

Engineering Flow Solutions

Pumps for Oil & Gas Downstream Applications API 610 / ISO 13709:2009



Downstream





OIL REFINING & PETROCHEMICAL PROCESSING

Reliability and safety of the pumping systems are ones of the main features for oil refining and petrochemical processing that are classified as hazardous production facilities. Total cost of ownership is equally important as the cost of unscheduled maintenance procedures can be a significantly expense item.

HMS Group offers the extensive range of API 610 (11th edition) state-of-the-art pumps for oil refining & petrochemical processing:

- Process pumps for all processes of primary and secondary processing of crude oil and oil products. Depending on the fluid temperature and ambient temperature the pumps can be manufactured of the special materials.
- Auxiliary pumps for injection of crude oil, oil products and various liquids for processes in oil refining and petrochemical processing.

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















OVERHUNG SINGLE STAGE RADIALLY SPLIT PUMPS

OH1, OH2

KRH, KRHA, KRHL / KRPO, KRP / KRPH, NK

APPLICATION

Primary and secondary processing of crude oil and oil products:

coking

- alkylation

hydrotreatingreforming

demercaptanization

- gas fractionation
- hydrocracking
- catalytic cracking
- isomerization
- visbreaking

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Mechanical seals according to API 682
- Optional inducer for lower NPSHa
- Interchangeable impellers for different capacities
- Q = 10...2400 m³/h
 H = 5...350 m
 T = up to 450 °C





Project	Parameters Features and Application			
Neste Jacobs Refinery Customer: YTM-Industrial Oy Finland, 2012	Q = 100 m³/h H = 105 m P = 45 kW	KRH-80/350-308/CN pumps Application: handling of LPG propane Fluid temperature: -46+150 °C (special material)		
Novokuibyshevsk Oils and Additives Plant Customer: Rosneft Russia, 2012	Q = 31.4 m ³ /h H = 34 m P = 2.2 kW	KRPO-25/200-399/CN pumps Application: handling of sulphurous water Fluid temperature: up to 100 °C		
Mozyr Refinery Belarus, 2011	Q = 68 m ³ /h H = 226 m P = 90 kW	KRH-50/400-308/CN pumps Application: handling of benzine in the isomerization unit Special material for ambient temperature -34 °C with thermosiphon		
Customer: Nordtrade GmbH for Tatneft Russia, 2010	Q = 30 m ³ /h H = 121 m P = 22 kW	KRH-40/350-308/CN pumps Application: handling of diesel fuel Fluid temperature: up to 215 °C		

SINGLE- / TWO-STAGE DOUBLE SUCTION RADIALLY SPLIT PUMPS ZPR, KGR / KGRD

APPLICATION

Primary and secondary processing of crude oil and oil products:

- gas fractionation
- atmospheric/vacuum distillation
- hydrocracking
- catalytic cracking
- isomerization

DESIGN FEATURES

- Flanges according to DIN/ANSI/ISO
- Seals according to API 682
- Back-to-Back impellers
- Q = 100...950 m³/h
 H = 50...640 m
 T = up to 400 °C

- visbreakingdemercaptanization
- alkylation
- hydrotreating
 roforming
- reforming



H, m 800 600 400 200 0 200 400 600 800 1000 2000 Q, m³/h

Project	Parameters	Features and Application			
Khabarovsk Refinery Customer: NK Alliance Russia, 2012	Q = 1380 m ³ /h H = 200 m P = 710 kW	ZPR-250/400-308/CN pumps Application: diesel fuel handling Fluid temperature: up to 215 °C Material: cold rolled iron-chromium alloy			
Customer: Eesti Energia Olitoostus AS Estonia, 2011	Q = 210 m ³ /h H = 215 m P = 355 kW	KGRZ-150/450-399/CN pumps Application: handling of heavy duty oil slurry with solids for shale oil distillation unit Fluid temperature: 180 200 °C Material: cold rolled iron chromium alloy			

