Catalog 1301-001
Section: 1301
Effective: May 2016
Replaces: January 2009

System One® Technical Reference Catalog

Heavy-Duty Process Centrifugal Pumps

Industry Standard for Reliability

- High-strength, low maintenance line of innovative process pumps
- Designed specifically for the toughest, most extreme environments
- Maximum BHP: 100 HP (74.5 kW)

Durability

Lowest shaft stiffness ratio (L3/D4) in the process industry:

- Frame S – 46 (1.9)
- Frame LD17 – 17 (.65)
- Frame M – 19 (.87)

Exclusive Features

- Designed around the seal and bearings where 90% of failures occur
- Designed to maximize system reliability – stronger, more vibration-resistant pump
- Heavy-duty, solid, low deflection shaft prevents common vibration damage and greater stability at the seal area to improve seal life
- Heavy-duty bearings offer greater load capacity and extend bearing life
- Patented System One® Labyrinth Seals provide non-wearing lifetime protection for radial and thrust bearings

Heavy-Duty Construction

- Heavy-duty shaft, bearings, seals and housing design means this pump is built for reliability in the most extreme environments
- Offers the widest window of operation off the BEP of any conventional centrifugal pump

System One® Heavy-Duty Process Pump 2005 Catalog Index

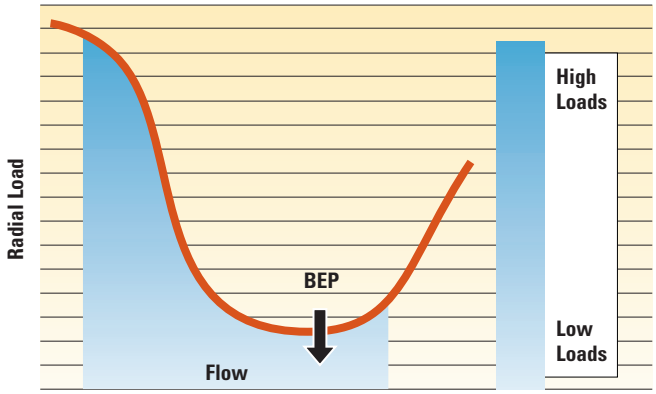
[1] SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd.,Waverly, Nova Scotia

blackOPS: Blackmer Optimum Pump Solutions

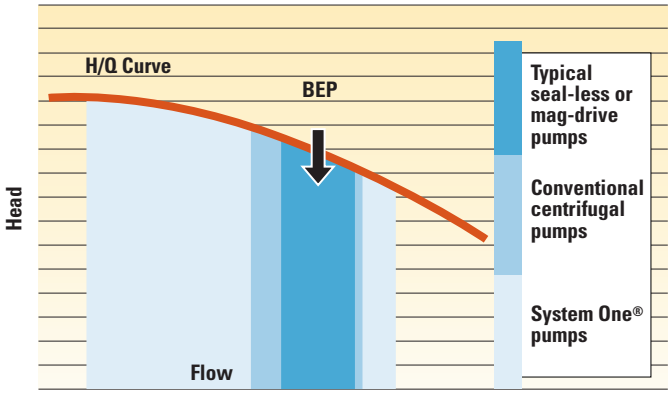
***blackOPS** is a selection software program created specifically for Blackmer's System One centrifugal and positive displacement pump lines. The program allows you to print (or save) your pump selection data and pump curves in a PDF format. For additional information on blackOPS, please visit our web site.*

blackmer.com

Wider Window of Operation Off the BEP (Best Efficiency Point)



Many processes demand operation off the BEP where higher loads can create damaging vibration.



System One® pumps resist vibration for a larger operational window off the BEP and greater reliability.

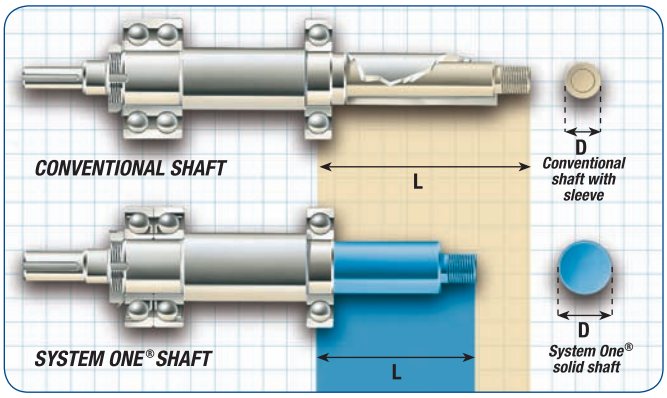
Process Pump Challenges:

- Due to process changes and variations, the majority of process pumps operate off the BEP where radial loads create high stresses.
- Conventional pumps are prone to damaging shaft vibration under off-BEP conditions.
- Seal and bearing failures result from vibration damage.

System One® Is The Solution:

- Heavy-duty design for the toughest applications in the process industry.
- System One® pumps are designed to prevent vibration under high radial loads.
- System One® pumps offer the widest operational window off the BEP of any standard process pump.
- Seals and bearings last longer for greater system reliability.
- When your process demands that pumps vary from the BEP, System One® will save you money and prevent lost production.

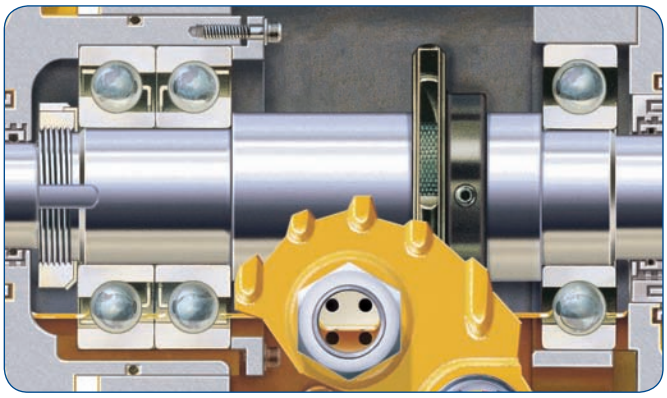
Shaft



Solid design, low deflection shaft prevents common vibration damage

- Prevents common vibration damage.
- Heavier duty construction and lower stiffness ratios than competing pumps.
  - Frame S – 46 (1.9)
  - Frame LD17 – 17 (.65)
  - Frame M – 19 (.87)
- Greater stability at seal area improves seal life.
- Short shaft overhang reduces bearing load to extend bearing life.

Bearings



Heavy-duty bearings with longer bearing life

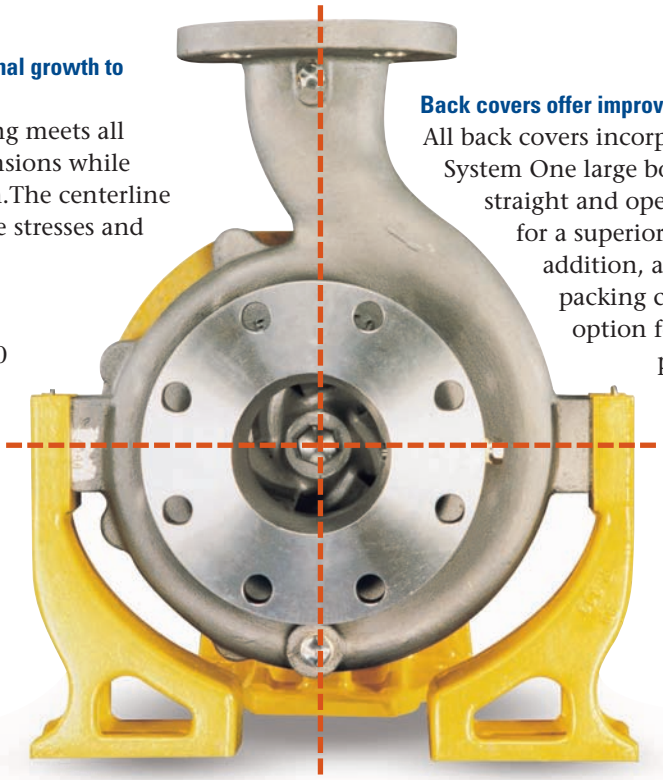
- Larger bearings than competing pumps for greater load capacity and bearing life.
- Bolted retainer cover locks thrust bearing into cartridge for enhanced reliability.
- Angular contact thrust bearings as required by API 610 specification.

Blackmer 1809 Century Avenue SW, Grand Rapids, MI 49503-1530 USA T 616.241.1611 F 616.241.3752 www.blackmer.com

Wet Ends

Centerline design provides balanced thermal growth to prevent mechanical stresses

The System One Frame A pump casing meets all ASME/ANSI specifications and dimensions while offering a centerline mounted design.The centerline configuration eliminates many of the stresses and strains that can damage seals and bearings due to thermal growth in elevated temperature applications. Centerline design, required by API 610 specifications, is standard on all Frame A and LD17 pumps. The Frame S offers an optional bearing frame foot with overhung casing, while the Frame M offers steel centerline casing legs as an option. Casing wall thickness includes 1/8" (3.2 mm) corrosion allowance.



Back covers offer improved mechanical reliability

All back covers incorporate the state-of-the-art System One large bore seal chamber in both straight and open taper bore configurations for a superior sealing environment. In addition, a separate patented radial packing chamber is available as an option for those applications where packing is desired. The 13" (330 mm) back covers are bolted to the casing by their own flange, offering improved mechanical reliability compared to conventional designs. Carbon, polyurethane and SpiralTrac[1] throat bushings are available when required.

Patented micrometer impeller adjustment mechanism results in precise, repeatable settings

Impeller clearances are set by a patented micrometer adjustment mechanism. This enables the pump to achieve maximum efficiency with precise repeatability.

Precision cast/ high efficiency impellers

System One pump wet end components incorporate the finest quality castings available today. Impellers are investment cast with precision vane layout, resulting in superior finish and balance for maximum hydraulic efficiency. The impeller design incorporates back pump-out vanes for reduction of pressure in the seal chamber, plus threaded-to-shaft attachment.

1 *SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd., Waverly, Nova Scotia.*

Mounting

Maximum installation flexibility

System One pumps allow maximum flexibility to meet any application criteria. Side discharge is possible with the addition of a special foot. System One pumps are the only ASME/ANSI pump with these mounting configuration options.

Right or left side discharge available

Self-supporting power end

A unique feature of System One Frame A/LD17 pumps which provides ease of maintenance.

Motor alignment is automatically, mechanically achieved

Every System One pump is equipped to accept a C-Frame (NEMA)/D-Flange (IEC) motor adaptor. This provides for alignment of motor and power end without special tools or excessive labor. Because alignment is mechanical, it is fast and repeatable thus reducing misalignment-induced vibration.

Frames S & SD

- Mid-size frame strength and reliability in small frame space – heavy-duty alternative to standard small frame pumps
- Lowest L^3/D^4 stiffness ratio of any competitive size pump – 46 (1.9) Frame S
- Meets ASME/ANSI dimensional specifications
- Frame SD is the DIN/ISO (metric) version
- Capacities to 450 gpm (102 m^3/hr)

Vortex

Vortex pump puts System One® strength and reliability in the service of handling entrained solids without clogging. Available in the LD17 and IPP Metric configurations. Capacities to 1,500 gpm (340 m^3/hr).

- Frame A and LD17 pump with vortex casing and impeller, designed specifically for difficult pumping situations:
  - Sludges and slurries with large solids
  - Pumped material with entrained air
  - Pumped fluids with stringy or fibrous materials
  - Minimum product shearing
- ASME/ANSI & IPP Metric flanges available
- Especially suited for:
  - Waste treatment
  - Food and chemical processing
  - Pulp and paper
  - Agriculture

Frame A/LD17

- Low maintenance, long life, maximum value process pump
- Most stable shaft in the industry
- Lowest L^3/D^4 stiffness ratio of any competitive size pump – 17 (.65) Frame LD17
- Dramatically reduces bearing, sealing device and shaft failures
- Frame A meets ASME/ANSI dimensional specifications
- LD17 configuration available for severe-duty applications
- Available in IPP Metric construction
- Capacities to 1,400 gpm (320 m^3/hr)

Frame M

- Engineered reliability for the most demanding environments
- Lowest L^3/D^4 ratio of any process pump in this size range – 19 (.87) Frame M
- The only ASME/ANSI B73.1 pump of its size that offers centerline mount for high temperature applications
- Optional left/right side discharge

Power End Conversions

- Upgrade existing pumps to System One® heavy-duty design
- Low stiffness ratio power end for maximum reliability
- Direct replacements available for popular models
- Universal configurations to fit most other pumps

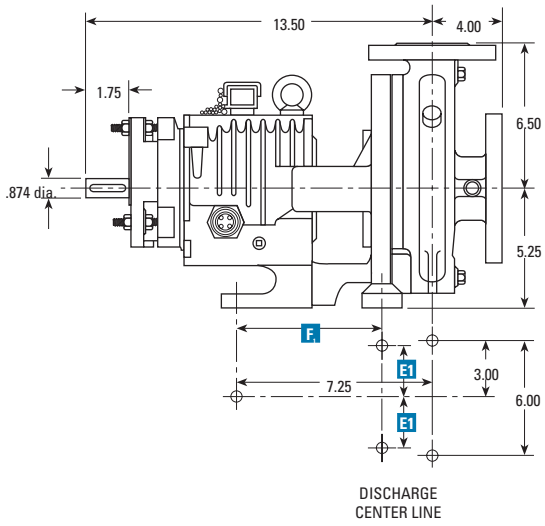
Blackmer®

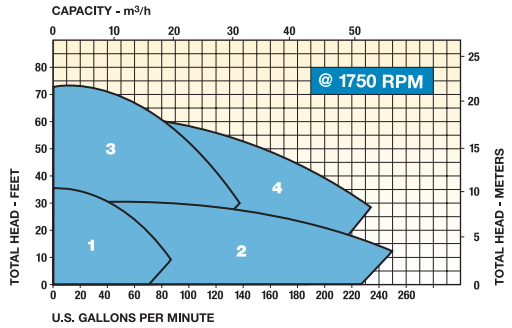
blackmer.com

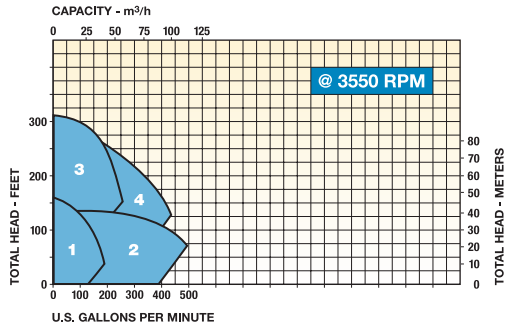
World Headquarters
1809 Century Avenue SW
Grand Rapids, MI 49503-1530 USA
T 616.241.1611 F 616.241.3752

System One® Frame S/SD Dimensions

Frame S (ASME/ANSI)





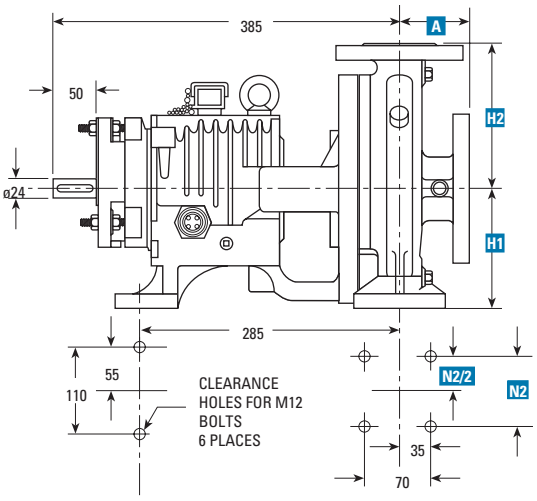


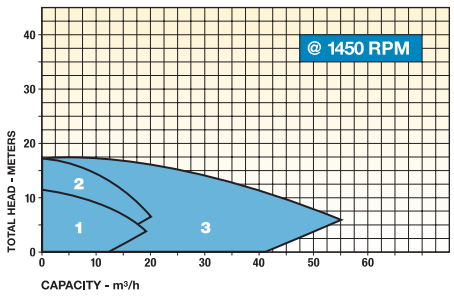
Frame S Pump – ASME/ANSI

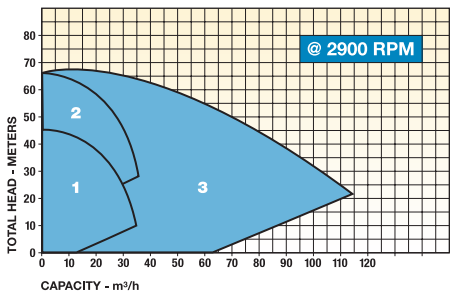
	Pump Size	F_1	$2E_1$
1	1 x 1.5-6	4.88	5.50
2	2 x 3-6	4.88	5.50
3	1 x 1.5-8	4.25	7.50
4	1.5 x 3-8	4.25	7.50

All dimensions are in inches.

Frame SD (DIN/ISO)







Frame SD Pump – DIN/ISO

	Pump Size	A	H_1	H_2	N_2
1	32 x 50-160	80	132	160	190
2	32 x 50-200	80	160	180	190
3	50 x 80-200	100	160	200	212

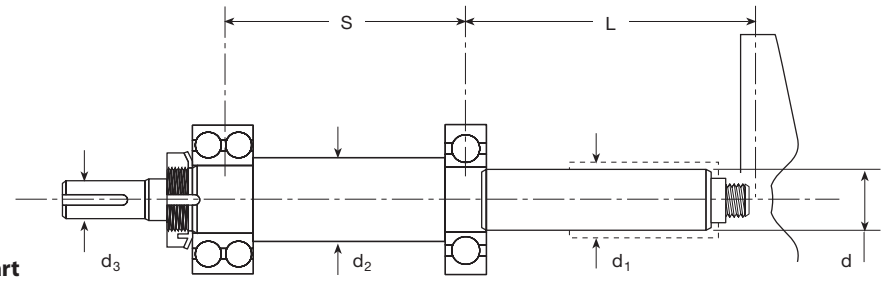
All dimensions are in millimeters.

- Heavy-duty alternative to standard small frame pumps
- Lowest L^3/D^4 stiffness ratio of any competitive size pump
- Designed and built for the toughest applications

System One® Pump Design Data - Frame S (ANSI)

	1 x 1.5-6	2 x 3-6	1 x 1.5-8	1.5 x 3-8
Shaft				
L^3/D^4 Ratio	46 (1.9)			
Diameter at Impeller	.75-10UNC Thread (19)			
Diameter at Seal	1.500 (38)			
Diameter Between Bearings	1.98 (50)			
Diameter at Coupling	0.874 (22)			
Bearings				
Thrust	5308 AHC3			
Thrust Option	7308 BEGBY (pair)			
Radial	6308 C3			
Bearing Span	3.86 (98)			
Shaft Overhang	6.15 (156)			
Seal Chamber				
Seal Bore Diameter (nose)	2.38 (60)			
Inside Bore	3.44 (87)			
Depth	2.21 (56)			
Back Cover/Shaft Clearance	.02 Diametral (.5)			
Gland Bolting	4X .375-16UNC on 3.50 Bolt Circle Diameter (10 on 89 B.C.)			
Distance to Nearest Obstruction	2.38 (60)			
Open Impeller				
Clearance	.06 (1.5) Total .015 (0.4)Suction Side			
Eye Area sq. in. (cm^2)	3.30 (21)	8.10 (52)	4.13 (27)	5.71 (37)
Maximum Diameter Solids	0.3 (8)	0.6 (15)	0.4 (10)	0.5 (13)
Number of Vanes	4	5	5	5
Pumps Weights lbs/kg				
Pump Only	110 (50)	130 (59)	112 (50)	126 (57)
Casing				
Type	Single Volute			
Wall Thickness	0.44 (11) Minimum			
Maximum Working Pressure	See Pressure vs. Temperature Limit Chart			
Test pressure	Class 150 Flanges-250PSIG, Class 300 Flanges-450PSIG			
Rotating Element				
Wk^2 Dry lbs-ft^2 (kg-m^2)	0.18 (.007)	0.24 (.010)	0.38 (.015)	0.43 (.018)
Wk^2 Wet lbs-ft^2 (kg-m^2)	0.27 (.011)	0.36 (.015)	0.57 (.024)	0.66 (.028)
Maximum Speed (oil lube)	3500	3500	3500	3500
Power Limits				
HP (KW)/100 RPM 316SS	1.1 (0.9)			

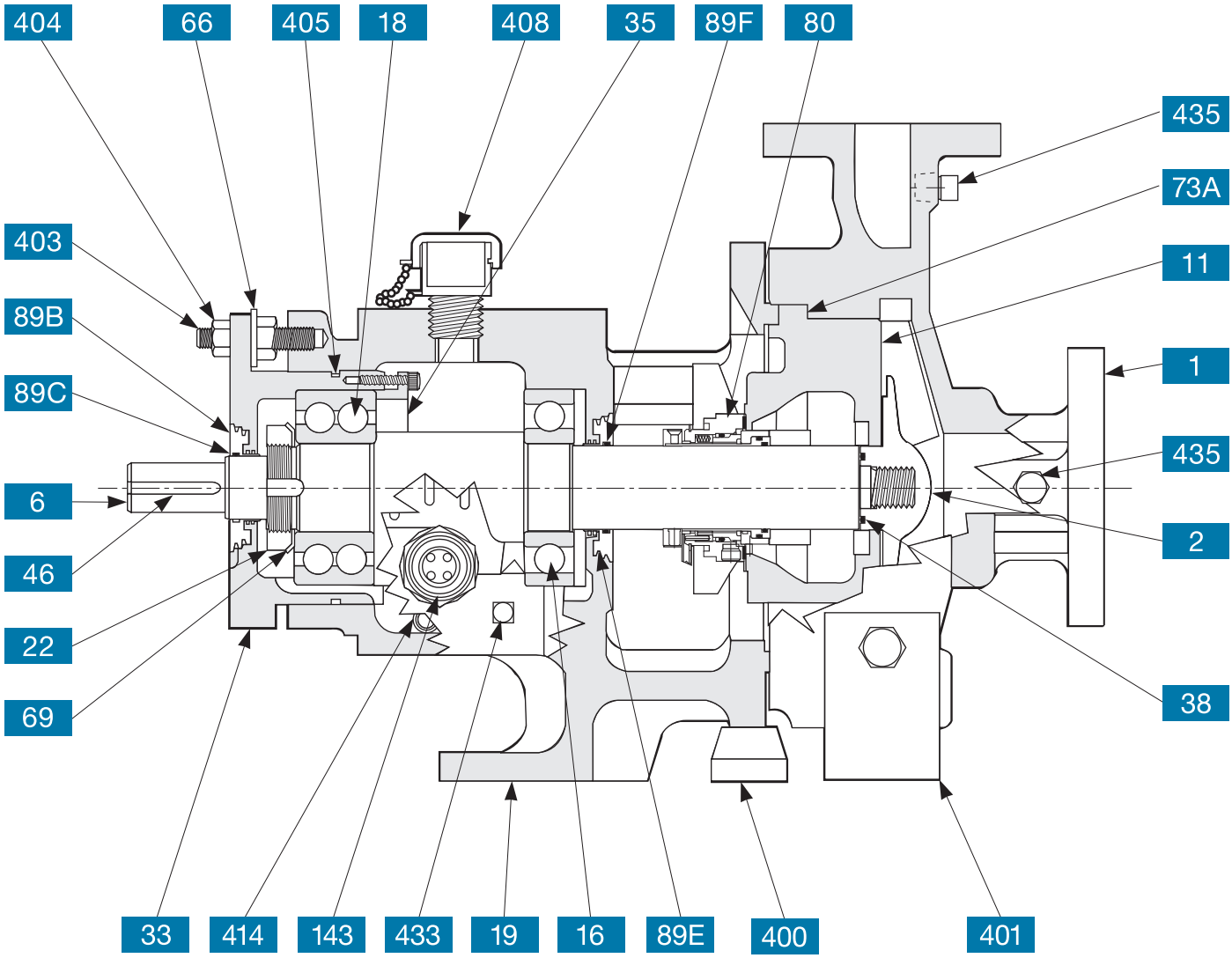
Lowest L^3/D^4 stiffness ratio for any competitive size pump in the industry.



Shaft Stiffness Ratio Comparison Chart

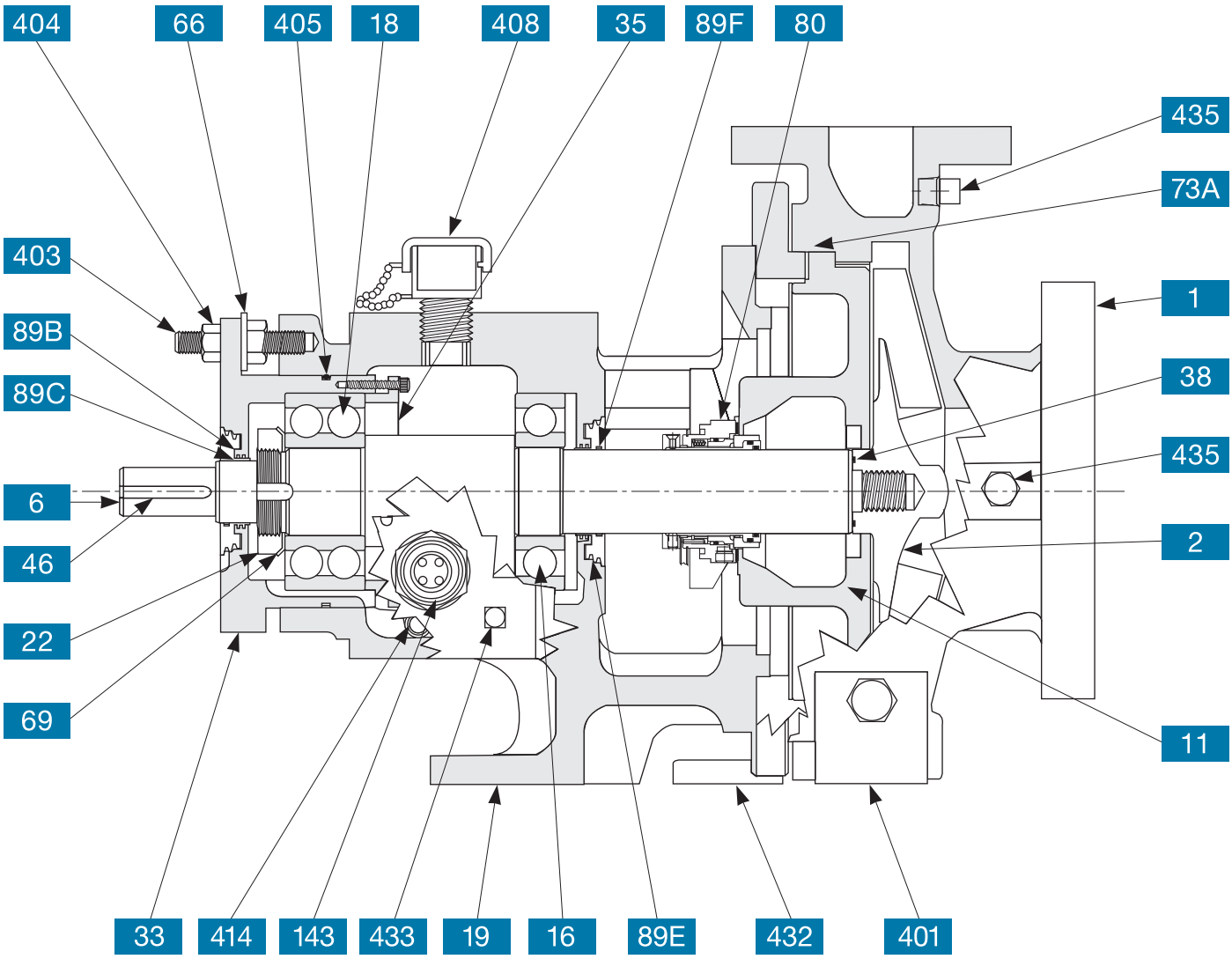
		System One Frame S	Competitor A with Sleeve	Competitor A Solid Shaft	Competitor B with Sleeve	Competitor B Solid Shaft
SHAFT DIAMETERS	In Stuffing Box (Less Sleeve)(d)	1 1/2 (38)	1 1/8 (28)	1 3/8 (35)	7/8 (22)	1 1/8 (28)
	In Stuffing Box (With Sleeve)(d_1)	N/A	1 3/8 (35)	N/A	1 1/8 (28)	N/A
	Between Bearings (d_2)	2 (51)	1 1/2 (38)	1 1/2 (38)	1 1/4 (32)	1 1/4 (32)
	At Coupling (d_3)	7/8 (22)	7/8 (22)	7/8 (22)	7/8 (22)	7/8 (22)
BEARINGS	Radial	6308	6207	6207	6206	6206
	Thrust	5308	5306	5306	5305	5305
	Bearing Span (S)	3.86 (98)	4.12 (105)	4.12 (105)	4.06 (103)	4.06 (103)
	Shaft Overhang (L)	6.15 (156)	6.12 (155)	6.12 (155)	5.87 (149)	5.87 (149)
STIFFNESS RATIO[1]	L^3/D^4	46 (1.9)	143 (4.5)	64 (2.5)	346 (14.3)	127 (4.4)

[1] For good vibration resistance, especially at speeds above 1750 RPM, the stiffness ratio should not exceed 60 in the seal area. The higher the ratio, the higher the frequency of downtimes, especially as related to bearing and seal failures. The pump has less resistance to the common running conditions which cause vibration – running off Best Efficiency Point (BEP), cavitation, motor misalignment, water hammer, worn parts, plugged or unbalanced impellers, poor piping.



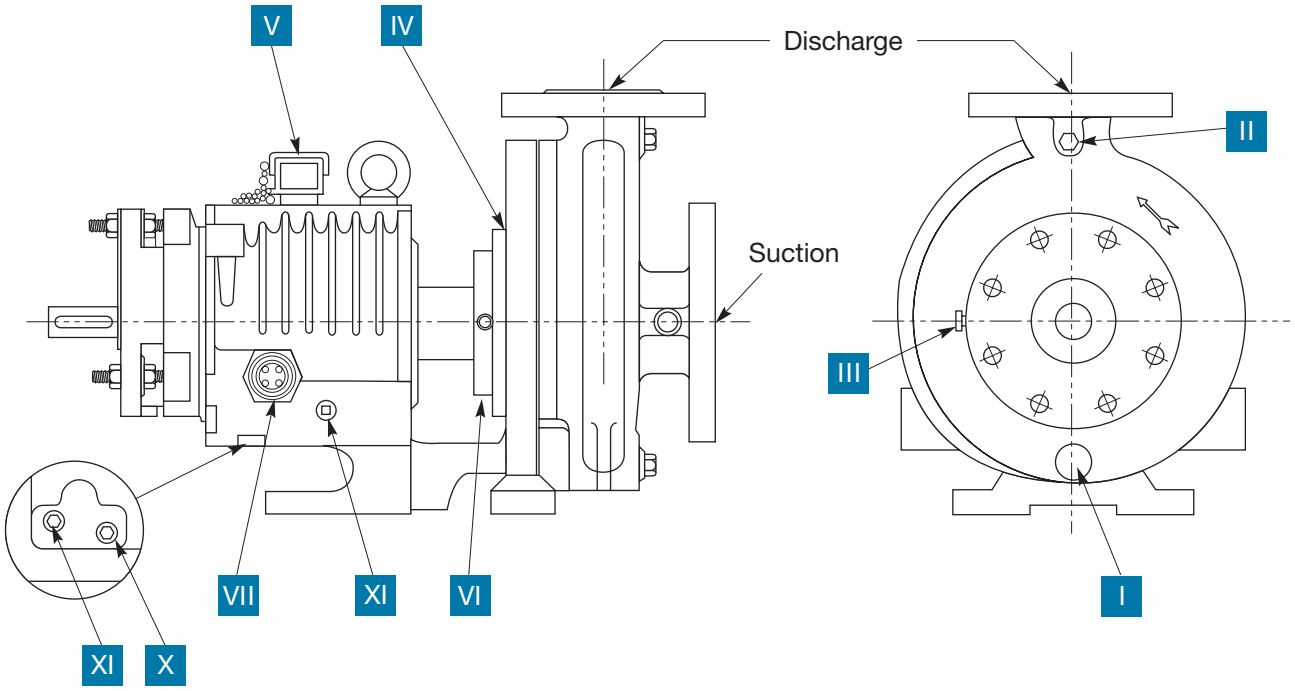
NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	38	O-ring, Impeller Hub	143	Oil Sight Glass
2	Impeller	46	Key, Coupling	400	Foot, Bearing Frame
6	Shaft	66	Micrometer Nut	401	Foot, casing (optional)
11	Back Cover	69	Lockwasher, Thrust Bearing	403	Stud, Cartridge
16	Bearing, Radial	73A	Gasket, Casing	404	Locknut, Cartridge
18	Bearing, Thrust	80	Mechanical Seal	405	O-Ring, Cartridge
19	Bearing, Frame	89E	Seal, Labyrinth Rotor, Radial	408	Oil Filler Assembly
22	Locknut, Thrust Bearing	89F	Seal, Labyrinth O-Ring, Radial	414	Plug, Magnetic
33	Bearing Cartridge	89B	Seal, Labyrinth Rotor, Thrust	433	Plug, Bearing Frame
35	Retainer Cover	89C	Seal, Labyrinth O-Ring, Thrust	435	Plug, Casing

System One® Pump Assembly - Frame S, Horizontal 8"



NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	46	Key, Coupling	401	Foot, casing (optional)
2	Impeller	66	Micrometer Nut	403	Stud, Cartridge
6	Shaft	69	Lockwasher, Thrust Bearing	404	Locknut, Cartridge
11	Back Cover	73A	Gasket, Casing	405	O-Ring, Cartridge
16	Bearing, Radial	80	Mechanical Seal	408	Oil Filler Assembly
18	Bearing, Thrust	89E	Seal, Labyrinth Rotor, Radial	414	Plug, Magnetic
19	Bearing, Frame	89F	Seal, Labyrinth O-Ring, Radial	432	Adapter Plate
22	Locknut, Thrust Bearing	89B	Seal, Labyrinth Rotor, Thrust	433	Plug, Bearing Frame
33	Bearing Cartridge	89C	Seal, Labyrinth O-Ring, Thrust	435	Plug, Casing
35	Retainer Cover	143	Oil Sight Glass		
38	O-ring, Impeller Hub	400	Foot, Bearing Frame		

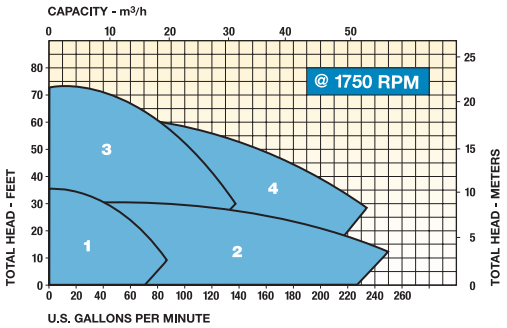
System One® Auxiliary Pipe Connections List - Frame S

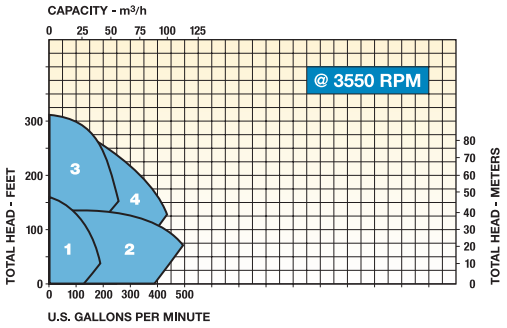


ITEM NUMBER	NPT SIZE	NUMBER OF TAPS	CONNECTION
* I	0.38-18	1	Casing Drain
II	0.25-18	1	Discharge Gage
III	0.25-18	1	Suction Gage
IV	0.12-27	1	Seal Chamber Flush
V	0.75-14	1	Oil Fill
* VI	0.25-18 & 0.12-27	2	Seal Chamber Jacket-Inlet & Outlet
# VII	0.75-14	1	Oil Sight Glass
## X	0.25-18	1	Oil Drain
XI	0.25-18	2	Magnetic Plug or Cooling Coil *

* Optional
\# Left side of pump facing suction end
\## Right side of pump facing suction end

Frame S (ASME/ANSI)



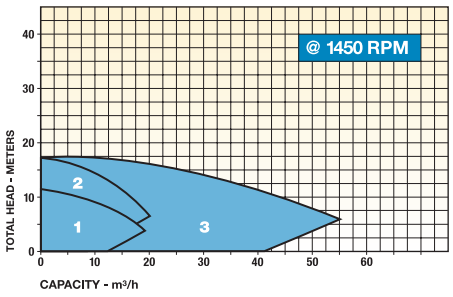


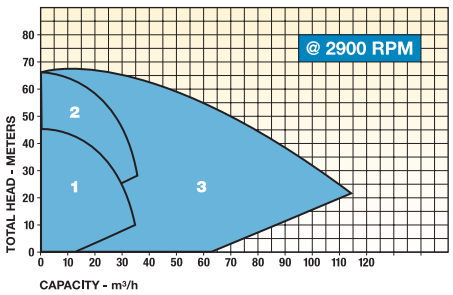
Frame S Pump – ASME/ANSI

	Pump Size	F_1	$2E_1$
1	1 x 1.5-6	4.88	5.50
2	2 x 3-6	4.88	5.50
3	1 x 1.5-8	4.25	7.50
4	1.5 x 3-8	4.25	7.50

All dimensions are in inches.

Frame SD (DIN/ISO)

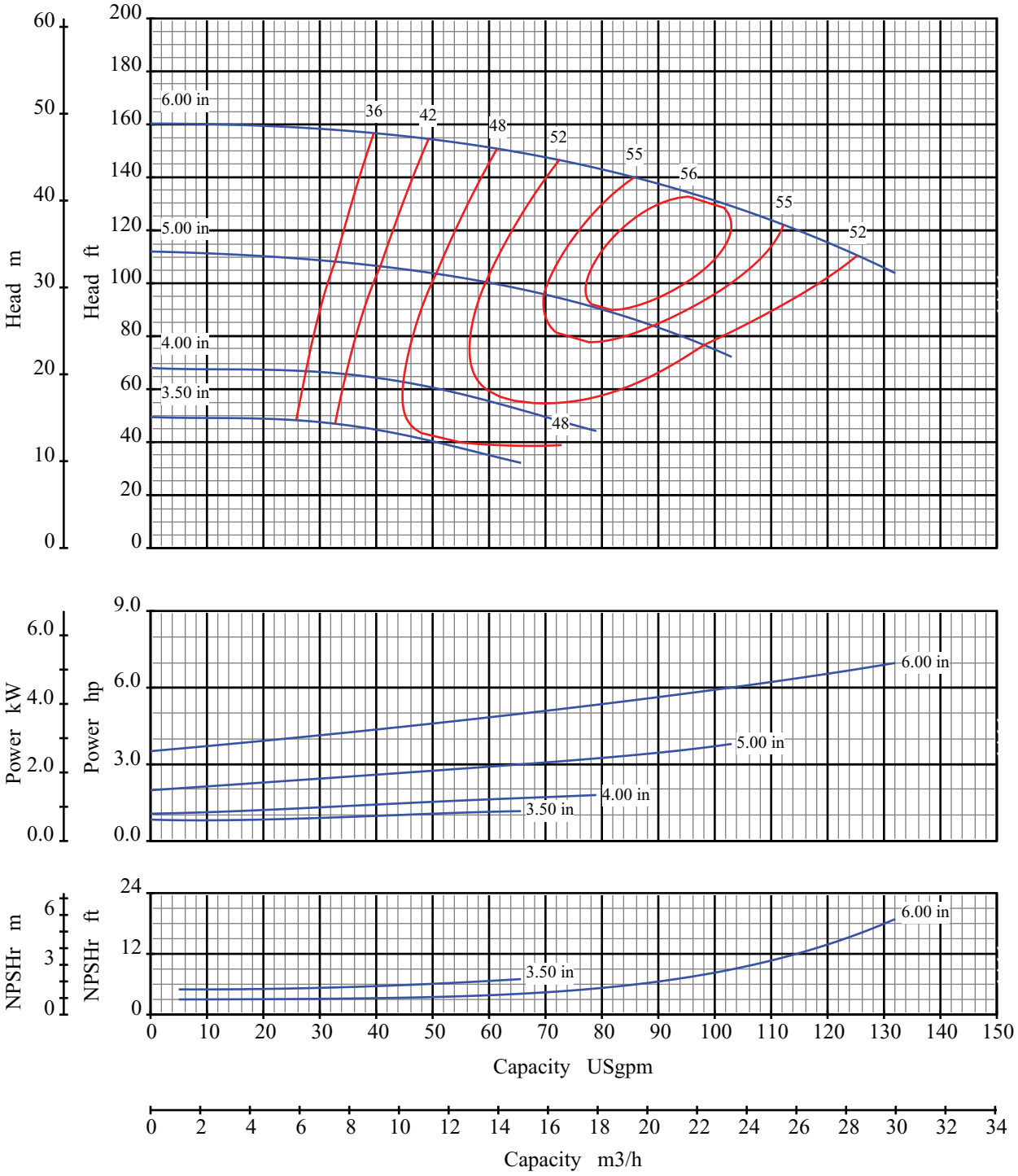




Frame SD Pump – DIN/ISO

	Pump Size	A	H_1	H_2	N_2
1	32 x 50-160	80	132	160	190
2	32 x 50-200	80	160	180	190
3	50 x 80-200	100	160	200	212

All dimensions are in millimeters.



Curve No: S18100V1

Blackmer System One

Pump Performance Characteristics

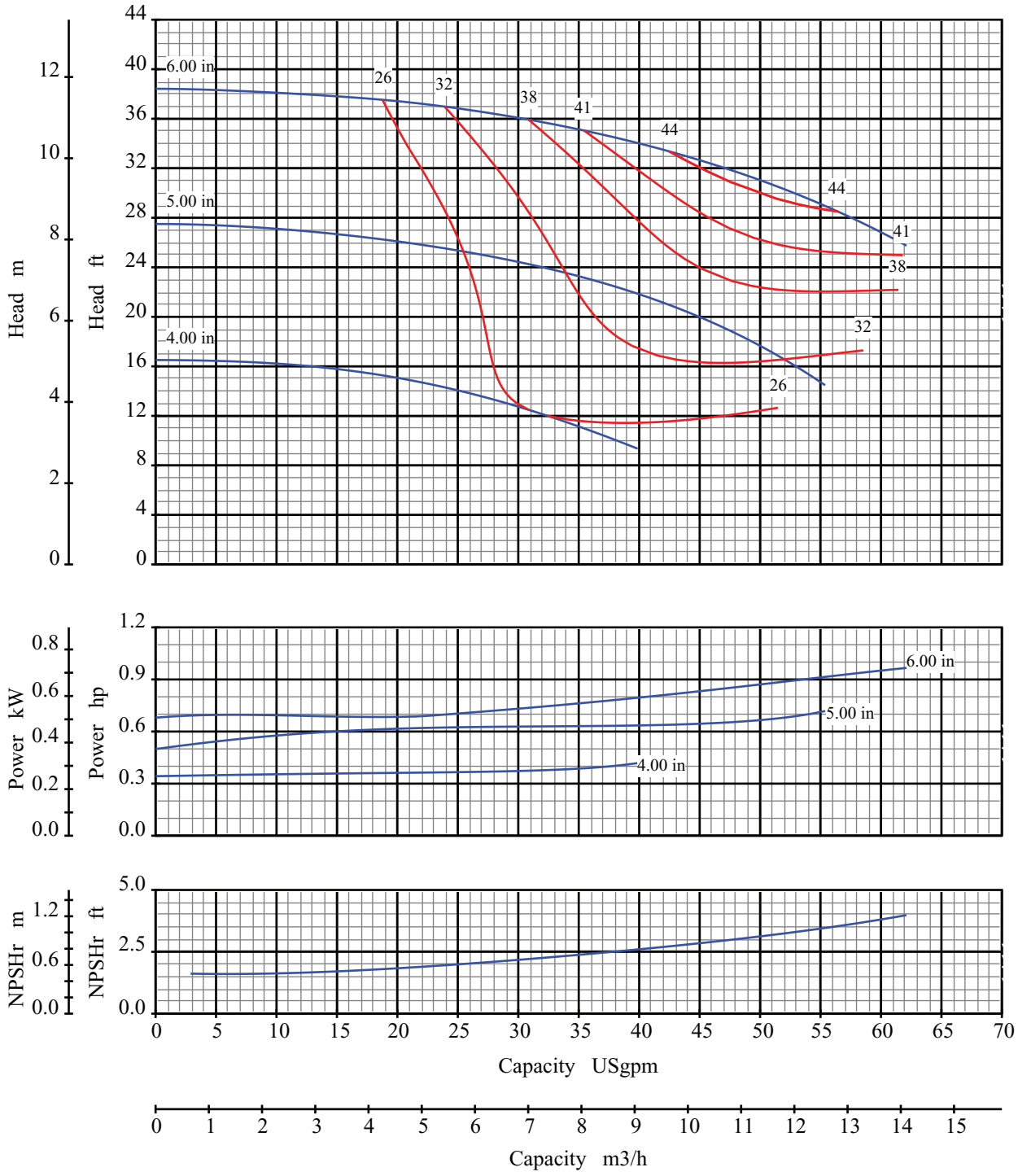
Pump Size: 1x1.5 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 3550 rpm

Open Impeller



Curve No: S18102V1

Blackmer System One

Pump Performance Characteristics

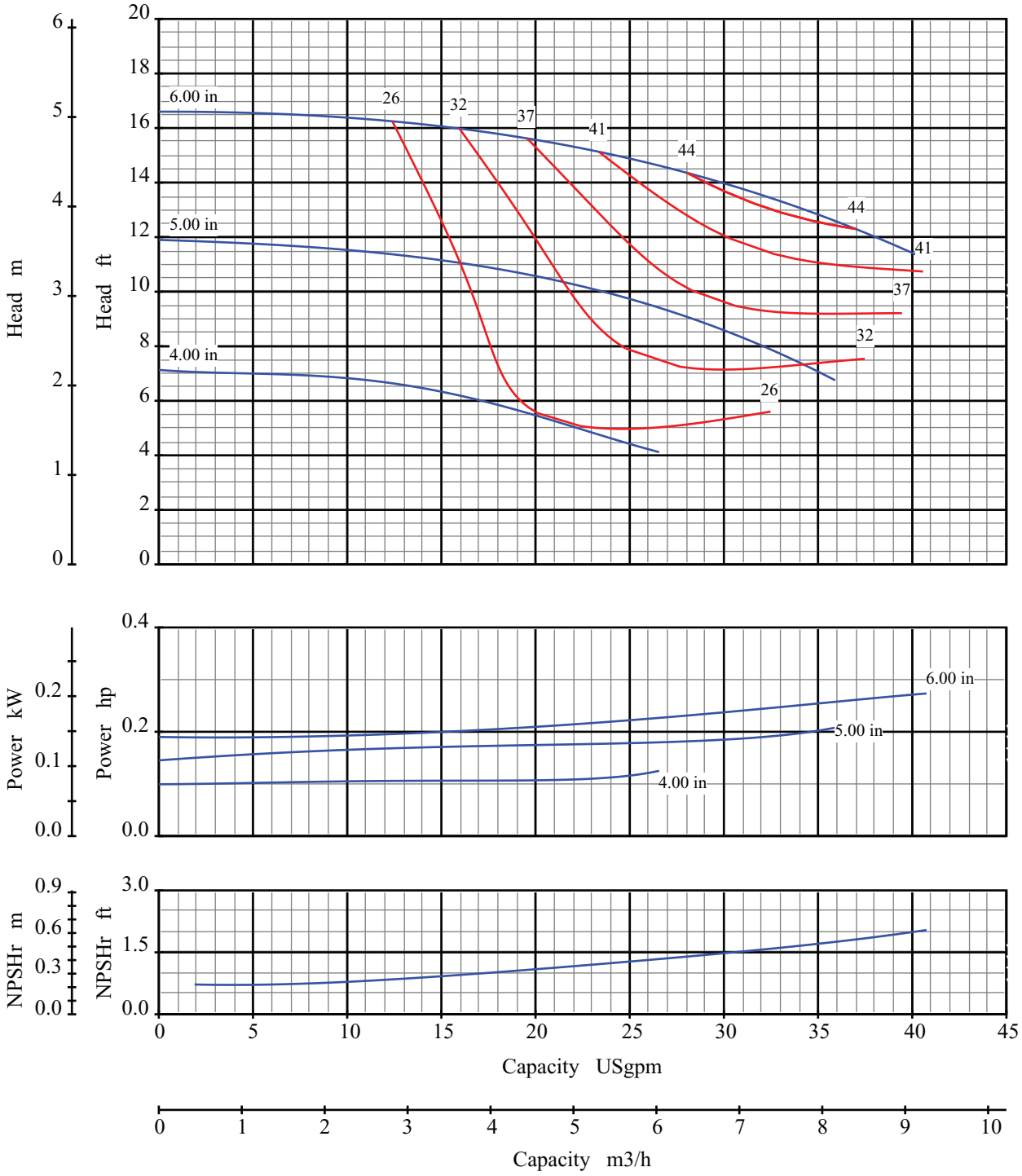
Pump Size: 1x1.5 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18104V1

Blackmer System One

Pump Performance Characteristics

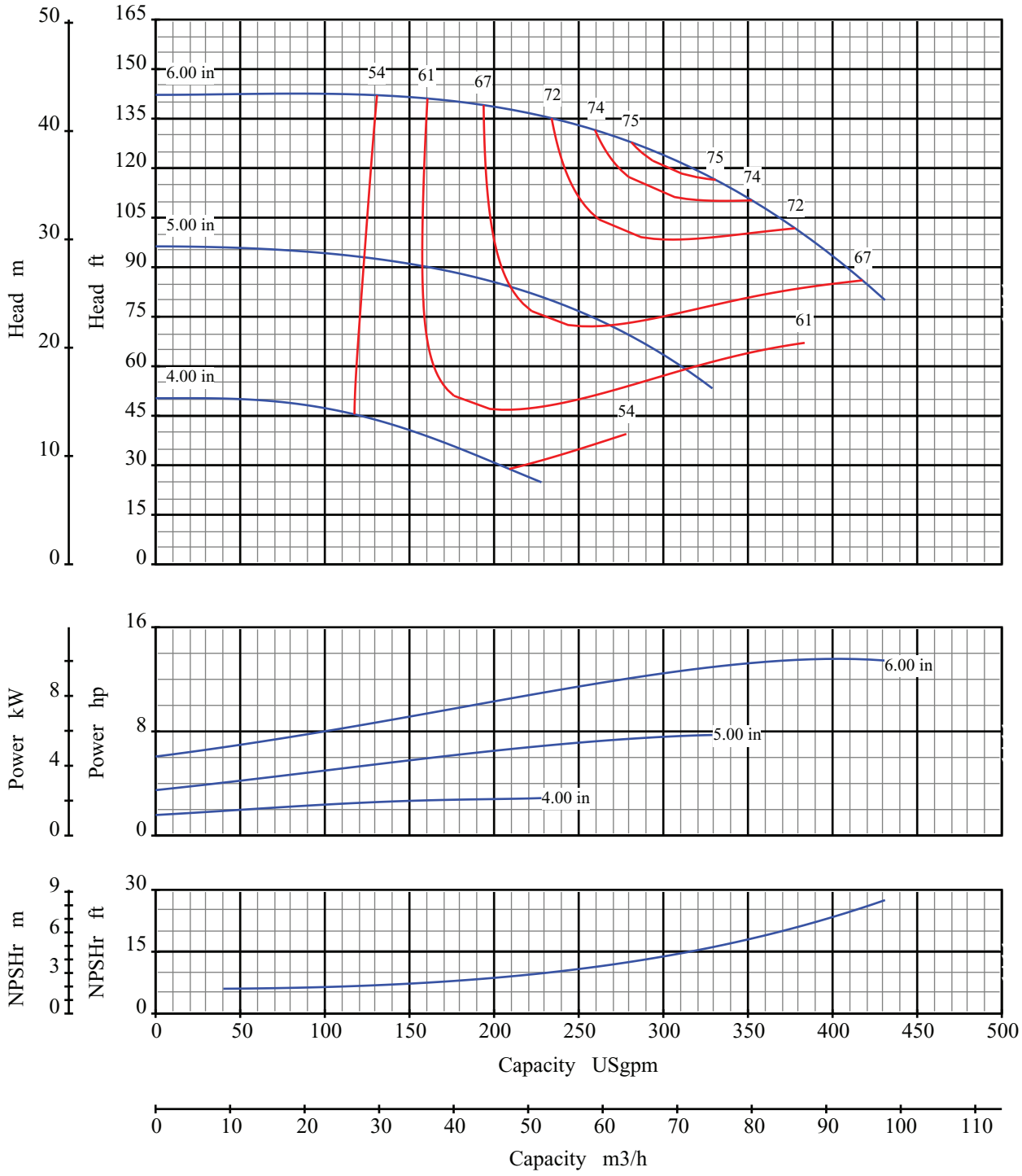
Pump Size: 1x1.5 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18106V1

Blackmer System One

Pump Performance Characteristics

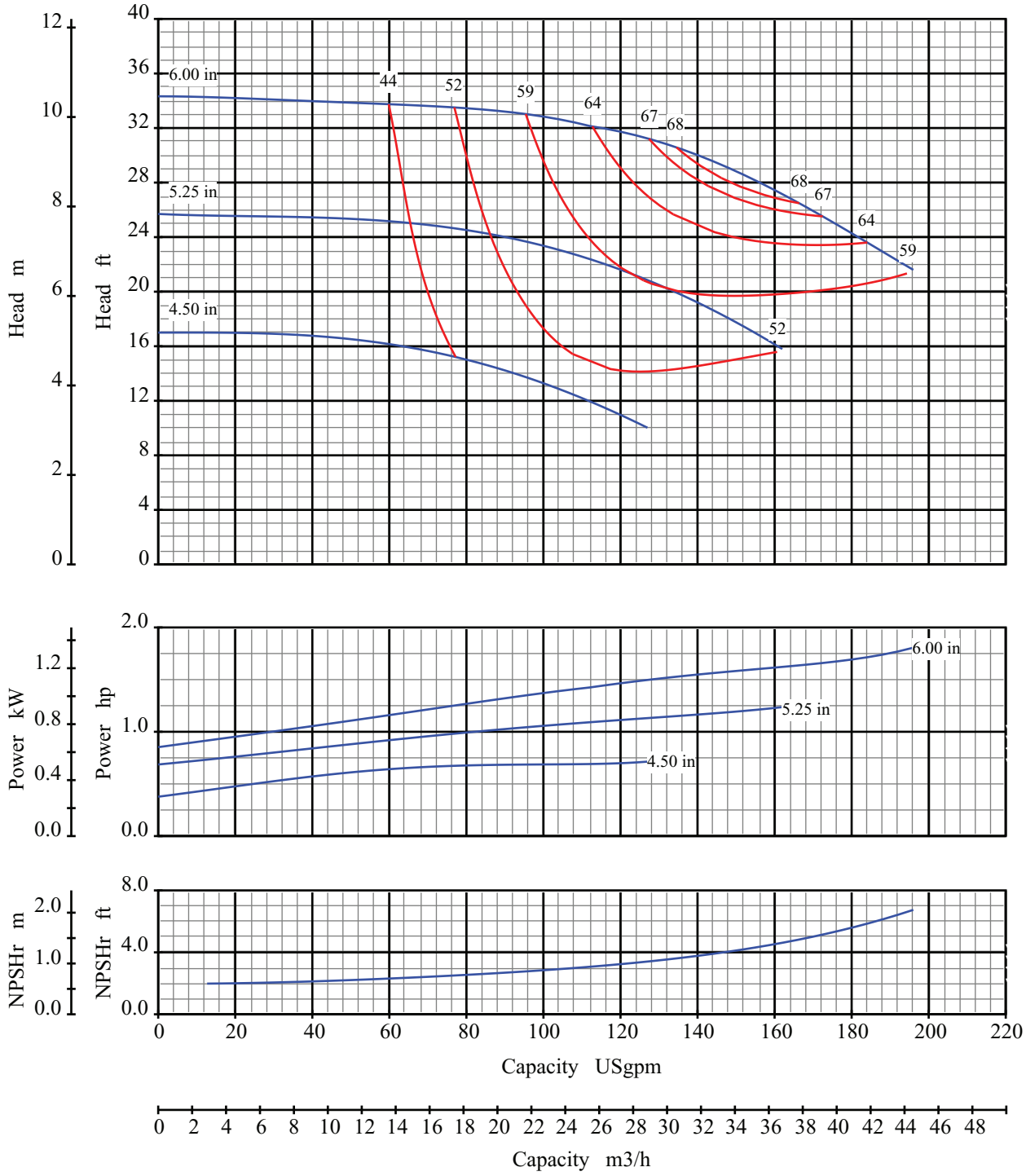
Pump Size: 2x3 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 3550 rpm

Open Impeller



Curve No: S18108V1

Blackmer System One

Pump Performance Characteristics

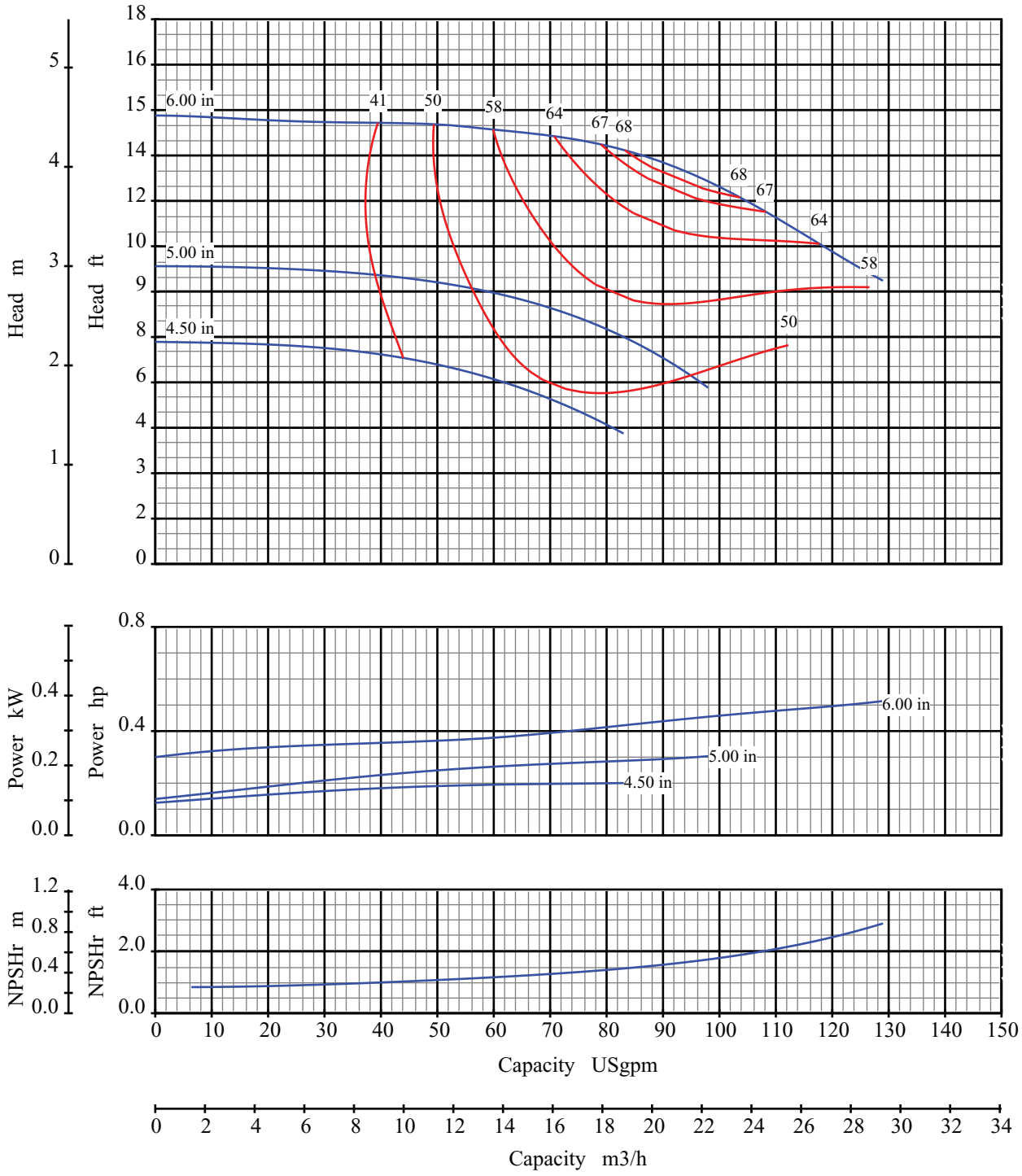
Pump Size: 2x3 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18110V1

Blackmer System One

Pump Performance Characteristics

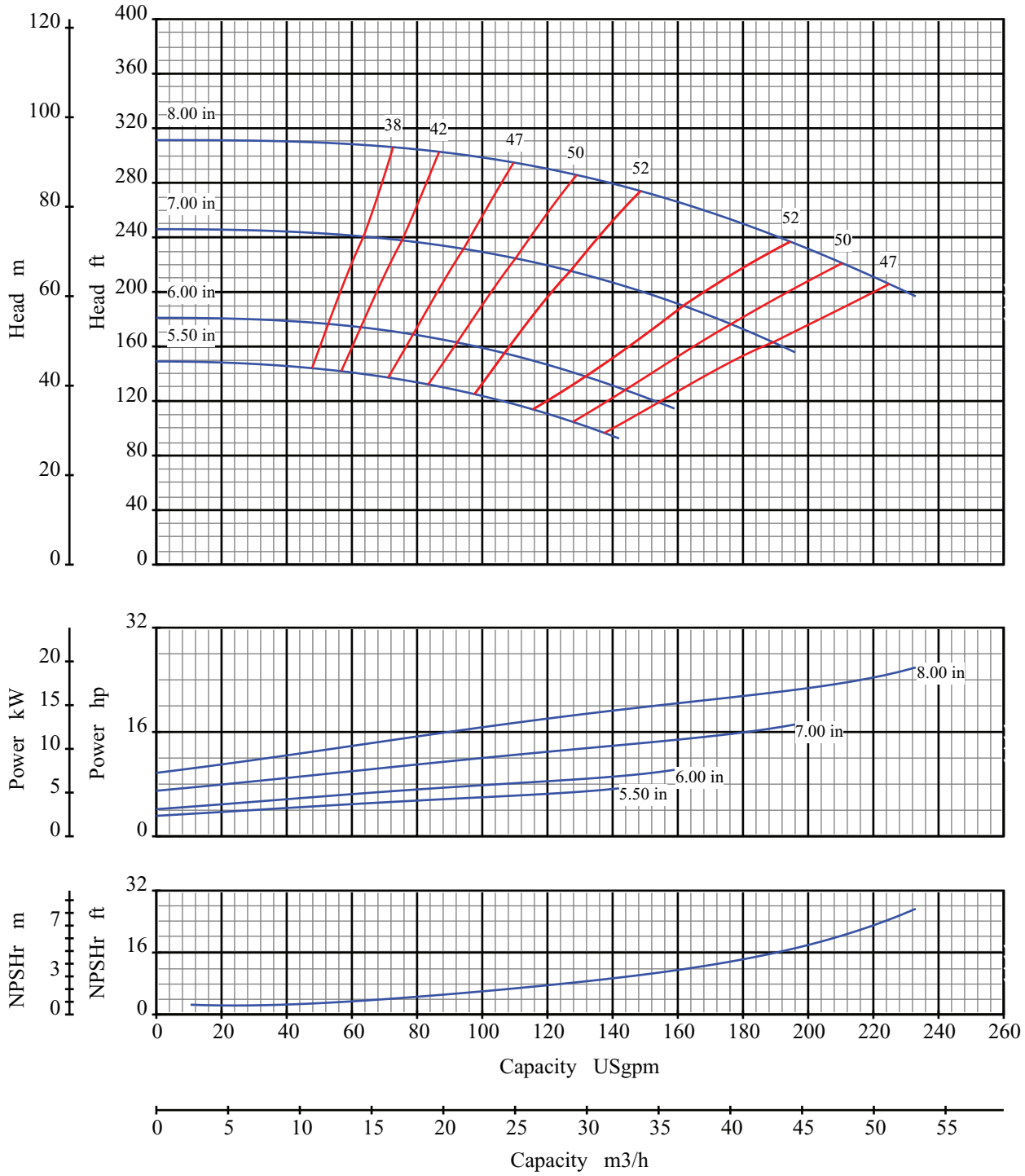
Pump Size: 2x3 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18112V1

Blackmer System One

Pump Performance Characteristics

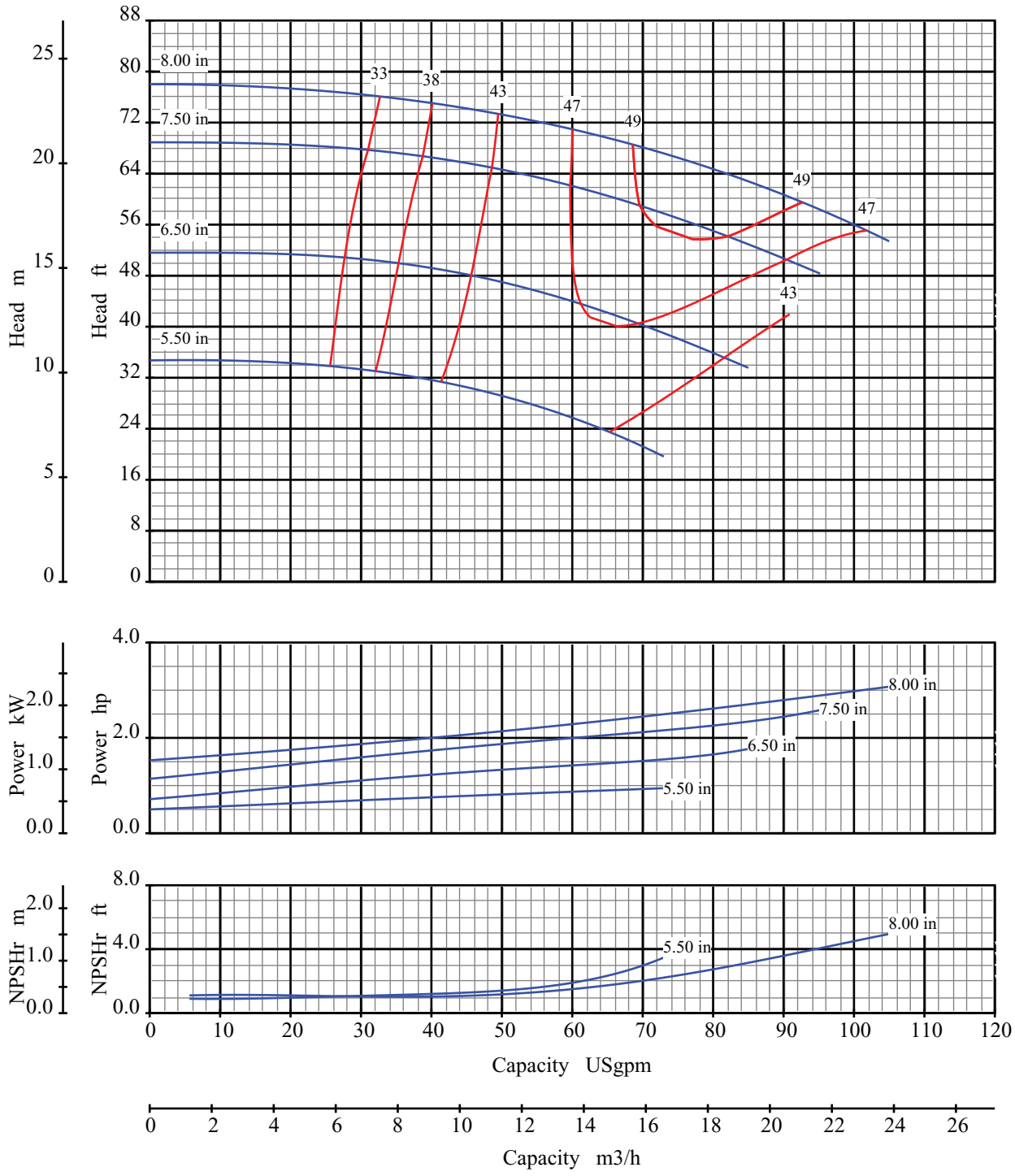
Pump Size: 1x1.5 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 3550 rpm

Open Impeller



Curve No: S18114V1

Blackmer System One

Pump Performance Characteristics

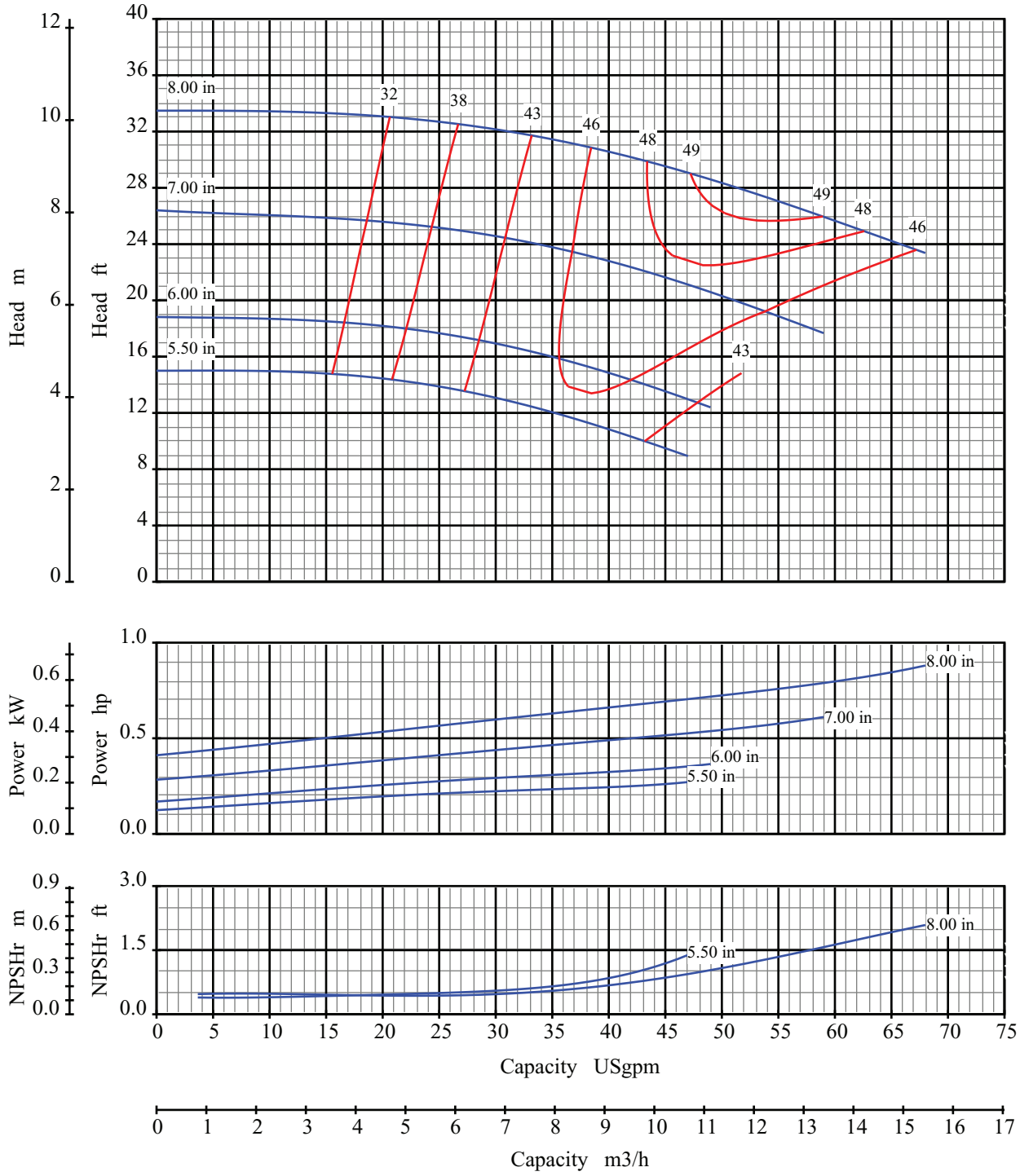
Pump Size: 1x1.5 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18116V1

Blackmer System One

Pump Size: 1x1.5 8

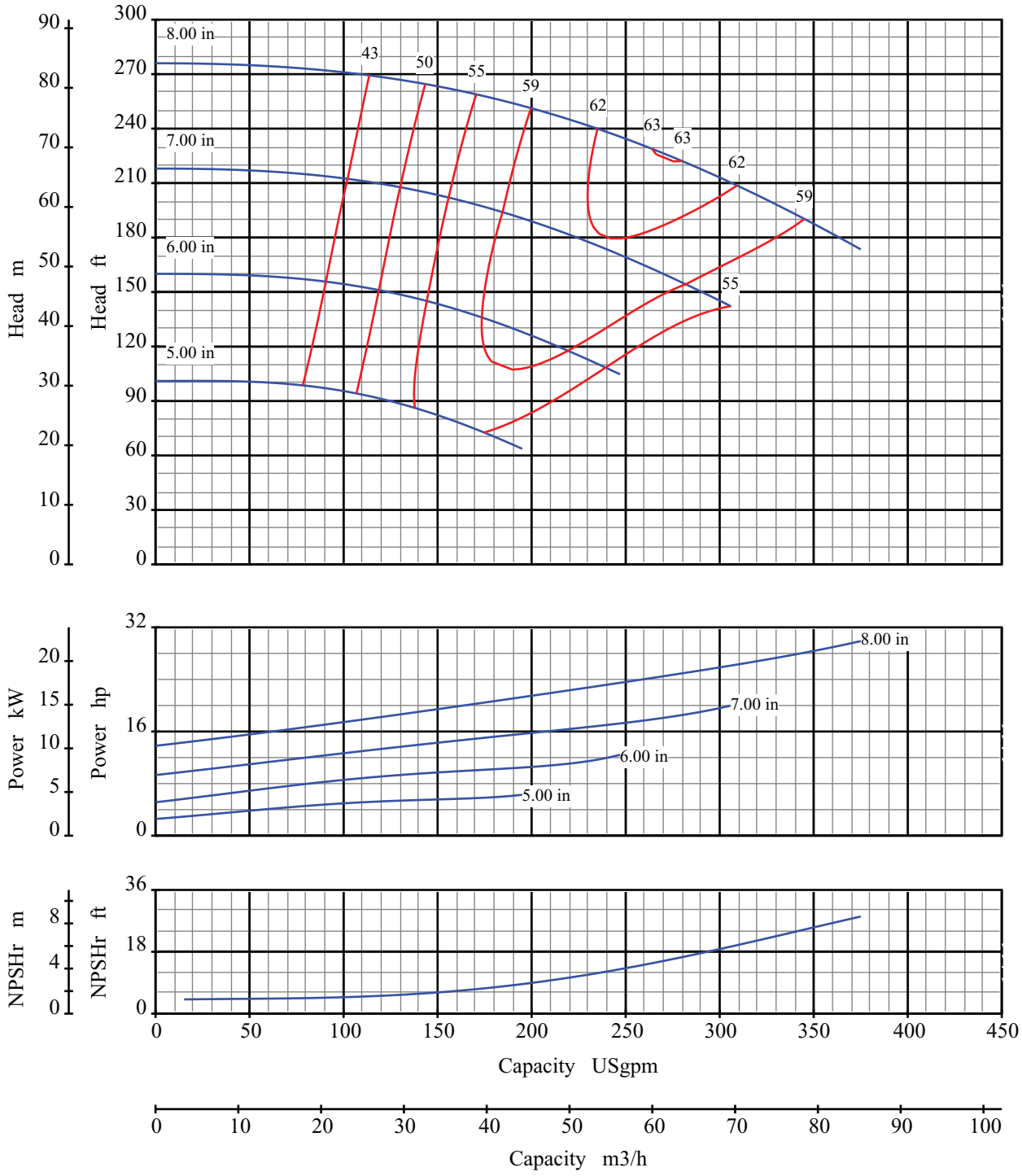
Pump Performance Characteristics

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18118V1

Blackmer System One

Pump Performance Characteristics

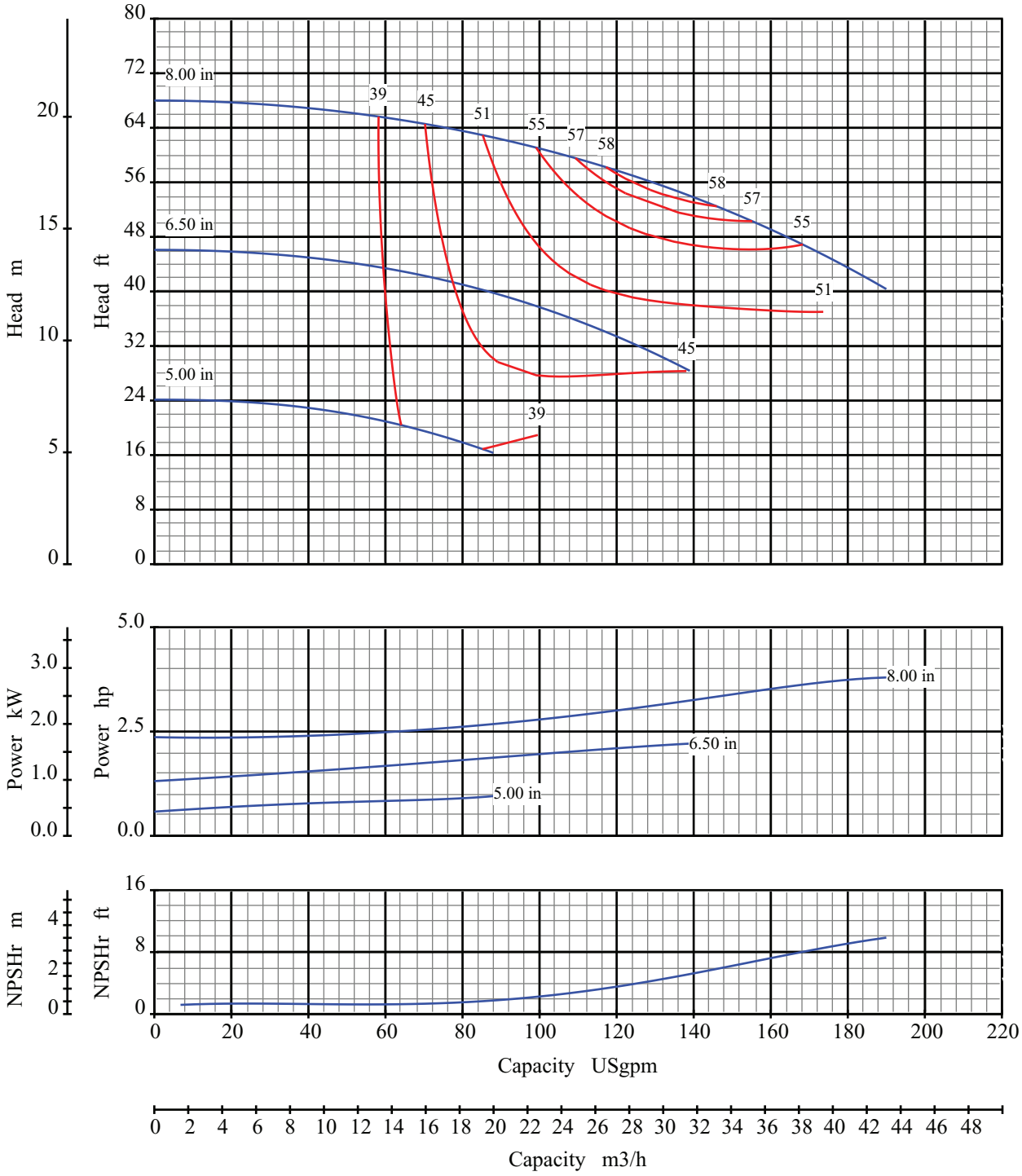
Pump Size: 1.5x3 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 3550 rpm

Open Impeller



Curve No: S18120V1

Blackmer System One

Pump Performance Characteristics

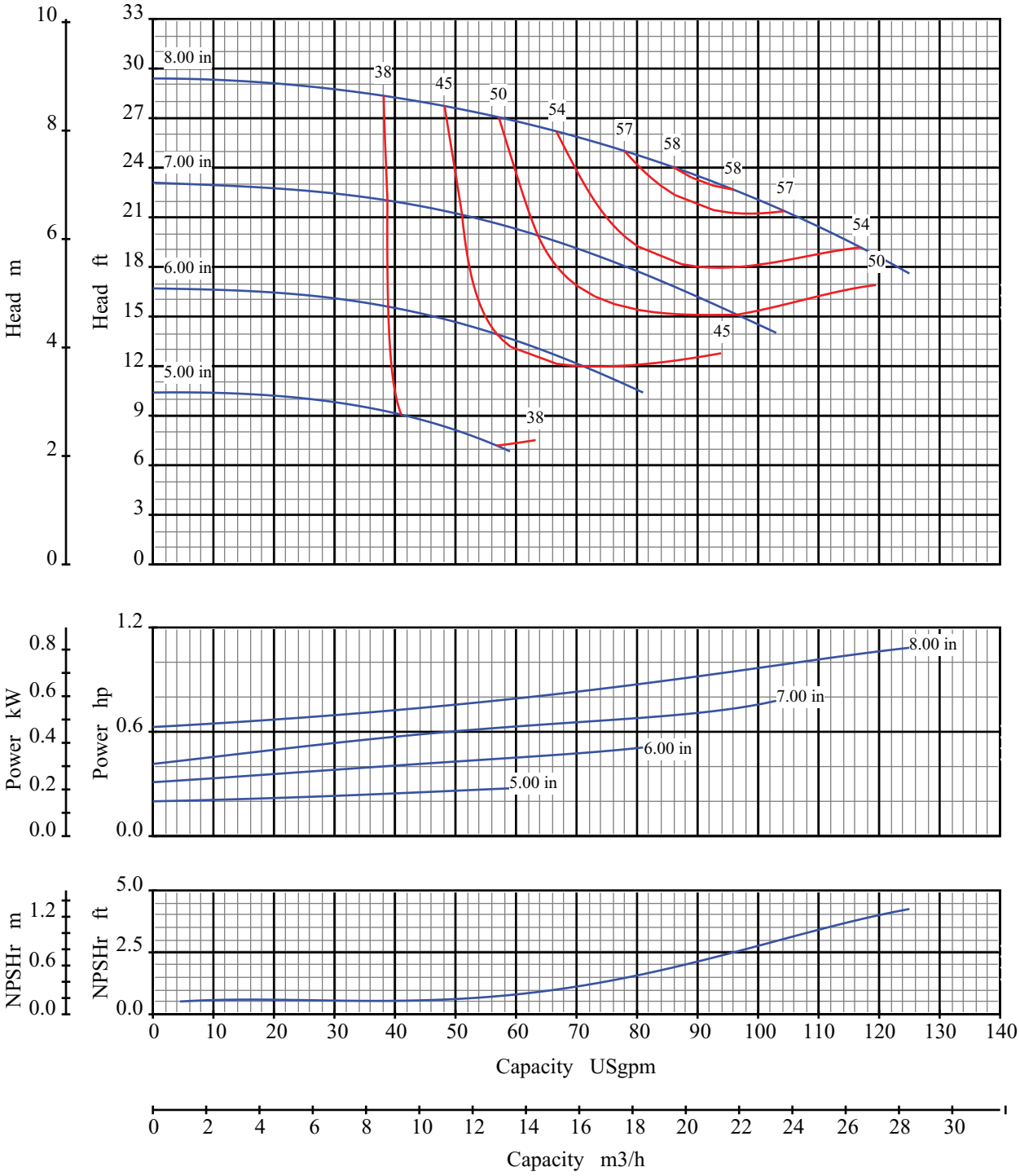
Pump Size: 1.5x3 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18122V1

