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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Pumps - Testing - Submersible mixers for wastewater and similar applications

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Table of Contents

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

The translation method used in this standard is equivalent to ISO 21630.2007 "Pump Test Sewage and Submersible Mixers for Similar Applications".

For ease of use, this standard has made the following editorial changes.

--- Include the definitions of "submersible agitator" and "liquid" in the scope of international standards in terms and definitions (see 2.4, 2.5).

This standard was proposed by the China Machinery Industry Federation.

This standard is under the jurisdiction of the National Pump Standardization Technical Committee (SAC/TC211).

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1 Scope

This standard specifies the acceptance test method for submersible agitators (hereinafter referred to as "agitators").

This standard applies to agitators in which at least one of the system media is liquid in the transportation of sewage and other applications.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1

Thrust-to-power ratio

The ratio of the thrust of the stirrer to the power of the stirrer.

RFP =F/P1

Note 1.The ratio of the minimum necessary mixing system power dissipation to the agitator power consumption refers to the (end-user-oriented) system efficiency. In order to understand the weight of the thrust-to-power ratio

It is important to consider the situation where the agitator produces a longitudinal flow velocity u in the recirculation channel such as the sewage oxidation ditch. This is actually a common application of agitator

Use, and the following argument may be extended to other applications in principle.

The flow momentum loss in a cycle is equal to the momentum rate provided by the agitator in a quasi-steady state. This is given by the agitator thrust F. Momentum loss caused

The power consumption P=Fu, which is the minimum stirring system power necessary to maintain the speed u. Therefore, the system efficiency P/P1=Fu/P1.

In this expression, the characteristics of the agitator can be separated from the system requirements, and it can be concluded that the thrust power ratio RFP is an important parameter related to the efficiency of the agitator. It should be noted

The point is that it depends on the diameter and speed of the impeller, not just the geometry of the impeller. In addition to considering the generation of vertical flow energy efficiency, it is also necessary to consider the actual

Various factors such as the diameter and speed of the impeller available in the application.

Note 2.The efficiency of the impeller can be defined as the ratio of the power produced by the axial movement of the impeller flow to the electric power absorbed by the agitator. In this definition, it is assumed that the approach speed u is sufficient

It is small enough and has negligible influence on the characteristics of the agitator impeller. The relationship between hydraulic discharge power Ph=pQ and thrust is.

p=F/A and F =2rhoQ2/A

It can be applied to the agitator test specified in this standard. Because the exit section best meets the requirements of the plane velocity distribution, A/2 is usually used. by

A=piD2/4, we get.

Ph = F/AAF/2rho 1

/2 =F3/2/D pirho/2 1

/2

Therefore, the impeller efficiency can be obtained.

eta=F3

/2/pirho/2 1

/2D P1

It is worth noting that usually the correction is in the range of 1%, and the efficiency is usually given as (assuming SI unit [F]. Newton, [P1]. Watt, [D]. meter, and such as

Clean cold water as defined in 5.4.5.2).

eta=F3

/2/40DP1

Although the derivation given here is not based on completely correct assumptions, more rigorous methods can be used to derive approximate expressions of efficiency.

Since the efficiency of the stirring system is determined according to the diameter and speed of the impeller, the efficiency of the impeller itself is not important.

2.2

Advance ratio

The ratio of the speed of the propeller or the average environmental speed of the liquid to the (essential) blade tip speed.

J=u/nD

2.3

Impeler Reynoldsnumber impelerReynoldsnumber

The ratio of the inertial force and the viscous force at the impeller.