

Customer Price Sheet

| | | | |
|--------------------|---------------------|-------------------------|-----------------|
| Customer | | Size and model / Stages | 3x6x9MH PWM / 5 |
| Item number | | Pump speed | 3560 rpm |
| Customer reference | | Quote number | |
| Date | 07 Jan 2019 1:07 PM | | |

Totals

| | | | |
|-------------|------------|-----------------|-----------------|
| Grand Total | \$ 883,635 | Lead Time Total | 34-36 Weeks ARO |
| Pump Total | \$ 883,635 | | |

Pump

| Qty | Description | Average Unit Price | Extended Price |
|-----|--|--------------------|----------------|
| 4 | <p>3x6x9MH PWM 5 Stage NEW PumpWorks610 Model PWM Between Bearing Axially Split Multistage Pump API610 Configuration BB3 NOTE: PW610 Model PWM is Fully Compliant with API 610 11th Edition. Pump</p> <p>Materials Material Class: Material Class S-6 Flange Rating: 900# ANSI RF Case Material: ASTM A216 Gr. WCB Impeller Material: ASTM A743 Gr. CA6NM Stationary Wear Parts: ASTM A436 Type 1 Ni-resist Rotating Wear Parts: ASTM A743 Gr CA15 Shaft Material: ASTM A276 Type 410HT Bolting Material: ASTM A193 Gr. B7</p> <p>Drain & Vent Piping Drain Piping: 2 Plane Gusseted, SW 3/4" 160 SCH, Piped To Skid Edge, 900# ANSI RF Drain Piping Material: Same as Pump Casing Material Vent Piping: 2 Plane Gusseted, SW 3/4" 160 SCH, 900# ANSI RF Vent Piping Material: Same as Pump Casing Material</p> <p>Pump Options Rotation: Counterclockwise Inserts: None Bearings: Ball / Ball Bearing Lubrication: Ring Oil Lube Housing Cooling: Cooling Fan</p> <p>Mechanical Seal Seal Type: Single Seal: John Crane (8648VRS)</p> <p>Seal Flush Plan - Primary Primary Seal Flush Plan: Plan 11 Primary Seal Flush Piping Assembly: Tubing with Compression Fittings Primary Seal Flush Piping Material: 316 SS Tubing, with 316 SS Compression Fittings</p> <p>Seal Flush Plan - Secondary Secondary Seal Flush Plan: Plan 61 (connections only)</p> <p>Cooling Water Piping Cooling Water Piping Plan: None</p> <p>Driver Driver Type: Motor Driver Supplied By: Pump Manufacturer Driver Mounted By: Pump Manufacturer</p> | | |

