Session 20 –
New Developments in the VS6 Market
(vertical double case pumps for low NPSH service)

Vertical pumps, especially VS6 pumps, are among the least well understood pump types among rotating equipment engineers, mainly because they are not as frequently used as their horizontal brothers. This short course will revisit VS6 & VS1 pumps in API610 hydrocarbon applications and introduce an exciting new development in this market segment.
Aimed at Process and Mechanical Engineers, and Consultant Engineers who specify pumping equipment as well as Applications & Sales Engineers selecting and quoting them

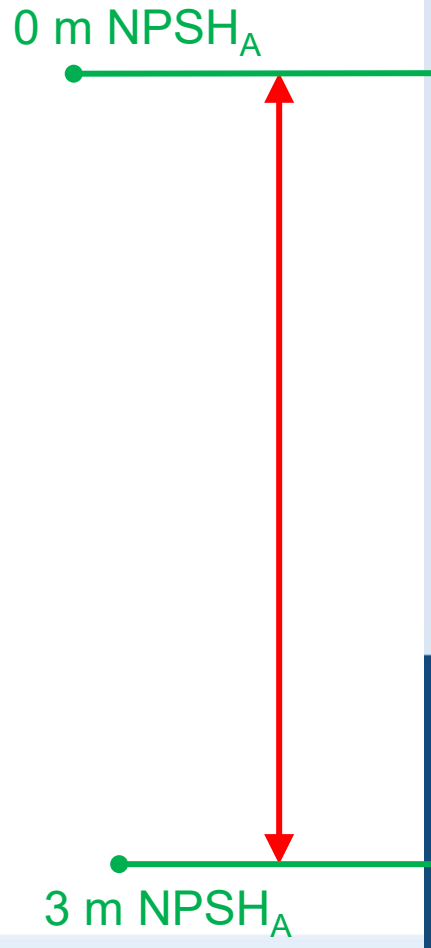
Pump Type VS6
“Double Casing, Diffuser Type, Vertical Suspended” Pumps
“Canned Suction” Pumps
“Vertical Barrel” Pumps

VS6 Pumps – Zero $NPSH_R$

The Spacesaver and Costsaver

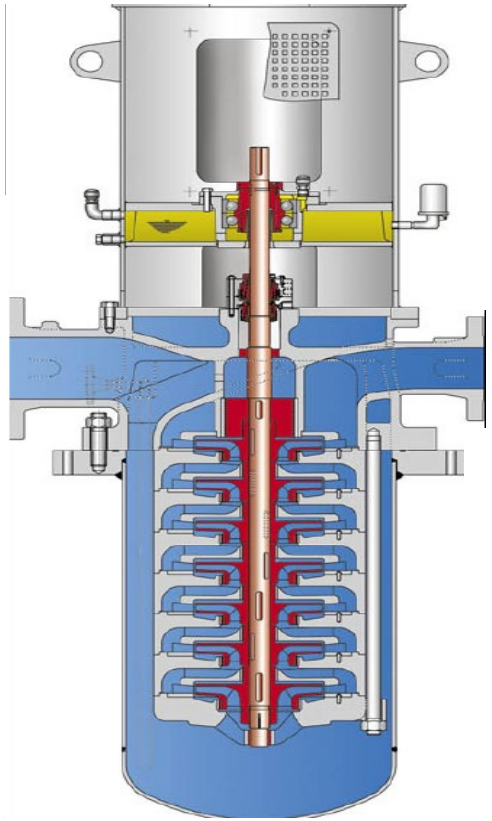
Works on the basis that if you have 0m NPSHA at Grade, then 3m down you have 3m NPSHA
So we make the pump long enough, by putting in spool pieces as necessary to position the first impeller low enough to give you sufficient NPSH margin.

- 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.

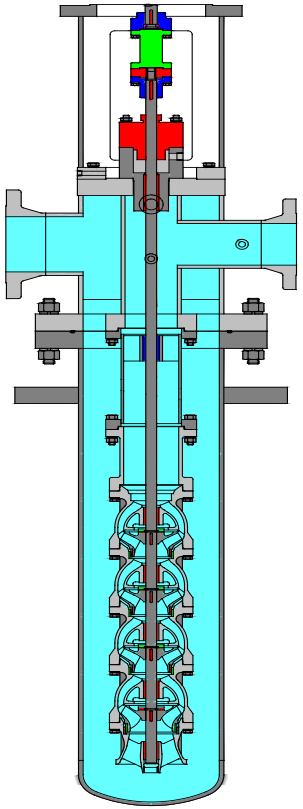


SECTIONAL OF RADIAL VS FRANCIS VANE

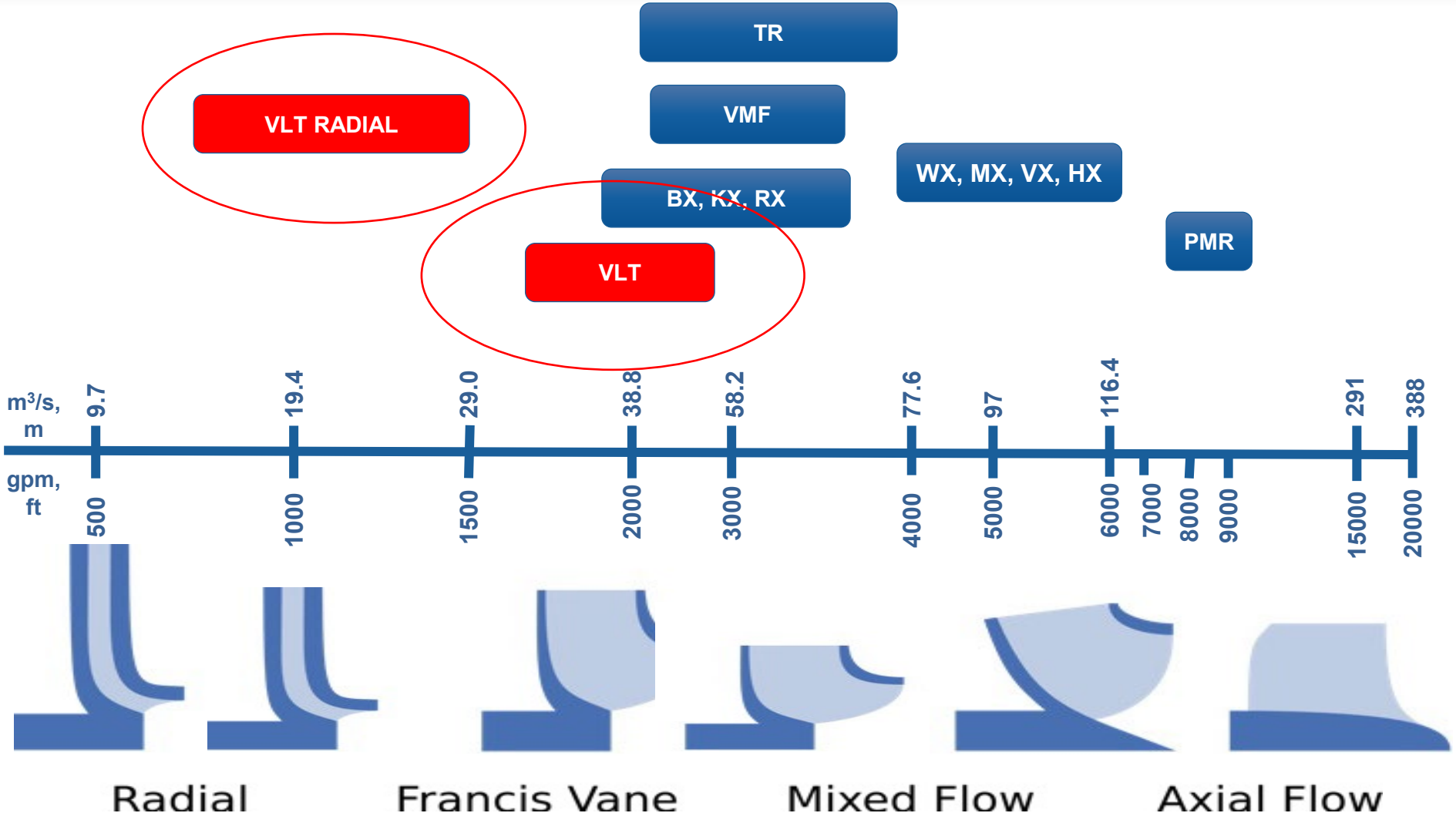
Note the difference between ‘flat’ appearance of radial design “VLT-Radial” model (low flow, high head)



… compared with curved Francis Vane design of “VLT” model

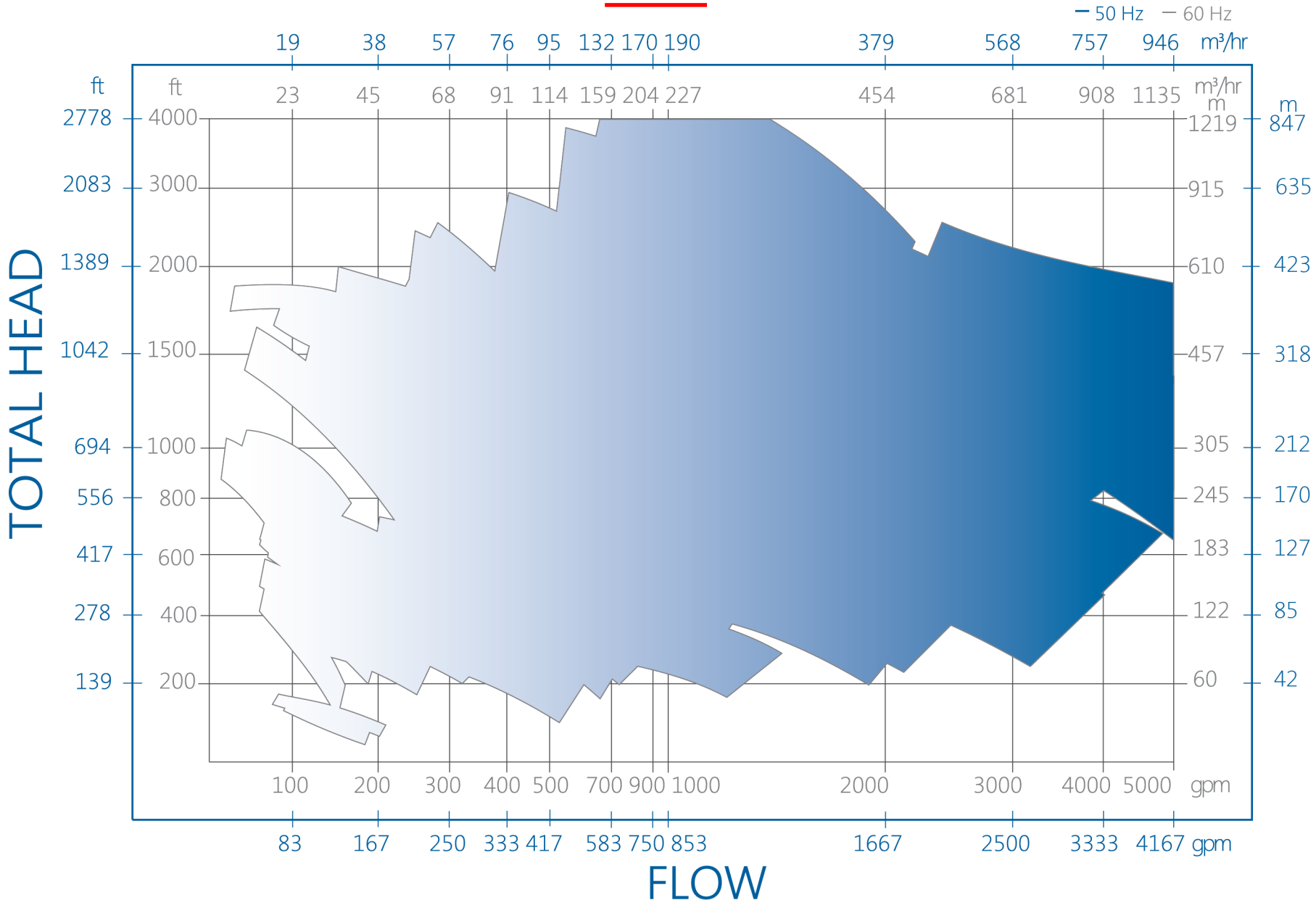


SPECIFIC SPEED, Ns



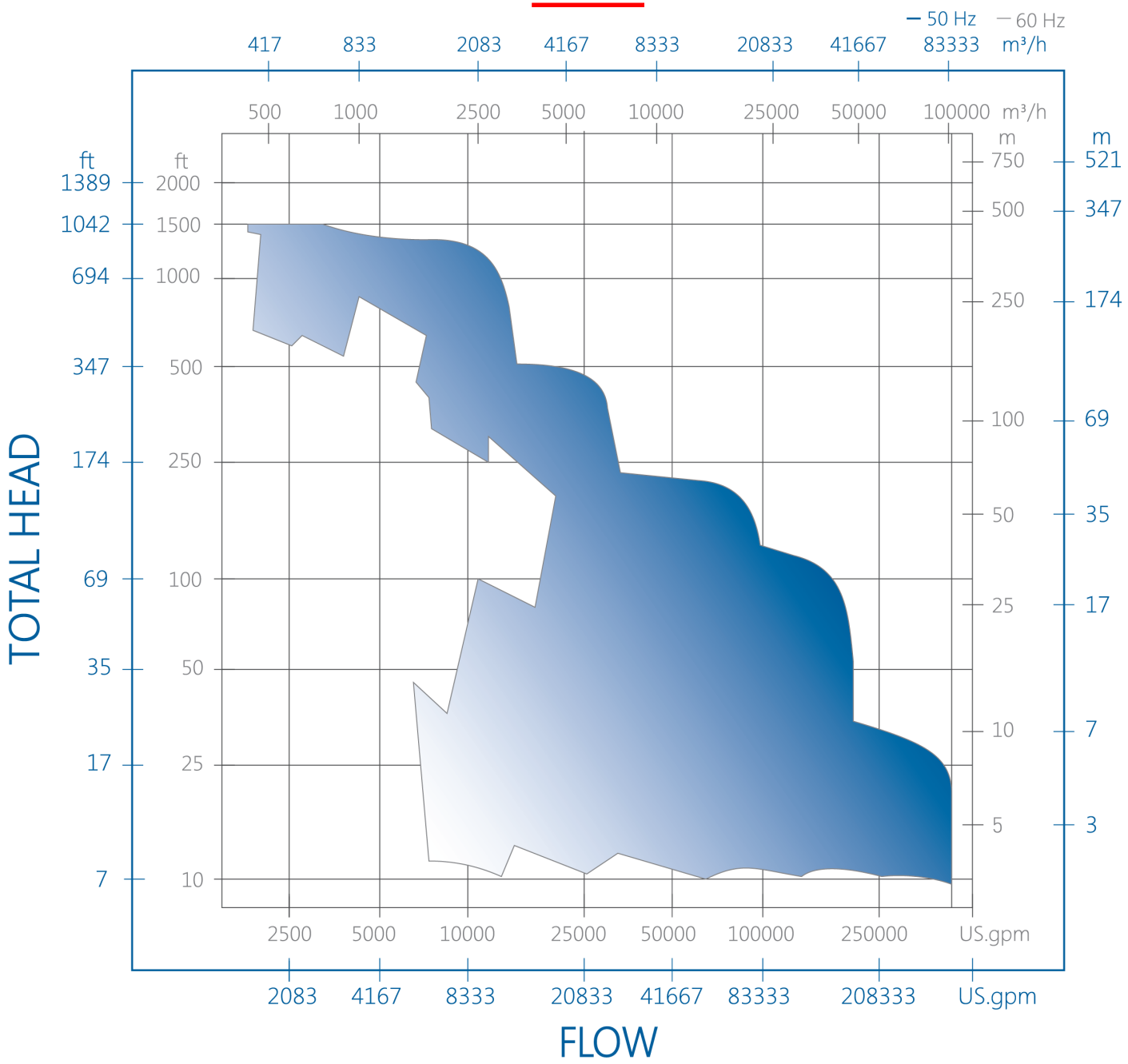
VS6 – Multispeed – Semi Engineered Range

