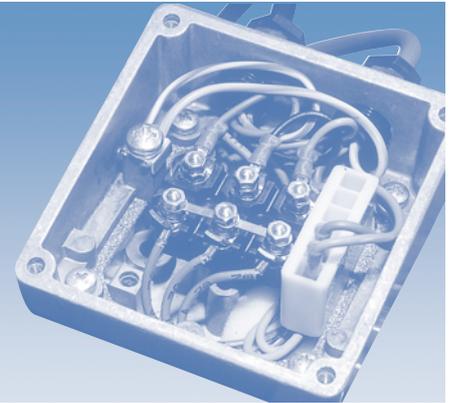


Spare parts, installation and maintenance



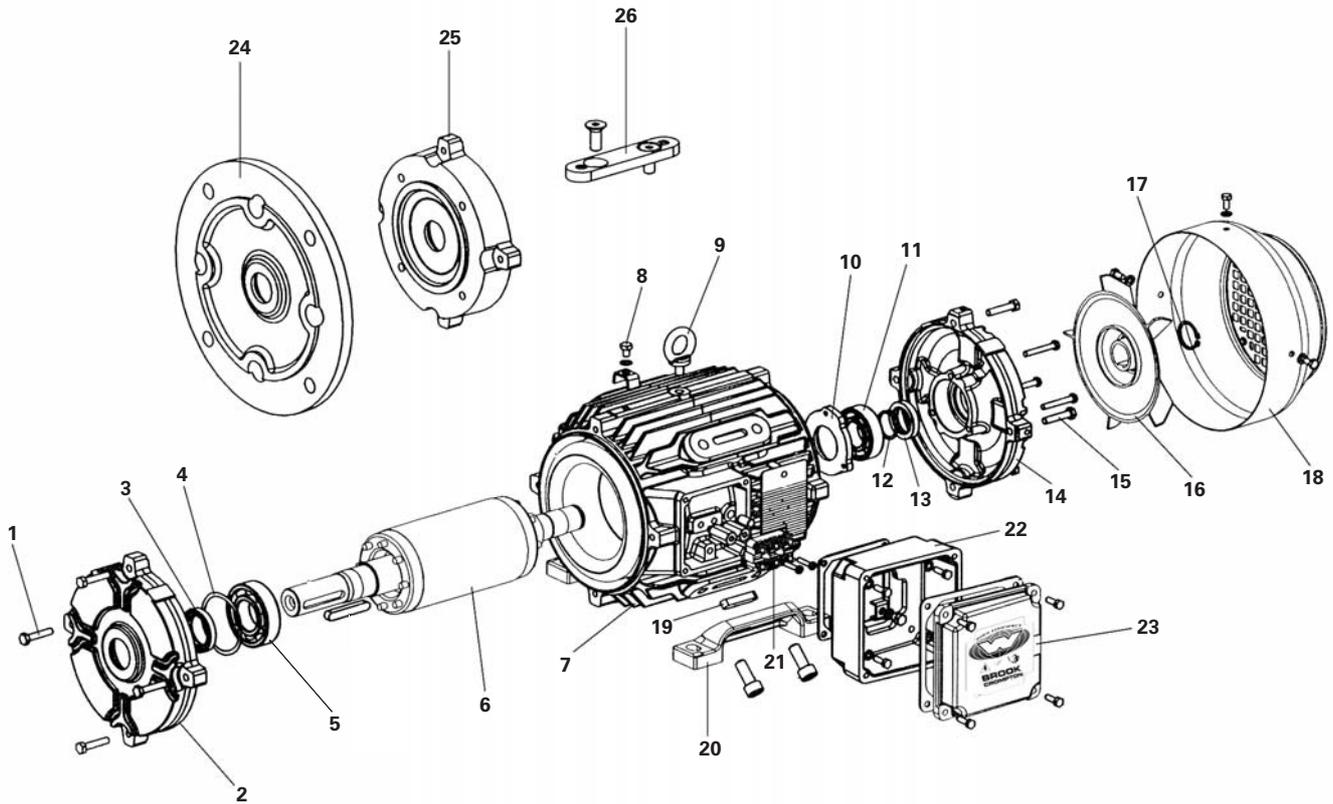
**Totally enclosed and totally enclosed fan ventilated motors
EEx e, EEx nA and combustible dust designs
Frame sizes 71 to 355**

