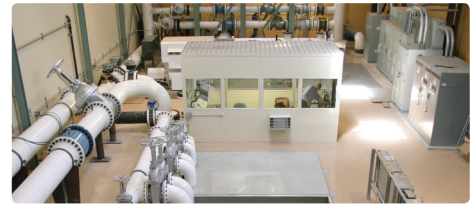


# PUMP Test REPORT

PROVEN RESULTS FOR ENGINEERED UPGRADES

DECEMBER 2014



## Validation Test for Certified Remanufactured Pump

Hydro's Test Lab worked with Hydro's new remanufactured pump program, and Hydro Pumping Solutions, to validate the performance of a redesigned Bingham pump. The test measured the actual performance of the pump's hydraulics versus the theoretical design's predicted performance. In addition, vibration analysis was used to track the preferable operating conditions and the allowable operating conditions, based on overall vibration amplitudes and FFT analyses.

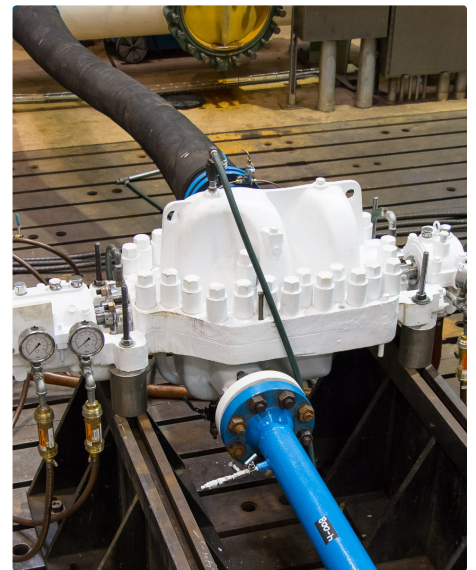
A Certified Performance Test (CPT) was completed at the rated speed of the pump. In order to optimize field performance, the performance curve was plotted at 6 different speeds. This will allow the operators to get the most efficient pump use possible. By tracking the vibration amplitudes as function of the rotational speed of the pump, they can also verify any critical speeds that may be present throughout the operating range of the pump.

The pumping industry has made significant improvements over the years in material and engineering upgrades. However, hydraulic performance enhancements have not kept pace with mechanical upgrades and modifications. Hydro remains independent of the constraints that can be imposed by relying on existing hydraulic designs and manufacturer's predicted performance curves. Instead Hydro engineers employ the latest technology to design hydraulics for particular requirements and validate those designs by rigorously testing to the highest standard.



Testing doesn't interrupt our business. It is our business.

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| INDUSTRY        | Oil & Gas                                             |
| APPLICATION     | L.H. - Ethane (80%)<br>Propane (20%)                  |
| MANUFACTURER    | Bingham                                               |
| TYPE            | Multistage, Axially Split, Between Bearing Pump (BB3) |
| MODEL           | MOD                                                   |
| SIZE            | 4x8-11.5                                              |
| STAGES          | 3                                                     |
| IMP. DIA. (IN.) | 11.25                                                 |



This test was performed within days of receiving the pump from the customer, allowing a swift turnaround time needed to ensure minimal downtime for the customer.

PTR1412