



شماره پیمان:  ۰۵۳ - ۰۷۳ - ۹۱۸۴	SPECIFICATION FOR HAZARDOUS AREA CLASSIFICATION							شماره صفحه: ۱ از ۱۳
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## نگهداشت و افزایش تولید میدان نفتی بینک



D03	JAN.2022	AFD	A.H.Saber	M.Fakharian	M.Mershad	
D02	OCT. 2021	IFA	E.Sadeghi	M.Fakharian	M.Mershad	
D01	SEP. 2021	IFA	M.Asgharnejad	M.Fakharian	Sh.Ghalikar	
D00	JUL. 2021	IFC	M.Asgharnejad	M.Fakharian	Sh.Ghalikar	
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**Class: 2**

**CLIENT Doc. Number:**

**Status:**



**IDC: Inter-Discipline Check**  
**IFC: Issued For Comment**  
**IFA: Issued For Approval**  
**AFD: Approved For Design**  
**AFC: Approved For Construction**  
**AFP: Approved For Purchase**  
**AFQ: Approved For Quotation**  
**IFI: Issued For Information**  
**AB-R: As-Built for CLIENT Review**  
**AB-A: As-Built –Approved**

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## 1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

### GENERAL DEFINITION

The following terms shall be used in this document.



CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – General Facilities
GENERAL CONTRACTOR (GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of : Hirgan Energy – Design & Inspection(D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.
THIRD PARTY INSPECTOR (TPI):	The firm appointed by EPD/EPC CONTRACTOR(GC) and approved by CLIENT (in writing) for the inspection of goods.
SHALL:	Is used where a provision is mandatory.
SHOULD:	Is used where a provision is advisory only.
WILL:	Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR.
MAY:	Is used where a provision is completely discretionary.

## 2.0 SCOPE

This specification gives amendment and supplement to IPS-E-SF-100, "Engineering standard for CLASSIFICATION OF FIRES AND FIRE HAZARD PROPERTIES" in this project.

It shall be used in conjunction with data/requisition sheets for present document subject.

This Engineering Standard covers the general features and rules and minimum requirements for

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extinguishing fires in the related industries. Fire hazards, occupancy hazards, extinguishing methods, hazard identifications and classification etc. are also discussed.

### 3.0 NORMATIVE REFERENCES

#### 3.1 LOCAL CODES AND STANDARDS



No amendments or supplements are to state.

#### 3.2 INTERNATIONAL CODES AND STANDARDS

- API 500 Recommended practice for classification of locations for electrical installations at petroleum facilities classified as class I, division 1 and division 2.
- API-PR-505 Recommended practice for classification of locations for electrical installations at petroleum facilities classified as Class I, Division 1, Zone 0, Zone 1, Zone 2 first edition R(2002)
- GS-SAF-216 "Total" Standard for Area classification
- GS-SAF-253 "Total" Standard for Impacted area, restricted area and Fire zones
- IEC 60079 Electrical Apparatus for Explosive Gas Atmospheres
- BS-EN 13463 Non-electrical equipment for use in potentially explosive atmospheres
- IPS-E-EL-110 Engineering Standard for Hazardous Area- Second Revision

#### 3.3 THE PROJECT DOCUMENTS

- BK- W007S -PEDCO-110-SA-LI-0001 Hazard Source List – Extension of Binak B/C Manifold
- BK- W007S -PEDCO-110-SA-LI-0002 Hazard Source List – W007S
- BK-W018S-PEDCO-110-SA-LI-0001 Hazard Source List – W-018S
- BK-W046S-PEDCO-110-SA-LI-0001 Hazard Source List – W046S
- BK-W028-PEDCO-110-SA-LI-0001 Hazard Source List – W028
- BK-W035-PEDCO-110-SA-LI-0001 Hazard Source List – W035
- BK-W008N-PEDCO-110-SA-LI-0001 Hazard Source List – W008N
- BK-PPL-PEDCO-320-SA-LI-0001 Hazard Source List – (Pipeline)
- BK-GCS-HD-120-SA-LI-0001 Hazard Source List – (Gas Compressor)

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### 3.4 ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No. BK-GNRAL-PEDCO-000-PR-DC-0001".

### 4.0 UNITS

No amendments or supplements are to state.

### 5.0 CLASSIFICATION OF FIRES

No amendments or supplements are to state.

### 6.0 CLASSIFICATION OF HAZARDS

No amendments or supplements are to state.

### 7.0 CLASSIFICATION OF OCCUPANCY HAZARDS

No amendments or supplements are to state.

### 8.0 CLASSIFICATION OF CONSTRUCTION

No amendments or supplements are to state.

### 9.0 ELECTRICAL AREA CLASSIFICATION, EXTENT AND METHODS OF SAFEGUARDING OF ELECTRICAL INSTALLATION IN HAZARDOUS AREAS IN OIL, GAS AND PETROCHEMICAL INDUSTRIES



#### 9.2 AREA CLASSIFICATION PROCEDURE (ADD)

Area Classification should be carried-out by persons who have a good knowledge of the properties of the flammable materials used in the installation, of the processes and of the environment of the installation to be classified.

