PUMPUNIT HK400

PUMP

General
The HK pump is a single-stage mixed-flow centrifugal pump for lifting large quantities of water to medium heads.
The pump is suitable for heavily contaminated and unpurified water.
The pump types HK are not self-priming, but by using the Van Heck priming system and non-return valve, the pump will be made self-priming.

<table>
<thead>
<tr>
<th>Type</th>
<th>HK-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>see performance curve 281105-01</td>
</tr>
<tr>
<td>Connections</td>
<td>suction 600 mm stc705 / discharge 400 mm stc515</td>
</tr>
</tbody>
</table>

Pump Casing
A solid circular casing with a tangential discharge nozzle Ø 400 mm, which can be turned 360 degrees in discrete steps.
The pump casing is supported by a cast iron bearing block with 4 integrally casted feet.

Shaft Seal
Sealing is by means of gland packing with grease lubrication.
A stainless steel sleeve in the seal area protects the shaft.

Materials
Pump casing : cast-iron GG20
Bearing block : cast-iron GG20
Shaft : steel (st 50)
Shaft sleeve : stainless steel
Impeller : cast-iron GG20
GEARBOX
To reduce the engine speed of 1,950 rpm to the pump speed of 800 rpm, a gearbox is mounted directly to the bearing block of the pump. This gearbox, type TW-400-G, designed by Van Heck, is sufficient to cope with an input of 140 kW at 1,950/800 rpm \((i = 2.44)\).

PRIMING SYSTEM
The Van Heck priming system consists of a vacuumpan, which is mounted at the suction nozzle of the pump and a continuously driven air-cooled, oil lubricated vacuumpump. In combination with a non-return valve on the discharge flange, the pump becomes self-priming.

Make : Demag Wittig  
Type : SL 15-1 VR  
Capacity : 110 m³/hr  
Vacuum : 100 mbar (90%)  

The vacuumpump is cooled by a radial fan mounted on the rotor shaft and is provided with an automatic lubrication oilpump. Finally the vacuumsystem is provided with an oilseparator and a exhaust to reduce the noise.
Engine Performance Data
Cummins Inc
Columbus, Indiana 47202-3005
http://www.cummins.com

Industrial
QSC
FR92001

245 BHP (183 kW) @ 1800 RPM
870 lb-ft (1,180 N-m) @ 1400 RPM

Configuration: D41305SCX03
CPL Code: 8627-SC16
Revision: 11-May-2007

Compression Ratio: 17.5:1
Displacement: 506 in³ (8.3 L)
Fuel System: CCR
Aspiration: Turbocharged and Charge Air Cooled
Emission Certification: U.S. EPA Tier 3, CARB Tier 3, EU Stage IIIA

All data is based on the engine operating with fuel system, water pump, and 15 in H2O (3.73 kPa) inlet air restriction with 6 in (152 mm) inner diameter, and with 3 in Hg (10 kPa) exhaust restriction with 4 in (102 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Continuous/WMR

Torque Output

<table>
<thead>
<tr>
<th>RPM</th>
<th>Torque (lb-ft)</th>
<th>N-m</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>750</td>
<td>1,017</td>
</tr>
<tr>
<td>1,000</td>
<td>800</td>
<td>1,085</td>
</tr>
<tr>
<td>1,100</td>
<td>835</td>
<td>1,132</td>
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<tr>
<td>1,200</td>
<td>870</td>
<td>1,180</td>
</tr>
<tr>
<td>1,400</td>
<td>870</td>
<td>1,180</td>
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<tr>
<td>1,500</td>
<td>835</td>
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<td>1,600</td>
<td>800</td>
<td>1,085</td>
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<tr>
<td>1,700</td>
<td>757</td>
<td>1,026</td>
</tr>
<tr>
<td>1,800</td>
<td>715</td>
<td>969</td>
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</tbody>
</table>

