



Engineering Flow Solutions

Pumps for Pipelines and Transportation

API 610 / ISO 13709:2009



Midstream







Midstream

The main volume of the oil transit accounts for the pipeline transport. Around 97% of produced oil is pumped through the oil-trunk pipeline system.

For the oil pipeline equipment higher requirements are set in regards of the pipelines safety, ecological compatibility of applied technologies and solutions, including high corrosion protection and temperature drop resistance.

HMS Group offers state-of-the-art API 610 (11th edition) pumping equipment for infield, interfield and trunk transport of crude oil and oil products:

- **Trunk pumps** for crude oil and oil products transportation by the pipelines
- **Booster pumps** for supply of crude oil and oil products to the trunk pumps inlets to ensure their cavitation-free operation
- **Pumps for handling crude oil/oil products spills** and supply into the inlet pipeline of the oil pumping station
- **Loading/Unloading pumps for tank farms and storages** of crude oil and oil products

API 610 STANDARD

Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries

High requirements to the pumps design and operating parameters are set by the system of standards and recommendations of the American Petroleum Institute (API).

HMS Group develops and manufactures a full range of pumps compliant with API 610. The pumps are offered in standard design and tailored in accordance with customer requirements. API 610 Standard is identical to ISO 13709:2009 one.

API 610 standard sets requirements to the centrifugal pumps regarding their reliability, safety, service & upgrade procedures as well as increase of the overall operational efficiency of the pumping system.

KEY BENEFITS & ADVANTAGES OF API 610 PUMPS

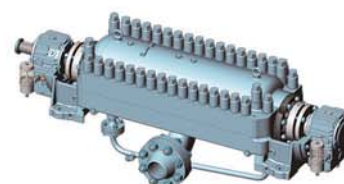
- Long service life: at least 20 years with at least 3 years of uninterrupted operation
- High pressure casing: minimum rated pressure of 4 000 kPa (40 bar) (600 psi) at 38 °C (100 °F)
- Closed type cast impeller and high rigidity shaft
- Shaft sealing according to API 682
- Flanges according to DIN/ANSI/ISO
- Shaft run-out limited by 0.025 mm
- Replaceable wear rings to reduce wear of casing and axial running clearances
- Vibration limit up to 3.0 mm/s in BEP, up to 3.9 mm/s in the rest of the operating range
- Dynamic balancing of impellers:
 - Single-/two-stage pumps: to ISO 1940-1 grade G1
 - Multistage pumps: flow part – ISO 1940-1 grade G1, rotor – ISO 1940-1 grade G2.5
- Long-life bearings: at least 25000 hours with continuous operation at rated conditions
- Standardized baseplates for the maximal alignment of the pump and drive shafts, as well as for increased reliability of the whole pumping unit. Drain rims to catch and keep all leakage within the baseplate
- Stringent requirements to hydraulic test: pressure shall exceed the maximum admissible working pressure (MAWP) by 1.5



