



Specialist for Pumping Technology

INNOVATION
EFFICIENCY
QUALITY



HVN

Double Suction, Heavy Duty
API 610 Process Pump (BB2)

For more than 60 years the name Ruhrpumpen™ has been synonymous worldwide with innovation and reliability for pumping technology

Ruhrpumpen is an innovative and efficient centrifugal pump technology company that offers operators of Pump Systems and a wide range of quality products. Ruhrpumpen is committed to global excellence with a complete range of Pumps, Fire Pump Packages and related products, such as Decoking Systems and Tools to support the core markets, namely Oil & Gas, Petrochemical, Power, Heavy Industry Applications, Mining and Water Services.

The broad product line complies with the most demanding quality specifications and goes beyond stringent industry standards such as API, ANSI, Hydraulic Institute, Underwriter's Laboratories, Factory Mutual and ISO 9001.

Ruhrpumpen is a vertically integrated company with its own foundry, machine shop, pump manufacturing plants and service centers. With strategically located manufacturing plants, operating offices and service centers in many parts of the world, Ruhrpumpen is truly a global pump company which also has the strength to focus on the local necessities of each client.

Double Suction, Heavy Duty, API 610 Process Pump (BB2)

The pumps of the HVN range are heavy-duty centrifugal process pumps for universal applications. These pumps are one-stage design. The range comprises more than 30 pumps sizes with 6 different bearing sizes. HVN pumps are of one-stage design. They are usually operated at the speeds shown in the selection charts. Higher and lower speeds are possible.

The HVN range is in accordance with the latest edition of the API Standard 610. This pump range can be adapted to the needs and specifications of individual clients.

To meet these demands, this product range is available in a wide spectrum of materials and numerous design alternatives. (See excerpt from material table, pg. 6).

The HVN pumps are:

- Horizontal arrangement
- Process design
- Modular design system
- One -stage
- Double Suction impeller
- Centerline mounted API 610

MODERN AND ROBUST CASING

The radially split pump casing with sturdy feet at the centerline top-top suction and discharge branches integrally cast in the casing ensures good conditions for the absorption of forces and moments from the piping, even at high temperatures.

Accurately designed pump casing and progressive pattern, moulding and casting techniques, together with high-precision machining and continuous, independent quality assurance guarantee a long service life.

With the use of a double volute casing the radial forces are minimized to reduce the shaft deflection and the bearing load.

The casings are equipped with a welded or integrally flanged drain line. Vent lines are not necessary due to the self venting design.

Casing and cover are holding the amply designed stuffing box room.

The corrosion allowance for the wall thickness of carbon steel casings and casing covers is 3.2 mm or more.

The HVN range is characterized by the use of robust and modular design elements to reduce the number of parts.

PUMP TEST PRESSURE

The casting is tested at 1.5 times the value of the maximum discharge pressure. Higher test pressures on special request.