Typical marking is as follows:

CE 0600  II 2G EEx e II T3 BAS00ATEX2102U and BAS00ATEX2045U
CE 1180  II 3G EEx nA II T3 BAS00ATEX3119X and BAS00ATEX3133X
CE 0600  II 2D T125°C BAS00ATEX2205X and BAS99ATEX2217
CE 1180  II 3D T125°C BAS00ATEX3206X and BAS99ATEX3218

Typical W construction

Frame sizes W-DA71 to W-DF355



| Ref | Part description |
|-----|--------------------------------------|
| 1 | Drive end endshield fixing bolts |
| 2 | Drive end endshield |
| 3 | Drive end oilseal |
| 4 | Preloaded washer |
| 5 | Drive end bearing |
| 6 | Rotor assembly |
| 7 | Stator assembly with or without feet |
| 8 | Earth terminal |
| 9 | Eyebolt |

| Ref | Part description |
|-----|---|
| 10 | Non-drive end bearing cap (when fitted) |
| 11 | Non-drive end bearing |
| 12 | Bearing circlip |
| 13 | Non-drive end oilseal |
| 14 | Non-drive end endshield |
| 15 | Non-drive end endshield fixing bolts |
| 16 | Fan |
| 17 | Fan circlip |
| 18 | Fan cover |

| Ref | Part description |
|-----|--|
| 19 | Foot locking method (when fitted) |
| 20 | Bolt-on feet and bolts |
| 21 | Terminal board and fixing screws |
| 22 | Terminal box, gasket and fixing screws |
| 23 | Terminal box lid, gasket and bolts |
| 24 | Flange endshield |
| 25 | Face endshield |
| 26 | Bolt-on pad |

