

0.4

0.4.3 Apparatus classification

0.4.4 Enclosure groups

0.4.3 Apparatus classification

The ATEX 94/9/EC European Directive classifies equipment into three categories, with differing protection levels, related to the protection guaranteed.

Table 0 D - Equipment categories

| PROTECTION LEVEL guaranteed by the equipment Category | MINE | SURFACE | |
|---|------------------|-----------------|---------------------------------|
| | Category | GAS Category | COMBUSTIBLE DUST Category |
| Very high | M1 | 1G | 1D |
| High | M2 | 2G | 2D |
| Normal | not provided for | 3G | 3D |

NOTE: Equipment of higher categories can also be installed instead of those of a lower category.

0.4.4 Enclosure groups

The standards classify electrical equipment into two groups.

Group I: electric apparatus to be installed in mines or galleries susceptible to firedamp or coal dust.

Group II: electric apparatus to be installed in surface plants susceptible to other explosive atmospheres.

The enclosures for equipment intended for use on the surface, providing “d” protection (flameproof), are in turn broken down into three sub-groups, in relation to the inflammable substances for which they are suitable:

Group IIA, Group IIB, Group IIC.

A motor that belongs to a certain enclosure group is also suitable for lower enclosure groups: a motor in group IIB is also suitable for group IIA; a motor in group IIC is also suitable for group IIA and IIB.

0.4

0.4.5 Temperature classes (for gas atmospheres)

0.4.5 Temperature classes (for gas atmospheres)

The electrical apparatus is classified into 6 classes according to the maximum surface temperatures.

The maximum surface temperature is the highest temperature which is attained in service under the conditions described in the standards, by any part of the electrical apparatus, which, could ignite the surrounding atmosphere.

For electric motors this is:

- the temperature of the outside surface of the enclosure for “d” and “p” protection modes;
- the temperature of any internal or external point for type of protection “e” or “n”.

GB

Table 0 E

| Ignition temperature of medium relative to limit temperature [°C] | Temperature class | Maximum surface temperature of electrical equipment including 40 °C ambient temperature | |
|--|-------------------|---|------|
| | | [°C] | [°F] |
| over 450 | T 1 | 450 | 842 |
| from 300 to 450 | T 2 | 300 | 572 |
| from 200 to 300 | T 3 | 200 | 392 |
| from 135 to 200 | T 4 | 135 | 275 |
| from 100 to 135 | T 5 | 100 | 212 |
| from 85 to 100 | T 6 | 85 | 185 |

0.4

0.4.6 Combustion temperatures of gases, vapours and groups

0.4.6 Combustion temperatures of gases, vapours and groups

Combustible gases and vapours are divided into classes according to their ignition temperature and into groups according to their explosive capacity.

Markings on motors and other electrical equipment with the symbols used to indicate the protection mode, the enclosure group, and the temperature class, indicate the zone in which such equipment can be installed.

GB

Table 0 F - Classification of the more common combustible gases and vapours according to temperature class and group

| Group | Temperature classes | | | | | |
|------------|---|--|---|-----------------------|-----|------------------------------------|
| | T 1 | T 2 | T 3 | T 4 | T 5 | T 6 |
| I | Methane (firedamp) | | | | | |
| IIA | Acetic acid Acetone Ammonia Benzole Benzene Butanone Carbon monoxide Ethane Ethyl acetate Ethyl Chloride Methane Methanol Methyl acetate Methyl alcohol Methyl Chloride Naphtalene Propane Toluene Xylene | Acetic anhydride l amyl acetate n butane n butyl alcohol Amylic alcohol Butyl acetate Cyclohexanon Ethyl alcohol Iso butylic alcohol Liquefied gas Natural gas Propyl acetate | Cyclohexane Cyclohexanol Decane Diesel fuels Gasoline Heating oil Heptane Hexane Jet fuels Pentane Petroleum* | Acetaldehyde Ether | | |
| IIB | Coke-oven gas Water gas (carburetted) | 1,3- butadiene Ethylene Ethylbenzene Ethylene oxide | Hydrogen sulphide Isoprene Petroleum* | Ethyl ether | | |
| IIC | Hydrogen | Acetylene | | | | Carbon disulphide Ethyl nitrate |

* depending on composition

0.4

0.4.7 Temperature for atmospheres with combustible dusts

0.4.7 Temperature for atmospheres with combustible dusts

The flash point of the dust must be taken into account in providing protection against flammable dust, both where this is in cloud form and in layers.

