LEAFLET 51

CONTROL OF ABRASIVE WHEELS

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A Abrasive Grinding Wheels Marking Storage and Use

LEAFLET FOR LINE MANAGERS

LEGISLATION

1 This leaflet indicates the requirements needed to comply with the Provision and Use of Work Equipment Regulations (PUWER) 1998, in relation to the use, storage, mounting, making true and dressing of abrasive wheels. PUWER has now replaced all the requirements of the Abrasive Wheel Regulations of 1970, but application of the requirements of those Regulations, in particular regulation 9, will assist in meeting the PUWER requirements.

DEFINITIONS

2 In this leaflet the following definitions apply.

Line Manager

3 Means all MOD staff, both Service and Civilian, who have authority and responsibility for directing and supervising people working for them. The working staff maybe either permanent or temporary MOD employed staff, or persons employed on MOD contracts.

Abrasive wheel

4 Abrasive wheel means:

4.1 A wheel, cylinder, disc or cone which, whether or not any material is comprised therein consists of abrasive particles held together by mineral, metallic or organic bonds whether natural or artificial.

4.2 A Mounted wheel or point and a wheel or disc having in either case separate segments of abrasive material.

4.3 A wheel, disc, or saw to any surface of which is attached a rim or segments consisting in either case a diamond abrasive particles.

4.4 A wheel or disc in either case of metal, wood, cloth, felt rubber or paper and having any surface consisting wholly or partly of abrasive material.

Mounted Wheel or Point

5 A mounted wheel or point is deemed to be any wheel or point consisting in either case of abrasive particles held together by mineral, metallic or organic bonds whether natural or artificial and securely and permanently mounted on the end of a mandrel or quill.

DUTIES

Heads of Establishment/ Commanding Officers

6 Heads of Establishment/ Commanding Officer are to make arrangements to:

6.1 Appoint in writing competent persons to examine, mount and dress abrasive wheels as defined in Paras 4.1, 4.2 and 4.3 above.

6.2 Keep a register listing suitably qualified persons competent to perform the task at the Establishment/Unit (HSE Form F2346 available form HMSO may be used unless separate TLB procedures exist).

6.3 Ensure that copies of training certificates for MOD employees, in the examination, mounting and dressing of abrasive wheels, are held on individual personnel file, and a copy is held on the Unit register (See Para 6.2 above).

6.4 Maintain equipment on which the abrasive wheel is to be mounted and used, in an efficient state, efficient working order and in good repair.

Line Managers

7 Line Managers will ensure that:

7.1 Any person issued an abrasive wheel, by the Ministry of Defence, for the intention of mounting the wheel ready for use shall be competent to do so, and, if a MOD employee, they have been appointed to do the task, while ensuring the abrasive wheel is marked with the maximum rotational speed.

7.2 Where small abrasive wheels are used for which it is not possible to mark with their maximum rotational speed, they are to ensure that a notice is displayed locally, giving individual or class maximum permissible rotational speed.

7.3 Any MOD employee required to dress or mount an abrasive wheel is competent and has been appointed in writing to undertake that duty.

7.4 All employees working with abrasive wheels shall be aware of the need for any wheel dressing or mounting to be carried out by a designated competent person.

7.5 Any person required to change a mounted wheel or point or an abrasive wheel as defined in Para 4 above is competent to do so.

7.6 Any machine or piece of equipment intended for use with abrasive wheels is marked with its maximum rotational speed.

7.7 Guarding is provided to contain fragments of any abrasive wheel, the guarding is kept in good repair and used.

Employees

8 Employees required to mount or dress or make true abrasive wheels as defined in Para 4.1, 4.2 and 4.3 above will:

8.1 Have been trained and competent to perform the task.

8.2 Hold a certificate of training.

8.3 Supply a copy of the certificate to their line manager.

TRAINING

9 The training for employees required to mount and or dress abrasive wheels, as defined in Para 4.1, 4.2 and 4.3 above, can be supplied internally, if the expertise to undertake the task is available, or by an external provider.

10 The training will comprise, as a minimum, of the following elements:

10.1 An explanation of the duties for employees and the duties placed on the employer in respect to abrasive wheels.

10.2 An explanation of the composition and function of abrasive wheels, including the functions of wheel components and methods of assembly.

10.3 An explanation of the abrasive wheel marking system.

10.4 How to select abrasive wheels for particular tasks and/or machines.

10.5 The correct method of mounting an abrasive wheel

10.6 How to true, dress and inspect abrasive wheels

10.7 The hazards arising from the use of abrasive wheels

10.8 The correct methods of storing abrasive wheels.

11 Employees who are required to use abrasive wheel equipment, or change a mounted wheel or point or abrasive wheel as defined in Para 4.4 above, shall be trained as a minimum in the following.