Blackmer System One

Pump Performance Characteristics

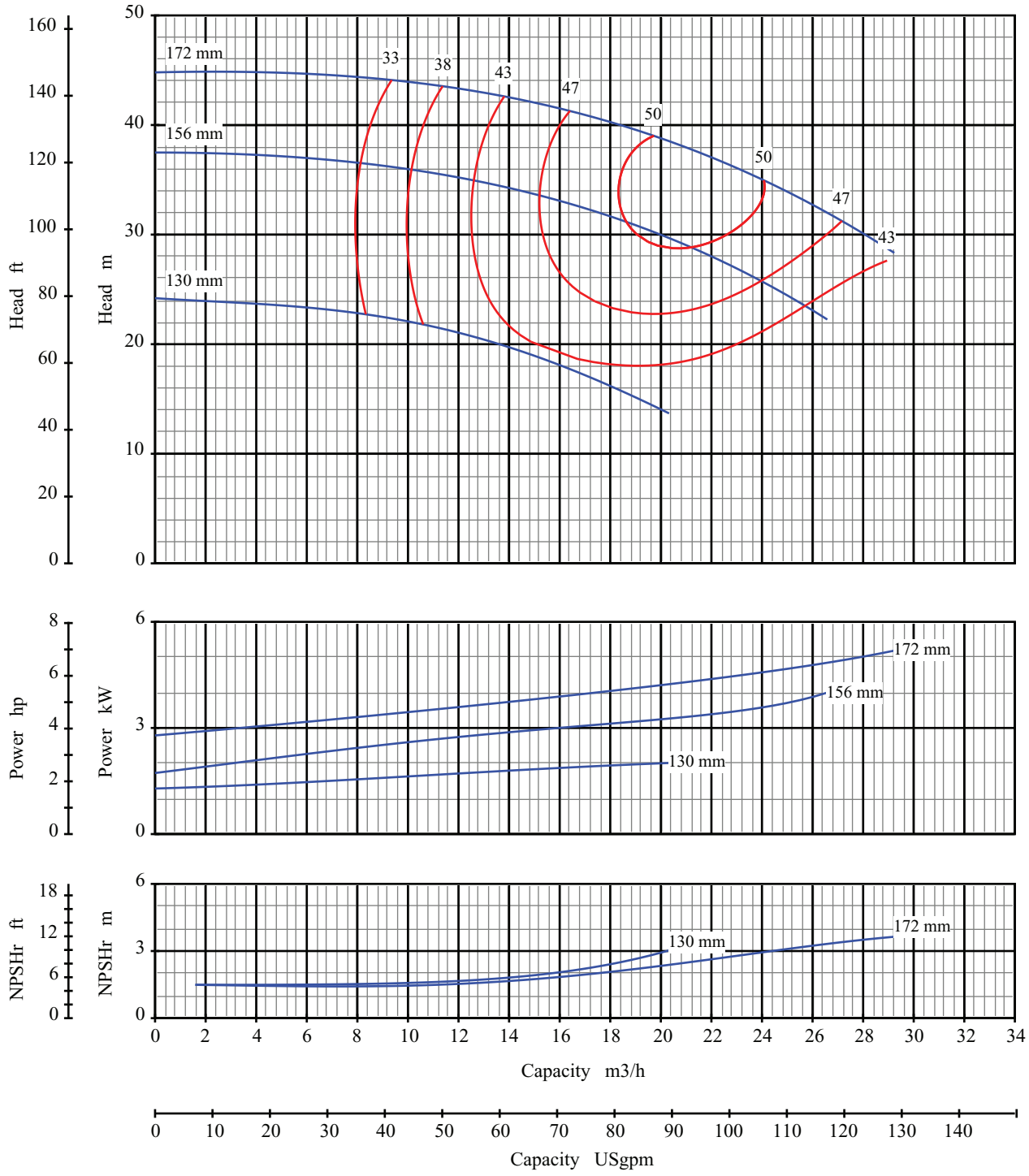
Pump Size: 1.5x3 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18125V1

Blackmer System One

Pump Performance Characteristics

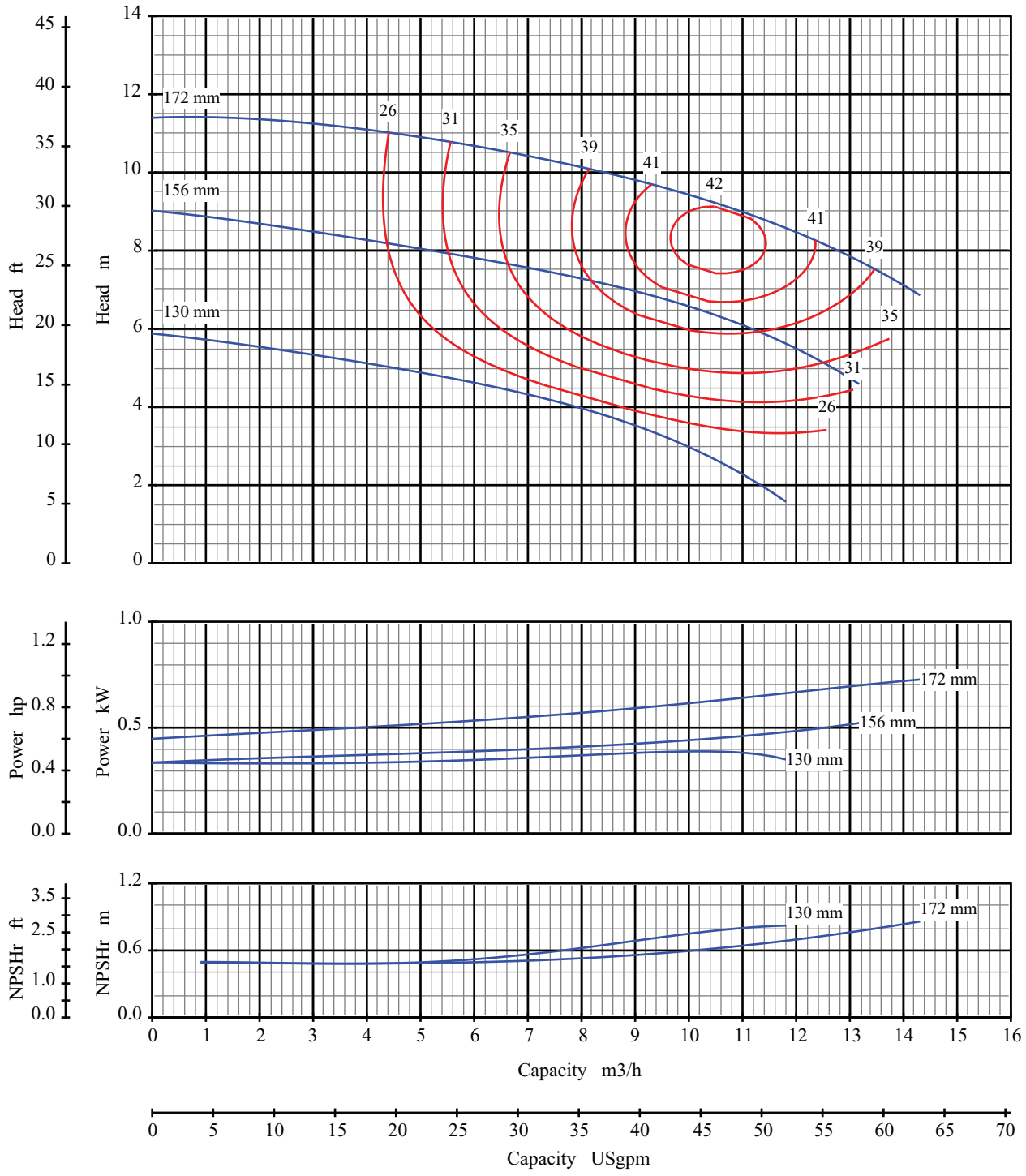
Pump Size: 32x50 160

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18127V1

Blackmer System One

Pump Performance Characteristics

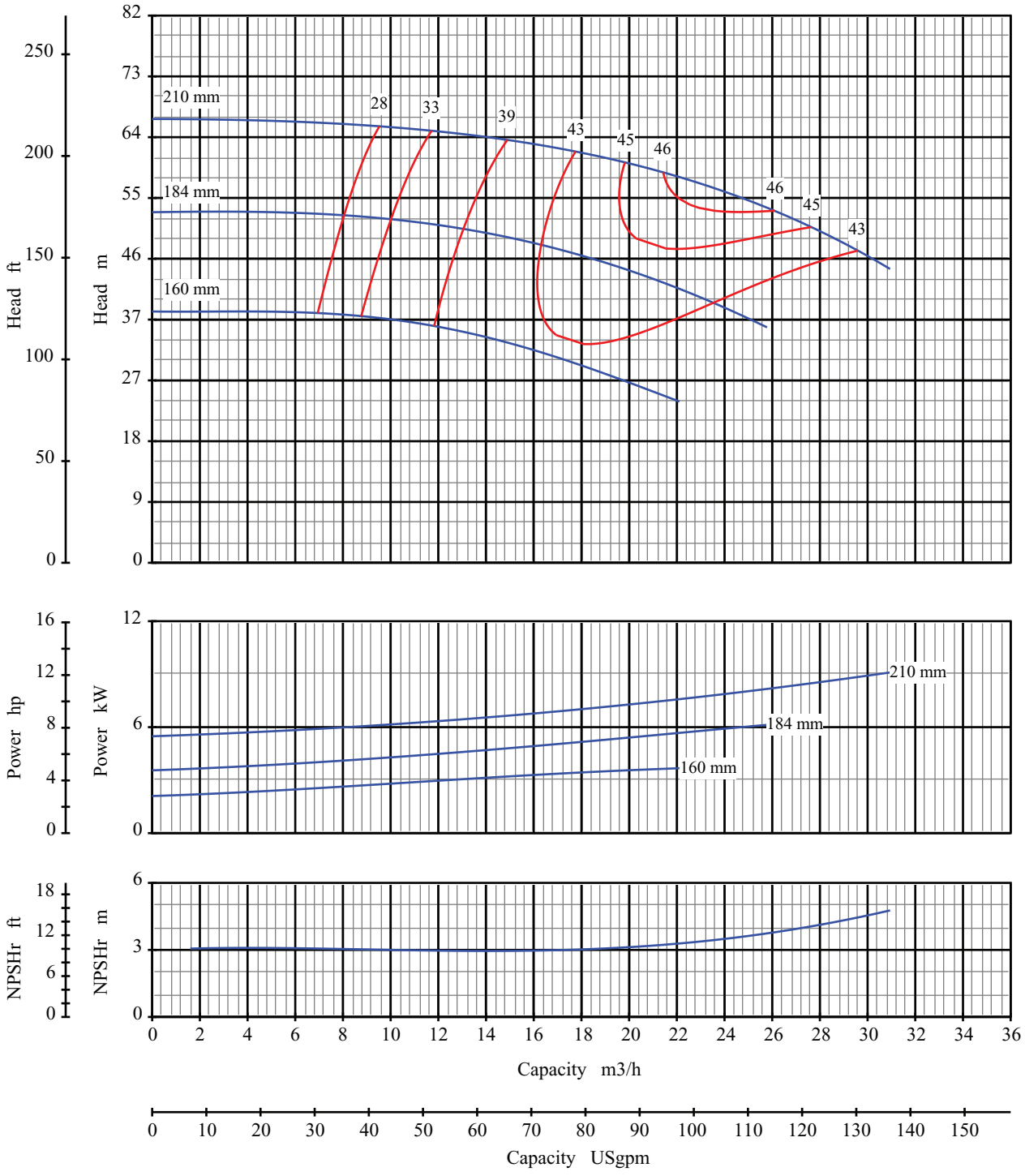
Pump Size: 32x50 160

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18131V1

Blackmer System One

Pump Performance Characteristics

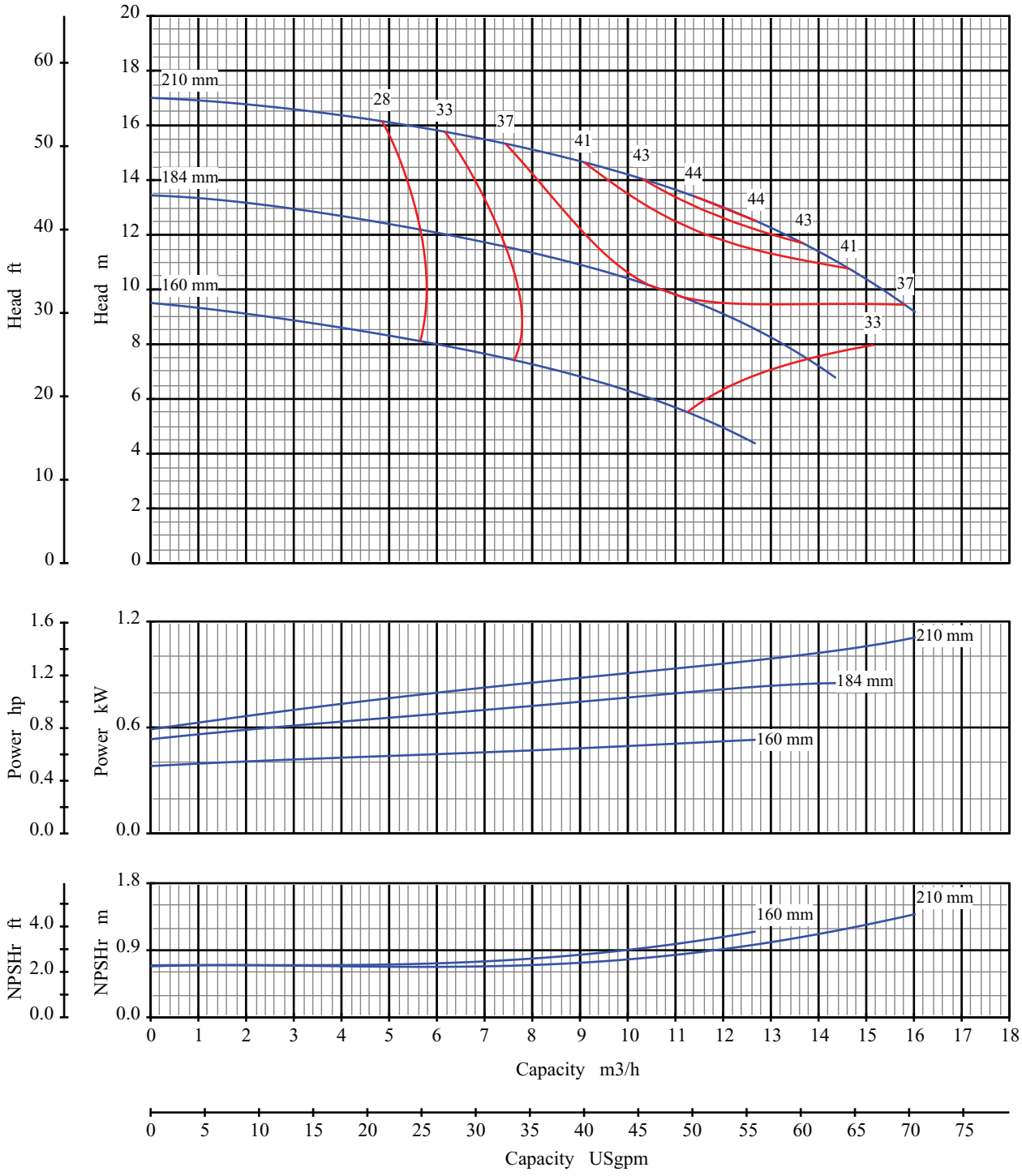
Pump Size: 32x50 200

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18133V1

Blackmer System One

Pump Performance Characteristics

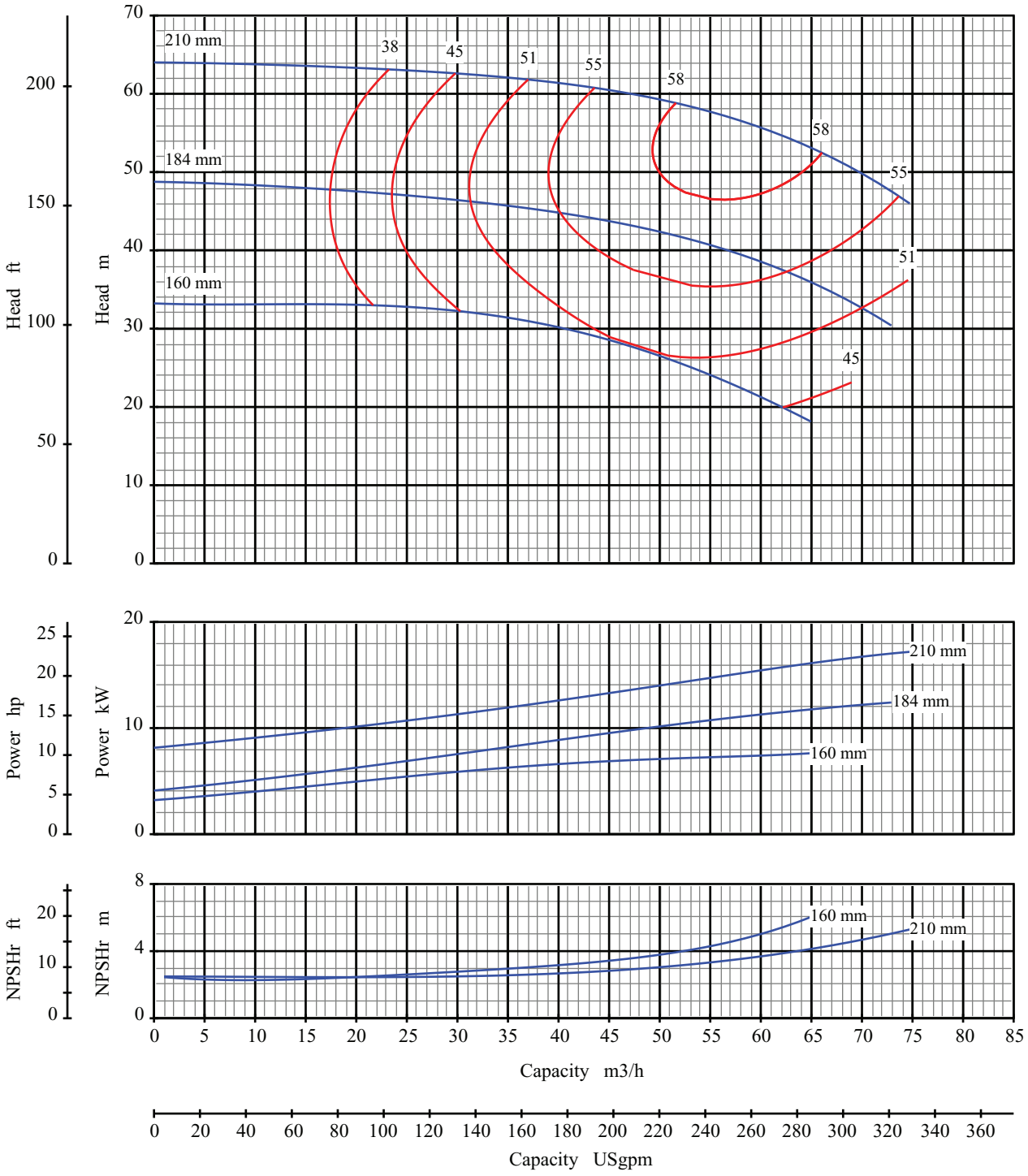
Pump Size: 32x50 200

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18137V1

Blackmer System One

Pump Performance Characteristics

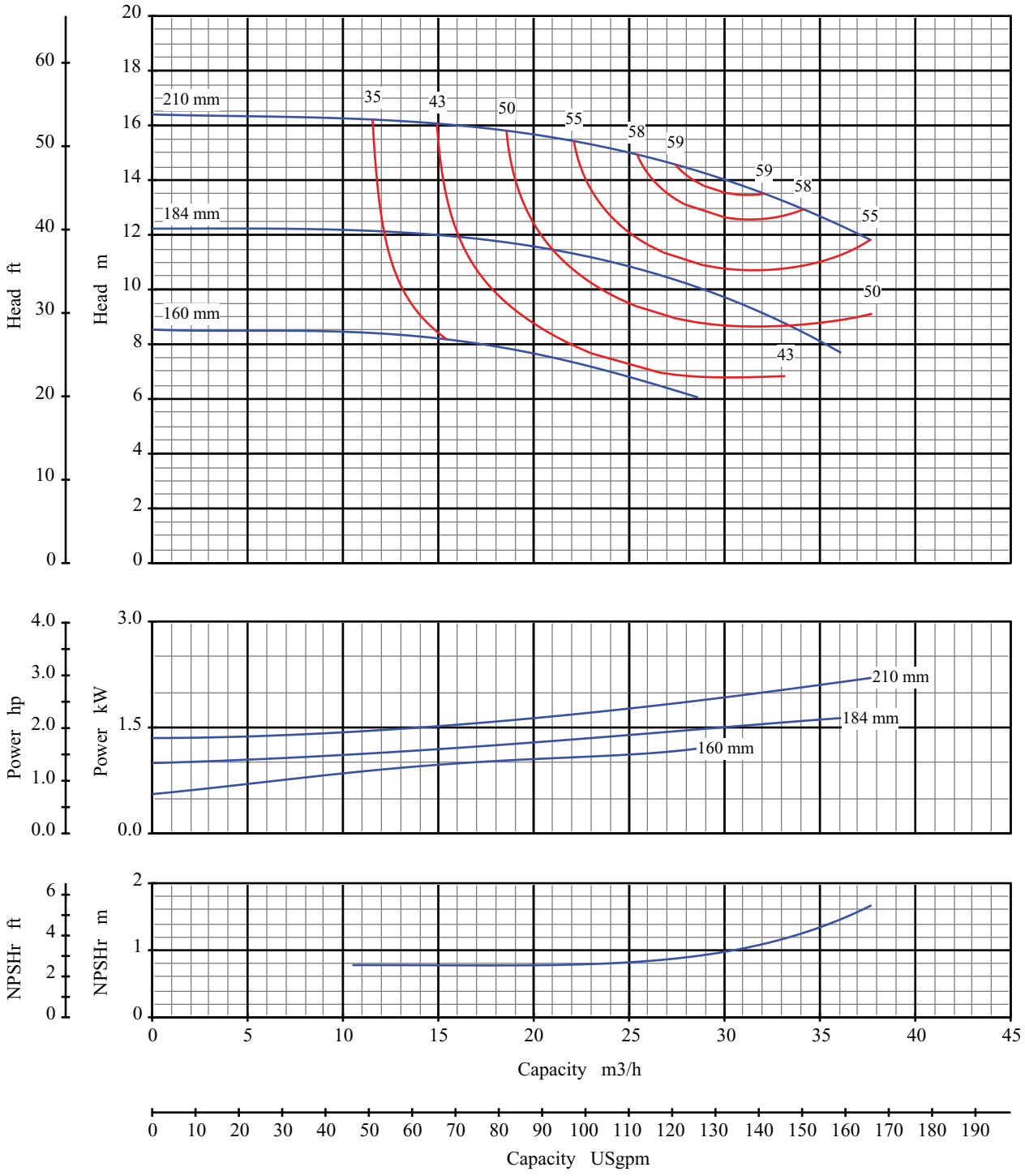
Pump Size: 50x80 200

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18139V1

Blackmer System One

Pump Performance Characteristics

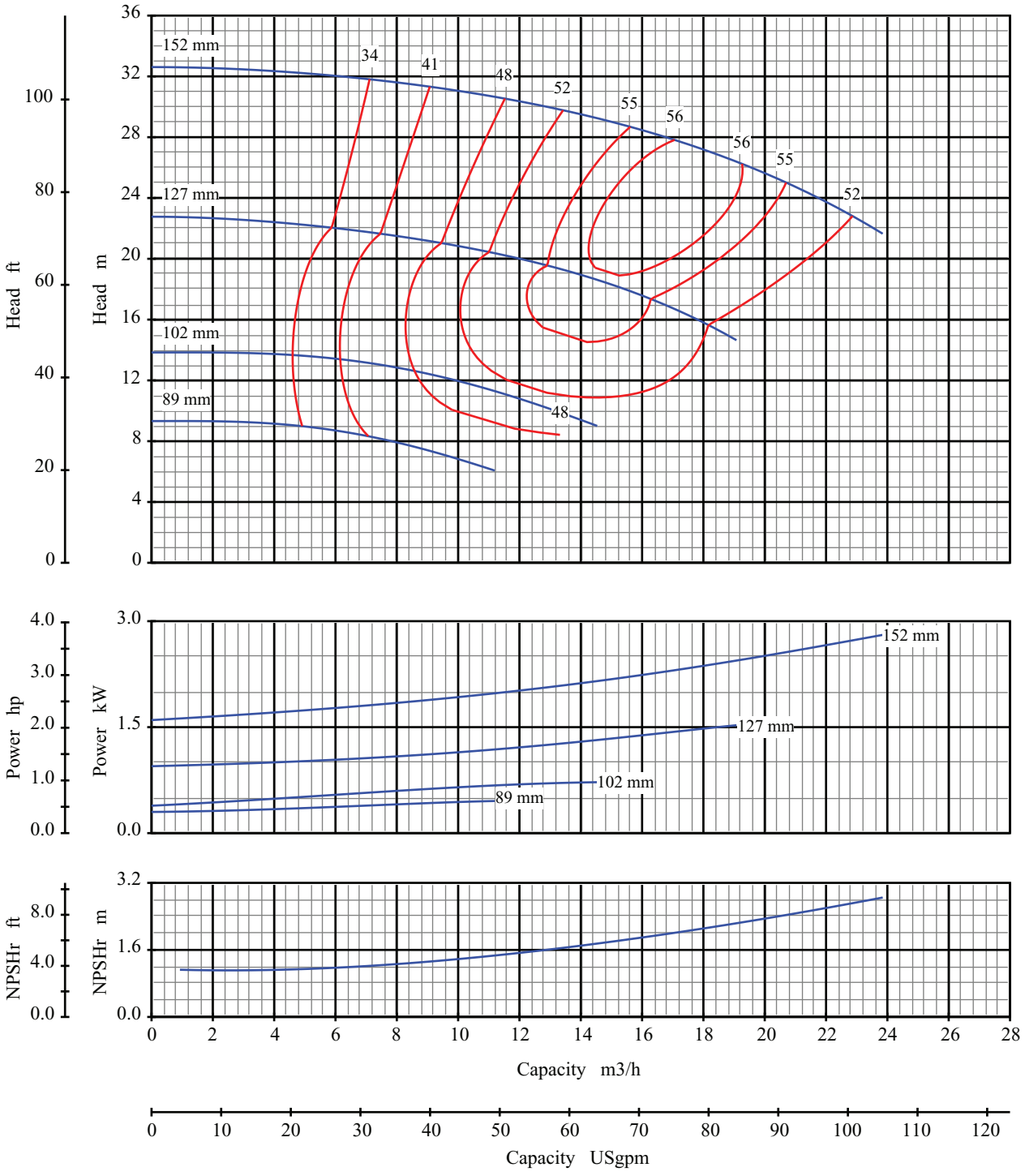
Pump Size: 50x80 200

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18101V1

Blackmer System One

Pump Performance Characteristics

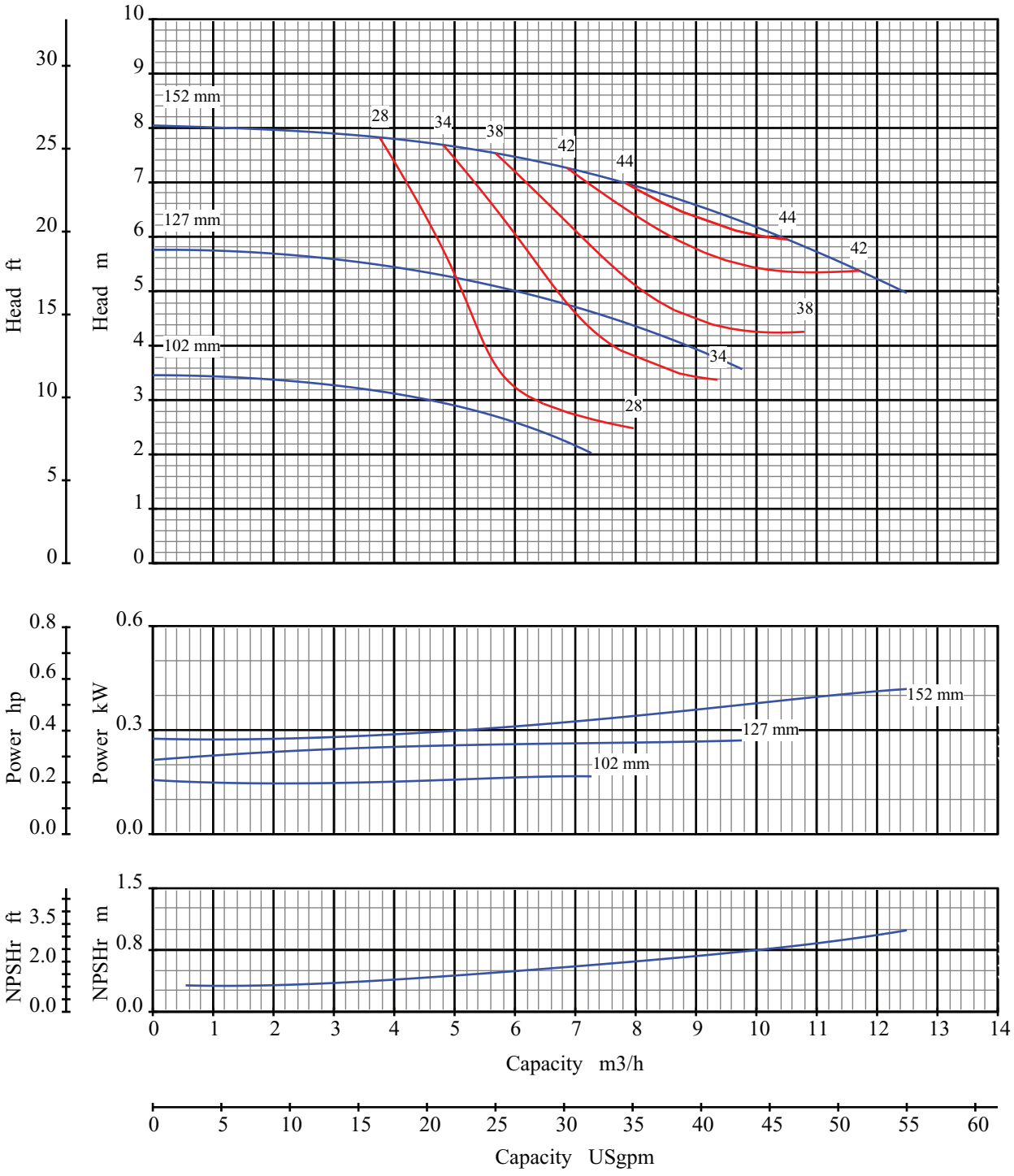
Pump Size: 1x1.5 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18103V1

Blackmer System One

Pump Performance Characteristics

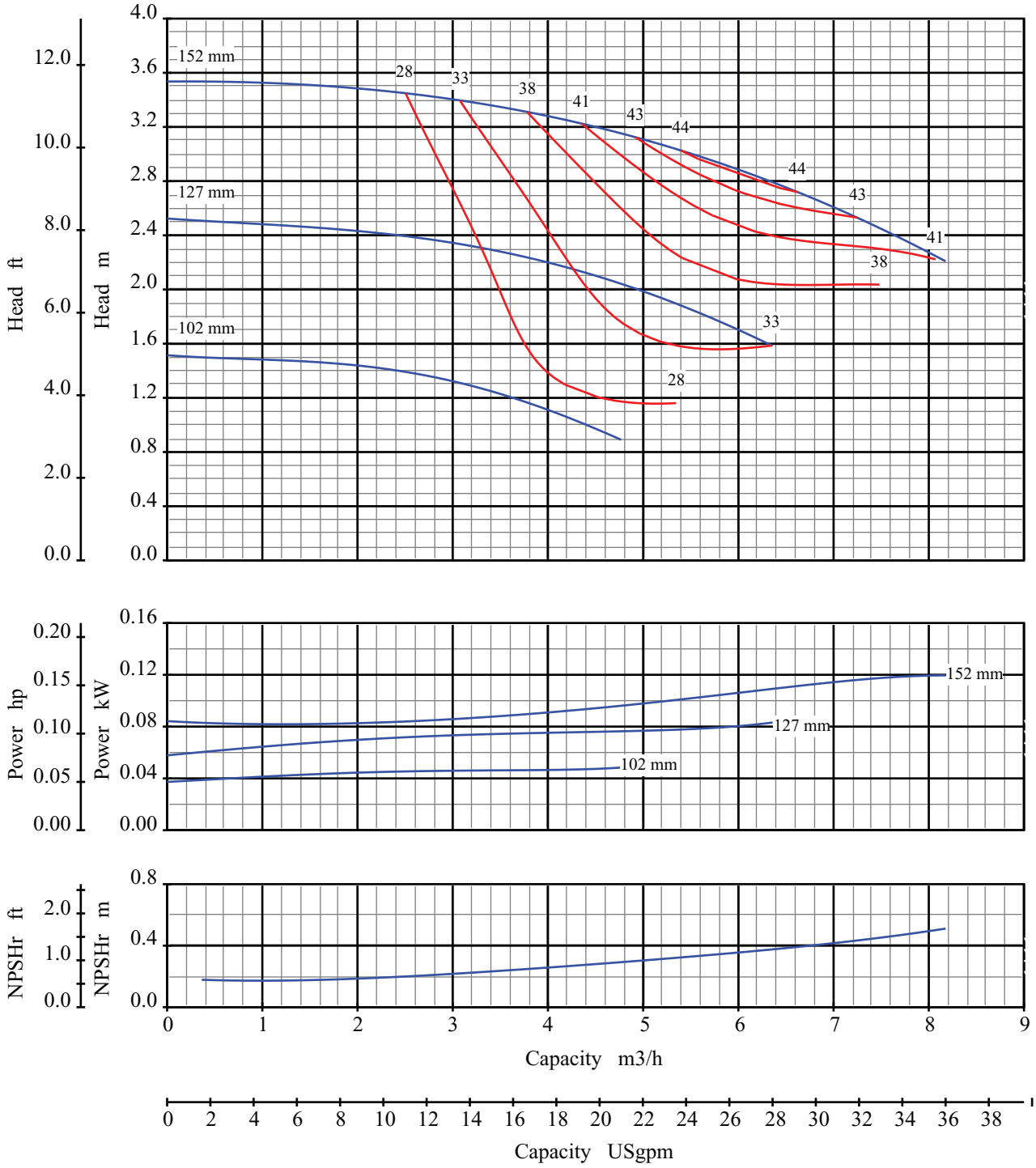
Pump Size: 1x1.5 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18105V1

Blackmer System One

Pump Performance Characteristics

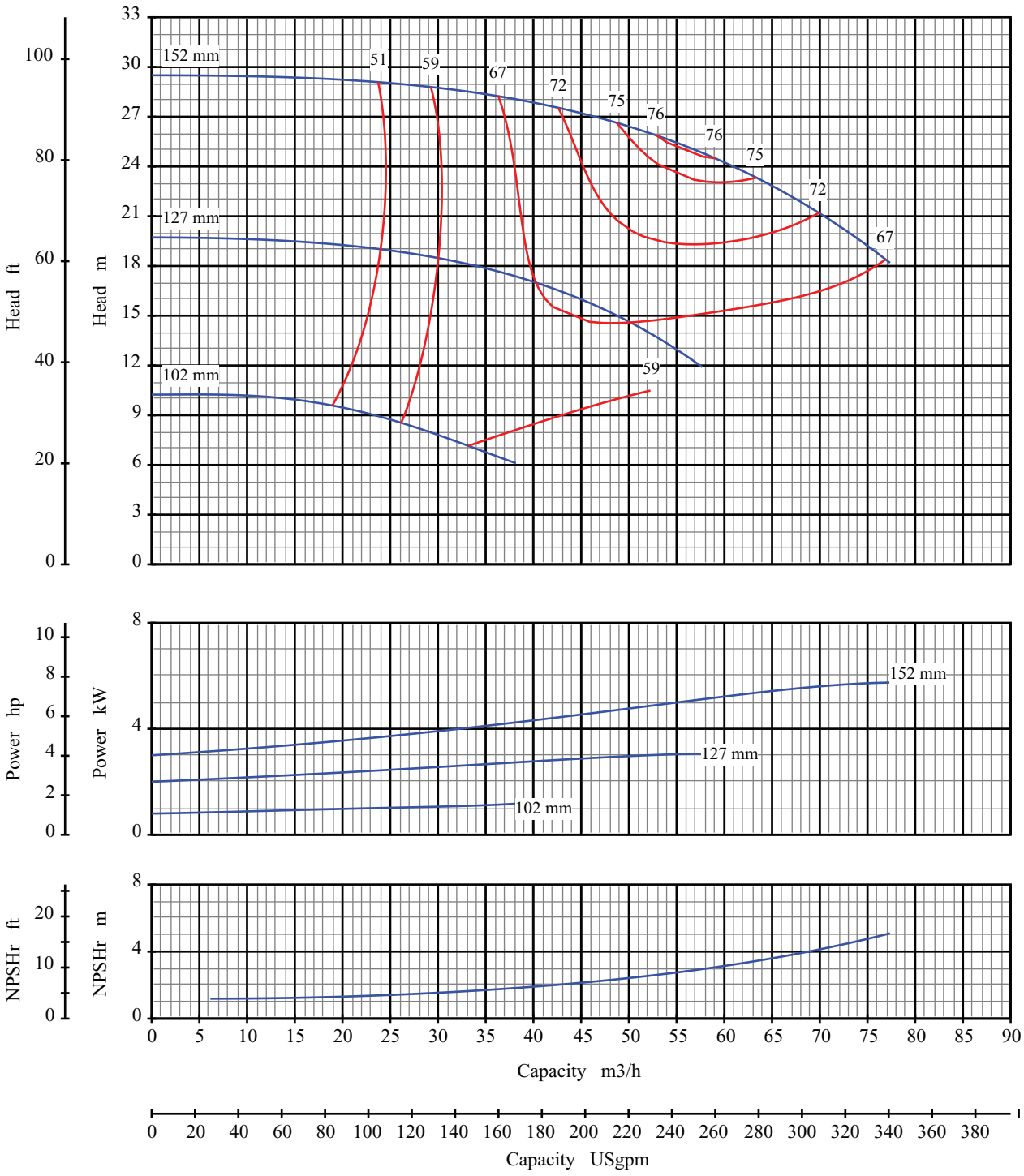
Pump Size: 1x1.5 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 960 rpm

Open Impeller



Curve No: S18107V1

Blackmer System One

Pump Performance Characteristics

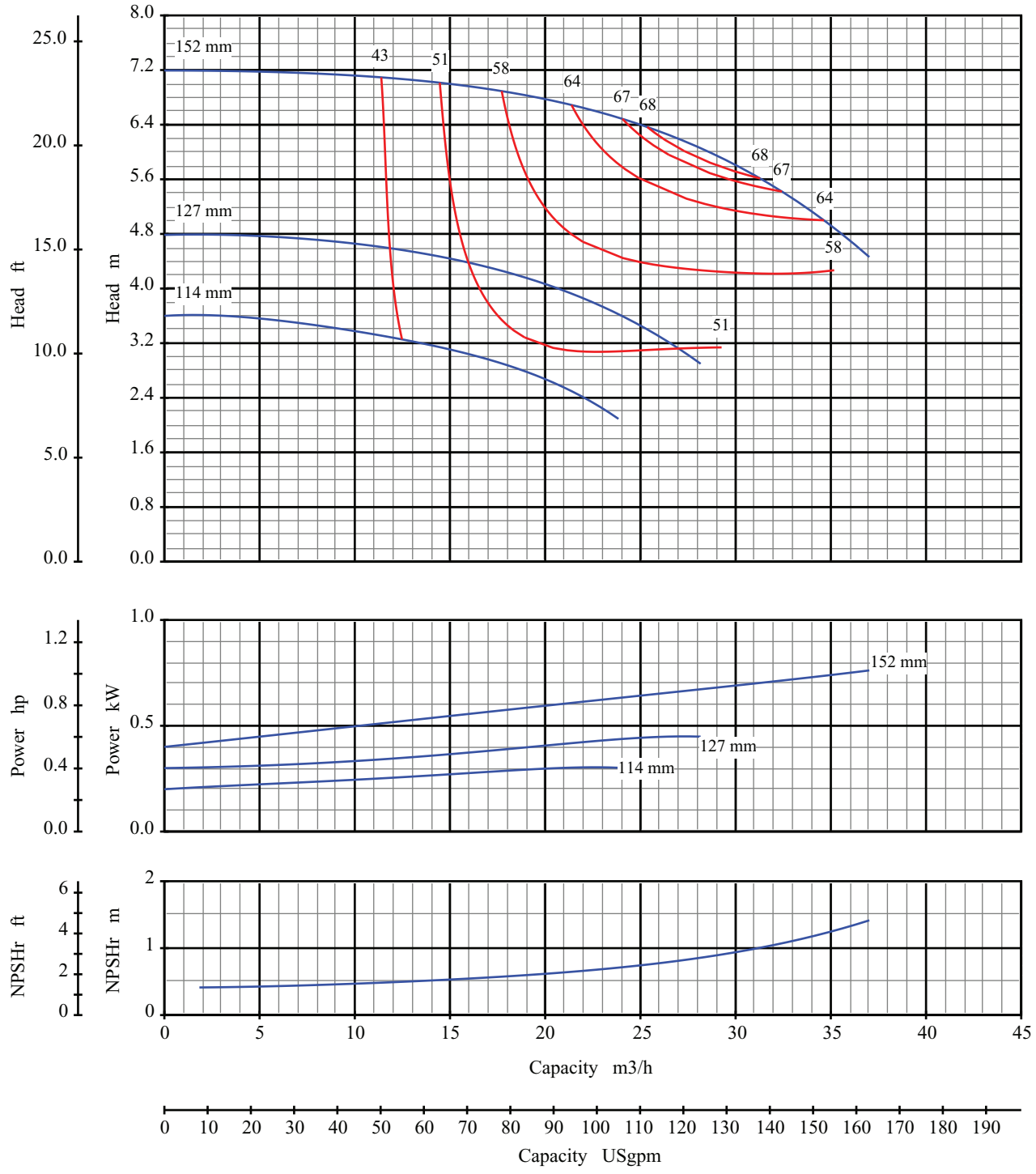
Pump Size: 2x3 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18109V1

Blackmer System One

Pump Performance Characteristics

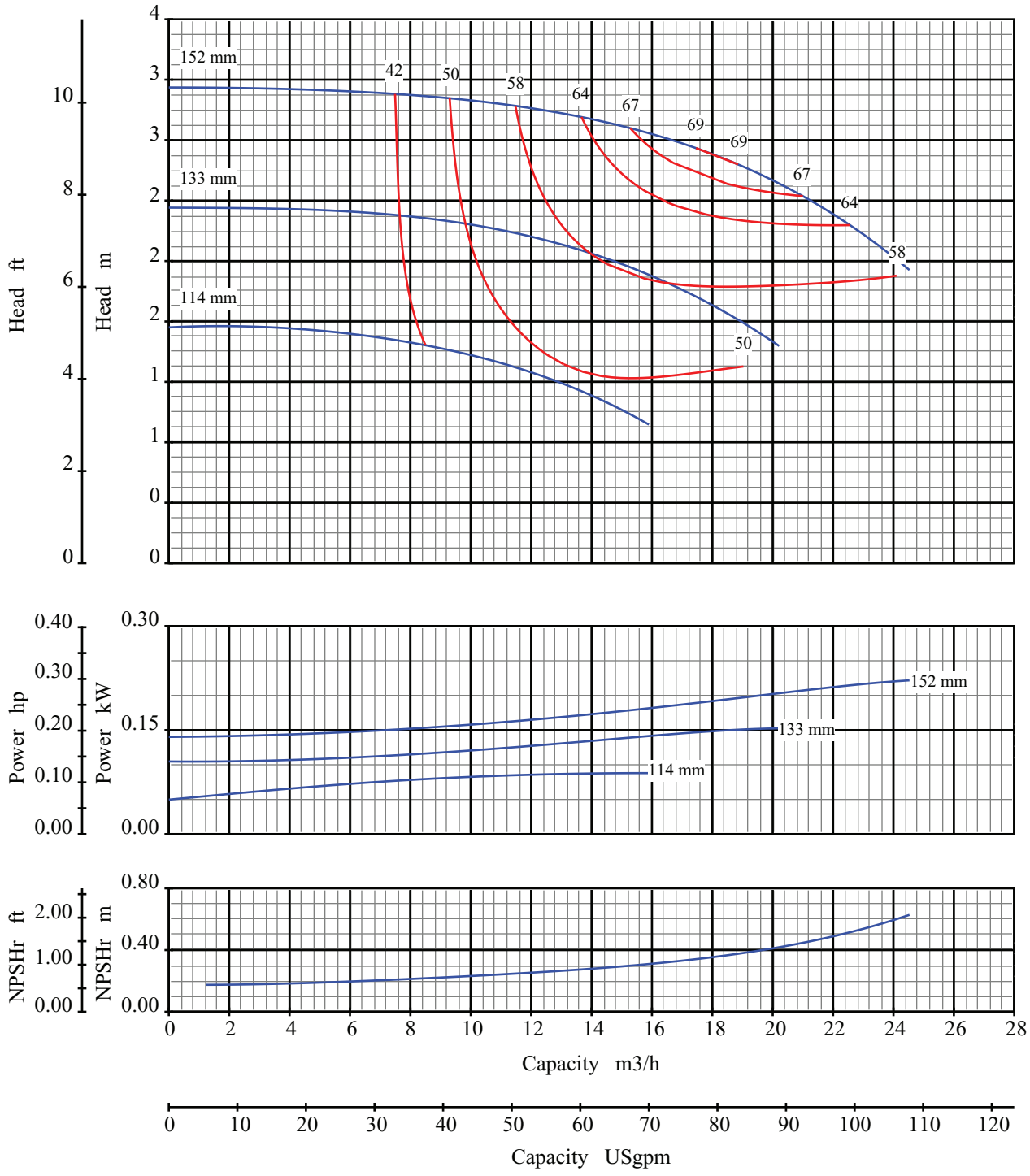
Pump Size: 2x3 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18111V1

Blackmer System One

Pump Performance Characteristics

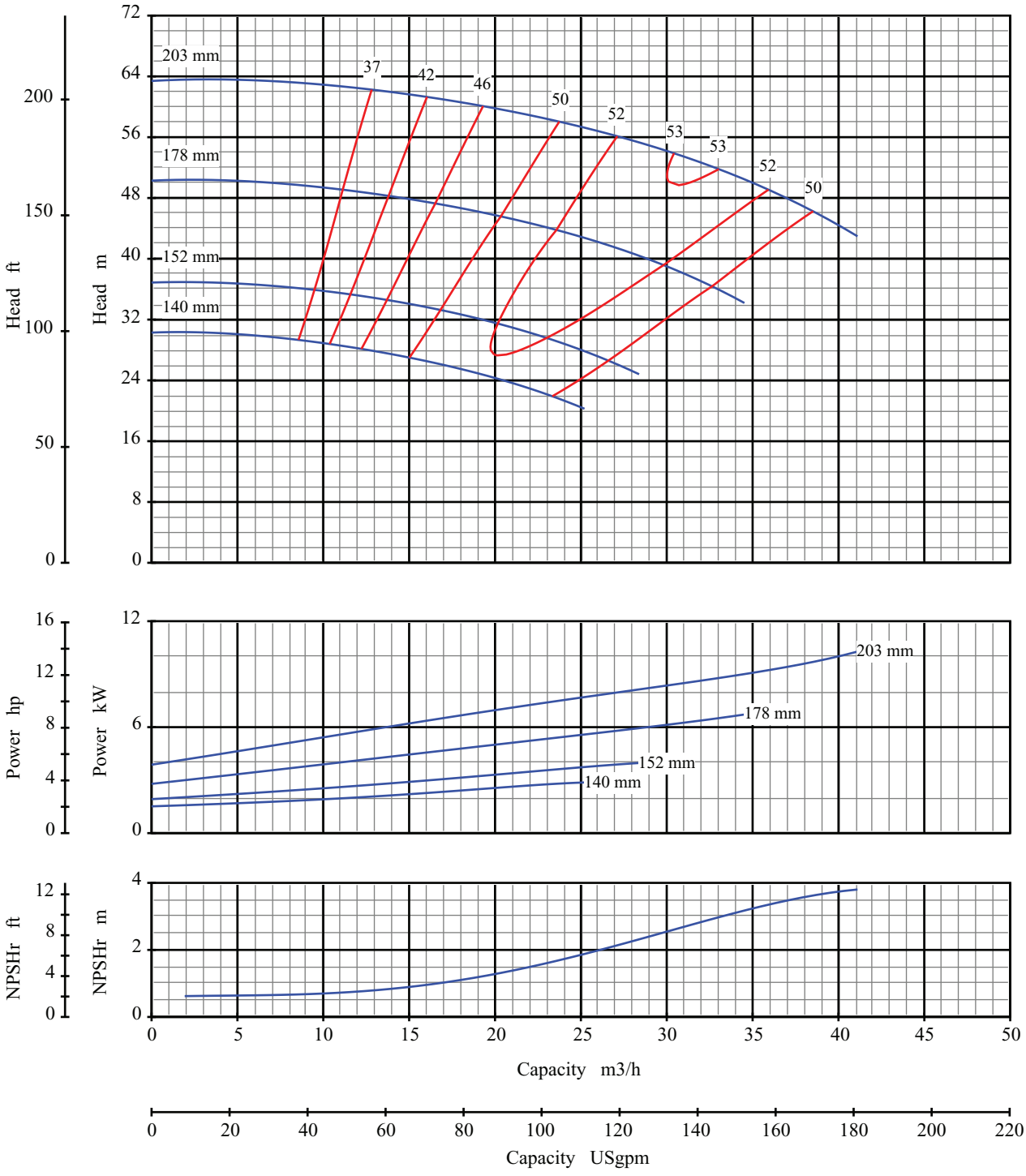
Pump Size: 2x3 6

Effective Date: Jan/2005

Catalog: 1301

Speed: 960 rpm

Open Impeller



Curve No: S18113V1

Blackmer System One

Pump Performance Characteristics

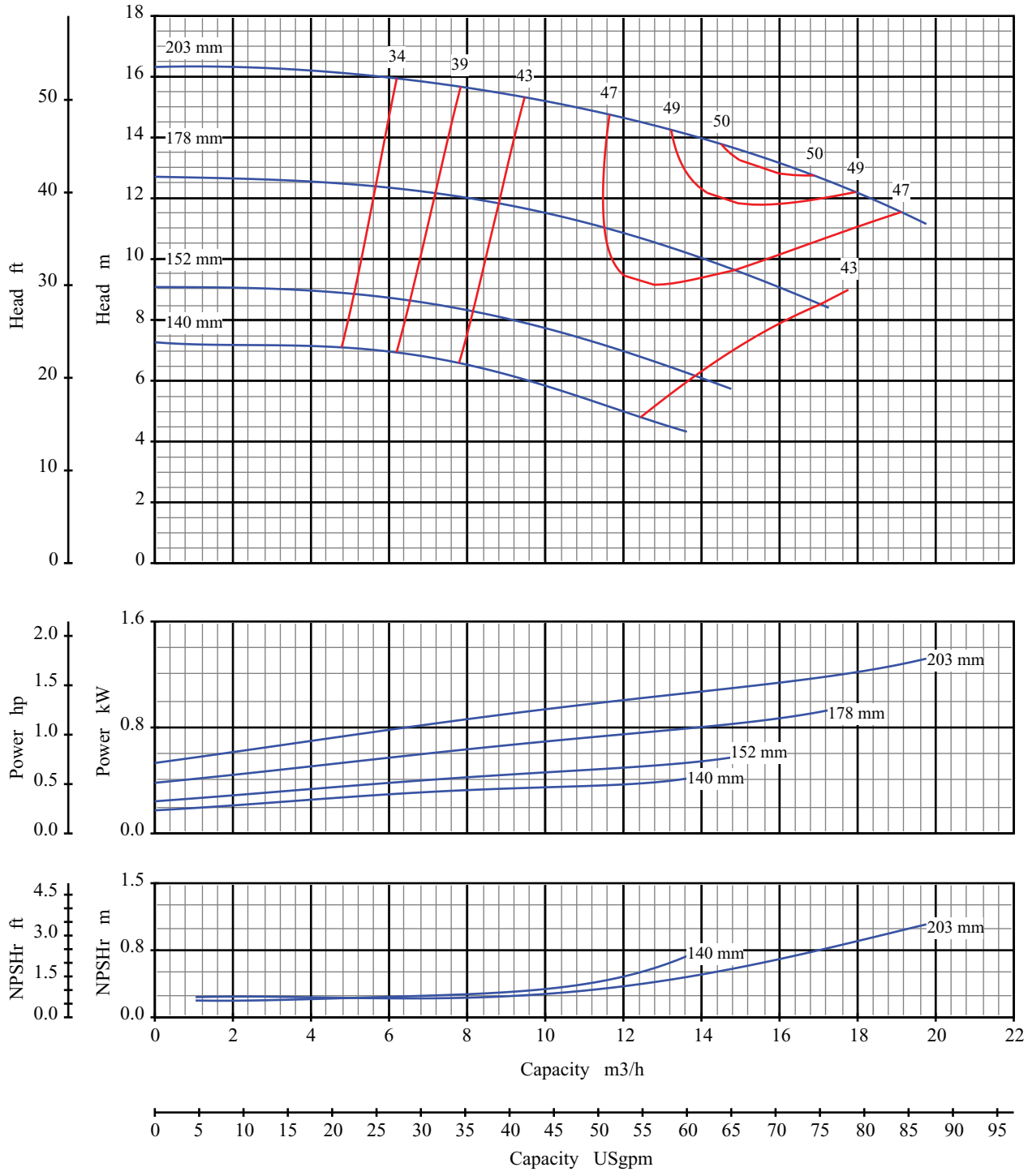
Pump Size: 1x1.5 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18115V1

Blackmer System One

Pump Performance Characteristics

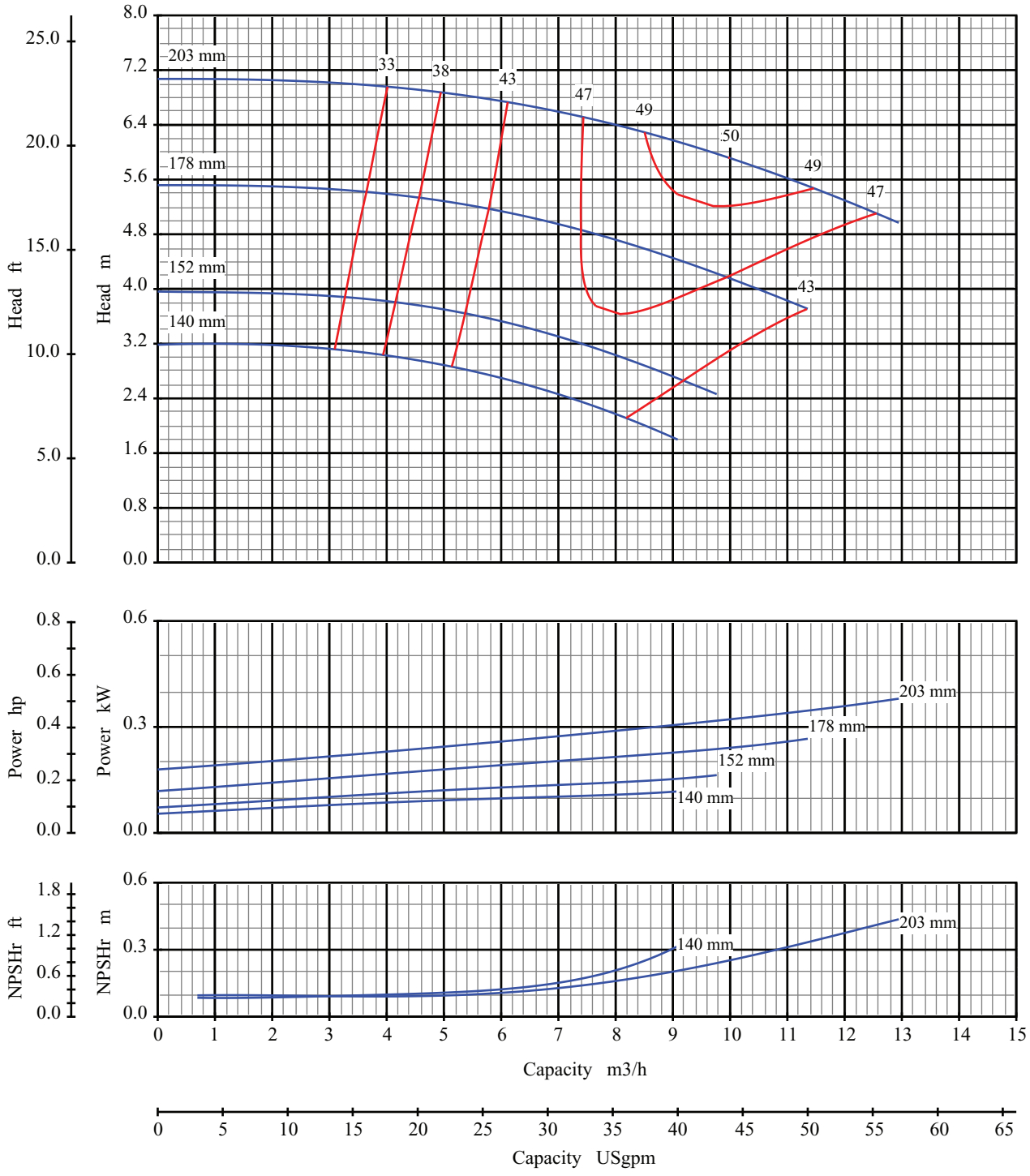
Pump Size: 1x1.5 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18117V1

Blackmer System One

Pump Performance Characteristics

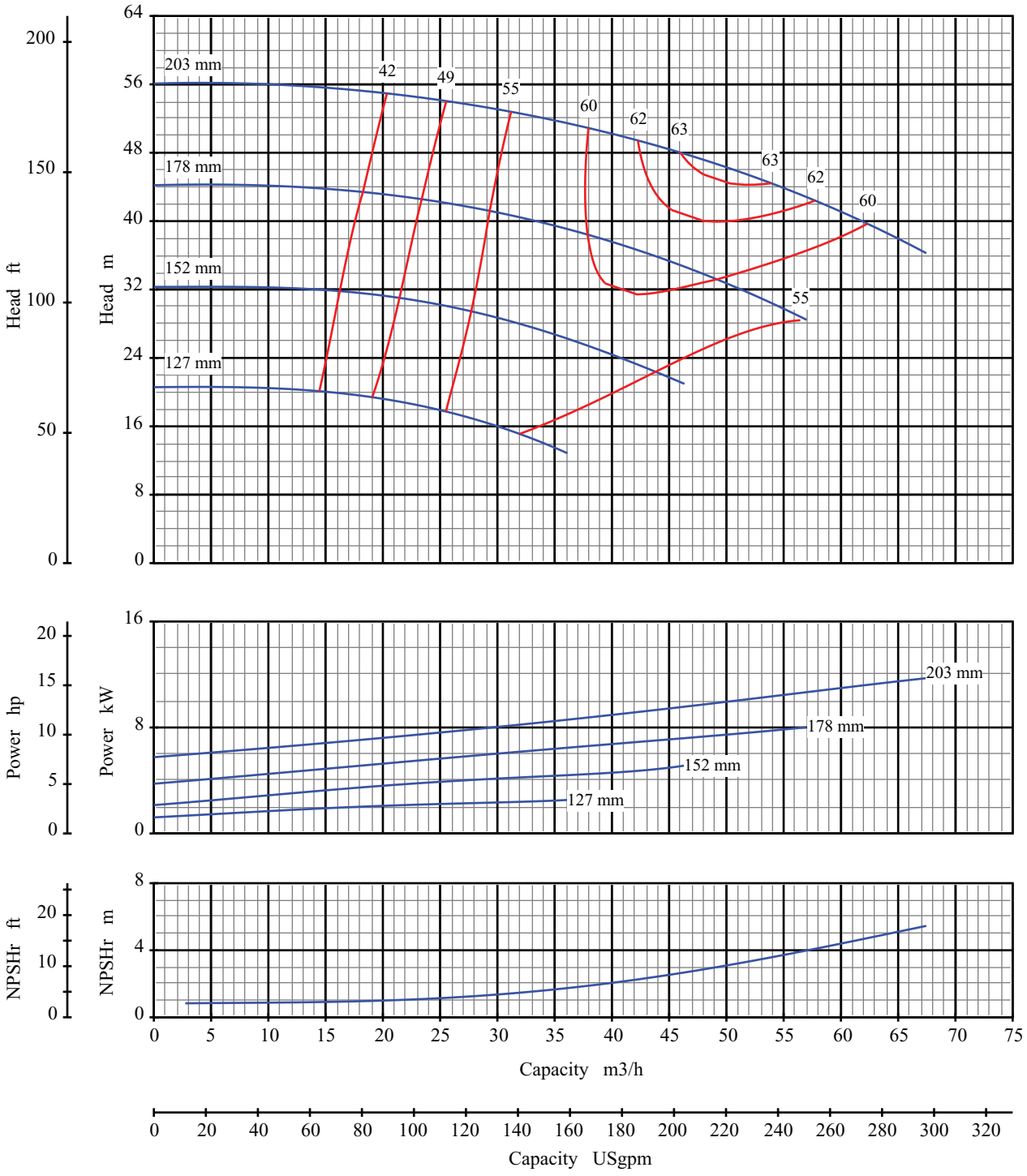
Pump Size: 1x1.5 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 960 rpm

Open Impeller



Curve No: S18119V1

Blackmer System One

Pump Performance Characteristics

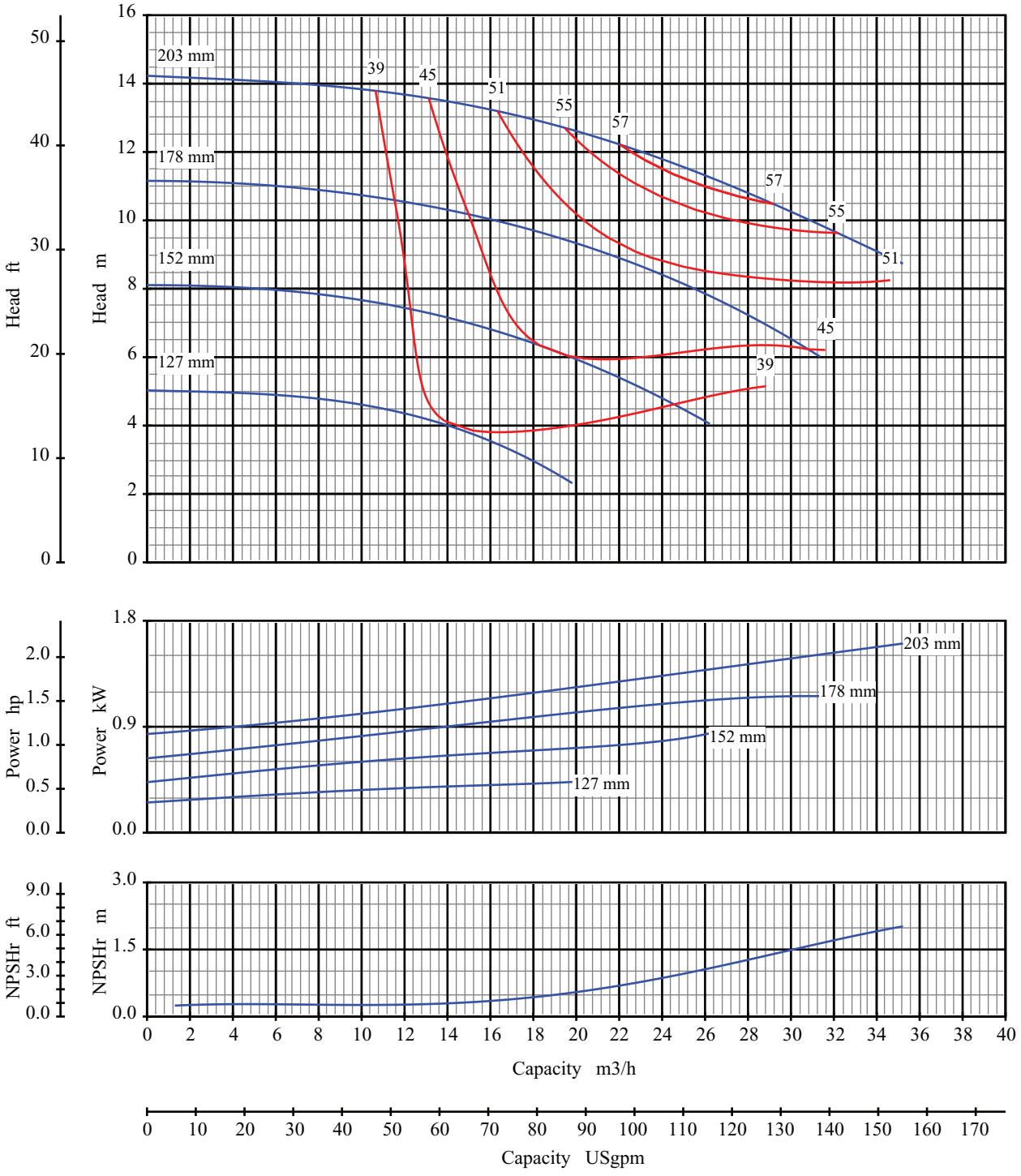
Pump Size: 1.5x3 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 2900 rpm

Open Impeller



Curve No: S18121V1

Blackmer System One

Pump Performance Characteristics

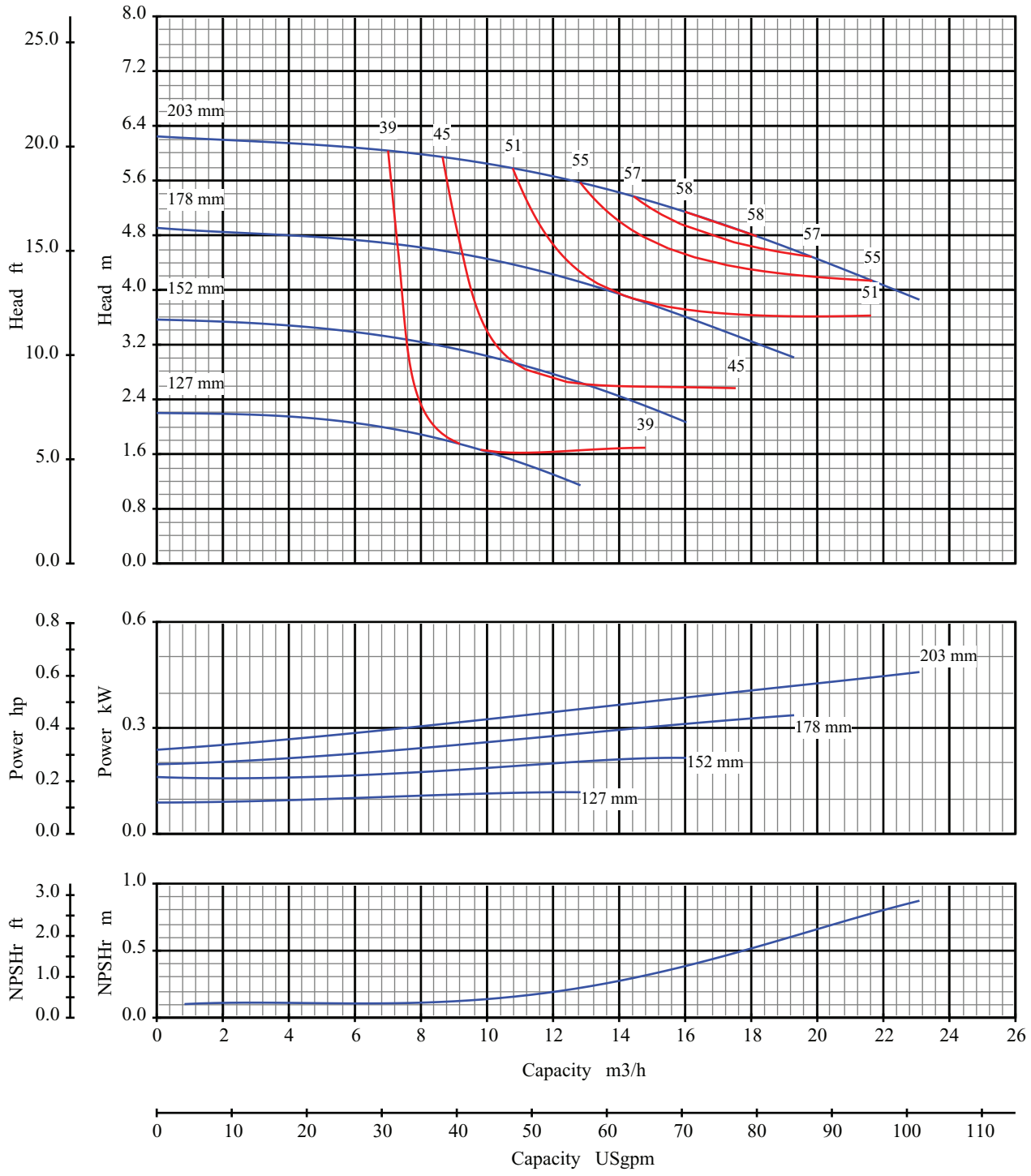
Pump Size: 1.5x3 8

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18123V1

Blackmer System One

Pump Performance Characteristics

Pump Size: 1.5x3 8

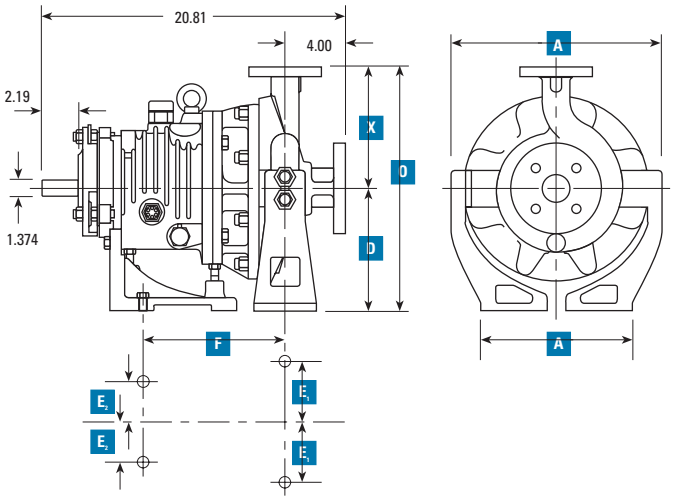
Effective Date: Jan/2005

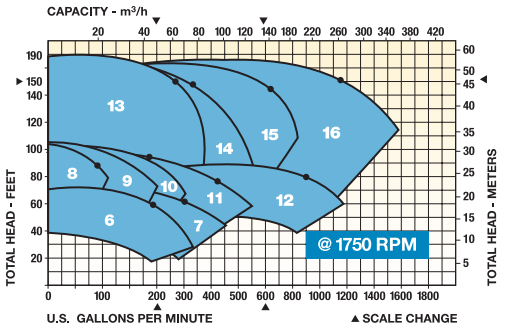
Catalog: 1301

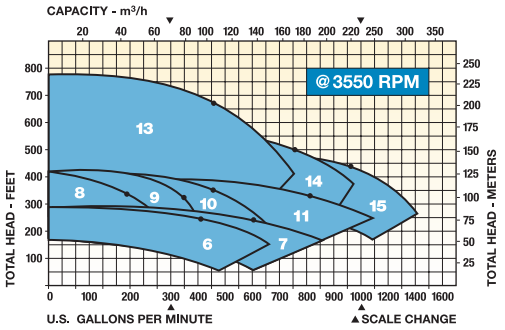
Speed: 960 rpm

Open Impeller

LD17 Pump (ASME/ANSI)





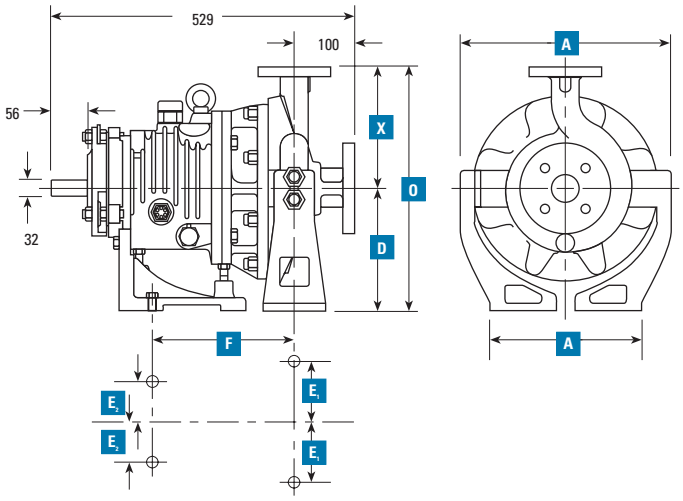


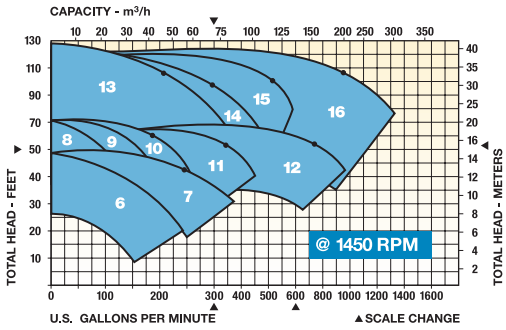
LD17 Pump – ASME/ANSI

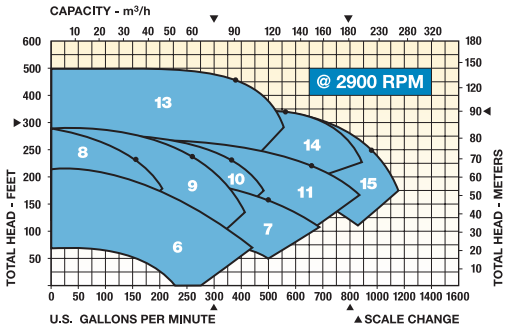
	Pump Size	Discharge	Suction	X	D	O	F	$2E_1$	$2E_2$	A	A_1
6	2 x 3-8	2.0	3.0	9.50	8.25	17.75	9.81	9.75	7.25	15.00	15.00
7	3 x 4-8	3.0	4.0	11.00	8.25	19.25	9.81	9.75	7.25	15.75	15.75
8	1 x 2-10	1.0	2.0	8.50	8.25	16.75	9.81	9.75	7.25	15.75	15.75
9	1.5 x 3-10	1.5	3.0	8.50	8.25	16.75	9.81	9.75	7.25	16.13	16.13
10	2 x 3-10	2.0	3.0	9.50	8.25	17.75	9.81	9.75	7.25	16.38	16.38
11	3 x 4-10	3.0	4.0	11.10	8.25	19.25	9.81	9.75	7.25	13.63	17.63
12	4 x 6-10	4.0	6.0	13.50	10.00	23.50	9.81	9.75	7.25	14.44	19.94
13	1.5 x 3-13	1.5	3.0	10.50	10.00	20.50	9.81	9.75	7.25	15.00	20.50
14	2 x 3-13	2.0	3.0	11.50	10.00	21.50	9.81	9.75	7.25	15.38	20.88
15	3 x 4-13	3.0	4.0	12.50	10.00	22.50	9.81	13.00	7.25	16.63	22.13
16	4 x 6-13	4.0	6.0	13.50	10.00	23.50	9.81	13.00	7.25	17.56	23.07

All dimensions are in inches.

LD17 Pump (IPP Metric)







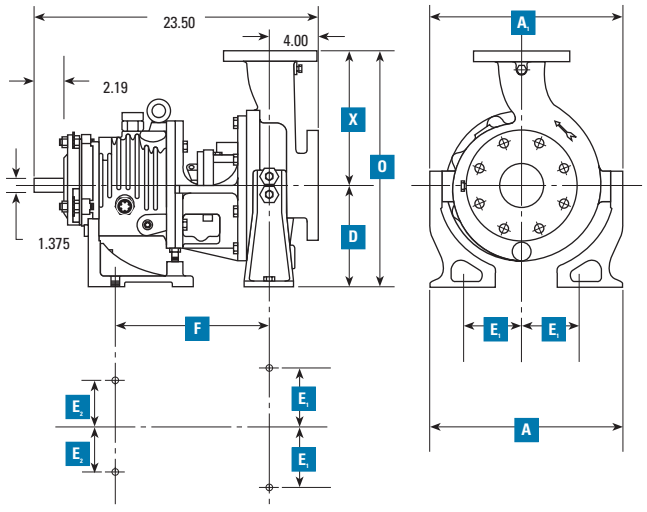
LD17 Pump – IPP Metric

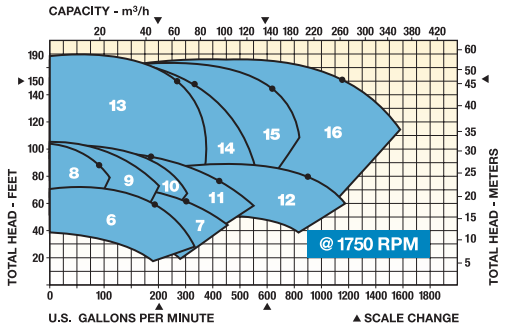
	Pump Size	Discharge	Suction	X	D	O	F	$2E_1$	$2E_2$	A	A_1
6	50 x 80-200	50	80	241	200	441	249	250	184	279	381
7	80 x 100-200	80	100	279	200	479	249	250	184	298	400
8	25 x 50-250	25	50	216	200	416	249	250	184	298	400
9	40 x 80-250	40	80	216	200	416	249	250	184	318	419
10	50 x 80-250	50	80	241	200	441	249	250	184	314	416
11	80 x 100-250	80	100	279	200	479	249	250	184	346	448
12	100 x 150-250	100	150	343	250	593	249	250	184	367	506
13	40 x 80-330	40	80	267	250	517	249	250	184	381	521
14	50 x 80-330	50	80	292	250	542	249	250	184	391	530
15	80 x 100-300	80	100	318	250	568	249	330	184	422	562
16	100 x 150-300	100	150	343	250	593	249	330	184	460	586

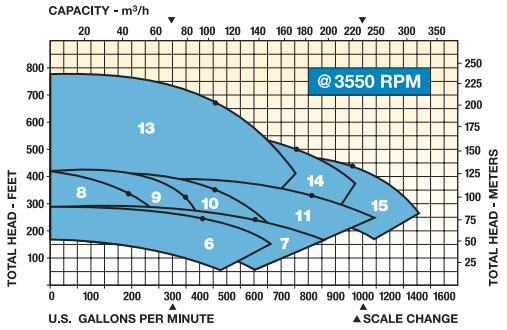
All dimensions are in millimeters.

- The most stable shaft in the industry keeps mechanical seal faces perfectly centered for the lowest possible VOC emissions.

Frame A (ASME/ANSI)





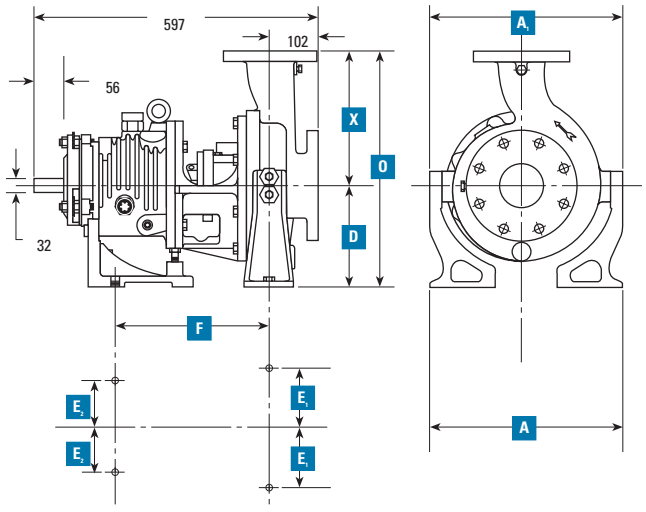


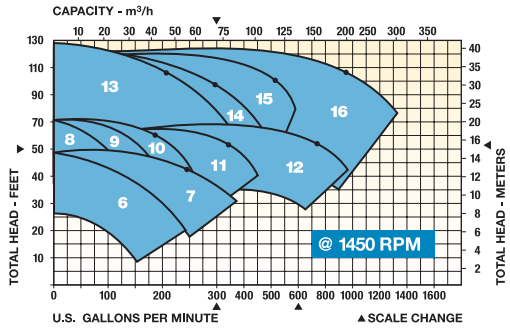
Frame A Pump – ASME/ANSI

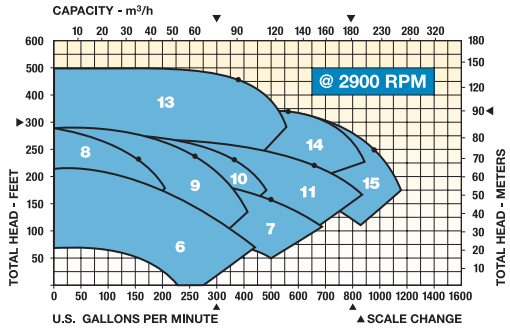
	Pump Size	Discharge	Suction	X	D	O	F	2E1	2E2	A	A1
6	2 x 3-8	2.0	3.0	9.50	8.25	17.75	12.50	9.75	7.25	15.00	15.00
7	3 x 4-8	3.0	4.0	11.00	8.25	19.25	12.50	9.75	7.25	15.75	15.75
8	1 x 2-10	1.0	2.0	8.50	8.25	16.75	12.50	9.75	7.25	15.75	15.75
9	1.5 x 3-10	1.5	3.0	8.50	8.25	16.75	12.50	9.75	7.25	16.13	16.13
10	2 x 3-10	2.0	3.0	9.50	8.25	17.75	12.50	9.75	7.25	16.38	16.38
11	3 x 4-10	3.0	4.0	11.10	8.25	19.25	12.50	9.75	7.25	13.63	17.63
12	4 x 6-10	4.0	6.0	13.50	10.00	23.50	12.50	9.75	7.25	14.44	19.94
13	1.5 x 3-13	1.5	3.0	10.50	10.00	20.50	12.50	9.75	7.25	15.00	20.50
14	2 x 3-13	2.0	3.0	11.50	10.00	21.50	12.50	9.75	7.25	15.38	20.88
15	3 x 4-13	3.0	4.0	12.50	10.00	22.50	12.50	13.00	7.25	16.63	22.13
16	4 x 6-13	4.0	6.0	13.50	10.00	23.50	12.50	13.00	7.25	17.56	23.07

All dimensions are in inches.

Frame A (IPP Metric)







Frame A Pump – IPP Metric

	Pump Size	Discharge	Suction	X	D	O	F	2E1	2E2	A	A1
6	50 x 80-200	50	80	241	200	441	318	250	184	279	381
7	80 x 100-200	80	100	279	200	479	318	250	184	298	400
8	25 x 50-250	25	50	216	200	416	318	250	184	298	400
9	40 x 80-250	40	80	216	200	416	318	250	184	318	419
10	50 x 80-250	50	80	241	200	441	318	250	184	314	416
11	80 x 100-250	80	100	279	200	479	318	250	184	346	448
12	100 x 150-250	100	150	343	250	593	318	250	184	367	506
13	40 x 80-330	40	80	267	250	517	318	250	184	381	521
14	50 x 80-330	50	80	292	250	542	318	250	184	391	530
15	80 x 100-330	80	100	318	250	568	318	330	184	422	562
16	100 x 150-330	100	150	343	250	593	318	330	184	460	586

All dimensions are in millimeters.

