

# **Approval of Ex (Electrical) Equipment for use/installation in Hazardous Areas.**

Requirement under Rule 102 of the Petroleum Rules, 2002 lays down that no electrical wiring shall be installed and no electrical apparatus shall be used in Petroleum Refinery, storage installation, storage shed, service station or any other place where petroleum is refined, blended, stored, loaded/filled or unloaded unless it is approved by the Chief Controller of Explosives. It is in this context that electrical equipment which has to be used in an Hazardous area covered under Petroleum Rules, 2002 shall require approval from the Chief Controller of Explosives.

For the purpose of installation of electrical equipments, the areas have been divided into 3 categories of hazardous areas namely :

- i. Zone „0“ area where inflammable gas and vapours are expected to be continuously present eg., inside the tank.
- ii. Zone „1“ area where inflammable gas and vapours are expected to be present under normal operating conditions eg., on the mouth of the vent pipe or near fill point, unloading point etc., during the operation.
- iii. Zone „2“ area where inflammable gas and vapours are expected to be present under abnormal operating condition eg., during the failure or rupture of the equipment.

The extent of the hazardous area for petroleum refineries/processing plants storage installation, storage sheds and service stations shall be determined as laid down in Fourth Schedule of the Petroleum Rules, 2002. Various types of protection techniques have been developed to make these electrical equipments safe for use in hazardous areas, viz –

**I. Flameproof protection :-** In this type of protection the enclosure which houses the electrical equipment is designed in a manner that the explosion inside the enclosure due to ingress of explosive/flammable gas or vapour will not be transmitted/communicated to outside hazardous atmosphere.

**II. Intrinsically safe :-** In this type of protection the equipment is designed in such a manner that the electrical energy which can enter explosive environment is so low or restricted in a manner that it cannot ignite a explosive gas air mixture.

**III. Pressurised protection :-** In this type of protection the pressure inside the enclosure housing the electrical equipment is maintained at a positive pressure (higher than atmospheric pressure outside enclosure) so as not to allow ingress of inflammable/explosive gas air mixture thus avoiding possibility of explosion.

**IV. Encapsulated protection :-** The principle of this type of the protection is that the apparatus to be protected is submerged/potted in a suitable substance in liquid state which is then allowed to cool and form a solid block. This prevents direct contact between the electrical apparatus and the explosive atmosphere.

**V. Increased safety type of protection :-** This type of protection is achieved by adopting measures in the design and manufacture of electrical apparatus to ensure security against occurrence of arcs, sparks and excessive temperature. In addition to the type of protection provided, the nature of explosive gas which will occur in the atmosphere around the equipment has also to be borne in mind.

**VI Type 'n' or non sparking type :-** For achieving this type of protection, it is to be ensured that the equipment is so constructed and maintained that no incendive spark is formed in normal operation and no fault is likely to occur in equipment which can lead to ignition of explosives gas mixture

**VII. Oil Immersion :-** When an electrical equipment capable of igniting explosive gas mixture is protected by immersion in mineral oil or other suitable protective liquid so that explosive gas mixture cannot come in contact with electrical equipment i.e. oil/liquid acts as a barrier between them .

**VIII. Powder Filling :-** A low energy spark producing equipment, if covered with a layer of appropriate thickness made of granulated material, such as quartz or solid glass particles (electrical non-conducting inorganic materials) of particle size 0.5 mm to 1 mm will prevent propogation of flame from interior of the layer to explosive atmosphere present above the surface of filling material. Such protection can even prevent flame propogation of Hydrogen-air mixture (having lowest experimental safe gap valve MESG = 0.29 mm) if granule size smaller than 1 mm & a layer thickness of 10 mm is used as filling material.