Marking

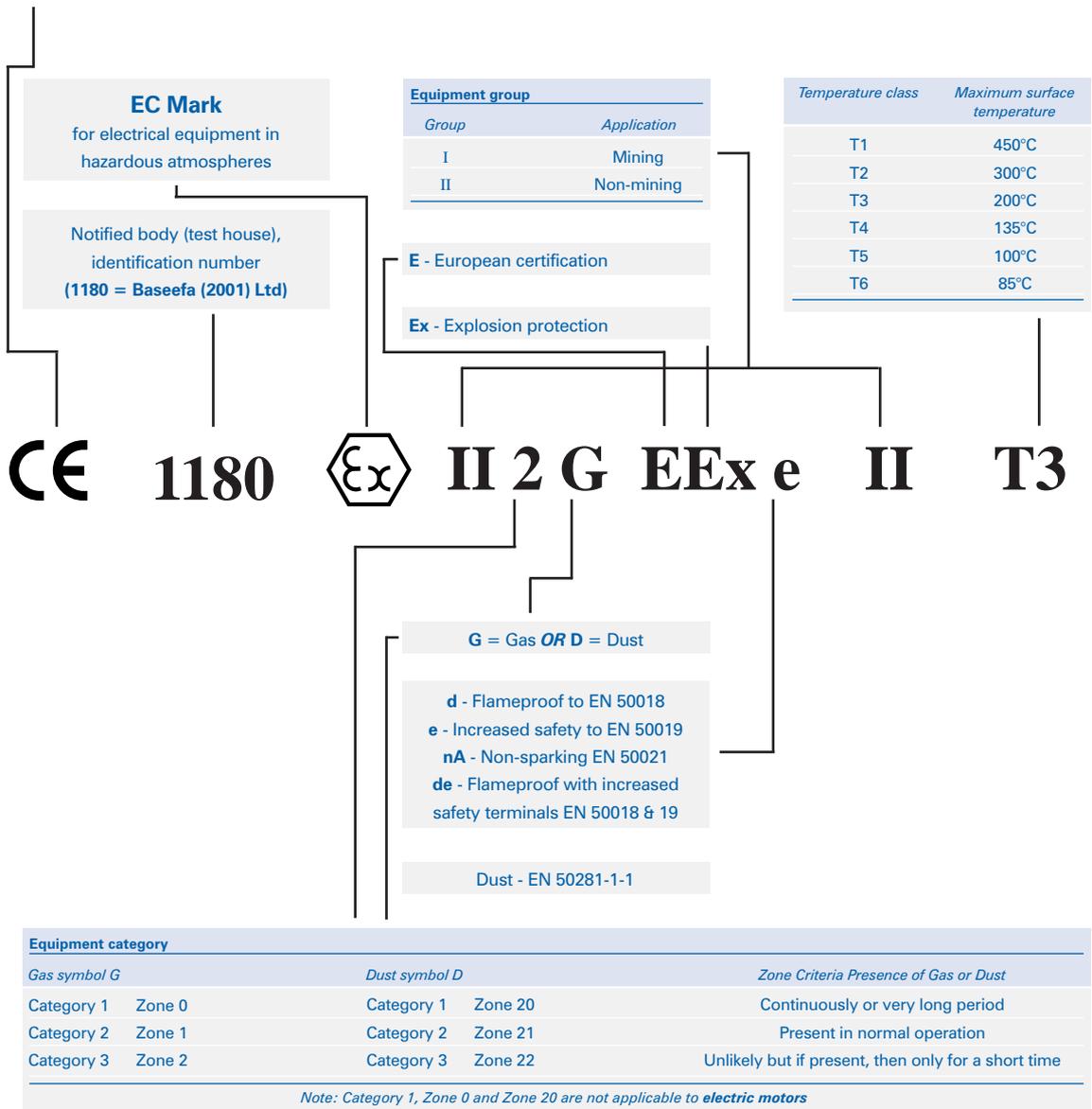
Marking

Typical marking is as shown below

CE 1180  **II 2G EEx e II T3**

and has the following meaning:

Compliant with European Directives



Dust are marked differently, eg:

CE 1180  **II 2D T125°C**

T125°C = certified external surface temperature

General/installation

Warning

These motors are certified by a European Notified Body for use in hazardous areas and should be installed, maintained and repaired (if necessary), strictly in accordance with the relevant standards and codes of practice of the user country for the repair and overhaul of Ex electrical apparatus. (For example, in UK: EN 60079-19 and recommendations outlined in the BEAMA/AEMT 'Code of Practice' for repair and overhaul of Ex electrical apparatus').

The certificates issued apply to motors as originally supplied, and in order to maintain validity, it is essential that any servicing/repair be undertaken only by accredited establishments (see paragraph on 'Spares and Repairs'). Only genuine replacement parts can be used on these certified motors - always specify motor serial number, output (kW), RPM, voltage, Hz and mounting when ordering spares.

Warning

Qualified personnel only must undertake handling and lifting of electric motors. See additional sections of this manual and the customer safety and installation instructions. Full product documentation and operating instructions must be available together with tools and equipment necessary for safe working practice.

Note - before any work commences, reference should be made to the warning paragraph at the top of this page.

Receipt

Before any motor is accepted on site, it should be carefully inspected for damage or loss incurred during transit.

Report any damage to the carriers and your supplier as soon as possible, quoting the motor and/or order number and consignment note reference. The insurance companies agents shown on the insurance certificate should also be advised.

Storage

If the motor is not to be used immediately, it should be stored in a clean, dry place which is vibration free. Temperature should be stabilised to -20°C to +40°C.

When drain holes are provided, they are supplied with a screwed, fitted plug.

Under no circumstances should the motor be located or operated in a hazardous environment with these plugs removed as the enclosure protection will be compromised.

Lifting

Eyebolts and/or lifting trunnions supplied with the motor are designed to support only the weight of the motor, not the weight of

the motor and any ancillary equipment attached to it. Be absolutely sure that cranes, jacks, slings and lifting beams are capable of carrying the weight of equipment to be lifted.

Where an eyebolt is provided with the motor, this should be screwed down until its shoulder is firmly against the face of the stator frame to be lifted. Eyebolts are normally designed for a vertical lift.

Where two eyebolts are used with inclined loading, the maximum safe working loads should not be exceeded, see table (approximate weights) on page 5.

Bearings

To avoid static indentation (false brinelling), the storage area should be vibration free. If this is not possible, it is strongly recommended that the motors be stood on thick blocks of rubber or other soft material.

Where exposure to some vibration is not unavoidable, the shaft should be locked in position to avoid static indentation of the bearings

Shafts should be rotated by hand (90°), weekly/periodically.