- Centerline mount for high temperature applications
- Optional left or right side discharge

System One® Pumps Design Data - Frame LD17

Inches (mm)

	2.0 x 3.0-08	3.0 x 4.0-08	1.0 x 2.0-10	1.5 x 3.0-10	2.0 x 3.0-10	3.0 x 4.0-10	4.0 x 6.0-10	1.5 x 3.0-13	2.0 x 3.0-13	3.0 x 4.0-13	4.0 x 6.0-13
Shaft											
L3/D4 Ratio	17 (.65)										
Diameter at Impeller	1.06 (27) 1.00-12 UNF Thread High Torque 1.31 (33) 1.25-12 UNF Thread										
Diameter at Seal	1.875 (47.63)										
Diameter Between Bearings	2.45 (62)										
Diameter at Coupling	1.375 (34.93)										
Bearings											
Thrust	SKF 7310 BEGAY (pair)										
Radial	6310 C3										
Bearing Span	6.02 (153)										
Shaft Overhang	5.94 (151)										
Seal Chamber											
Seal Bore Diameter (nose)	2.69 (68) nose										
Inside Bore	3.00 (76)										
Depth	2.00 (51)										
Back Cover/Shaft Clearance	Open 5 Degree Taper										
Gland Bolting ANSI	4X .500-13UNC on 4.62 B.C. (12 on 117 B.C.)										
Distance to Nearest Obstruction	2.19 (56)										
Open Impeller											
Clearance	.06 (1.5) Total .015 (0.4) Suction Side										
Eye Area sq. in. (cm^2)	10.6 (68)	10.6 (68)	2.8 (18)	7.9 (51)	9.4 (61)	10.6 (68)	26.8 (173)	7.7 (50)	13.5 (87)	14.4 (93)	30.2 (195)
Maximum Dia. Solids	0.5 (13)	0.6 (15)	0.4 (10)	0.4 (10)	0.7 (18)	0.8 (20)	0.8 (20)	0.5 (13)	0.6 (15)	0.7 (18)	1.0 (25)
Number of Vanes	5	5	4	5	4	4	6	4	4	4	5
Pumps Weights lbs/kg											
Pump Only	258 (116)	268 (121)	244 (110)	259 (117)	268 (121)	278 (125)	318 (143)	338 (152)	359 (162)	374 (168)	401 (180)
Casing											
Type	Single Volute										
Wall Thickness	0.44 (11) Minimum										
Maximum Working Pressure	See Pressure vs. Temperature Limit Chart										
Test pressure	Class 150 Flanges-250PSIG, Class 300 Flanges-450PSIG										
Rotating Element											
Wk^2 Dry lbs-ft^2 (kg-m^2)	0.53 (.022)	0.52 (.022)	0.68 (.029)	0.79 (.033)	1.04 (.043)	1.04 (.043)	1.08 (.045)	1.50 (.063)	1.80 (.076)	2.14 (.09)	2.48 (.104)
Wk^2 Wet lbs-ft^2 (kg-m^2)	0.80 (.033)	0.78 (.033)	1.02 (.043)	1.19 (.05)	1.56 (.066)	1.56 (.066)	1.62 (.068)	2.25 (.095)	2.70 (.113)	3.21 (.135)	3.72 (.156)
Maximum Speed (oil lube)	3500	3500	3500	3500	3500	3500	1750	3500	3500	3500	1750
Power Limits											
HP (KW)/100 RPM 316SS	3.4 (2.6)										
HP (KW)/100 RPM 17-4Ph	4.2 (3.1)										
HP (KW)/100 RPM 17-4Ph High Torque	5.6 (4.2)										

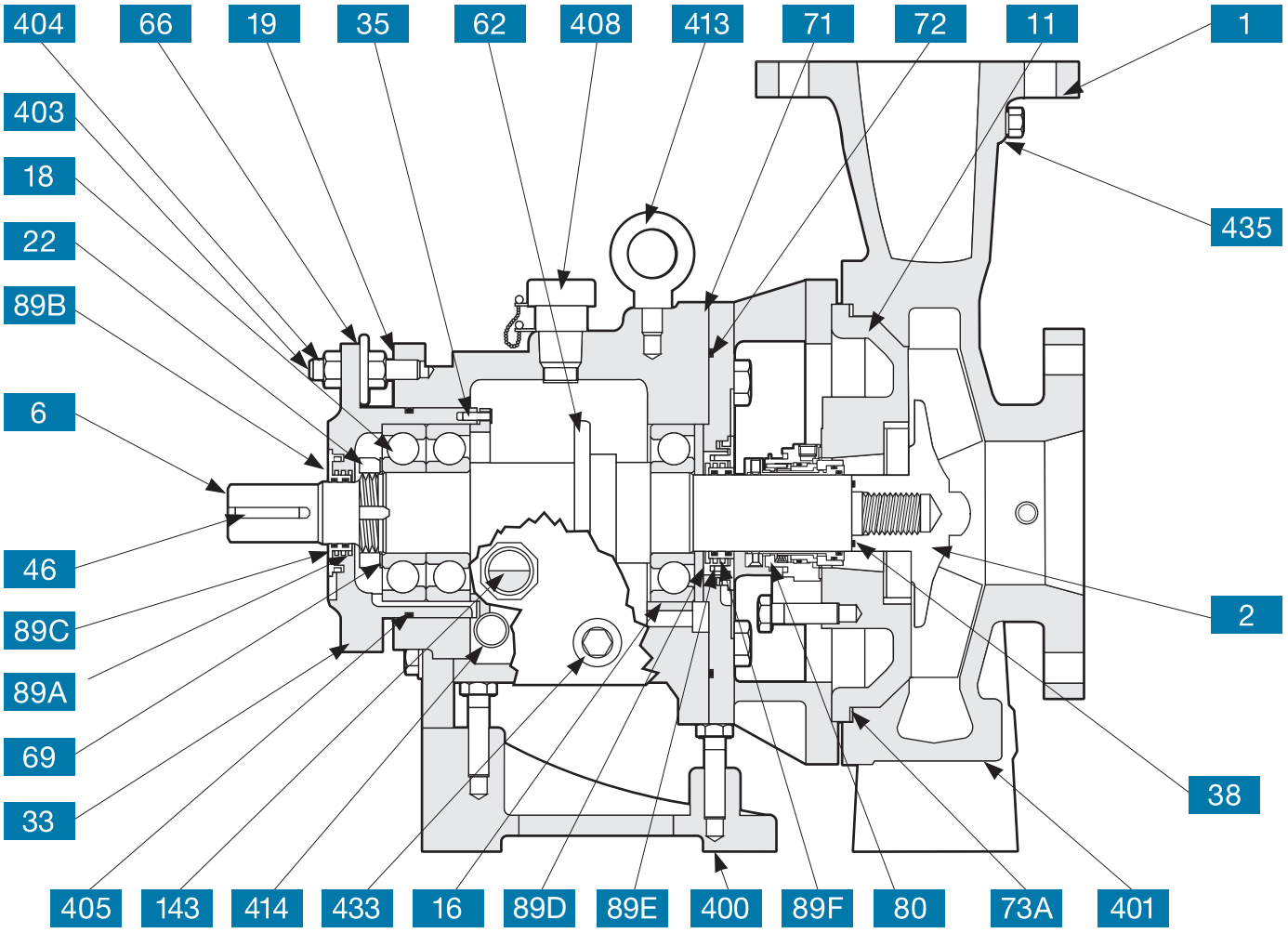
Reference drawings A40210, A40211

System One® Pumps Design Data - Frame A

Inches (mm)

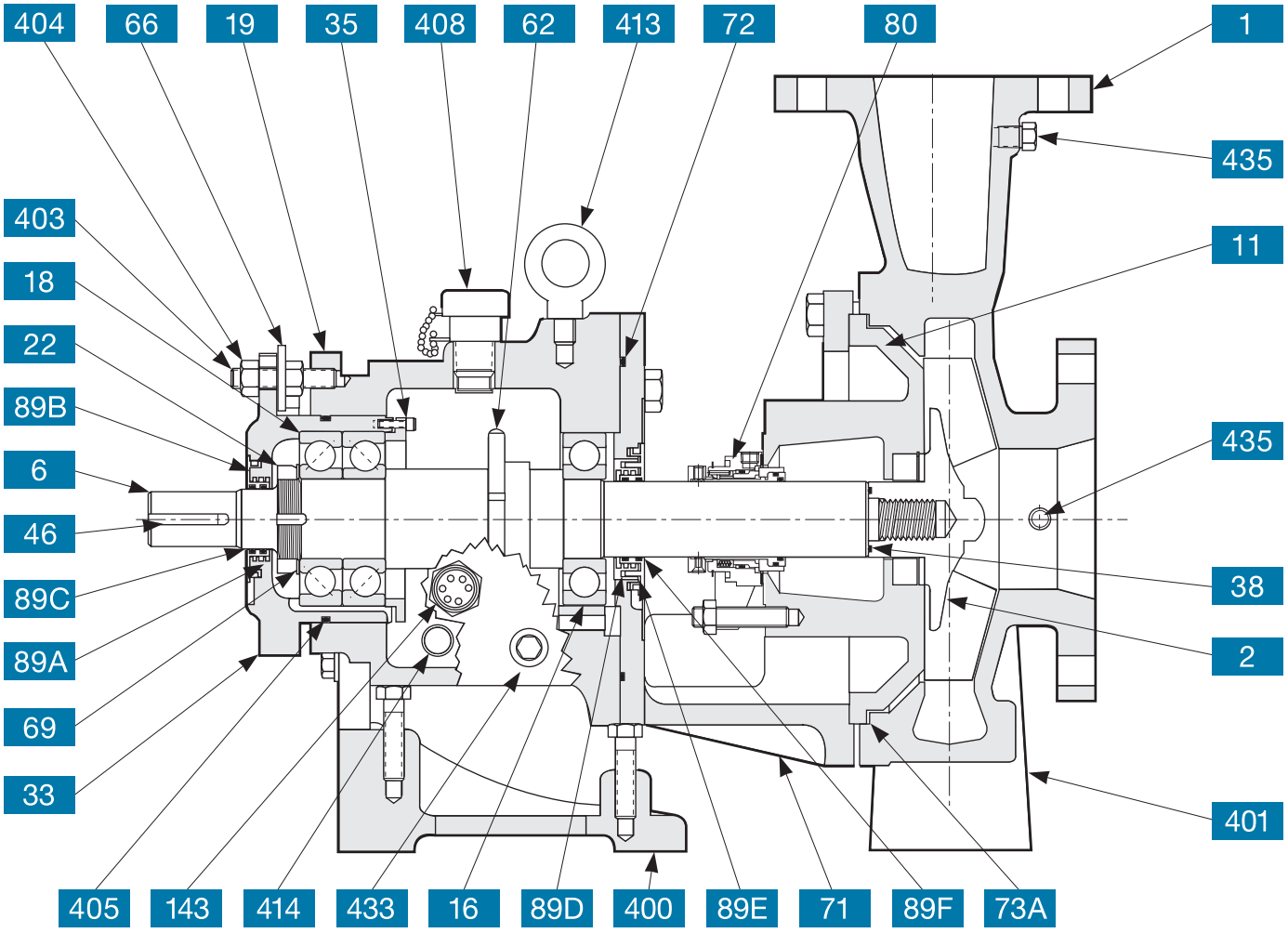
	2.0 x 3.0-08	3.0 x 4.0-08	1.0 x 2.0-10	1.5 x 3.0-10	2.0 x 3.0-10	3.0 x 4.0-10	4.0 x 6.0-10	1.5 x 3.0-13	2.0 x 3.0-13	3.0 x 4.0-13	4.0 x 6.0-13
Shaft											
L3/D4 Ratio	52 (1.98)										
Diameter at Impeller	1.06 (27) 1.00-12 UNF Thread High Torque 1.31 (33) 1.25-12 UNF Thread										
Diameter at Seal	1.875 (48)										
Diameter Between Bearings	2.45 (62)										
Diameter at Coupling	1.375 (35)										
Bearings											
Thrust	SKF 7310 BEGAY (pair)										
Radial	6310 C3										
Bearing Span	6.02 (153)										
Shaft Overhang	8.63 (219)										
Seal Chamber											
Seal Bore Diameter (nose)	2.69 (68) nose										
Inside Bore	3.75 (95)										
Depth	2.88 (73)										
Back Cover/Shaft Clearance	.12 (3) Diametral										
Gland Bolting ANSI	4X .500-13UNC on 4.75 B.C. (12 on 121 B.C.)										
Distance to Nearest Obstruction	3.00 (76)										
Open Impeller											
Clearance	.06 (1.5) Total .015 (0.4) Suction Side										
Eye Area sq. in. (cm^2)	10.6 (68)	10.6 (68)	2.8 (18)	7.9 (51)	9.4 (61)	10.6 (68)	26.8 (173)	7.7 (50)	13.5 (87)	14.4 (93)	30.2 (195)
Maximum Dia. Solids	0.5 (13)	0.6 (15)	0.4 (10)	0.4 (10)	0.7 (18)	0.8 (20)	0.8 (20)	0.5 (13)	0.6 (15)	0.7 (18)	1.0 (25)
Number of Vanes	5	5	4	5	4	4	6	4	4	4	5
Pumps Weights/Lbs. (kg.)											
Pump Only	258 (116)	268 (121)	244 (110)	259 (117)	268 (121)	278 (125)	318 (143)	338 (152)	359 (162)	374 (168)	401 (180)
Casing											
Type	Single Volute										
Wall Thickness	0.44 (11) Minimum										
Maximum Working Pressure	See Pressure vs. Temperature Limit Chart										
Test pressure	Class 150 Flanges-250PSIG, Class 300 Flanges-450PSIG										
Rotating Element											
Wk^2 Dry lbs-ft^2 (kg-m^2)	0.53 (.022)	0.52 (.022)	0.68 (.029)	0.79 (.033)	1.04 (.043)	1.04 (.043)	1.08 (.045)	1.50 (.063)	1.80 (.076)	2.14 (.09)	2.48 (.104)
Wk^2 Wet lbs-ft^2 (kg-m^2)	0.80 (.033)	0.78 (.033)	1.02 (.043)	1.19 (.05)	1.56 (.066)	1.56 (.066)	1.62 (.068)	2.25 (.095)	2.70 (.113)	3.21 (.135)	3.72 (.156)
Maximum Speed (oil lube)	3500	3500	3500	3500	3500	3500	1750	3500	3500	3500	1750
Power Limits											
HP (KW)/100 RPM 316SS	3.4 (2.6)										
HP (KW)/100 RPM 17-4Ph	4.2 (3.1)										
HP (KW)/100 RPM 17-4Ph High Torque	5.6 (4.2)										

Reference drawings A40210, A40211



NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	62	Flinger	89F	Seal, Labyrinth O-Ring (Radial)
2	Impeller	66	Micrometer Nut	143	Oil Sight Glass
6	Shaft	69	Lockwasher, Thrust Bearing	400	Foot, Bearing Frame
11	Back Cover	71	Frame Adapter	401	Foot, casing
16	Bearing, Radial	72	O-Ring Frame Adapter	403	Stud, Cartridge
18	Bearing, Thrust	73A	Gasket, Casing	404	Locknut, Cartridge
19	Bearing, Frame	80	Mechanical Seal	405	O-Ring, Cartridge
22	Locknut, Thrust Bearing	89A	Seal, Labyrinth Stator, (Thrust)[1]	408	Oil Filler Assembly
33	Bearing Cartridge	89B	Seal, Labyrinth Rotor, (Thrust)	413	Bolt, Eye
35	Retainer Cover	89C	Seal, Labyrinth O-Ring, (Thrust)	414	Pipe Plug, Magnetic
38	O-ring, Impeller Hub	89D	Seal, Labyrinth Stator, (Radial)	433	Pipe Plug, Bearing Frame
46	Key, Coupling	89E	Seal, Labyrinth Rotor, (Radial)	435	Pipe Plug, Casing

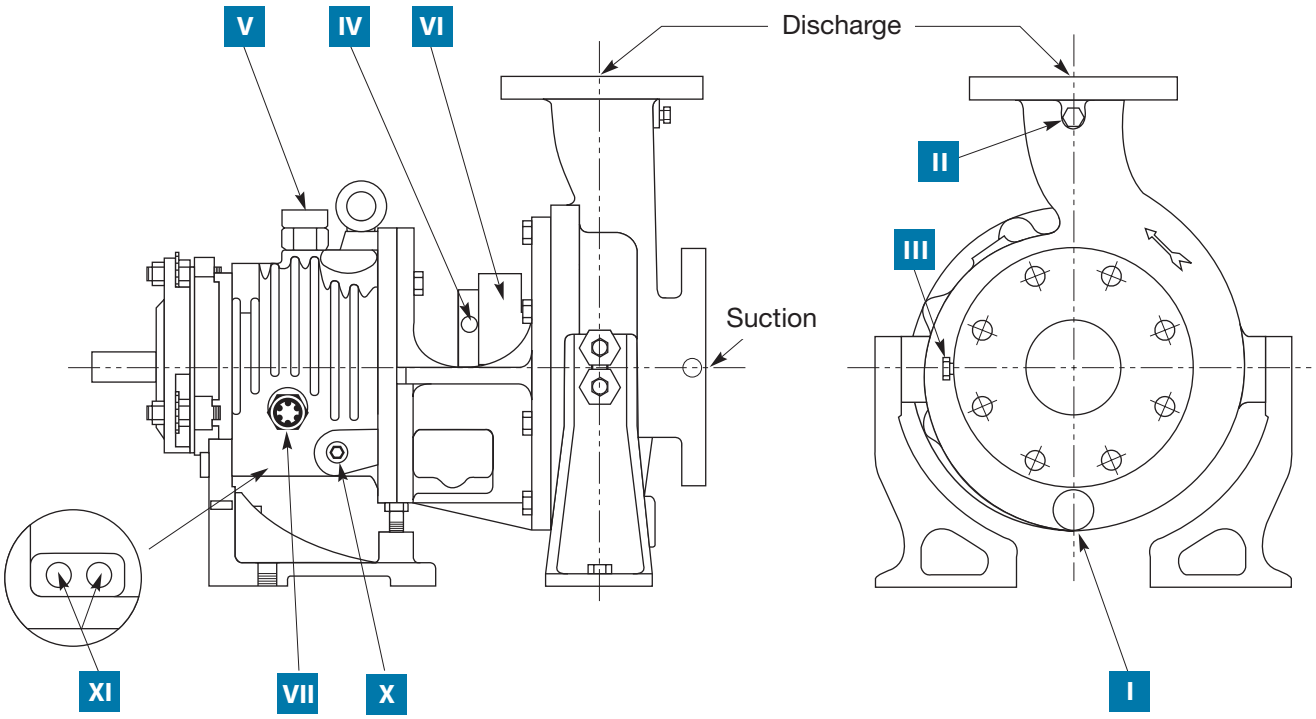
[1]Incorporated as part of cartridge in 2000.



NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	62	Flinger	89F	Seal, Labyrinth O-Ring (Radial)
2	Impeller	66	Micrometer Nut	143	Oil Sight Glass
6	Shaft	69	Lockwasher, Thrust Bearing	400	Foot, Bearing Frame
11	Back Cover	71	Frame Adapter	401	Foot, casing
16	Bearing, Radial	72	O-Ring Frame Adapter	403	Stud, Cartridge
18	Bearing, Thrust	73A	Gasket, Casing	404	Locknut, Cartridge
19	Bearing, Frame	80	Mechanical Seal	405	O-Ring, Cartridge
22	Locknut, Thrust Bearing	89A	Seal, Labyrinth Stator, (Thrust)[1]	408	Oil Filler Assembly
33	Bearing Cartridge	89B	Seal, Labyrinth Rotor, (Thrust)	413	Bolt, Eye
35	Retainer Cover	89C	Seal, Labyrinth O-Ring, (Thrust)	414	Pipe Plug, Magnetic
38	O-ring, Impeller Hub	89D	Seal, Labyrinth Stator, (Radial)	433	Pipe Plug, Bearing Frame
46	Key, Coupling	89E	Seal, Labyrinth Rotor, (Radial)	435	Pipe Plug, Casing

[1] Incorporated as part of cartridge in 2000.

System One® Auxiliary Pipe Connections List - Frame LD17 & A

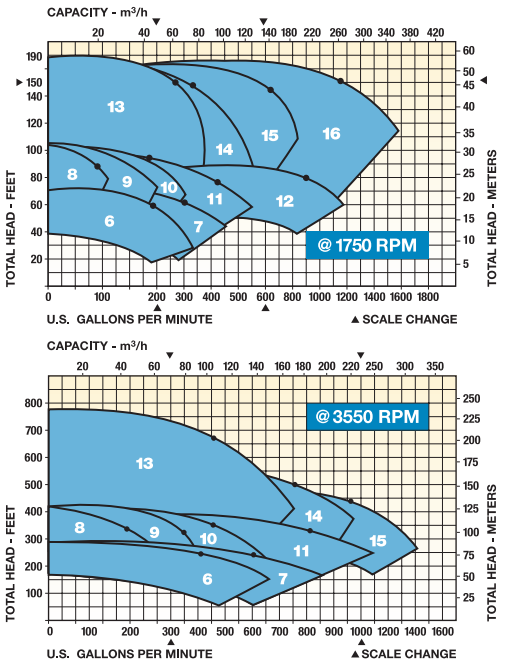


ITEM NUMBER	NPT SIZE	NUMBER OF TAPS	CONNECTION
* I	0.50-14	1	Casing Drain
II	0.25-18	1	Discharge Gage
# III	0.25-14	1	Suction Gage
* IV	0.25-18	1	Seal Chamber Flush (not available on LD17)
V	0.75-14	1	Oil Fill
VI	0.25-18	2	Seal Chamber Jacket*– Inlet & Outlet (not available on LD17)
# VII	1.00-11.5	1	Oil Sight Glass
# X	0.25-18	1	Oil Drain
## XI	0.50-14	2	Magnetic Plug or Cooling Coil*

* Optional
\# Left side of pump facing suction end
\## Right side of pump facing suction end

(4x6-10 & 4x6-13 Casings have discharge tap only)

Frame LD17/A (ASME/ANSI)

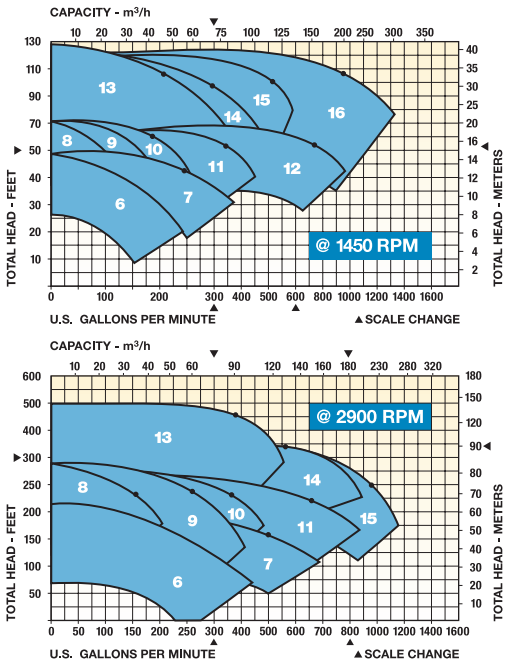


LD17 Pump – ASME/ANSI

	Pump Size	Discharge	Suction	X	D	O	F	$2E_1$	$2E_2$	A	A_1
6	2 x 3-8	2.0	3.0	9.50	8.25	17.75	9.81	9.75	7.25	15.00	15.00
7	3 x 4-8	3.0	4.0	11.00	8.25	19.25	9.81	9.75	7.25	15.75	15.75
8	1 x 2-10	1.0	2.0	8.50	8.25	16.75	9.81	9.75	7.25	15.75	15.75
9	1.5 x 3-10	1.5	3.0	8.50	8.25	16.75	9.81	9.75	7.25	16.13	16.13
10	2 x 3-10	2.0	3.0	9.50	8.25	17.75	9.81	9.75	7.25	16.38	16.38
11	3 x 4-10	3.0	4.0	11.10	8.25	19.25	9.81	9.75	7.25	13.63	17.63
12	4 x 6-10	4.0	6.0	13.50	10.00	23.50	9.81	9.75	7.25	14.44	19.94
13	1.5 x 3-13	1.5	3.0	10.50	10.00	20.50	9.81	9.75	7.25	15.00	20.50
14	2 x 3-13	2.0	3.0	11.50	10.00	21.50	9.81	9.75	7.25	15.38	20.88
15	3 x 4-13	3.0	4.0	12.50	10.00	22.50	9.81	13.00	7.25	16.63	22.13
16	4 x 6-13	4.0	6.0	13.50	10.00	23.50	9.81	13.00	7.25	17.56	23.07

All dimensions are in inches.

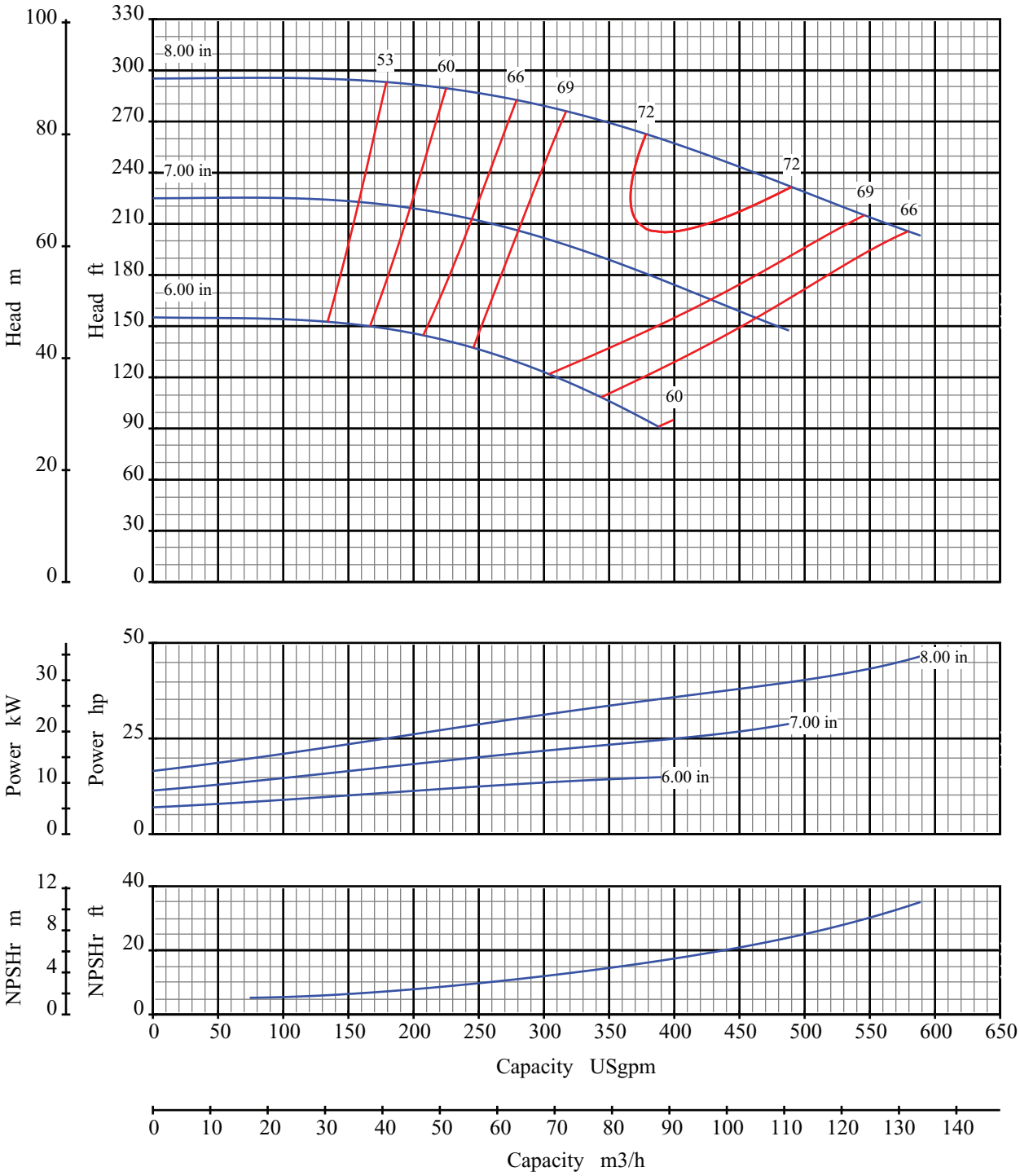
Frame LD17/A Pump (IPP Metric)



LD17 Pump – IPP Metric

	Pump Size	Discharge	Suction	X	D	O	F	$2E_1$	$2E_2$	A	A_1
6	50 x 80-200	50	80	241	200	441	249	250	184	279	381
7	80 x 100-200	80	100	279	200	479	249	250	184	298	400
8	25 x 50-250	25	50	216	200	416	249	250	184	298	400
9	40 x 80-250	40	80	216	200	416	249	250	184	318	419
10	50 x 80-250	50	80	241	200	441	249	250	184	314	416
11	80 x 100-250	80	100	279	200	479	249	250	184	346	448
12	100 x 150-250	100	150	343	250	593	249	250	184	367	506
13	40 x 80-330	40	80	267	250	517	249	250	184	381	521
14	50 x 80-330	50	80	292	250	542	249	250	184	391	530
15	80 x 100-300	80	100	318	250	568	249	330	184	422	562
16	100 x 150-300	100	150	343	250	593	249	330	184	460	586

All dimensions are in millimeters.



