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Road construction and maintenance equipment — Bituminous binder spreaders/sprayers — Terminology and commercial specifications

Équipement pour la construction et l'entretien des routes — Épandeuses/pulvérisatrices de liants bitumineux — Terminologie et spécifications commerciales

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Foreword

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ISO 15643 was prepared by Technical Committee ISO/TC 195, *Building construction machinery and equipment*.

Road construction and maintenance equipment — Bituminous binder spreaders/sprayers — Terminology and commercial specifications

1 Scope

This International Standard establishes the terminology for soil stabilizers used in road construction and pavement works. It provides the terminology for the machine and its components, also the definitions of operation principles and parameters.

This International Standard also establishes the parameters required for the technical characteristics of the whole machine and its components, such as the transport vehicle and mixing device, for commercial specifications.

2 Terms and definitions

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

2.1
bituminous binder spreader
machine used to apply a film of binder on a pavement at a predetermined application rate

NOTE The particular spreader types may be defined by associating the operating principle, the shape of the components, the type of binder, and by specifying the spreading performances.

2.2
displacement pump spreader
machine in which binder transfer from the storage tank to the spray bar is provided by a pump

NOTE The pump's output is proportional to its rotating speed which may be controlled by the vehicle movement speed.

2.3
constant pressure spreader
machine in which binder transfer from the storage tank to the spray bar is provided by pressurizing the binder

NOTE The binder may be pressurized directly by compressed air above the binder, or by a pump and regulating valve maintaining a constant binder pressure in the spray bar feeder circuit.

2.4
fixed assembly spreader
machine in which the tank and its attachments are fixed to the transport vehicle

2.5
removable assembly spreader
machine in which the tank and its attachments are fixed to a removable chassis

2.6
heat-insulated spreader
machine in which the tank is equipped with thermal insulation to avoid heat loss

2.7
directly heated spreader
machine with heating provided by circulation of hot gases in a tube or by an electrical resistor in contact with the binder

2.8
indirectly heated spreader
machine with heating provided by circulation of a hot liquid supplied by a generator outside or inside the spreader

2.9
hot binder spreader
machine which enables application of binder at a temperature greater than 80 °C

2.10
cold binder spreader
machine which spreads binders at a temperature lower than 80 °C

2.11
high-viscosity-binder spreader
machine which enables application of a binder with a viscosity greater than 300 cSt at the application temperature

2.12
high-binder-pressure spreader
machine in which the binder pressure in the spray bar during spreading is greater than 0,2 MPa

2.13
medium-binder-pressure spreader
machine in which the binder pressure in the spray bar during spreading is between 0,02 MPa and 0,2 MPa

2.14
low-binder-pressure spreader
machine in which the binder pressure in the spray bar during spreading is less than 0,02 MPa

2.15
tank volume
internal volume of the tank

NOTE It is expressed in cubic metres.

2.16
rated capacity
volume of binder which can be carried

NOTE It is expressed in cubic metres.

2.17
nominal loading of tank
loading using the available capacity of the binder with the highest density

NOTE It is expressed in kilograms.

2.18
spray bar width
distance between end flow points

NOTE It is expressed in metres.

2.19
maximum output of pumping unit
largest capacity for a binder with a viscosity of 100 cSt

NOTE It is expressed in cubic metres per hour.

2.20
nominal application rate
application rate at maximum output of a pumping unit moving at a speed of 4 km/h with a binder of a density of 1 g/cm^3 and a viscosity of 100 cSt and with maximum spray bar width

NOTE It is expressed in kilograms per square metre.

2.21
binder carrying capacity
difference between the laden and kerb mass of a spreader

2.22
spreading height
height measured between the average plane of the pavement and the orifice of the nozzles

NOTE 1 It is expressed in metres.

NOTE 2 See h_2 in Figure 7.

3 Description of spreader components

3.1 Transport vehicle

This vehicle, in the form of a truck, trailer or semi-trailer, carries all the components and provides movement of the spreader during spreading and during road transfers.

3.2 Tank

The tank is used to store the binder during work and transport.

It may have a facility to heat the binder and may have a system to protect against loss of heat.

