

APPLICATION STANDARD

FOR

SAFETY BOUNDARY LIMIT

CONTENTS :	PAGE No.
0. INTRODUCTION	2
1. SCOPE	3
2. REFERENCES	3
3. DEFINITIONS AND TERMINOLOGY.....	3
4. UNITS	3
5. HYDROCARBON PRODUCTION AND PROCESSING PLANTS.....	4
5.1 Layout and Design.....	4
 APPENDICES:	
APPENDIX A	6
APPENDIX B	13

0. INTRODUCTION

0.1 Design for Safety

Efficiency and Safety in industrial operations can be greatly increased by careful planning of the location, design and layout of a new plant or an existing one in which major alteration are to be made. Numerous accidents, explosions and fires are preventable if suitable measures are taken right from the earliest planning stages.

The size, shape, type of buildings and structures, spacing, the nature of processes and materials, working conditions, chemical and physical properties of dangerous substances and their processing methods are the major factors to be considered.

It is always preferable that high hazard processes be located in small isolated buildings of limited occupancy or in areas away from hazard involved. Lower-hazard operations can justify larger unit.

0.2 Safe Distance Limits

Selection of safe distances from the possible hazards involves consideration of a number of factors; possible hazards to the community and their relationship to climate and other conditions, highly flammable materials (liquid and gases), amount of harmful substances, drainage and waste disposal. Plan for safety boundry limits should include all necessary safety precautions and each case shall be carefully studied and planned by competent engineers.

1. SCOPE

This Standard specifies minimum requirements for spacing of hydrocarbon production, gas and oil refineries, petrochemical complexes and safe distance of oil and gas wells to other production facilities, high tension elec. pole, roads and residential areas. This Standard is a guide line for normal operations but each special case shall be carefully studied considering all factors of possible hazards.

2. REFERENCES

Throughout this Standard, the following standards and codes are referred to. The editions of these standards and codes that are in effect at the time of publication of this Standard shall, to the extent specified herein, form a part of this Standard. The applicability of changes in standards and codes that occur after the date of this Standard shall be mutually agreed upon by the Company and the Vendor:

IPS-E-PR-190;
IPS-E-PR-470;
IPS-E-PR-480;
IPS-E-PR-800;
IPS-E-EL-110.

3. DEFINITIONS AND TERMINOLOGY

3.1 Blowdown Drums

A stock into which the contents of a unit are emptied in an emergency.

3.2 Rundown Tank

One of the tanks in which are received the condensate from the still agitators or other refinery equipment and from which the distillates are pumped to larger tanks known as work tanks or storage tanks. Rundown tanks are also known as "pans" or receiving tanks. If the condensate were received directly into the larger storage tank, the lubing of a still would contaminate unnecessary perhaps thousands of liters (barrels) of distillate.

3.3 Blending Tanks

A tank used for any mixture prepared for the special purpose "eg" the product of a refinery are blended to the such market.

4. UNITS

This Standard is based on International System of Units (SI), except where otherwise specified.

5. HYDROCARBON PRODUCTION AND PROCESSING PLANTS

5.1 Layout and Design

5.1.1 General safeguards

Spacing of equipment shall be in accordance with oil Insurance Association Appendix A, Tables 1 to 3 Attached. When the topography of the site is level, arrange drainage to minimize exposure of process areas to large spills. Otherwise, locate storage tanks at a lower elevation than process areas.

5.1.2 Storage tanks

The selection, design, construction, installation and testing, as well as fire protection, of storage tanks shall be in accordance with Appendix A, Tables A5, A6, A7.

5.1.3 Emergency shutdown system

a) Gas and Product Line Control Valves

High-pressure gas lines shall not pass through a process area or run within 30 m of important structures or equipment without shutdown valving to insure that portions of piping within the process area can be isolated from the main gas line and depressurized in the event of an emergency. However, extensive use of shutdown valves may not be needed, since the increased complexity of the system will require a greater degree of preventive maintenance if unwarranted shutdowns are to be avoided. Shutoff valves, sometimes known as "station isolation valves", shall be provided on all gas and product pipelines into and out of the plant. A bypass line with a normally shut valve may be required between plant inlet and discharge lines.

All station isolation valves-and bypass valves, if any should be located at a minimum distance of 75 m but not more than 150 m from any part of the plant operations. Care should be taken in locating these valves so they will not be exposed to damage by plant equipment or vehicular traffic.

b) Emergency Shutdown Stations

At least two remote emergency shutdown stations, located at a minimum distance of 75 m apart, shall be provided. Locate actuating points at least 30 m from compressor buildings and high-pressure gas lines. More than two shutdown stations may be required, depending on the size and complexity of a given plant. One of the actuating stations shall be located in the control room. It shall be distinctively marked and equipped with signs stating the proper method of actuation in the event of an emergency.

5.1.4 Wastewater separators

Wastewater separators handling hydrocarbons should be spaced at least 30 m from process unit equipment handling flammable liquids and 60 m from heaters or other continuous sources of ignition. Preferably, wastewater separators should be located downgrade of process equipment and tankage.

5.1.5 TEL blending plants

Tetraethyl Lead (TEL) blending plants should be spaced 30 m from process equipment handling flammable liquids and 45 m from fired heaters or other continuously exposed sources of ignition. Arrange to reduce any possibility of flammable liquids draining near the TEL plant.

5.1.6 Flares

Spacing of flares from process equipment depends on the flare stack height, flare load in pounds per hour and the allowable heat intensity at the equipment location. Flare locations should be at lower elevations than process areas, should be curbed to contain hydrocarbon carry-over, and should be at least 60 m from equipment containing hydrocarbons. Also, areas where personnel may be present and where the public has free access must be considered. For spacing requirements, refer to attached figures for oil and gas separation units. (See Appendix (B) Table 2).

