

ISO 15551-1:2015-05 (E)

Petroleum and natural gas industries - Drilling and production equipment - Part 1: Electric submersible pump systems for artificial lift

Contents		Page
Foreword		vi
Introduction		vii
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Symbols and abbreviated terms	13
5	Functional specification	16
5.1	General	16
5.2	Component type	16
5.3	Functional requirements	16
5.3.1	General	16
5.3.2	Application parameters	16
5.3.3	Environmental compatibility	18
5.3.4	Compatibility with related well equipment and services	19
5.4	User/purchaser selections	20
5.4.1	General	20
5.4.2	Design validation	20
5.4.3	Component functional evaluation	20
5.4.4	Quality grades	20
5.4.5	Shipping, handling, and storage	21
5.4.6	Additional documentation or requirements	21
6	Technical specification	21
6.1	General	21
6.2	Design criteria	22
6.2.1	General	22
6.2.2	Design documentation	22
6.2.3	Materials	22
6.2.4	Dimensional information	25
6.2.5	Component and assembled system design verification	26
6.2.6	Component design validation	26
6.2.7	Component functional evaluation requirements	26
6.2.8	Assembled system functional evaluation	26
6.2.9	Design changes	26
6.3	Technical specification -- All components	26
6.3.1	Technical characteristics	26
6.3.2	Performance rating	27
6.4	Technical specification -- Bolt-on discharge	27
6.4.1	General	27
6.4.2	Technical characteristics for the discharge	27
6.4.3	Performance ratings	27
6.4.4	Scaling of design validation	27
6.5	Technical specification -- Pump and gas handler	27
6.5.1	General	27
6.5.2	Technical characteristics for the pump and gas handler	27

6.5.3	Performance ratings	28
6.5.4	Scaling of design validation	28
6.6	Technical specification -- Bolt-on intake	28
6.6.1	General	28
6.6.2	Technical characteristics for the intake	28
6.6.3	Performance ratings	28
6.6.4	Scaling of design validation	28
6.7	Technical specification -- Mechanical gas separators	29
6.7.1	General	29
6.7.2	Technical characteristics	29
6.7.3	Performance ratings	29
6.7.4	Scaling of design validation	29
6.8	Technical specification -- Seal chamber sections	29
6.8.1	General	29
6.8.2	Technical characteristics	29
6.8.3	Performance ratings	29
6.8.4	Scaling of design validation	30
6.8.5	Horsepower requirement	30
6.9	Technical specification -- Motors	30
6.9.1	General	30
6.9.2	Technical characteristics	30
6.9.3	Performance ratings	30
6.9.4	Scaling of design validation	31
6.10	Technical specifications -- Power and motor lead extension cable	31
6.10.1	General	31
6.10.2	Technical characteristics	31
6.10.3	Performance ratings	31
6.10.4	Scaling of design validation	31
6.11	Technical specifications -- Pothead	32
6.11.1	General	32
6.11.2	Technical characteristics	32
6.11.3	Performance ratings	32
6.11.4	Scaling of design validation	32
6.12	Assembled ESP system	32
6.12.1	General	32
6.12.2	Technical characteristics	33
6.12.3	System capabilities	33
7	Supplier/manufacturer requirements	34
7.1	General	34
7.2	Documentation and data control	34
7.2.1	General	34
7.2.2	Delivery documentation	34
7.2.3	Operator's manual	35
7.2.4	Certificate of compliance	35
7.2.5	Component data sheet	35
7.3	Component identification	38
7.3.1	Permanent identification	38
7.3.2	Semi-permanent identification	38
7.4	Quality	39
7.4.1	General	39
7.4.2	Quality grade requirements	39
7.5	Raw materials	40
7.6	Additional processes applied to components	41
7.6.1	Documentation	41
7.6.2	Coatings and surface treatments	41
7.6.3	Welding	41
7.6.4	Heat treating	41
7.7	Traceability	41
7.8	Calibration systems	42
7.9	Examination and inspection	42

7.9.1	General	42
7.9.2	Weld	42
7.9.3	Component and subcomponent dimensional inspection	43
7.9.4	Construction features	43
7.10	Manufacturing non-conformance	44
7.11	Component functional testing	44
8	Repair/redress	44
9	Shipping, handling, and storage	44
9.1	General	44
9.2	Storage	45
Annex A (normative) Design validation performance rating requirements by component		46
Annex B (normative) Requirements for determining performance ratings as an assembled system		74
Annex C (normative) Functional evaluation: single component		77
Annex D (normative) Cable reference information		85
Annex E (informative) Functional evaluation guideline -- Assembled ESP system		91
Annex F (informative) Establishing recommended operating range (ROR) of ESP system		93
Annex G (informative) Example user/purchaser ESP functional specification form		95
Annex H (informative) Considerations for use of 3-phase low and medium voltage adjustable speed drives for ESP applications		99
Annex I (informative) Analysis after ESP use		105
Annex J (informative) Downhole monitoring of ESP assembly		117
Annex K (informative) Information on permanent magnet motors for ESP applications		119
Bibliography		121