

DIRECT PRESSURE BLASTING EQUIPMENT

1 This Information Document (ID), consisting of text plus Figures 1 and 2 for illustration purposes, contains internal guidance which has been made available to the public. This guidance is considered good practice but is not compulsory. You may find it useful in deciding what you need to do to comply with the law. However, the guidance may not be directly applicable in all circumstances and any queries should be directed to the appropriate enforcing authority.

2 This guidance addresses the physical risks and hazards associated with direct pressure blasting (DPB) equipment. Information Document 634/8 Parts 1 and 2 address health issues arising from exposure to noise and dust.

BACKGROUND

3 The equipment used for DPB is frequently obtained by contractors from a variety of sources. Very often the compressor, kettle, hoses and blaster's helmet are owned by different suppliers. They are normally connected together by the contractor. This frequently leads to confusion amongst contractors as to their legal duties.

4 This ID explains the responsibilities of owners and contractors operating mobile pressure systems.

SUMMARY OF CONTRACTOR RESPONSIBILITIES FOR A MOBILE SYSTEM

Legal requirements

5 Current legislation places increasing emphasis on the assessment of workplace health and safety matters. Relevant health and safety legislation includes:

- (1) the Health and Safety at Work etc Act 1974 (HSW Act);
- (2) the Management of Health and Safety at Work Regulations 1992 (Management Regulations);
- (3) the Pressure Systems and Transportable Gas Containers Regulations 1989 (PS and TGC Regulations); and
- (4) the Provision and Use of Work Equipment 1992 (PUWER).

(The above list is not exhaustive).

6 The purpose of risk assessment is to determine what measures need to be taken to comply with health and safety law. The actual measures will derive from compliance with the legislation indicated at paragraph 5.

7 The compressor, blasting kettle, air delivery hose, blast hose and other ancillary equipment are connected together and so become part of a system. Where a contractor hires or leases the kettle, air receiver and hoses from different suppliers and assembles them on site, then the contractor creates a 'pressure system' as defined in the PS and TGC Regulations regulation 2. However, the PS and TGC Regulations, regulation 8 will not apply because the contractor is not the owner of this mobile equipment and the system is not 'installed'. The act of assembling the equipment by the contractor to undertake DPB does not create a new owner as defined in the PS and TGC Regulations.

Duties of the owners of air receivers and kettles

8 The air receivers and kettles should be properly designed and properly constructed (PS and TGC Regulations, regulation 4). The following standards are considered to be suitable standards of manufacturing for blasting kettles:

- (1) BS 5169: 1992 *Specification for fusion welded steel air receivers*;
- (2) ASME VIII *Boiler and Pressure Vessel Code 1989*; and
- (3) BS 5500: 1997 *Specifications for unfired fusion welded pressure vessels*.

9 Whilst it is not a legal requirement to use these standards, they do give an indication of good manufacturing practice. Manufacturers using alternative standards should be able to demonstrate how they ensure that the equipment is safe, so far as is reasonably practicable, when properly used at work.

10 Appropriate identification plates, containing the information listed in the PS and TGC Regulations schedule 4, should be fitted to receivers and kettles, unless they are less than 250 bar litres. Safe operating limits (SOLs) should be clearly identified and the SOLs should be either marked on the vessels or the information provided to users.

11 The PS and TGC Regulations, regulation 4 requires that the kettle and receiver be provided with protective devices as may be necessary for preventing danger. Difficulties have been encountered in fitting pressure relief devices to kettles (but not receivers), although suitable overpressure protective devices (eg bursting discs) should be fitted, if it is practicable to do so.

12 A pressure indicating device should be fitted to indicate the air pressure inside the kettle. It may be sited as follows:

- (1) automatic method - downstream of the remote valve (valve 3) and prior to the choke valve (some suppliers already do this) (as shown in Figure 1); or

- (2) manual method - downstream of valve 1 and prior to valve 2 (Figure 2).

13 The owner of the compressor which includes an air receiver or a blasting kettle with a capacity in excess of 250 bar litres, should ensure it is subject to a written scheme of examination and that it is examined in accordance with that scheme. The owner of an existing air receiver (>250 bar litres), should not allow the air receiver or blasting kettle to be operated unless the compressor and air receiver system has:

- (1) a suitable written scheme of examination (WSE); and
- (2) a current report of examination.

