DUS 158

DRAFT UGANDA STANDARD

Second Edition
2017-May-dd

Wheelbarrows — Specifications

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DUS 158: 2017

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

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Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 4, [Mechanical Engineering and Metallurgy].

This second edition cancels and replaces the first edition (US 158:2000), which has been technically revised.

Wheelbarrows — Specifications

1 Scope

The draft Uganda standard specifies the requirements for five types of wheelbarrows of single wheel make suitable for domestic, industrial, agricultural and building-site conditions.

2 Normative references

The following referenced documents 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 898-1*, Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

3 Terms and definitions

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

3.1
acceptable
meets stakeholder expectations that are capable of being shown as reasonable or merited.

3.2
Frame
chassis that supports the pan and wheel

3.3
Pan
part of the wheelbarrow that forms the receptacle

3.4
Wheel
circular component that is intended to rotate on an axle bearing

3.5
Wheelbarrow
small hand-propelled vehicle, with one wheel, designed to be pushed and guided by a single person using two handles at the rear.

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

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Wheelbarrow types

4.1 Wheelbarrows shall be of one of the following types, as required (see Annex A):

a) type 1 domestic (light duty);

b) type 2 industrial/agricultural;

c) type 3 industrial/agricultural - high bulk carrying capacity (large);

d) type 4 industrial/agricultural - high bulk carrying capacity (extra-large); or

e) type 5 industrial/civil (suitable for concrete pouring).

4.2 Wheelbarrows for use in mines, in foundries or in similar situations should be of types 2 to 5, as required (see Annex A).

5 Materials

5.1 Steel sheets

Steel sheets used in the manufacture of wheelbarrows shall be of a low carbon content and shall be suitable for drawing or deep drawing, as applicable. The sheets shall be free from cracks, laminations and surface blemishes.

5.2 Steel tubes

Steel tubes used in the manufacture of wheelbarrow frames shall comply with the requirements for, grade 275, of FDUS 1673. If the tubes are supplied in the annealed condition to facilitate cold bending, the minimum tensile strength and minimum yield stress specified in FDUS 1673 shall not apply.

5.3 Steel bars and rods

Bars and rods used in the manufacture of wheelbarrows shall be of mild steel

5.4 Bolts and nuts

Bolts and nuts used for pan attachment shall be of diameter at least 8 mm, shall have mushroom heads with square shanks and shall be fitted with the relevant hexagon or square nuts. Other bolts and nuts shall comply with the requirements of ISO 898-1

5.5 Axles

Axles shall be manufactured from cold-rolled steel.

6 Design

6.1 Dimensional parameters

The dimensions of assembled wheelbarrows shall comply with the requirements given in Table 1.

Table 1-Dimensions of an assembled wheelbarrow in mm

Type of wheel barrow	Width of pan max.	Height of the pan lip max.	Distance between ends of handles		Height of ends of handles		Distance from wheel center to pan Max.	Distance from wheel center to ends of handles min
			min	max	min	max		
1	760	550	480	560	550	700	225	1 220
2	760	710	480	560	430	560	265	1 220
3	800	710	480	560	430	560	265	1 220
4	1 000	710	480	560	430	560	265	1 220
5	760	710	480	560	430	560	265	1 200

6.2 Pans

6.2.1 Manufacturing requirements

The pan shall be formed either by a solid drawn pressing, or by cutting and folding, with the joints being seam welded. The inside of the pan shall be free from projections and all weld spatter shall have been removed. The rim of the pan shall be flat, smooth and free from sharp edges and sharp corners. Except in the following cases, the rim shall be rolled over a wire of diameter at least 5.5 mm, to form a bead as shown in Figure 1 (a):

a) in the case of a pan for a type 1 wheelbarrow, the rim may be curled downwards or folded under as shown in Figure 1 (b); and

b) when a pan of thickness 3.0 mm is required (see 5.2.3), the rim shall be formed as shown in Figure 1 (c).

