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Controls for heating systems - Part 3: Outside temperature compensated control equipment for electrical heating systems

Mess-, Steuer- und Regeleinrichtungen für Heizungen - Teil 3: Witterungsgeführte Regeleinrichtungen für Elektroheizungen

Régulation pour les systèmes de chauffage - Partie 3: Equipements de régulation en fonction de la température extérieure pour les systèmes de chauffage électrique

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Controls for heating systems - Part 3: Outside temperature compensated control equipment for electrical heating systems

Régulation pour les systèmes de chauffage - Partie 3:
Equipements de régulation en fonction de la température
extérieure pour les systèmes de chauffage électrique

Mess-, Steuer- und Regeleinrichtungen für Heizungen - Teil
3: Witterungsgeführte Regeleinrichtungen für
Elektroheizungen

This European Standard was approved by CEN on 7 November 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

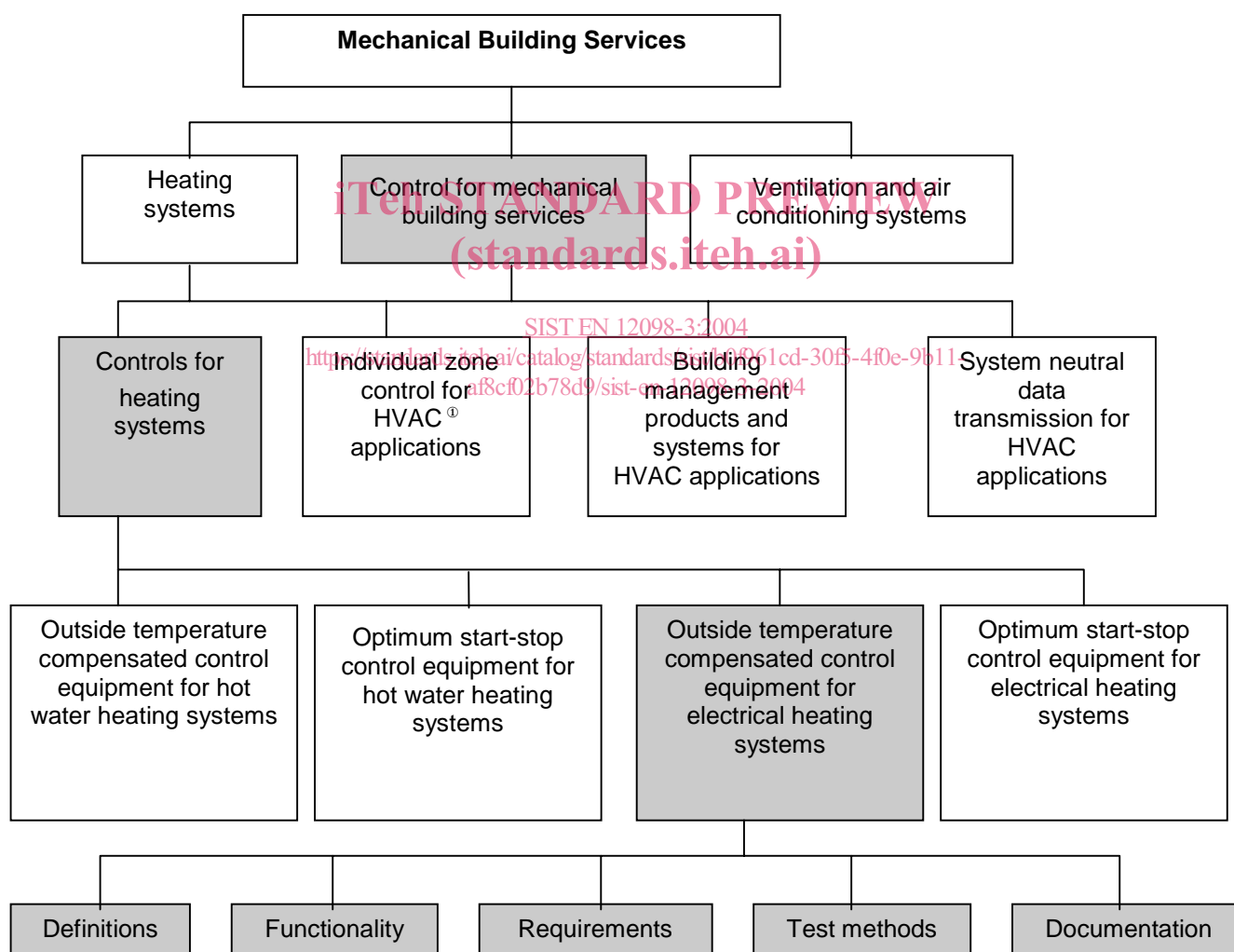
This document (EN 12098-3:2002) has been prepared by Technical Committee CEN/TC 247, "Building Automation, Controls and Building Management", the secretariat of which is held by SNV.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This document includes a Bibliography.

