API 675 Evaluation

Hydra-Cell® METERING SOLUTIONS™

Evaluation of Hydra-Cell Pumps for Conformity to the Requirements of API Standard 675: Positive Displacement Pumps – Controlled Volume. Second Edition, October 1994

Section 1 – General

1.1 Scope

API Standard 675 covers the minimum requirements for controlled volume positive displacement pumps for use in service in the petroleum, chemical, and gas industries. Both packed plunger and diaphragm types are included; however, mechanical acting diaphragm pumps are not included.

- Both Hydra-Cell Metering Solutions (HCMS) P Series Pumps and Hydra-Cell Bare Shaft Pumps (Industrial D/G Series) are used extensively in the petroleum, chemical, and gas industries.
- Both Hydra-Cell Metering Solutions (HCMS) P-Series Pumps and Hydra-Cell Bare Shaft Pumps are hydraulic actuated diaphragm pumps, thus they can be evaluated against the requirements of API Standard 675.

1.2 Alternative Designs

This section states that a vendor may offer alternative designs; substitutions to particular requirements of API 675 may be made as long as there is mutual agreement between the purchaser and vendor.

1.3 Conflicting Requirements

This section states that in cases where there is a conflict between the standard and the inquiry or order, the information included in the order shall govern.

- API Standard 675 does allow for use of both Hydra-Cell Metering Solutions (HCMS) P-Series Pumps and Hydra-Cell Bare Shaft Pumps in petroleum, chemical, and gas industries, as long as the purchaser and vendor agree on where the product conforms to and differs from the exacting requirements spelled out in API Standard 675.

1.4 Definition of Terms

This section defines key terms used throughout the standard itself

1.5 Referenced Publications

This section states that API 675 makes reference to American standards; however, other international or national standards may be used as mutually agreed upon. It is noted that the other standards should meet or exceed the American standards referenced.

1.6 Unit Conversion

This section discusses how customary units are converted to SI units.

The remainder of this document includes a cursory review of both Hydra-Cell Metering Solutions (HCMS) P Series pumps and Hydra-Cell Bare Shaft pumps (Industrial D/G Series); whether or not either or both conform to the requirements of API Standard 675.

Section numbers of the standard are listed, with a simple evaluation of each type of pump, along with comments to add clarification in many cases. Conformance to each section is classified as follows:

Yes	Indicates the pump does conform to the section requirement.
No	Indicates the pump does not conform to the section requirement.
Can Meet	indicates the pump manufacturer could likely, if required, take actions in order to allow the section requirement to be met. The pump could meet the specification depending on the application and duty.
N/A	Indicates the section does not apply directly to the pump and/or pump manufacturer.

Section 2: Basic Design

Hydra-Cell® METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
2.1	**General**		
2.1.1	Can Meet	No	
2.1.2	Yes	Yes	Wanner Engineering provides components up to and including pump packages and some fluid accessory items – assuming unit responsibility per the definition in section 1.4.26 of API 675.
2.1.3	N/A	N/A	This is a requirement put on the purchaser to specify the normal operating point of the equipment on the data sheets (ref. Appendix A of API 675).
2.1.4	Can Meet	Can Meet	Case by case evaluation – HCMS maximum sound pressure level (SPL) is significantly less than that of HC Bare Shaft Pumps.
2.1.5	Yes	Yes	
2.1.6	Can Meet	Can Meet	Case by case evaluation – purchaser also jointly responsible. Consult manual for guidelines.
2.1.7	Can Meet	Can Meet	Case by case evaluation – purchaser also jointly responsible for meeting this requirement.
2.1.8	Yes	Yes	
2.1.9	Yes	Yes	
2.1.10	Yes	Yes	
2.1.11	Yes	Yes	Both HCMS and HC Bare Shaft require “removable spool pieces” in the purchasers piping to meet this requirement.
2.1.12	N/A	N/A	This is a requirement put on the purchaser to specify the environmental conditions in which the equipment must operate.
2.1.13	No	No	Spare parts will not meet all criteria of the standard, as the pumps themselves do not.
2.1.14	Yes	Yes	
2.1.15	Yes	Yes	
2.1.16	Yes	Yes	
2.1.17	Yes	Yes	
2.1.18	Yes	Yes	
2.1.19	Yes	Yes	
2.1.20	No	No	If specified by the purchaser, neither HCMS nor HC Bare Shaft pumps could be fitted with water-jacket on pump head for heating or cooling.

