

ISO 21978:2023-12 (E)

Air to water heat pumps - Testing and rating at part load conditions and calculation of seasonal coefficient of performance for space heating

Contents		Page
Foreword		v
Introduction		vi
1 Scope		1
2 Normative references		1
3 Terms and definitions		1
4 Symbols		8
5 Installation requirements		9
5.1 Test apparatus and uncertainties of measurement.....		9
5.2 Test room for the airside.....		10
5.3 Installation and connection of the heat pump.....		10
5.4 Installation of heat pumps consisting of several parts.....		11
5.5 Environment conditions for indoor unit installation and electrical power supply requirements.....		11
6 Setting and part load test conditions		11
6.1 General.....		11
6.2 Setting for capacity ratio.....		11
6.3 Setting the external static pressure difference for ducted units.....		11
6.4 Setting of units with integral pumps.....		12
6.5 Part load test conditions.....		12
7 Space heating test		15
7.1 Heating capacity test.....		15
7.2 Heating capacity correction.....		16
7.2.1 General.....		16
7.2.2 Capacity correction due to indoor liquid pump.....		16
7.2.3 Effective power input.....		17
7.3 Test procedure.....		19
7.3.1 General.....		19
7.3.2 Permissible deviations.....		19
7.3.3 Preconditioning period.....		20
7.3.4 Equilibrium period.....		21
7.3.5 Data collection period.....		21
7.4 Heating capacity calculation.....		21
7.4.1 Steady state capacity test.....		21
7.4.2 Transient capacity test.....		21
7.5 Effective power input calculation.....		21
7.5.1 Steady state test.....		21
7.5.2 Transient capacity test.....		21
7.6 Determination of degradation coefficient C_d		21
7.7 Test methods for electric power input during thermostat-off mode, standby mode, crankcase heater mode and off mode.....		22
7.7.1 Uncertainties of measurement.....		22
7.7.2 Measurement of electric power input during thermostat-off mode.....		22
7.7.3 Measurement of electric power input during standby mode.....		23
7.7.4 Measurement of electric power input during crankcase heater mode.....		23
7.7.5 Measurement of electric power input during off mode.....		23

8	Calculation methods for seasonal coefficient of performance (S_{COP})	23
8.1	General formula for calculation of S_{COP}	23
8.2	Calculation of the reference annual heating demand, Q_H	24
8.3	Calculation of the annual energy consumption, Q_{HE}	24
8.4	Calculation of $S_{COP,on}$ and $S_{COP,net}$	24
8.5	Calculation procedure for determination of C_{pb} values at part load conditions A to G	26
	8.5.1 General	26
	8.5.2 Calculation procedure for fixed capacity units	26
	8.5.3 Calculation procedure for staged and variable capacity units	26
9	Test results and test report	27
9.1	Data	27
9.2	Test report	28
10	Marking provisions	29
10.1	General	29
10.2	Nameplate requirements	29
10.3	Nameplate information	29
	Annex A (normative) Heating capacity test procedures given in 7.3	30
	Annex B (normative) Determination of the liquid pump efficiency	36
	Annex C (informative) Examples of set of bin hours and hours for active mode, thermostat-off mode, standby mode, off mode and crankcase heater mode	40
	Annex D (informative) $S_{COP,on}$ and $S_{COP,net}$ calculation for fixed capacity for 35 °C temperature application — Example	42
	Annex E (informative) $S_{COP,on}$ and $S_{COP,net}$ calculation for variable capacity unit for 35 °C temperature application — Example	46
	Bibliography	50