For new projects it is recommended that Area Classification is conducted by a senior safety engineer assisted by a process engineer. For the modifications of an existing installation the team should include a member of the operating crew. It should be noted that although the results of Area Classification have direct implications on the selection of the electrical apparatus, knowledge in electrical matters is not a must for conducting or participating to an Area Classification exercise.

The area classification shall be done in three steps:

- 1) Identify the sources of release. Determine and record their basic characteristics for area classification. All the sources of release in the installation shall be analyzed. Their

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characteristics shall be recorded in a data base which shall contain all the information requested in Hazard Source List.

- 2) Study how to reduce the risk through design improvements. Consider reducing the number and grades of the releases and optimize the equipment layout wherever possible to decrease the risk of ignition (e.g. pertinent grouping of equipment, optimization of ventilation, consideration of buoyancy).
- 3) Prepare/modify the hazardous area drawings; draw the envelopes of the zones.

The segregation of ignition sources and flammable inventories shall be achieved in the design through the classification of hazardous areas. This shall be undertaken in accordance with the Institute of Petroleum's Area Classification Code for Installations Handling Flammable Fluids (IP 15).

This exercise shall classify the process into hazardous areas of progressively decreasing risk of flammable atmospheres based on the following zones:

Zone 0 – hazardous areas in which a flammable atmosphere is continuously present or present for long periods of time.

Zone 1 – hazardous areas in which a flammable atmosphere is likely to occur in normal operation.

Zone 2 – hazardous areas in which a flammable atmosphere is not likely to occur in normal operation and, if it occurs, will exist only for a short period of time.

Throughout this specification, the zones are represented as follows:



PREFERRED SYMBOLS FOR THE ZONES OF A HAZARDOUS AREA

Fig. 4



Note:

According to IEC standard 79.10

\* IP use symbol for Zone '0'

Zone 0



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Zone 1



Zone 2



Safe Areas (Non-Hazardous Areas) – areas that do not fall into any of the above categories. Field equipment that is required to operate under emergency conditions (e.g. ESD) shall be suitable for use within Zone 1 – Apparatus Group IIB / IIA. Such equipment includes the emergency lighting, PA system (speakers and call stations outside safe area) and fire and gas detectors.

### 9.3 CHARACTERISTICS OF PETROLEUM FLUIDS (ADD)

For Area Classification in petroleum installations, the classification of petroleum fluids shall be done in two steps, first in classes then in categories:

- The Class of liquid hydrocarbons relates to their flash point and handling temperature at actual storage or process conditions.
- The Category is derived from the class and indicates to which extent a fluid on release can form a flammable mixture with air. This is a determining factor in the calculation of the hazard radius.



A liquid shall only give rise to a flammable vapor if it is at temperature above its flash point. Fluids with a flash point below 60°C or at a temperature above their flash points are hazardous.

### 9.4 FLUID CATEGORIES (ADD)

#### RELATION BETWEEN “T” (TEMPERATUR) CLASS AND INTERNATIONAL STANDARDS (IPS-E-EL-110)

MAX. SURFAC TEMPERATURE IN DEGREE CENTIGRADE	IEC60079-0 PART”0”	CENELEC EN,60079-0	UL 698
450	T1	T1	T1
300	T2	T2	T2
280	-	-	T2A
260	-	-	T2B
230	-	-	T2C
215	-	-	T2D
200	T3	T3	T3



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180	-	-	T3A
165	-	-	T3B
160	-	-	T3C
135	T4	T4	T4
120	-	-	T4A
100	T5	T5	T5
85	T6	T6	T6



**GROUPING AND CLASSIFICATION OF ELECTRICAL APPARATUS IN DIFFERENT COUNTRIES (IPS-E-EL-110)**

CENELEC EN 60079	IEC 60079	USA NATIONAL ELECTRICAL CODE (Class 1)	TYPICAL GLASS AND VAPORS
IIA	IIA	D	ETHANE, PROPANE, BUTANE, PENTANE, HEXANE, HEPTANE, OCTANE, NONANE, DECANE, ACETIC ACID, ACETONE, METHANOL, TOLUENE, ETHYLACETATE
IIB	IIB	C	ETHYLENE, COKE OVEN GAS, DIMETHYL ETHER, DIETHY-LETHYR, ETHYLENE OXIDE
IIC	IIC	B	HYDROGENE
			CARBON DISULPHIDE
		A	ACETYLENE
			ETHYL NITRATE

CAT.	DEFINITION
<b>G</b>	Flammable gas or vapor.
<b>A</b>	Any flammable liquid that, on release, will vaporize rapidly or substantially. Includes LPG and lighter flammable liquids e.g. LNG. Also includes any flammable liquid at a temperature sufficient to produce, on release, more than 40% vaporization with no heat input other than from the surroundings.
<b>B</b>	Any flammable liquid, not in Category A, but at a temperature sufficient for boiling to occur on release.
<b>C</b>	Any flammable liquid, not in Category A or B, but which can be at a temperature above its flash point or form a flammable mist, on release.

