



Specialist for Pumping Technology

**Session 30 –
Selecting the Right Pump
for the Application (2)**

Simon Smith February 2024





Presenter Profile – Simon Smith

Simon graduated with an honours degree in Chemical Engineering from the University of Surrey in 1978 and began a long career in the engineered pump industry spanning 40 years (so far!) with Peerless Pump, BW/IP International / Flowserve, SPP Pumps, Ruhrpumpen and Ebara Cryodynamics.

Over his long career he has filled various roles as Applications Engineer / Manager, Project Manager, Key Account Specialist, Vertical Pump Product Specialist, International Sales Engineer / Manager / Director and he has considerable experience in Training & Mentoring young engineers.





RuhRPumpen Short Courses

Here is a listing of all the previous courses.

- No 1 – API610 12th v 11th editions
- No 2 - Curve Shape (1)
- No 3 – The Importance of System Curves (1)
- No 4 - Selecting the Right Pump for the Application
- No 5 - NPSH & Nss
- No 6 - Mechanical Seals & Systems (1)
- No 7 - Firepumps
- No 8 - BB5 Barrel Pumps
- No 9 - Pump Instrumentation
- No 10 – Non-Destructive Examination
- No 11 - Vertical Pumps (Part 1) Type VS1, VS2, VS3
- No 12 – Vertical Pumps (Part 2) Type VS4, VS5, VS6 & VS7
- No 13 – Performance Testing of Centrifugal Pumps; the What, the Why & the How
- No 14 – Testing & Inspection of API 610 Pumps
- No 15 – Start-Up, Commissioning & Troubleshooting Centrifugal Pumps
- No 16 – Introduction to Positive Displacement (Plunger) Pumps
- No 17 – Refresher Session
- No 18 – Overhung Process Pumps OH1 & OH2

Continued next slide

Any you have missed you can get from our website www.ruhrpumpen.com

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RuhrPumpen Short Courses

Here is a listing of all the previous courses. Contd

- No 19 – Vertical Overhung Process Pumps OH3-OH6
- No 20 – New Developments in the VS6 Market
- No 21 – BB4 Multistage Pumps for the Power Industry
- No 22 – Coking Process and Hydraulic Decoking Equipment
- No 23 – Pumps for the Desalination Market
- No 24 – Cryogenic Pumps
- No 25 – Magnetic Drive Pumps
- No 26 – Mechanical Seals & Systems (2)
- No 27 – The Importance of System Curves (2)
- No 28 – NPSH & Nss Made Simple (2)
- No 29 – Curve Shape, Head Rise & Allowable Tolerances (2)

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- Impeller Lift Procedure
- Newsletter Ruhrpumpen Fire Systems - December 2022
- VTP pumps for major water transfer project in Bolivia
- COVID-19 UPDATE
- Introducing the RP ANSI Process Pump Range
- Ruhrpumpen Resources
- Coolant System Maintenance
- RP delivers API 674 pumps for Gas Dehydration Package in Algeria
- Packing strips and packing gland tightening procedure

All Courses

Don't miss our **short course #25**

COMING SOON



Simon Smith
Solutions Expert

QUALITY
INNOVATION
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RuhRPumpen Short Courses

SHORT COURSE 12

Vertical Pumps (VS4/5, VS6, VS7)

Full session.

 Downloads. (14.73 MB)

SHORT COURSE 13

Performance Testing and Inspection of API 610 Pumps

Full session.

 Downloads. (4.58 MB)

SHORT COURSE 14

Performance Testing and Inspection of API 610 Pumps

Full session.

 Downloads. (7.30 MB)



RuhRPumpen Short Courses

SHORT COURSE 14

Performance Testing and Inspection of API 610 Pumps

Full session.

 Downloads. (7.30 MB)

SHORT COURSE 15

Start-Up, Commissioning & Troubleshooting Centrifugal Pumps

Full session.

 Downloads. (6.14 MB)

SHORT COURSE 16

Introduction to Positive Displacement (Plunger) Pumps

Session part 1.

Session Part 2.

 Downloads. (10.50 MB)



Session 30 – “Selecting the Right Pump for the Application (2)”

Aimed at Process and Mechanical Engineers and Consultant Engineers specifying pumping equipment as well as Applications & Sales Engineers selecting and quoting them. Develop an understanding as to which type of pump is appropriate for different applications.

Will cover such topics as when to transition from an OH2 to a BB2, when to consider VS6 pumps, Barrel vs Horizontal Split Case multi-stage pumps

▪



Scenario A

Process Engineer or Mechanical / Rotating Equipment Engineer

You have preliminary process data for a pump

For example:

200m³/hr, 200m TDH, 5m NPSHA, SG 0.7, Temp 150⁰C, 50 Hz

What sort of pump will this be?

You guess OH2

Are you right?

I am going to give you the tools to be able to check this out & save you getting yourself into trouble.



Scenario B

Sales or Applications Engineer

Your customer (from Scenario A) has phoned you up with the same preliminary data

200m³/hr, 200m TDH, 5m NPSHA, SG 0.7, Temp 150⁰C

“What sort of pump do I need, just a quick check, don’t spend long on it?”

What do you do?

Do you immediately plug the duty into your pump selection program and tell your customer the first selection it comes up with?



	Size		Speed, rated (rpm)	Motor poles	Bowl Efficiency (%)	Pump Efficiency (%)
<input type="checkbox"/>	SM 6x14 (A) (BB3) CH		1485	4	-	76.19
<input type="checkbox"/>	SM 4x11 (A) (BB3)		2960	2	-	75.78
<input type="checkbox"/>	SM 4x11 (D) (BB3) CH		2960	2	-	75.54
<input type="checkbox"/>	SM 4x9.5 (A) (BB3)		2960	2	-	75.43
<input type="checkbox"/>	SM 4x11 (C) (BB3) CH		2965	2	-	75.08
<input type="checkbox"/>	SM 4x11 (C) (BB3) CH		2965	2	-	73.62
<input type="checkbox"/>	AB 8x6x15 C-C (A) CH		1485	4	-	72.86
<input type="checkbox"/>	SM 4x11 (C) (BB3) CH		2965	2	-	72.56
<input type="checkbox"/>	SM 4x11 (B) (BB3)		2960	2	-	71.77



	Size		Speed, rated (rpm)	Motor poles	Bowl Efficiency (%)	Pump Efficiency (%) ▼
<input type="checkbox"/>	4X15J (BB2)		2975	2	-	69.80
<input type="checkbox"/>	4X15JH (BB2)		2975	2	-	69.80
<input type="checkbox"/>	RON 6x14 (A)		2960	2	-	69.68
<input type="checkbox"/>	 JTN 6 x 4 x 9 1/2 (A) (BB3)		2960	2	-	69.05
<input type="checkbox"/>	 AB 6x4x12 (B)		2960	2	-	68.74
<input type="checkbox"/>	RON-D 6x13 (A) CH		2960	2	-	68.64
<input type="checkbox"/>	RON-D 6x13 (B) CH		2960	2	-	68.64
<input type="checkbox"/>	SCE 6x4x16 (A) Inducer 1 (OH2)		2960	2	-	66.77
<input type="checkbox"/>	SCE 6x4x16 (A) (OH2)		2960	2	-	66.77



Lessons Learned

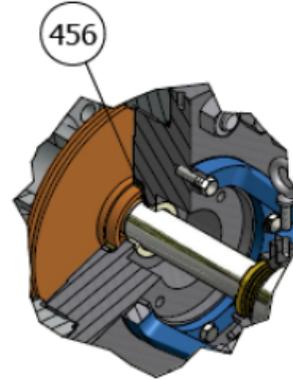
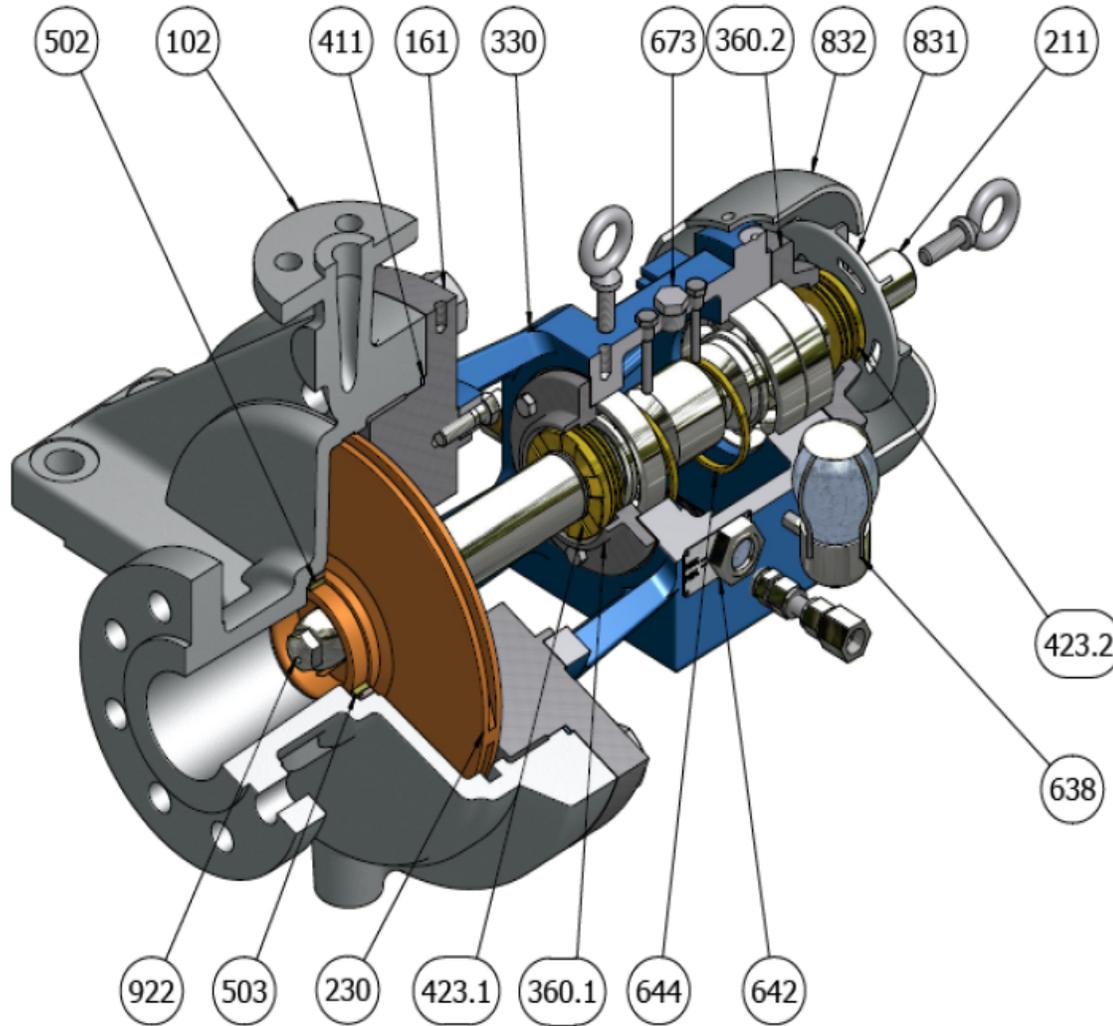
- Pump selection programs are STUPID
- They are a great tool but a poor master
- ALWAYS KNOW THE PUMP YOU EXPECT TO SEE BEFORE YOU USE THE PUMP SELECTION PROGRAM

I am going to give you the tools to be able to check this out & save you getting yourself into trouble.



SCE Pump

Type OH2

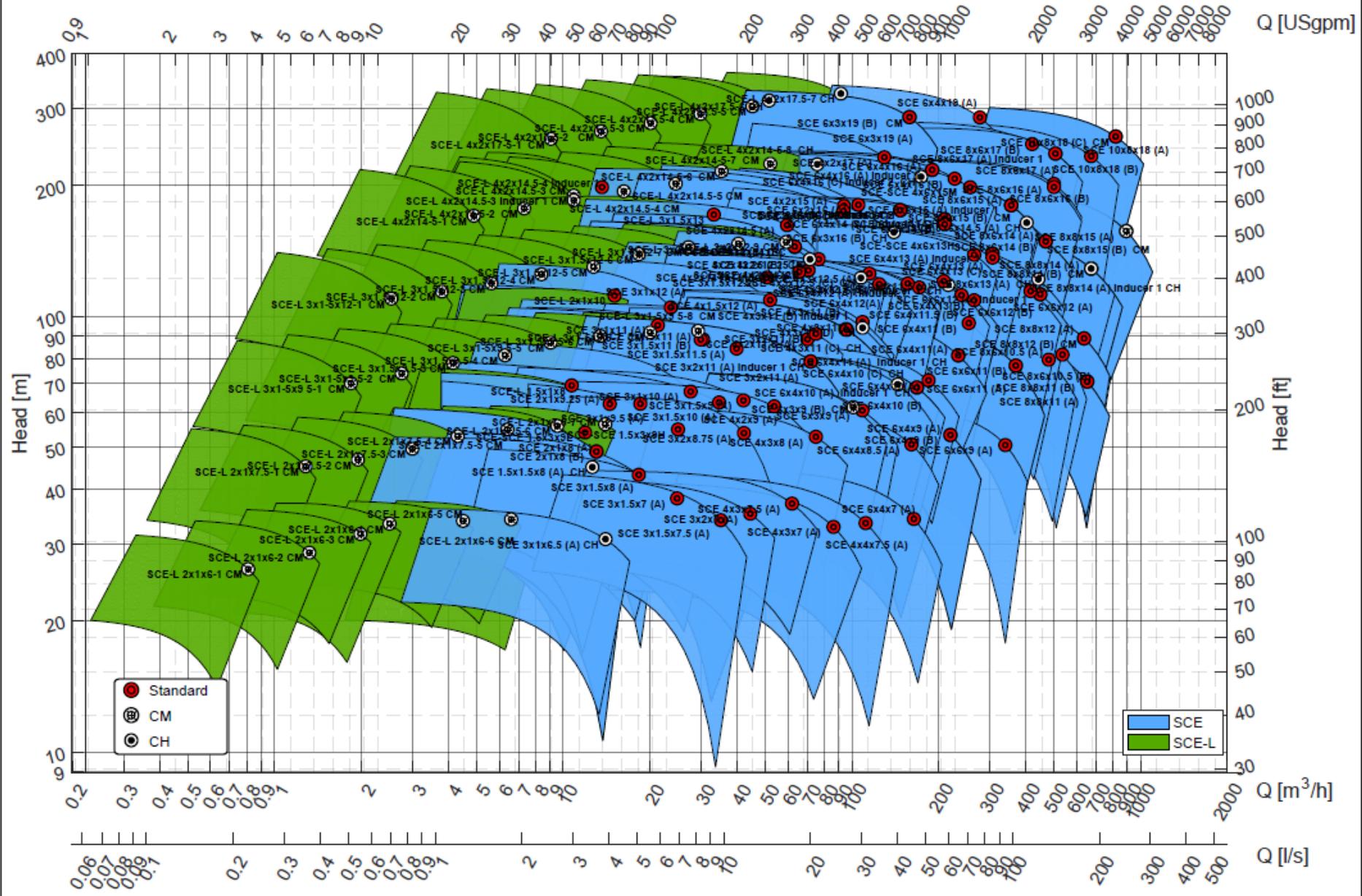


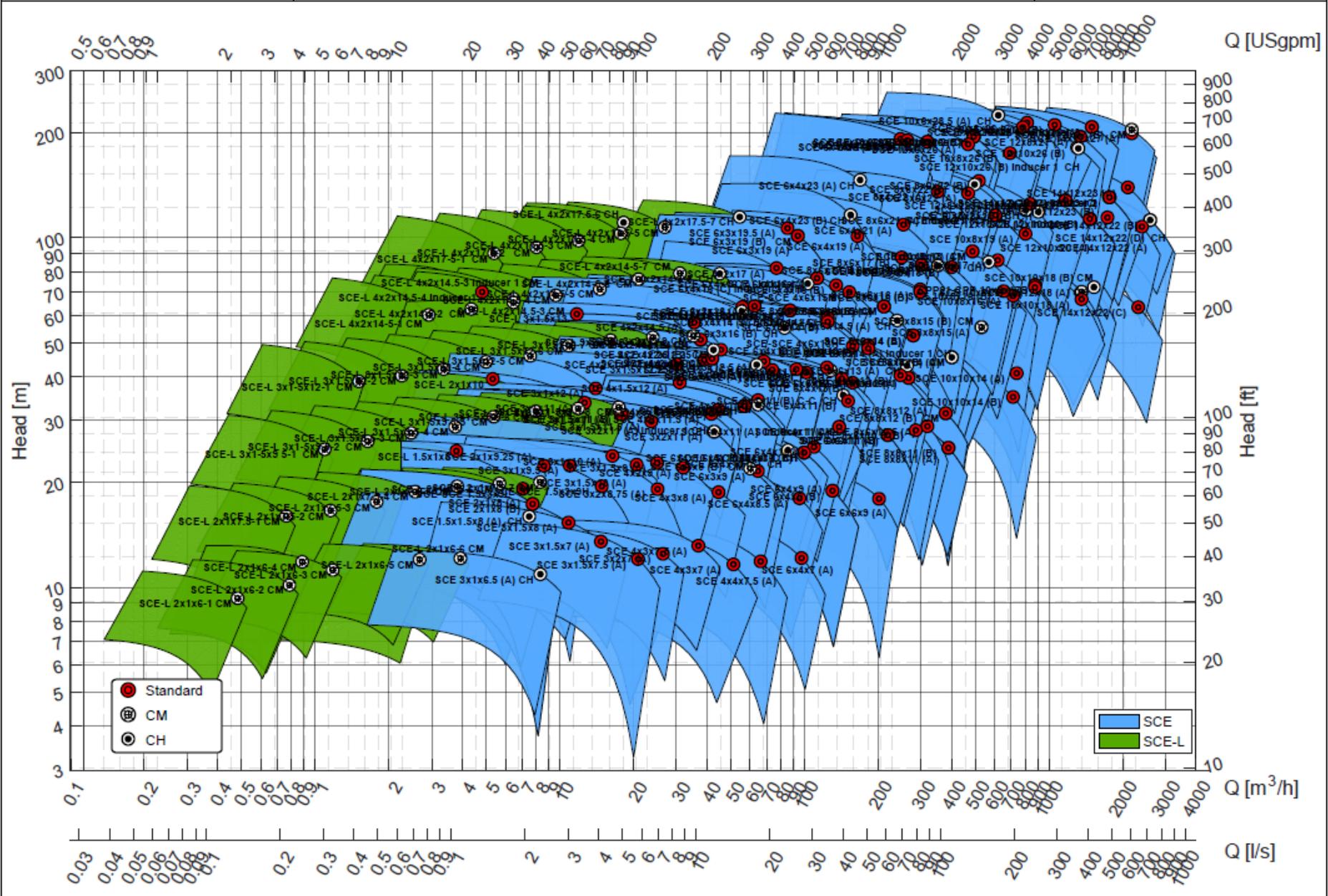
PARTS LIST		
ITEM	QTY	DESCRIPTION
102	1	VOLUTE CASING
161	1	CASING COVER
211	1	PUMP SHAFT
230	1	IMPELLER
330	1	BEARING BRACKET
360.1	1	BEARING COVER
360.2	1	BEARING COVER
411	1	JOINT RING
423.1	1	LABYRINTH RING
423.2	1	LABYRINTH RING
456	1	STUFFING BOX BUSHING
502	2	CASING WEAR RING
503	2	IMPELLER RING
638	1	CONSTANT LEVER OILER
642	1	OIL LEVEL SIGHT GLASS
644	2	LUBRICATING RING
673	2	VENT FILTER
831	1	VENTILATOR FAN
832	1	VENTILATOR CAP
922	1	IMPELLER NUT

