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**LIQUID PUMPS – GENERAL TERMS FOR
PUMPS AND INSTALLATIONS – DEFINITIONS,
QUANTITIES, LETTER SYMBOLS AND UNITS**

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English version

**Liquid pumps - General terms for pumps and installations -
Definitions, quantities, letter symbols and units**

Pompes pour liquides - Termes généraux pour les pompes
et installations - Définitions, grandeurs, symboles et unités

Flüssigkeitspumpen - Allgemeine Begriffe für Pumpen und
Pumpenanlagen - Definitionen, Größen, Formelzeichen und
Einheiten

This European Standard was approved by CEN on 8 November 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 197 "Pumps", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2000, and conflicting national standards shall be withdrawn at the latest by November 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard deals with terms, letter symbols and units related to the flow of liquids through rotodynamic and positive displacement liquid pumps and associated installations. It serves as a means of clarifying communications between the installation designer, manufacturer, operator and plant constructor.

The standard identifies the units in common usage but all further legal units may be used.

A definition of a liquid pump is included.

This standard deals solely with conditions described by positive values for the rate of flow and pump head. The definitions are set out showing firstly the most common form of a quantity followed by some frequently used variants. Other variants can be constructed and appropriate symbols evolved using the symbols and subscripts shown. Prefixes such as working ..., design ..., can be also applied to the defined quantities.

This standard is not concerned with terms, letter symbols and units referring to the component parts of rotodynamic and positive displacement pumps and installations.

Whenever possible symbols and definitions conform to those used in ISO 31 and ISO 1000, with further explanations where these are deemed appropriate. Some deviations have been incorporated for reasons of consistency.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 31, *Quantities, units and symbols*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

3 General terms and definitions for pumps and installations**3.1 List of symbols and quantities**

Where units in formulars are given, these units shall be used. For all other units care shall be taken to use consistant units.

3.1.1 Alphabetical list of symbols

Symbol	Quantity	Units
<i>A</i>	Area	m ²
<i>E</i>	Energy	J
<i>e</i>	Overall uncertainty, relative value	[%]
<i>F</i>	Force	N
<i>f</i>	Frequency	s ⁻¹ , Hz
<i>g</i>	Acceleration due to gravity	m/s ²
<i>H</i>	Head	m
<i>K</i>	Type number	1/s
<i>k</i>	Equivalent uniform roughness	m
<i>l</i>	Length	m
<i>m</i>	Mass	kg
<i>M</i>	Moment	Nm
<i>n</i>	Speed of rotation, stroke frequency	s ⁻¹ , min ⁻¹ , r/s, r/min, stroke/s
<i>(NPSH)</i>	Net positive suction head	m
<i>p</i>	Pressure	bar
<i>P</i>	Power	W, kW
<i>q</i>	Mass rate of flow	kg/h
<i>Q</i>	Volume rate of flow	m ³ /h
<i>Re</i>	Reynolds number	pure number
<i>tol</i>	Tolerance, relative value	[%]
<i>t</i>	Time	s, h
<i>T</i>	Temperature thermodynamic	K
<i>θ</i>	Temperature Celsius	°C
<i>U</i>	Mean velocity	m/s
<i>v</i>	Local velocity	m/s
<i>V</i>	Volume	m ³
<i>y</i>	Specific energy	J/kg
<i>z</i>	Height above reference plane	m
<i>η</i>	Efficiency	–
<i>λ</i>	Pipe friction loss coefficient	pure number
<i>ρ</i>	Density	kg/m ³
<i>ν</i>	Kinematic viscosity	m ² /s
<i>μ</i>	Dynamic viscosity	N·s/m ²
<i>ω</i>	Angular velocity	rad/s
Additional symbols used for positive displacement pumps		
<i>K</i>	Bulk modulus	m ³ /kg
<i>(Mi)</i>	Miller number	–
<i>(NPIP)</i>	Net positive inlet pressure	bar
<i>w</i>	Number of pistons or other displacement elements	–
<i>RL</i>	Rod load	N, MN
<i>β</i>	Compressibility	–
<i>s</i>	Length of stroke	m

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