

DRAFT UGANDA STANDARD

First Edition
2019

Light vehicle towed trailer — Specification



Reference number
US nnnn-n: yyyy

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PUBLIC REVIEW DOCUMENT

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Foreword

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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 08, *transport and communication*

Light vehicle towed trailer — Specification

1 Scope

This standard specifies material, constructional and other requirements of trailer operated by a light vehicle
This standard covers requirements of balanced and unbalanced trailers up to 3.5 tonnes

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.

US 479:2003, *Code of practice—Inspection of road vehicles for roadworthiness*

US EAS 358:2004, *Pneumatic tyres for passenger cars — Specification*

US 845:2017, *Road vehicles — Requirements for inspection and testing of used motor vehicles for road worthiness*

3 Terms and definitions

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

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>

3.1

Reflex Reflectors

An assembly ready for use and comprising one or more reflecting optical units

3.2

Stop Light

A brake operated lighting device, which emits red, or amber light at the rear of the vehicle intended to give warning of the slowing down or the stopping of the vehicle

3.3

Direction Indicator

A lighting device to show in which direction, the driver intends to turn by giving a flashing light on the side of the vehicle towards which the turn will be made

3.4

Tail Light

A lighting device, which emits red light indicating the presence of the vehicle when seen from the rear and intended to show the width. A tail light has direction light, reverse light and licensed plate light

4 TYPES

4.1 The light vehicle towed trailers shall be of following two types:

- a) Balanced trailer (two axel and three axle trailer), and
- b) Single axle trailer.

4.2 Both the types of trailers maybe fitted with fixed or tipping platform

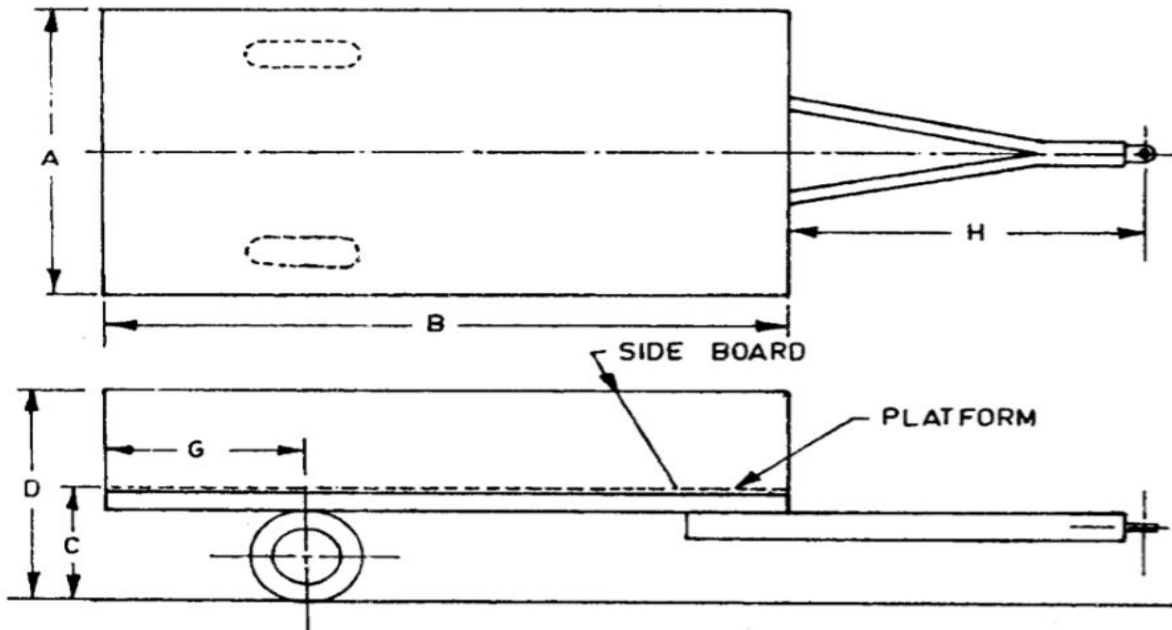


Fig. 1 Single axle trailer

5 MATERIALS YIELD STRENGTH

5.1 The material for important components and that for axle assembly shall be as given in column 3 of Table 1. The material shall conform to ISO 3573 and grade given in column 4 of Table 1