Features and Benefits



OH2 50Hz 2 Pole



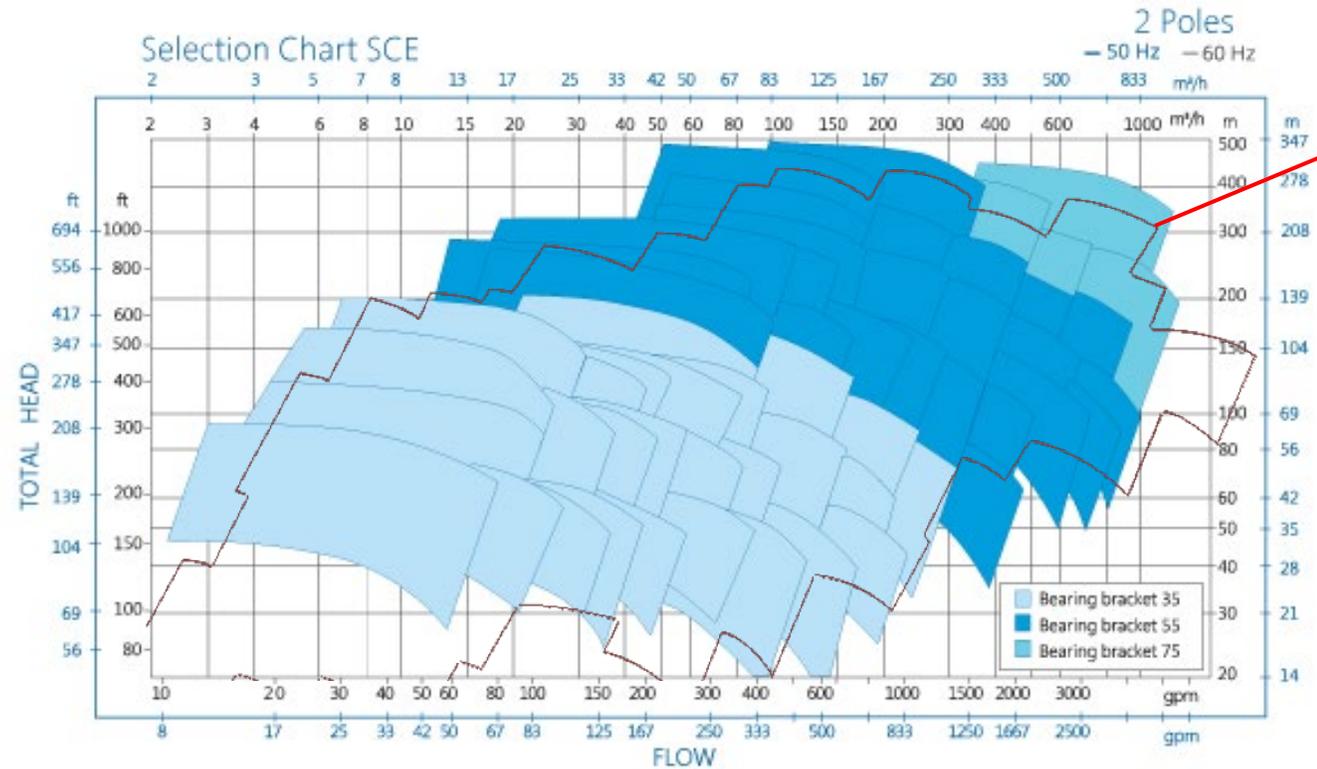
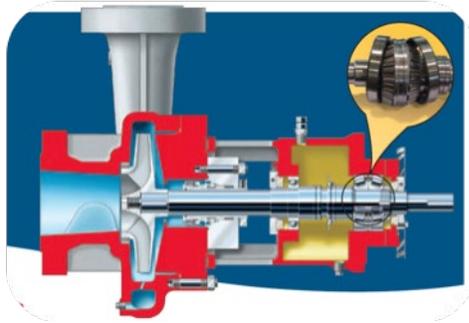




Benchmark

Ruhrpumpen vs Flowserve

Benchmark





Benchmark

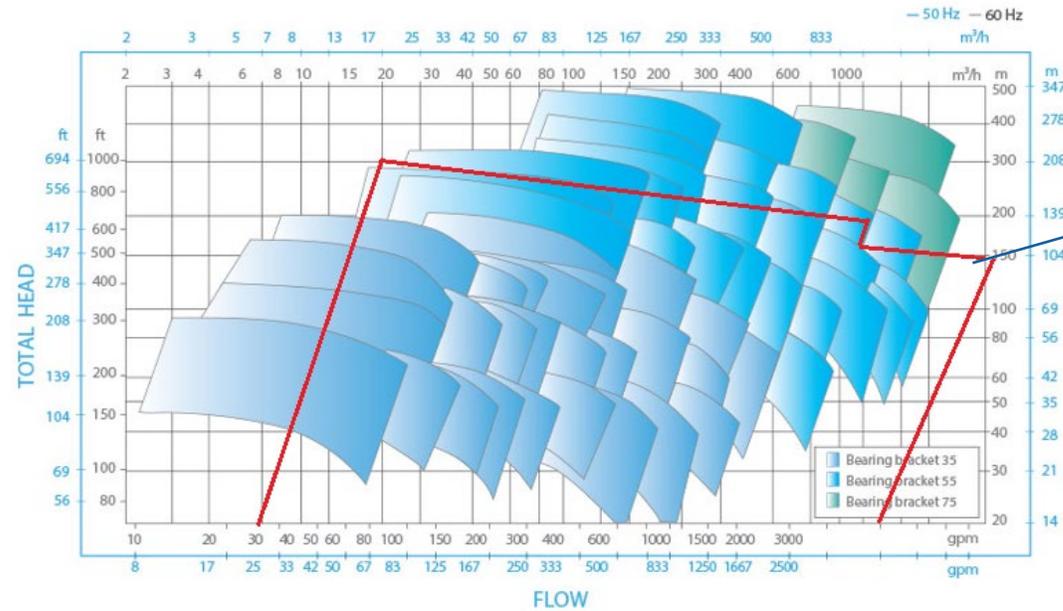
Ruhrpumpen vs Sulzer

Benchmark



Selection Chart SCE

2 POLES



Sulzer

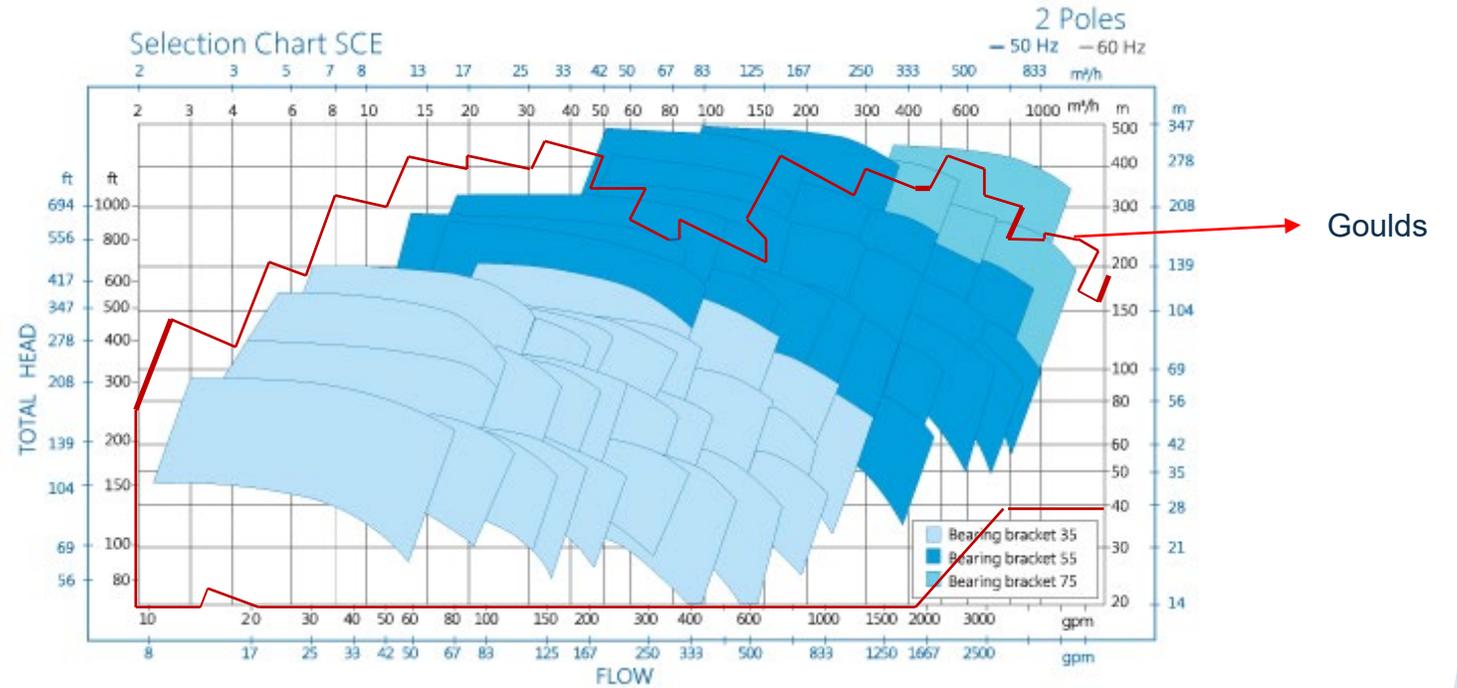
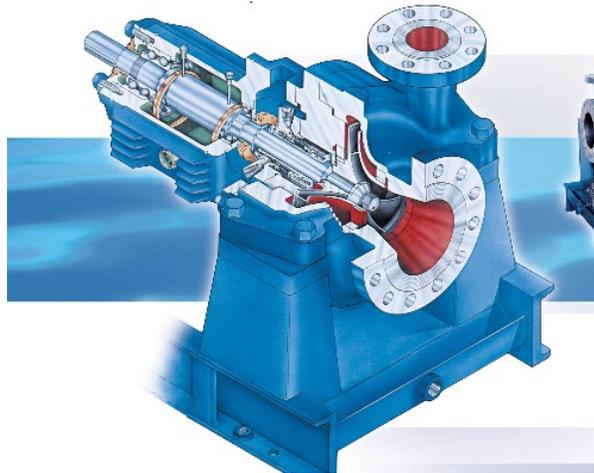
- Optional triple row thrust bearing and roller radial bearing
- Optional high pressure casing



Benchmark

Ruhrpumpen vs Goulds

Benchmark



http://www.gouldspumps.com/ittgp/medialibrary/goulds/website/Products/3700/3700_reader_spreads.pdf?ext=.pdf



Do you have enough $NPSH_A$?

- You have established that the pump flow and head falls within the general range for most vendors of OH2 Pumps
- But do you have enough NPSH available?
- Use this simple NPSH/Nss Calculator to check.
- (A copy of this calculator will be sent to all participants when we send out the copy of this Session's slides.)



NPSH / Nss Calculator

$$N_{SS} = N_{(RPM)} Q_{(BEP \text{ Full Dia})}^{0.5} / NPSH_{(BEP \text{ Full Dia})}^{0.75}$$

$$N_{SS(Metric)} = N_{SS(US)} \times 1.16 \text{ (m}^3/\text{hr, m, rpm)}$$

Is there a commercially available pump to meet your NPSH requirement?

Enter rated flow, available NPSH, and pump speed below (in the units of your choice).

The calculator will calculate the Suction Specific Speed (Nss) of the theoretical pump that will meet your requirements with a 1m (3ft) NPSH margin.

If you see a Nss value at or below 11,000 (US units) or 12,760 (metric units) then there is probably a pump that will meet your needs

If not, try a lower speed (e.g 1450rpm instead of 2950rpm)

If the Nss is still too high, increase the NPSHA until you DO find a theoretical pump

ENTER DATA ↓	
Flow m3/hr	200
NPSHA (M)	5
RPM	2960

ENTER DATA ↓	
Flow (USGPM)	1100
NPSHA (FT)	25
RPM	3550

Theoretical Nss of a pump to do this duty with a 1m (or 3ft) NPSH margin

Single Suction Pump

m3/hr,m,rpm units	14800
USGPM,Ft,RPM units	12759

Single Suction Pump

USGPM,Ft,RPM units	11591
m3/hr,m,rpm units	13445

Try a slower speed or increase the NPSH available

Try a slower speed or increase the NPSH available

Double Suction Pump

m3/hr,m,rpm units	10465
USGPM,Ft,RPM units	9022

Double Suction Pump

USGPM,Ft,RPM units	8196
m3/hr,m,rpm units	9507

SUCCESS! There is probably a suitable double suction pump for your NPSH condition

SUCCESS! There is probably a suitable double suction pump for your NPSH condition



Do you have enough $NPSH_A$?

So your options are:-

- Is there a 4 Pole OH2 selection available?



Do you have enough $NPSH_A$?

So your options are:-

- Is there a 4 Pole OH2 selection available
- Can you find a bit more NPSHA?



N_{ss} Calculator

NPSH / Nss Calculator

$$N_{SS} = N_{(RPM)} Q_{(BEP \text{ Full Dia})}^{0.5} / NPSH$$

--	--	--	--	--	--

Is there a commercially available pump to meet your NPSH requirement?

Enter rated flow, available NPSH, and pump speed below (in the units of your choice).

The calculator will calculate the Suction Specific Speed (N_{ss}) of the theoretical pump that will meet your requirements with a 1m (3ft) NPSH margin.

If you see a N_{ss} value at or below 11,000 (US units) or 12,760 (metric units) then there is probably a pump that will meet your needs

If not, try a lower speed (e.g 1450rpm instead of 2950rpm)

If the N_{ss} is still too high, increase the NPSHA until you DO find a theoretical pump

ENTER DATA ↓	
Flow m3/hr	200
NPSHA (M)	6
RPM	2960

ENTER DATA ↓	
Flow (USGPM)	1100
NPSHA (FT)	25
RPM	3550

Theoretical N_{ss} of a pump to do this duty with a 1m (or 3ft) NPSH margin

<u>Single Suction Pump</u>	
m3/hr,m,rpm units	12519
USGPM,Ft,RPM units	10792
<u>Single Suction Pump</u>	
USGPM,Ft,RPM units	11591
m3/hr,m,rpm units	13445

SUCCESS! There is probably a suitable single suction pump for your NPSH condition

Try a slower speed or increase the NPSH available

<u>Double Suction Pump</u>	
m3/hr,m,rpm units	8852
USGPM,Ft,RPM units	7631
<u>Double Suction Pump</u>	
USGPM,Ft,RPM units	8196
m3/hr,m,rpm units	9507

SUCCESS! There is probably a suitable double suction pump for your NPSH condition

SUCCESS! There is probably a suitable double suction pump for your NPSH condition



Do you have enough $NPSH_A$?

