

# DIN EN 17038-1:2022-08 (E)

## Pumps - Methods of qualification and verification of the Energy Efficiency Index for rotodynamic pump units - Part 1: General requirements and procedures for testing and calculation of Energy Efficiency Index (EEI) (includes Corrigendum :2021)

---

| <b>Contents</b>   |   | <b>Page</b> |
|---|---|-------------|
| European foreword .....   |   | 3           |
| Introduction .....  |   | 4           |
| 1   | Scope .....   | 5           |
| 2   | Normative references .....  | 5           |
| 3   | Terms and definitions, symbols and subscripts .....   | 5           |
| 4   | Energy Efficiency Index (EEI) calculations .....  | 9           |
| 4.1   | General information and explanation on EEI .....  | 9           |
| 4.2   | Weighted-average value of the electric power input .....  | 9           |
| 4.3   | The reference electric power input P <sub>1, ref</sub> .....  | 10          |
| 5   | Qualification of pump unit types in respect to their Energy Efficiency Index .....                                  | 10          |
| 5.1   | General remarks .....   | 10          |
| 5.2   | Qualification methods .....   | 11          |
| 6   | Verification of the Energy Efficiency Index for pump units .....  | 12          |
| 6.1   | General remarks .....   | 12          |
| 6.2   | Procedure and decision .....  | 12          |
| Annex A (informative) Mean value and confidence interval of the Energy Efficiency Index EEI ..... |   | 14          |
| Annex B (informative) Methods recommended for the qualification of a pump unit type by test ..... |   | 19          |
| B.1   | General remarks .....   | 19          |
| B.2   | Determination of the mean value of EEI of a pump unit type population from a test on only one test pump unit .....  | 19          |
| B.3   | Determination of the mean value of EEI of a pump unit type population from a sample test of M pump units .....      | 20          |
| Annex C (informative) Application of mathematical statistics on tests .....                       |   | 23          |
| C.1   | Purposes of applying statistics in the frame of qualification and verification .....                                | 23          |
| C.2   | Normal or Gaussian distribution .....   | 23          |
| C.3   | Confidence interval .....   | 24          |
| C.4   | Outlier test .....  | 25          |
| Annex D (informative) Measurement uncertainties .....   |   | 27          |
| Annex E (informative) The probability of the result of the verification procedure .....           |   | 30          |
| E.1   | General .....   | 30          |
| E.2   | Probability that the conformity to law is confirmed by verification tests .....                                     | 32          |
| E.3   | Probability that a numerical value of indicated by the responsible company is confirmed by verification tests ..... | 33          |
| Bibliography .....  |   | 34          |