BS EN 15906:2011

BSI Standards Publication

Winter maintenance equipment — Snow removal machines with rotating tools — Specification and clearing capacity

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 15906:2011.

The UK participation in its preparation was entrusted to Technical Committee B/513, Construction equipment and plant and site safety.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 65730 6

ICS 43.160

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2011.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15906

November 2011

ICS 43.160

English Version

Winter maintenance equipment - Snow removal machines with rotating tools - Specification and clearing capacity

Matériel de viabilité hivernale - Machines de déneigement à outils rotatifs - Spécifications et capacité de déneigement

Winterdienstausrüstung - Schneeräummaschinen mit rotierenden Werkzeugen - Spezifikation und Räumleistung

This European Standard was approved by CEN on 8 October 2011.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 15906:2011: E

Contents

Page

Figures

Tables

Foreword

This document (EN 15906:2011) has been prepared by Technical Committee CEN/TC 337 "Winter maintenance and road service area maintenance equipment", 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of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by May 2012.

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements for snow removal machines with rotating tools for winter application on traffic areas. It is valid for design and construction. It also includes the minimum requirement concerning contents of the operating instructions.

This European Standard applies to:

— snow blowers;

— snow cutters;

— snow cutter blowers;

and related products such as side blowers, side cutters, etc.

This European Standard does not apply for:

— requirements for registration and approval;

— vehicle manufacturer requirements;

— safety requirements.

2 Normative references

The following referenced documents are indispensable for the application 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 15144:2007, *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 15432-1, *Winter and road service area maintenance equipments - Front-mounted equipments - Part 1: Fixed front mounting plates*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15144:2007 apply.

NOTE If the term "Snow removal machine" is used in the following text, it applies to one or more different models of snow removal machines with rotating tools.

4 Technical data

4.1 General

This clause contains the minimum necessary technical data for a machine description explained for the three types of machines:

