BRITISH STANDARD

BS 1703:2005

Refuse chutes and hoppers — Specification

ICS 13.030.40; 91.140.70

Confirmed December 2011

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Subcommittee B/508/1, Waste containers and associated lifting devices on refuse collection vehicles, upon which the following bodies were represented:

Association of Refuse Vehicles Manufacturers
BRE — Building Research Establishment
British Plastics Federation
CIWM — Chartered Institution of Wastes Management
Container Handling Equipment Manufacturers
Environmental Services Association
Galvanizers Association
ODPM — Represented by WRc
Public Authority Transport Network
Freight Transport Association
Society of Motor Manufacturers and Traders Limited

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Contents

Foreword

This British Standard has been prepared under the direction of Technical Committee B/508. It supersedes BS 1703:1997, which is withdrawn.

This British Standard was first prepared at the request of the Building Divisional Council in order to indicate a general design and suitable materials for refuse chutes for multi-storey buildings. Attention is drawn to British Standard BS 5906.

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

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Summary of pages
This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 11 and a back cover.

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1 Scope

This British Standard specifies requirements for gravity transport systems for refuse in multi-storey buildings, consisting of refuse chutes in the form of one or more vertical pipes, complete with hoppers, receiving refuse from successive floors in a building and discharging it into a refuse storage system.

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.

BS 65, *Specification for vitrified clay pipes, fittings and ducts, also flexible mechanical joints for use solely with surface water pipes and fittings.*

BS 476-4, *Fire tests on building materials and structures — Part 4: Non-combustibility test for materials.*

BS 476-22, *Fire tests on building materials and structures — Part 22: Methods for determination of the fire resistance of non-loadbearing elements of construction.*

BS 915-2, *High alumina cement — Part 2: Metric units.*

BS 1449-1, *Steel plate, sheet and strip — Part 1: Carbon and carbon manganese plate, sheet and strip.*

BS 2523, *Specification for lead-based priming paints.*

BS 5906, *Code of practice for storage and on-site treatment of solid waste from buildings.*

BS 5911-3, *Concrete pipes and ancillary concrete products — Part 3: Specification for unreinforced and reinforced concrete manholes and soakaways (complementary to BS EN 1917:2002).*

BS EN 573-3:1994, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition.*

BS EN 771-4, *Specification for masonry units — Part 4: Autoclaved aerated concrete masonry units.*

BS EN 840-1, *Mobile waste containers — Part 1: Containers with two wheels with a capacity from 80 l to 390 l for comb lifting devices — Dimensions and design.*

BS EN 840-2, *Mobile waste containers — Part 2: Containers with four wheels with a capacity from 500 l to 1200 l with flat lid(s), for trunnion and/or comb lifting devices — Dimensions and design.*

BS EN 840-3, *Mobile waste containers — Part 3: Containers with four wheels with a capacity from 770 l to 1300 l with dome lid(s), for trunnion and/or comb lifting devices — Dimensions and design.*

BS EN 840-4, *Mobile waste containers — Part 4: Containers with four 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.*

BS EN 840-5, *Mobile waste containers — Part 5: Performance requirements and test methods.*

BS EN 840-6, *Mobile waste containers — Part 6: Safety and health requirements.*

BS EN 1011-2, *Welding — Recommendations for welding of metallic materials — Part 2: Arc welding of ferritic steels.*

BS EN 1011-4, *Welding — Recommendations for welding of metallic materials — Part 4: Arc welding of aluminium and aluminium alloys.*

BS EN 1706:1998, *Aluminium and aluminium alloys — Castings — Chemical composition and mechanical properties.*

BS EN 10029, *Specifications for tolerances on dimensions, shape and mass for hot rolled steel plates 3 mm thick or above.*

BS EN 22063, *Metallic and other inorganic coatings — Thermal spraying — Zinc, aluminium and their alloys.*

BS EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods.*

3 Terms and definitions

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

3.1
chute
ventilated, essentially vertical, pipe passing from floor to floor of a building with openings as required to connect with hoppers and normally terminating at its lower end at the roof of the refuse storage chamber