Selection Chart VLT VS6



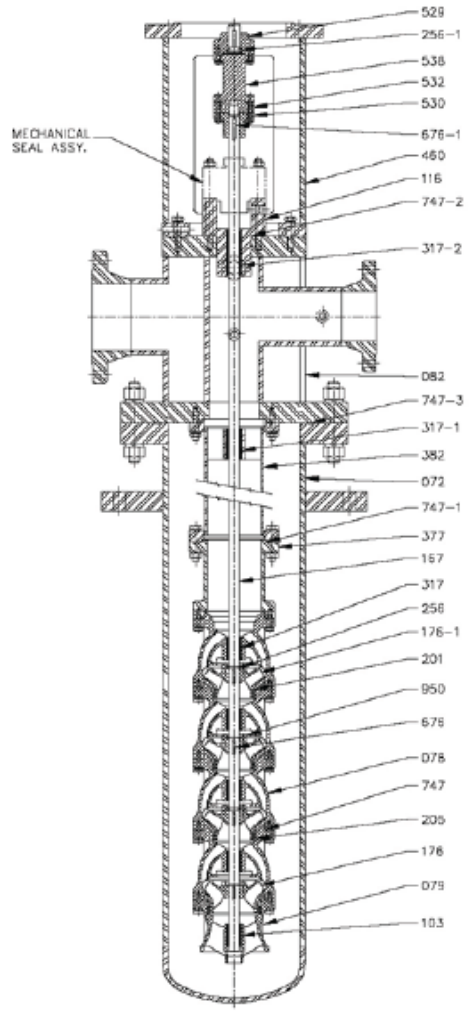
VS6 – Multispeed – Engineered Range

Selection Chart VMT VS6



CONFIGURATION AND MOUNTING OPTIONS

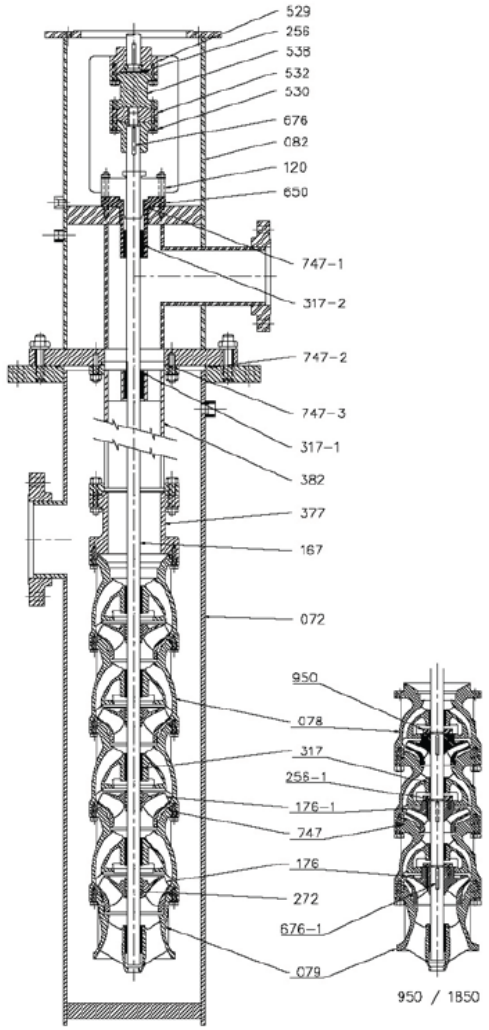
SH (SUCTION IN HEAD)



REFERENCE NUMBER	PART DESCRIPTION
072	CAN
078	CASE, SERIES
079	CASE, BOTTOM
082	NOZZLE HEAD
103	BEARING, CASE, BOTTOM
116	SEAL CHAMBER
167	SHAFT, PUMP
176	IMPELLER, 1ST STAGE
176-1	IMPELLER, SERIES
201	WEAR RING, IMPELLER
205	WEAR RING, CASE
256	RING, SPLIT, IMPELLER
256-1	RING, SPLIT, COUPLING
317	BEARING, CASE, SERIES
317-1	BEARING, COLUMN
317-2	BEARING, SEAL CHAMBER
377	FLANGE, CASE, TOP
382	COLUMN, SPOOL
460	SUPPORT, DRIVER
529	COUPLING, DRIVER
530	COUPLING, PUMP
532	PLATE, ADJUSTING
538	COUPLING, SPACER
676	KEY, IMPELLER
676-1	KEY, COUPLING
747	O-RING, CASE
747-1	O-RING, COLUMN
747-2	O-RING, SEAL CHAMBER
747-3	O-RING, BARREL
950	GUARD, RING, RETAINING

NOTE: S-1 Bowls have integrally cast impeller wear rings as Standard.

SB (SUCTION IN CAN)



REFERENCE NUMBER	PART DESCRIPTION
072	CAN
078*	CASE, SERIES
079	CASE, BOTTOM
082	NOZZLE HEAD
120*	SEAL, CRTG
167*	SHAFT, PUMP
176*	IMPELLER, 1ST STAGE
176-1*	IMPELLER, SERIES
256	RING, SPLIT, COUPLING
256-1	RING, SPLIT, IMPELLER
272	COLLER, LOCK
317*	BEARING, CASE
317-1*	BEARING, COLUMN
317-2*	BEARING, STUFFING BOX
377	FLANGE, CASE, TOP
382	COLUMN, SPOOL
529	COUPLING, DRIVER
530	COUPLING, PUMP
532	PLATE, ADJUSTING
538	COUPLING, SPACER
650	HOUSING, BEARING
676	KEY, COUPLING
676-1	KEY, IMPELLER
747*	O-RING, CASE
747-1*	O-RING STUFFING BOX
747-2*	O-RING, BARREL
747-3*	O-RING, COLUMN
950	GUARD, RING, RTNG

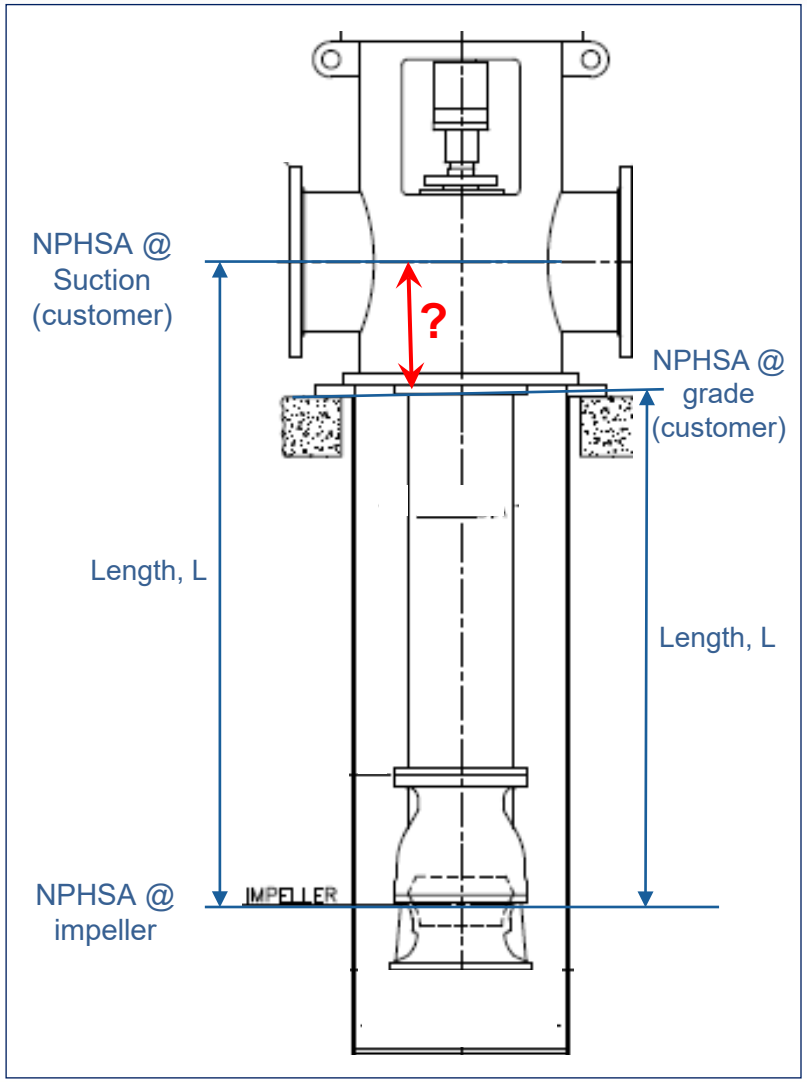
* Recommended Spare Parts

1. IMPACT OF NPSH (SUCTION IN HEAD)

- NPSH Available must be stated by the customer
- We can assume head/can is always full of fluid
- Vendor should ensure that it's clear what is the reference level of customer NPSHA. Often stated @ pump suction flange or @ grade. When stated @ suction flange vendor should check with customer what is the assumed height of pump suction from grade. This ensure we are 100% clear on the actual submergence over the impeller

$$NPSHA\ @\ Impeller = NPSHA\ customer + L$$

- If NPSHA @ Impeller is still not sufficient - lengthen the pump with column pipe to increase L
- NPSHR of pump defined by 1st stage only
- Once 'L' is known then total can length can be calculated

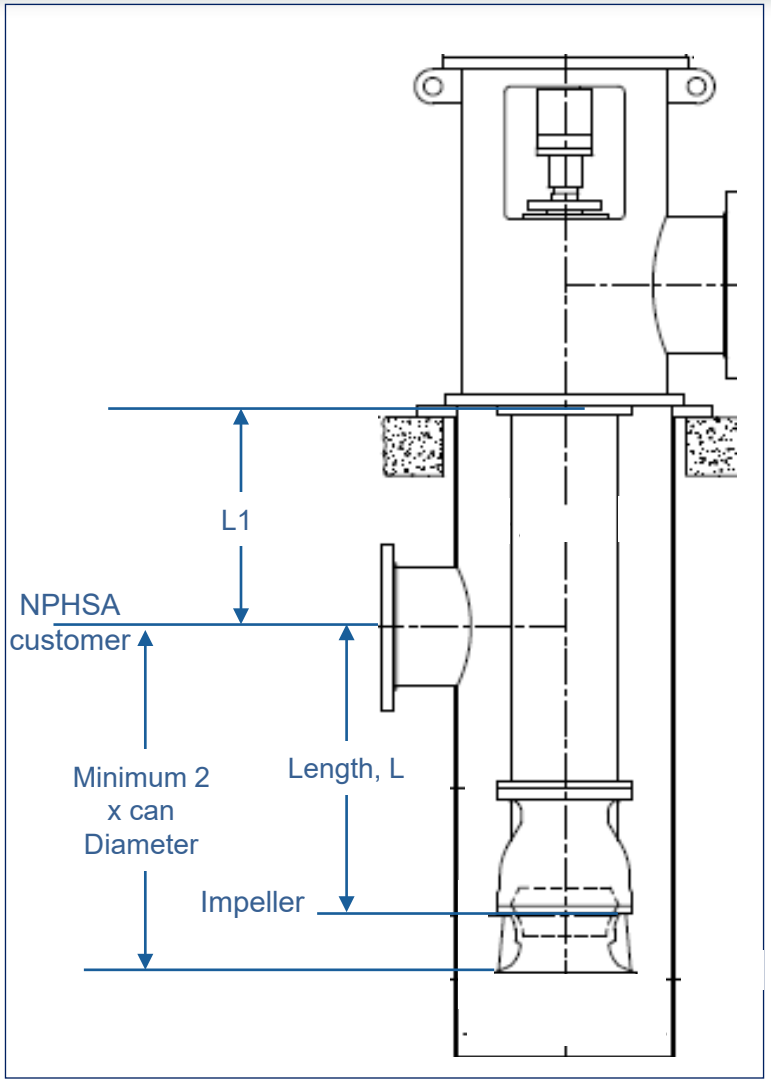


1. IMPACT OF NPSH (SUCTION IN CAN)

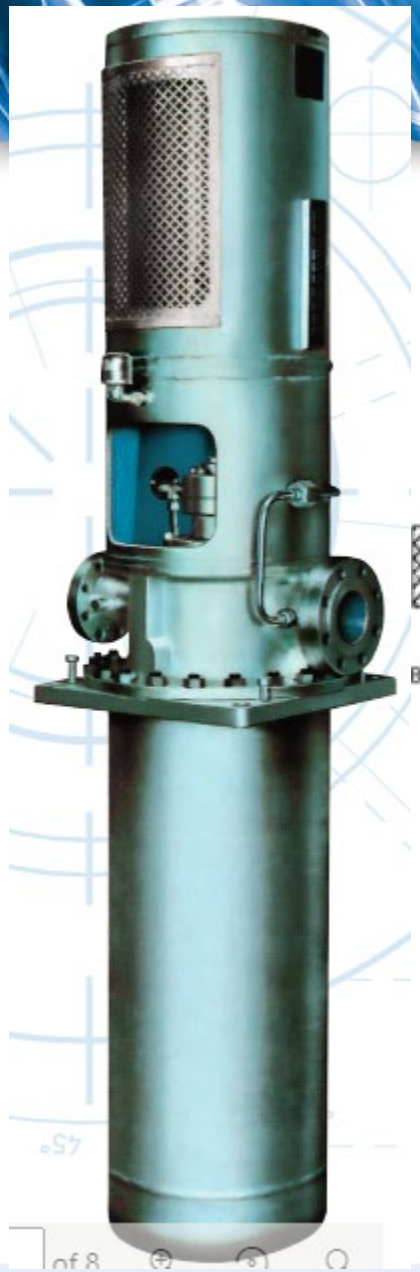
- With suction-in-can the situation is different
- Minimum distance of 2 can diameters must be considered for distance from cL of suction-in-can to inlet of pump
- Vendor shall ensure that it's clear what is the reference level of customer NPSHA and correct to CL suction if necessary

