

ANNEX VII

Document Generated: 2023-12-02

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## ANNEX VII

### Measurements and calculations

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published in the *Official Journal of European Union*, or other reliable, accurate and reproducible method, which takes into account the generally recognised state of the art methods, and whose results are deemed to be of low uncertainty.
2. The determination of the seasonal energy consumption and seasonal energy efficiency ratio (SEER) and seasonal coefficient of performance (SCOP) shall take into account:
  - (a) European seasonal conditions, as defined in Table 1 of this Annex;
  - (b) Reference design conditions, as defined in Table 3 of this Annex;
  - (c) Electric energy consumption for all relevant modes of operation, using time periods as defined in Table 4 of this Annex;
  - (d) Effects of the degradation of the energy efficiency caused by on/off cycling (if applicable) depending on the type of control of the cooling and/or heating capacity;
  - (e) Corrections on the seasonal coefficients of performance in conditions where the heating load can not be met by the heating capacity;
  - (f) The contribution of a back-up heater (if applicable) in the calculation of the seasonal efficiency of a unit in heating mode.
3. Where the information relating to a specific model, being a combination of indoor and outdoor unit(s), has been obtained by calculation on the basis of design, and/or extrapolation from other combinations, the documentation should include details of such calculations and/or extrapolations, and of tests undertaken to verify the accuracy of the calculations undertaken (including details of the mathematical model for calculating performance of such combinations, and of measurements taken to verify this model).
4. The energy efficiency ratio (EER<sub>rated</sub>) and, when applicable, coefficient of performance (COP<sub>rated</sub>) for double ducts and single ducts shall be established at the standard rating conditions as defined in Table 2 of this Annex.
5. The calculation of electricity consumption for cooling and/or heating shall take into account electric energy consumption of all relevant modes of operation, when appropriate, using time periods as defined in Table 4 of this Annex.

TABLE 1

**Bin number (j), outdoor temperature (T<sub>j</sub>) in °C and number of hours per bin (h<sub>j</sub>) for the cooling season and for heating seasons ‘average’, ‘warmer’ and ‘colder’. ‘db’ = dry bulb temperature**

| COOLING SEASON |                   |                  | HEATING SEASON |    |                   |                   |                   |                   |        |
|----------------|-------------------|------------------|----------------|----|-------------------|-------------------|-------------------|-------------------|--------|
|                | T <sub>j</sub> °C | h <sub>j</sub> h |                | j# | T <sub>j</sub> °C | h <sub>j</sub> Ah | Average           | Warmer            | Colder |
| j#             | db                |                  |                | j# | db                |                   | h <sub>j</sub> Wh | h <sub>j</sub> Ch |        |