As per the Indian standards the explosive gases are classified under two broad categories viz.,

- i. Group I – Methane
- ii. Group II is subdivided into three types, viz. IIA, IIB, IIC

IIA represents Propane

IIB represents Ethylene

IIC represents Hydrogen and Acetylene

Since areas coming under the Petroleum Rules, 2002 will have presence of hydrocarbons consisting of Carbon chain of C2 and above, the equipment to be used should be appropriate to IIA & IIB classification. However, if the equipment is to find application in petroleum refineries where presence of hydrogen cannot be ruled out, approval under Group IIC would be required in such case.

PROCESS OF APPROVAL FOR ELECTRICAL FITTINGS FOR USE IN HAZARDOUS AREAS FALLING UNDER THE PURVIEW OF PETROLEUM RULES, 2002:

**Most Important:-** Only those electrical Equipments/Instruments/Apparatus/Fittings (generally denoted by “Ex Equipments”) finding application/use in petroleum hazardous areas of petroleum refineries/Installations/Terminals and other licensed premises covered under Petroleum Rules, 2002 are only be considered for approval by Chief Controller of Explosives, Nagpur. It is also mandatory to install CCE approved electrical equipments in the licensed premises where storage, filling and dispensing of flammable gases like LPG, CNG, CBG, Hydrogen, Acetylene and other hazardous gases and chemicals are used, as mandated in respective statutory Rules.

Requirements of documents for approval of “Ex Equipments” is based on situation i.e. whether the equipment is imported one or manufactured indigenously in India.

**[A] Documents for indigenous equipments :- Application indicating -**

1. Name and address of applicant/company
2. Name and address of manufacturer indicating place of manufacture.
3. Profile of the manufacturer including documentary evidence about the company including its Directors/Partners (as the case may be) and authorized signatories.
4. Organizational setup of the manufacturer.
5. Quality control setup of the manufacturer at the manufacturing premises.
6. Details of equipments and machinery provided for manufacture and stage wise quality assurance including final Quality Control System.
7. Details of testing facilities available with manufacturer.
8. Service and maintenance setup by the manufacturer.
9. Zone and Gas Group for which approval is sought.
10. Applicable standards including Temperature Class under which testing of the equipment has been done by the approved Test House/Laboratory. At present testing shall be done in compliance to following standards viz

IS/IEC 60079-0: 2011	General requirements
IS/IEC 60079-1: 2007	Equipment protection by flameproof enclosures "d"
IS/IEC 60079-2: 2007	Equipment protection by pressurized enclosure "p"
IS/IEC 60079-5: 2007	Equipment protection by powder filling "q"
IS/IEC 60079-6: 2007	Equipment protection by liquid immersion "o"
IS/IEC 60079-7: 2006	Equipment protection by increased safety "e"
IS/IEC 60079-11: 2006	Equipment protection by intrinsic safety "i"
IS/IEC 60079-15: 2005	Equipment protection by type of protection "n"
IS/IEC 60079-18: 2009	Equipment protection by encapsulation "m"
IS/IEC 60079-25: 2003	Intrinsically safe electrical systems
IS/IEC 60079-26: 2006	Equipment with Equipment Protection Level (EPL) Ga
IS/IEC 60079-28: 2006	Protection of equipment and transmission systems using optical radiation
IS/IEC 60079-29-1: 2007	Gas detectors. Performance requirements of detectors for flammable gases
IS/IEC 60079-30-1: 2007	Electrical resistance trace heating. General and testing requirements

11. Copy of Test Report with copy of **approved drawings** from the Test House/Laboratory duly recognized by CCE.
12. Technical details of electrical components/apparatus if intended to be housed in the flameproof enclosure (for which approval is sought).
13. Scrutiny fee of Rs. 500/- in form of DD drawn in favour of “Chief Controller of Explosives, Nagpur” payable at Nagpur for approval of each type of Ex Equipment
14. Copy of licence under BIS Marks Scheme with appropriate endorsements. (only for Flameproof equipments/apparatus).

