

BRITISH STANDARD 4115 : Part 1 : 1967

UDC 632.982.1: 621.647.2

SPECIFICATION FOR
COMPRESSION
KNAPSACK SPRAYERS

Part 1
Non-pressure retaining type

BRITISH STANDARDS INSTITUTION

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Price 7/- net

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B.S. 4115 : Part 1 : 1967

THIS BRITISH STANDARD, having been approved by the Agricultural Machinery and Implements Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 31st January, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, fully indexed and with a note of the contents of each, will be found in the Institution's Yearbook, price 15s. The B.S. Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

- B.S. 410. Test sieves.
- B.S. 1449. Steel plate, sheet and strip.
- B.S. 1667. Woven cotton webbing No. 4 (4.5 lb).
- B.S. 1806. Dimensions of toroidal sealing rings ('O' seals and their housings).
- B.S. 2087. Chemical requirements for textiles treated by certain preservative processes.
- B.S. 2779. Fastening threads of B.S.P. sizes (formerly in B.S. 84 : 1940).
- B.S. 2968. Hydraulic spray nozzles for insect, fungus and weed control and for like purposes.
- B.S. 3628. Hose clips (worm drive type) for general purpose use.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee reference AGE/15 Draft for comment D65/3157

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CO-OPERATING ORGANIZATIONS

The Agricultural Machinery and Implements Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- *Agricultural Engineers' Association
- Agricultural Machine Parts Association
- *Agricultural Machinery and Tractor Dealers' Association
- Department of Agriculture and Fisheries for Scotland
- Institution of Agricultural Engineers, Incorporated
- *Ministry of Agriculture, Fisheries and Food
- *National Farmers' Union
- *National Institute of Agricultural Engineering
- Royal Welsh Agricultural Society

The Government department and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of British Manufacturers of Agricultural Chemicals
 Imperial College of Science and Technology
 Industrial Pest Control Association
 Ministry of Defence, Army Department
 National Association of Agricultural Contractors (Incorporated)
 Royal Horticultural Society
 University of Bristol
 Individual manufacturers

BRITISH STANDARD SPECIFICATION FOR COMPRESSION KNAPSACK SPRAYERS

Part 1. Non-pressure retaining type

FOREWORD

This British Standard has been prepared, under the authority of the Agricultural Machinery and Implements Industry Standards Committee, at the request of the National Institute of Agricultural Engineering.

The requirements regarding materials included in this specification will provide satisfactory performance; other materials having equivalent or higher characteristics may be used within the coverage of this standard. To ensure interchangeability of certain parts which may require to be replaced, the necessary mating dimensions have been specified but, in doing so, care has been taken to see that no restriction is placed on improvement in design.

It is recognized that some existing designs and practices will continue to be used until they become obsolete, but it is hoped that the adoption of this standard for new designs and developments will simplify design, manufacture and stock-holding, and so benefit the user by increased safety, lowering costs, making it easier to obtain replacements, and promoting a degree of interchangeability.

With the kind permission of the World Health Organization, some of the text in this standard, and Figs. 1, 2 and 5, have, with further modifications, been reproduced from their publication 'Equipment for Vector Control'.

NOTE. The values stated in British units are to be regarded as the standard. Any metric equivalents are approximate. More accurate conversions should be based on the data in B.S. 350, 'Conversion factors and tables'.

SPECIFICATION

1. SCOPE

This British Standard specifies the requirements and the methods for testing the performance of non-pressure retaining types of compression knapsack sprayers having working pressures not exceeding 175 lbf/in² (12 kgf/cm²).

2. DEFINITIONS

For the purposes of this British Standard the following definitions apply:

(1) *Air pressure safety valve*. The automatic escape valve which releases air when the pressure exceeds the working pressure.

(2) *Pressure release*. A means for releasing residual air pressure.

NOTE. The air pressure safety valve and the pressure release device may often be combined.

(3) *Check valve assembly*. A device which will allow flow of either liquid or air in one direction only and which will prevent any loss of pressure when closed.

(4) *Pressure gauge*. An instrument for giving a visual indication, by means of a pointer relative to a scale, of the amount by which the pressure of a fluid applied to it exceeds the pressure of the surrounding atmosphere.

(5) *Adapter tee*. A fitting which provides a third connection to which can be added an additional component.

(6) *Dip tube*. A tube which has its lower opening immersed in a pressure container and through which the liquid can flow.

(7) *An up-stroke bumper*. A spring or suitable resilient material placed on a pump shaft to absorb shock as the shaft reaches the end of its travel.

(8) *Nozzle drip*. Drops which fall out of the spray as the result of impaction or collection of liquid on any part of the nozzle assembly. Drops resulting from leakage between the nozzle and the holder are not included in this definition.

(9) *Discharge outlet*. An adapter on the tank to which the hose is connected.

(10) *Cut-off valve*. The hand-operated mechanism situated between the discharge outlet and the nozzle which controls the flow of liquid from the sprayer.

(11) *Hose couplings*. Male or female fittings connecting the hose to the cut-off valve and the discharge outlet.

(12) *Spray angle*. The greatest included angle subtended at the final nozzle orifice by the spray pattern.

(13) *Statistically adequate sample*. See Appendix A.

(14) *Washer*. An annular disc which is usually flat, made of metal, leather, fibre, rubber, plastics, etc., placed between two surfaces to achieve an even loading, to prevent screwed components loosening under vibration, or to provide a liquid- or gas-tight seal.