4.2 Snow blower

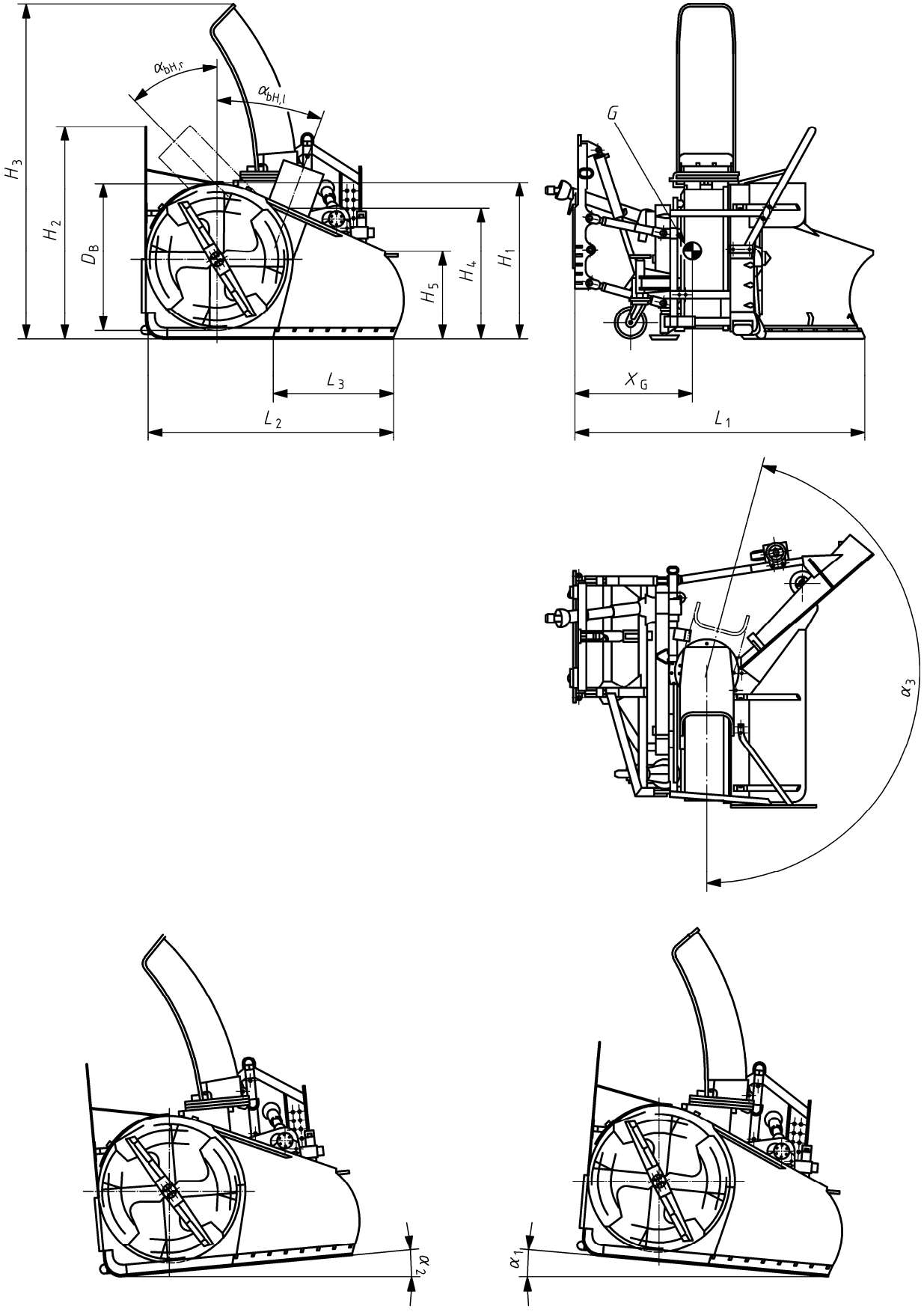


Figure 1 ***(continued)***

Key

H_1	clearing head height	(mm)
H_2	height including cutting knives	(mm)
H_3	height including standard chute	(mm)
H_4	max. height of feed plough	(mm)
H_5	min. height of feed plough	(mm)
L_1	clearing head length	(mm)
L_2	clearing width	(mm)
L_3	length of feed plough (clearing length of cutting edge)	(mm)
D_B	blower wheel diameter	(mm)
$\alpha_{bH, l}$	rotating angle of blower housing to the left side	(°)
$\alpha_{bH, r}$	rotating angle of blower housing to the right side	(°)
G	position of centre of gravity	
X_G	distance between centre of gravity and mounting level	(mm)
α_1	lateral inclination to the left side	(°)
α_2	lateral inclination to the right side	(°)
α_3	rotating angle of the chute	(°)

Figure 1 — Dimensions of snow blower

Additional data for snow blower:

— C_C snow clearing capacity (t/h)

— P_D driving power (kW)

— W weight (Basic machine, workable) (t)