3.3 Binder transfer device

This device provides transfer of the binder from the tank to the spray bar in order to apply a specific quantity to the pavement.

3.4 Spray bar

The spray bar distributes the binder uniformly across the pavement.

3.5 Control station

The control station contains all the control, adjustment, measuring and automatic control equipment. There are two types, as follows.

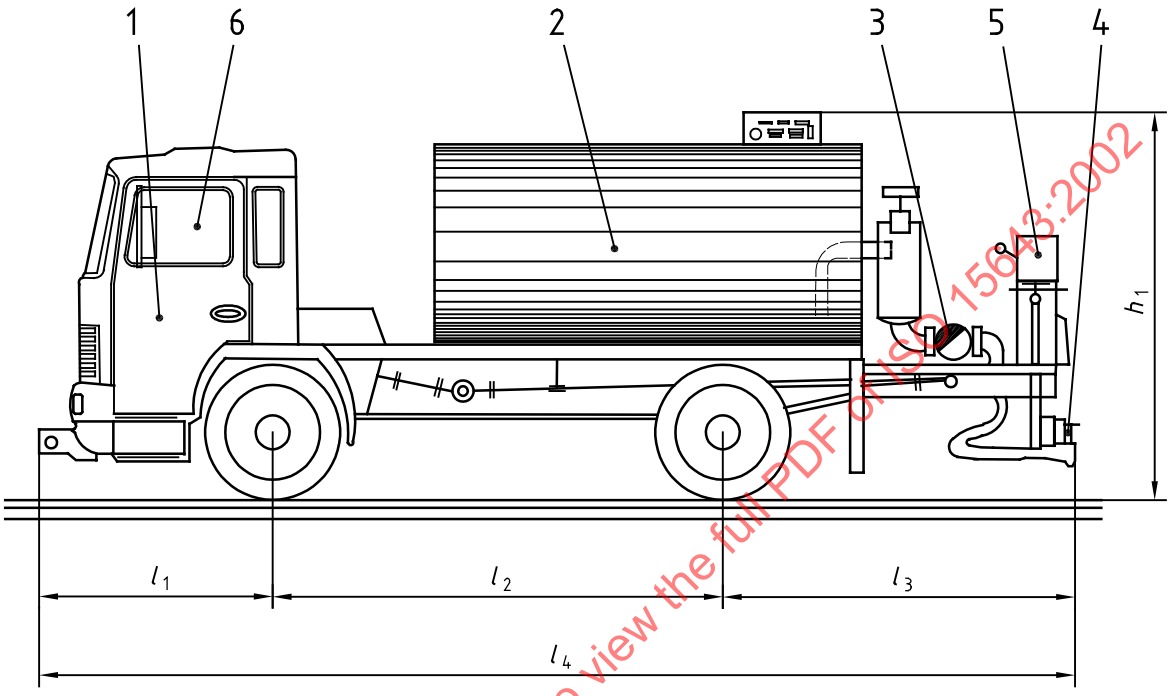
a) Manual control: the operator adjusts all the operating parameters to obtain the required application rate.

b) Automatic control: using predetermined operating parameters, automation ensures accuracy of the application rate.

4 Commercial specifications

4.1 Spreader components list

The components of the binder spreader/sprayer and their dimensions shall be specified. An example is shown in Figure 1.



Key

1	Vehicle	4	Spray bar
2	Tank	5 and 6	Measuring instruments placed in driver's cab or on the rear part of the vehicle platform
3	Binder transfer unit		

Figure 1 — Overall view of binder spreader/sprayer

4.2 Vehicle characteristics

The following characteristics shall be specified:

— laden mass kg

— kerb mass kg

— binder carrying capacity kg

— minimum spreading speed km/h

— overall dimensions:

  — length, l_4 mm

  — width mm

  — height, h_1 mm

— front overhang, l_1 mm

— wheel base, l_2 mm

— rear overhang, l_3 mm

— external turning radius m

— internal turning radius m

— maximum axle load daN

— engine rating power kW

— maximum travel speed km/h

4.3 Tank: performance and characteristics

4.3.1 General characteristics

The following characteristics shall be specified:

— tank volume m^3

— rated capacity m^3

— working pressure MPa

4.3.2 Binder tank performance

The following units of the binder tank shall be specified (see Figures 2 and 3):

— tank itself, of the following geometrical shapes:

  — circular (see 1 in Figure 2),

  — elliptical (see 2 in Figure 2),

  — prismatic with rounded corners (see 3 in Figure 2);

— wash plate partition (see 4 in Figure 2);

— inspection hole (see 5 in Figure 2);

— cleaning orifice (see 6 in Figure 2);

— level indicator (see 7 in Figure 2);

— insulation: type and thickness (see 8 in Figure 2);

— insulation protective coating (see 9 in Figure 2);

— access equipment:

  — platform (see 10 in Figure 2),

  — access ladder to inspection hole (see 11 in Figure 2),

  — guard rail (see 12 in Figure 2);

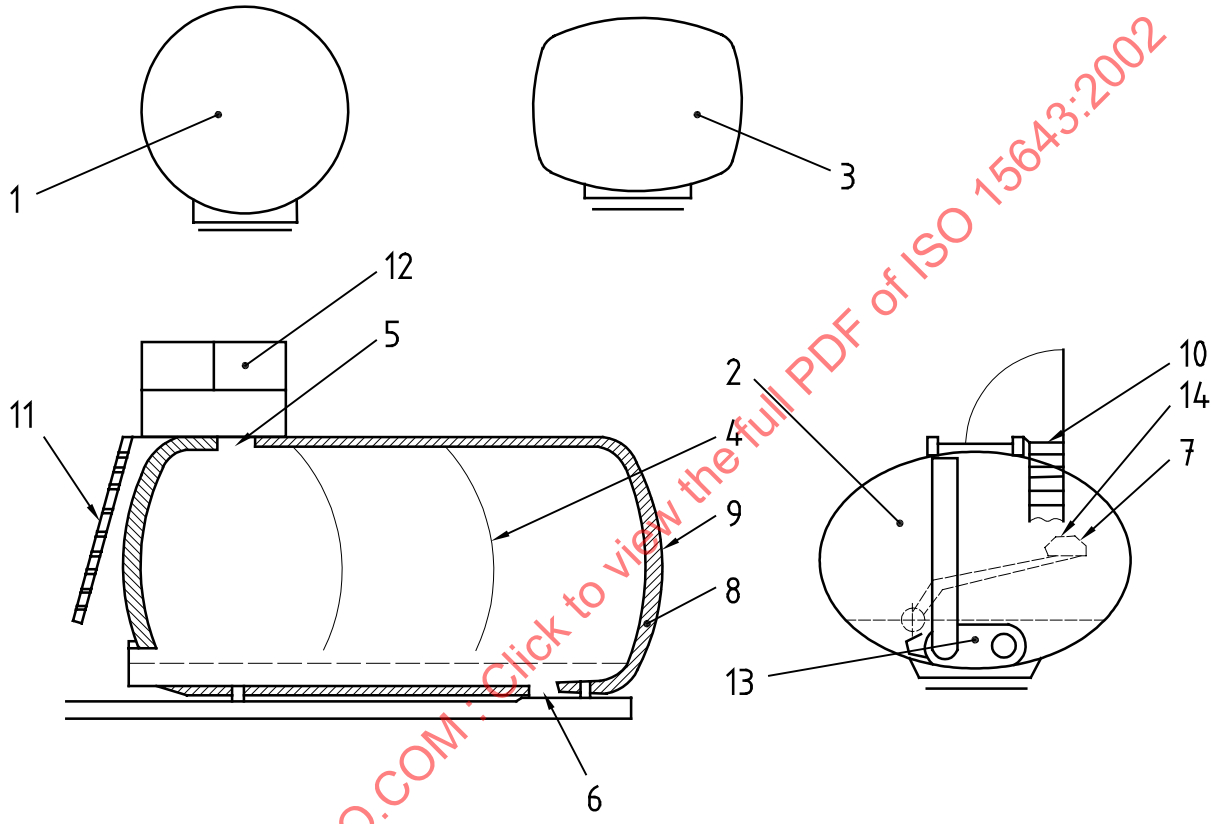
— heating device (see 13 in Figure 2);

