

Flameproof Motors For Hazardous Area Applications

“CG Launches Series FLP Motors”

Motors for hazardous area represent one of CGL's special area of focus. The regulatory requirements & the scenario in which CGL's customers operate are complex and constantly changing with the introduction of new European and Indian standards. Among the latest development CGL ensures that its products comply with relevant regulations.

Applications

CGL offers Flameproof motors for hazardous areas for applications such as fans, pumps, compressors, blowers, and areas where inflammable gases/vapours are likely to be present such as oil & gas (on-shore / off-shore) exploration sites, oil & gas terminals, refineries, petrochemicals, fertilizers plants and chemical industries. CGL offers Flameproof Ex 'd' motors for zone-I & II gas group I, IIA, IIB complying to IS: 325 / IEC 60034-7 IS: 2148 - 2004 & IEC 60079-1:2007

Note: Motors for gas group IIC are also available on special request

Application groups

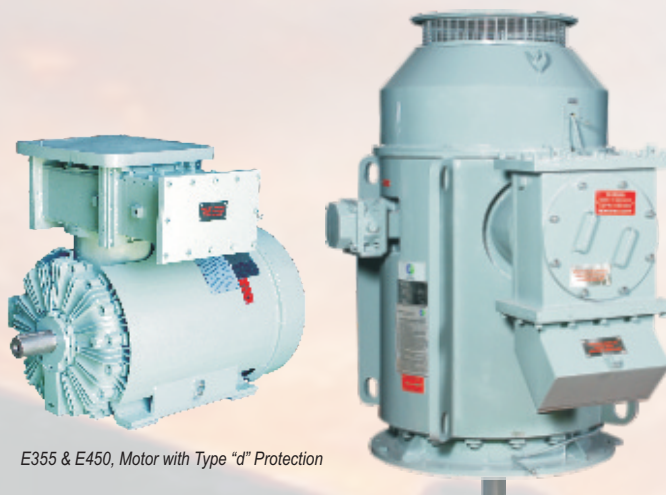
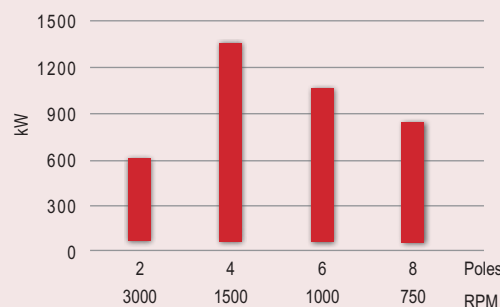
Depending on the intended use, explosion proof electrical operating equipment is divided into two major groups:

- Group I** Equipment for coal mines (only special designed motors for mines can be used)
- Group II** Electrical equipment for use other than mines (surface industry) Group II motors with flameproof enclosure are still further divided into gas groups: IIA, IIB & IIC.

Testing and certification

Motors conform to latest IS/IEC standards Flameproof (Exd) motors have to meet tough requirements with regard to withstanding and preventing transmission of internal explosion. The latest IEC and EN standards specify criteria for risk assessment and gas environment tests for the motor designs. CGL motors are tested by Central Institute of Mining and Fuel Research (CIMFR, formerly CMRI) Dhanbad and approved by Statutory bodies like Directorate General of Mine Safety (DGMS) Dhanbad for use in mines and by Petroleum and Explosive Safety Organization (PESO, formerly CCOE) Nagpur for use in surface industries.

FLP Output Chart, 3300-6600 V, 50Hz



E355 & E450, Motor with Type "d" Protection

E560 Motor with Type "d" Protection & Vertical Mounting

Temperature Classes

Temperature Class	Ignition temp. for gas vapour °C	Max. permitted temperature equipment °C
T1	> 450	450
T2	> 300 < 450	300
T3	> 200 < 300	200
T4	> 135 < 200	135
T5	> 100 < 135	100
T6	> 85 < 100	85

Zone 2

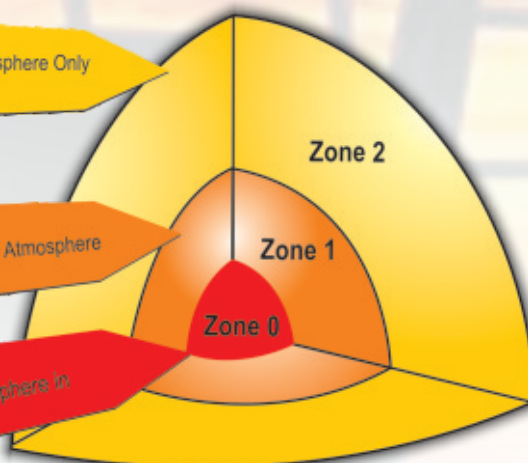
Abnormal condition Presence of explosive atmosphere Only by accident (≤ 10 h per year)

Zone 1

Occasionally incidental presence of explosive Atmosphere during normal duty (10 - 1000 h per year)

Zone 0

Continuous presence of Explosive atmosphere in normal operation (> 1000 h per year)



Crompton Greaves Large Flameproof Motors are robust, compact and simple in construction which need minimum of attention. They are best suitable for conditions encountered in applications, such as:

- Frequent movements during coal extraction.
- Rigorous transport system.
- Restriction in space due to narrow lanes.
- Inadequate maintenance facilities.
- Impact of falling stones/coal and debris, dusty and damp conditions.
- Necessity to maintain lower surface temperatures.
- Hazardous gases and combustible coal dust.
- Fluctuating loads.
- Wide fluctuations in supply voltage.

