



# SLOVENSKI STANDARD

## SIST EN 840-5:2000

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### Mobilni zbiralniki odpadkov - 5. del: Izvedbene zahteve in preskusne metode

Mobile waste containers - Part 5: Performance requirements and test methods

Fahrbare Abfallsammelbehälter - Teil 5: Anforderungen an die Ausführung und Prüfverfahren

Conteneurs roulants a déchets - Partie 5: Exigences de performance et méthodes d'essais

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#### **ICS:**

13.030.40	Naprave in oprema za odstranjevanje in obdelavo odpadkov	Installations and equipment for waste disposal and treatment
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## Mobile waste containers - Part 5: Performance requirements and test methods

Conteneurs roulants à déchets - Partie 5:  
Exigences de performance et méthodes d'essaisFahrbare Abfallsammelbehälter - Teil 5:  
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 183 "Waste management" the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by August 1997, and conflicting national standards shall be withdrawn at the latest by August 1997.

This European Standard is one part of the series of standards of EN 840 about "Mobile waste containers" comprising the following Parts:

- Part 1: Mobile waste containers - Part 1: Containers with 2 wheels with a capacity from 80 l to 390 l for comb lifting devices, dimensions and design
- Part 2: Mobile waste containers - Part 2: Containers with 4 wheels with a capacity from 500 l to 1200 l with flat lid(s), for trunnion and/or lifting devices, dimensions and design
- Part 3: Mobile waste containers - Part 3: Containers with 4 wheels with a capacity from 770 l to 1300 l with dome lid(s), for trunnion and/or comb lifting devices, dimensions and design
- Part 4: Mobile waste containers - Part 4: Containers with 4 wheels with a capacity from 750 l to 1700 l with flat lid(s), for wide trunnion or BG and/or wide comb lifting devices, dimensions and design
- Part 5: Mobile waste containers - Part 5: Performance requirements and test methods
- Part 6: Mobile waste containers - Part 6: Safety and health requirements

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## 1 Scope

This part of EN 840 gives the test methods for mobile waste containers according to EN 840-1 to EN 840-4. It also gives the levels to be reached during the tests or after they have been done.

This Standard is applicable to mobile waste containers with capacities from 80 l to 1700 l.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- EN 840-1:1997 Mobile waste containers - Part 1: Containers with 2 wheels, with a capacity from 80 l to 390 l for comb lifting devices, dimensions and design
- EN 840-2 Mobile waste containers - Part 2: Containers with 4 wheels, with a capacity from 500 l to 1200 l with flat lids for trunnion and/or lifting, dimensions and design
- EN 840-3 Mobile waste containers - Part 3: Containers with 4 wheels, with a capacity from 770 l to 1300 l with dome lids, for trunnions and/or comb lifting devices, dimensions and design
- EN 840-4 Mobile waste containers - Part 4: Containers with 4 wheels, with a capacity from 750 l to 1700 l with flat lid, wide trunnions or BG-lifting device and/or wide comb lifting device, dimensions and design
- EN 840-6 Mobile waste containers - Part 6: Safety and health requirements for solid waste containers
- prEN 1029 Hot dip galvanized coatings on fabricated ferrous products - Specification
- prEN 1501-1 Refuse collection vehicles and their associated lifting devices - General requirements and safety requirements - Part 1: Rear-end loaded refuse collection vehicle
- ISO 2081 Metallic coatings - Electroplated coatings of zinc on iron or steel

### 3 Definitions

Terms for components of waste containers and lifting devices in three languages are given in annex A of EN 840-1:1997.

For the purposes of this European Standard the definitions according to EN 840-1 to EN 840-4 apply.

### 4 Tests

#### 4.1 General

Before and after the tests a visual inspection of the container has to be done for the purpose of:

- a) checking that the container is not damaged and has no visual defect;
- b) checking that the manufacturing characteristics of the container to be tested are those specified in the Standards applying to the container according to EN 840-1 to EN 840-4;
- c) comparing the condition of the container before and after the sequence of the tests.

After having finished the test deformations are allowed, however, the entire functionality of the container shall be kept.

#### 4.2 Control before the tests

##### 4.2.1 Visual aspects

No obvious damages, no cracks, bubbles, large flashes or sharp edges in handgrip areas. No surfaces defects (unsmooth areas; trails in colour) perceptible from a distance of 1 m by a normal eye.