The surface temperature of the enclosure indicated on the motor nameplate must be less than the reference ignition temperature.

The reference temperature is the lowest between the two values thus calculated:

$TS1 = 2/3 T_{cl}$ (T_{cl} = ignition temperature of the cloud of dust)

$TS2 = T_{5mm} - 75K$ (T_{5mm} = ignition temperature of a 5mm layer of dust).

T_{amm} = lowest between $TS1$ and $TS2$.

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Table 0 G - Calculation of the flash points for combustible dusts

| | | |
|---|-----------------------------------|------------------|
| Dust ignition temperature ↓ | Cloud Tcl | Layer T5mm |
| Safety temperature ↓ | Ts1 = 2/3 Tcl | Ts2 = T5mm - 75K |
| Maximum surface temperature ↓ | Tamm = lowest between Ts1 and Ts2 | |
| Surface temperature of the motor ≤ Tamm | | |

Table 0 H - Examples of flash points for combustible dusts

| | Cloud [°C] | Layer [°C] |
|-----------------|---------------|---------------|
| Aluminium | 590 | >450 |
| Carbon dust | 380 | 225 |
| Flour | 490 | 340 |
| Wheat dust | 510 | 300 |
| Methylcellulose | 420 | 320 |
| Phenolic resin | 530 | >450 |
| Polyethylene | 420 | melting |
| PVC | 700 | >450 |
| Soot | 810 | 570 |
| Starch | 460 | 435 |
| Sugar | 490 | 460 |

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0.4

0.4.8 Choice of safety-electric motor

0.4.8 Choice of safety-electric motor

The connection between danger zones and the categories of equipment to be used is defined in Directive 1999/92/EC.

The specific construction standards for the protection modes (e.g. Ex d) also define the motor category that can be obtained by applying the standards (e.g. 2G).

GB

Table 0 I - Choosing the protection mode for zones in which gas is present

| Explosive Atmosphere | Danger Zone | Protection guaranteed by Equipment | Motor Category | Protection Mode |
|----------------------|-------------|------------------------------------|----------------|-----------------------|
| ALWAYS PRESENT | 0 | Very High | 1G | IEC EN 60079-26 |
| PROBABLE | 1 | High | 2G | Ex d Ex de Ex e |
| IMPROBABLE | 2 | Normal | 3G | Ex nA |

Table 0 L - Choice of protection mode for areas where combustible dust is present

| Explosive Atmosphere | Danger Zone | Protection guaranteed by Equipment | Motor Category | Protection Mode |
|----------------------|----------------------------|------------------------------------|----------------|----------------------------|
| ALWAYS PRESENT | 20 | Very High | 1D | Currently not provided for |
| PROBABLE | 21 | High | 2D | Ex tD - A21 - IP6x |
| IMPROBABLE | 22 Conductive dusts | Normal | 2D | Ex tD - A21 - IP6x |
| IMPROBABLE | 22 Non-conductive dusts | Normal | 3D | Ex tD - A22 - IP5x |

N. B. Equipment of a higher category can be installed in place of equipment of a lower category

0.4

0.4.9 Certification and approved laboratories

0.4.9 Certification and approved laboratories

The motors offered in the catalogue herein comply with Directive 94/9/EC ATEX, which states that two different certificates of conformity are to be issued:

- EC Type examination certificate
- Product quality assurance notification.

Certification

Flameproof motors and motors with added protection must be approved by a notified body appointed by the European Commission according to the methods defined by the same ATEX directive.

The motors are classified based on the hazardous atmosphere of the place of installation.

The type of motor protection must be chosen on the basis of the area of installation.

The dangerousness of the zone is determined by the atmosphere involved.