Section 2: Basic Design

Hydra-Cell® METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
2.2	**Pressure Containing Parts**		
2.2.1	No	No	No standard currently used.
2.2.2	Yes	Yes	
2.2.3	No	No	
2.2.4	N/A	N/A	No studded connections used in either product.
2.2.5.1	No	No	
2.2.5.2	No	No	Cap screws are used throughout both products.
2.2.5.3	Yes	Yes	
2.2.5.4	No	No	Internal socket type fasteners are used throughout both products.
2.2.5.5	N/A	N/A	No studs used. Cap screws used have ID on exposed head of screw.
2.2.6	Yes	Can Meet	Alignment of pump to motor is currently required for H25/G25 and D35/G35 bare shaft pumps.

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
2.3	**Liquid End Connections**		
2.3.1	Can meet	Can meet	Flange options available.
2.3.2	Yes	Yes	Note: no hydrostatic testing is performed currently as standard but could be undertaken.
2.3.3	No	No	Piping connections are primarily tapered threads.
2.3.3.1	Can Meet	Can Meet	System component, not part of pump.
2.3.3.2	Can Meet	Can Meet	System component, not part of pump.
2.3.3.3	Can Meet	Can Meet	System component, not part of pump.
2.3.3.4	Can Meet	Can Meet	System component, not part of pump.
2.3.3.5	No	No	
2.3.3.6	No	No	Need standard review.
2.3.3.7	No	No	Need standard review.
2.3.4	N/A	N/A	NPS threads not used.
2.3.5	No	No	Both use plastic plugs.
2.3.6.1	N/A	N/A	C.I. flanges currently not offered.
2.3.6.2	N/A	N/A	
2.3.7	N/A	N/A	No studded connections are used (ref. section 2.2.4).
2.3.8	Can Meet	Can Meet	Needs evaluation – subjective, part of system design.

Section 2: Basic Design

Hydra-Cell® METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
2.4	**Pump Check Valves**		
	Can Meet	Can Meet	Valves are field-replaceable and do include guiding for quick seating; however, double check valves currently not offered. Implementation would be difficult in some models for both products.
2.5	**Diaphragms**		
2.5.1	Yes	Yes	Many diaphragm material options available for both products.
2.5.2	Yes	Yes	
2.5.3	Yes	Yes	
2.5.4	N/A	N/A	
2.5.5	N/A	N/A	
2.6	**Packed Plungers**		
	This section not relevant for HCMS or HC Bare Shaft pumps.		
2.7	**Relieve Valve Application**		
2.7.1	No	No	No integral hydraulic relief valve used in either product.
2.7.2	N/A	N/A	Neither pump utilizes packed plunger design.
2.8	**Gears**		
	Can Meet	N/A	Would require review of AGMA standards. Note: the gear lubrication system is self-contained for HCMS, thus meeting this part of the standard.

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
2.9	**Enclosure**		
2.9.1	Yes	Yes	
2.9.2	Yes	Yes	
2.9.3	Yes	Yes	
2.9.4	Yes	Yes	
2.10	**Drive Bearings**		
2.10.1	Yes	No	
2.10.2	No	No	
2.10.3	No	No	
2.11	**Lubrication**		
2.11.1	Yes	Yes	
2.11.2	Yes	Yes	
2.12	**Capacity Adjustment**		
2.12.1	Yes	Yes	
2.12.2	N/A	N/A	Capacity stroke control not utilized.
2.12.3	N/A	N/A	Capacity stroke control not utilized.
2.12.4	N/A	N/A	Capacity stroke control not utilized.