BB1



BB2



BB3



BB4



BB5



VS6

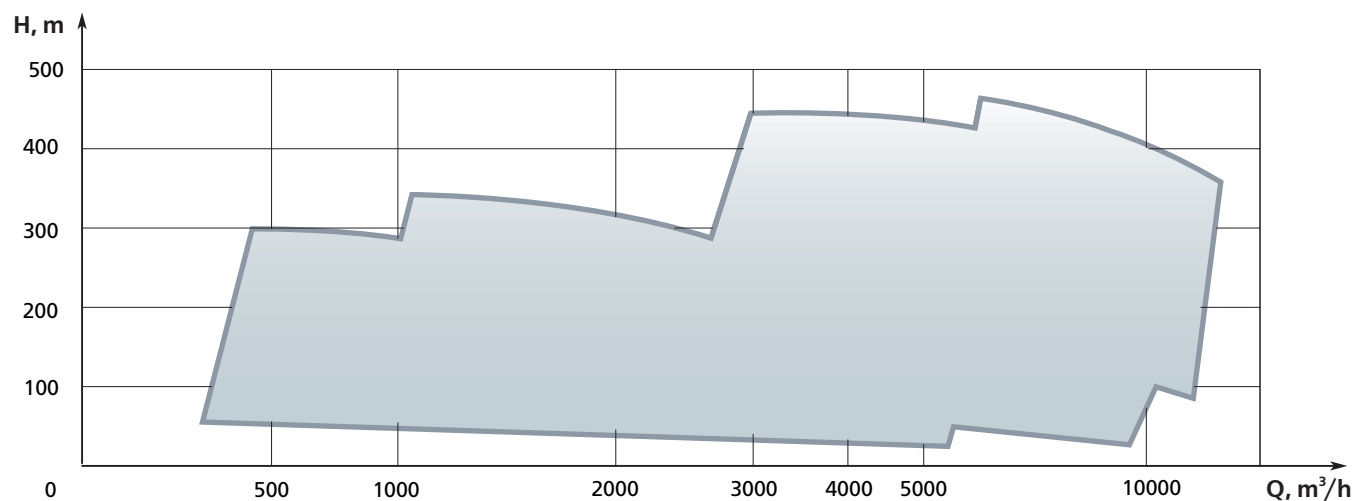
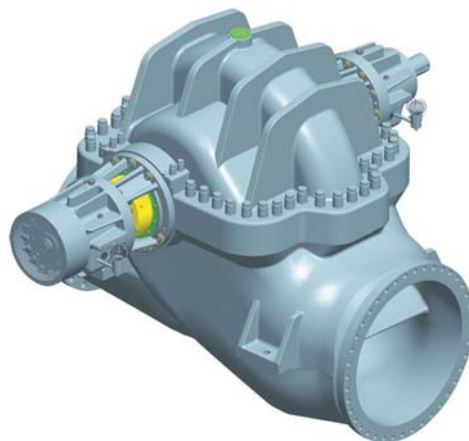
SINGLE-/DOUBLE-STAGE AXIALLY SPLIT DOUBLE SUCTION PUMPS**BB1****ZMK / ZKMV, NM, NGPN-M, NCN-E****APPLICATION**

- Transportation of crude oil and oil products
- Pressure boosting
- Oil supply from buffer tanks and vessels into trunk pipelines

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Seals according to API 682
- Horizontal or vertical installation
- Interchangeable impellers for different capacities

■ $Q = 80 \dots 12500 \text{ m}^3/\text{h}$ ■ $H = 20 \dots 380 \text{ m}$ ■ $T = \text{up to } 150 \text{ }^\circ\text{C}$



Project	Parameters	Features and Application
ESPO-1 Pipeline System Customer: Transneft Russia, 2012	$Q = 10000 \text{ m}^3/\text{h}$ $H = 380 \text{ m}$ $P = 11 \text{ MW}$	Trunk pumps NM 10000-380 series Application: crude oil transportation Options: frequency invertors/ fluid couplings; interchangeable rotors Material: alloy steel
ESPO-2 Pipeline System Customer: Transneft Russia, 2012	$Q = 10000 \text{ m}^3/\text{h}$ $H = 250 \text{ m}$ $P = 8 \text{ MW}$	Trunk pumps NM 10000-250 series Application: crude oil transportation Options: frequency invertors; interchangeable rotors Material: alloy steel
Baltic Pipeline System Customer: Transneft Russia, 2012	$Q = 4000 \text{ m}^3/\text{h}$ $H = 125 \text{ m}$ $P = 1.6 \text{ MW}$	Booster pumps NGPN-M 4000-125 series Application: crude oil supply to main trunk pumps Options: oil bath lubricated bearings Material: alloy steel
Purpe-Samotlor Pipeline System Customer: Transneft Russia, 2011	$Q = 700 \text{ m}^3/\text{h}$ $H = 250 \text{ m}$ $P = 5.5 \text{ MW}$	Trunk pumps NM 7000-250 series Application: crude oil transportation Options: frequency invertors; double mechanical seals Material: alloy steel

