

**ENGINEERING, CONSTRUCTION**

**AND**

**MATERIAL STANDARD**

**FOR**

**FENCING AND GATES**

**ORIGINAL EDITION**

**MAY 1997**

**This standard specification is reviewed and updated by the relevant technical committee on Jul. 2002(1) and Dec. 2012(2). The approved modifications are included in the present issue of IPS.**

**FOREWORD**

The Iranian Petroleum Standards (IPS) reflect the views of the Iranian Ministry of Petroleum and are intended for use in the oil and gas production facilities, oil refineries, chemical and petrochemical plants, gas handling and processing installations and other such facilities.

IPS are based on internationally acceptable standards and include selections from the items stipulated in the referenced standards. They are also supplemented by additional requirements and/or modifications based on the experience acquired by the Iranian Petroleum Industry and the local market availability. The options which are not specified in the text of the standards are itemized in data sheet/s, so that, the user can select his appropriate preferences therein.

The IPS standards are therefore expected to be sufficiently flexible so that the users can adapt these standards to their requirements. However, they may not cover every requirement of each project. For such cases, an addendum to IPS Standard shall be prepared by the user which elaborates the particular requirements of the user. This addendum together with the relevant IPS shall form the job specification for the specific project or work.

The IPS is reviewed and up-dated approximately every five years. Each standards are subject to amendment or withdrawal, if required, thus the latest edition of IPS shall be applicable

The users of IPS are therefore requested to send their views and comments, including any addendum prepared for particular cases to the following address. These comments and recommendations will be reviewed by the relevant technical committee and in case of approval will be incorporated in the next revision of the standard.

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**GENERAL DEFINITIONS**

Throughout this Standard the following definitions shall apply.

**COMPANY :**

Refers to one of the related and/or affiliated companies of the Iranian Ministry of Petroleum such as National Iranian Oil Company, National Iranian Gas Company, National Petrochemical Company and National Iranian Oil Refinery And Distribution Company.

**PURCHASER :**

Means the "Company" where this standard is a part of direct purchaser order by the "Company", and the "Contractor" where this Standard is a part of contract document.

**VENDOR AND SUPPLIER:**

Refers to firm or person who will supply and/or fabricate the equipment or material.

**CONTRACTOR:**

Refers to the persons, firm or company whose tender has been accepted by the company.

**EXECUTOR :**

Executor is the party which carries out all or part of construction and/or commissioning for the project.

**INSPECTOR :**

The Inspector referred to in this Standard is a person/persons or a body appointed in writing by the company for the inspection of fabrication and installation work.

**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 the "Company" rather than by a contractor, supplier or vendor.

**MAY:**

Is used where a provision is completely discretionary.

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**1. SCOPE**

This Standard covers the minimum mandatory requirements for material, design and construction of appropriate types of fencing to be used at Major oil Industry's installations, consisting of masonry, corrugated sheet, open pale and chain link fencing in accordance with sensitivities of locations.

**Note 1:**

**This standard specification is reviewed and updated by the relevant technical committee on July 2002. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No 168 on July 2002. These modifications are included in the present issue of IPS.**

**Note 2:**

**This standard specification is reviewed and updated by the relevant technical committee on Dec. 2012. The approved modifications by T.C. were sent to IPS users as amendment No. 2 by circular No 375 on Dec. 2012. These modifications are included in the present issue of IPS.**

**2. REFERENCES**

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

**BSI (BRITISH STANDARDS INSTITUTION)**

BS 1722: Part 1: 1986	"Fences/Specification for Chain Link Fences"
BS 1722: Part 10: 1990	"Fences/Specification for Anti-Intruder Fences in Chain Link and Welded Mesh"
BS 1722: Part 12: 1990	"Fences/Specification for Steel Palisade Fences"
BS 5628: Part 3: 1985	"Materials and Components, Design and Workmanship"

**ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIAL)**

ASTM-A 121-86	"Specification for Zinc-Coated (Galvanized) Steel Barbed Wire"
ASTM-A 392-84	"Specification for Zinc-Coated Steel Chain-Link Fence Fabric"
ASTM-A 641-82	"Specification for Zinc-Coated (Galvanized) Carbon Steel Wire"

