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**Road construction and maintenance  
equipment — Bituminous binder  
sprayers and synchronous bituminous  
binder sprayers-chip spreaders  
— Terminology and commercial  
specifications**

*Équipements pour la construction et l'entretien des routes —  
Répanduses de liants bitumineux et répanduses-gravillonneurs  
synchrones — Terminologie et spécifications commerciales*



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# Contents

Page

|                                                                                                                  |           |
|------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Foreword</b>                                                                                                  | <b>iv</b> |
| <b>1 Scope</b>                                                                                                   | <b>1</b>  |
| <b>2 Normative references</b>                                                                                    | <b>1</b>  |
| <b>3 Terms and definitions</b>                                                                                   | <b>1</b>  |
| <b>4 Description of sprayer components</b>                                                                       | <b>3</b>  |
| 4.1 Transport vehicle                                                                                            | 3         |
| 4.2 Tank                                                                                                         | 3         |
| 4.3 Binder transfer device                                                                                       | 3         |
| 4.4 Spray bar                                                                                                    | 3         |
| 4.5 Control station                                                                                              | 3         |
| <b>5 Commercial specifications of bituminous binder sprayers and spraying part of synchronised combined unit</b> | <b>4</b>  |
| 5.1 General                                                                                                      | 4         |
| 5.2 Binder sprayer components list                                                                               | 4         |
| 5.3 Vehicle characteristics                                                                                      | 6         |
| 5.4 Tank: performance and characteristics                                                                        | 7         |
| 5.4.1 General characteristics                                                                                    | 7         |
| 5.4.2 Binder tank performance                                                                                    | 7         |
| 5.5 Burner                                                                                                       | 9         |
| 5.6 Binder transfer unit: bitumen pumping and transmission characteristics                                       | 10        |
| 5.7 Spray bar: performance and characteristics                                                                   | 11        |
| 5.8 Control station performance                                                                                  | 15        |
| 5.8.1 Positioning, control and adjustment equipment                                                              | 15        |
| 5.8.2 Automatic measuring and control equipment                                                                  | 15        |
| <b>6 Commercial specifications of spreading part of synchronised combined units</b>                              | <b>15</b> |
| 6.1 Components list of spreading part of combined units                                                          | 15        |
| 6.2 Control station performance                                                                                  | 16        |
| 6.2.1 Positioning, control and adjustment equipment                                                              | 16        |
| 6.2.2 Automatic measuring and control equipment                                                                  | 17        |
| 6.3 Chip hopper: performance and characteristics                                                                 | 17        |
| 6.4 Chip spreader: performance and characteristics                                                               | 18        |
| <b>Bibliography</b>                                                                                              | <b>21</b> |

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 15643:2002), which have been technically revised. It also incorporates the Amendment ISO 15643:2002/Amd 1:2012.

The main changes compared to the previous edition are as follows:

- adjusted the use of the terms "spread" and "spray" throughout the document;
- added [Figure 1 c](#)) — Trailed binder sprayer;
- added chip spreaders;
- corrected the references for most of the figures.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Road construction and maintenance equipment — Bituminous binder sprayers and synchronous bituminous binder sprayers-chip spreaders — Terminology and commercial specifications

## 1 Scope

This document establishes the terminology and the content of commercial literature specifications for bituminous binder sprayers and synchronous bituminous binder sprayers-chip spreaders (i.e. synchronised combined units) including their components and their technical characteristics.

This document covers cold and hot bituminous binder sprayers.

## 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.

ISO 15644, *Road construction and maintenance equipment — Chippings spreaders — Terminology and commercial specifications*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15644 and the following apply.

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

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

### 3.1

#### **bituminous binder sprayer**

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

Note 1 to entry: The particular sprayer types may be defined by associating the operating principle, the shape of the components, the type of binder, and by specifying the spraying performances.

### 3.2

#### **synchronised combined unit**

#### **synchronous bituminous binder sprayer-chip spreader**

machine which consists of a combination of *bituminous binder sprayer* (3.1) and chip spreader, used to make synchronised application of bituminous binder and chips on a pavement at predetermined application rate for a complete road surface treatment

### 3.3

#### **displacement pump sprayer**

*bituminous binder sprayer* (3.1) in which bituminous binder transfer from the storage tank to the spray bar is provided by a pump

Note 1 to entry: The pump's output is proportional to its rotating speed which may be controlled by the vehicle movement speed.

### 3.4

#### **constant pressure sprayer**

*bituminous binder sprayer* (3.1) in which bituminous binder transfer from the storage tank to the spray bar is provided by pressurizing the binder

Note 1 to entry: 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.

### 3.5

#### **heat-insulated sprayer**

machine in which the tank is equipped with thermal insulation to avoid heat loss

### 3.6

#### **directly heated sprayer**

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

Note 1 to entry: See [Figure 4](#).

### 3.7

#### **indirectly heated sprayer**

machine with heating provided by circulation of a hot liquid supplied by a generator outside or inside the sprayer

Note 1 to entry: See [Figure 4](#).

### 3.8

#### **hot bituminous binder sprayer**

machine which enables application of binder at a temperature greater than 100 °C

### 3.9

#### **cold bituminous binder sprayer**

machine which sprays binders at a temperature lower than 100 °C

### 3.10

#### **tank volume**

internal volume of the tank

Note 1 to entry: It is expressed in cubic metres.

