

Discussion on standards

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Present classification thermal comfort standards

| Category | Thermal state of the body as a whole | | Operative temperature °C | | Max. mean air velocity m/s | |
|----------|--------------------------------------|--------------------|--------------------------|-----------------------|----------------------------|-----------------------|
| | PPD % | PMV | Summer (0,5 clo) Cooling | Winter(1 clo) Heating | Summer(0,5 clo) Cooling | Winter(1 clo) Heating |
| A | < 6 | -0.2 < PMV < + 0.2 | 23,5 – 25,5 | 21,0 – 23,0 | 0,18 | 0,15 |
| B | < 10 | -0.5 < PMV < + 0.5 | 23,0 – 26,0 | 20,0 – 24,0 | 0,22 | 0,18 |
| C | < 15 | 0.7 < PMV < + 0.7 | 22,0 – 27,0 | 19,0 – 25,0 | 0,25 | 0,21 |

(From: ISO 7730 and EN 15251)

Some remarks on present standards

(with thanks to Lada Hensen Centnerova & Zhang Hui + Ed Arens, CBE UC Berkeley)

- 1) Class A bandwidth seems to be 'too narrow' (no proof that operating in line with class A requirements delivers more comfort than operation in line with class B requirements)
- 2) Local discomfort (e.g. in relation to air speed) is handled as if it only causes problems ('prevent draft') *
- 3) No suggestions are included to provide comfort with local heating or cooling of hands, feet, head, back etc.
- 4) Personal control is not included even though it is essential to realize high end-user satisfaction
- 5) Drifts and ramps are dealt with as if they only cause problems ('prevent drifts and ramps')
- 6) Requirements have to be met 100% of the time (?)
- 7)

Question

PRESENT THERMAL COMFORT STANDARDS...

DO THEY INHIBIT OR STIMULATE
ENERGY EFFICIENT DESIGN AND OPERATION
OF BUILDINGS AND HVAC SYSTEMS?

WHAT COULD WE DO TO IMPROVE THE STANDARDS
WHILE STILL SAFEGUARDING THERMAL COMFORT?

Classification suggestion Nicol & Humphreys

| Category | Explanation |
|----------|---|
| I | Building requiring no energy to remain comfortable |
| II | Building requiring energy only at limited times of the year to remain comfortable |
| III | Building requiring year-round energy input to remain comfortable |

From: Nicol, J.F., Humphreys, M.A. (2009) "New standards for comfort and energy use in buildings". Building Research & Information 37(1):68-73.

Multi Level Performance Indication in NL

| Energy performance | Existing residential | | |
|--|----------------------------------|----------------------------------|----------------------------------|
| <p> A+++ <math>-0.50</math> A++ 0.51-0.70 A 0.71-1.05 B 1.06-1.30 C 1.31-1.60 D 1.61-2.00 E 2.01-2.40 F 2.41-2.99 G <math>\geq 3.00</math> </p> | Energy class | | |
| <p>The energy performance is indicated as an energy-index. This Index gives the asset rating of the existing building under standardized indoor and outdoor conditions. This asset rating is calculated on basis of the properties of the building the building services (installations) and their standardized use. This makes it possible to compare the performance of similar buildings.</p> | 2,19 | | |
| Indoor Environmental Quality Label | A Low Risk) | B | C High Risk |
| Ventilation | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> |
| Humidity & mould | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Exhaust gasses of boilers and household appliances | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Thermal comfort in winter | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> |
| Thermal comfort in summer (over heating risk) | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Noise of installations | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Sound insulation | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Daylight allowance | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <p>The IEQ of a dwelling is expressed in 3 classes A, B, and C; these classes indicate the expected risk that the indoor environment for a specific aspect will not meet the expectations of an average user. The warning sign indicates that immediate action is needed.</p> | | | |
| <p>Address Date of survey: Usable floor area : xxx m2 Name consultant Identification of consultant</p> | | | |


Source:
ISSO publication 82.4
(to be published soon)

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2,19

Indoor Environmental Quality Label

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|-------------------|---|-------------------|
|-------------------|---|-------------------|

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The IEQ of a dwelling is expressed in 3 classes A, B, and C; these classes indicate the expected risk that the indoor environment for a specific aspect will not meet the expectations of an average user. The warning sign indicates that immediate action is needed.

Address

Date of survey:

Usable floor area : xxx m2

Name consultant

Proposal for new classification WINTER

| Class / category | Minimum indoor temperature under winter design situation (-10 C outside in NL) | Standard winter temperature setpoint | Personal control over winter indoor temperature? | Required personal control bandwidth |
|------------------|--|--------------------------------------|---|--|
| A+ | 21 | 22 | Yes, at workstation level e.g. with hand/feet warmers or radiant table top | 18-24 C (-4/+2 C around setpoint) |
| A | 21 | 22 | Yes, at room level e.g. with radiators or afterheater in ventilation system | 18-24 C (-4/+2 C around setpoint) |
| B | 20 | 22 | Yes, limited e.g. with radiators or afterheater in ventilation system | 19-23 per room (-3/+1 C around setpoint) |
| C | 19 | 22 | No | - |

(example office work; 1,2 met; '1,0 clo')

Proposal for new classification SUMMER

| Class / category | Maximum indoor temperature under summer design situation (+28C outside in NL) | Standard summer temperature setpoint | Personal control over winter indoor temperature? | Required personal control bandwidth |
|------------------|---|--------------------------------------|---|---|
| A+ | '25,5 C' | 24,5 C | Yes, at workstation level e.g. with TAC, PV system, table fan | 22,5-28,5 C (temp adjustable -2/+4 C around setpoint or airspeed adjustable 0/1,5 m/s) |
| A | '25,5 C' | 24,5 C | Yes, at room level easy to use operable windows or ceiling fans | 22,5-28,5 C (temp adjustable -2/+4 C around setpoint or airspeed adjustable 0/1,5 m/s) |
| B | '26 C' | 24,5 C | Yes, limited e.g. with operable windows | 23,5-27,5 per room (temp adjustable -1/+3 C around setpoint or airspeed adjustable 0,1/0,4 m/s) |
| C | '27 C' | 24,5 C | No | - |

(example office work; 1,2 met; 0,5 clo)