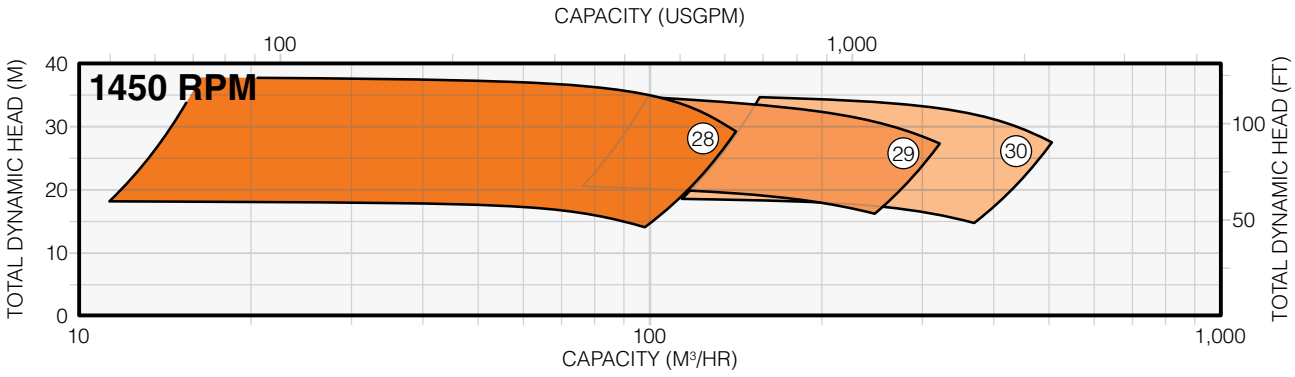


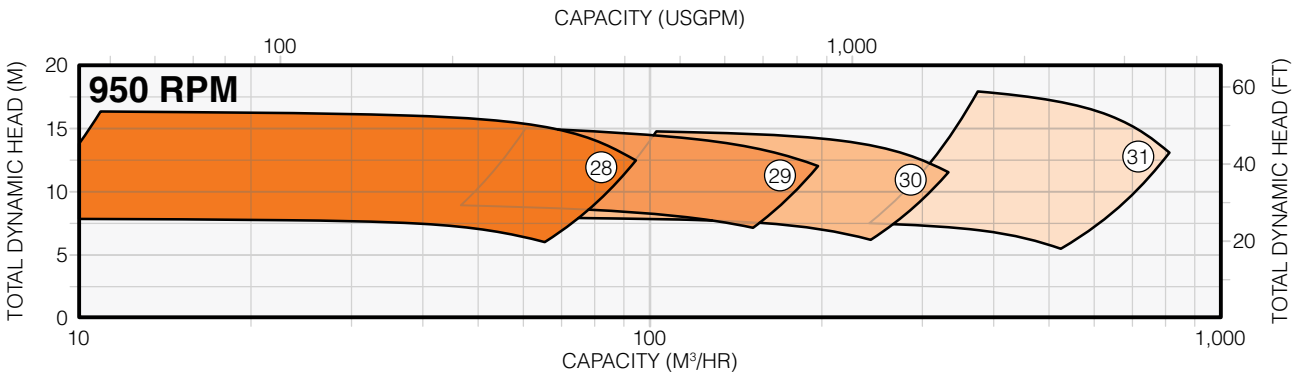


MODEL A9 RECESSED (VORTEX) CAPACITIES

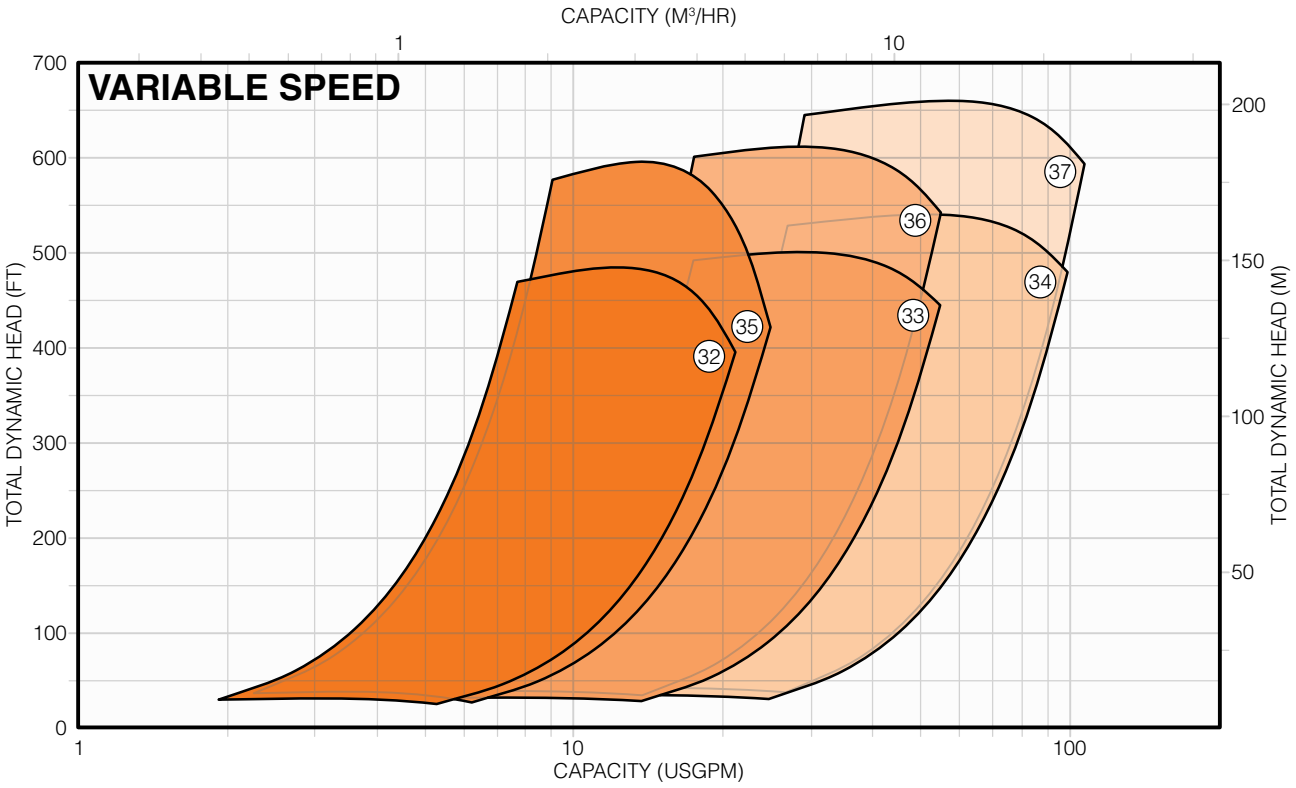








MODEL A9 LOW-FLOW HIGH-HEAD CAPACITIES

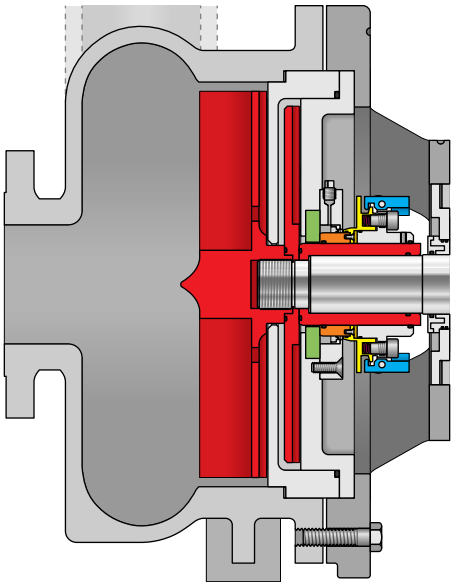


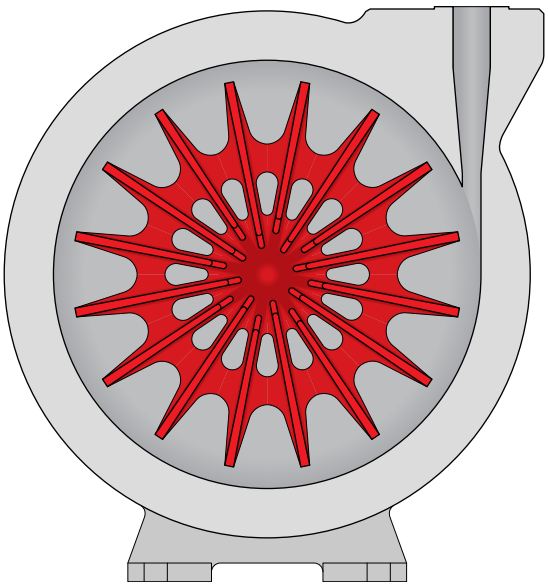
A9R – RECESSED (VORTEX)

28. 2.5x2-13
29. 4x4-13
30. 6x6-13
31. 10x10-16

A9LF – LOW-FLOW HIGH-HEAD

32. 2x1-9 A
33. 2x1-9 B
34. 2x1-9 C
35. 2x1-10 A
36. 2x1-10 B
37. 2x1-10 C





MATERIALS

Wilfley works discreetly with key suppliers, such as Western Foundries, to provide a variety of engineered metallurgies and proprietary processes for the longest possible pump and parts life and reliability.

WILFLEY KNOWS METALLURGY

Some of Wilfley's most recent innovations include:

WCD4™ - better corrosion / erosion resistance than conventional CD4MCuN

Alloy C Max - better corrosion resistance than CW2M