### 3.11

#### **rated capacity**

volume of binder which can be carried

Note 1 to entry: It is expressed in cubic metres, taking into account that the nominal loading of the tank depends on the density of bituminous binder.

### 3.12

#### **spray bar width**

distance between end flow points

Note 1 to entry: It is expressed in metres.

### 3.13

#### **maximum output of a pumping unit**

largest capacity for a binder with a viscosity of 100 mm<sup>2</sup>/s

Note 1 to entry: It is expressed in cubic metres per hour.

**3.14****nominal application rate**

application rate at *maximum output of a pumping unit* (3.13) moving at a speed of 4 km/h with a binder of a density of 1 g/cm<sup>3</sup> and a viscosity of 100 mm<sup>2</sup>/s and with maximum *spray bar width* (3.12)

Note 1 to entry: It is expressed in kilograms per square metre.

**3.15****binder carrying capacity**

difference between the laden and kerb mass of a sprayer or *synchronised combined unit* (3.2)

**3.16****spraying height**

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

Note 1 to entry: It is expressed in millimetres.

Note 2 to entry: See  $h_2$  in [Figure 8](#).

**4 Description of sprayer components****4.1 Transport vehicle**

The vehicle, in the form of a truck, trailer or semi-trailer, carries all the components and provides movement of the sprayer during spraying and during road transfers.

**4.2 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 prevent loss of heat, e.g. a heat-insulated sprayer.

**4.3 Binder transfer device**

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

**4.4 Spray bar**

The spray bar distributes the binder uniformly across the pavement.

**4.5 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.

## 5 Commercial specifications of bituminous binder sprayers and spraying part of synchronised combined unit

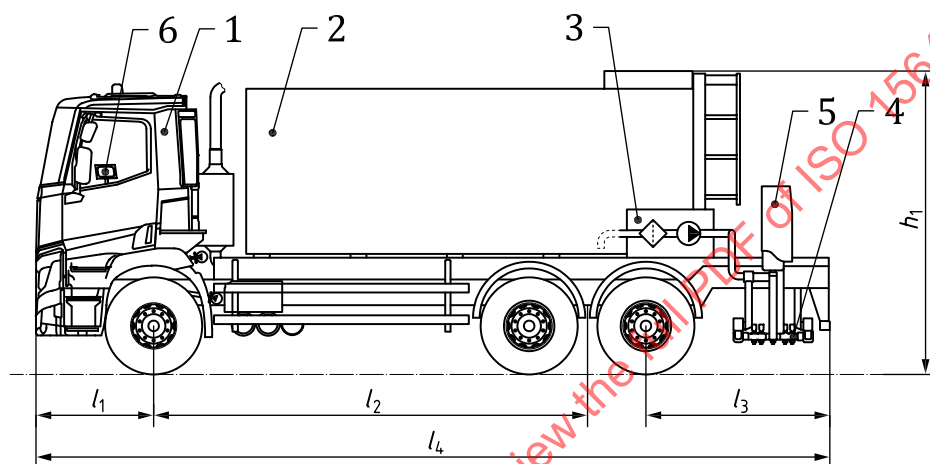
### 5.1 General

The components and dimensions of a bituminous binder sprayer and spraying part of a synchronised combined unit shall be specified according to [Clause 4](#) and [5](#).

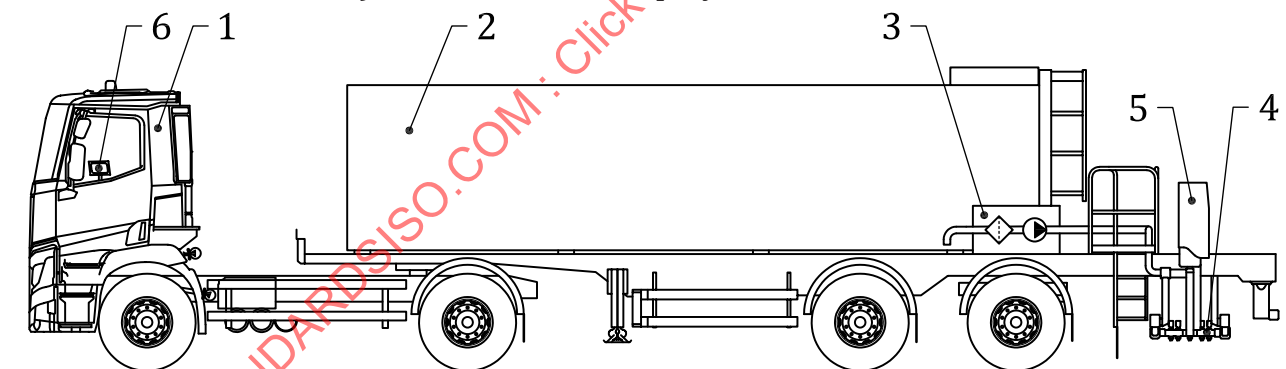
The spreading part of a synchronised combined unit shall be specified according to [Clause 6](#).