So your options are:-

- Is there a 4 Pole OH2 selection available
- Can you find a bit more NPSHA?
- Is there a BB2 pump available?
- BUT before going to BB2 I do need to address another alternative to the OH2 which is the vertical in-line type OH3



General Description

SPI In-Line Vertical Pumps

- Vertical In-line pump - Fully API610 compliant
- Flexible Coupling
- Driver is usually mounted on support integral to the pump.
- Fully enclosed, balanced, one-piece design impeller
- Back pull-out design, without lifting the motor or suction and discharge pipework
- Flanged suction and discharge on common centerline casing
- Bearing housing (3 sizes) integral with the pump to absorb all pump loads
- D and C Motors



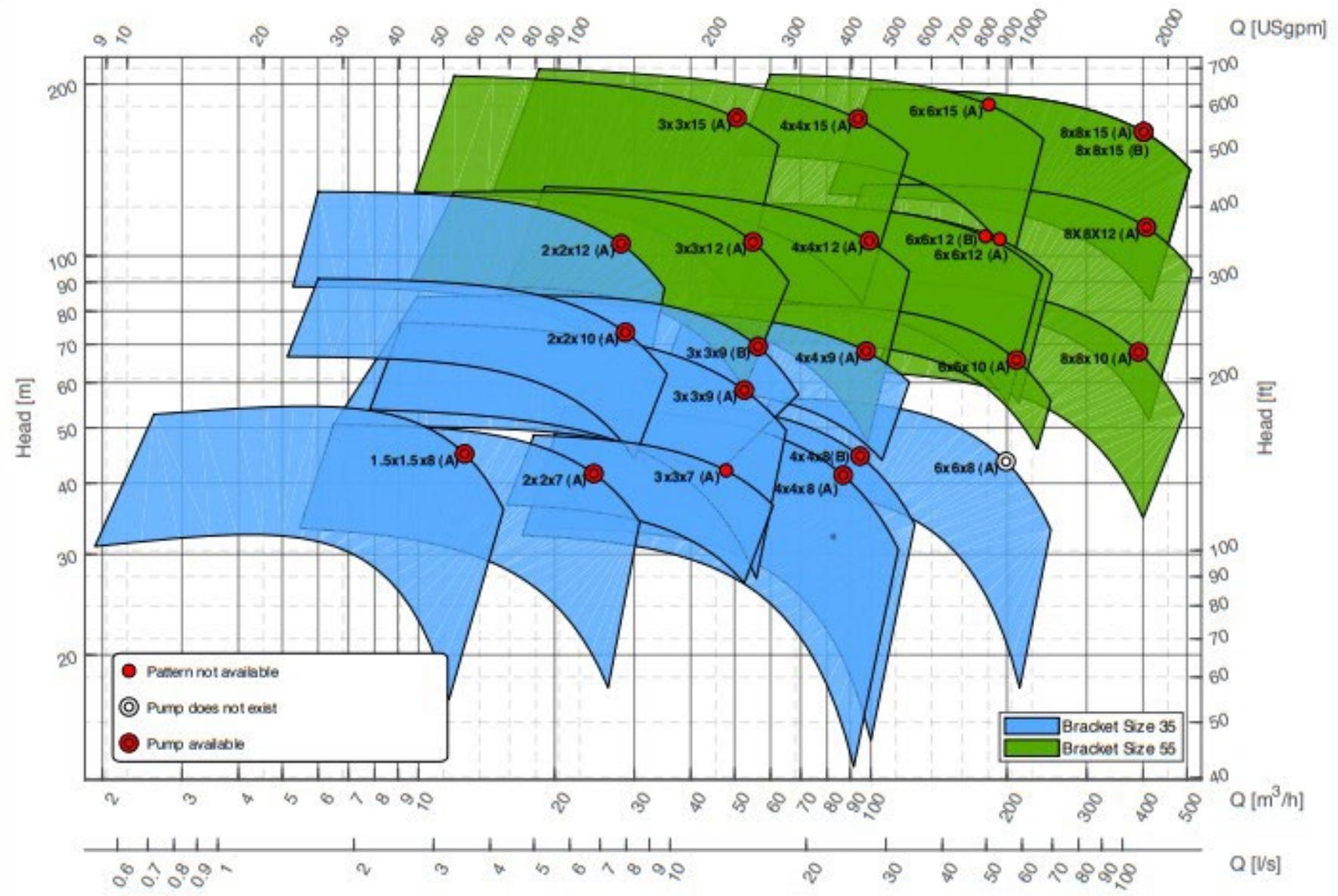
SPI
1.5 X 1.5 X 8
2 X 2 X 7
2 X 2 X 10
2 X 2 X 12
3 X 3 X 7
3 X 3 X 9 A
3 X 3 X 9 B
4 X 4 X 8
4 X 4 X 9
3 X 3 X 12
3 X 3 X 15
4 X 4 X 12
4 X 4 X 15
6 X 6 X 10
6 X 6 X 12
6 X 6 X 15
8 X 8 X 10
8 X 8 X 12
8 X 8 X 15
12 X 10 X 20
6 X 20

Capacity	450 m ³ /h	2,000 US GPM
Head	200 m	656 ft
Temperature	-50°C to 450 °C	-58°F to 842 °F
Pressure	80 bar	1160 psi



SPI Selection Chart 2 poles - 50Hz

Drawn by: AMJ
Date: 21-Aug-2018
Drawing: 51046200001
Version: 01

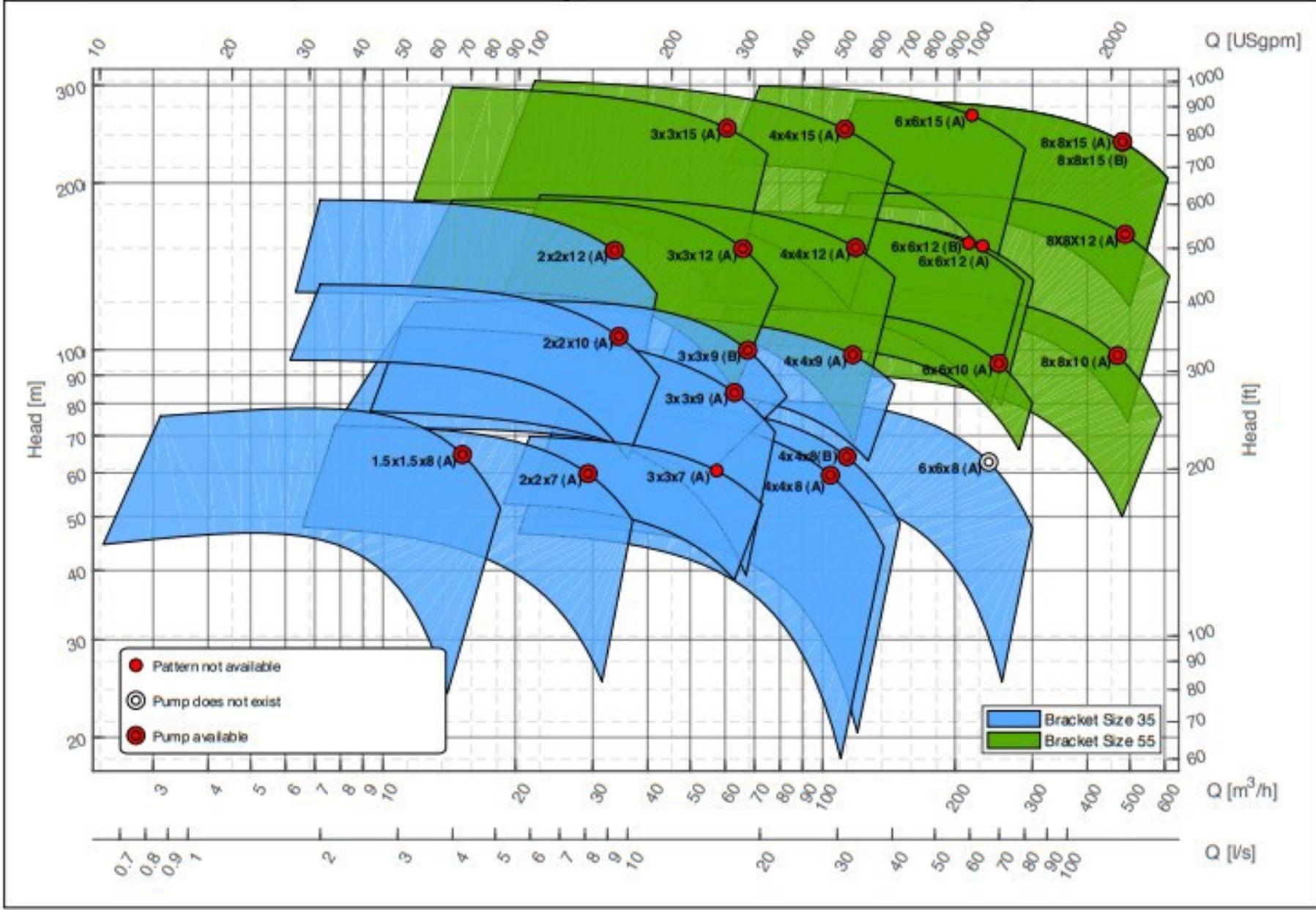




SPI Selection Chart

2 poles - 60Hz

Drawn by: AMJ
Date: 21-Aug-2018
Drawing: 5 1046200003
Version: 01





Advantage of OH3 SPI line over OH2

Vertical Inline Pump Design eliminates the need for an expensive base-plate and saves valuable floor space.

Advantages of OH3 vs OH2

- Reduces footprint
- Saves in platform, FPSO deck cost
- Reduces installed weight vs OH2 systems
- Do not require grouting

Disadvantages of OH3 vs OH2

- Accessibility for maintenance
- Higher NPSHR
- Smaller hydraulic range coverage



LESS SPACE REQUIREMENT



Type BB2

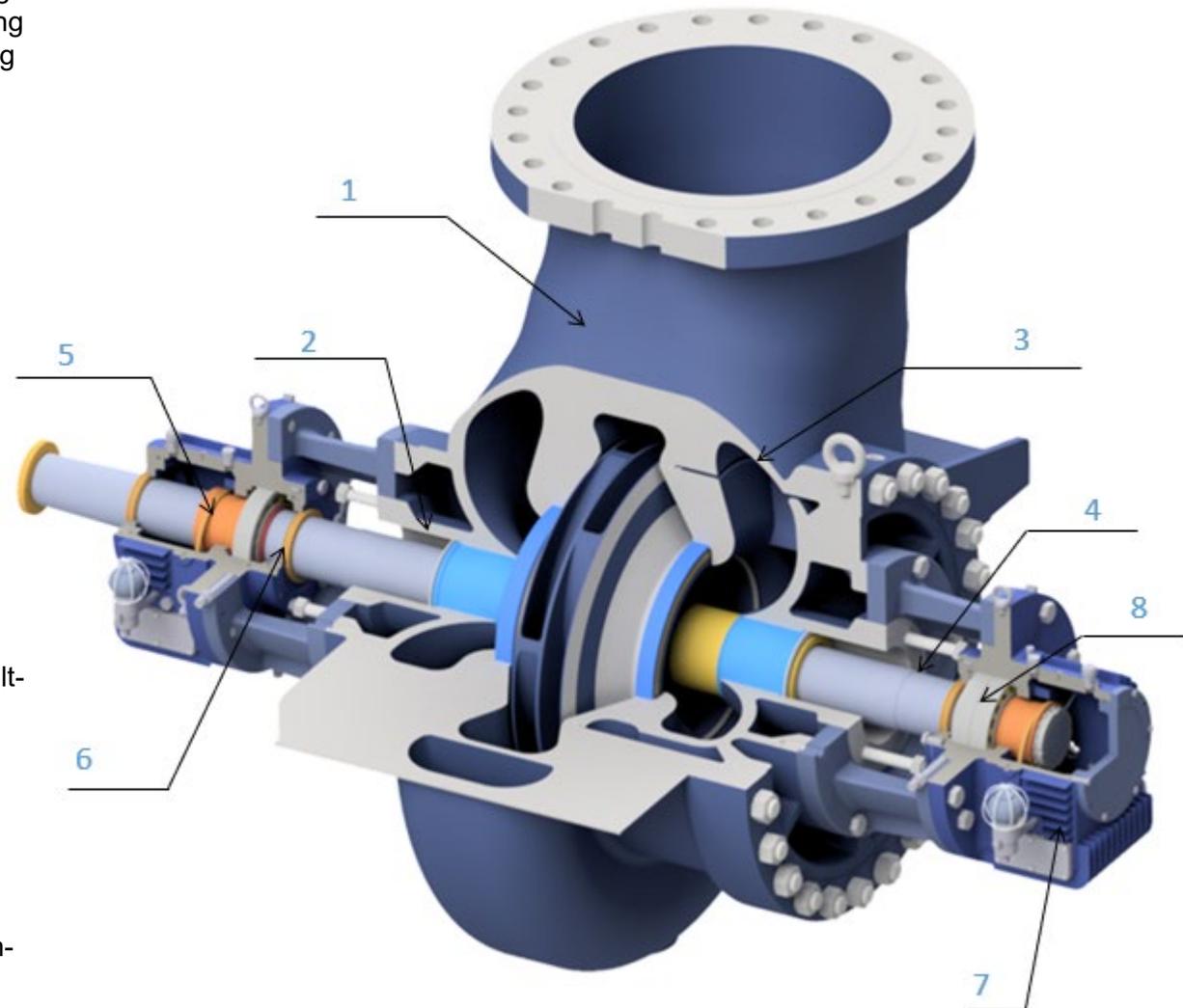




Pump Type BB2

Full API Compliant

- 1 Heavy duty, dual volute, centerlined supported, radial split casing designed to reduce the effects of piping loads, thereby maximizing the life of bearings, seals and wear rings. The single cover casing minimizes alignment problems.
- 2 Wide dimensioned shaft sealing chamber fitting for all commercially available designs (single, dual unpressurized and pressurized mechanical seal).
- 3 Dynamically balanced, double suction impeller minimizes thrust problems, reduces NPSH requirements and provides smooth operation for longer mechanical seal and bearing life.
- 4 Between bearing, stiff shaft design reduces shaft deflection for longer bearing and mechanical seal life
- 5 Positive positioned oil rings assure complete oil penetration into the bearing without foaming and thereby extend bearing life. Provisions for oil mist lubrication are standard design.
- 6 Labyrinth flingers at each end of the bearing housing provide built-in protection of the lubrication against contamination
- 7 Standard finned cooling inserts reduce bearing temperatures on hot services and lengthen bearing life. The insert is made of corrosion-resistant materials to handle the most difficult cooling liquids.
- 8 Optional bearing designs and lubrication systems can be custom-fit to application. Pressure lubrication systems to API 610 or 617 are available.



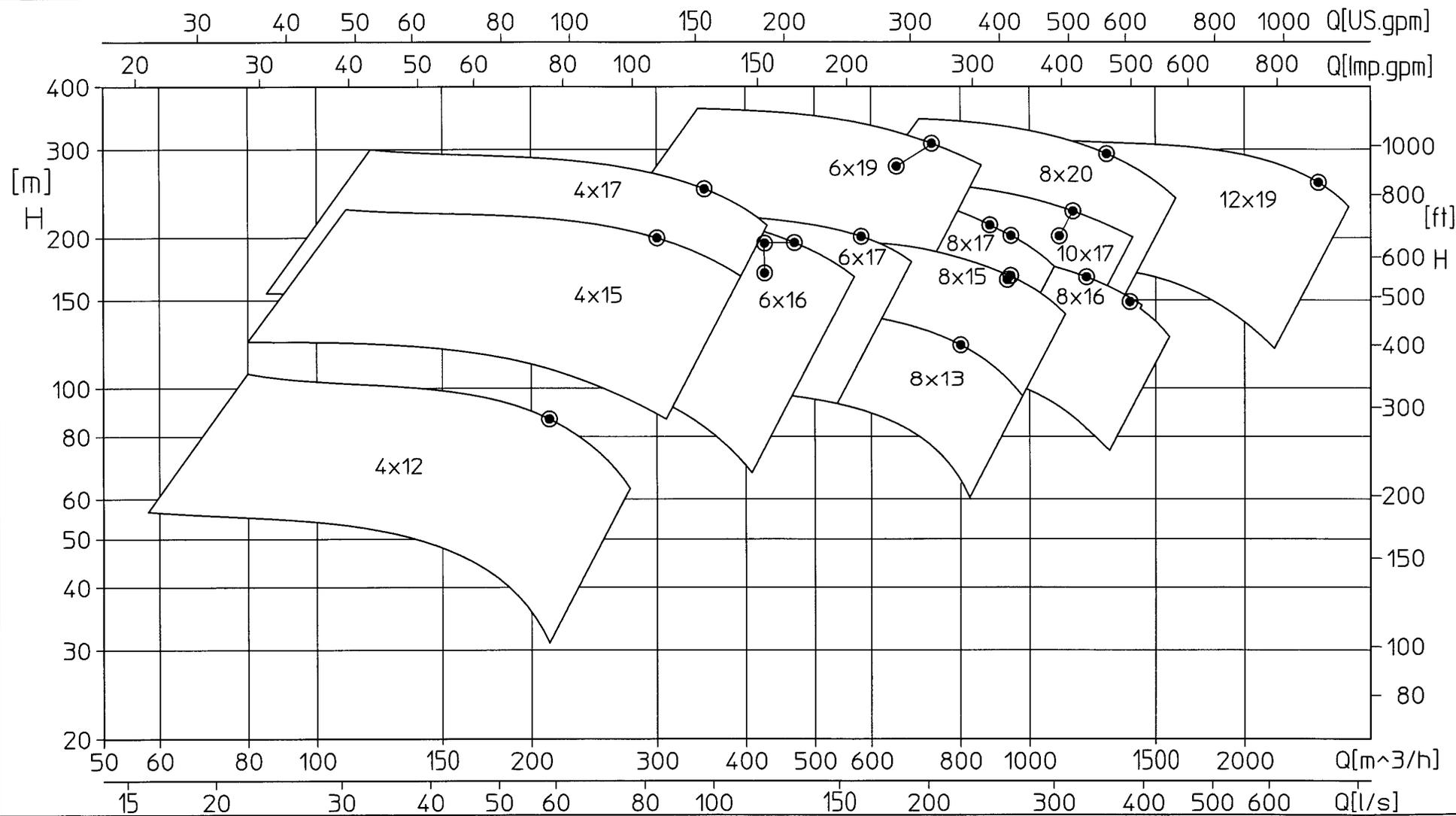


BB2 50Hz 2 Pole



BB2 Selection Chart J n=2960 1/min

LT 1398.00	Stand:10.03
Gez.: Kölling	Dat.: 10.10.03
Gepr.: <i>H</i>	Dat.: 27.10.03





Do you have enough $NPSH_A$?

So your options are:-

- Is there a 4 Pole OH2 selection available
- Can you find a bit more NPSHA?
- Is there a BB2 pump available?
- Is an inducer acceptable?
- Is a higher Nss impeller acceptable?
- Select a VS6 Pump (vertical barrel pump, low $NPSH_R$)
- DON'T Select a 3 stage BB3 and lose the project!

