PAKSITAN STANDARD SPECIFICATIONS FOR FERTILIZER BROADCASTER

1 SCOPE

1.1 This standard specifies the material, dimensions, manufacturing and other requirements of major/critical components/sub-assemblies and replacement parts of tractor rear mounted fertilizer broadcaster to ensure proper quality control measures in the manufacture of these implements.

1.2 This standard is related to trade and manufacturing practices prevailing in the country and therefore, permits the purchaser to use his option for selecting the implement to suit his requirements.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of PS ----/2018. At the time of publication, the edition indicated was valid. All the normative references listed below are subject to revision, and parties to agreement, based on this part of PS ---/2018 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below;

i) ISO 530-1:1994(E): Agricultural tractors – Rear-mounted three-point linkage – Part 1: Categories 1, 2, 3 and 4.

ii) PS 1650/1/1984: Specification for Agricultural Wheeled Tractors – Three point linkage – Part 1: categories 1, 2 and 3.

iii) PS 1808/86: Agricultural wheeled tractors – Three-point linkage – Linchpins.

iv) PS 877/72: The provision of safety on farm implements.

v) ASAE S318.9/SAE J208d: Safety for Agricultural equipment.

3 DEFINITIONS

For the purpose of this standard, the following definitions shall apply.

3.1 **Fertilizer broadcaster:** A tractor rear mounted machine primarily designed to spread or broadcast fertilizers in the field, but the same can also be used to spread seeds and manures if required. The equipment can be calibrated for different application rates as per field specific requirements.

3.2 **Linkage Categories:** Linkage categories have been standardized through PS 1650/I/1984 and ISO 530-1:1994(E) as per tractor drawbar power which helps in selecting matching size of machine with tractor drawbar power. Recommended size of implement to be used with specified tractor drawbar power and associated category of three point linkage system of the tractor is shown below;

Linkage Category	Tractor drawbar power		Recommended size of machine
	kW	HP	
1	15-35	20-45	Up to 250 kg
2	30-75	40-100	250-500 kg
3	60-168	80-225	500 kg and above

3.3 **Three point linkage assembly:** Combination of one upper link and two lower links, each articulated to the tractor and the implement at the opposite ends in order to connect the implement to the tractor.

3.4 **Three-point hitch assembly:** Combination of implement mast (providing yoke with hole for insertion of upper hitch attachment) and two lower hitch attachments on the implement, each used to connect tractor links with the implement rigidly.

3.5 **Upper hitch attachment:** Pin, usually detachable and forming part of the upper link assembly, by which an upper link is secured.

3.6 **Lower hitch attachment:** Pin, or clevis and pin, usually attached to the implement, by which a lower link is secured.

3.7 **Hitch point:** Articulated connection between link and implement.

3.8 **Mast:** Component of the implement that provides location of the upper hitch point on the implements.

3.9 **Linchpin:** Pin, usually fitted with a spring retaining device, by which an articulated connection is retained in position.

3.10 **Lower hitch attachment span:** Distance between the shoulders of the lower hitch pins or inner faces of the clevis prongs against which the sides of the lower link socket ball joints abut.

3.11 **Mast height:** Vertical distance between the center line of the upper hitch point and the

3.12 **Mounted Implement:** An implement which is directly attached with the tractor by connecting three point linkages and three point hitch. During transportation, implement is lifted by the three point linkage with the help of tractor hydraulic system.

3.13 **Mild Steel (MS):** Steel with low carbon contents in the range of 0.05%-0.25% carbon. It is commonly used for implement frame, mast and other non-wearing and structural components of the implements.

3.14 **Stainless steel (SS): Steel essentially containing** a variety of corrosion resistant constituents like a minimum of 11% Chromium. Changing the Chromium content and adding other elements like Nickel, Molybdenum, Titanium and Niobium changes the mechanical and physical properties of the steel.

3.15 **Agitator:** The device which mechanically initiates the movement of the fertilizer within the hopper.

3.16 **Distributer plate:** A circular disc having equally spaced fins or wings for spreading the material falling on it by centrifugal force.

3.17 **Feed Control lever/calibration lever:** A device to control the feed rate of the fertilizers, seed or fertilizers for the purpose of calibration.

3.18 **Hopper:** A container for holding the fertilizer, seed or any other agriculture input.

3.19 **Working Size:** The working size of the Fertilizer Broadcaster depends upon speed of rotation and shall be determined by spreading the fertilizer in the field. The dia. of the spreading is approximately between 9 to 10.5 m.

4 DIMENSIONAL, MATERIAL AND MANUFACTURING REQUIREMENTS

Note: *All dimensions are in mm and minimum, except where tolerances are specified.*

4.1 Frame and three-point hitch assembly (Figure 1)

Frame and three-point hitch assembly of fertilizer distributor is shown in Figure 1(a).

4.1.1 Frame Assembly

4.1.1.1 The frame assembly shall consist of main frame, reinforcement member, hopper mounting brackets, and distributor mounting plate.

4.1.1.2 Main frame shall be made from seamless M.S pipe having outer diameter 60 mm and wall thickness 5 mm.

4.1.1.3 Reinforcement member shall be of two types; i.e. horizontal member and inclined members as described below;

4.1.1.3.1 Horizontal member shall be made from the same material as specified for the main frame (see clause 4.1.1.2) .

4.1.1.3.2 Inclined members shall be made from MS channel measuring 25 x 15x 5 mm.

4.1.1.4 Hopper mounting brackets shall be of L shaped and made from MS plate 90 x 90 x 4 mm which shall be welded to pipe frame at the top end..

4.1.1.5 Distributor mounting plate shall be made from M.S sheet 6 mm thick which shall be welded to pipe frame.

4.1.2 Three-point hitch assembly

Three point hitch assembly shall conform to provisions of PS 1650/1/1984 and ISO 530-1:1994(E) and shall consist of a yoke to connect upper hitch point and two lower hitch attachments to connect lower hitch points with the implement.

Yoke

4.1.2.1 Yoke shall be made from a U shaped plate of 16 mm thickness which shall be welded to the horizontal member of the frame.