SINGLE-/TWO-STAGE DOUBLE SUCTION RADIALLY SPLIT PUMPS

BB2

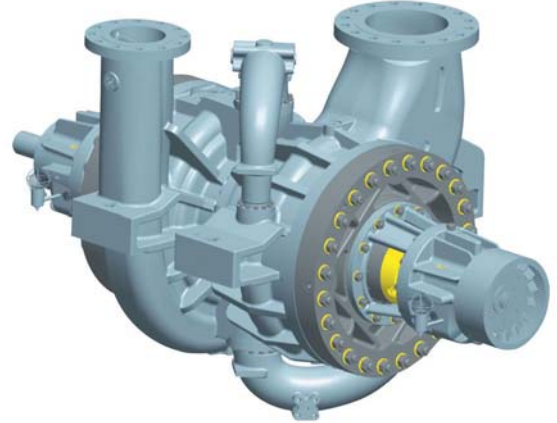
ZPR, KGR / KGRD

APPLICATION

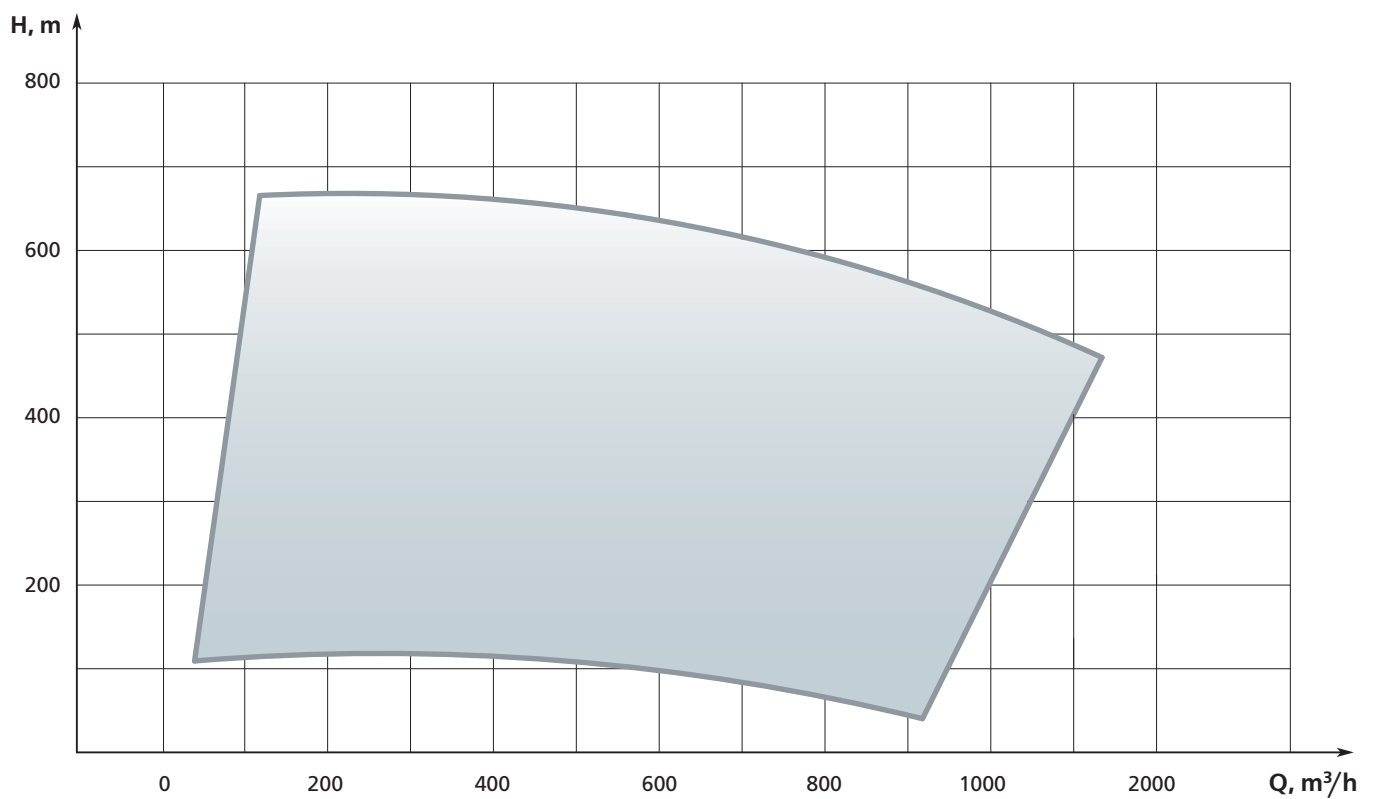
- Transportation of crude oil, oil products and liquefied gases
- Pressure boosting
- Tank farm oil pumping

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Seals according to API 682
- Back-to-Back impellers



■ $Q = 100 \dots 950 \text{ m}^3/\text{h}$ ■ $H = 50 \dots 640 \text{ m}$ ■ $T = \text{up to } 400 \text{ }^\circ\text{C}$