MAXALLOY® 5 - a machinable 27% chrome hard iron with an average hardness of 645 HBN

Item Name	STANDARD MATERIALS					
	Ductile Iron	304L	316L	Alloy 20	CD4MCuN	WCD4™
WET END						
Cap Screws	18-8					
Case Gasket	Gylon®					
Case Plate	Ductile Iron	304L	316L	Alloy 20	CD4MCuN	WCD4™
Casing	Ductile Iron	304L	316L	Alloy 20	CD4MCuN	WCD4™
Expeller	Ductile Iron	304L	316L	Alloy 20	CD4MCuN	WCD4™
Impeller	Ductile Iron	304L	316L	Alloy 20	CD4MCuN	WCD4™
O-rings	Viton® (Kalrez®, Teflon-Coated Viton®, EPDM Optional)					
SEAL						
DryLock® 2	CD4MCuN	304L	316L	Alloy 20	CD4MCuN	WCD4™
POWER END						
Bearing Frame	Ductile Iron					
Bearing Locknut	Steel					
Frame Bracket	Ductile Iron (CD4MCuN Optional)					
Frame Foot	Ductile Iron					
Inboard Bearing	Single-Row Deep Groove					
Inboard Bearing Cover	316SS					
INPRO® VBXS Oil Seal	303SS					
Oil Sight Glass	Glass/Steel					
O-rings	Viton®					