The user is responsible for determining the type of protection, enclosure group, and maximum surface temperature of the motor to be installed.

The user must also correctly install, connect to the mains, use and service the motor.

Certificates of conformity to CENELEC standards are valid in all member countries in the European Union and member countries of CENELEC.

The electro-technical committees of the following countries are members of the CENELEC: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, Holland, Portugal, United Kingdom, Spain, Sweden and Switzerland.

The nominal characteristics of motors relate to a maximum ambient temperature of 40°C.

The certifications are valid for a maximum ambient temperature of 60°C (IIC) and 80°C (IIB).

At ambient temperatures exceeding 40°C, the nominal characteristics may deviate from the standard.

Certificates of EC Type Conformity relate to motors with:

- IIB or IIC enclosure groups
- Ex d or Ex de protection modes
- category 2G and temperature classes T3, T4, T5, T6
- category 2GD and surface temperatures T150°C, T135°C, T100°C, T85°C.

These certificates cover:

- motors with voltage up to 1000V and frequencies of 50 and 60Hz
- single-phase motors
- three-phase double winding and/or double polarity motors
- motors installed at altitudes higher than 1000m above sea level
- service from S1 to S9
- motors operated by electronic frequency converter and with forced ventilation.
- accessories such as: anti-condensation heaters and temperature detectors
- ambient temperature:
 - minimum - 50 °C
 - maximum + 80 °C (T3)
 - + 60 °C (T4).

Notified bodies

The list of notified bodies can be found on the European Union website at the following address:
www.europa.eu.int/comm/enterprise/atex/nb/nblast.htm

IECEX Certifications

Presently (July 2008) the procedure for obtaining certifications according to the IECEX program is in place.

1. General informations

1.1 Range of motors in the ATEX series

1.1 Range of motors in the ATEX series

The motors offered in this catalogue comply with standards concerning equipment and protective systems intended for use in potentially explosive atmospheres, in compliance with European Directive 94/9/EC dated 23/3/94, otherwise known as the ATEX directive.

The ATEX directive states that two different certificates of conformity are to be issued.

One is the "EC-Type examination certificate" for the homologation of the prototype and the other is for the "Production Quality Assurance Notification".

The Certificates are issued by CESI in Milan, Notified Body no. 0722.

All motors in the ATEX series are available in 2G (for gas) or 2GD (for gas and dust) versions.

Table 1 A - The Series ATEX range

| Version | Frame size [mm] | Output range (2 pole) [kW] | Standard temperature class for 2G motors | Standard surface temperature for 2GD motors | Motor type | | | |
|---|-----------------|----------------------------|--|---|--------------|--------------|--------------|--------------|
| | | | | | Ex d IIB | Ex de IIB | Ex d IIC | Ex de IIC |
| Single speed, three phase (2, 4, 6, 8 pole) | 63 ÷ 315 | 0.18 ÷ 200.00 | T4 | T 135°C | AB 30 | AB 35 | AC 30 | AC 35 |
| Two speeds, three phase (2/4, 4/8, 4/6, 6/8 pole) for general purpose (constant-torque) | 63 ÷ 315 | 0.15 ÷ 160.00 | T4 | T 135°C | AB 20 | AB 25 | AC 20 | AC 25 |
| Two speeds, three phase (2/4, 4/8, 4/6, 6/8 pole) for centrifugal machines (quadratic-torque) | 63 ÷ 315 | 0.18 ÷ 160.00 | T4 | T 135°C | AB 40 | AB 45 | AC 40 | AC 45 |
| Single phase, (2, 4, 6 pole) | 63 ÷ 100 | 0.10 ÷ 3.00 | T4 | T 135°C | AB 10 | AB 15 | AC 10 | AC 15 |
| Single-phase with capacitor in extra-size terminal box (2, 4, 6 pole) | 63 ÷ 100 | 0.10 ÷ 1.10 | T4 | T 135°C | AB 12 | | AC 12 | |
| Motors energized by inverter (2, 4, 6, 8 poli) | 63 ÷ 315 | 0.18 ÷ 200.00 | T4 | T 135°C | AB 70 | AB 75 | AC 70 | AC 75 |

Table 1 B - Temperature Class upon request

| Version | T3 | T5 | T6 |
|------------------|------------------|----------------------|---------------------|
| 63 ÷ 160 | Same power as T4 | Same power as T4 (*) | Power lower than T4 |
| 180 ÷ 315 | Same power as T4 | Power lower than T4 | Power lower than T4 |

(*) For the single and three-phase, 2-speed motors: power lower than T4.