3.2
chute extension
straight or sometimes offset section added to the lower end of the chute to direct the fall of refuse into the refuse container

3.3
hopper
a fitting into which refuse is placed and from which it passes into a chute or sometimes direct into a refuse container, consisting of a fixed frame and hood unit (the frame) and a hinged or pivoted combined door and receiving unit (the door)

3.4
hopper extension
apron or extension tray, additional to the receiving unit, which is provided to project refuse, at the correct angle from the hopper, direct into a refuse container

3.5
mouth
smallest cross sectional area of the clearway into the installed hopper when the door is fully opened

3.6
refuse storage chamber
compartment containing one or more containers into which refuse is discharged, and which can also house plant, such as a compactor, for the treatment of refuse before collection

3.7
refuse storage container
removable receptacle situated within the storage chamber and into which the refuse is discharged

3.8
shutter
device consisting of a cut-off plate and supporting frame to close off the chute at its base when it is required to withdraw the refuse container for emptying

3.9
throat
smallest cross sectional area of the clearway through the installed hopper when the door is fully closed

NOTE See Figure 3.

3.10
ventilating flue
pipe or shaft at the top of the chute to afford an outlet for foul air

NOTE See Figure 1.

4 Information to be provided by the purchaser

4.1 Chutes

For ordering purposes the purchaser shall provide the following information:

a) the number of this British Standard, i.e. BS 1703;

b) chute diameter;

c) material from which the chute is to be constructed;

d) details of the ventilating system to be used, including dimensions and materials for flue and roof terminals;

e) whether a chute extension is required, and, if so, whether it should be bifurcated;

f) the finish required for any chute extension, shutter, or ventilating flue;

g) whether separate access points for rodding are required.

4.2 Hoppers

For ordering purposes the purchaser shall provide the following information:

a) the number of this British Standard, i.e. BS 1703;

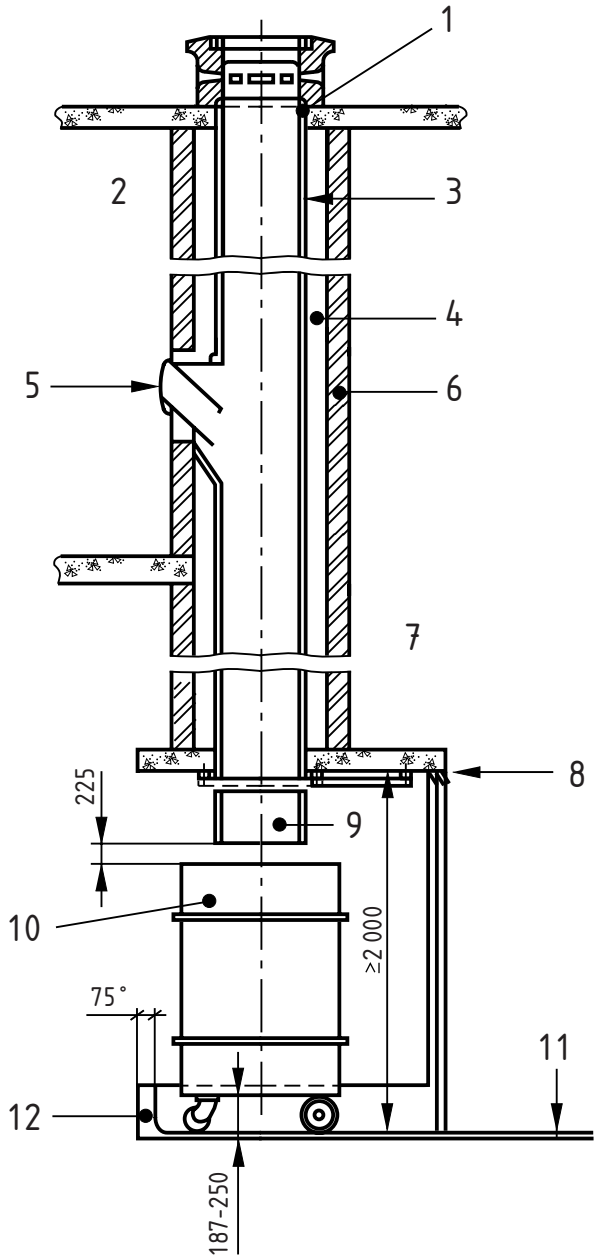
b) material from which the hopper is to be constructed;

c) finish required;

d) size of chute to which the hopper is to be connected;

e) whether a hopper extension is required, in which case dimensions and other details will be required by the manufacturer.