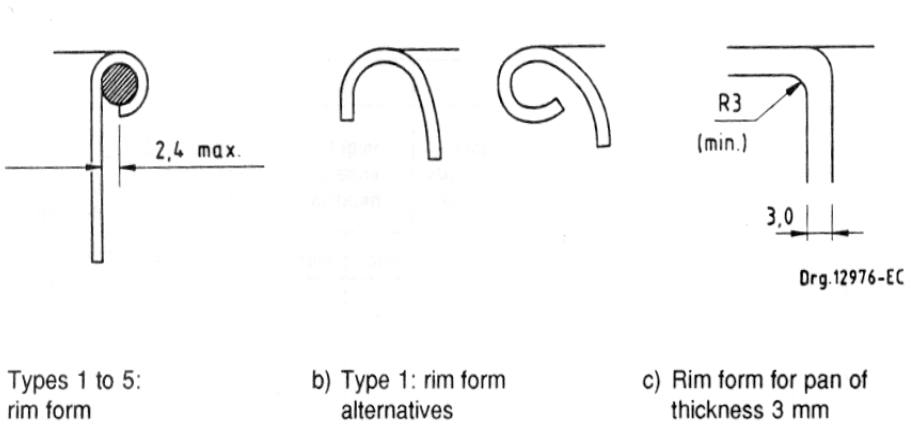


Figure 1 — Pan rim detail

6.2.2 Capacity

When determined in accordance with 11.2, the capacity of the pan shall be within the limits given in Table 2 for the relevant type of wheelbarrow.

Table 2 — Pan capacity and steel thickness

Type of wheelbarrow	Pan capacity L		Minimum steel thickness mm
	min	max	
1	40	60	1.0
2	40	60	1.2
3	90	110	1.6
4	150	170	1.6
5	60	70	1.2

6.2.3 Steel thickness

The steel thickness of the pan shall comply with the relevant requirement given in Table 2. When so required (see Annex A), the steel thickness of pans of wheelbarrows of type 2, type 4 and type 5 shall be 3.0 mm.

6.2.4 Attachment details

6.2.4.1 Pans

The pan of wheelbarrows of all types shall be firmly attached to the frame by means of bolts and nuts (see 4.4) that have acceptable locking devices.

The pan of a type 5 wheelbarrow shall be so positioned on the frame that, when determined in accordance with 10.3, the total lifting force (when equally applied between the handles) does not exceed 400 N.

6.3 Frames

6.3.1 General

6.3.1.1 The frame shall be constructed from round tubing of nominal diameter of at least

a) 25 mm and of wall thickness at least 2.5 mm for type 1 wheelbarrows, and

b) 34 mm and of wall thickness at least 2.0 mm for wheelbarrows of types 2 to 5

6.3.1.2 The frame, including the handles, shall be formed from a single length of tubing to provide a suitable support for the wheel and the pan. The frame shall have a bow of acceptable size and shape to protect the wheel and to act as a pivot when the wheelbarrow is tipped.

6.3.1.3 The legs may be formed as part of the frame or may consist of separate lengths of tubing (see 5.3.1.1) formed into a suitable shape and welded or bolted to the frame.

6.3.2 Reinforcement and bracing of the frame

The frame of a type 1 wheelbarrow shall be braced by means of two steel bars of section 30 mm x 6 mm. The bracing can be used for the pan attachment (see 5.2.4.]. For wheelbarrows of types 2 to 5, the reinforcing and bracing shall comprise the following:

a) at least two reinforcing bars or tubes that span the tubes of the frame, to form supports for the pan. Flat bars shall be of width at least 30 mm and of thickness at least 6 mm; tubes shall be of strength at least equivalent to that of the flat bars. The reinforcing bars or tubes shall be so welded to the frame that the bolt holes for securing the pan to the frame can be located in them (see Figure 2);

b) two front braces of flat bar of width at least 25 mm and of thickness at least 6 mm (or other section of equivalent strength) fitted between the front face of the pan and the bow end of the frame. The braces shall be secured to the frame by the axle-mounting bolts and shall be bolted to the pan. A reinforcing bar of similar section to that of the braces shall span the bolt holes on the front face of the pan; and

c) wearing strips of length approximately 100 mm, formed from flat bar of width at least 25 mm and of thickness at least 6 mm, welded to the underside of each leg and also, in the case of a type 5 wheelbarrow, to the front of the bow end of the frame. Such wearing strips shall be formed to suit the contour of the relevant part.