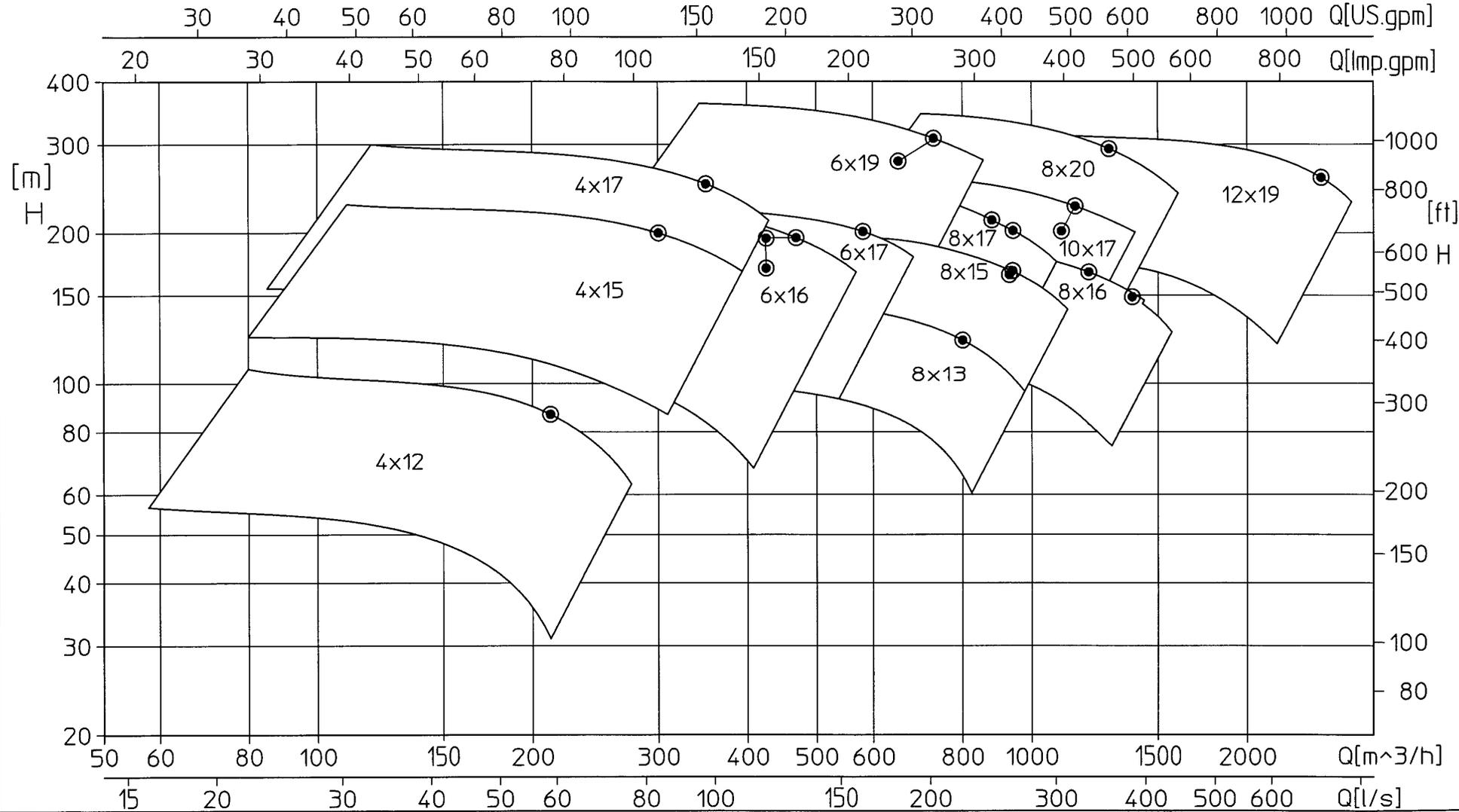


BB2 50Hz 2 Pole



BB2 Selection Chart J n=2960 1/min

LT 1398.00	Stand:10.03
Gez.: Kölling	Dat.: 10.10.03
Gepr.: <i>H</i>	Dat.: 27.10.03



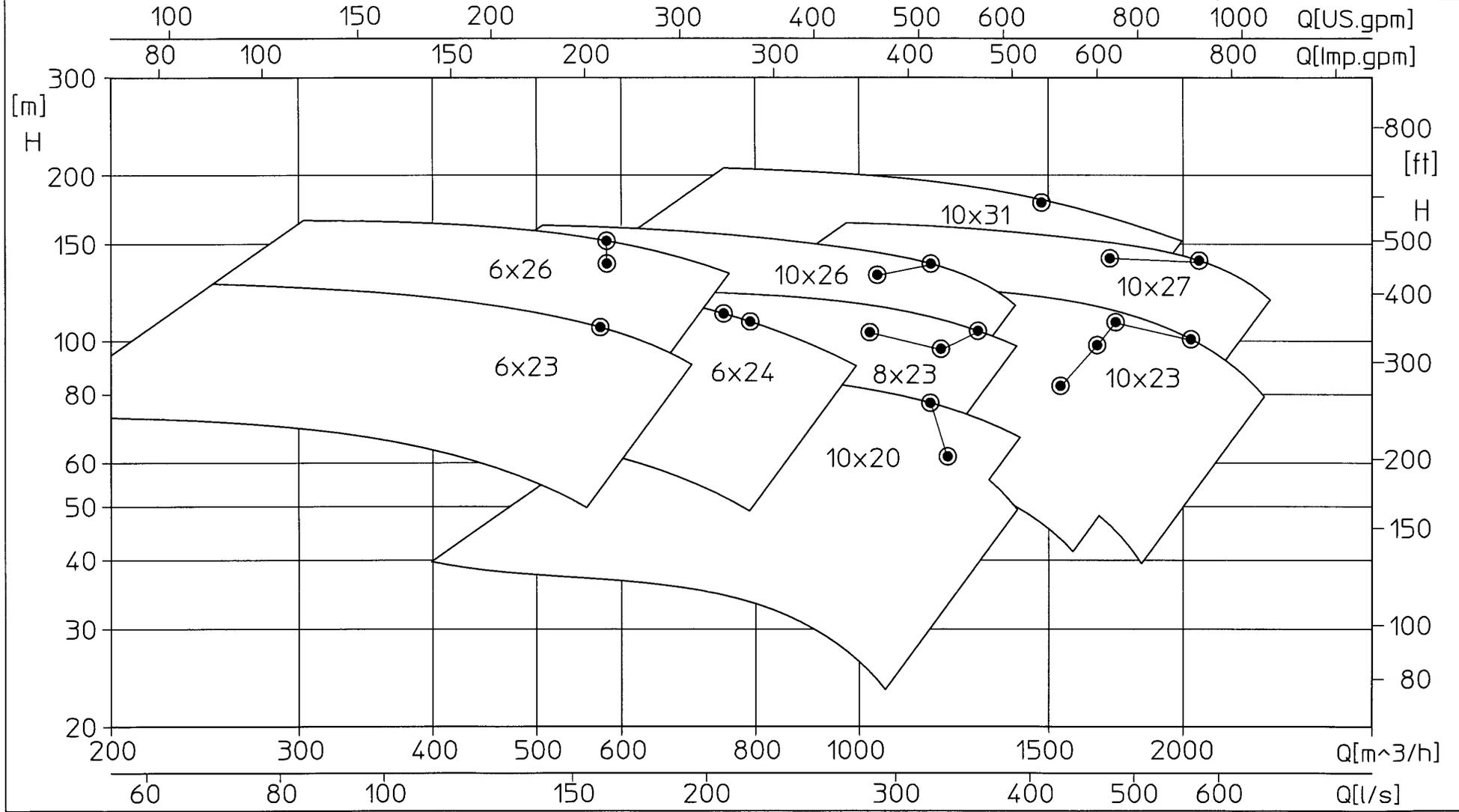


BB2 50Hz 4 Pole



BB2 Selection Chart J n=1480 1/min

LT 1401.00	Stand:10.03
Gez.: Kölling	Dat.: 21.10.03
Gepn: <i>Hi</i>	Dat.: <i>27.10.03</i>



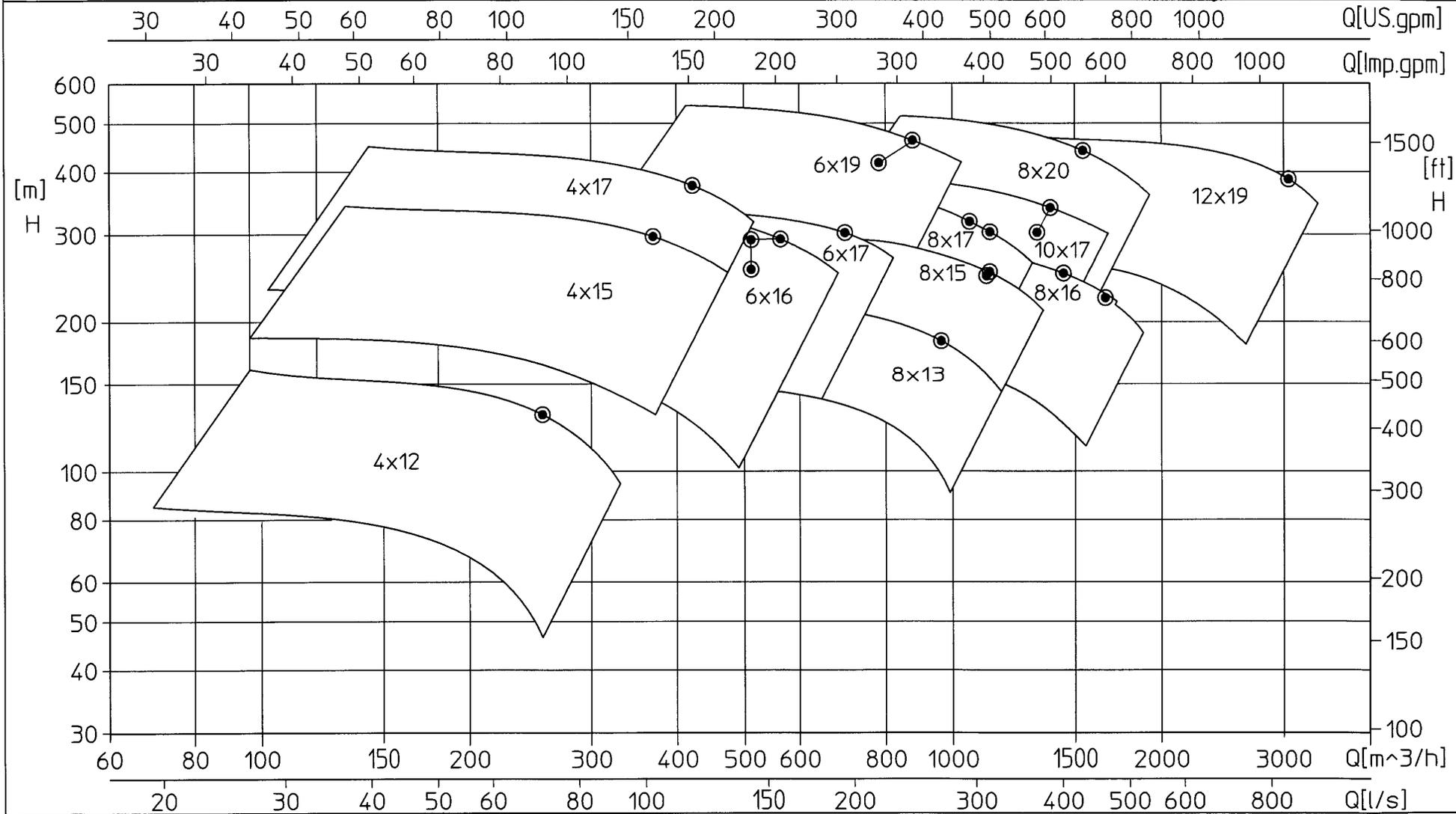


BB2 60Hz 2 Pole



BB2 Selection Chart J n=3560 1/min

LT 1399.00	Stand:10.03
Gez.: Kölling	Dat.: 20.10.03
Gepr.: <i>Mi</i>	Dat.: 27.10.03



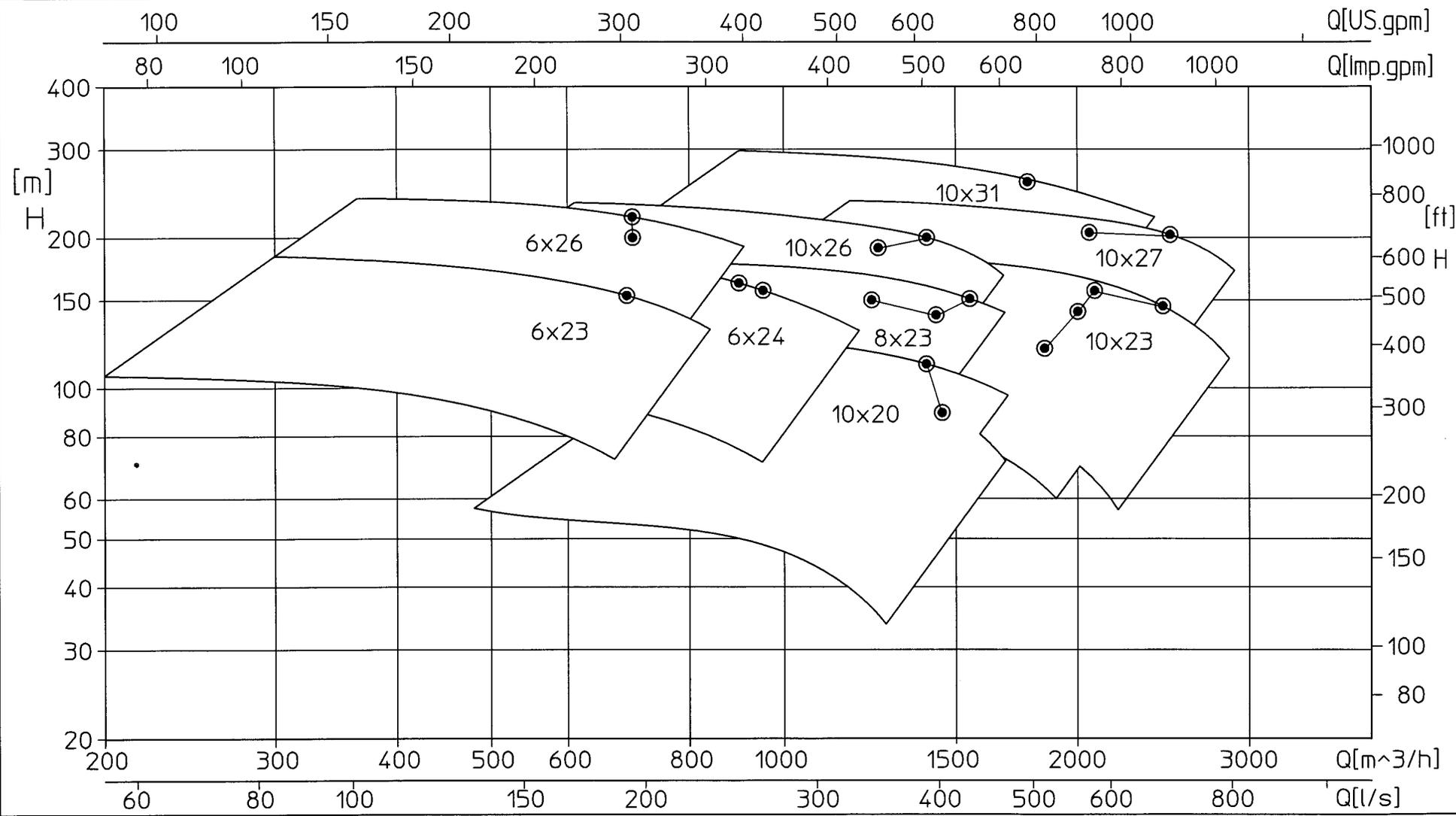


BB2 60Hz 4 Pole



BB2 Selection Chart J n=1780 1/min

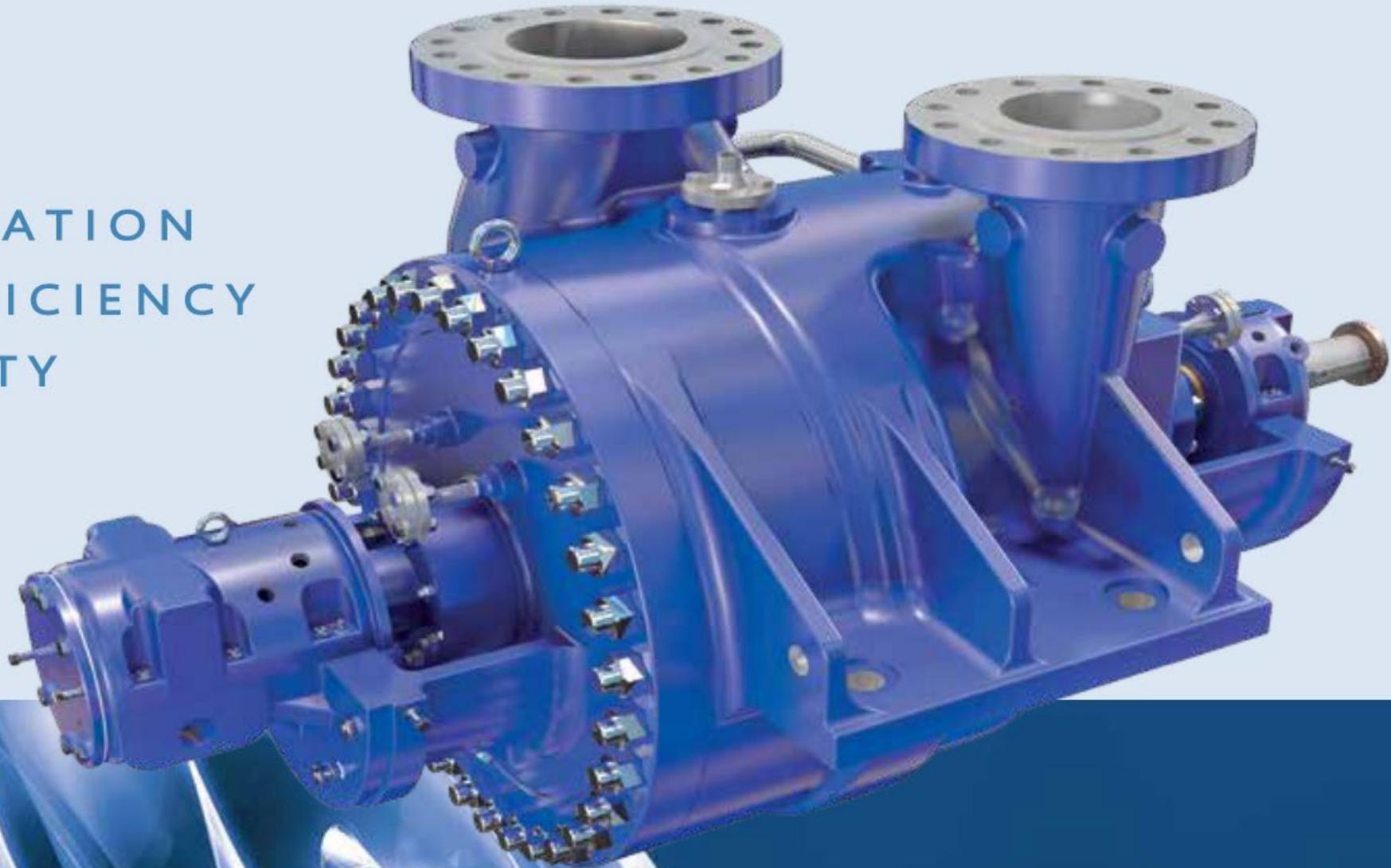
LT 1400.00	Stand:10.03
Gez.: Kölling	Dat.: 21.10.03
Gepr.: <i>Hi</i>	Dat.: <i>27.10.03</i>