##### 4.2.2 Correspondence with EN 840-1 to EN 840-4

###### 4.2.2.1 Components

Body, lid, wheels and other fittings shall be in line with the relevant container standard.

###### 4.2.2.2 Sizes and dimensions

Functional dimensions as per drawings and tables respectively, attached to EN 840-1 to EN 840-4 (length, width, height, rims, trunnions) for the whole container and for the components and the basic functional details.

###### 4.2.2.3 Capacities

The capacities of container parts and the total capacity shall be measured

- a) for the body, by tank method, up to 1700 l
- b) for the lid, if possible by tank method
- c) total volume results in a) and b) minus interferences

Ensure within the tolerances on capacity according to EN 840-1 to EN 840-4.

###### 4.2.2.4 Tank method

The test equipment shall consist of a tank with sufficient capacity to receive the container to be tested.

The test procedure goes as follows:

- place the empty container in a tank, the container shall not be inclined;
- simultaneously fill the tank and the container with water at a temperature of  $(15 \pm 5) ^\circ\text{C}$ ;
- measure the quantity of water inside the container

Accuracy of measurement shall be  $\pm 1\%$  of the measured capacity of the container.

#### 4.2.3 Deflection for comb lifting system

In areas involved by the comb-rim, interface shall have no more deflection than:

- a) 1,5 % of the length of the frontal receiver for plastic
- b) 0,6 % of the length for steel

NOTE: For other systems the values have to be defined when the systems are standardized.

#### 4.2.4 Masses

The tolerances on the container mass claimed are as follows: for plastic containers  $\pm 5$  % and for metal containers  $\pm 10$  %.

#### 4.2.5 Colour

The colour has to be defined and agreed between customer and supplier. Colour measurement, differences and tolerances refer to existing international standards.

#### 4.2.6 Marking

It shall be inspected according to EN 840-1 to EN 840-4.

#### 4.3 Control after the tests

In spite of variations in deflection and sizes, it shall be possible to lift and tilt the container loaded according to 4.5 with nominal weight safely on the designated lifting equipment and to move the container on its wheels.

#### 4.4 Conditions of the tests

Plastic containers shall be tested under the following conditions:

$t_1 = (23 \pm 5) ^\circ\text{C}$  (temperature of the room)

$t_2 = (-18 \pm 2) ^\circ\text{C}$  (cold for some impact tests when made on plastic products)

Before testing the specimens have to be in the cold room for at least 12 h. The tests have to be made in the cold room or within 5 min outside the cold room.

#### 4.5 Ballast weight

For the test the containers are to be filled with ballasts of HDPE granulates in bags of 4 kg max., with granules having a specific weight of  $0,5 \text{ kg/dm}^3$ .

The ballast weight shall be  $0,4 \text{ kg/dm}^3$  multiplied by nominal volume, with a maximum load of 440 kg (nominal load).

#### 4.6 Other test conditions

If any, they have to be defined with the tests involved.

#### 4.7 Tests on the containers

All tests have to be made on new containers.

##### 4.7.1 Impact tests by ball drop

Ball drops are not compulsory for steel containers.

The ability of the sensitive points of the container to resist under impacts at low temperature shall be tested.

The 2-wheeled containers shall be placed on a concrete or steel surface in the normal position.

The 4-wheeled containers are standing on their wheels.

After 12 h at a temperature  $t_2$  in the cold room, tests shall be fulfilled either in the cold room or within 5 min outside.

Ball drop tests shall be carried out by a 5 kg steel cylinder, diameter 65 mm, with hemispheric end radius of 32,5 mm. The steel cylinder is guided in a vertical plastic pipe with a slot or with holes in order to allow the air to escape during the drop.

The following areas of containers shall be tested by impact tests according to the below mentioned conditions:

a) On the inside of the bottom:

- At least 3 points beginning with the injection point (areas less than 20 mm to sprue areas) and then potentially weak points (i. e. drainage holes for instance in 4-wheeled container).
- with a drop height of 1,5 meters<sup>1)</sup> and
- with a frequency of 3 times per measuring point

b) At protrusions on body (handle, top rim etc.), junctions between lid and body, hinges at the lid and protruding areas on the lid:

- with a drop height of 0,8 m<sup>1)</sup> and
- with a frequency of 2 impacts per measuring point

After tests, the container shall be waterproof in the tested point.

The device shall be according to figure A.1.