Power Output

<table>
<thead>
<tr>
<th>RPM</th>
<th>Power (hp)</th>
<th>kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>129</td>
<td>96</td>
</tr>
<tr>
<td>1,000</td>
<td>152</td>
<td>113</td>
</tr>
<tr>
<td>1,100</td>
<td>175</td>
<td>130</td>
</tr>
<tr>
<td>1,200</td>
<td>199</td>
<td>148</td>
</tr>
<tr>
<td>1,400</td>
<td>232</td>
<td>173</td>
</tr>
<tr>
<td>1,500</td>
<td>238</td>
<td>177</td>
</tr>
<tr>
<td>1,600</td>
<td>244</td>
<td>182</td>
</tr>
<tr>
<td>1,700</td>
<td>245</td>
<td>183</td>
</tr>
<tr>
<td>1,800</td>
<td>245</td>
<td>183</td>
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</tbody>
</table>

Fuel Consumption

<table>
<thead>
<tr>
<th>RPM</th>
<th>Fuel Consumption (lb/hp-hr)</th>
<th>g/kW-hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,400</td>
<td>0.39</td>
<td>237</td>
</tr>
<tr>
<td>1,500</td>
<td>0.381</td>
<td>232</td>
</tr>
<tr>
<td>1,600</td>
<td>0.373</td>
<td>227</td>
</tr>
<tr>
<td>1,700</td>
<td>0.368</td>
<td>224</td>
</tr>
<tr>
<td>1,800</td>
<td>0.365</td>
<td>222</td>
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</tbody>
</table>

Curves shown above represent gross engine performance capabilities obtained and corrected in accordance with SAE J1995 conditions of 29.61 in Hg (100 kPa) barometric pressure [300ft (91m) altitude] 77 deg F (25 deg C) inlet air temperature, and 0.30 in Hg (1kPa) water vapor pressure with No. 2 diesel fuel. The engine may be operated up to 11,000 ft (3,353 m) altitude before electronic derate is applied.

STATUS FOR CURVES AND DATA:
TOLERANCE: Within +/- 5 %

CHIEF ENGINEER:
Kevin R Wadell

Cummins Confidential
Intake Air System
Maximum allowable air temperature rise over ambient at Intake Manifold (Naturally Aspirated Engines) or Turbo Compressor inlet (Turbo-charged Engines): (This parameter impacts emissions, LAT and/or altitude capability) 30 delta deg F 16.7 delta deg C

Charge Air Cooling System
Maximum intake manifold temperature at 25 deg C (77 F) ambient 120 deg F 49 deg C
Maximum allowable pressure drop across charge air cooler and OEM CAC piping (IMPD): 4 in-Hg 14 kPa
Maximum Intake Manifold Temperature Differential (Ambient to IMT) (IMTD): 43 delta deg F 23.9 delta deg C
Intake manifold temperature for Fan-ON 120 deg F 49 deg C
Maximum coolant temperature for engine protection controls 225 deg F 107 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp): 225 deg F 107 deg C

Exhaust System
Maximum exhaust back pressure: 3 in-Hg 10 kPa
Recommended exhaust piping size (inner diameter): 4 in 102 mm

Lubrication System
Nominal operating oil pressure
@ minimum low idle 10 psi 69 kPa
@ maximum rated speed 56.3 psi 388 kPa
Minimum engine oil pressure for engine protection devices
@ minimum low idle 8 psi 55 kPa

Fuel System
Fuel cooling requirements (with diesel fuel)
Maximum heat rejection to return fuel at max. coolant and inlet fuel temperature: 70 BTU/min 1 kW
@ fuel return flow rate of: 165 lb/hr 75 kg/hr
@ fuel return temperature prior to cooler: 250 deg F 121 deg C
Maximum supply fuel flow: 302 lb/hr 137 kg/hr
Maximum return fuel flow: 165 lb/hr 75 kg/hr
Engine fuel compatibility (consult Service Bulletin #3379001 for appropriate use of other fuels) DF1, DF2
Maximum fuel inlet pressure: 10 psi 70 kPa