All dimensions are in millimetres — not to scale



Key

1 Ventilating outlet, taken above roof level

2 Chute with internal cross-sectional area not less than 0.035 m^2

3 Chute, preferably taken through next floor or roof slab. Alternatively, chute shall terminate not less than 0.3 m above the highest hopper, with vent pipe continuing to roof.

4 Weak concrete infill

5 Refuse hopper

6 Brick facing

7 Provision should be made for ground floor residents to discharge waste through hopper at half landing level

8 Refuse chute cut-off

9 Chute extension

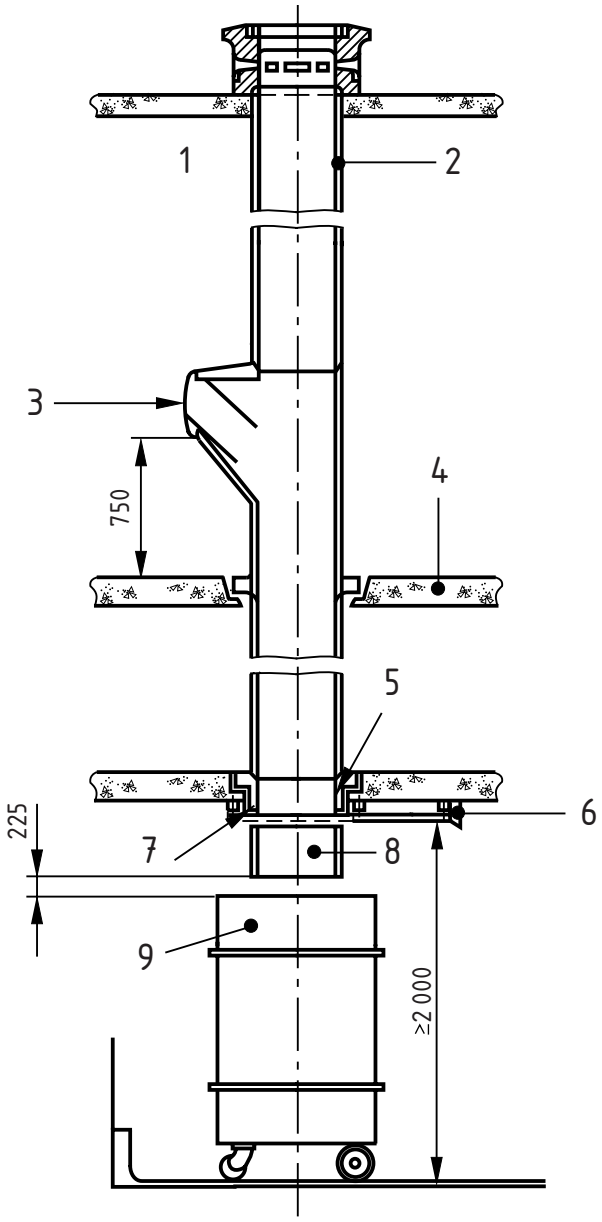
10 Container to BS EN 840 (all parts)

11 Smooth finish for container handling

12 Grano, taken up chamber walls all around 75 mm thick with covered base

Figure 1 — Section through a typical encased chute installation

All dimensions are in millimetres — not to scale



Key

1 Free standing chute, minimum internal cross-sectional area 0.035 m^2

2 Chute, preferably taken through next floor or roof slab. Alternatively, chute shall terminate not less than 0.3 m above the highest hopper, with vent pipe continuing to roof