#### 4.7.2 Impacts at inclined plane

Only 4-wheeled containers shall be tested with impact on each wall of the body and on each corner to check the resistance to straining and breaking of sensitive areas, including protruding areas and fittings. The test conditions shall be:

- test temperature  $t_1$  = room temperature
- ballast weight of 0,4 kg/dm<sup>3</sup> multiplied by nominal volume, with a maximum load of 440 kg (nominal load)
- inclination of 10° (ten degrees) to the slopeline
- impact against a wall perpendicular to the moving direction
- number of total 16 impacts according to table 1 for the sequence

During the procedure the lid shall be closed. The loaded container shall be placed on a trolley with an inclination of 10° (ten degrees) (relative to the horizontal). Precautions shall be taken to avoid accidental tipping of the container during the test (see figure E.1).

Other apparatuses could be used if they allow to have the same impact and velocity conditions.

The impact velocity shall be 1,85 m/s<sup>1)</sup> when one face is tested and 1,3 m/s<sup>1)</sup> when one corner is tested.

The vertical faces of the container will be numbered from 1 to 4 and the face marked 1 being one of the large faces fitted for the (comb) lifting system. Corners are marked 1.2, 2.3, 3.4 and 4.1.

**Table 1: Sequence of the lateral impacts**

Impact no	Face or corner tested	No of impacts
1 to 2	Face 1	2
3 to 4	Corner 1.2	2
5 to 6	Face 2	2
7 to 8	Corner 2.3	2
9 to 10	Face 3	2
11 to 12	Corner 3.4	2
13 to 14	Face 4	2
15 to 16	Corner 4.1	2

After the test even if some deformations occur, the functionality of the container shall be maintained.

<sup>1)</sup> Recommended values; due to a lack of experience the interested parties can decide by agreement on different value.



#### 4.7.3 Kerb travel (run)

4-wheeled containers shall only be tested in kerb travel by run tests under the following conditions:

- the test shall be carried out at room temperature  $t_1$
- ballast weight of  $0,4 \text{ kg/dm}^3$  multiplied by nominal volume, with a maximum load of 440 kg (nominal load)
- The apparatus shall comply with Annex C.
- The kerb height shall be 140 mm orthogonal to the moving direction and located at the end of the run.
- The wheels are to be guided in order to be orthogonal to the kerb at the time of the impact.
- The impact velocity shall be  $1,85 \text{ m/s}^{1)}$ .
- The number shall be 4 times by short side (total 8 times).

After the test permanent deformation or breakage able to disturb handling, tilting, rolling (castors move freely) shall be avoided.

#### 4.7.4 Kerb travel (falls)

##### 4.7.4.1 General

Strength and roll tests shall be carried out on 2- and 4-wheeled containers under the following conditions:

- test temperature  $t_1$  = room temperature
- ballast weight of  $0,4 \text{ kg/dm}^3$  multiplied by nominal volume, with a maximum load of 440 kg (nominal load)
- height fall of 140 mm

The container is lifted up to 140 mm and then dropped freely so that 2 wheels hit the ground first.

##### 4.7.4.2 Test conditions for 2-wheeled containers:

- two wheels shall hit the ground
- at least a number of 1000 falls shall be carried out
- number of 12 falls per minute maximum
- test apparatus shall be according to figure D. 1

##### 4.7.4.3 Test conditions for 4-wheeled containers:

- 2 wheels shall hit the ground
- at least a number of 1000 falls shall be carried out
- frequency of 5 falls per minute maximum
- test apparatus shall be according to figure D. 2

After the test the container shall be able to roll and shall meet the pulling and pushing requirements.

#### 4.8 Stability test

The static stability of the empty and loaded containers on a slope of  $10^\circ$  (ten degrees) to the horizontal shall be tested at first on empty containers and after that on containers filled with the nominal load.

The test shall be carried out without wind.

For 4-wheeled containers, the brakes, if any, could prevent them to roll. Other arrangements shall be made to prevent containers from gliding or rolling without hindering tipping.

The container shall be checked in 3 directions.

##### a) Stability at right angles to the slope line (transversal stability):

The wider part of 4-wheeled containers and the wheel's axle of 2-wheeled containers shall be parallel to the slope line.

##### b) longitudinal stability:

The wider part of 4-wheeled containers and the wheel's axle of 2-wheeled containers shall be in the right angle to the slope line.

<sup>1)</sup> see page 6.

## c) diagonal stability:

The diagonal line of the container shall be parallel to the slope line.