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|    |    |     |  |        |              |     |     |     |
|----|----|-----|--|--------|--------------|-----|-----|-----|
| 1  | 17 | 205 |  | 1 to 8 | - 30 to - 23 | 0   | 0   | 0   |
| 2  | 18 | 227 |  | 9      | -22          | 0   | 0   | 1   |
| 3  | 19 | 225 |  | 10     | -21          | 0   | 0   | 6   |
| 4  | 20 | 225 |  | 11     | -20          | 0   | 0   | 13  |
| 5  | 21 | 216 |  | 12     | -19          | 0   | 0   | 17  |
| 6  | 22 | 215 |  | 13     | -18          | 0   | 0   | 19  |
| 7  | 23 | 218 |  | 14     | -17          | 0   | 0   | 26  |
| 8  | 24 | 197 |  | 15     | -16          | 0   | 0   | 39  |
| 9  | 25 | 178 |  | 16     | -15          | 0   | 0   | 41  |
| 10 | 26 | 158 |  | 17     | -14          | 0   | 0   | 35  |
| 11 | 27 | 137 |  | 18     | -13          | 0   | 0   | 52  |
| 12 | 28 | 109 |  | 19     | -12          | 0   | 0   | 37  |
| 13 | 29 | 88  |  | 20     | -11          | 0   | 0   | 41  |
| 14 | 30 | 63  |  | 21     | -10          | 1   | 0   | 43  |
| 15 | 31 | 39  |  | 22     | -9           | 25  | 0   | 54  |
| 16 | 32 | 31  |  | 23     | -8           | 23  | 0   | 90  |
| 17 | 33 | 24  |  | 24     | -7           | 24  | 0   | 125 |
| 18 | 34 | 17  |  | 25     | -6           | 27  | 0   | 169 |
| 19 | 35 | 13  |  | 26     | -5           | 68  | 0   | 195 |
| 20 | 36 | 9   |  | 27     | -4           | 91  | 0   | 278 |
| 21 | 37 | 4   |  | 28     | -3           | 89  | 0   | 306 |
| 22 | 38 | 3   |  | 29     | -2           | 165 | 0   | 454 |
| 23 | 39 | 1   |  | 30     | -1           | 173 | 0   | 385 |
| 24 | 40 | 0   |  | 31     | 0            | 240 | 0   | 490 |
|    |    |     |  | 32     | 1            | 280 | 0   | 533 |
|    |    |     |  | 33     | 2            | 320 | 3   | 380 |
|    |    |     |  | 34     | 3            | 357 | 22  | 228 |
|    |    |     |  | 35     | 4            | 356 | 63  | 261 |
|    |    |     |  | 36     | 5            | 303 | 63  | 279 |
|    |    |     |  | 37     | 6            | 330 | 175 | 229 |
|    |    |     |  | 38     | 7            | 326 | 162 | 269 |
|    |    |     |  | 39     | 8            | 348 | 259 | 233 |
|    |    |     |  | 40     | 9            | 335 | 360 | 230 |

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|              |  |       |  |    |    |       |       |       |
|--------------|--|-------|--|----|----|-------|-------|-------|
|              |  |       |  | 41 | 10 | 315   | 428   | 243   |
|              |  |       |  | 42 | 11 | 215   | 430   | 191   |
|              |  |       |  | 43 | 12 | 169   | 503   | 146   |
|              |  |       |  | 44 | 13 | 151   | 444   | 150   |
|              |  |       |  | 45 | 14 | 105   | 384   | 97    |
|              |  |       |  | 46 | 15 | 74    | 294   | 61    |
| <b>Total</b> |  | 2 602 |  |    |    | 4 910 | 3 590 | 6 446 |

TABLE 2

**Standard rating conditions, temperatures in ‘dry bulb’ air temperature (‘wet bulb’ indicated in brackets)**

| Appliance                               | Function | Indoor air temperature(°C) | Outdoor air temperature(°C) |
|-----------------------------------------|----------|----------------------------|-----------------------------|
| air conditioners, excluding single duct | cooling  | 27 (19)                    | 35 (24)                     |
|                                         | heating  | 20 (max. 15)               | 7(6)                        |
| single duct                             | cooling  | 35 (24)                    | 35 (24) <sup>a</sup>        |
|                                         | heating  | 20 (12)                    | 20 (12) <sup>a</sup>        |

<sup>a</sup> In case of single ducts, the condenser (evaporator) when cooling (heating), is not supplied with outdoor air, but indoor air.

TABLE 3

**Reference design conditions, temperatures in ‘dry bulb’ air temperature (‘wet bulb’ indicated in brackets)**

| Function / season | Indoor air temperature(°C) | Outdoor air temperature(°C) | Bivalent temperature(°C) | Operating limit temperature(°C) |
|-------------------|----------------------------|-----------------------------|--------------------------|---------------------------------|
|                   | Tin                        | Tdesignc/<br>Tdesignh       | Tbiv                     | Tol                             |
| cooling           | 27 (19)                    | Tdesignc = 35 (24)          | n.a.                     | n.a.                            |
| heating / Average | 20 (15)                    | Tdesignh = – 10 (– 11)      | max. 2                   | max. – 7                        |
| heating / Warmer  |                            | Tdesignh = 2 (1)            | max. 7                   | max. 2                          |
| heating / Colder  |                            | Tdesignh = – 22 (– 23)      | max. – 7                 | max. – 15                       |