Duties of the users of air receivers and kettles

14 Contractors (users) should ensure that the equipment they use is suitable for the work to be undertaken as required by PUWER. Regulation 5(1) of PUWER, requires that every employer shall ensure that work equipment is so constructed or adapted as to be suitable for the purpose for which is used or provided. Regulation 5 is at the heart of PUWER. It addresses the safety of work equipment from 3 aspects:

- (1) the initial integrity;
- (2) the place where it will be used; and
- (3) the purpose for which it will be used.

15 In seeking to achieve compliance with PUWER regulation 5(1), contractors should establish that equipment owners have complied with the PS and TGC Regulations. In particular, contractors should obtain evidence from the owners that the reports of the WSEs are current before the DPB equipment is assembled and they should check that the hoses are of the correct pressure rating and that they are in good condition. If the suitability of the kettle design is in doubt, then further guidance should be sought from the supplier.

16 Contractors should ensure that operators are protected against specified hazards. Such hazards are specified in regulation 12(3) and include:

- (1) articles ejected from equipment;
- (2) rupture of blasting kettle or hose; and
- (3) unintended discharge of air and blasting grit.

A fixed guard or grid should be fitted over the hemispherical roof of the kettle to prevent access to the trapping point between the popper valve and the kettle body. Further information on the precautions which contractors should adopt is given at paragraphs 17-23.

STANDARDS OF EQUIPMENT CONSTRUCTION

17 The following is a summary of the basic requirements of the standards of manufacture essential to ensure the initial integrity of pressure blasting equipment. A fundamental requirement shared by all key assemblies of equipment, ie hoses and kettles is that they should be pressure rated.

Rubber hose for compressed air

18 The hose linking the compressor to the kettle should be manufactured to BS 5118: 1980 Specification for rubber hoses for compressed air, or an equivalent standard. In BS 5118, hoses are classed in 3 types which depend upon maximum design working pressure:

Type 1:	Light duty	10 bar
Type 2:	Medium duty.....	16 bar
Type 3:	Heavy duty	25 bar

Blast hose

19 A specification for blast hose is BS 5121: 1975 Specification for rubber sandblast hose. This specifies a hose design working pressure of 6.30 bar (90 psi). The typical modern blasting kettle operating pressure may exceed this level. Therefore, hoses in compliance with BS: 5121 would be of insufficient operating capacity for the rigours of industrial abrasive blasting. Higher rated hoses should be used, eg 10-12 bar. Contractors should ensure that blast hose is of a satisfactory standard.

Blasting kettle

20 The kettle should be properly designed and be properly constructed from suitable material, as required by PS and TGC Regulations, regulation 4. Suitable standards of manufacture to ensure the basic requirement of the blasting kettle are listed at paragraph 8.

Hose connectors

21 Connections should be of the twin lock type, or similar, with positive locking of the components and secure attachment to the respective hoses. There should be no internal metallic connector surfaces exposed to abrasive in compressed air.

22 Anti-whip devices which prevent the separation of hose couplings whilst the system is pressurised should be fitted. Only anti-whip devices supplied or approved by an equipment manufacturer should be used.

Blasting nozzle

23 There are no particular standards of manufacture, for what is a wide range of product. Nozzle selection is based on blasting pressure required and the volume of compressed air available.

GENERAL

24 When working by the manual method, effective means of communication is necessary between the blaster and kettleman to prevent inadvertent operation of the blast resulting in whiplash injuries by impact with the worker, or from the abrasive projected from the nozzle. Systems of work should be employed which prevent inadvertent pressurising of the blast hose, and which ensure pressure is switched off in the event of an emergency.

25 The lack of a 'dead man's valve' at the blasting nozzle results in a fail to danger system of work. The blaster is reliant on the secondary system of the communication arrangement to turn off a potentially lethal hose blasting out high volumes of high pressure air. If the secondary system fails, the operator is stranded. Operators should employ an automatic system incorporating a dead man's handle at the nozzle end of the blast hose, and a remote valve on the kettle body.

Training

26 In order to comply with PUWER regulation 9, all operators of DPB equipment should be trained in its use. The training should include operational methods and associated risks.