Also available flameproof motors with brake and flameproof motors of Group I for installation in mines. Documentation supplied upon request.

1.2 Main characteristics

1.2 Main characteristics

- Flameproof motors compliant with the Standards IEC EN 60079-0, 60079-1, 60079-7 for atmospheres where gas is present and IEC EN 61241-0, 61241-1 for areas where combustible dust is present.
- Three phase and single phase Squirrel Cage Asynchronous Induction motors.
- Totally enclosed, fan cooled, frame IP55 with Terminal box IP65.
- The motors dimensions comply with IEC 60072 standard.
- Power Supply 400V / 50Hz. Three-phase, 1-speed motors, 2-4-6-8 poles, T4 (for sizes between 63 and 250, multi-voltage power supply 380-400-420V/ 50 Hz).
- Class F insulation.
- Noise level within 80 dB (A).
- Terminal Box:
 - available both in a flameproof, or increased safety version
 - large size
 - standard position - top, opposite feet
 - rotate by 90° in 4 positions.
- Motor frame and terminal box enclosure separated to avoid the transmission of explosions.
- Winding cables connected to the terminal board by means of terminal blocks or by a flameproof sealing device.
- Internal and external mechanical components painted with epoxy polyester powders;
 - stainless steel nameplate,
 - anti-corrosion screws.
- Highly resistant to impact:
 - frame, terminal box and cast iron endshields.
 - fan cover in sheet steel.
- Low friction dust seals.
- The conformity certificates also cover alternatives, such as:
 - altitude over 1000m
 - modification of the rated voltage and rated frequency
 - power supply from an inverter
 - motor protection through temperature detectors
 - duty S1 to S9.

1.3 Main options

1.3 Main options

Main versions

- Motors with brakes.
- 2GD motors for areas classified as zone 21 and zone 22 (Combustible dusts).
- Group I motors (for mines).

Electrical variants

- Non-standard voltages and frequencies (maximum voltage 1000V).
- Motors for tropical climates.
- Motors for low temperatures (-50°C)
- Temperature rise below 80K.
- Motors insulated to class H.
- Motors with bimetallic detector, thermistor PTC or thermistor PT100.
- Motors with anti-condensation heaters.
- Motors with special electrical design.
- Single-phase motors with capacitor fitted in a large-size terminal box (Ex d, max 50 µF).

Mechanical variants

- Special flanges and shafts.
- Double ended shafts.
- Cable gland fitted to terminal box.
- Terminal box with special cable entries.
- Motors without terminal box and with loose cables. Sealing joints and conduits can be supplied on request.
- Motors protection IP56 - IP65 - IP66.
- Motors with condensation drainage valves.
- Motors with special bearings (uni-directional, with sensors, with rollers, insulated, oversized, thrust bearings).
- Grade A or B balancing
- Motors with a rain cap or sun shield, water-shedding disc.
- Side terminal box, 180 to 315M high (excluding 250)
- Separate terminal box for auxiliary terminals.
- Low noise emission version.
- High protection against corrosion for tropical climates or applications in marine environments:
 - external mechanical components finished with epoxy paint;
 - protection of the internal parts (winding and rotor) with protective paint;
 - stainless steel screws.

Accessories

- Motors suitable for frequency inverter drive.
- Motors with encoder.
- Motors with forced ventilation (from frame size 100).

Certificates

- Motors according to American Bureau of Shipping, Bureau Veritas, Det Norske Veritas, Germanischer Lloyd, Korean Register of Shipping, Lloyd Register of Shipping, Nippon Kaiji Kyokai, R.I.Na., ...

