

## High Performance in Centrifugal Pump Testing Standards

In 2011, the Hydraulic Institute updated their testing standards for centrifugal pumps (ANSI/HI 14.6 - *Rotodynamic Pumps for Hydraulic Performance Acceptance Tests*) to harmonize with international standards (ISO 9906) for common practices worldwide. Since the new standard is a more significant change for North America manufacturers, implementation has been slower to adopt.

Previously, acceptance grades were level A or B with tolerance values based on specific flow and/or pressure ranges – regardless of industry or pump type. In short, Level A allowed for no negative tolerance whereas Level B generally allowed for a -3% deviation from the contract performance. All certified tests at Wilfley were carried out to the higher standard (Level A).

The new guidelines recognize that different pumps and/or industries have differing needs and established a multitude of default acceptance grades based on the application and rated power of the pump:

Application		Rated shaft power of pump	
		>10 to 100 kW (13 to 134 hp)	>100 kW (134 hp)
Municipal water and wastewater		2B	1B
Building trades and HVAC		2B	1B
Electric power industry		1B	1B
Oil and gas industry	API pumps	1B	1B
	Pipeline	1B	1B
	Water injection	N/A	1B
Chemical Industry		2B	2B
Cooling tower		2B	2B
Pulp and paper		2B	2B
Slurry		3B	3B
General industry		3B	2B
Dewatering, drainage and irrigation		3B	2B
Pumps not listed above		3B	2B

Note: The tolerance classes are for rated shaft power above 10 kW (13hp). For lower power levels, the default acceptance criteria is ±10% on flow, ±8% on head and efficiency or power are controlled by a special formula. Contact your pump manufacturer for details.

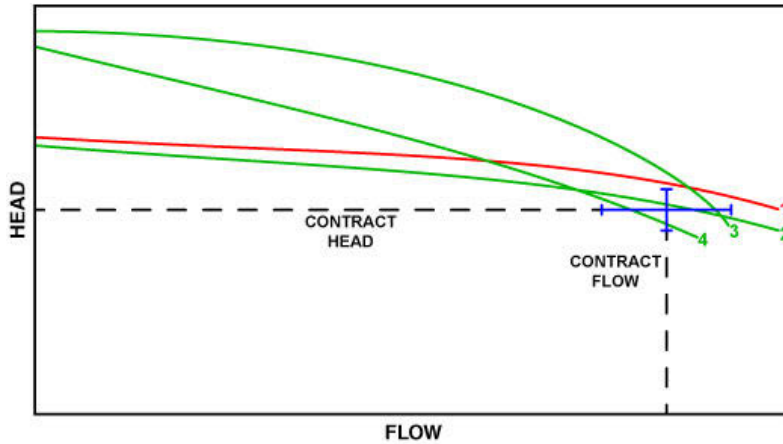
In general, the level of acceptable tolerance value increases from Grade 1 to Grade 3 and can either be unilateral (one sided) or bilateral (two sided). True to our nature, Wilfley decided to implement the new testing procedures based on the highest grade accounted for (1U).

### Pump Test Acceptance Grades and Corresponding Tolerance Band

Test Parameter	Guarantee requirement	Grade	Grade 1			Grade 2		Grade 3
		$\Delta t_Q$	10%			16%		18%
		$\Delta t_H$	6%			10%		14%
		Symbol	Acceptance grade					
			1B	1E	1U	2B	2U	3B
Rate of flow	Mandatory	$t_Q(\%)$	±5%	±5%	0% to +10%	±8%	0% to +16%	±9%
Total head	Mandatory	$t_H(\%)$	±3%	±3%	0% to +6%	±5%	0% to +10%	±7%
Power	Optional	$t_P(\%)$	+4%	+4%	+10%	+8%	+16%	9%
Efficiency	(either/or)	T(%)	-3%	-0%	-0%	-5%	-5%	-7%

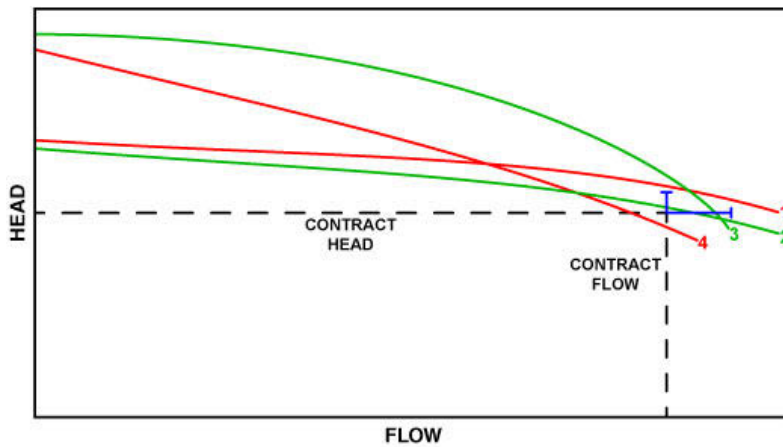
As noted above, the default classification for chemical process pumps (ASME B73.1 or ISO 5199 pumps) is Grade 2B. This allows a bilateral tolerance band of up to 8% on flow, 5% on head and either 8% overage on power or 5% deficiency on efficiency. By contrast, we follow Grade 1U which has a tighter tolerance band (unilateral 10% versus bilateral 8% = 16 points) and no negative tolerance on flow, head or efficiency. This grade is clearly more stringent than 2B and it ensures that the customer will get what they pay for.

## Bilateral vs. Unilateral Tolerance Acceptance



### Bilateral Tolerance Band

- Curve 1 = Fail
- Curve 2 = Pass
- Curve 3 = Pass
- Curve 4 = Pass



### Unilateral Tolerance Band

- Curve 1 = Fail
- Curve 2 = Pass
- Curve 3 = Pass
- Curve 4 = Fail

As you can see, Wilfley is constantly striving to add value for our customers in every aspect of the company. Contact your local Wilfley representative to learn more.