

Rotodynamic pumps - Hydraulic performance acceptance test using a model pump

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 General terms	1
3.2 Terms and definitions relating to performance	2
4 Symbols and suffixes	5
5 Test types and measurement items	7
6 Model pump	7
6.1 Extent of model pump	7
6.2 Dimensional ranges of model pump	8
6.2.1 Reynolds number	8
6.2.2 Dimension of impeller	8
6.2.3 Pump total head	8
6.3 Construction of model pump	8
7 Performance test	9
7.1 Test installation and measuring instruments	9
7.2 Test conditions	12
7.2.1 Test operation	12
7.2.2 Stability of operation	12
7.3 Number of measurement points	14
7.4 Pump total head	14
7.4.1 General	14
7.4.2 Measuring instruments	14
7.4.3 Liquid column manometer	14
7.4.4 Spring pressure gauge	15
7.4.5 Digital pressure gauge	15
7.4.6 Pressure tappings	15
7.4.7 Damper	16
7.5 Volume rate of flow	16
7.5.1 Orifice plate nozzle and venturi tube	16
7.5.2 Electromagnetic flowmeter	16
7.5.3 Mass method or volumetric method	16
7.6 Speed of rotation	16
7.6.1 Measurement method	16
7.6.2 Measuring instruments	16
7.7 Pump power input	17
7.7.1 Method for measuring pump power input	17
7.7.2 Measurement of torque	17
7.8 Measurement uncertainty	17
7.9 Calculation of pump power input, pump power output, and pump efficiency	17
8 Cavitation test and NPSH3 test	18
8.1 Concept of test	18
8.2 Test method	18

8.2.1	General.....	18
8.2.2	Cavitation test.....	18
8.2.3	NPSH3 test.....	19
8.3	Characteristics of the test liquid.....	19
8.4	Test installation.....	19
9	Indication of performance and evaluation of test results	19
9.1	Arrangement of measured values and indication of performance test results	19
9.1.1	Conversion at specified speed of rotation.....	19
9.1.2	Performance curves of model pump.....	20
9.1.3	Performance curves of adjustable vane type model pump	20
9.2	Conversion of various quantities from model to prototype pump.....	21
9.2.1	Conversion of volume rate of flow, pump total head and pump power input.....	21
9.2.2	Calculation of volumetric, mechanical and hydraulic efficiency ratios.....	23
9.3	Evaluation of test results	23
9.3.1	Performance curve.....	23
9.3.2	Pump total head.....	23
9.3.3	Pump efficiency.....	23
9.3.4	Cavitation performance	23
9.4	Preparation of test results sheet.....	26
10	Prototype pump.....	26
Annex A (informative) Additional tests	27	
Annex B (informative) Calculation of measurement uncertainty	37	
Annex C (informative) Hydraulic performance conversion formulae	41	
Bibliography	43	