6.3.3 Handles

The handles of wheelbarrows shall be closed by means of plastics end-caps.

6.4 Wheels, tyres and axles

6.4.1 Disc wheels and tyres

5.4.1.1 Discs used for disc wheels shall be manufactured from steel of thickness at least 1.8 mm and shall be profiled to match the type of tyre required (see 5.4.1.2). The dimensions of a disc wheel shall be as given in Table 3. The wheel shall be fitted with the specified tyre, using bolts and nuts of nominal diameter 8 mm and that comply with the requirements of ISO 898-1 (see 5.4.1.1).

Table 3 — Disc wheel dimensions

Type of wheelbarrow	Minimum outside	Minimum rim width at periphery
1	250	45
2	325	70
3	325	70
4	325	70
5	325	70
NOTE These dimensions are not applicable to wheelbarrows fitted with steel wheels (see 5.4.2)		

6.4.1.2 Disc wheels shall be fitted with tyres of one of the following types, as required (see Annex A):

a) solid rubber tyre (wheelbarrows of types 1 to 5); or

b) pneumatic tyre of 2-ply construction (wheelbarrows of types 2 to 5); or

c) pneumatic tyre of 4-ply construction (wheelbarrows of types 2 to 5).

6.4.1.3 If a pneumatic tyre is required, one of the discs shall have a hole of adequate size and with rounded edges to accept the inner-tube valve stem.

6.4.1.4 Disc wheels shall be fitted with one of the following types of wheel bearings, as required (see Annex A).

a) self-lubricated sintered metal bearing; or

b) bearing that has a sealed ball race.

6.4.1.5 The diameter of the axle shall be as recommended by the manufacturer of the wheel bearing, and shall be of sufficient length to ensure its positive clamping to the frame.

6.4.1.6 Axles shall be so secured to the frame by means of clamps or brackets that any axial movement is prevented.

6.4.2 Steel wheels

6.4.2.1 If so required (see Annex A), wheelbarrows of types 2 to 5 (for use in mines, in foundries and in similar situations), shall be fitted with steel wheels.

6.4.2.2 Steel wheels shall be of welded construction throughout.

6.4.2.3 The rim of a steel wheel shall be of width at least 38 mm, of thickness at least 6 mm and formed to a diameter of at least 350 mm.

6.4.2.4 The hub shall be of length at least 150 mm and shall have a wall thickness of at least 3.0 mm. The bore of the hub shall not exceed the diameter of the axle by more than 0.8 mm.

6.4.2.5 The axle shall be of diameter 16.0 mm ± 0.5 mm and of sufficient length to ensure its positive clamping to the frame.

6.4.2.6 Axles shall be so secured to the frame by means of clamps or brackets that any axial movement is prevented.

7 Welding

All welds shall be free from irregularities and defects, and shall present a neat appearance.

8 Finish

If so required (see Annex A), the pan shall be galvanized. All non-galvanized parts (with the exception of the wheel bearings) shall be given at least one coat of corrosion resistant and nontoxic paint. (The parts shall have been degreased and cleaned before the paint is applied.) The painted surfaces shall be free from corrosion spots and from sags and wrinkles.

9 Performance

When a wheelbarrow has been tested in accordance with 10.4:

a) the tyre shall show no signs of looseness on its rim, or non-uniform wear, flattening, grooves or cracks;

b) the clearance between the wheel bearing and the axle shall not have increased by more than 0.5 mm as a result of the test;

c) the wheel shall be capable of spinning freely; and

d) there shall be no sign of failure or looseness of any component part of the wheelbarrow

10 Inspection and methods of test

10.1 Inspection

Visually examine and then measure dimensions of the wheelbarrow for compliance with those requirements of the standard for which tests to assess compliance are not given in 10.2 to 10.4 (inclusive).

10.2 Capacity test

Stand the wheelbarrow so that the rim of the pan is horizontal. Fill the pan with water to overflow. Measure, to the nearest half-litre, the volume of water in the pan. Check for compliance with 6.2.2.