MULTISTAGE AXIALLY SPLIT PUMPS

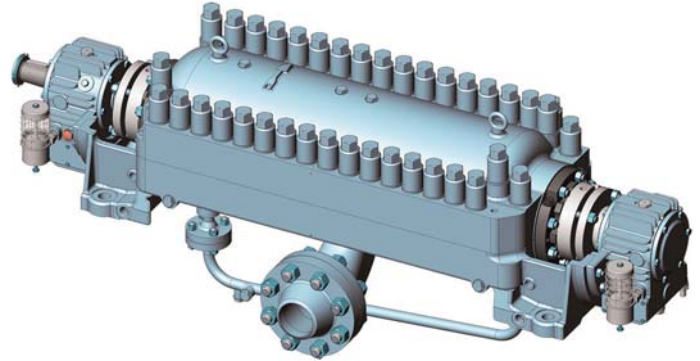
BB3
ZMP, NPS

APPLICATION

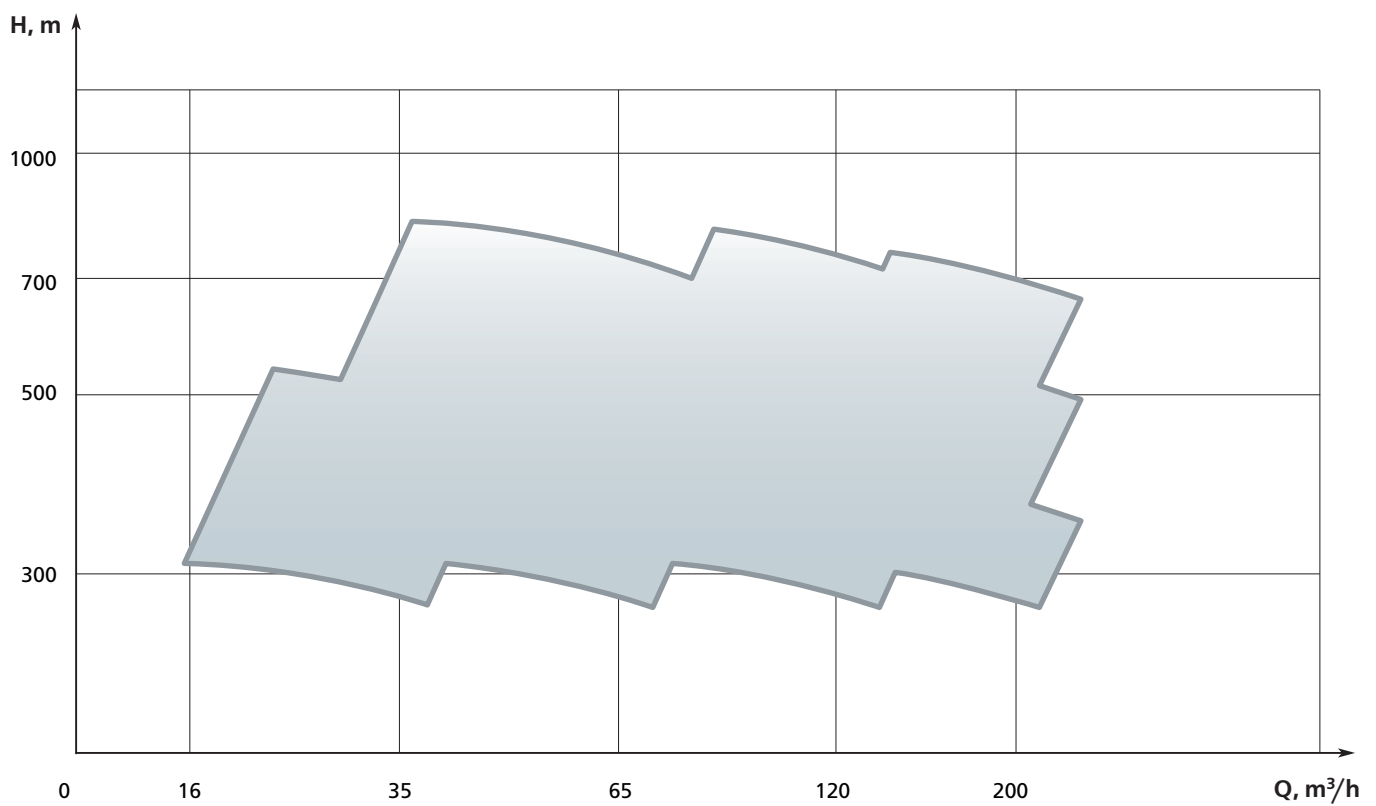
- Transportation of crude oil, oil products and liquefied gases
- Pressure boosting