### 5.2 Binder sprayer components list

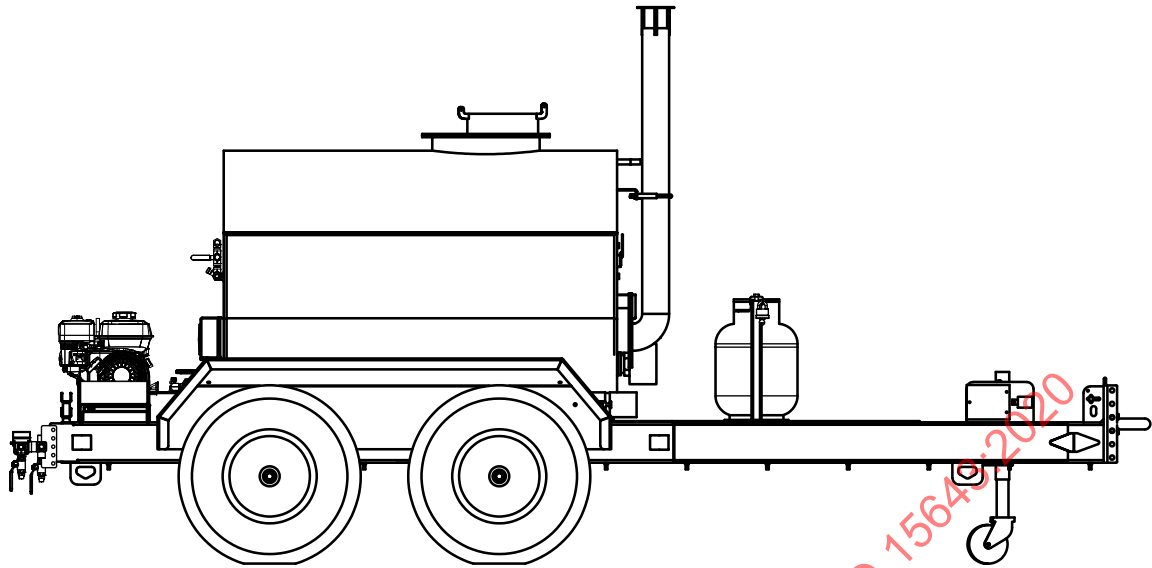
Examples of sprayer component lists are shown in [Figures 1 a\), b\), c\)](#) and [Figure 2 a\) and b\)](#).



a) Bituminous binder sprayer on 3-axe truck



b) Bituminous binder sprayer on semi-trailer

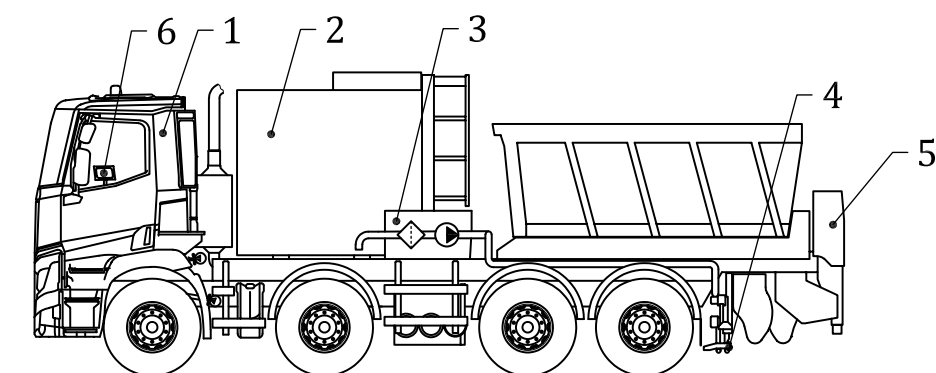


c) Trailed bituminous binder sprayer

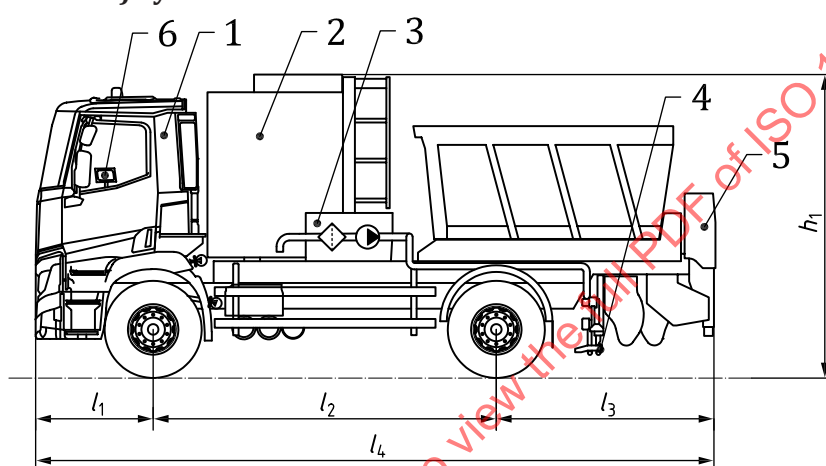
**Key**

- |       |                      |       |                                                                                          |
|-------|----------------------|-------|------------------------------------------------------------------------------------------|
| 1     | vehicle              | 5     | measuring instruments placed in driver's cab or on the rear part of the vehicle platform |
| 2     | tank                 | 6     | measuring instruments placed in driver's cab or on the rear part of the vehicle platform |
| 3     | binder transfer unit |       |                                                                                          |
| 4     | spray bar            |       |                                                                                          |
| $l_1$ | front overhang       | $l_2$ | wheel base                                                                               |
| $l_3$ | rear overhang        | $l_4$ | length                                                                                   |
| $h_1$ | height               |       |                                                                                          |