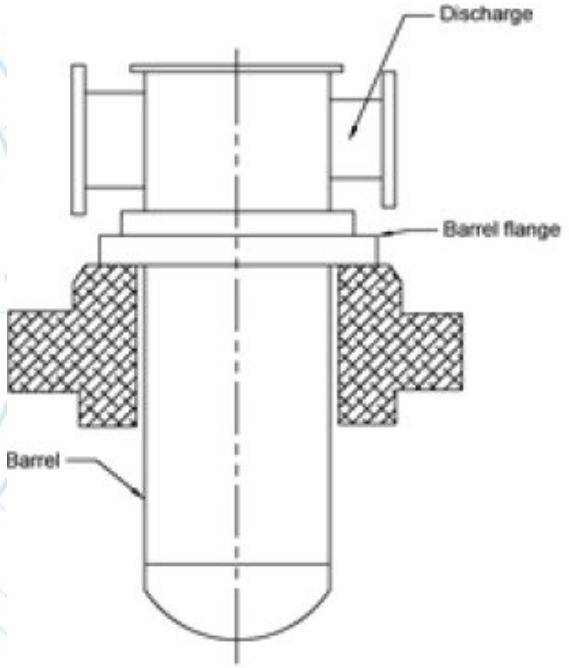
$$NPSHA\ @\ Impeller = NPSHA\ customer\ @\ CL\ Suction\ + L$$

- If NPSHA @ Impeller is still not sufficient then lengthen the pump with column pipe to increase L. Suction flange remains on same elevation
- Can is likely to be full above CL suction during operation, but we do not assume it. Also there is usually some turbulence on the open surface of the fluid so we do not consider L1 for NPSH purposes
- Once 'L' is known then total can length can be calculated



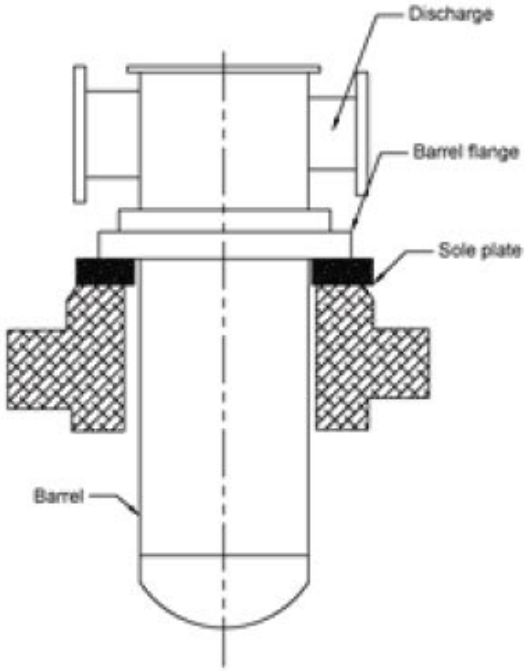
MOUNTING OPTIONS





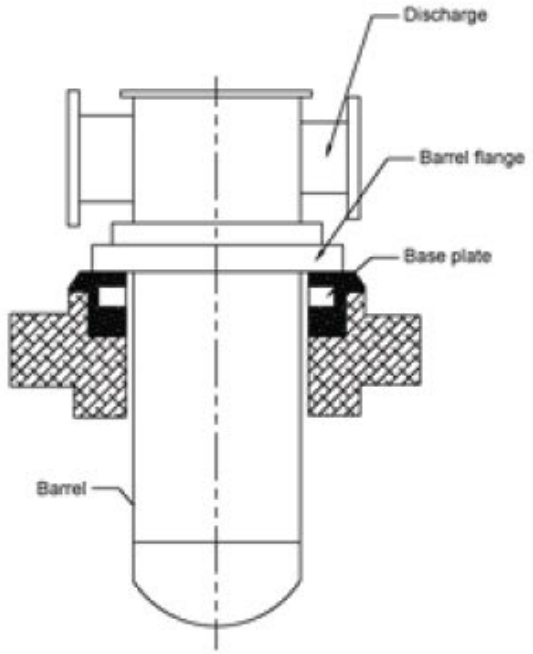
Standard Design

One flange at the barrel
Barrel directly mounted on the foundation



Standard Design with Sole Plate

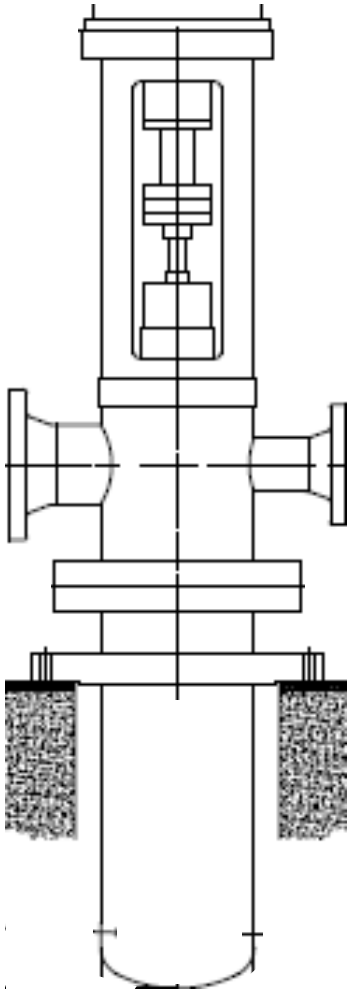
One flange at the barrel
Barrel mounted on the sole plate
Sole plate mounted and adjusted on the foundation



Standard Design with Base Plate

One flange on the barrel
Barrel mounted on the base plate
Base plate mounted and adjusted in the foundation Grouted with concrete

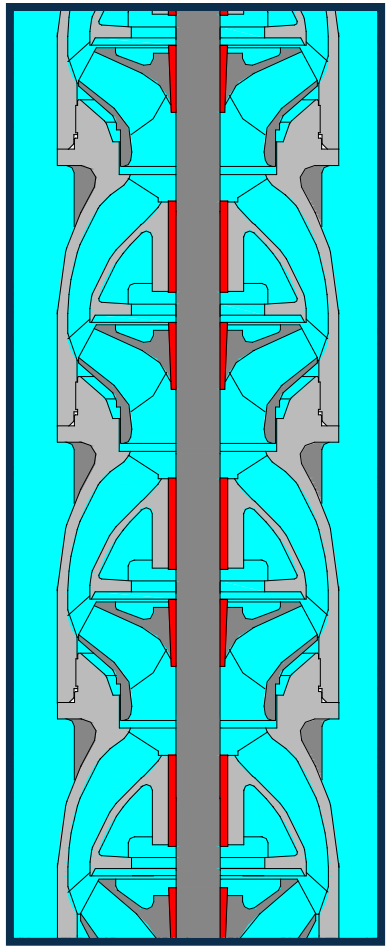
MOUNTING OPTIONS



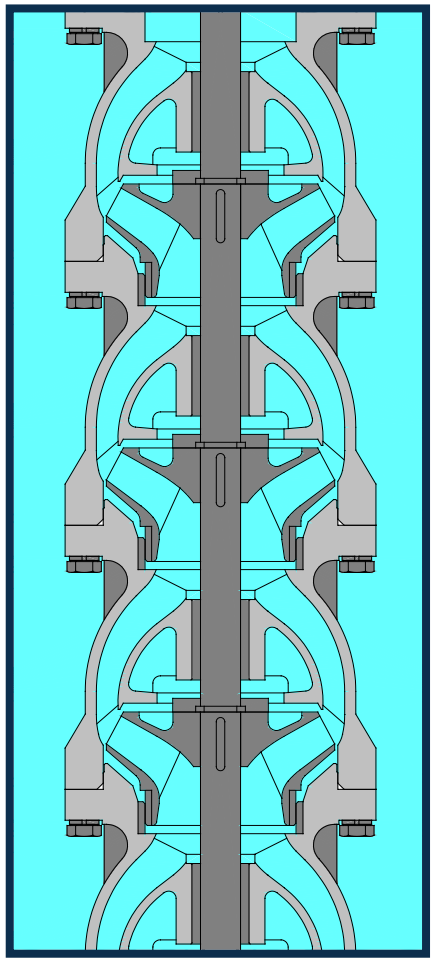
- Separate mounting flange on can was required for API 610 8th edition
- No longer required by API, but is available as an option if required by the customer

FLANGED VS THREADED BOWLS

Threaded Bowls (Non API)



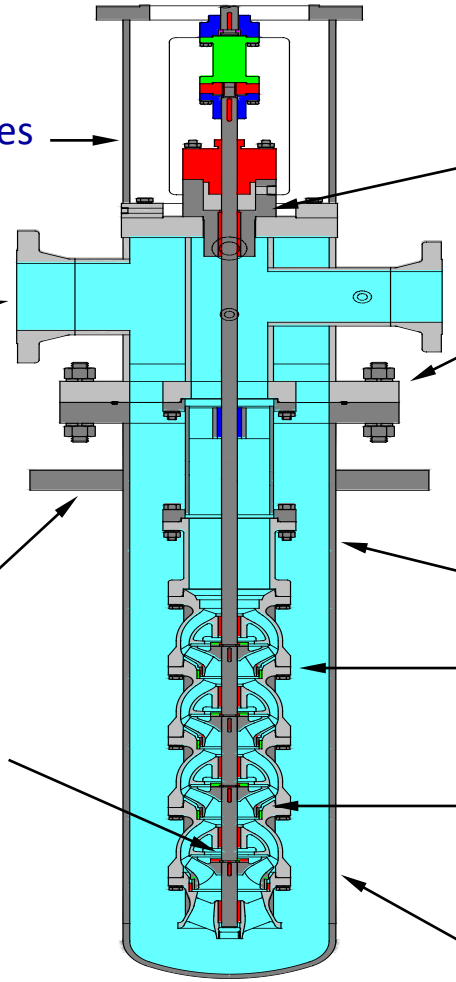
Flanged Bowls (API)



LOW NPSH FIRST STAGE

- Low NPSH First Stage (13,000 Nss) with wide operating range (15-120% BEP)
- Some (non RP) designs use an inducer.
- Inducers historically had a limited operating range (U shaped NPSH curve)
- More recent designs have a broader range

API 610 - MANDATORY REQUIREMENTS



Fabrication to ASME Section VIII stresses

Weld Neck Flanges
Full Penetration Welds,
Access to NDE where possible

Surface Mounting Flange
(mandatory on 8th edition pumps.
Optional for 9th edition onward)*

Split Ring and Key Impeller Mounting

External Seal Chamber Sized to API 682

Code Certified Welding

1/8” Corrosion Allowance*

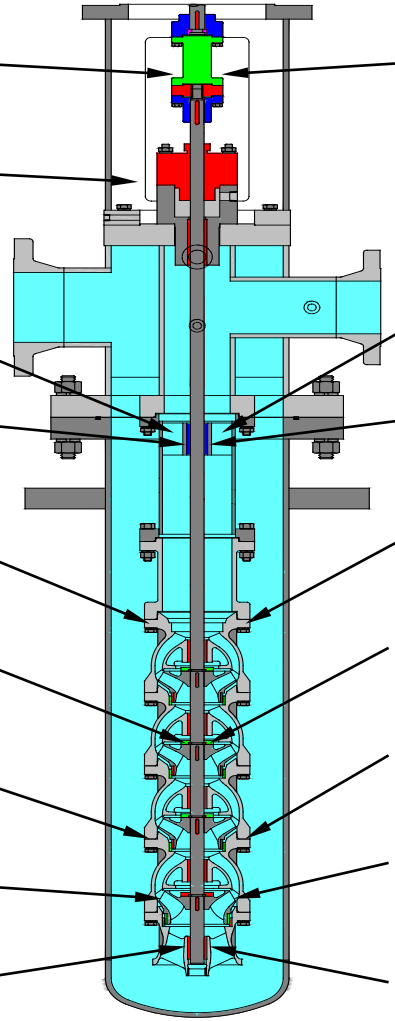
Flanged bowls

Separate Impeller and Case Wear Rings

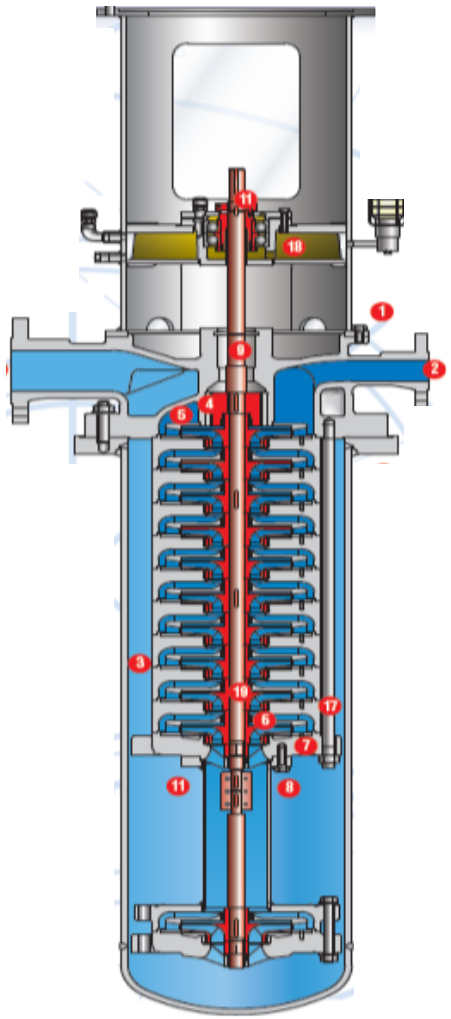
A.P.I. Material Codes

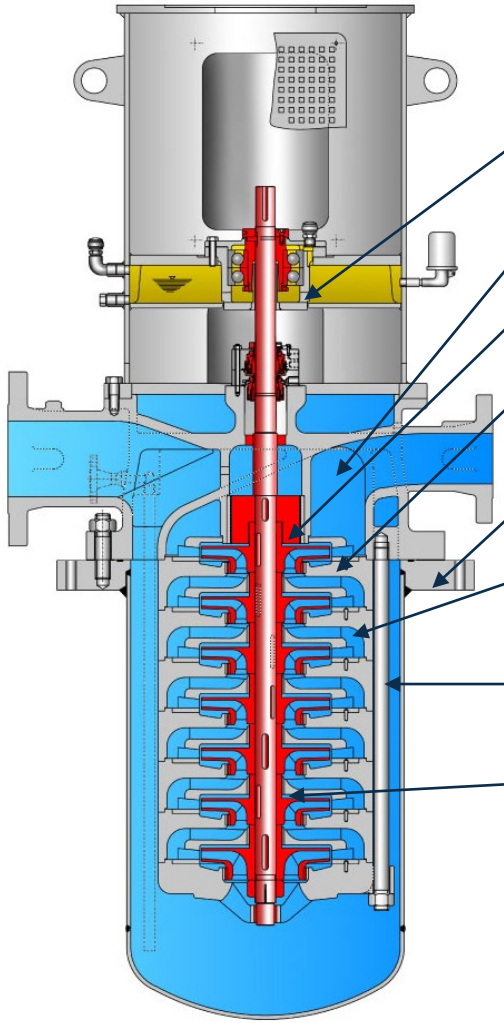
FEATURES AND BENEFITS
API 610 VLT

Feature	Benefit
4 - Piece Rigid Adjustment Coupling	Maintains Superior Alignment, Spacer Allows Removal of Cartridge Seal
External Seal, Reduces Pressure for Mechanical Seal	
Integral Welded Spider	Ensures Maximum Shaft Alignment and Support
Carbon Impregnated Bearings throughout	Handles Wide Variety of Low Lubricity Fluids Inert to Chemicals and Hydrocarbons
Flanged and Bolted Bowls for all Metallurgies	Ease of Maintenance with Galling Materials
Positive Split Ring and Key	Takes Thrust Positively, Locates Impeller
Metal to Metal Rabbet Fits with O-Rings	Superior Alignment, No Leakage
Low N.P.S.H. First Stage Impeller for Shockless Fluid Entry	Optimum Efficiency, Shorter Pump Length
Bottom Case Bearing	Shaft Support at Critical Suction Area