Pump

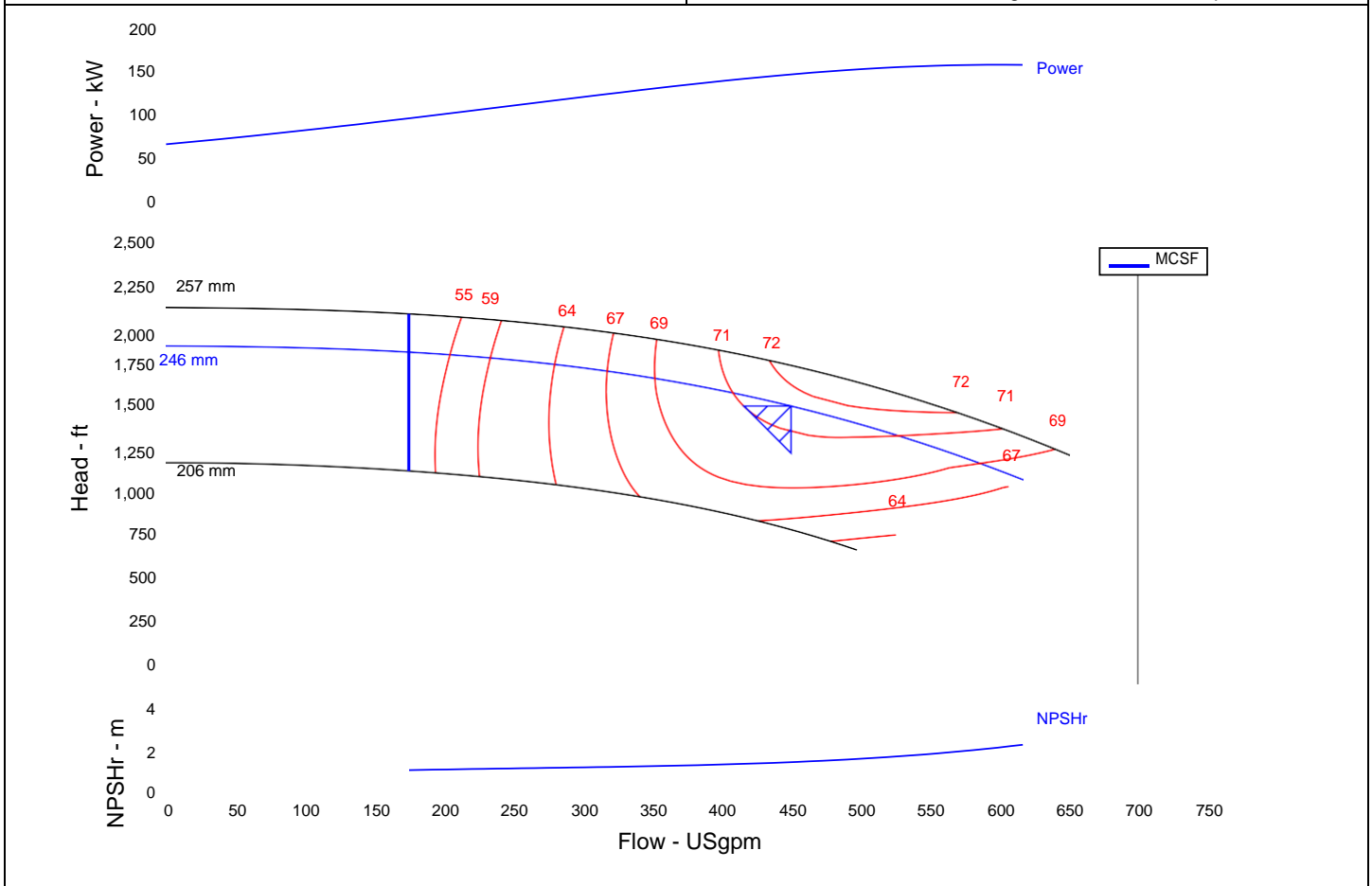
| Qty | Description | Average Unit Price | Extended Price |
|-----|--|--------------------|----------------|
| | <p>Special Driver: TOSHIBA or Similar PWR: 250 HP 3600 RPM, V 230/460, FRAME :N449TS, WEIGHT :3500 LBS, AMPS: 275, EFF ; 95.8 %. CLASS 1 DIV. 1 EXPROOF</p> <p>Coupling Manufacturer: Metastream Design: Flexible Disc Spacer Length: 7 inch Service Factor: 1.5 Drive Method: Key Drive - Pump Hub Coupling: Metastream TSCS 0135 Shaft Design: Tapered Shaft Extension Coupling Guard: PW610 Standard Aluminum Coupling Guard</p> <p>Baseplate Baseplate Size: Standard Baseplate Standard Baseplate Features All joints continuously seal-welded to prevent crevice corrosion Vertical leveling screws at each anchor bolt location Removable transverse and axial motor positioning screws 2" radius on each corner Base intended for use with grout - will have grout holes and vent holes per API 610 Prepared underside for epoxy grout</p> <p>Baseplate Adders Grounding Lug</p> <p>Testing Critical Speed Analysis Will this pump be driven by a variable speed driver?: No Casting NDE API 610 11th Ed Level I Per Table 14/15 Performance Test: Certified Performance - Non-Witnessed (All Pumps) NPSH Test: Certified NPSHr - Non-Witnessed (First Pump Only) Other Testing Options Casing Hydrostatic Test with Report</p> <p>Material Test Reports (6.12.1.8) Casing Impeller Shaft</p> <p>Preparation and Painting Equipment to be Painted: Pump and Baseplate Paint Specification: PW Std. Preparation and Painting Paint Specification: Onshore</p> <p>Packed Items Packaging: Domestic (Soft) Packed Items: Pump, Baseplate and Driver Preservation: Std. Preparation Pump, Driver and Baseplate</p> | | |

