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Winter maintenance equipment - Spreading and spraying machines - Part 2: Requirements for distribution and their test

Winterdienstausrüstung - Streumaschinen - Teil 2: Anforderungen an die Streustoffverteilung und deren Prüfung

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Équipement de viabilité hivernale - Épanduses - Partie 2: Exigences relatives à la distribution et essai

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English Version

**Winter maintenance equipment - Spreading and spraying
machines - Part 2: Requirements for distribution and their
test**

Équipement de viabilité hivernale - Épanduses -
Partie 2 : Prescriptions relatives à la distribution et
essai

Winterdienstausrüstung - Streumaschinen - Teil 2:
Anforderungen an die Streustoffverteilung und deren
Prüfung

This European Standard was approved by CEN on 2 September 2019.

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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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European foreword

This document (EN 15597-2:2019) has been prepared by Technical Committee CEN/TC 337 "Road operation equipment and products", 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of an identical text or by endorsement, at the latest by June 2020, and conflicting national standards shall be withdrawn at the latest by June 2020.

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 CEN/TS 15597-2:2012, which has been technically revised. The main following changes were introduced:

- update of the normative references and of the Bibliography;
- deletion of Table 1 and Table 2 (defined working ranges of the different types of machinery) for spreader type definition, this is reported in EN 15597-1;
- inclusion of the determination and characteristics of test materials for salt 1 and salt 2 (Clause 5);
- addition of a new test for the starting behavior;
- simplification of the static tests;
- modification of Figure 1 to Figure 4 and deletion of Figures 5 to 8;
- adaptation of the test points to the changes in the working ranges of the spreader types;
- inclusion of Annex B as an example for a static test report..

EN 15597, *Winter maintenance equipment - Spreading and spraying machines*, is composed of the following parts:

- *Part 1: General requirements and definitions;*
- *Part 2: Requirements for distribution and their test.*

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.

EN 15597-2:2019 (E)**Introduction**

This document is meant to assess the demands made on mobile spreading and spraying machines operated in traffic.

For simplicity, in this document all machines are called “spreaders” also for liquid agent spraying.

Spreading machines (spreaders/gritters) are meant to be operated in such way that homogeneous distribution of spreading media is given within the set spreading dosage, width and spreading pattern track.

The static and dynamic test procedure has the task to test functionality and accuracy of the spreader. With dynamic testing, the task is also to test the spreading pattern as much as possible under real conditions. Therefore, the dynamic test is done with trucks driving realistic speeds.

To ensure the repeatability of the results and to limit the expenditure, the tests for the certification are not done with all possible spreading agents and all possible parameters of the operational area of the spreader. The salt for the test is limited to three defined test materials, also the brine is defined (see Clause 5), and the dynamic tests are not done with the highest possible driving speeds. This does not mean that the spreaders do not work with other materials or higher speeds. If the spreader is bound to operate with other materials and/or higher speed, this is meant to be tested and adjusted individually by the customer. Especially when driving at higher speeds, the influences of the driving turbulences and the truck configuration upon which the spreader is mounted become very strong so that it makes no sense to test this for the certification independent of the special truck.

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1 Scope

This document gives the possibility to certify a model of vehicle-mounted or (trailer) dragged spreading machines for winter service with standard parameters, leaving the possibility to the manufacturer to evolve in performances. At the same time, information is given on the minimum content required for operating manuals.

This document is valid for machines which are used to spread the following media:

- not pre-wetted spreading agent (solid spreading agent);
- pre-wetted spreading agent;
- liquid spreading agent (brine).

The following points are not covered by this document:

- requirements for registration and approval;
- requirements made by automobile manufacturers;
- requirements on EN 15518-3.

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 15144, *Winter maintenance equipment — Terminology — Terms for winter maintenance*

EN 15431, *Winter and road service area maintenance equipments — Power system and related controls — Interchangeability and performance requirements*

EN 15597-1:2020, *Winter maintenance equipment — Spreading machines (gritting machines) — Part 1: General requirements and definitions for spreading machines*

EN ISO 13473-1, *Characterization of pavement texture by use of surface profiles — Part 1: Determination of mean profile depth (ISO 13473-1)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15144 and the following 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

machine model

machine model that includes a spreader of thawing media for road maintenance and its control box.