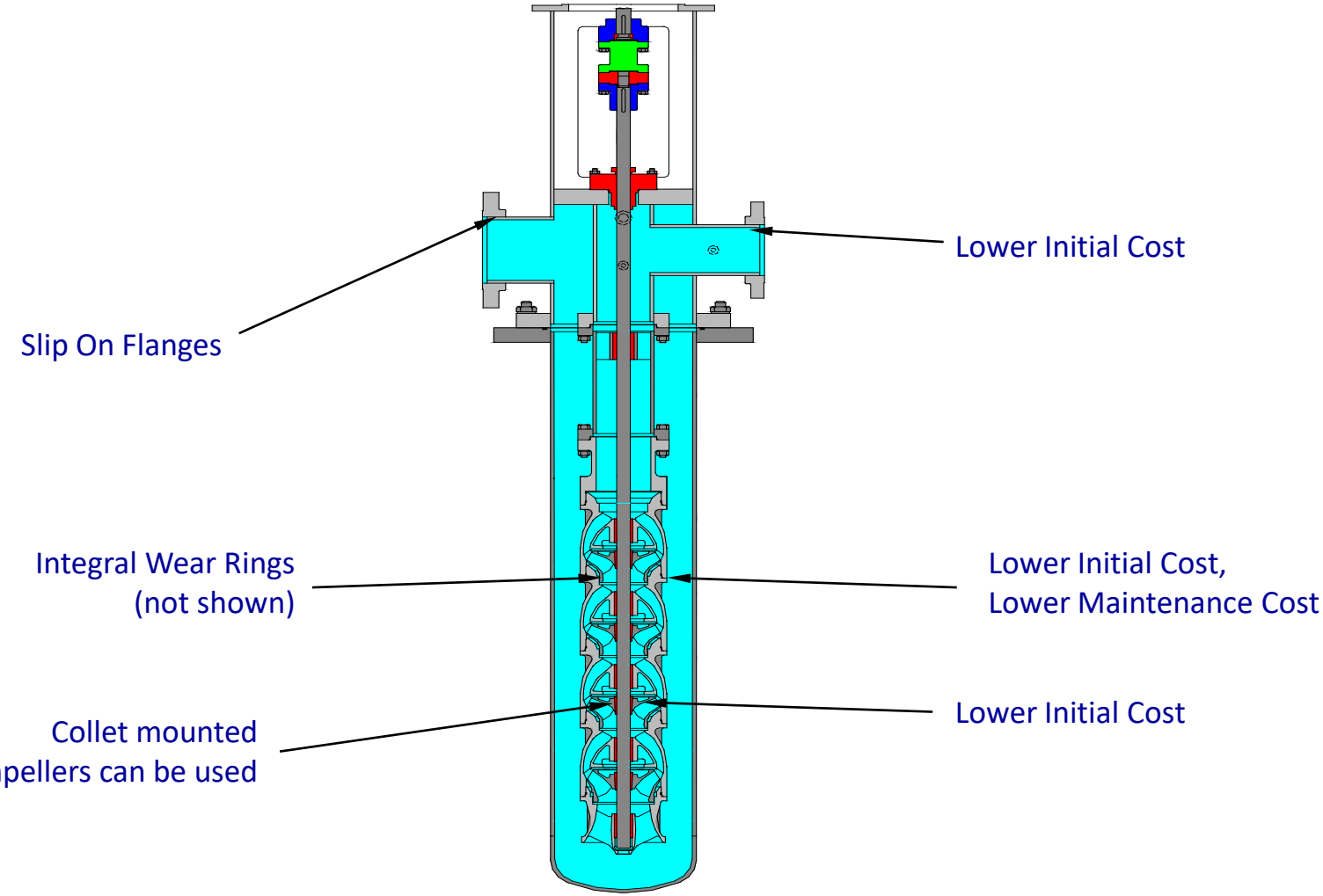
FEATURES AND BENEFITS
VLT RADIAL FLOW





- **Integrated thrust bearing**
- **Casted head**
- **Balance drum**
- **Discharge stage directly mounted to nozzle head**
- **Integral can and mounting flange**
- **Stage casings – metal to metal, rabbet fits, no o-ring**
- **Tie-rod (6x or 12x) design**
- **Impeller hub and interstage bush serve as sleeve bearing**

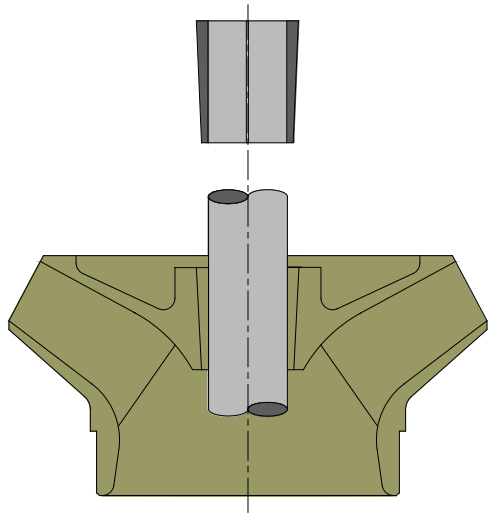
FEATURES AND BENEFITS COMMERCIAL VLT – DIFFERENT FROM API



FEATURES AND BENEFITS
DESIGN CHARACTERISTICS

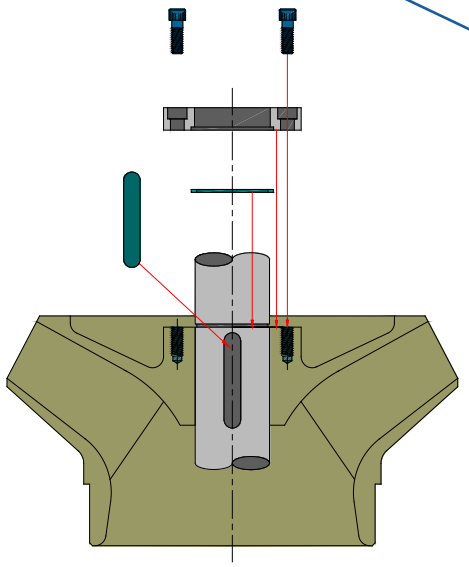
Non API

- Collet mounted Impellers
  - Ease of assembly and disassembly
  - Ensures positioning of impeller
  - Lower cost and easier for maintenance



COLLET MOUNTED IMPELLER

API



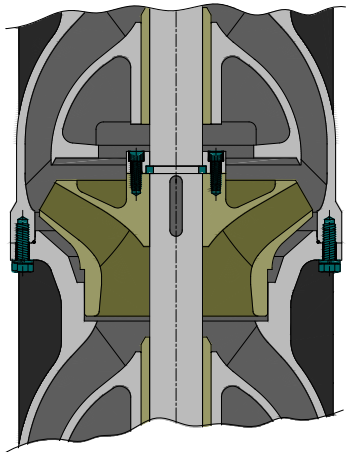
RING & KEYED IMPELLER

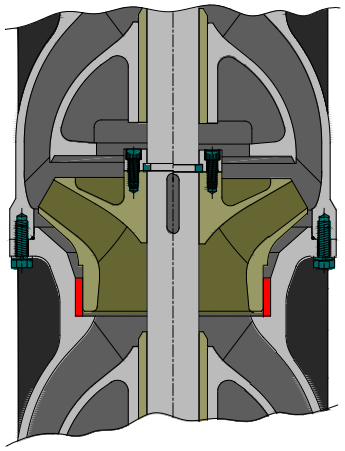
- Locked and keyed Impellers.
  - Positive retention.
  - Important when pumping hot/cold liquids.
  - Less susceptible to loosening when subject to shock load

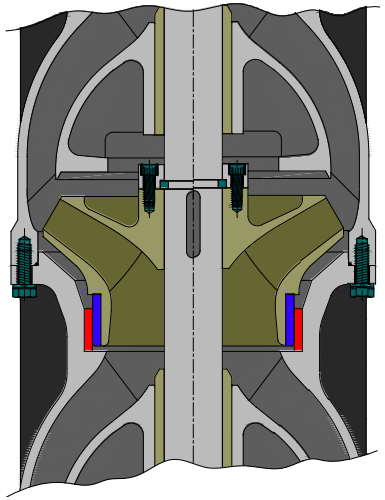
The use of locked and keyed impellers is mandatory for hot services above 230 deg F and below -20 deg F. The reason for this is the tendency for collets to loosen.

We also like to use locked and keyed impellers for high suction pressures and also series pump operation

FEATURES AND BENEFITS
WEAR RINGS







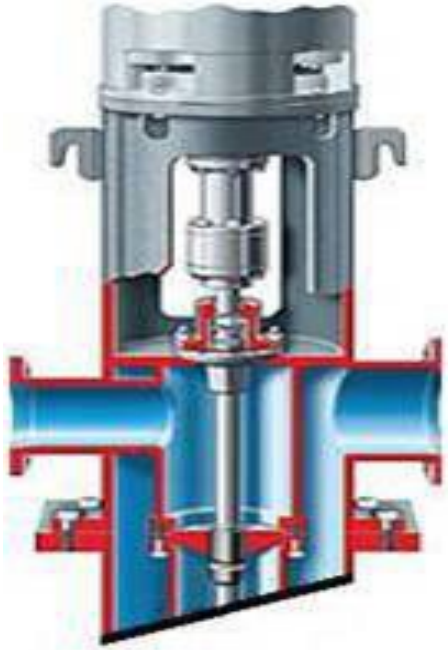
Integral Wear Rings **(Non API)**

Renewable Wear Rings **(API)**

- The choice of wear rings is available
- Integral wear rings is a cost saving

FEATURES AND BENEFITS
NOZZLE HEAD

- Fabricated Steel Discharge Heads
- Pre-Engineered standard designs for the 100 to the 2000 VLT size



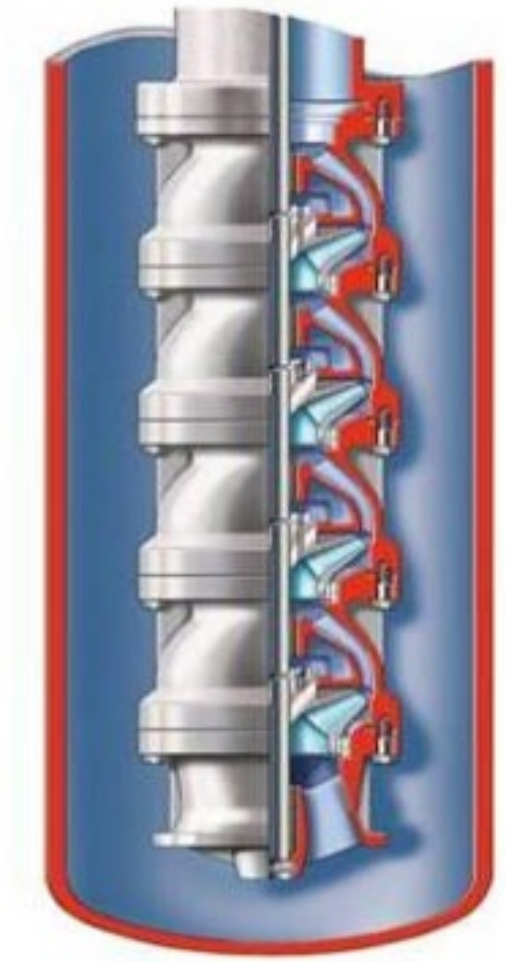
- Meets API 610 nozzle load requirements (Only API model)
- 300# flanges standard for API VLT. 150#, 600# & 900# optional
- All pipe, vent & gauge connections are ANSI Class 300

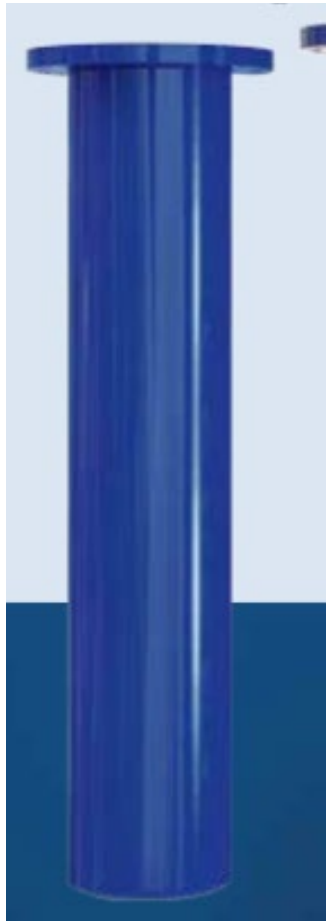
- 150# flanges are standard for Commercial VLT
- 300# and above optional

- Top flange has rabbet / register fit for motor - no field doweling or fit-up
- Lifting Lugs
- OSHA coupling guards
- Standard motor mating flanges to NEMA standards for Vertical Solid Shaft Motor

