

# PAKISTAN STANDARD SPECIFICATION FOR ULTRA LOW VOLUME (ULV) SPRAYER

## 1. SCOPE

- 1.1** This standard specifies the material, dimensions, manufacturing and other requirements of major/critical components/sub-assemblies and replacement parts as well as performance requirements of locally manufactured or imported ULV sprayers (hand held type) to ensure proper quality control measures in the manufacture and import of these sprayers.
- 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 sprayer to suit his requirements.

## 2. NORMATIVE REFERENCES

The following standard and technical book 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) IS 14459 (1997): Crop Protection Equipment - Battery Operated Rotary Atomizer Disc Type ULV Sprayer.
- ii) PS 877/72: The provision of safety on farm implements.
- iii) ASAE S318.9/SAE J208d: Safety for Agricultural equipment.
- iv) Mathews, G. A. (1992): Pesticide Application Methods, 2<sup>nd</sup> Edition. Longman Scientific and Technical, UK.

## 3. DEFINITIONS

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

- 3.1 ULV sprayer:** a sprayer used to spray pesticides formulations in ultra lowvolume (ULV) i.e. less than 5 liter per hectare for field crops and less than 50 liter per hectare in case of trees/orchards. Formulation for pesticides is usually oil based while the same for weedicides is water based. Use of ULV sprayers is well-established spraying technique for locust control. These sprayers are very useful where water availability is scarce and terrain is uneven. The sprayer consists of a bottle/tank and a rotating disc. The liquid is dropped on the rotating disc to produce droplets as a result of centrifugal force.
- 3.2 Atomizer Disc:** A device having number of radial grooves ending in sharp pointed teeth on the periphery through which liquid is sprayed out with centrifugal force resulting in fine droplets.
- 3.3 Mass:** The mass of the complete sprayer assembly without any liquid in the tank without back pack assembly, but including batteries.
- 3.4 Tank / bottle:** A container for holding the spray liquid.

- 3.5 **Tank/bottle capacity:** The volume of the tank/bottle when spray liquid is filled to its neck level, the tank/bottle being duly equipped with all its internal mountings.
- 3.6 **Backpack:** A device made out of plastic to contain spray liquid. The device also has tube with a valve to provide outlet with controlled flow rate.
- 3.7 **Spray pattern:** Geometrical appearance of spray droplets coming out of sprayer.
- 3.8 **Throw:** The distance covered by the spray droplets in vertical as well as in horizontal plane.
- 3.9 **Mist:** The distribution of droplets with dimensions in range of 50 µm and 100 µm.
- 3.10 **Type 1 sprayer:** Sprayer used for application of pesticides (Figure 1).
- 3.11 **Type 2 sprayer:** Sprayer used for application of weedicides (Figure 2).

#### 4 MATERIAL AND MANUFACTURING REQUIREMENTS

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

##### 4.1 Material requirements

The material of construction of various components of the sprayer shall be selected from col. 3 of Table 1.

**Table 1: Material specifications of sprayer components**

Sr. No. (1)	Components (2)	Material (3)
i)	Bottle	High Density Poly-Propylene HDPP)
ii)	Cap of bottle	Polypropylene (PP)/HDPE
iii)	Battery case	Rigid Polyvanyle chloride (PVC)/HDPE
iv)	Atomizer disc	Engineering plastics
v)	Atomizer cover	Plastic
vi)	Motor housing	Plastic
vii)	Bottle holder	Plastic
viii)	Feed nozzle	Plastic, stainless steel
ix)	Motor seal	Synthetic rubber/PVC
x)	Strap	Woven web cotton/ synthetic yarn
xi)	Valve	Plastic/ss/brass
xii)	Strainer	Stainless Steel/Plastics
xiii)	Hose clips	Steel
xiv)	Hose	PVC
xv)	Gasket	Synthetic rubber/PVC/fiber/leather
xvi)	Brush	soft hair
xvii)	Straps	Non-absorbent material