EN 15597-2:2019 (E)**3.2****spreader type**

machine able to spread thawing and/or abrasive spreading material on the traffic area

3.3**sprayer**

machine able to spray liquid de-icing material on the traffic area

3.4**test material**

specific sodium-chloride (NaCl) substance or brine for verification purposes of spreading capability

Note 1 to entry: See Clause 5.

3.5**test**

test realized with different spreading parameters (dosage, spreading width and vehicle speed), for a machine model, a test spreading agent and a spreader type

3.6**test run**

single drive over the test field with adjustments

Note 1 to entry: These adjustments need to be according to Tables 10, 11 and 12.

3.7**qualification**

qualification of a machine model that states the conformity to the requirements defined in this standard

Note 1 to entry: The check of the respect of these requirements is realized after a series of static and dynamic tests defined for a type of spreader and a test thawing media.

3.8**test report**

document in which the whole conditions and test results for a qualification are recorded

Note 1 to entry: Examples of test reports can be found in Annex B, Tables B.1 to B.4.

3.9**technical certificate**

technical certificate that is set for a qualified machine model

Note 1 to entry: If several qualifications of the same model are realized with different couples "test material/spreader type", the whole test results of the different qualifications will be reported on the same technical certificate.

3.10**test area**

prepared section where specific conditions for dynamic test are required

Note 1 to entry: See Figure 4.

3.11**outer strip**

part of the total collecting area, and two strips of 1 m width each side (left and right) out of the measurement area

3.12**measurement area**

area, in the dynamic test, corresponding to the defined spreading length multiplied by the set theoretical spreading width

3.13**total collecting area strip**

measurement area plus the two outer strips

3.14**spacing area**

area between two total collecting area strips and has a length of minimum 2,5 m, maximum 4,0 m, in this area the thawing material is not to be collected

3.15**last strip**

outer strip with a width of 1 m right and left within the specified theoretical spread

3.16**second last strip**

last outer strip but one with a width of 1 m on the right and left within the specified theoretical width

Note 1 to entry: Only for spreading width of 8 m and/or more than 30 km/h of spreading speed.

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3.17**inner strip**

other strips adjacent to strips as described in 3.12 and 3.13 with a width of 1 m within the specified theoretical spread

3.18**in-driving area**

area inside the test area, before the first total collecting area strips, minimum length 15 m

3.19**out-driving area**

area inside the test area, after the last total collecting area strips, minimum length 15 m

3.20**effective average dosage**

ratio of the total amount collected divided by the measurement area, in g/m^2

3.21**theoretical dosage**

value set on the control box in g/m^2

3.22**theoretical total amount**

theoretical dosage multiplied by the measurement area

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3.23

total amount

complete mass collected on a total collecting area

3.24

effective dosage in a strip

total amount of test material collected in this strip, divided by the strip surface area

3.25

mathematic average dosage

average of the effective average dosage of the two best out of three test runs in dynamic test

3.26

dosage percentage

relation between the effective dosage in a strip and the effective average dosage

4 Definition

The table reference for different types of spreader is shown in EN 15597-1:2020, 4.1.

5 Test materials

The materials used in Europe for winter maintenance are very different. The sodium chloride (NaCl) has different granulometry according to the mine or production type, the humidity of these products is very variable too. For this reason the test shall be done with one or more reference salts with the characteristic shown in Tables 1 and 2.