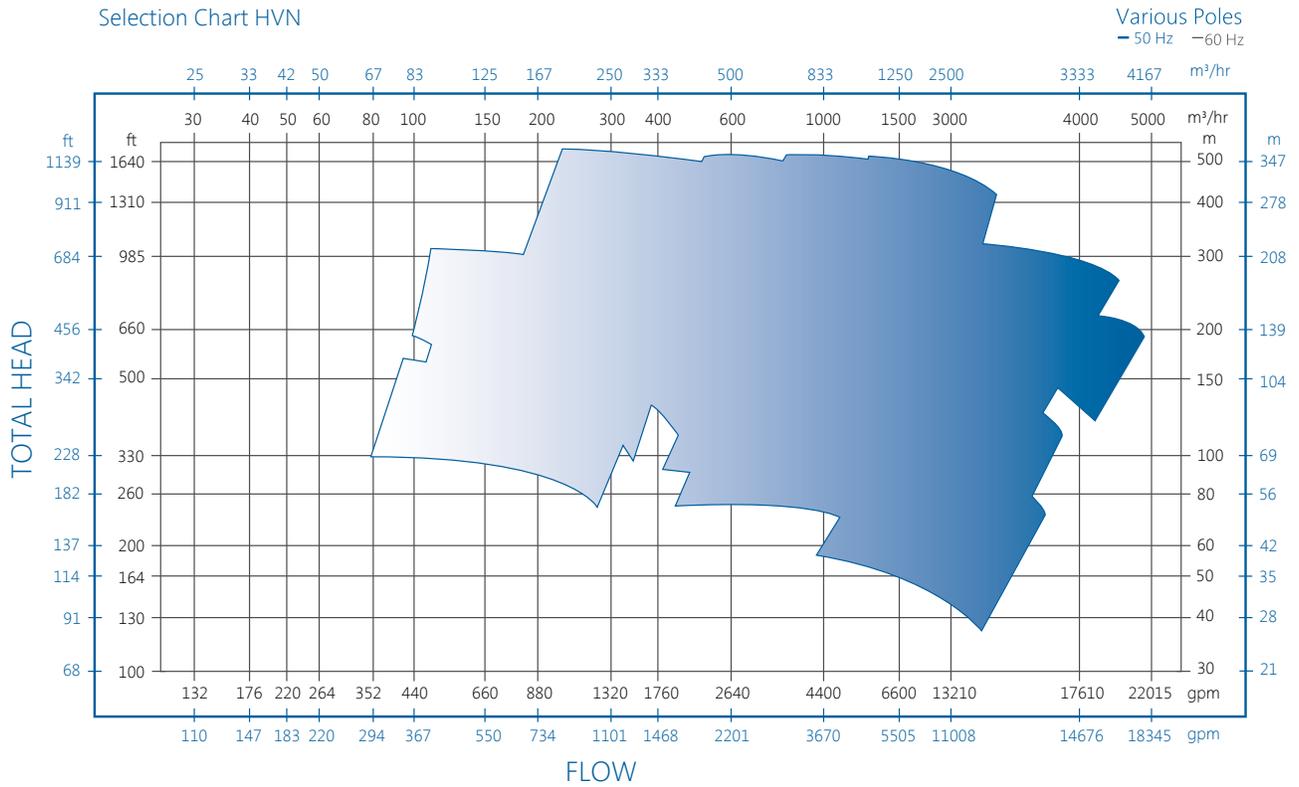
WEAR RINGS

All HVN pumps are equipped with casing and impeller wear rings. The clearances are in accordance with API 610. A minimum hardness difference of 50 HRB is mandatory.

All pumps are available with flanges acc. to ASME B16.5, 300 lb or alternative acc. to Din 2545, PN 40. For special conditions all relevant ASME- or DIN/ISO-flanges are available.