BB2- 2 Stage Pumps

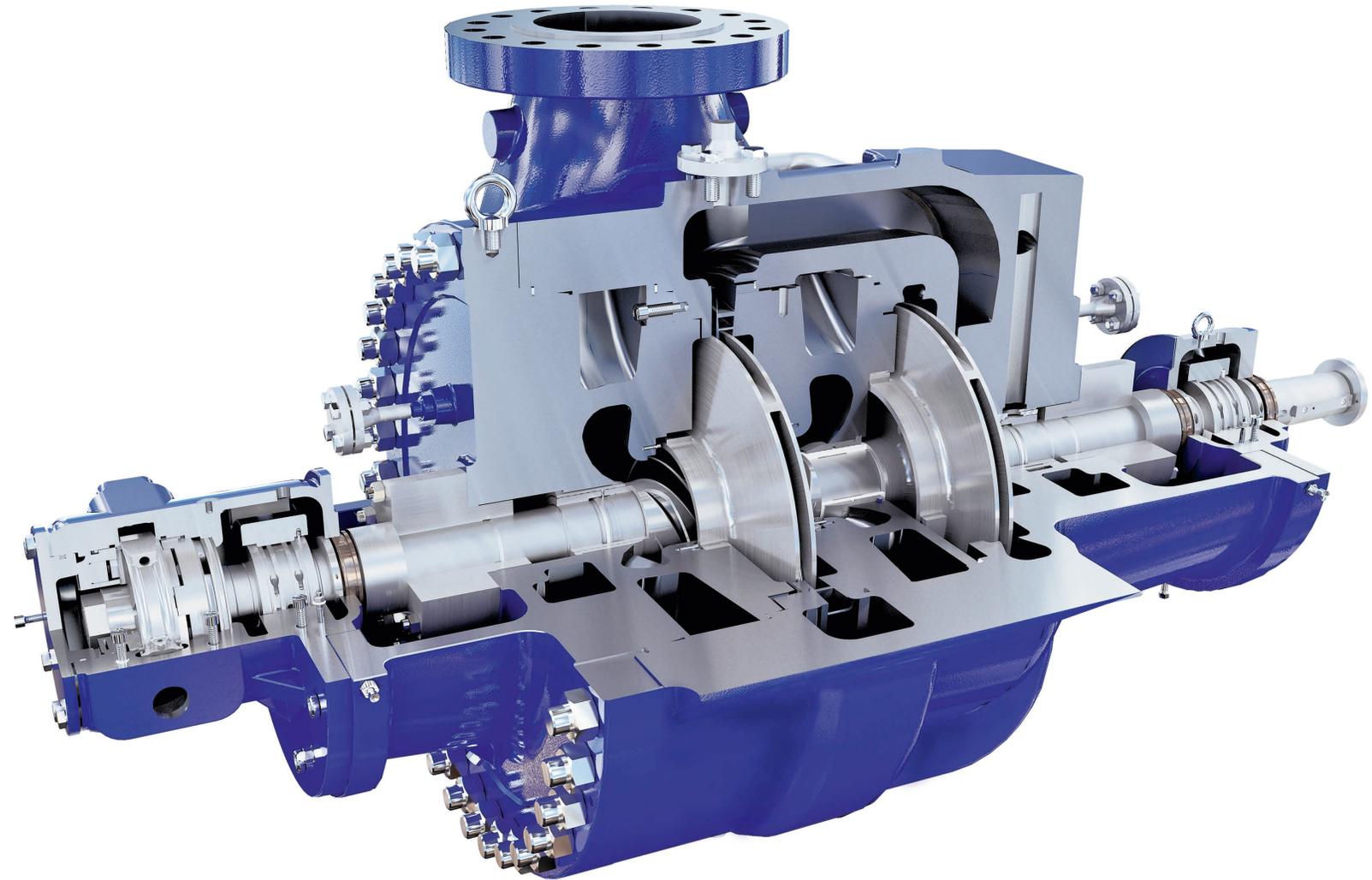
INNOVATION
EFFICIENCY
QUALITY





BB2- 2 Stage Pumps

Available in Single Suction and Double Suction 1st Stage construction.





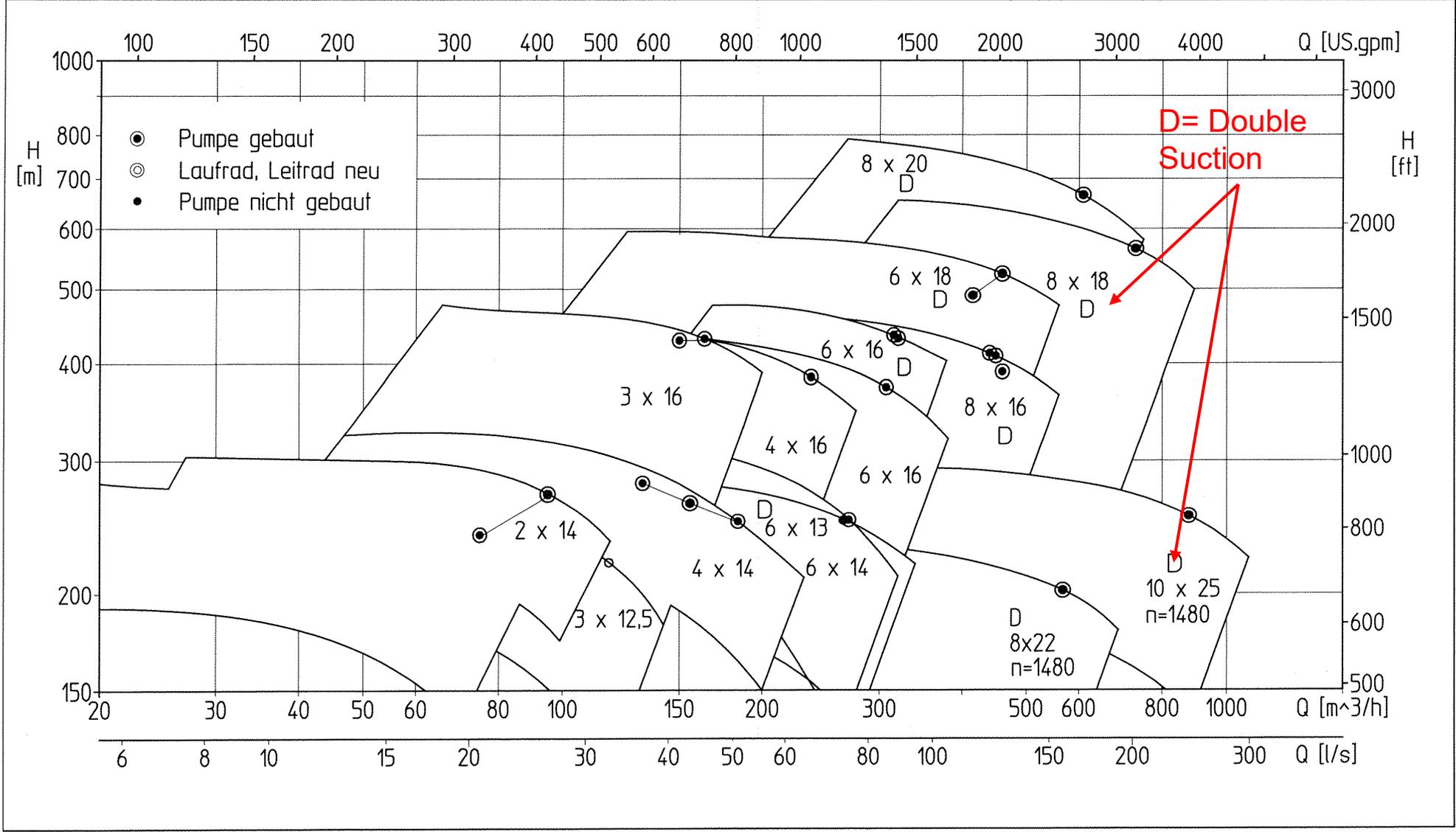
BB2 - 2 Stage, 50 Hz 2 Pole

BB2 - 2 Stage



Selection Chart RON n = 2960 1/min

Stand: 07.17	LT 1285.39
Gez.: Kölling	Datum: 05.07.17
Gepr.: <i>li</i>	Datum: <i>6.7.17</i>





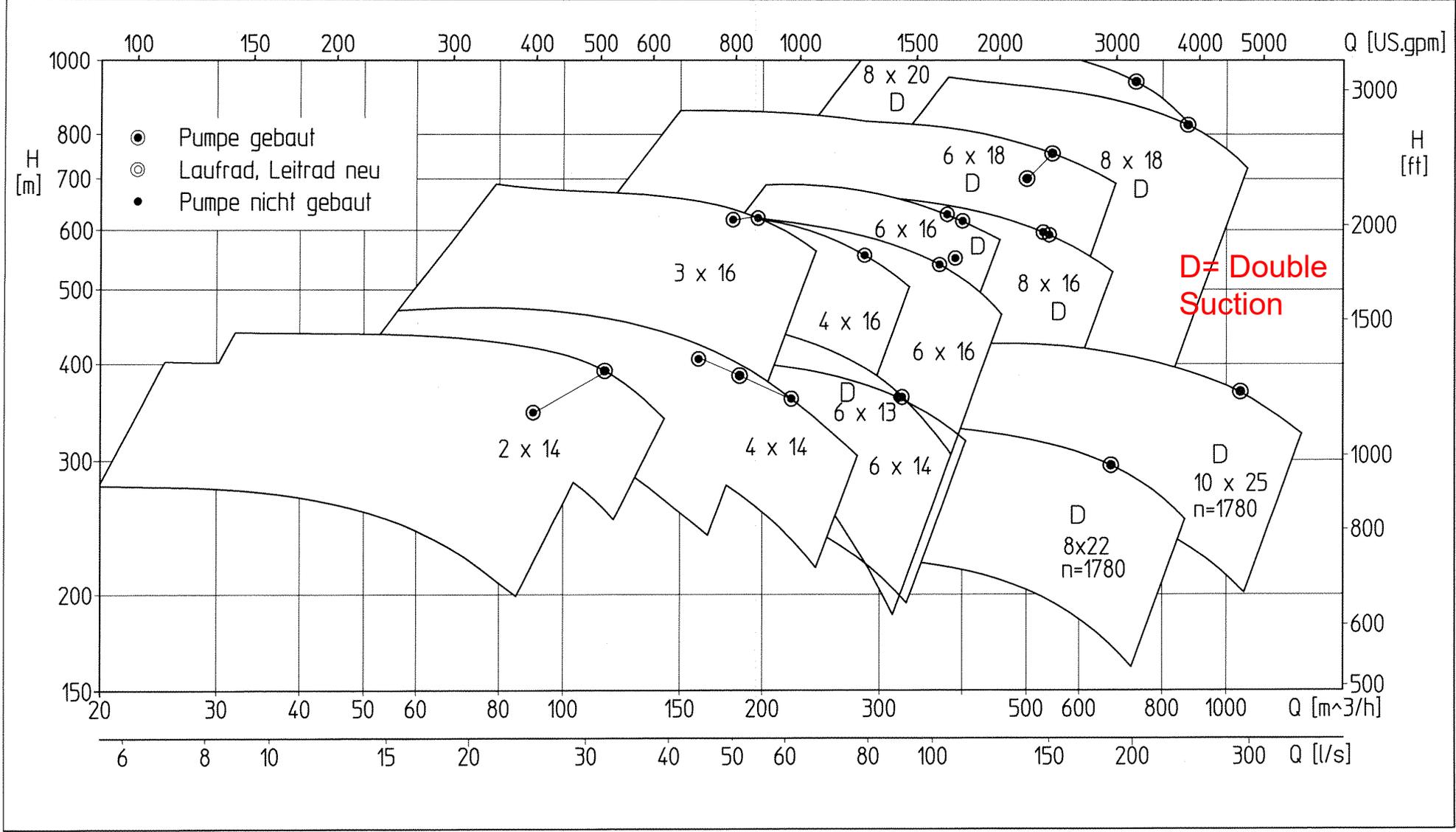
BB2 - 2 Stage, 60 Hz 2 Pole

BB2 - 2 Stage



Selection Chart RON n = 3560 1/min

Stand: 05.17	LT 1369.59
Gez.: Kölling	Datum: 08.05.17
Gepr.: <i>M.</i>	Datum: 9.5.17