1.4 Nomenclature

1.4 Nomenclature

GB

Pos. 1 = Motor series:

A Flameproof 63÷315

Pos. 2 = Type of application:

B Enclosure group IIB

C Enclosure group IIC

Pos. 3 = Type of motor (electric characteristics):

1 Single phase

2 Three-phase 2 speed, constant torque

3 Three-phase 1 speed

4 Three-phase 2 speed quadratic torque

5 For lifting

7 For inverters

Pos. 4 = Terminal box version:

0 Protection method Ex d

3 Without box, with plate Ex d

5 Protection method Ex e

2 Ex d capacitor holder in extra-size box

Pos. 5 = Size (centre height):

| | | | | |
|-----------|------------|------------|------------|------------|
| 63 | 90 | 132 | 200 | 280 |
| 71 | 100 | 160 | 225 | 315 |
| 80 | 112 | 180 | 250 | |

Pos. 6 = Length of stator pack:

| | 63 | 71 | 80 | 90 | 100 | 112 | 132 | 160 | 180 | 200 | 225 | 250 | 280 | 315 |
|-------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | | | | * | * | | | | | | |
| Extra short | | | | | | | SA | | | | | | | |
| Short | A | A | A | S | LA | | SB | S | MA | | LA | S | S | S |
| Medium | | | | | | M | MB | M | MB | M | | M | | |
| Long | B | B | B | L | LB | | ML | L | L | L | LB | M | M | M |
| Extra long | | | L | | | | | | | | ML | | | L |

* Three-phase, 2-speed version

Pos. 7 = Polarity:

| | | |
|--------------------|---|---|
| 2 2 poles | 24 Double polarity: 2 / 4 poles | 46 Double polarity: 4 / 6 poles |
| 4 4 poles | 28 Double polarity: 2 / 8 poles | 48 Double polarity: 4 / 8 poles |
| 6 6 poles | 21 Double polarity: 2 / 12 poles | 41 Double polarity: 4 / 12 poles |
| 8 8 poles | | 43 Double polarity: 4 / 16 poles |
| 10 10 poles | | 68 Double polarity: 6 / 8 poles |
| 12 12 poles | | 61 Double polarity: 6 / 12 poles |

Pos. 8 = Mounting (IM Code I):

| | | |
|------------|------------|------------|
| B3 | V5 | V6 |
| B5 | V1 | V3 |
| B14 | V18 | V19 |
| B35 | V15 | V36 |

Pos. 9 = Supply:

| | |
|----------------------------|---|
| 3F xxxD / xxxS / xx | Three-phase 1-speed; voltage for delta connection; voltage for star connection; frequency |
| 3F xxx / xx | Three-phase, 2-speed: voltage; frequency |
| 1F xxx / xx | Single-phase; voltage; frequency |

A B 2 5 132 S 46 B5 3F 400/50 = Example of the commercial codes

2. Design features

2.1 Mounting arrangements

2.1 Mounting arrangements

The most commonly used mounting arrangements are shown in the table 2 A. Other mounting arrangements are available on request.

Standard motors ordered in basic mounting arrangements (universal mounting arrangements)

IM B3, IM B5 or IM B14 can also be operated in the following different mounting positions:

- IM B3 in IM B6, IM B7, IM B8, IM V5 or IM V6,
- IM B5 in IM V1 or IM V3,
- IM B14 in IM V18 or IM V19.

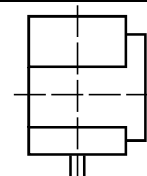
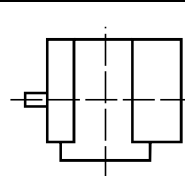
According to the safety standard for electrical machines, foreign objects must be prevented from falling into the fan cover.

Motors for vertical arrangement with shaft end down are fitted with a protective hood over the fan cowl.

