

Approval of Ex(Electrical) Apparatus for use / installation in the Hazardous Areas

Requirement under Rule 102 of the Petroleum Rules, 2002 lays down that no electrical wiring shall be installed and no electric 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.

As per Rule 22 of the Gas Cylinders Rules, 2016 and Rule 31 of the Static and Mobile Pressure Vessels (Unfired) Rules, 2016 the premises for filling & storing flammable gas(es) in cylinders or storing flammable gases in pressure vessel, the Ex Electric Apparatus installed shall be of the type approved by the Chief Controller of Explosives.

The Composite CNG dispensing unit & CNG dispenser shall be of the type approved by the Chief Controller of Explosives as per Condition 1(b) and 8 of the license FORM G issued under the Gas Cylinders Rules, 2016. Auto LPG and Auto LNG dispenser shall be of the type approved by the Chief Controller of Explosives as per Rule 29 of the Static and Mobile Pressure Vessels (Unfired) Rules, 2016.

In this context for the above, electric apparatus which has to be used in an hazardous area covered under Petroleum Rules, 2002 or Gas Cylinders Rules, 2016 or Static and Mobile Pressure Vessels (Unfired) Rules, 2016 shall require approval from the Chief Controller of Explosives.

For the purpose of installation of electric apparatus, 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 e.g., inside the tank.
- ii. Zone—1 area where inflammable gas and vapours are expected to be present under normal operating conditions e.g., 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 e.g., during the failure or rupture of the equipment.

The extent of the hazardous area for petroleum refinery / processing plant storage installation, storage shed and service station 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 –

1. **Flameproof protection:** -In this type of protection the enclosure which houses the electric apparatus 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.
2. **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.

3. **Pressurised protection:** -In this type of protection the pressure inside the enclosure housing the electric apparatus 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.
4. **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 electric apparatus and the explosive atmosphere.
5. **Increased safety type of protection:** - This type of protection is achieved by adopting measures in the design and manufacture of electric 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 as also to be borne in mind.
6. **Non sparking or Restricted Breathing or or 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
7. **Oil Immersion:** - When an electric apparatus 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 electric apparatus i.e. oil/liquid acts as a barrier between them .
8. **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 propagation of flame from interior of the layer to explosive atmosphere present above the surface of filling material. Such protection can even prevent flame propagation 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,

Group I–Methane

Group II is sub divided into three types, viz IIA, IIB, IIC

IIA	represents Propane
IIB	represents Ethylene
IIC	represents Acetylene
IB+H ₂	represent Ethylene + Hydrogen

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 electric apparatus 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 ELECTRIC APPARATUS FOR USE IN HAZARDOUS AREAS

Most Important:- Only those electric Apparatus / Instruments / Fittings (generally denoted by Ex Equipments) finding application / use in hazardous areas of petroleum refineries / Installations / Terminals and other licensed premises covered under Petroleum Rules, 2002 ,Gas Cylinders Rules, 2016 and SMPV(U) Rules 2016 are only be considered for approval by Chief Controller of Explosives, Nagpur.

It is also mandatory to install CCE approved electric apparatus in the licensed premises where storage, filling and dispensing of flammable gases like LPG, LNG, CNG, CBG, Hydrogen, Acetylene and other hazardous gases and chemicals are used, as mandated in respective statutory Rules.

The selection of Ex-Electrical Apparatus shall be as per equipment protection level (EPL) as defined in IS 16724:2018 / IEC 60079-14 or IEC 60079-14.

Requirement of documents for approval of —Ex Electric Apparatus is based on type i.e. whether the equipment is manufactured **indigenously** in India or **imported** in India.

Documents required for approval for indigenously manufacturing

1. Online application form indicating name of the firm, correspondence address, manufacturing address and details of the Ex Electric Apparatus duly signed (*name, designation of the signatory along with seal of firm*).
2. Profile of the manufacturer including documentary evidence of the company such as:
 - a. Certificate of Incorporation issued by Registrar of Companies or
 - b. FORM G issued by Registrar of Firms and Registered Partnership deed or
 - c. Declaration on non judicial stamp paper stating that the firm is a proprietorship firm duly notarized along with PAN, TAN and GST Certificate
3. Test report issued by Indian test laboratory recognized by the Chief Controller of Explosives and valid copy of BIS license (*only for Ex Electric Apparatus having flameproof type protection*) or IECEx Certificate of Conformity, valid copy of IECEx Quality Assessment Report (*summary*) and IECEx Test Report.
4. General assembly drawing of the electric apparatus duly vetted by the test laboratory.
5. Technical details of the electric apparatus indicating working of the electrical apparatus, zone of installation, gas group, temperature and other relevant information.
6. Details of manufacturing facilities available for manufacturing / assembly of electric apparatus including machinery, equipment, instruments for manufacturing and quality control.
7. List of technically trained personnel for manufacturing, quality control and after sales service.

