
Changes to legislation: There are outstanding changes not yet made to Commission Delegated Regulation (EU) No 665/2013. Any changes that have already been made to the legislation appear in the content and are referenced with annotations. (See end of Document for details) [View outstanding changes](#)

Commission Delegated Regulation (EU) No 665/2013 of 3 May 2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of vacuum cleaners (Text with EEA relevance)

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ANNEX VI

Measurement and calculation methods

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using a reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art measurement and calculation methods, including harmonised standards the reference numbers of which have been published for the purpose in the *Official Journal of the European Union*. They shall meet the technical definitions, conditions, equations and parameters set out this Annex.
2. **Technical definitions**
 - (a) ‘hard floor test’ means a test of two cleaning cycles where the cleaning head of a vacuum cleaner operating at maximum suction setting passes over a wooden test plate test area with width equal to the cleaning head width and appropriate length, featuring a diagonally (45°) placed test crevice, where the time elapsed, electric power consumption and the relative position of the center of the cleaning head to the test area are continuously measured and recorded at an appropriate sample rate and where at the end of each cleaning cycle the mass decrease of the test crevice is appropriately assessed;
 - (b) ‘test crevice’ means a removable U-shaped insert with appropriate dimensions filled at the beginning of a cleaning cycle with appropriate artificial dust;
 - (c) ‘carpet test’ means a test with an appropriate number of cleaning cycles on a Wilton carpet test rig where the cleaning head of a vacuum cleaner operating at maximum suction setting passes over the test area with width equal to the cleaning head width and appropriate length, soiled with equally distributed and appropriately embedded test dust of appropriate composition, where the time elapsed, electric power consumption and the relative position of the center of the cleaning head to the test area are continuously measured and recorded at an appropriate sample rate and at the end of each cleaning cycle the mass increase of the appliance dust receptacle is appropriately assessed;
 - (d) ‘cleaning head width’ in m, at an accuracy of 3 decimal places, means the external maximum width of the cleaning head;
 - (e) ‘cleaning cycle’ means a sequence of 5 double strokes of the vacuum cleaner on a floor-specific test area (‘carpet’ or ‘hard floor’);
 - (f) ‘double stroke’ means one forward and one backward movement of the cleaning head in a parallel pattern, performed at a uniform test stroke speed and with a specified test stroke length;
 - (g) ‘test stroke speed’ in m/h means the appropriate cleaning head speed for testing, preferably realized with an electromechanical operator. Products with self-propelled cleaning heads shall try to come as close as possible to the appropriate speed, but a deviation is permitted when clearly stated in the technical documentation;
 - (h) ‘test stroke length’ in m means the length of the test area plus the cleaning head distance covered by the center of the cleaning head when moving over the appropriate acceleration zones before and after the test area;

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- (i) ‘dust pick up’ (dpu), at an accuracy of 3 decimal places, means the ratio of the mass of the artificial dust removed, determined for carpet through the mass increase of the appliance dust receptacle and for hard floor through the mass decrease of the test crevice, after a number of double strokes of the cleaning head, to the mass of artificial dust initially applied to a test area, for carpet corrected for the specific test conditions and for hard floor corrected for the length and positioning of the test crevice;
- (j) ‘reference vacuum cleaner system’ means electrically operated laboratory equipment used to measure the calibrated and reference dust pick-up on carpets with given air related parameters to improve the reproducibility of test results;
- (k) ‘rated input power’ in W means the electric input power declared by the manufacturer, whereby for appliances that are enabled to function also for other purposes than vacuum cleaning only the electric input power relevant to vacuum cleaning applies;
- (l) ‘dust re-emission’ means the ratio, expressed as a percentage at an accuracy of 2 decimal places, of the number of all dust particles of a size from 0.3 to 10 µm emitted by a vacuum cleaner to the number of all dust particles of the same size range entering the suction inlet when fed with a specific amount of dust of that particle size range. The value includes not only dust measured at the vacuum cleaner outlet but also dust emitted elsewhere either from leaks, or generated by the vacuum cleaner;
- (m) ‘sound power level’ means airborne acoustical noise emissions, expressed in dB(A) re 1 pW and rounded to the nearest integer.