Curve No: S18142V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

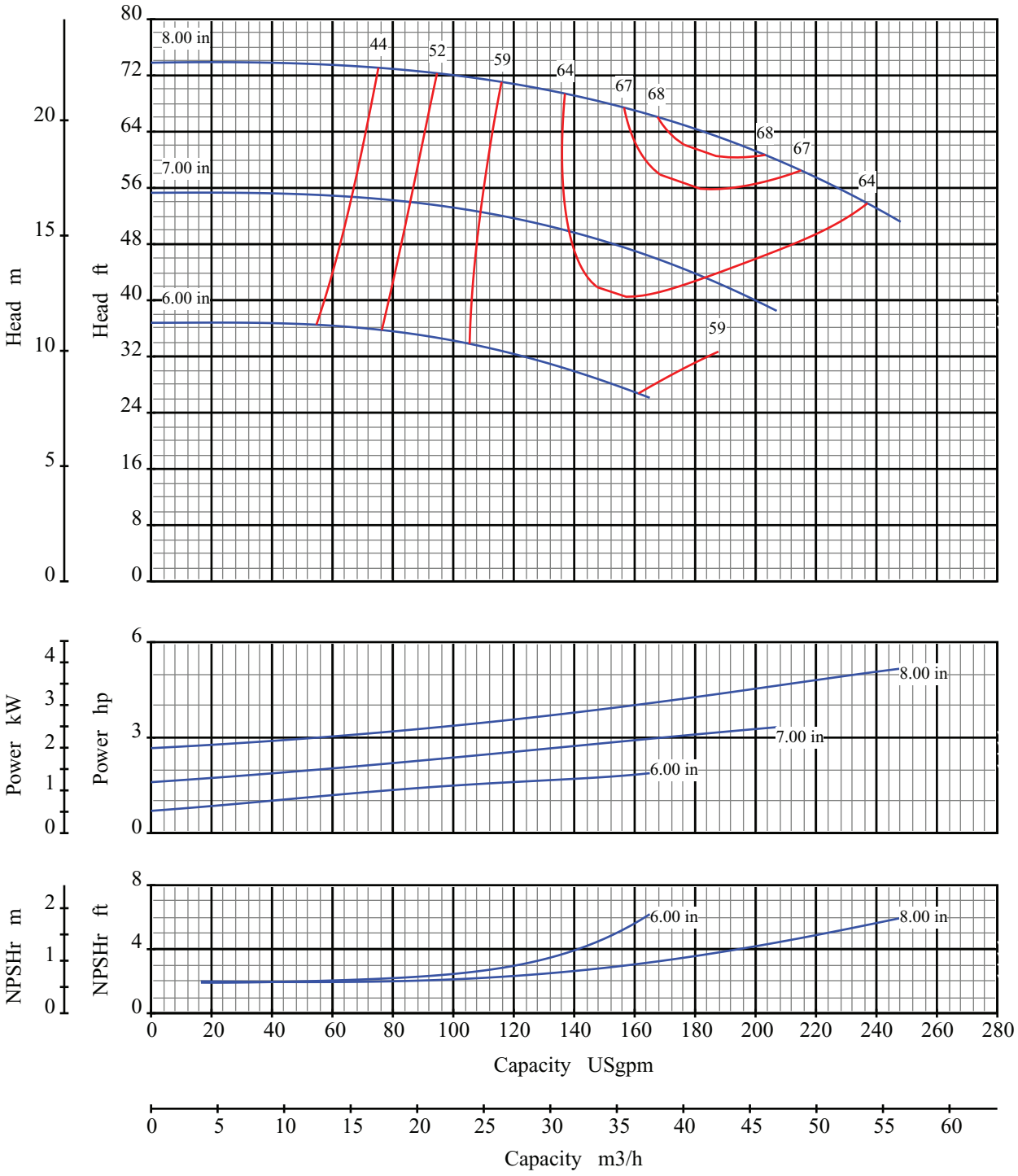
Catalog: 1301

Pump Size: 2x3 8

Pump Size: 50x80 200

Speed: 3550 rpm

Open Impeller



Curve No: S18144V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

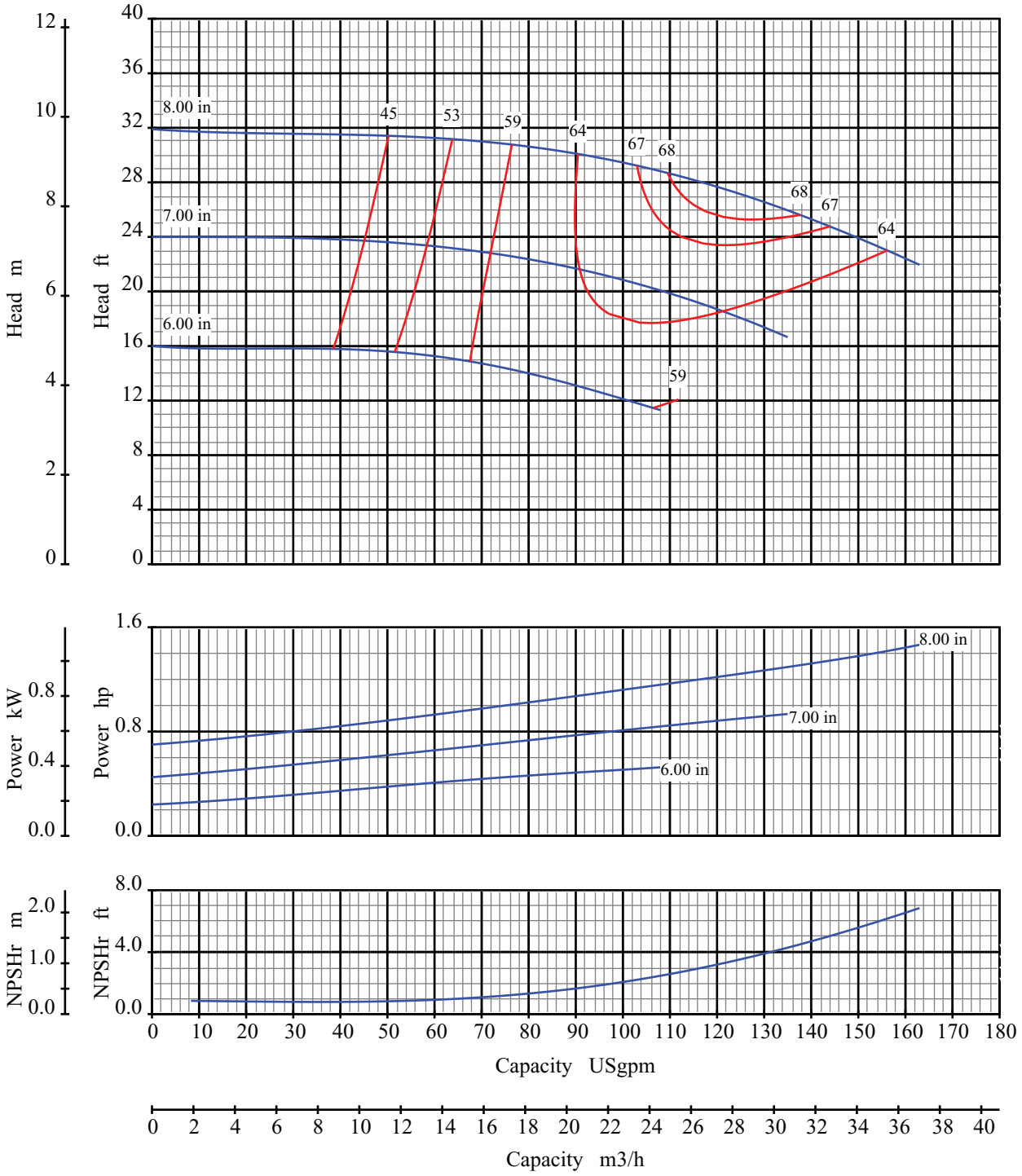
Catalog: 1301

Pump Size: 2x3 8

Pump Size: 50x80 200

Speed: 1750 rpm

Open Impeller



Curve No: S18146V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

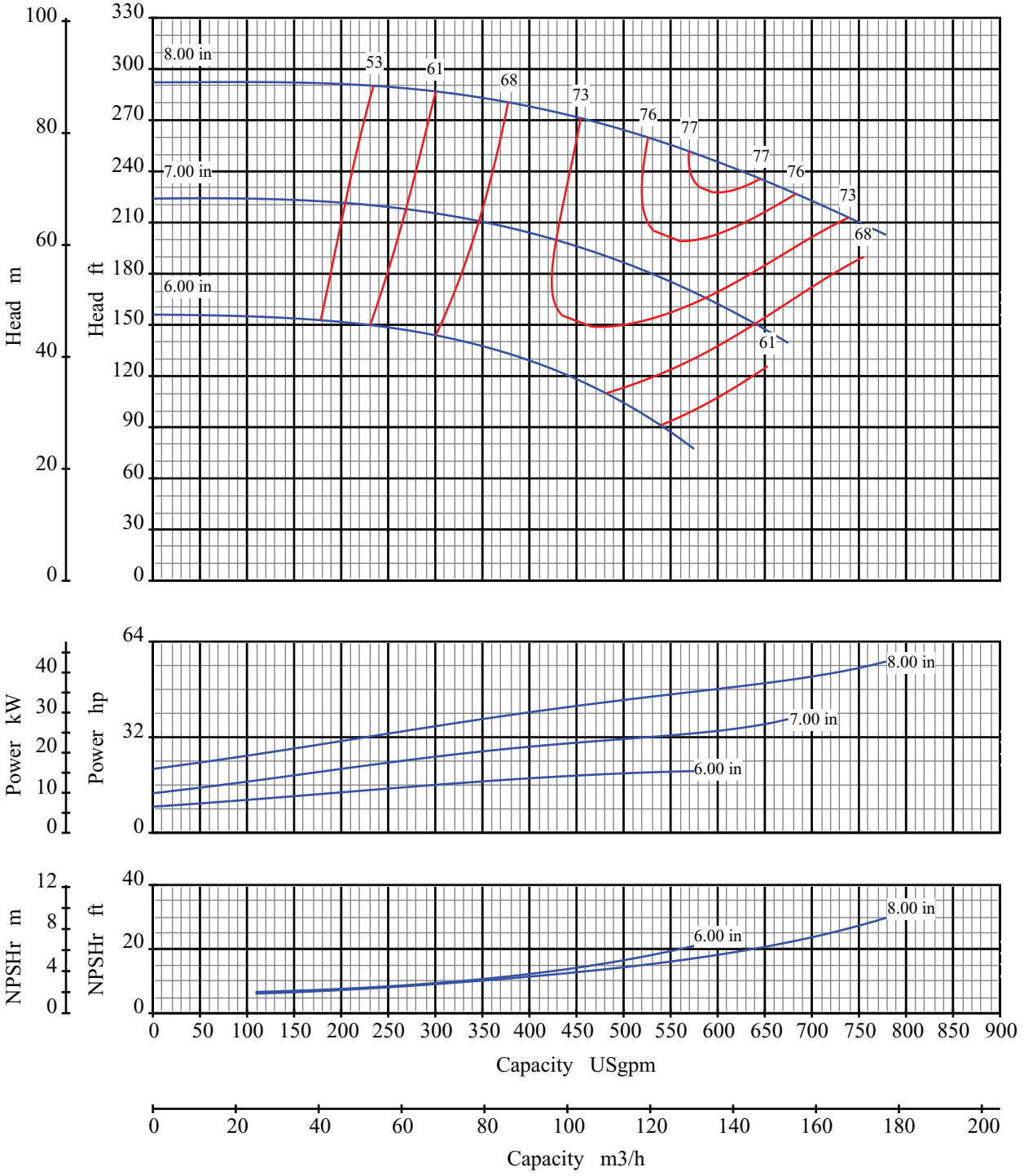
Catalog: 1301

Pump Size: 2x3 8

Pump Size: 50x80 200

Speed: 1150 rpm

Open Impeller



Curve No: S18148V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

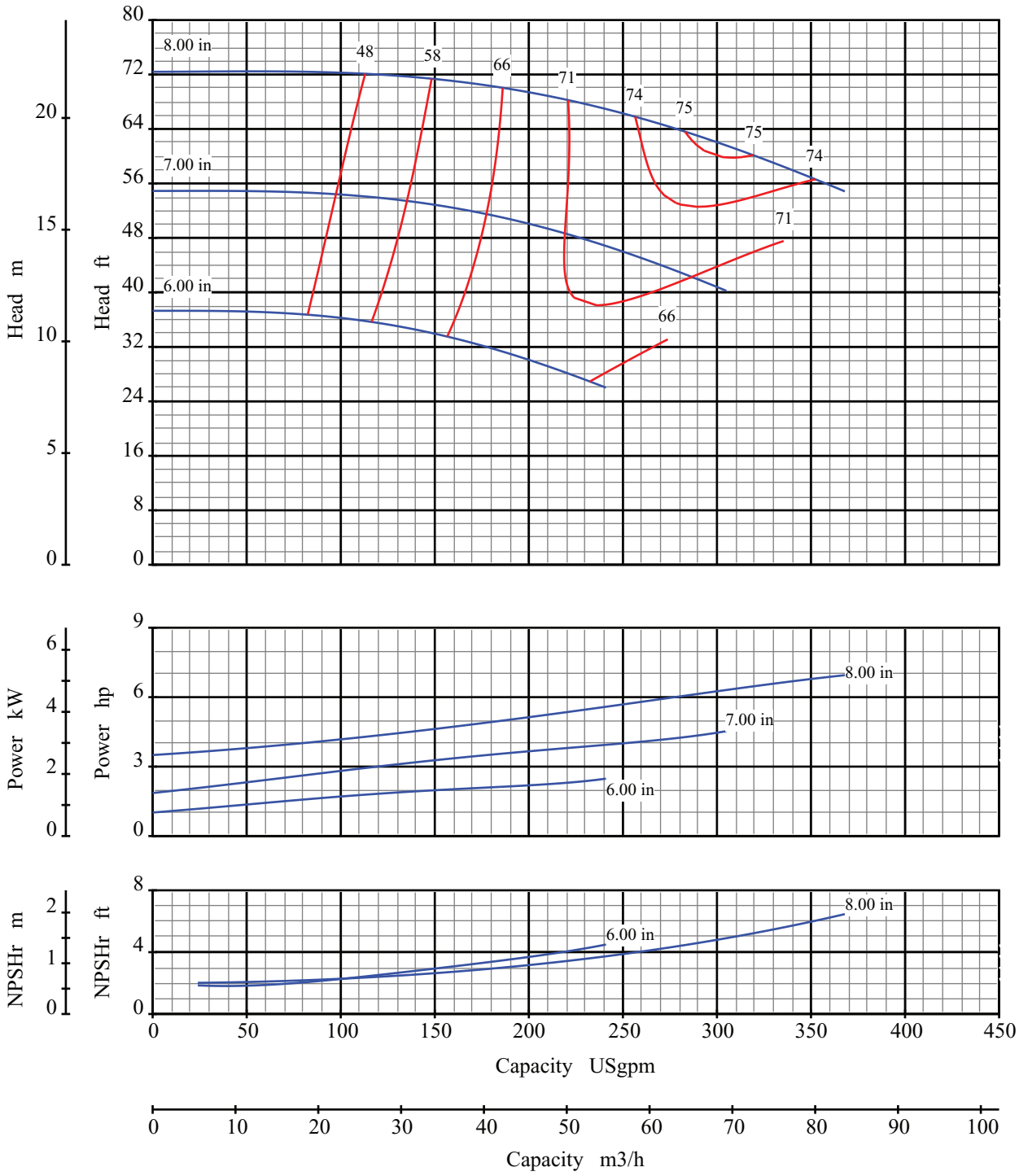
Catalog: 1301

Pump Size: 3x4 8

Pump Size: 80x100 200

Speed: 3550 rpm

Open Impeller



Curve No: S18150V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

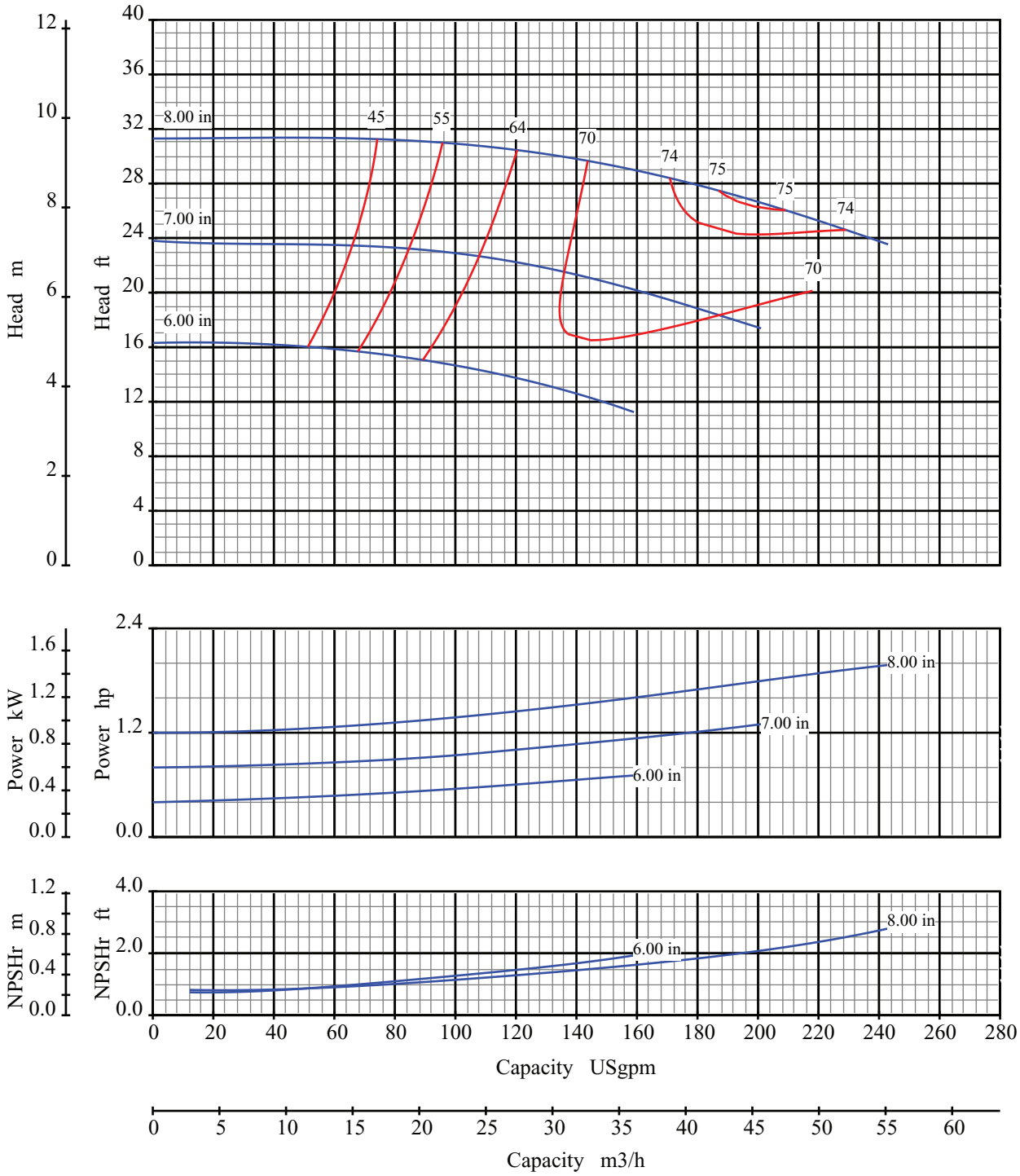
Catalog: 1301

Pump Size: 3x4 8

Pump Size: 80x100 200

Speed: 1750 rpm

Open Impeller



Curve No: S18152V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

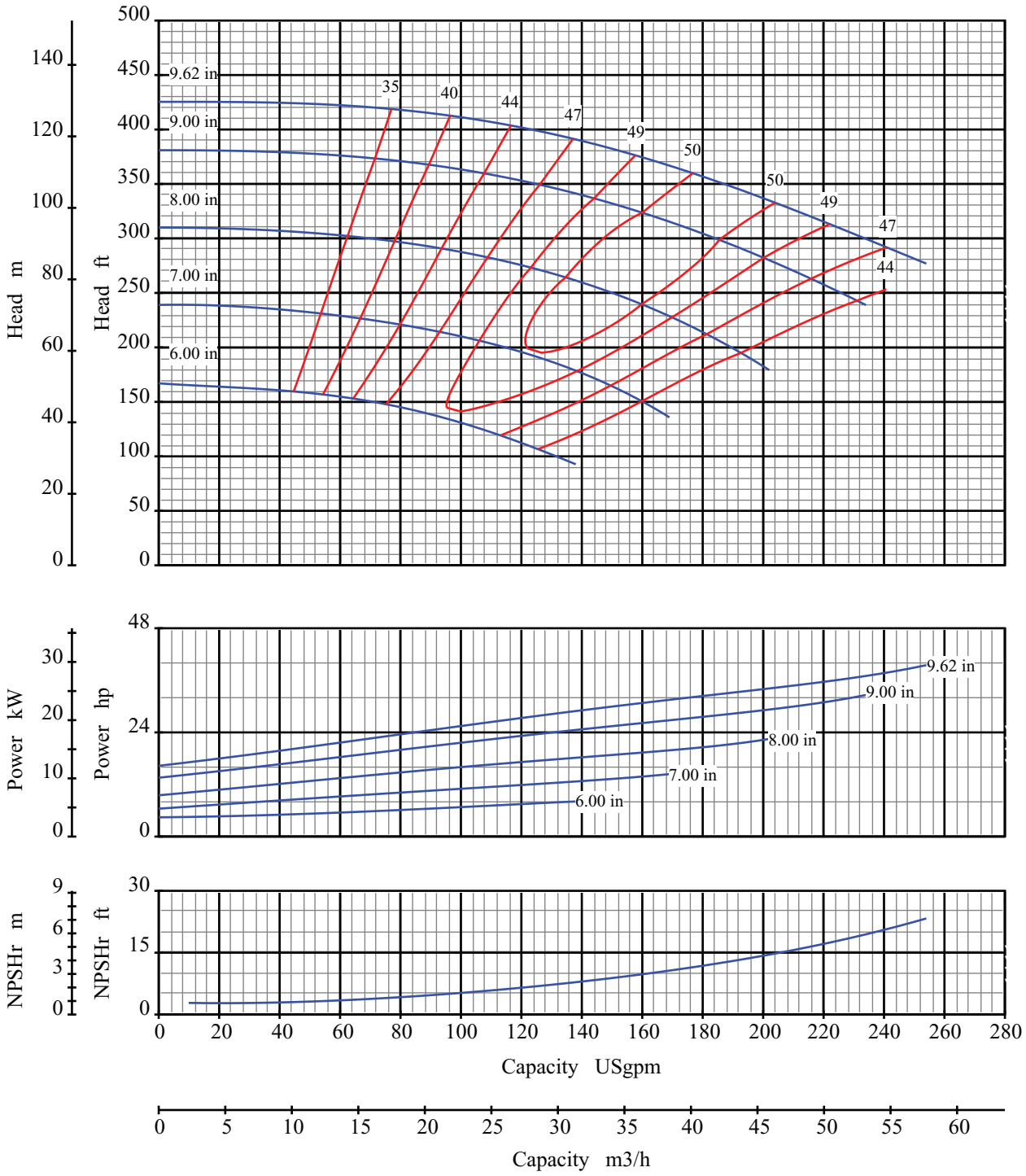
Effective Date: Jan/2005

Pump Size: 3x4 8

Pump Size: 80x100 200

Speed: 1150 rpm

Open Impeller



Curve No: S18154V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

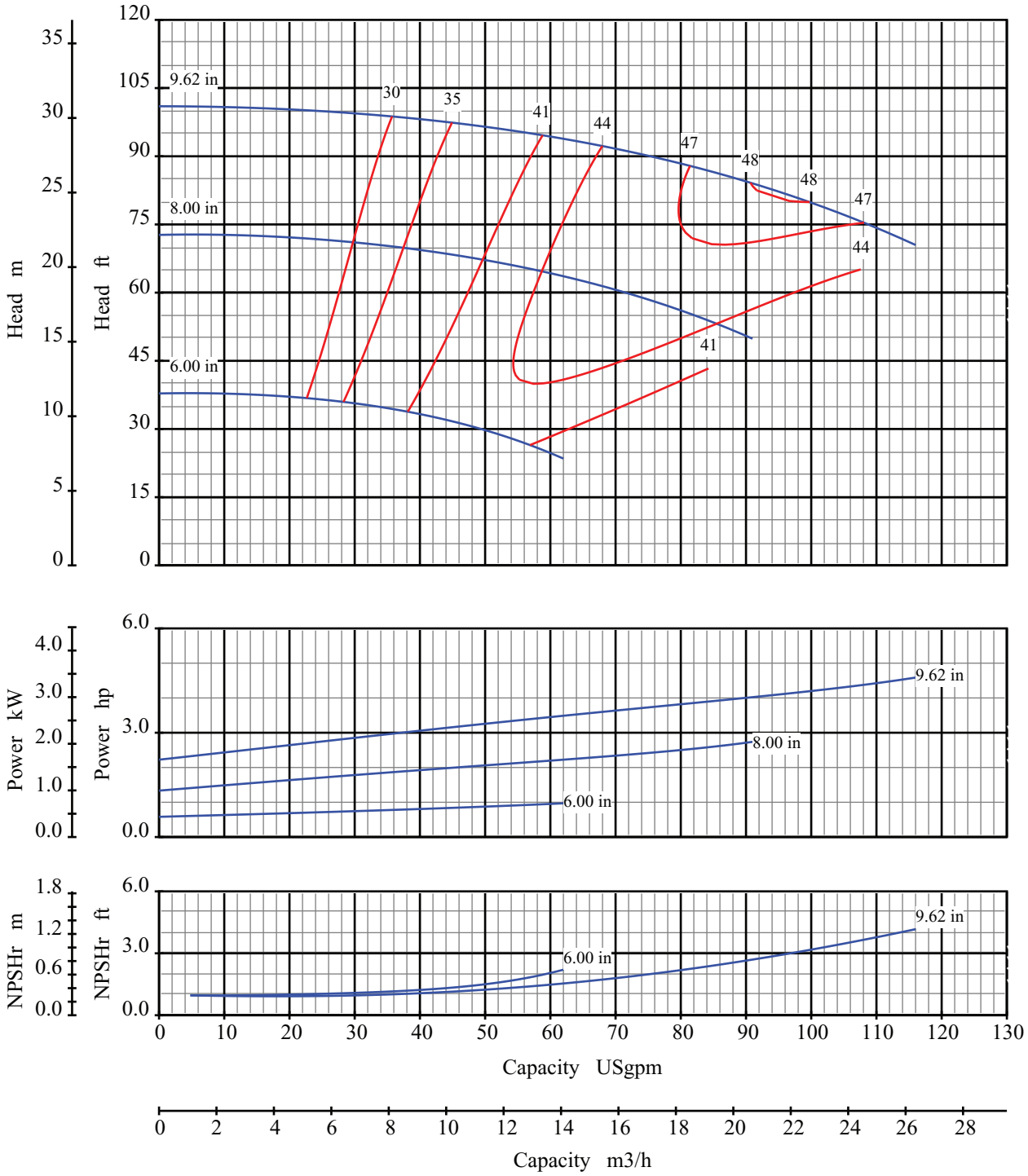
Catalog: 1301

Pump Size: 1x2 10

Pump Size: 25x50 250

Speed: 3550 rpm

Open Impeller



Curve No: S18156V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

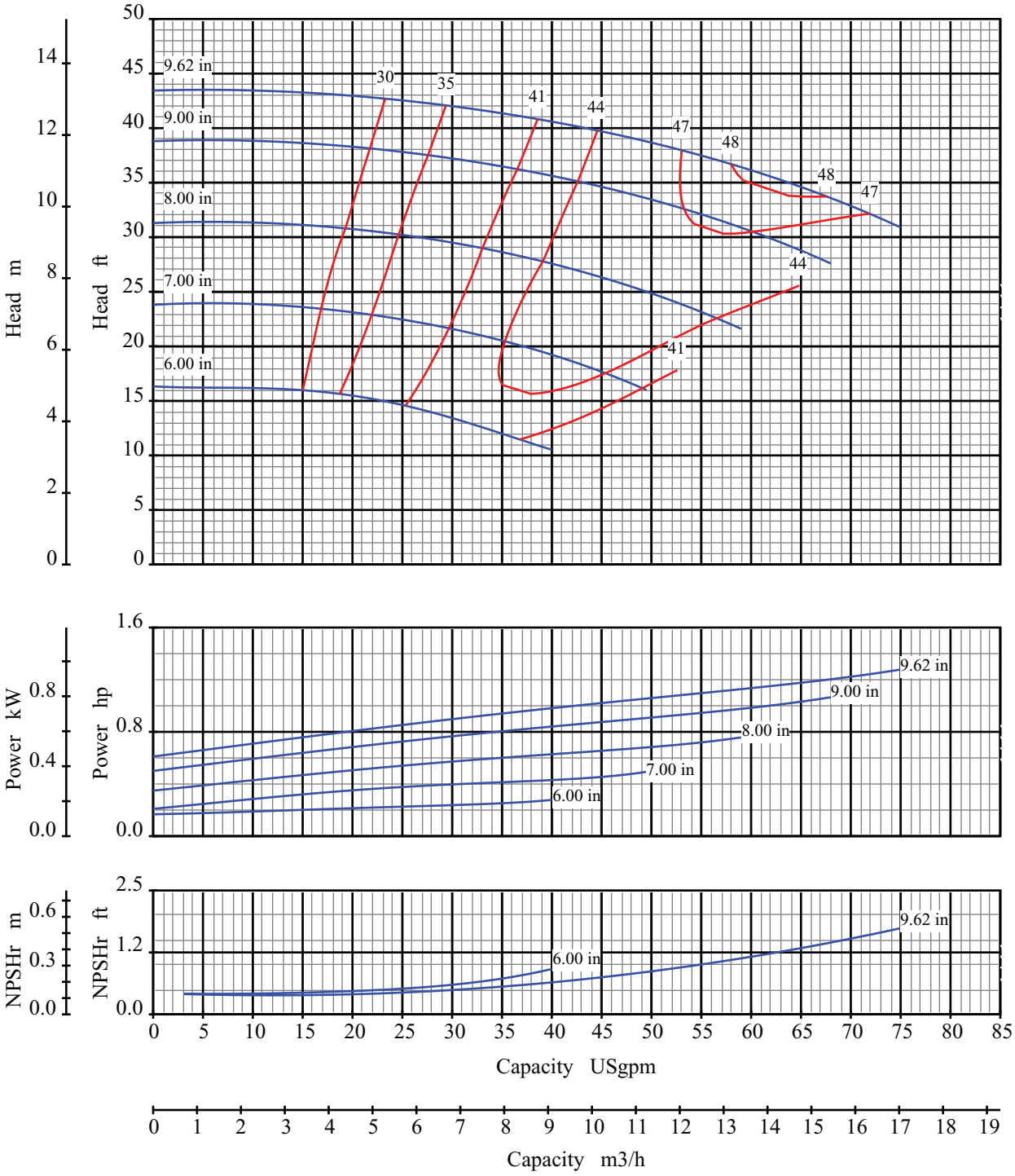
Catalog: 1301

Pump Size: 1x2 10

Pump Size: 25x50 250

Speed: 1750 rpm

Open Impeller



Curve No: S18158V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

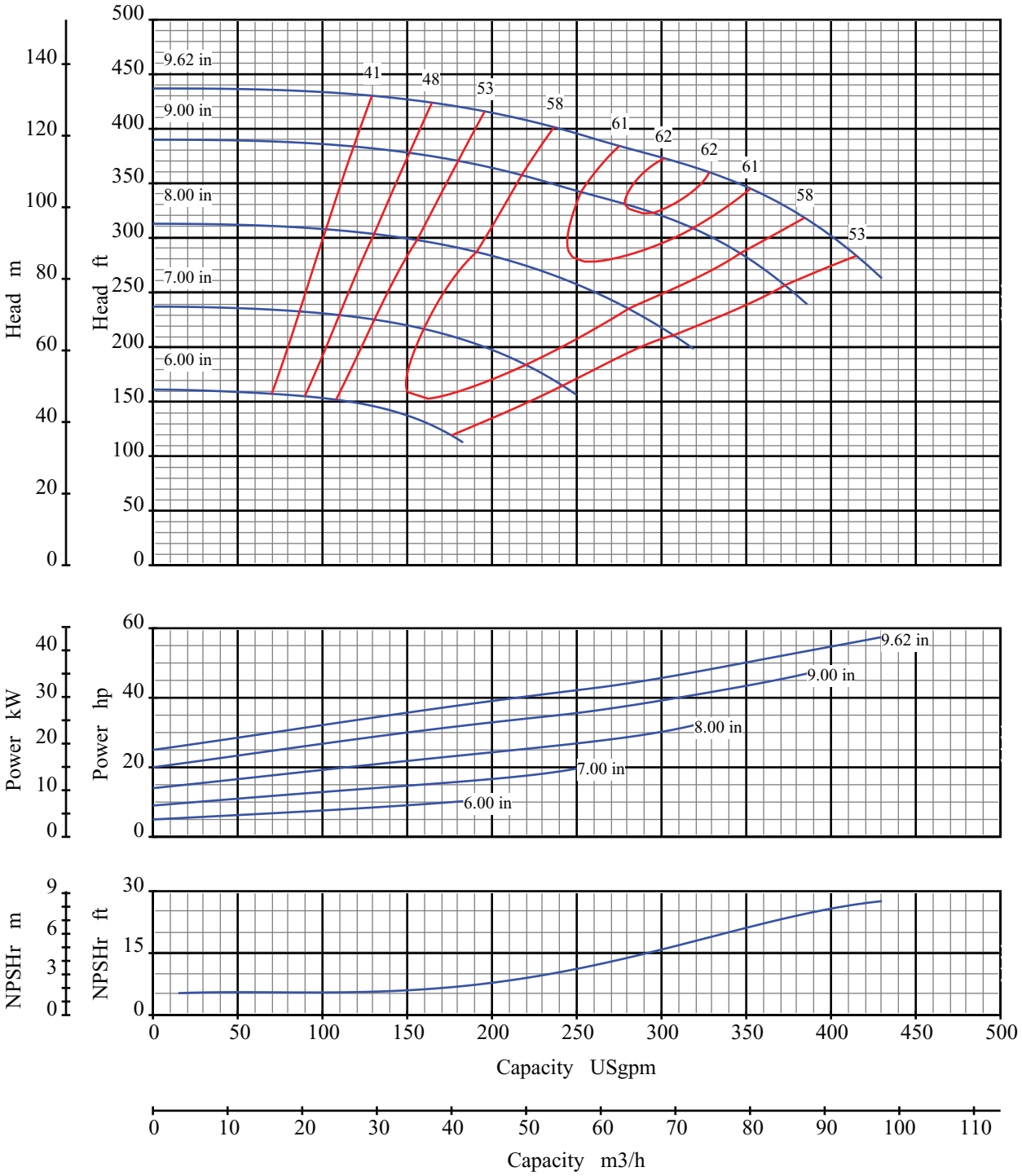
Catalog: 1301

Pump Size: 1x2 10

Pump Size: 25x50 250

Speed: 1150 rpm

Open Impeller



Curve No: S18160V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

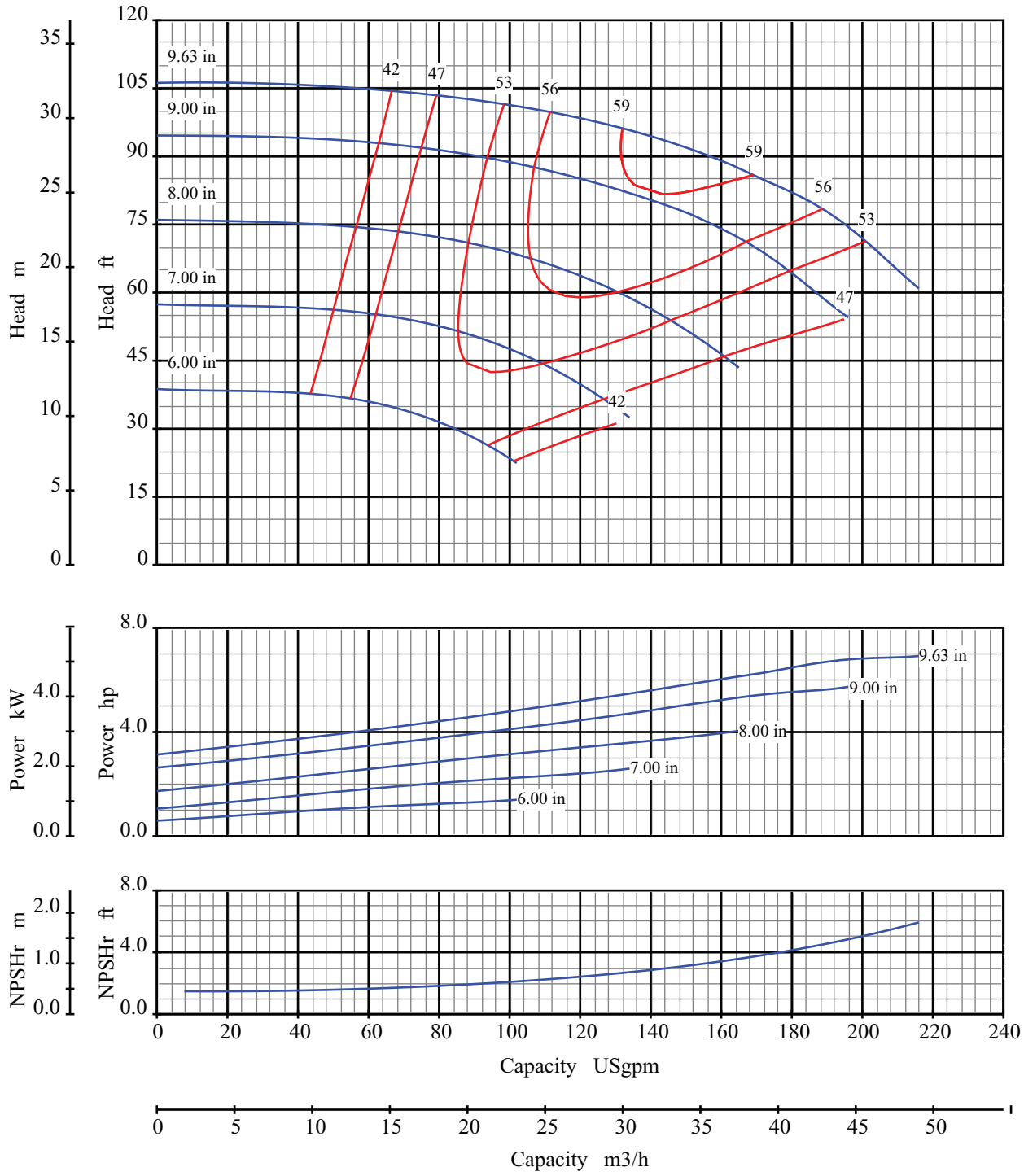
Catalog: 1301

Pump Size: 1.5x3 10

Pump Size: 40x80 250

Speed: 3550 rpm

Open Impeller



Curve No: S18162V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

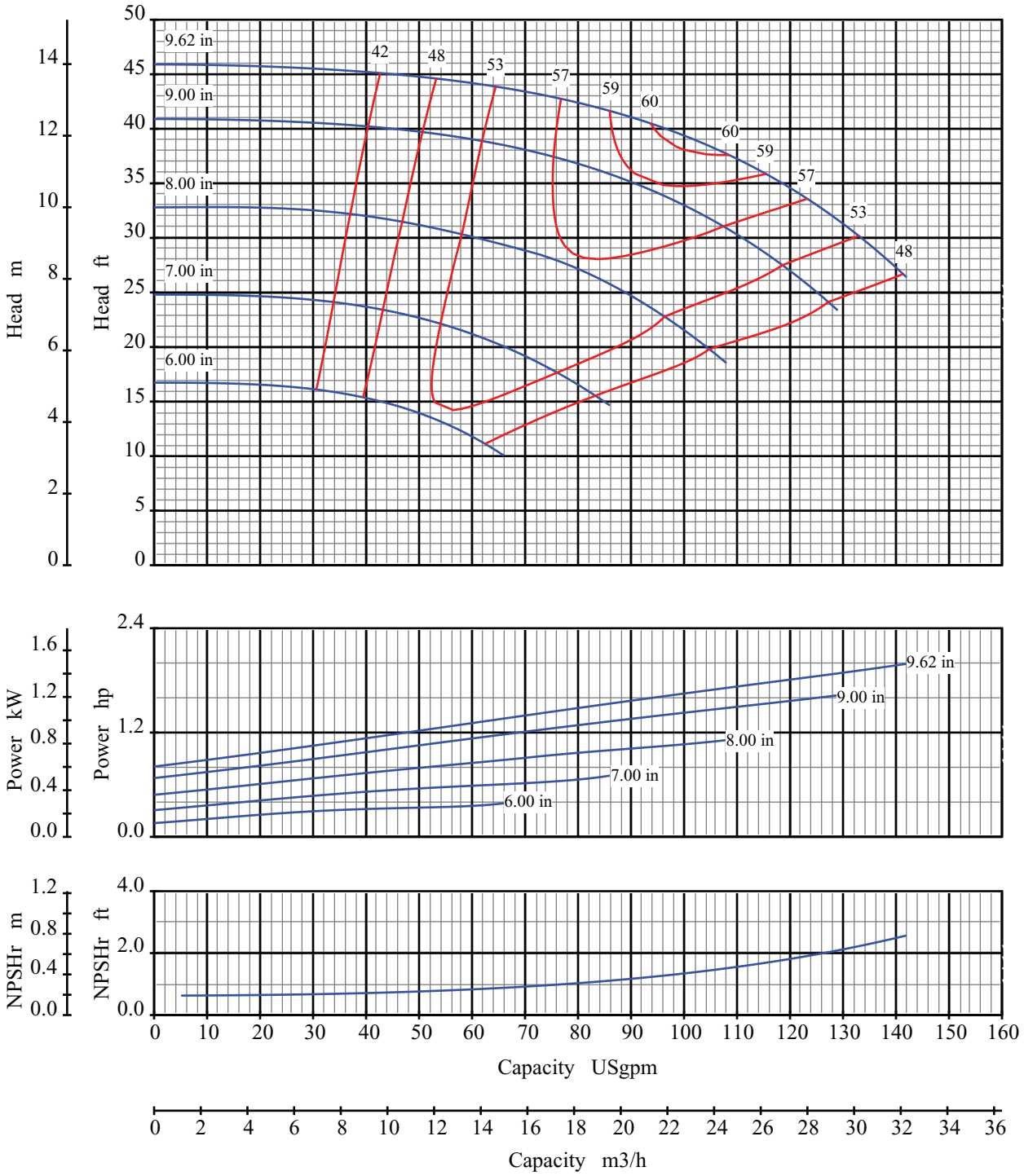
Catalog: 1301

Pump Size: 1.5x3 10

Pump Size: 40x80 250

Speed: 1750 rpm

Open Impeller



Curve No: S18164V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

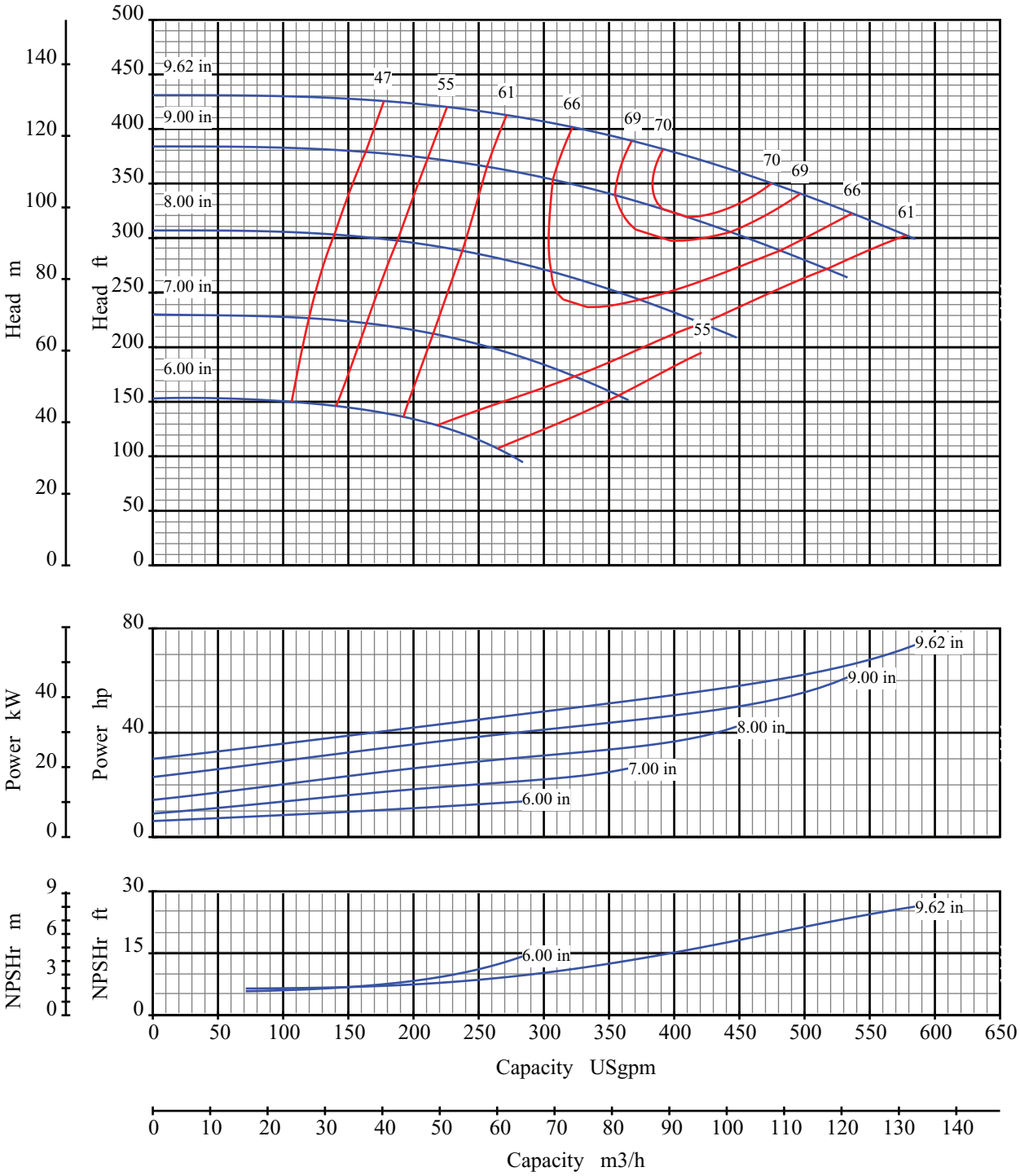
Catalog: 1301

Pump Size: 1.5x3 10

Pump Size: 40x80 250

Speed: 1150 rpm

Open Impeller



Curve No: S18166V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

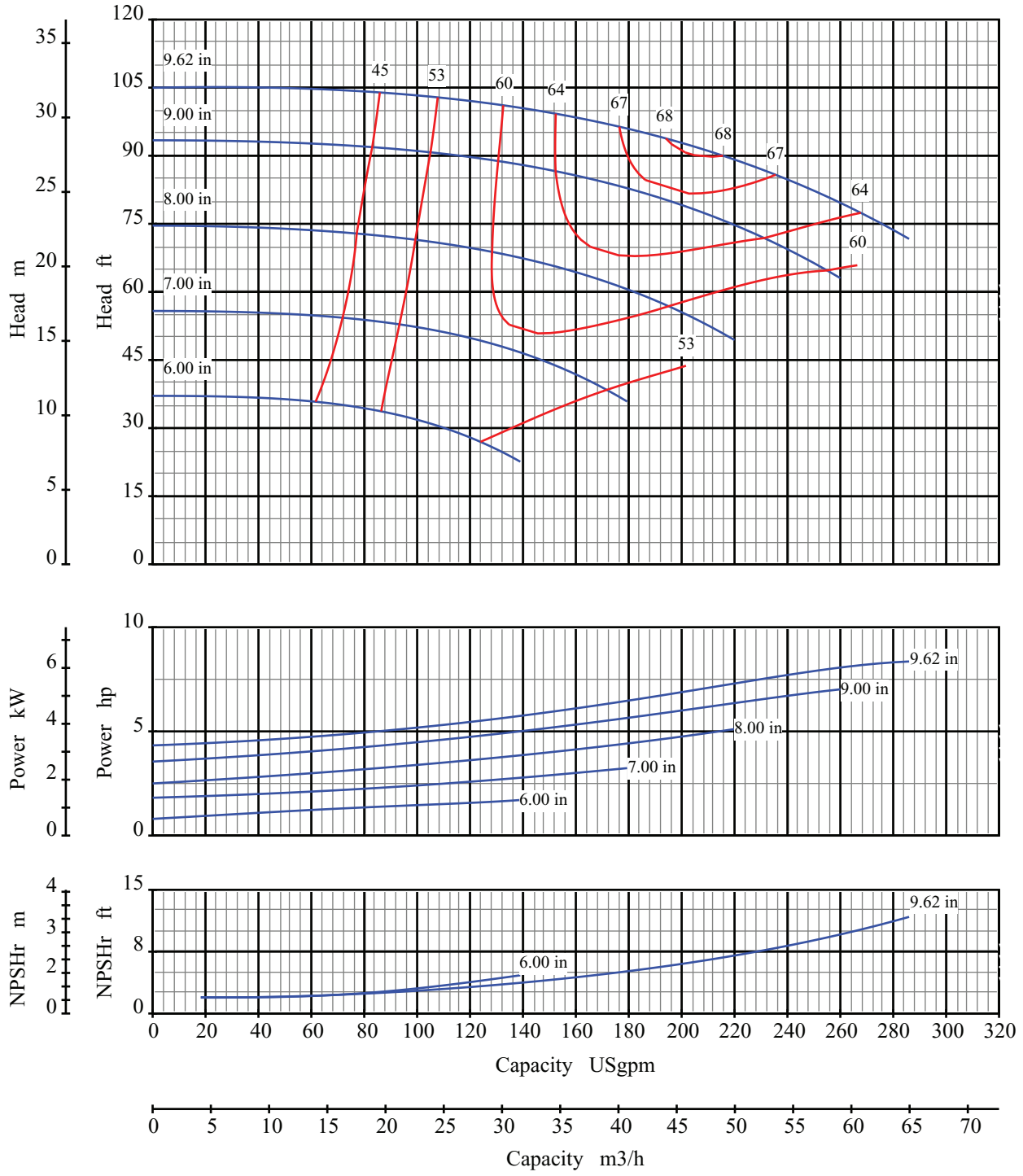
Catalog: 1301

Pump Size: 2x3 10

Pump Size: 50x80 250

Speed: 3550 rpm

Open Impeller



Curve No: S18168V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

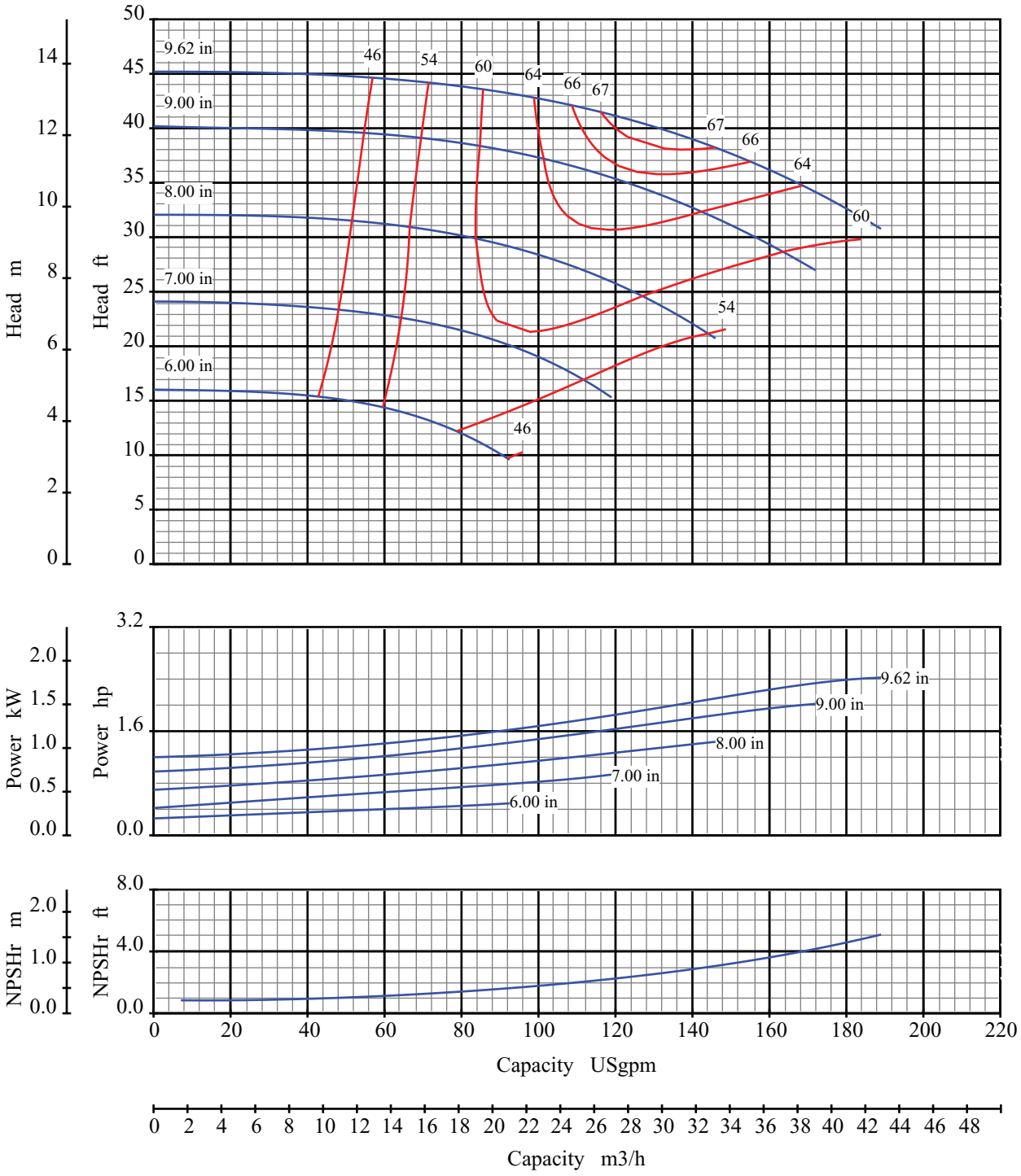
Effective Date: Jan/2005

Pump Size: 2x3 10

Pump Size: 50x80 250

Speed: 1750 rpm

Open Impeller



Curve No: S18170V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

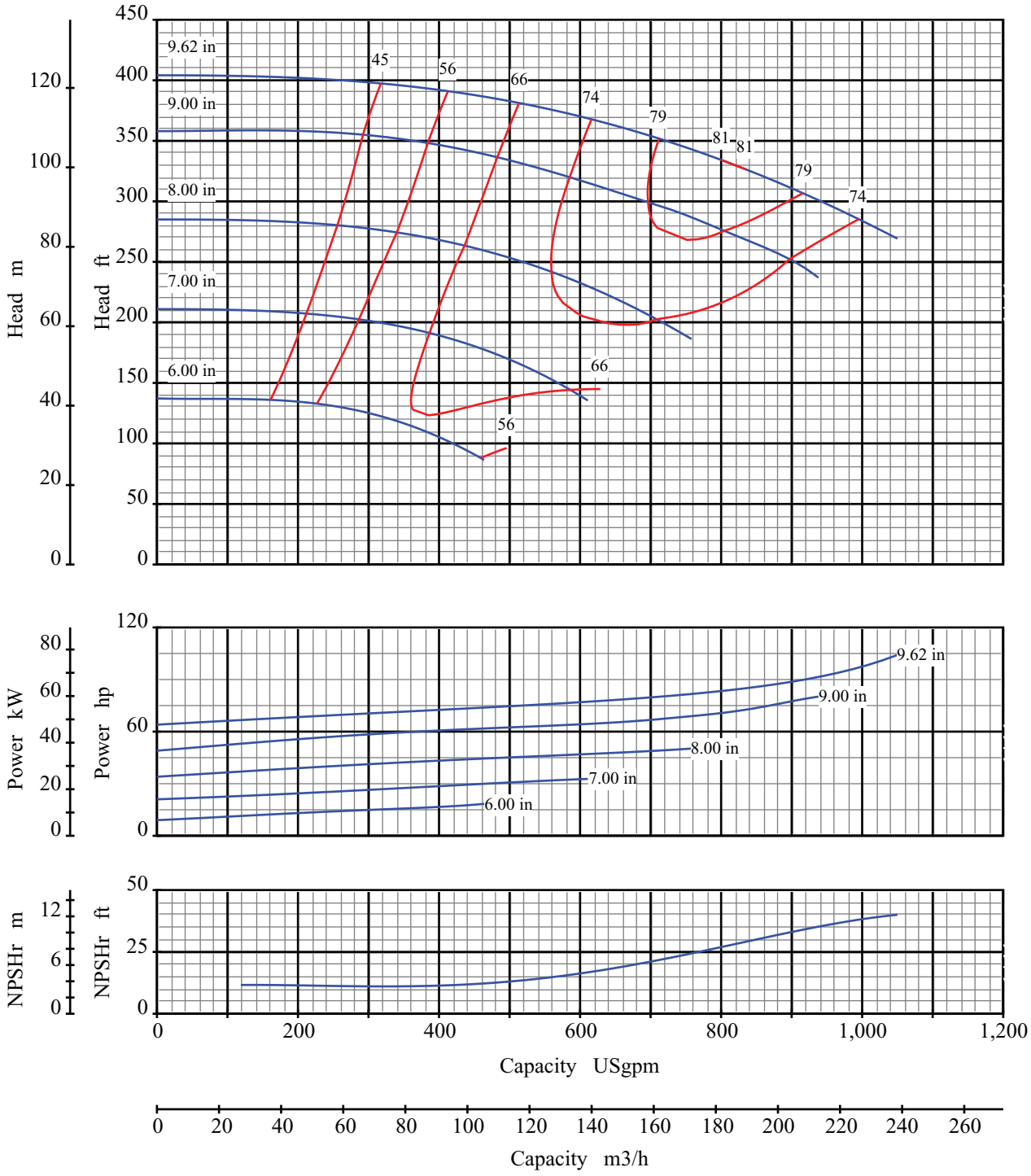
Catalog: 1301

Pump Size: 2x3 10

Pump Size: 50x80 250

Speed: 1150 rpm

Open Impeller



Curve No: S18172V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

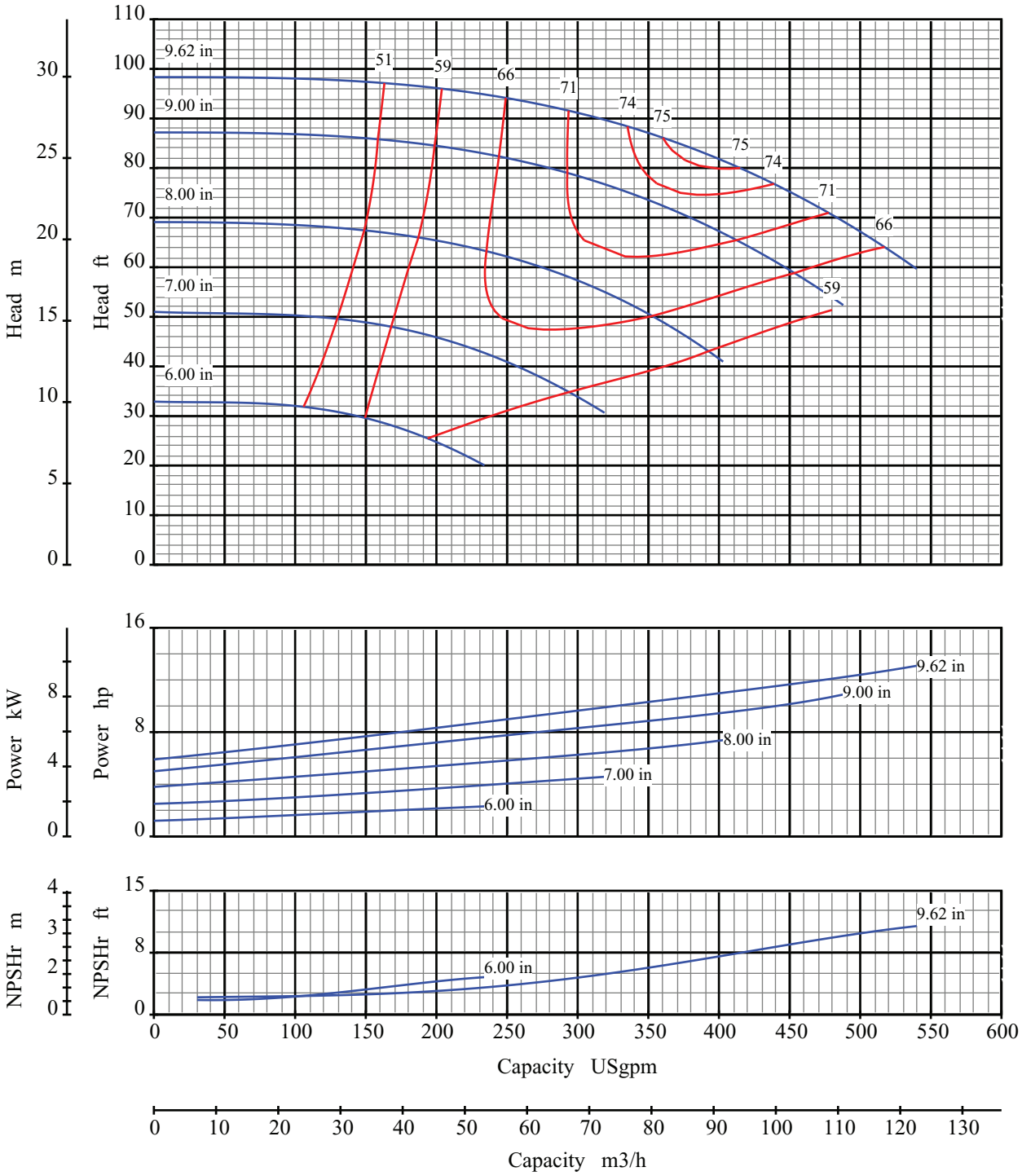
Catalog: 1301

Pump Size: 3x4 10

Pump Size: 80x100 250

Speed: 3550 rpm

Open Impeller



Curve No: S18174V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

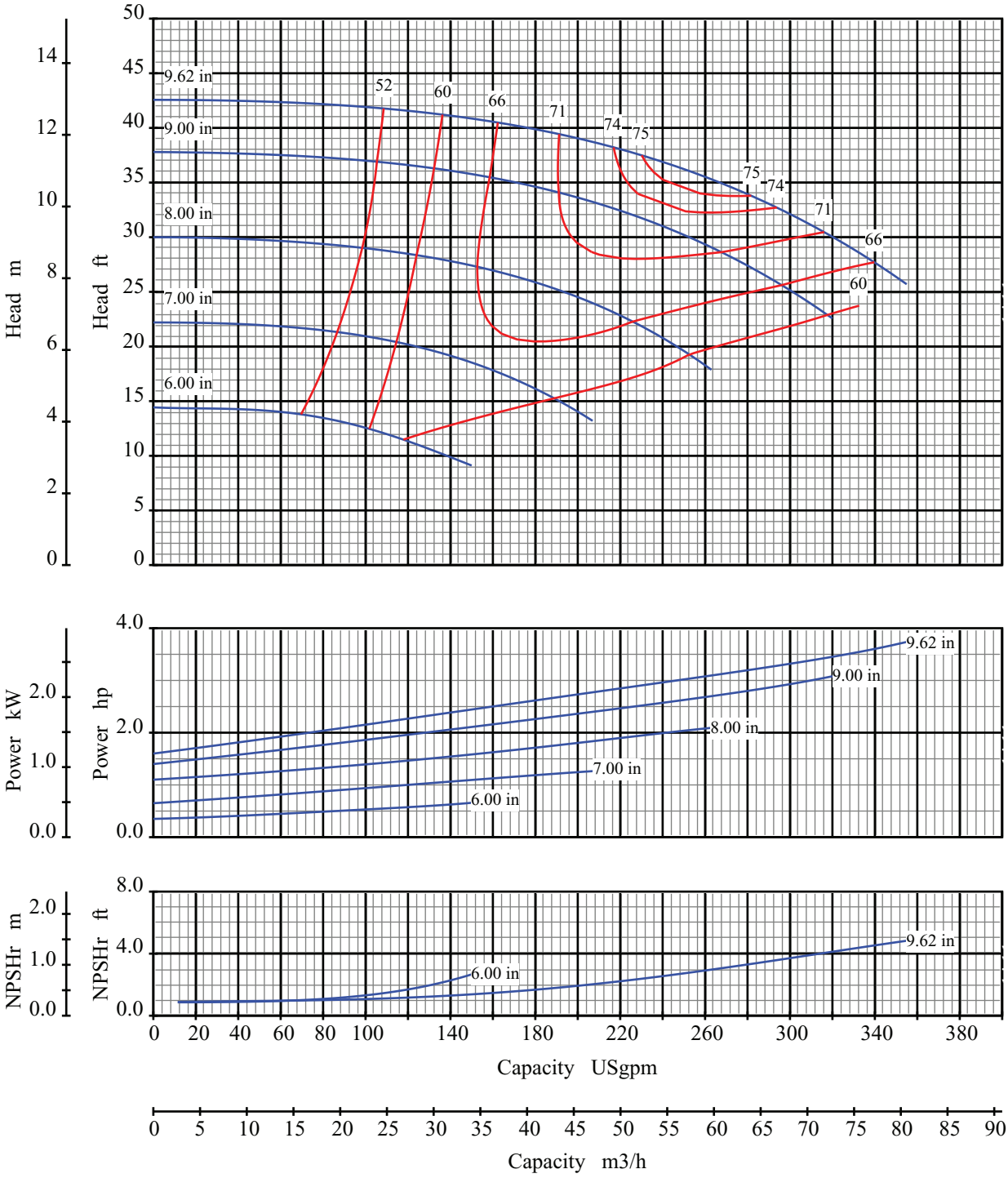
Catalog: 1301

Pump Size: 3x4 10

Pump Size: 80x100 250

Speed: 1750 rpm

Open Impeller



Curve No: S18176V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

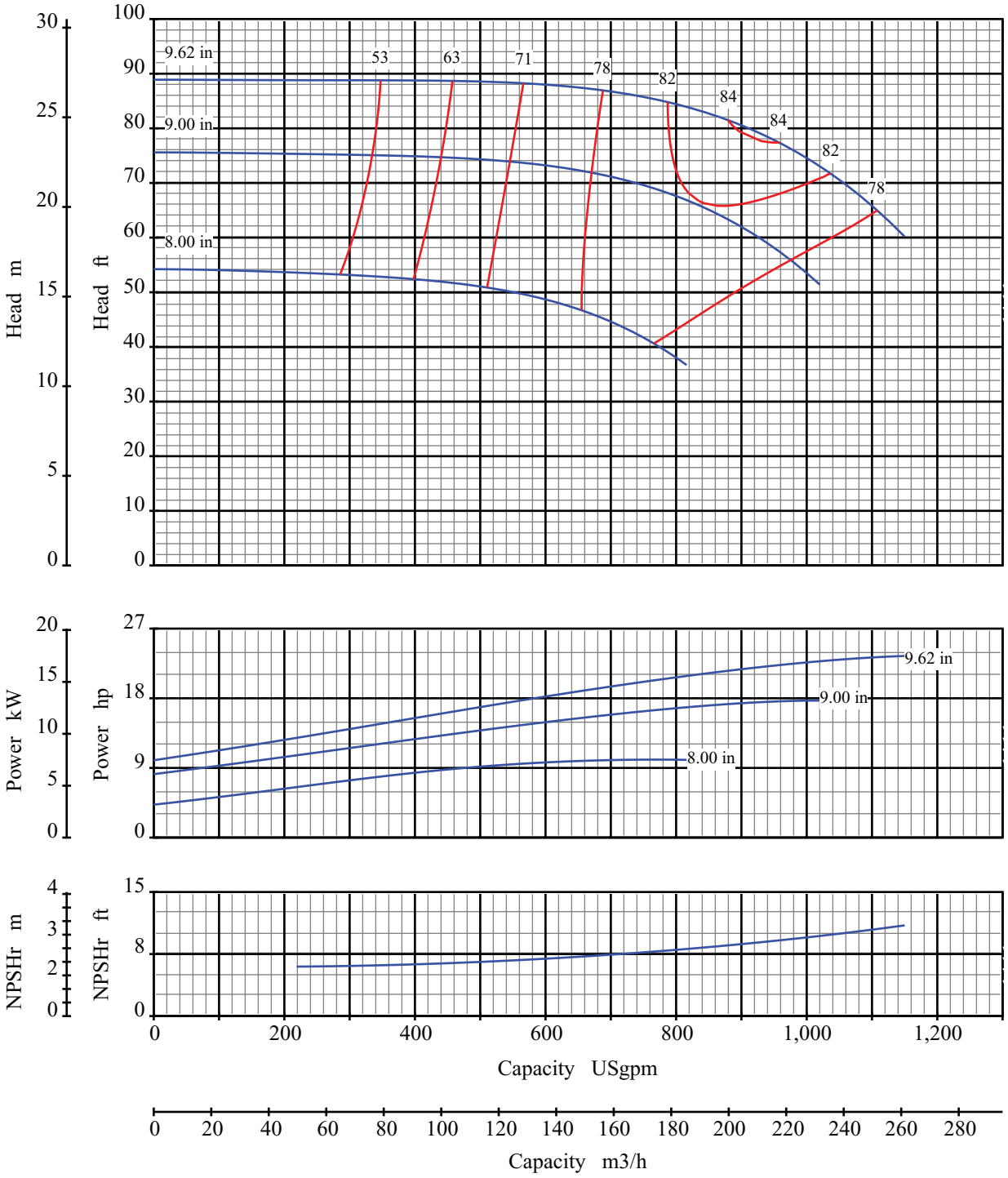
Catalog: 1301

Pump Size: 3x4 10

Pump Size: 80x100 250

Speed: 1150 rpm

Open Impeller



Curve No: S18180V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

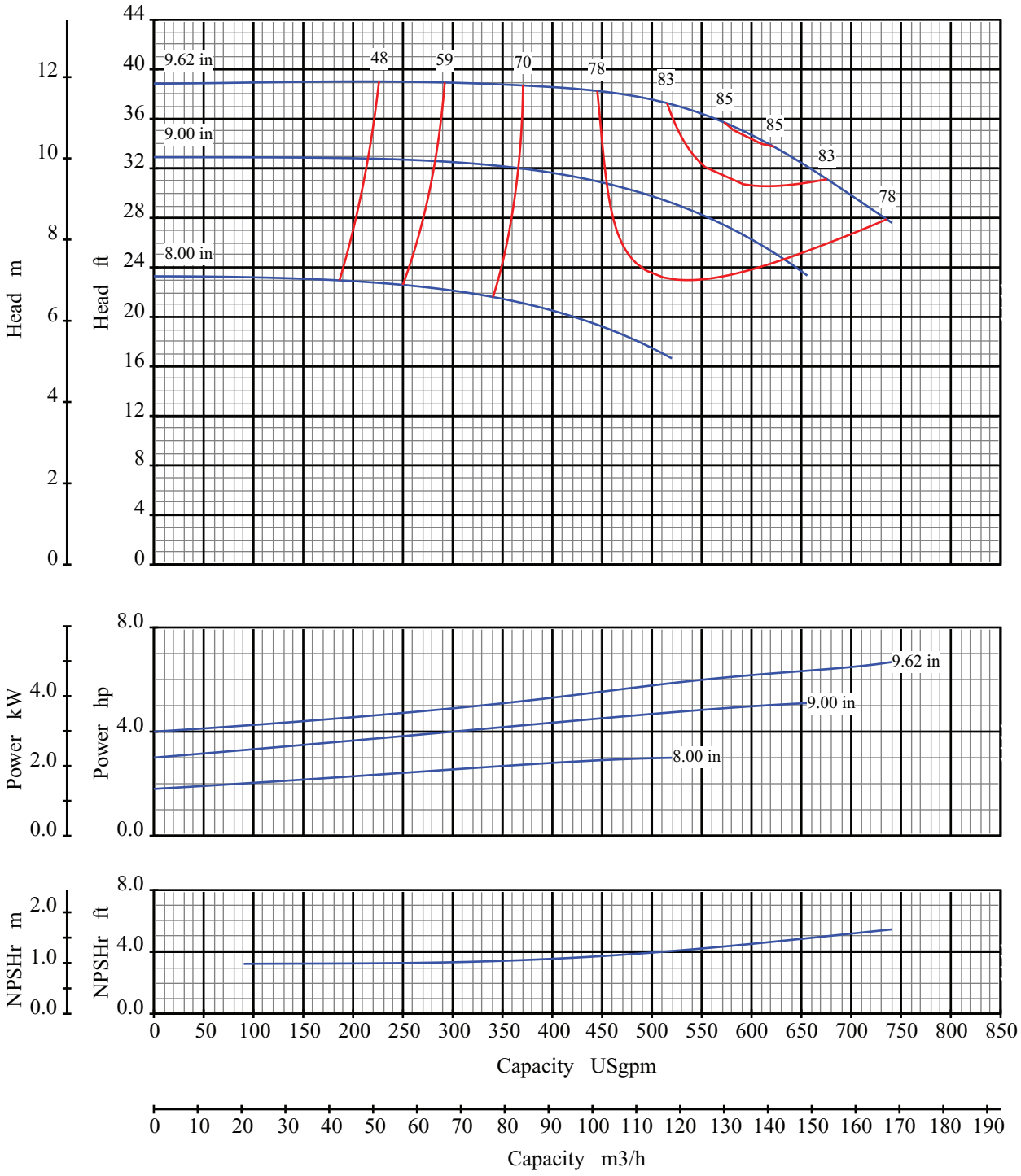
Catalog: 1301

Pump Size: 4x6 10

Pump Size: 100x150 250

Speed: 1750 rpm

Open Impeller



Curve No: S18182V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

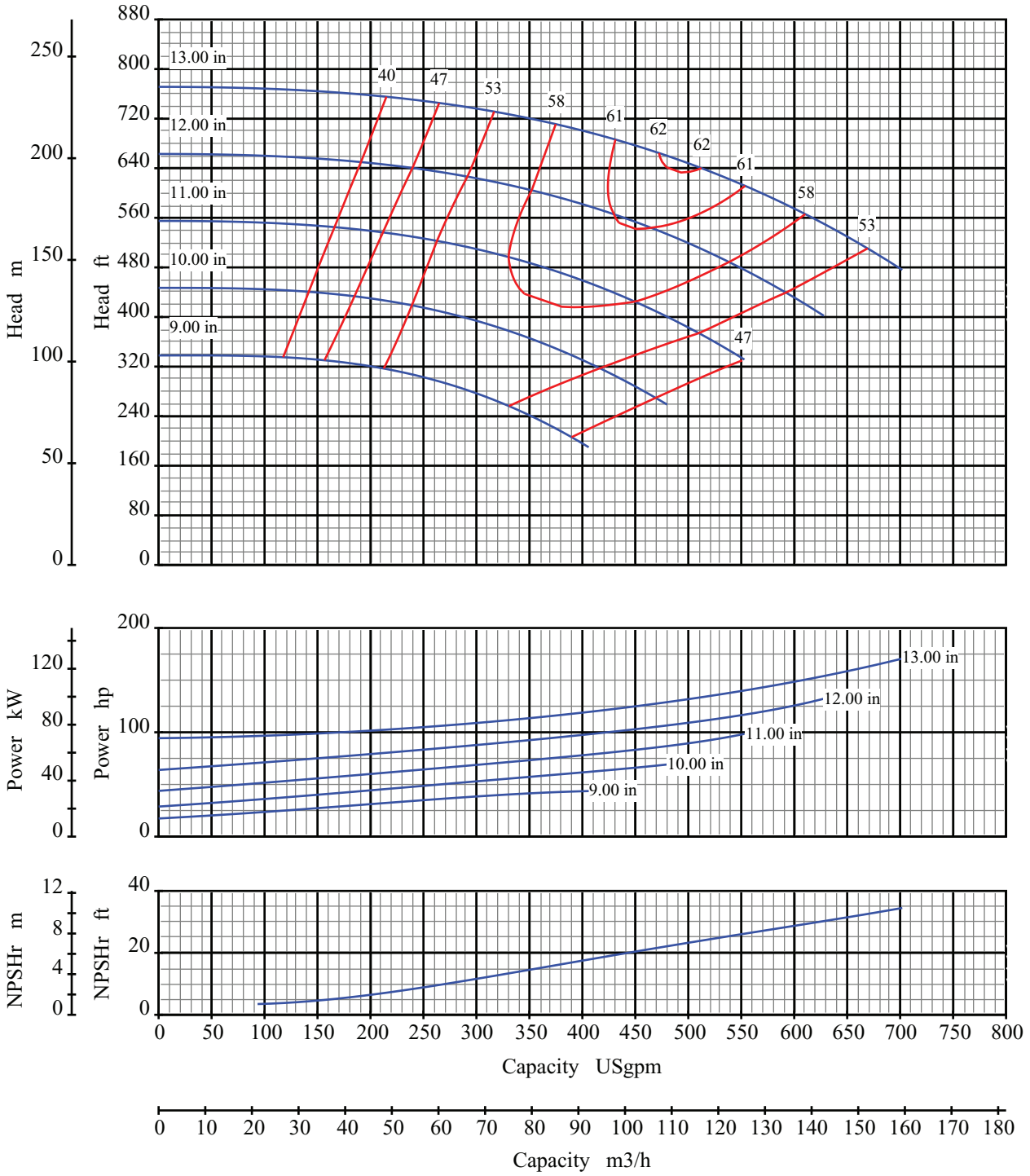
Catalog: 1301

Pump Size: 4x6 10

Pump Size: 100x150 250

Speed: 1150 rpm

Open Impeller



Curve No: S18184V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

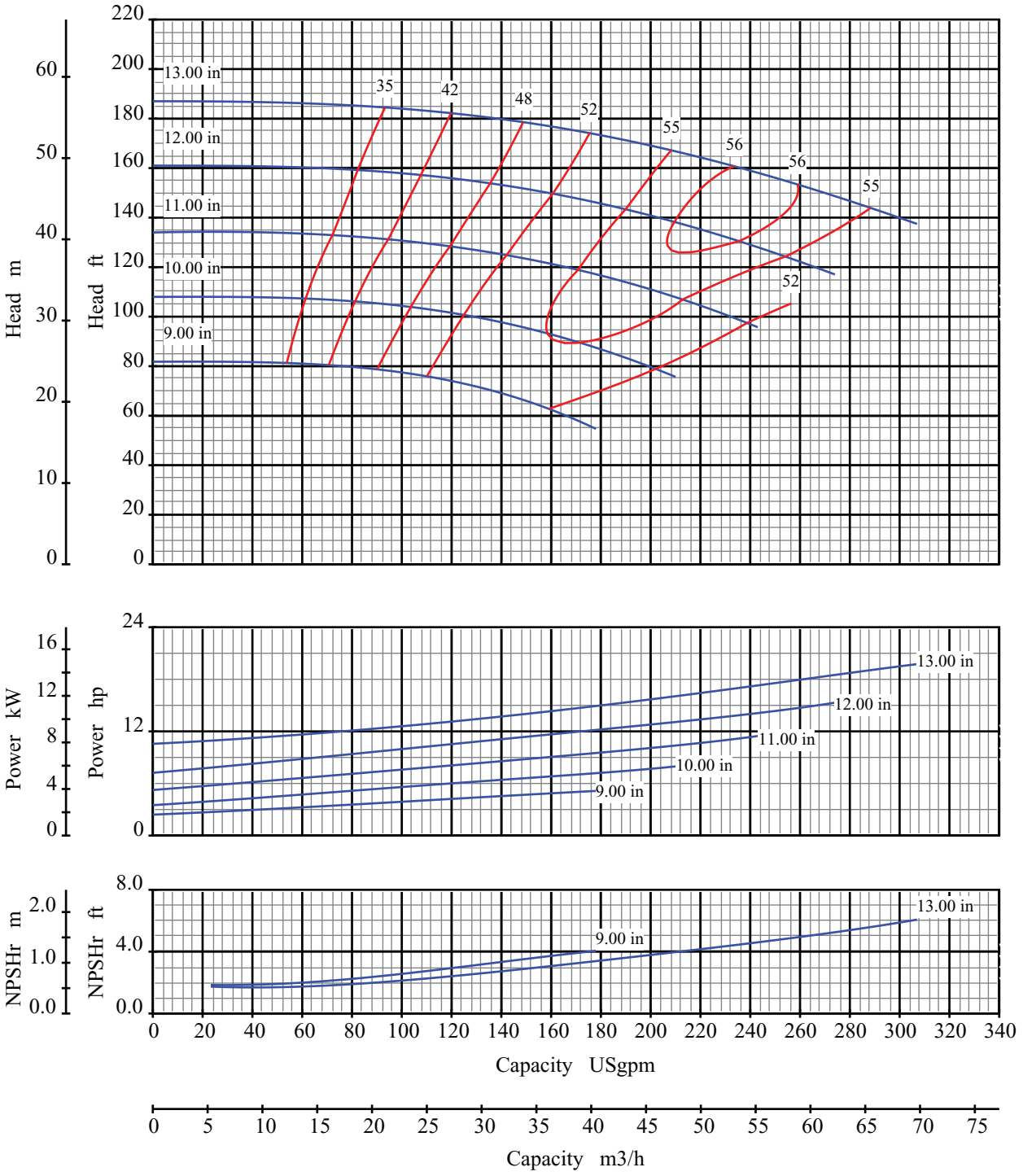
Effective Date: Jan/2005

Pump Size: 1.5x3 13

Pump Size: 40x80 330

Speed: 3550 rpm

Open Impeller



Curve No: S18186V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

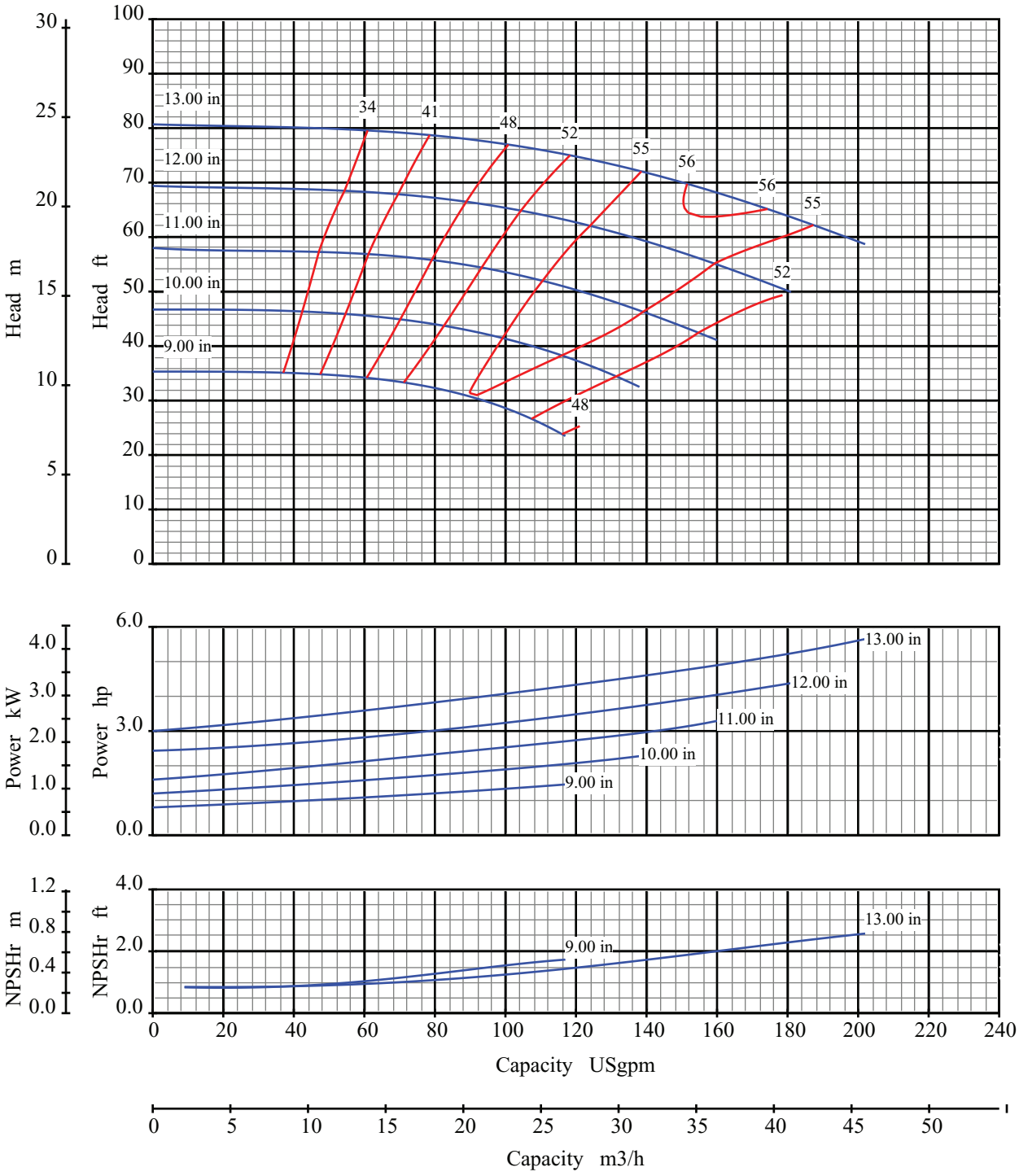
Effective Date: Jan/2005

Pump Size: 1.5x3 13

Pump Size: 40x80 330

Speed: 1750 rpm

Open Impeller



Curve No: S18188V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

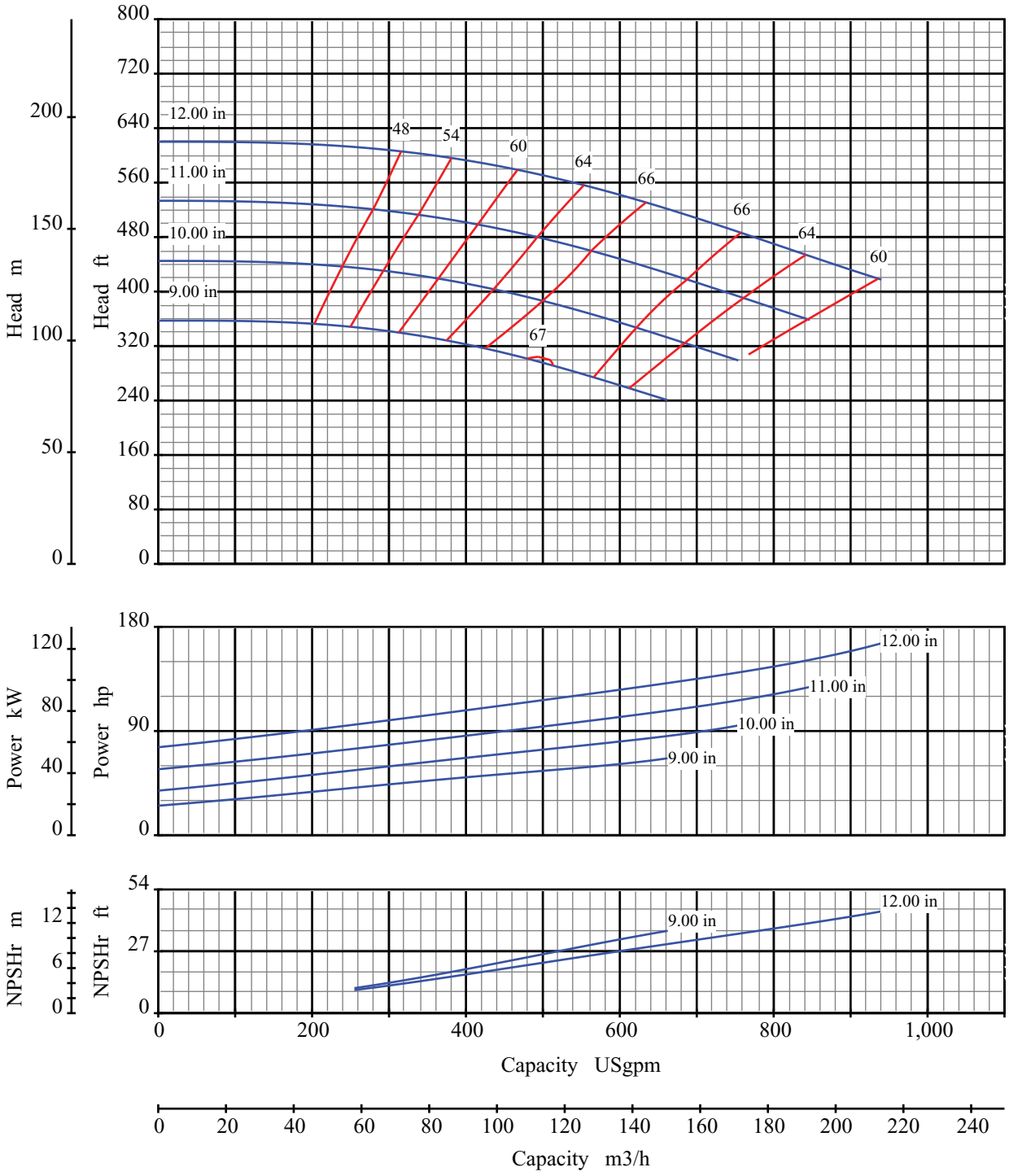
Catalog: 1301

Pump Size: 1.5x3 13

Pump Size: 40x80 330

Speed: 1150 rpm

Open Impeller



Curve No: S18190V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

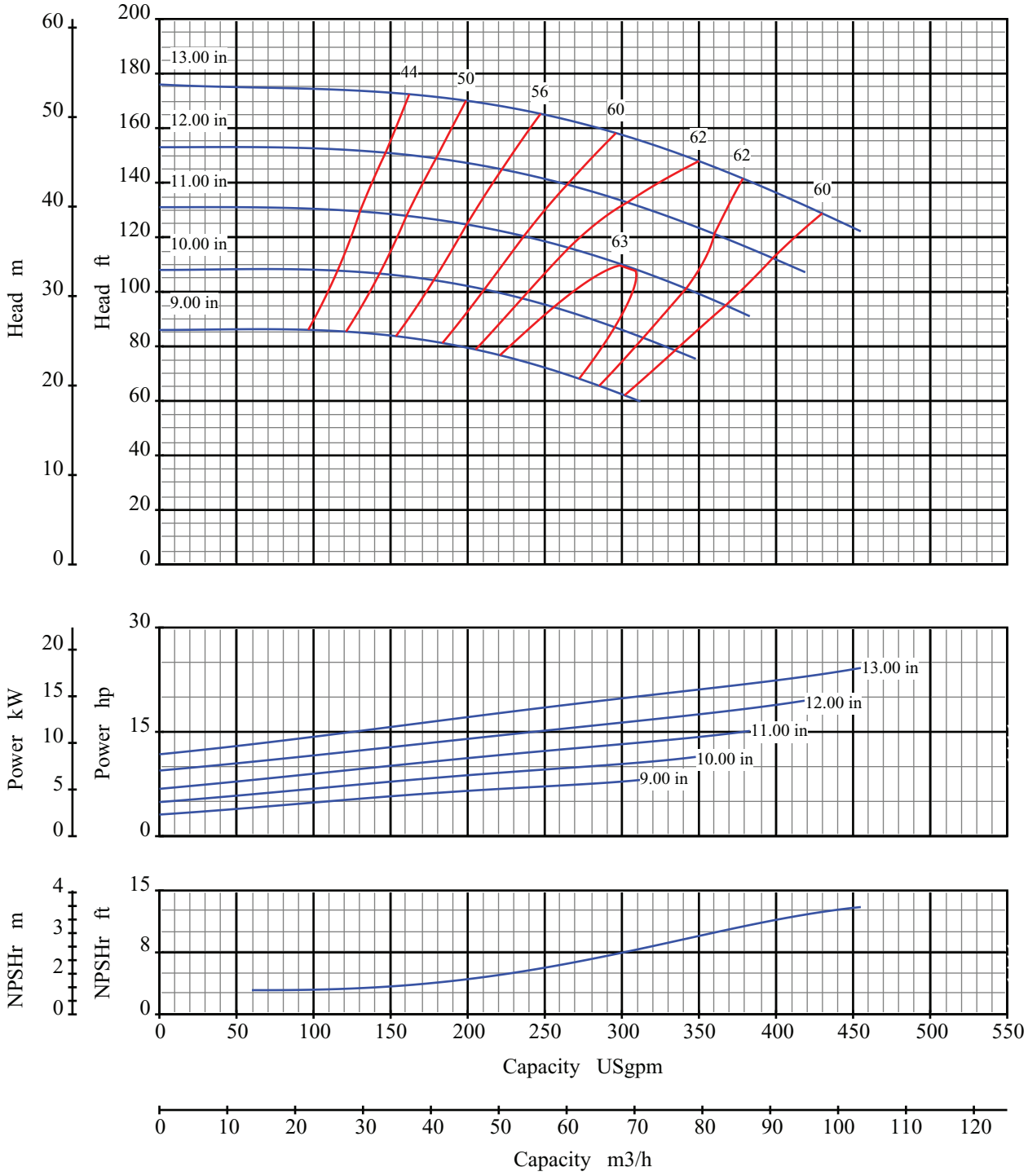
Catalog: 1301

Pump Size: 2x3 13

Pump Size: 50x80 330

Speed: 3550 rpm

Open Impeller



Curve No: S18192V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

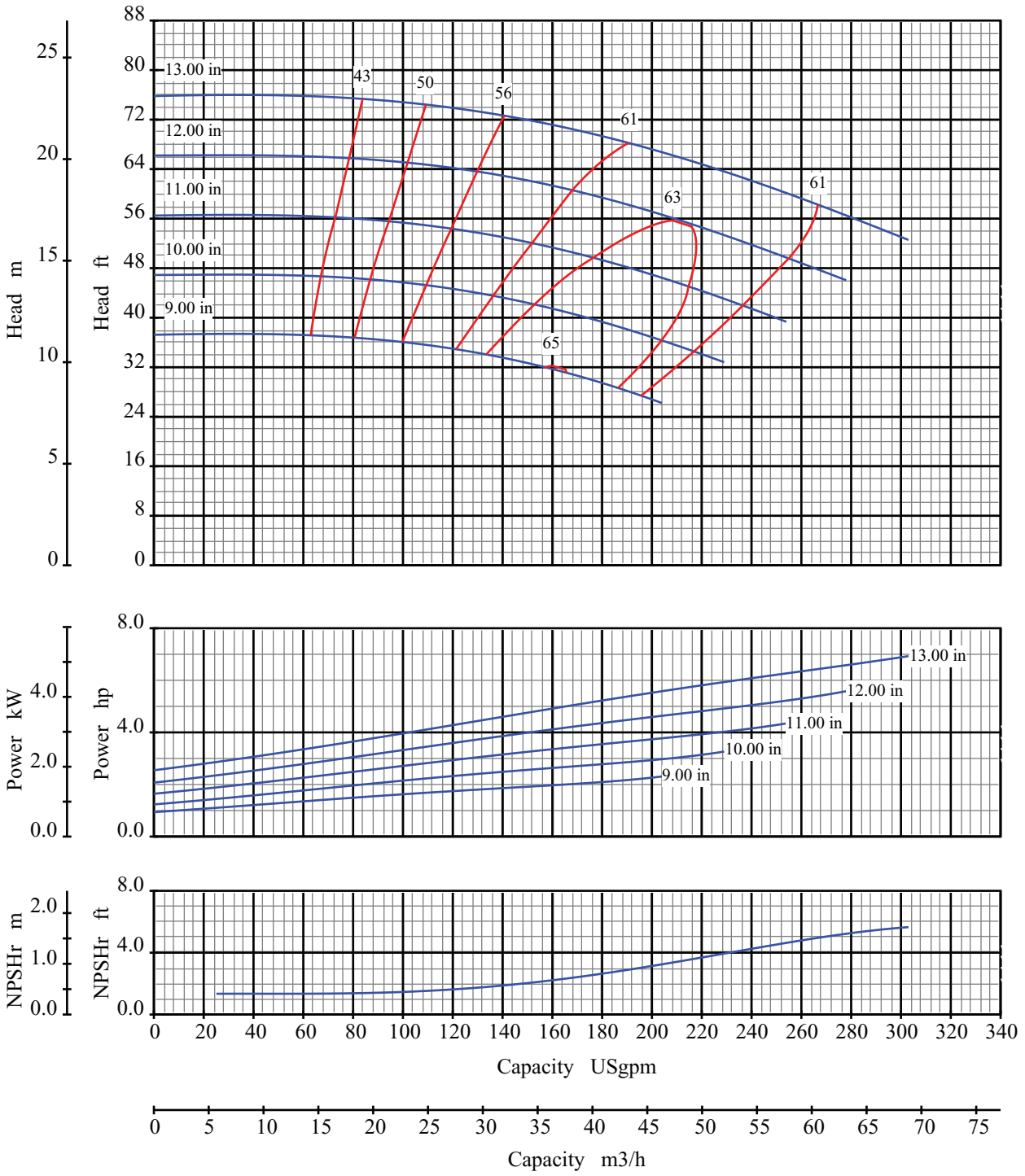
Catalog: 1301

Pump Size: 2x3 13

Pump Size: 50x80 330

Speed: 1750 rpm

Open Impeller



Curve No: S18194V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

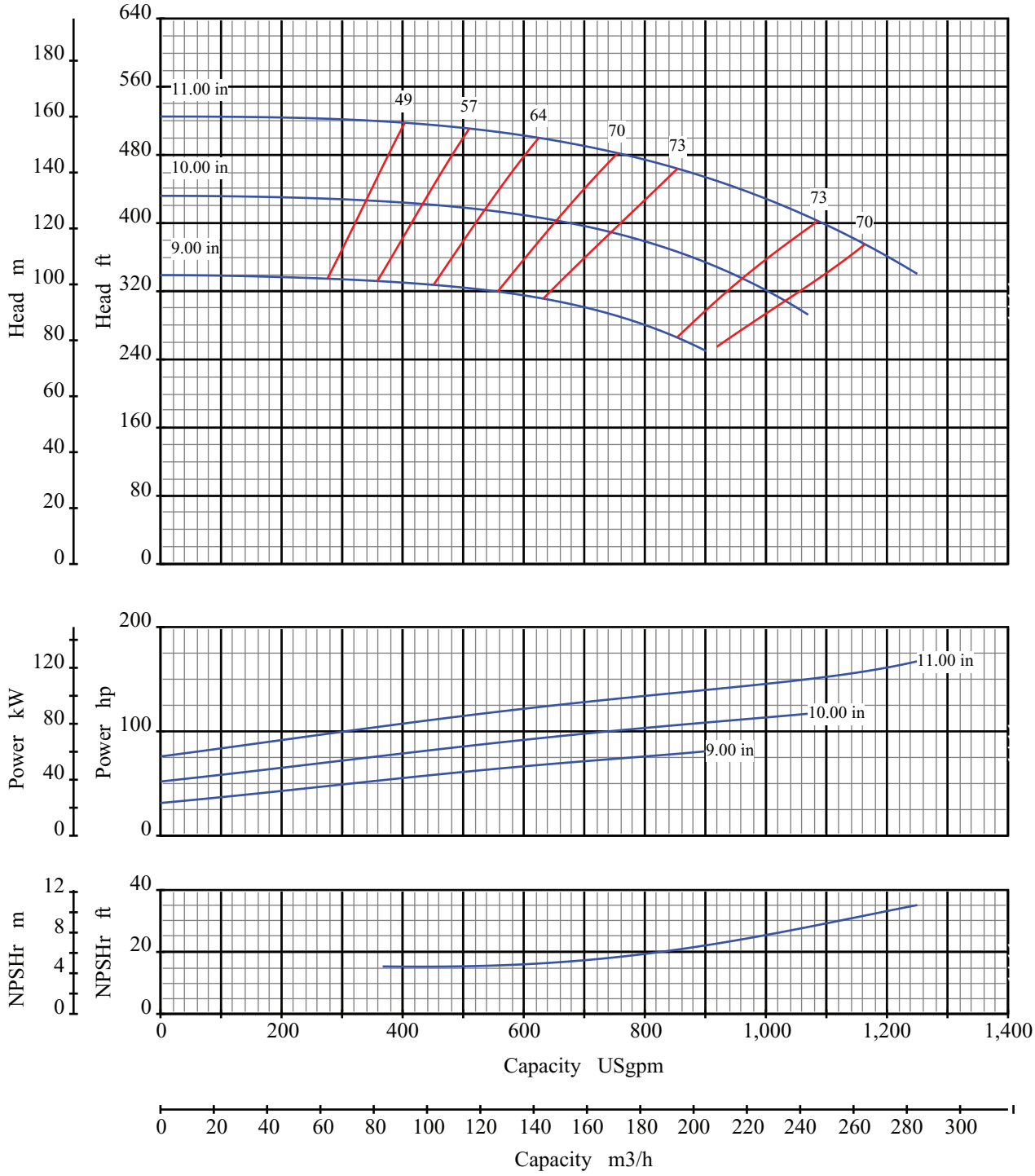
Catalog: 1301

Pump Size: 2x3 13

Pump Size: 50x80 330

Speed: 1150 rpm

Open Impeller



Curve No: S18196V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

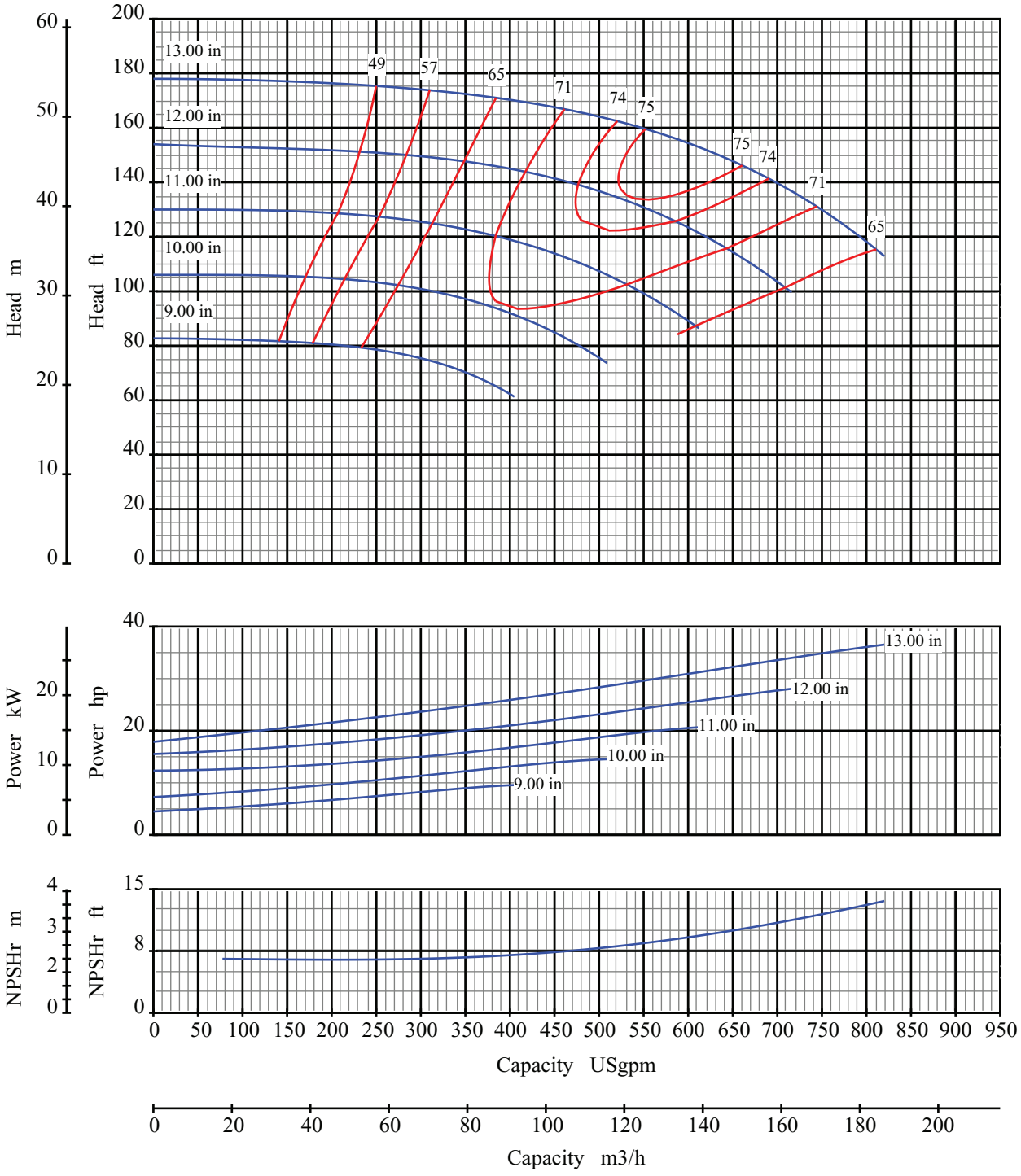
Effective Date: Jan/2005

Pump Size: 3x4 13

Pump Size: 80x100 330

Speed: 3550 rpm

Open Impeller



Curve No: S18198V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

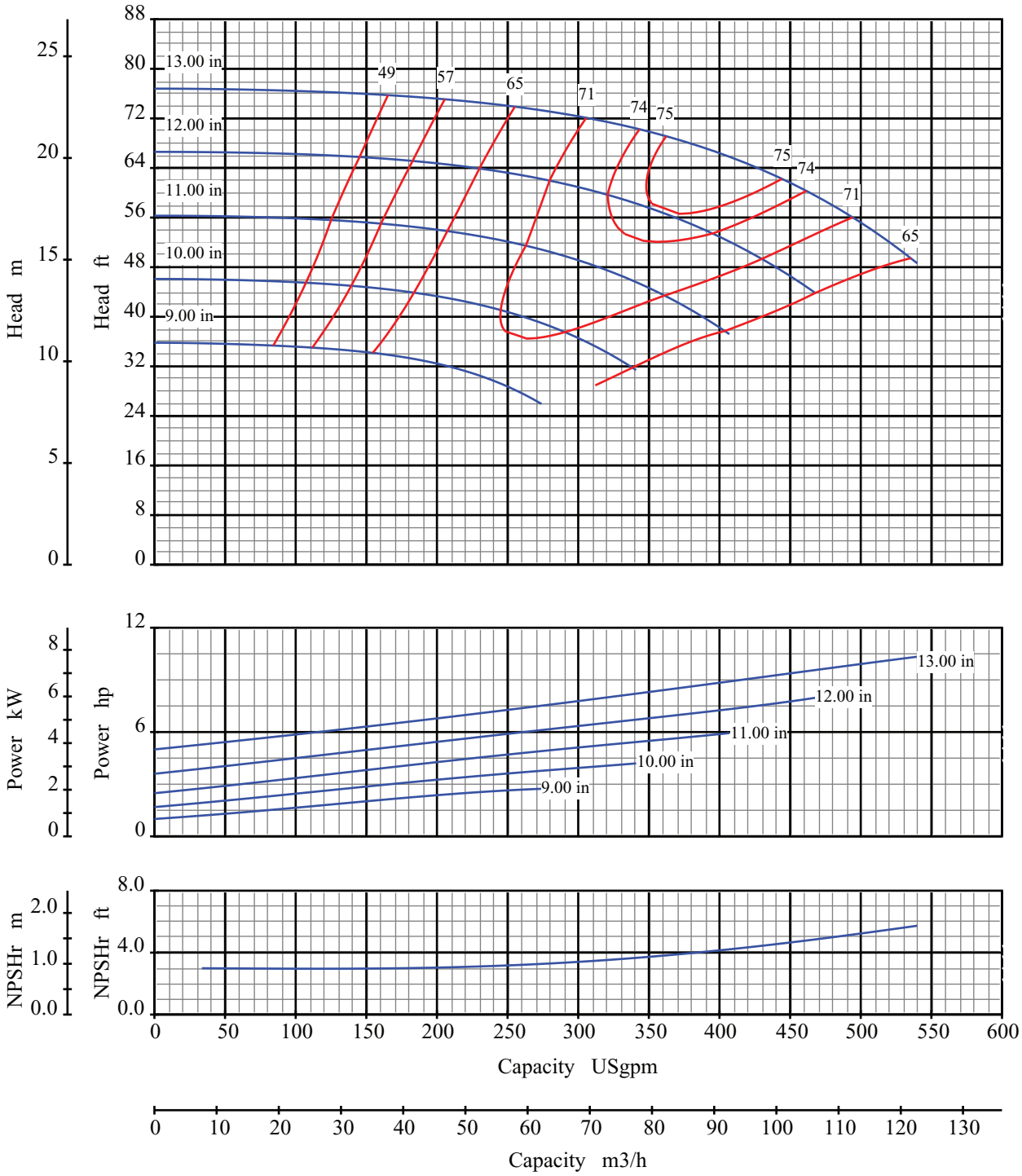
Catalog: 1301

Pump Size: 3x4 13

Pump Size: 80x100 330

Speed: 1750 rpm

Open Impeller



Curve No: S18200V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

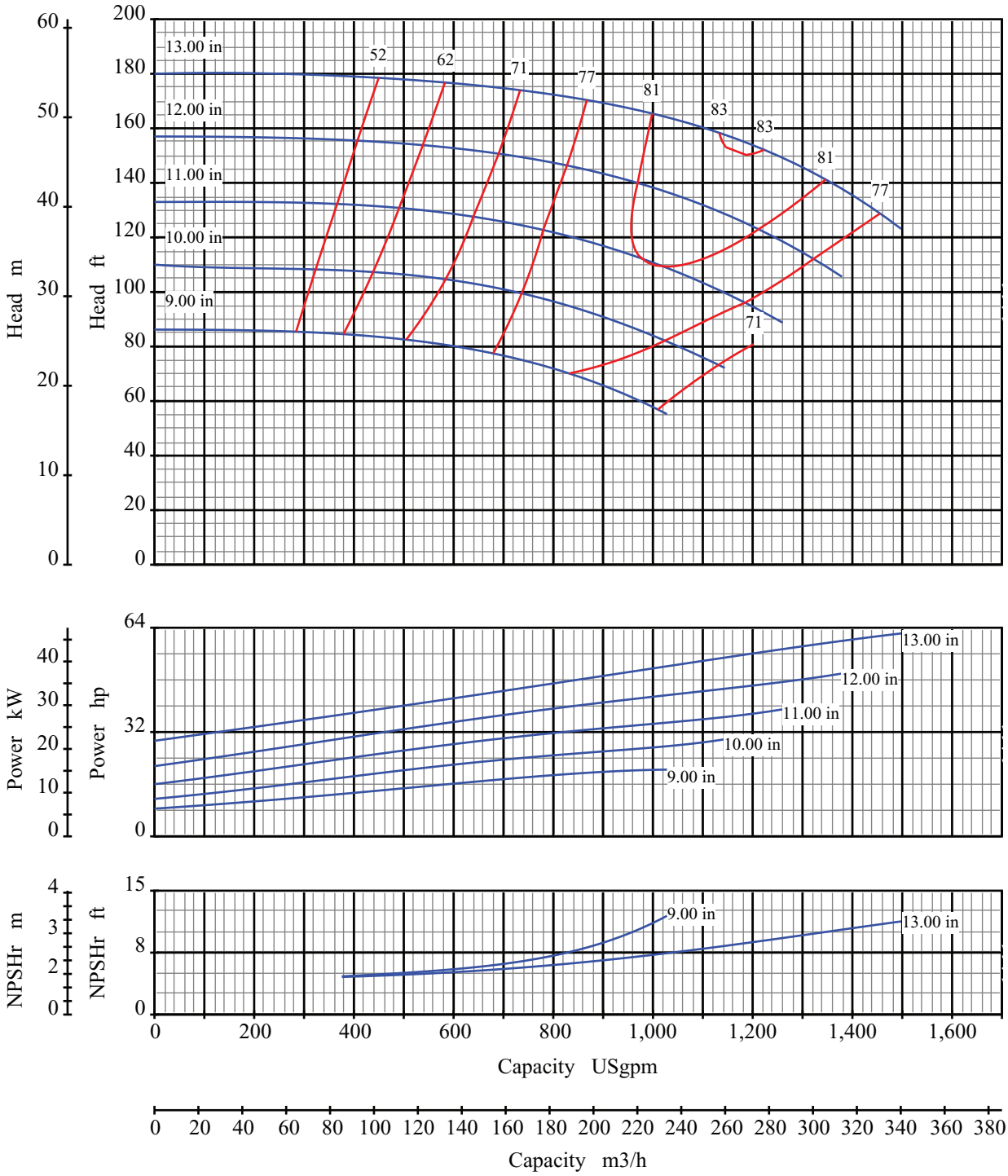
Catalog: 1301

Pump Size: 3x4 13

Pump Size: 80x100 330

Speed: 1150 rpm

Open Impeller



Curve No: S18204V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

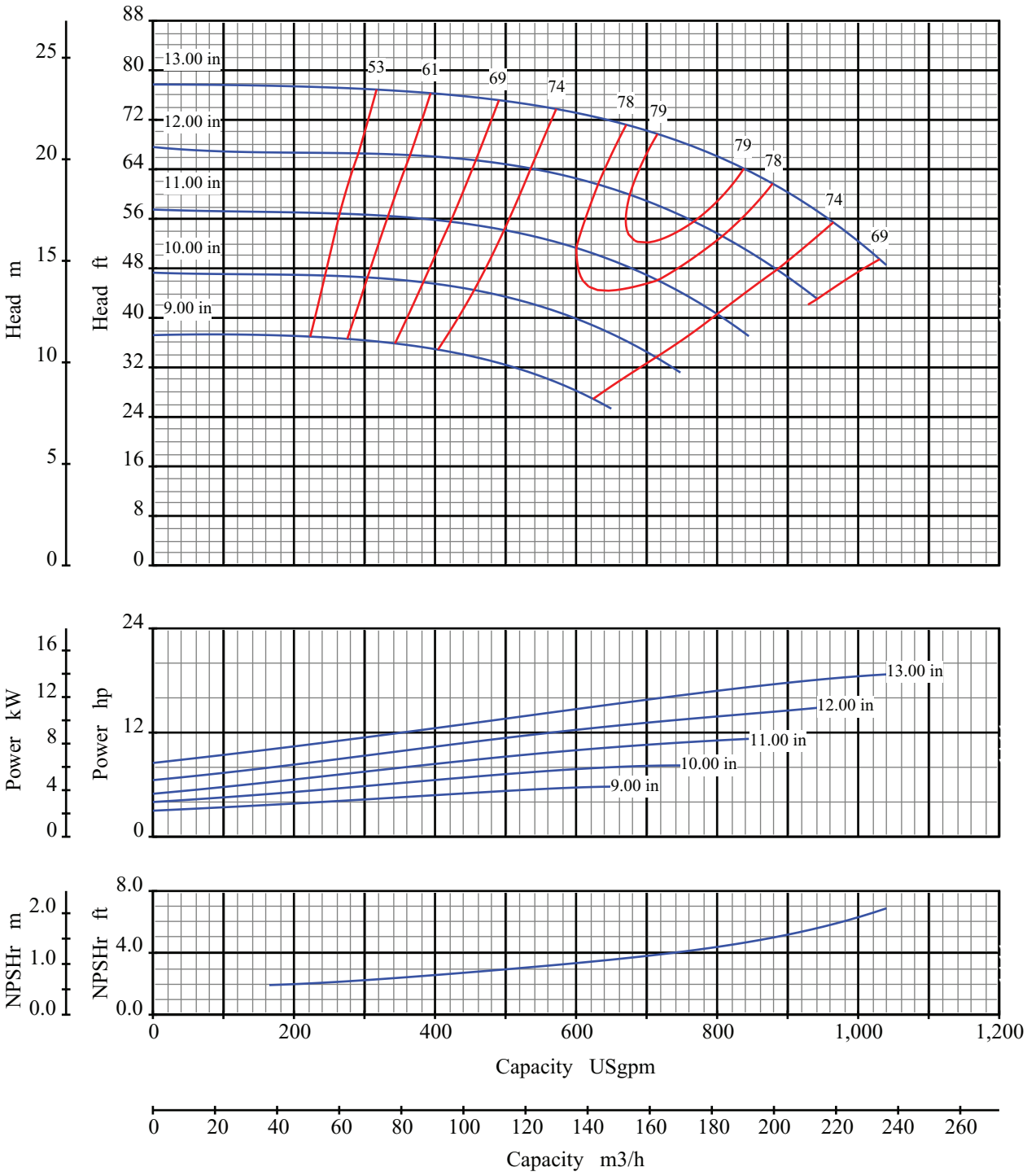
Catalog: 1301

Pump Size: 4x6 13

Pump Size: 100 150 330

Speed: 1750 rpm

Open Impeller



Curve No: S18206V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

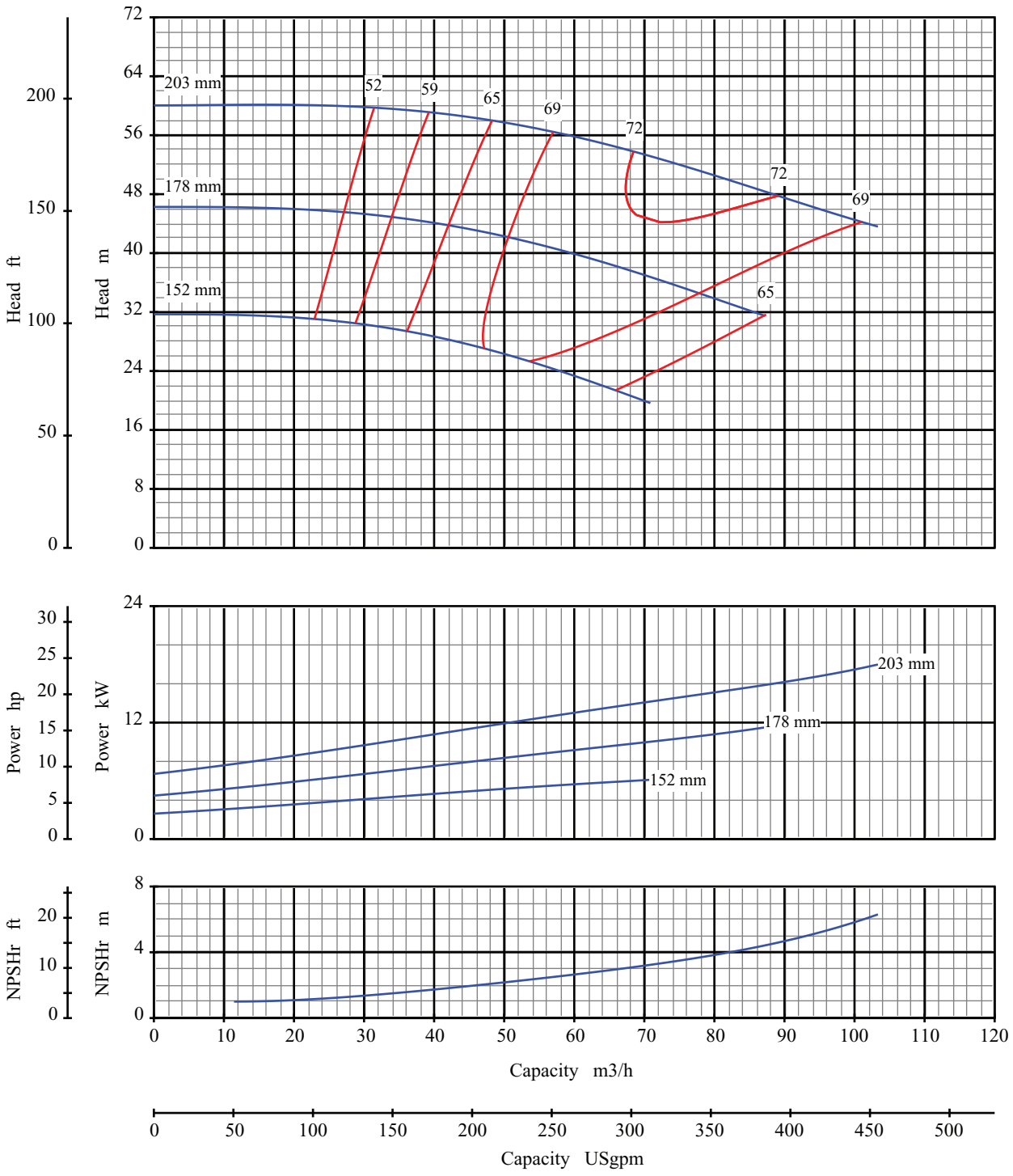
Catalog: 1301

Pump Size: 4x6 13