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Seals according to API 682
- Interchangeable impellers for different capacities



■ $Q = 20 \dots 240 \text{ m}^3/\text{h}$ ■ $H = 350 \dots 800 \text{ m}$ ■ $T = \text{up to } 400 \text{ }^\circ\text{C}$



MULTISTAGE RADIALLY SPLIT PUMPS

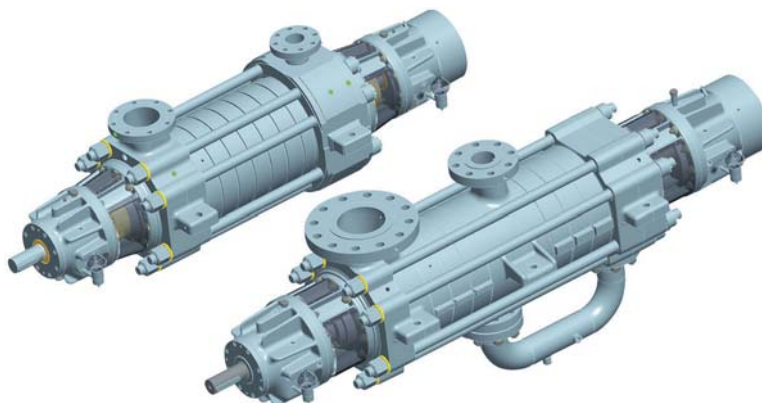
BB4
GH, GMHD, HP, GP, NM, CNSn

APPLICATION

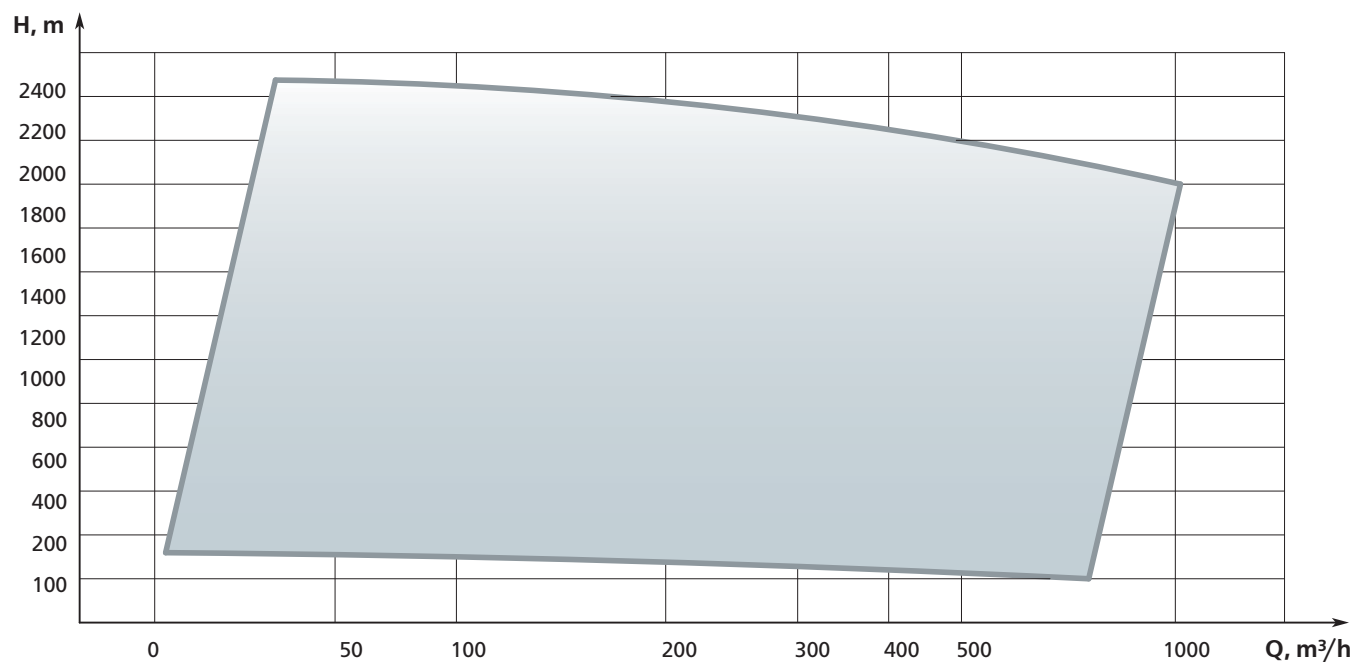
- Transportation of crude oil and oil products
- Pressure boosting

