



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 13614:2021

**Bitumen and bituminous binders -
Determination of adhesivity of
bituminous emulsions by water
immersion test**

Bitumes et liants bitumineux -
Détermination de l'adhésivité des
émulsions bitumineuses par l'essai
d'immersion dans l'eau

Bitumen und bitumenhaltige Bindemittel
- Bestimmung des Haftverhaltens von
Bitumenemulsionen bei Wasserlagerung

03/2021



National Foreword

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English Version

**Bitumen and bituminous binders - Determination of
adhesivity of bituminous emulsions by water immersion
test**

Bitumes et liants bitumineux - Détermination de
l'adhésivité des émulsions bitumineuses par l'essai
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Bestimmung des Haftverhaltens von
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This European Standard was approved by CEN on 1 March 2021.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 13614:2021) has been prepared by Technical Committee CEN/TC 336 “Bituminous binders”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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

This document supersedes EN 13614:2011.

The main changes with respect to the previous edition are listed below:

- curing and conditioning the coated aggregates within a heat resistant glass dish in the form of a monolayer of materials instead of placing them into a beaker (8.2.4 and 8.3.5);
- making the assessment under water, which can be replaced if dirty, with the help of an appropriate desk lamp (8.2.5 and 8.3.7);
- no requirements for a specific thermometer (6.9) since room temperature can be checked with ordinary means. After drying, aggregates are to be left to cool down to room temperature before starting the test procedure (8.1 and 8.3.1);
- acceptable tolerance on conditioning time (8.3.6) is reduced from ± 4 h to ± 2 h;
- guidance for the marking of covered surface area (Annex A) is improved by complementing the sketches with actual pictures.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies a method for determining the adhesion of a bituminous emulsion coated onto aggregate when immersed in water.

The method considers two different aspects of adhesivity, i.e. immediate adhesivity and water effect on binder adhesion.

The method may be used with a reference aggregate. In that case, it measures the intrinsic adhesion behaviour of a bituminous emulsion. The method may also be used with a specific aggregate as used on a job site.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 58, *Bitumen and bituminous binders — Sampling bituminous binders*

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

EN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*

EN 13808, *Bitumen and bituminous binders — Framework for specifying cationic bituminous emulsions*

EN 1428, *Bitumen and bituminous binders — Determination of water content in bituminous emulsions — Azeotropic distillation method*

EN 1431, *Bitumen and bituminous binders — Determination of residual binder and oil distillate from bitumen emulsions by distillation*

EN 16849, *Bitumen and bituminous binders — Determination of water content in bituminous emulsions — Method using a drying balance*

EN ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1**adhesion**

ability of a binder to coat the surface of an aggregate and to remain bonded over time in the presence of water

3.2**adhesivity**

qualitative assessment of the measurement of the adhesion

3.3**immediate adhesivity**

qualitative assessment of the ability of the binder from a bituminous emulsion to resist the action of water just after coating of the aggregate

3.4**water effect on binder adhesion**

qualitative assessment of the ability of the binder from a bituminous emulsion to resist the action of water after coating of the aggregate and a period of curing

4 Principle

The bituminous emulsion is mixed thoroughly with the considered aggregate under specified conditions.

When testing immediate adhesivity, the mixture is immediately washed under running water and the percentage of the aggregate surface covered with binder is assessed visually under specified conditions, using as a reference the sketches of Figure A.1 and the pictures of Figures A.2 to A.7.

When testing water effect on binder adhesion, the mixture is first left to cure and then immersed under water under specified conditions. The percentage of the aggregate surface covered with binder is assessed visually under specified conditions, using as a reference the sketches of Figure A.1 and the pictures of Figures A.2 to A.7.

Conformity to the “adhesivity” requirement specified in EN 13808 is to be assessed while measuring the water effect on binder adhesion with a reference aggregate.

5 Reagents and materials

5.1 Reference aggregate, as light in colour as possible, or aggregate from a specific job site, which either passes through a sieve having a mesh size of 10 mm and is retained on a sieve having a mesh size of 6,3 mm (sieve sizes belonging to the “basic set plus set 2” sizes specified in EN 13043), or passes through a sieve having a mesh size of 11 mm and is retained on a sieve having a mesh size of 8 mm (sieve sizes belonging to the “basic set plus set 1” sizes specified in EN 13043).

NOTE Each country can define petrographically its own reference aggregates, for instance, in a national informative annex.

5.2 Water, distilled or deionised, conforming to grade 3 of EN ISO 3696.

5.3 Cleaning agents, conventionally used in a laboratory.

6 Apparatus

6.1 Ventilated oven, capable of maintaining a temperature of $(60 \pm 3) ^\circ\text{C}$.

6.2 Spatula.

6.3 Two dishes, diameter approximately 15 cm to 20 cm.

6.4 Timer, accurate to at least 1 s over 60 s.

6.5 Two heat resistant glass dishes with cover, with a minimum surface area of 300 cm² and a minimum inner height of 20 mm.

NOTE A 200 mm diameter Petri dish with a minimum inner height of 20 mm satisfies these conditions.

6.6 Balance, of sufficient capacity, accurate to ± 1 g.

6.7 Ventilated oven, capable of maintaining a temperature of (110 ± 5) °C.

7 Sampling

Sample the test material in accordance with EN 58. Prepare the test samples in accordance with EN 12594.

8 Procedure

8.1 General

Carry out the procedure under normal laboratory conditions (23 ± 5) °C, as indicated by usual room temperature measuring device. Very viscous emulsions may be tested at a temperature up to 40 °C but only if this is necessary to adequately carry out the procedure. The actual emulsion temperature shall be mentioned in the test report (Clause 11, b)).

If the intrinsic adhesivity of the emulsion is controlled, the procedure shall be carried out with the reference aggregate(s). The reference aggregate shall be washed with water (5.2) and dried in the ventilated oven (6.7) at (110 ± 5) °C for about 2 h, then let to cool down to room temperature.

If the adhesivity behaviour of a specific emulsion/aggregate combination is controlled for a specific job site, the aggregate shall be used in its job site conditions (5.1).

8.2 Determination of immediate adhesivity

8.2.1 Weigh (100 ± 5) g of aggregate (5.1) into a dish (6.3) and (150 ± 5) g of emulsion into another dish (6.3).

8.2.2 Pour the aggregate into the emulsion, start the timer (6.4) and allow contacting for (60 ± 5) s without stirring; the dish may be gently shaken to disperse any air bubbles which might prevent proper moistening of the aggregate.

8.2.3 Remove excess emulsion by carefully tilting the dish and wash the aggregate at room temperature, holding the dish tilted under a slow stream of water (5.2) until the water runs clear.

8.2.4 Introduce and spread the coated aggregate evenly in the form of a monolayer of material into a heat resistant glass dish (6.5) and cover completely with the needed amount of water (5.2) at room temperature.

NOTE The needed amount of water depends on the actual size of the used heat resistant glass dish.

8.2.5 Immediately assess the surface coated with the film of binder and grade it according to the scheme indicated in (Clause 9). Assessment is to be done with the aggregate still under water and, if necessary, with the help of an appropriate desk lamp to overcome reflections and shades.