Pump Size: 100 150 330

Speed: 1150 rpm

Open Impeller



Curve No: S18143V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

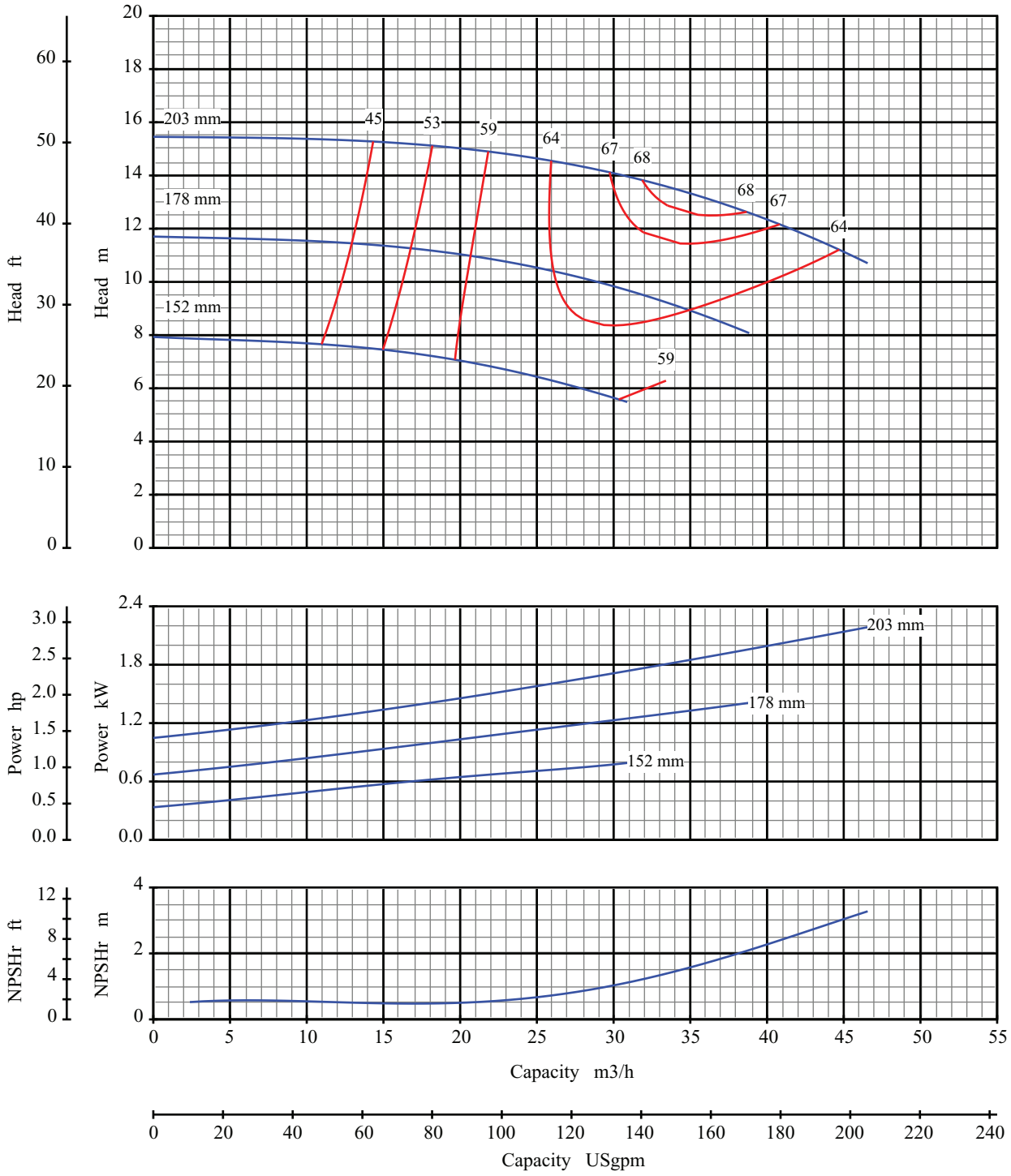
Effective Date: Jan/2005

Pump Size: 50x80 200

Pump Size: 2x3 8

Speed: 2900 rpm

Open Impeller



Curve No: S18145V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

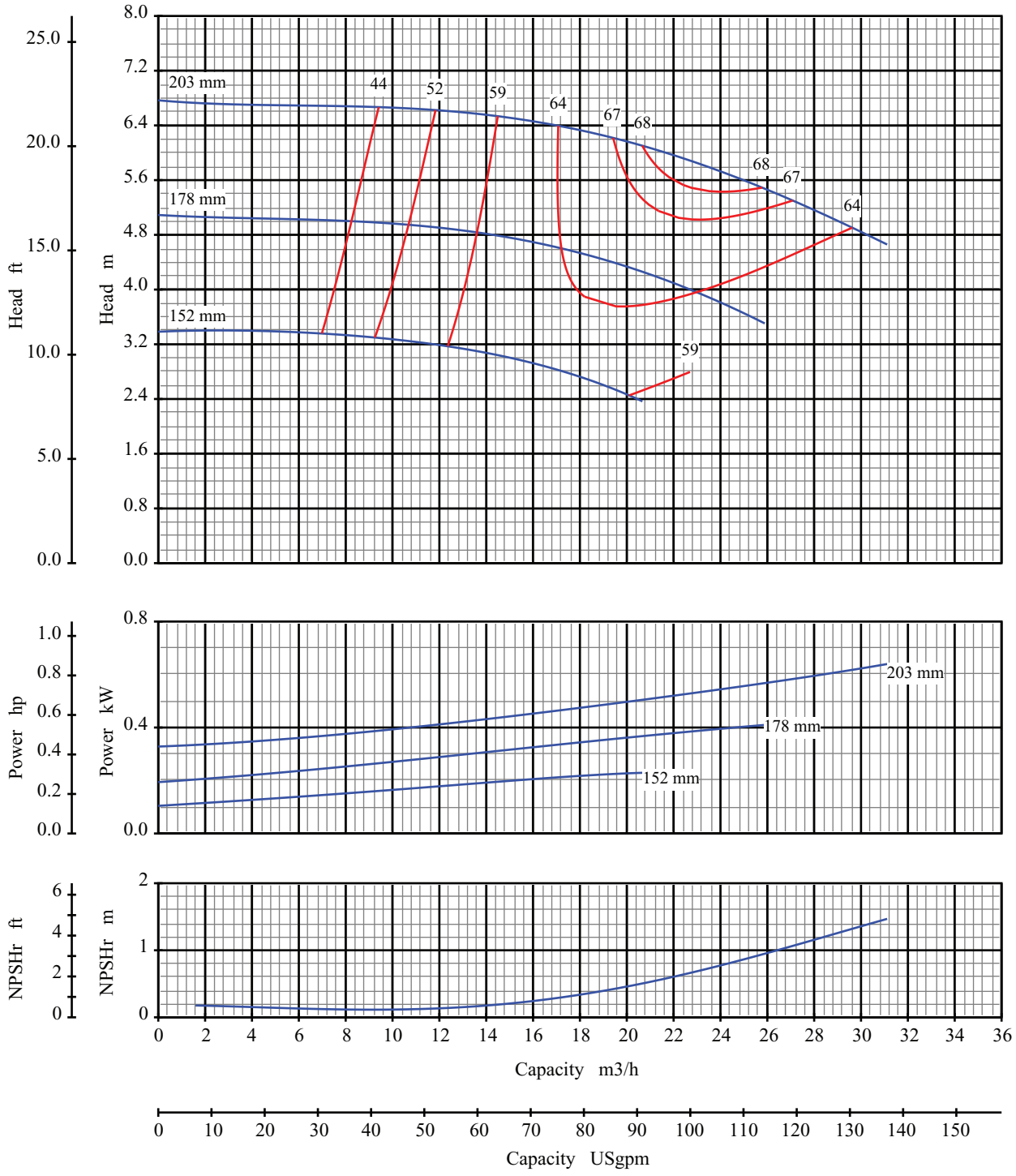
Effective Date: Jan/2005

Pump Size: 50x80 200

Pump Size: 2x3 8

Speed: 1450 rpm

Open Impeller



Curve No: S18147V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

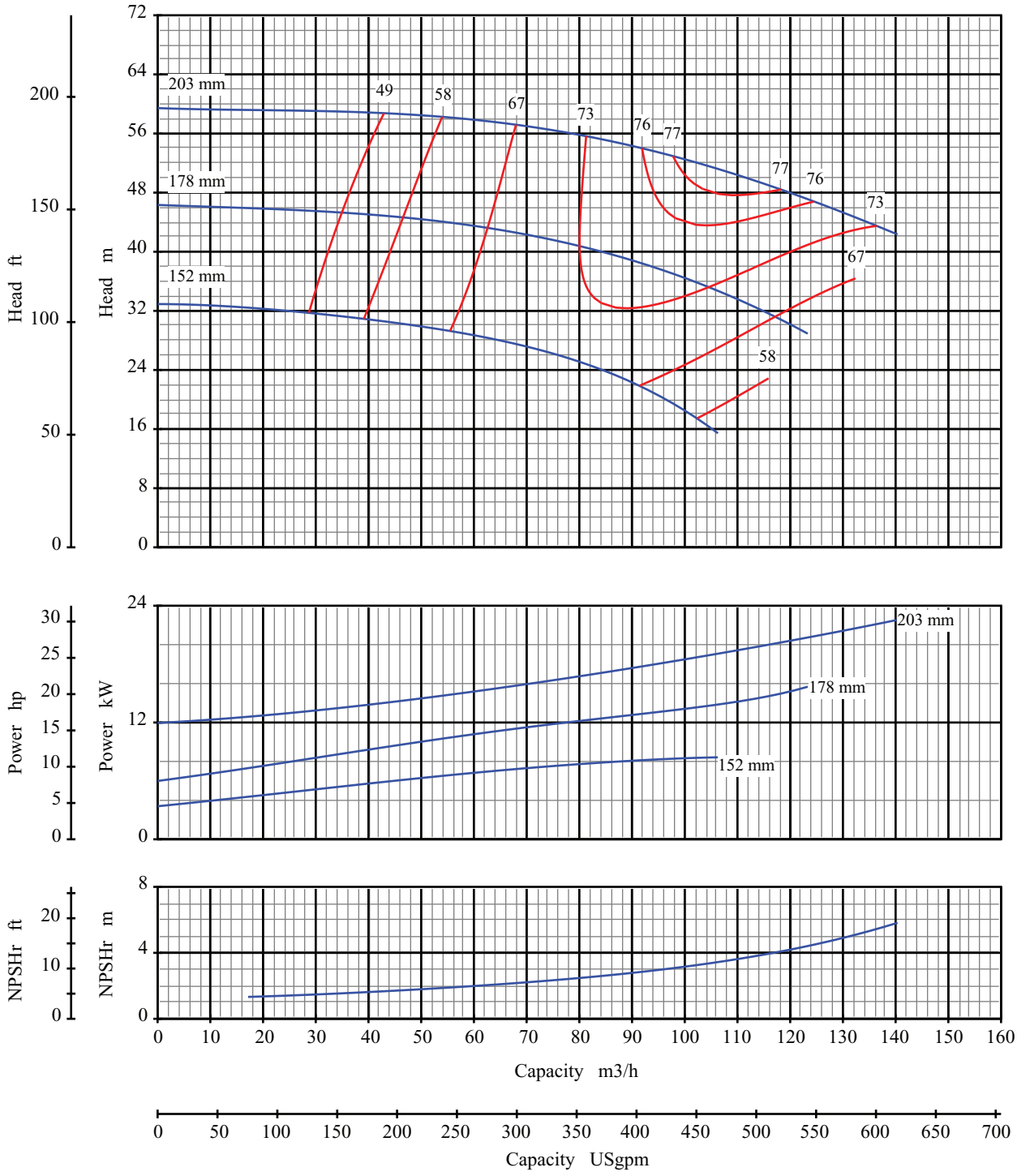
Catalog: 1301

Pump Size: 50x80 200

Pump Size: 2x3 8

Speed: 960 rpm

Open Impeller



Curve No: S18149V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

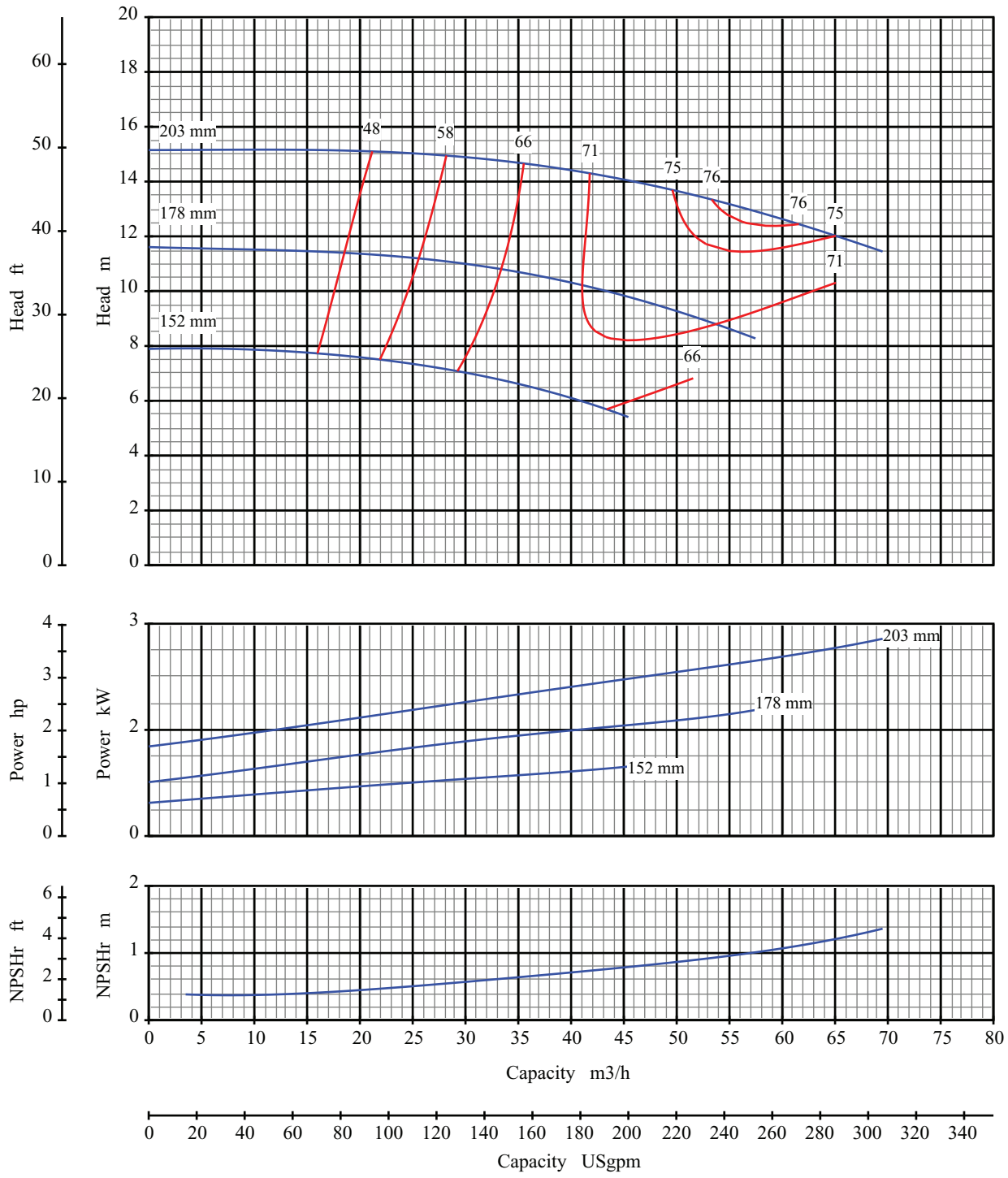
Effective Date: Jan/2005

Pump Size: 80x100 200

Pump Size: 3x4 8

Speed: 2900 rpm

Open Impeller



Curve No: S18151V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

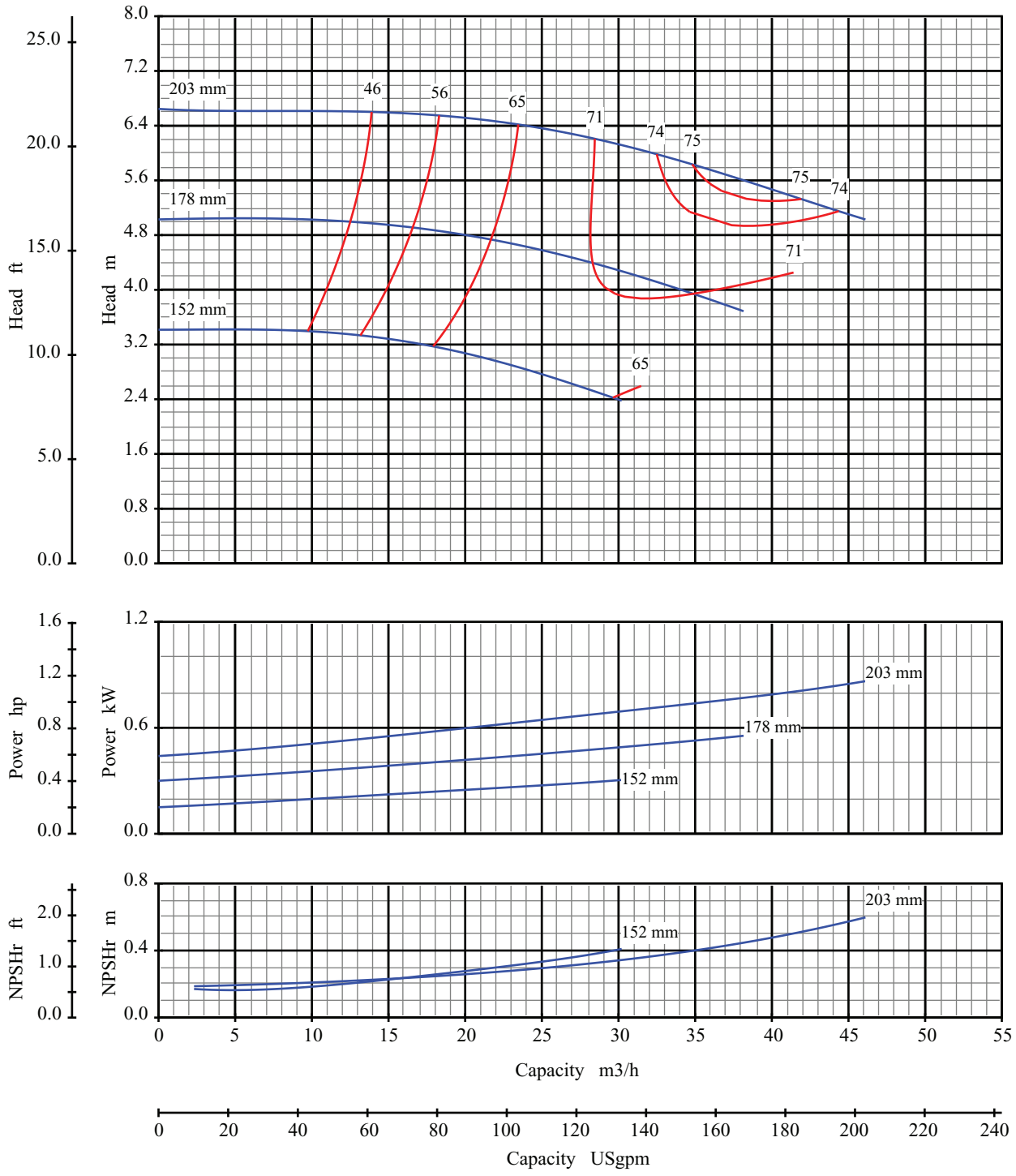
Catalog: 1301

Pump Size: 80x100 200

Pump Size: 3x4 8

Speed: 1450 rpm

Open Impeller



Curve No: S18153V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

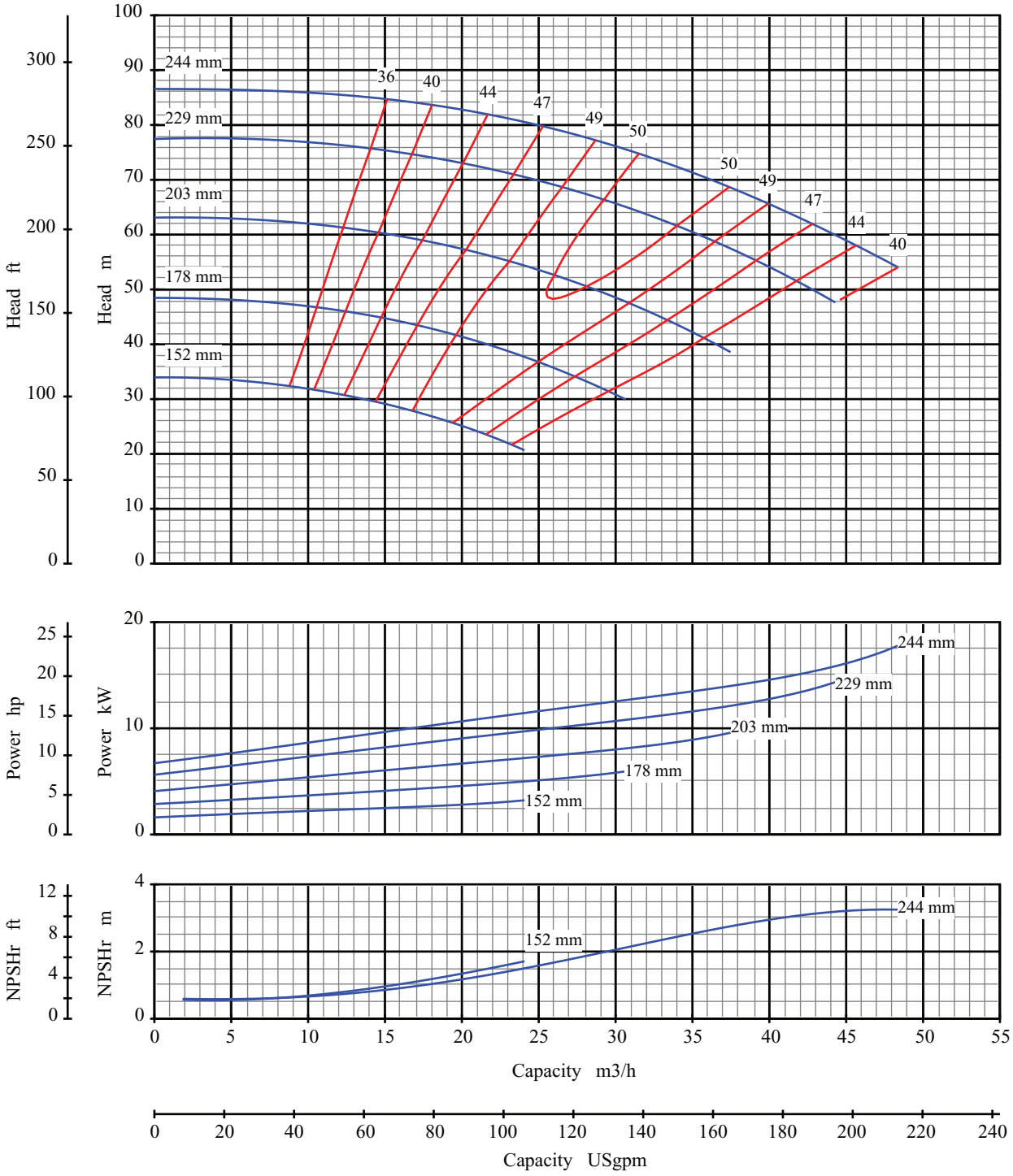
Catalog: 1301

Pump Size: 80x100 200

Pump Size: 3x4 8

Speed: 960 rpm

Open Impeller



Curve No: S18155V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

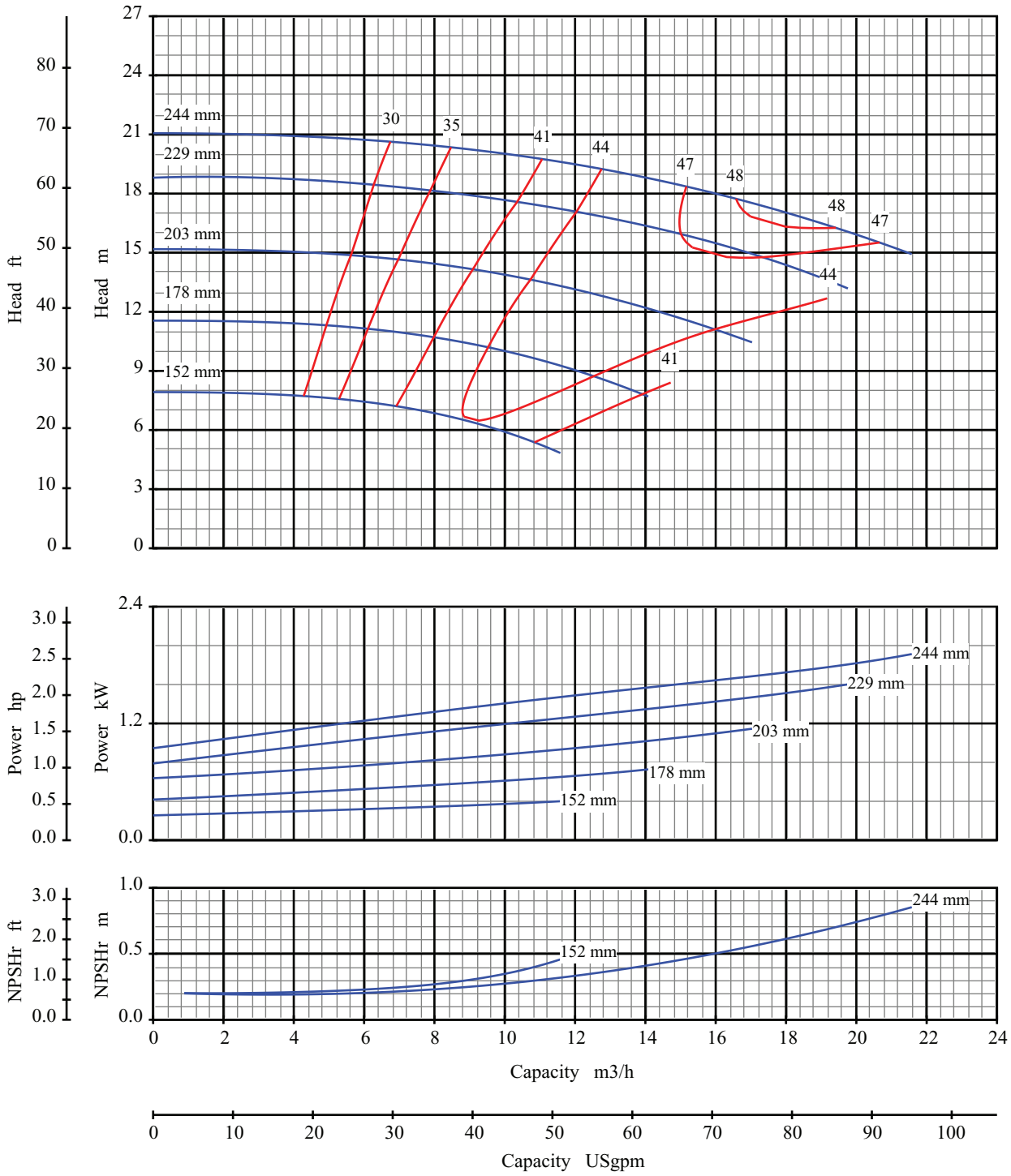
Effective Date: Jan/2005

Pump Size: 25x50 250

Pump Size: 1x2 10

Speed: 2900 rpm

Open Impeller



Curve No: S18157V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

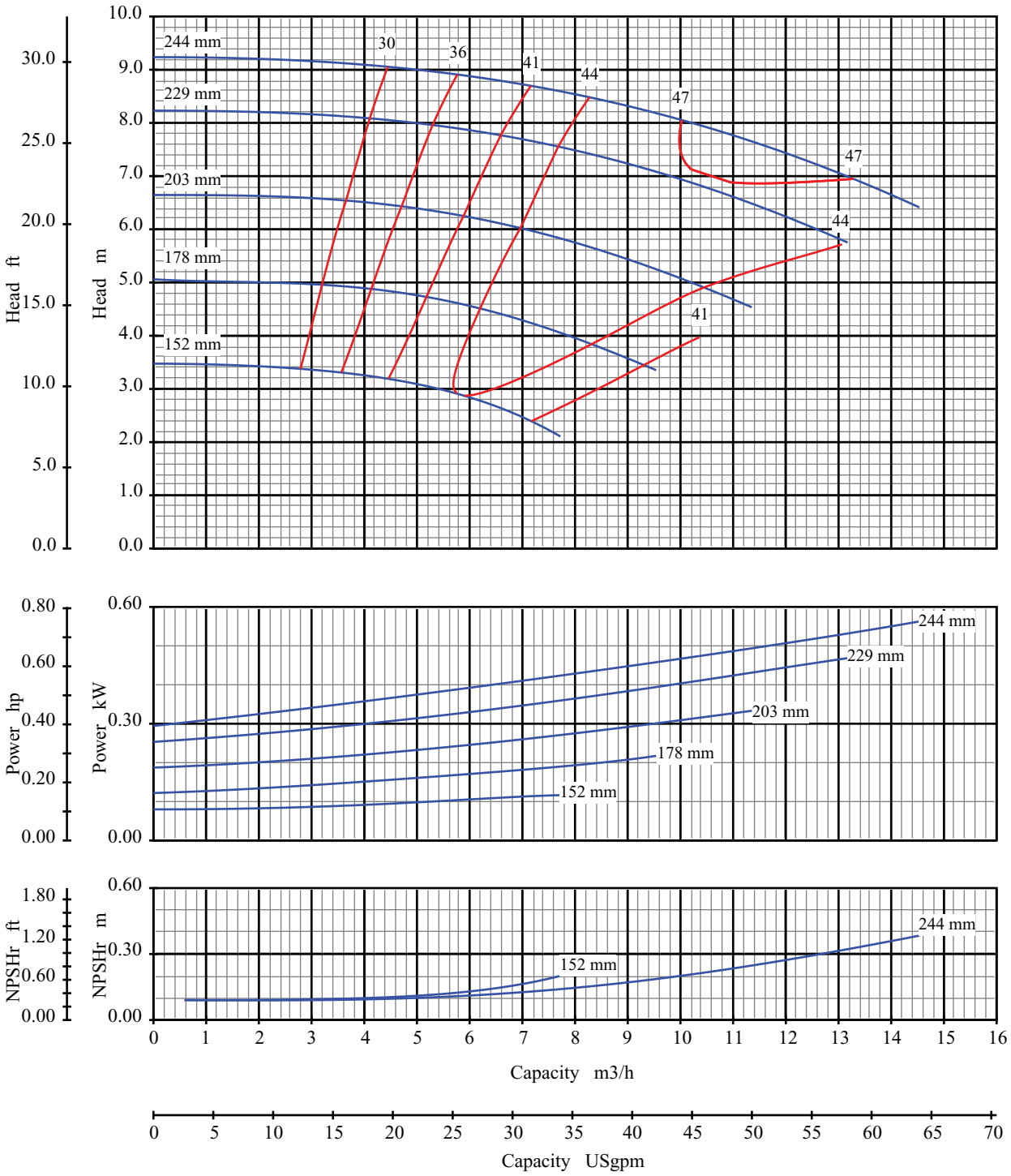
Effective Date: Jan/2005

Pump Size: 25x50 250

Pump Size: 1x2 10

Speed: 1450 rpm

Open Impeller



Curve No: S18159V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

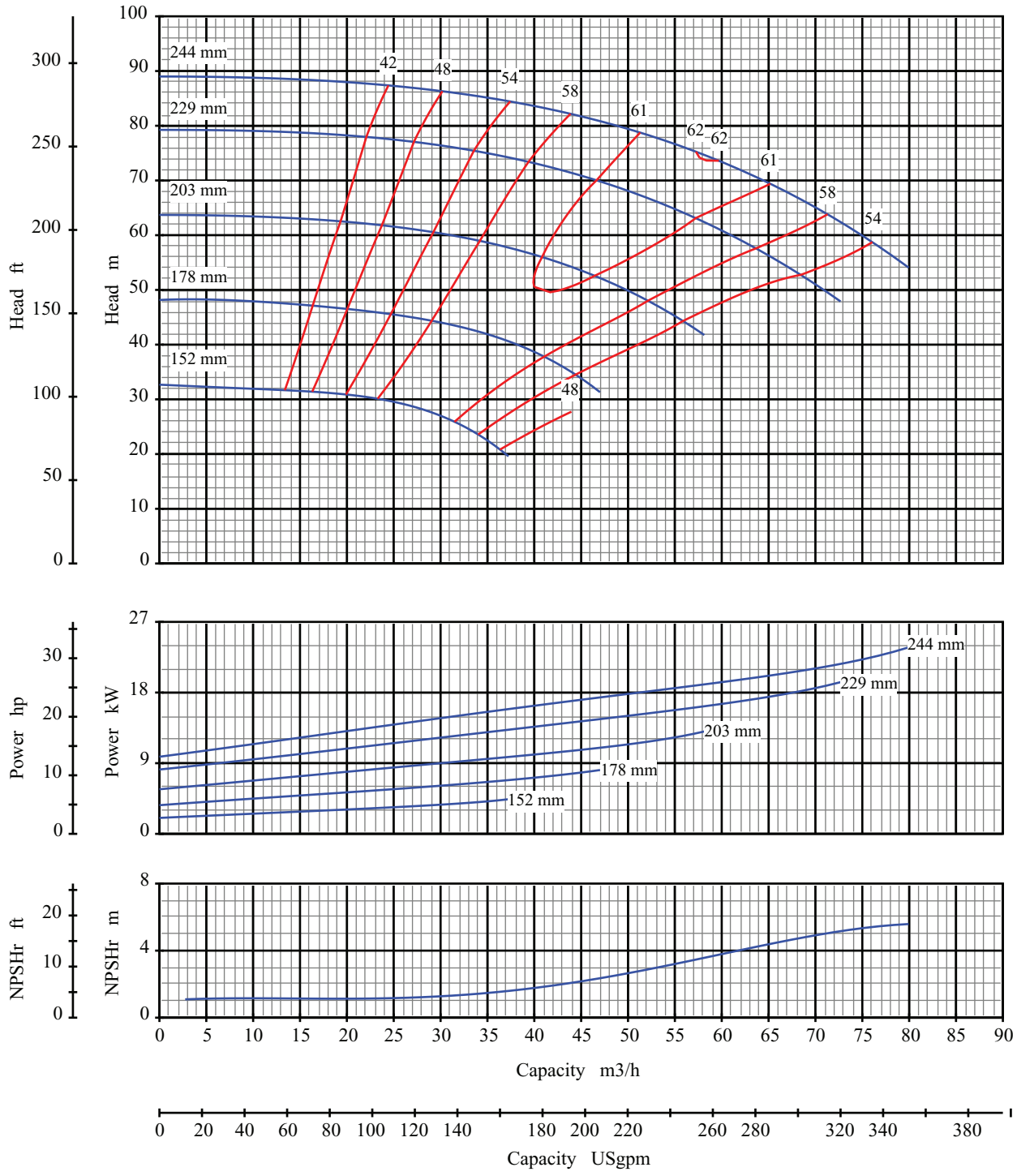
Effective Date: Jan/2005

Pump Size: 25x50 250

Pump Size: 1x2 10

Speed: 960 rpm

Open Impeller



Curve No: S18161V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

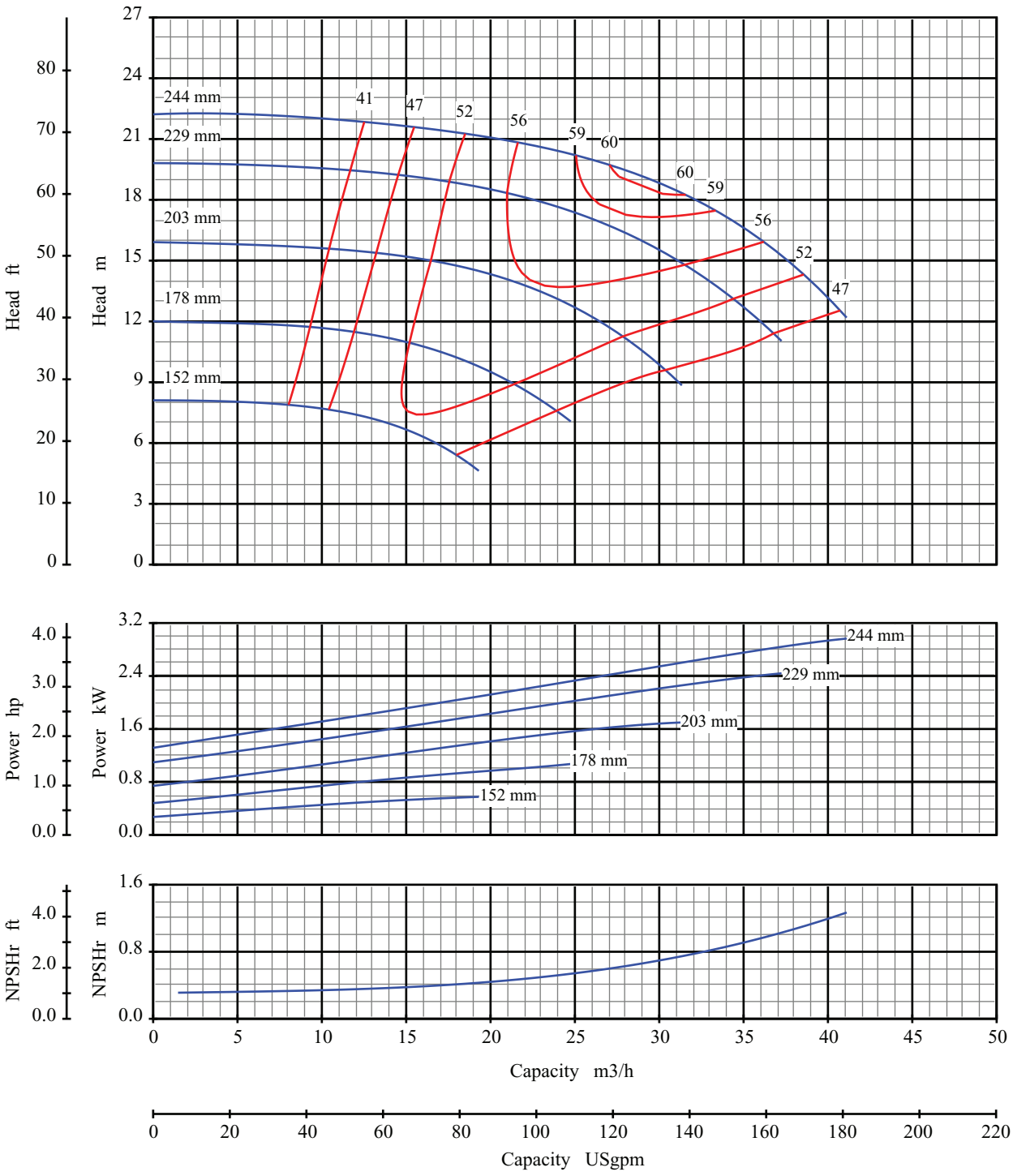
Effective Date: Jan/2005

Pump Size: 40x80 250

Pump Size: 1.5x3 10

Speed: 2900 rpm

Open Impeller



Curve No: S18163V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

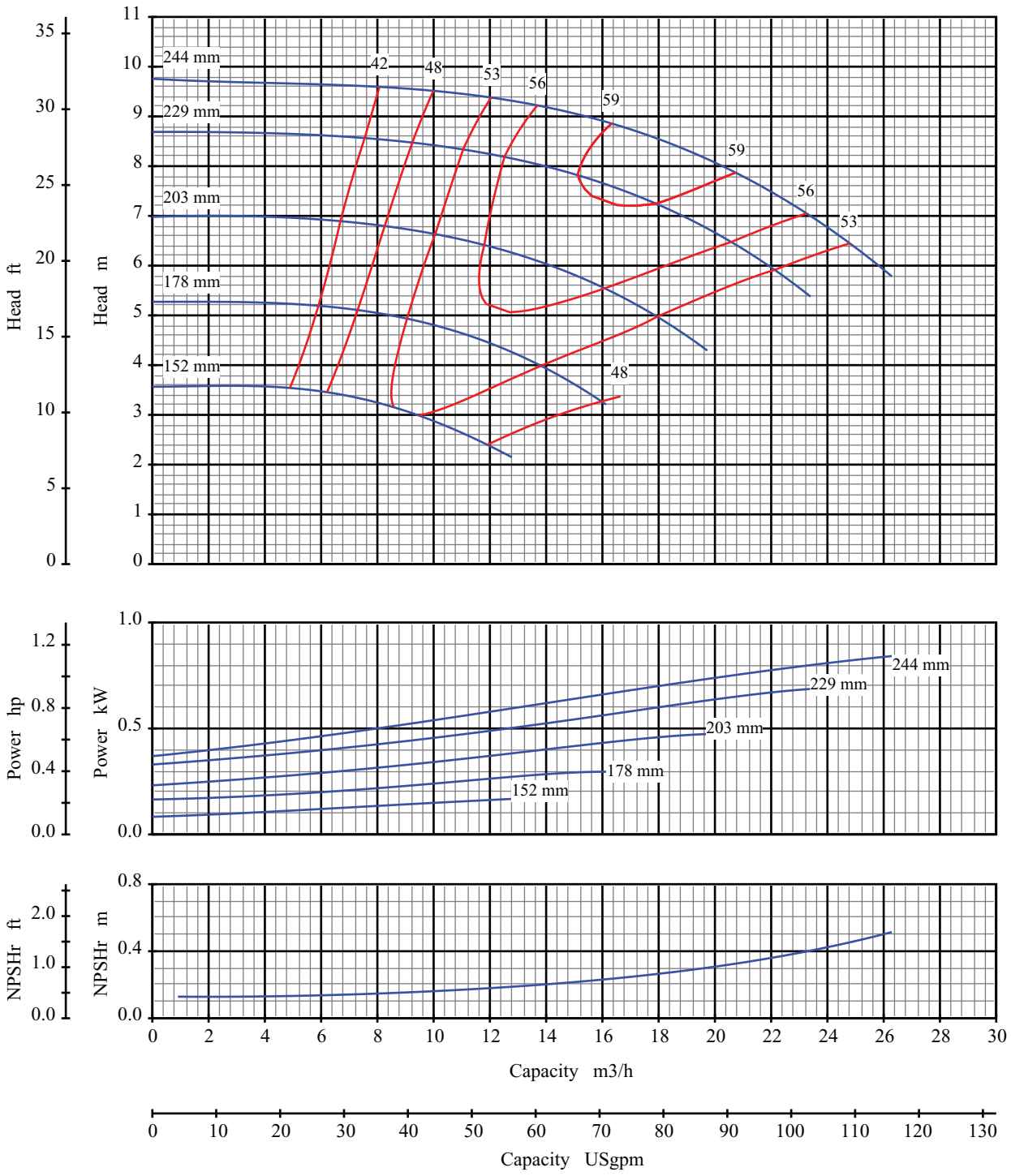
Effective Date: Jan/2005

Pump Size: 40x80 250

Pump Size: 1.5x3 10

Speed: 1450 rpm

Open Impeller



Curve No: S18165V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

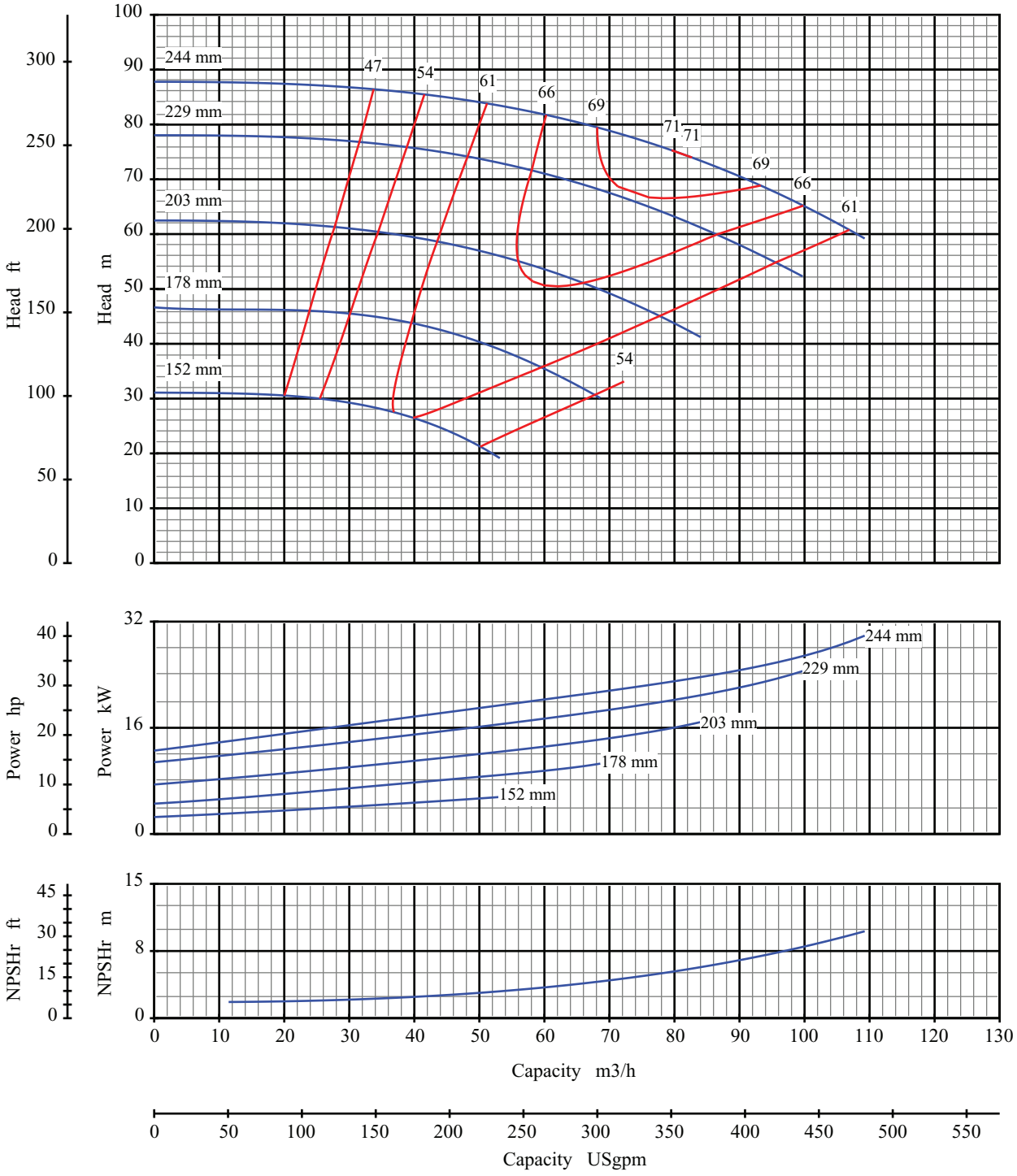
Effective Date: Jan/2005

Pump Size: 40x80 250

Pump Size: 1.5x3 10

Speed: 960 rpm

Open Impeller



Curve No: S18167V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

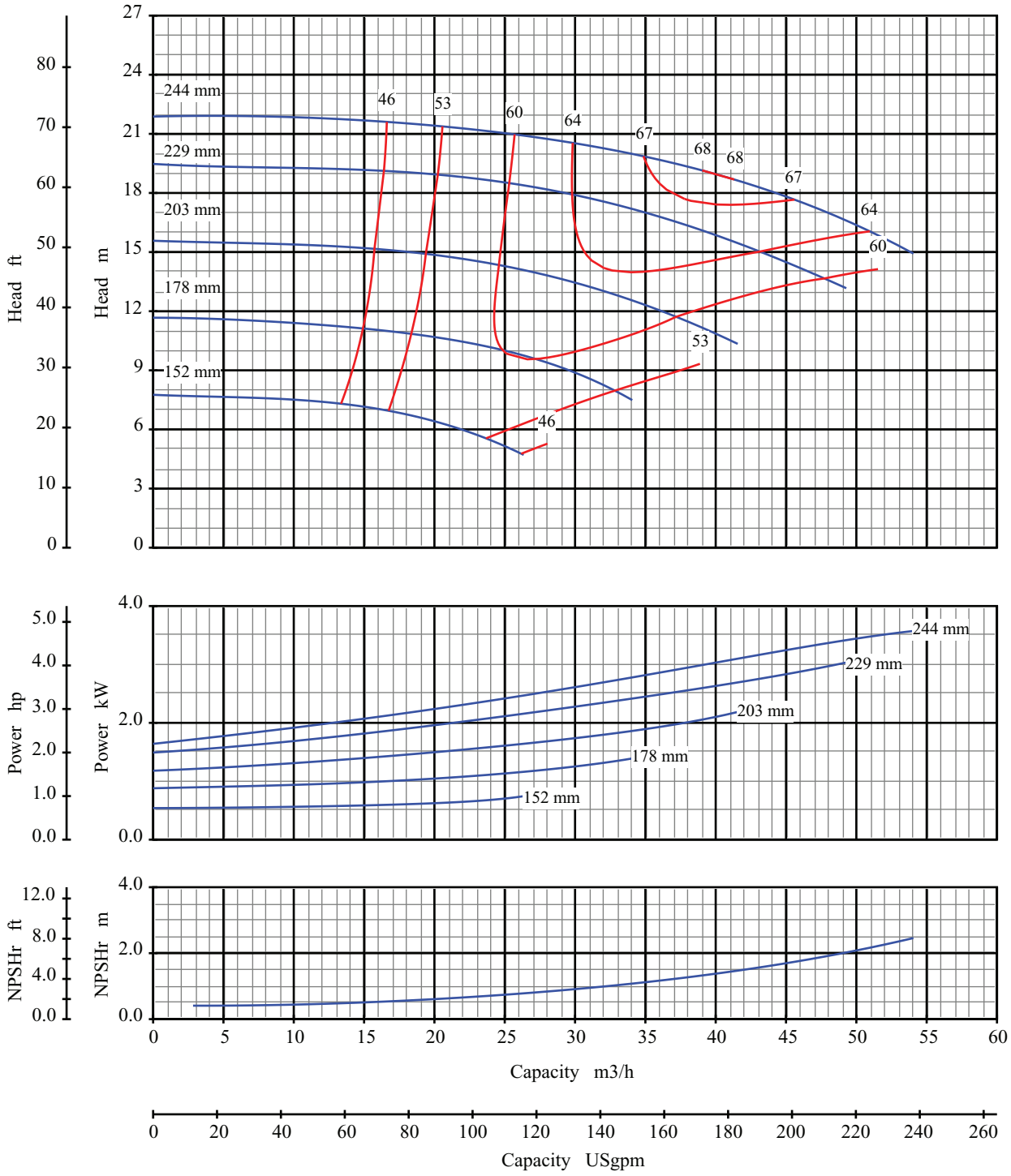
Effective Date: Jan/2005

Pump Size: 50x80 250

Pump Size: 2x3 10

Speed: 2900 rpm

Open Impeller



Curve No: S18169V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

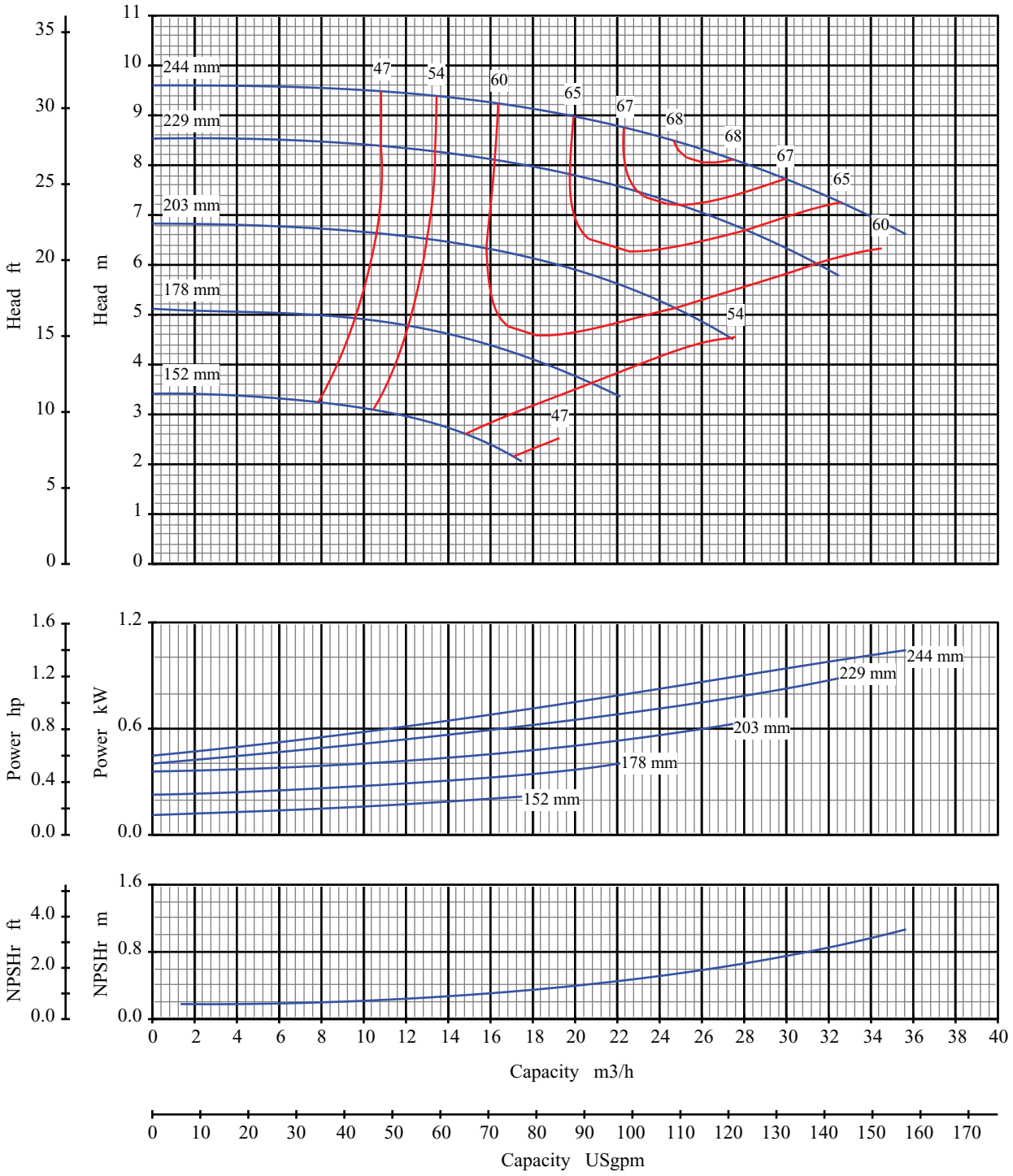
Effective Date: Jan/2005

Pump Size: 50x80 250

Pump Size: 2x3 10

Speed: 1450 rpm

Open Impeller



Curve No: S18171V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

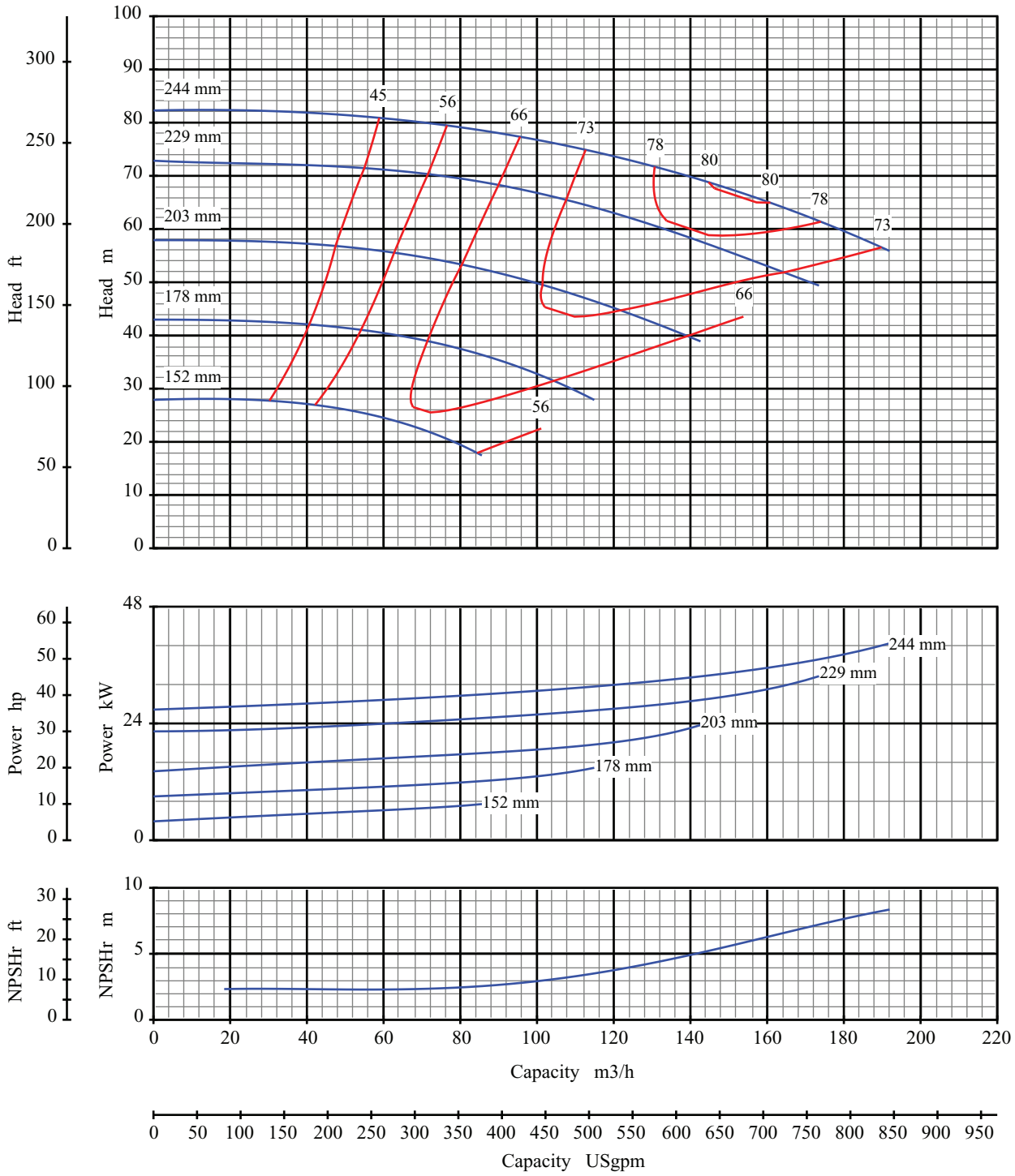
Catalog: 1301

Pump Size: 50x80 250

Pump Size: 2x3 10

Speed: 960 rpm

Open Impeller



Curve No: S18173V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

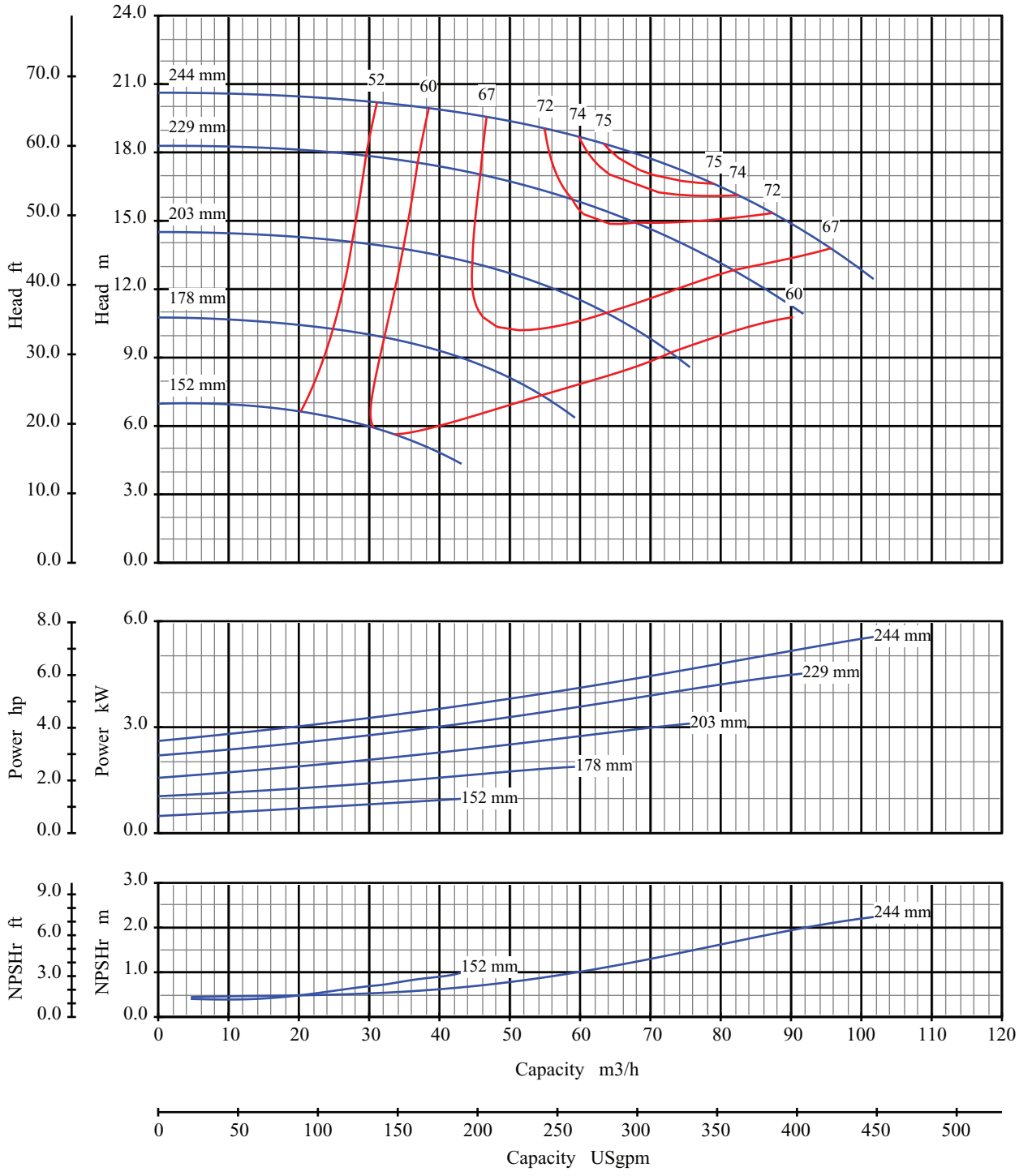
Effective Date: Jan/2005

Pump Size: 80x100 250

Pump Size: 3x4 10

Speed: 2900 rpm

Open Impeller



Curve No: S18175V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

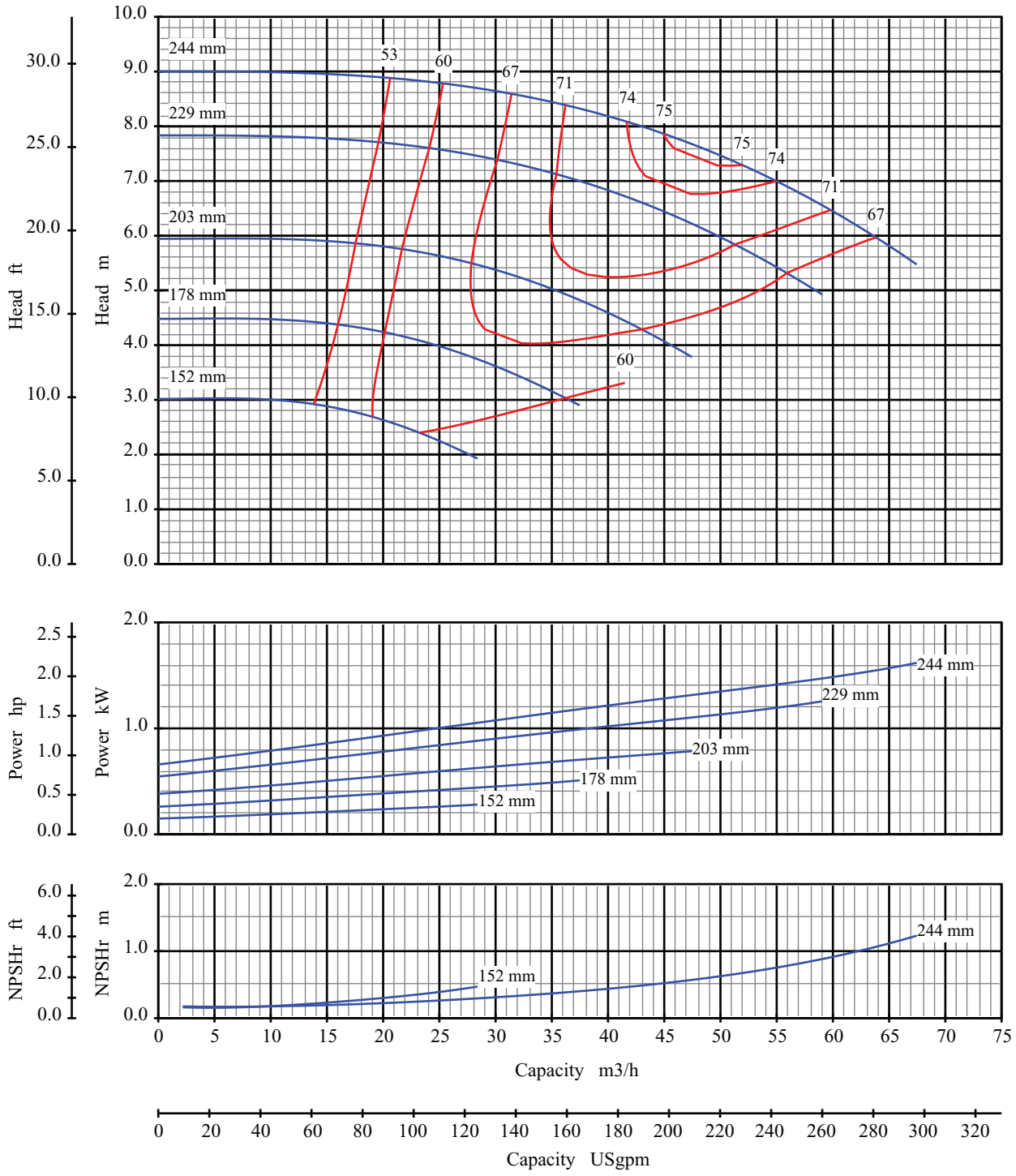
Catalog: 1301

Pump Size: 80x100 250

Pump Size: 3x4 10

Speed: 1450 rpm

Open Impeller



Curve No: S18177V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

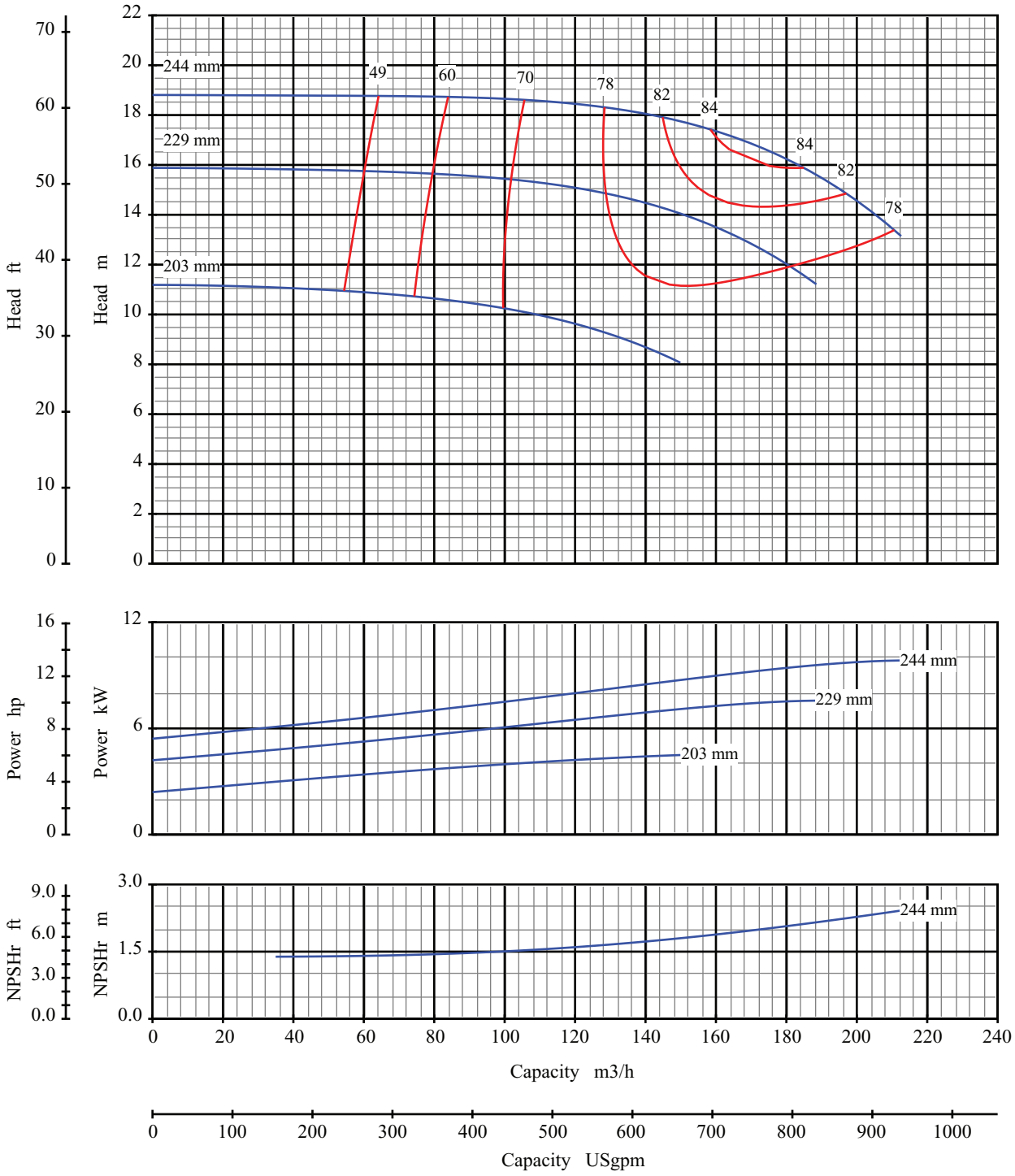
Catalog: 1301

Pump Size: 80x100 250

Pump Size: 3x4 10

Speed: 960 rpm

Open Impeller



Curve No: S18181V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

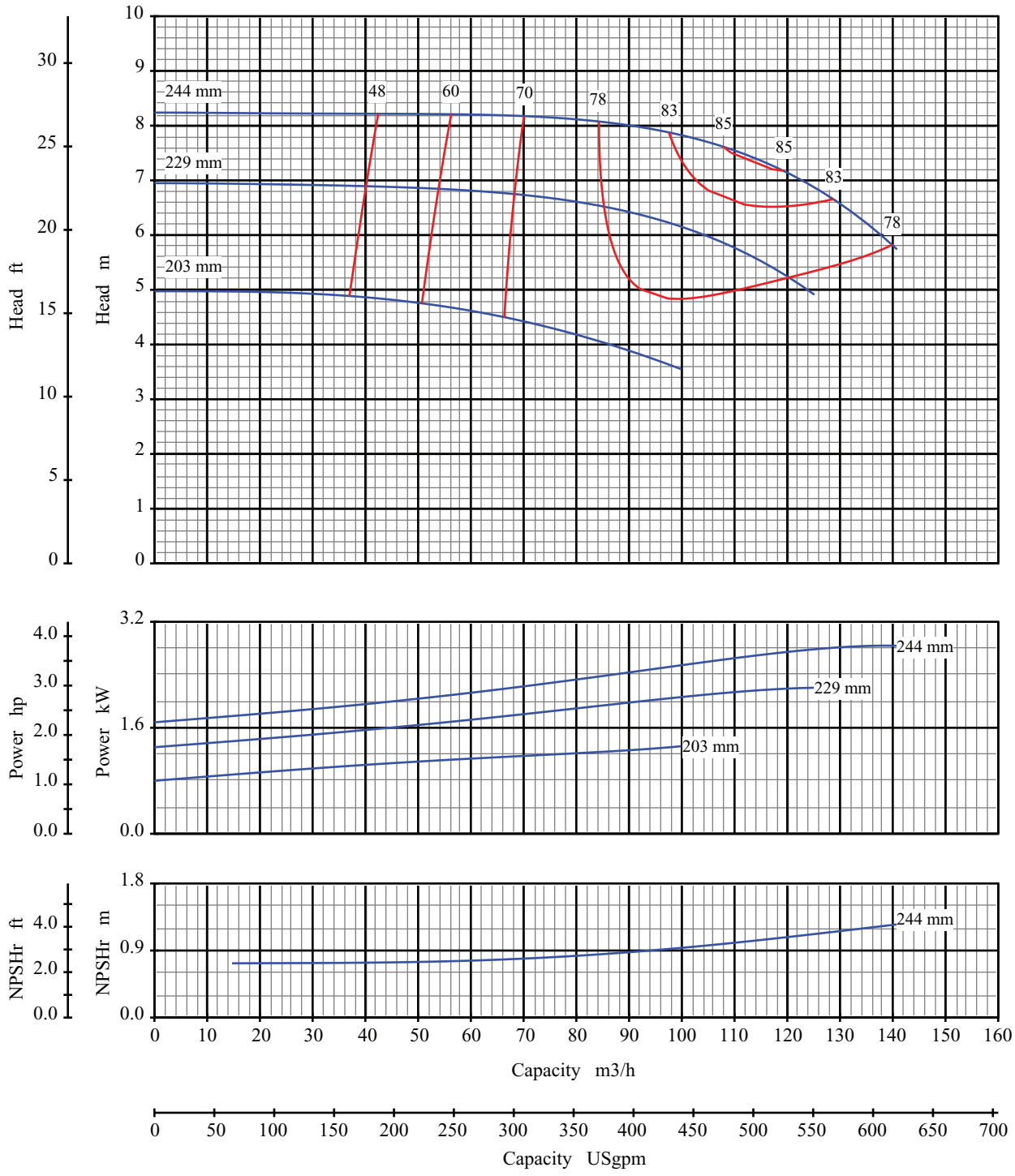
Catalog: 1301

Pump Size: 100x150 250

Pump Size: 4x6 10

Speed: 1450 rpm

Open Impeller



Curve No: S18183V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

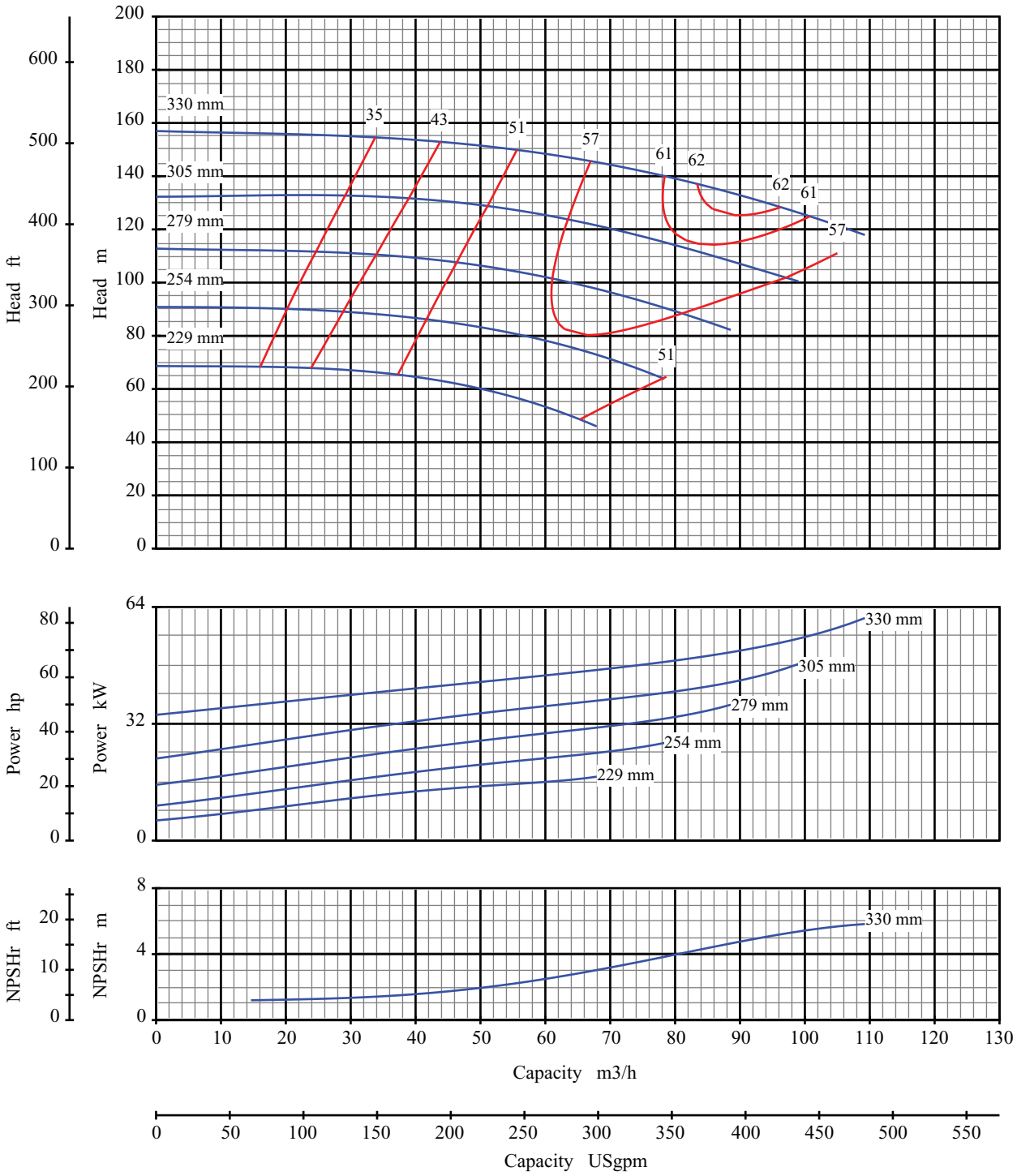
Catalog: 1301

Pump Size: 100x150 250

Pump Size: 4x6 10

Speed: 960 rpm

Open Impeller



Curve No: S18185V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

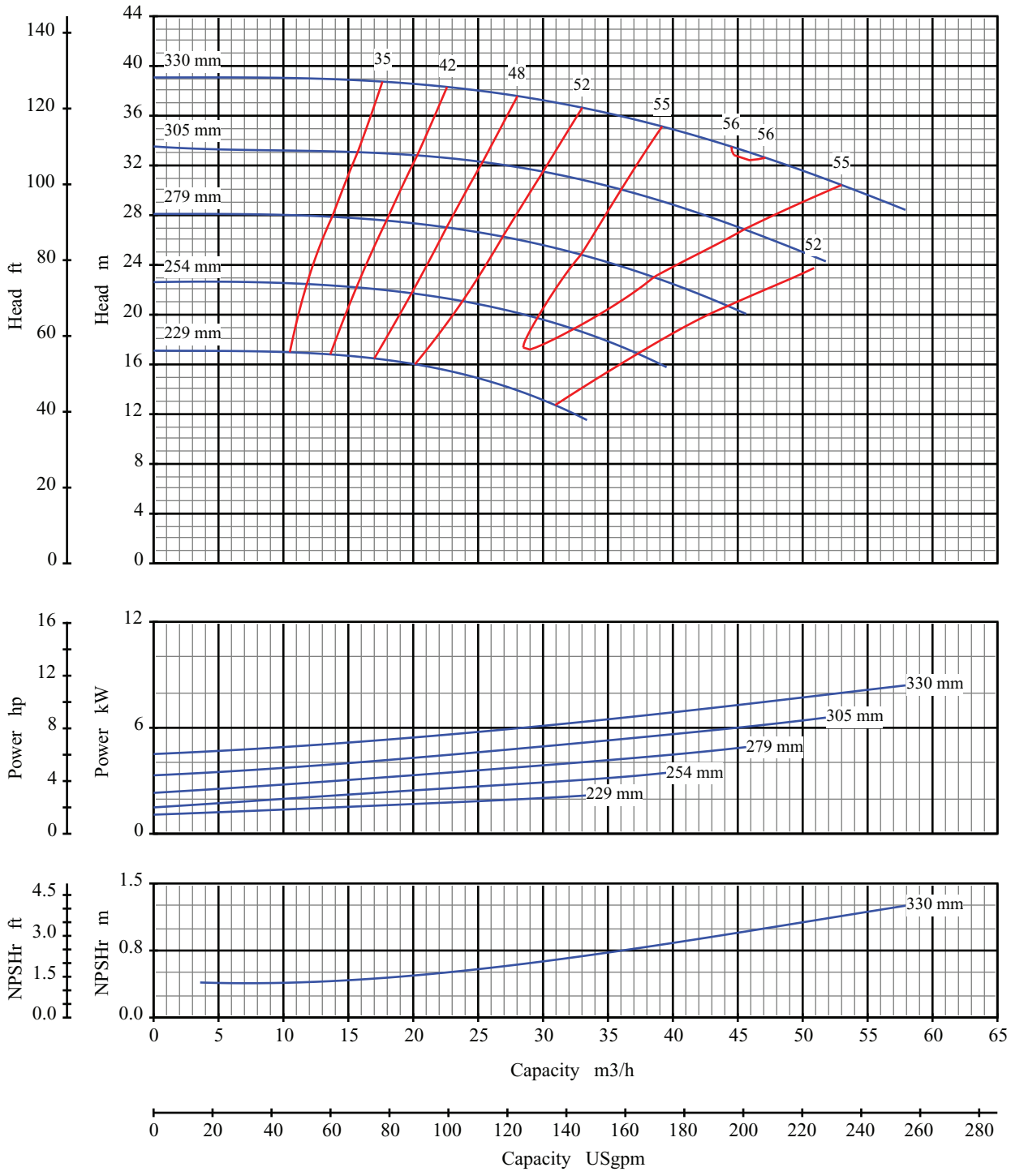
Effective Date: Jan/2005

Pump Size: 40x80 330

Pump Size: 1.5x3 13

Speed: 2900 rpm

Open Impeller



Curve No: S18187V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

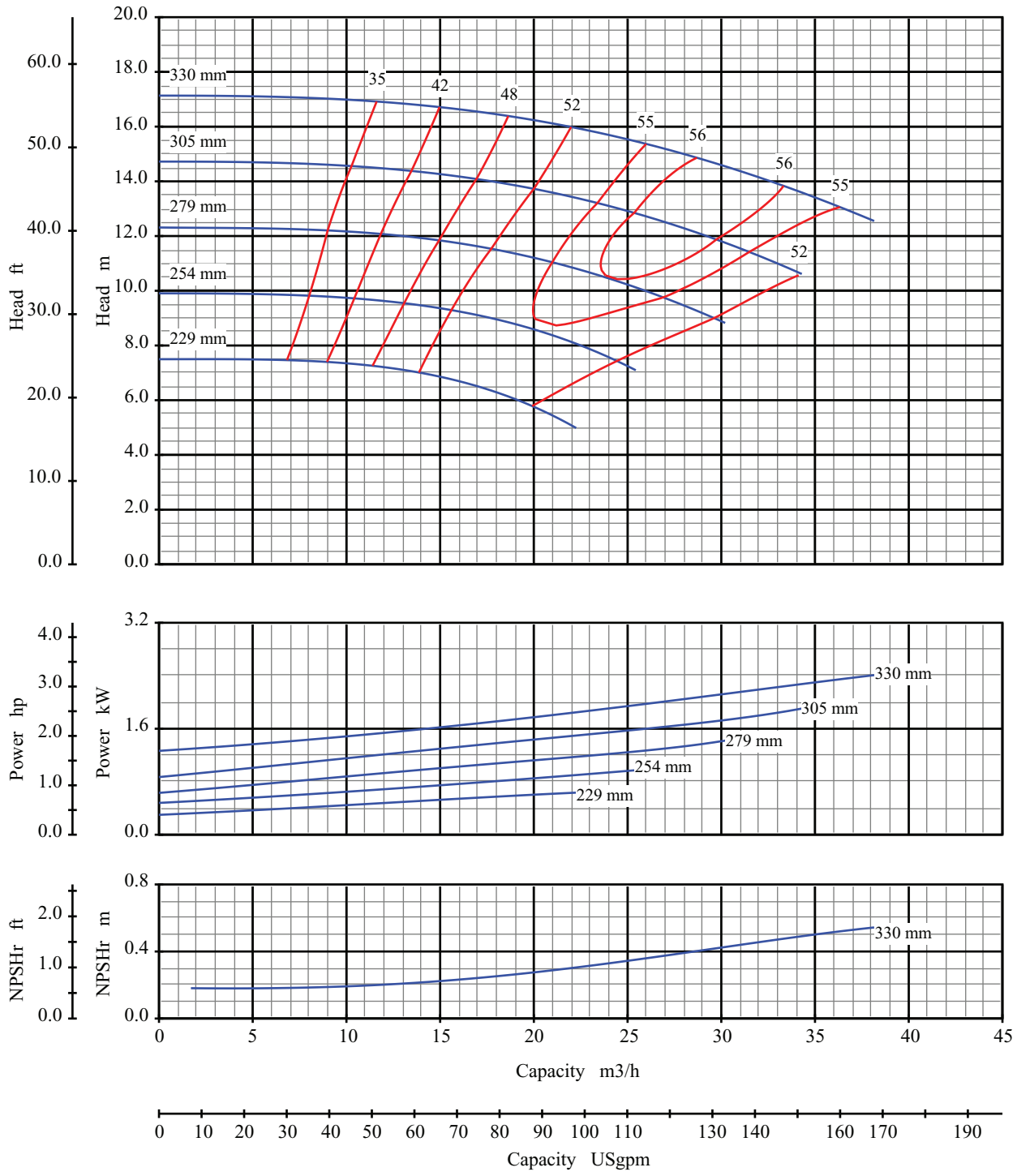
Effective Date: Jan/2005

Pump Size: 40x80 330

Pump Size: 1.5x3 13

Speed: 1450 rpm

Open Impeller



Curve No: S18189V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

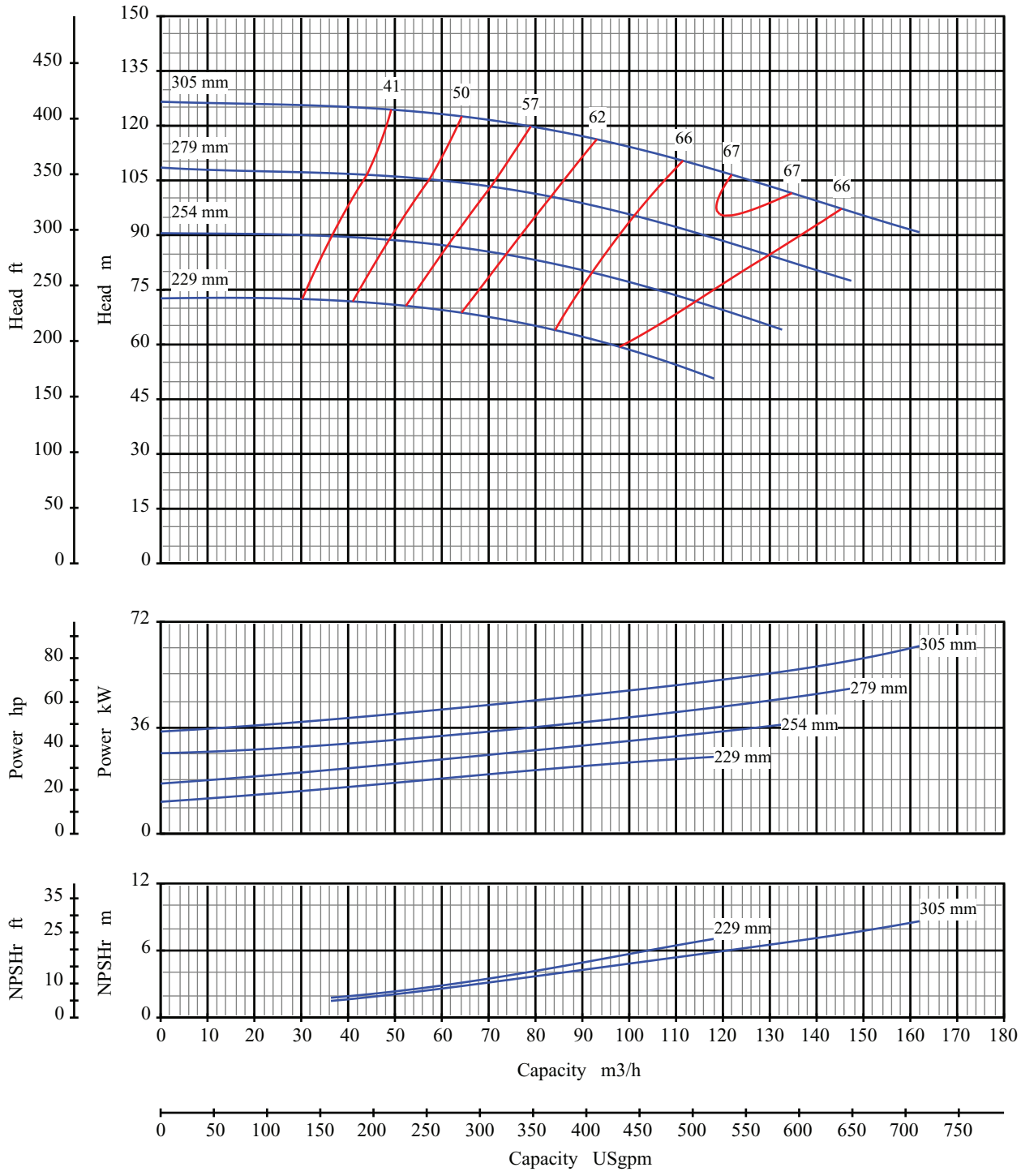
Effective Date: Jan/2005

Pump Size: 40x80 330

Pump Size: 1.5x3 13

Speed: 960 rpm

Open Impeller



Curve No: S18191V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

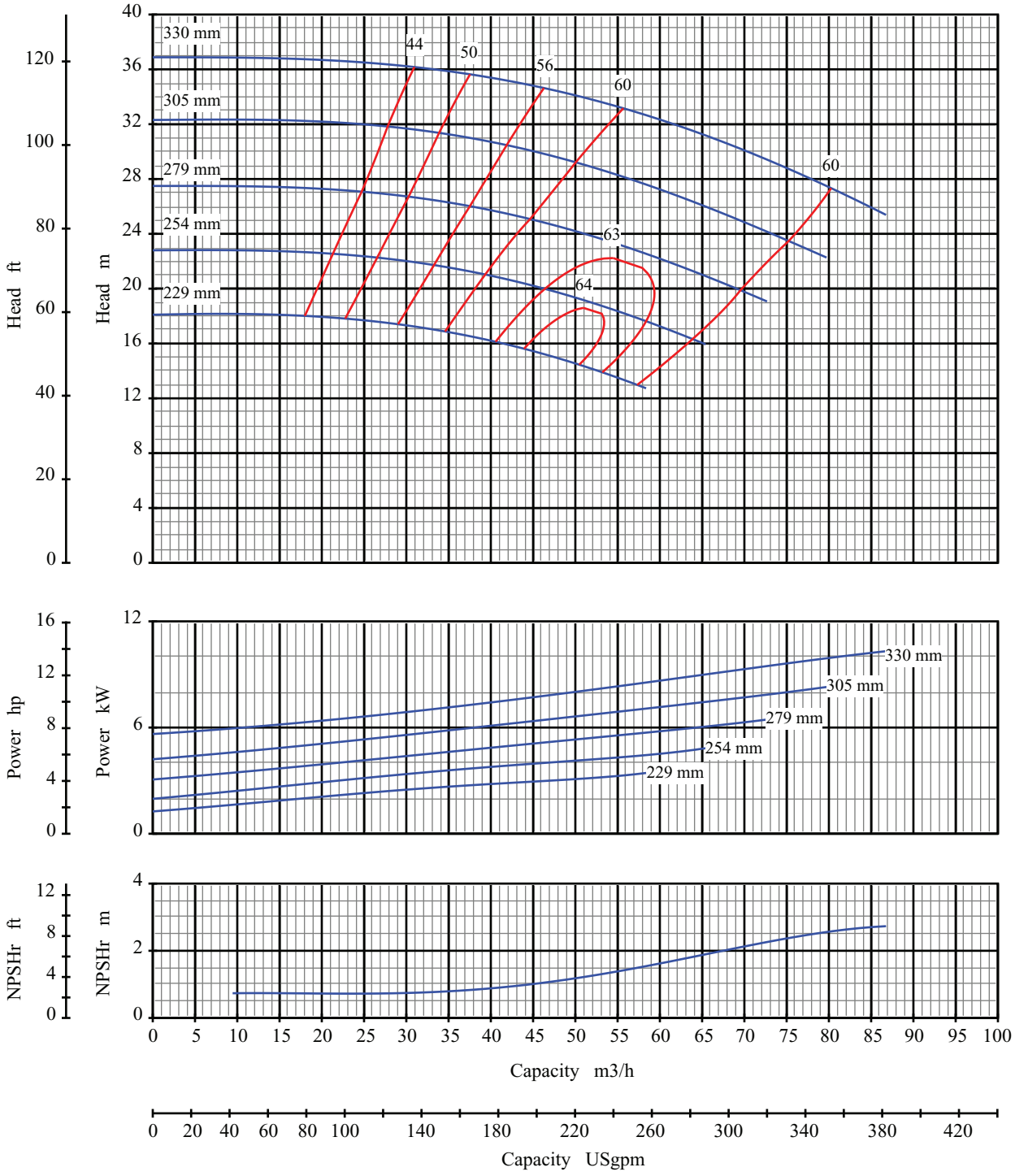
Effective Date: Jan/2005

Pump Size: 50x80 330

Pump Size: 2x3 13

Speed: 2900 rpm

Open Impeller



Curve No: S18193V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

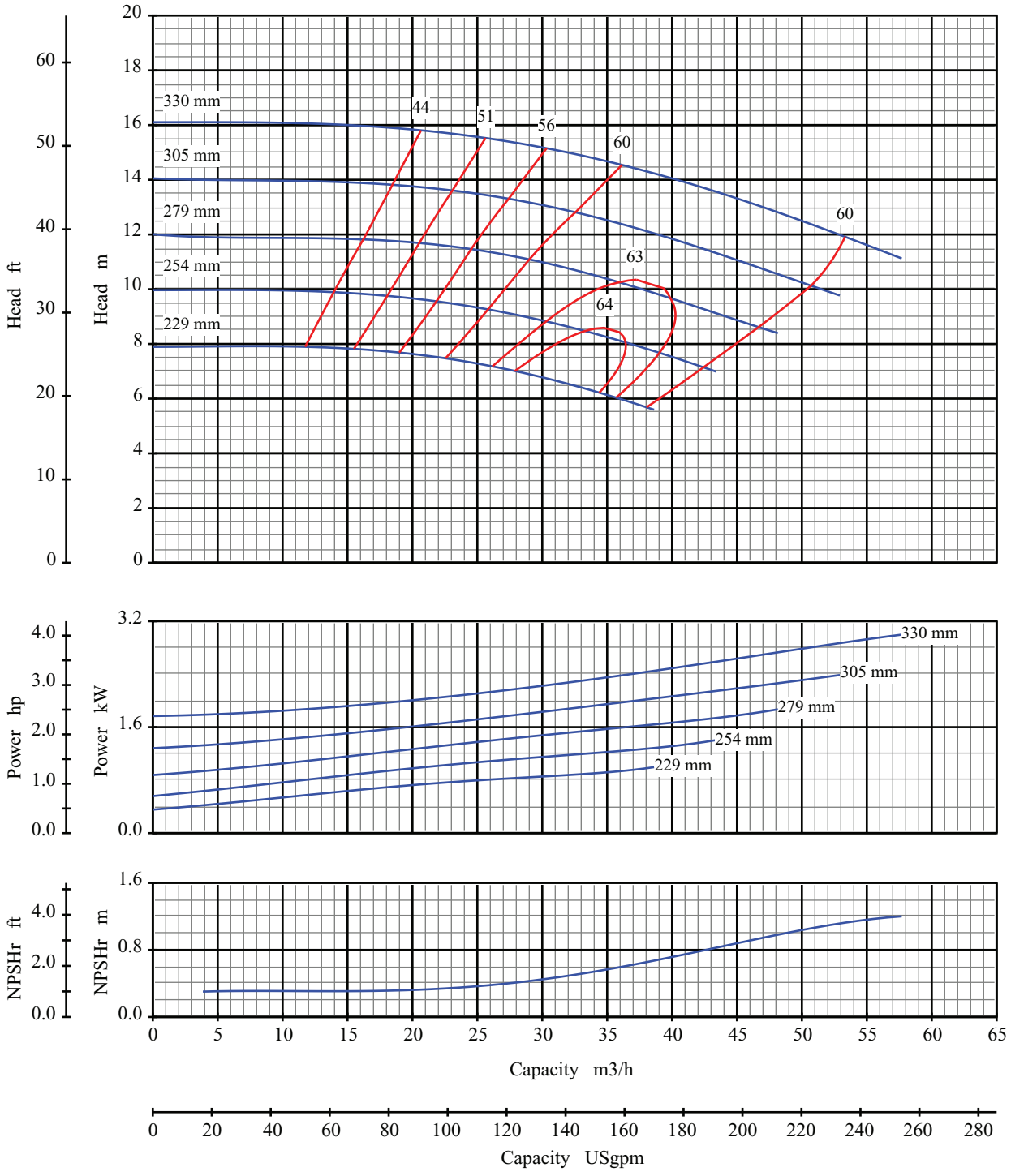
Effective Date: Jan/2005

Pump Size: 50x80 330

Pump Size: 2x3 13

Speed: 1450 rpm

Open Impeller



Curve No: S18195V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

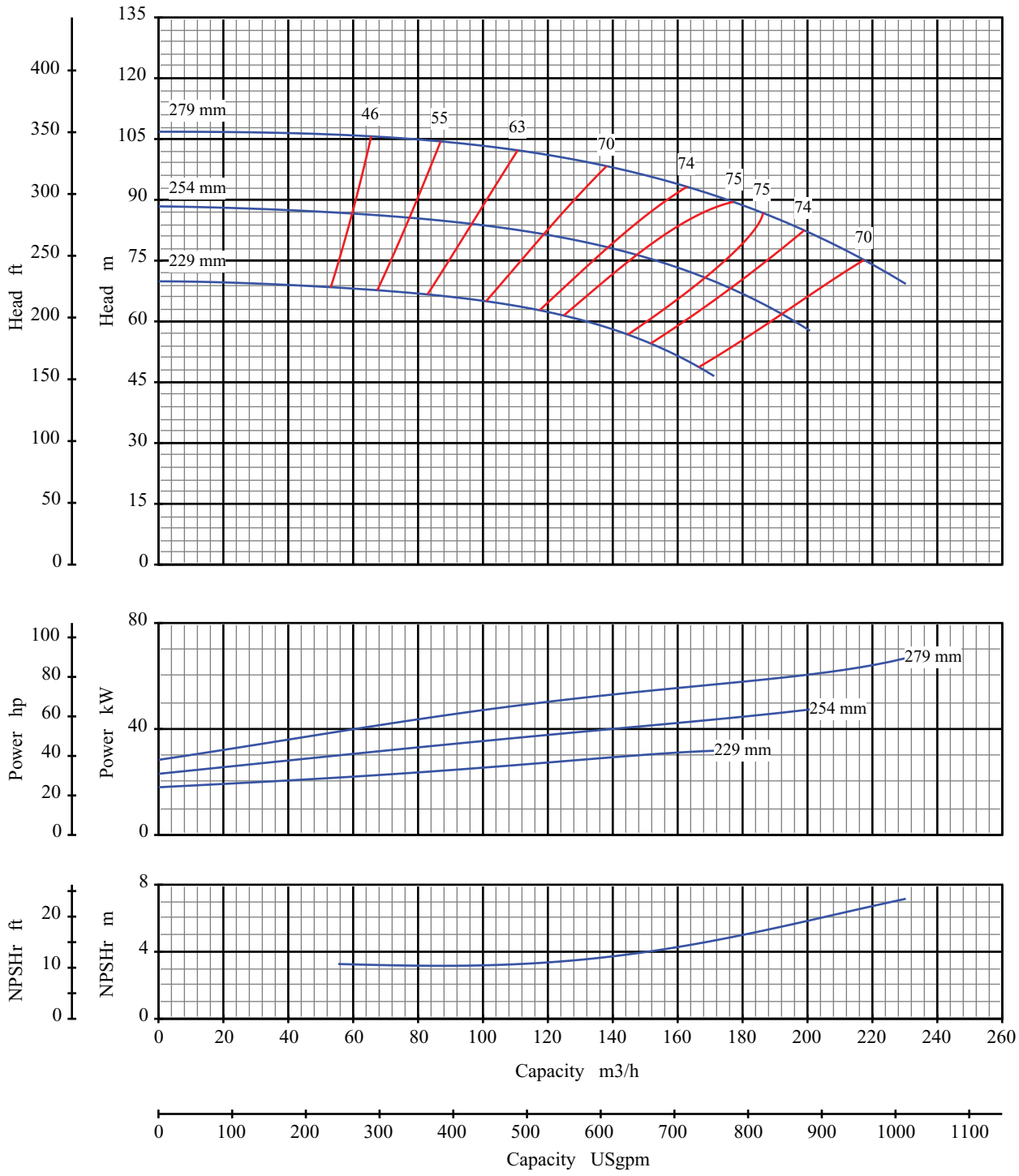
Effective Date: Jan/2005

Pump Size: 50x80 330

Pump Size: 2x3 13

Speed: 960 rpm

Open Impeller



Curve No: S18197V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

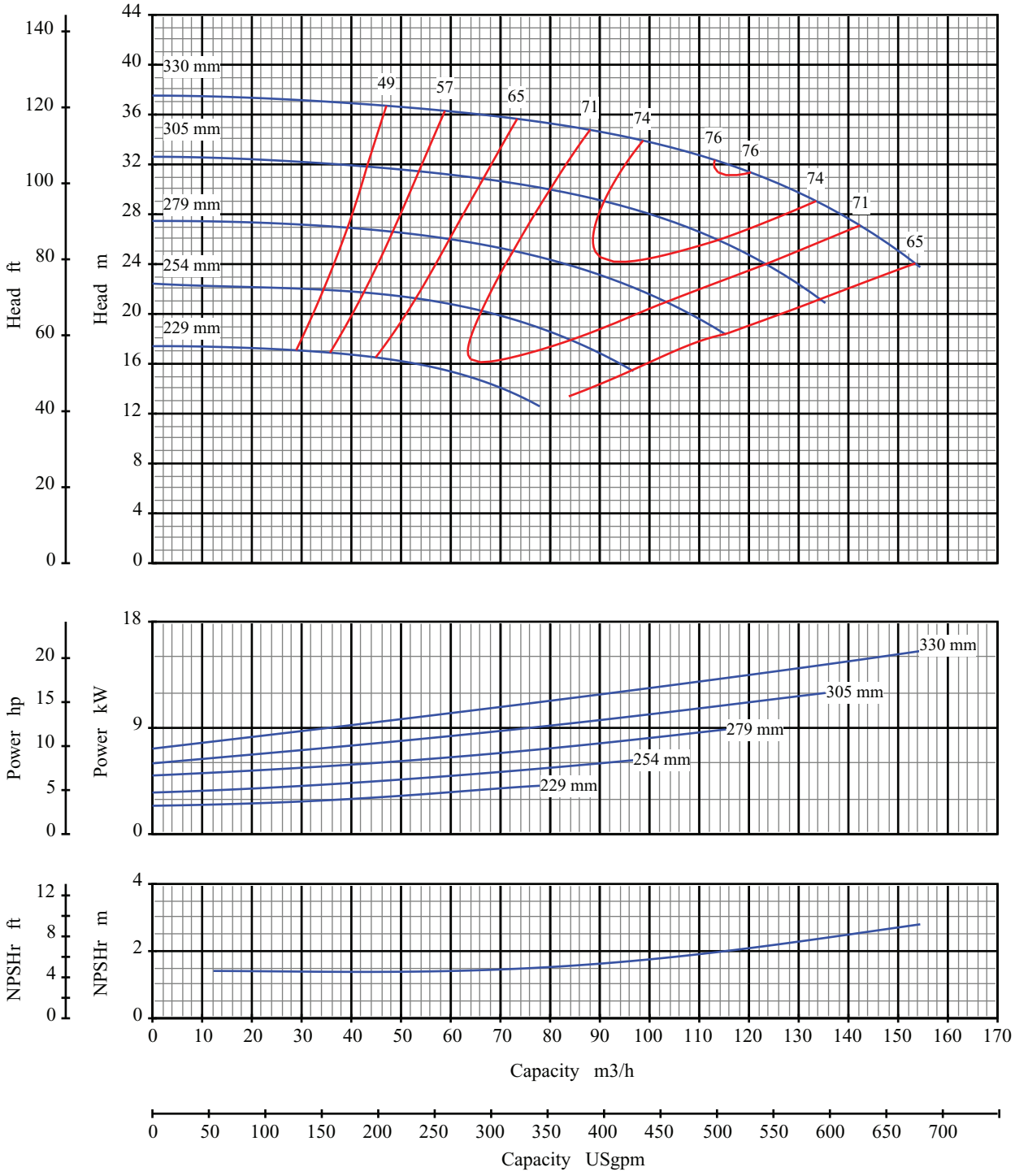
Effective Date: Jan/2005

Pump Size: 50x80 330

Pump Size: 2x3 13

Speed: 2900 rpm

Open Impeller



Curve No: S18199V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

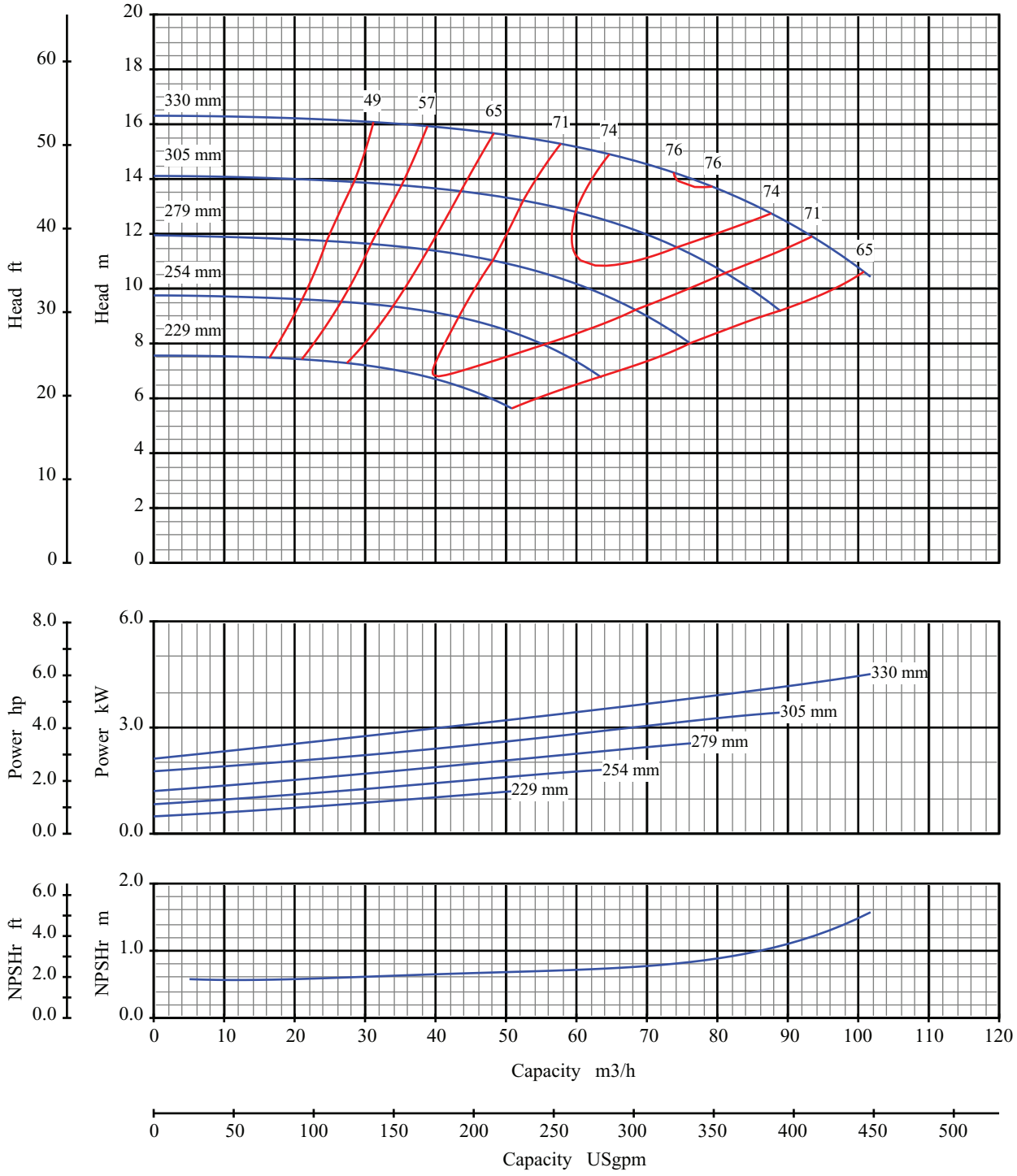
Catalog: 1301

Pump Size: 80x100 330

Pump Size: 3x4 13

Speed: 1450 rpm

Open Impeller



Curve No: S18201V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

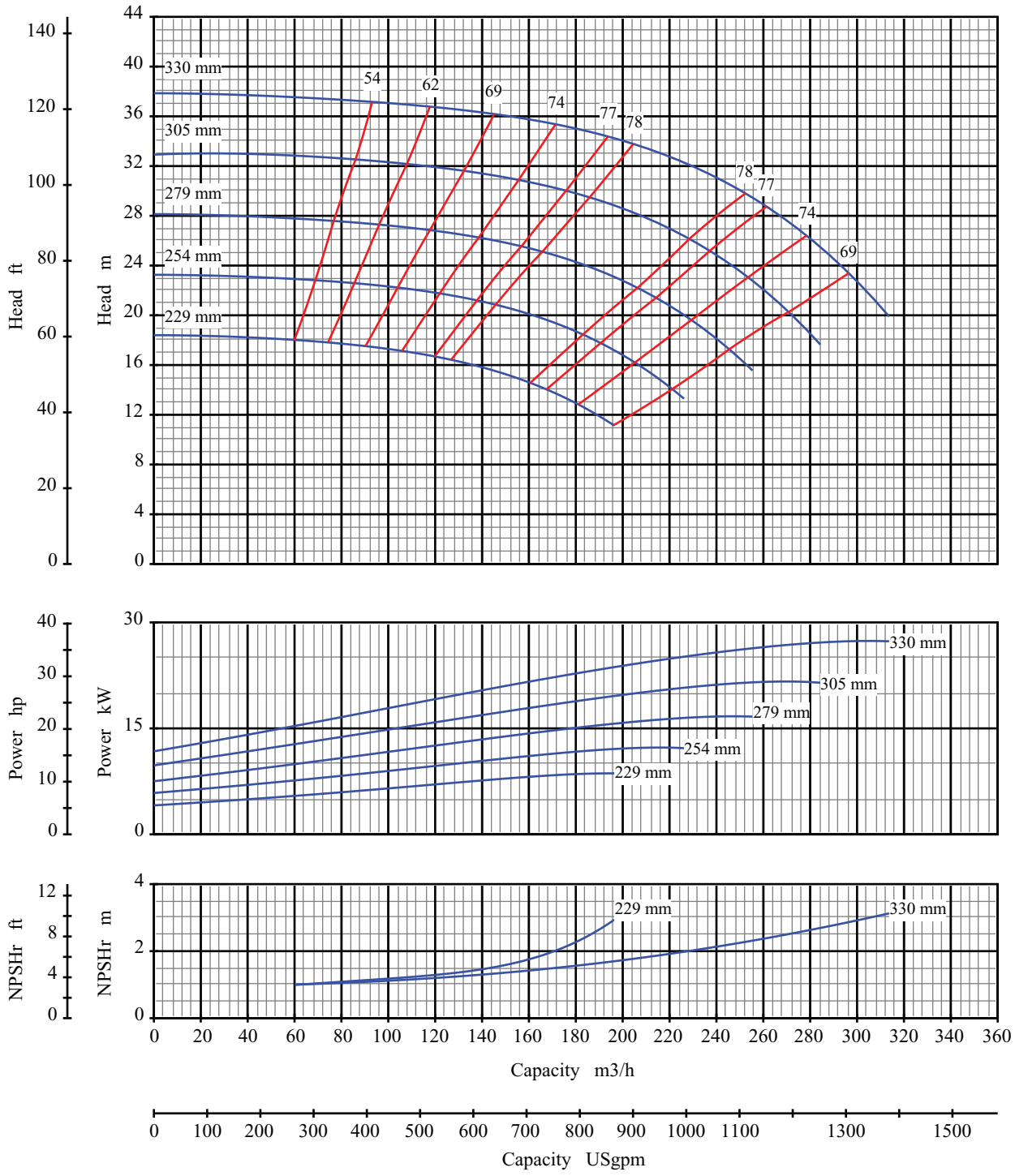
Catalog: 1301

Pump Size: 80x100 330

Pump Size: 3x4 13

Speed: 960 rpm

Open Impeller



Curve No: S18205V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

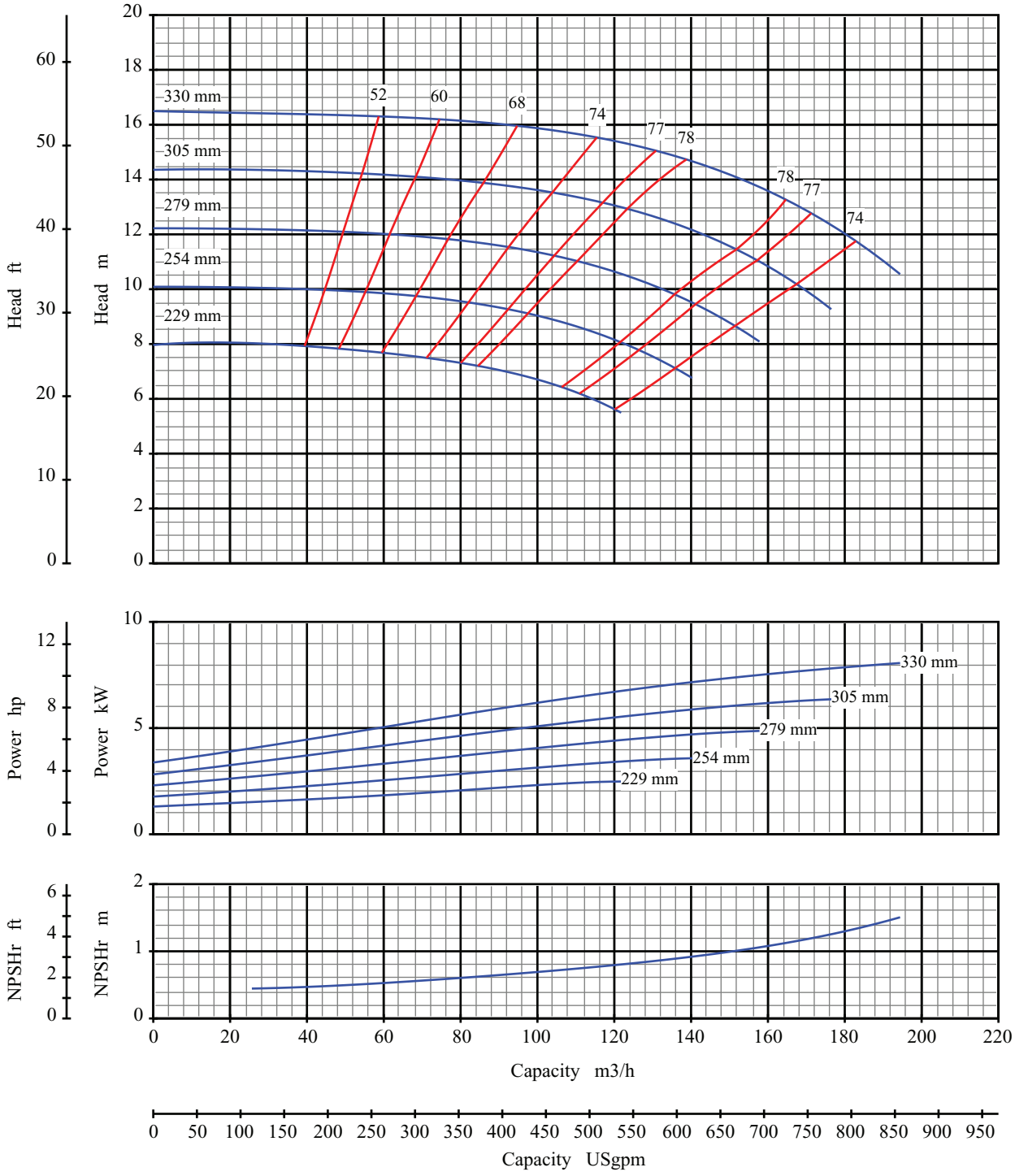
Catalog: 1301

Pump Size: 100 150 330

Pump Size: 4x6 13