Roller bearings may be fitted with a shaft locking device. This should be kept in place during storage.

Grease

Factory fitted regreasable bearings use either Lithium or Polyurea based grease with a recommended shelf life of two years. If stored for a longer period, the grease may need to be replaced. Shielded bearings have a storage life of five years and a further two years operational life following installation.

Heaters

Where anti-condensation heaters have been fitted, it is strongly recommended that they are energised during storage. In such cases, prominent warnings of live terminals (inside the terminal box) must be posted inside and outside the terminal box.

Heaters must be isolated whilst the motor is energised, since the heaters, if energised, could cause the motor surface temperature to exceed the maximum for which it is certified. This would invalidate the certification and could result in ignition of the surrounding atmosphere. Heaters must be de-energised before opening any part of the motor enclosure.

Where the certificate permits, the winding may be energised at a low voltage as an alternative to anti-condensation heaters (for maximum voltage see marking on motor). The mains supply must be disconnected during these periods.

Where anti-condensation heaters are not fitted, the use of a desiccant is recommended.

Installation

Withdrawal from storage

Before taking any motor from storage, ensure that anti-condensation heaters (if fitted), have been disconnected and isolated before moving the motor. Check that no foreign matter is present and remove all surface dust and dirt.

Test the stator insulation resistance between phases and also to earth. If an insulation resistance of lower than ten Megohms at 20°C is measured, the windings must be dried out. Any such tests must not be carried out whilst there is risk of the presence of an explosive atmosphere. After measurement, the windings should be discharged immediately to avoid the risk of electric shock or electrostatic discharge.

Location

Motors must be installed with adequate access for routine maintenance. A minimum of 0.75m of working space around the motor is recommended. Adequate space around the motor, particularly at the fan inlet (50mm), is also necessary to facilitate airflow.

Where several motors are installed in close proximity or other heat sources are present, care must be taken to ensure that there is no re-circulation of exhausted warm air. Foundations must be solid, rigid and level.

On motors which are mounted vertically with the output shaft facing upwards, the driven equipment must prevent falling objects from entering the fan housing.

Electrical connection

The connection diagram is shown on the leaflet enclosed in the motor terminal box or the diagram inside the terminal box lid. The cables used should be capable of carrying the full load current of the motor (see motor nameplate), without overheating or undue voltage drop.

Cable terminations

All cable terminations should be tightly secured. There should be no nuts or lock washers fitted between the supply and the motor lugs.

Permanently attached cables shall be suitably protected against mechanical damage and terminated within the terminal or junction facility suitable for the conditions of use.

Wiring should be carried out or checked by a qualified electrician and equipment must be earthed in accordance with current regulations.

Installation

When the motor is despatched with plastic plugs fitted into the cable entry holes, these plugs *must* be removed prior to commissioning and a suitably certified gland inserted. Cable entries are not to be left open, therefore if any holes are unused or made redundant, they must be plugged with a suitably certified and correctly inserted stopping plug (stopping plugs to be removed only with the aid of a tool).

Alternatively, a replacement gland plate or terminal box must be obtained from Brook Crompton. All cable glands/conduit/plugs etc, must have at least the same IP rating and the hazardous area certification as the motor, thereby ensuring that the motor certification and protection are not compromised.

Note - the operating temperatures at the conduit or cable entry may exceed 70°C and at the branching point of the conductors may exceed 80°C under rated conditions.

If aluminium cables are used they must be terminated in such a way, as to ensure protection against corrosion due to dissimilar metals. Earth bonding of the motor, both on the motor frame and inside the terminal box, should always be carried out to eliminate the risk of electrostatic discharges from the motor.

Bearings

Ball and roller bearings are despatched from the works fully charged with grease. Shielded bearings have sufficient grease for an operating life of at least two years in normal ambient temperatures, providing there is little or no grease leakage.

On motors with re-lubrication facilities, replenish with a compatible grease but take care to avoid overfilling the bearing housings. It should be noted that over

greasing presents a far greater hazard to trouble-free service than under greasing but careful attention is a mandatory requirement. Bearings without re-lubrication facilities will eventually need replacing.

When changing bearings, it is essential to replace shaft seals that are of the same size, type and material as originally fitted. Care should be taken to ensure that shaft seals are not damaged during fitting and that the lips are lubricated. For details of which seals are used, please contact Brook Crompton.