Optional Adders

| Qty | Description | Unit Price | Extended Price |
|-----|--------------------------|------------|----------------|
| | Optional Spare Parts | | |
| 8 | Roll of Gasket Material | \$ 395 | \$ 3,160 |
| 4 | Radial Bearing | \$ 495 | \$ 1,980 |
| 8 | Thrust Bearing | \$ 595 | \$ 4,760 |
| 8 | Complete Mechanical Seal | \$ 24,788 | \$ 198,304 |
| 4 | Rotating Assembly | \$ 81,508 | \$ 326,032 |

Pump Performance Datasheet

| | |
|--|--|
| Customer Customer reference Item number Service Quantity 4 | Quote number Size and model : 3x6x9MH PWM Stages : 5 Based on curve number : 3x6x9MH Date last saved : 07 Jan 2019 1:07 PM |
| Operating Conditions | Liquid |
| Flow, rated : 450.0 USgpm Differential head / pressure, rated (requested) : 1,595.0 ft Differential head / pressure, rated (actual) : 1,604.1 ft Suction pressure, rated / max : 3.00 / 10.00 psi.g NPSH available, rated : 8.90 m Frequency : 60 Hz | Liquid type : Hydrocarbon Additional liquid description : CONDENSATE LIQUID Solids diameter, max : 0.00 mm Solids concentration, by volume : 0.00 % Temperature, max : 100.0 deg F Fluid density, rated / max : 0.789 / 0.789 SG Viscosity, rated : 4.00 cP Vapor pressure, rated : 10.50 psi.a |
| Performance | Material |
| Speed, rated : 3560 rpm Impeller diameter, rated : 246 mm Impeller diameter, maximum : 257 mm Impeller diameter, minimum : 206 mm Efficiency : 71.60 % NPSH required / margin required : 2.44 / 2.90 m Ns (imp. eye flow) / Nss (imp. eye flow) : 997 / 15,989 US Units MCSF : 175.0 USgpm Head, maximum, rated diameter : 1,938.1 ft Head rise to shutoff : 21.51 % Flow, best eff. point : 466.9 USgpm Flow ratio, rated / BEP : 96.38 % Diameter ratio (rated / max) : 95.68 % Head ratio (rated dia / max dia) : 87.30 % Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010] : 1.00 / 1.00 / 0.99 / 1.00 Selection status : Acceptable | Material selected : S-6 (Carbon Steel / Chrome) |
| | Pressure Data |
| | Maximum working pressure : 46.33 bar.g Maximum allowable working pressure : 153.1 bar.g Maximum allowable suction pressure : N/A Hydrostatic test pressure : 229.6 bar.g |
| | Driver & Power Data (@Max density) |
| | Driver sizing specification : Maximum power Margin over specification : 0.00 % Service factor : 1.15 Power, hydraulic : 107 kW Power, rated : 149 kW Power, maximum, rated diameter : 160 kW Minimum recommended motor rating : 186 kW / 250 hp |