Speed: 1450 rpm

Open Impeller



Curve No: S18207V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

Effective Date: Jan/2005

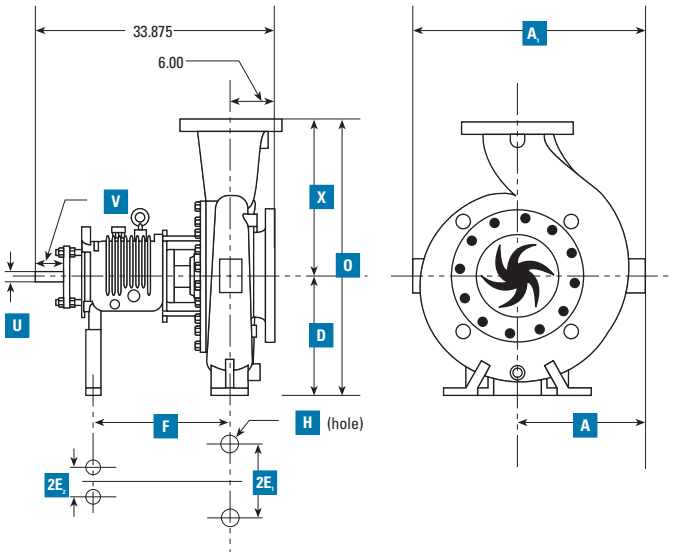
Pump Size: 100 150 330

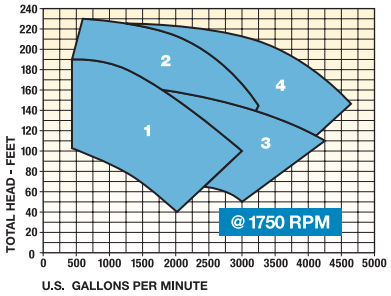
Pump Size: 4x6 13

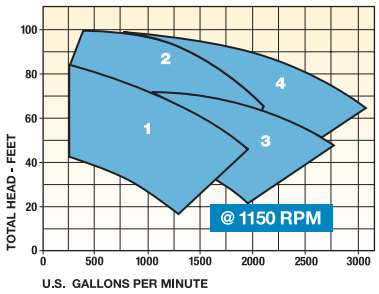
Speed: 960 rpm

Open Impeller

Frame M Pump (ASME/ANSI)





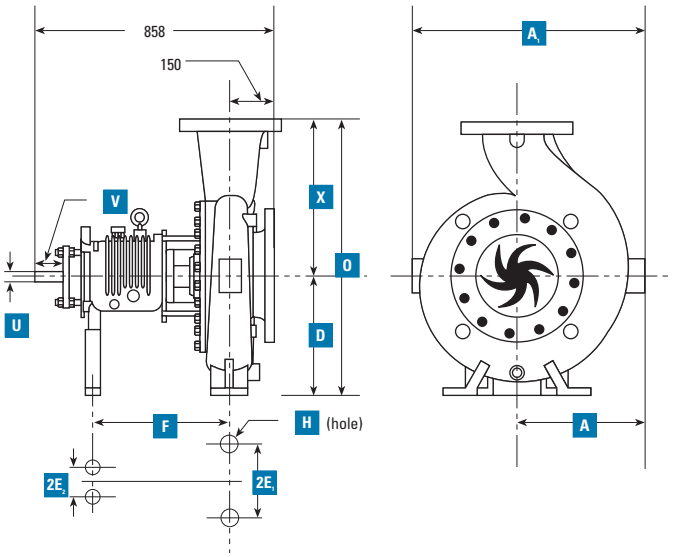


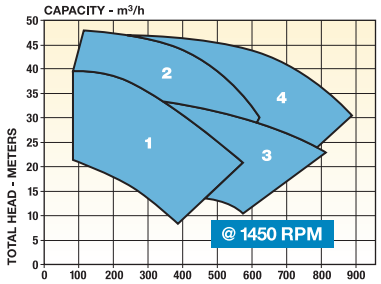
Frame M Pump – ASME/ANSI

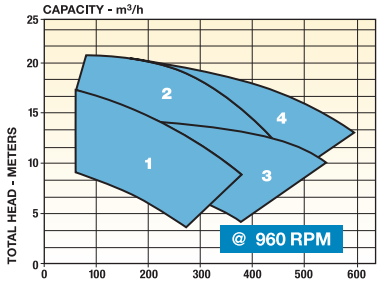
	Pump Size	A_1	A	D	$2E_1$	$2E_2$	F	H	O	U	V	X
1	6 x 8-13	25.50	14.00	14.50	16.00	9.00	18.75	0.875	30.50	2.375	4.00	16
2	6 x 8-15	27.25	14.75	14.50	16.00	9.00	18.75	0.875	32.50	2.375	4.00	18
3	8 x 10-13	27.25	15.25	14.50	16.00	9.00	18.75	0.875	32.50	2.375	4.00	18
4	8 x 10-15	28.75	15.75	14.50	16.00	9.00	18.75	0.875	33.50	2.375	4.00	19

All dimensions are in inches.

Frame M Pump (Metric)







Frame M Pump – Metric

	Pump Size	A_1	A	D	$2E_1$	$2E_2$	F	H	O	U	V	X
1	150 x 200-330	648	356	368	406	229	476	22	775	60	102	406
2	150 x 200-380	692	375	368	406	229	476	22	826	60	102	457
3	200 x 250-330	692	387	368	406	229	476	22	826	60	102	457
4	200 x 250-330	730	400	368	406	229	476	22	851	60	102	483

All dimensions are in millimeters.

- Optional centerline mount for high temperature applications
- Optional left or right side discharge

System One® Pumps Design Data - Frame M (ANSI)

Inches (mm)

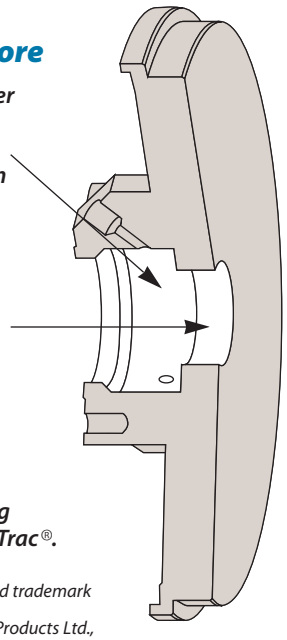
	6 x 8-13	6 x 8-15	8 x 10-13	8 x 10-15
Shaft				
L3/D4 Ratio	17.98 (.87)	17.22 (.83)	19.85 (.96)	19.55 (.94)
Diameter at Impeller	1.50-8UN (38)			
Diameter at Seal	2.625 (66.7)			
Diameter Between Bearings	3.25 (82.6)			
Diameter at Coupling	2.375 (60.3)			
Bearings				
Thrust	7314 BEGAY			
Thrust Option	N/A			
Radial	6314 C3			
Bearing Span	10.53 (267)			
Shaft Overhang	9.49 (241)	9.35 (237)	9.80 (249)	9.75 (248)
Seal Chamber	**Standard**		**Taper**	
Seal Bore Diameter (nose)	3.627 (92)		3.627 (92)	
Inside Bore	4.125 (105)		4.125 Minimum (105)	
Depth	2.56 (65)		3.56 (90)	
Back Cover/Shaft Clearance	.02 (Radial) (.50)		.75 (Radial) (19)	
Gland Bolting	4X .625-11UNC On 5.75 Bolt Circle Diameter (16 on 146 AC)			
Distance to Nearest Obstruction	3.13 (79.5)			
Open Impeller				
Clearance	.06 Total .015 Suction Side (1.5 total 0.4 Suction Side)			
Eye Area sq. in. (cm^2)	45 (290)	50 (322)	60 (387)	63 (406)
Maximum Dia. Solids	1.00 (25)	1.13 (29)	1.50 (38)	1.19 (30)
Number of Vanes	6	6	5	6
Pumps Weights lbs (kg)				
Pump Only	545 (245)	618 (278)	657 (296)	730 (329)
Casing				
Type	Double Volute			
Wall Thickness	0.75 Minimum (19)			
Maximum Working Pressure	See Pressure vs. Temperature Limit Chart			
Test pressure	Class 150 Flanges-250PSIG, Class 300 Flanges-450PSIG			
Rotating Element				
Wk^2 Dry lbs/ft^2 ($kg-m^2$)	3.68 (.154)	4.9 (.206)	5.75 (.242)	7.65 (.321)
Wk^2 Wet lbs/ft^2 ($kg-m^2$)	5.19 (.218)	6.91 (.290)	8.11 (.341)	10.8 (.454)
Maximum Speed (oil lube)	4000 RPM			
Power Limits				
HP (KW)/100 RPM 316SS	14.25 (10.65)			

Reference drawings A40210, A40211

Cylindrical Bore

Large seal chamber volume provides optimum volume for seal lubrication and cooling.

Cast restriction bushing reduces fluid exchange between casing and seal chamber and allows maximum cooling of fluid. Other bushing options are available including carbon and SpiralTrac®.

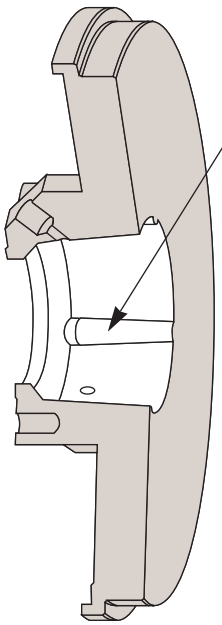


SpiralTrac® is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd., Waverly, Nova Scotia.

Two industry-tested seal chamber designs provide the right seal environment for virtually any process application.

Large volume seal chambers accept standard sized glands.

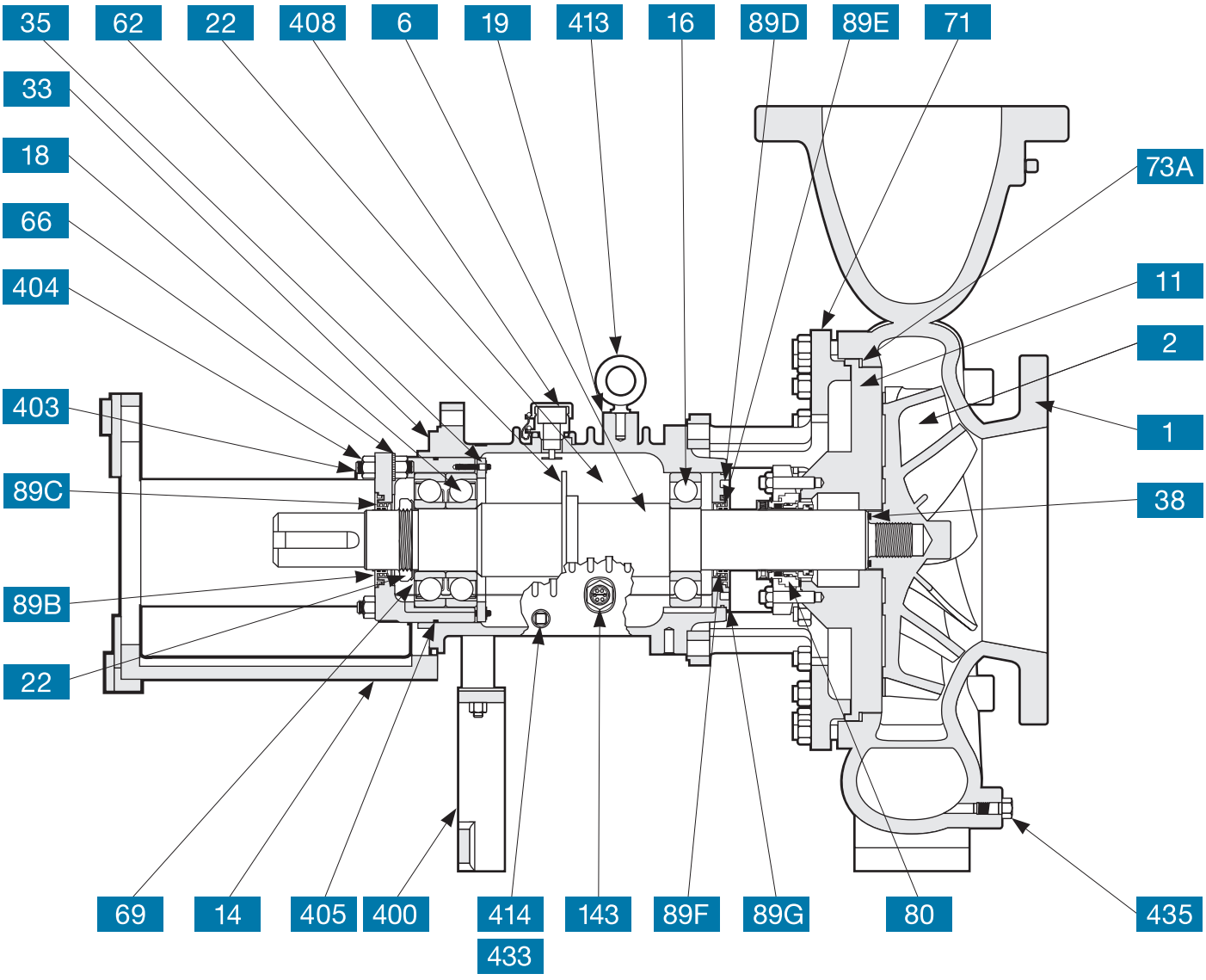
Available seal chamber jackets provide optimum cooling or heating of seal chamber fluid to maximize seal life.



Taper Bore

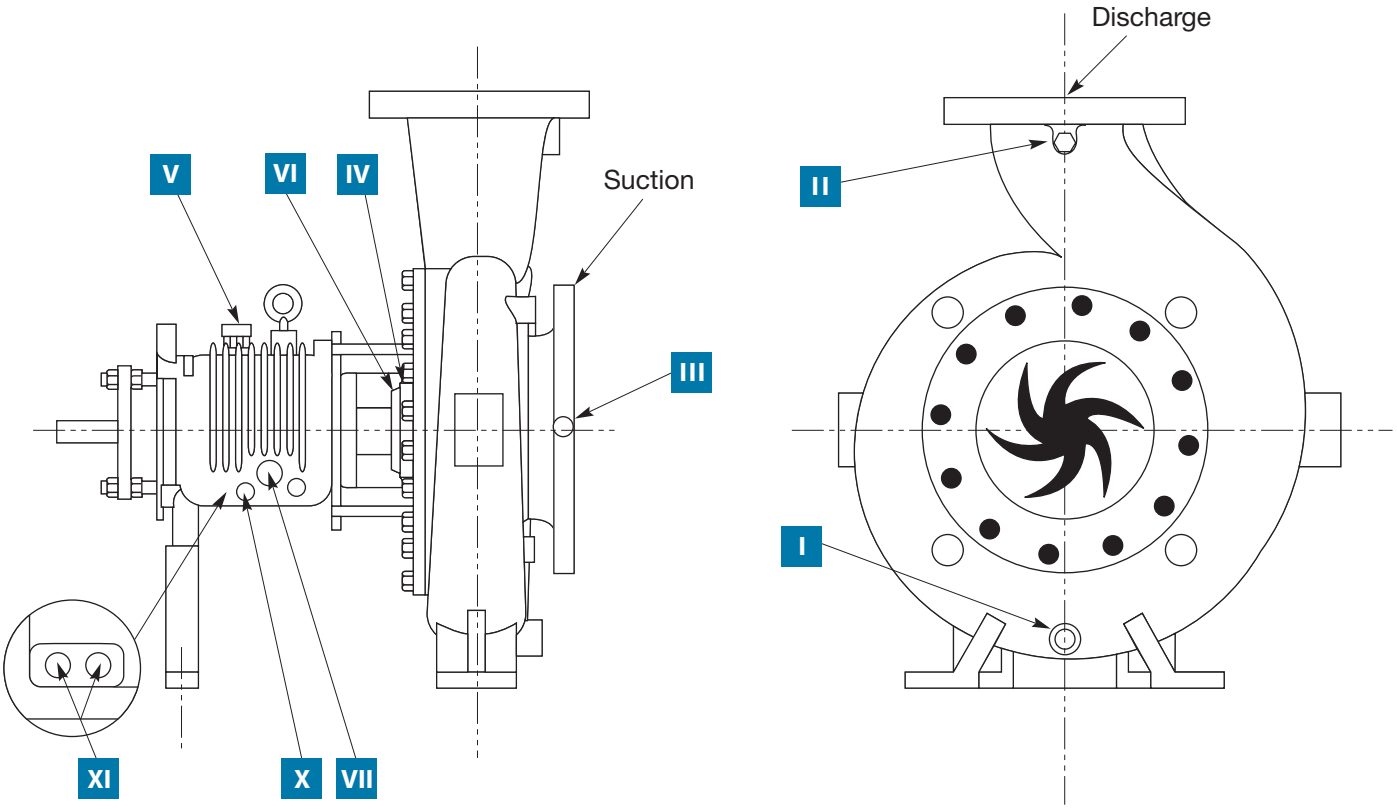
Vortex breakers alter seal chamber flow patterns to move solids out and away from the seal.

Air or gas buildup can be detrimental to seal life. Taper design allows trapped air and gases to escape.



NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	62	Flinger	143	Oil Sight Glass
2	Impeller	66	Micrometer Nut	400	Foot, Bearing Frame
6	Shaft	69	Lockwasher, Thrust Bearing	403	Stud, Cartridge
11	Back Cover	71	Frame Adapter	404	Locknut, Cartridge
14	C Frame motor Adapter	73A	Gasket, Casing	405	O-Ring, Cartridge
16	Bearing, Radial	80	MechanicalSeal	408	Oil Filler Assembly
18	Bearing, Thrust	89B	Seal, Labyrinth Rotor, Thrust	413	Bolt, Eye
19	Bearing, Frame	89C	Seal, Labyrinth Rotor O-ring, Thrust	414	Plug, Magnetic
22	Locknut, Thrust Bearing	89D	Seal, Labyrinth Stator, Radial	433	Plug, Bearing Frame
33	Bearing Cartridge	89E	Seal, Labyrinth Rotor, Radial	435	Plug, Casing
35	Retainer Cover	89F	Seal, Labyrinth Rotor O-ring, Radial		
38	O-ring, Impeller Hub	89G	Seal, Labyrinth Stator O-ring, Radial		

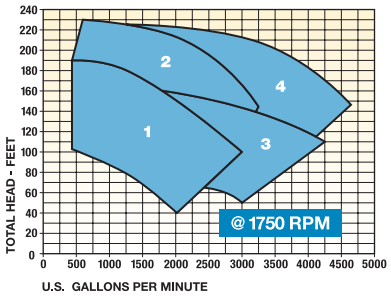
System One® Auxiliary Pipe Connections List - Frame M

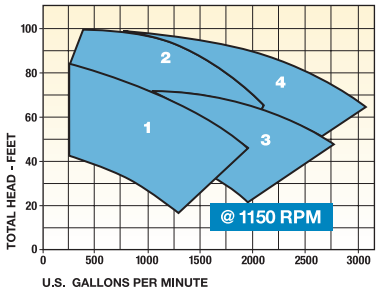


ITEM NUMBER	NPT SIZE	NUMBER OF TAPS	CONNECTION
I	0.50-14	1	Casing Drain
II	0.25-18	1	Discharge Gage
* III	0.25-18	1	Suction Gage
IV	0.50-14	2	Seal Chamber Flush
V	0.75-14	1	Oil Fill
* VI	0.50-14	2	Seal Chamber Jacket inlet & outlet
# VII	1.00-11.5	1	Oil Sight Glass
# X	0.25-18	1	Oil Drain
## XI	0.50-14	2	Plug or (cooling coil*)

*Optional
Left side of pump facing suction end
Right side of pump facing suction end

Frame M Pump (ASME/ANSI)



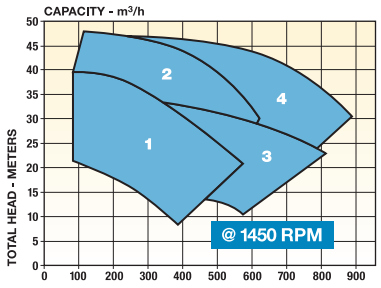


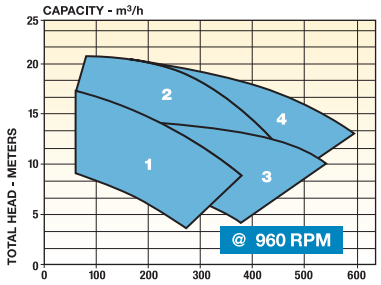
Frame M Pump – ASME/ANSI

	Pump Size	A_1	A	D	$2E_1$	$2E_2$	F	H	O	U	V	X
1	6 x 8-13	25.50	14.00	14.50	16.00	9.00	18.75	0.875	30.50	2.375	4.00	16
2	6 x 8-15	27.25	14.75	14.50	16.00	9.00	18.75	0.875	32.50	2.375	4.00	18
3	8 x 10-13	27.25	15.25	14.50	16.00	9.00	18.75	0.875	32.50	2.375	4.00	18
4	8 x 10-15	28.75	15.75	14.50	16.00	9.00	18.75	0.875	33.50	2.375	4.00	19

All dimensions are in inches.

Frame M Pump (Metric)

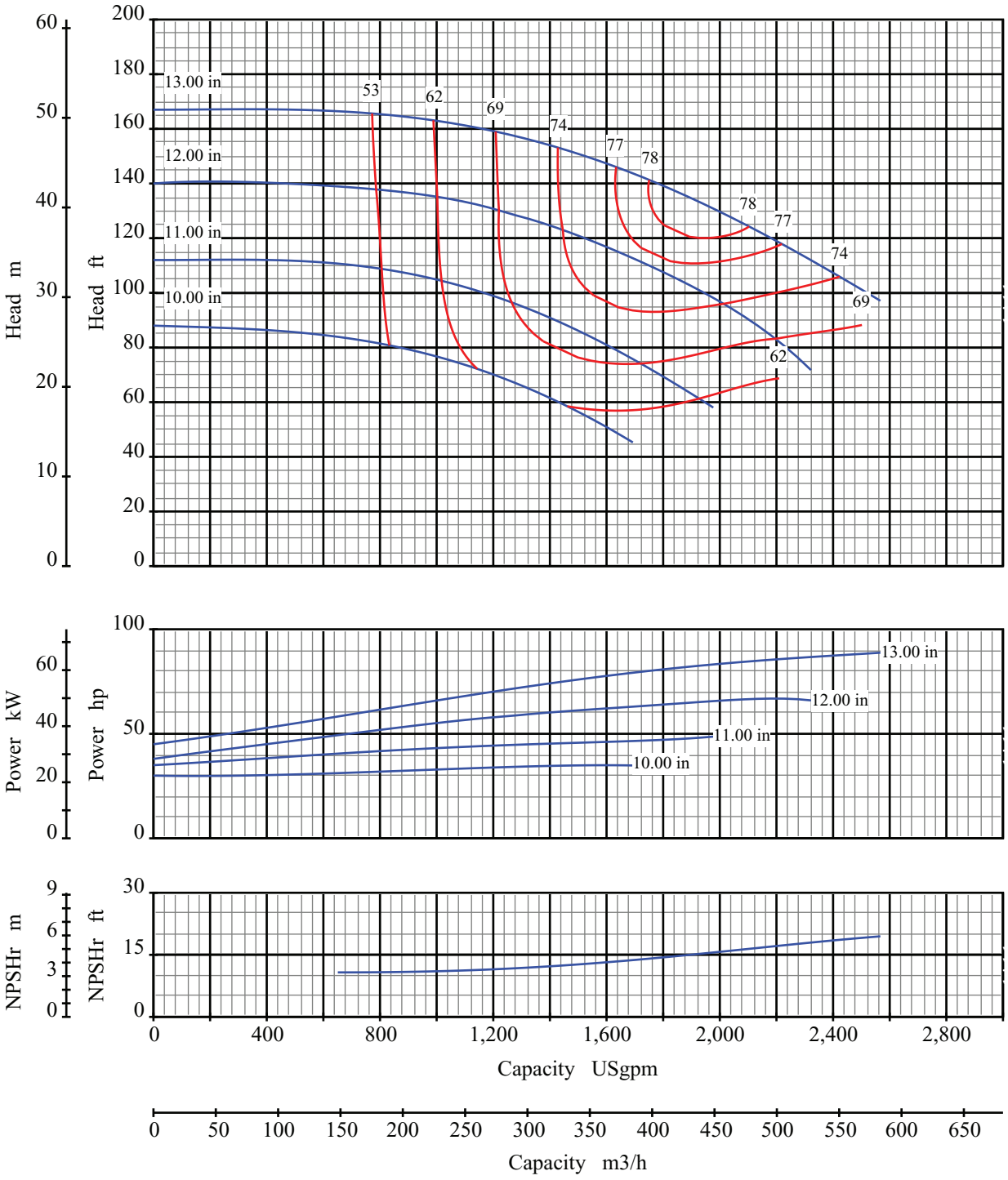




Frame M Pump – Metric

	Pump Size	A_1	A	D	$2E_1$	$2E_2$	F	H	O	U	V	X
1	150 x 200-330	648	356	368	406	229	476	22	775	60	102	406
2	150 x 200-380	692	375	368	406	229	476	22	826	60	102	457
3	200 x 250-330	692	387	368	406	229	476	22	826	60	102	457
4	200 x 250-330	730	400	368	406	229	476	22	851	60	102	483

All dimensions are in millimeters.