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Seals according to API 682
- Interchangeable impellers for different capacities
- Back-to-Back or Inline impellers
- Double suction impellers or inducer at the first stage (optional) for lower NPSHa



■ $Q = 30 \dots 1000 \text{ m}^3/\text{h}$ ■ $H = 400 \dots 2600 \text{ m}$ ■ $T = \text{up to } 200 \text{ }^\circ\text{C}$



Project	Parameters	Features and Application
ESPO-1 Pipeline System Customer: Transneft Russia, 2010	$Q = 500 \text{ m}^3/\text{h}$ $H = 560 \text{ m}$ $P = 1.6 \text{ MW}$	NM 500-560 pumps Application: crude oil handling within portable oil pumping station Material: alloy steel
Vankor oil and gas field Customer: Rosneft Russia, 2007	$Q = 315 \text{ m}^3/\text{h}$ $H = 630 \text{ m}$ $P = 665 \text{ kW}$	CNSp 315-630 pumps Application: crude oil handling Material: CR 12% steel

BARREL MULTISTAGE RADIALLY SPLIT PUMPS

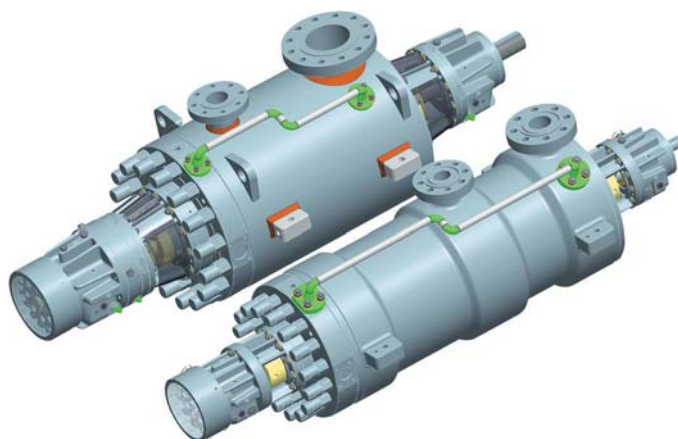
BB5
TL, TG, NM

APPLICATION

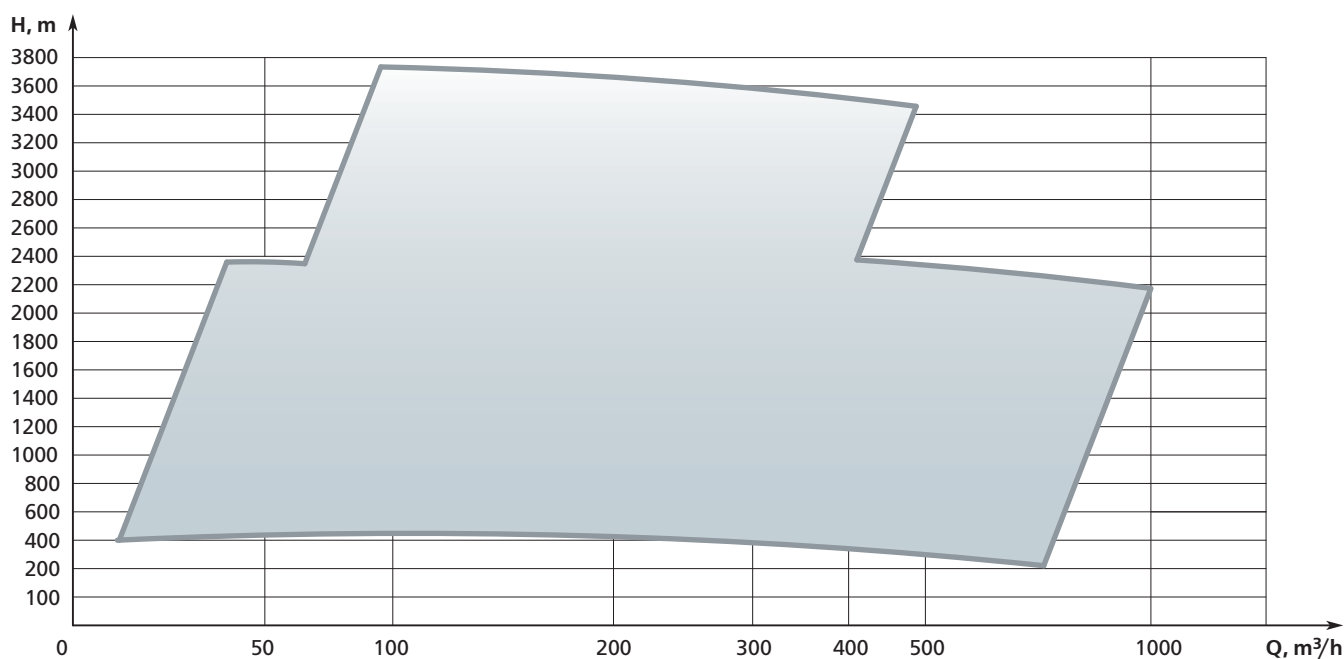
- Transportation of crude oil and oil products
- Pressure boosting