FEATURES AND BENEFITS
SUCTION CAN AND SHAFTING

- Fabricated Steel Barrel (or “Can”)
- O-ring gasket seal to the head
- Sized to meet allowable velocities
- Elliptical bottom is standard on API VLT
- Flat bottom standard on Commercial VLT
- 416ss shafting as standard





RUHRPUMPEN
Specialist for Pumping Technology

- For API design bearing holder / 'spider' is welded into the top of each column piece and machined concentric with mating flanges

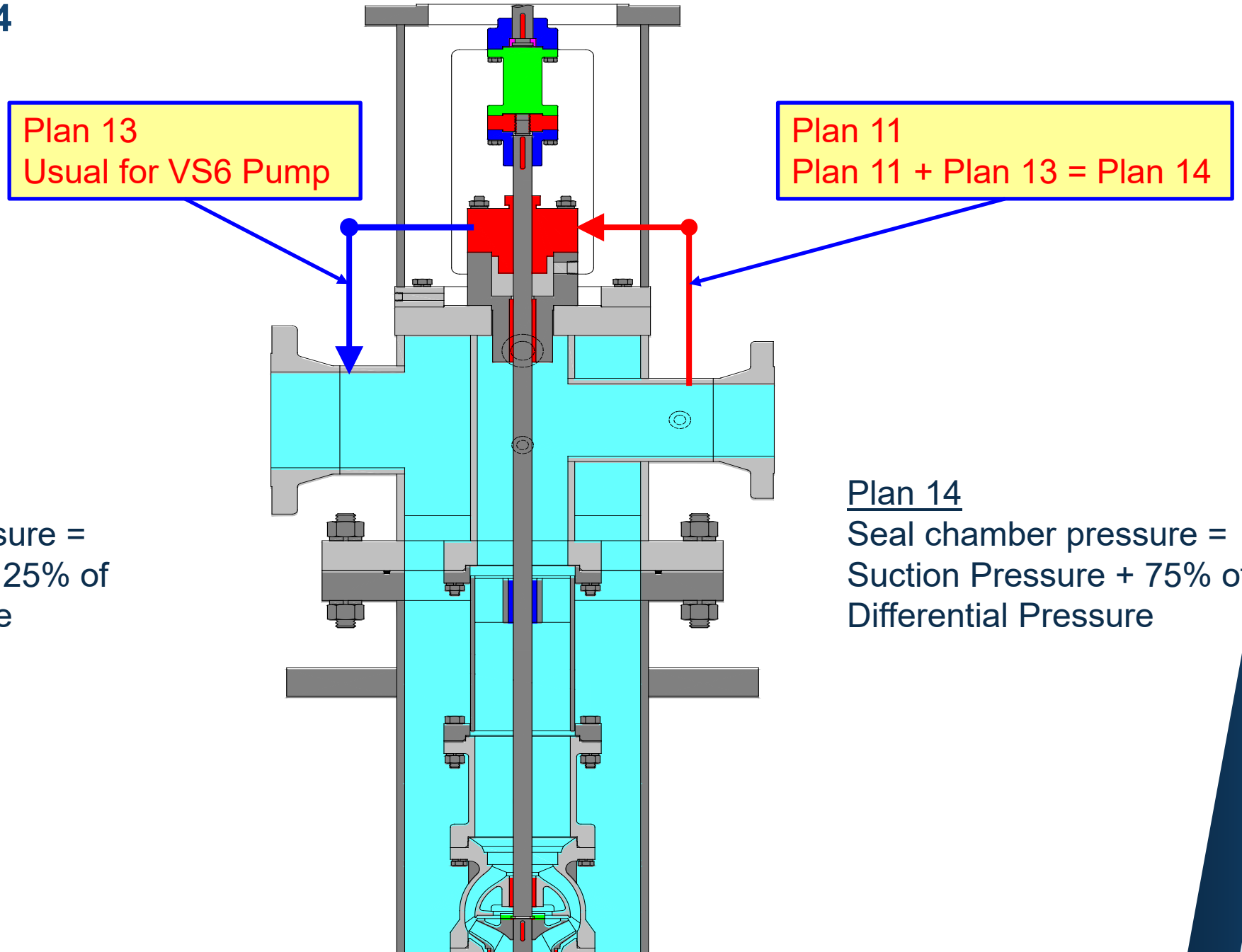
- For Commercial design spiders can be drop—in type. But there is an option for welded
- Better radial loading capability
- Rabbet /Register fit and o-ring sealing between column and head, and column and bowl assembly
- Carbon Impregnated bearings as standard (usually graphalloy)
  - Suitable for wide range of services and can tolerate upset conditions
  - These bearings give excellent life when pumping dry liquids like propane, butane, ethane and also condensate
- Bronze, Cast Iron, Nitronics are also available depending on the service

MECHANICAL SEALING OPTIONS

DESIGN CHARACTERISTICS
MECHANICAL SEALS

- Seal chambers suitable for API 682 mechanical seals
- Choice of arrangements to suit process
- Seal systems normally mounted away from the pump, but engineering will look at mounting on pump head on case to case basis if required (photo)

API Plans 13 &14

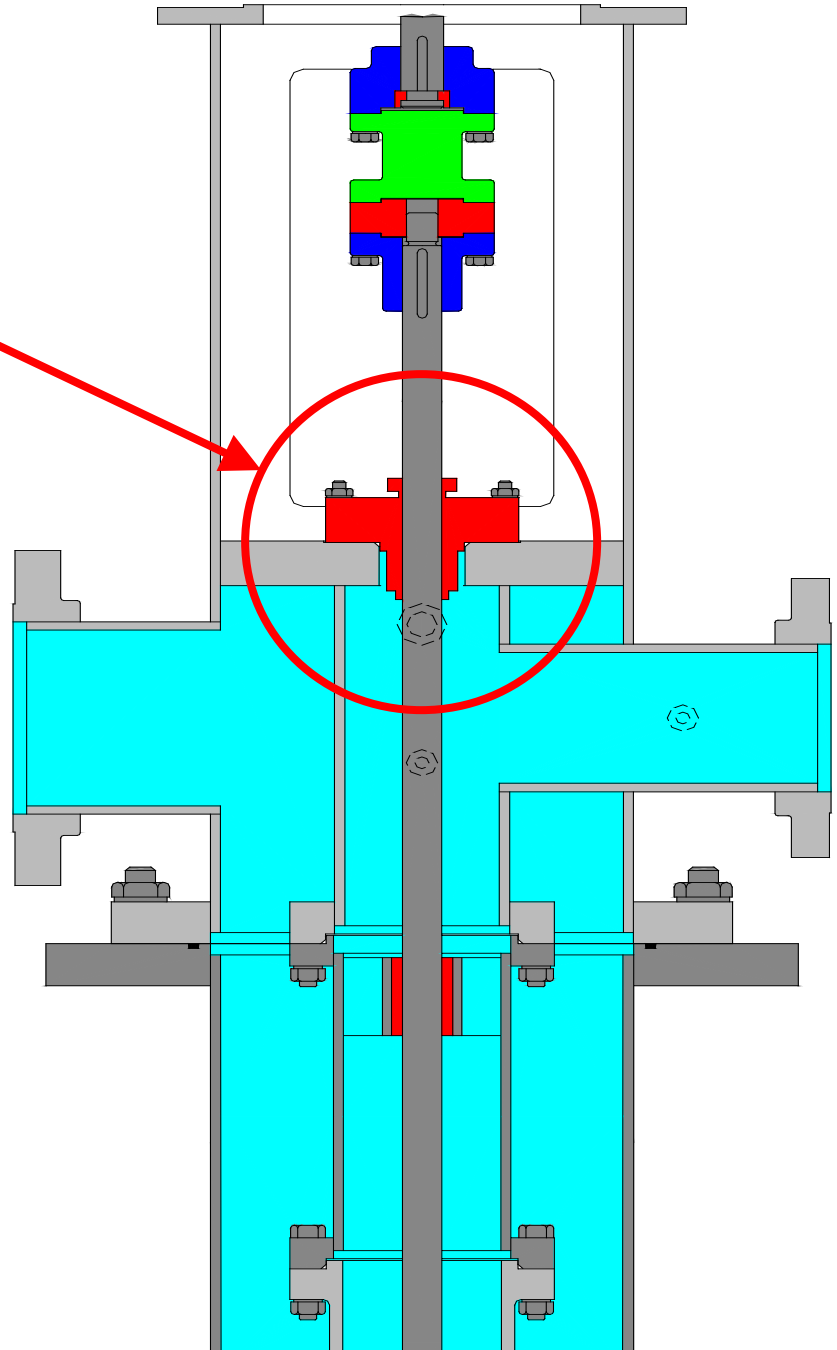


Plan 13
Seal chamber pressure = Suction Pressure + 25% of Differential Pressure

Plan 14
Seal chamber pressure = Suction Pressure + 75% of Differential Pressure

Non-API VS6 Seal Arrangement

- No seal chamber (as standard)
- Seal is set in the pump discharge flow and is self flushing
- No seal flush piping required
- (Seal chamber and flush plans are options)



API Plan 52

- Plan 52 uses an external reservoir to provide buffer fluid for the outer seal of an Unpressurized Double seal arrangement.
- Advantages: In comparison to single seals, Dual Unpressurized Seals can provide reduced net leakage rates as well as redundancy in the event of a primary seal failure.
- General: Cooling coils in the reservoir are available for removing heat from the buffer fluid. Plan 52 is often used where the process fluid cannot be affected with the buffer fluid.

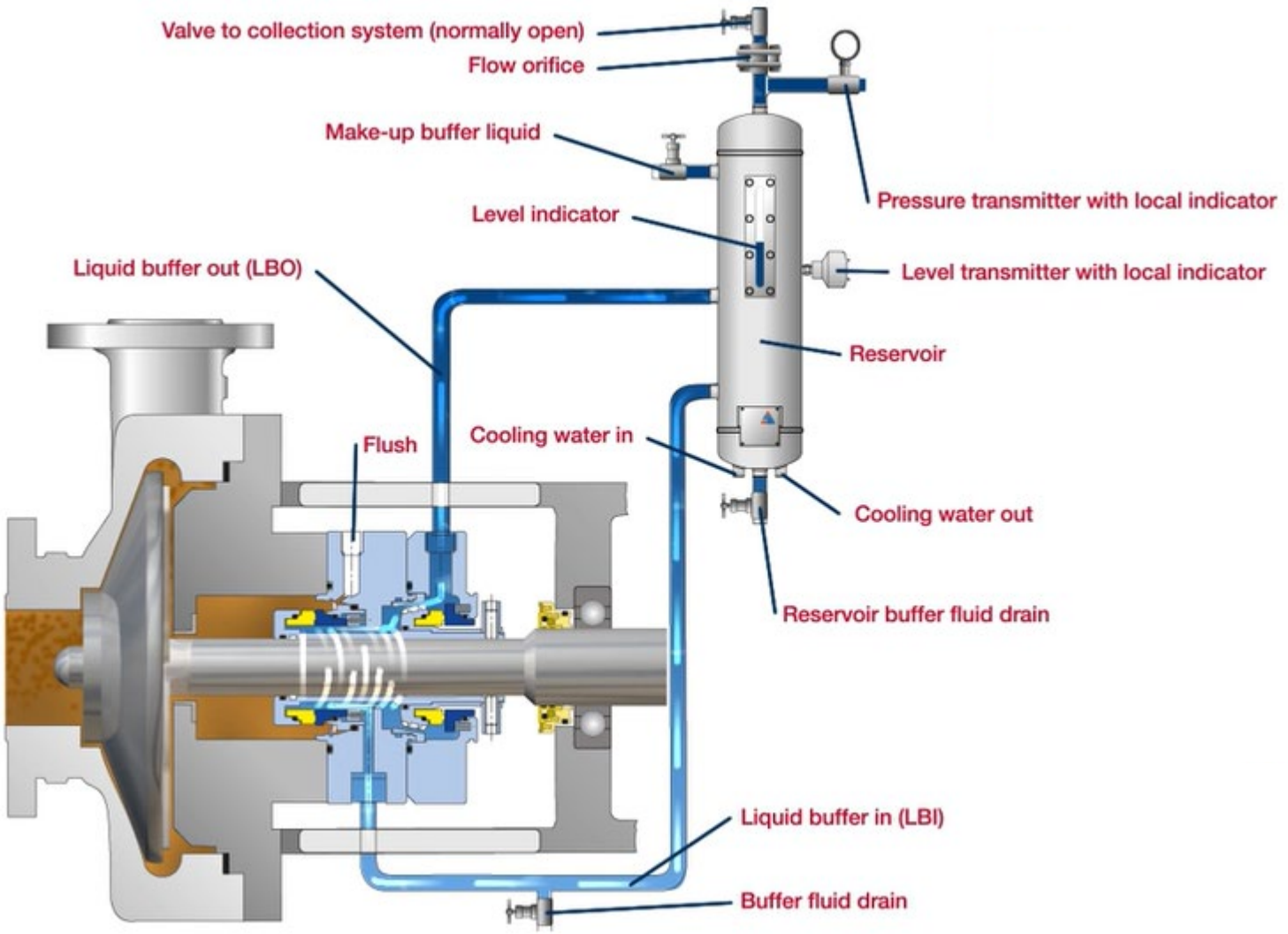


Image borrowed from AES Seals

API Plan 53A

- Plan 53A uses an external reservoir to provide a pressurized barrier fluid for a pressurized Double seal arrangement. Reservoir pressure is produced by a gas, usually nitrogen. Flow is induced by a pumping ring within the Seal Gland.

- Advantages: Reservoir size can be optimized dependent on flow rate. Wear particles settle to bottom of reservoir and don't get recirculated.

- General: Heat is dissipated by reservoir cooling coils. Barrier fluid is subject to gas entrainment at pressures/temperatures above 300 psi/250F 20 Bar/120C.