— direct heating:

  — by open flame (see 1 in Figure 3),

  — by electricity (see 2 in Figure 3);

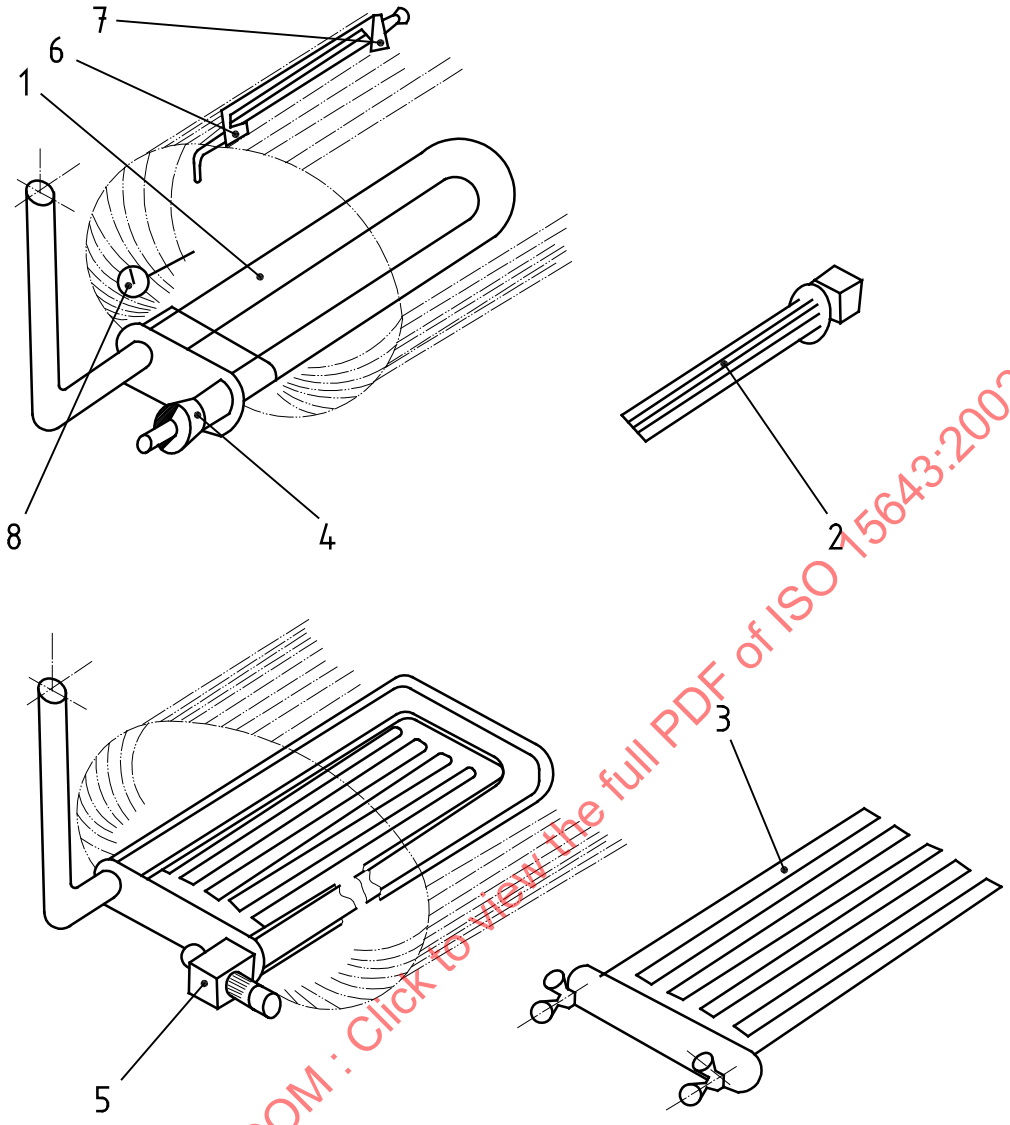
— indirect heating by thermal oil (see 3 in Figure 3).