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Pump dismantling without separating from pipeline
- Seals according to API 682
- Back-to-Back or Inline impellers
- Double suction impeller or inducer at the first stage (optional) for lower NPSHa



- Q = up to 800 m³/h
- H = up to 3700 m
- T = up to 450 °C



Project	Parameters	Features and Application
Cherkassy linear operating dispatcher station Customer: Transneft Russia, 1990-2012	Q = 500 m ³ /h H = 800 m P = 1.6 MW	Trunk pumps NM 500-800 series Application: oil products handling Material: alloy steel
Perm Regional office Customer: Lukoil Russia, 2002-2009	Q = 500 m ³ /h H = 800 m P = 1.6 MW	Trunk pumps NM 500-800 series Application: diesel fuel handling Material: alloy steel

VERTICALLY SUSPENDED SEMISUBMERSIBLE SINGLE/ DOUBLE CASING MULTISTAGE PUMPS WITH DIFFUSERS

VS1, VS6

HPTV, GSTV/GLKV, HPVX, NPV, NV-M

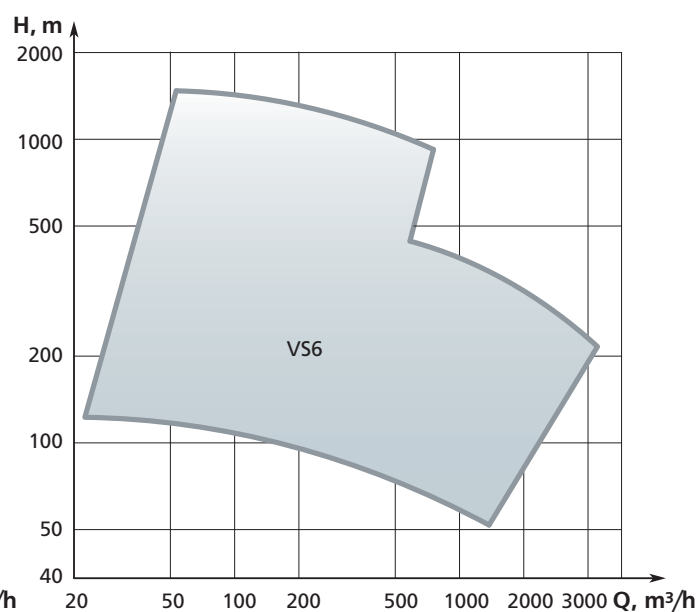
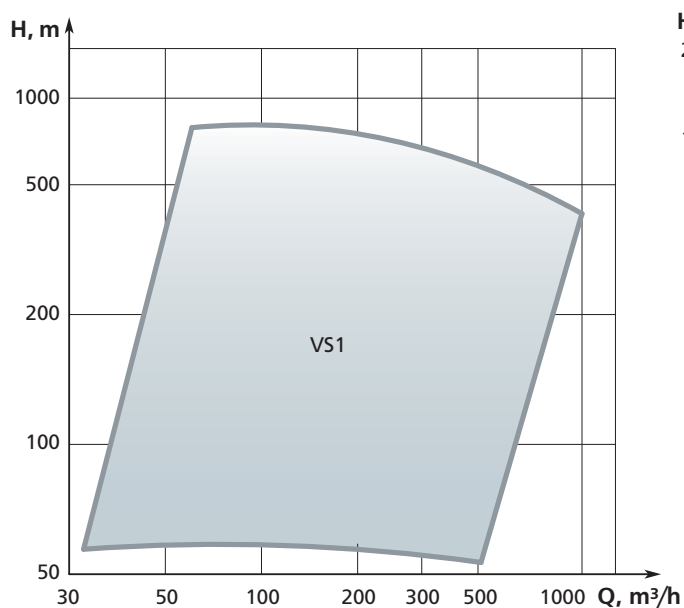
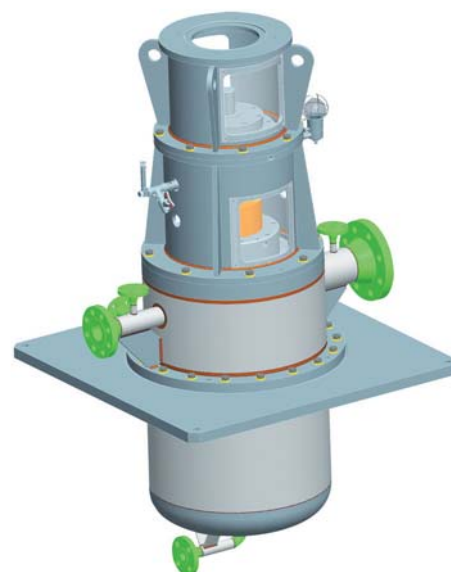
APPLICATION