Section 2: Basic Design

Hydra-Cell® METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
2.13	**Materials**		
2.13.1	**General**		
2.13.1.1	Can Meet	Can Meet	Not currently a standard practice.
2.13.1.2	Can Meet	Can Meet	Not currently a standard practice.
2.13.1.3	Can Meet	Can Meet	Not currently a standard practice.
2.12.1.4	Can Meet	Can Meet	Depends on what components fall into this classification.
2.13.1.5	Can Meet	Can Meet	Pumping head bolts, washers, etc. typically not SST and may not meet corrosion resistance requirements of environment.
2.13.1.6	N/A	N/A	This is a requirement put on the purchaser to specify any corrosive agents present in the motive fluid, process fluid and environment.
2.13.1.7	No	No	Would require extensive case by case review.
2.13.1.8	Yes	Yes	
2.13.1.9	No	No	
2.13.1.10	No	No	
2.13.1.11	No	No	
2.13.1.12	No	No	
2.13.1.13	No	No	
2.13.2	**Castings**		
2.13.2.1	No	No	
2.13.2.2	Yes	Yes	
2.13.2.3	No	No	
2.13.2.3.1	N/A	N/A	No steel castings used.
2.13.2.3.2	No	No	
2.13.2.4	No	No	
2.13.2.5	Can meet	Can meet	Can meet for pump models. P100, P200, P300, F20/ G20,M03/G03, D04/G04
2.13.2.6	N/A	N/A	Nodular iron castings not used.
2.13.2.6.1	N/A	N/A	
2.13.2.6.2	N/A	N/A	
2.13.2.6.3	N/A	N/A	
2.13.2.6.4	N/A	N/A	
2.13.2.6.5	N/A	N/A	
2.13.3	**Forgings**		
	Can Meet	Can Meet	Requires review of standards and engineering prints, possible review with suppliers.
2.13.4	**Welding**		
2.13.4.1	No	No	
2.13.4.2	No	No	
2.13.4.3	No	No	
2.13.4.4	No	No	
2.13.4.4.1	No	No	
2.13.4.4.2	No	No	
2.13.4.4.3	No	No	
2.13.4.5	No	No	
2.13.4.5.1	N/A	N/A	This is a requirement put on the purchaser to specify additional welding inspections if desired.
2.13.4.5.2	No	No	
2.13.4.5.3	No	No	
2.13.4.5.4	N/A	N/A	This is a requirement put on the purchaser to specify design approval authority.
2.13.4.5.5	No	No	
2.13.5	**Impact Test Requirements**		
2.13.5.1	No	No	
2.13.5.2	No	No	Not currently a standard practice.
2.13.5.3	N/A	N/A	This is a requirement put on the purchaser to specify minimum design metal temperature for impact testing.
2.14	**Nameplates and Rotation Arrows**		
2.14.1	Yes	Yes	
2.14.2	Yes	Can Meet	Aluminum name plates currently used on HC. SS standard on HCMS.
2.14.3	Can Meet	Can Meet	Name plate does not currently allow for all required information.
2.15	**Quality**		
2.15.1	No	No	

Section 3: Accessories

Hydra-Cell METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
3.1	**Drivers**		
3.1.1	N/A	N/A	This is a requirement put on the purchaser, to specify the type of driver.
3.1.2	N/A	N/A	This is a requirement put on the purchaser to specify anticipated process variations.
3.1.3	N/A	N/A	This is a requirement put on the purchaser to specify the starting conditions for the driven equipment.
3.1.4	Yes	Yes	
3.1.5	N/A	N/A	This is a requirement put on the purchaser, to specify the type of motor and its characteristics and accessories.
3.1.6	N/A	N/A	This is a requirement put on the purchaser to specify the reduced voltage at which the motor's starting torque requirements shall be met.
3.1.7	N/A	N/A	Driver weight of 500 lbs and up is outside current application range.
3.2	**Couplings and Guards**		
3.2.1	Yes	Yes	
3.2.2	Yes	Yes	
3.2.3	Yes	Yes	
3.3	**Baseplates**		
3.3.1	Yes	Yes	
3.3.2	Yes	Yes	
3.3.3	No	No	Would need engineering evaluation on case-by-case basis.
3.3.4	No	No	
3.3.5	N/A	N/A	Mounting plate product currently not offered.
3.3.6	N/A	N/A	Mounting plate product currently not offered.
3.3.7	N/A	N/A	Requirement put on the purchaser, to furnish anchor bolts.
3.3.8	No	No	Product currently not offered.
3.3.9	N/A	N/A	Unit weight of 1000 lbs and up is outside current application range.
3.3.10	No	No	Product currently not offered.
3.4	**Controls and Instrumentation**		
3.4.1	**General**		
3.4.1.1	No	No	
3.4.1.2	Can Meet	Can Meet	Properly specified controls and instrumentation allow this to be met.
3.4.1.3	Can Meet	Can Meet	Properly specified controls and instrumentation allow this to be met.
3.4.2	**Control Systems**		
3.4.2.1	Can Meet	Can Meet	Properly specified controls and instrumentation allow this to be met. Also requires the purchaser specify some technical details as well as equipment to be furnished by the vendor.
3.4.2.2	Can Meet	Can Meet	Same comment as 3.4.2.1.
3.4.3	**Instrument and Control Panels**		
3.4.3.1	Can Meet	Can Meet	Properly specified controls and instrumentation allow this to be met. Also requires the purchaser specify some technical details as well as equipment to be furnished by the vendor.
3.4.3.2	Can Meet	Can Meet	
3.4.4	**Instrument**		
3.4.4.1.1	Can Meet	Can Meet	Properly specified temperature gauges allow this to be met.
3.4.4.1.2	Can Meet	Can Meet	System design & installation issue.
3.4.4.2	Can Meet	Can Meet	System design & specification issue.
3.4.4.3	Can Meet	Can Meet	Properly specified pressure gauges allow this to be met.
3.4.4.5.1	Can Meet	Can Meet	Properly specified relief valves allow this to be met.
3.4.4.5.2	Can Meet	Can Meet	Properly specified relief valves allow this to be met.