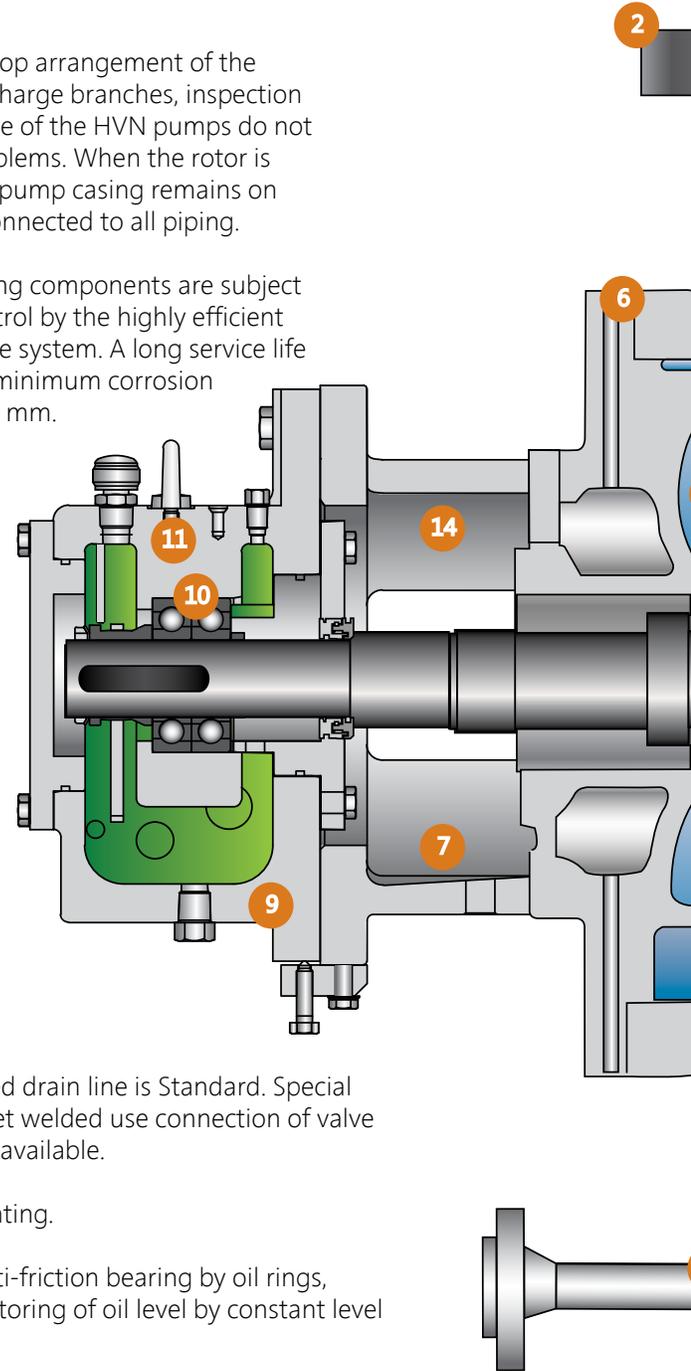
Selection Chart

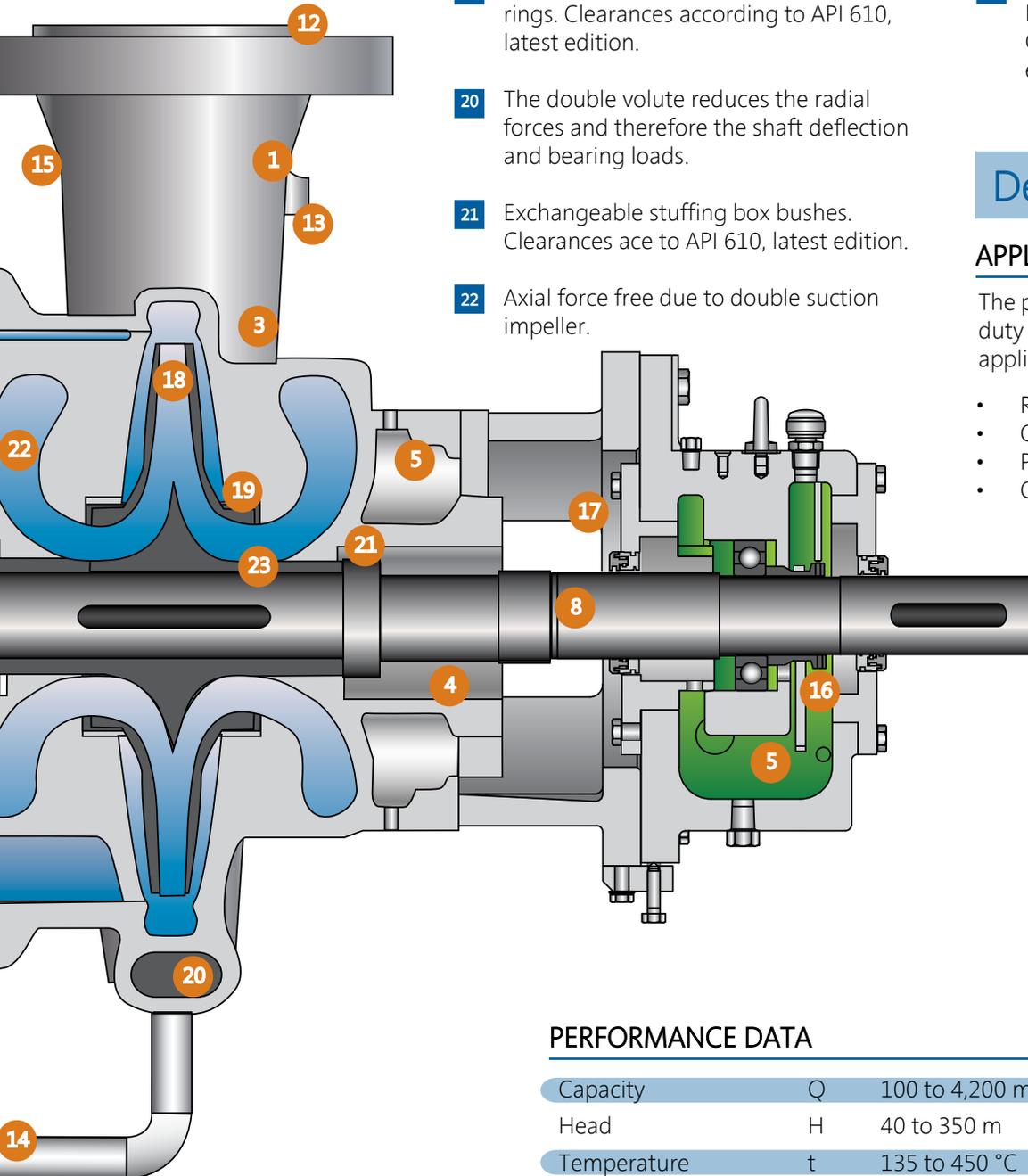
The HVN chart is covering more than 20 pump models with several sets of impeller, especially designed for 50/60 Hz applications. Our continuous development process allows the extensions.