Key

1 Circular tank
2 Elliptical tank
3 Prismatic tank with round corners
4 Wash plate partition
5 Inspection hole
6 Cleaning orifice
7 Level indicator
8 Thickness of thermal insulation
9 Thermal insulation
10 Access platform
11 Ladder for access to inspection hole
12 Guard rail
13 Heating device
14 Detector for minimum/maximum level of binder

Figure 2 — Bituminous binder tank performance



Key

1 Direct heating by open flame
2 Direct electric heating
3 Indirect heating installation by hot oil
4 Hot oil installation with manual burner control
5 Hot oil installation with automatic burner control
6 Venting device
7 Pressure and vacuum relief valve
8 Thermostat

Figure 3 — Heating installation of bituminous binder tank

4.4 Burner

The following characterisitics shall be specified:

— manual burner control (see 4 in Figure 3);

— automatic burner control (see 5 in Figure 3);

— detector for minimum binder level (see 14 in Figure 2);

— detector for maximum binder level (see 14 in Figure 2);

— venting device (see 6 in Figure 3);

— pressure and vacuum relief valve (see 7 in Figure 3);

— thermometer;

— thermostat (see 8 in Figure 3).

4.5 Binder transfer unit: bitumen pumping and transmission characteristics

The following characterisitics shall be specified:

— displacement pump (see 1 in Figure 4):

  — rotation speed min^{-1},

  — output dm^3/min;

— pump heating;

— filter (see 2 in Figure 4);

— transmission:

  — mechanical (see 3 in Figure 4),

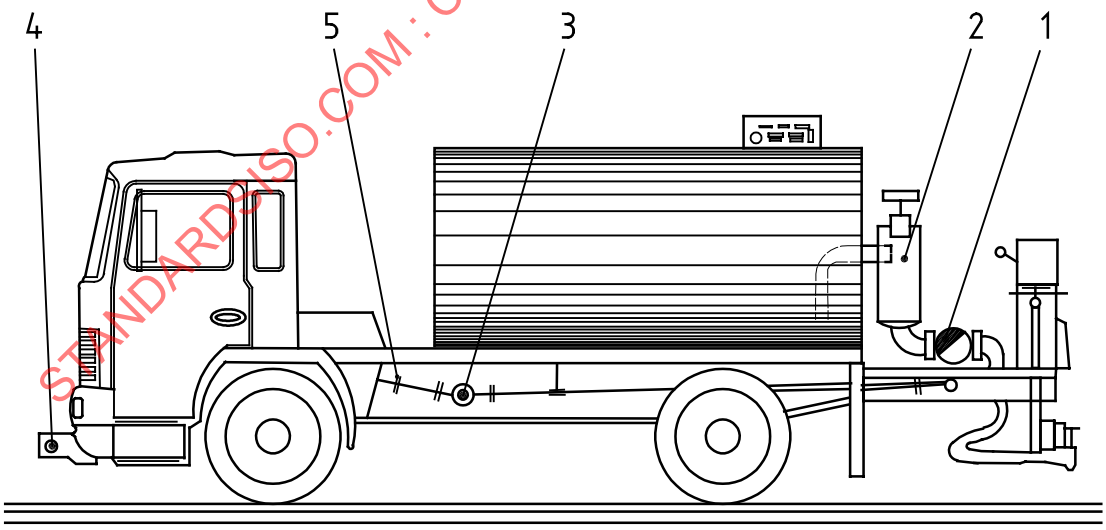
  — hydrostatic (alternatively);

— power take-off on engine (see 4 in Figure 4);

— power take-off on gearbox (see 5 in Figure 4);

— auxiliary engine (see 2 in Figure 5);