10.3 Determination of lifting force

Load the pan of the wheelbarrow with 105 kg ± 1 kg of sand. Measure the total vertical force (applied equally to both handles at a point at least 25 mm from the ends of the handles) required to hold the wheelbarrow with the rim horizontal. Check for compliance with 6.2.4.2.

NOTE This test is applicable to type 5 wheelbarrows only.

10.4 Durability test (not applicable to wheelbarrows fitted with steel wheels)

10.4.1 Test rig

This is one that

a) has a test wheel as shown in Figure 3;

b) firmly anchors the handles of the wheelbarrow under test to one end of the test rig, at such a height that the lowest point of the legs of the wheelbarrow is 150 mm ± 20 mm above the contact point of the test wheel and that the axle of the wheelbarrow wheel is vertically above the axis of the test wheel;

c) ensures that the wheel of the wheelbarrow under test rests on the running surface of the test wheel; and

d) includes an electric motor and gearbox combination that enables the test wheel to be driven at a speed of 38 r/min ± 2 r/min in the direction shown in Figure 3.

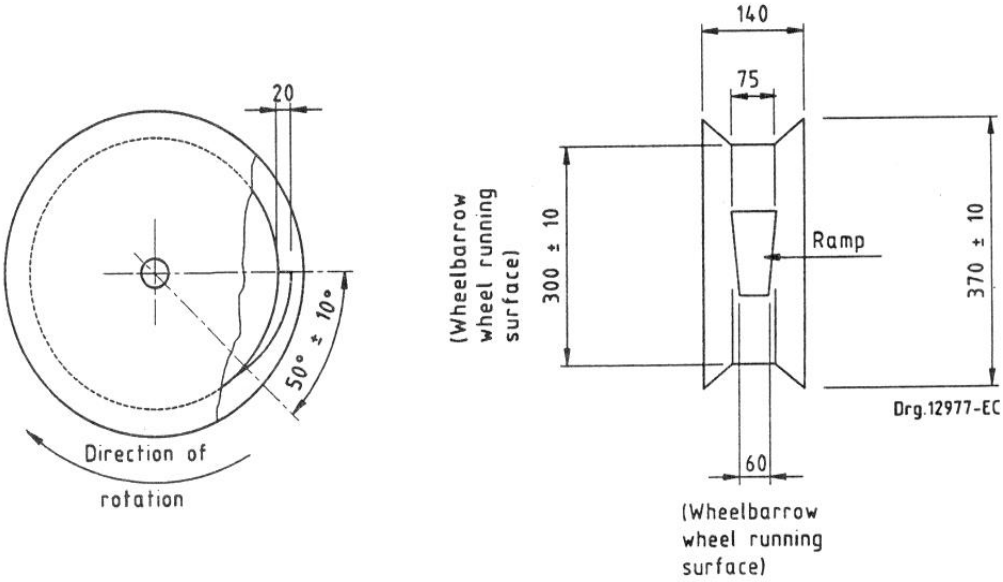


Figure 2 — Test wheel (modified car wheel rim)

10.4.2 Test load

A test load that consists of rounded rocks, the masses of which vary between 3 kg and 16 kg.

10.4.3 Test procedure

Carry out the test in the sequence given in 10.4.3.1 to 10.4.3.6.

10.4.3.1 Measurement of pre-test wheel bearing/axle clearance

Before the test, measure and record the clearance between the wheel bearing and the axle.

10.4.3.2 Wheelbarrow loading

Using the test rocks (see 10.4.2), load the pan of the wheelbarrow under test to the relevant test mass given in Table 4.

Table 4 — Test mass and running time

Type of wheelbarrow	Test mass kg	Running time h
1	65 ±2	150
2	65 ±2	200
3	80 ±2	200
4	80 ±2	200
5	80 ±2	200

10.4.3.3 Running time of test

Run the test rig, with the wheelbarrow under test mounted in position, for the relevant time given in Table 4.

10.4.3.4 Tyre and wheel integrity

On completion of the test, check the tyre and wheel for compliance with 9 a) and 9 c) respectively.

10.4.3.5 Measurement of post-test bearing/axle clearance

After the test, measure and record the clearance between the wheel bearing and the axle. Check for compliance with 9 b).