3 Refuse hopper

4 Main structural floor

5 Collar unit

6 Refuse chute cut-off

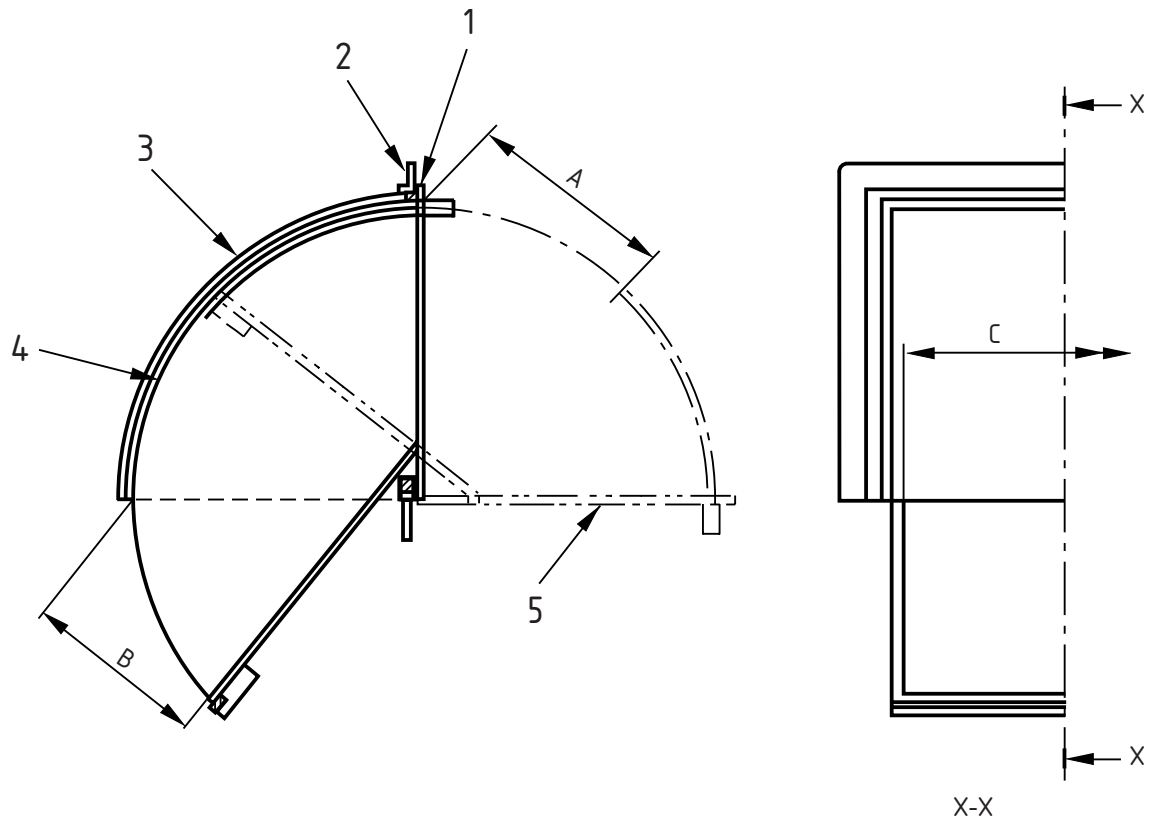
7 Chute to project 25 mm for drip

8 Chute extension

9 Container to BS EN 840 (all parts)

Figure 2 — Section through a typical free-standing chute installation

All dimensions are in millimetres — not to scale



Key

1 Door closed
2 Frame
3 Hood
4 Radial cheek
5 Door open
C Inside cheeks

NOTE 1 The hopper mouth is the rectangular area A × C, while the throat is the rectangular area B × C.
NOTE 2 Section X–X chain lines show door in open position.

Figure 3 — Hopper mouth and throat

5 Chutes

NOTE Typical refuse chute installations are shown in Figure 1 and Figure 2.

5.1 Materials

5.1.1 *General*

Chutes shall be formed of, or lined with, impervious materials with smooth inner surfaces. The materials shall be non-combustible when tested according to the requirements of BS 476-4. The materials shall be selected from:

a) clay pipes conforming to the requirements of BS 65;

b) concrete cylindrical pipes and fittings, conforming to the requirements of BS 5911-3;

c) heat resisting concrete made from a suitable heat resisting aggregate and high alumina cement conforming to the requirements of BS 915-2 and in accordance with the cement manufacturer's recommendations, when the chute concerned is not designed as a structural element;

d) precast concrete conforming to the requirements of BS EN 771-4, with compressive strength greater than 25 N/mm^2;

e) plain carbon steel sheet conforming to the requirements of BS 1449-1;

f) stainless steel sheet conforming to the requirements of BS EN 10029;

or materials of equivalent or better characteristics.