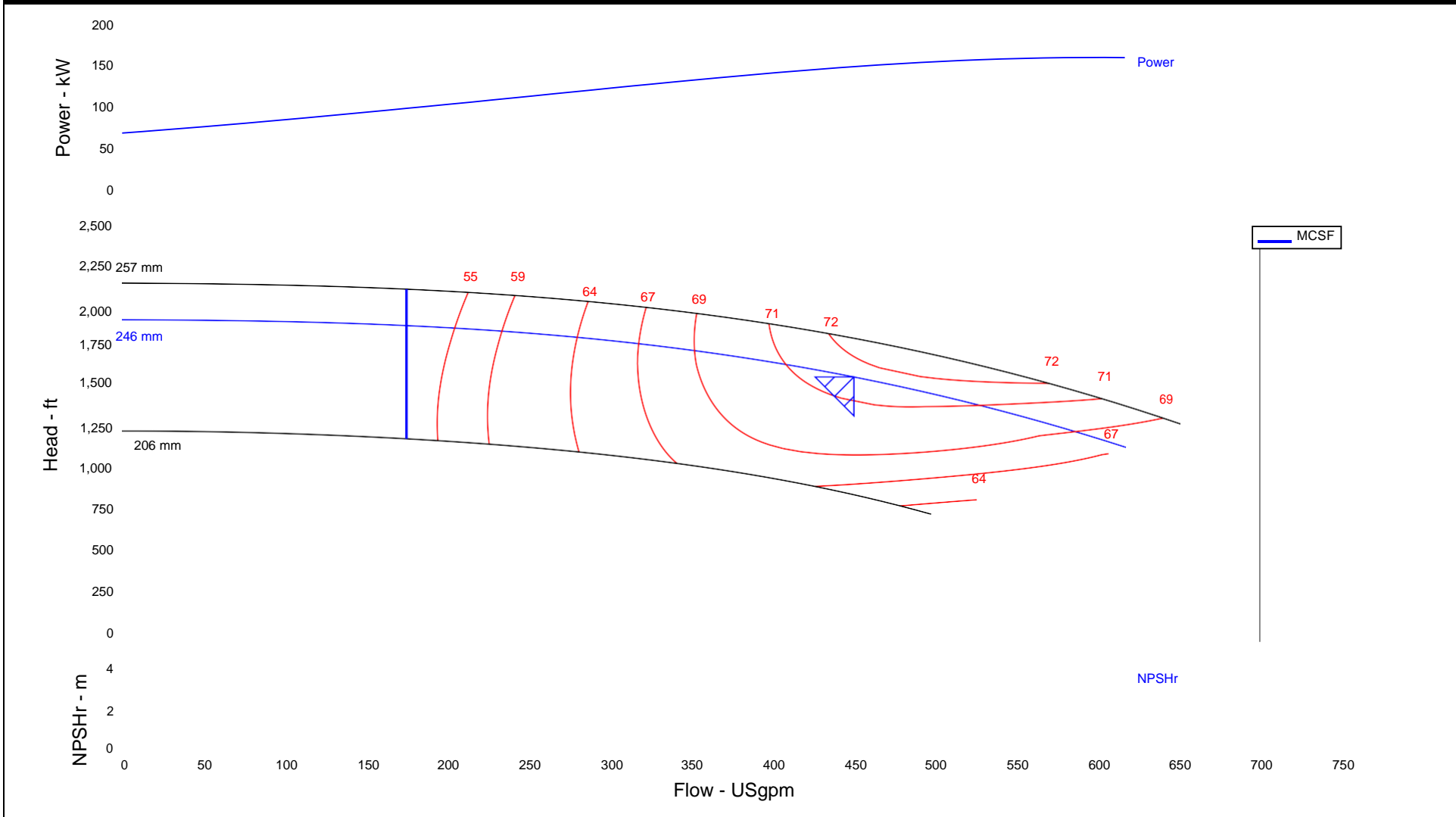
Pump Performance - Additional Data

| Customer | | Quote number | | | | |
|---|---------------------|---------------------------------------|-------------------------|--|-------------------------|------------|
| Customer reference | | Size and model : 3x6x9MH PWM | | | | |
| Item number | | Stages : 5 | | | | |
| Service | | Speed, rated : 3560 rpm | | | | |
| Quantity | | Intellicode : | | | | |
| | | Date last saved : 07 Jan 2019 1:03 PM | | | | |
| Performance Data | | Stage, Speed and Solids Limits | | | | |
| Head, maximum diameter, rated flow | : 1,827.1 ft | Stages, maximum | : 14 | | | |
| Head, minimum diameter, rated flow | : 889.0 ft | Stages, minimum | : 3 | | | |
| Head, maximum, rated diameter | : 1,938.1 ft | Pump speed limit, maximum | : 6000 rpm | | | |
| Efficiency adjustment factor, total | : 1.00 | Pump speed limit, minimum | : 900 rpm | | | |
| Power adjustment, total | : 0.00 kW | Curve speed limit, maximum | : 6000 rpm | | | |
| Head adjustment factor, total | : 1.00 | Curve speed limit, minimum | : 899 rpm | | | |
| Flow adjustment factor, total | : 1.00 | Variable speed limit, minimum | : - | | | |
| NPSHR adjustment factor, total | : 1.00 | Solids diameter limit | : 1.27 mm | | | |
| | | Typical Driver Data | | | | |
| NPSH margin dictated by pump supplier | : 0.00 m | Driver speed, full load | : 3570 rpm | | | |
| NPSH margin dictated by user | : 2.90 m | Driver speed, rated load | : 3576 rpm | | | |
| NPSH margin used (added to 'required' values) | : 2.90 m | Driver efficiency, 100% load | : N/A | | | |
| | | Driver efficiency, 75% load | : N/A | | | |
| | | Driver efficiency, 50% load | : N/A | | | |
| Mechanical Limits | | | | | | |
| Torque, rated power, rated speed | : 41.83 kW/1000 rpm | | | | | |
| Torque, maximum power, rated speed | : 44.96 kW/1000 rpm | | | | | |
| Torque, driver power, full load speed | : 52.22 kW/1000 rpm | | | | | |
| Torque, driver power, rated speed | : 52.37 kW/1000 rpm | | | | | |
| Torque, pump shaft limit | : - | | | | | |
| Radial load, worst case | : - | | | | | |
| Radial load limit | : - | | | | | |
| Impeller peripheral speed, rated | : - | | | | | |
| Impeller peripheral speed limit | : - | | | | | |
| Various Performance Data | | Flow (USgpm) | Head (ft) | Efficiency (%) | NPSHr (m) | Power (kW) |
| Shutoff, rated diameter | 0.00 | 1,938.1 | - | - | 68.92 | |
| Shutoff, maximum diameter | 0.00 | 2,157.8 | - | - | 83.13 | |
| MCSF | 175.0 | 1,902.9 | 50.14 | 2.07 | 98.67 | |
| Rated flow, minimum diameter | 450.0 | 889.0 | 65.96 | - | 90.11 | |
| Rated flow, maximum diameter | 450.0 | 1,827.1 | 72.27 | - | 169 | |
| BEP flow, rated diameter | 466.9 | 1,561.5 | 71.66 | 2.48 | 151 | |