**AWS (AMERICAN WELDING SOCIETY)**

AWS D1.1-90	"Structural Welding Code-Steel"
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**IPS (IRANIAN PETROLEUM STANDARDS)**

<a href="#">IPS-C-CE-200</a>	"Construction Standard for Concrete Structures"
<a href="#">IPS-E-GN-100</a>	"Engineering Standard for Units"
<a href="#">IPS-M-CE-105</a>	"Material Standard for Building Materials"
IPS-D-CE-300	"Typical Chainlink Fencing (Type 1)"
IPS-D-CE-301	"Typical Chainlink Fencing (Type 2)"
IPS-D-CE-302	"Typical Chainlink Fencing (Type 3)"
IPS-D-CE-303	"Typical Chainlink Fencing (4.80 & 1.20 Meter Wide)"

**3. UNITS**

This Standard is based on International System of Units (SI), as per [IPS-E-GN-100](#) except where otherwise specified.

**4. GENERAL DESCRIPTION**

Fencing is intended to provide safe boundary limits at houses and industrial facilities in order to prevent hazardous intrusion of animal, vehicles and people. In those locations where greater protection from trespass and vandalism is required, specially where there is vulnerable equipment or dangerous situation could exist for the intruder, masonry and corrugated sheet type of fencing should be employed, on the other hand at locations with light security provision, open pale type and chainlink fencing should be utilized.

In this Standard for security reasons, the facilities are classified as follows:

- 1) Sensitive installation areas;
- 2) Semi-sensitive installation areas;
- 3) Offices and residential areas.

The appropriate type of fencing to be used at above areas are respectively:

- 1) Masonry and Corrugated sheet security fencing (decided by AR\*).
- 2) Open Pale security fencing (decided by AR\*).
- 3) Chain link fencing Type 1, 2, 3 (see Std. Drwg. IPS-D-CE-300,301,302).

**5. MATERIALS**

Materials for all types of fencing shall be new. Damaged material should not be used. All material should be capable of meeting the requirements of Iranian Petroleum Standards for Building Materials ([IPS-M-CE-105](#)).

Shapes and sizes of fencing materials are shown in Standard Drawings IPS-D-CE-300, 301 and 302.

**6. DESIGN**

Chain link, open pale and corrugated sheet fencing should be designed under the Guard Regulations and AR\* decisions with respect to sensitivity of installations. The designer shall select the proper standard drawing complying with the following requirements:

**6.1 Posts**

The length of line posts, end and corner posts shall allow for a post setting depth of about minimum 0.5m into concrete footings:

- Line post spacing shall not exceed 3 m.
- End and corner posts shall be braced.
- Caps shall be provided on tubular posts which are not fitted with barbed wire arms.

**6.2 Fabric**

- The bottom of the fabric shall be within 50 mm of finished grade.
  - a) To posts: 350 mm centers.
  - b) To tension wire: 600 mm centers.

Tension wire shall be furnished at the top and bottom of the fabric. Fabric shall be installed on the designated "Security Side" of fencing.

**6.3 Barbed Wire**

Barbed wire installations, where required, shall be as follows:

- a) Extension arms shall be installed at 45 degrees for type 2 and 5 degree for type 1 on the top of each line and corner post to support the barbed wire.
- b) Each arm shall have equally spaced slots to hold the strands by means of lugs or stitch wire at a maximum of 150 mm center spacing.
- c) The topmost barbed wire shall be 300 mm above the fabric and 300 mm from the fence line.
- d) The extension arms shall be capable of withstanding, without failure, minimum 135 kg downward pull at the outermost end of the arm.

**6.4 Pales**

Pales shall be secured to rail at every intersection by the welding method. It shall consist of 3 mm fillet welds at least 30 mm long on each side of pale.

**6.5 Rails**

Open pale and corrugated sheet security fences shall have two horizontal rails of angle section as given in Table 1. The oversail from the center of upper rail fixing to the top of pales and the oversail from the center of lower rail fixing to the bottom of the pale shall be as given in Table 1.