**9.4.1. EXTENSION OF ZONES**

Process facilities should be designed such that, as far as practicable, no area is classified

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SPECIFICATION FOR HAZARDOUS AREA CLASSIFICATION																										
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D03	0002	SP	SA	000	PEDCO	GNRAL	BK																			

as Zone 1. This, however, does not preclude any additional steps that may be necessary to control the ignition hazards for large gas release events, e.g. gas detection and tripping of non-Zone 1 rated equipment. The facilities shall be classified according to the degree of hazard present and the probability of flammable gases and liquids being released.

All equipment that is sited outdoors within the hazardous areas shall be certified suitable for Zone 1 – Apparatus Group IIB/ IIA – Temperature Class T3, as a minimum. Electrical equipment and instrumentation is required to remain functional after an emergency shutdown.

Battery room (or other places that hydrogen may present) is classified as zone 1, group IIC, class T3, taking into account that adequate ventilation is provided. In the event of ventilation failure in the battery room (or other places that hydrogen may present), they are classified as zone 1, group IIC or IIB3+H<sub>2</sub>; class T3, so electrical equipment not suitable for zone 1 will be isolated.

As per client recommendation, all electrical equipment inside the battery room should be Exd II C T3 explosion proof.



IPS-E-EL-100 recommends 12 air changes per hour, or suggests that hydrogen concentration levels are kept below 1% to avoid the risk of explosion. This air change should be done by explosion proof fans.

Laboratory is not classified as hazardous locations for electrical installations. Only extraction fan of air exhaust system will be designed for zone 1, group IIB/ IIA, class T3.

Fixed equipment shall be located in non-hazardous areas. Plant roads that are around the perimeter of plots will be in non-hazardous areas and only authorized traffic will be allowed to enter the plant location.

During the course of area classification particular attention shall typically be given to the following:

- Location of equipment air intakes and exhausts
- Fuel lines in non-hazardous areas
- Cold vents
- Elevated pipework
- Chemical storage
- Battery storage

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	BK	GNRAL	PEDCO	000	SA	SP	0002	D03	

- Isolated flanges on hydrocarbon lines
- Ventilation and pressurization of buildings
- Drains
- Flare
- Relief valves



#### 9.4.2. NON HAZARDOUS AREAS

An area in which a flammable gas / air mixture is not expected to be present and which can form part of a general restricted area within the facility in which all operations (routine or unusual) are carried out under documentary control.

The following areas shall be defined by design, as "non-hazardous" either by location, ventilation or positive pressurization by "HVAC" system.

- a) Ventilation and Pressurization;
  - Control Rooms;
  - Electrical Substation;
  - Offices & Workshop;
  - Battery Rooms (special consideration shall apply owing to battery venting and possible H<sub>2</sub> generation.
  - Negative pressurization by reference to indoor pressure to be considered for Laboratory;
- b) Location;
  - Fire Pumps;
  - Emergency Generator;
  - Main Generator ( if any);
  - Work Shop;
  - Store Room (Ware-houses).

Electrical equipment installed in a hazardous area shall be suitable for use in the appropriate classified area and shall comply:

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- With the requirements of IEC 60079 or equivalent standard.
- Be certified by a recognized national or international authority e.g. BASEEFA (British Approvals Service for Electrical Equipment in Flammable Atmospheres (UK; product standards organization)) or other CENELEC (European Committee for Electro technical Standardization) approved testing authority.

All mechanical equipment installed in hazardous areas shall be of a type which will ensure that hot surfaces are insulated, is non-sparking and adequately protected against the generation of a static charge. Non Electrical equipment used within hazardous areas shall comply with EN 13463.

Vehicles and mobile equipment that constitute a potential ignition source shall be prohibited from the hydrocarbon storage areas and process units, unless suitably protected and specifically authorized.

To minimize the classification of a hazardous area, adequate ventilation is necessary. In unrestricted open areas a natural airflow across the area is sufficient. In enclosed or sheltered areas, forced ventilation is likely to be required to prevent accumulations of significant quantities of gas-air mixtures above (25% LEL) one quarter of their lower flammable limit.

Hazardous area classification drawings for the Binak will be prepared and will show the Hazardous Areas in plan view and shall include the following information:



- Identification of sources of release;
- All ventilation inlets and outlets;
- Air intakes and exhausts of all internal combustion machinery;
- Location of all equipment units;
- Tank or process vents; and
- The classification and extent of all hazardous zones.

## 10.0 BASIC METHOD OF FIRE FIGHTING

Not applicable in this project.

## 11.0 PRINCIPLES OF FIRE PROTECTION

Not applicable in this project.

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	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	GNRAL	PEDCO	000	SA	SP	0002	D03	

## 12.0 FIRE HAZARD PROPERTIES

No amendments or supplements are to state.

## 13.0 EXTINGUISHING METHODS

Not applicable in this project.

## 14.0 SUGGESTED HAZARD IDENTIFICATION

No amendments or supplements are to state.

## 15.0 OXYGEN MIXTURES

Not applicable in this project.

## 16.0 MISTS AND FROTHS

Not applicable in this project.

## 17.0 FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES AND VOLATILE SOLIDS

Not applicable in this project.