| 120% rated flow, rated diameter | 540.0 | 1,393.3 | 70.69 | 2.76 | 158 | |
| End of curve, rated diameter | 617.3 | 1,173.0 | 67.29 | 3.23 | 160 | |
| End of curve, minimum diameter | 497.5 | 772.3 | 62.21 | 2.58 | 91.76 | |
| End of curve, maximum diameter | 650.7 | 1,313.4 | 68.23 | 3.52 | 186 | |
| Maximum value, rated diameter | - | 1,938.1 | 71.66 | - | 160 | |
| Maximum value, maximum diameter | - | - | 72.64 | - | 186 | |
| System differential pressure | | @ Density, rated | | @ Density, max | | |
| Differential pressure, rated flow, rated diameter (bar) | | 37.56 | | 37.56 | | |
| Differential pressure, shutoff, rated diameter (bar) | | 45.64 | | 45.64 | | |
| Differential pressure, shutoff, maximum diameter (bar) | | 50.81 | | 50.81 | | |
| Discharge pressure | | @ Suction pressure, rated | @ Suction pressure, max | @ Suction pressure, rated | @ Suction pressure, max | |
| Discharge pressure, rated flow, rated diameter (bar.g) | | 37.77 | 38.25 | 37.77 | 38.25 | |
| Discharge pressure, shutoff, rated diameter (bar.g) | | 45.85 | 46.33 | 45.85 | 46.33 | |
| Discharge pressure, shutoff, maximum diameter (bar.g) | | 51.02 | 51.50 | 51.02 | 51.50 | |
| Ratios | | | | | | |
| Maximum flow / rated flow, rated diameter | | : 137.17 % | | Head rated diameter / head minimum diameter, rated flow : 179.41 % | | |

Pump Performance - Additional Data

| Mixed Stage Performance | Set #1 | Set #2 | Set #3 | Set #4 | Alternate First Stage |
|--------------------------|-----------------------------------|--------|---------------|--------|-----------------------|
| Size and model | 3x6x9MH PWM | - | - | - | - |
| Stages | 5 | - | - | - | - |
| Based on curve number | 3x6x9MH | - | - | - | - |
| Impeller diameter, rated | 246 mm | - | - | - | - |
| Construction | | | | | |
| Sizes Available | : Standard | | Flange Rating | : 900# | |
| Clearances | : PWM Standard Running Clearances | | | | |

Pump Performance Curve



| | | | | |
|--------------------|-----------------------|---------------|-------------------------------------|-----------------------------|
| Customer | Size and model | : 3x6x9MH PWM | Flow, rated | : 450.0 USgpm |
| Customer reference | Stages | : 5 | Differential head / pressure, rated | : 1,595.0 ft |
| Item number | Speed, rated | : 3560 rpm | Fluid density, rated / max | : 0.789 / 0.789 SG |
| Service | Based on curve number | : 3x6x9MH | Viscosity | : 4.00 cP |
| Quantity | Efficiency | : 71.60 % | Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010] | : 1.00 / 1.00 / 0.99 / 1.00 |
| Quote number | Power, rated | : 149 kW | Solids diameter limit | : 1.27 mm |
| Date last saved | NPSH required | : 2.44 m | | |

