# DIN EN 14933:2007-12 (E)

## Thermal insulation and light weigth fill products for civil engineering applications - Factory made products of expanded polystyrene (EPS) - Specification

## Contents

Page


Foreword ..... 5

1 Scope ..... 6

2 Normative references ..... 6

3 Terms, definitions, symbols, units and abbreviated terms ..... 7
3.1 Terms and definitions ..... 7
3.2 Symbols, units and abbreviated terms ..... 8

4 Requirements ..... 10
4.1 General ..... 10
4.2 For all applications ..... 11
4.3 For specific applications ..... 13

5 Test methods ..... 20
5.1 Sampling ..... 20
5.2 Conditioning ..... 20
5.3 Testing ..... 20

6 Designation code ..... 22

7 Evaluation of conformity ..... 23

8 Marking and labelling ..... 23

Annex A (normative) Determination of the declared values of thermal resistance and thermal conductivity ..... 25

A.1 Introduction ..... 25
A.2 Input data ..... 25
A.3 Declared values ..... 25
A.3.1 General ..... 25
A.3.2 Case where thermal resistance and thermal conductivity are declared ..... 25
A.3.3 Case where thermal resistance alone is declared ..... 26

Annex B (normative) Factory production control ..... 27

B.1 Testing frequencies ..... 27
B.2 Indirect testing ..... 31
B.2.1 General ..... 31
B.2.2 Compressive stress at 10 % deformation ..... 31
B.2.3 Thermal conductivity ..... 32

Annex C (normative) Product classification ..... 33

Annex D (normative) Determination of behaviour under cyclic square-wave load ..... 34

D.1 Scope ..... 34
D.2 Definitions ..... 34
D.3 Principle ..... 35

D.4 Testing equipment ... 35
D.4.1 Cutting tool ... 35
D.4.2 Length measuring equipment ... 35
D.4.3 Steel plate ... 35
D.4.4 Measuring gauges ... 35
D.4.5 Apparatus ... 35
D.5 Test specimens ... 36
D.5.1 Dimensions of test specimens ... 36
D.5.2 Number of test specimens ... 36
D.5.3 Conditioning of test specimens ... 36
D.6 Procedure ... 36
D.6.1 Test conditions ... 36
D.6.2 Test procedure ... 36
D.7 Calculation and expression of results ... 38
D.8 Accuracy of measurement ... 39
D.9 Test report ... 39

Annex E (informative) Additional properties ... 40

E.1 General ... 40
E.2 Compressive modulus of elasticity ... 40
E.3 Determination of shear strength ... 40
E.4 Long-term compressive behaviour ... 41
E.5 Water vapour diffusion resistance factor ... 42
E.6 Additional information ... 42

Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 89/106/EEC, EU Construction Products Directive ... 43

ZA.1 Scope and relevant characteristics ... 43

ZA.2 Procedures for attestation of conformity of expanded polystyrene products ... 45

ZA.2.1 Systems of attestation of conformity ... 45

ZA.2.2 EC certificate and declaration of conformity ... 48

ZA.3 CE Marking and labelling ... 50

Bibliography ... 52

Figures Figure B.1 -- Relationship between compressive stress at 10 % deformation and apparent density for indirect testing; 1 -  = 0,90; n = 495 ... 31

Figure B.2 -- Relationship between declared thermal conductivity (at 50 mm reference thickness) and apparent density; 1 -  = 0,90; n = 3 873 ... 32

Figure D.1 -- Required load cycle during the fatigue test ... 36

Figure D.2 -- Dimensions of the test specimen ... 37

Figure D.3 -- Test set-up ... 38

Figure ZA.1 -- Example CE marking information ... 51

Tables Table 1 -- Classes of dimensional tolerances ... 12

Table 2 -- Levels for compressive stress at 10 % deformation ... 13

Table 3 -- Levels of dimensional stability under specified temperature and humidity conditions ... 14

Table 4 -- Levels of deformation under specified compressive load and temperature conditions ... 14

**Table 5 -- Levels for compressive stress at 2 % deformation ..... 15**

**Table 6 -- Levels for compressive stress at 5 % deformation ..... 15**

**Table 7 -- Levels of bending strength ..... 17**

**Table 8 -- Levels for long term water absorption by total immersion ..... 18**

**Table 9 -- Levels for long term water absorption by diffusion ..... 19**

**Table 10 -- Levels for freeze-thaw resistance ..... 19**

**Table 11 -- Test methods, test specimens and conditions ..... 20**

**Table A.1 -- Values for k for one sided 90 % tolerance interval with a confidence level of 90 % ..... 26**

**Table B.1 -- Minimum product testing frequencies ..... 27**

**Table B.2 -- Minimum product testing frequencies for the reaction to fire characteristics ..... 29**

**Table C.1 -- Classification of EPS products ..... 33**

**Table E.1 -- Correlation between bending strength and shear strength ..... 40**

**Table E.2 -- Test methods, test specimens, conditions and minimum testing frequencies ..... 41**

**Table E.3 -- Tabulated values of water vapour diffusion resistance index and water vapour permeability ..... 42**

**Table ZA.1 -- Relevant clauses ..... 44**

**Table ZA.2 -- System(s) of attestation of conformity ..... 46**

**Table ZA.2.1 -- Assignment of evaluation of conformity tasks for products under system 1 ..... 47**

**Table ZA.2.2 -- Assignment of evaluation of conformity tasks for products under system 3 and 3 (with 4 for RtF) ..... 48**