TABLE 4

**Operational hours per type of appliance per functional mode to be used for calculation of electricity consumption**

| Type of appliance / | Unit | Heating season | On mode | Thermost off mode | Standby mode | Off mode | Crankcase heater mode |
|---------------------|------|----------------|---------|-------------------|--------------|----------|-----------------------|
|---------------------|------|----------------|---------|-------------------|--------------|----------|-----------------------|

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| <b>functionality (if applicable)</b>                      |              |          |                                |                                              |                       |                        |                       |       |  |
|-----------------------------------------------------------|--------------|----------|--------------------------------|----------------------------------------------|-----------------------|------------------------|-----------------------|-------|--|
|                                                           |              |          | <b>cooling: H<sub>TO</sub></b> | <b>H<sub>CE</sub>heating: H<sub>HE</sub></b> | <b>H<sub>SB</sub></b> | <b>H<sub>OFF</sub></b> | <b>H<sub>CK</sub></b> |       |  |
| Air conditioners, except double ducts and single duct     |              |          |                                |                                              |                       |                        |                       |       |  |
| Cooling mode, if appliance offers cooling only            |              | h/annum  |                                | 350                                          | 221                   | 2 142                  | 5 088                 | 7 760 |  |
| Cooling and heating modes, if appliance offers both modes | Cooling mode | h/annum  |                                | 350                                          | 221                   | 2 142                  | 0                     | 2 672 |  |
|                                                           | Heating mode | h/annum  | Average                        | 1 400                                        | 179                   | 0                      | 0                     | 179   |  |
|                                                           |              |          | Warmer                         | 1 400                                        | 755                   | 0                      | 0                     | 755   |  |
|                                                           |              |          | Colder                         | 2 100                                        | 131                   | 0                      | 0                     | 131   |  |
| Heating mode, if appliance offers heating only            |              | h/annum  | Average                        | 1 400                                        | 179                   | 0                      | 3 672                 | 3 851 |  |
|                                                           |              |          | Warmer                         | 1 400                                        | 755                   | 0                      | 4 345                 | 4 476 |  |
|                                                           |              |          | Colder                         | 2 100                                        | 131                   | 0                      | 2 189                 | 2 944 |  |
| Double duct air conditioner                               |              |          | <b>cooling: H<sub>TO</sub></b> | <b>H<sub>CE</sub>heating: H<sub>HE</sub></b> | <b>H<sub>SB</sub></b> | <b>H<sub>OFF</sub></b> | <b>H<sub>CK</sub></b> |       |  |
| Cooling mode, if appliance offers cooling only            |              | h/60 min |                                | 1                                            | n/a                   | n/a                    | n/a                   | n/a   |  |
| Cooling and heating modes, if appliance offers both modes | Cooling mode | h/60 min |                                | 1                                            | n/a                   | n/a                    | n/a                   | n/a   |  |
|                                                           | Heating mode | h/60 min |                                | 1                                            | n/a                   | n/a                    | n/a                   | n/a   |  |
| Heating mode, if appliance offers heating only            |              | h/60 min |                                | 1                                            | n/a                   | n/a                    | n/a                   | n/a   |  |
| Single duct air conditioner                               |              |          | <b>cooling: H<sub>TO</sub></b> | <b>H<sub>CE</sub>heating: H<sub>HE</sub></b> |                       |                        |                       |       |  |
| Cooling mode                                              |              | h/60 min |                                | 1                                            | n/a                   | n/a                    | n/a                   | n/a   |  |
| Heating mode                                              |              | h/60 min |                                | 1                                            | n/a                   | n/a                    | n/a                   | n/a   |  |