5.1.2 *Chute extension and shutter*

Chute extensions and shutters shall be of plain carbon steel or other suitable material of comparable strength to withstand the impact of falling refuse. The minimum thickness of steel for the extension shall be three millimetres except where the highest hopper in the system is at a height of 12 storeys or over, when the minimum thickness shall be four millimetres. The minimum thickness of steel for the cut-off plate of the shutter shall be six millimetres.

5.1.3 *Ventilating flue*

The ventilating flue shall be constructed of any of the materials listed in **5.1.1**, or cast iron flue pipe, clay flue lining, rendered brickwork or other suitable materials. Materials other than those specified in **5.1.1** may be used more than 300 mm above the top of the highest hopper inlet.

5.2 Finish

5.2.1 *Chute*

The interior of the chute, the chute extension and any part with which refuse is likely to come into contact shall have a smooth, impervious finish. Where the chute is constructed of plain carbon steel sections they shall be galvanized after manufacture in accordance with the requirements of BS EN ISO 1461.

5.2.2 *Chute extension, shutter and flue*

Where ferrous metals are used and the purchaser specifies that they are to be zinc-protected, they shall either be galvanized after manufacture of the component in accordance with BS EN ISO 1461 or be zinc sprayed after manufacture in accordance with the requirements of BS EN 22063.

5.3 Dimensions and design

5.3.1 *Chute*

Chutes shall have an internal diameter of not less than 375 mm and the internal section shall be circular. The entry into the chute from the hopper shall be of such shape and dimension that the passage of refuse is in no way restricted. Where chutes are assembled from a number of individual sections, joints shall be smooth and free from intrusions into the bore of the chutes which could trap particles of refuse or initiate blockage.

5.3.2 *Access points*

It is essential that there is access for rodding. Where purchasers consider that access through hoppers is insufficient or unsuitable, they shall agree on an acceptable alternative with the manufacturer that meets the same safety requirements.

5.3.3 *Ventilating flue*

The cross-sectional area of the ventilating flue and the total area of the ventilating outlet(s) shall each be not less than 0.035 m^2. Where there is a common vent for more than one chute the cross-sectional area of the flue and its outlet(s) shall each be not less than 0.035 m^2 for each and every chute.

The ventilating flue shall be protected at the outlet(s) against the ingress of the elements. The outlet(s) shall be so positioned as to give free cross-ventilation.

5.3.4 *Chute extension*

The chute extension shall have a cross-sectional area at least equal to that of the chute and the least dimension of its cross section shall be not less than the inside diameter of the chute.

There shall be adequate provision for secure fixing, i.e. the extension will remain attached when subject to normal wear and tear such as blows from falling waste and objects protruding above the waste container.

The chute extension shall be as near vertical as possible, but if offset, the angle of inclination to the horizontal shall be not less than 60°.

Where the chute extension is bifurcated, a pivotable baffle plate shall be provided to direct the refuse into one or other of the outlets. The baffle plate shall be not less than five millimetres thick and be robustly mounted. There shall be adequate clearance for the rotation of the baffle plate and an operating handle shall be provided in a reasonably accessible position.

5.3.5 *Shutter*

The framework of the shutter shall be adequately robust and provide for secure fixing according to the size of the chamber.

In order to limit the emission of dust, the clearance between the top of the cut-off plate and the termination of the chute shall be kept to a minimum and shall in no case exceed 20 mm.

The handle of the shutter shall be positioned so that it is easily accessible for operation.

The cut-off plate shall be designed to move freely and be of such dimensions that, when closed, it completely covers the outlet area of the chute or chute extension. When fully open, it shall not obstruct the passage of refuse to the storage container.

5.4 Further considerations

To avoid noise nuisance, which can be considerable, chutes shall not be sited adjacent to habitable rooms.