**Figure 1 — Bituminous binder sprayer**



a) Synchronised combined unit on 4-axle truck



b) Synchronised combined unit on 2-axle truck

**Key**

|       |                      |       |                                                                                          |
|-------|----------------------|-------|------------------------------------------------------------------------------------------|
| 1     | vehicle              | 5     | measuring instruments placed in driver's cab or on the rear part of the vehicle platform |
| 2     | tank                 | 6     | measuring instruments placed in driver's cab or on the rear part of the vehicle platform |
| 3     | binder transfer unit | $l_2$ | wheel base                                                                               |
| 4     | spray bar            | $l_4$ | length                                                                                   |
| $l_1$ | front overhang       |       |                                                                                          |
| $l_3$ | rear overhang        |       |                                                                                          |
| $h_1$ | height               |       |                                                                                          |

**Figure 2 — Synchronised combined unit**

### 5.3 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.

## 5.4 Tank: performance and characteristics

### 5.4.1 General characteristics

The following characteristics shall be specified:

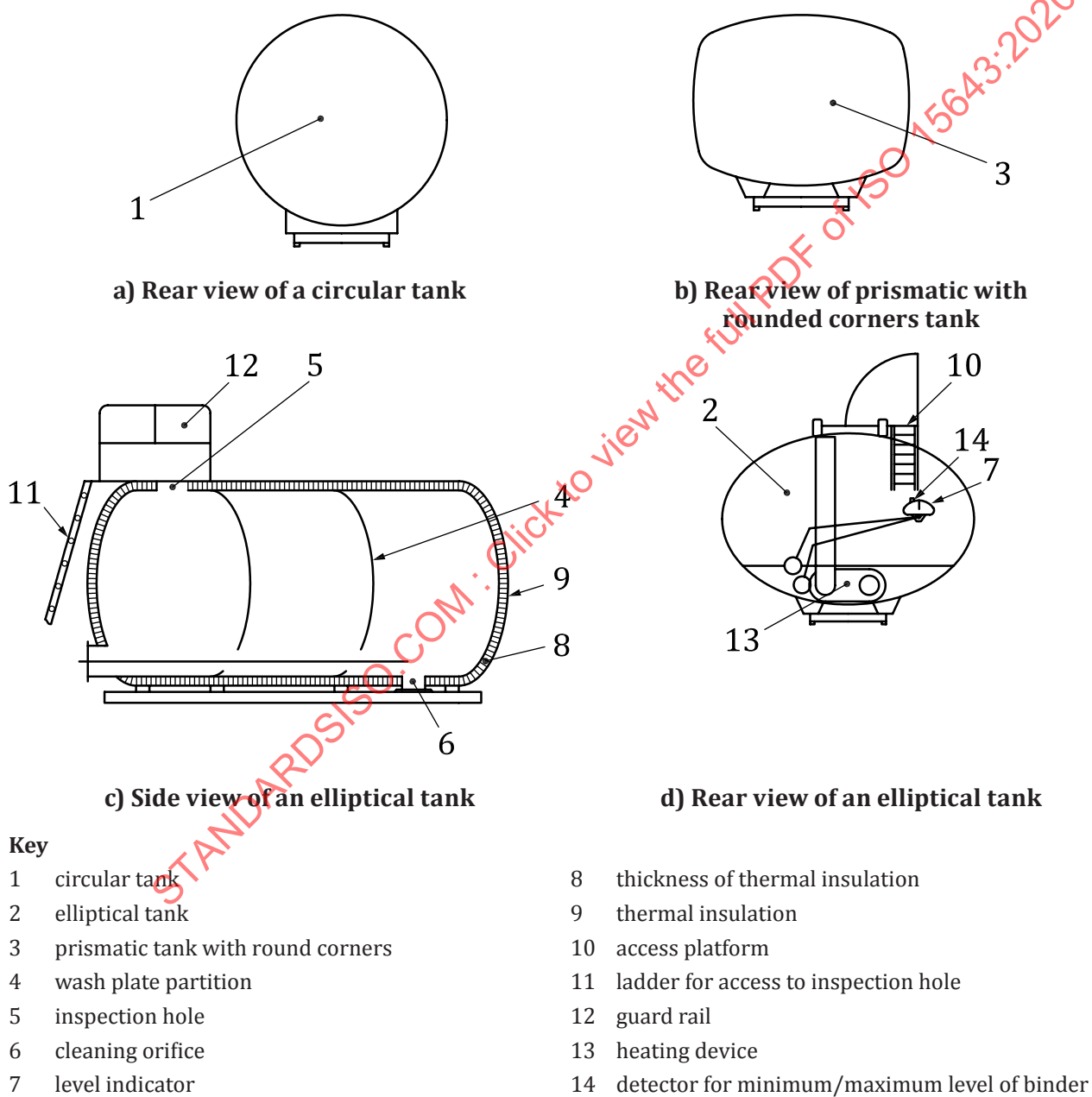
- tank volume, m<sup>3</sup>;
- rated capacity, m<sup>3</sup>;
- working pressure, MPa.