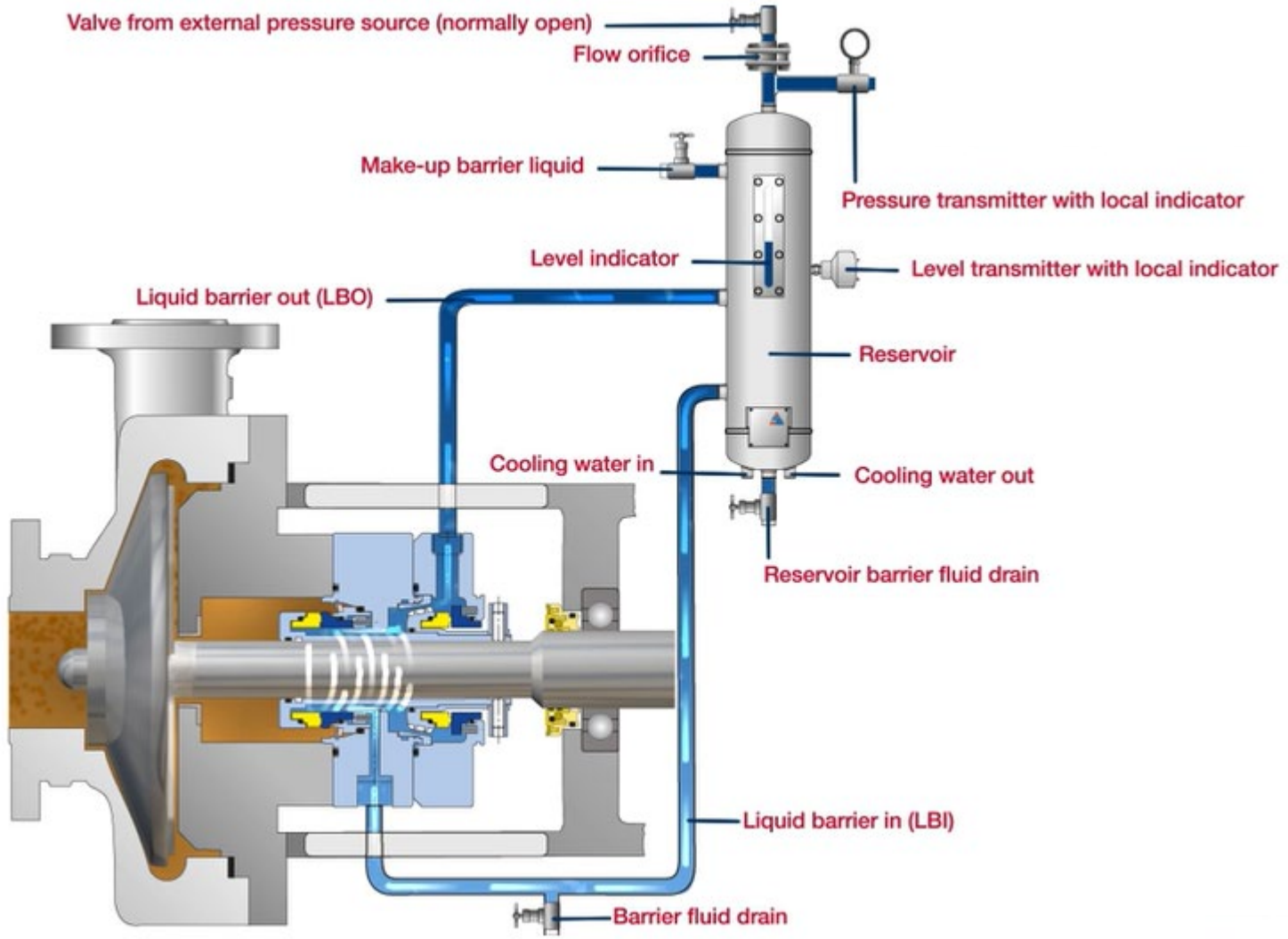


Image borrowed from AES Seals

API Plan 53B

- Plan 53B, previously termed 53 Modified, uses an accumulator to provide the pressurizing gas and the barrier fluid. A heat exchanger is included in the circulation loop to cool the barrier fluid. Flow is induced by a pumping ring in the Seal Gland.

- Advantages: If the loop is contaminated by the Pumped Liquid for any reason, the contamination is contained within the closed circuit. The make-up system can supply barrier fluid to multiple dual pressurized sealing systems, on between bearing Pumps with 2 Stuffing Boxes & 2 sets of Mechanical Seals.

- General: The bladder accumulator isolates the pressurizing gas from the barrier fluid to prevent gas entrainment. The heat exchanger can be a water-cooled unit, an air-cooled unit, or utilize finned tubing based upon the system heat load.

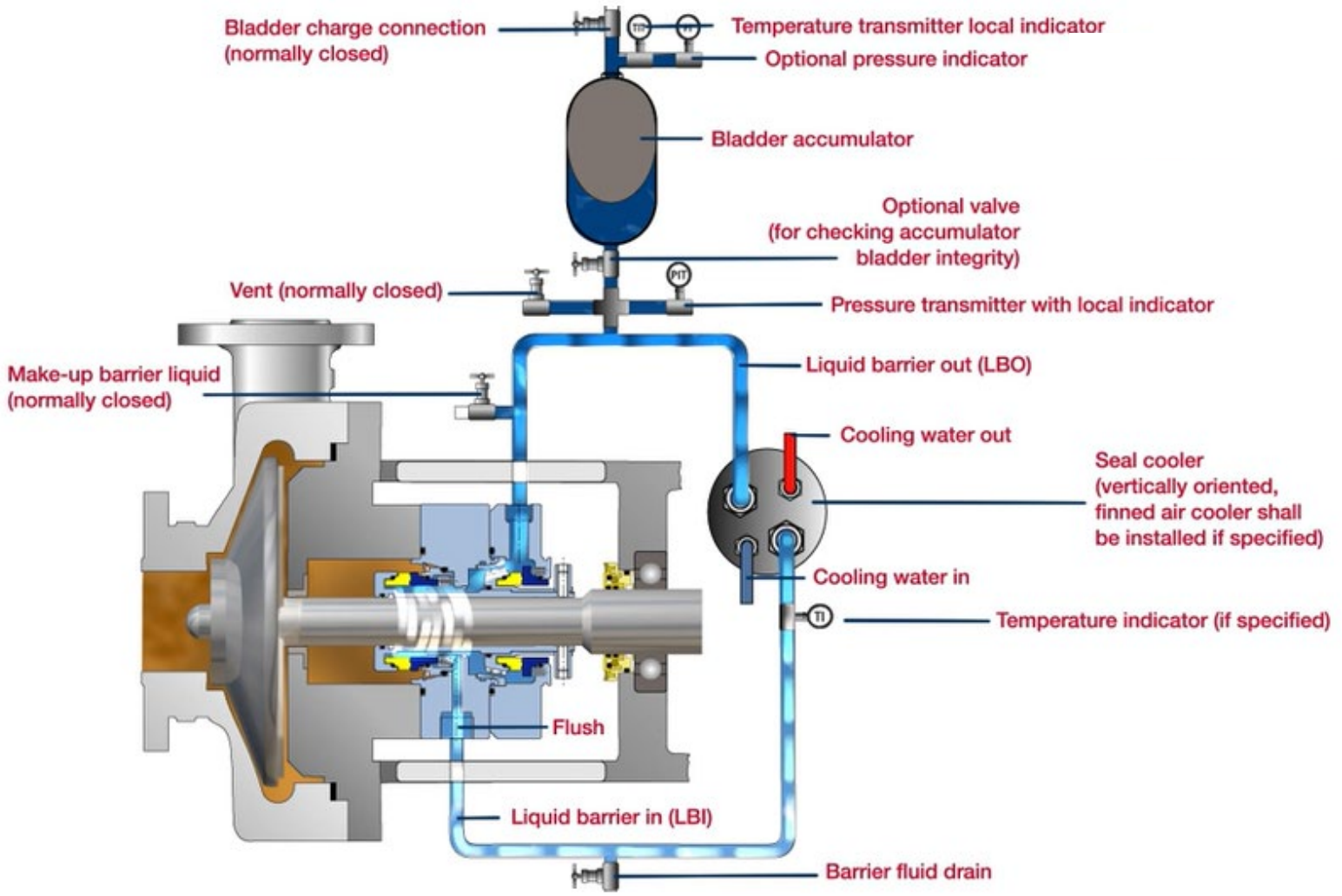


Image borrowed from AES Seals

API Plan 76

- Plan 76 is a system to divert non-condensing primary seal leakage to a flare or vapor recovery system.
- Advantages: Lower initial and maintenance costs than dual unpressurized seals using a Plan 52.
- General: Plan 76 can be used in conjunction with a gas purge from Plan 72. Can be used with dry-running, contacting or non-contacting Secondary Containment Seals.

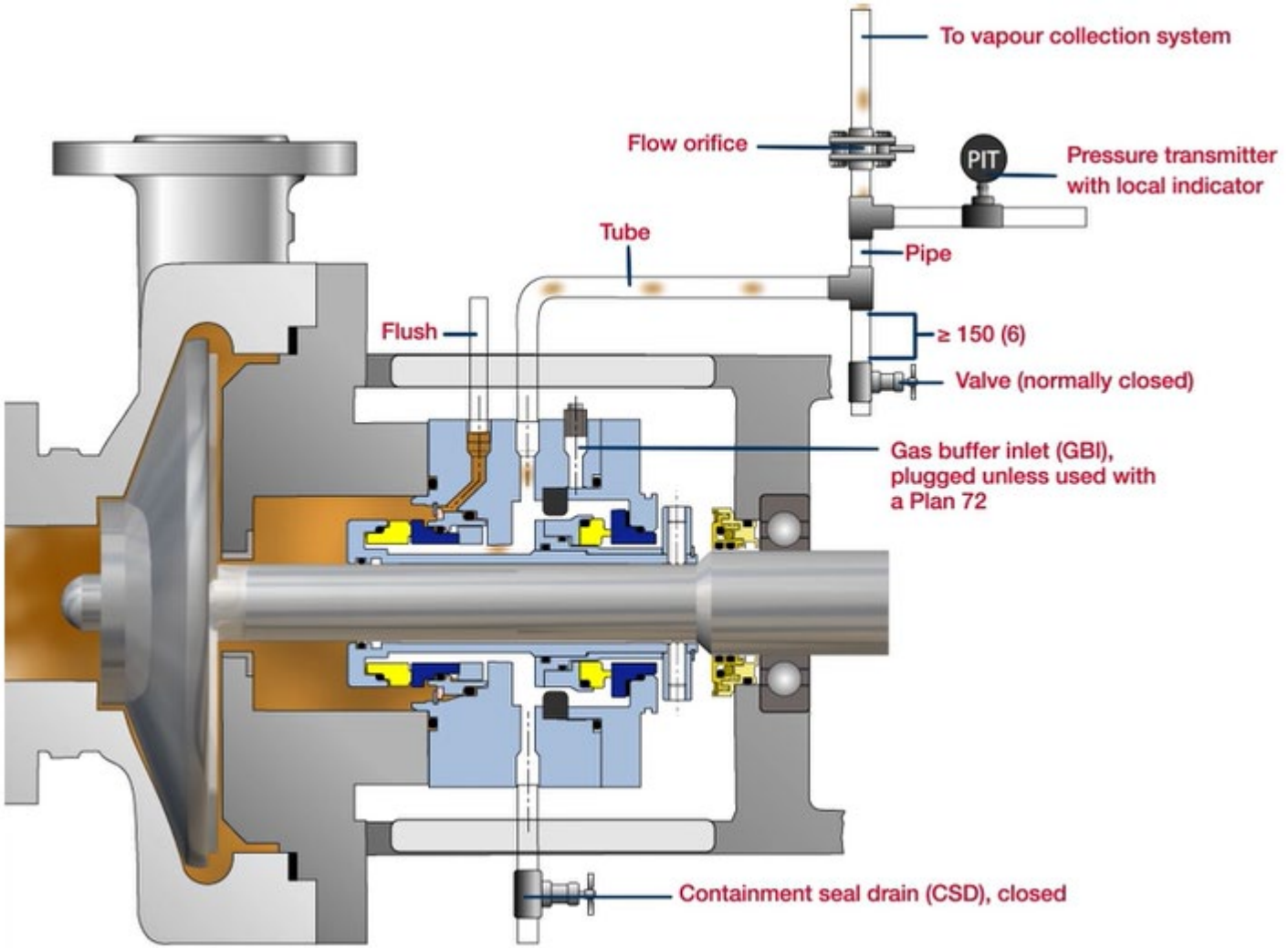


Image borrowed from AES Seals

API Plan 75

- Plan 75 is a collection system used with Secondary Containment Seals for process fluid that will condense at lower temperatures or is always in a liquid state.
- Advantages: The collection reservoir contains a pressure gauge and a high pressure switch to indicate a build up in pressure from excessive primary seal leakage or failure.
- General: Plan 75 can be used in conjunction with a gas purge from Plan 72. Typically dry-running, contacting Secondary Containment Seals are used with this plan.