4.1.2.2 Width between inner faces of yoke (W_1), width between outer faces of yoke (W_2) and diameter of hitch pin hole (D_1) shall have dimensions as specified in Table 1.

Lower hitch attachments

4.1.2.3 Lower hitch attachments shall be welded to main frame directly.

4.1.2.4 Diameter of lower hitch attachment (D_2) shall have dimensions as specified in Table 1.

4.1.2.5 The lower hitch attachments shall be welded to the frame at a place to ensure that lower hitch attachments span (S) and height of mast (H) shall be as specified in Table 1.

Note: *Vital dimensions of three point hitch assembly are shown in Table 1 and Figure 1(b).*

4.1.3 **Upper hitch attachment, lower hitch attachment and linchpin (Figure 2)**

4.1.3.1 Upper hitch attachment, lower hitch attachments and linchpin shall be made from cold drawn MS which shall be zinc coated to make these corrosion resistant.

4.1.3.2 Upper hitch attachment, lower hitch attachment for different categories of three point linkages shall have dimensions as specified in Table 2.

4.1.4 Linchpin for different categories of three point linkage systems shall conform to provisions of PS 1808/86 and shall have dimensions as specified in Table 3.

Table 1: Vital dimensions of three-point hitch assembly

Dimension	Cat 1		Cat 2		Cat 3	
	Min.	Max.	Min.	Max.	Min.	Max.
Yoke						
Width between inner faces of yoke (W_1)	44.5	-	52.0	-	52.0	-
Width between outer faces of yoke (W_2)	-	69	-	86	-	95
Diameter of yoke hole (D_1)	19.30	19.32	25.70	25.72	32.00	32.25
Mast height (H)	460 ± 1.5		610 1.5		685 ±1.5	
Lower hitch attachments						
Width between inner faces of clevis prongs (W_3)	-	65	-	65	-	65
Diameter of clevis prongs hole (D_2)	22.40	22.73	28.70	29.03	37.40	37.75
Lower hitch attachments span (S)	683.± 1. 5		825±1.5		965±1.5	

Table 2 (a): Upper hitch attachment dimensions

Dimension	Cat 1	Cat 2	Cat 3
Diameter of upper hitch attachment (B)	18.97 - 19.00	25.27 - 25.40	31.50 - 31.75
Linchpin hole distance (A)	76 min	93 min	102 min
Diameter of linchpin hole (C)	12	12	12

Table 2 (b): Lower hitch attachment dimensions

Dimension	Cat 1	Cat 2	Cat 3
Diameter of lower hitch attachment (B)	21.79 - 22.00	27.79 - 28.00	36.40 - 36.50
Linchpin hole distance (A)	39 min	49 min	52 min
Diameter of linchpin hole (C)	12	12	17

Table 3: Linchpin dimensions

Dimension	Cat 1	Cat 2	Cat 3
Linchpin length (A)	32	32	32
Diameter of Linchpin (B)	11	11	16
Diameter of Linchpin wire (C)	3	3	3

4.2 **Hopper assembly (Figure 3)**

4.2.1 Hopper assembly shall consist of a funnel type conical hopper and reinforcements.

4.2.2 Funnel type hopper shall be made from MS formed sheet 3 mm thick. The upper dia. of the hopper shall be 1160 ± 10 mm and the bottom dia. shall be 200 ± 5 mm.

4.2.3 Reinforcements shall be made from MS pipes of 25 x 25 x 4 mm and welded to hopper using 04 Nos. MS plates 10 mm thick.

4.2.4 Hopper shall be bolted with hopper mounting brackets (see clause 4.1.1.4).

4.3 **Distributor assembly (Figure 4)**

4.3.1 Distributor assembly shall consist of agitator shaft, distributor plate, distributor wings and gearbox sub-assembly.

4.3.2 Agitator shaft shall be made from MS round 25 mm dia.

4.3.3 Distributor plate shall be made from MS plate 6 mm thick and shall have diameter of 430 ± 5 mm.

4.3.4 Distributor wings shall be made from SS 3 mm thick and shall be formed to Z shape with flange dimension of 32 mm and web dimension of 60 mm. Each distributor wing shall have a maximum length of 180 mm.

4.3.5 Distributor wings shall be bolted to distributor plate using M10 bolts.

4.3.6 Gear box sub-assembly shall consist of gear box with bevel gear set and bearings and a female UJ drive shaft

4.3.6.1 Gearbox shall be made from cast steel and shall house two bevel gears having speed ratio of 1:1 mounted with 6205 bearings.

4.3.6.2 Gearbox sub-assembly shall be mounted on distributor mounting plate (see clause 4.1.1.5).

4.3.6.3 UJ shaft shall be of female type.

4.4 **Calibration assembly (Figure 5)**

4.4.1 A manually operated calibration system shall be provided with a lever and markings for adjusting application rate.

5 OTHER REQUIREMENTS

5.1 All the structural components shall be manufactured by using new materials.

5.2 All the market items like nuts and bolts shall be brand new.

5.3 Nuts and bolts shall be zinc coated.

5.4 Overall size and weight of the fertilizer broadcaster shall be declared by the manufacturer.

5.5 All the components/sub-assemblies shall be welded at right angle and parallel members of the frame shall be of equal length and size.

5.6 All the nut bolt fastenings shall be tightened at appropriate torque using imported spring washers.

5.7 Operation and maintenance (O&M) manual shall be provided in English & Urdu with complete illustrations of assembling of replaceable components.

5.8 O&M manual shall also contain relevant safety instructions as provided in PS 877:1972 and ASAE S318.9/SAE J208d.

5.9 A set of pins with linchpins and two adjustable wrenches of 250 mm and 300 mm size should also be provided.

5.10 The implement shall be painted preferably using baking/stoving paint with primer.

5.11 When the fertilizer Broadcaster is set at its working position and is placed on a plane surface, the Fertilizer Broadcaster shall be well balanced.

6 FINISH AND WORKMANSHIP

6.1 All components of the fertilizer broadcaster should be free from pits, burrs and other visual defects.

6.2 The welding of various parts shall be satisfactory in all respects.

6.3 All the weld-ments shall be smoothened by grinding.

6.4 All the exposed parts shall have protective coating to prevent surface from rusting and to avoid deterioration in transit and during storage.