This document is part of series of standards relating to controllers for heating systems. It considers definitions, functionality, requirements, test methods, marking and documentation for outside temperature compensated controls for electrical heating systems.

The position of this document in the whole field of standards for mechanical building services is illustrated below.



① HVAC = Heating, Ventilation, Air conditioning

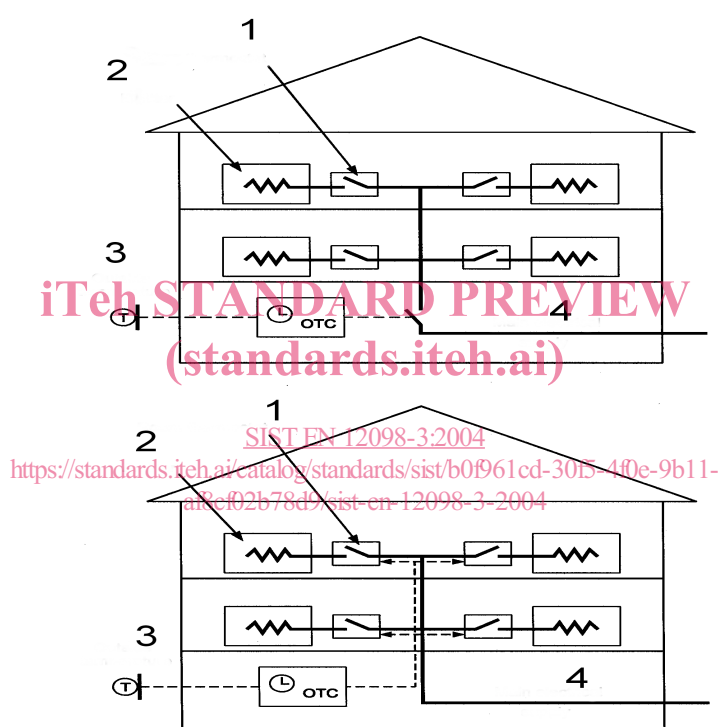
According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard covers outside temperature compensated controllers for electrical heating systems; it does not take into account charge rate and/or thermal optimisation functions.

The equipment which regulates and programs the electrical heating in a building is intended to reduce the energy consumption of the heating installations and improve comfort. It saves energy by preventing overheating.

For this purpose, a central controller, like an outside temperature compensated controller is necessary, although in some cases this may not be sufficient.



Key

- 1 Room thermostat
- 2 Emitter
- 3 Outside temperature
- 4 Main electrical supply

Figure 1 — Example of central control electrical heating system. OTC controller is generally completed by room heating control. It can control main electrical supply or send an information to room controllers

Included in this standard are the main equipment characteristics which assist in reaching these energy saving and comfort objectives.

The characteristics which are tested directly are :

- accuracy of sensors,
- part load characteristics.

The characteristics which are to be indicated by the manufacturer are :

- time constants.

NOTE This standard complies with the requirements and objectives of the interpretative document no. 6 "Energy Economy and Heat Retention" relating to the Construction Products Directive (89/106/EEC).