3. Annual energy consumption

The annual energy consumption AE is calculated, in kWh/year and rounded to one decimal place, as follows:

for carpet vacuum cleaners:

$$AE_c = 4 \times 87 \times 50 \times 0,001 \times ASE_c \times \left(\frac{1-0,20}{dpu_c-0,20} \right)$$

for hard floor vacuum cleaners:

$$AE_{hf} = 4 \times 87 \times 50 \times 0,001 \times ASE_{hf} \times \left(\frac{1-0,20}{dpu_{hf}-0,20} \right)$$

for general-purpose vacuum cleaners:

$$AE_{gp} = 0,5 \times AE_c + 0,5 \times AE_{hf}$$

Where:

- ASE_c is the average specific energy consumption in Wh/m² during carpet test, calculated as provided below;
- ASE_{hf} is the average specific energy consumption in Wh/m² during hard floor test, calculated as provided below;
- dpu_c is the dust pick-up on carpet, determined in accordance with point 4 of this Annex;
- dpu_{hf} is the dust pick-up on hard floor, determined in accordance with point 4 of this Annex;
- 50 is the standard number of cleaning tasks per year;
- 87 is the standard dwelling surface to be cleaned in m²;
- 4 is the standard number of times that a vacuum cleaner passes over each point on the floor (two double strokes);
- 0,001 is the conversion factor from Wh to kWh;
- 1 is the standard dust pick-up;

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- 0,20 is the standard difference between dust pick-up after five and after two double strokes.

Average specific energy consumption (ASE)

The average specific energy consumption during carpet test (ASE_c) and during hard floor test (ASE_{hf}) shall be determined as an average of the specific energy consumption (SE) of the number of cleaning cycles that constitute the carpet and hard floor test respectively. The general equation for the specific energy consumption SE in Wh/m² test area, at an accuracy of 3 decimal places, applicable for carpet, hard floor and general purpose vacuum cleaners with the appropriate suffixes, is:

$$SE = \frac{(P+NP) \times t}{A}$$

Where:

- P is the average power in W, at an accuracy of 2 decimal places, during the time in a cleaning cycle that the center of the cleaning head is moving over the test area;
- NP is the average power equivalent in W, at an accuracy of 2 decimal places, of battery operated active nozzle, if any, of the vacuum cleaner, calculated as provided below;
- t is the total time in hours, at an accuracy of 4 decimal places, in a cleaning cycle during which the centre of the cleaning head, i.e. a point halfway between the side, front and back edges of the cleaning head, is moving over the test area;
- A is the surface area in m², at an accuracy of 3 decimal places, passed over by the cleaning head in a cleaning cycle, calculated as 10 times the product of the head width and the appropriate length of test area. If a household vacuum cleaner has a head width of over 0,320 m, then the figure of 0,320 m shall be substituted for head width in this calculation.

For the hard floor tests the suffix hf and parameter names SE_{hf} , P_{hf} , NP_{hf} , t_{hf} and A_{hf} shall be used in the above equation. For the carpet tests the suffix c and parameter names SE_c , P_c , NP_c , t_c and A_c shall be used in the above equation. For each of the cleaning cycles, values of SE_{hf} , P_{hf} , NP_{hf} , t_{hf} , A_{hf} and/or SE_c , P_c , NP_c , t_c , A_c , as applicable, shall be included in the technical documentation. *Power equivalent of battery operated active nozzles (NP)*

The general equation for the average power equivalent of battery operated active nozzles NP in W, applicable for carpet, hard floor and general purpose vacuum cleaners with the appropriate suffixes, is:

$$NP = \frac{E}{t_{bat}}$$

Where:

- E is the electricity consumption in Wh at an accuracy of 3 decimal places of the battery operated active nozzle of the vacuum cleaner necessary to return the initially fully charged battery to its originally fully charged state after a cleaning cycle;
- t_{bat} is the total time in hours, at an accuracy of 4 decimal places, in a cleaning cycle in which the battery operated active nozzle of the vacuum cleaner is activated, in accordance with manufacturer's instructions;

In case the vacuum cleaner is not equipped with a battery operated active nozzle the value of NP equals zero.