Fitting pinions, pulleys and couplings

These should be stored to suit the shaft diameter.

Warning

Tapping of fitments onto the motor shaft with a hammer or mallet, causes bearing damage. This results in an increase in bearing noise and a significant reduction in bearing life.

Re-lubrication

Recommended re-lubrication intervals are available on request as these are load dependant. When replenishing, use a type that is compatible to the grease detailed on the motor nameplate. (See table below.)

When the ambient temperature is outside the normal operating range of the grease, see rating plate for re-lubrication details.

Maintenance

Warning

Isolate power supply to motor before commencing any routine cleaning or maintenance work.

Routing cleaning

The time intervals between inspections should be sufficiently regular (to be decided by the user but not exceeding three months for combustible dust environments), so as to ensure that the user can be alerted to excessive build up of accumulated layers of dust on the equipment surface. Routine cleaning should include but not be limited to the following:

- Remove the fan cover and ensure that all air inlet holes are completely free.
- Clean any dust or dirt and obstructions from behind the fan and along the ribs of the frame.

Tightening torques and bolt sizes can be obtained from Brook Crompton.

Ongoing maintenance

- As routine cleaning first.
- That no visible damage has occurred to the motor, ie cracked or broken components, bent fan cowl, loose components etc.
- Running clearances are adequate
- No significant corrosion of the lifting facilities
- No excessive vibration
- No loose bolts or fasteners
- Cables and earths are sound
- Sealing of the motor and gland plate are in good condition. This is to include the condition of the gaskets, shaft seal and jointing compound
- Insulation resistance is adequate. It is imperative that this is checked prior to starting and after prolonged shut down
- Regreasing or replacement of bearings if normal life has been exceeded

| Approximate weights | | | | |
|---------------------|------------|---------------|-----------------|-----------------------|
| Type | | Net weight kg | Gross weight kg | Cubage m ³ |
| European | BS | | | |
| W-DA71S | W-DA71S | 6.5 | 6.9 | 0.01 |
| W-DF80M | W-DF80M | 15 | 16.5 | 0.02 |
| W-DF90S | W-DF90S | 19 | 20.5 | 0.03 |
| W-DF90L | W-DF90L | 22 | 23.5 | 0.03 |
| W-DF100L | W-DF100L | 35.5 | 38 | 0.03 |
| W-DF112M | W-DF112M | 45 | 48 | 0.05 |
| W-DF132S | W-DF132S | 68 | 71 | 0.08 |
| W-DF132M | W-DF132M | 72.5 | 78.5 | 0.08 |
| W-DF160M | W-DF160M | 121 | 133 | 0.15 |
| W-DF160L | W-DF160L | 133 | 145 | 0.15 |
| W-DF180M | W-DF180M | 162 | 178 | 0.21 |
| W-DF180L | W-DF180L | 177.5 | 193.5 | 0.21 |
| W-UDF200LNX | W-DF200LNX | 255 | 270 | 0.30 |
| W-UDF225S | W-DF225S | 320 | 335 | 0.37 |
| W-UDF225M | W-DF225M | 375 | 390 | 0.37 |
| W-UDF250ME | W-DF250S | 420 | 460 | 0.63 |
| W-UDF280SE | W-DF250M | 570 | 610 | 0.70 |
| W-UDF280ME | W-DF280S | 660 | 721 | 1.2 |
| W-UDF315SE | W-DF280M | 800 | 871 | 1.2 |
| W-UDF315ME | W-DF315S | 1000 | 1095 | 1.8 |
| W-UDF315M | W-DF315M | 1100 | 1195 | 1.8 |
| W-UDF315L | W-DF315L | 1300 | 1395 | 1.8 |
| W-UDF355S | W-DF355S | 2000 | 2120 | 2.3 |
| W-UDF355M | W-DF355M | 2300 | 2420 | 2.3 |
| W-UDF355L | W-DF355L | 2500 | 2620 | 2.3 |

| Re-lubrication table | | |
|--|-------------------------------|-----------------|
| Frame size | Grease | Type |
| 71/355 | Esso | Lithium complex |
| | Unirex N3 | |
| | NSK EA6 | Polyurea |
| <i>Note: Lithium complex type greases are not compatible with Polyurea type greases - refer to nameplate</i> | | |
| Standard regreasing facility | | |
| Frame size | Facility | |
| 71 | Sealed for life bearings | |
| 80/180 | On request | |
| 200/355 | Regrease facility as standard | |