MULTISTAGE AXIALLY SPLIT PUMPS

ZMP, NPS

APPLICATION

Secondary processing of crude oil and oil products:

- catalytic cracking
- isomerization

DESIGN FEATURES

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



Q = 20...240 m³/h
 H = 350...800 m
 T = up to 400 °C



Project	Parameters	Features and Application
Saratov Refinery Customer: THK-BP Russia, 2013	Q = 65 m³/h H = 500 m P = 160 kW	2ΗΠC 65/35-500 pumps Application: oil products handling for catalytic cracking unit Fluid temperature: up to 140 °C Material: CR 12% steel

MULTISTAGE RADIALLY SPLIT PUMPS

GH, GMHD, HP, GP, NM, CNS, CNSp, CNSz

APPLICATION

Injection of oil, oil products and various liquids in refining and petrochemical processes

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...1000 m³/h

• **H** = 400...2600 m



T = up to 200 °C



Project	Parameters	Features and Application		
Customer: Daewoo Engineering South Korea, 2010	Q = 27.9 m ³ /h H = 1399 m P = 50.6 kW	GPH-40/10-599/BC pumps Application: TDA toluene-mixture production Fluid temperature: 90 °C Material: stainless steel		
Customer: KELAG AG Switzerland, 2010	Q = 115.4 m ³ /h H = 1057 m P = 412 kW	HPC-80B/12-302/GN pumps Application: fuel oil injection Fluid temperature: 48 °C Material: carbon steel		
Kirishi Refinery Customer: Surgutneftegas Russia, 2008	Q = 6.6 m ³ /h H = 855 m P = 75 kW	HPB-50A/14-308/CN pumps Application: steam-condensate system Material: stainless steel		

BB4

BARREL MULTISTAGE RADIALLY SPLIT PUMPS

TL, TG

APPLICATION

Primary and secondary processing of crude oil and oil products:

- gas fractionation
- visbreaking
- coking

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

- alkylation

- reforming



BB5

• **H** = up to 3700 m T = up to 450 °C



Project	Parameters	Features and Application
Novokuibyshevsk Oils and Additives Plant Customer: Rosneft Russia, 2012	Q = 98.5 m ³ /h H = 2620 m P = 1200 kW	TGD-80C/12-308/CN pumps Application: paraffin handling Fluid temperature: 146 °C Material: carbon steel
Porvoo Refinery Customer: YTM-Industrial Oy for Neste Oil Finland, 2012	Q = 100 m³/h H = 475 m P = 160 kW	TGB-80B/4-808/CN pumps Application : liquefied petroleum gas (propane) handling
Kirishi Refinery Customer: Surgutneftegas Russia, 2008	Q = 370 m³/h H = 1308 m P = 1600 kW	TGC-150/8-308/CN pumps Application: handling of mixture of crude oil fractions Fluid temperature: 146 °C

VERTICALLY SUSPENDED SEMISUBMERSIBLE SINGLE/ VS1, VS6 DOUBLE CASING MULTISTAGE PUMPS WITH DIFFUSERS HPTV, GSTV/GLKV, HPVX, NPV, NV-M

Application

Primary and secondary processing of crude oil and oil products:

- gas fractionation
- demercaptanization
- visbreaking
- reforming

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			
Khabarovsk Oil Refinery Customer: NK Alliance Russia, 2013	Q = 50 m ³ /h H = 80 m P = 23.4 kW	NV-Mv-E 50-80 pumps Application: oil product pumping from tanks (highly flammable liquid) Material: alloy steel			
Customer: Eesti Energia Olitoostus AS Estonia, 2011	Q = 30 m ³ /h H = 95 m P = 45 kW	KRHV-50/3-399/S1-2 pumps Application: handling of heavy fuel oil with solids Fluid temperature: 200 °C			
Customer: Mozyr Refinery Belarus, 2010	Q = 50 m³/h H = 50 m P = 15 kW	HPV-50B/1-308/CN-3000 pumps Application: handling of oil products with solids Special material for ambient temperature -34 °C with thermosiphon			

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				
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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