For the hard floor tests the suffix hf and parameter names NP_{hf} , E_{hf} , $t_{bat_{hf}}$ shall be used in the above equation. For the carpet tests the suffix c and parameter names NP_c , E_c , t_{bat_c} shall be used in the above equation. For each of the cleaning cycles, values of E_{hf} , $t_{bat_{hf}}$ and/or E_c , t_{bat_c} , as applicable, shall be included in the technical documentation.

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4. **Dust pick-up**

The dust pick-up on hard floor (dpu_{hf}) shall be determined as the average of the results of the two cleaning cycles in a hard floor test.

The dust pick-up on carpet (dpu_c) shall be determined as the average of the results of the cleaning cycles in a carpet test. To correct for deviations from a test carpet's original properties, the dust pick-up on carpet (dpu_c) shall be calculated as follows:

$$dpu_c = dpu_m \times \left(\frac{dpu_{cal}}{dpu_{ref}} \right)$$

Where:

- dpu_m is the measured dust pick-up of the vacuum cleaner;
- dpu_{cal} is the dust pick-up of the reference vacuum cleaner system measured when the test carpet was in original condition;
- dpu_{ref} is the measured dust pick-up of the reference vacuum cleaner system.

Values of dpu_m for each of the cleaning cycles, dpu_c , dpu_{cal} and dpu_{ref} shall be included in the technical documentation.

5. **Dust re-emission**

The dust re-emission shall be determined while the vacuum cleaner is operating at its maximum air flow.

6. **Sound power level**

Sound power level shall be determined on carpet.

7. **Hybrid vacuum cleaners**

For hybrid vacuum cleaners all measurements shall be executed with the vacuum cleaner powered by the electric mains and any battery operated active nozzle only.

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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. 8\(6\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 3 para. 1(j) words inserted by [S.I. 2019/539 Sch. 5 para. 8\(8\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 3 para. 1(j) words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(8) by [S.I. 2020/1528 reg. 4](#)
- Annex 7(7) omitted by [S.I. 2019/539 Sch. 5 para. 8\(11\)\(b\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 1para. 1.1 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(7\)\(a\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 1para. 1.2 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(7\)\(a\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 1para. 1.3 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(7\)\(a\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 2para. 2.1 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(7\)\(b\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 2para. 2.2 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(7\)\(b\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 2para. 2.3 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(7\)\(b\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 2 s. 1.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(7)(a) by [S.I. 2020/1528 reg. 4](#)
- Annex 2 s. 1.2 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(7)(a) by [S.I. 2020/1528 reg. 4](#)
- Annex 2 s. 1.3 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(7)(a) by [S.I. 2020/1528 reg. 4](#)
- Annex 2 s. 2.1 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(7)(b) by [S.I. 2020/1528 reg. 4](#)
- Annex 2 s. 2.2 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(7)(b) by [S.I. 2020/1528 reg. 4](#)
- Annex 2 s. 2.3 words substituted in earlier amending provision S.I. 2019/539, Sch. 5 para. 8(7)(b) by [S.I. 2020/1528 reg. 4](#)
- Annex 4 para. 1(c) word substituted by [S.I. 2019/539 Sch. 5 para. 8\(9\)\(a\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Annex 4 para. 3 words inserted by [S.I. 2019/539 Sch. 5 para. 8\(9\)\(b\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))

- Annex 6 para. 1 words substituted by [S.I. 2019/539 Sch. 5 para. 8\(10\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Art. 2(10) words substituted by [S.I. 2019/539 Sch. 5 para. 8\(2\)\(a\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Art. 2(16) words substituted by [S.I. 2019/539 Sch. 5 para. 8\(2\)\(b\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))
- Art. 3(1)(c) words substituted by [S.I. 2019/539 Sch. 5 para. 8\(3\)](#) (This amendment not applied to legislation.gov.uk. Sch. 5 para. 8 omitted immediately before IP completion day by virtue of S.I. 2020/1528, regs. 1(2), 10(c))