Table 1 Material Requirements for Components of Trailer

S/No	Components	Material	Grade
1	Chassis	Mild steel	Fe 410-S
2	Drawbar	Mild steel	Fe 410-S
3	Tow eye or tow jaw	alloy steel	20C Grade 23 to 45
4	Platform	Mild steel/ timber	Fe 410-S
5	Side boards	Mild steel/ aluminium Timber	Fe 410-S

5.2 The material of the brake drum, hub and cap shall be cast iron of grade FG 200

5.3 The axle material shall be structural steel of grade Fe 410-S

6 CAPACITY

The capacity of a trailer shall be its gross load and shall be up to 3.5 tonnes. The manufacturer shall declare the gross load along with the payload

7 DIMENSIONS

7.1 The dimensions given under 7.3 to 7.6 shall not in any way infringe the rules and regulations of the Uganda traffic and road safety act 1998

7.2 The overall width of the trailer shall not exceed 2.5 m

7.3 The overall length of the trailer shall conform to provisions specified in US 845:2017

7.4 The height of the trailer, with tyres inflated at the recommended pressure, when measured from the level supporting surface to the top of the platform shall not be more than 1.5 m.

7.5 The height of the trailer, with tyres inflated at the recommended pressure, when measured from the level supporting surface to the top of the sideboard shall not be more than 2.2 m

7.6 In case of semi-trailer, the load transfer from the trailer to the tow eye of the trailer shall not be more than 20 percent of the trailer capacity. Assuming that the trailer is loaded uniformly to the entire length of platform and the centre of gravity lies in the lateral vertical plane at half the length of platform from rear edge, the value of G (see Fig. 2) can be derived from the following formula;

$$G = \frac{\frac{W \cdot B}{2} - R_t(H + B)}{W - R_t}$$

where

W = gross load of the trailer, and

R_t = load transfer on tow eye, percent.

On the basis of 20 percent load transfer from the trailer to the tow eye, the above formula can be written as follows:

$$G = \frac{3B - 2H}{8}$$

7.7 Ground clearance shall not be less than 300 mm.

8 CONSTRUCTIONAL REQUIREMENTS

8.1 The loading platform may be plain or provided with hinged or fixed sideboards. If trailer is provided with sideboards, some kind of locking provision shall be provided to keep it vertical. This can be met by giving a latching system at the top of the vertical posts fitted to the platform. The hinges by which sideboards are fixed shall be provided with split pins to restrict its lateral motion.

8.2 The trailers shall be provided with lashing hooks for tying down the load.

8.3 Tow eye of the trailer shall be capable of rotating at 180 degrees angle to take on even rigid trailer hook of the towing vehicle

8.4 For balanced trailers, the front axle shall have the capability to swivel to a maximum of 120° (60° on either side) about the vertical axis.

- 8.5** The trailer shall be fitted with pneumatic tyres conforming to US EAS 358:2004
- 8.6** The axle(s) shall conform to requirements specified in Annex A
- 8.7** The braking system shall apply to all trailers exceeding 750kg
- 8.8** Trailers shall have service (overrun) and parking brake. It shall be ensured that during operation of service or parking brake, the brakes at both the wheels of trailer are activated simultaneously.
- 8.9** The service brakes shall be capable of a deceleration of 2.5 m/s² measured in accordance with the method described in Annex B with operating brakes pedal force not exceeding 600 N and 400 N in case of foot operated and hand operated brakes respectively.
- 8.10** The parking brake shall hold fully laden trailer on a 12 percent slope uphill or downhill. The maximum force to operate a hand lever shall not exceed 400 N. The parking brake shall operate on the same drum and shoe or disc and pad as the service brake.
- 8.11** Hydraulic ram of suitable capacity compatible with tractor hydraulic shall be provided in case of tipping type. The ram may be used in single or tandem as per need and the operating pressure shall not exceed 13.8 MPa.
- 8.12** Tipping angle of the body, in case of tipping type, shall be 42° to 50°