Characteristics & Design Features

- 1 More than 30 radially split pump casing sizes centerline mounted. Suction and discharge branches are arranged top-top. Discharge Branch sizes ranking from 4" to 20".
- 2 All applicable flange connection available. Flange to ASME B 16.5, DIN/ISO, BS, NF, etc. are possible. All material acceptable according to ASME, DIN/ISO, and BS available on request.
- 3 Basic pressure rating is 40 bar g (580 psig) at 260°C (500 °F) for A 26 WCC casing material. Operating temperatures up to +450 °C (845 °F) and higher pressure are possible due to a Wide spectrum of materials.
- 4 Ample dimensioned shaft sealing chamber fitting for all commercially available designs.
- 5 Heating or cooling of the stuffing box chamber is available.
- 6 Casing/casing cover in metal-to-metal contact. Non-asbestos spirally wound gasket made of stainless steel/graphite.
- 7 Casing mounted centerline on support pedestals of the baseplate. The baseplate is rated for twice the force and moments specified by API610, latest edition.
- 8 Shaft deflection smaller than .03 mm in the area of the mechanical seal due to the ample pump shaft dimensions and the balancing of the hydrodynamical radial loads. Critical speeds considerable above the operating speed.
- 9 Single-piece 360° bearing housing, air cooled. Alternatively, cooling by internally cast cooling channels with external piping connections for cooling water pipes according to API 610, Annex D. Fan cooling on special request.
- 10 Anti-friction bearing with a L_{10} service life of more than 25,000 h even under arduous conditions. Grooved ball bearings on the drive side, double angular ball bearing on the opposite side.
- 11 Sleeve and tilting pad bearing also possible on request.
- 12 Due to the top-top arrangement of the suction and discharge branches, inspection and maintenance of the HVN pumps do not present any problems. When the rotor is dismantled, the pump casing remains on the baseplate connected to all piping.
- 13 Pressurized casing components are subject to intensive control by the highly efficient quality assurance system. A long service life is ensured by a minimum corrosion allowance of 3.2 mm.
- 14 Integrally flanged drain line is Standard. Special option like socket welded use connection of valve termination are available.
- 15 Pump is self-venting.
- 16 Oil supply to anti-friction bearing by oil rings, automatic monitoring of oil level by constant level oiler.
- 17 Wear-free labyrinth seals with oil return bores, alternatively radial sealing rings.
- 18 Low tolerant impellers with excellent surface finish lead to high efficiencies and low NPSH-values.





- 19 Exchangeable impeller and casing wear rings. Clearances according to API 610, latest edition.
- 20 The double volute reduces the radial forces and therefore the shaft deflection and bearing loads.
- 21 Exchangeable stuffing box bushes. Clearances according to API 610, latest edition.
- 22 Axial force free due to double suction impeller.

- 23 Balancing with semi-fitted key. Exchange stuffing box bushes. Clearances according to API 610, latest edition.