Whenever the design of a building permits, chutes shall be designed such that they will discharge waste centrally over the container in the container chamber. The bottom edge of the chute shall end at a distance of not less than 25 mm below the level of the ceiling and a suitable extension shall be provided.

The chute shall be continued full bore until its upper end is open to the external air, unless this is impracticable, in which case the chute shall be continued up above the level of the top hopper to a ventilating outlet(s) with a cross-sectional area of not less than 0.035 m^2. The ventilating pipe or shaft shall be continued up to such a height and so positioned that foul air is carried away from the building and any windows or ventilation inlets. The clear opening to the ventilating outlet shall be at least equal in area to that of the ventilating pipe or shaft.

6 Hoppers

6.1 Location

Whenever the design of a building permits, hoppers shall be in freely ventilated positions in the open air, e.g. sheltered balconies.

Hoppers shall not be situated within any stairway enclosure, enclosed staircase lobby or enclosed corridor, unless installed in accordance with the requirements given in the next paragraph.

Each hopper shall be contained in its own compartment. Such compartments shall be constructed of material having a fire resistance of 30 min when tested in accordance with BS 476-22 and be fitted with a self-closing access door and be freely ventilated to the external air. Adequate ventilation of such compartments is of paramount importance and at least six changes each hour shall be provided, by mechanical means if necessary. In buildings with open access balconies the hoppers may be installed on the balconies, and no special fire precautions are necessary in such cases.

NOTE 1 It might be necessary to provide facilities for waste disposal for occupants of ground floor units by locating a hopper and extension in the wall of the waste storage chamber. Normally, a short flight of steps to the hopper will be needed in such cases.

In no case shall hoppers be situated within a dwelling, habitable room or place in which food is stored or prepared.

Hoppers shall, where practicable, be positioned to take advantage of natural daylight, and adequate artificial lighting shall be provided.

Hoppers shall be accessible to the occupants of each dwelling on or near their own floor level. Hoppers shall be fixed at a height of 750 mm, measured from floor level to the lower edge of the inlet opening.

NOTE 2 To maintain hygienic conditions and to prevent exceptional wear and tear of the waste disposal facilities, it is desirable that not more than six dwellings share one hopper.

6.2 Materials

6.2.1 *General*

Materials used in the construction of the hopper unit shall be, as far as practicable, non-combustible, when tested in accordance with the requirements of BS 476-4, and resistant to hard wear and abuse. The materials shall be selected from:

a) steel plate, sheet or strip, conforming to the requirements of BS 1449-1 or BS EN 10029;

b) cast aluminium, conforming to the requirements of grade EN AC 44200 of BS EN 1706:1998;

c) wrought aluminium sheet and strip, conforming to the requirements of grade EN AW 3XXX of BS EN 573-3:1994;

or materials of equivalent or better characteristics.

6.2.2 *Welding*

The welding of carbon steel shall be carried out in accordance with the requirements of BS EN 1011-2. The welding of aluminium shall be in accordance with the requirements of BS EN 1011-4.

6.3 Finish

6.3.1 *General*

All materials that are not inherently non-corrodible shall be protected from corrosion in accordance with the requirements of **6.3.2**, **6.3.3** or **6.3.4**.

6.3.2 *Galvanizing*

Where galvanizing is specified by the purchaser it shall be by the hot dip process carried out after manufacture of the hopper and it shall be in accordance with the requirements of BS EN ISO 1461.

6.3.3 *Painting*

Where no other finish is specified, iron and steel hoppers shall at least be supplied with a coat of priming paint, conforming to the requirements of BS 2523. Any aluminium components likely to come into contact with mortar shall be supplied with at least one coat of bitumen paint.

6.3.4 *Other finishes*

Any finish other than those in **6.3.2** and **6.3.3** shall be by agreement between the purchaser and the supplier. Any such finish shall, if a relevant British Standard exists, conform to the requirements of that standard.

6.4 Dimensions and design

6.4.1 *General*

The hopper shall be designed and constructed such that there can be no emission of dust or fumes, and excessive noise is prevented when the hopper is in the closed or open position; no part of the hopper or frame shall obstruct the free passage of waste.

