Standard ID and Name: HI 40.5 Program Guideline for Energy Rating Program
Title of Addendum: Revision of $PEI_{Baseline}$ to 1.00
Approval Date: December 3rd, 2018

The following addendum presents the corrections and revision of the HI 40.5 Program Guideline for Energy Rating Program, approved on December 3rd, 2018. An addendum is issued to change or alter any technical information in a published standard, guidebook, or program guideline, substantive in nature, from its original intended form. It has been approved through a 2 week ballot process.

Please note that this document is released with the acknowledgement and consideration of all other previous revisions made since the last publication this program guideline.

The Hydraulic Institute and its affiliates caution and encourage all users to ensure that they have the latest edition of any HI standard by periodically checking the following URL: http://www.pumps.org/StandardsUpdates.aspx

~~Red strike through text~~ will be replaced with blue underlined text.

Page	Section	Change
6	40.5.3.2	The $PEI_{Baseline}$ describes the ~~PEI score of the market baseline for each pump~~ DOE minimally compliant pump for each equipment category and speed of rotation outlined in the guiding standards. ~~The $PEI_{Baseline}$ is determined using the baseline efficiency and performance of each pump equipment category in the guiding standards.~~ The $PEI_{Baseline}$ ~~used in the rating of a baseline model is determined by the ratio of the baseline pump energy rating ($PER_{Baseline}$) and the standard pump energy rating (PER_{STD})~~ shall be equal to 1.00 as shown in Equation 40.5.3.2.

$$PEI_{Baseline} = \frac{PER_{Baseline}}{PER_{STD}} \quad 1.00 \quad \text{(Eq. 40.5.3.2)}$$

~~The $PER_{Baseline}$ is representative of the weighted average input power of a bare pump and motor at the baseline efficiency level and is determined uniquely for each pump based on the nominal speed of rotation; the BEP flow rate; the hydraulic power at 75%, 100%, and 110% of BEP; and the C-value for the baseline level (shown in Table 40.5.3.2).~~

~~Similarly the PER_{STD} is the representative of the weighted average input power to a DOE minimally compliant bare pump and motor, and is determined based on the nominal speed of rotation; the BEP flow rate; the hydraulic power at 75%, 100%, and 110% of BEP; and the C-value for the standard level (shown in Table 40.5.3.2).~~

~~The procedure for determining the PER_{STD} and $PER_{Baseline}$ for a basic model is described in Section II.B of Appendix A of Subpart Y of 10 CFR Part 431 of the guiding standards, except use the applicable C-values shown in Table 40.5.3.2.~~

~~Table 40.5.3.2 — Baseline and standard level C-values~~

~~Baselline & Standard Level C-Values~~		
~~DOE Type~~	~~C-Value - Baseline Level~~	~~C-Value - Standard Level~~
~~ESCC 1800~~	~~134.43~~	~~128.47~~

~~ESCC 3600~~	~~135.94~~	~~130.48~~
~~ESFM 1800~~	~~134.99~~	~~128.85~~
~~ESFM 3600~~	~~136.59~~	~~130.99~~
~~IL 1800~~	~~135.92~~	~~129.3~~
~~IL 3600~~	~~141.01~~	~~133.84~~
~~RSV 1800~~	~~129.63~~	~~129.63~~
~~RSV 3600~~	~~133.20~~	~~133.20~~
~~ST 1800~~	~~138.78~~	~~138.78~~
~~ST 3600~~	~~138.78~~	~~134.85~~

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7	Footnote	~~[1]The $PEI_{Baseline}$ in Equation 40.5.3.3 for a model is determined as defined in Equation 40.5.3.2.~~ [2][1]The rated PEI_{CL} or PEI_{VL} in Equation 40.5.3.3 is the PEI of the model being rated and shall be consistent with any existing PEI listed on the pump nameplate and PEI reported to the DOE for certification of the model. For the certificate option refer to Section 40.5.7.
14	A.2.1	Three pumps of the same equipment category have the following $PEI_{Baseline}$ and rated PEI_{CL} values: • Pump 1: $PEI_{Baseline}$ of ~~1.09~~ 1.00 and PEI_{CL} of ~~0.99~~ 0.90 • Pump 2: $PEI_{Baseline}$ of ~~1.09~~ 1.00 and PEI_{CL} of ~~1.02~~ 0.93 • Pump 3: $PEI_{Baseline}$ of ~~1.09~~ 1.00 and PEI_{CL} of ~~1.04~~ 0.95 Using Equation 40.5.3.3, the ER for each pump is determined as follows: • Pump 1: ER = ~~(1.09 – 0.99) × 100 = 10~~ (1.00 – 0.90) × 100 = 10 • Pump 2: ER = ~~(1.09 – 1.02) × 100 = 7~~ (1.00 – 0.93) × 100 = 7 • Pump 3: ER = ~~(1.09 – 1.04) × 100 = 5~~ (1.00 – 0.95) × 100 = 5
14	A.2.2	A pump distributed as a bare pump or with a driver only will have a constant-load rating. However, that same bare pump or bare pump with driver could have a continuous control added that would change the rating of the pump. The following is an example of this case. • Pump 4 constant load: $PEI_{Baseline}$ of ~~1.09~~ 1.00 and PEI_{CL} of ~~0.92~~ 0.83 (bare pump and driver) • Pump 4 variable load: $PEI_{Baseline}$ of ~~1.09~~ 1.00 and PEI_{VL} of ~~0.50~~ 0.41 (add continuous control) Using Equation 40.5.3.3, the ER for each configuration is determined as follows: • Pump 4 constant load: ER = ~~(1.09 – 0.92) ×100 = 17~~ (1.00 – 0.83) × 100 = 17 • Pump 4 variable load: ER = ~~(1.09 – 0.50) × 100 = 59~~ (1.00 – 0.41) × 100 = 59

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15	B.1	The HI ER can be used to estimate the power savings over a ~~base-case condition for a selected pump~~ DOE minimally compliant pump or to estimate and compare the power savings of multiple pumps under the proper use conditions noted in the Scope (Section 40.5.1.2). This appendix provides a method to estimate power and energy savings and provides two examples of the proper use of the ER for estimating power savings and comparing the savings.
15	Footnote	[1]This represents the energy savings over the baseline case ~~prior to~~ after the regulatory compliance date of Jan. 27, 2020.