Curve No: S18210V1

Blackmer System One

Pump Performance Characteristics

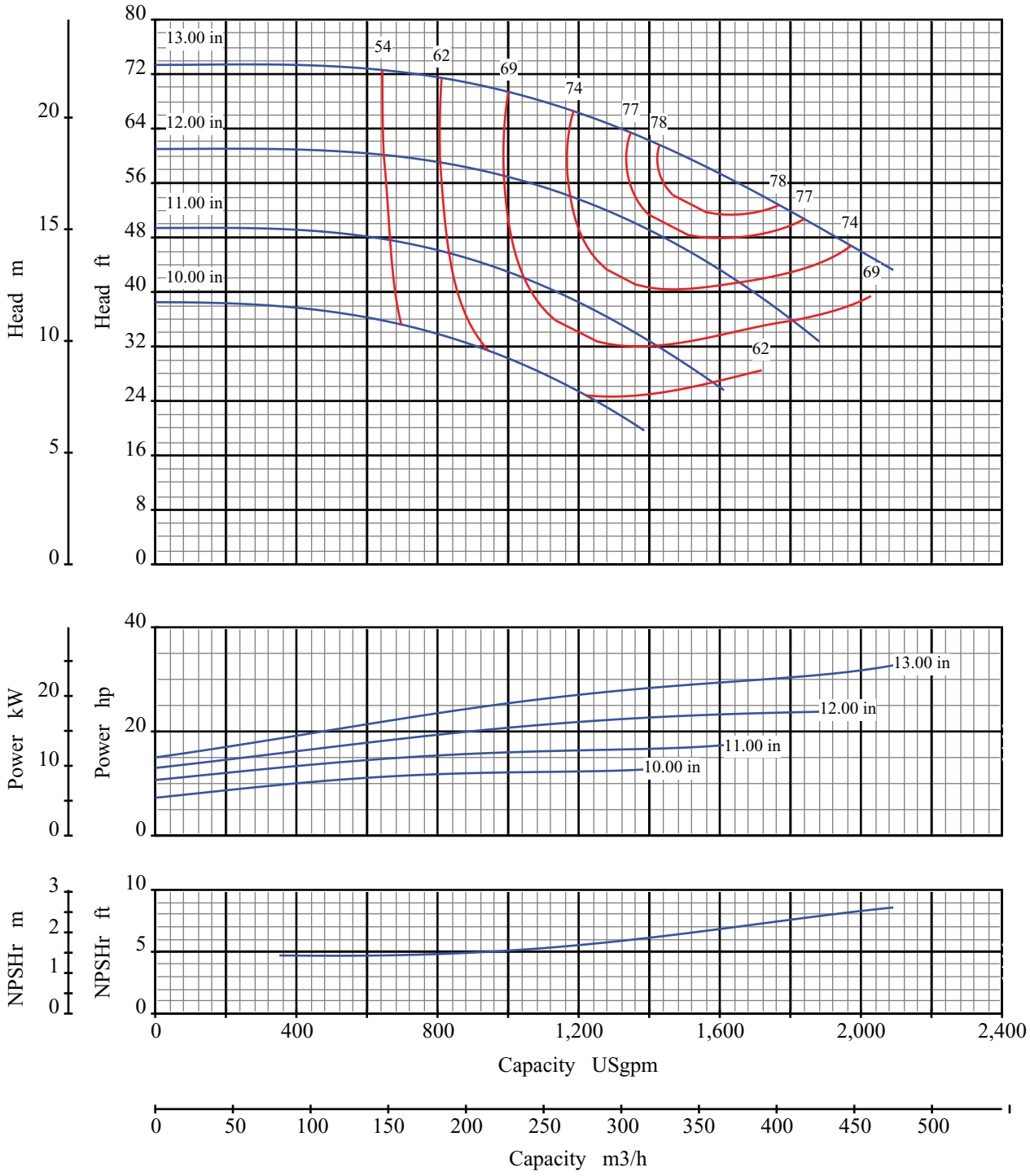
Pump Size: 6x8 13

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18212V1

Blackmer System One

Pump Performance Characteristics

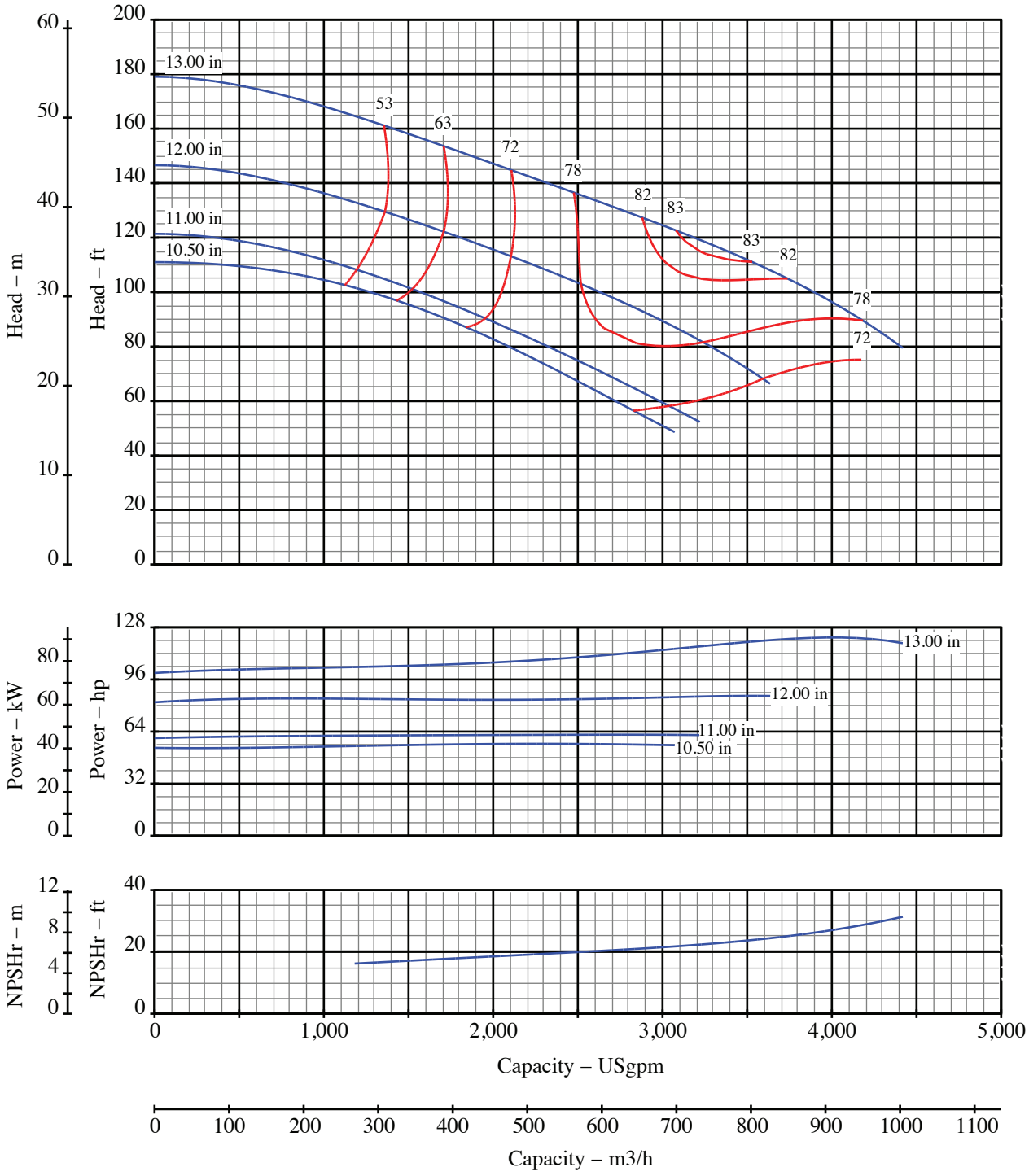
Pump Size: 6x8 13

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18216V1

Blackmer System One

Pump Performance Characteristics

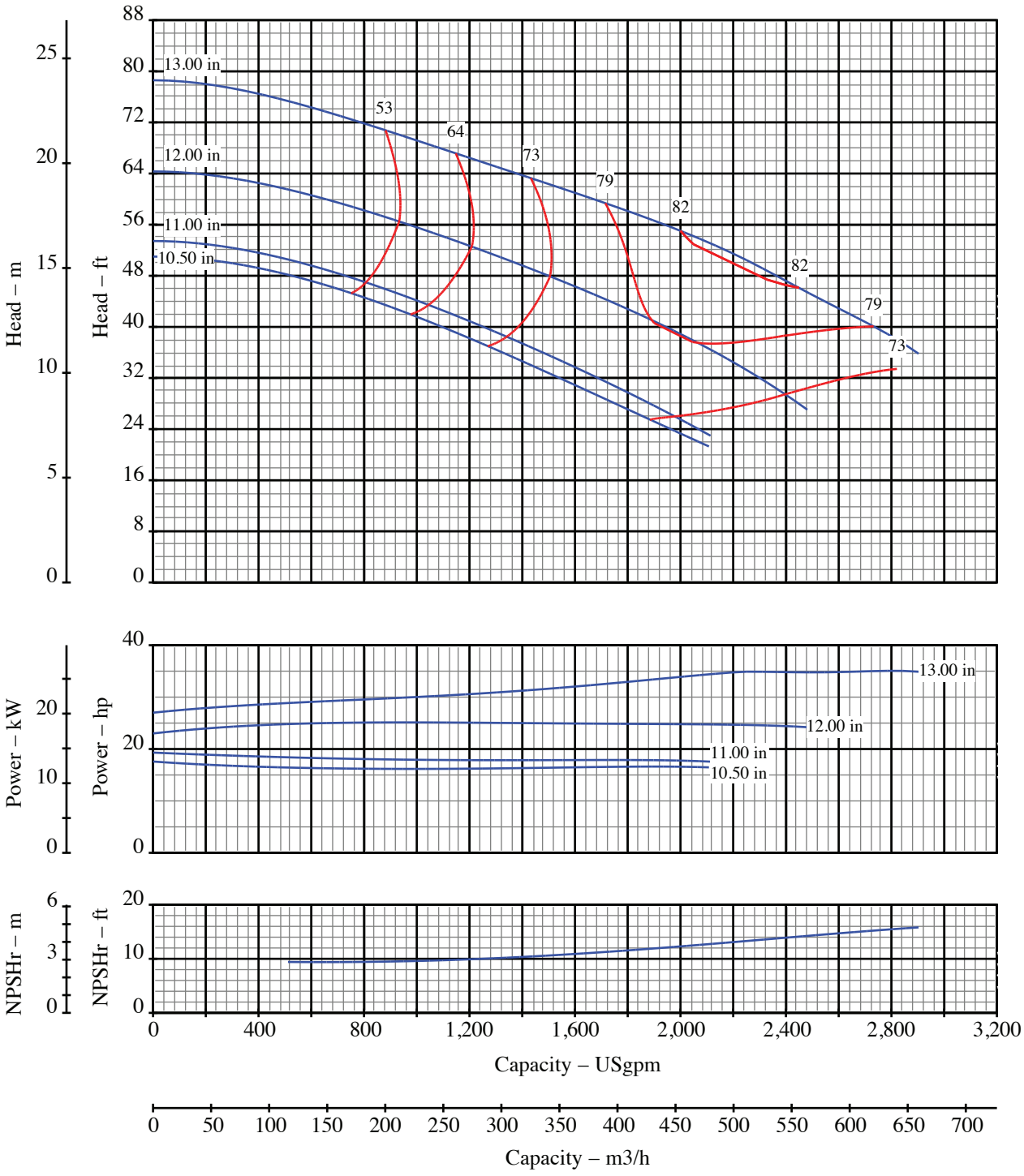
Pump Size: 8x10–13

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18218V1

Blackmer System One

Pump Performance Characteristics

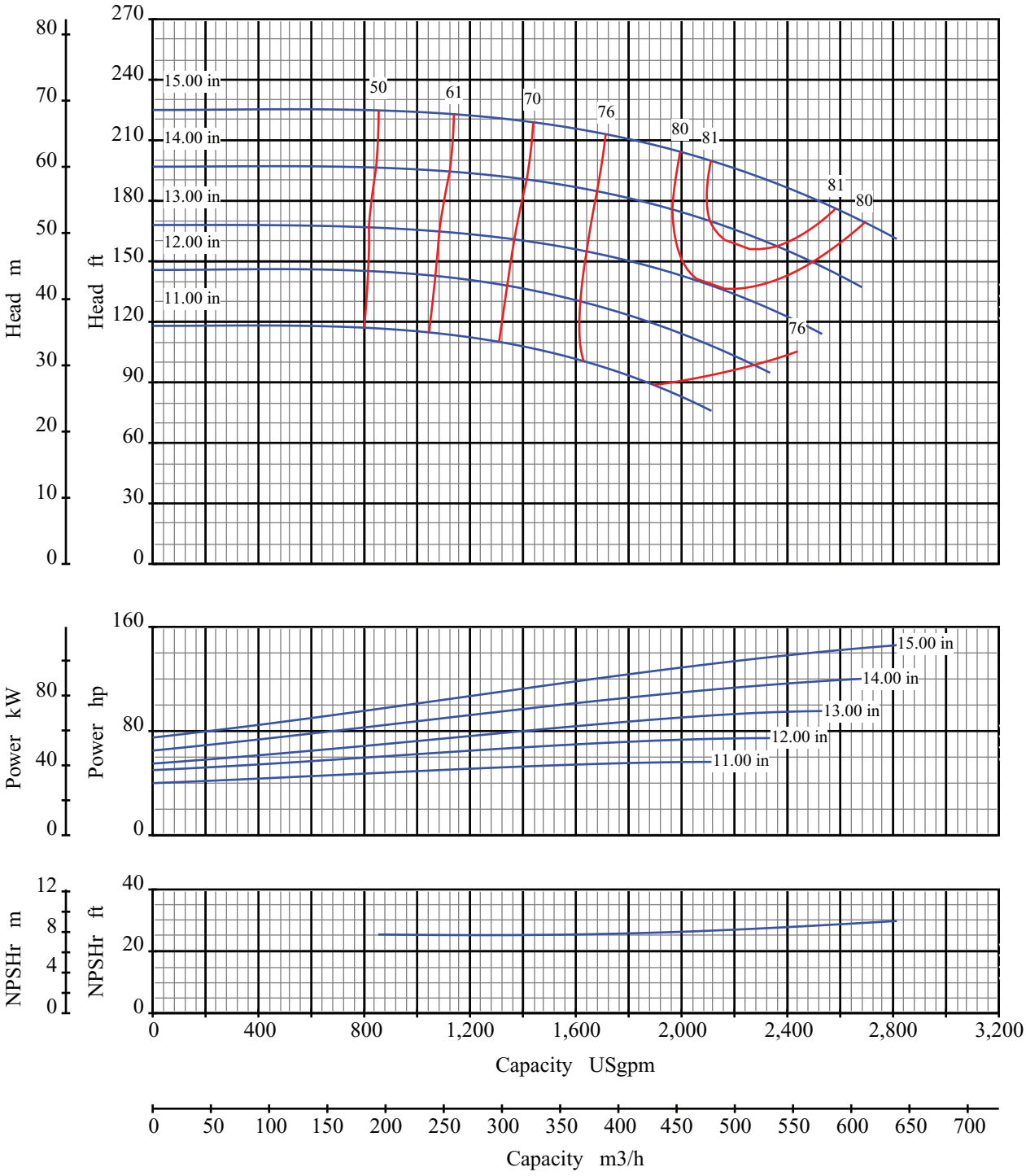
Pump Size: 8x10–13

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18222V1

Blackmer System One

Pump Performance Characteristics

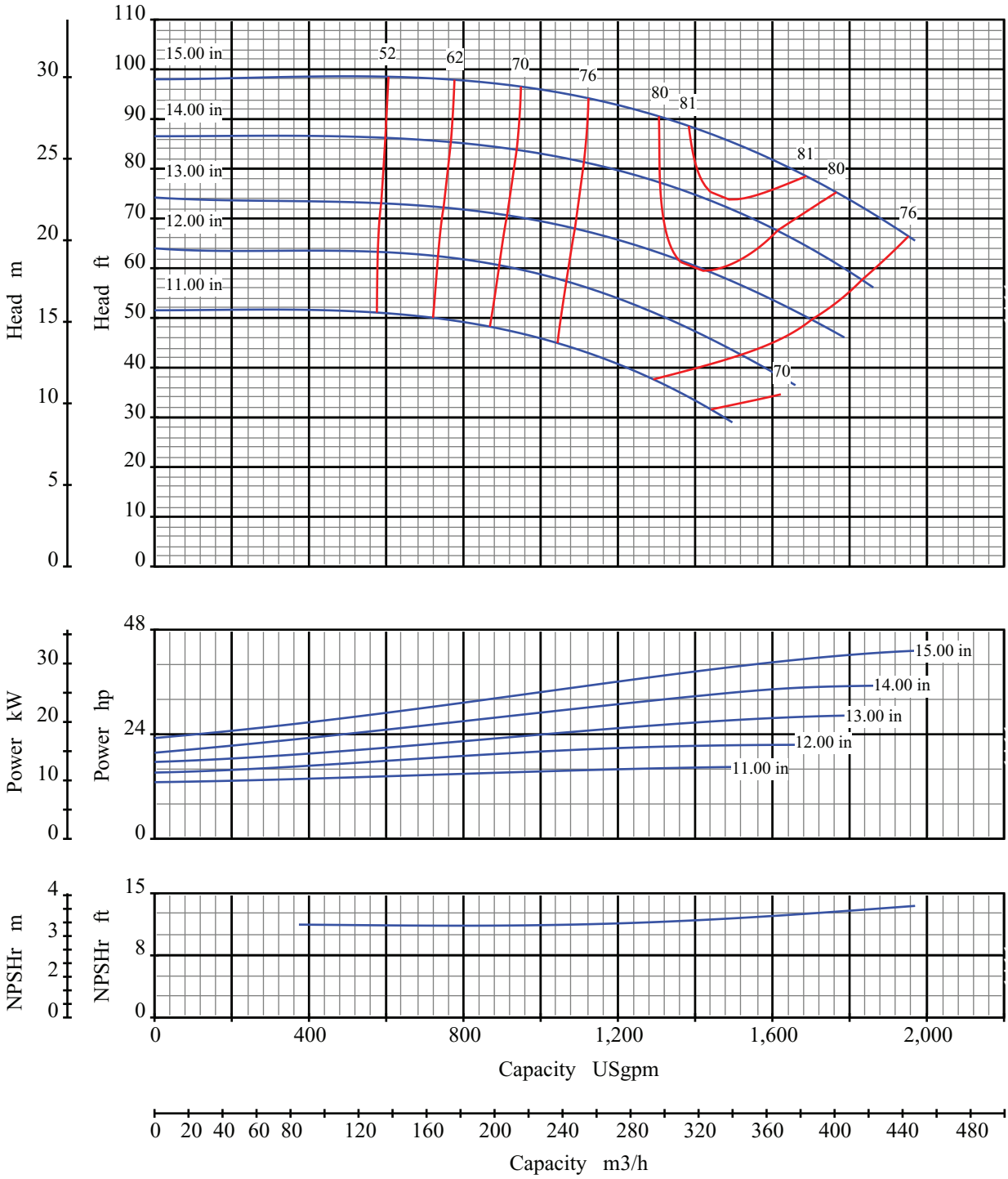
Pump Size: 6x8 15

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18224V1

Blackmer System One

Pump Performance Characteristics

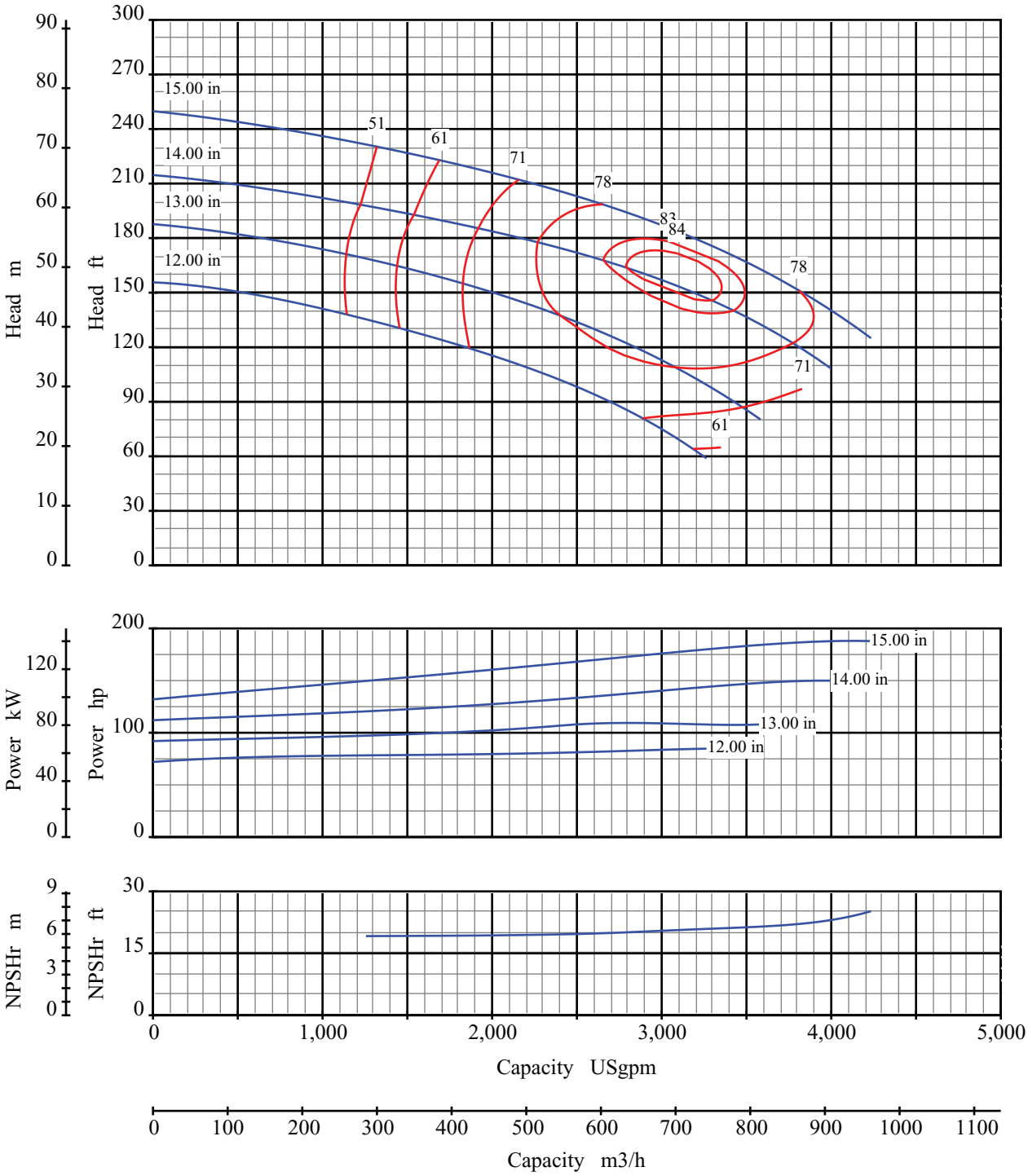
Pump Size: 6x8 15

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18228V1

Blackmer System One

Pump Performance Characteristics

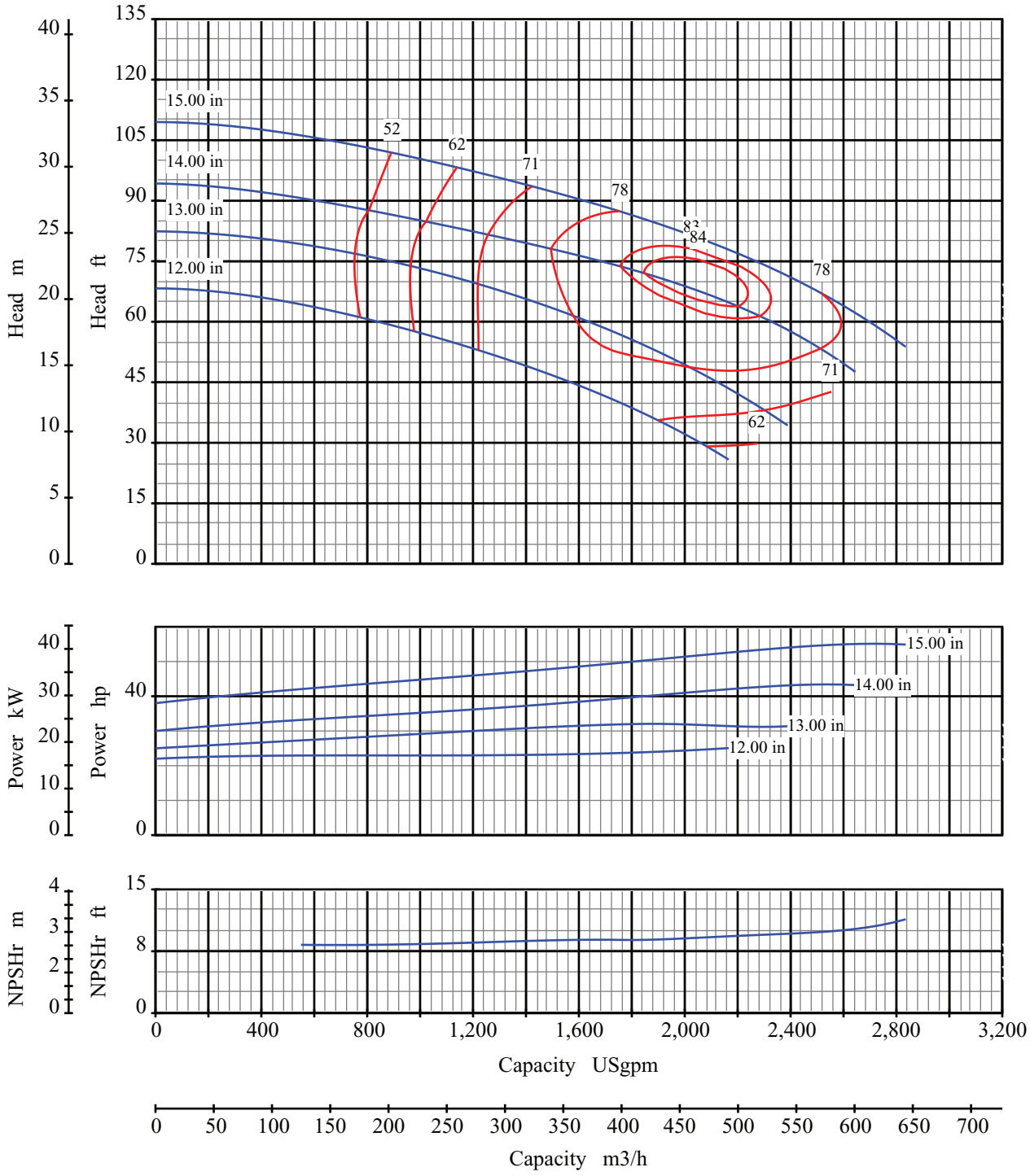
Pump Size: 8x10 15

Effective Date: Jan/2005

Catalog: 1301

Speed: 1750 rpm

Open Impeller



Curve No: S18230V1

Blackmer System One

Pump Performance Characteristics

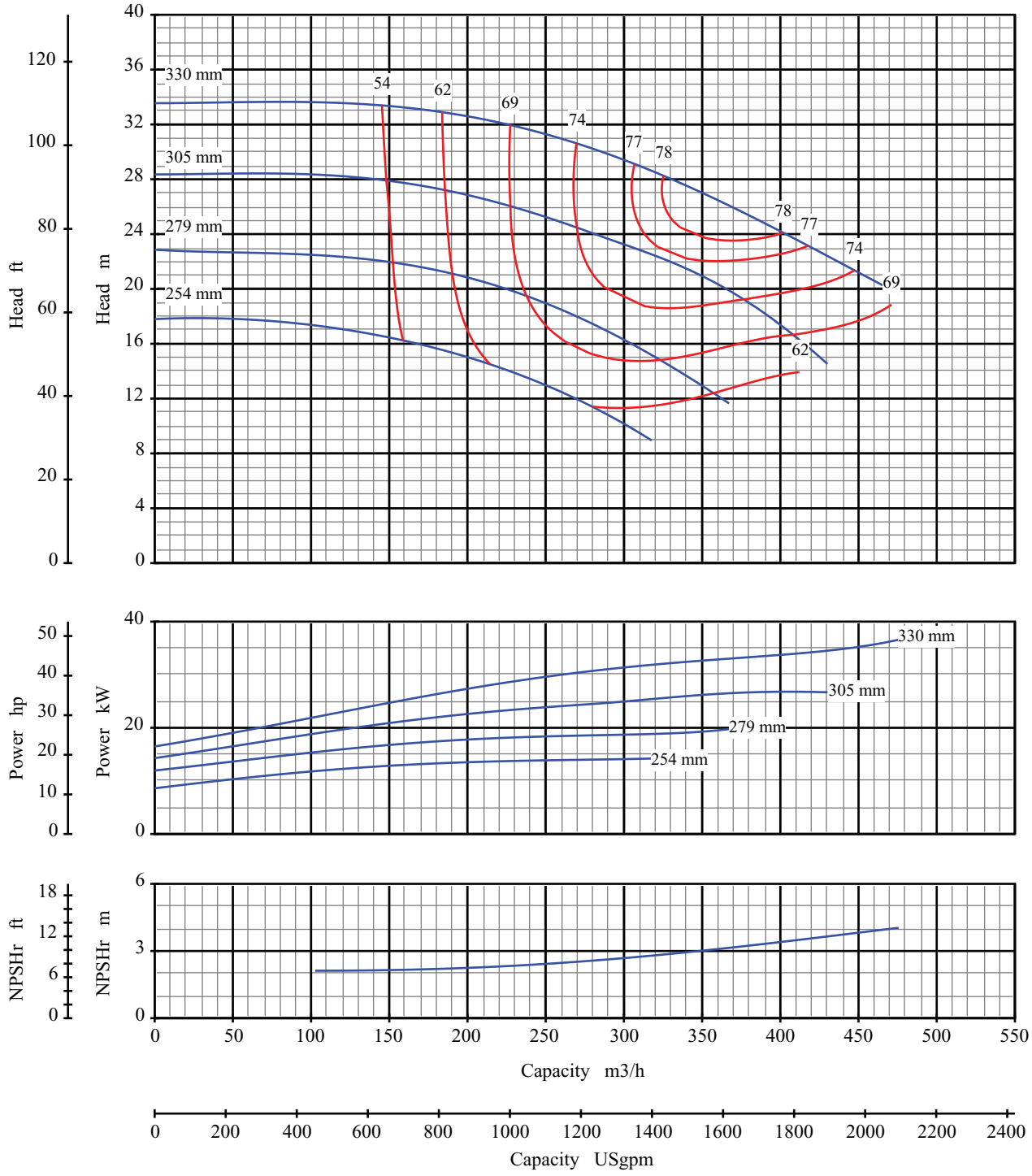
Pump Size: 8x10 15

Effective Date: Jan/2005

Catalog: 1301

Speed: 1150 rpm

Open Impeller



Curve No: S18211V1

Blackmer System One

Pump Performance Characteristics

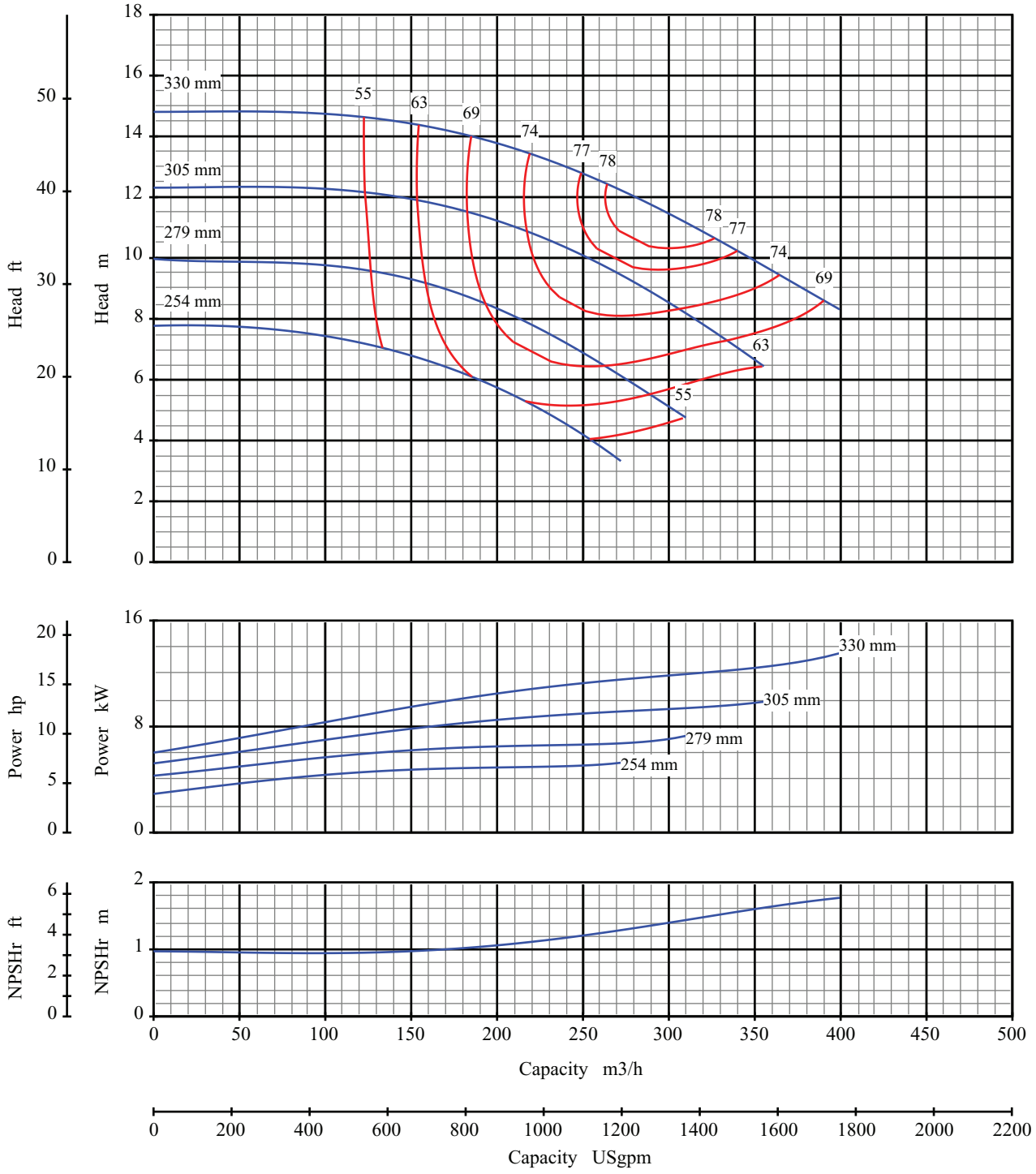
Pump Size: 6x8 13

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18213V1

Blackmer System One

Pump Performance Characteristics

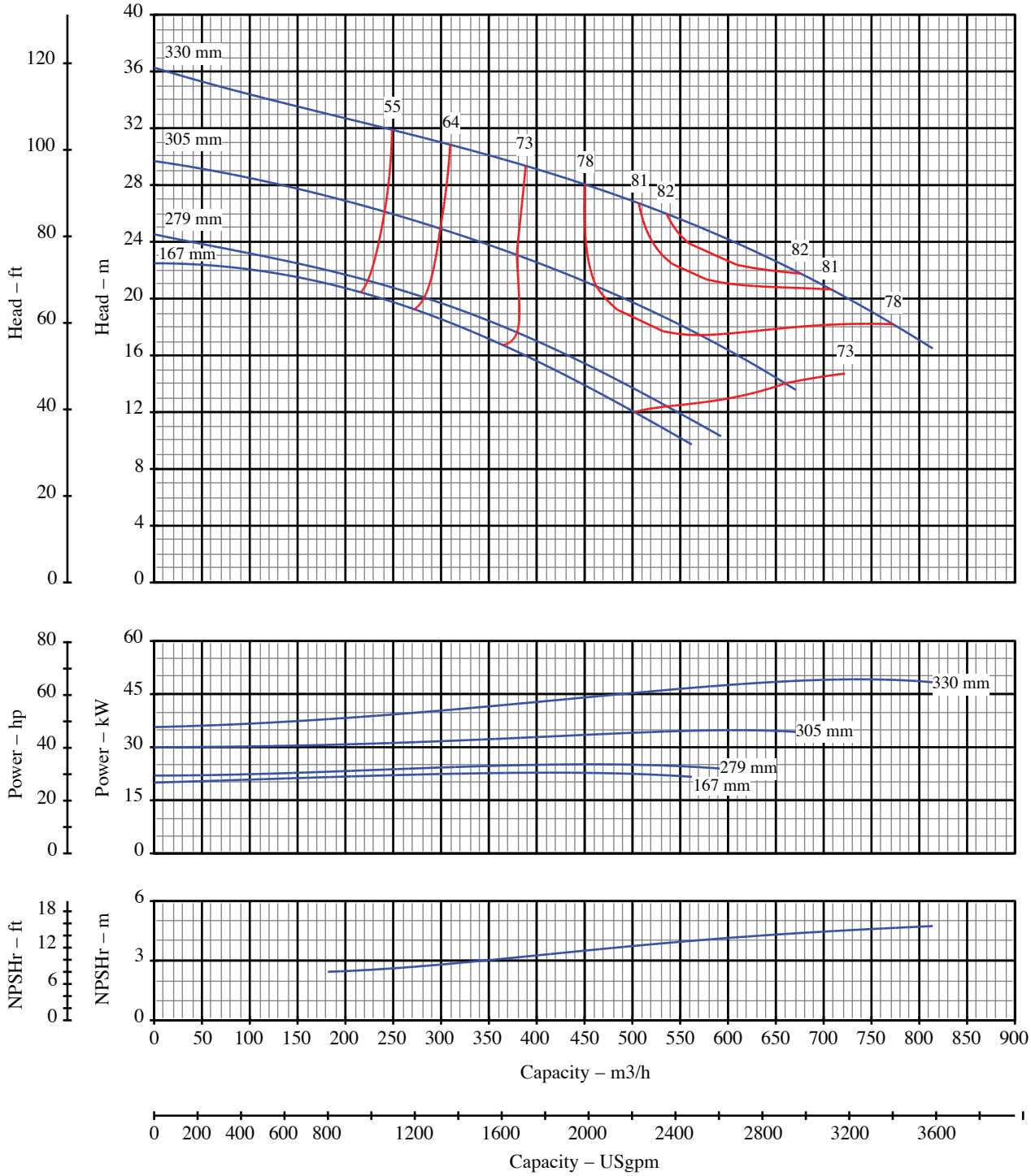
Pump Size: 6x8 13

Effective Date: Jan/2005

Catalog: 1301

Speed: 960 rpm

Open Impeller



Curve No: S18217V1

Blackmer System One

Pump Performance Characteristics

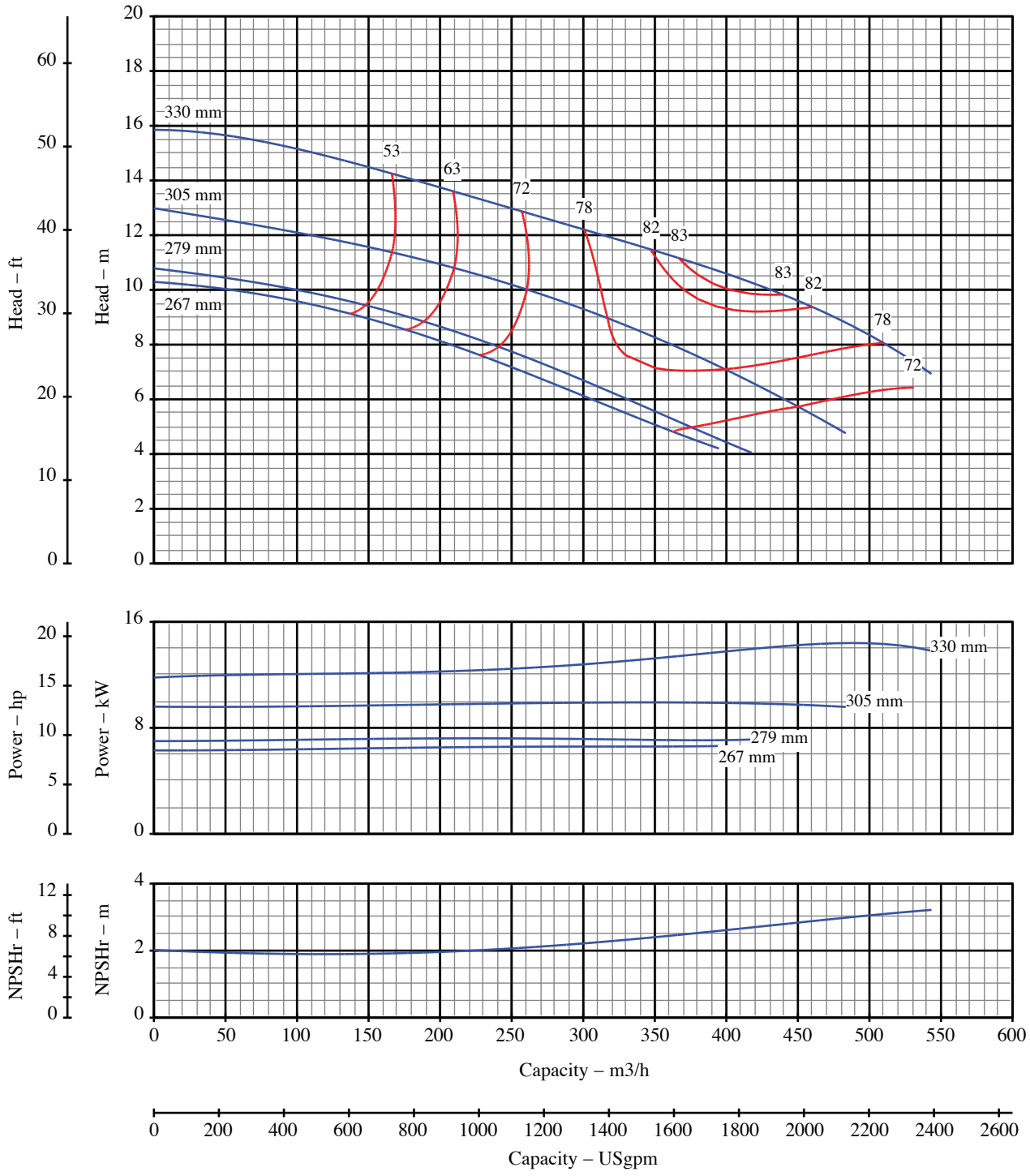
Pump Size: 8x10–13

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18219V1

Blackmer System One

Pump Performance Characteristics

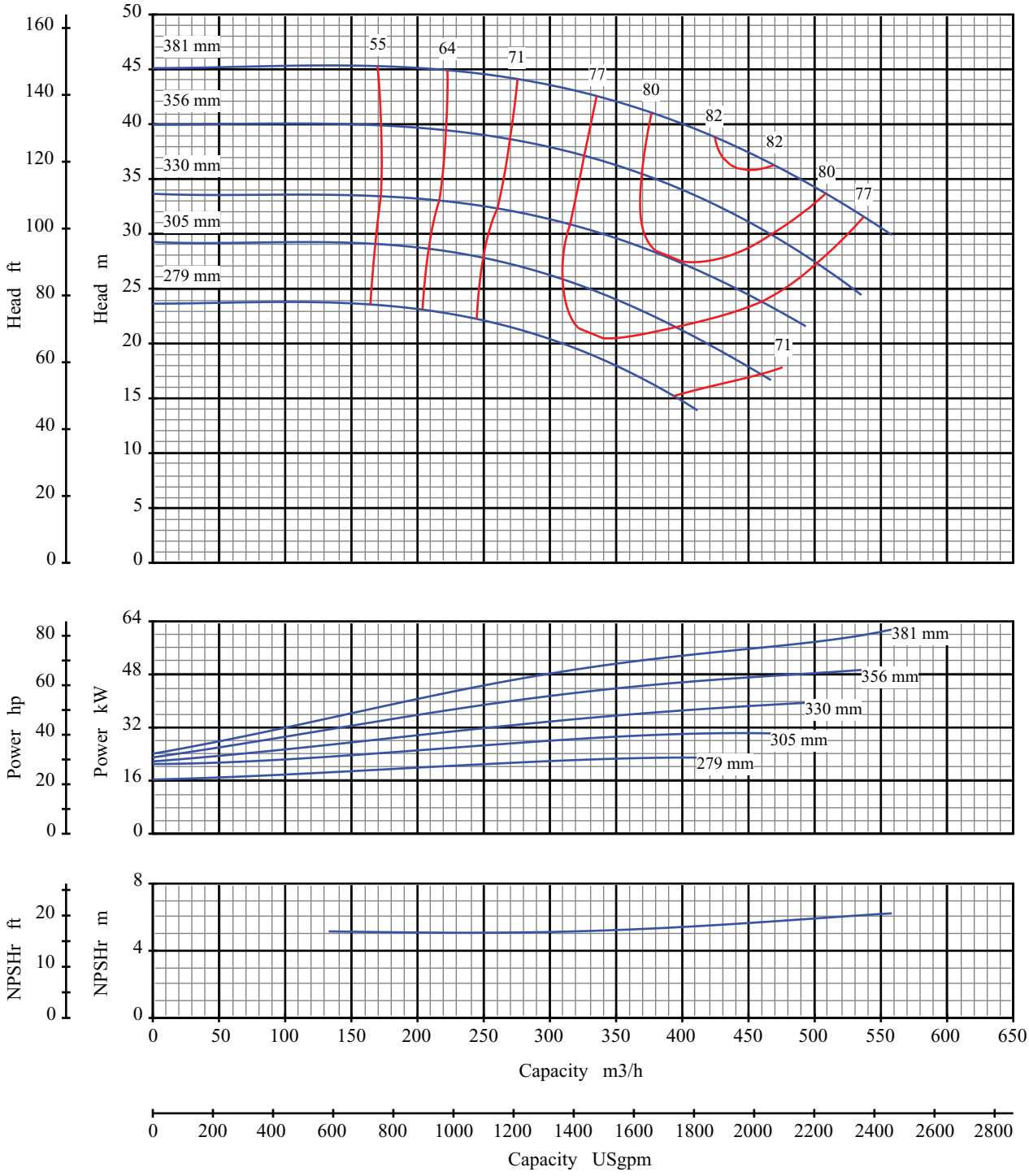
Pump Size: 8x10–13

Effective Date: Jan/2005

Catalog: 1301

Speed: 960 rpm

Open Impeller



Curve No: S18223V1

Blackmer System One

Pump Performance Characteristics

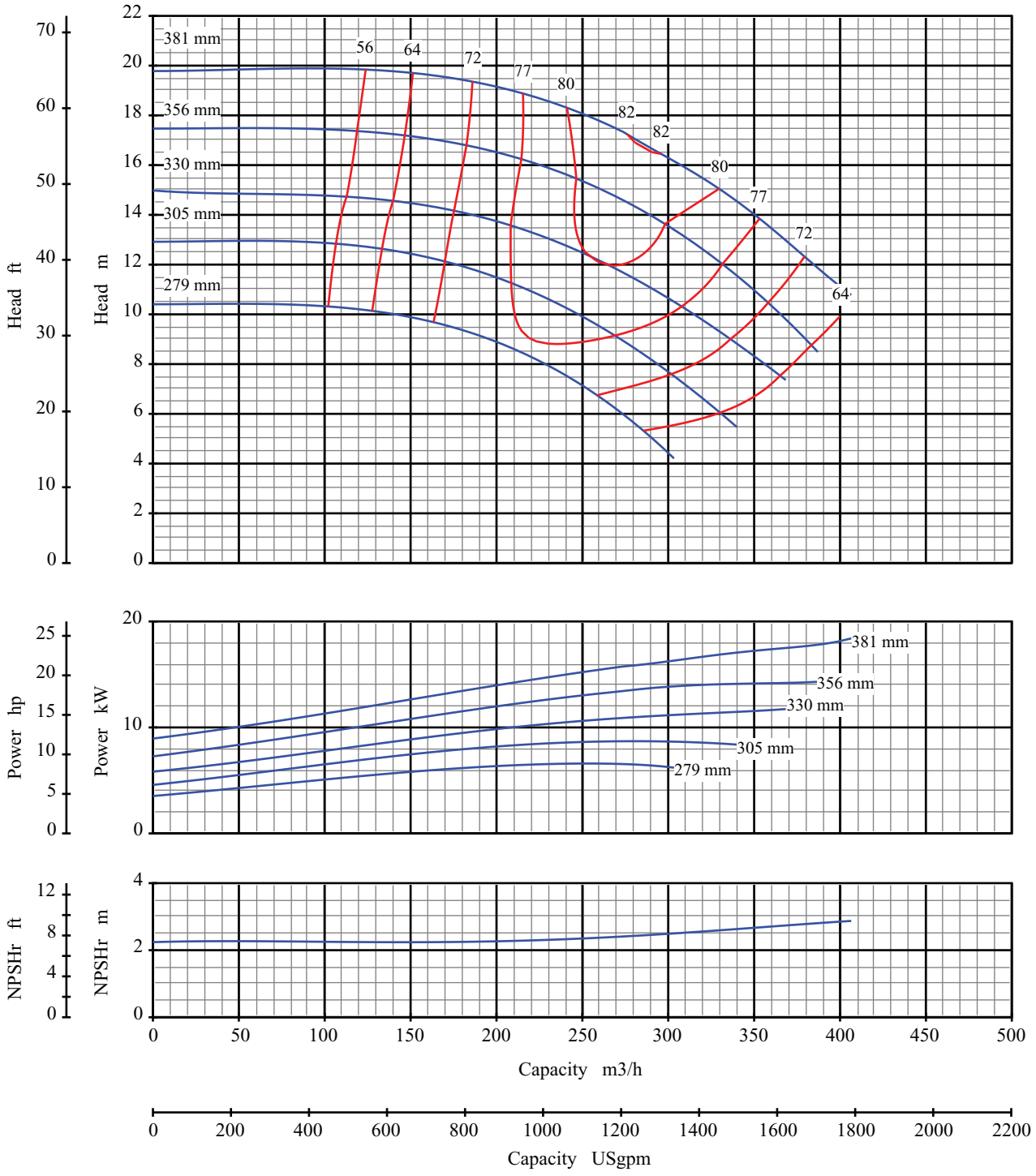
Pump Size: 6x8 15

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18225V1

Blackmer System One

Pump Performance Characteristics

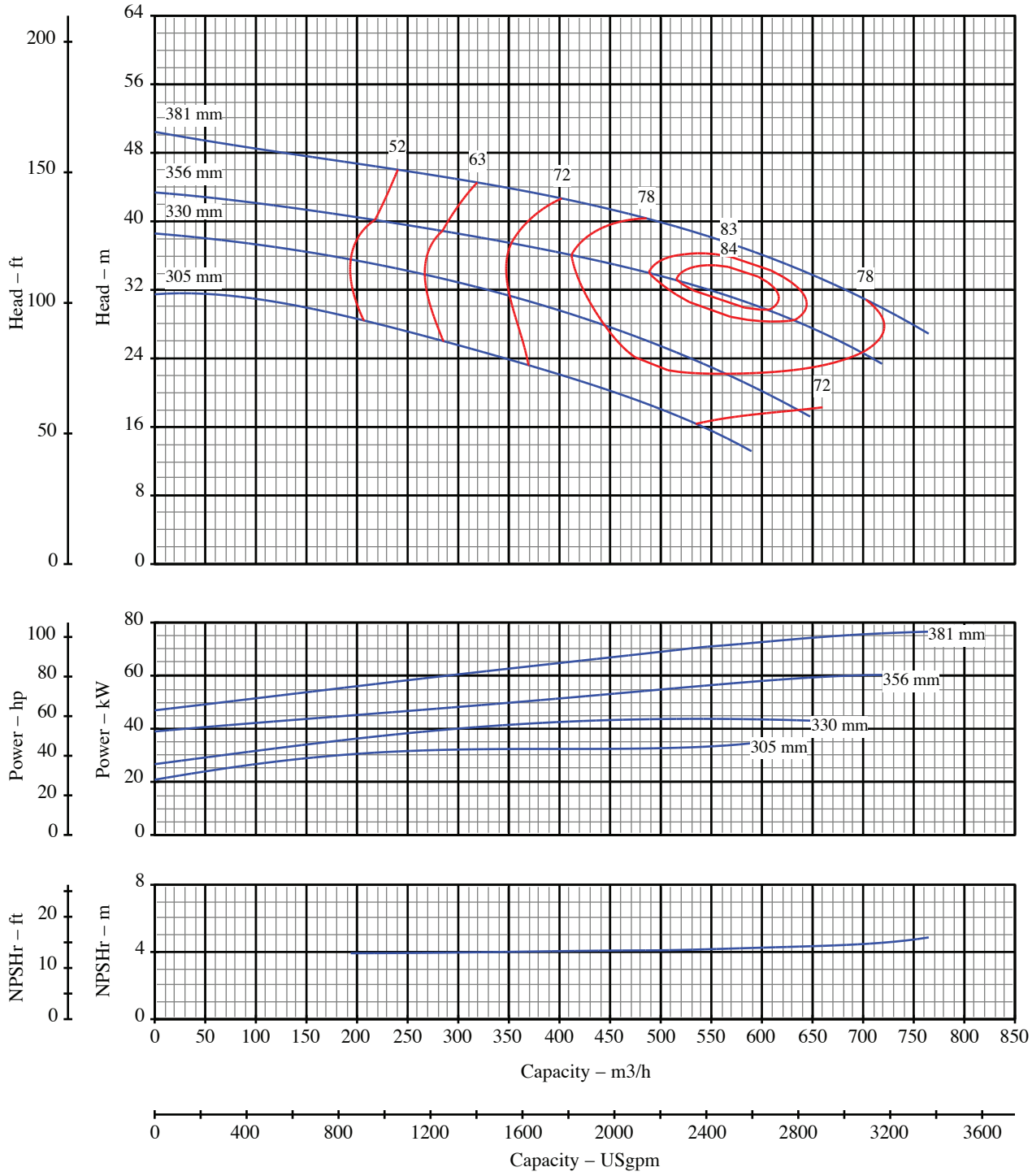
Pump Size: 6x8 15

Effective Date: Jan/2005

Catalog: 1301

Speed: 960 rpm

Open Impeller



Curve No: S18229V1

Blackmer System One

Pump Performance Characteristics

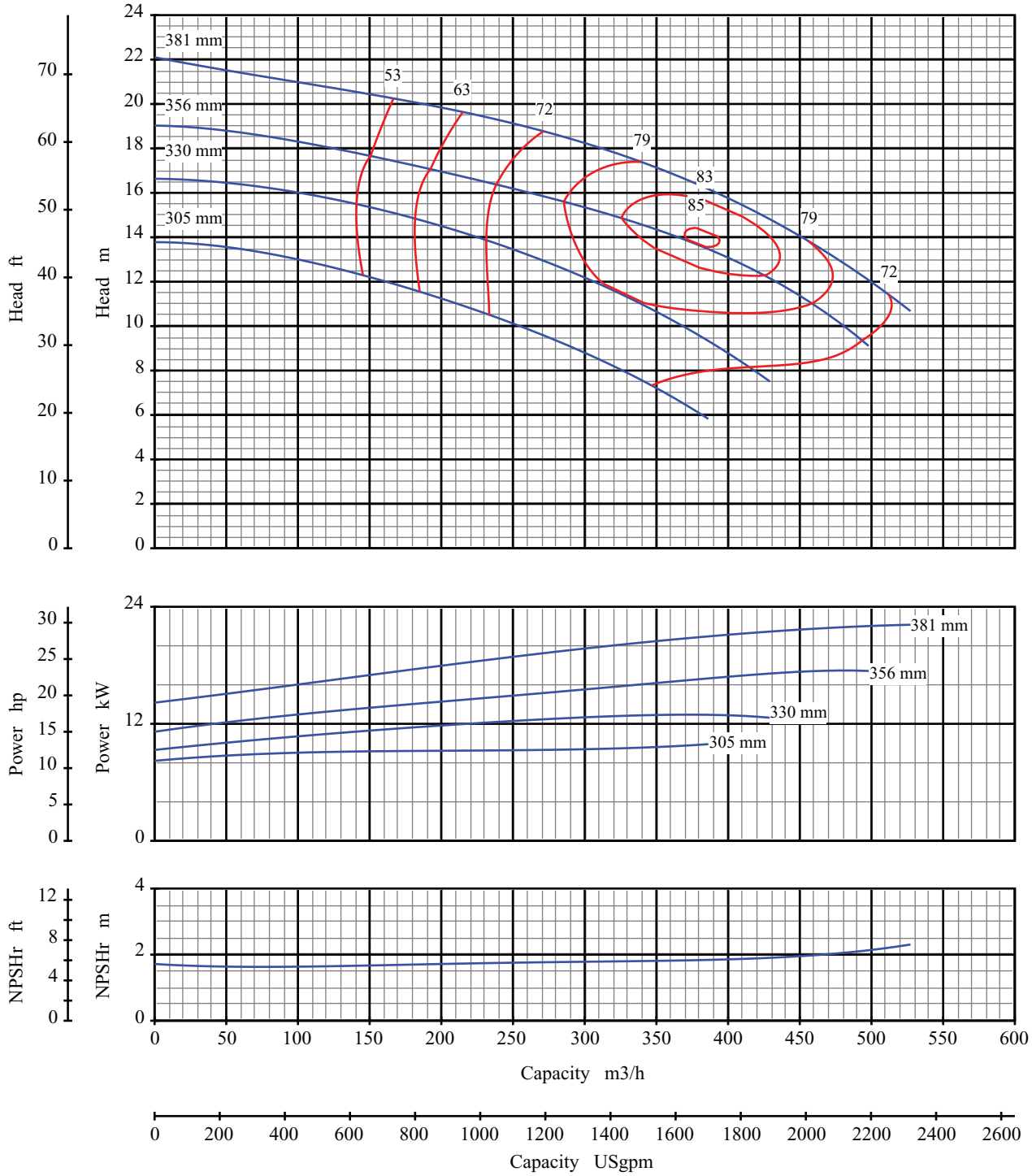
Pump Size: 8x10–15

Effective Date: Jan/2005

Catalog: 1301

Speed: 1450 rpm

Open Impeller



Curve No: S18231V1

Blackmer System One

Pump Performance Characteristics

Pump Size: 8x10 15

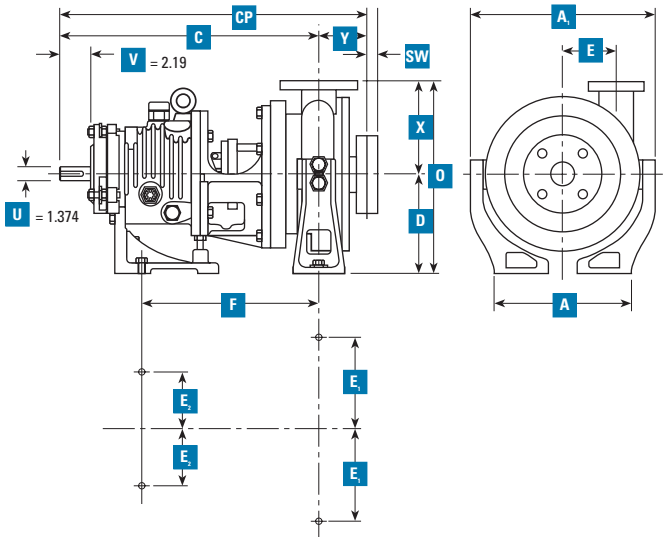
Effective Date: Jan/2005

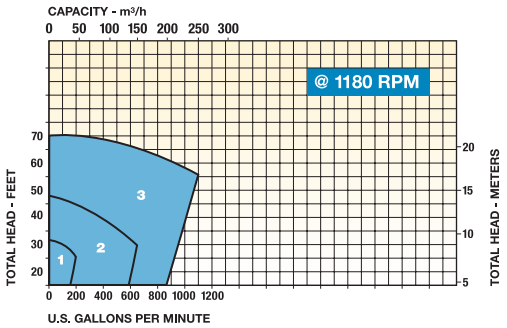
Catalog: 1301

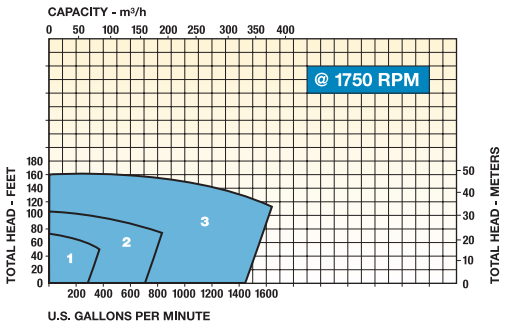
Speed: 960 rpm

Open Impeller

Vortex Pump (FRAME A & LD17)





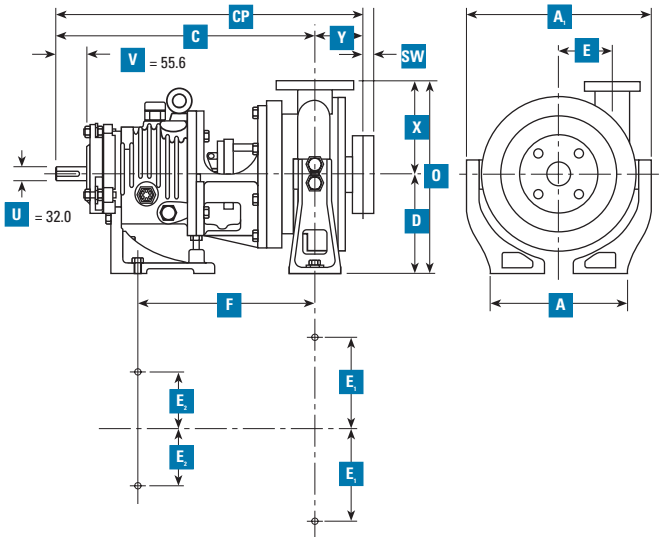


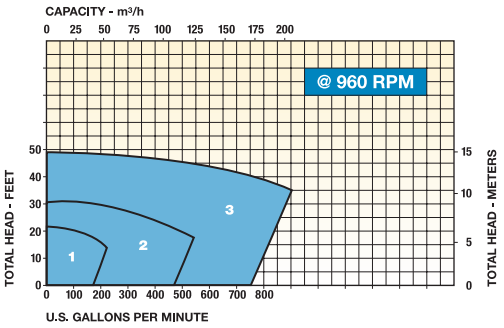
Vortex Pump – Frame A & LD17

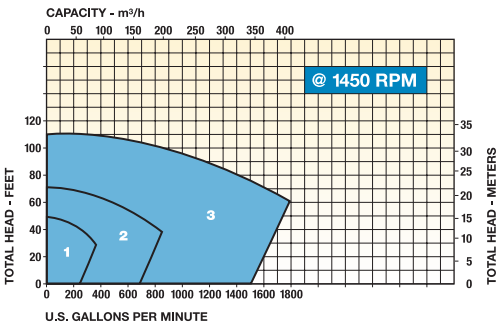
	Pump Size	CP FrA	CP LD17	C FrA	C LD17	Y	X	E	D	O	F FrA	F LD17	A	A_1	$2E_1$	$2E_2$	SW
1	2 x 2-8	25.62	22.93	21.62	18.93	4.00	7.75	4.37	8.25	16.0	14.62	11.93	11.25	15.25	7.50	7.25	1.00
2	3 x 3-10	27.18	24.49	22.56	19.87	4.62	9.50	5.50	10.00	19.5	15.58	12.89	13.75	19.25	7.12	7.25	1.12
3	4 x 4-12	29.38	26.69	23.88	21.19	5.50	11.50	6.50	10.00	21.5	16.83	14.14	16.50	22.00	9.88	7.25	1.38

SW dim. indicates width of optional spacer flange.
All dimensions are in inches.

Vortex Pump (Metric Flange)







Vortex Pump – Metric Flange

	Pump Size	CP FrA	CP LD17	C FrA	C LD17	Y	X	E	D	O	FF FrA	F LD17	A	A_1	$2E_1$	$2E_2$	SW
1	50 x 50-200	651	582	550	481	100	195	111	200	406	382	303	285	387	191	185	25
2	80 x 80-250	690	622	573	505	117	241	140	250	495	396	327	350	489	181	185	28
3	100 x 100-300	746	678	606	538	140	292	165	250	546	427	359	420	559	250	185	35

SW dim. indicates width of optional spacer flange.
All dimensions are in millimeters.

Designed for difficult pumping problems such as:

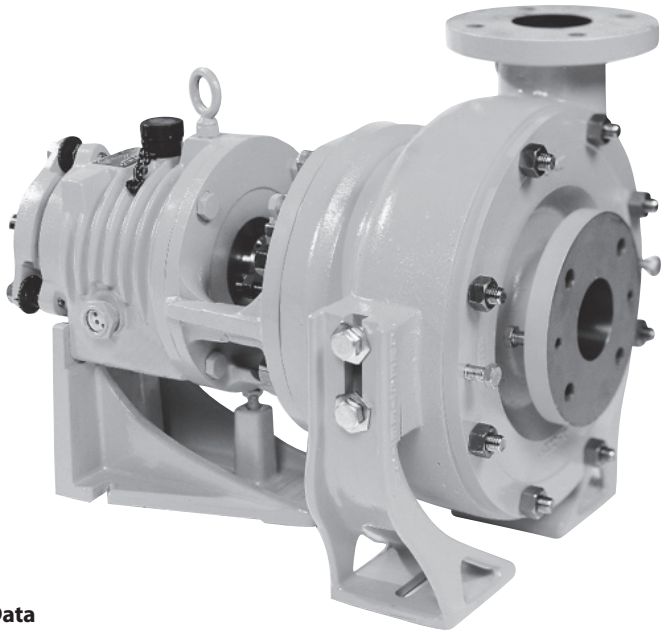
- Sludges and slurries with large solids
- Pumped materials with entrained air
- Pumped fluids with stringy or fibrous materials
- Minimum product shearing

Especially suited for the following industries:

- Waste treatment
- Food and chemical processing
- Pulp and paper
- Agriculture

System One® Pumps Design Data - Vortex Pump

NON-CLOGGING RECESSED IMPELLER
Designed for:
WASTE TREATMENT
FOOD & CHEMICAL PROCESSING
PULP & PAPER
AGRICULTURE
and other industries pumping difficult materials

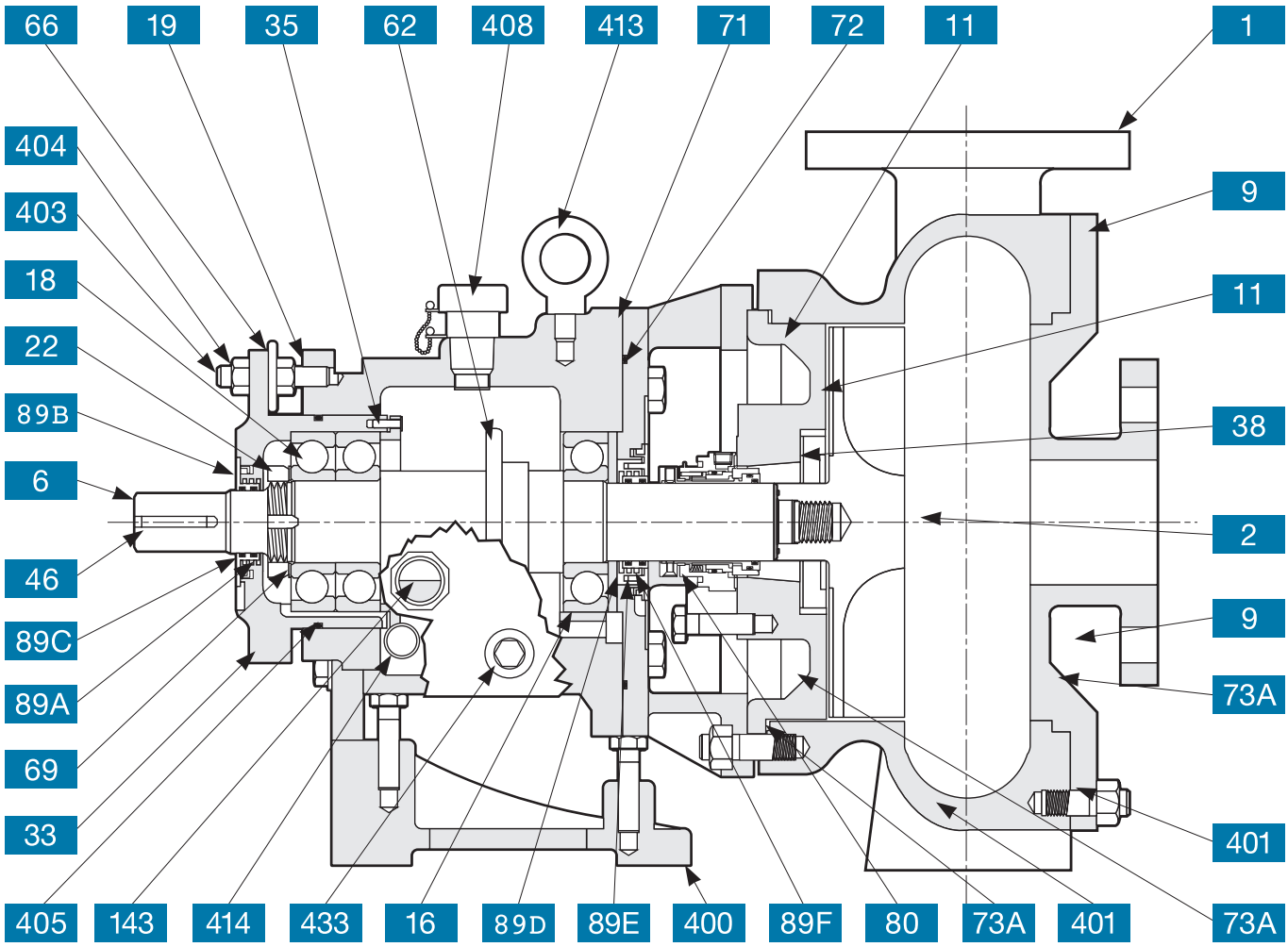


System One Pumps Design Data
VORTEX ANSI

	2.0 x 2.0-08	3.0 x 3.0-10	4.0 x 4.0-12
Shaft			
L3/D4 Ratio FRAME A	61 (2.3)	64 (2.4)	75 (2.9)
L3/D4 Ratio LD17	21 (0.8)	23 (0.8)	28 (1.06)
Diameter at Impeller	1.06 (27) 1.00-12 UNF Thread		
Diameter at Seal	1.875 (47.63)		
Diameter Between Bearings	2.45 (62)		
Diameter at Coupling	1.375 (34.93)		
Bearings			
Thrust	SKF 7310 BEGAY (pair)		
Radial	6310 C3		
Bearing Span	6.02 (153)		
Shaft Overhang FRAME A	9.11 (231)	9.25 (235)	9.73 (247)
Shaft Overhang LD17	6.42 (163)	6.56 (167)	7.04 (179)
Seal Chamber			
Seal Bore Diameter (nose)	2.69 (68) nose		
Inside Bore	FRAME A 3.75 (95) LD17 3.00 (76)		
Depth	FRAME A 2.88 (73) LD17 2.00 (51)		
Back Cover/Shaft Clearance	FRAME A .12 (3) Diametral LD17 Open 5 degree Taper		
Gland Bolting FRAME A ANSI	4X .500-13UNC on 4.75 B.C. (12 on 121 B.C.)		
Gland Bolting LD17	4X .500-13UNC on 4.62 B.C. (12 on 117 B.C.)		
Distance to Nearest Obstruction	FRAME A 3.00 (76) LD17 2.19 (56)		
Open Impeller			
Clearance	.05 (1.3) Back of Impeller		
Maximum Diameter Solids	2.0 (51)	3.0 (76)	4.0 (102)
Number of Vanes	8		
Pumps Weights/Lbs. (kg)			
Pump Only	302 (136)	357 (160)	470 (211)
Casing			
Type	Single Volute		
Wall Thickness	0.44 (11) Minimum		
Maximum Working Pressure	See Pressure vs. Temperature Limit Chart		
Test pressure	Class 150 Flanges-250PSIG, Class 300 Flanges-450PSIG		
Rotating Element			
Maximum Speed (oil lube)	1750	1750	1750
Power Limits			
HP (KW)/100 RPM 316SS	3.4 (2.6)		

Reference Drawings A40210, A40211

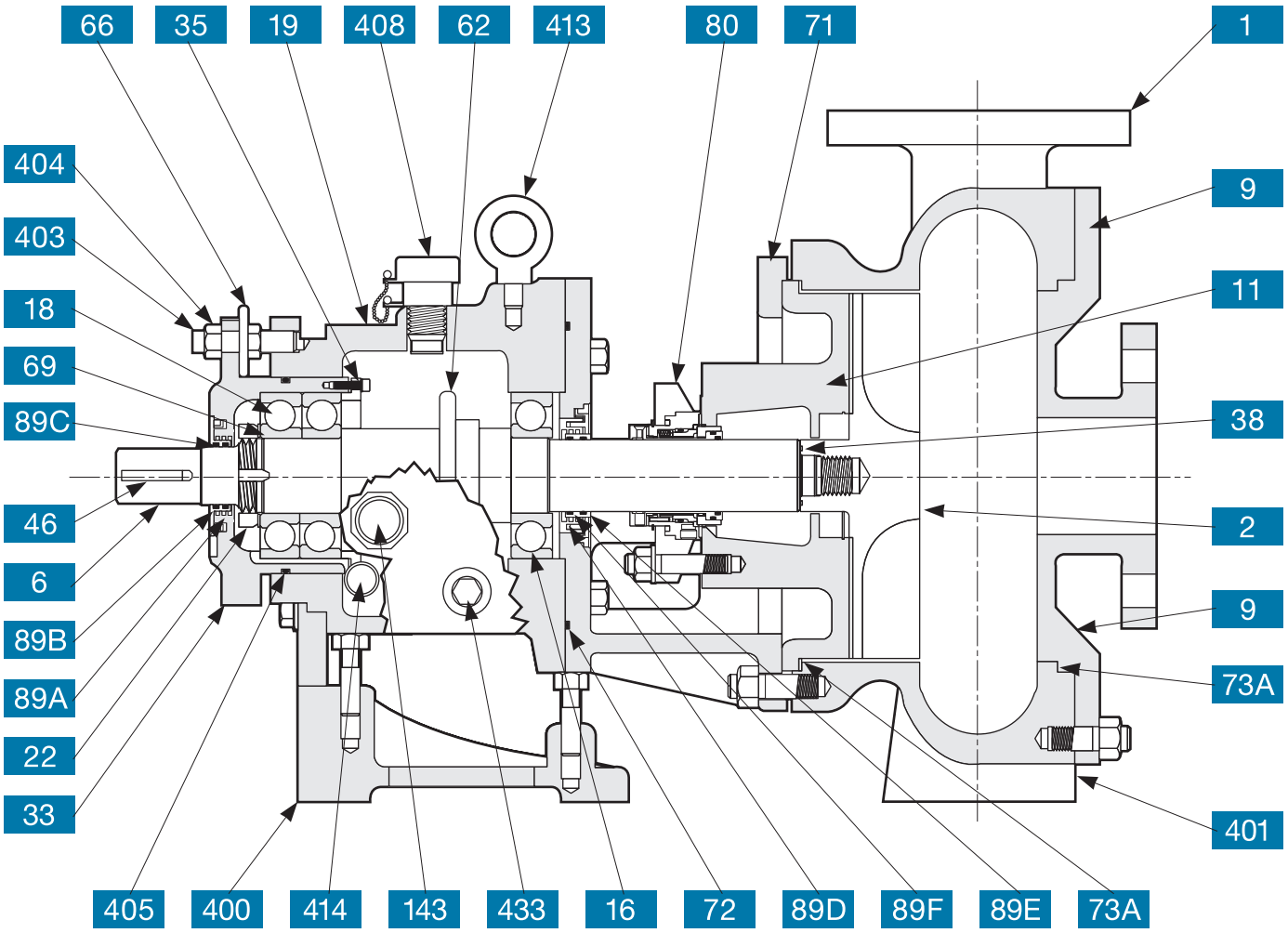
LD17



NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	46	Key, Coupling	89E	Seal, Labyrinth Rotor, (Radial)
2	Impeller	62	Flinger	89F	Seal, Labyrinth O-Ring (Radial)
6	Shaft	66	Micrometer Nut	143	Oil Sight Glass
9	Suction Cover	69	Lockwasher, Thrust Bearing	400	Foot, Bearing Frame
11	Back Cover	71	Frame Adapter	401	Foot, casing
16	Bearing, Radial	72	O-Ring Frame Adapter	403	Stud, Cartridge
18	Bearing, Thrust	73A	Gasket, Casing	404	Locknut, Cartridge
19	Bearing, Frame	80	Mechanical Seal	405	O-Ring, Cartridge
22	Locknut, Thrust Bearing	89A	Seal, Labyrinth Stator, (Thrust)[1]	408	Oil Filler Assembly
33	Bearing Cartridge	89B	Seal, Labyrinth Rotor, (Thrust)	413	Bolt, Eye
35	Retainer Cover	89C	Seal, Labyrinth O-Ring, (Thrust)	414	Plug, Magnetic
38	O-ring, Impeller Hub	89D	Seal, Labyrinth Stator, (Radial)	433	Plug, Bearing Frame

[1]Incorporated as part of cartridge in 2000.

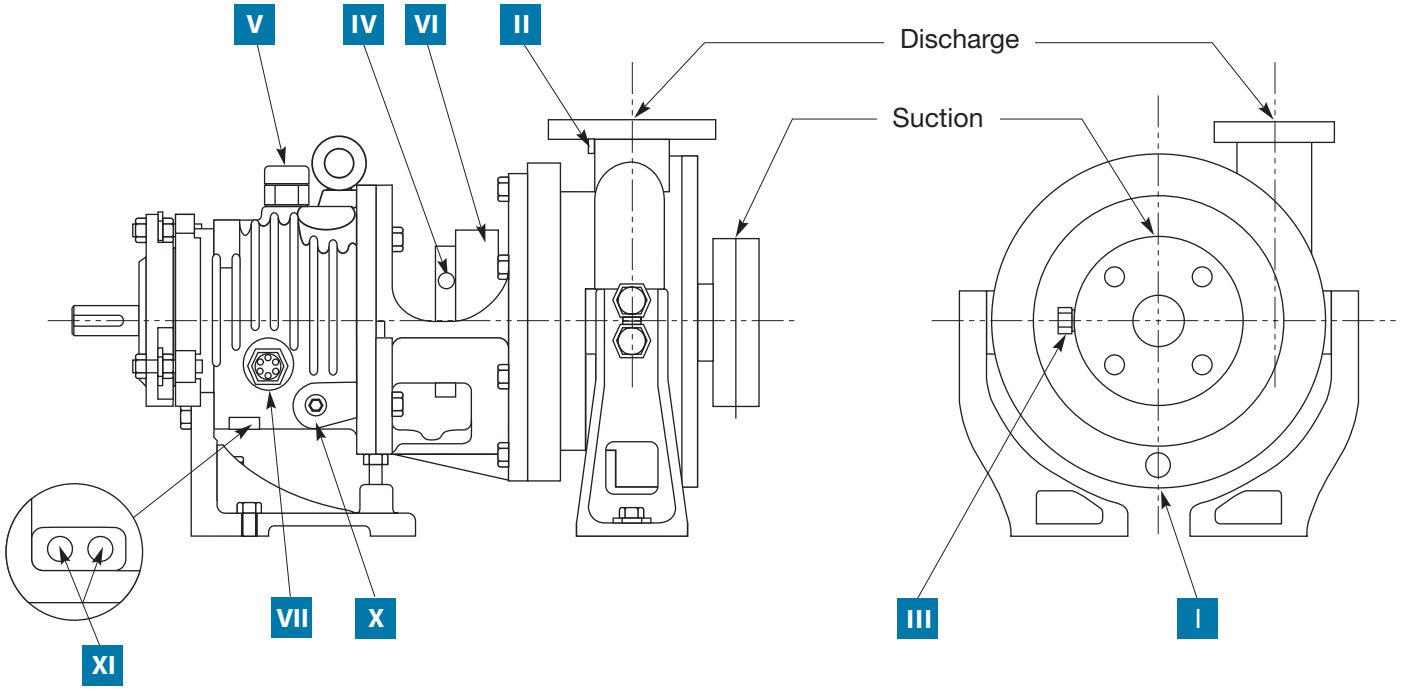
Frame A



NO.	ITEM	NO.	ITEM	NO.	ITEM
1	Casing	46	Key, Coupling	89E	Seal, Labyrinth Rotor, (Radial)
2	Impeller	62	Flinger	89F	Seal, Labyrinth O-Ring (Radial)
6	Shaft	66	Micrometer Nut	143	Oil Sight Glass
9	Suction Cover	69	Lockwasher, Thrust Bearing	400	Foot, Bearing Frame
11	Back Cover	71	Frame Adapter	401	Foot, casing
16	Bearing, Radial	72	O-Ring Frame Adapter	403	Stud, Cartridge
18	Bearing, Thrust	73A	Gasket, Casing	404	Locknut, Cartridge
19	Bearing, Frame	80	Mechanical Seal	405	O-Ring, Cartridge
22	Locknut, Thrust Bearing	89A	Seal, Labyrinth Stator, (Thrust)[1]	408	Oil Filler Assembly
33	Bearing Cartridge	89B	Seal, Labyrinth Rotor, (Thrust)	413	Bolt, Eye
35	Retainer Cover	89C	Seal, Labyrinth O-Ring, (Thrust)	414	Plug, Magnetic
38	O-ring, Impeller Hub	89D	Seal, Labyrinth Stator, (Radial)	433	Plug, Bearing Frame

[1]Incorporated as part of cartridge in 2000.

System One® Vortex Frame LD17 and A - Auxiliary Pipe Connections List

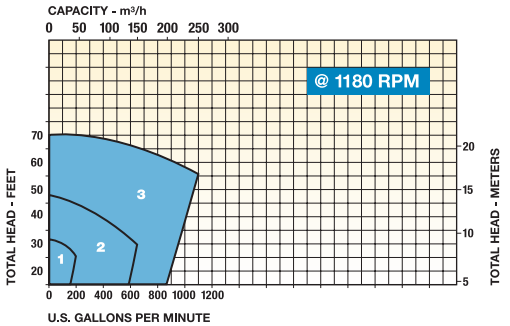


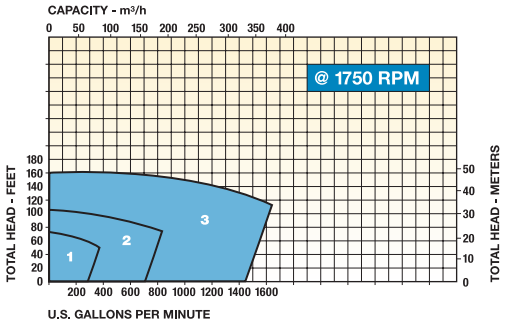
ITEM NUMBER	NPT SIZE	NUMBER OF TAPS	CONNECTION
* I	0.50-14	1	Casing Drain
* II	0.25-18	1	Discharge Gage
* III	0.25-18	1	Suction Gage
* IV	0.25-18	1	Seal Chamber Flush (not available on LD17)
V	0.75-14	1	Oil Fill
* VI	0.25-18	2	Seal Chamber Jacket – Inlet & Outlet (not available on LD17)
# VII	1.0-11.5	1	Oil Sight Glass
# X	0.25-18	1	Oil Drain
## XI	0.50-14	2	Magnetic Plug or Cooling Coil*

* Optional
\# Left side of pump facing suction end
\## Right side facing suction end

System One® Vortex Pump Composite Pump Curves - Frame LD17 and A and Metric Flange

Vortex Pump (FRAME LD17 and A)



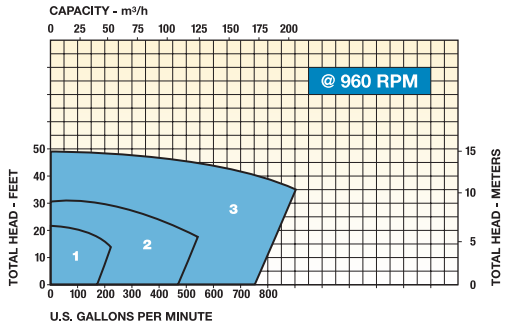


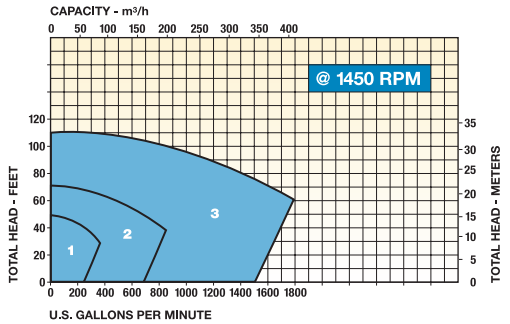
Vortex Pump – Frame LD17 and A

	Pump Size	CP FrA	CP LD17	C FrA	C LD17	Y	X	E	D	O	F FrA	F LD17	A	A_1	$2E_1$	$2E_2$	SW
1	2 x 2-8	25.62	22.93	21.62	18.93	4.00	7.75	4.37	8.25	16.0	14.62	11.93	11.25	15.25	7.50	7.25	1.00
2	3 x 3-10	27.18	24.49	22.56	19.87	4.62	9.50	5.50	10.00	19.5	15.58	12.89	13.75	19.25	7.12	7.25	1.12
3	4 x 4-12	29.38	26.69	23.88	21.19	5.50	11.50	6.50	10.00	21.5	16.83	14.14	16.50	22.00	9.88	7.25	1.38

SW dim. indicates width of optional spacer flange.
All dimensions are in inches.

Vortex Pump (Metric Flange)

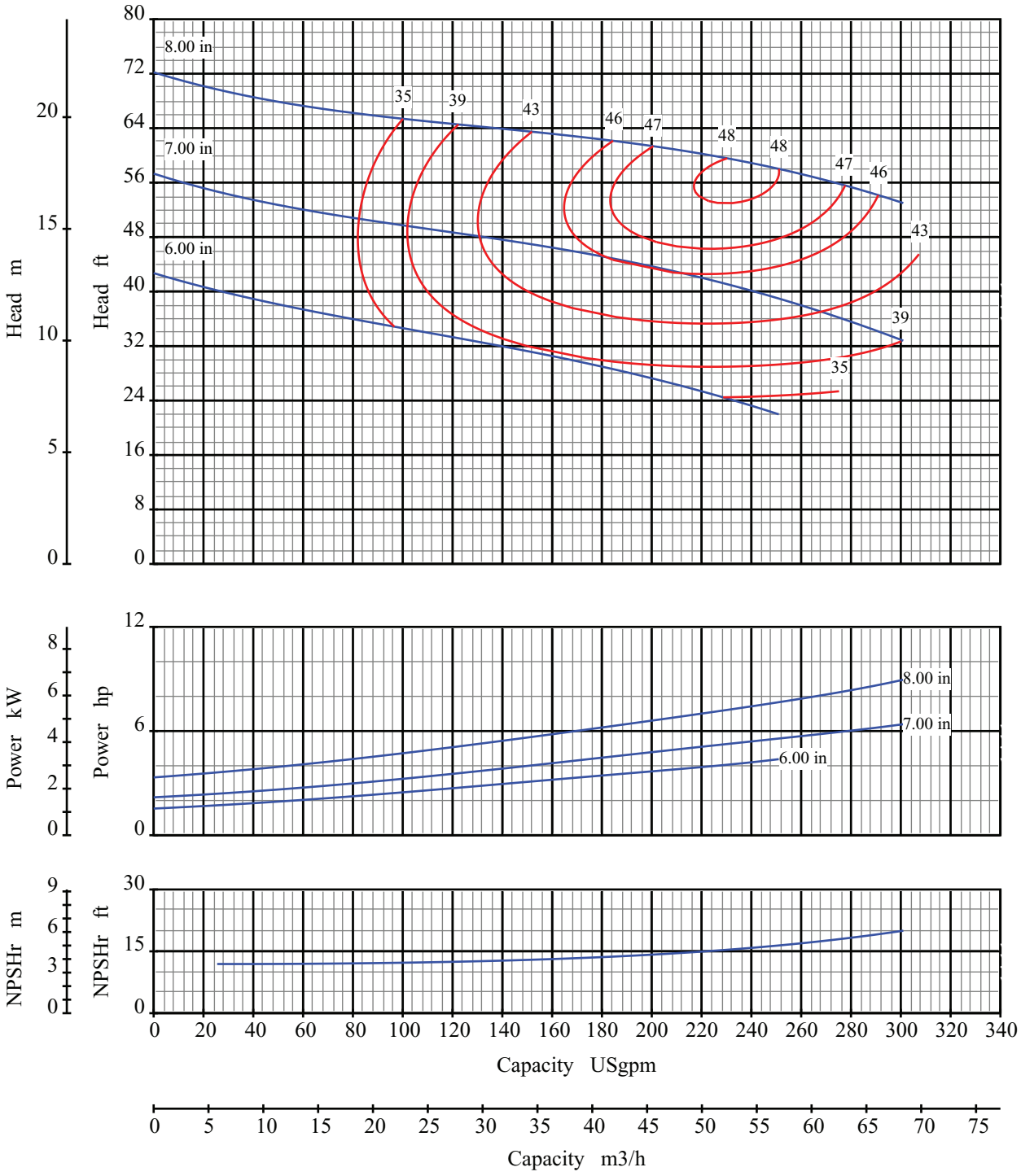




Vortex Pump – Metric Flange

	Pump Size	CP FrA	CP LD17	C FrA	C LD17	Y	X	E	D	O	FF FrA	F LD17	A	A_1	$2E_1$	$2E_2$	SW
1	50 x 50-200	651	582	550	481	100	195	111	200	406	382	303	285	387	191	185	25
2	80 x 80-250	690	622	573	505	117	241	140	250	495	396	327	350	489	181	185	28
3	100 x 100-300	746	678	606	538	140	292	165	250	546	427	359	420	559	250	185	35

SW dim. indicates width of optional spacer flange.
All dimensions are in millimeters.



Curve No: S17102V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

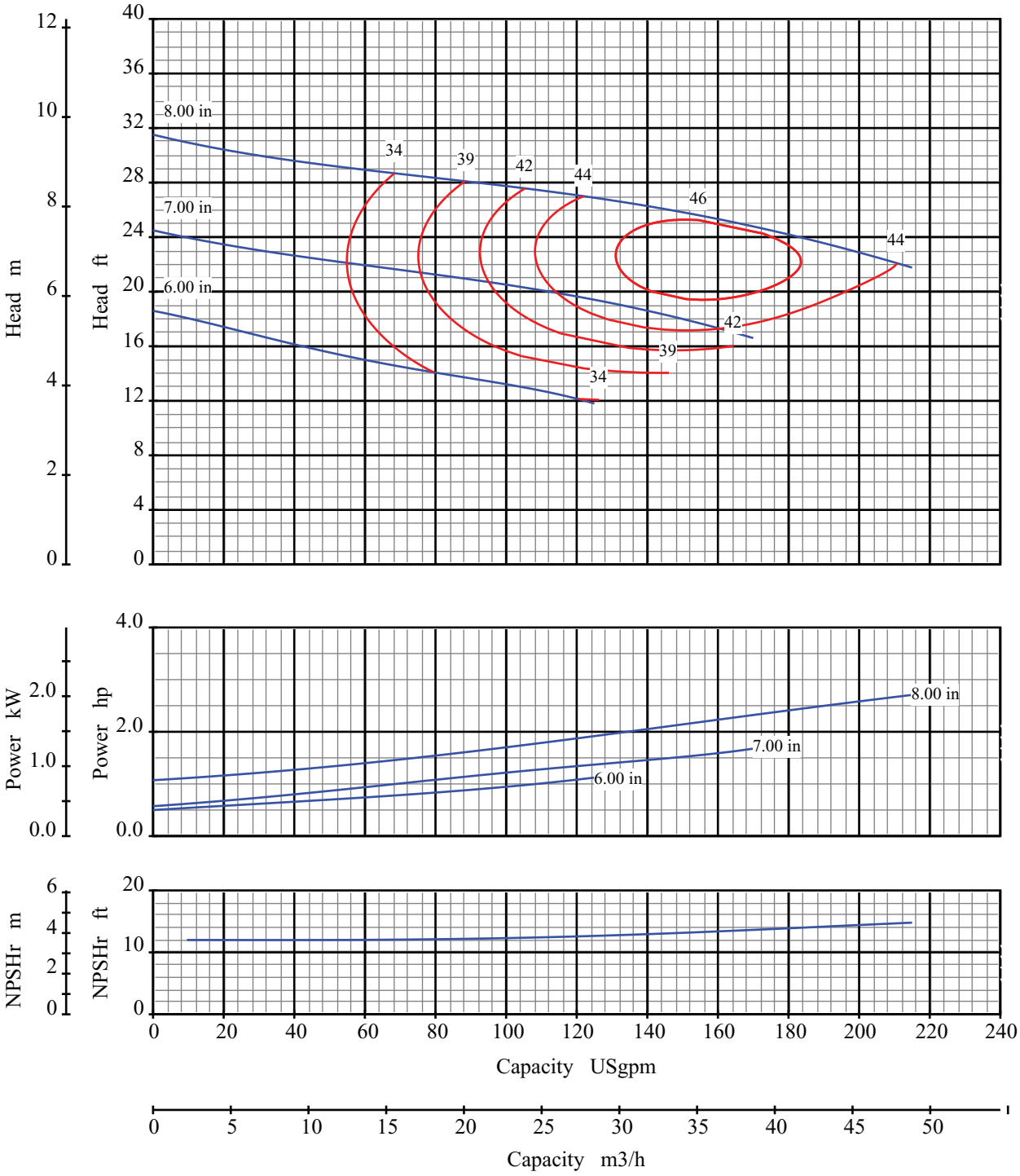
Effective Date: Jan/2005

Pump Size: 2x2 8

Pump Size: 50x50 200

Speed: 1750 rpm

Vortex Impeller



Curve No: S17104V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

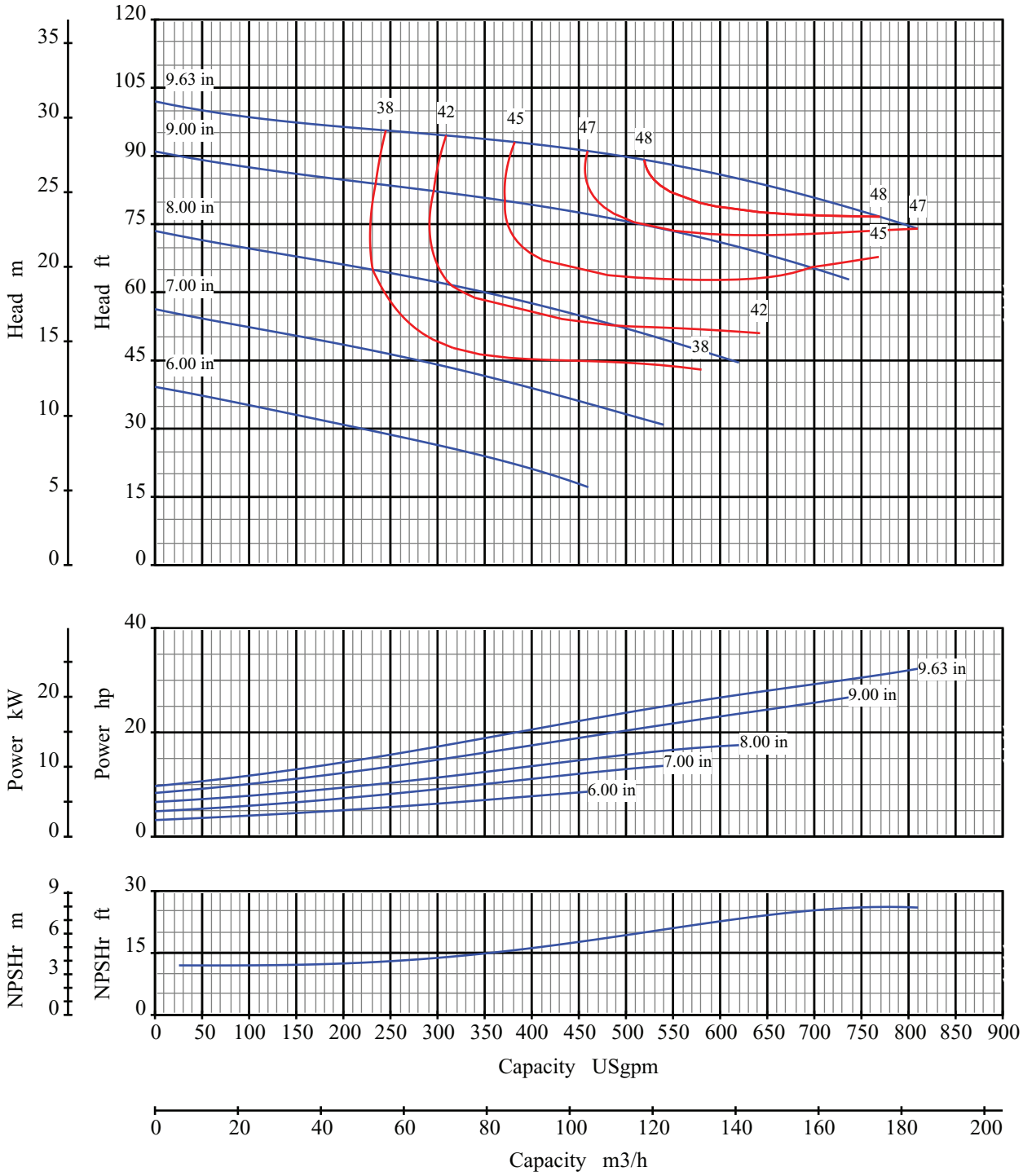
Catalog: 1301

Pump Size: 2x2 8

Pump Size: 50x50 200

Speed: 1150 rpm

Vortex Impeller



Curve No: S17108V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

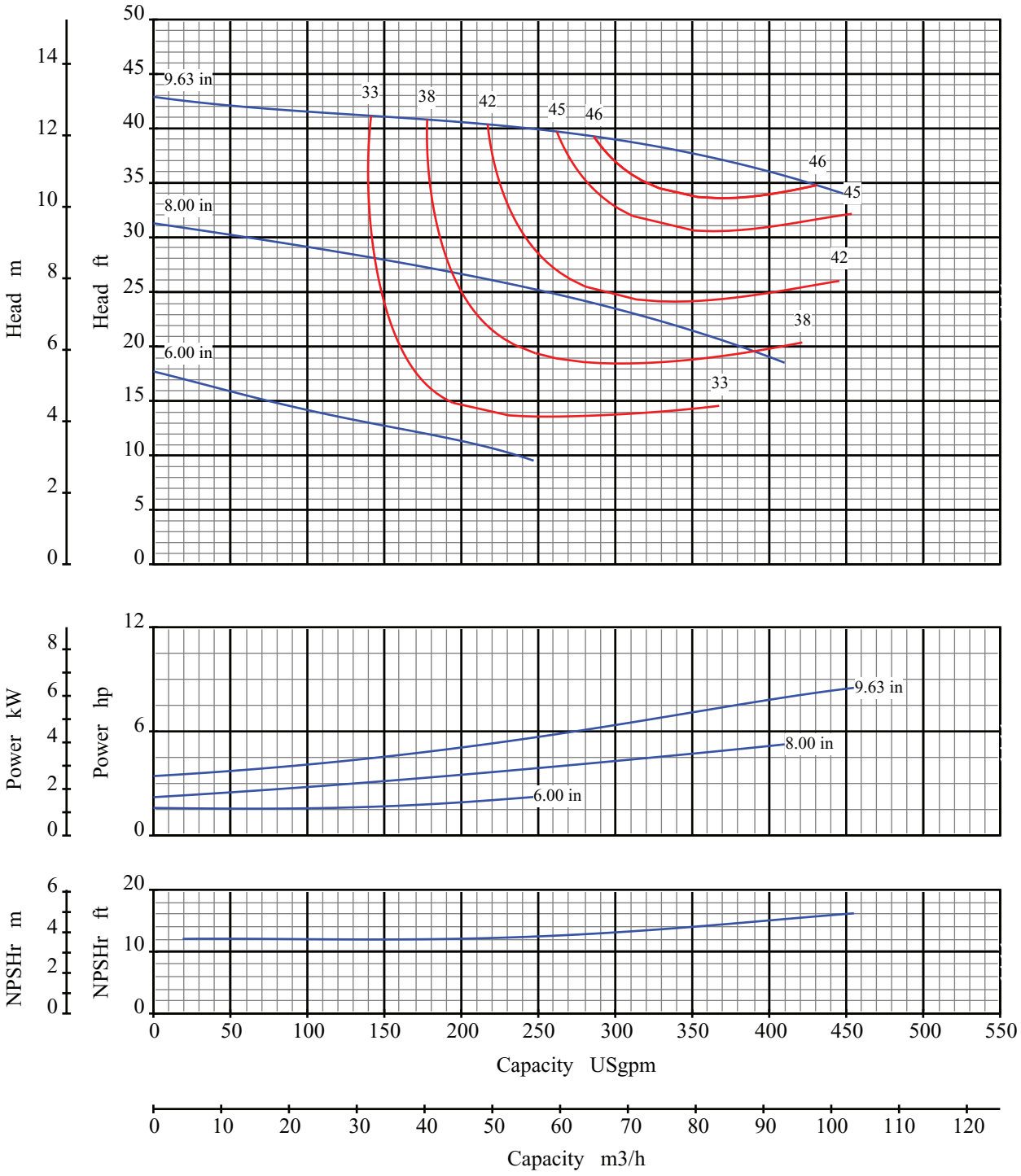
Catalog: 1301

Pump Size: 3x3 10

Pump Size: 80x80 250

Speed: 1750 rpm

Vortex Impeller



Curve No: S17110V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

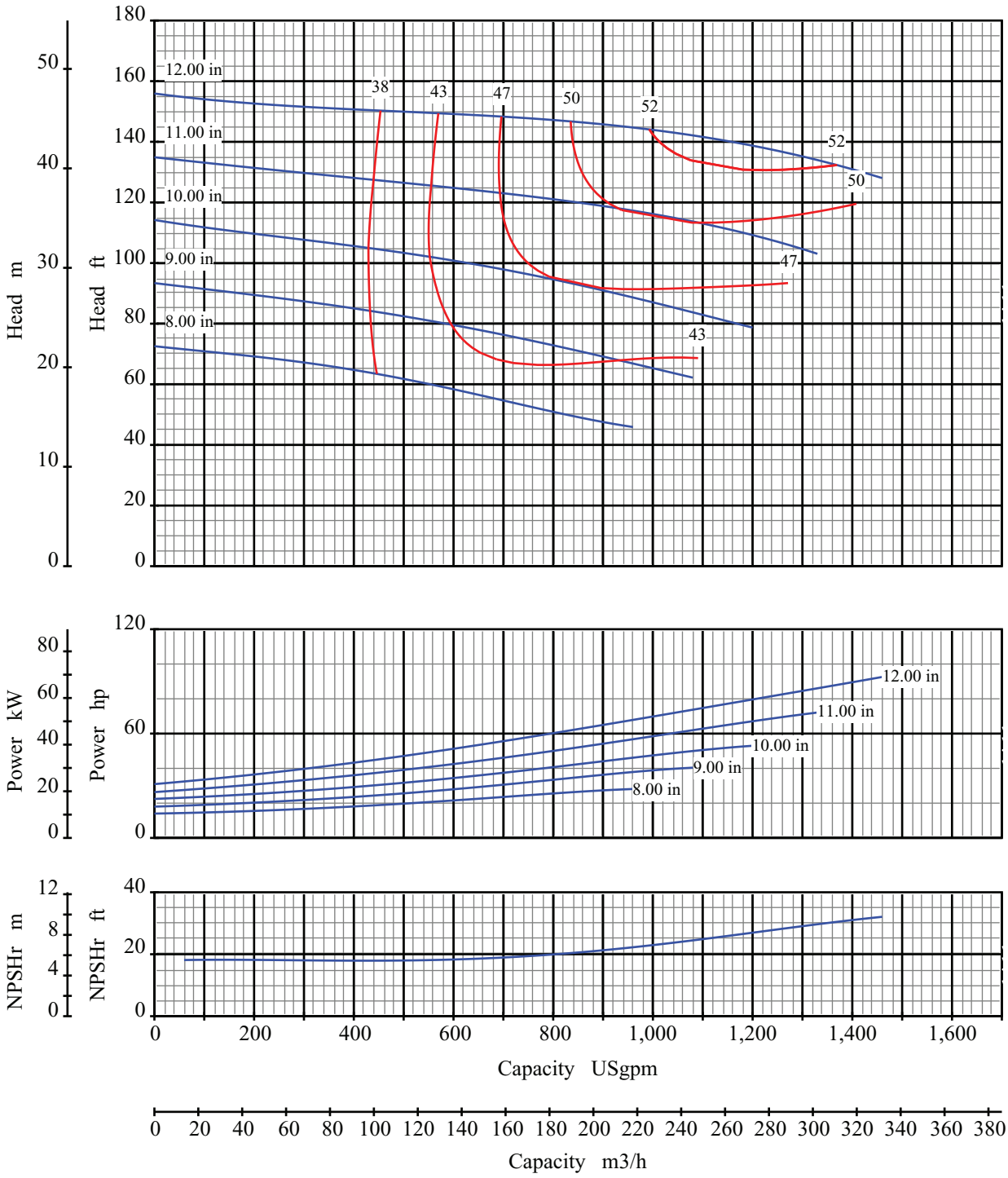
Catalog: 1301

Pump Size: 3x3 10

Pump Size: 80x80 250

Speed: 1150 rpm

Vortex Impeller



Curve No: S17114V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

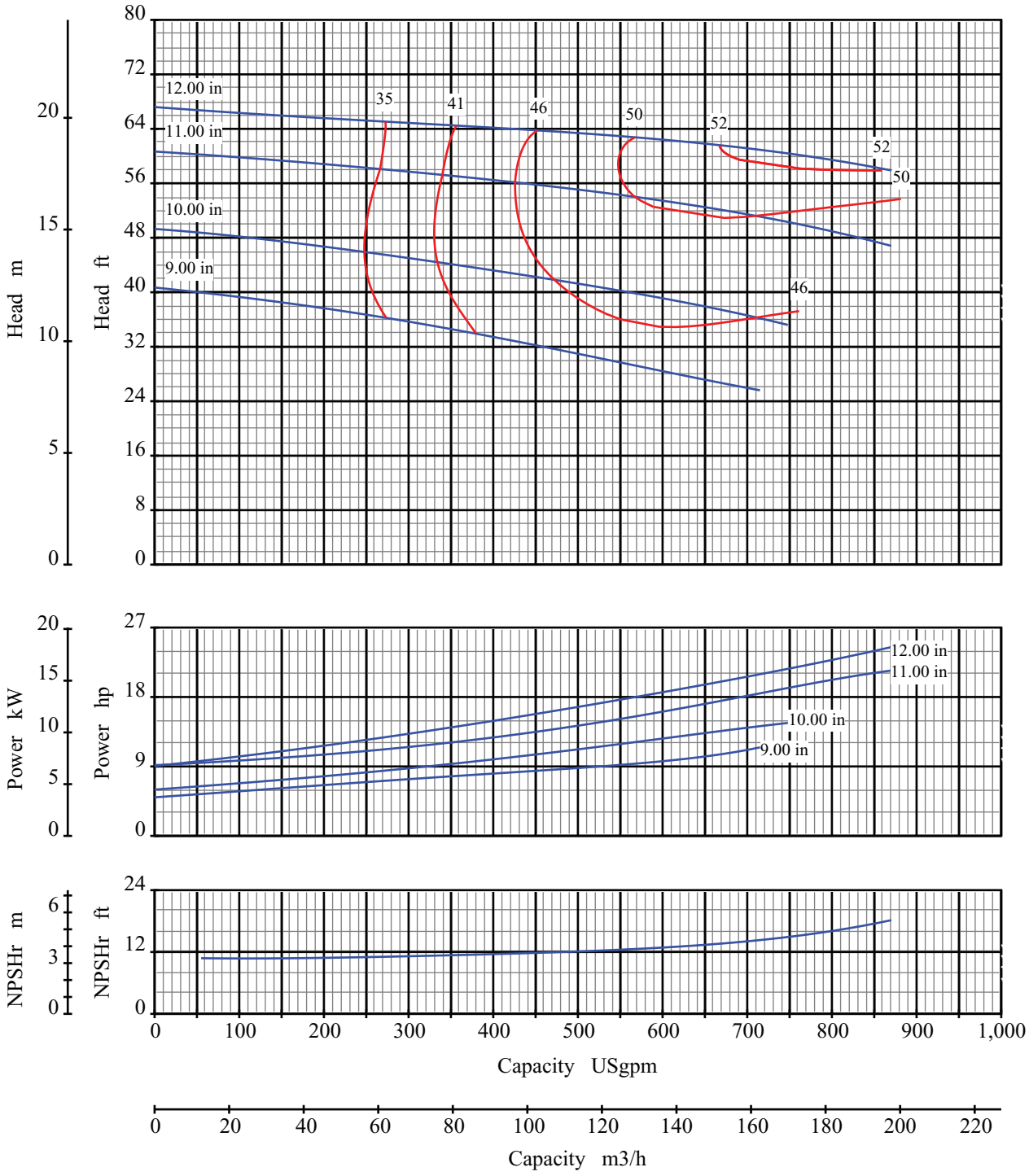
Catalog: 1301

Pump Size: 4x4 12

Pump Size: 100x100 300

Speed: 1750 rpm

Vortex Impeller



Curve No: S17116V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

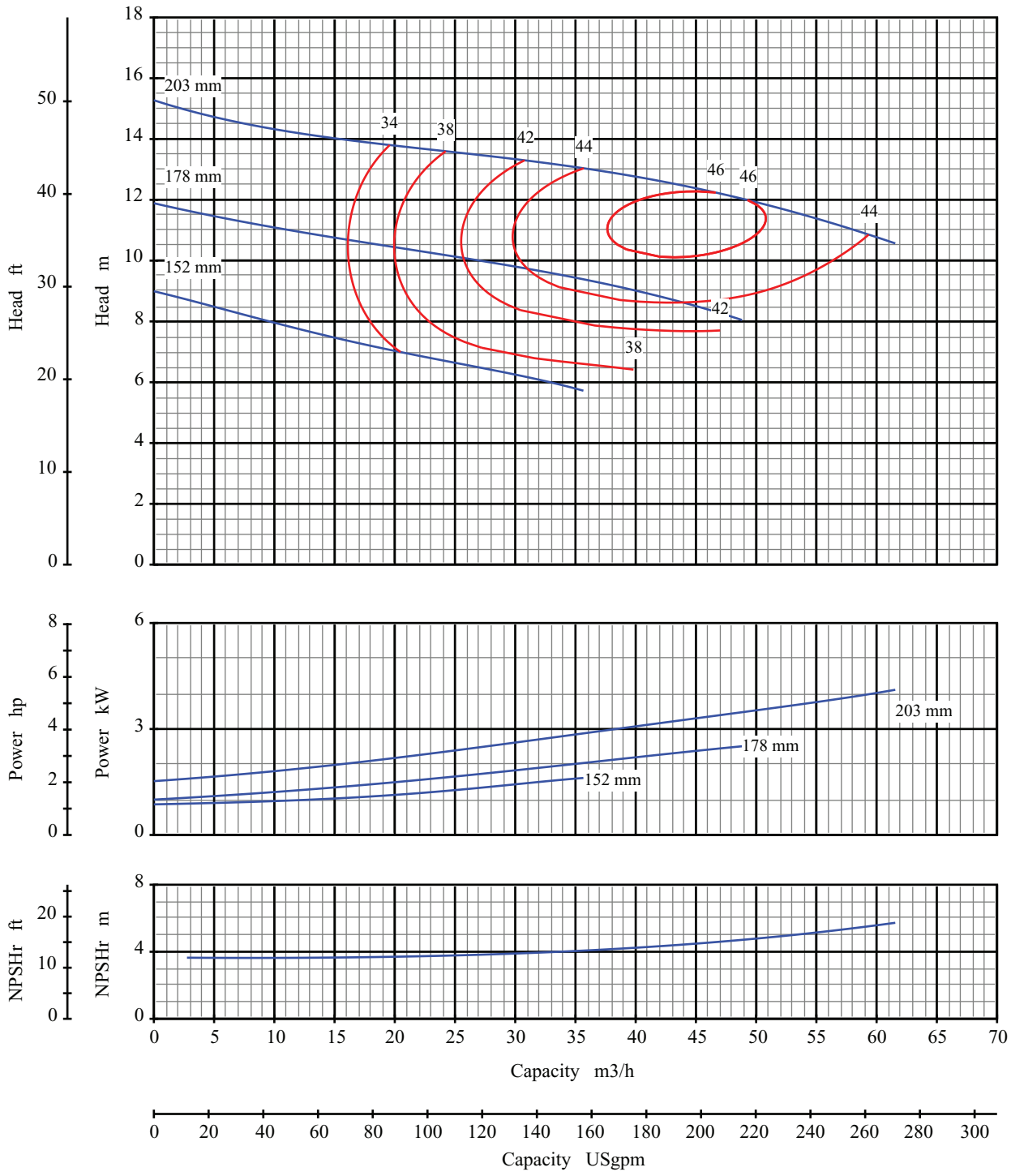
Catalog: 1301

Pump Size: 4x4 12

Pump Size: 100x100 300

Speed: 1150 rpm

Vortex Impeller



Curve No: S17103V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

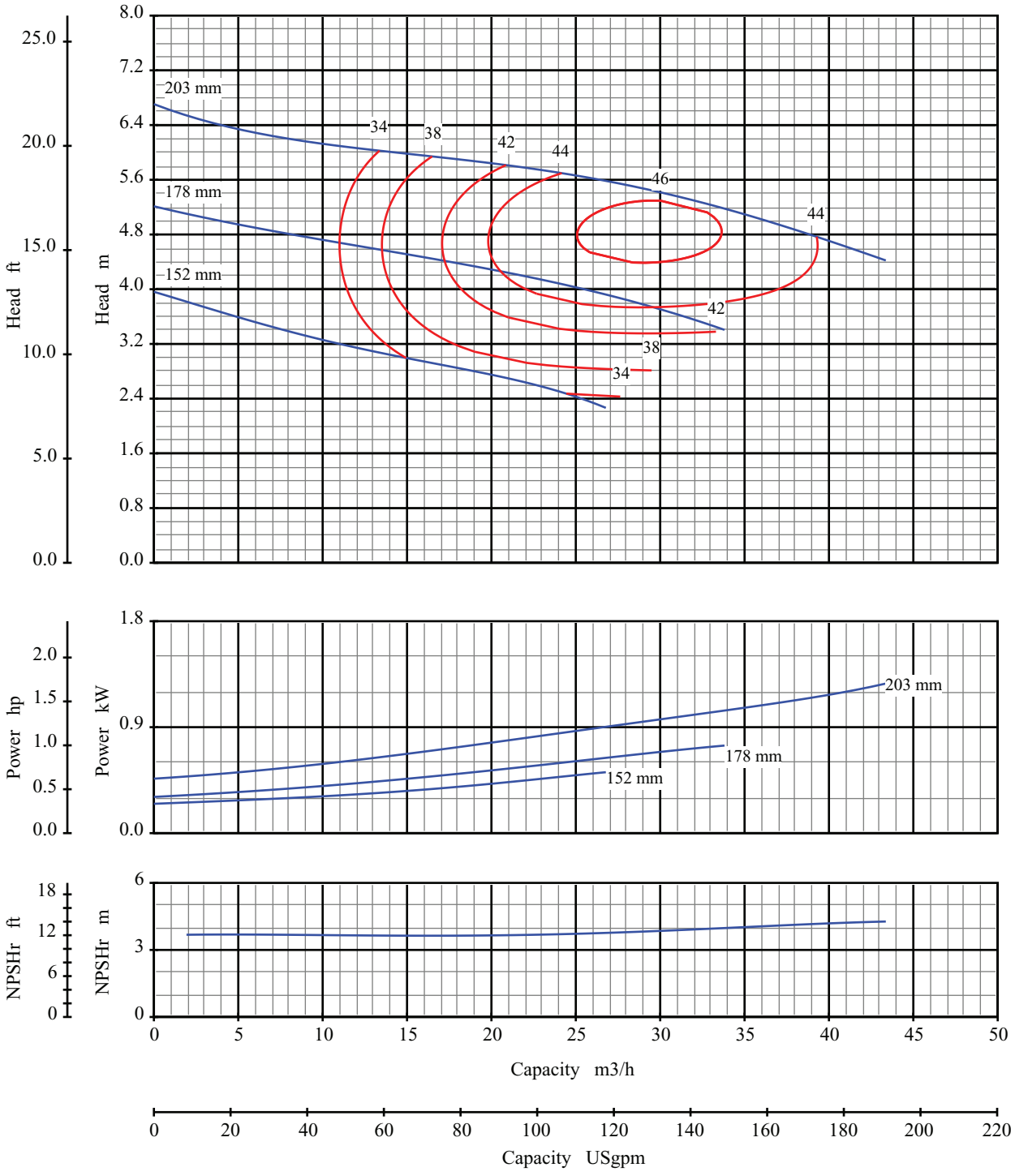
Effective Date: Jan/2005

Pump Size: 50x50 200

Pump Size: 2x2 8

Speed: 1450 rpm

Vortex Impeller



Curve No: S17105V1

Blackmer System One

Pump Performance Characteristics

Effective Date: Jan/2005

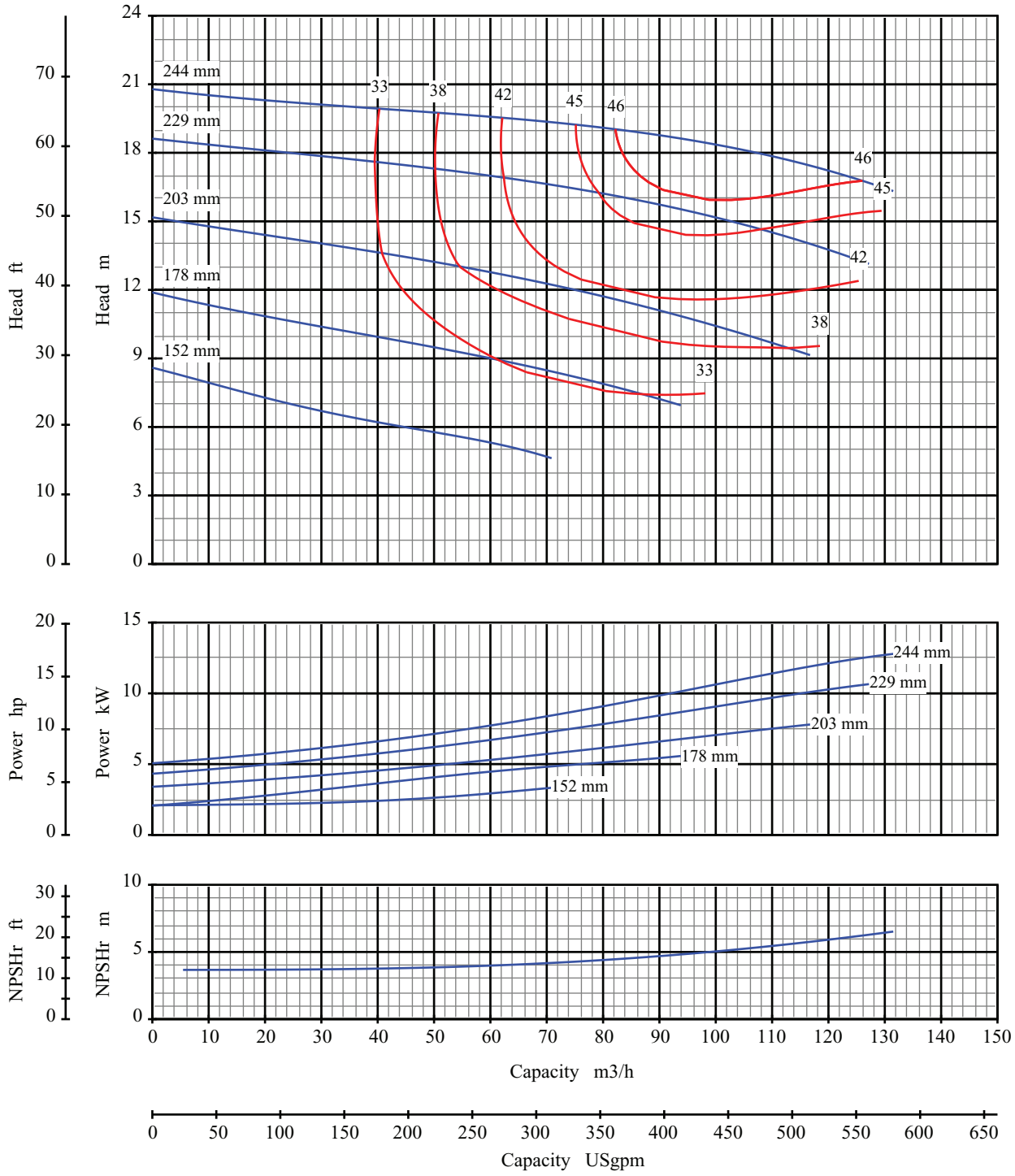
Catalog: 1301

Pump Size: 50x50 200

Pump Size: 2x2 8

Speed: 960 rpm

Vortex Impeller



Curve No: S17109V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

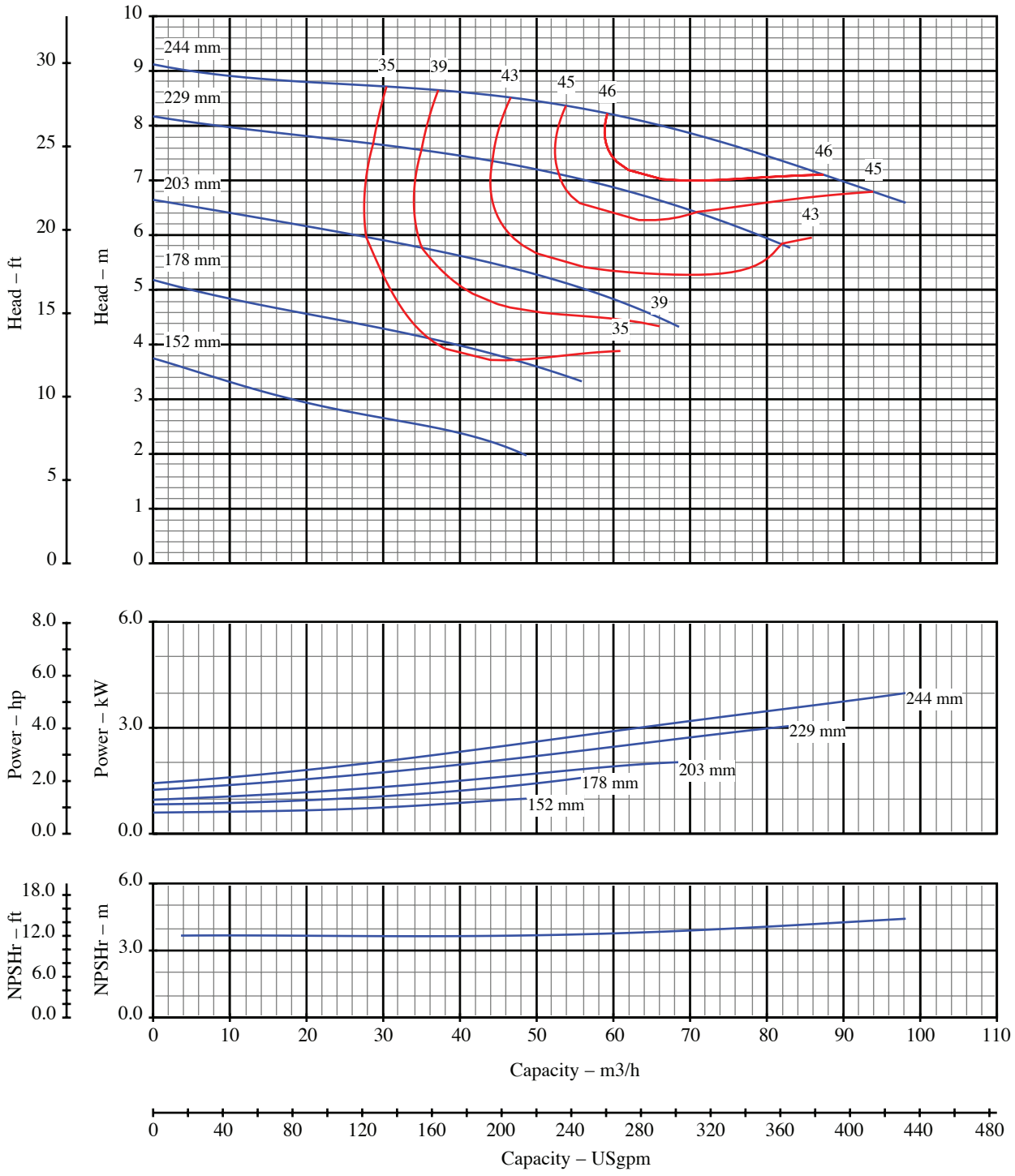
Effective Date: Jan/2005

Pump Size: 80x80 250

Pump Size: 3x3 10

Speed: 1450 rpm

Vortex Impeller



Curve No: S17111V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

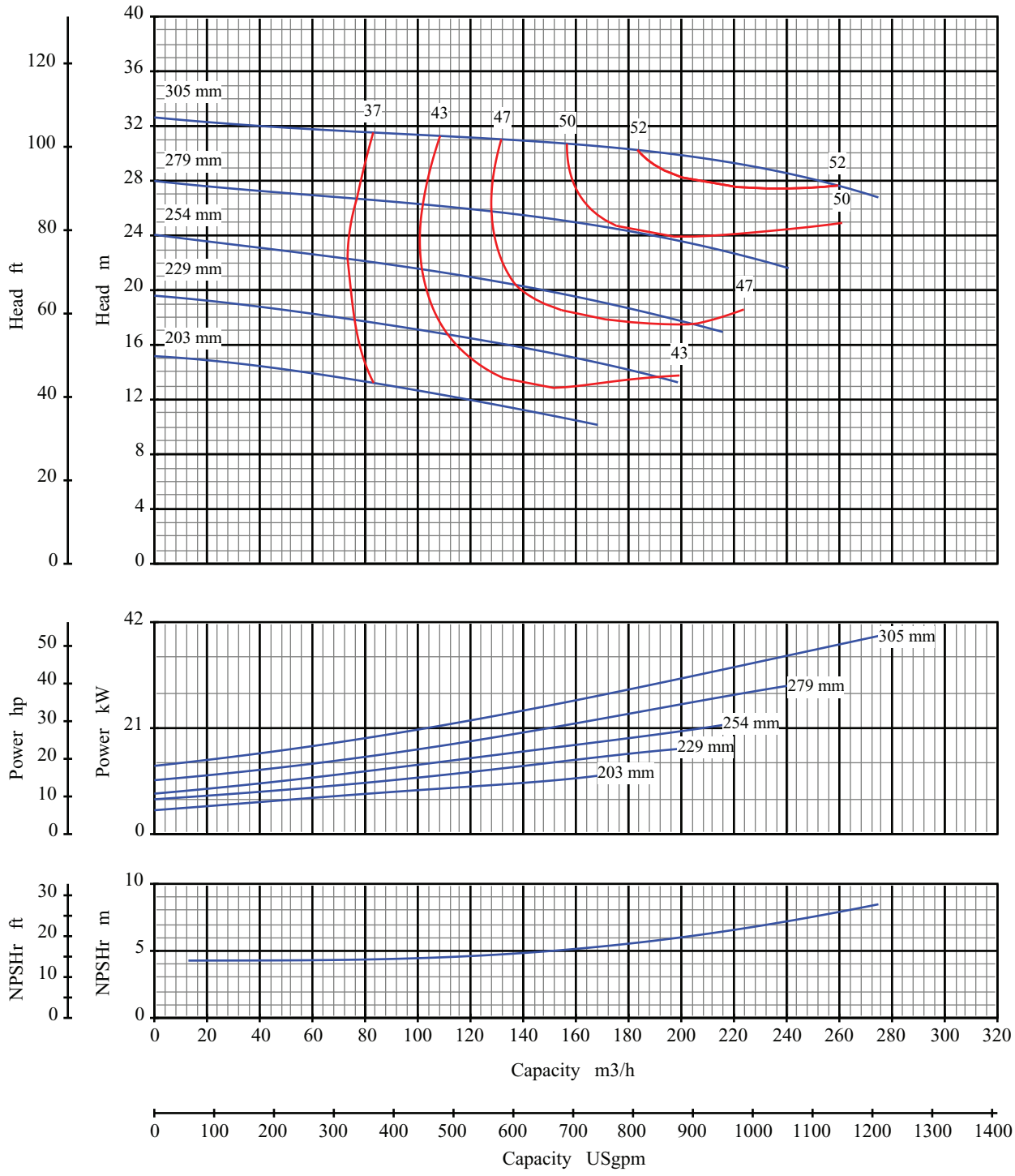
Catalog: 1301

Pump Size: 80x80–250

Pump Size: 3x3–10

Speed: 960 rpm

Vortex Impeller



Curve No: S17115V1

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

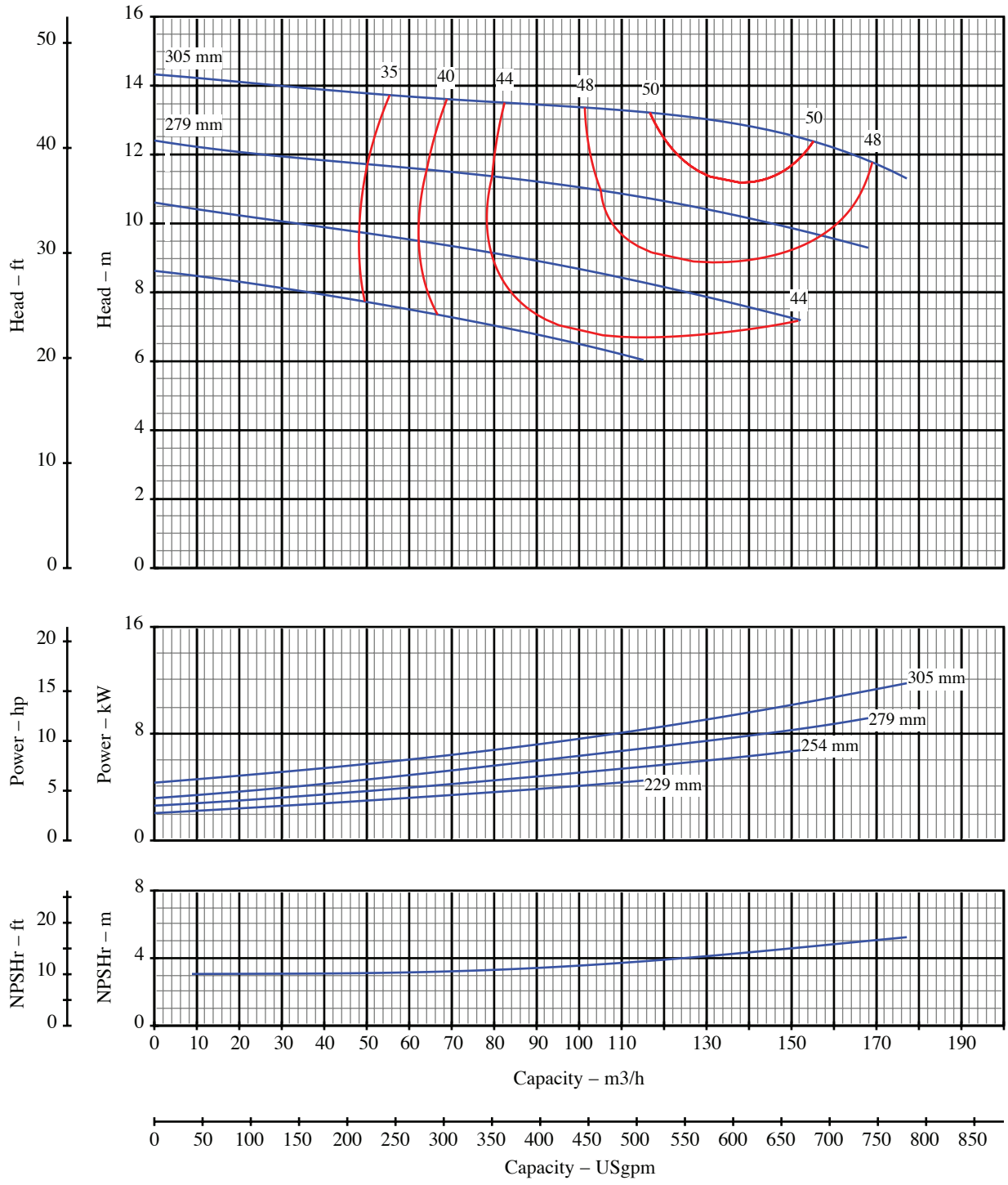
Effective Date: Jan/2005

Pump Size: 100x100 300

Pump Size: 4x4 12

Speed: 1450 rpm

Vortex Impeller



Curve No: S17117V1

Effective Date: Jan/2005

Blackmer System One

Pump Performance Characteristics

Catalog: 1301

Pump Size: 100x100–300

Pump Size: 4x4–12

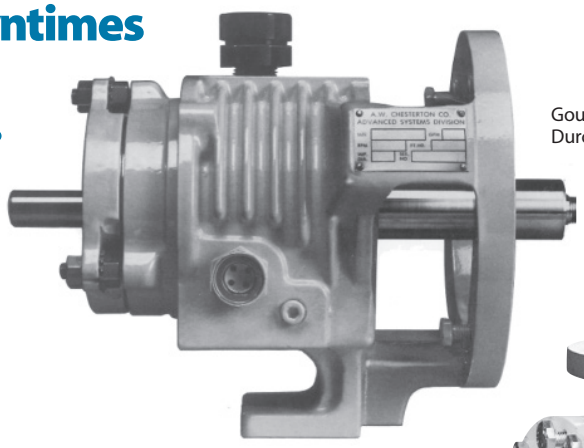
Speed: 960 rpm

Vortex Impeller

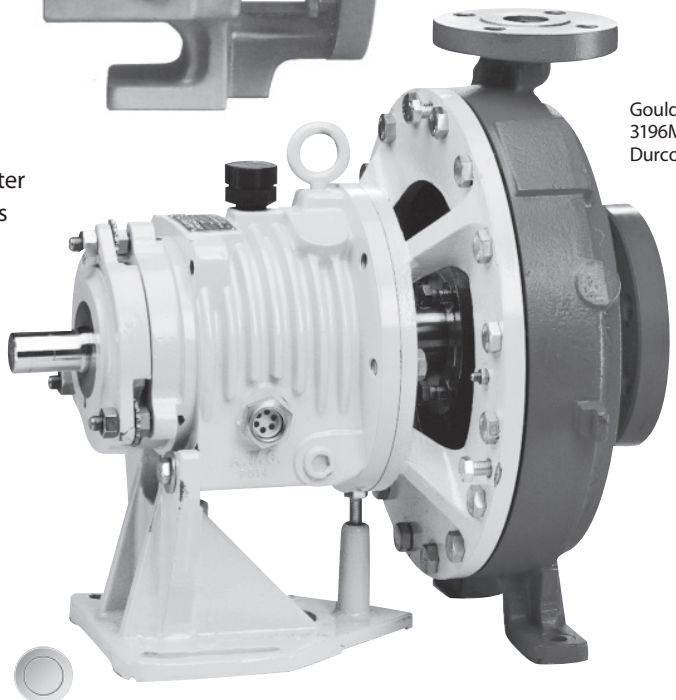
System One® Heavy-Duty Power End Upgrades - Advantages

4 out of 5 pump downtimes are caused by seal and bearing failures.