Outboard Bearing	Double-Row Deep Groove (2x Single-Row Angular Contact Optional)					
Shaft	SAE4140 (316SS, Nitronic 50, Ferralium 255 Optional)					

CONSTRUCTION DETAILS

		FRAME 1				FRAME 2							
		1.5x1-6 AA-6	3x1.5-6 AB-6	3x2-6 AC-6	1.5x1-8 AA-8	3x1.5-8 A50-8	3x2-8 A60-8	4x3-8 A70-8	2x1-10 A05-10	3x1.5-10 A50-10	3x2-10 A60-10	4x3-10 A70-10	6x4-10 A80-10
GENERAL													
Pump Weight	lbs	145	150	170	145	305	315	325	290	295	310	335	420
	kg	66	68	77	66	138	143	147	132	134	141	152	190
Max. Solids Size	in	0.188	0.25	0.25	0.313	0.25	0.25	0.375	0.25	0.375	0.375	0.375	0.375
	mm	5	6	6	8	6	6	10	6	10	10	10	10
SHAFT													
Diameter at Impeller	in	1				1.25							
	mm	25				32							
Diameter at Coupling	in	0.875				1.125							
	mm	22				29							
BEARINGS													
Heavy Duty	Radial	6308				6311							
	Thrust	5208A				5310A							
Extreme Duty	Radial	N/A				6311							
	Thrust	N/A				7310BECB							

