SLOVENSKI STANDARD
SIST EN 14518:2006

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Prezraļevanje stavb ï Stropni hladilni konvektorji ï Preskuġanje in ocenjevanje pasivnih stropnih konvektorjev

Ventilation for buildings - Chilled beams - Testing and rating of passive chilled beams

Lüftung von Gebäuden - Kühlbalken - Prüfung und Bewertung von passiven Kühlbalken

Ventilation des bâtiments - Poutres froides - Essais et évaluation des poutres froides passives

Ta slovenski standard je istoveten z: **EN 14518:2005**

ICS:

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English version

Ventilation for buildings - Chilled beams - Testing and rating of passive chilled beams

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This European Standard was approved by CEN on 25 March 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 14518:2005) has been prepared by Technical Committee CEN /TC 156, "Ventilation for buildings", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.The other standards dealing with chilled beams and chilled ceilings are:

EN 14240 *Ventilation for buildings — Chilled ceilings — Testing and rating*

prEN 15116 *Ventilation in buildings — Chilled beams — Testing and rating of active chilled beams*

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

1 Scope

This European Standard specifies test conditions and methods for the determination of the cooling capacity of chilled beams or other similar systems with free convection, i.e. without forced air flow. Also included is the method to determine local air velocity and temperature below the beam.

The purpose of the standard is to give comparable and repeatable product data.

The test method applies to all types of convector cooling systems using any medium as energy transport medium.

NOTE The result is valid only for the specified test set up. For other conditions, (i.e. different positions of heat loads, inactive ceiling elements around the test objects or forced flow into or around the test object), the producer should give guidance based on full scale tests.

This standard refers to water as the cooling medium throughout, however, wherever water is written, any other cooling medium can also be used in the test. Where air is the transport medium this air may not be discharged into the test room.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12792:2003, *Ventilation for buildings - Symbols, terminology and graphical symbols*

EN 13182, *Ventilation for buildings — Instrumentation requirements for air velocity measurements in ventilated spaces*

EN 14240:2004, *Ventilation for buildings — Chilled ceilings — Testing and rating*

EN ISO 7726, *Ergonomics of the thermal environment - Instruments for measuring physical quantities (ISO 7726:1998)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 12792:2003 and the following apply.

3.1.1
chilled beam
convector cooled with water and mounted under the ceiling of the test room with suspended ceiling

NOTE This standard deals with passive beams, i.e. convectors with free convection only.

3.1.2
test room
room in which the test object is mounted

3.1.3
convection flow
local airflow from a heating element in the test room, or the local airflow from a test object of type chilled beam

NOTE These types of convection flow can be visualised with smoke tests.

3.1.4
room air temperature (θ_a)
average of air temperatures measured with radiation shielded sensors in positions out of the convection flow

3.1.5
globe temperature (θ_g)
temperature measured with a temperature sensor placed in the centre of the globe. The globe is placed in a position out of the convection flow

3.1.6
air on coil temperature (θ_{ac})
reference temperature equals average air temperature on the inlet side of a cooling convector, measured with radiation shielded sensors in two positions along the convector, ¼ of the convector length from each end of the convector. One sensor is placed 30 mm vertically above the left side and the other 30 mm above the right side of the convector

3.1.7
local air temperature
temperature measured at 0,75 m below the beam discharge point in the convective airflow from the beam

3.1.8
local mean air velocity
velocity measured at 0,75 m below the beam discharge point in the convective airflow from the beam

3.1.9
cooling water flow rate (q_v)
average of the measured water flow rates during the test period

3.1.10
cooling water inlet temperature (θ_{w1})
average of the measured water temperature into the test object during the test period

3.1.11
cooling water outlet temperature (θ_{w2})
average of the measured water temperature out of the test object during the test period

3.1.12
mean cooling water temperature (θ_w)
mean value of the cooling water inlet and outlet temperatures, ($\theta_w = 0{,}5 \cdot [\theta_{w1} + \theta_{w2}]$)

3.1.13
temperature difference ($\Delta\theta$)
difference between air on coil temperature and mean cooling water temperature, ($\Delta\theta = \theta_{ac} - \theta_w$)

3.1.14
specific heat capacity (c_p)
heat require to raise the temperature of unit mass of the cooling medium by I K

NOTE c_p for water = 4,187 kJ/(kg·K) at 15 °C.

3.1.15
cooling length (*L*) of a chilled beam
active length of the cooling section

3.1.16
total length (L_t) of a chilled beam
total installed length of the cooling section including casing

3.1.17
cooling capacity (*P*)
total cooling capacity of the test object calculated from the measured cooling water mass flow rate and the cooling water temperature rise

3.1.18
specific cooling capacity of a chilled beam (P_L)
cooling capacity divided by the (active) cooling length

3.1.19
nominal temperature difference
nominal temperature difference (8 K) between the air on coil temperature and the mean cooling water temperature ($\Delta\theta_N = \theta_{ac} - \theta_w = 8$ K)

3.1.20
nominal cooling water flow rate (q_{wN})
flow rate that gives a cooling water temperature rise ($\theta_{w2} - \theta_{w1}$) of 2 K ± 0,2 K at the nominal temperature difference ($\Delta\theta_N = 8$ K)

3.1.21
nominal cooling capacity (P_N) or nominal specific cooling capacity (P_{LN})
cooling capacity calculated from the curve of best fit for the nominal cooling water flow rate at the nominal temperature difference ($\Delta\theta_N = 8$ K)

3.2 Symbols and units

For the purposes of this European Standard, the symbols in EN 12792:2003 apply together with those given in Table 1.

Table 1 — Symbols and units

Symbol	Quantity	Unit
c_p	Specific heat capacity	KJ/(kg·K)
L	Active length of a chilled beam	m
L_t	Total length of a chilled beam, including casing	m
P	Total cooling capacity $P = c_p \cdot q_m \cdot (\theta_{w2} - \theta_{w1})$	W
P_L	Specific cooling capacity of a chilled beam, relative to active length L	W/m
P_N	Nominal cooling capacity at $\Delta\theta_N = \theta_{ac} - \theta_w = 8$ K	W
P_{LN}	Nominal specific cooling capacity at $\Delta\theta_N = 8$ K	W/m
P_{Lt}	Specific cooling capacity of a chilled beam, relative to total length L_t	W/m
q_v	Cooling medium volume flow rate	l/s
q_{vN}	Nominal cooling water volume flow rate	l/s
q_m	Cooling medium mass flow rate ($q_m = \rho_w \cdot q_v$)	kg/s
v_L	Local mean air velocity at 0,75 m below the beam discharge plane	m/s
ρ_w	Density of cooling medium at θ_w	kg/l
θ_a	Room air temperature	°C
θ_g	Globe temperature	°C
θ_{ac}	Reference temperature = air on coil temperature	°C
θ_L	Local air temperature at 0,75 m below the beam discharge plane	°C
$\Delta\theta$	Temperature difference	K
$\Delta\theta_N$	Nominal temperature difference (8 K)	K
θ_{w1}	Cooling water inlet temperature	°C
θ_{w2}	Cooling water outlet temperature	°C
θ_w	Mean cooling water temperature	°C