Description

APPLICATIONS

The pumps of the HVN range are heavy-duty centrifugal pumps used for process applications in:

- Refineries
- Oil fields
- Petrochemical plants
- Chemical plants

PERFORMANCE DATA

| | | | |
|-----------------------|-----------------|-------------------------------------|-------------------|
| Capacity | Q | 100 to 4,200 m ³ /h | 435 to 18,200 gpm |
| Head | H | 40 to 350 m | 135 to 1,150 feet |
| Temperature | t | 135 to 450 °C | 275 to 845 °F |
| Ambient temp | t _a | up to 400 °C | up to 752 °F |
| Discharge Pressure | P _d | up to 40 bar | up to 580 psi |
| Discharge Branch Size | DN _d | 100 to 500 mm | 4 to 20 in |
| Speed 50/60 Hz | n | up to 1,480/3,560 min ⁻¹ | 1,480/3,560 rpm |

Note: For pump operation outside this range, please contact a Ruhrpumpen representative.

Economical and Energy Saving Hydraulics

The hydraulics of the HVN pumps are designed and built in accordance with the latest level of knowledge.

In extensive research, test and development programs, the shape of the impellers and volute casings were optimized with regard to the flow dynamics. The single piece, closed impellers are of an extremely high accuracy in shape and surface finish with special features to achieve very good properties in case of variation of impeller diameters. The high efficiencies over a wide flow range results in a low energy requirement.

Low NPSH values combined with moderate suction speeds guarantee trouble free operation even under severe suction conditions.

HVN Design

SMOOTH RUNNING, RELIABLE SHAFT AND BEARINGS

The shafts of the HVN pumps are amply dimensioned, and as a result the shaft deflection at the area of the mechanical seals is less than 0.03 mm referred to the defined working range.

This low deflection is supported by the use of a double volute which reduces the radial force and the bearing load.

The critical speeds are considerably higher than the pump operating speed. Sub-critical operation in conjunction with precise machining and a high balancing quality result in a low vibration velocity.

To ensure smooth running the complete rotors are balanced dynamically, in accordance with the latest edition of API 610.

Due to the double suction design of the impeller the axial bearing loads are almost zero.

The shaft is furthermore supported by amply dimensioned bearings within single-piece bearing housing arranged on each side of the volute casing. The bearings are of an anti-friction type with ring oil lubrication. The L¹⁰-Life- Time of the antifriction bearing is more than 25,000 hours.

Axial and radial sleeve bearings are also possible on special request.

The bearing housing will be cooled, if temperature is above 200°C. Shaft mounted fan cooling for temperatures from 200 C to 260 C. Water cooling by cooling coil inserts for temperatures above 260 C. All API 610 cooling plans are available.

RELIABLE SHAFT SEALING

The generously dimensioned shaft sealing chamber is suitable for the installation of all commercial mechanical seal designs. Client requirements concerning the pumped liquid and environment regulations can be satisfied by the use of double –acting mechanical seals. All seals and casings can be equipped with connections according to API 682 piping plans. The materials of the seal fully correspond to API 610/682. All types of sealing can be supplied with an additional integral cooling or heating chamber.

ENVIRONMENTAL PROTECTION

The existing stringent environmental regulations with regards to emission limitation are taken into account when selecting suitable mechanical seals. Double-acting mechanical seals in conjunction with special barrier systems prevent the pumped liquid from leaking into the environment.

COUPLING, COUPLING GUARD

Pumps and drivers are usually connected by flexible disc couplings. The spacer length is dimensioned to allow a trouble free removal of mechanical seal.

The standard coupling guards are made inf AlMg perforated sheet metal. The two piece rectangular shaped guards are built to withstand forces up to 200kg.

Special guard designs and material are available.

DIRECTION OF ROTATION

The normal rotating direction is preferably counter-clockwise (ccw) viewed from the driver end.
HVN 6x17/ 16x26/ 18x30 are running clockwise (cw) viewed from the driver end.

BASEPLATE

The pump aggregates are normally mounted in heavy duty baseplates made of fabricated steel. The standard baseplate are built for grouting after alignment and are equipped with a drain pan that extends under all potential leakage sources.

The baseplate can be drained by a 1" 150# ASME flange.

The baseplates are in accordance with the API 610 and are able to withstand two times the forces and moments given in the API 610.