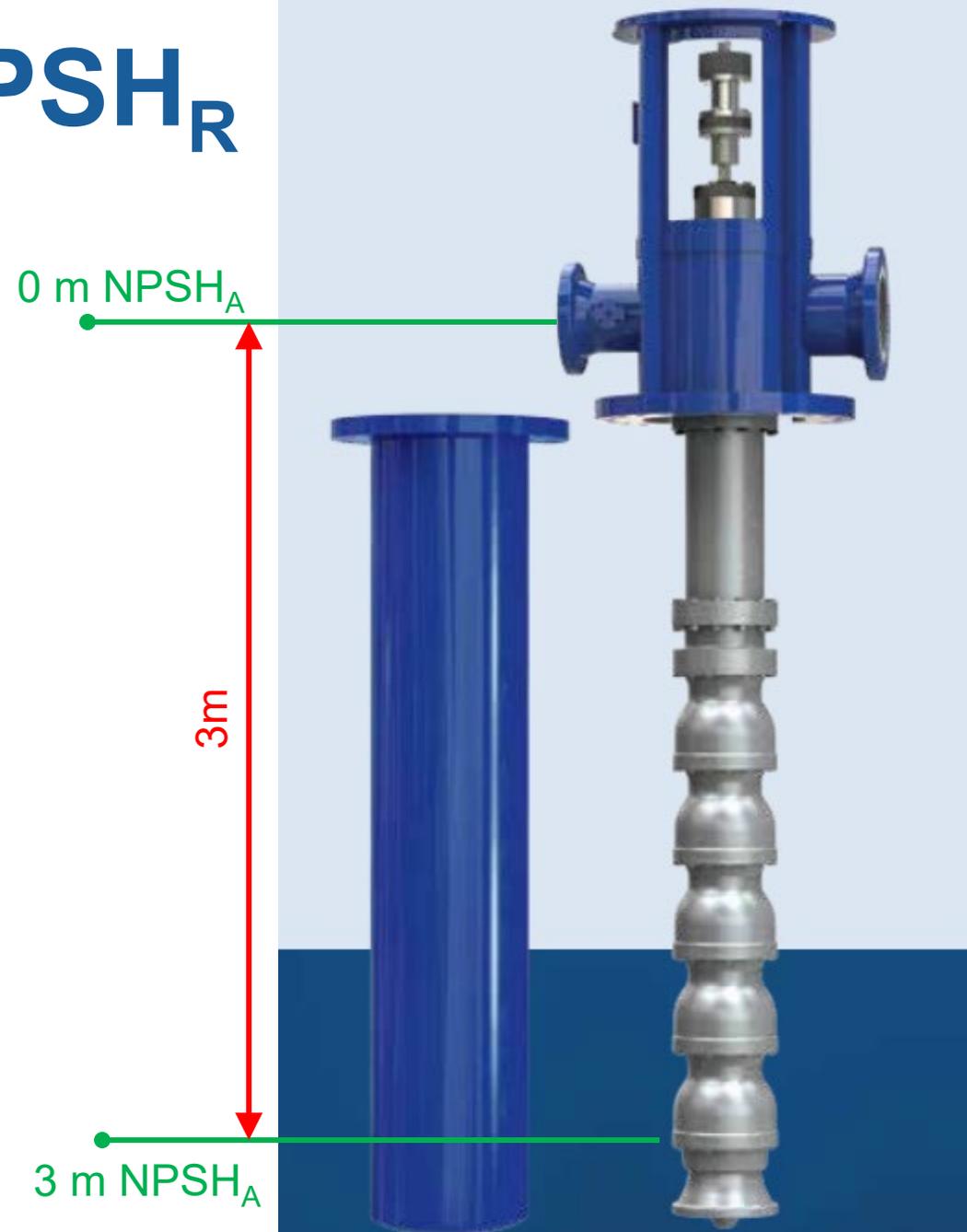




VS6 Pumps – Zero NPSH_R

The Spacesaver and Costsaver

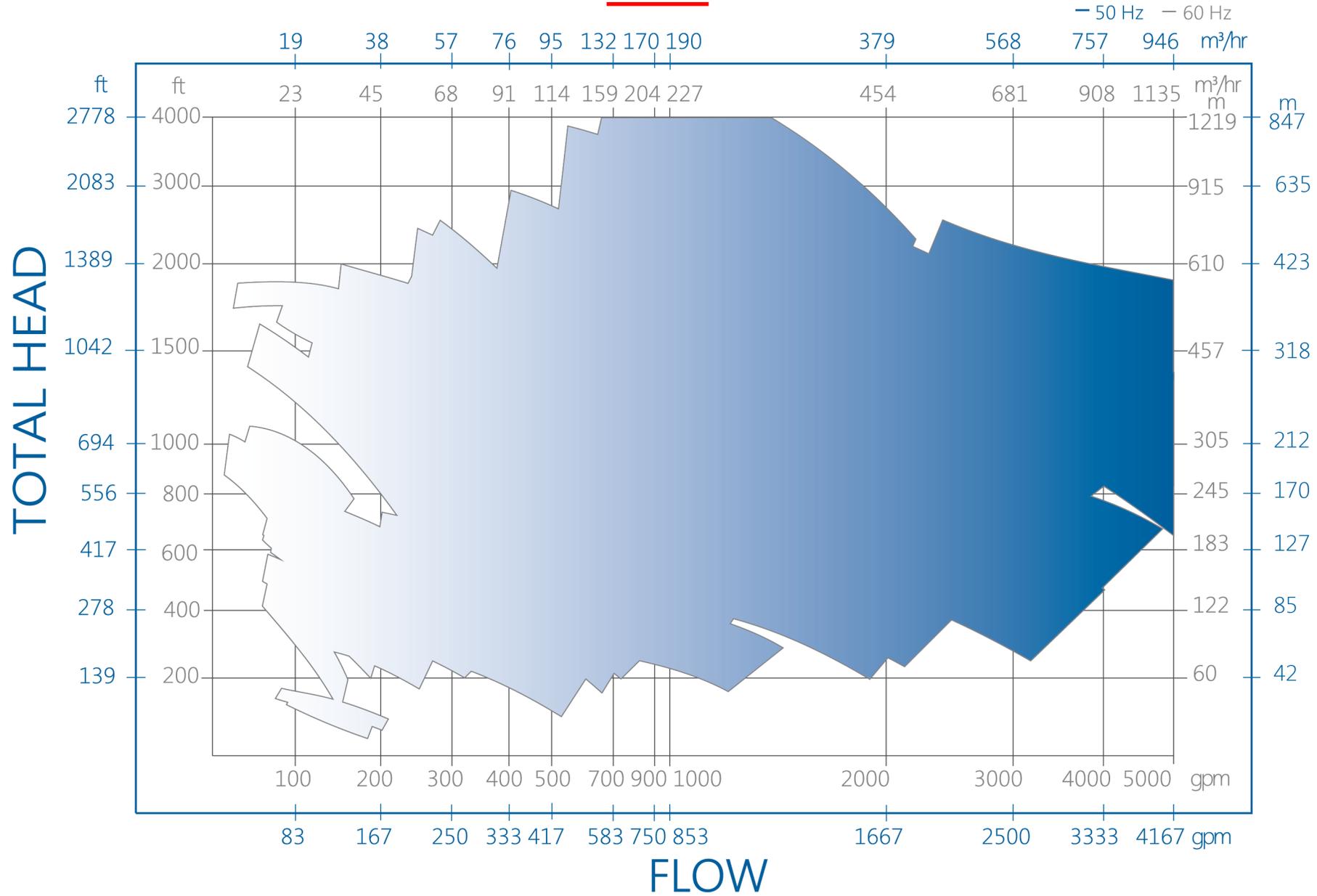
- You've looked OH2 pumps and at BB2 pumps and you still have an NPSH problem
- Not just an NPSH saver but a space saver too. Around 20% of the floorspace of the equivalent BB2
- And a cost saver too. Less expensive than the equivalent BB2
- One seal, one sealing system
- Once you can persuade your civil engineers to dig a hole you are saving all the way.





VS6 – Multispeed – Semi Engineered Range

Selection Chart VLT VS6





Axially Split Pumps BB1 & BB3

Pipeline Pumps



Axially Split Pumps BB1 & BB3

Limitation from API610 on use of axially split pumps

- 6.3.9 Unless otherwise specified, pumps with **radially split** casings are required in services for any of the following conditions:
 - a) **pumping temperature of 200 C (400 F)** or higher (a lower temperature limit should be considered if thermal shock is probable);
 - b) liquids with a **relative density of less than 0,7** at the specified pumping temperature;
 - c) liquids at a rated **discharge gauge pressure above 10 MPa (100 bar; 1450 psi)**.
- Axial split casings have been used successfully beyond the limits given above, generally for off-plot applications at higher pressure or lower relative density (specific gravity). The success of such applications depends on the margin between design pressure and rated pressure, the manufacturers experience with similar applications, the design and manufacture of the split joint, the user's ability to correctly remake the split joint in the field. The purchaser should take these factors into account before specifying an axial split casing for conditions beyond these limits.
- For an excellent article by Simon Bradshaw on this subject, follow this link
- <https://www.linkedin.com/pulse/thngs-api-610-got-wrong-part-5-simon-bradshaw/>



INNOVATION
EFFICIENCY
QUALITY



ZM I to III

Axially Split Case, Heavy Duty
API 610 Process Pump (BB1)