- Transportation of crude oil, oil products and liquefied gases
- Pressure boosting

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Seals according to API 682
- Single/double suction impellers
- Double suction impeller or inducer in the first stage (optional) for lower NPSHa

■ Q = up to 3000 m³/h ■ H = up to 1400 m ■ T = up to 300 °C



Project	Parameters	Features and Application
ESPO Pipeline System - Khabarovsk Oil Refinery Customer: NK Alliance Russia, 2013	Q = 50 m ³ /h H = 80 m P = 30 kW	NV-Mv-E 50-80 pumps Application: oil product pumping from tanks (highly flammable liquid) Material: alloy steel
Oil products storage tank farm Customer: Rosneft Russia, 2012	Q = 50 m ³ /h H = 50 m P = 18.5 kW	NVM 50-50 pumps Application: oil product pumping from tanks Material: alloy steel
Degassing station, Tuba field Customer: Lukoil Overseas Main supplier: VN-Pumpen GmbH Iraq, 2012	Q = 350 m ³ /h H = 76.7 m P = 99.4 kW	GLKV-150C/3-508/CN pumps Application: crude oil handling Material: CR 12 % steel

MATERIAL CLASS SELECTION FOR PUMP PARTS ACCORDING TO API 610 11TH ED.

Pump parts	Materials classes						
	I-1	I-2	S-1	S-3	S-4	S-5	S-6
Casing	Cast iron	Cast iron	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
Inner casing parts	Cast iron	Bronze	Cast iron	Ni-Resist	Cast iron	Carbon steel	12 % CR
Shaft	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	AISI 4140	AISI 4140
Impeller	Cast iron	Bronze	Cast iron	Ni-Resist	Carbon steel	Carbon steel	12 % CR

Pump parts	Materials classes						
	S-8	S-9	C-6	A-7	A-8	D-1	D-2
Casing	Carbon steel	Carbon steel	12 % CR	AUS	316 AUS	Duplex	Super Duplex
Inner casing parts	316 AUS	Ni-Cu alloy	12 % CR	AUS	316 AUS	Duplex	Super Duplex
Shaft	316 AUS	Ni-Cu alloy	12 % CR	AUS	316 AUS	Duplex	Super Duplex
Impeller	316 AUS	Ni-Cu alloy	12 % CR	AUS	316 AUS	Duplex	Super Duplex

SCOPE OF SUPPLY

- **Pump** according to API 610
- **Drive:** electric motor from SIEMENS, ABB, ELSIB and other manufacturers
- **Bearings** from the leading manufacturers
- **Shaft sealing:** stuffing box, single and double mechanical seals from John Crane, EagleBurgmann, Aesseal, TREM
- **Sensors,** auxiliary systems
- **Optional:** fluid couplings and frequency invertors from Voith, ABB, Siemens and other manufacturers

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