8. Declaration that equipment has not been installed in hazardous premises as per standard format (*Standard format is available on PESO's online application portal*).
9. Scrutiny fee of Rs 2000 per type / model /safety marking of the electrical apparatus. Maximum 5 nos of equipments with different test certificate is only being allowed in one online application.

Documents required for approval for electrical apparatus imported in India

1. Online application form indicating name of the firm, correspondence address, manufacturing address and details of the Ex Electric Apparatus duly signed (*name, designation of the signatory along with seal of firm*).
2. Profile of the Indian distributor / sister concern / service provider and documentary evidence of the company such as:
 - a. Certificate of Incorporation issued by Registrar of Companies or
 - b. FORM G issued by Registrar of Firms and Registered Partnership deed or
 - c. Declaration on non judicial stamp paper stating that the firm is a proprietorship firm duly notarized along with PAN, TAN and GST Certificate
3. Test report issued by Indian test laboratory recognized by the Chief Controller of Explosives and valid copy of BIS license or
IECEX Certificate of Conformity, valid copy of IECEX Quality Assessment Report (*summary*) and IECEX Test Report. or
EU Type Examination Certificate (*Applicable for manufacturers having manufacturing locations in countries covered under the European Union*), valid copy of Production Quality Assessment / Assurance Notification.
4. General assembly drawing of the electrical apparatus duly vetted by the test laboratory.
5. Technical details of the electric apparatus indicating working of the electrical apparatus, zone of installation, gas group, temperature and other relevant information.
6. List of technically trained personnel vetted by the principal manufacturer for quality control and after sales service present in India, working with Indian distributor / sister concern / service provider and duly trained by the principal manufacturer. (*Minimum 5 personnel*)
7. A letter of authorization by original equipment manufacturer / principal manufacturer addressed to the Chief Controller of Explosives, authorizing the Indian distributor / sister concern / service provider to apply and obtain approval on their behalf. The authorized representatives shall specify the name and designation below the signature along with the seal affixed.

The Indian distributor / sister concern shall have its own set up for providing after sales service, technical support, repairs, supply of spares, etc. Outsourcing of any of the facilities is not permitted.

8. A bi-party service agreement between the original equipment manufacturer / principal manufacturer and Indian distributor/ service provider indicating set up of the Indian distributor / service provider in India, qualified and trained technical service team assigned with responsibilities of initial installation / commissioning of the electric apparatus as well as post sales, technical back-up, repair, maintenance & supply of original spares etc.

The bi-party service agreement shall be signed by authorized representatives of principal manufacturer as well as Indian distributor. The authorized representatives shall specify name and designation below the signature along with seal affixed. The service agreement shall be valid for minimum five years.

9. Declaration that equipment has not been installed in hazardous premises as per standard format (*Standard format is available on PESO's online application portal*).
10. Scrutiny fee of Rs 2000 per type / model / safety marking of the electric apparatus. Maximum 5 nos of equipments with different test certificate is only being allowed in one online application.

Acceptable standards for approval:

Sr No	BIS Standards	IEC Standards	EN Standards*	Description
1	IS/IEC 60079-0:2017	IEC 60079-0:2017	EN IEC 60079-0:2018	Equipment—General Requirements
2	IS/IEC 60079-1:2014	IEC 60079-1:2014	EN 60079-1:2014	Equipment Protection by Flameproof Enclosures "d"
3	IS/IEC 60079-2:2014	IEC 60079-2:2014	EN 60079-2:2014, EN 60079-2:2014/AC:2015	Equipment protection by Pressurized enclosure "p"
4	IS/IEC 60079-5:2015	IEC 60079-5:2015	EN 60079-5:2015	Equipment protection by Powder filling "q"
5	IS/IEC 60079-6:2015	IEC 60079-6:2015	EN 60079-6:2015	Equipment protection by Liquid immersion "o"
6	IS/IEC 60079-7:2017	IEC 60079-7:2015	EN 60079-7:2015 EN IEC 60079 7:2015/A1:2018	Equipment protection by Increased safety "e"
7	IS/IEC 60079-11:2011	IEC 60079-11:2023 IEC 60079-11:2011	EN 60079-11:2012	Equipment Protection by Intrinsic Safety "i"
8	IS/IEC 60079-15:2017	IEC 60079-15:2017 IEC 60079-15:2010	EN 60079-15:2010	Equipment Protection by Non Sparking "n"
9	IS/IEC 60079-18:2014	IEC 60079-18:2014	EN 60079-18:2015, EN 60079- 18:2015/A1:2017	Equipment protection by Encapsulation "m"
10	IS/IEC 60079-25:2020 IS/IEC 60079-25:2010	IEC 60079-25:2020	EN60079-25:2010, EN 60079- 25:2010/AC:2013	Intrinsically safe electrical Systems