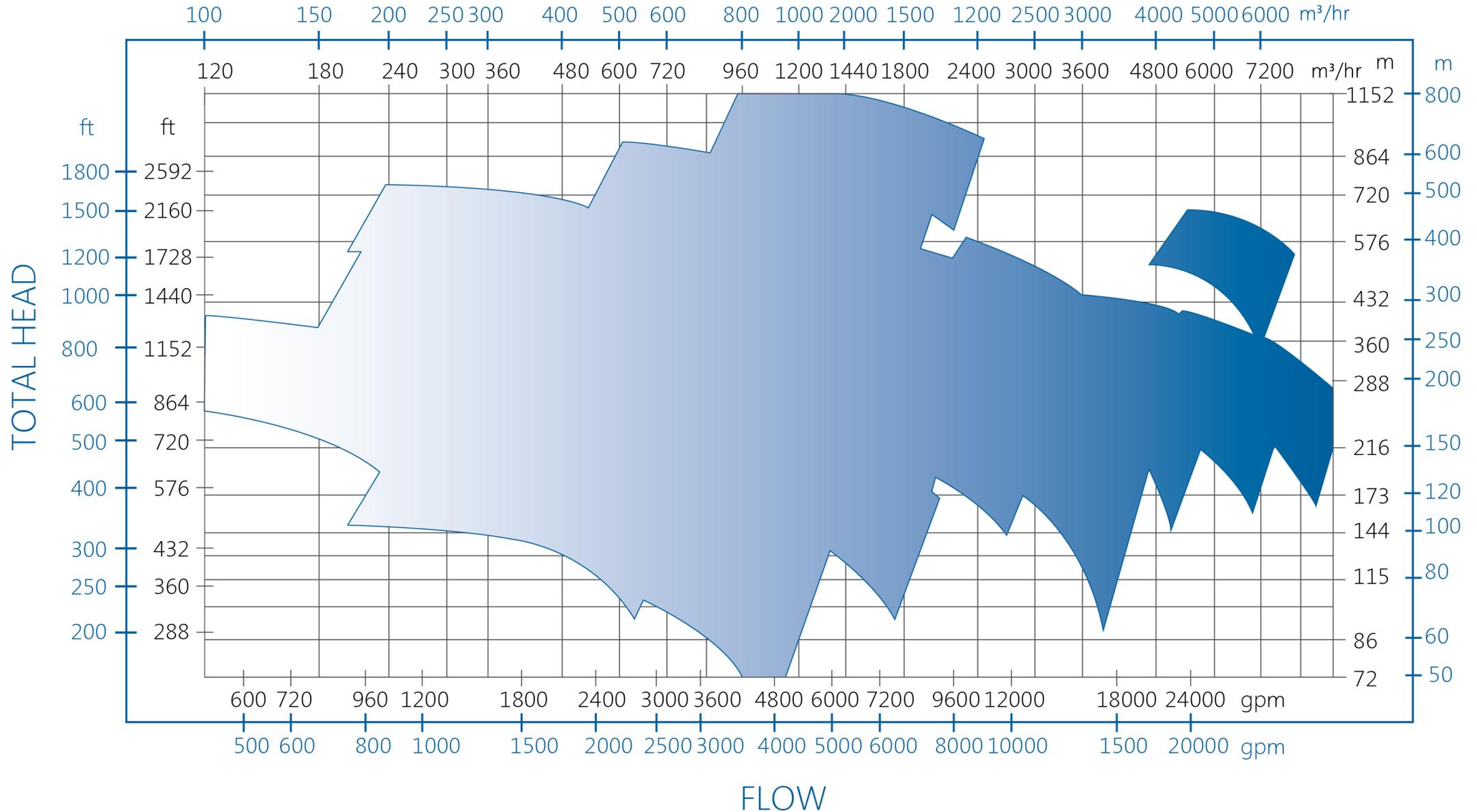


Selection Chart ZM I

BB1- B

2 POLES
50 Hz 60 Hz

BB1, 50 & 60 Hz, 2 Pole



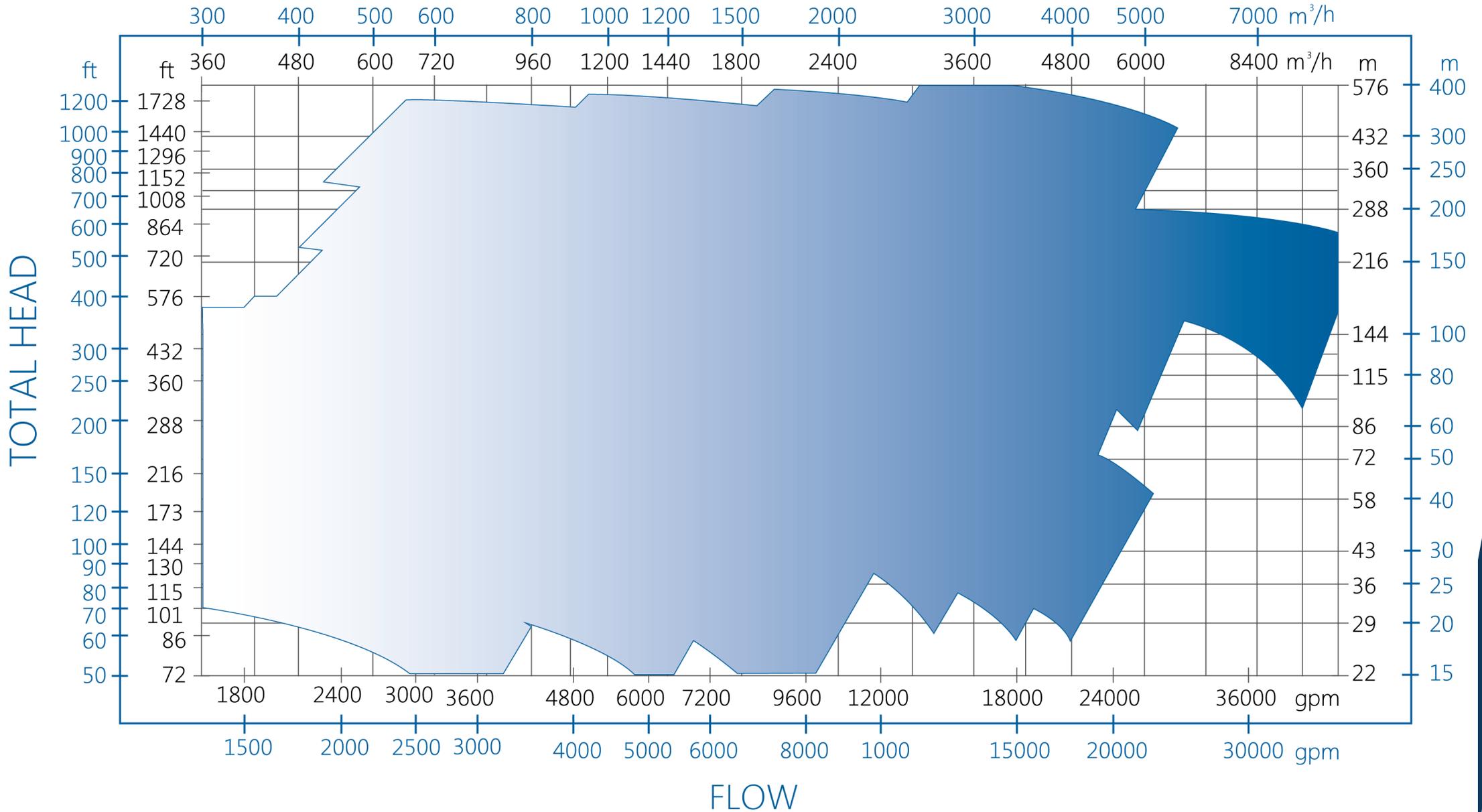


Selection Chart ZM II

BB1- B

4 POLES
- 50 HZ - 60 HZ

BB1, 50 & 60 Hz, 4 Pole



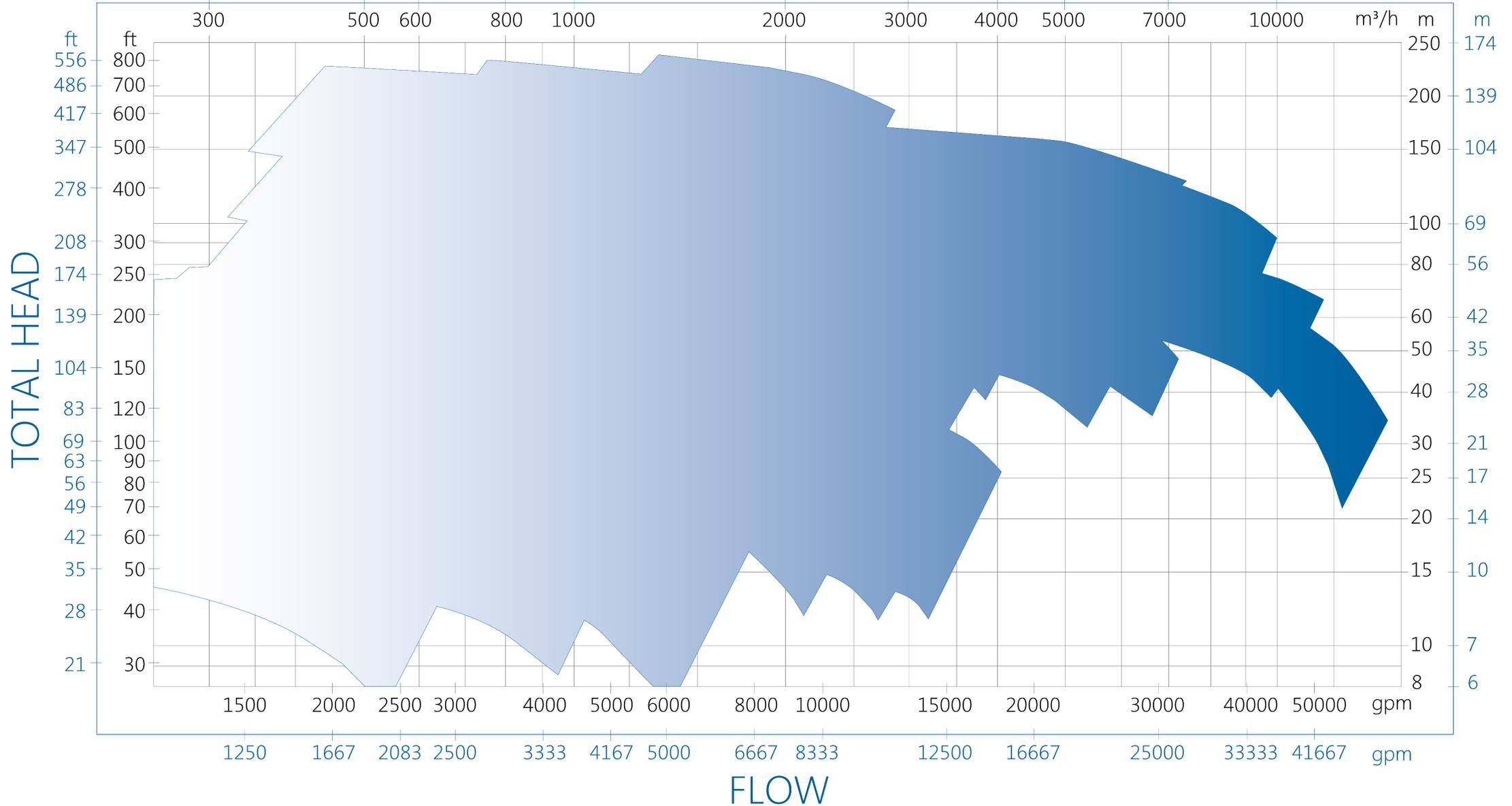


Selection Chart ZM III

BB1- B

6 POLES
50 Hz 60 Hz

BB1, 50 & 60 Hz, 6 Pole





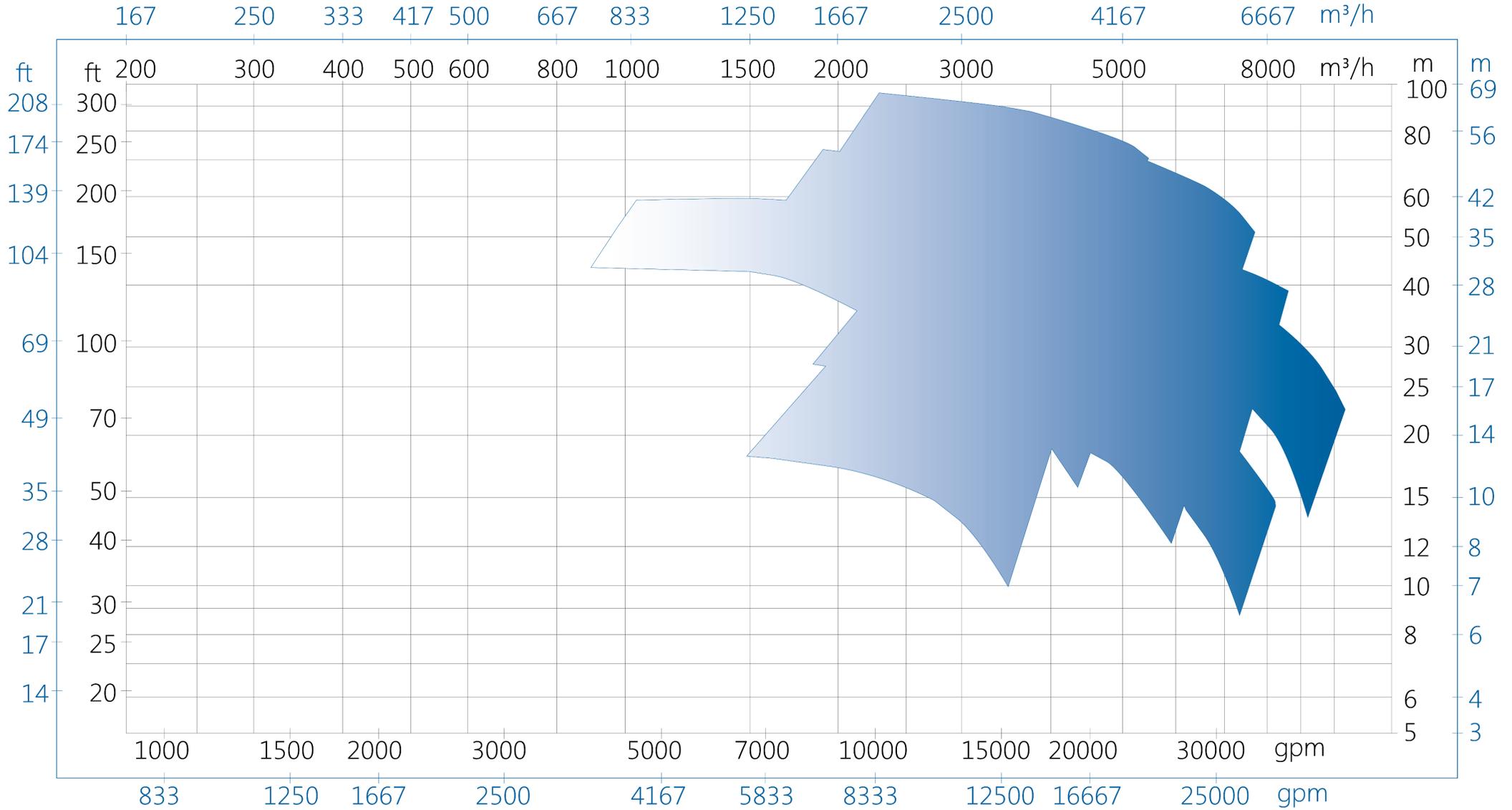
Selection Chart ZM IV

BB1- B

8 POLES
50 Hz 60 Hz

BB1, 50 & 60 Hz, 8 Pole

TOTAL HEAD

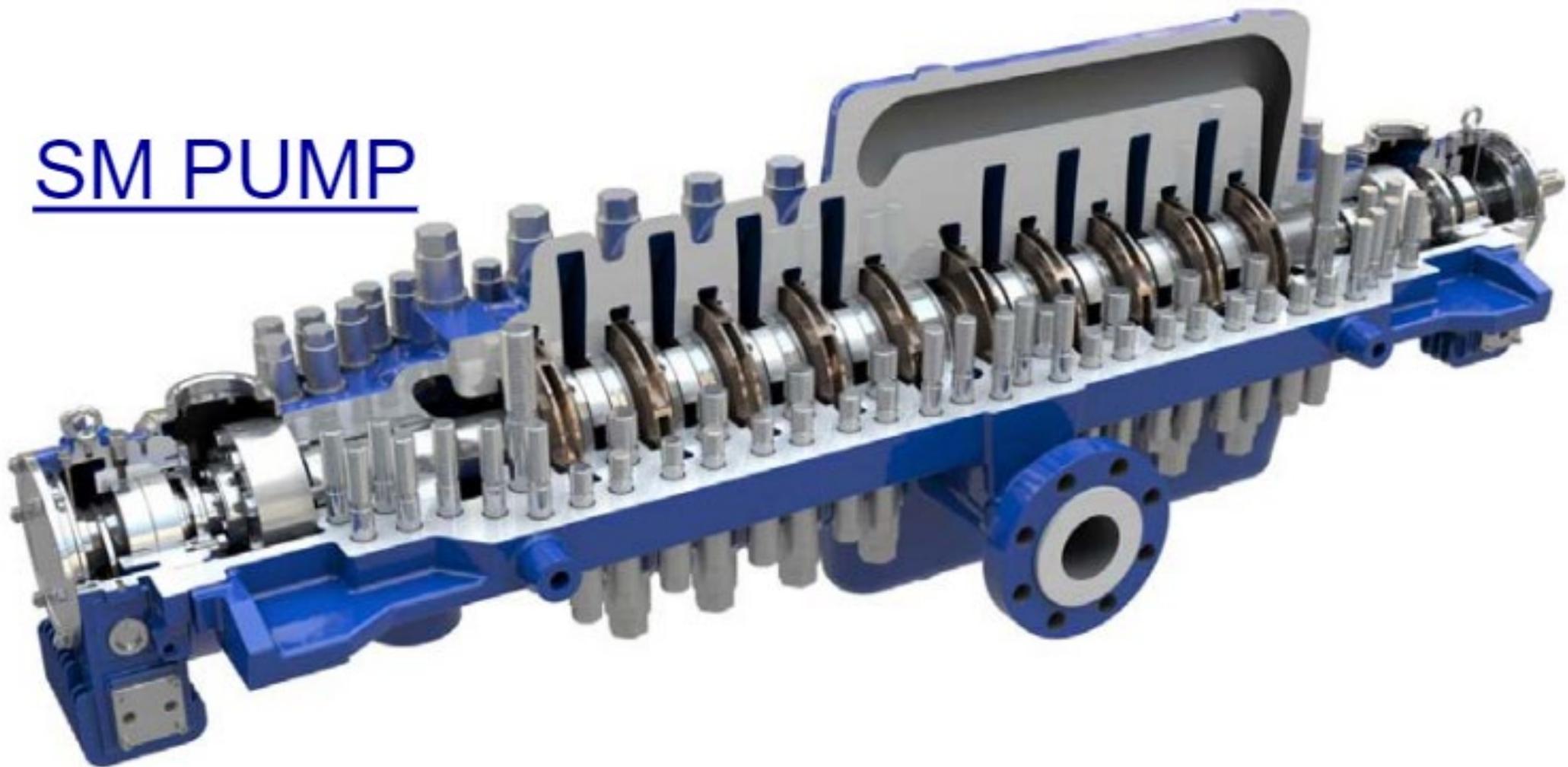


FLOW



Axially Split Multistage Type BB3

SM PUMP





Axially Split Type BB3

Interstage Bolting ensures gasket compression in this area and prevents erosion caused by fluid washover.

It means this design is good for SG as low as 0.4 and pressures to 180 Bar.