4.3 Snow Cutter

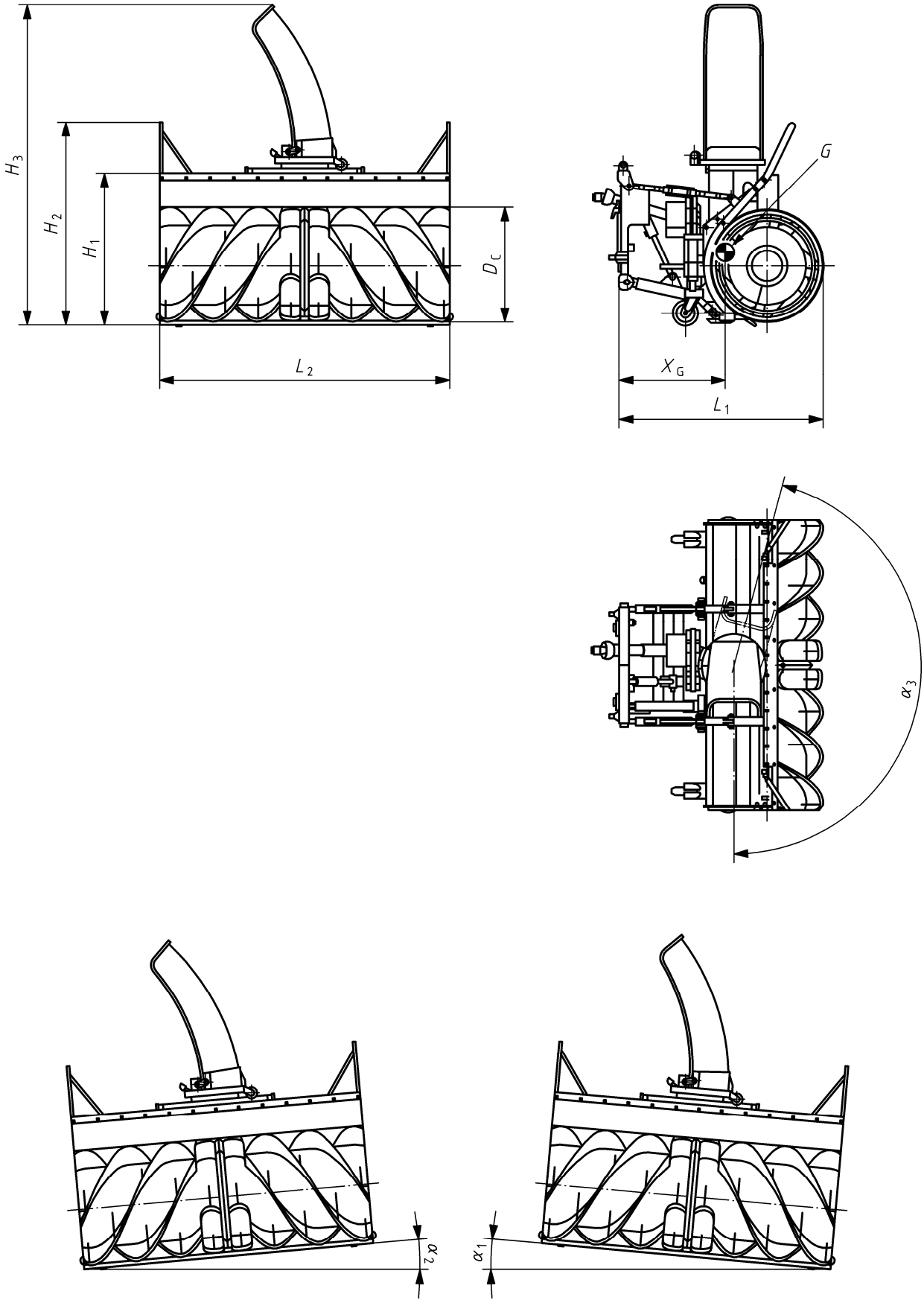


Figure 2 ***(continued)***

Key

H_1	clearing head height	(mm)
H_2	height including cutting knives	(mm)
H_3	height including standard chute	(mm)
L_1	clearing head length	(mm)
L_2	clearing width	(mm)
D_c	cutter drum diameter	(mm)
G	position of centre of gravity	
X_G	distance between centre of gravity and mounting level	(mm)
α_1	lateral inclination to the left side	(°)
α_2	lateral inclination to the right side	(°)
α_3	rotating angle of the chute	(°)

Figure 2 — Dimensions of snow cutter

Additional data for snow cutter:

— C_C snow clearing capacity (t/h)

— P_D driving power (kW)

— W weight (Basic machine, workable) (t)