**[B] DOCUMENTS FOR IMPORTED EQUIPMENTS – Application indicating**

1. Name and address of the applicant/Principal company/manufacturer.
2. Profile of the manufacturer.
3. Details of customers in petroleum, petrochemical field to whom the equipment has already been supplied abroad.
4. Name of the Indian subsidiary or Authorized Agent cum Service Provider in India with documents in support of the same like agreement between manufacturer and Indian agents cum service provider. The covering letter/Application addressed to Chief Controller shall be from the Indian Subsidiary or Authorised Agent only.
5. Profile of the Indian agent or subsidiary and enclosing documents in respect of company like “Certificate of Incorporation from ROC” or Deed of Partnership, list of Directors/Partners and its set up in this country clearly indicating qualified and trained technical service team assigned with responsibilities of initial installation/commissioning of the equipment/apparatus as well as post sales, Technical back-up, repair, maintenance & supply of original spares etc. List of technical persons specially trained by principal company/manufacturer shall be separately attached.
6. A letter of authorization by OEM/Principals addressed to CCE, authorizing their Indian Agent cum Service Provider/Subsidiary to apply and obtain approval on their behalf.
7. Name of the product(s) for which approval is sought.
8. Zone of hazardous area(s) and Gas Group(s) in which the equipment is proposed to be installed/used.
9. Copies of Examination Certificate or Certificate of Conformity of equipment/component tested in compliance to presently valid Harmonized

International Standard under ATEX **OR** IEC Ex Scheme respectively along with copy of the **approved drawing**, duly signed, from a Notified Test House under said scheme, with latest supplements (if any) indicating markings assigned including temperature Class i.e.

– T1, T2, T3, T4, T5 or T6 as certified, duly countersigned by the authorized officers of the manufacturer should be submitted.

<b>ATEX Scheme</b>	<b>OR</b>	<b>IECEX Scheme</b>
<b>(1) EC type Examination certificate under ATEX Scheme with latest standards as per EN 60079 series.</b> <b>(2) Valid Production Quality Assurance Notification under ATEX Scheme</b> <b>(3) Declaration of Conformity as per latest EN standards by manufacturer</b>		<b>(1) IECEX Certificate of Conformity as per latest IEC standard under IEC 60079 Series</b> <b>(2) Valid Quality Assessment Report mentioning the number of Certificate of Conformity under IECEX Scheme.</b> <b>(3) Test Reports Ex TR</b>

The following International Standards are valid and acceptable at present for grant of approval by PESO,

EN 60079-0: 2012/A11:2013	Or	IEC 60079-0: 2011(Modified)+ IS1:2013
EN 60079-1: 2014	Or	IEC 60079-1: 2014
EN 60079-2: 2014	Or	IEC 60079-2: 2014
EN 60079-5: 2015	Or	IEC 60079-5: 2015
EN 60079-5: 2007( valid Till 24/03/2018)	Or	IEC 60079-5: 2007 (valid Till 24/03/2018)
EN 60079-6: 2015	Or	IEC 60079-6: 2015
EN 60079-6: 2007( valid Till 27/03/2018)	Or	IEC 60079-6: 2007 (valid Till 27/03/2018)
EN 60079-7: 2015	Or	IEC 60079-7: 2015
EN 60079-7: 2007( valid Till 27/03/2018)	Or	IEC 60079-7: 2006 (valid Till 27/03/2018)
EN 60079-11: 2012	Or	IEC 60079-11: 2011
EN 60079-15: 2010	Or	IEC 60079-15: 2010
EN 60079-18: 2015	Or	IEC 60079-18: 2014
EN 60079-18: 2009 (valid Till 16/01/2018)	Or	IEC 60079-18: 2009( valid Till 16/01/2018)
EN 60079-25: 2010	Or	IEC 60079-25: 2010
EN 60079-26: 2015	Or	IEC 60079-26: 2014
EN 60079-26: 2007 (valid Till 02/12/2017)	Or	IEC 60079-26: 2006 (valid Till 02/12/2017)
EN 60079-27: 2008	Or	IEC 60079-27: 2008
EN 60079-28: 2015	Or	IEC 60079-28: 2015
EN 60079-28: 2007 (valid Till 01/07/2018)	Or	IEC 60079-28: 2006 (valid Till 01/07/2018)
EN 60079-29-1: 2007	Or	IEC 60079-29-1: 2007
EN 60079-30-1: 2007	Or	IEC 60079-30-1: 2007