Section 3: Accessories

Hydra-Cell® METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
3.4.4.6	Can Meet	Can Meet	Properly specified back pressure valves allow this to be met.
3.4.5	**Electrical Systems**		
3.4.5.1	Can Meet	Can Meet	Properly specified controls and instrumentation allow this to be met. Also requires the purchaser specify some technical details.
3.4.5.2	Can Meet	Can Meet	Properly specified electrical equipment allows this to be met.
3.4.5.3	Can Meet	Can Meet	Properly specified electrical equipment allows this to be met.
3.4.5.4	Can Meet	Can Meet	System design & installation issue.
3.4.5.5	Can Meet	Can Meet	System design & installation issue.
3.4.5.6	Can Meet	Can Meet	Partially a requirement for the purchaser to specify the type of environment the equipment will operate in.
3.4.5.6.1	Can Meet	Can Meet	
3.4.5.6.2	Yes	Yes	Standard practice.
3.4.5.7	Can Meet	Can Meet	System design & installation issue.
3.4.5.8	Can Meet	Can Meet	System design & installation issue.
3.4.5.9	Can Meet	Can Meet	System design & installation issue.
3.5	**Piping**		
3.5.1	**General**		
3.5.1.1	Can Meet	Can Meet	Would require standards review & doc./control. System design & installation issue.
3.5.1.2	No	No	Would require standards review & doc./control. Also a system design and installation issue.
3.5.1.3	Can Meet	Can Meet	System design & installation issue.
3.5.1.4	Can Meet	Can Meet	System design & installation issue.
3.5.1.5	Can Meet	Can Meet	System design & installation issue.
3.5.1.6	Can Meet	Can Meet	System design & installation issue.
3.5.1.7	No	No	
3.5.1.8	No	No	Some of the sizes this section declares “shall not be used” are used in some of the pump models, both P-Series and Bare Shaft.
3.5.1.9	No	No	
3.5.1.10	No	No	Some connections smaller than the minimum specified in this section are used in some of the pump models, both P-Series and Bare Shaft.
3.5.1.11	Can Meet	Can Meet	System design & installation issue.
3.5.1.12	No	No	
3.5.1.13	No	No	
3.5.2	**Instrument Piping**		
3.5.2.1	Can Meet	Can Meet	System design & installation issue.
3.5.2.2	Can Meet	Can Meet	System design & installation issue.
3.5.3	**Process Piping**		
3.5.3.1	N/A	N/A	This is a requirement put on the purchaser, to specify the extent of and requirements for process piping to be supplied by the vendor.
3.5.3.2	No	No	
3.5.3.3	Can Meet	Can Meet	This is a requirement put on the purchaser, to specify the extent of and requirements for review of process piping and accessory items to be completed by the vendor.
3.6	**Pulsation Depression Devices**		
3.6.1	Can Meet	Can Meet	WEI offers full line of pulsation dampeners and inlet stabilizers.
3.6.2	Can Meet	Can Meet	WEI offers full line of pulsation dampeners and inlet stabilizers.
3.7	**Special Tools**		
3.7.1	Can Meet	Can Meet	Wanner tool kits available to aid in servicing of all pumps.
3.7.2	Can Meet	Can Meet	Not currently a standard practice.

Section 4: Inspection, Testing and Preparation for Shipment

Hydra-Cell METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
4.1	**General**		
4.1.1	N/A	N/A	This is a requirement put on the purchaser to specify the extent of participation in the inspection and testing desired.
4.1.2	Can Meet	Can Meet	
4.1.3	Can Meet	Can Meet	
4.1.4	Can Meet	Can Meet	
4.1.5	Can Meet	Can Meet	
4.1.5.1	Can Meet	Can Meet	
4.1.5.2	Can Meet	Can Meet	
4.1.5.3	Can Meet	Can Meet	
4.1.6	Can Meet	Can Meet	
4.1.7	Can Meet	Can Meet	