11.1 The hazards arising from the equipment and the abrasive wheel

11.2 The correct methods of using any guards and other risk controls associated with the equipment and task.

11.3 The requirement to have the wheel mounted, dressed or made true by a nominated competent person.

11.4 How to recognise defects with abrasive wheels and how these are to be reported.

11.5 How to change the mounted wheel or point and the abrasive wheels as defined in Para 4.4 above.

RECORDS

12 Records of employee training are to be kept on their personal file, in addition to any other local records, and shall include dates on which the training was received, the name of the provider, and the result of the training (certificate or letter of competence) as applicable.

13 Records of appointment for employees to mount true or dress abrasive wheels are to be retained for 5 years after the date that appointment has expired or is no longer valid for what ever reason (e.g. person retires, Unit closure.)

RELATED PUBLICATIONS

14 Related publications

- Use of work equipment leaflet.
- HSE Guidance 'Safe Use in Abrasive Wheels' HS (G) 17 the latest issue.

LEAFLET 51 ANNEX A

CONTROL OF ABRASIVE WHEELS

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ABRASIVE GRINDING WHEELS MARKING STORAGE AND USE

INTRODUCTION

1 There is a high risk of mistakes and accidents occurring when grinding wheels are handled and used. This annex covers the identification of grinding wheels, information to ensure their safe storage, maintenance and operation.

2 Abrasive wheels are defined as wheels consisting of abrasive particles bonded together with various substances. There are two main types of bonding agent: organic (OBA) and inorganic (IBA). Inorganic bonds are mainly vitrified; i.e. the wheel is generally fired in a furnace to give the bond a hard, strong but brittle structure; these are used for precision grinding. Organic bonds are cured at low temperature and the bonding agents are resinoid (B), rubber (R) and shellac (E); most suited to non-precision applications.

IDENTIFICATION

3 Grinding wheels received from manufacturers must carry mandatory markings as required by BS EN 12413. The complete designation system for Bonded Abrasive Products is contained in BS ISO 525. In addition to the markings shown in Table 1, information on restriction of use, a traceable number and coloured speed strips may also be displayed.

Table 1 - Mandatory and Optional Markings - Grinding Wheel Marked 51A38L5/BF 23

Order or marking	Example	Meaning	Explanation
0	51	Type of abrasive*	
1	A	Nature of abrasive	A = aluminium C = silicon carbide Z = Zirconia Alumina
2	38	Grain size	Grain size varies from 4 (coarsest) to 1200 (finest)
3	L	Grade	A is softest, Z is hardest; L thus falls in the medium grain range
4	5	Structure*	Structure refers to the spacing of the grains; the range used is from 0 (extremely dense structure) to 30 (wide spacing between the grains). In this example, 5 indicates a dense structure.
5	BF	Nature of bond	See Table 2 for list of bond codes.
6	23	Type of bond*	Letters, numerals, or both, denote the exact type.

* Optional markings

NATURE OF BOND

4 Nature of bond in table 1 is important. The codes indicating nature of bond are given in Table 2 (Pre 1998) and Table 3 (Post 1998). OBA and IBA grinding wheels have special life and storage instructions (see Life of Grinding Wheels).

Table 2 - Bond Codes (Pre 1998)

Serial	Type of bond	Bond code	Remarks
1	OBA	R	Rubber bonded
2	OBA	B	Resinoid (synthetic resin) bond
3	OBA	BF	Resinoid (synthetic resin) reinforced bond
4	OBA	E	Shellac bond
5	IBA	Mg	Magnesite/magnesia bond
6	IBA	V	Vitrified - these are IBA but are NOT subject to special life and storage instructions
7	IBA	S	Silicated

NOTE

Serial 5 is IBA type of bond and is referred to throughout this annex as IBA/Mg.

Table 3 - Bond Codes (Post 1998)

Serial	Type of bond	Bond code	Remarks
1	OBA	PL	Plastic bond
2	OBA	R	Rubber bond
3	OBA	RF	Reinforced rubber bond
4	OBA	B	Resinoid and other thermosetting organic bonds
5	OBA	BF	Resinoid bond fibre reinforced
6	OBA	E	Shellac bond
7	IBA	MG	Magnesite bond
8	IBA	V	Vitrified bond

SPEED MARKING

5 All grinding wheels must be marked with the maximum permissible speed in revolutions per minute or meters per second. The speed must be on the wheel or on the blotter attached. The maximum permissible operating speed, specified by the manufacturer, is never to be exceeded.

SMALL WHEELS

6 When grinding wheels are too small, under 80mm diameter, to carry full markings they are to have an identification label attached.