## 4.2 **Manufacturing requirements**

- 4.2.1 **Bottle:** Type 1 sprayers shall be provided with a bottle having capacity of 500 mL or 1000 mL with a tolerance of  $\pm 10$  percent.
- 4.2.2 **Dispenser Brush:** A small soft hair brush may be provided on which the liquid from the bottle drips and the brush barely touches the atomizer disc. This acts as a device which spreads the liquid on the spinning disc. This device prevents uneven spray of the liquid from the sprayer.
- 4.2.3 **Battery:** The sprayer shall be provided with a rechargeable battery comprising of 6 dry cells of R 20 (for 9 V motor) or a dry battery pack (for 6 V motor).
- 4.2.4 **Angle Plate:** An angle plate shall be provided for changing the angle of the sprayer head by locking it in the appropriate slot.
- 4.2.5 **Atomizer Disc:** The atomizer disc shall have a 50 mm minimum outside diameter and shall have serrations at the outer periphery (Figure 3).
- 4.2.6 **Mass:** The mass of the sprayer shall not exceed 2 kg.
- 4.2.7 **Backpack:** Type 2 sprayers shall be provided with a backpack accessory. As an option, the Type 1 sprayer may also be supplied with a tank of backpack accessory (see Fig. 3) having a capacity of 5 L or 10 L with a tolerance of  $\pm 0.50$  L.
- 4.2.7.1 The material of construction of the backpack shall be resistant/inert to pesticide formulations. There shall be no sweating of the pesticide liquid from the wall of the backpack.
- 4.2.7.2 The backpack shall be provided with a strainer with a holding tube so that the contact of the spray mix is prevented with the hand and fingers while filling the backpack.
- 4.2.7.3 An air valve on the cap of the backpack shall be provided to prevent the liquid from spilling on the neck and back of the operator if and when he bends over.
- 4.2.7.4 The backpack lid shall have a gasket to prevent the liquid from coming out of the cap.
- 4.2.7.5 The design and construction of the cap, neck and shoulder of the backpack should be such so as not to allow any spray fluid to accumulate on the top and around the neck of the tank which may run over and contaminate the body of the operator.
- 4.2.8 **Straps:** Two straps of not less than 800 mm, when adjusted to maximum possible length and 38 mm in width shall be provided in order to help carriage of the backpack. Provision for adjustment of the length of each strap shall also be provided.

## 5 **PERFORMANCE REQUIREMENTS**

### 5.1 **Test for discharge Rate**

- 5.1.1 The discharge rate varies depending upon the orifice size of the nozzle. The nominal discharge rate shall be marked on the stainless steel nozzle and shall be indicated with colour code in case

of plastic nozzles. The discharge rate when measured in accordance with 4.1.2 and colour codes for different nozzles shall be as under:

Colour Code	Orifice diameter (mm)	Nominal Discharge Rate (mℓ/min)		Tolerance (%)
		Oil based formulations	Water based formulations	
Pink	2.2	17.7	195	±10
Red	1.1	12.86	90	±10
White	2.4	18.40	200	±10
Yellow	0.95	9.37	195	±10
Black	1.55	16.66	150	±10

5.1.2 To measure discharge rate inserts one of the nozzle into the sprayer, fill the bottle with water and attach it on the sprayer. Keep the sprayer in such a position so as the bottle remains in vertical position. Allow the water to run through the nozzle by gravity in to a measuring jar and note the time required to empty the bottle. Calculate the discharge rate in mℓ/min. repeat the test for other sizes of the nozzles.

## 5.2 Test for Micro-motor speed

5.2.1 The rated speed at rated voltage of the DC micro-motor shall be declared by the manufacturer. The declared value of rated speed shall not be less than 6000 rev/min for Type 1 sprayer and 2000rev/min for Type 2 sprayer at rated voltage. The actual speed of micro-motor when measured at rated voltage shall not vary by more than 1% from the declared value of rated speed.

5.2.2 The life of one set of batteries shall be such that after 6 h continuous running of the sprayer at no load (with atomizer disc) the speed of the motor shall not drop by more than 15% from the initial observed speed.

## 6 OTHER REQUIREMENTS

### 6.1 O&M Manual

6.1.1 The operation and maintenance (O&M) manual shall include technical specifications of the sprayer, material of construction of various components shown in the exploded view of the sprayer, instructions for operations and maintenance, common faults and their remedies and safety precautions.

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

### 6.2 Spare Parts

6.2.1 Spare parts separately packed for each sprayer according to the number required by the purchaser shall be provided. Even if no demand for spare parts has been made, a set of nozzles shall be provided with each sprayer.