7 MARKING AND PACKING

7.1 Each fertilizer broadcaster shall be marked with the following particular

7.1.1 Manufacturer's name, address, contact numbers and trade-mark, if any;

7.1.2 Maximum size and number of tines; and

7.1.3 Batch or code number.

7.2 The particulars listed under 7.1.1, 7.1.2 and 7.1.3 shall be stamped embossed or engraved on metallic plate and rigidly fitted on a non-wearing part of the fertilizer broadcaster.

7.3 Each fertilizer broadcaster may also carry the PSQCA Certification Mark subject to verification by the competent authority.

7.4 The fertilizer broadcaster should be packed to ensure safety of the components in transportation as agreed to between the purchaser and the manufacturer/supplier.

Note: *Design of typical fertilizer broadcasters is shown in Figure 6. The design can be modified as agreed between the purchaser and the manufacturer subject to compliance of these standard specifications.*

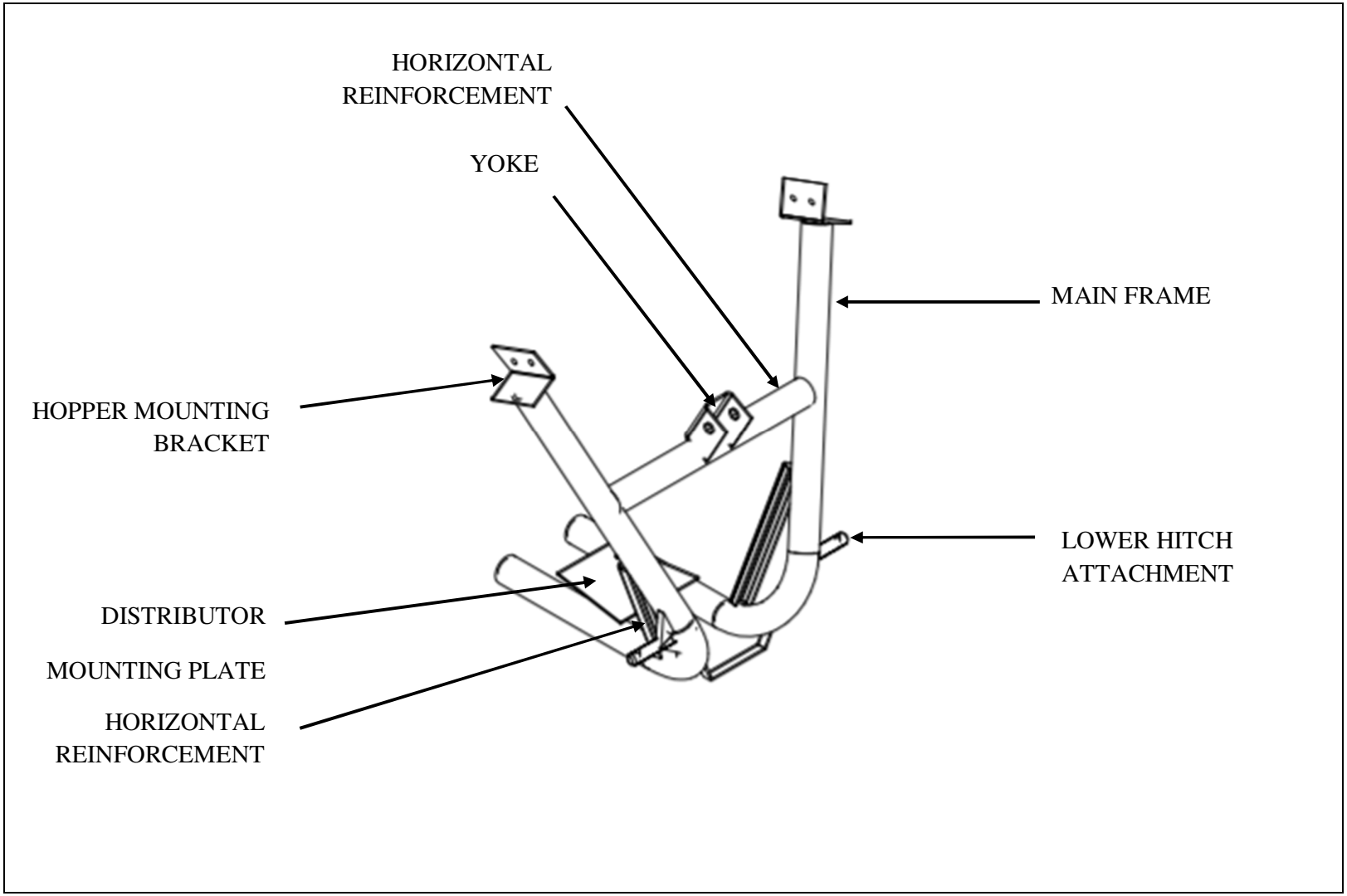

Figure 1(a): Frame and hitch assembly

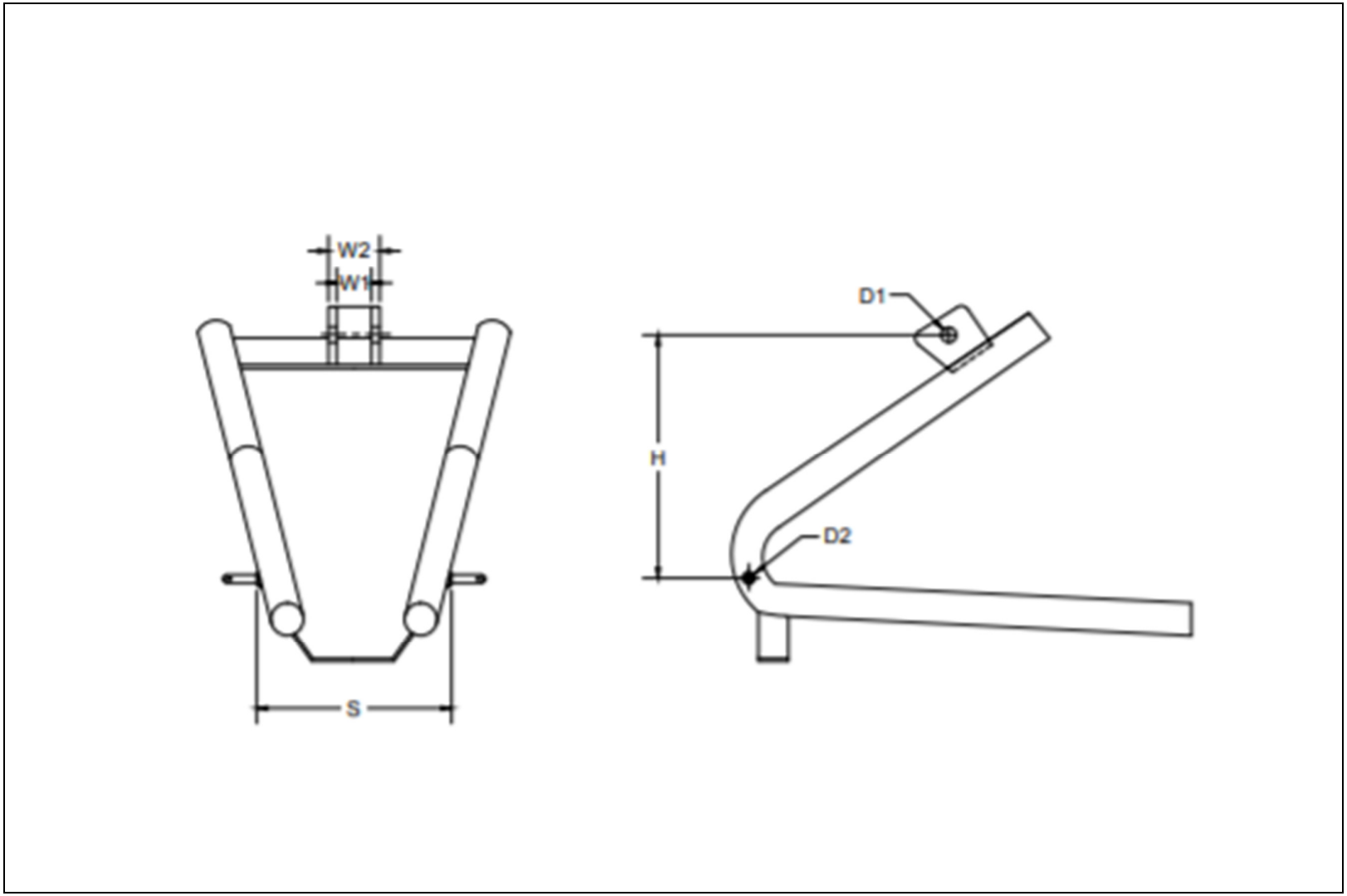

Figure 1 (b): Yoke and lower hitch attachment dimensions

