Hygrothermal performance of building equipment and industrial installations - Calculation of water vapour diffusion - Cold pipe insulation systems (ISO 15758:2014)

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NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 15758:2014 sisaldab Euroopa standardi EN ISO 15758:2014 inglisekeelset teksti.	This Estonian standard EVS-EN ISO 15758:2014 consists of the English text of the European standard EN ISO 15758:2014.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 07.05.2014.	Date of Availability of the European standard is 07.05.2014.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EUROPEAN STANDARD

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English Version

Hygrothermal performance of building equipment and industrial installations - Calculation of water vapour diffusion - Cold pipe insulation systems (ISO 15758:2014)

Performance hygrothermique des équipements de bâtiments et installations industrielles - Calcul de la diffusion de vapeur d'eau - Systèmes d'isolation de tuyauteries froides (ISO 15758:2014)

Wärmedämmung von haus- und betriebstechnischen Anlagen in Gebäuden - Berechnung der Wasserdampfdiffusion - Dämmung von Kälteleitungen (ISO 15758:2014)

This European Standard was approved by CEN on 20 March 2014.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN ISO 15758:2014) has been prepared by Technical Committee ISO/TC 163 “Thermal performance and energy use in the built environment” in collaboration with Technical Committee CEN/TC 89 “Thermal performance of buildings and building components” the secretariat of which is held by SIS.

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 November 2014, and conflicting national standards shall be withdrawn at the latest by November 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14114:2002.

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Endorsement notice

The text of ISO 15758:2014 has been approved by CEN as EN ISO 15758:2014 without any modification.

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Introduction

If the thermal insulation of a cold pipe system is not completely water vapour tight, there will be a flow of water vapour from the warm environment to the surface of the pipe, whenever the temperature of the surface of the cold pipe is below the dew point of the ambient air. This flow of water vapour leads to an interstitial condensation in the insulation layer and/or dew formation on the surface of the pipe itself. Interstitial condensation may cause the insulation material to deteriorate and dew formation on the surface of a metal pipe may cause corrosion over time. If the temperature is below 0 °C ice will be formed and the methods of this standard will not apply.

In period, when the dew point of the ambient air is higher than the temperature of the outer surface of the insulation, surface condensation will occur. This is dealt with in ISO 12241.

Different measures are available to control water vapour transfer and reduce the amount of condensation. The following are normally applied:

a) Installation of a vapour retarder;

b) Use of insulation materials with a high water vapour resistance factor (low permeability);

c) Use of a vapour retarder and a capillary active fabric to continuously remove condensed water from the pipe surface to the environment; see Annex B for an example.

Which protection measure is chosen depends on the ambient climate, the temperature of the medium in the pipe and the water vapour diffusion resistance of the insulation layer. The success of any system is strongly dependent on workmanship and maintenance. In any case anti-corrosion measures should be applied to a metal pipe in severe conditions.

The expected economic lifetime of an insulation system, assuming a maximum acceptable accumulated moisture content, can be calculated using the methods in this standard.

Hygrothermal performance of building equipment and industrial installations — Calculation of water vapour diffusion — Cold pipe insulation systems

1 Scope

This International Standard specifies a method for calculating the density of the water vapour flow rate in cold pipe insulation systems, and the total amount of water diffused into the insulation over time. The calculation method presupposes that water vapour can only migrate into the insulation system by diffusion, with no contribution from airflow. It also assumes the use of homogeneous, isotropic insulation materials so that the water vapour partial pressure is constant at all points equidistant from the axis of the pipe.

This International Standard is applicable when the temperature of the medium in the pipe is above 0 °C. It applies to pipes inside buildings as well as in the open air.

2 Normative references

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

ISO 9346, *Hygrothermal performance of buildings and building materials — Physical quantities for mass transfer — Vocabulary*

ISO 12241, *Thermal insulation for building equipment and industrial installations — Calculation rules*

ISO 12572, *Hygrothermal performance of building materials and products — Determination of water vapour transmission properties*

ISO 13788, *Hygrothermal performance of building components and building elements — Internal surface temperature to avoid critical surface humidity and interstitial condensation — Calculation methods*

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions given in ISO 9346, ISO 12572 and ISO 13788, and the following terms, definitions and symbols (see Table 1) apply.

3.1
exposed moist area
surface area of a capillary active fabric that is exposed to the ambient atmosphere

3.2
vapour retarder
material with high resistance to the flow of water vapour

3.3
corrected water vapour diffusion equivalent air layer thickness
thickness of an imaginary plane layer with μ =1, and an area of πD_j which has the same diffusion resistance as the layer j with $\mu = \mu_j$

Note 1 to entry: See Formula (18).