		FRAME 3				FRAME 4			
		3x1.5-13 A20-13	3x2-13 A30-13	4x3-13 / H A40-13	6x4-13 / H A80-13	8x6-13 A90-13	6x4-15 A105-15	8x6-15 / H A110-15	10x8-17 / H A120-17
GENERAL									
Pump Weight	lbs	480	490	490	520	960	710	1,100	1,250
	kg	218	222	222	236	435	322	499	567
Max. Solids Size	in	0.25	0.375	0.375	0.375	0.5	0.5	0.5	0.5
	mm	6	10	10	10	13	13	13	13
SHAFT									
Diameter at Impeller	in	1.625				2.25			
	mm	41				57			
Diameter at Coupling	in	1.625				2.375			
	mm	41				60			
BEARINGS									
Heavy Duty	Radial	6312				6319			
	Thrust	5312A				7319BECB			
Extreme Duty	Radial	21312E				21319E			
	Thrust	7312BECB				7319BECB			

		FRAME 5			LOW FLOW		RECESSED			
		6x4-19 -	8x6-19 -	10x8-19 -	2x1-9 -	2x1-10 -	2.5x2-13 -	4x4-13 -	6x6-13 -	10x10-16 -
GENERAL										
Pump Weight	lbs	1,390	1,455	1,650	240	240	680	870	1,025	2,190
	kg	630	660	748	109	109	308	395	465	993
Max. Solids Size	in	0.5	0.5	0.5	0.188	0.188	1	1	1	1
	mm	13	13	13	5	5	25	25	25	25
SHAFT										
Diameter at Impeller	in	2.375			1		1.625			2.25
	mm	60			25		41			57
Diameter at Coupling	in	2.875			0.875		1.625			2.375
	mm	73			22		41			60
SHAFT										
Heavy Duty	Radial	N/A			6308		6312			6319
	Thrust	N/A			5208A		5312A			7319BECB
Extreme Duty	Radial	21319E			N/A		21312E			21319E
	Thrust	7319BECB			N/A		7312BECB			7319BECB

DIMENSIONS

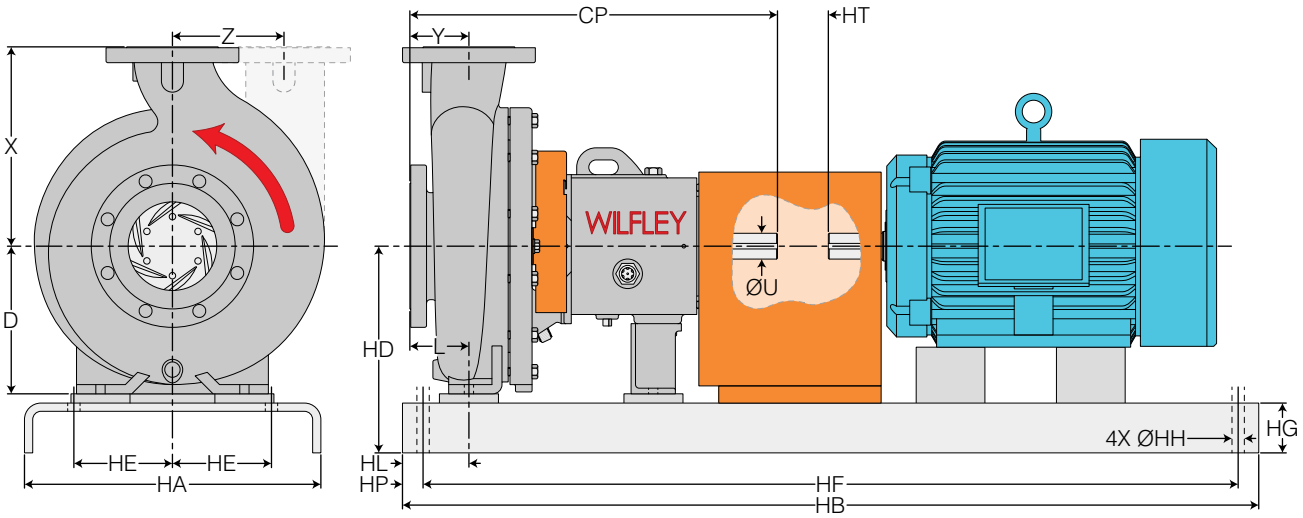
PUMP DIMENSIONS

Dimensions in inches (millimeters)