## **7 WORKMANSHIP AND FINISH**

7.1 All the components shall have a smooth finish and shall be free from pits, burrs, sharp edges and other defects that may be detrimental to the user.

## **8 MARKING AND PACKING**

8.1 Each sprayer shall be marked with the following;

8.1.1 Manufacturer's name or recognized trade –mark and

8.1.2 Batch or code number.

8.2 Each sprayer may also be marked with the PSQCA standard Mark.

8.3 The details of conditions under which the license for the use of standard mark maybe granted to manufacturers or producers may be obtained from the Pakistan standards and quality control Authority.

8.4 Each sprayer shall be packed in individual for safe handling in transit.



Figure 1: Type 1 ULV sprayer

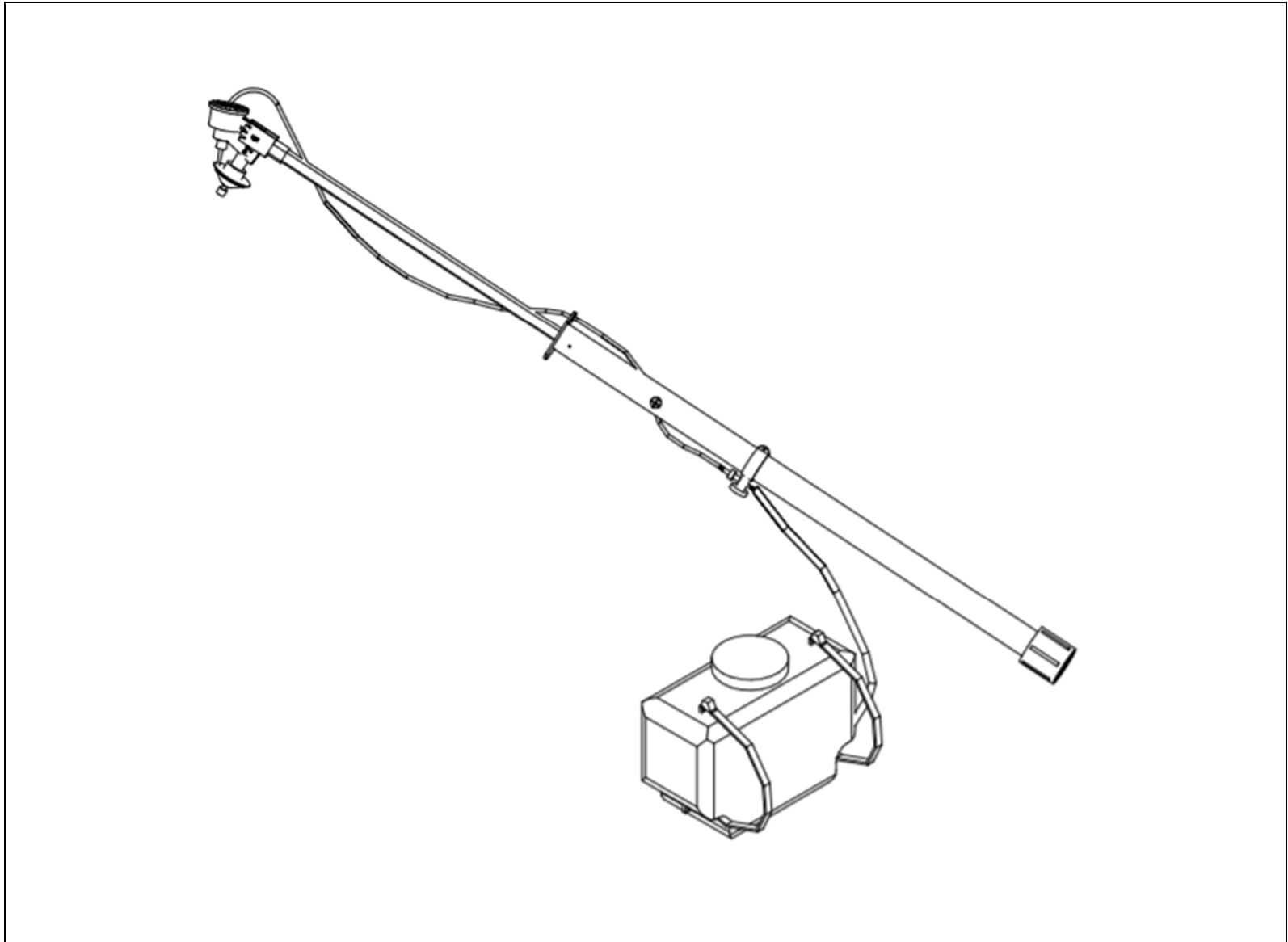


Figure 2: Type 2 ULV sprayer

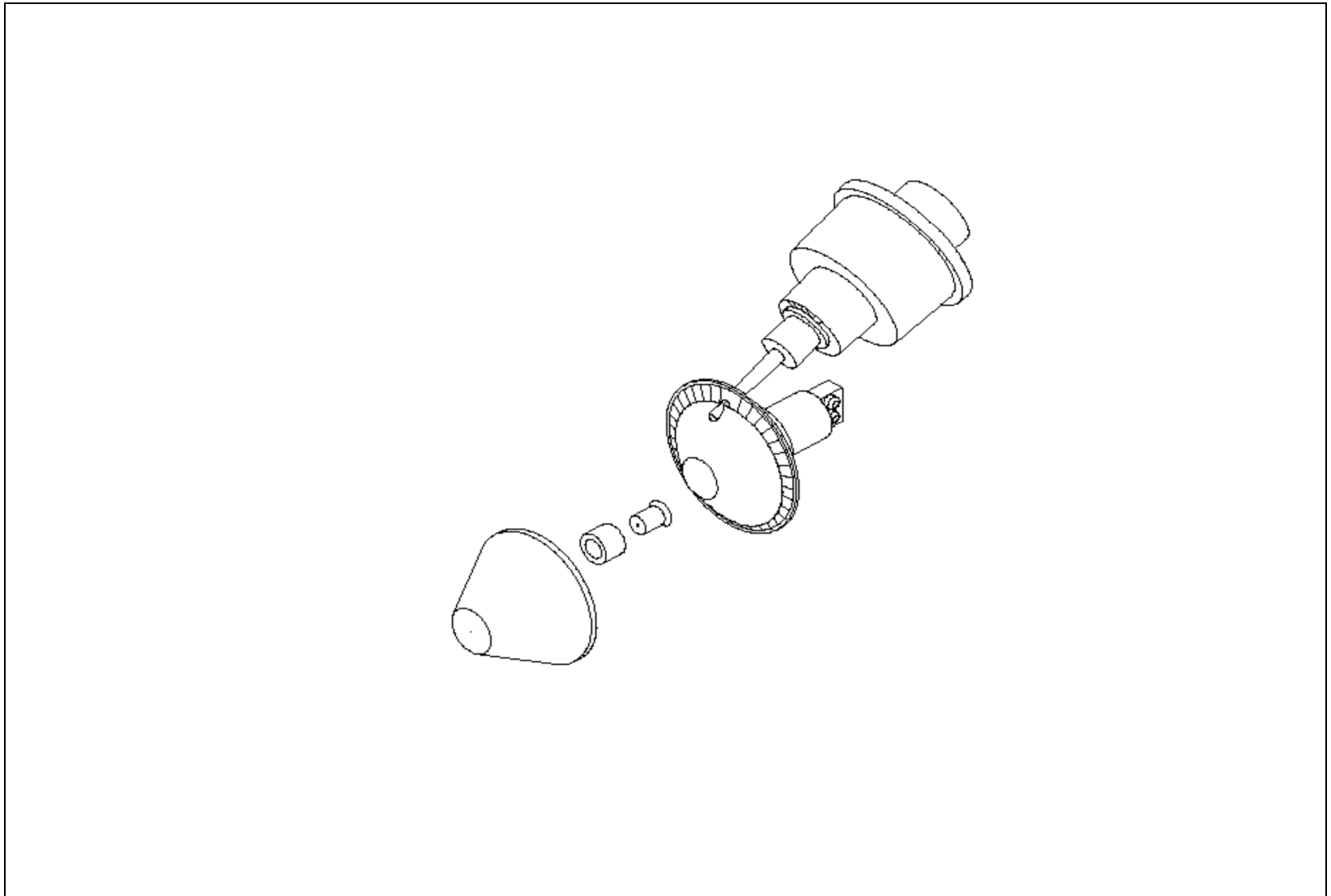


Figure 3: Atomizing assembly