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
4.2	**Inspection**		
4.2.1	**General**		
4.2.1.1	Can Meet	Can Meet	
4.2.1.2	Can Meet	Can Meet	
4.2.1.3	N/A	N/A	This section states the purchaser may specify certain additional inspection of welded components.
4.2.2	**Material Inspection**		
4.2.2.1	**General**		
4.2.2.2	**Radiography**		
4.2.2.2.1	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.2.2	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.3	**Ultrasonic Inspection**		
4.2.2.3.1	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.3.2	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.4	**Magnetic Particle Inspection**		
4.2.2.4.1	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.4.2	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.5	**Liquid Penetrant Inspection**		
4.2.2.5.1	No	No	Can likely meet - would require standards review & doc./control.
4.2.2.5.2	No	No	Can likely meet - would require standards review & doc./control.
4.2.3	**Mechanical Inspection**		
4.2.3.1	Yes	Yes	
4.2.3.2	No	No	Not currently a standard practice.
4.2.3.3	Can Meet	Can Meet	This section states the purchaser may specify and conduct certain inspections.
4.2.3.4	Can Meet	Can Meet	This section states the purchaser may specify certain additional inspection for hardness of parts, welds, or heat-affected zones.

Section 4: Inspection, Testing and Preparation for Shipment

Hydra-Cell METERING SOLUTIONS™

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
4.3	**Tests**		
4.3.1	**General**		
4.3.1.1	No	No	Hydrostatic testing not currently a standard practice.
4.3.1.2	Can Meet	Can Meet	Not currently a standard practice.
4.3.1.3	Can Meet	Can Meet	Not currently a standard practice.
4.3.2	**Hydrostatic Test (all sections)**		
	No	No	Hydrostatic testing not currently a standard practice.
4.3.3	**Performance Test**		
4.3.3.1	Can Meet	Can Meet	Not currently a standard practice.
4.3.3.2	Can Meet	Can Meet	Not currently a standard practice.
4.3.3.3	No	No	Case by case evaluation to determine feasibility of using job controls for automatically controlled pumps.
4.3.3.4	Can Meet	Can Meet	Not currently a standard practice.
4.3.3.5	Yes	Yes	

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
4.4	**Preparation for Shipment**		
4.4.1	Can Meet	Can Meet	Subjective – current methods may not meet requirements of this section – six months of outdoor storage.
4.4.2	Can Meet	Can Meet	Not currently a standard practice.
4.4.3	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.1	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.2	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.3	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.4	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.5	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.6	Can Meet	Can Meet	Not currently a standard practice.
4.4.3.7	Can Meet	Can Meet	Not currently a standard practice.
4.4.4	Yes	Yes	
4.4.5	Can Meet	Can Meet	Equipment typically not provided with auxiliary piping – usually a system design/installation issue.

Section 5: Vendor's Data

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
5.1	**General**		
5.1.1	Can Meet	Can Meet	Not currently a standard practice.
5.1.2	Can Meet	Can Meet	Not currently a standard practice.
5.2	**Proposals**		
5.2.1	Can Meet	Can Meet	Not currently a standard practice.
5.2.2	Can Meet	Can Meet	Not currently a standard practice.
5.2.2.1	Can Meet	Can Meet	Not currently a standard practice.
5.2.2.2	Can Meet	Can Meet	Not currently a standard practice.
5.2.3	Can Meet	Can Meet	Not currently a standard practice.
5.2.4	Can Meet	Can Meet	Not currently a standard practice.
5.2.5	Can Meet	Can Meet	Not currently a standard practice.

	Hydra-Cell Metering (P Series)	Hydra-Cell Industrial (D/G Series)	Comments
5.3	**Contract Data**		
5.3.1	**General**		
5.3.1.1	Can Meet	Can Meet	Not currently a standard practice.
5.3.1.2	Can Meet	Can Meet	Not currently a standard practice.
5.3.1.3	Can Meet	Can Meet	Not currently a standard practice.
5.3.2	Can Meet	Can Meet	Not currently a standard practice.
5.3.3	Can Meet	Can Meet	Not currently a standard practice.
5.3.4	Can Meet	Can Meet	Not currently a standard practice.
5.3.5	**Parts List and Recommended Spares**		
5.3.5.1	Can Meet	Can Meet	Not currently a standard practice.
5.3.5.2	Can Meet	Can Meet	Not currently a standard practice.
5.3.6	**Installation, Operation, Maintenance, and Technical Data Manuals**		
5.3.6.1	Can Meet	Can Meet	Not currently a standard practice.
5.3.6.2	Can Meet	Can Meet	Not currently a standard practice.
5.3.6.3	Can Meet	Can Meet	Not currently a standard practice.
5.3.7	Can Meet	Can Meet	Not currently a standard practice.

Wanner Engineering, Inc.
1204 Chestnut Avenue
Minneapolis, MN 55403 USA
(612) 332-5681 FAX (612) 332-6937
Toll Free FAX (USA only) (800) 332-6812
Email: sales@wannereng.com
www.hydra-cell.com/metering