The System One LD Power End is designed specifically to eliminate the root causes of these failures.



Goulds[1] 3196ST
Durco[2] MII G I

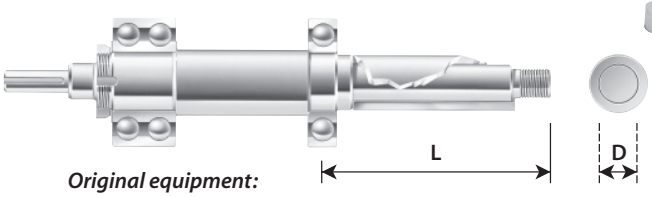


Goulds
3196MT
Durco MII G II

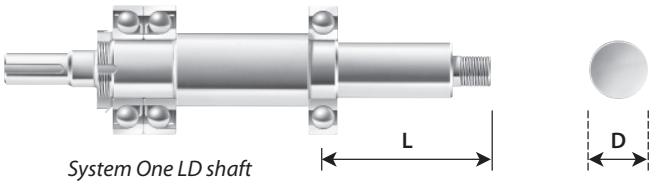
Stronger shaft, greater resistance to damaging vibration

Existing shafts with sleeves have a relatively small diameter and long overhang, resulting in a poor L^3/D^4 ratio. Unless conditions are perfect, the weak, slender shaft will bend under stress, causing vibration along its entire length. Shaft vibration hammers the mechanical seal and bearings, causing premature failures.

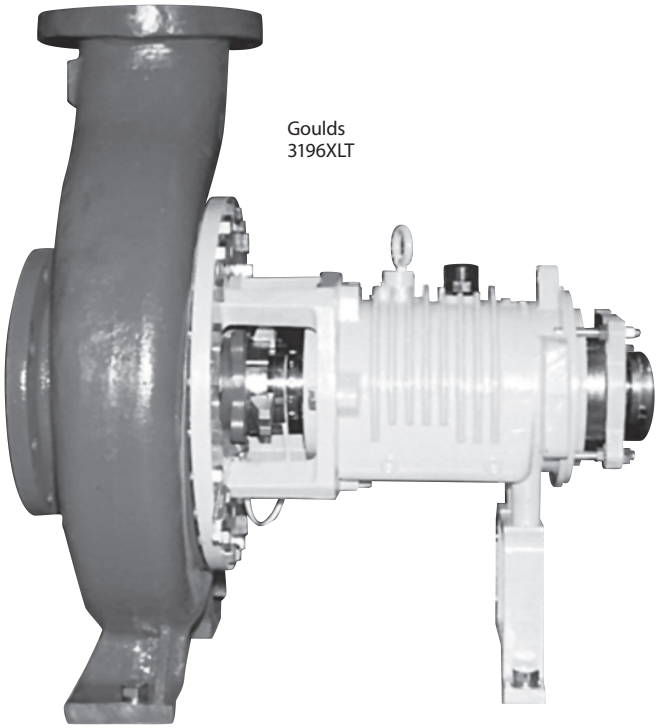
Converting to the LD Power End increases resistance to vibration by up to 5 times compared to original equipment. Seals and bearings are protected, even when the pump is running off the BEP, or subject to pipe strain or other external stresses.



Original equipment:
high L^3/D^4 equals high vibration.



System One LD shaft
has the lowest L^3/D^4 ratio in the industry.



Goulds
3196XLT

LD Power End Upgrades are available today for the following popular ANSI pumps

- ***Goulds ST***
- ***Goulds 3196MT***
- ***Goulds XLT***
- ***Durco MII G I***
- ***Durco MII G II***

[1]Goulds is a registered trademark.
[2]Durco is a registered trademark.

System One® Heavy-Duty Power End Upgrades - Advantages

L^3/D^4 and bearing Comparison

	System One Frame S	Goulds ST[1]	Durco GI[2]	System One Frame A Power End Conversion	Goulds MT[1]	Durco GII[2]	System One Frame M	Goulds XLT[1]
L^3D^4 without sleeve	46 (1.9)	64 (2.5)	127 (4.4)	23 Gld/18 Dur (0.9/0.7)	62 (2.3)	37 (1.7)	19 (.72)	25 (.94)
L^3D^4 with sleeve	N/A	143 (4.5)	346 (14.3)	N/A	116 (4.4)	65 (2.5)	N/A	61 (2.3)
bearings: radial	6308	6207	6206,7	6310	6309	6310	6314	313
bearings: thrust	5308	5306	5305,6	7310(2)	5309	5310	7314(2)	5313
shaft diameter at seal	1.500 (38)	1.375 (35)	1.125 (29)	1.875 (48)	1.750 (45)	1.875 (48)	2.625 (67)	2.50 (64)

System One LD Power End Conversions are also available as a "universal" version that allows adaptation to many existing process pumps. Universal frame adapters are available to retrofit various configurations.

Stronger shaft resists damaging vibration

The System One LD power ends increase resistance to deflection and vibration. With a solid shaft (no sleeve) and shorter overhang, System One pumps offer the lowest LD ratio in the industry and are especially suited for maximizing seal/bearing life and operation off the BEP.

Quality motor alignments

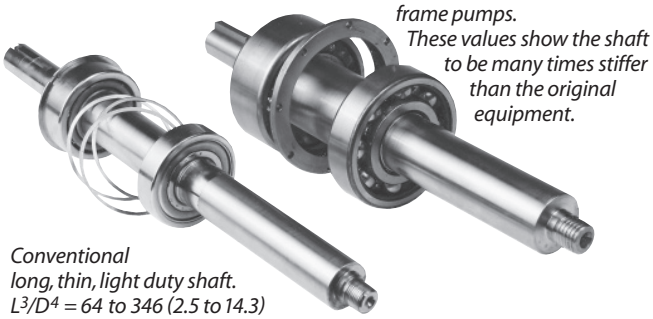
The System One LD power end features C-frame motor adapter capability that provides precise alignment for quick and repeatable motor mounting and eliminates vibration. And, skill level, temperature concerns, and time constraints are all eliminated with the simplified motor mounting.

Improved seal environment

The System One large volume seal chamber has an increased volume for enhanced cooling, cleaning, and seal lubrication. The first process pump manufacturer to offer large bore seal chambers as standard equipment.

Superior bearing protection

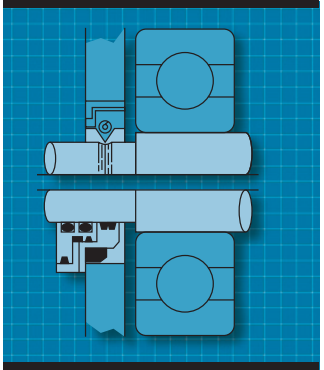
System One Labyrinth seals provide lifetime, non-wearing protection against contaminants that can decrease bearing life. The seals replace short-lived and shaft-damaging rubber lip seals. In addition, pressure tight face seals are available for moisture-laden environments or immersion.



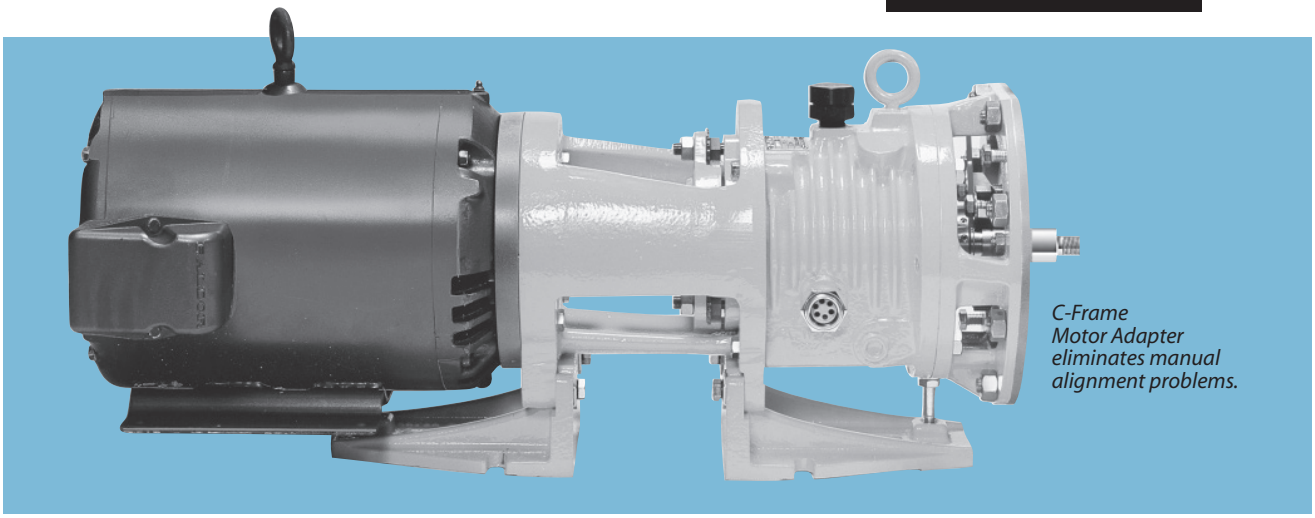
System One Upgrade shaft. L^3/D^4 = 46 (1.9) for small frame pumps. L^3/D^4 = 18 to 23 (0.7 to 0.9) for medium frame pumps. These values show the shaft to be many times stiffer than the original equipment.

Conventional long, thin, light duty shaft. L^3/D^4 = 64 to 346 (2.5 to 14.3) for small frame pumps. L^3/D^4 = 38 to 116 (1.7 to 4.4) for medium frame pumps.

***Top:** Lip seals damage shafts and lose effectiveness rapidly.*



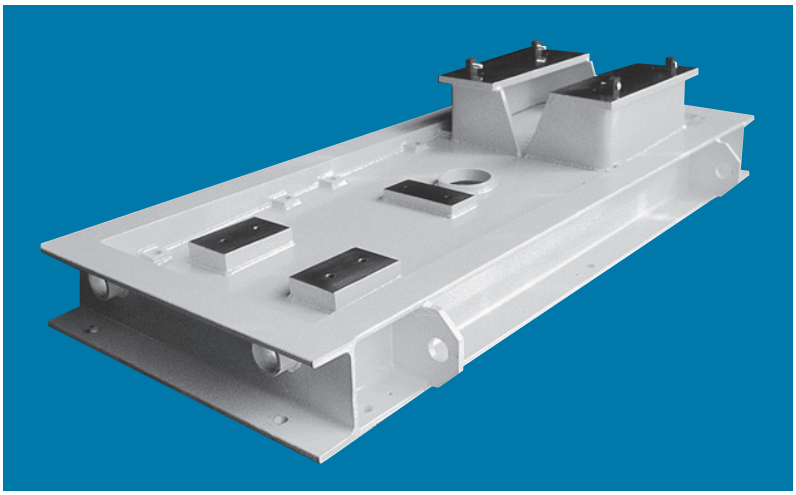
***Bottom:** Long term effective Labyrinth seal protection is standard on the LD Power End.*



C-Frame Motor Adapter eliminates manual alignment problems.

System One Pumps
Baseplates

Specialized baseplates available for all Blackmer System One Pumps



PIP Type Base – boxed ends, lifting lugs and sloped top with drain

Types Offered:

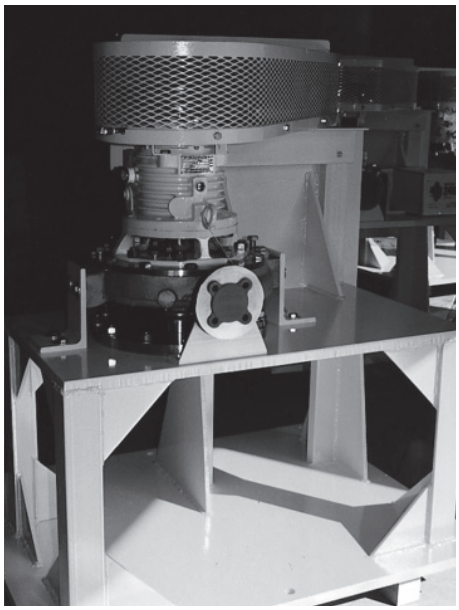
Standard System One steel channel
P.I.P. specification RESP002
Per Customer specific requirements

Options available:

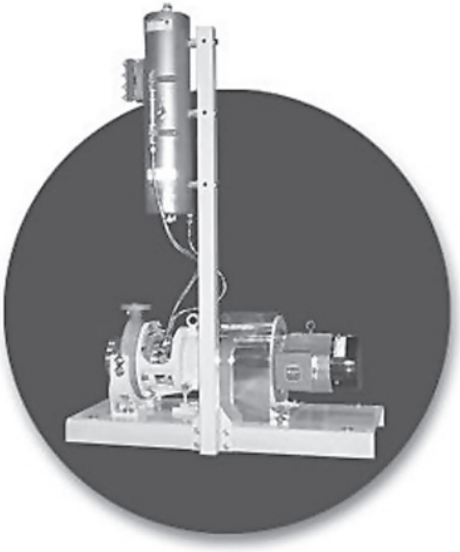
- Drip rim with drain
- Boxed ends
- Sloped base
- Leveling screws
- Grout holes - Vent holes
- Motor adjusting jacks
- Lifting lugs

Materials:

- Carbon Steel
- 304 or 316 Stainless Steel
- Galvanized Steel



Standard System One Pump mounted on a Vertical Stand for "V" Belt Drive



System One Pump on standard steel channel base with barrier fluid tank support stand

System One SpiralTrac[1] Seal Chamber Bushings

Innovative Technology for Improvement of the Seal Environment

SpiralTrac is a specially designed bushing that is inserted in the bottom of a seal chamber (or stuffing box if a packed pump) and is made from 316SS, 416SS, carbon graphite or PTFE material.

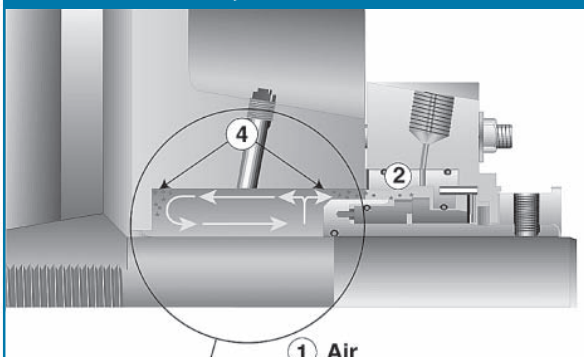
The SpiralTrac is designed to improve the operating environment for the mechanical seal through the use of a variable geometry spiral grooving system.

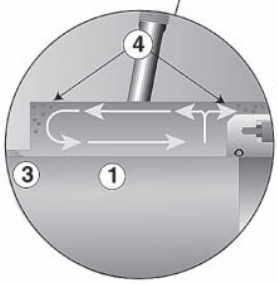
During operation, SpiralTrac converts the rotating flow to an axial flow in the seal cavity and drives it away from the seal toward the impeller.

- The contaminants are swept by centrifugal force toward the SpiralTrac and into the groove where the main spiral forces the contaminants out through the exit groove at the shaft.
- SpiralTrac contains a unique air vent in the top of the bushing to purge air on initial pump flooding.
- If the product is aerated or the pump runs dry, an external flush, a single seal with a quench, or a double seal is required.

SpiralTrac enables venting of the seal chamber, drives circulation and exchange of fluid, and removes abrasives or contaminants.

Seal Cavity *Without* SpiralTrac





1 Air
Air is trapped in cavity upon flooding of pump

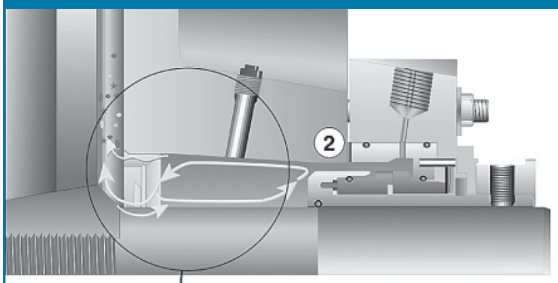
2 Circulation
No circulation around seal (No face cooling)

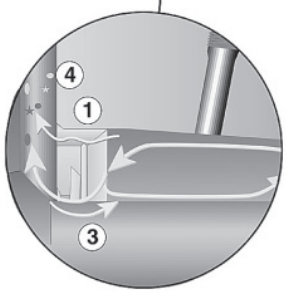
3 Exchange
No fluid exchange in or out of the seal cavity causing higher operating temperatures

4 Particulate
Thrown outward and driven to the seal and throat area by axial flow causing erosion and damage to the seal faces

***No* Environmental Control**

Seal Cavity *With* SpiralTrac





SpiralTrac Version N Type I

1 Air
Vented from cavity when pump is stationary (Eliminates crystallization, coking, over heating due to air)

2 Circulation
Driven around seal (Excellent face cooling)

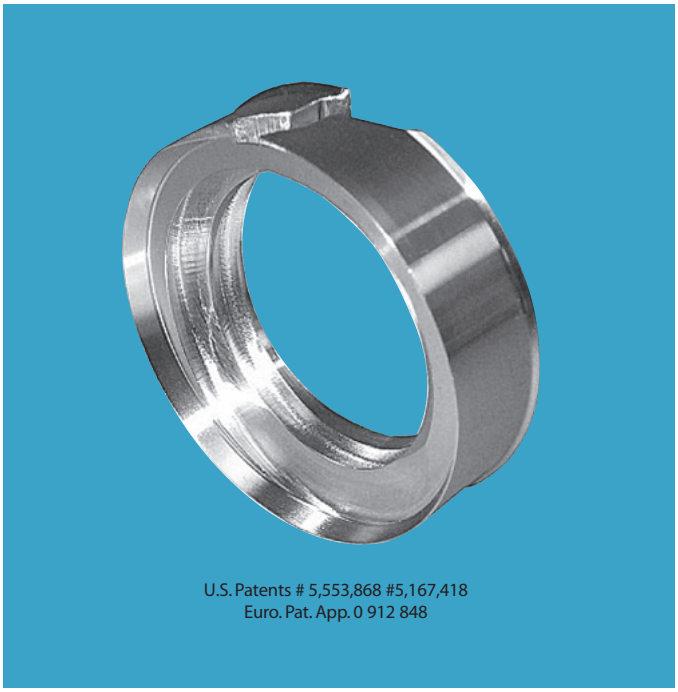
3 Exchange
In and out of cavity (Heat removed from cavity)

4 Particulate
Immediately removed from cavity through the exit groove-flush or no flush

***Total* Environmental Control**

[1] SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd.,Waverly, Nova Scotia.

System One SpiralTrac[1] Benefits



U.S. Patents # 5,553,868 #5,167,418
Euro. Pat. App. 0 912 848

Increases Seal MTBF
By preventing accumulation of solids in the cavity, circulating fluid around the seal, exchanging internal cleaned flush and venting the cavity when the pump is stationary.

Decreases or eliminates flush
Spiraltrac's patented design permits users to greatly reduce or eliminate flush in many standard process applications. Complete elimination of flush is dependent on the type of application and mechanical seal specified. Please check with the factory to determine the application's suitability for total flush elimination.

Eliminates seal and cavity erosion
In most mill and mining services, the flush itself contains solids from pipe scale, silt or settling ponds. This dirt is injected with the flush and due to flow patterns within the seal cavity, causes premature wear of the seal and cavity itself.
SpiralTrac develops a flow pattern whereby solids are drawn towards the front of the box, and subsequentially channeled through the exit groove of the device and expelled at the impeller. This same phenomenon also significantly reduces erosion of the shaft.

Reduces seal cavity sensitivity to flush pressure loss
In a standard seal cavity, if flush pressure is lost for a period of time, solids will enter the cavity. Once inside the cavity, centrifugal force will throw the solids to the bore, and even when the flush returns, it cannot push the solids out because they are trapped along the bore. With SpiralTrac installed, solids are continuously removed even if flush pressure is lost. Since solids are kept away from the seal, premature failure as a result should not occur.

Enables seals to operate in applications not possible before
Many customers have had poor results using mechanical seals because of high solids / fibre content in the process fluid. These solids get in around the seal area, de-water and consequently cause the seal to overheat and fail. SpiralTrac's inherent ability to remove solids / fibres from around the seal allows many of the applications to become successful.

Protects single or double seals
Solids will enter the seal cavity whether or not a single or double seal is installed. SpiralTrac will develop a flow to remove these solids regardless of the seal design.

The SpiralTrac offers a dramatic improvement of mechanical seal life over a broad range of applications and operating conditions.

These devices can be designed to operate with reduced or no flush in both fibrous and non-fibrous applications.

SpiralTrac significantly improves mechanical seal MTBF over a conventional seal operating alone.

[1] SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd., Waverly, Nova Scotia.

System One SpiralTrac[1] Environmental Controller & Throat Bushing Selection Chart

SpiralTrac	Frame S	Durco[2] MK II GR I Goulds[3] ST BCC	8" Durco[2] MK II GR II Goulds[3] MT BCC	10" & 13" Durco[2] MK II GR II Goulds[3] MT BCC	LD18 Durco[2] SLS LD 23 Goulds[3] SLS
Backcover Counterbore	3.468 x .75	3.468 x .75	4.500 x 1	5.250 x 1	3.468 x .75
SpiralTrac[3] CG/PTFE	1.500 x 3.468	1.375 x 3.468	1.875 x 4.500	1.875 x 5.250	1.875 x 3.468
SpiralTrac 316SS	1.500 x 3.468	1.375 x 3.468	1.875 x 4.500	1.875 x 5.250	1.875 x 3.468
SpiralTrac 416SS	1.500 x 3.468	1.375 x 3.468	1.875 x 4.500	1.875 x 5.250	1.875 x 3.468
SealMate[3] 316SS	1.500 x 3.470	1.375 x 3.470	N/A	N/A	1.875 x 3.470
SealMate Hast C22	1.500 x 3.470	1.375 x 3.470	N/A	N/A	1.875 x 3.470

SpiralTrac	Frame A ANSI	Frame A LD17	Mid Frame	Short Seal Chamber
Backcover Counterbore	3.982 x 1	3.468 x .75	4.125 x .87	Frame A[4] boreBC+SC thru 3.653
SpiralTrac CG/PTFE	1.875 x 3.982	1.875 x 3.468	2.625 x 4.125	
SpiralTrac CG/PTFE		for 280 Seal 2.567 x 3.468		
SpiralTrac 316SS	1.875 x 3.982	1.875 x 3.468	2.625 x 4.125	1.875 x 3.653
SpiralTrac 416SS	1.875 x 3.982	1.875 x 3.468	2.625 x 4.125	
SealMate 316SS	1.875 x 3.984	1.875 x 3.470	N/A	
SealMate Hast C22	1.875 x 3.984	1.875 x 3.470	N/A	

[4] Frame A Short Seal Chamber – 0.6 wide x 3.653/3.659 bore

Throat Bushings	Frame S	Durco M II GR I Goulds ST BCC	Durco M II GR II Goulds MT BCC	LD 18 Durco SLS LD 23 Goulds SLS
Carbon bushings				
Counterbore	2.39 x .35 special machining	consult factory	3.00 x .62 standard	consult factory
Bushing	1.50 x 2.39		1.87/1.75 x 3.00	
14K Bushings[5]				
Counterbore	3.468 x .75 special machining	3.468 x .75 special machining	3.00 x .62 standard	consult factory
14KRB (PTFE)[5] 14KRB2P (poly)	1.500 x 3.468 x .500			

Throat Bushings	Frame A ANSI	Frame LD17	Frame M	
Carbon bushings				
Counterbore	3.25 x .780 standard (incl.)	3.25 x .780 special machining	3.627 x .75 special machining	
Bushing	1.87 x 3.25	1.87 x 3.25	2.63 x 3.62 x .74	
14K Bushings[5]				
Counterbore	3.25 x .780 standard	3.25 x .780 special machining		
14KRB (PTFE)[5] 14KRB2P (poly)	1.890 x 3.235 x .56 1.890 x 3.235 x .56	1.890 x 3.235 x .56 1.890 x 3.235 x .56		

[1] SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd., Waverly, Nova Scotia.

[2] Durco is a registered trademark
[3] Goulds is a registered trademark
[5] Product of A. W. Chesterton Company

System One Pump Accessories

Bearing Oil Temperature Monitors

Early warning helps prevent bearing failures and improve equipment reliability

Increase in oil temperature indicates bearing or lube failure

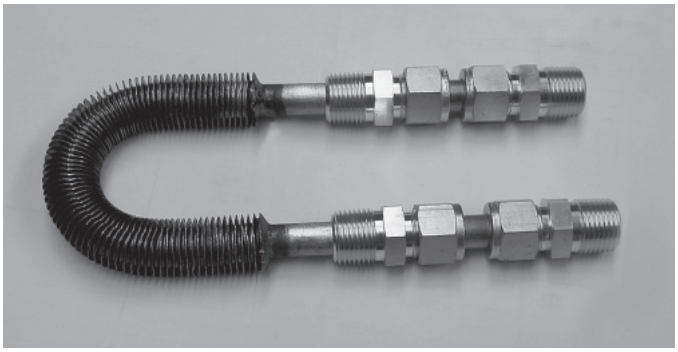
- Constant monitoring of lubrication environment
- Adapts to any type of oil-lubricated machinery by screwing into a 1/4" NPT connection
- Corrosion-resistant, hermetically sealed stainless steel housing
- Polycarbonate lens and easy-to-read color coded dial
- Calibrated in both Fahrenheit and Celsius scales
- Rustproof…Dustproof…Leakproof… Hermetically sealed
- Graduated in both Fahrenheit and Centigrade degrees; accuracy ± 1% total scale range.

Monitor clearly indicates potential failure of bearings and/or lubrication by an increase in oil temperature.

The System One Bearing Oil Temperature Monitor is a simple and effective preventive maintenance tool that improves equipment reliability by the constant monitoring of the lubrication environment. All types of pumps and other oil lubricated machinery will benefit from this product. The device simply screws into any 1/4" NPT connection and instantly registers the temperature of the oil.

To order

Frame S or any 1/4" NPT application – No. 685362.
Frame A & M (with 3/4" x 1/4" reducing bushing) – No. 685361.



Cooling coil with swagelock tube fittings.
Available for Frame S, Frame A, and Frame M pumps. (Frame A shown)

- Required for temperature greater than: 400°F (205°C) @ 1800 RPM (1450 RPM) 300°F (150°C) @ 3600 RPM (2900 RPM).
- More efficient than cast jackets.
- Oil is cooled directly, thus cooling the bearings simultaniously.
- Installed in place of magnetic plugs.

System One Pumps Control Heat Casing Jackets[1]

Full range of heating jackets for Frame S and Frame A Pumps

Jackets are required for applications where liquids must be maintained at a certain temperature or will solidify if cooled. Bolt on system provides thermal performance necessary to meet narrow-envelope processing.

Several recent applications for heating jackets include:

- Maleic anhydride
- Molten sulfur
- Food products
- Polyester resins
- Chlorinated resins
- Waxes
- Calcium chloride
- Coal tars

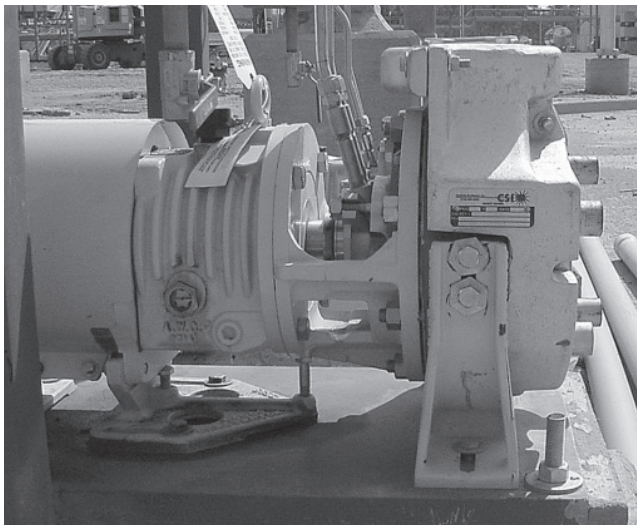
Construction:

- Jackets are made by casting aluminum alloy around steel tubing for connection to the heating liquid.
- Couplings are 3000 lb. 3/4" NPT fittings, 2 on each side.
- Custom designed to fit snugly against the casing walls for each casing size.
- Jackets are split into two sections to allow bolting around the casing.
- Special heat transfer cement is applied between the casing and the jacket to allow for maximum thermal conduction.

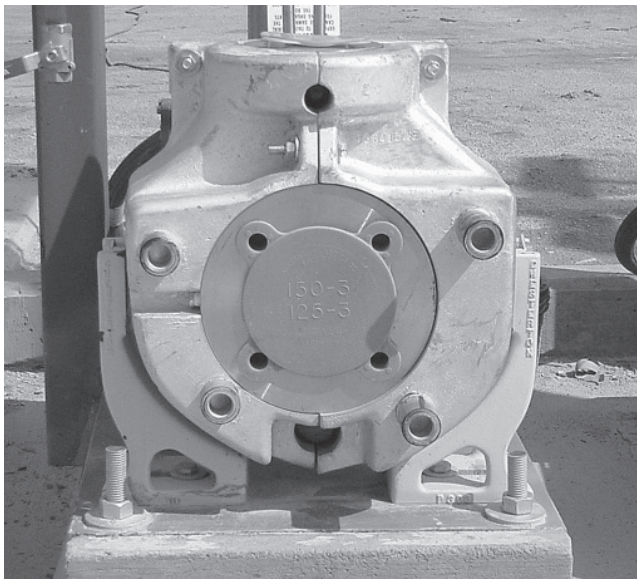
The System One Pump is particularly suited for high temperature operation due to the following design features:

- Centerline casing support
- Bearing frame fins for cooling
- C Frame motor adapter for alignment
- Finned cooling coil in the oil sump
- Jacketed large bore seal chamber

The System One Pump combined with the casing jacket provides the finest and most reliable high temperature pump in the industry today.



Side view of jacket showing clamp to discharge flange. Note piping connections to jacketed seal chamber.



Front view showing 3/4" NPT couplings for connection of steam piping. Jacket is split along vertical axis.

[1] Product of Controls Southeast of Charlotte, NC.

Part Name	# Req. per Pump	Frame S	Frame SD	Frame A & LD17	Frame A & LD17 Vortex	Frame M
Casing	1	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.
Casing Gasket	1	1/16" per Application	1.5 mm per Application	1/16" per Application	1/16" per Application	1/16" per Application
Casing Foot	2	Steel	Cast	D.I./Centerline	D.I./Centerline	Cast (Steel CL option)
Impeller	1	CD4MCu A-20, Hast.	CD4MCu A-20, Hast.	CD4MCu A-20, Hast.	D.I., CD4MCu A-20, Hast.	D.I., CD4MCu A-20, Hast.
Impeller Hub O-Ring Seal	1	PTFE	PTFE	PTFE	PTFE	PTFE
Suction Cover	1	N/A	N/A	N/A	D.I., 316SS CD-4, A-20, Hast.	N/A
Back Cover	1	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.	D.I., 316SS CD-4, A-20, Hast.
Mechanical Seal Assembly	1	Refer to Seal Dwg.	Refer to Seal Dwg.	Refer to Seal Dwg.	Refer to Seal Dwg.	Refer to Seal Dwg.
Shaft – bimetallic standard (Steel w/alloy wetted end)	1	316SS A-20, Hast.	316SS A-20, Hast.	316SS, A-20 17-4 Ph, Hast.	316SS, A-20 17-4 Ph, Hast.	316SS A-20, Hast.
Radial Bearing	1	6308	6308	6310	6310	6314
Thrust Bearing	2 1	5308 7308 (2) (opt.)	7308(2)	7310 (2)	7310 (2)	7314 (2)
Thrust Bearing Locknut	1	Steel N08	Steel KM8	Steel N10	Steel N10	Steel N14
Thrust Bearing Lock Washer	1	Steel W08	Steel MB8	Steel W10	Steel W10	Steel W14
Flinger	1	N/A	N/A	Nylon 66	Nylon 66	Alum
Radial Bearing Oil Seal Laby Thrust Bearing Oil Seal Laby	1 1	316SS	316SS	316SS	316SS	316SS
Thrust Bearing Cartridge	1	D.I.	D.I.	C.I.	C.I.	C.I.
Thrust Bearing Retainer Cover	1	Steel	Steel	Steel	Steel	Steel
Thrust Bearing Cartridge O-Ring	1	Buna	Buna	Buna	Buna	Buna
Bearing Frame	1	C.I.	C.I.	C.I.	C.I.	C.I.
Bearing Frame Foot	1	C.I. option	N/A	C.I.	C.I.	C.I.
Oil Sight Glass	1	Steel-Zinc Plated	Steel-Zinc Plated	Steel-Zinc Plated	Steel-Zinc Plated	Steel-Zinc Plated
Frame Adaptor and O-Ring	1	N/A	N/A	D.I./C.I. Buna	D.I./C.I. Buna	D.I. Buna
Micrometer Adjustment Nut	3	304SS	304SS	304SS	304SS	304SS
Cartridge Stud	3	304SS	304SS	304SS	304SS	304SS
Cartridge Locknut	3	304SS	304SS	304SS	304SS	304SS
Oil Filler and Cap	1	Nylon 66	Nylon 66	Nylon 66	Nylon 66	Nylon 66
C-Frame Motor Adaptor	1	C.I.	C.I.	C.I.	C.I.	C.I.

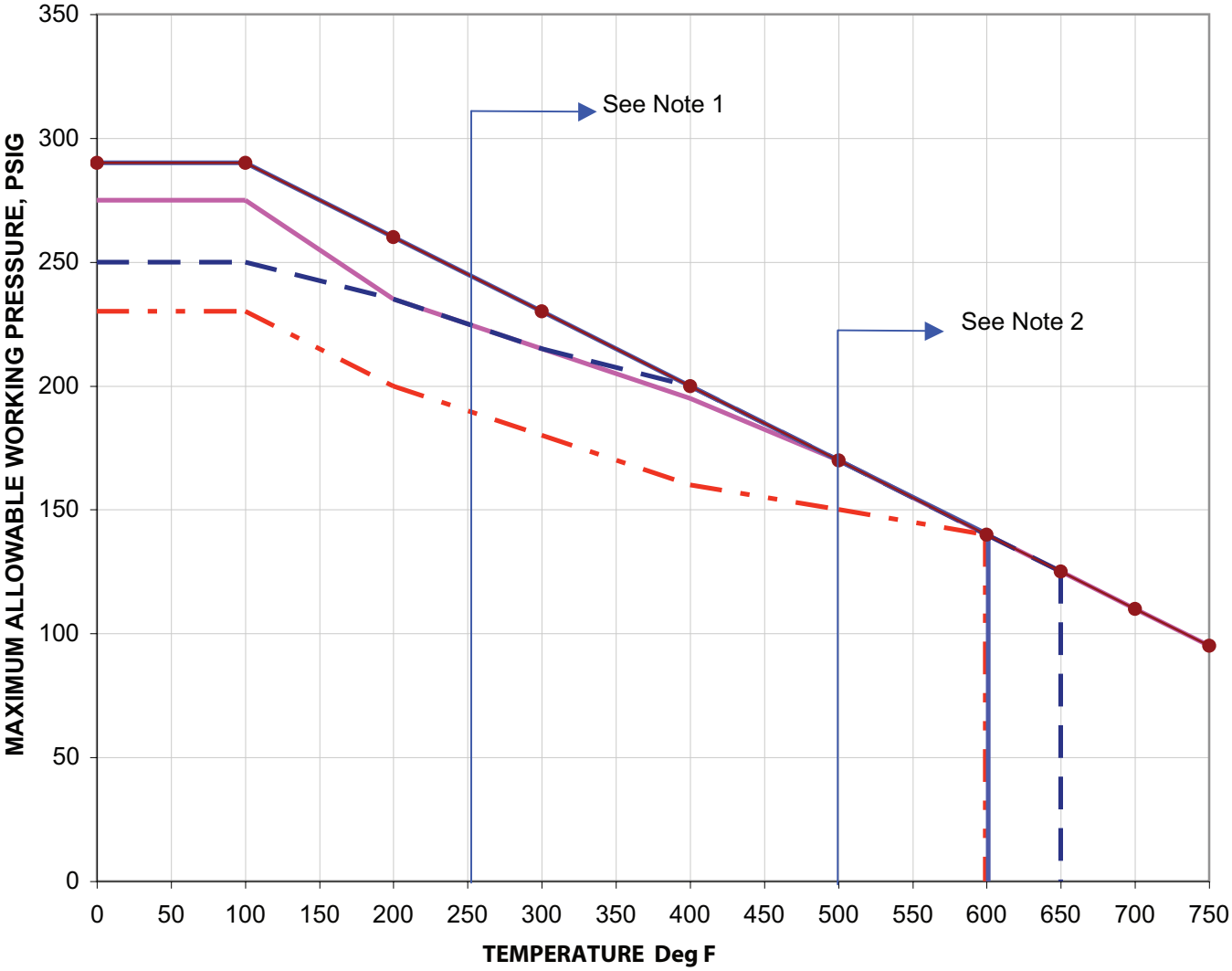
Material and equivalent ASTM: A-20 Grade CN7M, ASTM A-743; 316SS Grade CF8M, ASTM A-743; CD4MCu, ASTM A-743; Shaft, Steel portion, AISI 1018/316SS, ASTM A-276; Shaft 17-4 Ph, ASTM A-276; D.I. Ductile Iron, ASTM A-536; C.I. Cast Iron, ASTM A-48, CL 35.

System One® Heavy-Duty Process Pumps - Interchangeability Chart

Motor Adaptor	Power End	Back Cover	Impeller Open	Casing	Pump Size ASME/ANSI	Pump Size IPP
Frame S ASME/ANSI					1 x 1½ – 6	N/A
					2 x 3 – 6	N/A
					1 x 1½ – 8	N/A
					1½ x 3 – 8	N/A
Frame SD DIN					N/A	32 x 50 – 160
					N/A	32 x 50 – 200
					N/A	50 x 80 – 200
Frame A ASME/ANSI					2 x 3 – 8	50 x 80 – 200
					3 x 4 – 8	80 x 100 – 200
					2 x 2 – 8 Vortex	50 x 50 – 200
					1 x 2 – 10	25 x 50 – 250
					1½ x 3 – 10	40 x 80 – 250
					2 x 3 – 10	50 x 80 – 250
					3 x 4 – 10	80 x 100 – 250
					4 x 6 – 10	100 x 150 – 250
					3 x 3 – 10 Vortex	80 x 80 – 250
LD17					1½ x 3 – 13	40 x 80 – 330
					2 x 3 – 13	50 x 80 – 330
					3 x 4 – 13	80 x 100 – 330
					4 x 6 – 13	100 x 150 – 330
					4 x 4 – 12 Vortex	100 x 100 – 300
Frame M					6 x 8 – 13	Check with factory
					8 x 10 – 13	Check with factory
					6 x 8 – 15	Check with factory
					8 x 10 – 15	Check with factory

System One® Pumps - ANSI Pressure/Temperature Limits

For Pumps with standard 150 lb. flanges (all sizes).



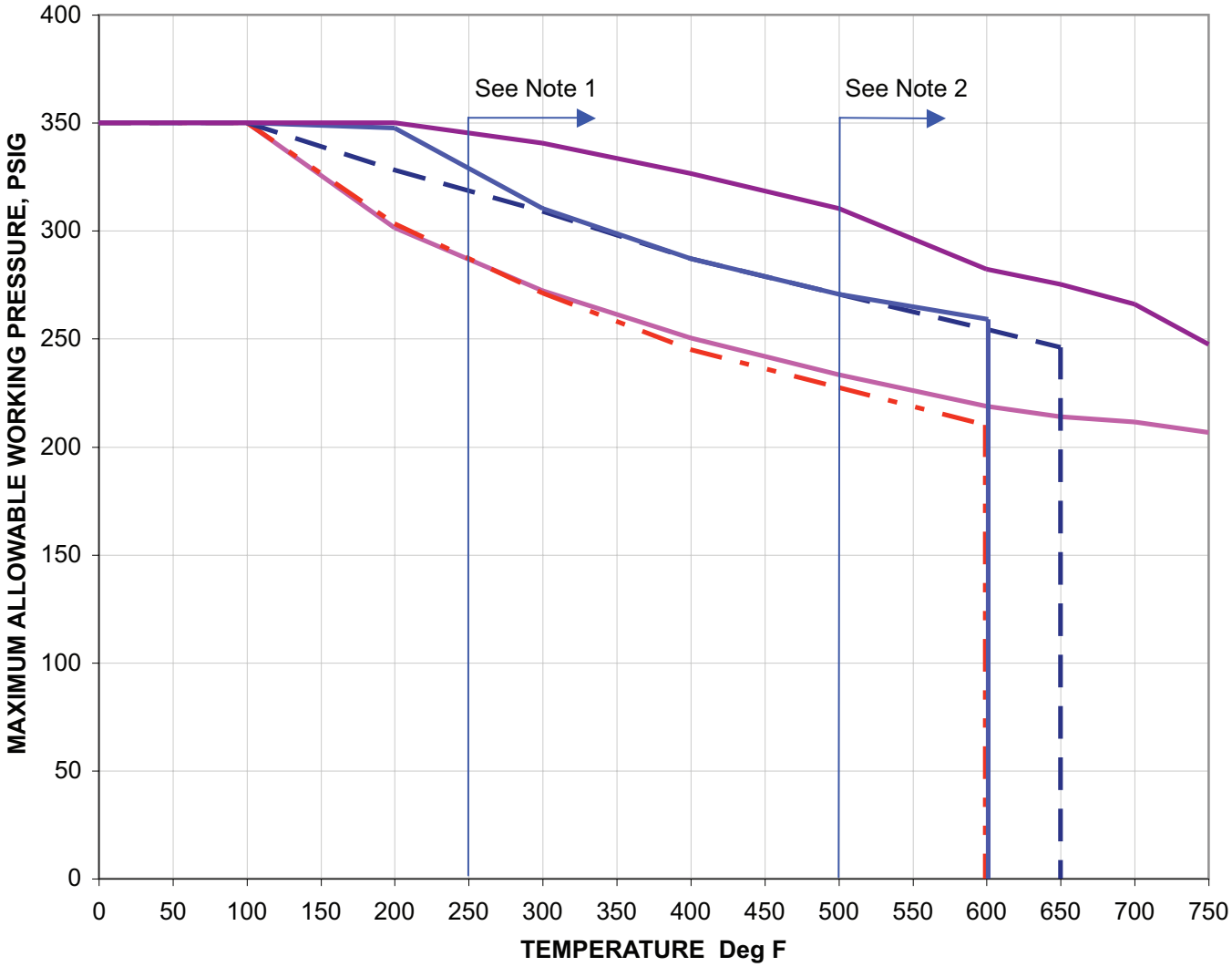
316SS
Alloy 20
DI 60-40-18
CD4MCu
Hastelloy B & C

Notes:

1) Center Line Mount Only.
2) Frame A (excluding LD17) and Frame M units only.

Warning : A pump or pump component used under the jurisdiction of the ASME Boiler & Pressure Vessel Code, the ASME Code for Piping, or Governmental Regulations is subject to any limitation of that code or regulation. This may include maximum temperature and/or pressure limitations, rules governing use of material at low temperature and restrictions on fluids or gases permitted to be contained by the pump material. The limitations defined in the chart provide application guidelines only and offer no guarantee that all applicable codes and regulations are met in any given application.

FRS 6", 8" & 10" with 300 LB Flanges.
FRA/LD17 6", 8" & 10" with 300 LB Flanges.
FRM 13" with 300 LB Flanges.



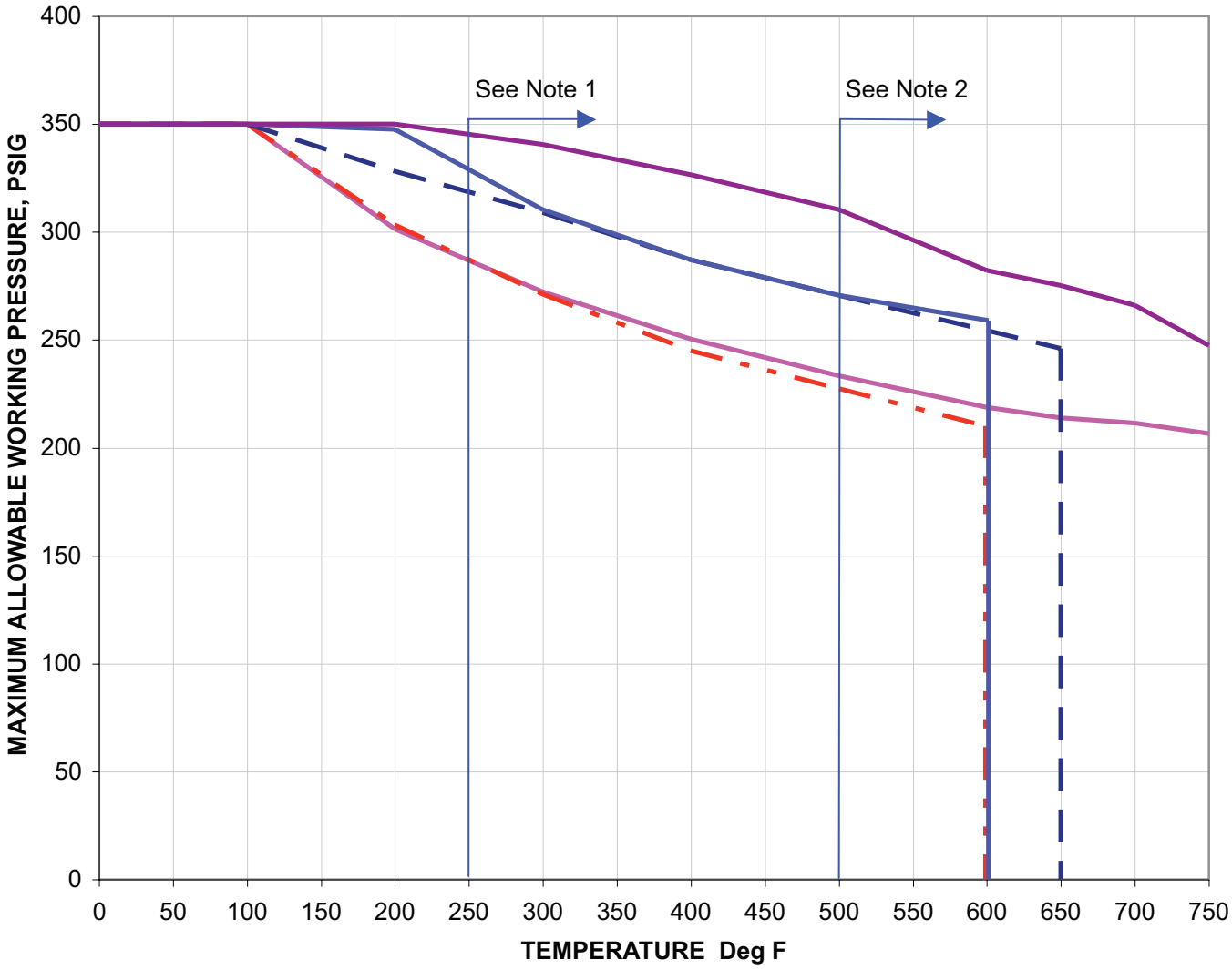
Notes:

1) Center Line Mount Only.

2) Frame A(excluding LD17) and Frame M units only.

Warning : A pump or pump component used under the jurisdiction of the ASME Boiler & Pressure Vessel Code, the ASME Code for Piping, or Governmental Regulations is subject to any limitation of that code or regulation. This may include maximum temperature and/or pressure limitations, rules governing use of material at low temperature and restrictions on fluids or gases permitted to be contained by the pump material. The limitations defined in the chart provide application guidelines only and offer no guarantee that all applicable codes and regulations are met in any given application.

FRA/LDI7 13" with 300 LB Flanges.
FRM 15" with 300 LB Flanges.



316SS
Alloy 20
DI 60-40-18
CD4MCu
Hastelloy B & C

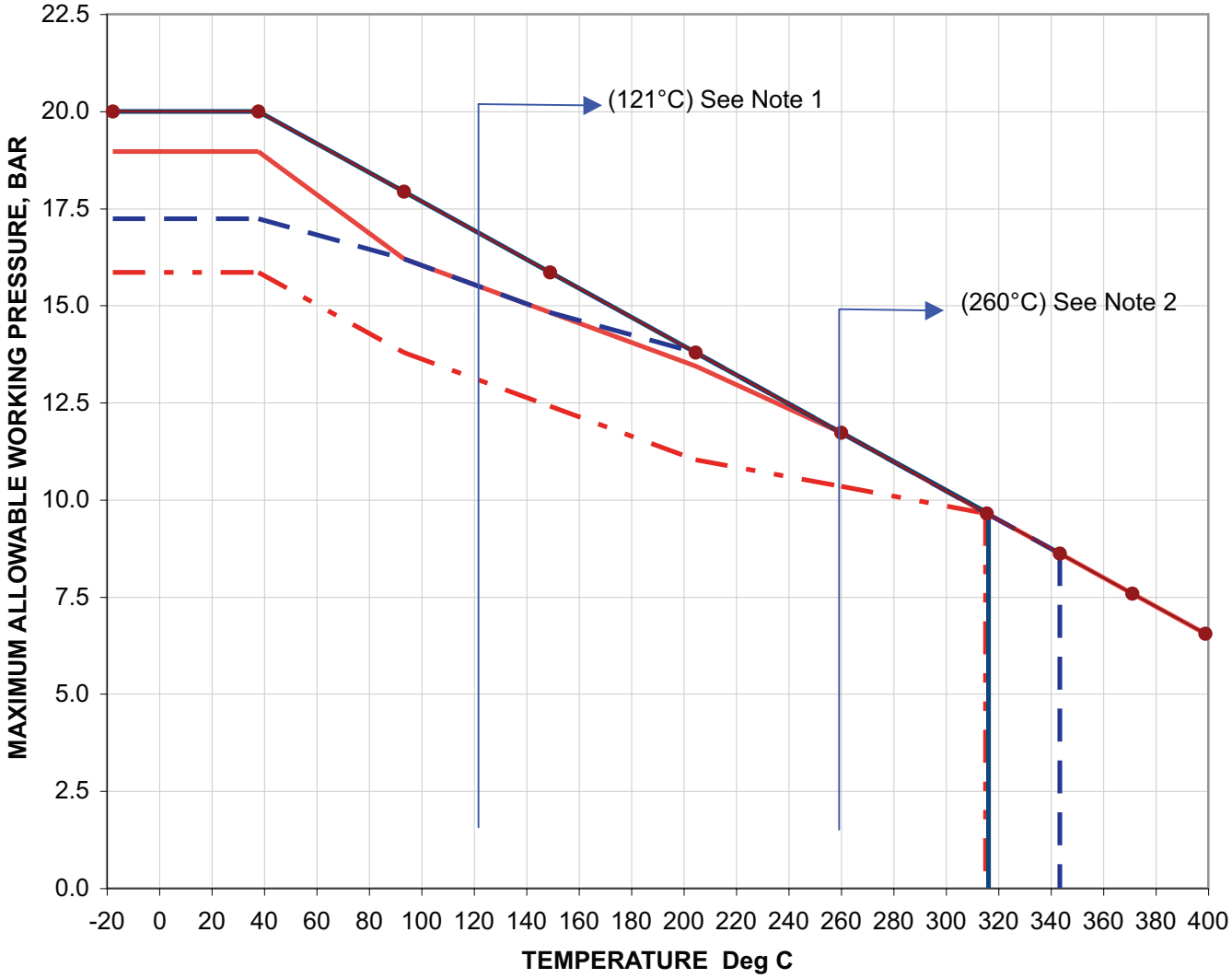
Notes:

1) Center Line Mount Only.
2) Frame A(excluding LD17) and Frame M units only.

Warning : A pump or pump component used under the jurisdiction of the ASME Boiler & Pressure Vessel Code, the ASME Code for Piping, or Governmental Regulations is subject to any limitation of that code or regulation. This may include maximum temperature and/or pressure limitations, rules governing use of material at low temperature and restrictions on fluids or gases permitted to be contained by the pump material. The limitations defined in the chart provide application guidelines only and offer no guarantee that all applicable codes and regulations are met in any given application.

System One® Pumps - Metric Pressure/Temperature Limits

For Pumps with standard 150 lb. flanges (all sizes).

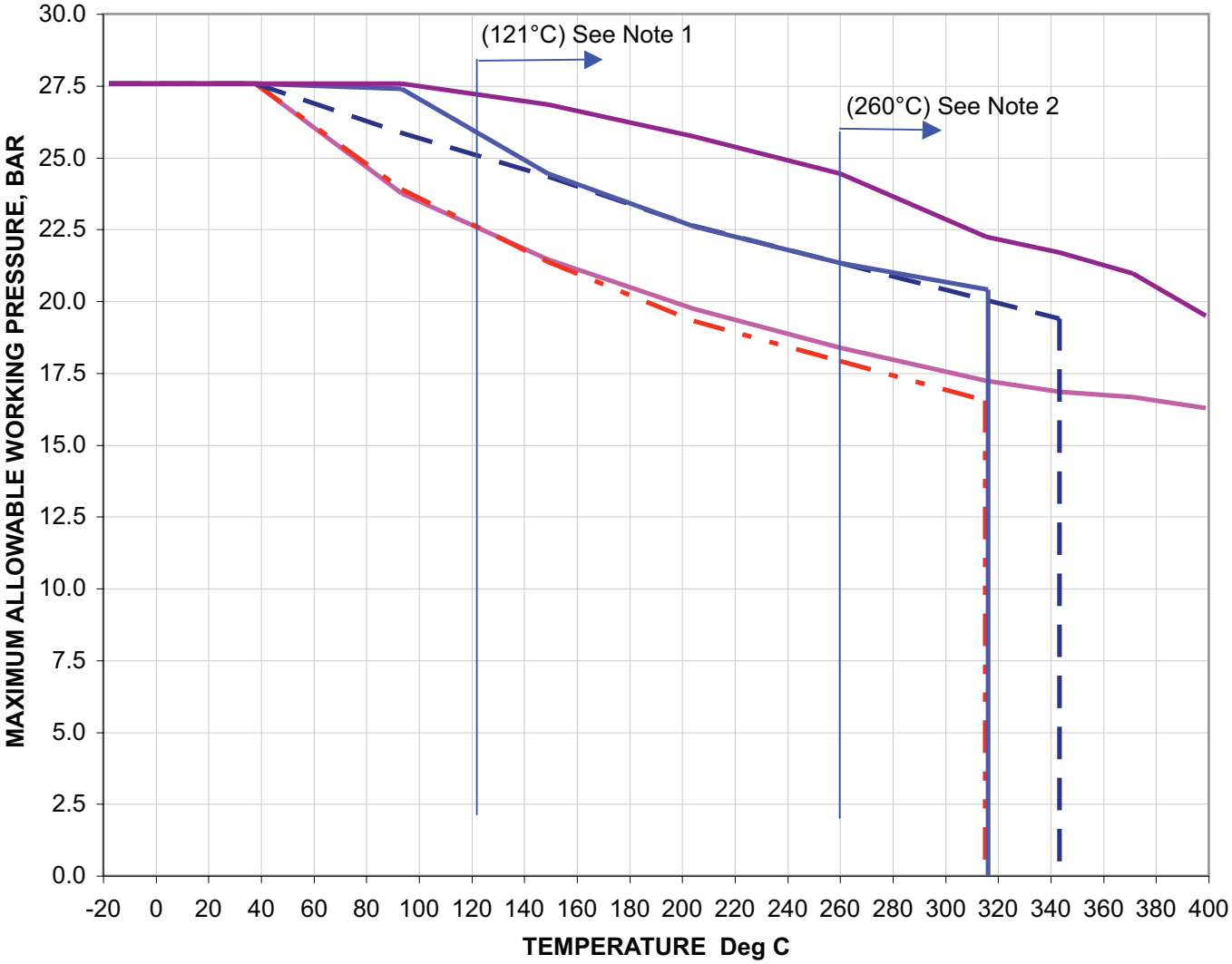


Notes:

1) Center Line Mount Only.
2) Frame A (excluding LD17) and Frame M units only.

Warning : A pump or pump component used under the jurisdiction of the ASME Boiler & Pressure Vessel Code, the ASME Code for Piping, or Governmental Regulations is subject to any limitation of that code or regulation. This may include maximum temperature and/or pressure limitations, rules governing use of material at low temperature and restrictions on fluids or gases permitted to be contained by the pump material. The limitations defined in the chart provide application guidelines only and offer no guarantee that all applicable codes and regulations are met in any given application.

FRS 6", 8" & 10" with 300 LB Flanges.
FRA/LD17 6", 8" & 10" with 300 LB Flanges.
FRM 13" with 300 LB Flanges.



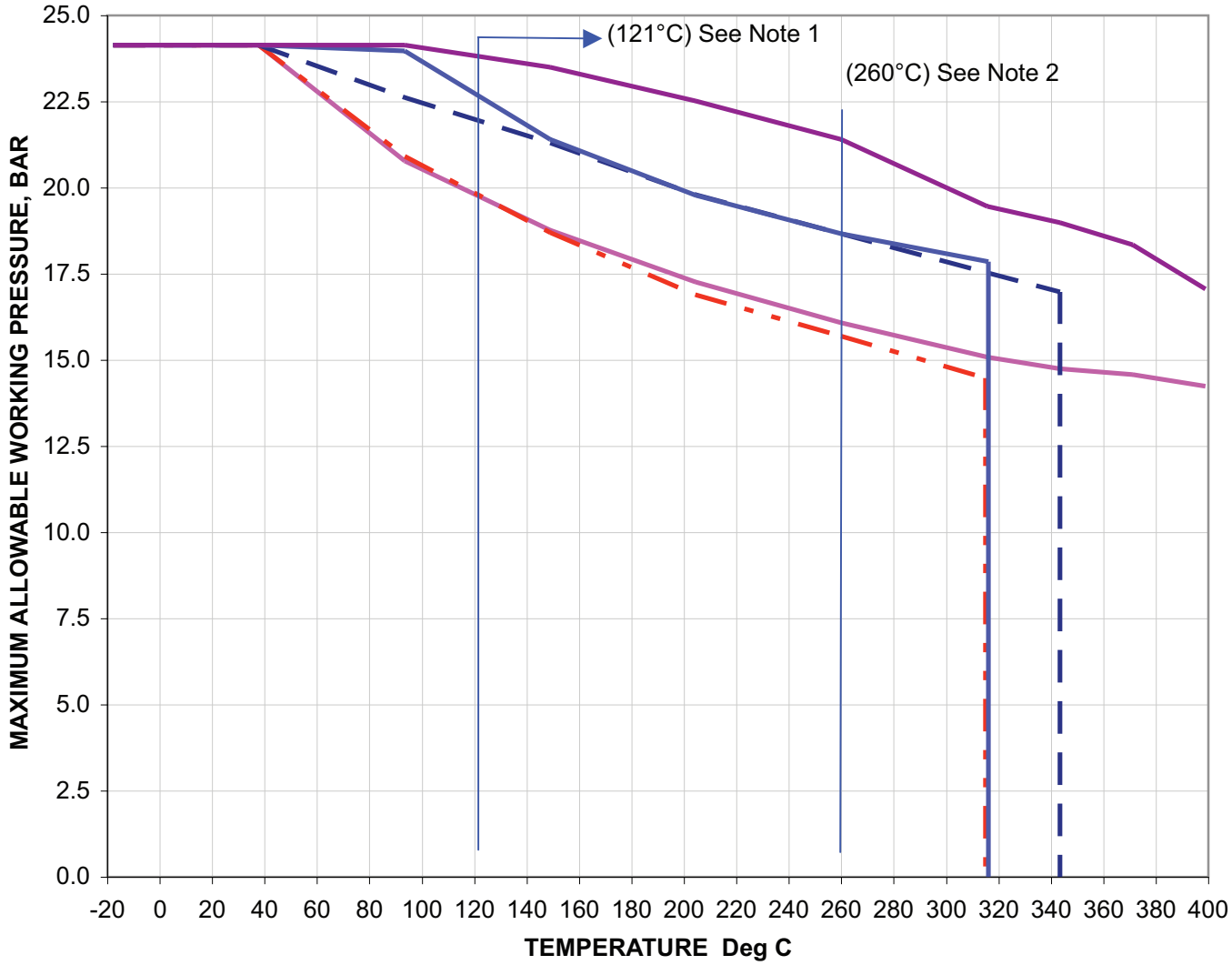
316SS
Alloy 20
DI 60-40-18
CD4MCu
Hastelloy B & C

Notes:

1) Center Line Mount Only.
2) High Strength Bolting only.
3) Frame A(excluding LD17) and Frame M units only.

Warning: A pump or pump component used under the jurisdiction of the ASME Boiler & Pressure Vessel Code, the ASME Code for Piping, or Governmental Regulations is subject to any limitation of that code or regulation. This may include maximum temperature and/or pressure limitations, rules governing use of material at low temperature and restrictions on fluids or gases permitted to be contained by the pump material. The limitations defined in the chart provide application guidelines only and offer no guarantee that all applicable codes and regulations are met in any given application.

FRA/LDI7 13" with 300 LB Flanges.
FRM 15" with 300 LB Flanges.



Notes:

1) Center Line Mount Only.
2) Frame A (excluding LD17) and Frame M units only.

Warning: A pump or pump component used under the jurisdiction of the ASME Boiler & Pressure Vessel Code, the ASME Code for Piping, or Governmental Regulations is subject to any limitation of that code or regulation. This may include maximum temperature and/or pressure limitations, rules governing use of material at low temperature and restrictions on fluids or gases permitted to be contained by the pump material. The limitations defined in the chart provide application guidelines only and offer no guarantee that all applicable codes and regulations are met in any given application.

System One® Pump Dimensions for Mechanical Seal Installation

inches/mm

Frame Size	Shaft Size	Seal Chamber Arrangement	First Obstruction Distance	Available Inboard Length	Seal Chamber Bore	Mounting Bolt Circle
SD	38 mm	Back Cover (Seal Chamber)	56 mm	53 mm	58 mm	95 mm
S	1.50	Back Cover (Seal Chamber)	2.38 (60)	2.21(56)	2.38 (60)	3.50 (89)
		Back Cover (Seal Chamber) with Jacket	2,38 (60)	2.12 (54)	2.30 (58)	3.50 (89)
A	1.88	Back Cover (Seal Chamber)	3.00 (76)	2.88 (73)	2.69 (68)	4.75 (121)
		Seal Chamber	2.19 (55)	2.62 (66)	2.69 (68)	4.88 (124)
		Short Seal Chamber	2.81 (71)	2.19 (55)	2.69 (68)	4.88 (124)
		LD17 Back Cover	2.19 (55)	2.00 (51)	2.69 (68)	4.62 (117)
		LD17 Back Cover with SealAdapter	2.19 (55)	1.88 (48)	2.75 (70)	4.62 (117)
M	2.625	Seal Chamber	3.13 (79)	2.56 (65)	3.62 (92)	5.75 (146)
		Taper Bore	3.13 (79)	3.56 (90)	3.62 (92)	5.75 (146)

Centrifugal Pump Specification for Horizontal End Suction Pumps

Table of Contents

System One® Centrifugal Pump Specification for Horizontal End Suction Pumps

1.0 SCOPE

This specification applies to the selection and performance of centrifugal pumps. The intent of the specification is that the supplied equipment shall be designed to offer long service life, minimize life cycle cost and be easily installed and maintained.

2.0 PUMP SELECTION

2.1.1
The pumps for this project shall be selected to allow maximum interchangeability of parts without limiting pump performance. The rotating assembly/power end for each pump shall be interchangeable with all the pump wet ends selected, unless otherwise designated.

2.1.2
The pumps shall operate in accordance with the hydraulic performance requirements.

2.1.3
The pump shall operate smoothly throughout the entire design operating flow range or rpm range with low vibrations. Acceptable vibration limits shall be as specified in Hydraulic Institute Standards for Centrifugal Pumps.

2.1.4
The pump impeller shall provide the design head and flow rate as designated by the purchaser. The impeller diameter selected to meet design conditions shall not be smaller than the minimum as shown in the manufacturers published performance curves.

2.1.5
The pumps defined herein are for general/industrial/chemical process service. They shall be designed for continuous duty, with extended performance life and low maintenance and operations costs.

2.1.6
The pump shall be a back pull-out design with a radially split casing.

2.1.7
The noise level generated by the pump and motor shall not exceed 85 dB, or motor noise level plus 3 dB, when measured at a distance of 3 feet.

2.2.0
The pump suction and discharge flange arrangement shall conform to ANSI B73.1 (or DIN 16 bar standard where applicable).

2.2.1
Castings shall be sound and free of shrink holes, blow holes, scale, blisters and other obvious defects.

2.2.2
Pressure containing castings shall not be repaired by plugging, peening, burring in or impregnating.

2.2.3
The pump shall be permanently tagged with a 300 series stainless steel nameplate. Nameplate information shall include pump size, gpm, TDH, speed, material of construction, rated impeller diameter and serial number. An arrow shall appear on the pump clearly showing the direction of rotation.

2.2.4
Casing discharge shall be centerline discharge unless otherwise specified. Side discharge to be an available option.

2.2.5
Pump shall be selected based on minimizing life cycle costs and emissions, not on minimizing initial purchase costs. Proposed selection will be based on rotor dynamics evaluation, hydraulic performance and effective window of operation. Debits/credits will be used to evaluate vendor proposals.

2.2.6
The pump casing shall incorporate centerline support feet for design operating temperatures above 250°F (120°C).

3.0 PUMP SPECIFICATION

The pump shall be horizontal end suction, in accordance with the following specification.

3.1.1 CASING
The pump casing shall be constructed of ductile iron, 316 SS, CD4MCU, Alloy 20, or other material as required by the application. The casing for pump sizes 4 x 6-13 (100 x 150-330)and below (ANSI designation A80) shall be single volute design, with the discharge flange located on the vertical centerline of the casing, and meet ANSI B73.1 specifications and dimensions. For all sizes above A80, double volute construction is required.

Centerline mounted casing feet are required for all applications over 250° F (120°C), on medium and large frame pumps. The casing is to be supported on two (2) separate legs; made of ductile iron or carbon steel, to prevent misalignment of the pump rotating element within the pump casing at elevated temperatures.

The casing suction and discharge nozzles shall have flat faced, 150 lb., 300 lb., or 16 bar flanges as required by the application. The casing shall be capable of accepting full API 610 suction and discharge nozzle loading.

The suction and discharge neck shall be drilled and tapped with 1/4" NPT connections, for pressure gauges and/or auxiliary piping. The casing wall thickness will include 1/8" corrosion allowance. A rotation arrow will be cast on the surface of the casing to indicate the proper direction of rotation.

3.1.2 IMPELLER

The impeller shall be open type, cast in CD4MCU or material as required by the application. Repelling vanes shall be cast on the back side of the impeller, to reduce the pressure behind the impeller in the immediate area of the mechanical seal and/or packing chamber.

The impeller hubs shall incorporate a threaded fit to the pump shaft.The impeller threads shall be sealed from corrosive environment by a PTFE O-ring in the hub.

Open impellers are preferred.

The impeller shall be balanced to ISO specification G.6.3 or better unless otherwise specified. Balancing must be performed in a minimum of two planes. Balancing shall, unless detrimental to the component or its performance, be attained by the removal of material.

3.1.3 SHAFT

The pump shaft shall be constructed of solid 316SS, 17-4PH, or as required by the application. Bimetallic shafts are acceptable. Shaft sleeves are not acceptable. The pump shaft shall be mechanically non-contacting throughout the entire rotating element, with the exception of the ball bearings, to prevent wear at the bearing oil seal and mechanical seal. The stiffness ratios (L^3/D^4), where L= length of shaft from impeller centerline to nearest bearing in inches and D= shaft diameter under the seal in inches, shall not exceed the following values in order to establish satisfactory mechanical seal life.

Shaft size at seal	L^3/D^4
• Shafts ≤1.5"	46 (1.9)
• Shafts >1.5", ≤ 2.0"	20 (0.8)
• Shafts >1.5", ≤ 2.0"[1]	551 (2.1)
• Shafts > 2"	19 (0.7)

[1]special requirements

3.1.4 THRUST AND RADIAL BEARINGS

The pumps shall be fitted with the following bearings:

Small Frame Pumps (ANSI AA through A50):
The thrust bearing shall be at a minimum a 5308, AHC3 clearance, double row, deep groove bearing. A pair of 7308 BEGAY, back to back angular contact bearings shall be provided as an option when required.
The radial bearing shall be at least a 6308, C3 clearance, single row, deep groove.

Medium Frame Pumps (ANSI A60 through A80):
The thrust bearing shall be at a minimum a pair of 7310 BEGAY clearance, back to back angular contact bearings.
The radial bearing shall be at least a 6310 C3 clearance, single row, deep groove.

Large Frame Pumps (ANSI A90 through A120 :
The thrust bearing shall be at a minimum a pair of 7314 BEGAY clearance, back to back angular contact bearings.
The radial bearing shall be at least 6314 C3 clearance single row, deep groove.

The thrust and radial bearings shall be fitted to the shaft based on SKF tolerance specifications. The method of lubrication shall be oil bath for horizontals and grease for verticals. The thrust bearings shall be locked into the cartridge by a bolt-on retainer cover. Snap ring bearing retainers are not acceptable. The radial bearing shall be permitted to slide within the inside diameter of the bearing frame to prevent axial load and permit radial load only. Double row filled slot bearings are not acceptable. Bearings shall be designed for a minimum L-10 life of 60,000 hours.

3.1.5 BEARING FRAME

The bearing frame shall be heavy-duty cast iron construction, with radial fins for maximum cooling. The oil sump shall contain a minimum of 8 ounces (.23L) of oil for small frame pumps, 24 ounces (.71) of oil for mid-frames and 32 (.94)ounces of oil for large frames to allow for more heat dissipation, better lubrication and a cooler running rotating element. The oil level within the bearing frame shall be monitored by an oil sight glass. The level shall not exceed the bearing lower ball centerline for both the thrust and radial bearings in order to provide ample lubrication and heat dissipation. The oil sight glass shall have a white color perforated background to permit visual inspection of the condition of the oil and also permit circulation of oil in the sight glass to keep the interior surface of the glass clean. An oil drain plug is required at the bottom of the bearing frame. Two (2) magnetic pipe plugs shall be located near the bottom of the bearing frame.The oil fill fitting at the top shall be of nylon with an easily removable cap for adding oil. Trico or bottle type constant level oilers are not acceptable.

3.1.6 BEARING OIL SEALS

Each end of the bearing frame assembly shall incorporate non-contacting labyrinth oil seals. This type of seal is required to eliminate shaft damage due to fretting and to eliminate the heat generated by the use of contact type lip seals. Materials of construction shall be nickel plated (or built in cast iron) stators and 316SS rotors. Other seal systems will be considered only if they are non-fretting. Shaft contacting type lip seals will not be accepted. Face type oil seals are to be available for severe applications where specified.

3.1.7 FRAME ADAPTER

The frame adapter shall be designed to maintain accurate alignment of the bearing frame and rotating element to the wet end and allow proper access to the mechanical seal and environmental seal control piping. . The frame adapter shall use a machined rabbit type fit to align with the bearing frame and pump casing.

3.2.0 MECHANICAL SEAL CHAMBER

The back cover and seal chamber shall be of ductile iron, 316 SS, CD4MCU, Alloy 20, or other material as required by the application.
A corrosion allowance of 1/8" (3 mm) is required.
The back cover shall be fastened to the pump casing with a confined type gasket.

The pump shall incorporate a large bore seal chamber. The seal chamber shall be designed with a minimum radial clearance of at least 0.75 (19 mm) inches. This will result in improved cooling, cleaning, lubricating and circulation to prolong the life of the mechanical seal, The chamber shall have an optional tangential flush connection on the side to flush the mechanical seal, and provide maximum cleaning capability. The seal chamber shall be capable of incorporating a jacket (when required) for cooling on high temperature applications or steam heating of liquids that tend to congeal in the seal chamber. Taper bore seal chambers shall have a minimum taper of 4° and a maximum radial clearance of 0.625 inches (16 mm) where abrasive solids are present to minimize rotation. Deep taper bore seal chambers must include vortex breakers and are not acceptable in abrasive applications.

3.2.1 CENTERLINE SUPPORT LEGS and POWER END FOOT

All Mid-frame and Large-frame pumps operating above 250°F (120°C) shall be supplied with adjustable centerline casing support legs. These feet will be affixed to the volute at the horizontal centerline of the volute. Small-frame pumps, when specified for applications above 200 °F (94°C), must allow unrestricted casing thermal growth.
A casing without feet (frame mounted pump) is required for these applications.
Small frame and medium frame pumps shall have a bearing frame foot that will support the power end in an upright position when removed from the wet end for service. The bearing frame foot may be height adjustable, if possible, to allow for ease of alignment.

3.2.2 IMPELLER CLEARANCE ADJUSTMENT

The thrust bearing end of the bearing frame shall be capable of precision impeller adjustments without the need to add or remove shims.
The minimum delineation shall be .003" (.08mm) and permit impeller clearance settings or readjustments without the need to remove the bearing frame from the volute section and without requiring shims, dial indicators, feeler gauges or disassembly.

3.2.3 BACK PULL-OUT FEATURE

The pump shall permit the removal of the entire bearing frame assembly, including shaft, mechanical seal or packing chamber, and impeller, without disturbing the pump discharge and suction piping and without disturbing the motor.
A spacer type coupling shall be furnished on non-motor adapter pumps to allow removal of the power end without disturbing the motor.

3.2.4 C- FRAME OR D-FLANGE MOTOR ADAPTERS

The pump shall have the capability of incorporating a C-Frame motor adapter, which permits mounting of motors up to NEMA frame size 256TC (IEC 132) for small frame, 405TC (447TSC) (IEC 180) for medium frame, and 449T(S)C (IEC 180) for large frame, without the need for parallel and angular alignment measurements and adjustments. The motor adapter may be equipped with adjustable feet in order to avoid frame soft foot and eliminate the need to use shims under the adapter assembly.

3.2.5 WARRANTY

The pump shall be warranted for a period of one (1) year from the date of installation, but not to exceed eighteen (18) months after the date of shipment to the user, to be free of defects in material and workmanship. In addition the following warranty, exclusive of erosion and corrosion, is required:

- Should the mechanical seal fail within one year of the original pump and seal installation, a rebuild kit or a rebuilt seal will be provided at no charge.
- If the mechanical seal causes shaft fretting damage that minimizes or eliminates sealing capability, a new replacement seal and/or shaft will be provided.
- Should any power end component, including bearings, fail within five (5) years of the original installation, a free replacement component will be provided.

4.0 PUMP PAINT SELECTION

Surface preparation:
Parts are cleaned in an industrial washer with appropriate cleaner.
All parts are then rinsed in a rinse tank.

Paint:
One coat of Rustoleum "High Performance Epoxy 9100 Series System" Yellow #A91-4412 base with A5275 activator or equivalent epoxy coat system.

This product is a two component, high build, polyamide / amine–modified low VOC epoxy coating.

Total Paint Thickness:
Dry film thickness range of epoxy coating shall be .005" to .008" (0.12-0.20 mm).

Total Paint Thickness:
Dry film thickness range of epoxy coating shall be .005" to .008".

5.0 QUOTATION REQUIREMENTS

5.1.1
Quotation shall be completed in strict accordance with the requisition requirement.

5.1.2
Vendor shall state all exceptions to this specification in the bid package. All deviations and/or exceptions from this specification must be outlined in full detail and the reasons for these exceptions fully explained.

5.1.3
Unless the vendors proposal takes exception as outlined in the section above (5.1.2) conformance is implied and assumed. Alternates and exceptions shall be clearly defined and described in the vendors proposal.

5.1.4
Alternates may be submitted with the bid. They shall be clearly described and defined in the vendors proposal.

5.1.5
The proposal shall include a Pump Performance Curve showing gpm, TDH, NPSHR, Efficiency, Power requirements @ design and runout, and design and maximum/minimum impeller. Also included shall be shaft stiffness ratios and descriptive literature for the pump and the mechanical seal.

5.1.6
The quotation shall include a complete list of recommended spare parts with price and delivery information.

6.0 DOCUMENTATION REQUIREMENTS

Within ten (10) working days after the purchase order is received the vendor will supply the following:

A)	Dimensional Prints	( ) Copy
B)	Parts List	( ) Copy
C)	Operation and Installation Manual	( ) Copy
D)	Certified Performance Curve	( ) Copy
E)	Mechanical Seal Drawing	( ) Copy

7.0 VENDOR REQUIREMENTS

The vendor shall have the capability of flying spare parts to any location within a 24 hour period. All applicable spare parts must be available from the plant within this time period.

Service capabilities will include start-up, troubleshooting and personnel training by a vendor authorized representative.

Notes:

Notes:

Notes:

Notes:

Notes:

Notes:

Where Innovation Flows

PSG® a DOVER company

Blackmer®

PSG® Grand Rapids
1809 Century Avenue SW
Grand Rapids, MI 49503-1530 USA
T: +1 (616) 241-1611
F: +1 (616) 241-3752
blackmer.com

Authorized PSG® Partner:

1301-001 05/16