NOTE

This requirement was for wheels up to 55mm diameter up until 1998

LIFE OF GRINDING WHEELS

7 Grinding wheels are subject to deterioration if stored in damp or humid conditions. The effects are a reduction in bond strength caused by the ingress of moisture; this affects the balance and causes surface growth, which reduces the bursting speed.

8 The life limits stated in this annex are mandatory. Older stock is to be issued first and if there is any doubt, or if wheels have been in stock for more that 3 years (1 year for Magnetise bonded wheels) the manufacturer should be consulted about their suitability for use. For wheels that are not individually date marked by the manufacturer, it is recommended that they be marked with the date they are received from the supplier.

9 On reaching their limits, all grinding wheels are to be removed from service and destroyed. Where, however, sufficiently large quantities of unused wheels are in store, they may be returned to the manufacturer for inspection and life extension. Workshops holding or using grinding wheels are to maintain a register specifying the life limit date and location of each wheel.

10 Inorganically bonded, vitreous abrasive wheels are identified by the letter "V". They are not subject to deterioration, do not have a life limit and are not subject to any special conditions.

STORAGE

11 It is important that grinding wheels are stored in continuously dry conditions at a temperature of 16-20 °C and not subject to extremes of temperature. In temperate European climates, humidity can be ignored.

12 IBA/Mg wheels held in store are to be kept in sealed waterproof wrapping. IBA/Mg wheels are to be stored separately from other grinding wheels.

13 Where stocks are issued, sufficient life should remain for the wheels to be brought into economical service use.

14 Storage shelves, bins or racks are to be marked with a prominent notice in black lettering on a bright yellow background.

WARNING

GRINDING WHEELS ARE MARKED WITH AN EXPIRY DATE. WHEELS ARE NOT TO BE ISSUED OR USED AFTER THEIR EXPIRY DATE

15 The following notice must be displayed for IBA/Mg storage.

WARNING

MAGNESITE BONDED GRINDING WHEELS ARE NOT TO BE ISSUED IF THEY ARE MORE THAN 1 YEAR OLDER THAN THE DATE MARKED ON THE WHEEL

16 A competent person (see para 17) must examine all wheels on receipt in workshops for identification marks, date and speed markings, signs of oxidation to the bonding and/or structural damage. When a wheel is found to be defective or having inadequate identification or life, it must not be brought into use and a discrepancy report must be raised.

COMPETENT PERSON

17 No person shall be issued with, mount or examine any abrasive grinding wheel unless:

17.1 They are competent, by means of having been trained and certificated (see abrasive wheels training section), and

17.2 Have been appointed by the Commanding Officer or Head of Establishment to carry out that duty with their name being contained on the register of competent persons currently certified. (Each establishment is required to maintain a register of competent persons.)

18 The requirements of paragraph 17 do not apply to:

18.1 A person undergoing training in the mounting of abrasive wheels who is being closely supervised, or

18.2 Anyone who mounts any mounted wheel or point as defined at Leaflet 51 paragraph 4.2.

NOTE

A mounted wheel or point is deemed to be any wheel or point consisting in either case of abrasive particles held together by mineral, metallic or organic bonds whether natural or artificial which are securely and permanently mounted on the end of a mandrel or quill.

HANDLING AND STORAGE

19 The following precautions are to be taken when handling abrasive wheels.

19.1 Abrasive wheels are relatively fragile and should be carefully handled at all times, they must be protected from impact and not rolled on hard surfaces;

19.2 Abrasive wheels are to be stored according to their sizes and types. Large thin wheels are to be laid flat, away from local excessive heat to prevent distortion; cylinder, cup or dish shaped wheels stacked on top of one another are to have cushioning material between each wheel to prevent damage.

MOUNTING OF ABRASIVE WHEELS

20 The danger of abrasive wheels breaking up is considerably increased if not properly mounted. Only competent persons as defined in para 17 are to be allowed to carry out abrasive wheel mounting and dressing. Before using a newly mounted wheel, the guard must be properly secured, work rests set as close to the wheel as possible, and the wheel rotated by hand to ensure its periphery is clear. The wheel is to be run for one minute, during which all personnel are to stand clear.

GUARDING

21 Machines to be used in association with abrasive wheels should be assessed iaw PUWER 98 to identify the requirement for guarding. Where identified fixed or adjustable guards should be provided to prevent injury from flying objects either from machine operations or from the bursting of the abrasive wheel. Guards should be supplied, fitted, used and maintained in good repair.

PROTECTION

22 Operators are exposed to the risk of injury if not properly protected during grinding wheel operations. A PPE assessment should be conducted to ensure the correct protection items are provided. Line managers should ensure that the appropriate PPE is used.

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