Flameproof Induction Motors (Exd for ZONE-I, II - Gas Group IIA, IIB)

The essential principle of electrical apparatus with flame proof enclosure is that the hazardous atmosphere is not excluded from entry into the enclosure. It is recognized that an explosion is likely to occur within the apparatus but the construction of the enclosure should be such that it shall withstand the internal explosion without any evidence of distress and shall prevent the communication of the internal ignition to the surrounding atmosphere (the term flame proof as used here is synonymous with the term "explosion proof" as used in the USA or "Explosion Proof type'd' protection" used in Germany and other continental countries)

Construction

Stator frame has a barrel type construction made from thick fabricated steel to withstand internal pressure, stringent checks like pressure tests are in place to ensure to high degree of welding quality. Adequate care is taken during machining to ensure a perfect concentricity of stator bore leading to minimum vibration level & optimum heat transfer. For higher frame sizes i.e. 630 & 710 the frame is of TETV construction. The tubes are double expanded in thick end plates to provide protection against leakage in case of explosion.

Other Features

- Resin poor insulation system with VPI using solvent less epoxy resin.
- Die penetration & Ultrasonically tested rotor shafts.
- Two stage dynamic balancing of rotors complying to grade 2.5 of ISO 1940.
- Copper/copper alloy bars tight fitted in slots and brazed to short circuiting ring.
- Grease lubricated ball /roller bearings.
- Oil lubricated sleeve bearings to withstand high speed & heavy loads.

Technical Specification

Degree of Protection : IP55

Enclosure : Totally Enclosed Fan cooled (TEFC)

Dimensions : As per IEC 60072-A

Output : Upto 2000kW

Supply Voltage : 415,690, 3300, 6600

Supply frequency : 50, 60 Hz

Mounting : IMB3, IMV1, IMB35

Frame Size : E355, E400, E450, E500, E560, E630*, E710*

* E630 & E710 is available on request in TETV Construction

TERMINAL BOX

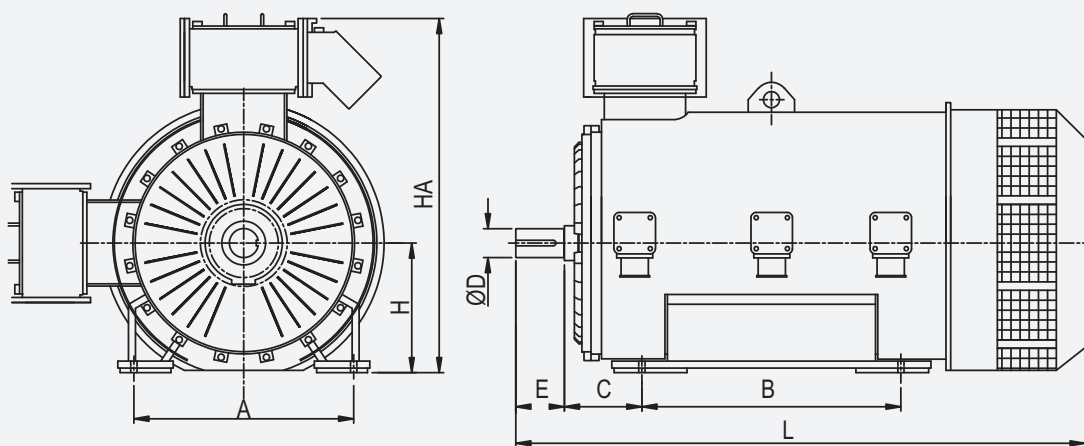
The terminal box has been certified to withstand fault level of 43kA for 0.25 secs. It is designed to withstand internal pressures, in the event of explosion and to prevent transmission of such explosion to outside explosive gases / vapours. Winding leads are terminated on a pillar type epoxy moulded insulators, which are mounted on insulating mounting plate. Double compression Flameproof cable glands are also provided.

ACCESSORIES

For easier and better monitoring of motor condition and for effective warning system for malfunctioning of vital parts of motors such as winding and bearing, following accessories can be provided:

- Resistance Temperature Detectors (RTD) for measuring / monitoring temperatures of winding and / or bearing.
- For low voltage motors, Thermistor as thermal switch can be provided for winding protection.
- Dial type thermometers (with / without contact) for bearing temperature indication

General Arrangement Drawing



Fabricated Frame for FLP

Overall Dimensions of Motor

Type	No. of Poles	A	B	C	ΦD	E	HA	H	L
E 355	2 - 6	610	630	254	85 - 95	1700 - 1540	1200	355	1700 - 1540
E 400	2 - 6	686	710	280	85 - 100	1900 - 1750	1300	400	1900 - 1750
E 450	2 - 8	750	710	315	85 - 100	2150 - 2000	1450	450	2150 - 2000
E 500	2 - 8	850	800	315	100 - 125	2300 - 2100	1500	500	2300 - 2100
E 560	2 - 8	950	1120	335	100 - 125	2450 - 2200	1530	560	2450 - 2200

All dimensions are in mm

Note : Due to continuous improvements and developments, the above data is likely to be changed without prior notice.

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