The test b) of the longitudinal stability of 4-wheeled containers includes the brake test according to 4.9.4. In consideration of all test conditions the container shall neither tip nor move.

## 4.9 Pulling and rolling tests

### 4.9.1 General

The aim of these tests is to check that the safety and the health of the worker are fulfilled when moving the containers.

These tests shall include:

- pulling tests
- wheels tests
- brake tests

### 4.9.2 Pulling tests

The strength required to start and maintain the container movement is to be checked and measured.

The pulling forces defined as horizontal forces in pulling direction are measured and the result is to be stated in the data sheet.

In order to get comparable result values of forces tests shall be done under the following conditions:

- a new container (loaded) (with nominal load, but 440 kg maximum)
- the ground shall be a plane, smooth concrete horizontal surface (slope = 1° ((one degree) maximum)
- the pulling force direction shall be horizontal  $\pm 2^\circ$  (two degrees) to all sides
- the pulling speed shall be 0,1 m/s  $\pm 0,005$  m/s
- the pulling distance shall be 3 m minimum
- the temperature in tests areas and of the tested container shall be  $t_1$  (room temperature)
- the total tolerance range of measuring equipment shall be  $\pm 3\%$  of the measured value
- the preparation of the tested container before every test shall be for
  - 2-wheeled containers to bring it in a tilted position where the strength at the handle is 20 % of the force (N), created by the container's total permissible mass (kg)
  - 4-wheeled containers to aligne the wheels in pulling direction. The direction block, if fitted, is in operation
- the number of tests shall be 3 times with nominal weight loaded container according to figure B.1.

Table 2: Maximal forces for sustained pulling (up to 1700 l capacity)

Container	pulling force N max.
2-wheeled	60 <sup>1)</sup>
4-wheeled	285 <sup>1)</sup>

NOTE: Maximal forces (including initial force) ought to be no more than 300 N<sup>1)</sup>, according to some work regulations.

### 4.9.3 Wheels testing

The functional qualities of the wheels running a distance, at a defined speed, under load, with a periodical step shall be tested. It is a test specifically for the wheel.

The apparatus shall be a concrete surface horizontal circle with a diameter of 1,1 m.

<sup>1)</sup> page 6.

The wheel is rolled on the circle. A step of 11,5 cm height is put in the circle roughly along the radius and allows the wheel to fall down after each 3,5 m run (1 turn). The wheel is loaded by loads according to table 3. The test shall be carried out in turns moving and at rest.

**Table 3: Conditions for testing wheels (200 mm diameter)**

Conditions	Wheels for 2-wheeled containers	Wheels for 4-wheeled containers
Number of wheels	2 consecutively	2 consecutively
Load on the wheels	50 kg	85 kg
Cycles running time	1 min	5 min
Resting time and again	3 min	5 min
Total distance run	5 km	20 km
Equivalent time	1,5 h	--
Running speed	3,3 km/h	3,3 km/h
Checking of the wheel	at the end of the test	each 3 h

The test shall be carried out at room temperature  $t_1$ .

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After passing the test tyre and wheel shape shall still allow correct use.

#### 4.9.4 Brake tests

The brake tests shall be carried out without rolling under nominal load and on a slope of 10 ° (ten degrees).  
A braked wheel should need a torque not below 22 Nm to overcome the brake resistance.

#### 4.10 Lifting-tilting tests

##### 4.10.1 General

This test checks that the container fits well on lifting-tilting systems in agreement with prEN 1501-1. The apparatus shall be a compatible standardized lifting device. The container and the lifting device are on the same plane, with an even ground. The test should be carried out under the normal service conditions.

##### 4.10.2 Lifting-tilting of the empty container

This is a test to be done after inspection of the container and before the other tests.

The test is carried out on an empty container successively with the lid closed.

5 cycles minimum of lifting-tilting are done without trouble.

After passing the tests no damage on any part of the containers, lid etc shall be visible with the naked eye. No hindering during the cycles are allowed. If unsuccessful, the test is stopped.

##### 4.10.3 Lifting-tilting of the loaded container

The test shall be carried out on one specimen under the following conditions:

- The ballast shall be 0,4 kg/dm<sup>3</sup> multiplied by nominal volume, with a maximum load of 440 kg (nominal load). A device prevents the load from flying out during the test.
- test temperature  $t_1$  = room temperature
- at least 100 cycles shall be made

Dynamics of the lifter: regular parameters as used actually.

After passing the test it shall be easy to position the container on the lifting device without lifting it by hand.