Special baseplate designs e.g. for offshore use are available on client's request.

HVN



Performance Curves

HVN pumps have stable characteristics. They can run continuously in the operating range from minimum flow (Q_{min}) to maximum flow provided that enough NPSH is available. HVN pumps can be operated at a wide range of speeds. For speeds higher than 3600 rpm, the smooth function has to be checked by the factory. The pump hydraulics are based on a kinematic viscosity of 1mm/s. For higher viscosities, correction factors are to be considered if applicable.

Materials of Construction

MATERIAL TABLE MATERIAL CLASSIC API 610

| Description | MATERIAL CLASS ACC. TO API 610 | | | LOW TEMPERATURE | |
|--------------------------------------|--------------------------------------|--|---|----------------------------|--------------------------------------|
| | S-1 | C-6 | A-8 | down to -50° C | down to -80°C |
| Volute Casing Casing Cover | GP240GH+QT ¹⁾ | GX8CrNi12+QT2 | GX5CrNiMo 19-11-2 | G21Mn 5+ QT | G9Ni 14 |
| Pump Shaft Impeller | 42 CrMo4 ²⁾ +QT GJL250 | X17CrNi 16+2+QT80 GX8CrNi12+QT2 | X6CrNiMoTi 17-12-2 GX5CrNiMo 19-11-2 | 26CrMo4 G21Mn 5+ QT | 12Ni19 G9Ni14t |
| Bearing Bracket | GP240GH+N | | | | |
| Stuffing Box Bushing | GJL250 | GX20Cr14 | GX5CrNiMo 19-11-2 | GX20Cr14 | GX5CrNiMo 19-11-2 |
| Impeller Wear Ring Case Wear Ring | GJL250 | GX20Cr14 ³⁾ GX20Cr14 ³⁾ | GX5CrNiMo 19-11-2 GX40CrNi 27-4 | GX20Cr14 GX120CrMo 29-2 | GX5CrNiMo 19-11-2 GJSA-XNiMn 23-4 |
| Seal Cover Shaft Sleeve | X6CrNiMoTi 17-12-2 | | | | |

1) In special cases GS12 C

2) In special cases GP240GH+QT

3) Hardened if necessary Other materials under request

MATERIAL COMPARISON LIST

| MATERIAL | GERMAN STANDARD | MATERIAL NO. | AMERICAN STANDARD | BRITISH STANDARD |
|---|------------------------------------|----------------------------|---|--|
| Cast Iron Nickel Modular Cast Iron | EN 1561 EN 13835 | JL 1040 JS 3021 | ASTMA 48-40 B ASTMA 571 Type D-2 M | EN 1561 EN 13835 |
| Steel Cast Steel | EN 10083 EN 10213 | 1.7225 1.0619 | ASTMA 322-4140 ASTMA 216 -WCC | EN 10083 EN 10213 |
| Steel Nickel Steel Chrome Steel | DIN 17280 DIN 17280 EN 10088 | 1.7219 1.568 1.4057 | ASTMA 322-4130 AISI 2515 ASTMA 276-431 | BS 1717CDS 110 BS EN 10083 |
| Chrome Nickel Steel Cast Chrome Steel Cast Chrome Steel | EN 10088 EN 10213 SEW 410 | 1.4571 1.4107 1.4027 | ASTMA 276-316 TI ASTMA 217-CA 15* ASTMA 743-CA-40 | EN 10088 EN 10213 BS 3100-420 C 29 |
| Cast Chrome Nickel Steel Cast Chrome Steel Cast Chrome Nickel Steel | EN 10283 SEW 410 SEW 410 | 1.4408 1.4138 1.4340 | ASTMA 743-CF-8 M ASTMA ASTMA 743-CC 50 | EN 10283 BS BS |
| Cast Steel Cast Steel Cast Nickel Steel | SEW 595 SEW 685 EN 10213 | 1.7363 1.1138 1.5638 | ASTMA 217-C 5 ASTMA 352-LCB ASTMA 352-LC 3 | BS 1504-625 BS 1504-161B EN 10213 |

* For pressure-retaining parts. For Impellers, ASTMA 74-CA 15 applies among others.



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-  USA, Tulsa & Orland
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