4.4 Snow cutter blower

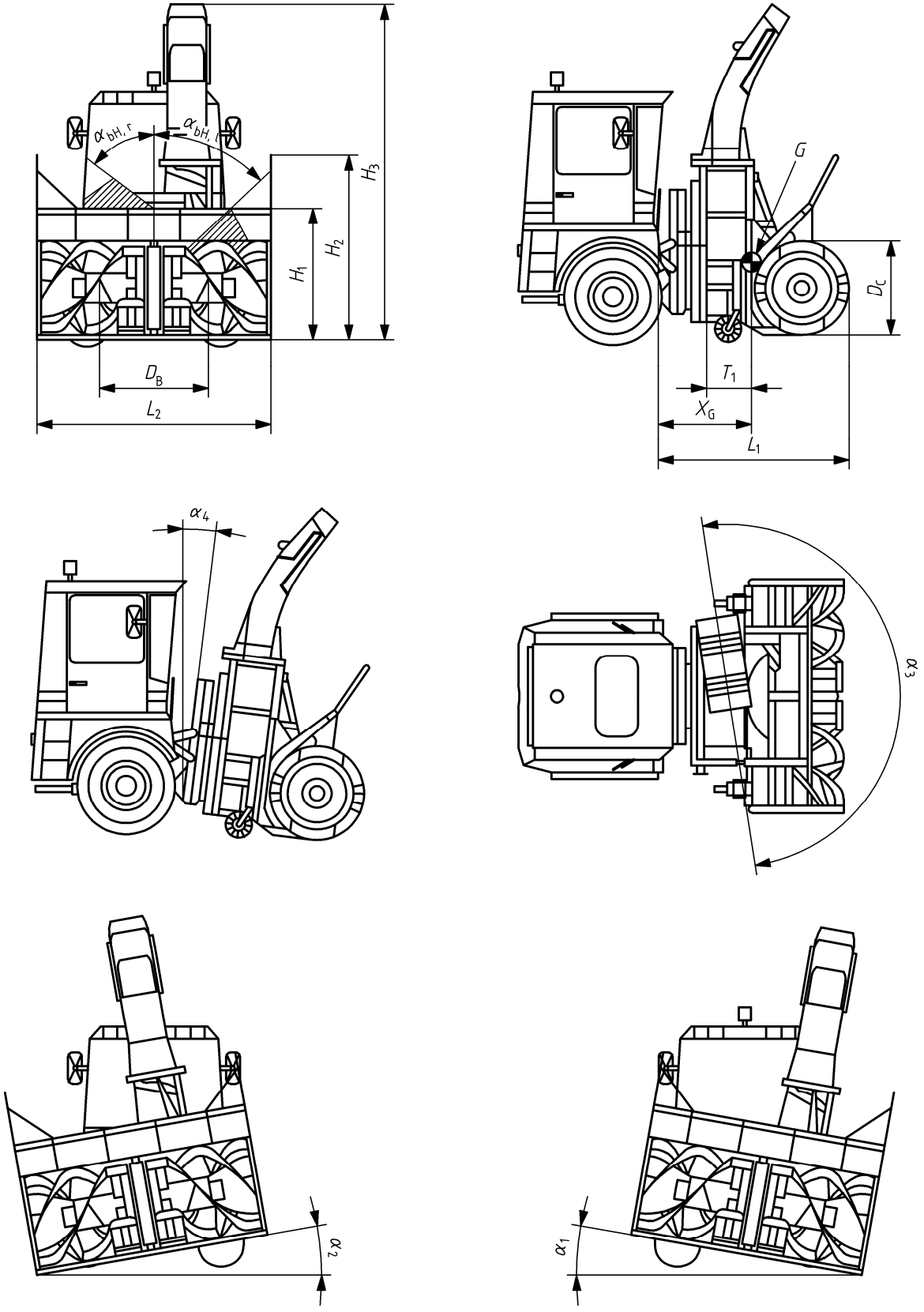


Figure 3 ***(continued)***

Key

H_1	clearing head height	(mm)
H_2	height including cutting knives	(mm)
H_3	height including standard chute	(mm)
L_1	clearing head length	(mm)
L_2	clearing width	(mm)
D_B	blower wheel diameter	(mm)
D_C	cutter drum diameter	(mm)
$\alpha_{bH,\ l}$	rotating angle of blower housing to the left side	(°)
$\alpha_{bH,\ r}$	rotating angle of blower housing to the right side	(°)
G	position of centre of gravity	
X_G	distance between centre of gravity and mounting level	(mm)
α_1	lateral inclination to the left side	(°)
α_2	lateral inclination to the right side	(°)
α_3	rotating angle of the chute	(°)
α_4	forward titling angle	(°)
T_1	depth of blower wheel housing	(mm)

Figure 3 — Dimensions of snow cutter blower

Additional data for snow cutter:

— C_C snow clearing capacity (t/h)

— P_D driving power (kW)

— W weight (basic machine, workable) (t)

5 Requirements

5.1 General

The snow removal machine shall be designed to enable handling during winter service and efficient mounting onto and demounting from a carrier vehicle. The snow removal machine shall be designed to clear snow off traffic areas and deposit it targeted aside or load it on a vehicle platform. The mounting shall be possible on vehicles with standards according to EN 15431 and EN 15432-1.

5.2 Quality of clearing

The snow removal machine shall attain an even clearing pattern.

The following characteristics are essential here:

— smooth running characteristics;

— adjustment according to profile and angle of the clearing area;

— adjustment of clearing speed (see 5.5);