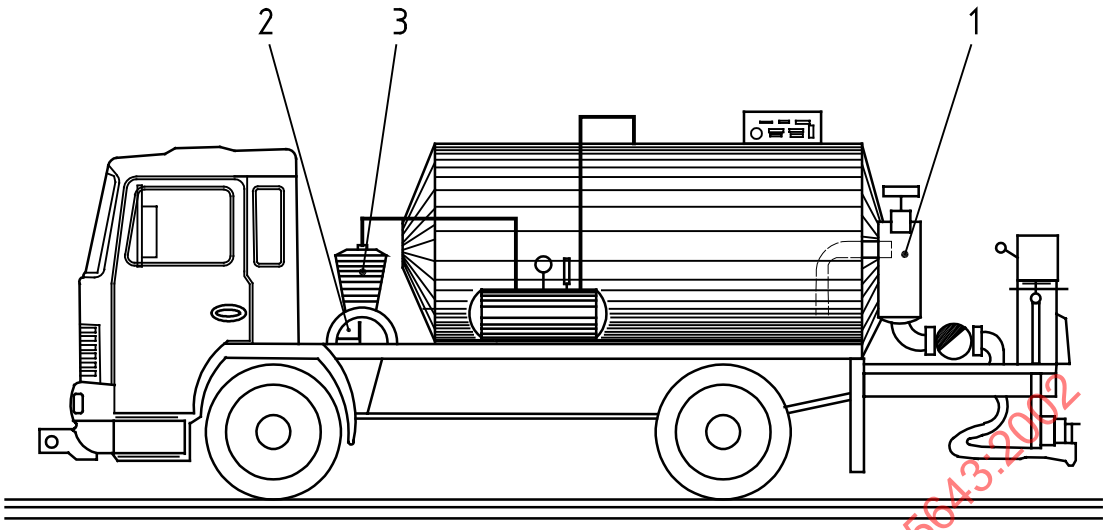
— compressor (see 3 in Figure 5).



Key

1 Bitumen displacement pump
2 Bitumen filter
3 Bitumen pump drive
4 Power take-off on engine
5 Power take-off on gearbox

Figure 4 — Spreader with displacement pump for bitumen pumping



Key

1 Bitumen filter
2 Auxiliary engine for driving compressor
3 Air compressor

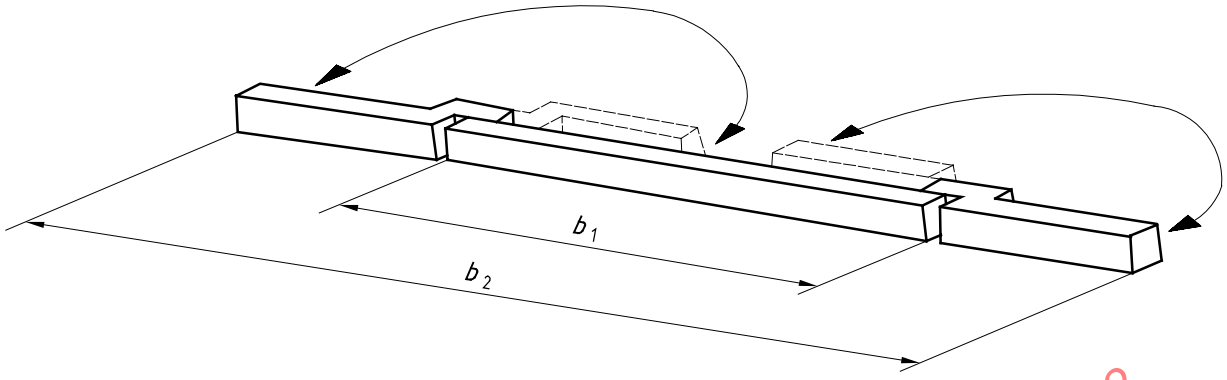
Figure 5 — Constant pressure spreader with air compressor for bitumen feeding