Table 1 — Characteristics of the test material – Salt 1

Moisture (weight %)	Dry (max. 0,6)	Semi-dry (max. 2,0)
	Weight % passing test sieve	
0,125 mm	2 — 6	
0,8 mm	6 — 24	
1,6 mm	26 — 60	
3,15 mm	80 — 90	
6,3 mm	100	

Table 2 — Characteristic of the test material – Salt 2

Moisture (weight %)	Wet (max. 3,5)
	Weight % passing test sieve
0,125 mm	< 5
0,8 mm	> 95
2,0 mm	100

The characteristics of the delivered test material shall be guaranteed and verified by the salt supplier. An official certificate of material delivered by material supplier shall be attached to the test report. A sample of salt used for test shall be collected and stored in the Institute with the test documentation.

The de-icing material shall be stored protected from atmospheric moisture agent, in order to keep the original characteristic during storage period.

The concentration of sodium chloride in the brine for pre-wetting or liquid spraying shall be between 20 % and 23 % by weight. This analysis shall be done prior each test.

The measured results shall be corrected according to the real NaCl content in the spreading material.

Each machine can be tested with one or more salts and different humidity, as shown in Tables 1 and 2, in the certificate the type of salt used for test shall be reported.

6 Certification procedure

6.1 Principle of qualification procedure

The qualification procedure of the spreaders includes two tests types, one static and one dynamic. The static test enables to check the right quantity, it is realized without moving the spreader. The dynamic test enables checking the quality of spreading and spraying pattern, it is realized driving the spreader vehicle during spreading operation on a test area.

According to the type of spreader tested, the qualification procedure sets the functioning parameters of the machine. These spreading parameters are different for the static and dynamic tests.

Each spreader type, in order to be qualified, shall meet the requirements of the two tests (static and dynamic).

During a qualification, it is only allowed to change the settings of spreading width, dosage, symmetry, simulated speed, pre-wet on/off. In case of changing other parameters the whole test procedure shall be restarted.

It is allowed to make pre-tests in order to be able to choose and test different settings. These tests will not be taken as qualification tests. The manufacturer shall declare clearly after the pre-tests that he wants to start with the qualification test procedure. Then only those test runs after this declaration will count for official qualification and the qualification test requirements become valid.

6.2 Identification and requirements on spreader types

A spreader type includes a spreader and a control box. The spreader and the control box shall be identified in the manufacturer's production (for instance: model number), and shall respect EN 15597-1.

The modification of the components influencing the spreading performances defined in Annex A involves the definition of a new machine model, a new procedure of qualification shall be realized for this new model.

Table 3 — Required test related to spreader types

Spreader type	Status of spreading agent		
	not pre-wetted spreading agent	pre-wetted spreading agent	liquid spreading agent
Spreader for not pre-wetted spreading agent	X		
Spreader for pre-wetted spreading agent	X	X	
Spreader for pre-wetted and liquid spreading agent	X	X	X
Spreader for liquid spreading agent			X

The certificate will have one sentence reporting the test related to the spreader type passed as shown in Table 3.

For the same model, the manufacturer can do different qualifications with different “test material/spreader type”.

6.3 Procedure of the static test

6.3.1 General

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The static test consists to verify, with weighing, the precision and regularity of test material flow and right quantity. It is realized without moving the spreader, consequently vehicle speeds shall be simulated.

- The spreader shall conform to EN 15597-1 (general technical information).
- For the spreaders having an auxiliary engine, the manufacturer's advices shall be respected.
- For the spreaders driven by the vehicle hydraulics, EN 15431 shall be applied (respect of the engine nominal speed).
- For the spreaders driven by the pump mounted on wheel, an independent system will have to ensure the pump rotation at the speed needed by the test.
- For the spreaders driven by the pump flanged on a vehicle wheel, an independent system will have to ensure the pump rotation needed by the test, applying a theoretical diameter of the vehicle tire of 1 m.

For spreaders working with pre-wetted thawing media, the tests shall be done collecting the two media concurrently but in separate bins (disconnection of injection pipes of the brine). If the nozzle influence the flow, shall remain mounted on the pipe during the test.

For spreaders working with liquid, the test shall be done collecting liquid of the spraying devices (e.g. nozzles) related to the spraying width.

The requirements on the methods and equipment are described in 6.3.3.