9 LIGHTING REQUIREMENTS

- 9.1** The trailer shall be fitted with two red coloured reflectors at rear sides and two white coloured reflectors on front sides at a distance not more than 150 mm from extreme ends to the centre of reflectors. Rear reflectors may be incorporated as part of lensing in tail lamps described in **A-5**
- 9.2** At least two amber flashing reversing lamps (warning lamps) as symmetrically mounted and as widely spaced laterally as practicable, mounted at least 1000 mm height but not more than 1500 mm. Lamps shall flash in unison at a rate of 60 to 120 flashes per minute.
- 9.3** Every trailer shall be fitted with two turn indicators (Direction indicators) lamps on the rear side. The direction indicator shall be of amber colour and shall flash in unison at a rate of 60 to 120 flashes per minute.
- 9.4** The rear amber flashing warning lamps may be used as the turn indicators
- 9.5** Two brake operated stop light shall be provided at the rear of the trailer which emit red light intended to give warning of the slowing down or stopping of the vehicle, The stop lights may be provided as a part of tail lamps

10 OTHER REQUIREMENTS

- 10.1** The semi-trailer shall be provided with suitable arrangement in the front for keeping the trailer in a levelled position when detached from the towing vehicle
- 10.2** In case of tipping type trailer, provisions shall be made for tilting the platform without disturbing the trailer
- 10.4** The dust cover shall be provided
- 10.5** Oil seals or grease retainers shall be provided to make the axle assembly leak and dust proof
- 10.6** The hub shall be fully packed with multi-purpose grease between the bearings

10.7 Reflectors shall be visible at night from all distances within 31 m to 183 m when directly in front of lawful lower beams of headlamps

11 WORKMANSHIP AND FINISH

11.1 The sharpness of the edges and corners shall be removed

11.2 Castings and forgings shall be free from blowholes, cracks and other visual defects

11.3 All wooden and metal surfaces shall be covered with a coat of suitable preservative. The metal parts shall be de-rusted, treated with anti-corrosive material and an appropriate primer painting

12 MARKING

The trailer shall be marked with the following information on identification plate which shall be welded or riveted to the body

- a) Manufacturer's name and registered trademark, if any
- b) Unladen mass, and
- c) Gross load; and

Annex A (Normative)

REQUIREMENT OF AXLE ASSEMBLY

A-1 NOMENCLATURE

A-1.1 For the axle assembly the nomenclature given in Fig. 2 shall apply.

A-2 CLASSIFICATION

A-2.1 For the purpose of this standard, the axle assembly shall be of the following two classes:

- a) Class A — The axle assembly of load carrying capacity up to 3 tonnes.
- b) Class B — The axle assembly of load carrying capacity up to 5 tonnes.

A-3 DIMENSIONAL REQUIREMENTS

A-3.1 The dimensions of various components of the axle assembly shall be as given in Col 3 and 4 of Table 2. The applicable standards for the components are given in COI 5 of Table 2 for guidance.