10. Technical Brochure and details of the equipment i.e, whether an associated apparatus or intrinsically safe system or like, including description of the equipment, its different models/variants, electrical parameters, working principle & operating mechanism (in case of special type of apparatus) and brief operation manual.

11. If the approval is sought for any system/package apparatus where number of

electrical components are used, separate Examination Certificate and copies of Production Quality Assurance Notification; EC type Declaration of Conformity from the manufacturer etc. is to be submitted for each component. Approval will be issued only for each component used in the integrated system/package equipment.

12. Scrutiny fee of Rs. 500/- for each component or Examination Certificate involved, in form of D.D. drawn in favour of Chief Controller of Explosives, Nagpur payable at Nagpur.

13. Documentary evidence such as purchase order copy/inquiry/indent letter of any oil Company stating installation in petroleum hazardous area/installation.

**Departmental Action :**

Based on the documentation submitted following assessment will be made :-

- a) Whether the manufacturer has the necessary infrastructure and technical manpower to produce safe and quality product in conformity to relevant standards and provide after sales service to the users.
- b) Whether manufacturer/its subsidiary of Indian Agent has the necessary set up to provide technical back up/maintenance and service to the customers once installed in the hazardous area.
- c) Whether the equipment is suitable for the Gas Group for which it is certified and proposed to be installed.
- d) Whether the equipment is suitable for the zone of the hazardous area where it is intended to be used based on its type of protection, and for the service, it will be used.
- e) Whether there is scope of any hazard in the use of such electrical equipment in the intended hazardous area and Gas Group.
- f) Whether the equipment has been tested by the Notified/Recognised test house in compliance to latest relevant standards if intended to be used specially, in hazardous areas.
- g) Whether the accessories/sub-components used in the electrical equipment are having proper certification of required explosion protection type and suitable for use in such hazardous area.

If the required documents and other assessments of the equipment and credentials of Indian service provider are found in order and satisfactory, approval will be issued in the favour of the manufacturer specifying the Indian Service Provider's name in the conditions of approval for foreign origin manufacturer.

### **[C] Revalidation of existing Approval - Documents required**

1. Every application for revalidation shall be made so as to reach the Chief Controller of Explosives on or before the date on which the approval expires.
2. Revalidation fee of Rs. 500/- for each EC type Examination Certificate / IECEX Certificate of Conformity in respect of each equipment / component in the form of demand draft drawn in favour of Chief Controller of Explosives, Nagpur payable at Nagpur.
3. Performance reports from the actual user of the equipment like Refinery, Petroleum Installation/Depot/Terminals, Petroleum Storage Sheds or Retail Outlets covered under Petroleum Rules and LPG Bottling Plants/Gas filling plants, ALDS/CNG installations licensed under Rules implemented by PESO. (In case the manufacturer has supplied Ex equipment to other vendor, who used such component/equipment in his system/package apparatus and supplied to the actual user then the performance report of user and actual supplier to be submitted along with performance certificate of system provider).
4. Supplementary EC type Examination Certificates issued after original/Base Certificates, or subsequent issues of the IECEX Certificate of Conformity shall be furnished, in compliance to Harmonized International Standards along with a copy of Production Quality Assurance Notification and EC type Declaration of Conformity of the manufacturer / & QAR etc. as provided under ATEX/IECEX System of Certification..

If the revised test certificates & Performance Reports are found in compliance to the requirements, a revalidation approval will be issued indicating new Standards & recent Test Certificate of such equipment.

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