11	IS/IEC 60079-26:2021	IEC 60079-26:2014	EN 60079-26:2015	Equipment with Equipment Protection Level (EPL) Ga
12	IS/IEC 60079-28:2015	IEC 60079-28:2015	EN 60079-28:2015	Protection of equipment and transmission systems using optical radiation
13	IS/IE C60079-29: Sec 1:2016	IEC 60079-29-1:2016	EN 60079-29-1:2016	Gas detectors Section 1 Performance Requirements of Detectors for Flammable Gases
14	IS/IEC 60079-29: Sec 4:2009	IEC 60079-29-4:2009	EN 60079-29-4:2010	Gas detectors: Sec 4 performance requirements of open path detectors for flammable gases
15	IS/IEC/IEEE 60079-30: Sec 1:2015	IEC/IEEE 60079-30-1: 2015	EN 60079-30-1:2017	Electrical Resistance Trace Heating Section 1 General and testing requirements
16	IS IS/IEC / TS 60079- 46 : 2017	IEC TS 60079-46 : 2017		Assembly of electrical components only

*(Applicable for manufacturing units located in the countries covered under European Union)

Assembly of Ex Electric Apparatus

Ex electric apparatus pre-manufactured with combination of individual Ex-electrical components, together with other parts as necessary, that are electrically or mechanically interconnected or that are pre-assembled prior to being placed into service at the end-user site, or that can be disassembled and then re-assembled at the end-user site may be considered for approval subject to condition that:-

The assemblies shall be covered under IECEx Certificate of Conformity or test report issued by testing laboratories recognized by the Chief Controller of Explosives and conform to combination of any of the latest standards as mentioned above. (Note: IS/IEC / TS 60079-46 and IEC TS 60079-46 standards are optional).

Vaporizers for liquefiable gas shall be approved under the Static & Mobile Pressure Vessels (Unfired) Rules, 2016 and electrical components used in it shall be of the type approved by the Chief Controller of Explosives.

Composite CNG dispensing Units and Portable Service Station shall be approved under the Gas Cylinders Rules, 2016 and the Petroleum Rules, 2002 respectively. The electrical components used in the assembly shall be of the type approved by the Chief Controller of Explosives.

Fuel Dispensers In case approval is sought for dispensers following additional documents to be submitted

1. EU Type Examination Certificate conforming the fuel dispenser (*petrol/ diesel / ethanol / other blends as notified by MoRTH*) to EN 13617-1: 2012 or EN 13617-1: 2021 along with

list of approved Ex electrical components duly endorsed by the notified body issuing EU Type Examination Certificate as well as a valid copy of Production Quality Assurance / Assessment Notification.

2. Third Party Audit Report issued by PESO approved Ex electrical testing Laboratory or IECEx Testing Body providing clause wise compliance of:
 - a. Clause 11 of ISO 16923: 2016 in case of CNG dispenser
 - b. EN 14678-1:2013 in case of Auto LPG dispenser.
 - c. Clause 10 of EN ISO 16924: 2018 in case of LNG dispenser.
 - d. Clause 8 of ISO 19880-1: 2020 in case of Hydrogen dispenser.
Auto LPG, LNG and Hydrogen dispenser shall also conform to the relevant provisions of the Static & Mobile Pressure Vessels (Unfired) Rules, 2016.
3. Scrutiny fees of Rs 2000 per component and additional Rs 2000 for entire assembly in case of fuel dispensers.

Application submission:

- ❖ All the documents and drawings to be submitted online only as a legible, readable and searchable PDF documents.
- ❖ All the applications and compliance to the discrepancies to be submitted through National Single Window Portal.
- ❖ After expiry of the current approval, fresh approval may be obtained by the manufacturer subject to condition that the apparatus conforms to latest standards as mentioned above. No renewal or re- validation will be issued.
- ❖ The link to access the portal is <https://www.nsws.gov.in/>
- ❖ In case of any difficult or doubt regarding online application submission, please contact on following:

<https://www.nsws.gov.in/contact-us>
support.ol@explosives.gov.in
1800-233-9011.