Maintenance

27 Both PUWER regulation 6 and the PS and TGC Regulations, regulation 12, require that equipment is maintained.

28 All pressure blast kettles, blast hoses, and associated fittings are subject to abrasive wear. The degree of wear varies with the rate of abrasive use and operator technique. It is essential that a proper maintenance programme is established and followed which includes both inspection and repair of equipment.

29 Equipment suppliers can advise on such programmes and usually suggest that the key stage of maintenance are:

- (1) at setting up;
- (2) after 4 hours of use;
- (3) after 40 hours of use; and
- (4) at monthly intervals.

Suppliers can also provide maintenance lists to assist in the establishment of a proper maintenance programme.

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FIGURE 1

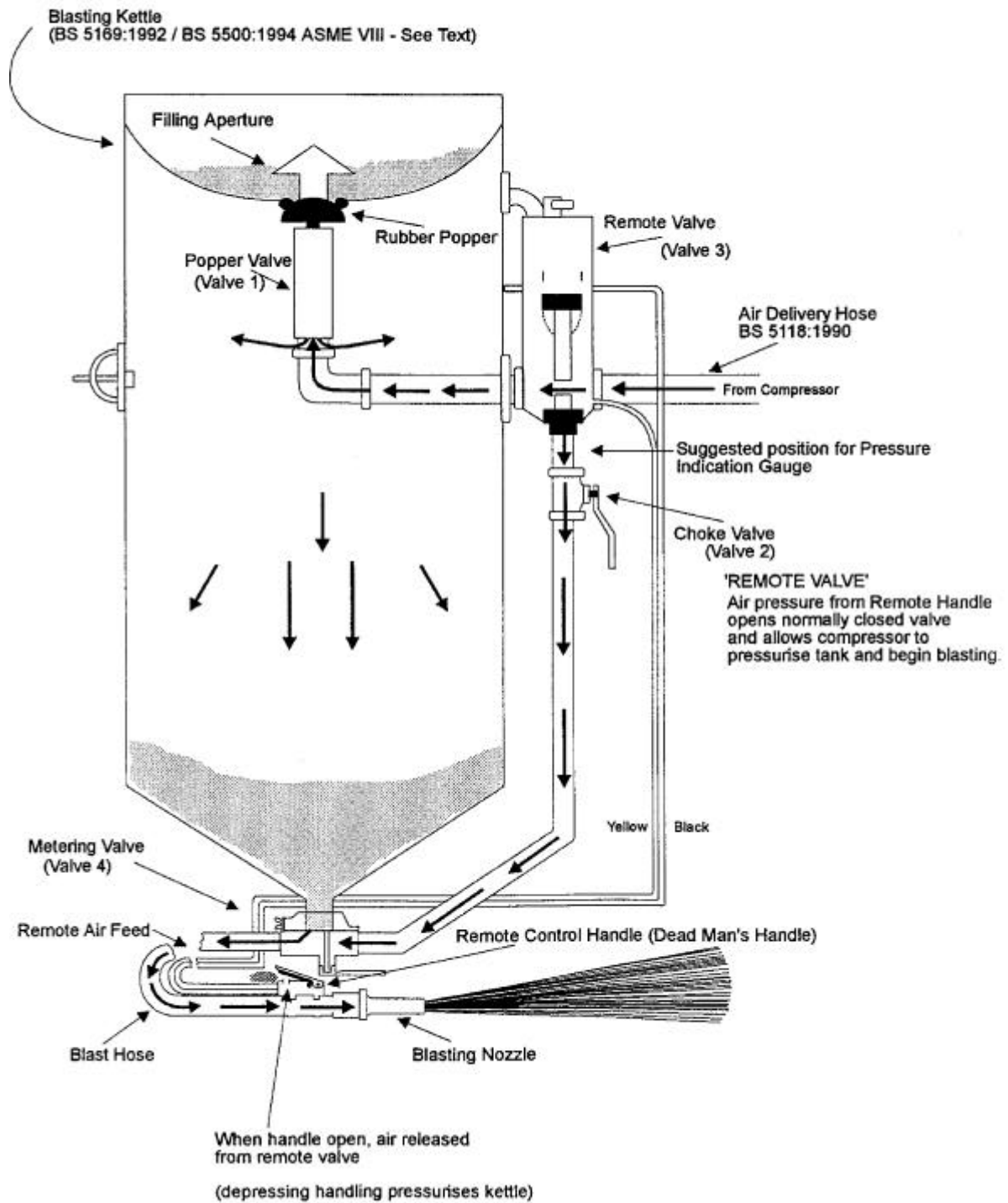
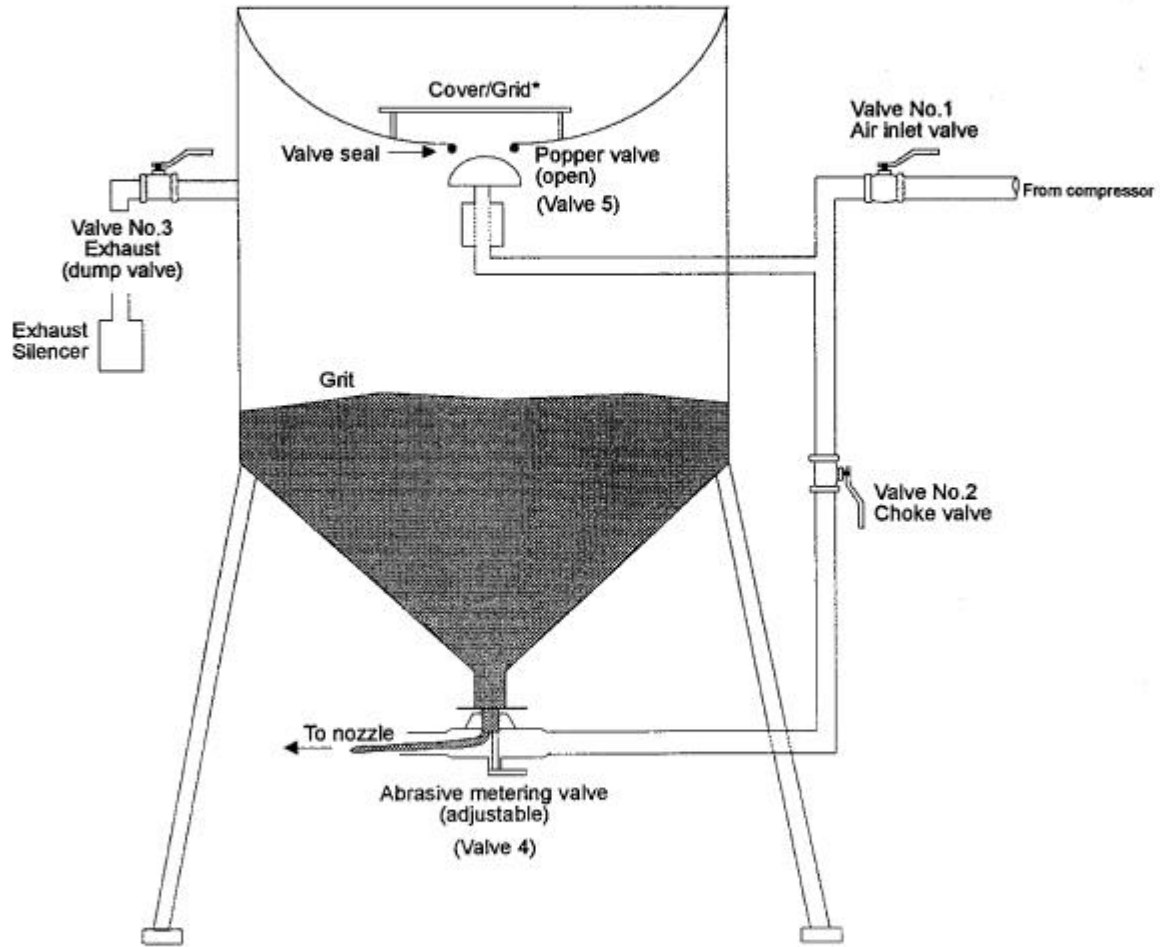


FIGURE 2

Direct Pressure Blast Kettle

(Manual Set Up)



* Suitably positioned to prevent injury, whilst allowing refilling.