Maintenance

Periodic maintenance

- a) As routine cleaning first.
- b) Remove the fan cover and the fan. Loosen and remove bearing cap screws and endshield screws/studs. The endshields should then be eased off their spigots and removed.
- c) The rotor can now be carefully withdrawn from the stator - taking care not to damage the stator bore, the stator winding and the rotor.
- d) Having dismantled the motor, maintenance can be carried out to remove all dirt. For this purpose, the use of an air line supplying dry compressed air under comparatively low pressure is best as a high velocity air stream can force dirt into the spaces between the windings and insulation etc. Grease removing solvents should only be used very sparingly to avoid damage to impregnation varnish or insulation.
- e) For lubrication details, refer to earlier 'Installation' paragraph.
- f) Motors should be reassembled in the reverse order from dismantling, remembering to ease endshields onto bearings and spigots. Do not use force. All shaft seals and enclosure gaskets should be replaced using identical components to those originally fitted. If required, the enclosure joint faces should be liberally coated with a suitable non-setting gasket and jointing compound to ensure the integrity of the enclosure.

Motors certified for Zones 21 or 22 may require additional sealant applying to various faces before assembly. Please refer to item j.

- g) Before starting, check that the rotor revolves freely. Ensure that the electrical connections are correct and terminal nuts tight (see section - 'Electrical Connection').
- h) Refit any pulley, coupling, sprocket etc which has been removed - being particularly careful to ensure correct alignment with the driven part, as misalignment will lead to ultimate bearing trouble and shaft breakage.
- i) When replacing screws and bolts, care should be taken to use only those with the requisite quality and tensile strength recommended by the manufacturer. A minimum grade of 8.8 is required for all fixing screws except socket head cap screws which must be a minimum of grade 12.9. These must also be of identical thread form and screw/bolt length. A marginally longer bolt, screwed into a

blind hole could 'bottom' and prevent correct closure of a joint. Recovery of tapped holes by counter drilling and fitment of propriety inserts is not recommended by Brook Crompton.

- j) The following lists the joint faces to be coated with gasket and jointing compound for motors used in Zones 21 or 22:
 - a) Motors with IP55 enclosure for use in Zone 22 environments where dust is non-conductive.
 - b) Motors with IP65 enclosure for use in Zone 21 and 22 (with conductive dusts):
 - 1) Stator frame to endshield spigot face - drive end and non-drive end, and where appropriate:
 - 2) Stator frame to terminal box and/or conduit facing.
 - 3) Terminal box body to terminal box lid
 - 4) Terminal box to spreader box/gland plate
 - 5) Spreader box to gland plate
 - 6) Removable drain plugs
 Further, soft copper washers should be replaced to inner bearing cap and gland plate fixing screws.

The practices given in IEC 60079-14 should be followed for inspection of components and the treatment of corrosion during maintenance.

Spares and repairs

When ordering spares, it is important to state the motor serial number to ensure that the correct spares will be supplied.

Notes:

- a) Fixing bolts, nuts, studs, screws, spacers or washers are not included with these parts and, if required, should be clearly specified on the order in addition to the part description number. The fixing duty and part description reference number for which they are required should also be clearly stated.
- b) Bearings ordered direct from bearing manufacturers must be specified as follows: 'ISO CN, ISO C3', with bearing size. (Bearing fit to be as original motor drawing).

Responsibility for the validity of certification after repair work or the fitting or spares rests with the user. Such repairs should be carried out by competent engineers who are fully trained in working on equipment for hazardous areas.

Spares for our certified motor ranges are

quoted/supplied on the understanding that the subsequent validity or certification of any repair* work and/or fitting of spares and replacement parts, rests with the user or accredited repair establishment. This is one where:

1) Either:

- a) Personnel have attended a course appropriate to the codes of practice and standards of the nation where the motor is installed. This will normally be a course recognised by the national trade association, health and safety inspectorate or certifying authority (eg, in the UK the AEMT course 'Repair and Overhaul of Ex Electrical Apparatus').

or

- b) Personnel have attended Brook Crompton's 'Hazardous Atmosphere Motor Repair Course'.
- 2) The workshop is approved by Brook Crompton's authorised repair agent liaison officer or is otherwise suitably accredited by a nationally recognised competent authority.
- 3) Brook Crompton's hazardous atmosphere repair manual is held and strictly adhered to.