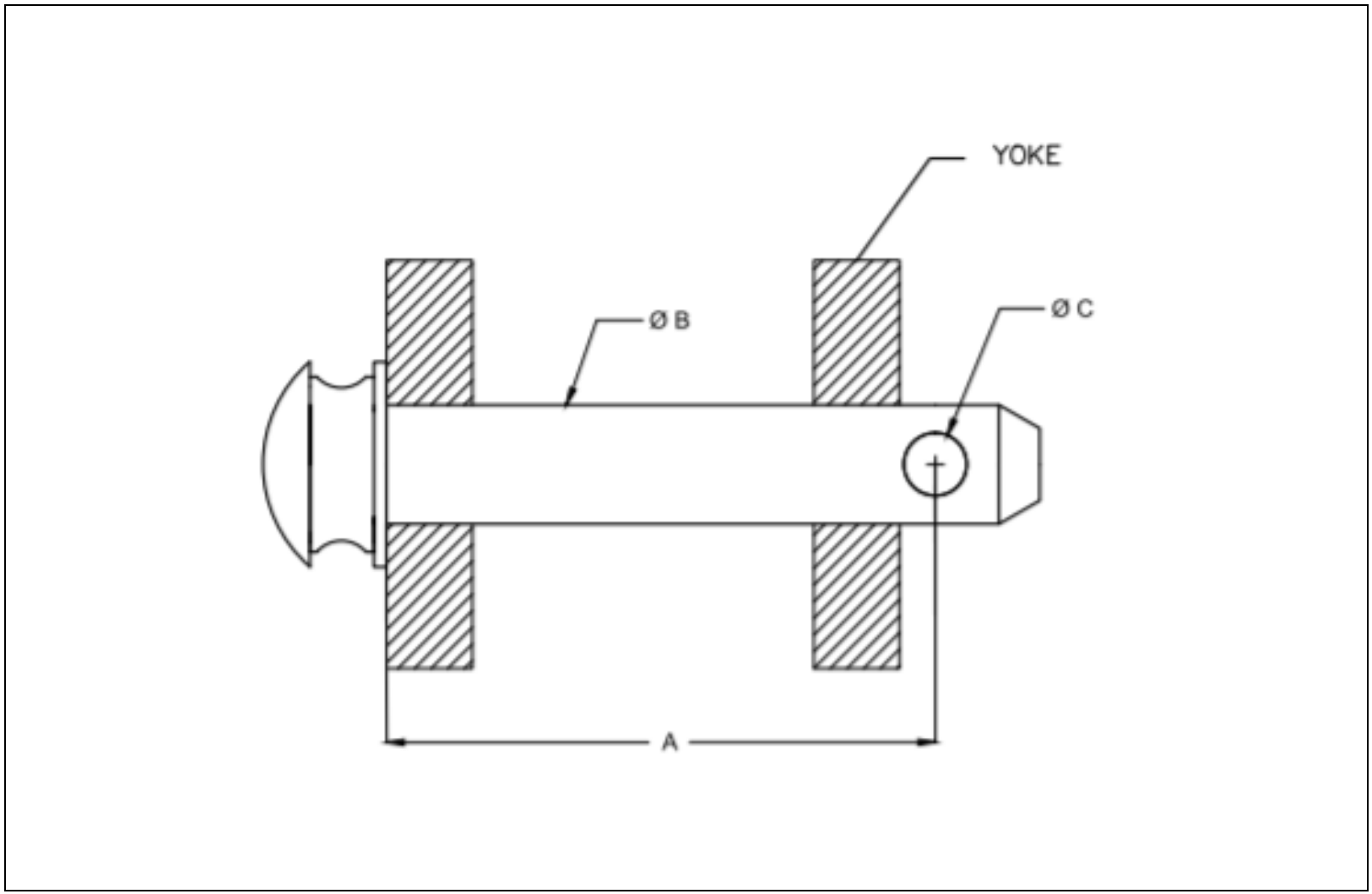

Figure 2 (a): Upper hitch attachment dimensions

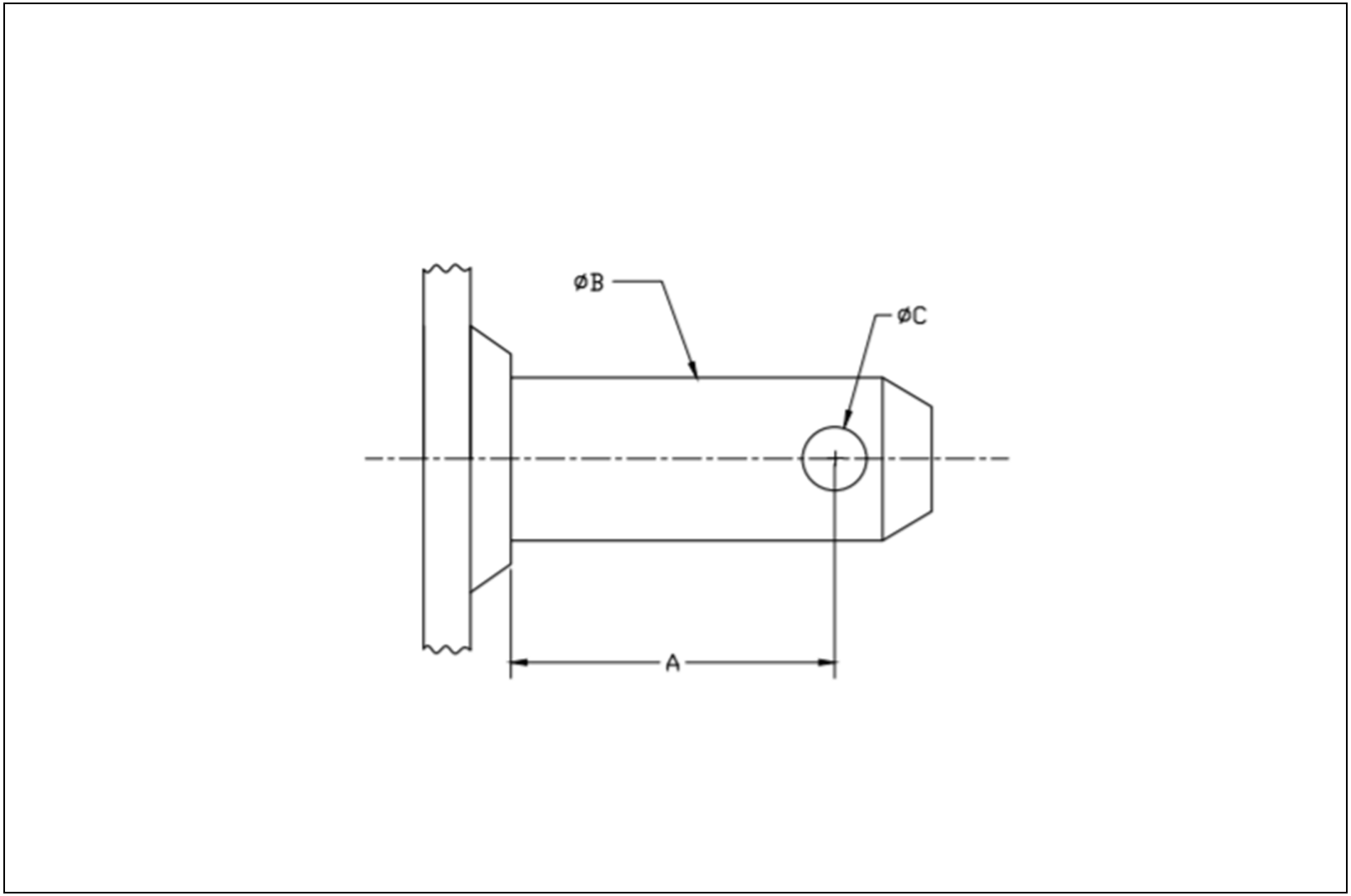

Figure 2(b): Lower hitch attachment dimensions

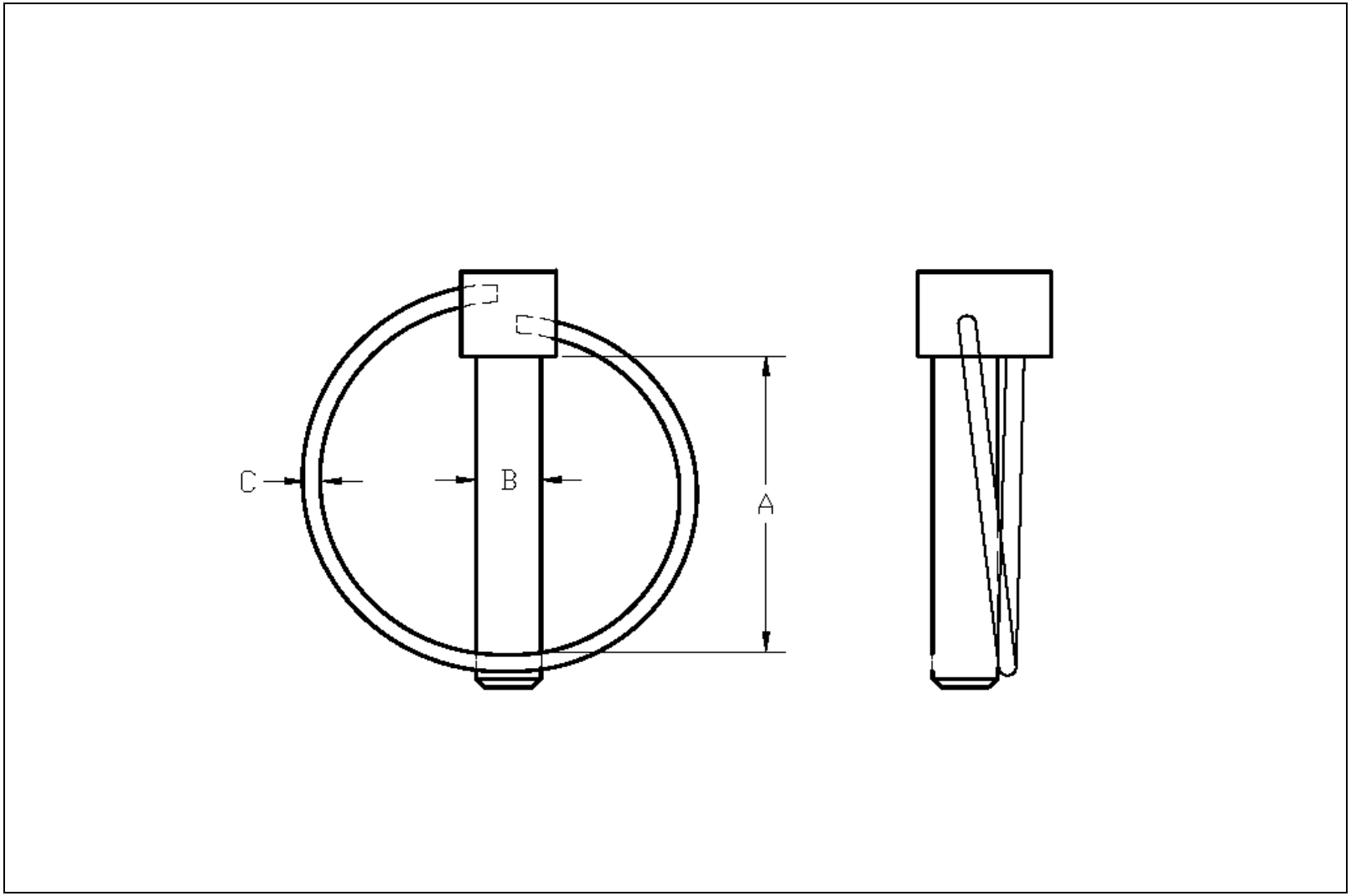

Figure 2 (c): Lynchpin dimensions