Pump Size	CP	D	L	U	X	Y	Z	KEYWAY
FRAME 1								
1.5x1-6 (AA-6)	17.5 (445)	5.25 (133)	4 (102)	0.88 (22)	6.5 (165)	4 (102)	-	0.19 x 0.09 (5 x 2)
3x1.5-6 (AB-6)					6.5 (165)			
3x2-6 (AC-6)					6.5 (165)			
1.5x1-8 (AA-8)					6.5 (165)			
2x1-9 (A,B,C)	16.45 (418)	8.25 (210)	3.3 (84)		7.19 (183)	A = 3.02 (77) B = 2.96 (75) C = 2.89 (73)	5 (127)	
2x1-10 (A,B,C)							5.5 (140)	
FRAME 2								
3x1.5-8 (A50-8)	23.5 (597)	8.25 (210)	4 (102)	1.13 (29)	8.5 (216)	4 (102)	-	0.25 x 0.13 (6 x 3)
3x2-8 (A60-8)					9.5 (242)			
4x3-8 (A70-8)					11 (280)			
2x1-10 (A05-10)					8.5 (216)			
3x1.5-10 (A50-10)					8.5 (216)			
3x2-10 (A60-10)					9.5 (242)			
4x3-10 (A70-10)					11 (280)			
6x4-10 (A80-10)		10 (254)			13.5 (343)			
FRAME 3								
3x1.5-13 (A20-13)	23.5 (597)	10 (254)	4 (102)	1.63 (41)	10.5 (266)	4 (102)	-	0.25 x 0.13 (6 x 3)
3x2-13 (A30-13)					11.5 (292)			
4x3-13 / H (A40-13)					12.5 (318)			
6x4-13 / H (A80-13)					13.5 (343)			
2.5x2-13	25.25 (641)		5.75 (146)		10 (254)	4 (102)	6.75 (171)	
4x4-13	27.5 (699)		8 (203)		12.5 (318)	4.63 (117)	6.13 (156)	
6x6-13	32 (813)		12.5 (318)		16 (406)	6 (152)	7 (178)	
FRAME 4								
8x6-13 (A90-13)	33.88 (860)	14.5 (368)	6 (152)	2.38 (60)	16 (406)	6 (152)	-	0.63 x 0.31 (16 x 8)
6x4-15 (A105-15)					16 (406)			
8x6-15 / H (A110-15)					18 (457)			
10x8-17 / H (A120-17)					19 (483)			
10x10-16	45.5 (1156)		17.64 (448)		18.75 (476)	9 (229)	8.5 (216)	
FRAME 5								
6x4-19	33.88 (860)	17.5 (445)	16.25 (413)	2.88 (73)	16.25 (413)	6.25 (159)	12 (305)	0.75 x 0.38 (19 x 10)
8x6-19	34.5 (876)	17.5 (445)	16.25 (413)		16.25 (413)	6.58 (167)	12 (305)	
10x8-19	35.38 (899)	20.5 (521)	16.38 (416)		16.38 (416)	7.44 (189)	14.37 (365)	

These dimensions are not for construction. Certified dimension prints are available for your specific installation

