

ISO 18888:2017-10 (E)

Gas turbine combined cycle power plants - Thermal performance tests

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Symbols and units	6
5	Test boundary	7
6	Preparation for test	11
6.1	General	11
6.2	Performance degradation	12
6.3	Measurement classification	12
6.4	Design and construction phase recommendations	12
6.5	Test procedure	13
6.6	Field preparations for the performance test	14
6.7	Instruments and measuring methods	16
6.7.1	General	16
6.7.2	Electrical power measurement	16
6.7.3	Flow measurements	17
6.7.4	Temperature measurements	18
6.7.5	Relative humidity measurements	22
6.7.6	Pressure measurements	23
6.7.7	Data acquisition system	25
6.7.8	Wind velocity	25
6.7.9	Storage vessel levels	25
6.7.10	Data sampling	26
6.8	Determination of fuel properties	26
6.8.1	General	26
6.8.2	Tests on fuel gas	27
6.8.3	Tests on liquid fuel	27
6.9	Determination of cooling water flow into the condenser	28
6.9.1	General	28
6.9.2	Energy balance method	28
6.9.3	Cooling water pump performance curves	31
6.9.4	Direct flow measurement	32
6.10	Measurement uncertainties	32
6.11	Maximum allowable uncertainties	34
6.12	Calibration	35
7	Execution of test	36
7.1	Base reference conditions	36
7.1.1	General	36
7.1.2	Specified gaseous fuel	37
7.1.3	Specified liquid fuel	37
7.2	Preliminary test	38
7.3	Performance test	38

7.4	Duration of test runs	39
7.5	Auxiliary equipment operation	39
7.6	Tests with inlet air heating system	39
7.7	Tests with inlet air cooling system	40
7.8	Maximum permissible variation in operation conditions	40
8	Calculation of results for absolute test	41
8.1	General	41
8.2	Correction to base reference conditions	41
8.2.1	General	41
8.2.2	Correction curves based correction approach	42
8.2.3	Thermodynamic heat balance model based correction approach	43
8.2.4	Boundary parameters for correction	44
8.2.5	Description of corrections to base reference conditions	46
8.3	Power output for combined cycle overall test	50
8.3.1	Measured power output	50
8.3.2	Power output corrected to nominal power factor	52
8.3.3	Corrected power output	52
8.4	Heat rate for combined cycle overall test	53
8.4.1	Measured heat rate/measured thermal efficiency	53
8.4.2	Corrected heat rate / corrected thermal efficiency	53
8.5	Power output of steam turbine determination for combined cycle in single shaft configuration	54
9	Part load tests	54
9.1	General	54
9.2	Test set up and conduct	55
9.3	Correction method for part loads	57
10	Calculation of results for comparative test	57
10.1	General	57
10.2	Comparative performance test uncertainty	57
10.3	Preparation for comparative test	58
10.3.1	Instrumentation	58
10.3.2	Preliminary activities and plant settings	58
10.4	Execution of comparative tests and calculation of results	59
11	Test report	59
11.1	Form of the report	59
11.2	Detailed report	60
	Annex A (informative) Typical secondary variables	61
	Annex B (informative) Numerical examples of uncertainty calculation	64
	Annex C (informative) Procedure for power factor conversion	69
	Bibliography	73