A-3.2 The axle assembly shall have wheel track of 1500 mm or 1700 mm

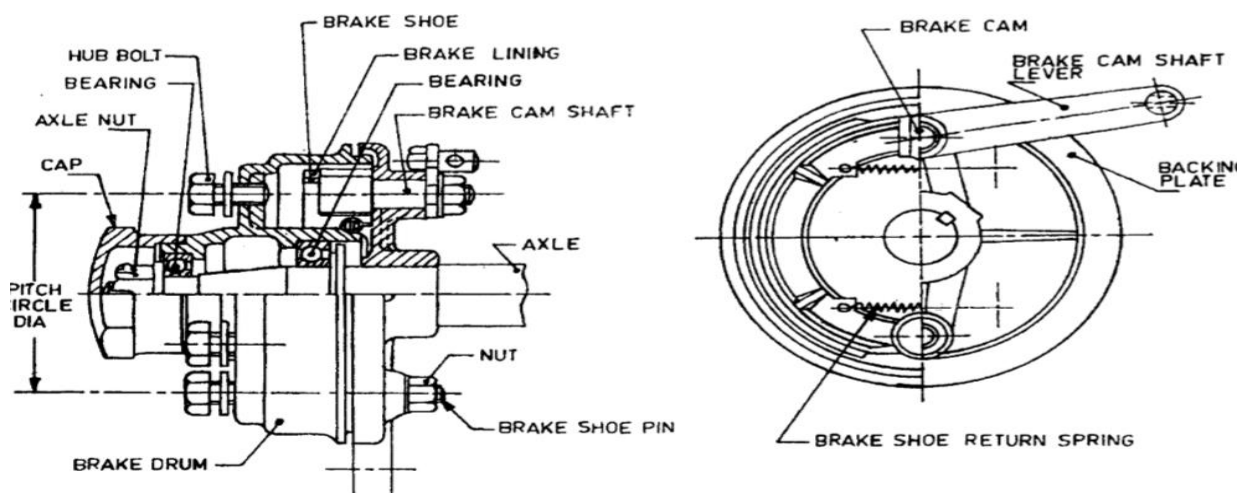


Fig 2. Nomenclature of axle assembly

Table 2 Dimensions of Various Components of Axle Assembly

S/N	Component	Dimensions	
		Class A	Class B
i.	Axle shaft size,mm	63 square or	

		80 round	
ii.	Outer bearing, bore size diameter, mm	45	45
iii.	Inner bearing, bore size diameter, mm	55	55
iv.	Castle nut, nominal size	M42 x1.5	M42 x1.5
v.	Split pin for nut, nominal diameter, mm	8	8
vi.	Washer for nut, nominal size,mm	43/45	43/45
vii.	Roundheadscrew:		
	a) Nominal size	M6 x1	M6 x1
	b) Length,mm	12	12
	c) Number	3	3
viii.	Wheel stkt:		
	a) Nominal size	M16 x1.5	M16 x1.5
	b) Pitch circle dkneter, mm	165	185
	c) Number	5	6
ix.	Hub flange:		
	a) Thickness, mm	20	25
	b) Diameter, mm	210	230
x.	Brake drum:		
	a) Diameter, mm	254	254
	b) Nominal width, mm	50	50

A-4 DESIGNATION

A-4.1 An axle assembly shall be designated by its class and wheel track.

A-4.1.1 Example 1 An axle assembly of Class A having wheel track of 1500 mm shall be designated as Axle A 1500 and

A-4.1.2 Example 2 An axle assembly of Class B having wheel of 1700 mm shall be designated as Axle B 1700.

A-5 LIGHTING REQUIREMENTS

Every trailer shall be provided with two tail lights of red colour at the rear and conforming to provisions of US 479:2003

The point on the illuminating surface farthest from the median longitudinal plane of trailer shall not be more than 400 mm from the extreme outer edge of the vehicle. The distance between the inner edge of the two illuminating surface shall not be less than 600 mm. This distance may be reduced to 400 mm, where the overall width of the trailer is less than 1300 mm. The height of taillights above the ground shall not be less than 350 mm and not more than 1600 mm

A-6 OTHER REQUIREMENTS

All the parts requiring lubrication shall be provided with suitable arrangement which should be easily accessible

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Annex B (NORMATIVE)

Cold brake performance test

B-1 GENERAL

B-1.1 During all the tests of service brake the trailed vehicle shall be coupled to a towing vehicle with which it is recommended for use by the manufacturer.

B-2 TEST CONDITIONS

B-2.1 The test surface shall not exceed one percent longitudinal slope and 3 percent side slope.

B-2.2 The trailer should be loaded to the maximum specified gross capacity.

B-2.3 In case of a multiple-axle trailer having any unbraked axles, the unbraked axles shall be loaded to its maximum axle load.

B-2.4 The test track shall have a dry, clean, concrete, and bituminous or an equivalent surface having good adhesion.

B-2.5 The test shall be performed when the wind velocity is below 10m/s.

B-2.6 The braked axle(s) shall be equipped with the largest diameter tyres specified by the vehicle manufacturer. The tyres shall be inflated to pressure(s) specified by the vehicle manufacturer.

