

Monday, June 6, 2016

New Pump Efficiency Standard Part 2: The Pump Energy Index (PEI)

Now that the U.S. Department of Energy (DOE) has published the first ever Energy Conservation Standards for Pumps, let's take a look at some of the finer details of that standard, starting with the terminology and what it means.

Pump Energy Index

The Pump Energy Index (PEI) is the new metric established by the DOE to rate the energy performance of the pumps covered by the standard. PEI is defined as the ratio of pump efficiency rating (PER) for a particular pump type and model (with full impeller diameter), divided by a calculated minimally compliant PER for the pump type:

$$PEI = PER/PER_{STD}$$

Thus, the PEI represents a comparison between the actual horsepower used by the pump and the maximum horsepower allowed by the standard for the same type of pump. If the PEI is greater than 1.0, then the pump does not comply with the new standard and it can no longer be manufactured after 2020, unless it is redesigned to meet the standard. If the horsepower used by a pump is less than or equal to the maximum horsepower allowed, the PEI is 1.0 or less and is acceptable. Think of a golf handicap – lower is better.

The DOE has established a way to calculate each unique PER_{STD} value for all of the different types of pumps covered in the standard. This is simply because pumps often vary in efficiency based on their type. For example, the DOE team determined that base-mounted end-suction flexibly coupled pumps are generally more efficient than vertical inline pumps and thus will have a lower PER_{STD} value.



Ratings for Constant and Variable Speed

The standard includes two versions of the PEI, one for constant load operation (PEI_{CL}) and one for variable load operation (PEI_{VL}).

Although “CL” denotes a constant load rating, it does not mean the pump can’t be used in a variable speed application. It just means the pump can be shipped by itself. It may or may not be installed with variable speed drives and controls provided by someone other than the pump manufacturer. This is defined as:

$$PEI_{CL} = PER_{CL} / PER_{STD}$$

The second “VL” version refers to a pump that is rated not on its own merits but with the inclusion of a variable speed controller. If a pump carries a rating that uses the “VL” subscript, the manufacturer must provide the pump with the drive controller. In this application the PEI is defined as:

$$PEI_{VL} = PER_{VL} / PER_{STD}$$

By 2020 every pump meeting the criteria of the standard as described in last week’s article and sold in the U.S. will come with a permanent nameplate bearing either the PEI CL OR VL and other pertinent information.

Next time we’ll take a look at how the DOE calculates the PER values for constant load (CL) and variable load (VL) pumps.