Bitumen and bituminous binders - Determination of complex shear modulus and phase angle - Dynamic Shear Rheometer (DSR)

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NATIONAL FOREWORD

See Eesti standard EVS-EN 14770:2012 sisaldab Euroopa standardi EN 14770:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 14770:2012 consists of the English text of the European standard EN 14770:2012.
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 16.05.2012.	Date of Availability of the European standard is 16.05.2012.
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.

ICS 75.140, 91.100.50

EUROPEAN STANDARD

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English Version

Bitumen and bituminous binders - Determination of complex shear modulus and phase angle - Dynamic Shear Rheometer (DSR)

Bitumes et liants bitumineux - Détermination du module complexe en cisaillement et de l'angle de phase - Rhéomètre à cisaillement dynamique (DSR)

Bitumen und bitumenhaltige Bindemittel - Bestimmung des komplexen Schermoduls und des Phasenwinkels - Dynamisches Scherrheometer (DSR)

This European Standard was approved by CEN on 7 April 2012.

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Foreword

This document (EN 14770:2012) has been prepared by Technical Committee CEN/TC 336 “Bituminous binders”, the secretariat of which is held by AFNOR/BNPé.

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of an identical text or by endorsement, at the latest by November 2012, and conflicting national standards shall be withdrawn at the latest by November 2012.

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 14770:2005.

Compared with EN 14770:2005, the following changes have been made:

a) Note 2 added to 3.3;

b) Principle application clarified in Clause 4;

c) Note 2 improved in 5.1;

d) Rewording of 6.2 and previous Note 2 deleted;

e) 7.1 has been re-structured and requirements for reheating times added;

f) requirement for reheating added in 7.2;

g) sub-clause 7.3 added;

h) Clause 8 revised and Note 4 added in 8.3;

i) Annex C (informative) added.

This European standard is based on IP PM CM-02 [1] and XPT 66-065 [2].

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

1 Scope

This European standard specifies a number of methods using a dynamic shear rheometer (DSR) capable of measuring the rheological properties of bituminous binders. The procedure involves determining the complex shear modulus and phase angle of binders over a range of test frequencies and test temperatures when tested in oscillatory shear.

From the test, the norm of the complex shear modulus, IG*I, and its phase angle, δ, at a given temperature and frequency can be calculated, as well as the components G', G'', J' and J'' of the complex shear modulus and of the complex compliance.

This method is applicable to un-aged, aged and recovered bituminous binders, cut-backs and bituminous binders stabilised from emulsions.

WARNING — The use of this European Standard can involve hazardous materials, operations and equipment. This European Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this European Standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

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.

EN 1427, *Bitumen and bituminous binders — Determination of softening point — Ring and Ball method*

EN 12594, *Bitumen and bituminous binders — Preparation of tests samples*

3 Terms and definitions

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

3.1
norm of the complex shear modulus
IG*I
ratio of peak stress to the peak strain in harmonic sinusoidal oscillation

3.2
phase angle
δ
phase difference between stress and strain in harmonic oscillation

3.3
norm of the complex compliance
IJ*I
ratio of the peak strain to the peak stress in harmonic sinusoidal oscillation

Note 1 to entry: The real parts of the complex shear modulus IG*I and the complex shear compliance IJ*I are respectively G´ and J´ and are associated with the elastic part of material behaviour which represents energy stored during a shear cycle. They are complex shear modulus or complex shear compliance multiplied with cosine of phase angle expressed in degrees.

The imaginary parts of the complex shear modulus and the complex shear compliance are respectively G´´ and J´´ and are associated with the viscous part of material behaviour which represents energy dissipated during a shear cycle. They are complex shear modulus or complex shear compliance multiplied with sine of phase angle expressed in degrees.