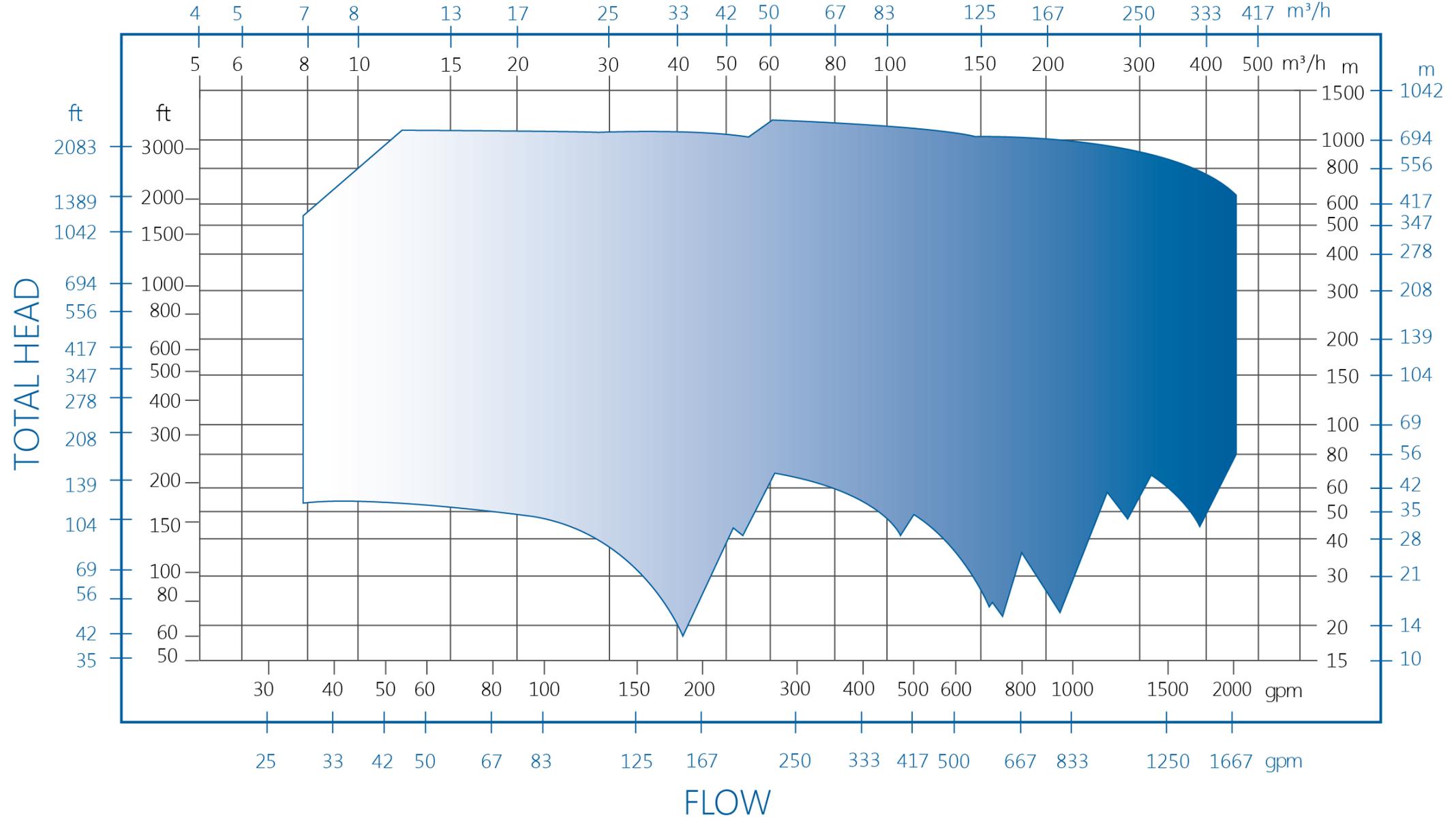
Selection Chart JTN

BB3

2 Poles

— 50 Hz — 60 Hz

BB3 Smaller Sizes, 50 & 60 Hz, 2 Pole



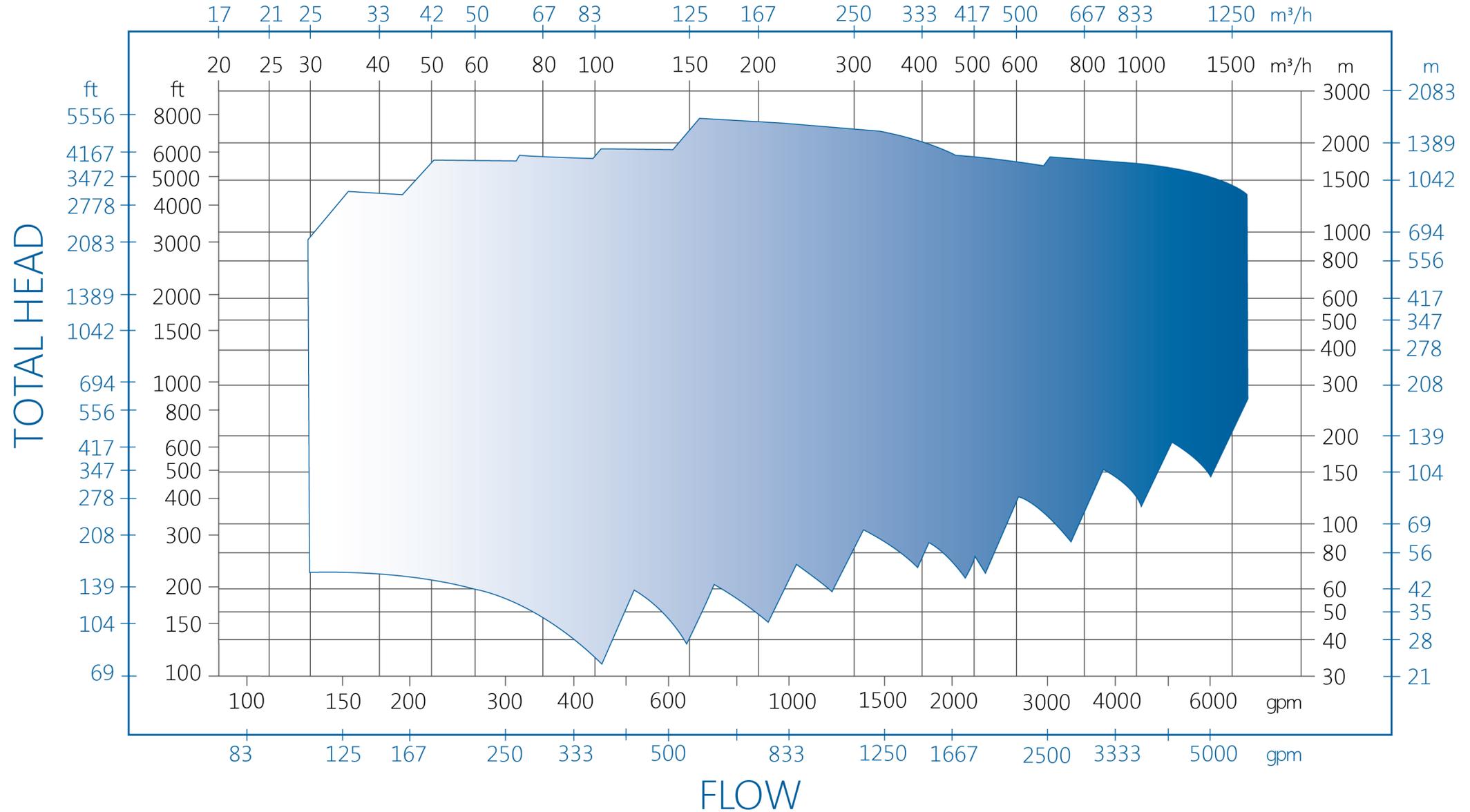


Selection Chart SM/SMI

BB3

2 POLES
(2960 / 3560 RPM)
— 50 Hz — 60 Hz

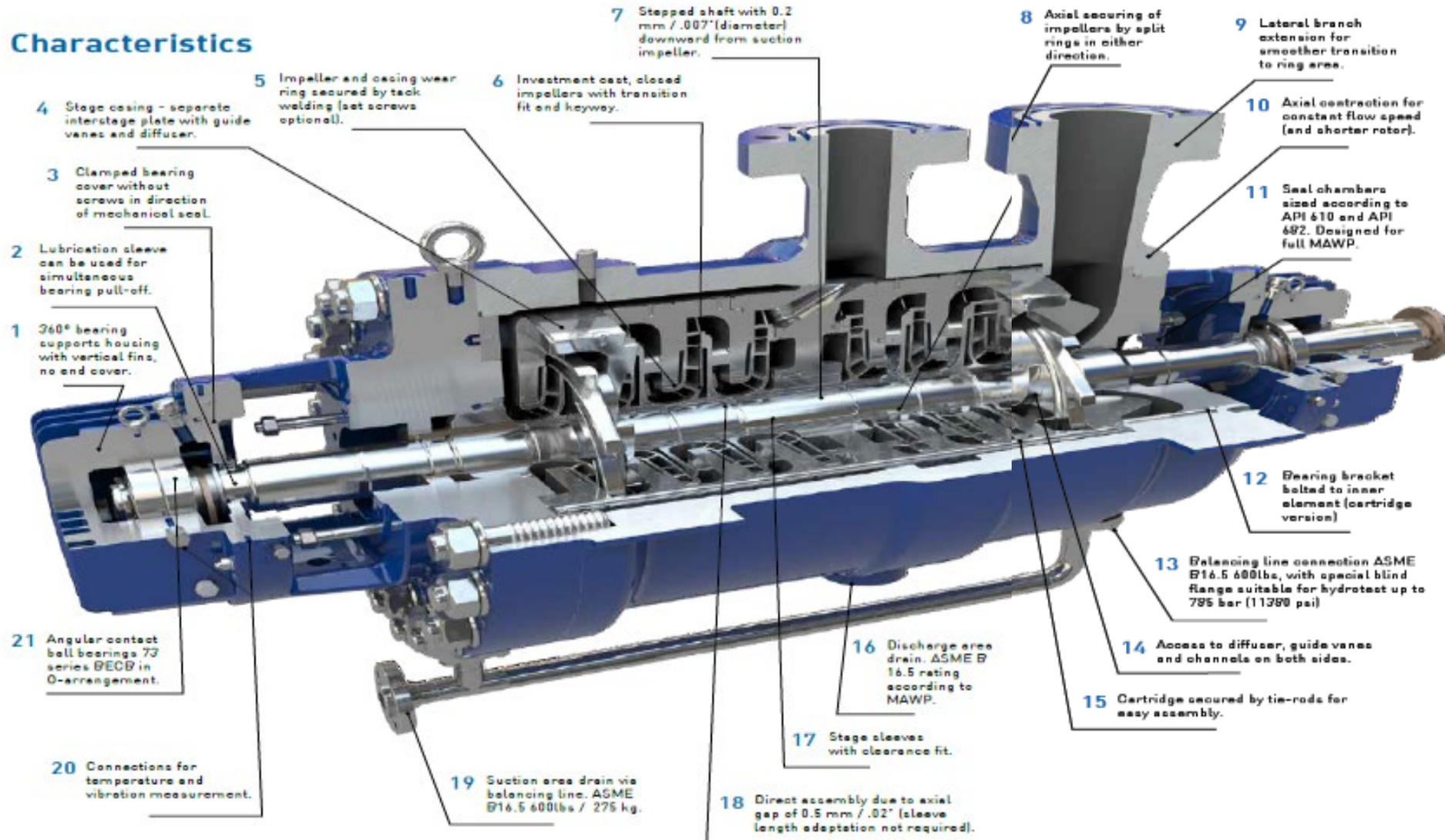
BB3 Larger Sizes, 50 & 60 Hz, 2 Pole





Double Case Pump Type BB5

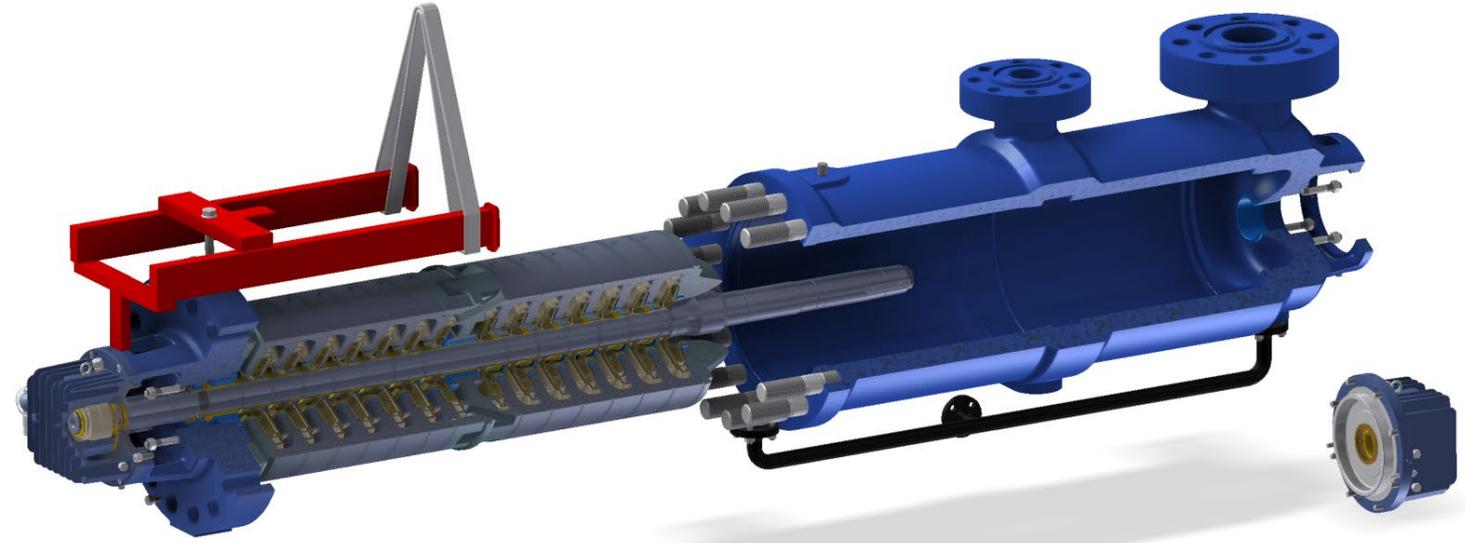
Characteristics





Double Case Pump Type BB5

Pull-out Design



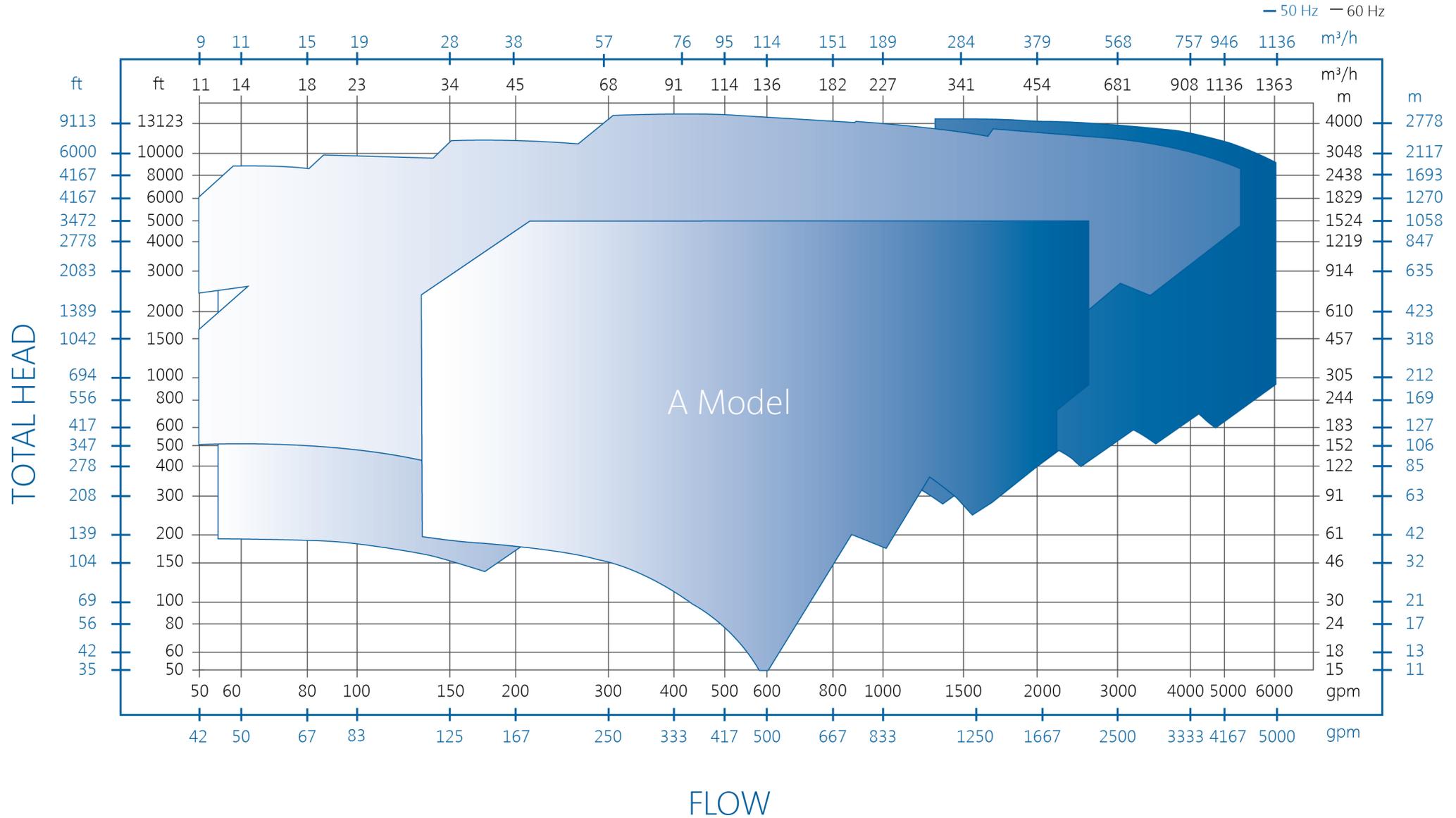


SELECTION CHART A-LINE

BB5

2 POLES

BB5, 50 & 60 Hz, 2 Pole





Coming Attractions 😊

“Comparison of API610 12th and 11th Editions”

Thurs 14th March – 08.00 (UK GMT) (Eastern Hemisphere) & 17.00 (UK GMT) (Western Hemisphere)

API 610 12th Edition has been around for a couple of years now and is being referenced in more and more end user/client specifications

The session will look at the KEY FEATURES of, & MAJOR CHANGES between 12th & 11th Editions of API610.

Aimed at Process and Mechanical Engineers and Consultant Engineers specifying pumping equipment as well as Applications & Sales Engineers selecting and quoting them.

The logo consists of a white circle with a stylized 'A' shape inside, formed by two diagonal lines meeting at the top and a horizontal line at the bottom. The word 'RUHRPUMPEN' is written in a bold, white, sans-serif font across the middle of the circle.

RUHRPUMPEN

Specialist for Pumping Technology

Q & A

www.ruhrpumpen.com

marketing@ruhrpumpen.com

RUHRPUMPEN AT A GLANCE

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**MANUFACTURING
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IN 10 COUNTRIES**

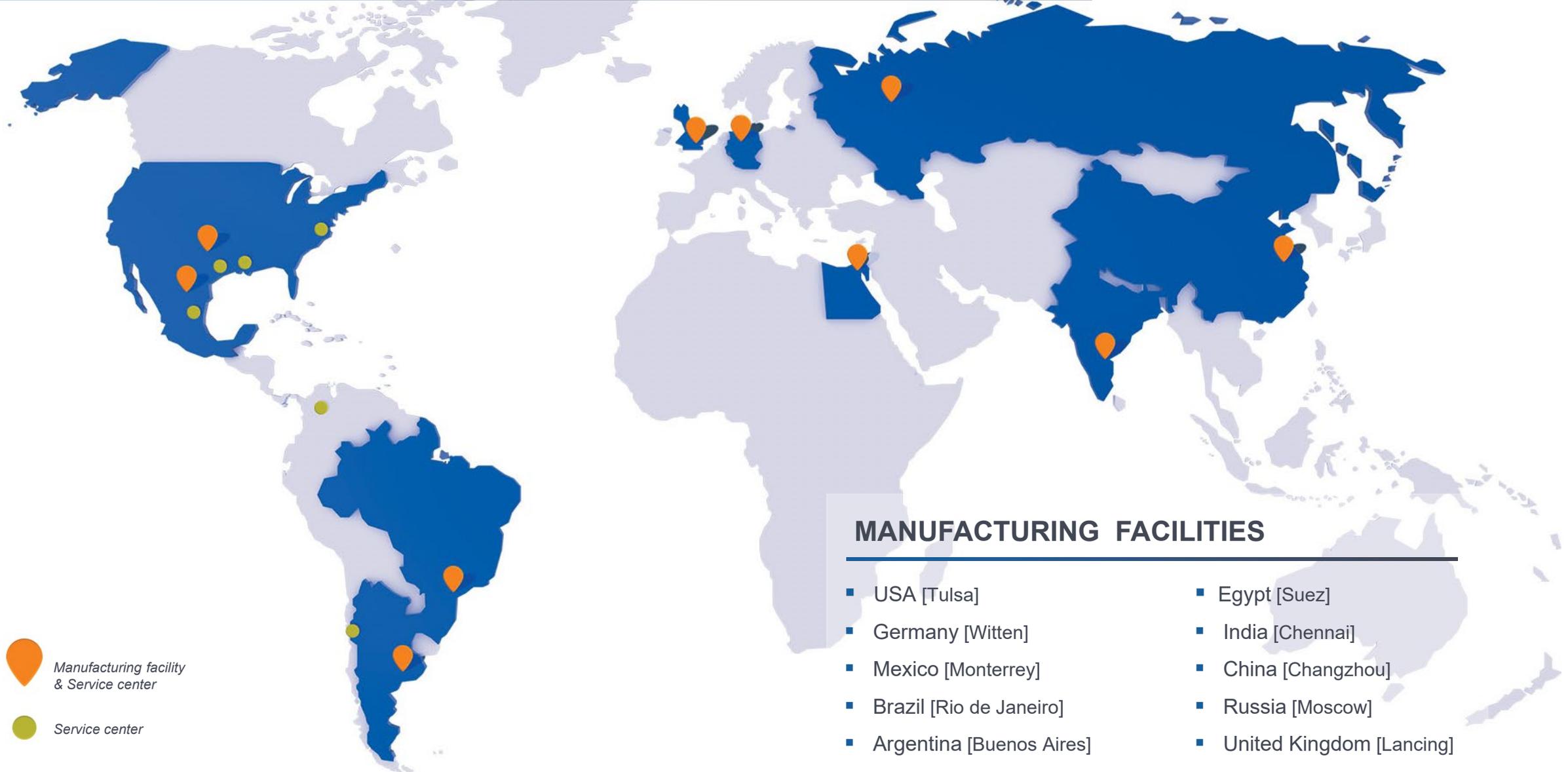
**+70 YEARS
OF EXPERIENCE**

**+2,000
EMPLOYEES**

**15 SERVICE
CENTERS**

+70,000 PUMPING SOLUTIONS INSTALLED WORLDWIDE

A GLOBAL COMPANY



MARKETS WE SERVE

Our commitment to create innovations that offer reliable solutions to our customers allow us to provide a complete range of pump systems to support **core markets** as:



OIL & GAS



CHEMICAL



INDUSTRIAL



POWER



WATER



OUR PUMP LINES

Ruhrpumpen offers a broad range of highly engineered and standard pumping products that meet and exceed the requirements of the most demanding quality specifications and industry standards.

Our pumps can handle head requirements as high as 13,000 ft (4,000 m) and capacities up to 300,000 gpm (68,000 m³/hr). Moreover, our pump designs cover temperatures from cryogenic temperatures of -310 °F (-196 °C) up to 752 °F (400 °C).

Products include:

- Single Stage Overhung Pumps
- Between Bearings Pumps
- Horizontal Multi-Stage Pumps
- Vertical Multi-Stage Pumps
- Vertical Mixed Flow & Axial Flow Pumps
- Positive Displacement Pumps
- Full Range of Industrial Pumps
- Submersible Pumps
- Magnetic Drive Pumps
- Decoking Systems
- Packaged Systems
- Fire Systems





OUR PUMPS

OVERHUNG PUMPS

CATEGORY	RP MODEL	DESIGN STANDARD	
Sealless Magnetic Drive Pumps	CRP-M / CRP-M-CC	ISO 2858 & 15783 HI design (OH11)	
	SCE-M	API 685	
Foot Mounted OH1 and General End Suction Pumps	IPP	HI design (OH1)	
	CPP / CPP-L	HI design (OH1) ANSI B73.1	
	CPO / CPO-L	HI design (OH1) ANSI B73.1	
	CRP	HI design (OH1) ISO 2858 & 5199	
	GSD	HI design (OH0)	
	SHD / ESK / SK / SKO SKV / ST / STV	HI design (OH1)	
	SWP	HI design (OH3A)	
Centerline Mounted	SCE	API 610 (OH2)	
Vertical In-Line Pumps	SPI	API 610 (OH3)	
	IVP / IVP-CC	HI design (OH4 / OH5)	
	IIL	HI design (OH5) Dimensionally compliant with ANSI B73.2	
	SPN	API 610 (OH5)	





BETWEEN BEARING PUMPS

CATEGORY		RP MODEL	DESIGN STANDARD	
1 and 2 stage	Axially split	HSC / HSD / HSL HSR / ZW	HI design (BB1)	
		HSM	HI design (BB3)	
		ZM / ZMS ZLM / ZME	API design (BB1)	
	Radially split	HVN / J	API design (BB2)	
		RON / RON-D	API design (BB2)	
Multi-stage	Axially split	SM / SM-I	API design (BB3)	
		JTN	API design (BB3)	
	Radially split <i>single casing</i>	GP	API design (BB4)	
	Radially split <i>double casing</i>	A LINE	API design (BB5)	





VERTICAL PUMPS

OUR PUMPS

CATEGORY		RP MODEL	DESIGN STANDARD	
Single casing	Diffuser	VTP	HI & API 610 (VS1)	
		VCT	HI & API 610 (VS1)	
		HQ	HI & API 610 (VS1)	
		VLT	HI & API 610 (VS1)	
	Volute	DSV / DX	HI & API 610 (VS2)	
	Discharge through column – Axial flow	VAF	HI & API 610 (VS3)	
Separate discharge line	VSP / VSP-Chem	HI & API 610 (VS4)		
Double casing	Diffuser	VLT / VMT	HI & API 610 (VS6)	
	Volute	DSV / DX	HI & API 610 (VS7)	
Submersible pumps		SMF	HI design (OH8A)	
		VLT-Sub / VTP-Sub	HI design (VS0)	





SPECIAL SERVICE PUMPS

CATEGORY	RP MODEL	DESIGN STANDARD	
Pitot tube pumps	COMBITUBE	HI design	
Reciprocating pumps	RDP	API 674 ISO 13710	
Vertical turbine generator	VTG	HI design (VS6)	
Barge	LS BARGE	HI design	
Floating dock pumps	ZVZ	HI design	
	LVZ	HI design	
Cryogenic pumps	SVNV	-	
	VTG Cryogenic	-	
	VLT Cryogenic VLTV	-	
Pre-packaged fire pump systems	Fire systems incorporate pumps, drivers, control systems and pipework in a single container. They can be skid mounted, with or without enclosure and supplied with electric motor or diesel engine.	NFPA-20-850 UL and FM approved components	