4.6 Spray bar: performance and characteristics

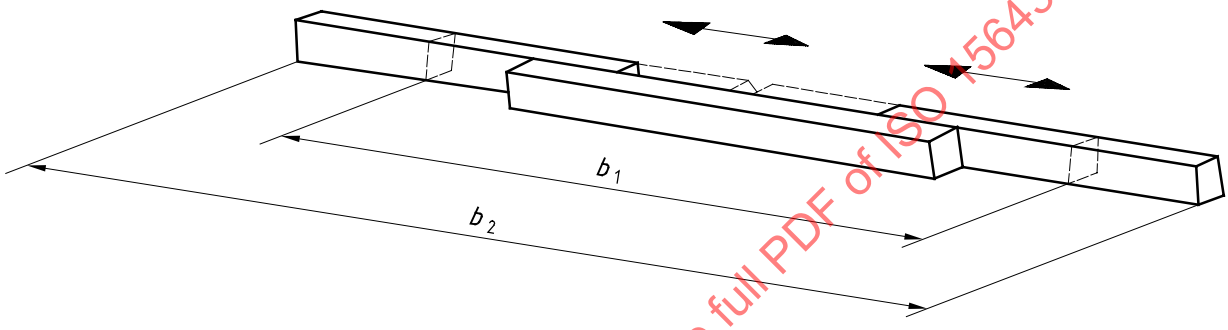
The following characterisitics shall be specified:

— bar raising method:
  — mechanical,
  — pneumatic,
  — hydraulic;
— spreading height (see Figure 7), h_2 mm;
— height of spray bar in transport mm;
— minimum width of bar in transport position, b_1 mm;
— maximum width of bar in working position, b_2 mm;
— bar width (see Figure 7), b_3 mm;
— automatic correction of spray bar height during spreading, or without correction;
— pressure in the bar during operation Mpa;
— bar heated by:
  — circulation of binder,
  — hot oil,
  — electric resistor;

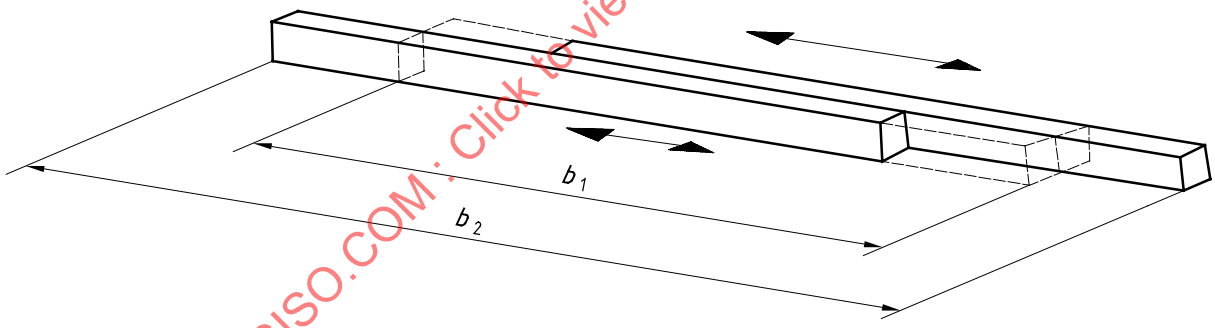
- spreading width:
  - full portion width (see Figure 7), b_4 mm,
  - medium width (see Figure 7), b_5 mm,
  - covered width (see Figure 7), b_6 mm;
- nozzles (see 4 in Figure 7):
  - number of nozzles,
  - nozzles control,
  - individual diffuser (see 5 in Figure 7),
  - collective diffuser for two nozzles or more,
  - mechanical,
  - pneumatic,
  - hydraulic,
  - spacing of nozzles (Figure 7), b_7 mm,
  - binder jet shape: coniform or flat (see 3 in Figure 7),
  - end flow correcting nozzle (see 4 in Figure 7);
- position of nozzles:
  - embedded in the spray bar,
  - outside the spray bar;
- orientation of nozzles (Figure 7), α 1°.