### 5.4.2 Binder tank performance

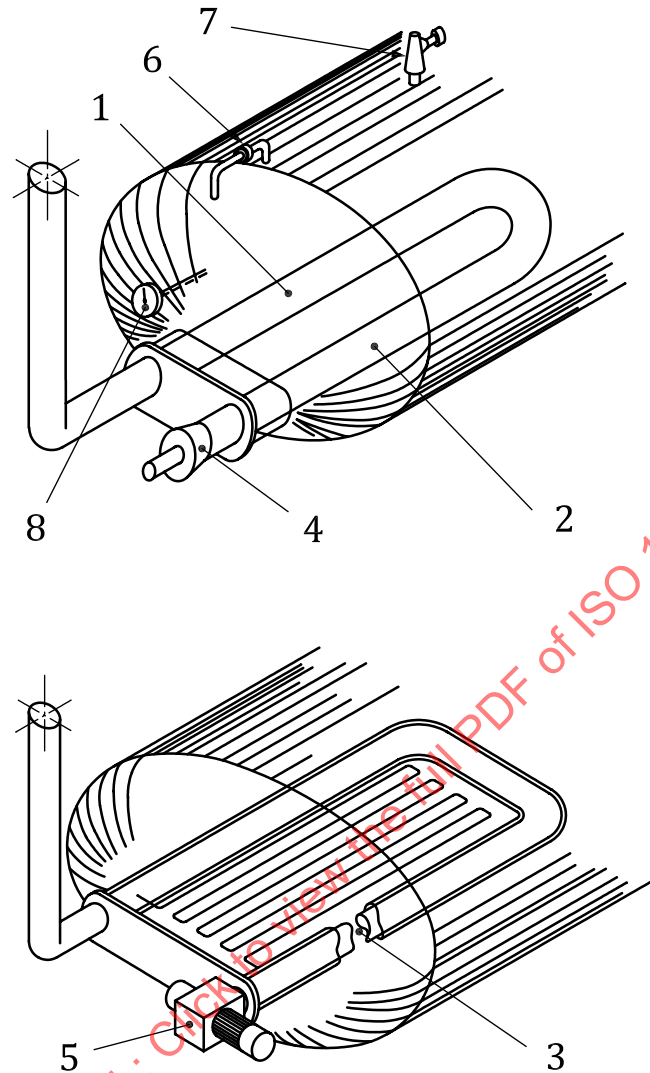
The following units of the binder tank shall be specified (see [Figures 3](#) and [4](#)):

- tank itself, of the following geometrical shapes:
  - circular (see key 1 in [Figure 3](#));
  - elliptical (see key 2 in [Figure 3](#));
  - prismatic with rounded corners (see key 3 in [Figure 3](#));
- wash plate partition (see key 4 in [Figure 3](#));
- inspection hole (see key 5 in [Figure 3](#));
- cleaning orifice (see key 6 in [Figure 3](#));
- level indicator (see key 7 in [Figure 3](#));
- insulation of heat-insulated sprayer: type and thickness (see key 8 in [Figure 3](#));
- insulation protective coating of heat-insulated sprayer (see key 9 in [Figure 3](#));
- access equipment:
  - platform (see key 10 in [Figure 3](#));

- access ladder to inspection hole (see key 11 in [Figure 3](#));
- guard rail (see key 12 in [Figure 3](#));
- heating device (see key 13 in [Figure 3](#)):
  - direct heating:
    - by open flame (see key 1 in [Figure 4](#));
    - by electricity (see key 2 in [Figure 4](#));
  - indirect heating by thermal oil (see key 3 in [Figure 4](#)).



**Figure 3 — Bituminous binder tank performance**



#### Key

- |   |                                              |   |                                  |
|---|----------------------------------------------|---|----------------------------------|
| 1 | direct heating by open flame                 | 5 | heating with automatic burner    |
| 2 | direct electric heating                      | 6 | venting device                   |
| 3 | indirect heating installation by thermal oil | 7 | pressure and vacuum relief valve |
| 4 | heating with manual burner                   | 8 | thermostat                       |

**Figure 4 — Heating installation for directly or indirectly heated sprayer**

### 5.5 Burner

The following characteristics shall be specified:

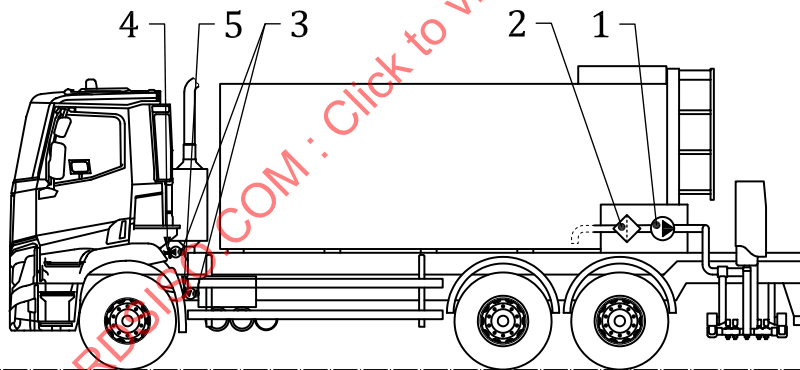
- manual burner control (see key 4 in [Figure 4](#));
- automatic burner control (see key 5 in [Figure 4](#));
- detector for minimum binder level (see key 14 in [Figure 3](#));
- detector for maximum binder level (see key 14 in [Figure 3](#));
- venting device (see key 6 in [Figure 4](#));
- pressure and vacuum relief valve (see key 7 in [Figure 4](#));

- thermometer;
- thermostat (see key 8 in [Figure 4](#)).