Performance Data
Maximum low idle speed: 1,200 RPM
Minimum low idle speed: 600 RPM
Minimum engine speed for full load sustained operation:

<table>
<thead>
<tr>
<th>Engine Speed</th>
<th>Output Power</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,800 RPM</td>
<td>245 hp</td>
<td>715 lb-ft</td>
</tr>
<tr>
<td></td>
<td>183 kW</td>
<td>969 N-m</td>
</tr>
<tr>
<td></td>
<td>1,400 RPM</td>
<td>232 hp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>870 lb-ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,180 N-m</td>
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</tr>
</thead>
<tbody>
<tr>
<td>35 hp</td>
<td>47 in-Hg</td>
<td>50 in-Hg</td>
<td>325 deg F</td>
<td>585 ft³/min</td>
<td>45 lb/min</td>
<td>1,377 ft³/min</td>
<td>907 deg F</td>
<td>302 lb/hr</td>
<td>5,044 BTU/min</td>
<td>70 BTU/min</td>
<td>904 BTU/min</td>
<td>9,292 BTU/min</td>
<td>0.6 Bosch</td>
</tr>
<tr>
<td>26 kW</td>
<td>160 kPa</td>
<td>170 kPa</td>
<td>163 deg C</td>
<td>276 L/s</td>
<td>20 kg/min</td>
<td>650 L/s</td>
<td>486 deg C</td>
<td>137 kg/hr</td>
<td>89 kW</td>
<td>1 kW</td>
<td>16 kW</td>
<td>163 kW</td>
<td>Bosch</td>
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**When operating Naturally Aspirated engines above SAE J1995 conditions, it should be noted that smoke levels will increase due to combustion inefficiencies associated with a reduction in the air to fuel mixture.

Bold entries revised after 1-Feb-2006

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### Cranking System (Cold Starting Capability)

**Unaided Cold Start:**
- Minimum cranking speed: 130 RPM
- Minimum ambient temperature for unaided cold start: 10.4 deg F (-12 deg C)
- Bare Engine cranking torque at minimum unaided cold start temperature: 162 lb-ft (220 N·m)

**Aided Cold Start:**
- Minimum ambient temperature with Grid Heater only: -20 deg F (-29 deg C)
- Minimum ambient temperature with coolant and lube heater only: -40 deg F (-40 deg C)
- Cold starting aids available: Intake Manifold Heater, Block Heater, Oil Pan Heater

**Maximum parasitic load at 10 deg F @**

**Noise Emissions**

<table>
<thead>
<tr>
<th>Location</th>
<th>dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>95.7</td>
</tr>
<tr>
<td>Right Side</td>
<td>95.7</td>
</tr>
<tr>
<td>Left Side</td>
<td>95.7</td>
</tr>
<tr>
<td>Front</td>
<td>95.7</td>
</tr>
</tbody>
</table>

*Exhaust noise emissions*

Estimated Free Field Sound Pressure Level at 3.28ft (1m) and Full-Load Governed Speed

(Excludes Noise from Intake, Exhaust, Cooling System and Driven Components)
REAR ATTACHMENT INFORMATION:
A. SAE#1 FLYWHEEL HOUSING
7/16-14 UNC-2B
1.14 [29.0] DEEP
12 HOLES EQUALLY SPACED
ON A Ø20.8 [530.2] B.C.
FLYWHEEL TO SUIT 15.5°
OVERCENTER CLUTCH
(SHOWN)

B. SAE#3 FLYWHEEL HOUSING
M16-1.5-6H
1.4 [29.6] DEEP
12 HOLES EQUALLY SPACED
ON A Ø16.67 [428.6] B.C.
FLYWHEEL TO SUIT 10° OR 11.5°
OVERCENTER CLUTCH
(NOT SHOWN)

NOTE:
DUE TO MANUFACTURING VARIANCES,
DIMENSIONS MAY VARY UP TO 0.25"