EN 12098-3:2002 (E)

1 Scope

This standard applies to control function which controls and regulates the electrical energy in relation to the outside temperature and other reference variables (e.g.: room temperature, emitter temperature).

This standard does not cover heat emitters.

Input and output signals can be processed by analogue or digital techniques.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

- EN 50090-2-2 *Home and building electronic systems (HBES) – Part 2-2: System overview – General technical requirements*
- EN 60529 *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*
- EN 60730-1:2000 *Automatic electrical controls for household and similar use – Part 1 : General requirements (IEC 60430-1: 1999, modified)*
- EN 60730-2-1 *Automatic electrical controls for household and similar use – Part 2-1 : Particular requirements for electrical controls for electrical household appliances (IEC 60730-2-1:1989, modified).*
- EN 60730-2-7 *Automatic electrical controls for household and similar use – Part 2-7 : Particular requirements for timers and time switches (IEC 60730-2-7:1990, modified).*
- EN 60730-2-9 *Automatic electrical controls for household and similar use – Part 2-9 : Particular requirements for temperature sensing controls (IEC 60730-2-9:1992, modified).*
- EN 60730-2-11 *Automatic electrical controls for household and similar use – Part 2-11: Particular requirements for energy regulators (IEC 60730-2-11:1993).*
- EN 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase) (IEC 61000-3-2:2000, modified).*
- EN 61000-3-3 *Electromagnetic compatibility (EMC) - Part 3-3: Limits; Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <math><kleiner \Rightarrow 16 \text{ A}</math> per phase and not subject to conditional connection; Amendment A1 (IEC 61000-3-3:1994/A1:2001)*
- IEC/TR2 61000-3-4 *Electromagnetic compatibility (EMC) – Part 3-4: Limits – Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A.*
- IEC/TR2 61000-3-5 *Electromagnetic compatibility (EMC) – Part 3: Limits - Section 5 : Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 16 A.*

EN 61000-6-1	<i>Electromagnetic compatibility (EMC) – Part 6-1: Generic standards - Immunity for residential, commercial and light industrial environments (IEC 61000-6-1:1997, modified).</i>
EN 61000-6-3	<i>Electromagnetic compatibility (EMC) – Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:1996, modified).</i>
IEC 60038	<i>IEC standard voltages.</i>

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1 outside temperature compensated controller (OTC)

the control device consists of the electronic controller, sensors and output signals but does not include the actuating equipment (see Figure 2)