— equipment for targeted snow throw-out;

— use of suitable scraper blades, sliding equipment or castor wheels;

— maximum utilization of drive power for clearing performance;

— clearly organized and logical control elements.

5.3 Snow removal performance

5.3.1 General

The measuring of the snow clearing capacity is based on the amount of snow removed over time. For a precise gauging the following parameters shall be taken into account:

— measurement period;

— clearing width;

— clearing height;

— removal speed;

— average snow density;

— consistency of the snow;

— throw-out distance;

— throw-out direction.

5.3.2 Requirements for testing snow removal performance

— Snow density σ: average from 3 vertical measuring points from every 10 m horizontal intervals (see Figure 4) left and right along the removal measuring path. Every volume specimen should be at least min. 0,001 m³ (specimen diameter = 0,1 m).

— Throw-out distance: throw-out direction should be 90° to the removal direction and horizontal to the deposited snow. Measuring distance is between the main focus point of the deposited snow and the middle of the snow removal machine (see Figure 5). Snow pick-up and snow deposition should be on the same height level.

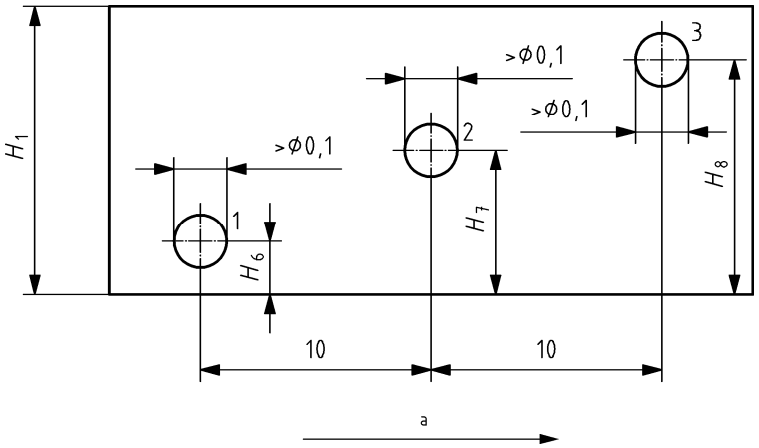
— Measurement period: at least 1 minute or one measuring path of minimum 30 m.

— The clearing height shall remain constant during the measuring procedure.

— The measurement shall be performed over a continuous application. The phase of starting the snow removal before the measuring distance shall not be taken into the calculation.