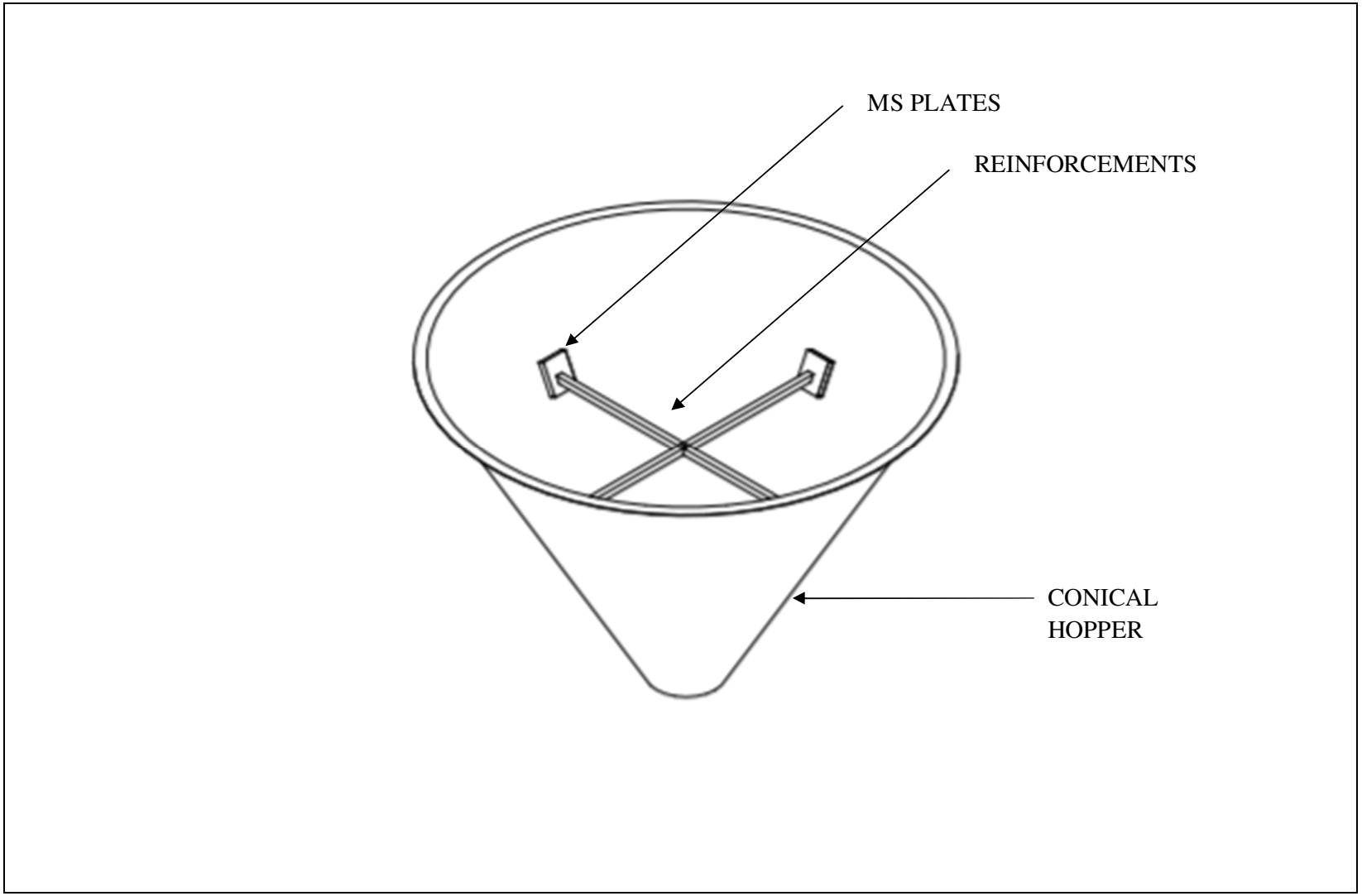

Figure 3: Hopper assembly

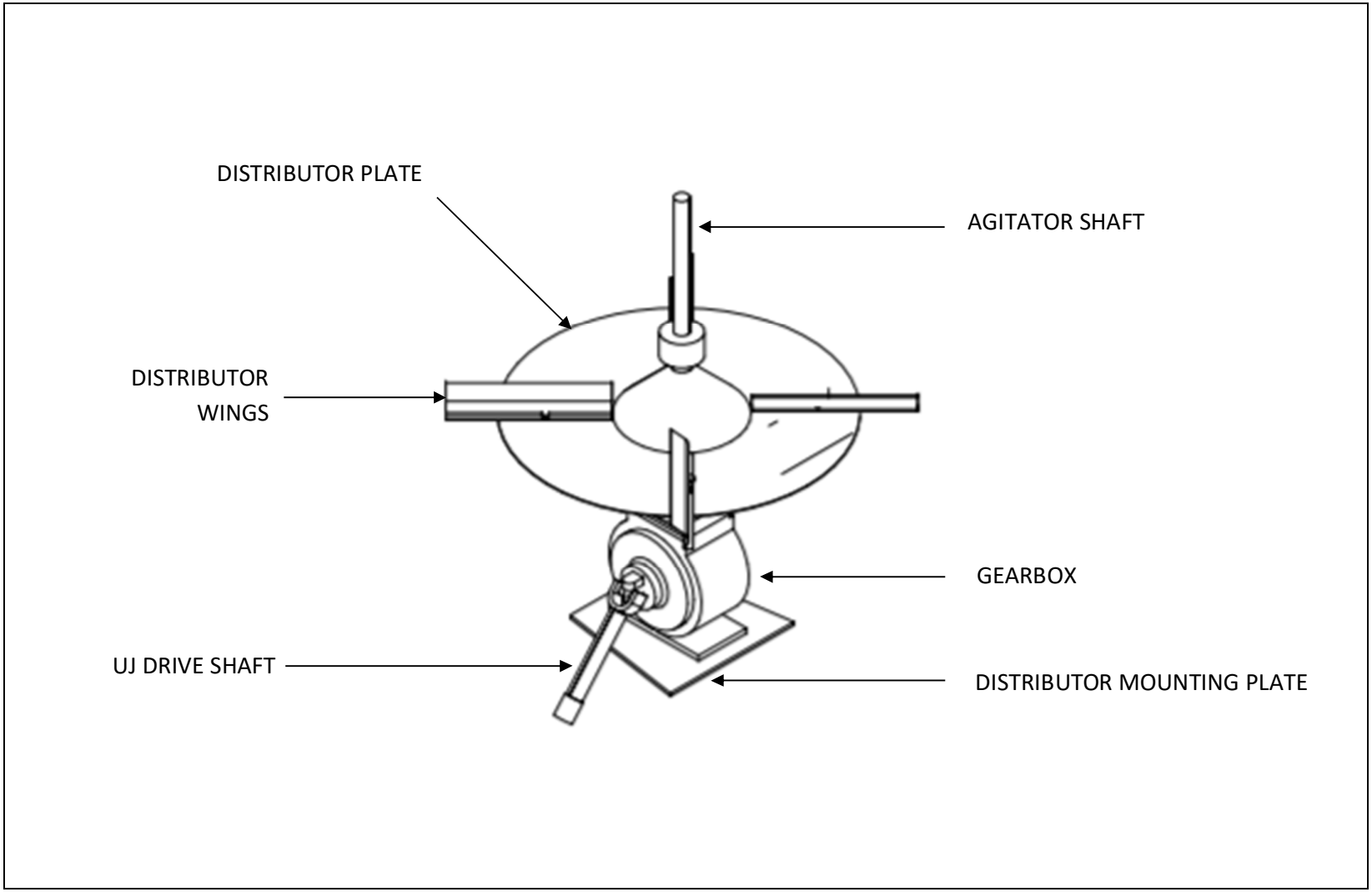

Figure 4: Distributor assembly

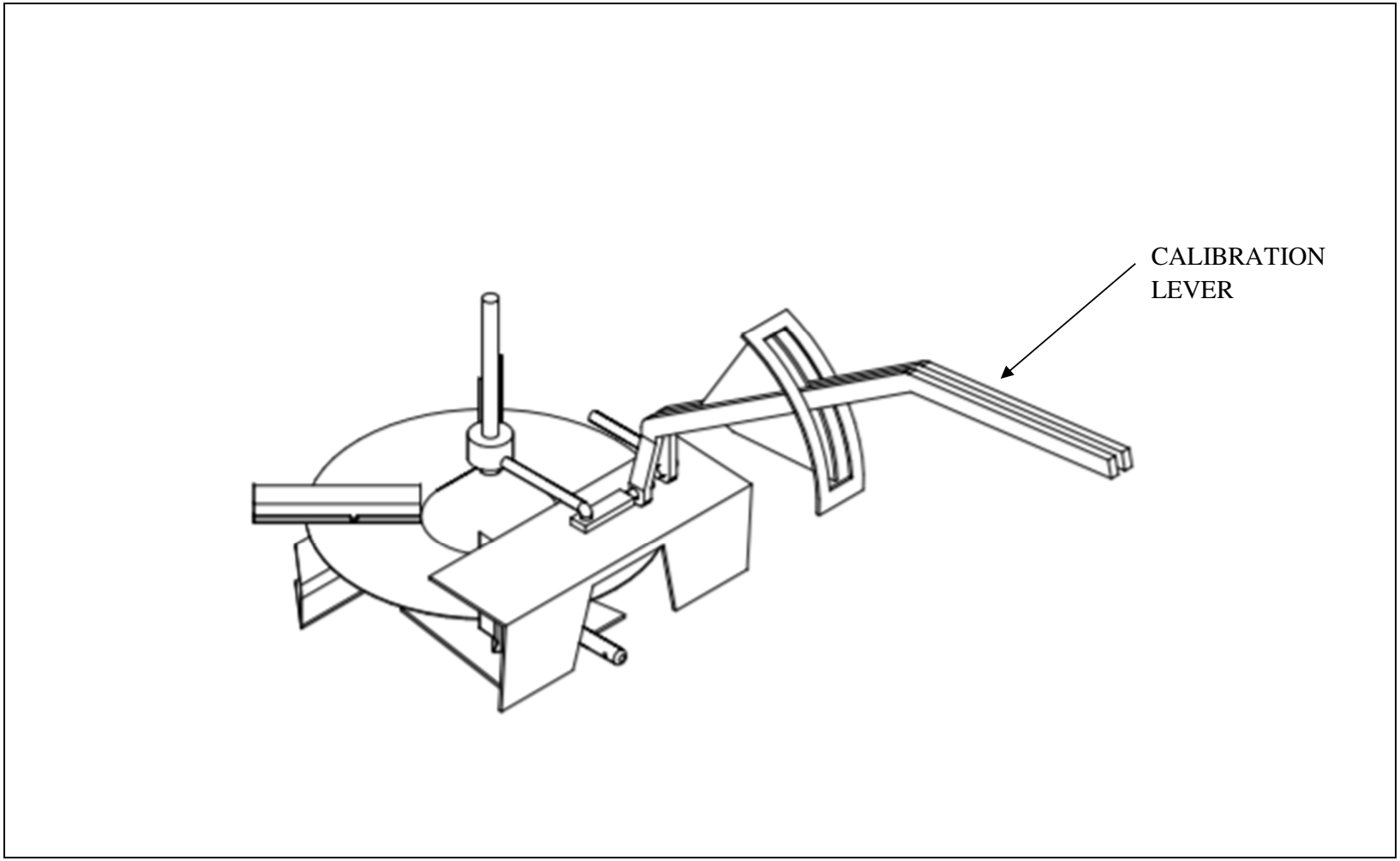

Figure 5: Calibration assembly

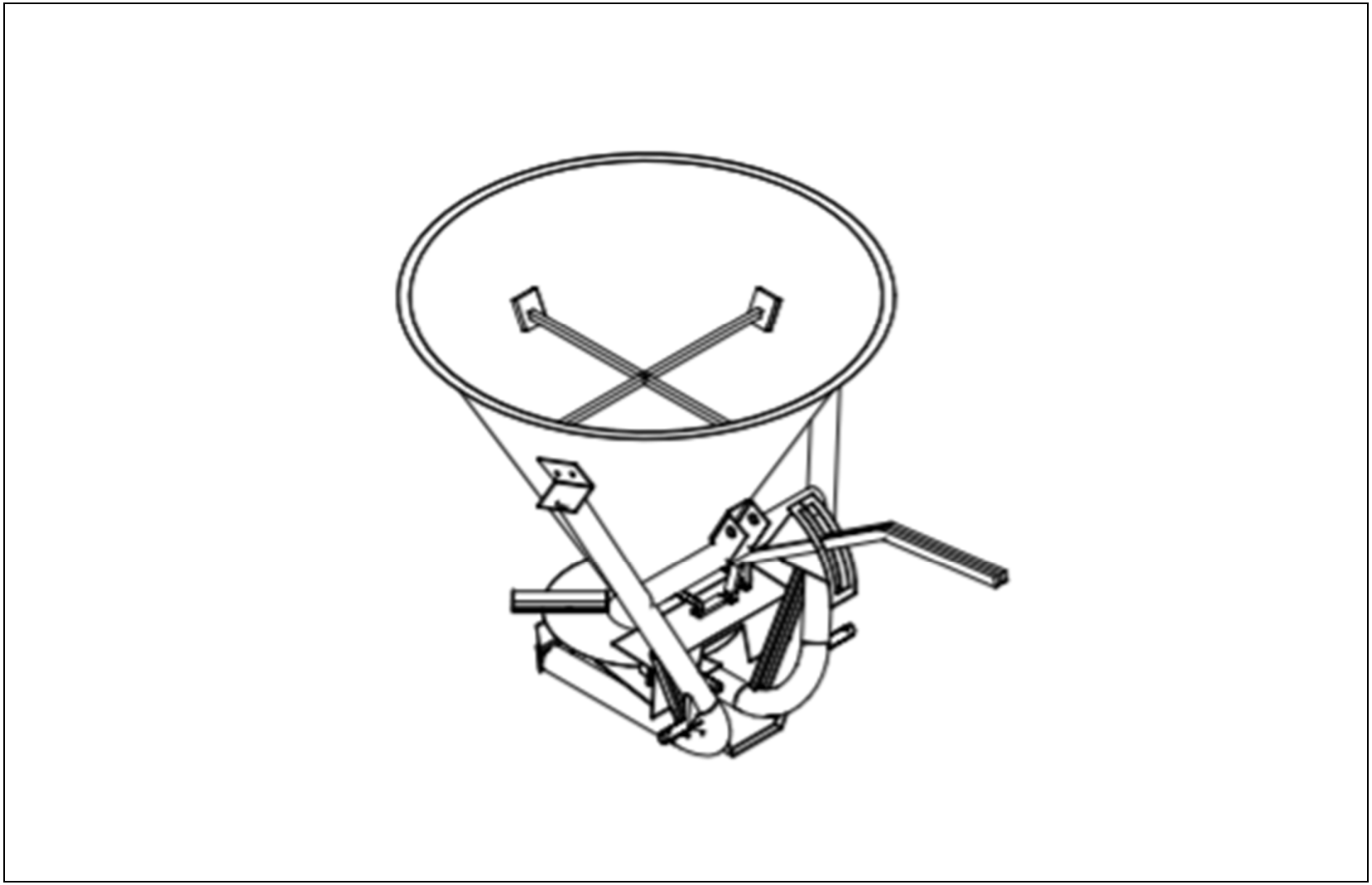

Figure 6: Typical fertilizer distributor