Where the motor has been originally repaired as indicated by symbol 'R' in accordance with IEC 60079-19, details of the repair should be obtained from the user/repairer before proceeding with repair. Alternatively, contact Brook Crompton.

Training videos

Brook Crompton has produced a set of videos covering the theory, design, construction and repair of electric motors for use in hazardous areas. These are available from Brook Crompton marketing department.

Motor modifications

Details on how to modify motors along with bolt sizes and tightening torques can be obtained from Brook Crompton.

Responsibility for the validity of certification after any modifications rests with the user. Such modifications should be carried out by competent engineers who are fully trained in working on equipment for hazardous areas.

Inspection schedule

Table 1 – Inspection schedule for safe use

| Check that | Inspection category* | |
|--|----------------------|----------|
| | Initial | Periodic |
| Apparatus is appropriate to area classification | A | A |
| Surface temperature is correct | A | A |
| Apparatus subgroup (if any) is correct | A | A |
| 1 Apparatus carries the correct circuit identification | A | B |
| Enclosures are satisfactory and undamaged, drain holes are closed | A | A |
| There are no unauthorised modifications | A | A |
| Bolts, glands and stopping plugs are complete and tight | A | A |
| Obstructions do not conflict with IEC 60079-14 | A | A |
| Enclosure seals are satisfactory | A | A |
| Gaps are free from corrosion, dirt and paint | A | A |
| 2 There is no undue accumulation of dust or dirt | B | B |
| All conduit runs and fitting are tight and free from corrosion | A | B |
| Earthing is satisfactory | A | A |
| Condition of enclosure gaskets are satisfactory | A | B |
| Electrical connections (used and unused) are tight | A | B |
| Motor airgaps and other running clearances are satisfactory | A | A |
| Electrical protection is satisfactory, overcurrent protection etc | A | A |
| 3 There is no obvious damage to cables, cable sheaths or cable glands | A | A |
| Apparatus is adequately protected against corrosion, the weather, vibration and other adverse factors | A | A |
| Guards (where used) are present and correctly fitted | A | A |
| Fan cowl undamaged and fitted correctly | A | A |
| Only 1 single or multistrand lead may be connected to either side of any auxiliary terminal, unless multiple connectors have been joined in a single insulated crimped boot lace ferrule | A | A |
| Leads to auxiliary blocks are to be a minimum of 1.0mm ² when connected to heaters, thermistors or thermostats | A | A |
| Ensure that only one lead is connected to either side of the auxiliary terminal block | A | A |
| Circuits carry greater than 1 amp shall be individually and suitably overcurrent protected | A | A |
| Connecting leads must be insulated for the appropriate voltage and the insulation must extend to within 1mm of the metal terminal | A | A |
| The suitability of the plastic fan material for certain solvents should be ascertained by the user | A | B |

Notes:

- 1 Apparatus must be positively identified with its circuit to ensure that correct isolation can be carried out.
- 2 Accumulation of dust or dirt can interfere with heat dissipation and result in surface temperature higher than those permitted in the hazardous area.
- 3 Particular attention should be paid to flexible cables used with portable apparatus.

*Category A inspections should be carried out in all cases. Category A intervals must not exceed 2 years. More frequent and/or more detailed inspection will be necessary where there is a corrosive or other adverse atmosphere, a high risk of mechanical damage or vibration, or where there are other onerous circumstances. The need for more frequent inspection may also be determined by operating experience.

The need for, the method, and the frequency of category B inspections is at the discretion of the engineer responsible. It is not intended that periodic inspections should incur undue disturbance of apparatus unless considered necessary by the engineer responsible.

Rotating Electrical Machines

Worldwide sales and service network

Every care has been taken to ensure the accuracy of the information contained in this publication, but, due to a policy of continuous development and improvement the right is reserved to supply products which may differ slightly from those illustrated and described in this publication

For the most recent version of any Brook Crompton catalogue/leaflet, please refer to www.brookcrompton.com



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