## 5.6 Binder transfer unit: bitumen pumping and transmission characteristics

The following characteristics shall be specified:

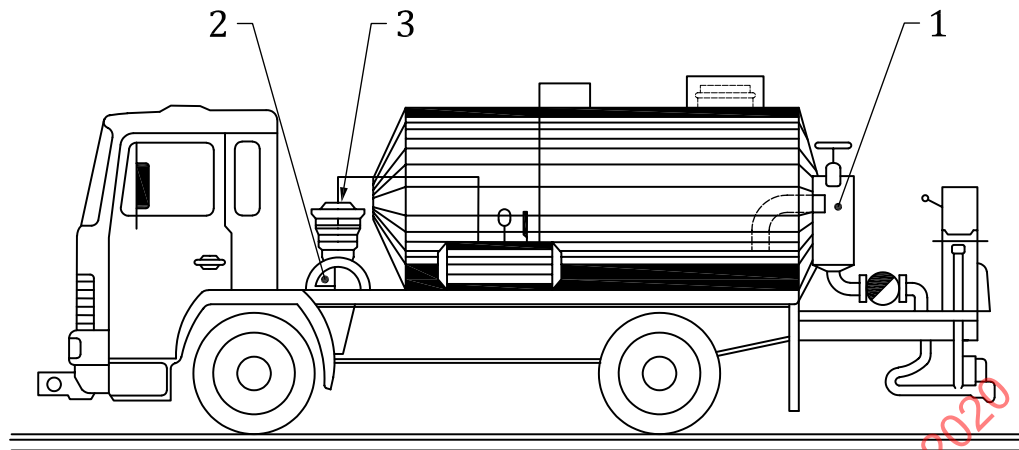
- displacement pump (see key 1 in [Figure 5](#)):
  - rotation speed,  $\text{min}^{-1}$ ,
  - output,  $\text{dm}^3/\text{min}$ ;
- pump heating;
- filter (see key 2 in [Figure 5](#));
- transmission:
  - mechanical (see key 3 in [Figure 5](#));
  - hydrostatic (alternatively);
- power take-off on engine (see key 4 in [Figure 5](#));
- power take-off on gearbox (see key 5 in [Figure 5](#));
- auxiliary engine (see key 2 in [Figure 6](#));
- compressor (see key 3 in [Figure 6](#)).



### 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 5 — Displacement pump sprayer

**Key**

- 1 bitumen filter
- 2 auxiliary engine for driving compressor
- 3 air compressor

**Figure 6 — Constant pressure sprayer with air compressor for bitumen feeding**

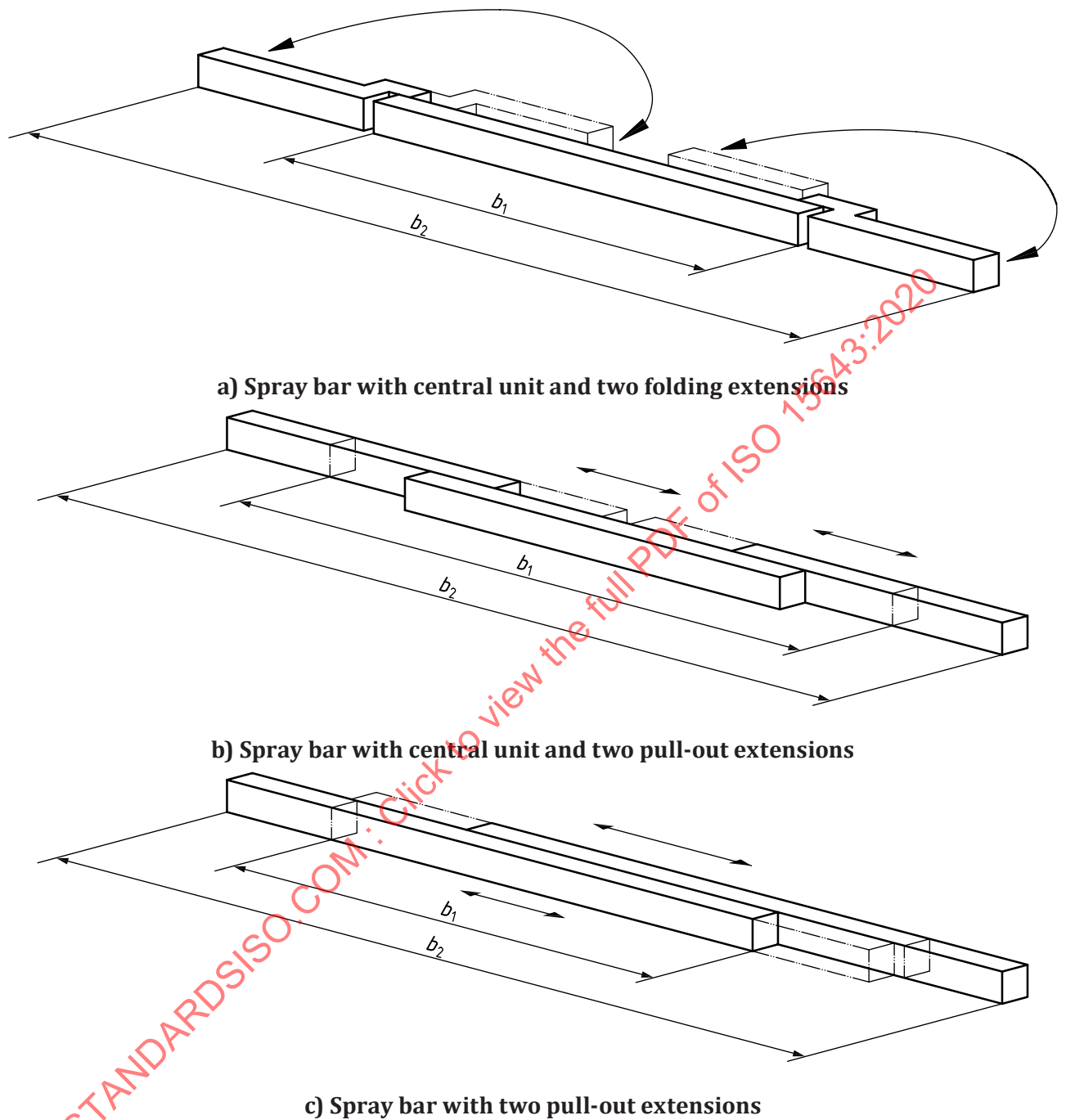
### 5.7 Spray bar: performance and characteristics