— The throw-out distance to determine the maximum clearing capacity shall be between 5 m and 10 m.

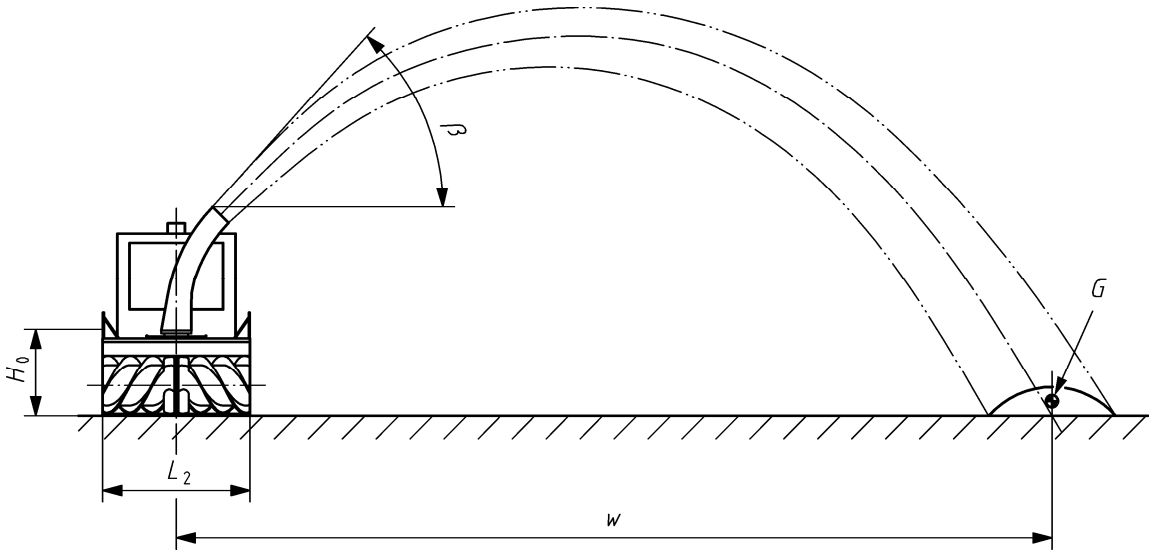
Dimensions in metres



Key

H_1	clearing head height in metre
1	measuring point 1: (H_6 = 30 % of the rotating tool diameter)
2	measuring point 2: (H_7 = 50 % of the rotating tool diameter)
3	measuring point 3: (H_8 = 70 % of the rotating tool diameter)
a	moving direction

Figure 4 — Measuring points for snow density measurement



Key

L_2	clearing width
H_0	clearing height
w	throw-out distance
G	main focus point of deposited snow
β	throw-out angle

Figure 5 — Throw-out distance measurement

Further information necessary for measurement:

— consistency of snow: dry snow, wet snow, icy snow, compressed snow;

— removal speed: average speed of travel during the measurement procedure calculated with clearing distance and measured time.

$$v = \frac{s}{t} \quad (1)$$

where

v is the removal speed in metre per second;
s is the clearing distance in metre;
t is the measured clearing time in second.

— clearing height: average removed snow height during the measurement procedure;

— throw-out direction: deviation in degrees from the direction of travel.

Formula for precise calculation of snow removal performance:

$$C_C = 3{,}6 \cdot 10^{-3} \cdot L_2 \cdot H_C \cdot \sigma \cdot v \quad (2)$$

where

C_C is the clearing capacity tons per hour;
L_2 clearing width in millimetre;
H_C clearing height in millimetre;
σ snow density in tons per cubic metre;
v removal speed in meter per second.

5.4 Overload protection

The snow removal machine shall be equipped with safety mechanisms that will protect the machine from damage that may be caused by foreign objects in the snow (e.g. stones). The safety mechanisms can be a mechanical, hydraulic or other system. Parts that wear, such as shear-bolts, shall be easy to replace.