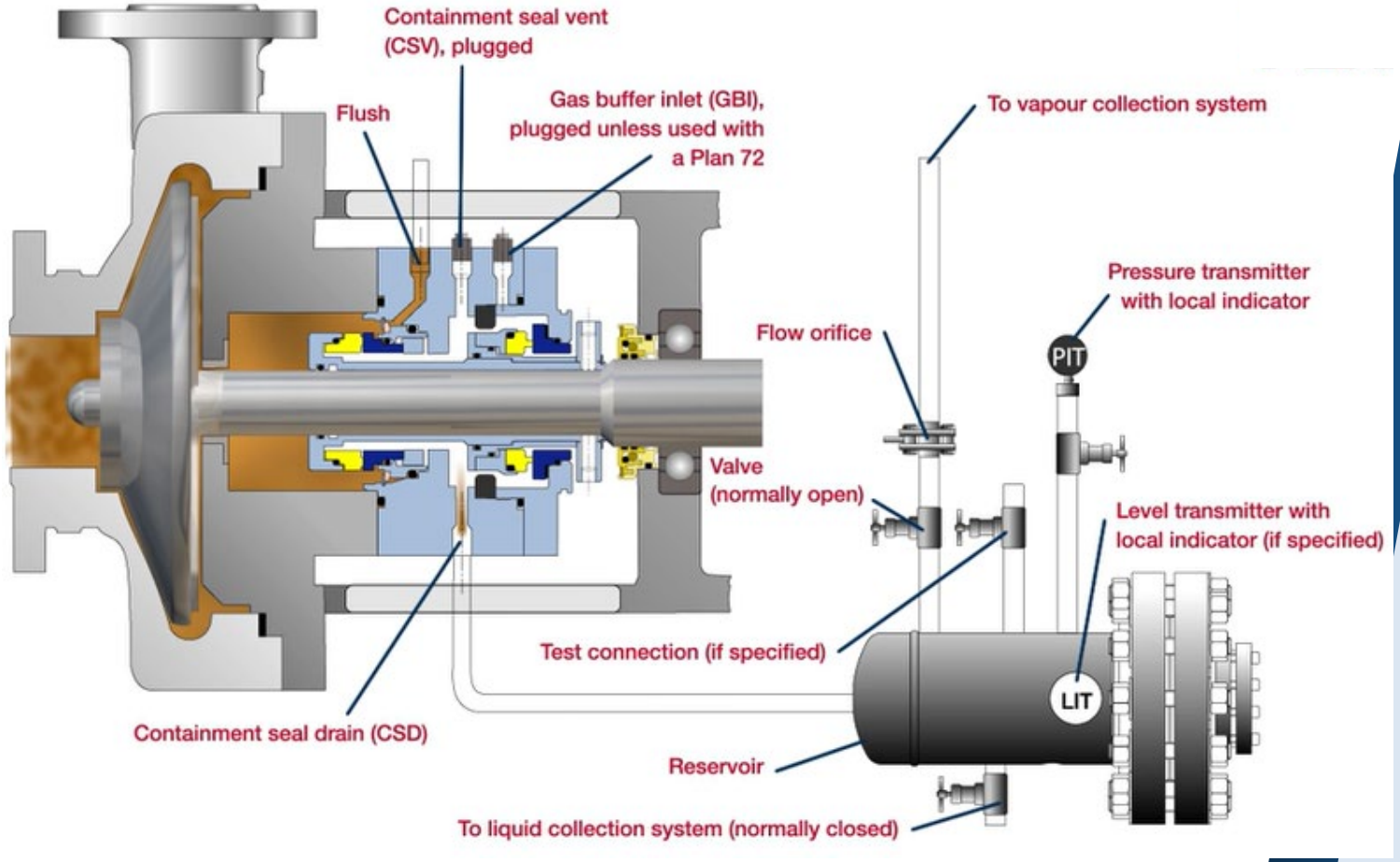
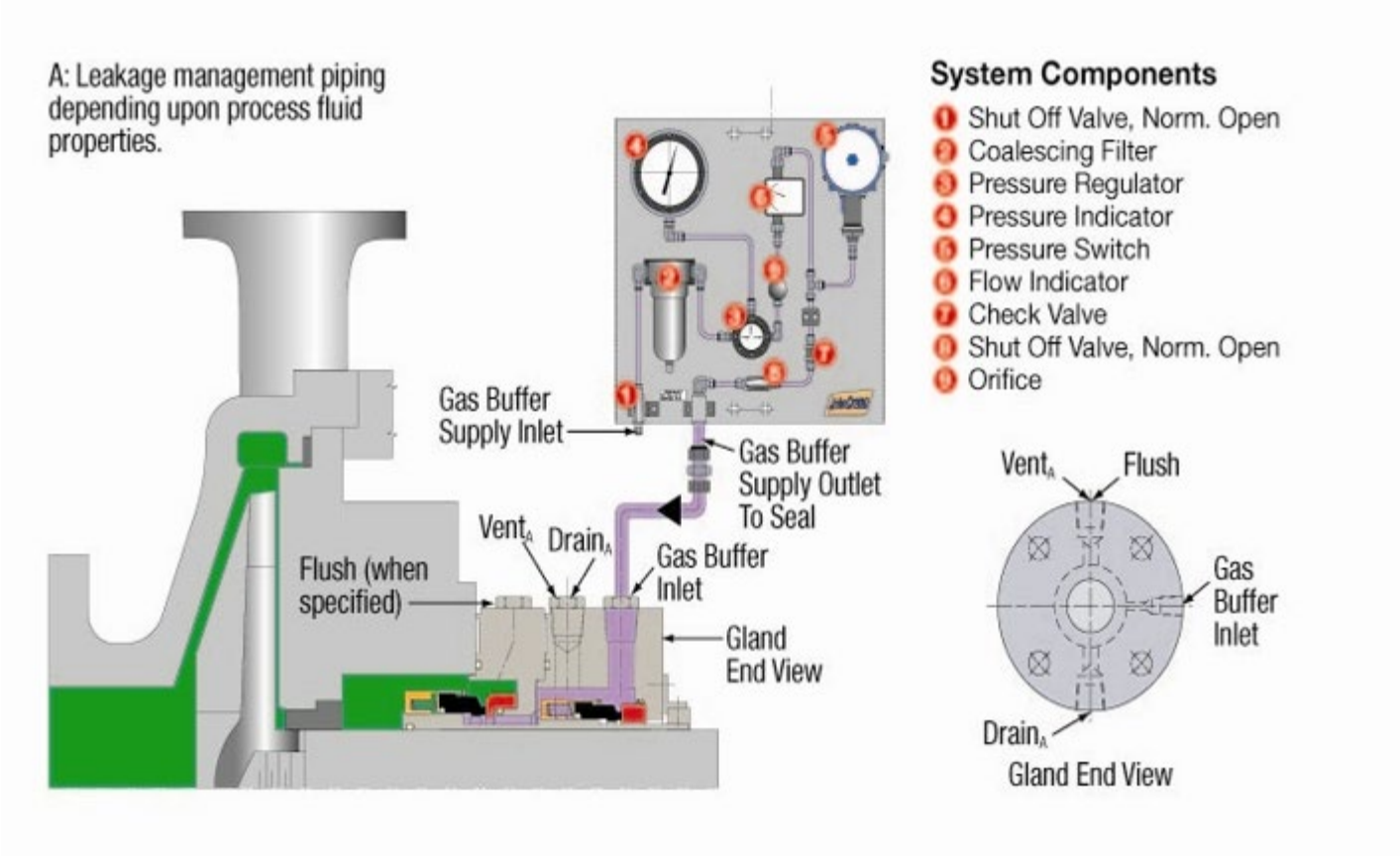


Image borrowed from AES Seals

API Plan 72

- Plan 72 for secondary containment uses an external low pressure buffer gas, usually nitrogen, regulated by a control panel that injects it into the outer seal cavity.
- Advantages: Introduction of a buffer gas like nitrogen reduces fugitive emissions, prevents icing on cold applications, and provides for some cooling to the outboard seal.
- General: Plan 72 is normally used with Plan 75 for primary seal leakage that is condensing, or with Plan 76 for non-condensing leakage.



THRUST HANDLING IN PUMP
IN-HEAD THRUST POTS

REFERENCE NUMBER	PART DESCRIPTION	MATERIAL
120	SEAL, CARTRIDGE	ASSY
167	SHAFT, PUMP	A582 TP 416
252	NUT, SHAFT, DRIVER	A582 TP 416
346	SLEEVE, BEARING, BALL, THRUST	STL 1213
486	RING, SEALING-V	NITRILE
486-1	RING, SEALING-V	NITRILE
508	THRUST POT	A48, CL 30
510	COVER, THRUST POT	A36
655	BEARING, BALL, RADIAL	ASSY
673	WASHER, LK, BBRG	A36
678	KEY, GIB	AISI 302-316
747-4	O-RING	NITRILE
878	NUT, LK, BBRG	A36

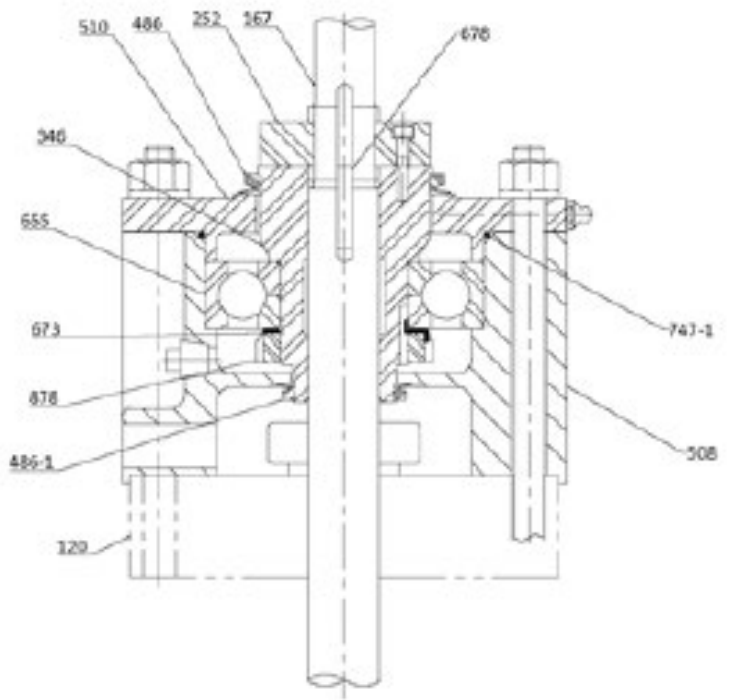
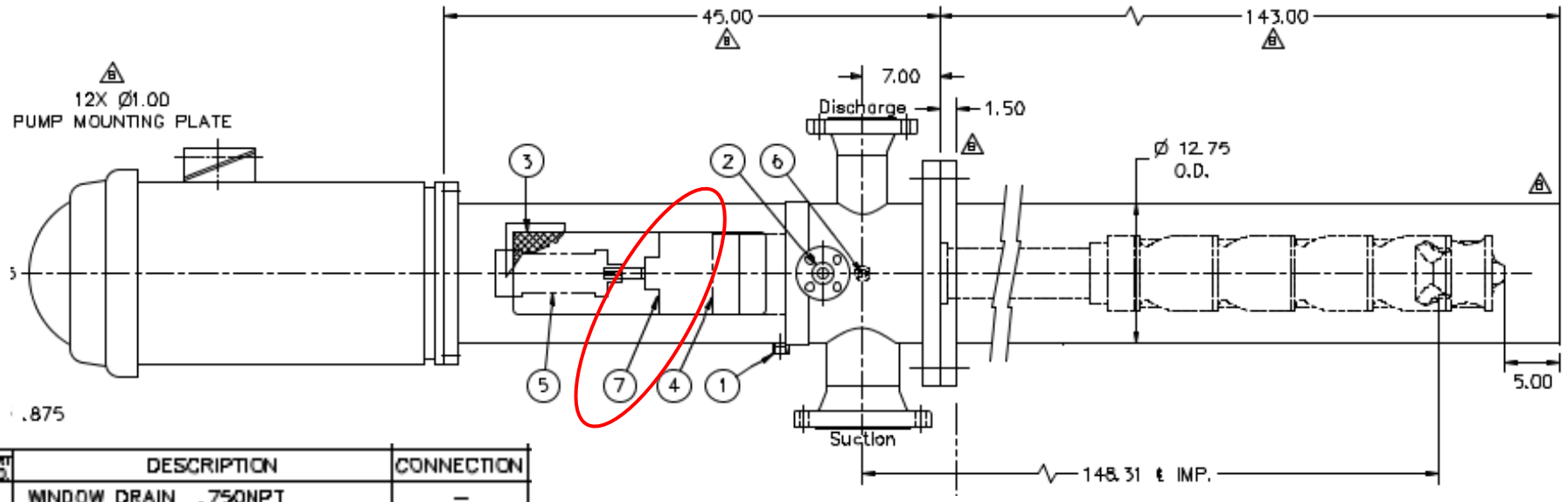


Figure 6.1 Thrust Pot Model 311 / 311 QJ Sectional Drawing

THRUST HANDLING IN PUMP
IN-HEAD THRUST POTS

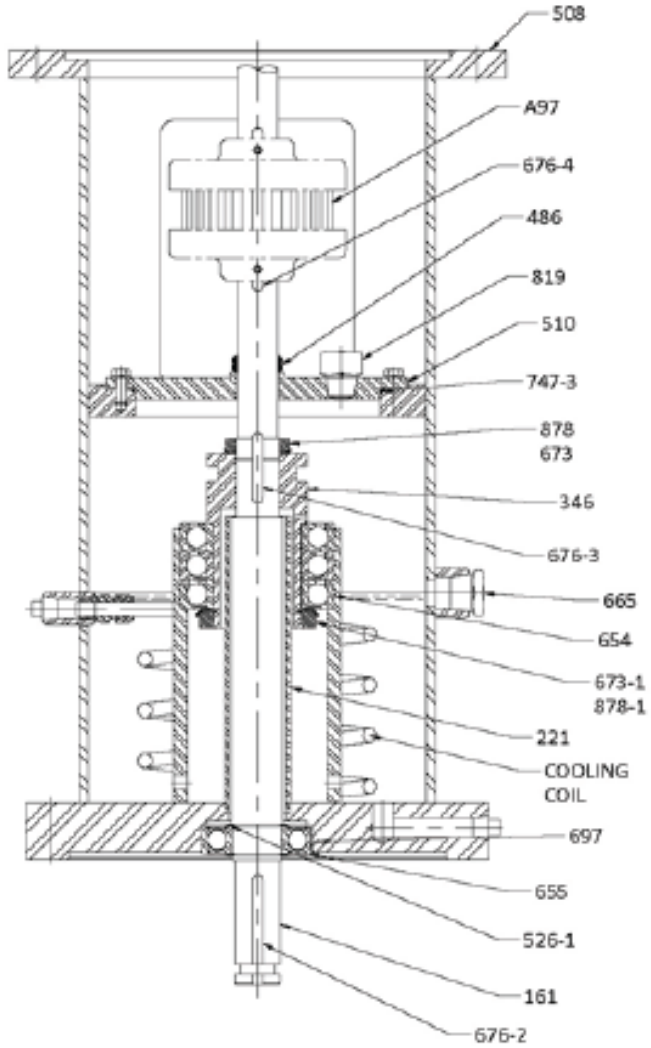


PART NO.	DESCRIPTION	CONNECTION
1	WINDOW DRAIN .750NPT	—
2	SUCTION VENT 1.0 CL300 RFWN	FLANGED
3	COUPLING GUARD	
4	MECH. SEAL	
5	METASTREAM COUPLING ASSY	
6	API PLAN13 CONN. .750NPT — SEE R009332	
7	311 THRUST POT ASSY — SEE R009331	
8		
9		