The following characteristics shall be specified:

- design type of spray bar set-up (see [Figure 7](#));
- bar raising method:
  - mechanical;
  - pneumatic;
  - hydraulic;
- spraying height (see [Figure 8](#)),  $h_2$ , 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 8](#)),  $b_3$ , mm;
- automatic correction of spray bar height during spraying, or without correction;
- pressure in the bar during operation, MPa;
- bar heated by:
  - circulation of binder;
  - thermal oil;
  - electric resistor;
- spraying width:
  - full portion width (see [Figure 8](#)),  $b_4$ , mm;

- medium width (see [Figure 8](#)),  $b_5$ , mm;
- covered width (see [Figure 8](#)),  $b_6$ , mm;
- nozzles (see key 1 in [Figure 8](#)):
  - number of nozzles;
  - nozzles control (see key 2 in [Figure 8](#));
  - type of diffuser (individual or collective for two nozzles or more):
    - mechanical;
    - pneumatic;
    - hydraulic;
  - spacing of nozzles ([Figure 8](#)),  $b_7$ , mm;
  - binder jet shape: coniform or flat (see key 3 in [Figure 8](#));
  - end flow correcting nozzle (see key 4 in [Figure 8](#));
  - position of nozzles:
    - embedded in the spray bar;
    - outside the spray bar;
  - orientation of nozzles ([Figure 8](#)),  $\alpha^\circ$ .

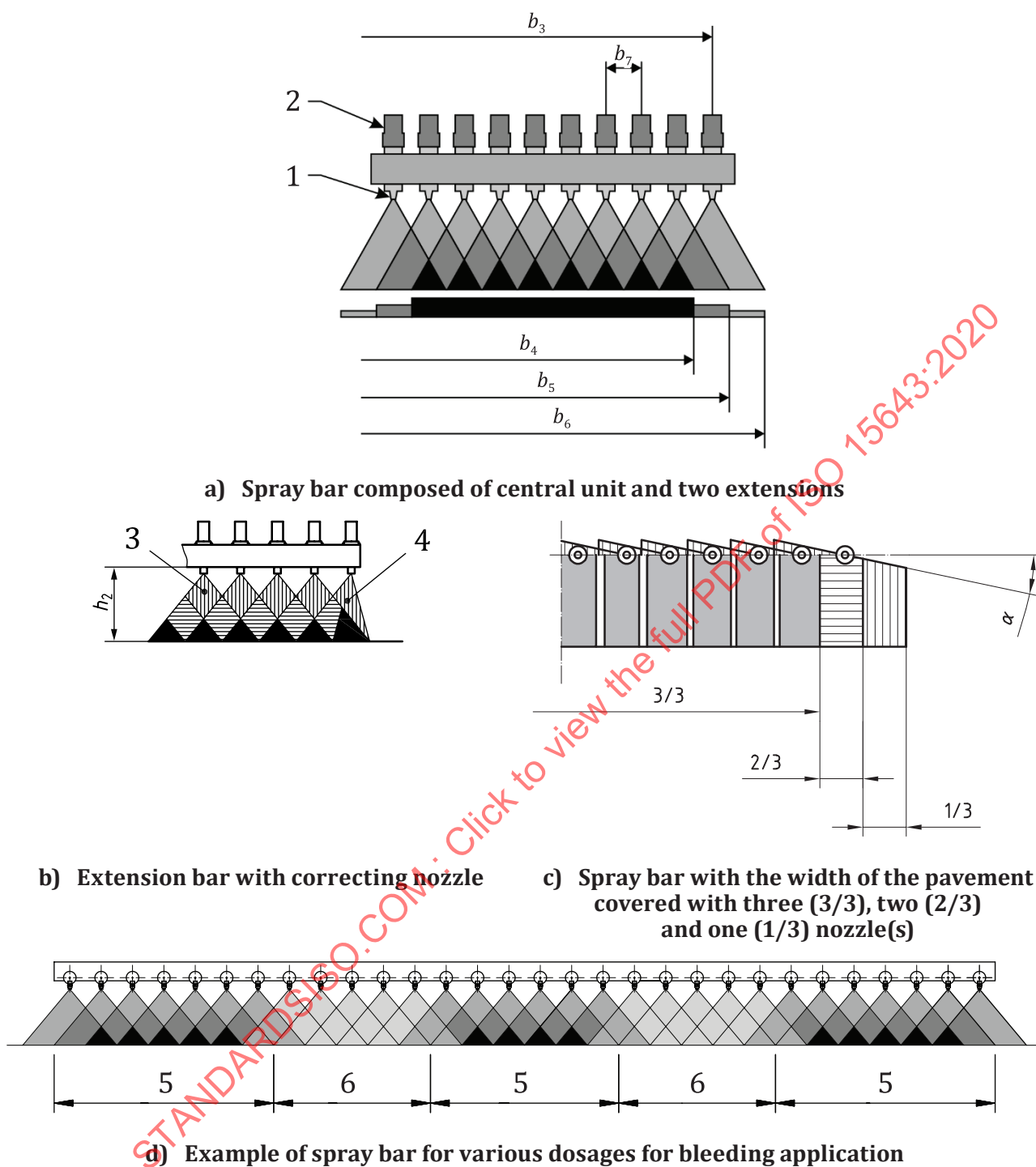
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**Key**