**TABLE 1 - BASIC DIMENSION FOR SECURITY FENCES WITH POST AT 2.75 m IN CENTERS**

POST HEIGHT m	POST SECTION	RAIL SECTION	TOP OVERSAIL	BOTTOM OVERSAIL
3.00	IPE 12	L 50 x 50 x 5	475 mm	380 mm

**6.6 Gates**

Gates shall be provided as specified on the standard drawings No. IPS-D-CE-260, 261 and 262. Standard gate sizes as shown below shall be used:

- Personnel Gates            Single Swing            1.2 m wide.
- Vehicular Gates            Double Swing            4.8 m wide.

Gates shall be designed to ensure a rigid framework allowing a minimum of sag in the open position. Gates shall be provided with heavy duty hinges that will permit 180° swing, 90° in each direction from close position. Gates shall be provided with drop bolts, slam plates and proper locking devices.

## 7. CONSTRUCTION

Different categories of construction activities shall be according to following requirements:

### 7.1 Erection

Erection of fencing shall be performed by competent workmen, experienced in industrial type fence erection.

**7.2** Particular care shall be exercised during fence erection so that no underground piping, cable or other appurtenances are touched or damaged.

**7.3** On completion of work, all excess and waste materials resulting from fence construction shall be removed from the site.

**7.4** Unless otherwise specified, the fence shall follow ground contour.

**7.5** Posts shall be accurately set to line and grade. Top of post footing shall be slope finished (crowned) to shed water.

**7.6** In case of chain link fences, the fabric shall be properly tensioned and securely fixed to posts and rails or tension wires by means of tie wires. Sags buckles, loose sections or improperly meshed fence shall not be accepted.

**7.7** Barbed wires shall be properly tensioned. Sagging shall not be allowed.

**7.8** Barbed wires shall be attached to extension arms in such a manner so that the barbed wires can not be bunched together or moved away from the fence top.

**7.9** Gates shall be fixed to swing freely without bending.

### 7.10 Welding

Welding shall conform to AWS D1.1 or other approved welding procedure by the jurisdiction of the AR\*.

### 7.11 Concrete Work

All concrete work shall conform to Iranian Petroleum Standard for Construction of Concrete Structures ([IPS-C-CE- 200](#)). Material should conform to [IPS-M-CE-105](#).

### 7.12 Rubble Masonry Work for Fences at Sensitive Installation Areas

This work shall consist of placing rock in cement mortar beds in such shapes and at such locations which is decided by the AR\*. Rock for rubble masonry shall be clean, hard, durable and free from seams or other imperfections. All weathered rock shall be rejected.

#### 7.12.1 Mortar

Mortar for bedding and pointing shall consist of one part by volume of Portland cement to 2 parts by volume of clean fine aggregate.

Unless otherwise permitted by the AR\*, mortar shall be mixed in mixing machine. If hand mixing of the mortar is permitted by the AR\*, the fine aggregate and cement shall be mixed dry in a tight box until the mixture assumes a uniform color, after which water shall be added as the mixing continues. Mortar shall be used within one hour after water has been added and shall not be retempered.

#### 7.12.2 Placing

Rock shall be thoroughly wetted before placing, and shall be laid in full mortar beds, in courses approximately horizontal both in longitudinal and transverse directions. Rocks will not be considered to be properly bedded until mortar exudes from the underside of bedded rocks.



### 7.12.3 Pointing

Within 24 hours after construction, the joints on all exposed faces shall be raked clear of loose mortar and pointed with the mortar specified in Clause 7.12.1 so that joints are recessed approximately 6 mm. The texture of recessed pointing shall match the texture of the rock used and in no case shall pointing be given a smooth finish. the wall shall be kept wet while the pointing is being done.

### 7.13 Brick Masonry Work for Fences at Sensitive Installation Areas

All brick masonry shall comply with BS 5628: Par 3: 1985, Section 4, Clause 31 "Batching, Mixing and Use of Mortars" and Clause 32 "Laying of Masonry Units".

Material should conform to [IPS-M-CE-105](#).

**AR\* = Authorized Representative of the Owner.**