B-2.7 At the start of each test, the brakes shall be cold. A brake is deemed cold if one of the following condition is met:

- a) The temperature measured over the disc or on the outside of the drum is below 100°C;
- b) In the case of totally enclosed brakes, including oil immersed brakes, the temperature measured on the outside of the housing is below 50°C, or within manufacturer's specifications; and
- c) The brakes have not been actuated for one hour.

B-3 PROCEDURE

B-3.1 Prior to the start of the test, the brakes shall have been fully bedded-in (burnished) and adjusted in accordance with the manufacturer's instructions. Thereafter, the brakes shall not be further manually adjusted during the complete test.

B-3.2 With the towing vehicle and trailed vehicle traveling at the maximum design speed of the trailed vehicle but not exceeding 30 km/h, measure deceleration for a series of different forces applied to the control of the braking device. Calculate the corresponding values of mean deceleration from the following formula:

$$a = \frac{v^2}{2s}$$

where

- a average deceleration in m/s²;
- v initial speed in m/s; and
- s stopping distance in m.

B-3.3 If the trailed vehicle service braking device control is independent of the towing vehicle braking device control, apply the trailed vehicle brakes only. When the brakes of trailed vehicle is operated, the engine in the towing vehicle shall be disengaged by the clutch so that the force to stop entire system shall come from brakes of trailed vehicle.

B-3.4 If the braking device transmission is not mechanical, measure an appropriate transmission parameter, such as fluid pressure, during each stop in such a way that the measurement does not interfere with the dynamic characteristics of the braking system.

B-3.5 Repeat the procedure for a series of different forces applied to the control of the braking device up to maximum force which can be applied without locking of the wheels, or up to a maximum input force of 600 N for foot-operated controls or 400 N for hand operated controls if the braked wheels are not locked.

B-3.6 For each value of force applied to the braking device control, calculate the trailed vehicle braking force from whichever of the following formula is appropriate:

B-3.6.1 If the trailed vehicle brakes only are applied, use the following formula

$$F_2 = (m_1 + m_2)a_3$$

where

- F₂ the trailed vehicle braking force in N;
- m₁ the towing vehicle mass in kg;
- M₂ the trailed vehicle mass in kg; and
- a₃ the mean deceleration of the towing and trailed vehicle combination in m/s².

B-3.6.2 If the towing and trailed vehicle brakes are applied, use the following formula:

$$F_2 = (m_1 + m_2)a_3 - m_1a_1$$

where

- a, mean deceleration measured with the towing vehicle alone at the same value of force applied to the towing vehicle braking device control which produced deceleration a₁ of the vehicle combination in m/s².

B-3.7 For each value of braking force F₂, calculate the equivalent mean deceleration (a₂) of the trailed vehicle from the following formula:

$$a_2 = \frac{F_2}{m_2}$$

B-3.8 For each value of the equivalent mean deceleration a₂, calculate the equivalent stopping distance s₂ of the trailed vehicle from the following formula:

$$s_2 = \frac{v_2^2}{2a_2}$$

Where

- S₂ equivalent stopping distance of the trailed vehicle in m, and

V_2 measured initial velocity of the trailed vehicle in m/s

B-3.9 Repeat the test with the trailed vehicle unladen.

B-4 REPORT

B-4.1 Report for both the laden and the unladen trailed vehicle, the relationship between input force, stopping distance mean deceleration either in the form of a graph or table values.

B-4.1.1 If the braking device transmission is not mechanical, report the relationship between stopping distance, mean deceleration and an appropriate transmission parameter, such as fluid pressure, in the form of a graph or table of corresponding values.

B-5 TOLERANCE

The following measuring tolerance shall be adhered to when conducting the test:

S/NO	Measurement	Tolerance, percent
I.	Travel speed	±3
II.	Vehicle mass	±3
III.	Deceleration	±3
IV.	Stopping distance	±1
V.	Brake control input force	±5
VI.	Tyre inflation pressure	±5
VII.	Brake system fluid (gas)	±5

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- [1] IS 8213:2000 Agricultural tractor trailer — Specification
- [2] Technical Requirements https://www.infrastructure.gov.au/vehicles/vehicle_regulation/bulletin/vs.
- [3] The traffic and road safety act, 1998
- [4] NSW Government Vehicle standards information, rev 5
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