(15) *Gasket*. A compressible insert made from similar materials to that of a washer, usually flat and specially shaped and placed between two surfaces to obtain a liquid- or gas-tight seal.

(16) *Plunger washer*. A circular moulded or U-shaped piece of leather, rubber, plastic, etc., used in plunger pumps to provide a liquid- or gas-tight seal between a plunger and cylinder when operated in one direction and to collapse when operated in the opposite direction.

(17) *O-ring*. A ring-shaped piece of rubber, plastic, etc., generally circular in section and often used to provide a liquid- or gas-tight seal in an annulus between moving parts such as occur in pumps, nozzles, etc., the seal being obtained as the result of compression of the ring between the adjacent components.

NOTE. A similar item may also be used between static components to provide a liquid- or gas-tight seal, in which instance it is often referred to as an 'O-SEAL'.

3. MATERIALS OF CONSTRUCTION

The container, including bottom, sides, top and/or removable filler-hole cover shall preferably be made of stainless steel complying with En 58B of B.S. 1449*. Alternatively, other materials may be used, provided that the finished unit complies with all other requirements of this specification.

Special stainless steel springs may be used if the flexure and corrosion resistance properties of the product are equal to or better than those of springs made from the above-mentioned stainless steel. All other metal parts that normally come into contact with the pesticide shall be of stainless steel of the above composition, or of brass, bronze, copper, Monel or other specified metal.

All joints shall be welded by contact or by metallic electric-arc process in the construction of the container. Resultant welds shall have a tensile strength at least equal to that of the parent metal. With the exception of the handle of the pump, no wooden parts shall be used in the construction of the sprayer or the component parts thereof. All threaded connections and all joints shall be leak-proof, without the use of cements, shellac, or chemical binders of any kind.

4. PRODUCTION CONTROL AND BATCH SAMPLING

Production control and batch sampling shall be in accordance with Appendix A.

5. CAPACITY

The liquid capacity and the volume of the air space of the sprayer shall be clearly marked† on the machine. The container shall be capable of discharging the full usable liquid contents after receiving one full charge of air to the recommended working pressure.

6. WEIGHT

The total dry weight of the sprayer, when empty, but equipped with discharge line and accessories for operation, shall be declared.

7. TANK

The construction of the tank shall be such that it is able to withstand the tests laid down in Appendices B, C and D.

8. SHOULDER HARNESS

At the purchaser's discretion, each sprayer shall be provided with a shoulder harness or straps designed to afford to the operator the maximum degree of comfort and the maximum freedom of movement without the sprayer being displaced. If of the shoulder harness type, it shall comprise a shoulder pad, a

* B.S. 1449, 'Steel plate, sheet and strip'.

† An embossed plate attached to the skirt is preferred to marking by paint or engraving.

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support for the shoulder pad, a back rest, a support for the back rest and two shoulder straps. Both the shoulder pad support and the support for the back rest shall be fastened to the tank.

NOTE. As a guide, the support for the back rest should be placed about 1 in (25 mm) from the bottom of the tank and the centre of the shoulder pad support should be between 11 and 12 in (28 and 30 cm) above the centre of the support for the back rest.

The shoulder pad, which shall be readily replaceable, shall be made of sponge rubber (a rectangular block 6 in (15 cm) $\times$ 12 in (5 cm) $\times$ $\frac{5}{8}$ in (16 mm) has been found suitable) and shall be encased in a waterproof canvas bag. The back rest shall be adjustable and shall be made of webbing complying with B.S. 1667* of width 3 in (8 cm) and shall present to the operator a bearing surface of between 11 and 12 in (28 and 31 cm) in length.

Two strap hangers located horizontally along a line parallel to and about 2 in (5 cm) above the centre line of the shoulder pad shall be fastened to the tank at a suitable distance apart. A length of webbing complying with B.S. 1667* and of width 2 in (5 cm) shall be fitted to each strap hanger. There shall be provision in each strap for ready and adequate adjustment. Each strap shall be so fitted that when the sprayer is mounted on the back the straps can be easily secured to the frame of the back rest support. The securing arrangement shall be readily accessible to the operator when the sprayer is mounted on the operator's back.

No rivets used for fastening the component parts of the shoulder harness to the tank shall penetrate the pressurized section of the tank. At the option of the purchaser, all webbing shall be rot-proofed in accordance with Clause 16 of B.S. 2087 : 1963†. No part of the shoulder harness shall break when the sprayer is subjected to the drop test described in Appendix E.

9. FILLER HOLE

The filler hole shall be as large as possible and not less than 3 in (8 cm) across the smallest dimension. Alternatively, the hole shall be reduced to a minimum of $1\frac{1}{2}$ in (38 mm), provided that a built-in funnel of not less than 5 in (13 cm) diameter is incorporated. It shall have no sharp edges.

The closure shall be easily removed, and refitted, so that an air-tight seal is readily formed. When the closure is of the screw-thread type, the pressure release shall be incorporated in the closure so that residual air pressure is safely released as opening takes place.

10. STRAINERS

All strainers shall be made of stainless steel, Monel, bronze or brass-screen wire, or suitable plastics material.

* B.S. 1667, 'Woven cotton webbing No. 4 (4.5 lb)'.

† B.S. 2087 : 1963, 'Chemical requirements for textiles treated by certain preservative processes'.