a) Spray bar with central unit and two folding extensions



b) Spray bar with central unit and two pull-out extensions

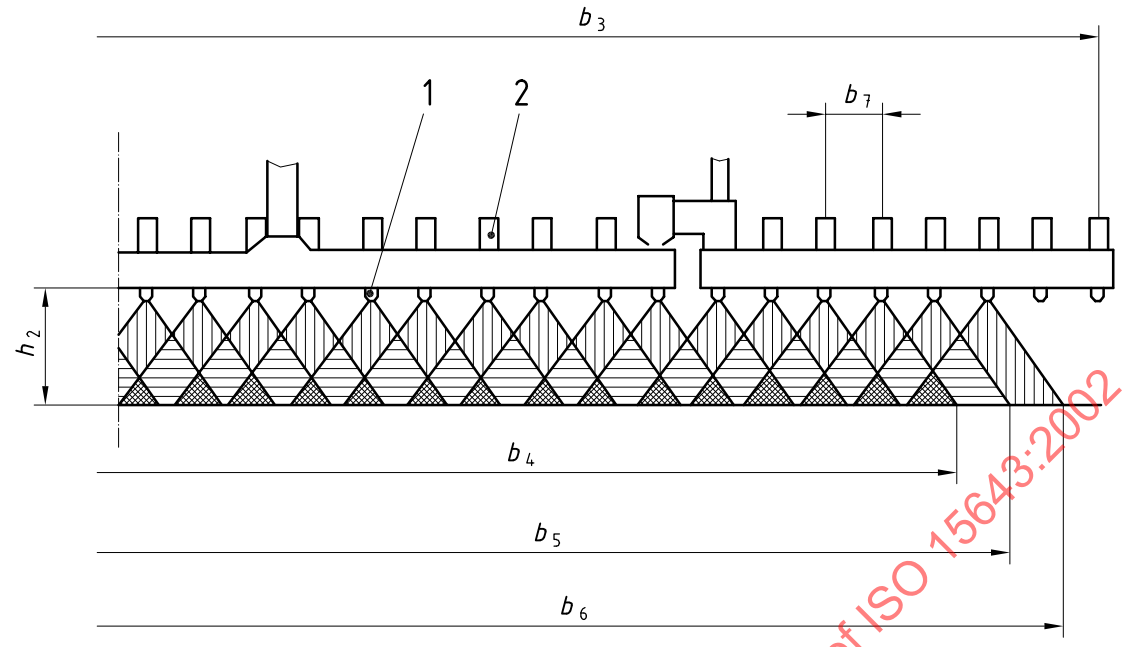


c) Bar in two pull-out extensions

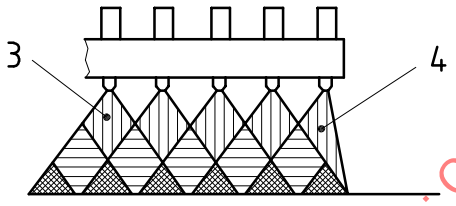
b_1 Minimum width of bar in transport position

b_2 Maximum width of bar in working position

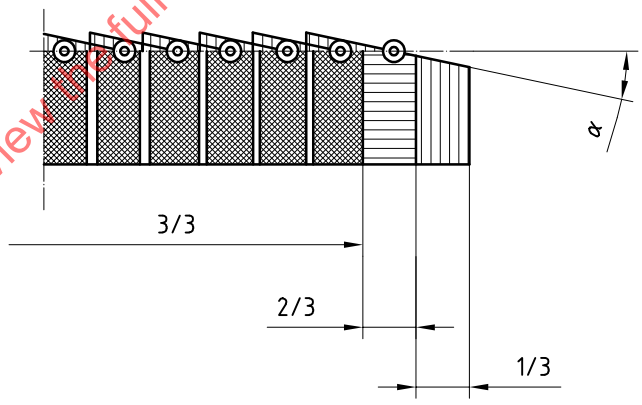
Figure 6 — Different designs of spray bar set-up



a) Spray bar composed of central unit and two extensions



b) Extension bar with correcting nozzle



c) Spray bar with the width of the pavement covered with three (3/3), two (2/3) and one (1/3) nozzle(s)

b_3 Bar width
b_4 Full portion spreading width
b_5 Medium spreading width
b_6 Covered spreading width
b_7 Spacing of nozzles
h_2 Spreading height
α Angle of nozzle placing in top view

Key

1 Nozzle
2 Individual nozzle
3 Flat binder jet shape
4 End flow correcting nozzle

Figure 7 — Spacing of nozzles and binder jet shape