

DIN EN 14825:2023-10 (E)

Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling, commercial and process cooling - Testing and rating at part load conditions and calculation of seasonal performance

Contents		Page
European foreword		6
Introduction		8
1	Scope	10
2	Normative references	10
3	Terms, definitions, symbols, abbreviated terms and units	11
3.1	Terms and definitions	11
3.2	Symbols, abbreviated terms and units	24
4	Part load conditions for space cooling	29
4.1	General	29
4.2	Air-to-air units	29
4.3	Water(brine)-to-air units	29
4.4	Air-to-water(brine) units	30
4.5	Water(brine)-to-water(brine) units	31
5	Calculation methods for seasonal space cooling efficiency s,c, SEER and SEERon	32
5.1	General	32
5.2	Calculation of the seasonal space cooling efficiency s,c	33
5.3	General formula for calculation of SEER	33
5.4	Calculation of the reference annual cooling demand QC	34
5.5	Calculation of the reference annual energy consumption for space cooling QCE	34
5.6	Calculation of SEERon	35
5.7	Calculation procedure for determination of EERbin values at part load conditions A, B, C and D	35
6	Part load conditions for space heating	37
6.1	General	37
6.2	Air-to-air units	38
6.3	Water(brine)-to-air-units	39
6.4	Air-to-water(brine) units	39
6.5	DX-to-water(brine) and water(brine)-to-water(brine) units	43
7	Calculation methods for seasonal space heating efficiency s,h, SCOP, SCOPon and SCOPnet of heat pumps	47
7.1	General	47
7.2	Calculation of the seasonal space heating efficiency s,h	48
7.3	General formula for calculation of SCOP	48
7.4	Calculation of the reference annual heating demand QH	49
7.5	Calculation of the annual energy consumption for heating QHE	49
7.6	Calculation of SCOPon and SCOPnet	50
7.7	Calculation procedure for determination of COPbin values at part load conditions A to G	52
7.8	Method for P_{sup} calculation	54
8	Test and calculation methods for hybrid units	54
8.1	General	54

8.2	Separated method	54
8.3	Combined test method	56
9	Part load conditions for process cooling	61
10	Calculation method for SEPR of process chillers and remote condenser process chillers	65
10.1	General formula for calculation of SEPR	65
10.2	Calculation procedure for determination of EERbin values at part load conditions A, B, C, D	66
11	Test methods for testing capacities, EERd and COPd values during active mode at part load conditions	68
11.1	General	68
11.2	Refrigerant piping	68
11.3	Basic principles	69
11.4	Uncertainties of measurement	69
11.5	Test procedures for units with fixed capacity	71
11.6	Test procedure for staged and variable capacity units	74
12	Test methods for electric power input during thermostat-off mode, standby mode and crankcase heater mode and off mode	75
12.1	Uncertainties of measurement	75
12.2	Measurement of electric power input during thermostat-off mode	75
12.3	Measurement of the electric power input during standby mode	76
12.4	Measurement of the electric power input during crankcase heater mode	76
12.5	Measurement of the electric power input during off mode	76
13	Test report	77
14	Testing and rating of individual indoor units	77
Annex A (informative) Applicable climate bins and hours for air conditioners with rated capacity of 12 kW for cooling, or heating if the product has no cooling function		78
A.1	Climate bins	78
A.2	Hours for active mode, thermostat-off, standby, off mode	80
A.3	Hours used for crankcase heater mode	81
Annex B (informative) Applicable climate bins and hours for air/water(brine)/DX-to- water(brine) heat pumps with a rated heat output 400 kW		82
B.1	Climate bins	82
B.2	Hours for active, thermostat-off, standby and off modes - Heating	83
B.3	Hours used for crankcase heater mode - Heating	84
Annex C (informative) Applicable climate bins and hours for process chillers		85
C.1	Climate bins	85
Annex D (informative) Applicable climate bins and hours for air-to-air units > 12 kW, water(brine)-to-air units and comfort chillers		89
D.1	Climate bins	89
D.2	Hours for active, thermostat-off, standby and off modes	91
D.3	Hours used for crankcase heater mode	92
Annex E (informative) Determination of water(brine) temperature for fixed capacity units with variable outlet temperature		93
E.1	General	93
E.2	Test procedure for an air-to-water unit with fixed water flow rate	93

Annex F (informative) Calculation example for SEERon and SEER - Application to a reversible air-to-air unit with variable capacity	97
F.1 Calculation of SEERon	97
F.2 Calculation of SEER	99
Annex G (informative) Calculation example for SCOPon and SCOPnet - Application to a fixed capacity air-to-water(brine) heat pump used for low temperature application	100
Annex H (informative) Calculation example for SCOPon and SCOPnet - Application to a fixed capacity brine-to-water(brine) heat pump used for medium temperature application	105
Annex I (informative) Calculation examples for SCOPon for hybrid units	112
I.1 Calculation example for SCOPon for variable speed hybrid unit based on heat pump and boiler separated tests	112
I.2 Calculation example for SCOPon for hybrid unit using combined test method	114
Annex J (informative) Calculation example for SEPR - Application to a process chiller with staged capacity	116
J.1 Rating performance	116
Annex K (informative) Compensation methods for air-to-water(brine) and water(brine)- to-water(brine) units	119
K.1 General	119
K.2 Compensation system for reduced capacity test in cooling mode	119
K.3 Compensation system for reduced capacity test in heating mode	121
Annex L (normative) Rating of outdoor units of multi-split air conditioners and heat pumps	123
L.1 General	123
L.2 Rating of outdoor units	123
L.3 Calculation of the SEER based on the EER_{outdoor}	124
L.4 Calculation of the SCOP based on the COP_{outdoor}	124
Annex M (normative) Testing and rating of individual indoor units	125
M.1 Indoor unit under test	125
M.2 Test methods	125
M.3 Test conditions	126
M.4 Rated performance	126
M.5 Data to be recorded	127
Annex ZA (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 206/2012 aimed to be covered	129
Annex ZB (informative) Relationship between this European Standard and the energy labelling requirements of Commission Delegated Regulation (EU) No 626/2011 aimed to be covered	130
Annex ZC (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 813/2013 aimed to be covered	131
Annex ZD (informative) Relationship between this European Standard and the energy labelling requirements of Commission Delegated Regulation (EU) No 811/2013 aimed to be covered	132
Annex ZE (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) 2015/1095 aimed to be covered	134
Annex ZF (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) 2016/2281 aimed to be covered	135
Bibliography	137