



CERTIFIED PERFORMANCE TEST FORM
BLACKMER VANE PUMP

TEST INFORMATION MUST BE SUPPLIED WITH YOUR ORDER

>>>> ORDER PROCESSING WILL NOT CONTINUE UNTIL BLACKMER RECEIVES THIS COMPLETED FORM <<<<

For specific questions - contact the Application Engineering HELP LINE (616) 475-9340

CUSTOMER CONTACT INFORMATION:

COMPANY: [Redacted]

SUBMITTED BY: [Redacted]

DATE: [Redacted] PHONE #: [Redacted]

E-MAIL: [Redacted]

Proposal / item #: [Redacted]

PURCHASE ORDER #: [Redacted]

Pump Model:: [Redacted]

Table with 4 columns: REQUESTED TESTS, NOT REQUIRED, NON-WITNESS, WITNESSED. Rows include Performance Test, Hydrostatic Test, and NPSHr (with Performance).

CERTIFIED TEST CONDITIONS:

Table listing test conditions: PUMP SPEED (RPM), DIFFERENTIAL PRESSURE (PSI/Bar), VISCOSITY (SSU/cSt), RELIEF VALVE SETTING (PSI/Bar), FLOW (GPM/m³/hr), POWER (HP/kW), NPSHr (if selected) (Ft/m), NPSHa (system available) (Ft/m).

Test Notes and Limitations:

Test Fluids: Standard test fluid for cast or ductile iron pumps will be 31 SSU (1 cSt) Safety Solvent; Standard test fluid for stainless steel pumps will be fresh water.

Viscosity: Standard test viscosity is 31 SSU (1cSt); Alternative viscosities are 100 SSU, 500 SSU, 1000 SSU and 4000 SSU (20 cSt, 110 cSt, 220 cSt, and 860 cSt). Viscous oils at varying temperatures are used to obtain the desired fluid viscosity.

Flow: Due to hardware limitations, flow rates for viscosities greater than 31 SSU (1 cSt) is limited to 200 GPM (45 M³/hr)

For Models HXL6, 8 & 10 the test fluid is 31 SSU (1 cSt) and limited to 230 nominal RPM. The performance test is conducted on production test equipment and does not comply with HI standards

NPSHr: If the as-tested value is +1-foot or less than published value OR + 2-ft or less than customer stated requirement, the as-tested value will be reported. If the value exceeds above stated margins, the customer will be contacted for approval.

Testing will be in accordance with the HI3.6-2016 Level A Type IV for pumps-only except for Models HLX6, 8, 10. Exceptions/clarifications to HI3.6-2016 are listed on Page 2 of this form

BLACKMER INTERNAL REVIEW:

Reviewed By: [Redacted]

Date: [Redacted]

Blackmer Order No: [Redacted]

>> Order-line: [Redacted]

Form 583 dated 7/19/2021

## Exceptions and Clarifications to ANSI/HI3.6-2016

Description	Paragraph/Table	Exception/Clarification/What we can do
Type of Tests Conducted	3.6.2	Blackmer will provide certified tests for Type IV only for pump sizes up to, and including, ML4 if flow limits permit. Performance curves for HXL pumps will be Type III only and do not comply with ANSI/HI 3.6-2016.
Clarification of pressure measurement location	3.6.3.14 3.6.3.16 3.6.8	Pump will have straight pipe immediately before the inlet flange and immediately after the outlet flange. Inlet pressure will be measured at the greater of 2 pipe dia or 12" after the entrance of the inlet pipe. The inlet pressure is also located a nominal length (4 to 8") from the pump inlet. The outlet pressure will be measured at the greater of 2 pipe dia or 12" after the pump flange. The actual lengths of the test may exceed dimensions listed.
Test Report	3.6.4.11.1	Blackmer will provide a chart showing the pump performance instead of a table of data. Level B tests will not be performed.
Deviation of independent test quantities	3.6.4.4 3.6.4.7.2 Table 3.6.4.4	Pressure - Test data will be collected just below and just above the specified differential pressure and interpolated to exact requirements graphically instead of testing at $\pm 1\%$ of specified. Inlet pressure, when specified, will be within $\pm 2$ PSI of required instead of 5% when less than 0 PSIG, where possible. High viscosity fluid may make it impossible to get specified inlet pressure, however. Inlet pressure greater than 0 PSIG will not be accommodated. When inlet pressure is unspecified, inlet pressure will be recorded but nominal and unregulated for the operating conditions. The average inlet pressure will be recorded on the performance chart
Instrument accuracy	3.6.4.6 Table 3.6.4.6.1	Pressure transducer accuracy is typically .5% of FS - 50 and 500 PSIG transducers are used. This will not meet the accuracy requirements of Table 3.6.4.6.1 in some situations. Torque meter precision is typically .5% FS - 2,000, 10,000, and 50,000 in-lb meters are used. This will not meet the requirements of Table 3.6.4.6.1 for accuracy in some situations. Speed pickup precision is typically .1% FS - 4,000 RPM max. This will not meet the requirements of Table 3.6.4.6.1 for accuracy in some situations.
Temperature measurement location	3.6.4.7.1.h 3.6.11	Fluid temperature will be measured immediately outside of the fluid tank on the inlet side of the pump
Correction to rated conditions	3.6.4.7.2	Fluid property conditions such as VP, SG, and temperature will not be corrected to the equivalent rated conditions. Viscosity will be within $\pm 7.5\%$ of requested viscosity by controlling temperature of the appropriate test fluid.
Misc Test Conditions	3.6.4.7.3.c	Will provide submergence level on pump inlet to level of fluid in tank on the performance chart, along with equivalent length of pipe on inlet side of pump only in feet (m) of pump nominal inlet port.
Instrumentation	3.6.4.7.3.f	Calibration records for instrumentation will be provided on certified witness tests only.
Data Output and Retention	3.6.4.8	Data supplied for a certified test will consist of a signed chart showing flow and power vrs pressure (Type IV) or flow vrs pressure (Type III) Blackmer will provide relative information about each test for up to 2 years instead of 5.
NPSH Fluid Properties and Operating Conditions	3.6.6.1.c 3.6.6.3	Blackmer does NPSH testing on water @ 50 PSID. Density and vapor pressure are determined by measuring temperature of the water and interpolating between known values of density and vapor pressure for the test temperatures. Temperature is not held constant. No correction to rated fluids or conditions will be made.
NPSH Equipment	3.6.6.1.d	test tanks do not have baffles. Inlet and outlet of the tanks used for testing are located at the bottom sidewall of the tank and are submerged.
NPSH Determination	3.6.6.4	Blackmer used the 5% reduction in flow to determine the NPICr of the test pump. Tests are conducted on water @ 50 PSID.
Friction loss	3.6.8	Pressure correction for friction loss between pump and pressure measurement is added to the outlet pressure and subtracted from the inlet pressure. Appropriate friction factors for the viscosity of the performance test will be used.
Pressure measurement	3.6.8 3.6.8.1 Fig 3.6.8b	1/4" NPT Weld-O-Lets are attached to pipe and a 1/8" hole is drilled through the wall of the pipe, similar to Figure 3.6.8b. Pipe is generally Schedule 40; no radius is machined on through holes, and the I/d requirements are not met.
Torque	3.6.9	Blackmer uses strain gauge-based torque meters to measure both torque and RPM. A "0" load reading will be taken before and after each test to verify no more than 1% FS reading of the torque meter has occurred during the performance test.