10.4.3.6 Inspection

Inspect the wheelbarrow under test for compliance with 9 d).

11 Marking

All wheelbarrows shall be legibly and indelibly marked with the following information:

a) manufacturer's name,

b) trade name and/ or trademark, and

c) code or symbol that indicates the type of wheelbarrow.

In the case of a type 5 wheelbarrow, the capacity of the pan, to the nearest litre, shall be indicated on an outside surface of the pan.

Annex A
(normative)

Notes to purchasers

The following requirements shall be specified in tender invitations and in each order or contract:

a) the type of wheelbarrow (see 4.1 and 4.2);

b) when relevant for wheelbarrows of types 2, 4 and 5, that the thickness of the pan shall be 3.0 mm (see 6.2.3);

c) for wheelbarrows of types 2 to 5, whether a pneumatic tyre is required and, if so, whether it shall be of 2-ply or 4-ply construction (see 6.4.1.2);

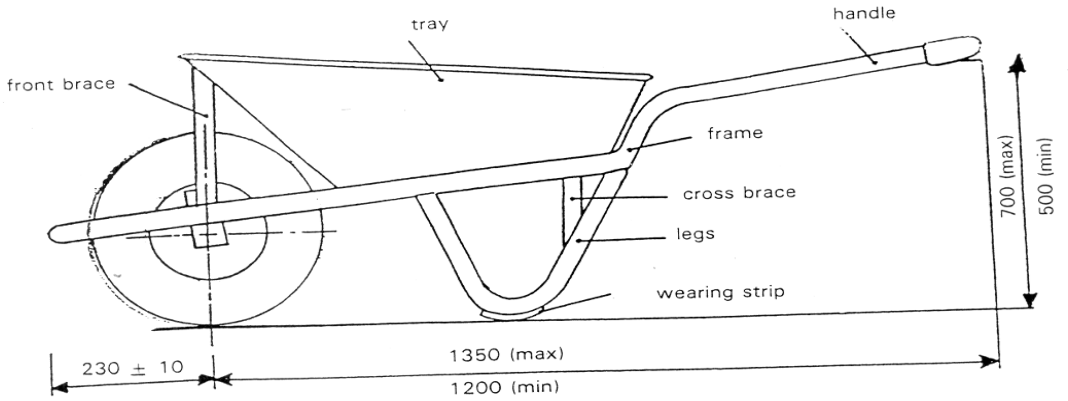
d) the type of wheel bearing required (see 6.4.1.3);

e) for wheelbarrows of types 2 to 5, whether a steel wheel is required (see 6.4.2.1); and

f) whether the pan is to be galvanized (see Clause 8).

Annex B
(informative)

Wheelbarrow dimensions



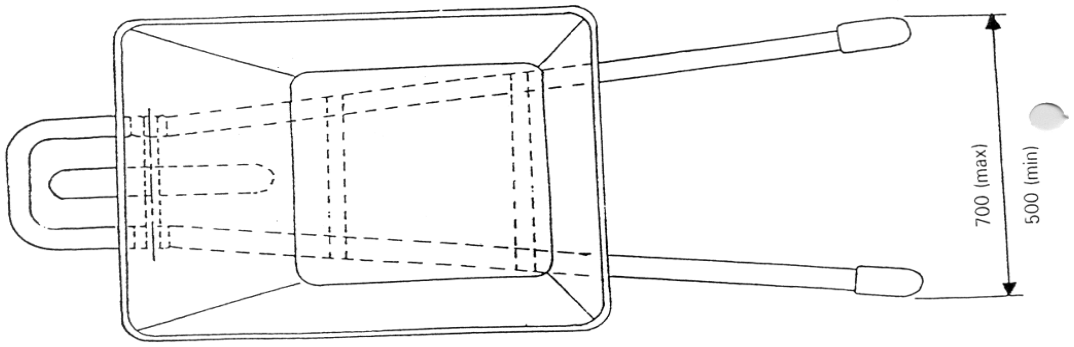


Fig. 1 — Typical Wheelbarrow
(dimensions in mm)

Bibliography

[1] US 158:2000, *Specification for wheelbarrows*

[2] Agricultural hand tools in emergencies — Guidelines for technical and field officers

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

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