Table 2 A

Size 63 ÷ 315

Foot-mounted motor



CEI 2-14

B3

V5

IEC EN 60034-7 code I

IM B3

IM V5

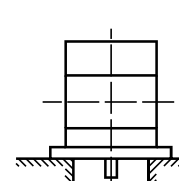
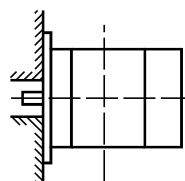
IEC EN 60034-7 code II

IM 1001

IM 1011

Size 63 ÷ 315

Flange-mounted motor:
large flange,
clearance fixing holes



CEI 2-14

B5

V1

IEC EN 60034-7 code I

IM B5

IM V1

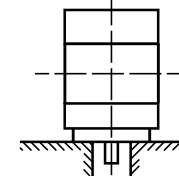
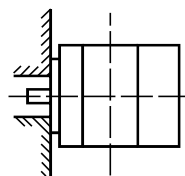
IEC EN 60034-7 code II

IM 3001

IM 3011

Size 63 ÷ 132

Flange-mounted motor:
small flange,
tapped fixing holes



CEI 2-14

B14

V18

IEC EN 60034-7 code I

IM B14

IM V18

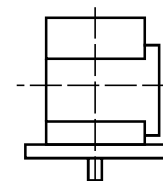
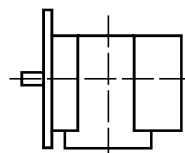
IEC EN 60034-7 code II

IM 3601

IM 3611

Size 63 ÷ 315

Foot and flange-mounted motor:
large flange, clearance
fixing holes



CEI 2-14

B3/B5

V5/V1

IEC EN 60034-7 code I

IM B35

IM V15

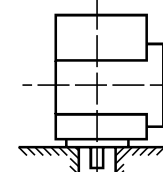
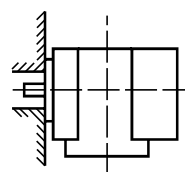
IEC EN 60034-7 code II

IM 2001

IM 2011

Size 63 ÷ 132

Foot and flange-mounted motor:
with small flange, tapped fixing
holes



CEI 2-14

B3/B14

V5/V18

IEC EN 60034-7 code I

IM B34

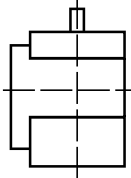
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IEC EN 60034-7 code II

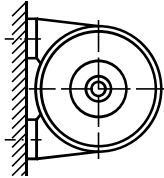
IM 2101

IM 2111

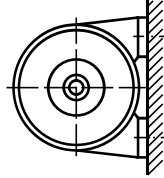
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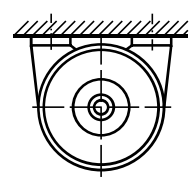
V6
IM V6
IM 1031



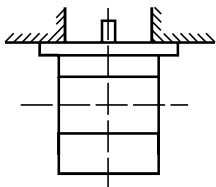
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IM B6
IM 1051



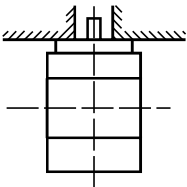
B7
IM B7
IM 1061



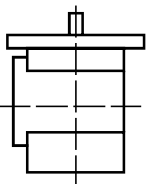
B8
IM B8
IM 1071



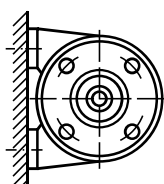
V3
IM V3
IM 3031



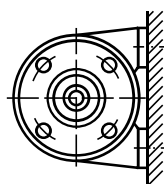
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IM V19
IM 3631



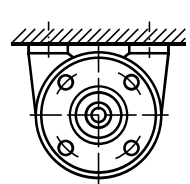
V6/V3
IM V36
IM 2031



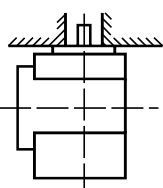
B6/B5
IM 2051



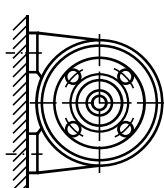
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IM 2061



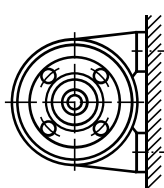
B8/B5
IM 2071



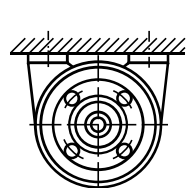
V6/V19
IM 2131



B6/B14
IM 2151



B7/B14
IM 2161



B8/B14
IM 2171