6.4.2 *Hopper clearway*

The hopper shall be designed and constructed so that there is no obstruction to the discharge of refuse into the chute and there is no entry to the chute whilst the hopper is partially open.

The dimensions of the throat of the hopper shall be not less than the dimensions of the mouth.

The largest dimension of the mouth opening, i.e. the diagonal of a rectangular opening, shall not exceed the diameter of the chute with which the hopper is to be connected. In no case shall this diagonal exceed 430 mm.

6.4.3 *Frame and hood unit*

6.4.3.1 *General*

The unit shall consist of a frame for fixing into an orifice in the wall of the chute and a hood as shown in Figure 3.

6.4.3.2 *Thickness of material*

The minimum thicknesses of material used in the construction of the frame and hood shall be as follows:

— mild steel	2 mm;
— cast aluminium	4 mm;
— wrought aluminium	3 mm.

6.4.3.3 *Luting flange*

All frames, as distinct from hoods, shall be so constructed as to provide a continuous luting flange for the purpose of dressing in the surrounding wall surfacing material.

6.4.3.4 *Lugs*

When lugs are used, they shall be securely fixed to the frame unit and shall be so constructed as to provide an adequate fixing for the frame unit to the surrounding structure.

6.4.4 ***Door and receiving unit***

6.4.4.1 *General*

The unit shall comprise a door, a receiving plate and two retaining side cheeks formed or continuously fixed so as to prevent any seepage. To prevent spillage from the sides, the cheeks shall be carried up as high as is practicable, without impeding the operation of the hopper, with a minimum height of 125 mm, measured radially from the intersection between the door and the receiving plate. The base of the receiving unit shall project downwards at an angle of not less than 45° to the horizontal when the door is closed.

6.4.4.2 *Thickness of material*

The minimum thicknesses of material used in the construction of the door and receiving unit shall be as follows:

— mild steel	door, unless reinforced to a comparable strength	2.5 mm,
	receiving unit	1.6 mm;
— cast aluminium	door	6 mm,
	receiving unit	4 mm;
— wrought aluminium	door	3 mm,
	receiving unit	2 mm.

6.4.4.3 *Gaskets*

A gasket shall be securely fixed to the door or frame to minimize noise and prevent the emission of dust or foul air when the door is closed. It shall be constructed of rubber or other suitable material and shall form a continuous effective seal. For the same reason a continuous strip of rubber or other similar material shall be provided to act as a buffer and seal between the back of the receiving unit and the hood and fixed so as to render malicious damage or removal difficult. The gaskets shall be readily replaceable.

6.4.4.4 *Counterbalance of door*

The unloaded door, when released from the fully opened position, shall automatically resume the closed position.

NOTE Consideration should be taken, at the design stage, of any danger of trapping fingers, hands or arms.

6.4.4.5 *Hinge*

The hinge shall be so constructed that it is protected from clogging by stray refuse and permits the door to conform to the requirements of **6.4.3.4**. It shall be securely fixed and shall present no sharp or otherwise dangerous feature to the user or passer-by. The construction of the hinge shall be such that the hopper door can be removed from the frame for maintenance purposes. To prevent vandalism and misuse, the method of removal shall be designed to deter tampering by unauthorized persons.

6.4.4.6 *Handle and fastener*

A handle or other means of opening shall be securely fixed to, or formed as an integral part of the door. If a fastener is used, it shall be of robust construction and shall be securely fixed. Neither the handle nor the fastener shall present any sharp or dangerous feature to the user or passer-by.

6.5 Installation

To accommodate a hopper in the wall of the chute, a precast block of impervious material, with a recess or other suitable means of bedding the frame squarely shall be used. Jointing of the blocks with the surrounding brickwork shall be secure.

7 Manufacturer's certification

7.1 Chute

The manufacturer shall be satisfied that the components of the chute conform to the requirements of this British Standard at the time of despatch and shall provide a certificate to this effect, at the request of the purchaser.

7.2 Hopper

Every hopper shall be legibly and indelibly marked with the following:

a) the manufacturer's name or identification mark;

b) the model number or name;

c) the number of this British Standard, i.e. BS 1703.

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