- $b_1$  minimum width of bar in transport position  
 $b_2$  maximum width of bar in working position

**Figure 7 — Different designs of spray bar set-up**



# Key

- 1 nozzle
- 2 nozzle control
- 3 flat binder jet shape
- 4 end flow correcting nozzle
- 5 nominal dosage (e.g. 1,5 kg/m<sup>2</sup>)
- 6 complementary dosage (e.g. 1,3 kg/m<sup>2</sup>)
- $\alpha$  angle of nozzle placing in top view

- $b_3$  bar width
- $b_4$  full portion spraying width
- $b_5$  medium spraying width
- $b_6$  covered spraying width
- $b_7$  spacing of nozzles
- $h_2$  spraying height

Figure 8 — Spacing of nozzles and binder jet shape

## 5.8 Control station performance

### 5.8.1 Positioning, control and adjustment equipment

The type of equipment shall be specified for adjustment of:

- spray bar height;
- opening of nozzles;
- general control;
- individual control;
- transverse movement of the spray bar;
- spraying width.

### 5.8.2 Automatic measuring and control equipment

The following equipment shall be specified:

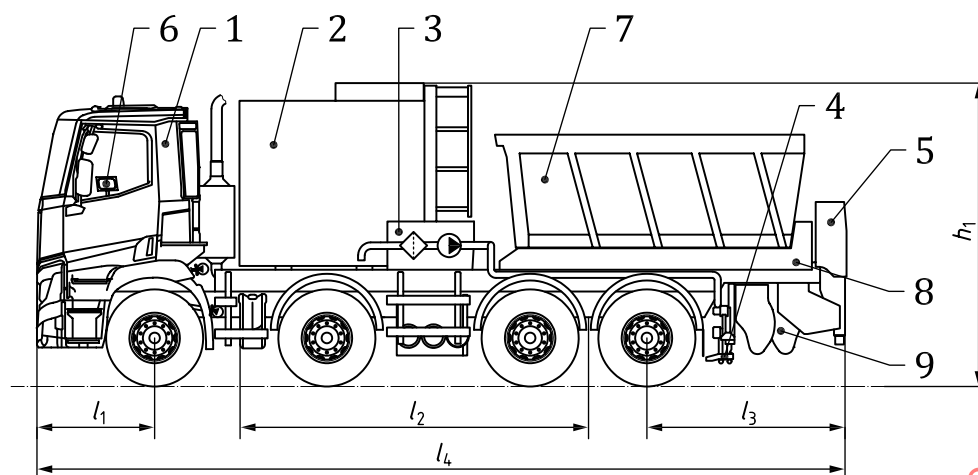
- nominal application rate, kg/m<sup>2</sup>;
- pump speed indicator, min<sup>-1</sup>;
- truck speed indicator, km/h;
- spray bar pressure gauge, MPa;
- binder temperature in tank, °C;
- binder density, g/cm<sup>3</sup>;
- binder viscosity, mm<sup>2</sup>/s;
- automatic correction device for spray bar height, mm;
- automatic proportioning control and adjustment box;
- control to move the vehicle forward at regular speed;
- means of displaying, printing and storing parameters during adjustment and spraying;
- remote control box.

## 6 Commercial specifications of spreading part of synchronised combined units

### 6.1 Components list of spreading part of combined units

The components of the spreading part of synchronised combined units and their dimensions shall be specified according to [6.2](#) and [6.3](#).

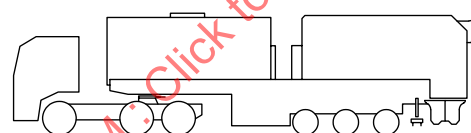
Examples of synchronised combined units are shown in [Figures 9, 10 and 11](#).



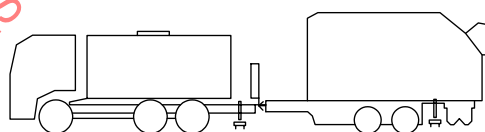
**Key**

|                                                                                            |                      |
|--------------------------------------------------------------------------------------------|----------------------|
| 1 vehicle                                                                                  | 7 chip hopper        |
| 2 tank                                                                                     | 8 receiving hopper   |
| 3 binder transfer unit                                                                     | 9 chip spreader      |
| 4 spray bar                                                                                | $h_1$ overall height |
| 5 measuring instruments placed in driver's cab or on the rear part of the vehicle platform | $l_1$ front overhang |
| 6 measuring instruments placed in driver's cab or on the rear part of the vehicle platform | $l_2$ wheel base     |
|                                                                                            | $l_3$ rear overhang, |
|                                                                                            | $l_4$ overall length |

**Figure 9 — Truck-mounted synchronised combined unit**



**Figure 10 — Semi-trailer synchronised combined unit**



**Figure 11 — Bituminous binder sprayer and towed spreader**

## 6.2 Control station performance

### 6.2.1 Positioning, control and adjustment equipment

In addition to 5.8.1, the following equipment related to aggregates shall be specified for adjustment of:

- opening of gates;
- general control;
- individual control.