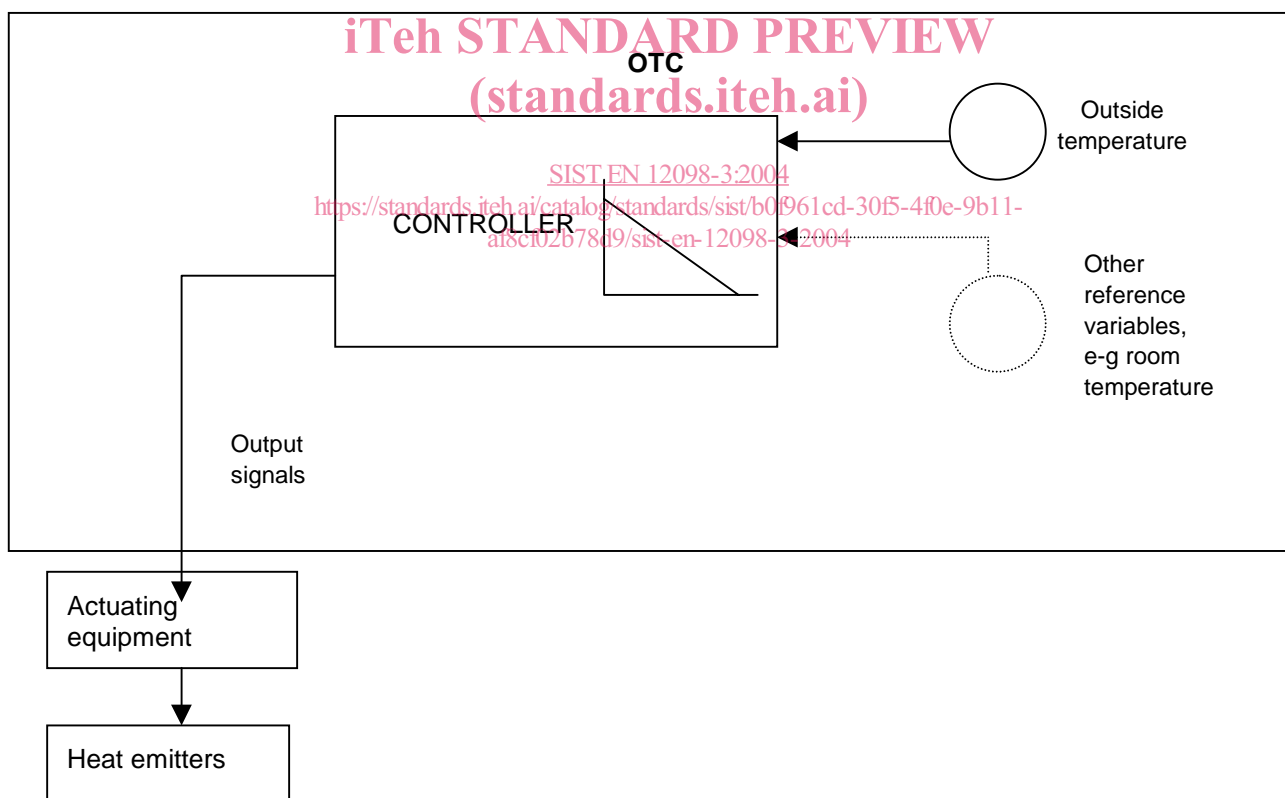


Figure 2 — Control equipment for electrical heating systems

3.2 actuating equipment

equipment providing the means by which the controller affects the controlled variable

EN 12098-3:2002 (E)**3.3****controlled variable**

output signal controlling actuating equipment, either:

- An on/off signal of cycling ratio F. The on-off period of a cycle is the cycling time.
- An analogic or continuous signal proportionnal to F
- A continuous data representing F value

Calculated in accordance with the equation:

$$F (\%) = 100 (\text{Reference} - \text{Outside temperature})/\text{Deviation}$$

Where:

- The reference is the value of the outside temperature for 0%
- The deviation indicates the difference of the outside temperatures between operation at 0% and 100%.

3.4**output signals**

signals generated by the controller to regulate or control the actuating equipment

3.5**reference variables**

outside temperature with or without other influences or variables (e.g. room temperature, emitter temperature) used to determine the controlled variable

3.6**outside temperature**

reference variable sensor measuring outside temperature of the building

3.7**outside temperature compensated control**

change of the controlled variable guided by the outside temperature

3.8**nominal room temperature**

resulting room temperature in the building arising in nominal operation of the controller. It is dependent on the design of the heating system and can be different for individual rooms.

3.9**reduced room temperature**

reduced room temperature compared with the nominal room temperature resulting from operation at a reduced set point

3.10**stand-by room temperature**

room temperature resulting from switching off the heating

NOTE If frost protection function is active, stand by temperature should be accepted above freezing point.

3.11**controller characteristic heating curve**

relationship between the controlled variable and the reference variables, defined by two or more parameters

3.12**switch-on**

timepoint in time at which the controller starts up the heating or modifies the set point in order to reach the nominal room temperature

3.13**switch-off time**

point in time at which the controller switches off the heating or modifies the set point in order to reach the reduced temperature

3.14**nominal operation**

operating period between the switch-on time and the switch-off time

3.15**reduced operation**

operating period from the switch-off time up to the switch-on time, maintaining a reduced room temperature compared with the nominal room temperature

3.16**stand-by operation**

operating mode in which the heating is switched off or subject to frost-protection room temperature control or prevent freezing inside the building without information of the room temperature control

3.17**manual operation**

mode in which the controller is inactive and the actuating equipment can be manipulated manually

3.18**frost protection function**

this function prevents freezing inside the building

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