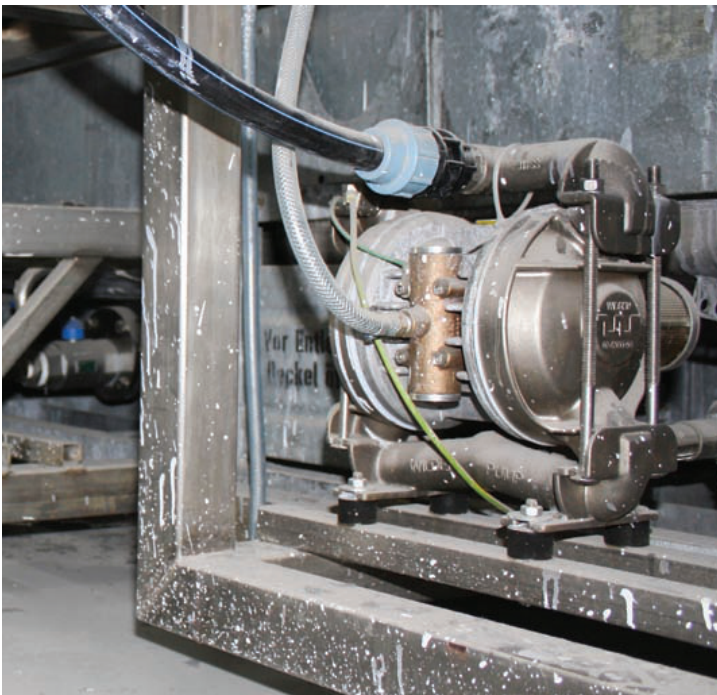


TECHNICAL WHITE PAPER / 05

Commissioning a Diaphragm Pump: A Repeatable Site Acceptance Test

A diaphragm pump installation guide for site acceptance: test conditions, traceable readings, startup checks and an agreed performance baseline.



Installed pump from the An Historic Partnership application report. Photo: Wilden / PSG. The acceptance method in this paper is an original proposed framework.

Scope: an original engineering discussion for pump selection and operating review. Examples are illustrative; this is not a product certification or a field-test report.

Executive summary

A pump can start, cycle and pass a brief water check without demonstrating that it will complete the production duty. Site acceptance should connect the purchase requirement with a documented operating condition and measurable result.

This diaphragm pump installation guide focuses on acceptance evidence after the installation requirements have been established. It helps connect commissioning observations to the agreed process duty.

This paper proposes a practical acceptance framework for diaphragm transfer pumps. It is an engineering planning guide, not a published certification standard, a pressure-test procedure or a substitute for the manufacturer's commissioning instructions. Acceptance criteria must be agreed by the purchaser and supplier before testing.

1. An installation guide needs a testable acceptance question

Replace “the pump works” with a specific requirement. For example: transfer an agreed batch volume within an agreed time, at the defined source level and product condition, while remaining within the equipment's operating limits. The actual numbers belong in the purchase specification and test sheet.

Identify what is being accepted: the pump alone, a supplied skid or the complete installed system. A pipe restriction supplied by another contractor can prevent the system from meeting the duty without proving a pump defect. Conversely, passing a workshop test does not prove that the installed arrangement is satisfactory.

2. Freeze the configuration under test

Record the manufacturer's full model designation, serial number where present, materials configuration and the manual revision used. Photograph the installed inlet, discharge, air or electrical supply, instruments and support arrangement. Include valve positions and any accessories that affect flow or control.

Confirm that the installed equipment and operating environment match the selected configuration. Required site controls, isolation and pressure-relief arrangements must already be in place. Manufacturer manuals provide model-specific starting instructions and limits; the test plan must work within them. [R10, R11]

A test using temporary oversized hoses may be useful for diagnosis, but it does not establish acceptance of the final installed pipework. Label temporary arrangements clearly and repeat the relevant checks after reinstatement.