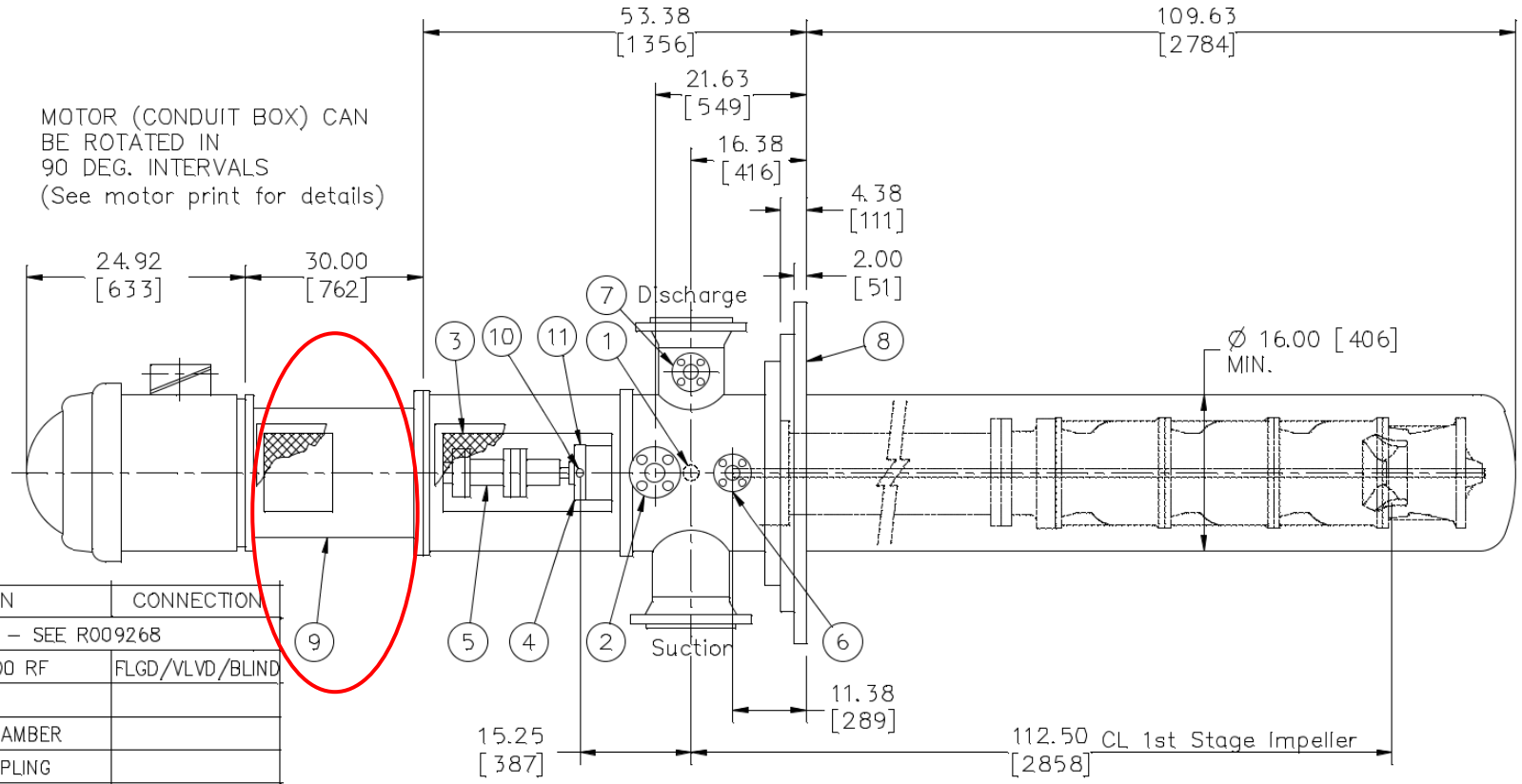
THRUST HANDLING IN PUMP
SEPARATE THRUST POTS

RUHRPUMPEN
Specialist for Pumping Technology

REF. NO.	PART DESCRIPTION	MATERIAL
161	SHAFT, THRUST POT	A528 TP 416
221	SLEEVE, OIL	A36 - STL LC
346	SLEEVE, BEARING, BALL	A36 - STL LC
486	RING, SEALING-V	NITRILE
508	THRUST POT	FABRICATION NOTE
510	COVER, THRUST POT	A36 - STL LC
523-1	RING, RETAINING	AISI 302
654	BEARING, BALL, THRUST (QTY: 3)	SKF # 7216-BG
655	BEARING, BALL, RADIAL (QTY: 1)	SKF # 6309-2RSNR
665	GAUGE, LEVEL	BW20 GITS # 04054
673	WASHER, LOCKNUT 40 W-80	STL SKF W08
673-1	WASHER, LOCKNUT 80 W-16	STL SKF W16
676-3	KEY, PRL (QTY: 1)	AISI 302-316
676-4	KEY, PRL (QTY: 2)	AISI 302-316
697	PIN, ANTI-ROTATION	AISI 302
747-3	O-RING	NITRILE
819	FITTING, VENT, BREATHER	M-841 TEDECO
878	NUT, BEARING, THRUST 40 N-08	STL SKF N-08
878-1	NUT, BEARING, THRUST 80 AN-16	STL SKF AN-16
A97	COUPLING METASTREAM TSKS 0135	



THRUST HANDLING IN PUMP
SEPARATE THRUST POTS



PART NO.	DESCRIPTION	CONNECTION
1	PLAN 13 CONN. .750NPT – SEE R009268	
2	SUCTION VENT 1.0 CL–300 RF	FLGD/VLVD/BLIND
3	COUPLING GUARD	
4	MECH. SEAL W/ SEAL CHAMBER	
5	4 PC. RIGID SPACER COUPLING	
6	INTERNAL BARREL DRAIN – .75 CL–300 RF	FLGD/VLVD/BLIND
7	DISCHARGE VENT .75 CL–300 RF	FLGD/VLVD/BLIND
8	36.0 SQ. FOUNDATION PLATE	
9	THRUST POT	
10	LBO FOR SEAL SYSTEM 0.50 NPT	TO PLAN 53
11	LBI FOR SEAL SYSTEM 0.50 NPT	TO PLAN 53

VLT

VLT prepared for Can

Technical Details	
Pump	VTP 10B-41
Application	Water / Mining
Flow	392 gpm (89 m^3/h)
Head	95 ft (29 m)

New Development

- Quickship VLT

API 610 Build Quickship Pump

This is what you get:-

- A fully compliant API610 12th Edition pumpset
- Built as a semi-engineered package with limited (but extensive) options
- Pump Sizes 100VLT through to 2000VLT (21 Pump sizes, 35 hydraulics)
  1000 m3/hr & 850m head 50 Hz
  5000 usgpm & 4000ft head 60 Hz
- Delivery Time 18 weeks (complete pump) ex works after receipt of order (future target 15 weeks), 8 weeks (bowl assembly)

API 610 Build Quickship Pump

This is what you get -1

BOWL ASSEMBLY:
bowl(s)/suction bell - dual certification WCB/LCB
flanged bowl(s)
impeller(s) - Duplex SS
keyed impeller(s)
case & impeller wear rings - 12% chrome
bowl bearing(s) - carbon
product lube bowl bearings
bowl shaft - 12% chrome
bowl bolting - carbon steel
OPTION: basket strainer - galvanized steel
COLUMN ASSEMBLY:
carbon steel
flanged
open lineshaft
column bearing(s) - carbon
column lineshaft - 12% chrome
columng bolting - carbon steel

API 610 Build Quickship Pump

This is what you get -2

HEAD ASSEMBLY:
fabricated - 150# RF discharge flange - carbon steel
stuffing box bearings - carbon
mechanical seal - cartridge (single or double; Ruhrpumpen choice of vendor)
Plan 13 seal flush - 304SS tubing
rigid adjustable 4-piece coupling
coupling guard - aluminum
head bolting - carbon steel
OPTION: flanged discharge vent connection
OPTION: flanged suction vent connection (when pump in can)
OPTION: packing
OPTION: suction in head - 150# RF suction flange
OPTION: 300# RF discharge flange
OPTION: 300# RF suction flange
OPTION: seal flush plan 14/52/53A/53B/65A/65B/66A/66B
OPTION: seal pot (for plan 52, 53)
OPTION: sole plate (standard RP dimensions) - carbon steel

API 610 Build Quickship Pump

This is what you get -3

MISCELLANEOUS:
Performance Test - Nonwitnessed only (Ruhrpumpen choice: use of job or test lab motor/seal & full length or short set pump)
Hydro Test - Nonwitnessed only
coating system A02-M: corrosivity category C2 / SSPC-SP10 surface preparation / EP top coat / color code RAL 5003 ("Ruhrpumpen blue") / exterior surfaces only
standard packaging for shipment (goods mounted on pallet)
OPTION: can (for VS6 configuration) - carbon steel
OPTION: suction in can - 150# RF
OPTION: suction in can - 300# RF
OPTION: Material Certificates [bowl(s)/impeller(s)]
OPTION: non-standard head and/or can dimensions

MOTOR:
Vertical Solid Shaft (thrust handling) - NEMA design standard
Ruhrpumpen choice of vendor & option to drop ship direct from vendor
500 HP maximum
2, 4, or 6 pole
Enclosure options: WP1, WP2, TEFC, TEFC Div 2
460 V / 3 Phase / 60 Hz / 1.15 S.F. (1.0 if used w/ VFD)
Premium Efficiency

API 610 Build Quickship Pump

This is what you get – 4 – Documentation 1

Drawings	Duration (Weeks)
Cross-sectional drawing (pump)	8
Certified dimensional outline drawing (with allowable forces and moments)	8
Certified dimensional outline drawing (driver only)	10
Shaft seal drawing	10
Cross-sectional drawing (shaft seal)	10
Wiring diagram (driver)	10
Coupling assembly drawing	16

Documents	Duration (Wks)
Document index	5
Performance curve (predicted)	7
Production schedule	7
Inspection and Test Plan	6
Data sheet (pump)	8
Complete parts list (pump)	8
Nameplate (pump) data	8
Data sheet (driver)	10
Spare parts list (pump)	8
Final Data Book (all submitted documentation) index	8.8
Sub-vendor list	10.8

API 610 Build Quickship Pump

This is what you get – 5 – Documentation 2

Test Results	Duration (WAT)
Performance test data	2
Final Inspection report	2
Certified hydrostatic test data	In FDB
Driver test data	In FDB
Material test report	In FDB
NDT report	In FDB
Balance data (impeller)	In FDB

Final Documentation	Duration (WAD)
IOM manual	In FDB
Final Data Book (all submitted documentation)	4 Weeks

API 610 Build Quickship Pump

This is what you DON'T get

1. No Bespoke documentation package
2. No Witnessed or Observed testing
   (Testing might be carried out on a Saturday or on second shift or be rearranged at no notice so there is no possibility of giving you advance warning of a date for even an Observed Test never mind a Witnessed test)
3. No NDE
4. No Customer Specifications with PO
   (These will be reviewed, commented and agreed during proposal stage as required but the agreed scope of supply in the PO will be a standalone document)
5. No Dedicated Project Manager. (Your PM will have 50 other jobs!)
6. NOTE – All the above **are** available but not in the Quickship Program

The above limitations make this more applicable to end user purchasers than EPC Contractors who are usually constrained by Project Specifications and Requirements

API 610 Build Quickship Pump

This Program has been rolled out, initially, predominantly for the North American market.

For Europe, Middle East, Africa & Asia (EMEAA) it will need some “tweaking”

It does not currently allow for:

- European / Asian IEC design & supply motors
- Separate Thrust Pots
- Flanged & welded seal piping
- Maybe other “essential EMEAA” requirements? You tell us!

NOTE – All the above **are** available but not in the Quickship Program

If the demand is there the program will be expanded to suit the EMEAA markets

HI Standard (Non-API 610) Quickship Pump

This is what you get:-

- An HI Standard pumpset
- Built as a semi-engineered package with limited options
- Pump Sizes 100VLT through to 2000VLT
  1000 m3/hr & 850m head 50 Hz
  5000 usgpm & 4000ft head 60 Hz
- Delivery Time 18 weeks ex works after receipt of order (future target 15 weeks), 8 weeks (bowl assembly)

HI Standard (Non-API 610) Build Quickship Pump

This is what you get -1

BOWL ASSEMBLY:
bowl(s)/suction bell - ductile iron or dual certification WCB/LCB (depending on model)
threaded or flanged bowl(s) (depending on model)
impeller(s) - Duplex SS
keyed impeller(s)
no wear rings
bowl bearing(s) - carbon
product lube bowl bearings
bowl shaft - 12% chrome
bowl bolting - carbon steel
OPTION: case & impeller wear rings - 12% chrome
OPTION: basket strainer - galvanized steel
COLUMN ASSEMBLY
carbon steel
flanged
open lineshaft
column bearing(s) - carbon
column lineshaft - 12% chrome
columng bolting - carbon steel

HI Standard (Non-API 610) Build Quickship Pump

This is what you get -2

HEAD ASSEMBLY:
fabricated - 150# RF discharge flange - carbon steel
stuffing box bearings - carbon
mechanical seal - cartridge (single or double; Ruhrpumpen choice of vendor)
Plan 13 seal flush - 304SS tubing
rigid adjustable 4-piece coupling
coupling guard - aluminum
head bolting - carbon steel
OPTION: threaded discharge vent connection
OPTION: threaded suction vent connection (when pump in can)
OPTION: packing
OPTION: suction in head - 150# RF suction flange
OPTION: 300# RF discharge flange
OPTION: 300# RF suction flange
OPTION: seal flush plan 14/52/53A/53B/65A/65B/66A/66B
OPTION: seal pot (for plan 52, 53)
OPTION: sole plate (standard RP dimensions) - carbon steel
OPTION: full penetration welds on discharge head

HI Standard (Non-API 610) Build Quickship Pump

This is what you get -3

MISCELLANEOUS:
coating system A02-M: corrosivity category C2 / SSPC-SP10 surface preparation / EP top coat / color code RAL 5003 ("Ruhrpumpen blue") / exterior surfaces only
standard packaging for shipment (goods mounted on pallet)
OPTION: can (for VS6 configuration) - carbon steel
OPTION: suction in can - 150# RF
OPTION: suction in can - 300# RF
OPTION: Material Certificates [bowl(s)/impeller(s)]
OPTION: Performance Test - Nonwitnessed only; acceptance grade 2B (Ruhrpumpen choice: use of job or test lab motor/seal & full length or short set pump)
OPTION: Hydro Test - Nonwitnessed only
OPTION: full penetration welds on can
OPTION: non-standard head and/or can dimensions
MOTOR:
Vertical Solid Shaft (thrust handling) - NEMA design standard
Ruhrpumpen choice of vendor & option to drop ship direct from vendor
500 HP maximum
2, 4, or 6 pole
Enclosure options: WP1, WP2, TEFC, TEFC Div 2
460 V / 3 Phase / 60 Hz / 1.15 S.F. (1.0 if used w/ VFD)
Premium Efficiency

HI Standard (Non-API 610) Build Quickship Pump

This is what you get – 4 – Documentation 1

Drawings	Duration (Weeks)
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Certified dimensional outline drawing (with allowable forces and moments)	8
Certified dimensional outline drawing (driver only)	10
Shaft seal drawing	10
Cross-sectional drawing (shaft seal)	10
Wiring diagram (driver)	10
Coupling assembly drawing	16

Documents	Duration (Wks)
Document index	5
Performance curve (predicted)	7
Production schedule	7
Inspection and Test Plan	6
Complete parts list (pump)	8
Spare parts list (pump)	8

HI Standard (Non-API 610) Build Quickship Pump

This is what you get – 5 – Documentation 2

Test Results	Duration (WAT)
Performance test data	2
Final Inspection report	2
Certified hydrostatic test data	In FDB
Material test report	In FDB
NDT report	In FDB
Balance data (impeller)	In FDB

Final Documentation	Duration (WAD)
IOM manual	In FDB
Final Data Book (all submitted documentation)	4 Weeks
Documentation package "1" items submitted individually (NOT ONLY IN Final Data Book)	NO