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### Changes and effects yet to be applied to the whole legislation item and associated provisions

- Signature words omitted by [S.I. 2019/539 Sch. 5 para. 5\(5\)](#)
- Annex 1(8) substituted by [S.I. 2019/539 Sch. 5 para. 5\(6\)](#)
- Annex 5(c) word substituted by [S.I. 2019/539 Sch. 5 para. 5\(9\)](#)
- Annex 3 para. 1.4 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(2\)](#)
- Annex 3 para. 1.5 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(3\)](#)
- Annex 3 para. 2.4 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(4\)](#)
- Annex 3 para. 2.5 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(5\)](#)
- Annex 3 para. 3.4 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(6\)](#)
- Annex 3 para. 3.5 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(7\)](#)
- Annex 3 para. 4.1 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(8\)](#)
- Annex 3 para. 4.2 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(9\)](#)
- Annex 3 para. 4.3 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(10\)](#)
- Annex 3 para. 4.4 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(11\)](#)
- Annex 3 para. 4.5 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(12\)](#)
- Annex 3 para. 4.6 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(13\)](#)
- Annex 3 para. 5.1 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(14\)](#)
- Annex 3 para. 5.2 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(15\)](#)
- Annex 3 para. 5.3 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(16\)](#)
- Annex 3 para. 5.4 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(17\)](#)
- Annex 3 para. 5.5 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(18\)](#)
- Annex 3 para. 5.6 image substituted by [S.I. 2020/1528 Sch. 5 para. 6\(19\)](#)
- Annex 3 s.0001para. 1.1 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(a\)](#)
- Annex 3 s.0002para. 2.1 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(b\)](#)
- Annex 3 s.0003para. 3.1 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(c\)](#)
- Annex 3 s.0004para. 4.1 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(d\)](#)
- Annex 3 s.0004para. 4.3 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(d\)](#)
- Annex 3 s.0004para. 4.5 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(d\)](#)
- Annex 3 s.0005para. 5.1 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(e\)](#)
- Annex 3 s.0005para. 5.3 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(e\)](#)
- Annex 3 s.0005para. 5.5 words inserted by [S.I. 2019/539 Sch. 5 para. 5\(7\)\(e\)](#)
- Annex 3 para. 1.5(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 2.5(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 3.5(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 4.2(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 4.4(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 4.6(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 5.2(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 5.4(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 5.6(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(a\)](#)
- Annex 3 para. 1.5(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 2.5(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 3.5(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 4.2(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 4.4(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 4.6(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 5.2(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 5.4(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)
- Annex 3 para. 5.6(iv) words substituted by [S.I. 2020/1528 Sch. 5 para. 6\(20\)\(b\)](#)

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|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | <ul style="list-style-type: none"><li>– Annex 3 para. 1.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(a) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 2.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(b) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 3.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(c) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 4.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(d) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 4.3 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(d) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 4.5 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(d) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 5.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(e) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 5.3 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(e) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 3 para. 5.5 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(7)(e) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Annex 7 para. 1 words substituted by <a href="#">S.I. 2019/539 Sch. 5 para. 5(10)</a></li><li>– Annex 8(7) omitted by <a href="#">S.I. 2019/539 Sch. 5 para. 5(11)(b)</a></li><li>– Annex 4 para. 1(c) substituted by <a href="#">S.I. 2019/539 Sch. 5 para. 5(8)</a></li><li>– Annex 4 para. 1(c) words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(8) by <a href="#">S.I. 2020/1528 reg. 4</a></li><li>– Art. 3(1)(c) words substituted by <a href="#">S.I. 2019/539 Sch. 5 para. 5(2)</a></li><li>– Art. 3(1)(c) words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 5(2) by <a href="#">S.I. 2020/1528 reg. 6(1)reg. 6(2)(c)(v)</a></li></ul> |  |
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