3. Agree the minimum data set

Field	Entry required before the test	Why it matters
Fluid	Identity, temperature, density and relevant viscosity	Defines the process condition
Source	Starting and ending level; vessel pressure where relevant	Documents changing inlet duty
Discharge	Destination condition and pressure measurement point	Defines the resistance being overcome
Utility	Dynamic air pressure and flow, or electrical input as applicable	Identifies available driving input
Delivery	Volume or mass, elapsed time and measurement method	Demonstrates useful output
Instruments	Identification, range and calibration status	Supports traceability
Configuration	Pump code, accessories and operating settings	Makes a repeat run meaningful

If water is used for a preliminary check, describe exactly what it verifies. It may help confirm operation and detect visible leakage, but it does not validate the viscosity, chemical behavior or solids handling of the production fluid. Establish an approved transition and cleaning process before product introduction.

4. Use a small test matrix

Choose representative operating cases instead of taking many readings at one easy point. A transfer installation may require a normal-duty run, a low-source-level run and an approved restart check. A controlled batch process may require additional verification of its stop condition and delivered quantity.

A plant with narrow operating variation may need fewer cases. A duty with large temperature or backpressure changes may need more. The selection should follow the process risk and purchase requirement, not an arbitrary requirement to collect a fixed number of tests.

Test case	Condition to define	Result to compare with the agreed limit
Normal transfer	Representative fluid and source level	Delivered quantity and transfer time
Lowest normal source level	Realistic end-of-batch inlet condition	Sustainable delivery and stable operation
Highest normal discharge resistance	Approved downstream condition	Required output within operating limits
Restart	Defined stop period and normal restart sequence	Repeatable return to service
Control response	Approved simulation or functional check	Correct stop, indication and restart permissions

Do not create a hazardous blocked line, overflow or diaphragm rupture simply to test a control. Use the manufacturer's approved functional-check method and the site's authorized procedure.

5. Keep raw observations and calculations separate

Retain start and finish readings, elapsed times and operator notes. Calculate delivery from those values in a separate field. If tank mass is used, note the tare method and density used to infer volume. Record fluctuations rather than replacing them with a single favorable number.

Repeat a run when an unexplained difference appears. Compare source level, temperature, utility pressure and valve positions before declaring an equipment change. Wilden's installation guidance identifies suction integrity and piping arrangement as performance factors, so those conditions belong in the record. [R7]

Instrument uncertainty must be small enough to distinguish an acceptable result from an unacceptable one. If a required transfer rate lies close to the measured value, an approximate tank graduation and a casual stopwatch reading may not settle the question. Agree how borderline results will be resolved before the test.

6. Classify the outcome, not just pass or fail

Use three findings: accepted, accepted with a documented limitation, or corrective action required. A limitation should identify the exact condition, its operational consequence and who has accepted it. It should not silently redefine the purchase requirement after testing.

For a shortfall, distinguish utility supply, inlet arrangement, downstream resistance, control sequence and equipment condition. Record the evidence for each suspected cause. Change one relevant factor at a time when practical, so a successful rerun explains what improved the result.

7. Hand over a usable baseline

The final file should contain the configuration, test conditions, raw readings, calculations, deviations and responsible sign-off. Attach photographs and the applicable manual reference. Retain an operating baseline for later maintenance comparisons; it is more useful than a statement that the pump “ran normally on installation day.”

WILLEE can help turn a pump enquiry into a testable duty by clarifying fluid, quantity, transfer time, pressure conditions and connection details before ordering. Acceptance is simplest when the specification already explains what success looks like.

Prepare a pump duty and acceptance enquiry - willeepump.com/contact/

Technical references

[R7] Wilden / PSG. PS8 Plastic Engineering, Operation and Maintenance Manual.

[R10] Wilden / PSG. Safety Supplement to Engineering, Operation and Maintenance Manual.

[R11] Graco. 308981ZAZ: Air-Operated Diaphragm Pumps - Instructions.

Photographs: manufacturer application references, not WILLEE customer projects. Rights remain with the original owners.