5.5 Removal speed

A minimum removal speed of 0,1 m/s shall be possible at full power.

5.6 Throw-out control

Targeted snow-throw shall be possible. The control for this should be actuated remotely.

5.7 Raising and lowering of snow removal machines

The snow removal machine shall allow, independent of the vehicle, a raising height of 200 mm. In addition, the snow removal machine shall allow a lowering of 100 mm under the traffic area.

5.8 Support while working

The snow removal machine shall be able to adapt to the unevenness of the sub-grade or to smoothen to a targeted level. Suitable supports (sliding shoes, castor wheels, etc.) or respective control is to be used. Parts that wear should be simply changed.

5.9 Transportation lock

The snow removal machine should be positioned as close as possible parallel to the traffic area during transportation. In transport position, a lock shall prevent the machine against unintentional lowering. The necessary view of the driver to the traffic area shall be guaranteed also in transport position.

5.10 Operation with the communal hydraulics of the carrier vehicle

When operating with the communal hydraulic system of the carrier vehicle, EN 15431 shall be observed.

5.11 Repairs, maintenance and service

Operational repairs, maintenance and service works should be easily possible with standard tools by the operating people. If special tools should be necessary they shall be provided by the manufacturer.

Outdoor storing shall be possible without any impairment on functionality of any part.

5.12 Scraper blades

The scraper blades shall meet the following requirements:

— wear without creating sharp splinters;

— reliable fastening;

— easy replacement;

— high durability.

5.13 Parking support

The parking support should allow for easy and safe storage of the disassembled snow removal machine.

5.14 Data logging

EN 15430-1 should be used for recording and transmitting any data.

5.15 Reliability

Snow removal machines should guarantee as standard a reliable operation between – 20 °C and + 20 °C. Movable parts should not be blocked by the influence of ice.

For lower temperatures, special protections recommended and specified by the manufacturer, shall be made.

5.16 Corrosion protection

Hollows in the driver's cabin and in the chassis should be protected against corrosion.

6 Operating manual

The following points should be observed in the operating manual:

— declaration of confirmation (DOC);

— observation of the permitted axle loads and balancing of the vehicle and the respective construction guidelines;

— observation of national regulations;

— reference to suitable controls;

— minimum total width and height (drive-through width and height);

— reference to vehicle specific limitations;

— short form of operating manual.

7 Spare part list

All parts that are important for safety, wear and repair shall be listed in the spare part list.

8 Inspection

The inspection methods for checking the requirements in Clause 5 are listed in the following Table 1.

Table 1 — Inspection methods

Requirements		Inspection method	
Paragraph	**Quality**	**Visual inspection**	**Functional testing**
According to Clause 5			x
	Operating manual	x	

Annex A
(informative)

Snow removal performance measuring — Example for data collecting form

NOTE The user of the form is allowed to copy this present form.

Measurement no.:	Machine type:	Serial no.:
Carrier vehicle:	Engine power:	Snow chains: yes: no:
Clearing head drive:	mechanical:	hydrostatic:
Vehicle drive:	mechanical:	hydrostatic:
Location:	Height above see level:	Air temperature:
Snow temperature:		
Date:	Operator:	Writer:

Clearing distance	s (m)	
measured clearing time	t (s)	
Clearing height Individual values	H_C (mm)	
average	$H_{C,m}$ (mm)	
Clearing width	L_2 (mm)	
Snow density average	σ (t/m³)	
Throw-out angle horizontal	β (°)	
Throw-out distance	w (m)	

$$v = \frac{s}{t} \tag{A.1}$$

$$C_C = 3{,}6 \cdot 10^{-3} \cdot L_2 \cdot H_{C,m} \cdot \sigma \cdot v \tag{A.2}$$

Remarks:

Bibliography

[1] EN 13021, *Winter service machines — Safety requirements*

[2] EN 15430-1, *Winter and road service area maintenance equipments — Data acquisition and transmission — Part 1: In vehicle data acquisition*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™