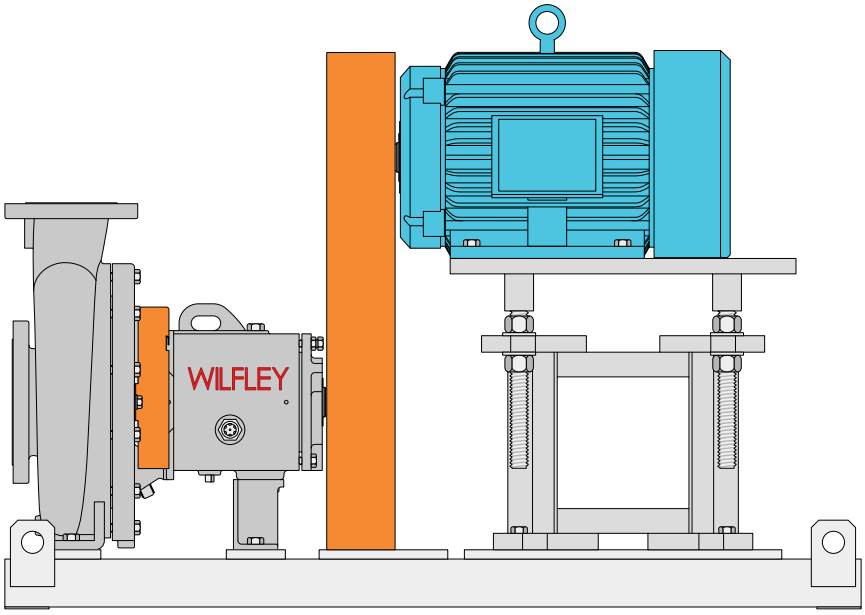
Flanges are drilled to match ASME B16.5 150lbs.



BASE DIMENSIONS

Dimensions in inches (millimeters)

Base	NEMA Motor	IEC Motor	HA	HB	HD (MAX)	HE	HF	HG	HH	HL	HP	HT (MIN)
FRAME 1												
139	143T-184T	80M-90L	15 (381)	39 (991)	9 (229)	4.5 (114)	36.5 (927)	3.63 (92)	0.75 (19)	4.5 (114)	1.25 (32)	3.5 (89)
148	213T-256T	132M-160L	18 (457)	48 (1219)	10.5 (267)	6 (152)	45.5 (1156)	4 (102)				
153	284TS-326TS	180M-180L	21 (533)	53 (1346)	12.88 (327)	7.5 (191)	50.5 (1283)	4 (102)				
FRAME 2 / 3												
245	143T-184T	100L-132M	15 (381)	45 (1143)	13.75 (349)	4.5 (114)	42.5 (1080)	3.63 (92)	0.75 (19)	4.5 (114)	1.25 (32)	3.5 (89)
252	213T-215T	160M-180L	18 (457)	52 (1321)	14.13 (359)	6 (152)	49.5 (1257)	4 (102)				
258	254T-286T	200L	21 (533)	58 (1473)	14.75 (375)	7.5 (191)	55.5 (1410)	4 (102)	1 (25)			
264	324TS-365T	225S-225M	21 (533)	64 (1626)	14.75 (375)	7.5 (191)	61.5 (1562)	4 (102)				
268	404T-405TS	250M	26 (660)	68 (1727)	14.88 (378)	9.5 (241)	65.5 (1664)	4.25 (108)				
280	405T-449TS	280S-280M	26 (660)	80 (2032)	15.88 (403)	9.5 (241)	77.5 (1969)	4.25 (108)				
FRAME 4												
368	284T-286T	180L	26 (660)	68 (1727)	19.25 (489)	9.5 (241)	65.5 (1664)	4.25 (108)	1 (25)	6.5 (165)	1.25 (32)	3.5 (89)
380	324T-405T	200L-250M		80 (2032)			77.5 (1969)					
398	444T-449TS	280S-315L		98 (2489)			95.5 (2426)					
FRAME 5												
-	324T-405TS	200L-250M	37.7 (958)	85.7 (2177)	24.38 (619)	15 (381)	77.7 (1974)	6.88 (175)	1.13 (29)	11.75 (298)	4 (102)	5.5 (140)
-	444T-449TS	280S-315L	37.7 (958)	100.7 (2558)	24.38 (619)	15 (381)	92.7 (2355)					
-	444T-449TS	280S-315L	47.3 (1201)	100.7 (2558)	27.38 (695)	18 (457)	92.7 (2355)					



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