The noise level should be as indicated in Table 6 of IPS-E-SF-900.

5.1.7 Blowdown drums

Blowdown drums are used for liquid relief in emergencies and are not usually installed when a suitable pressure relieving system and flare are provided. When used, blowdown drums should be 30 m minimum from process unit battery limits and 60 m from storage tanks and other refinery facilities.

5.1.8 Fire training areas

Fire training areas are ignition sources when in use. Because of the smoke produced, they can also create a nuisance for the refinery and neighboring facilities. Fire training areas shall be 60 m from process unit battery limits, main control rooms, fired steam generators, fire pumps, cooling towers and all types of storage tanks. They shall also be 75 m from property boundaries, administration, shop and similar buildings and from the main substation.

APPENDICES

APPENDIX A

TABLE A.1 - OIA (OIL INSURANCE ASSOCIATION) GENERAL RECOMMENDATIONS FOR SPACING IN REFINERIES

Equipment	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'	65'	70'	75'	80'	85'	90'	95'	100'
PROCESS CONTROL HOUSES	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
BOILERS, HEATERS & ELECTRIC GENERATING EQUIPMENT, ETC.	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
FIELD PROCESS HEATERS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
PROCESS VESSELS, REACTIONATING EQUIPMENT, ETC.	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
VAPE COMPRESSOR VESSELS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
LARGE OIL PIPE HOUSES	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
CONTROL HOUSES *	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
COILING TOWERS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
DEPOSIT CONTROLS, STEAM GENERATORS, & WATER STEAM CONTROLS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
RECYCLING DRUMS & FLARE STACKS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
PERIODIC STORAGE TANKS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
STORAGE TANKS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
BLENDING TANKS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
HAZARDOUS COILING & BLENDING FACILITIES, INCLUDING BOOMS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
FIRE TOWERS	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

- 1. Between Safety Limits.
- 2. Tanks over 500 m³ capacity 15 m unless less than 1500 m³ capacity 45 m.
- 3. Tanks with capacities in excess of 795 m³ 15 000 m³ - 50 m, tanks less than 795 m³ - 10 m.
- 4. 8 m in 10 15 m considering area.
- 5. Control may be installed adjacent to or inside to serve as a safe area.
- 6. Fire stacks less than 23 m height should be 30 m distance with stacks over 20 m in height 50 m distance.
- 7. Tanks with capacities up to 1500 m³ should be spaced 1 dia apart, tanks from 1500 to 1970 m³ capacity spaced 1 dia apart, and tanks over 1970 m³ should be spaced 1 dia apart. Tanks over 1970 m³ require special consideration.
- 8. Service buildings include offices, change houses, maintenance, electrical, lab, hospital, storage, except as specified or provided for in standards.
- 9. Process tank structures, preferably, should be isolated to more remote sections of plant and "land" away from other plant areas or occupancies. Spares also should be remotely located whenever possible.

Note:

* Control houses serving unusually large or hazardous units and central control houses for multiple units or housing computer equipment, require greater spacing and may require blast-resistant construction.

APPENDIX A
 TABLE A.2 - OIA GENERAL RECOMMENDATIONS FOR SPACING
 IN PETROCHEMICAL PLANTS

Process Unit	HAZARD	LARGER				15-30 to Center of Target for 30m. Flare that is 6m above Surrounding Equipment. Use 50m	60	60	60	60	60	60	60	60	60	60	60	60
		1	2	3	4													
TANK FARMS -	LOW HAZARD	3	3	ONE DIA.	11													
	HAZARD	60	30	LARGER	LARGER													
PRODUCT WAREHOUSE	LOW HAZARD	43	45	75	30	15												
SHIPPING & RECEIVING - HIGH HAZARD		60	60	45	30	35	115											
SHIPPING & RECEIVING - LOW HAZARD		45	30	30	15	6	15											
SERVICE BUILDINGS		50	30	50	30	30	45	30	15									
BOILER AREA		60	45	60	45	30	60	30	30									

RECOMMENDED SPACING WITHIN PROCESS UNITS

Process Unit	REACT.		COMP.		TANKS		HAZ. COMP. ROOMS		Other
	1	2	3	4	5	6	7	8	
REACTOR	8								
SMALL COMPRESSOR HOUSE OR PUMP HOUSE	12								
INTERMEDIATE SIZE TANKS NICH	30	30							
HAZARD RUNDOWN-FEED	170	170	ONE DIA.						
HAZARD RUNDOWN-FEED	60	60	ONE DIA.						
FRACTIONATION EQUIPMENT	115	9	30						
CONTROL ROOMS *	15	15	30		15	3			
	170	170	30		170				
	30	30			30				

Note: * Control houses serving unusually large or hazardous units and central control houses for multiple units or housing computer equipment, require greater spacing and may require blast-resistant construction.

- under the above schedule. Class "E" requires special consideration.
- E. High hazard shipping and receiving denotes stable materials with flash point below 43°C.
- F. High hazard shipping and receiving of unstable materials requires special consideration.
- G. Service buildings include office, store houses, change houses, laboratories, shops, garages, maintenance warehouses, cafeterias, hospitals, etc. Experimentals laboratories classify as process units.
- H. Keep open flames 30 m from vapor hazard areas.
- I. Deviation from these distances requires special protective installations such as fixed foam systems, water spray, automatic sprinklers, fire-system grading of 1 or better, or superior construction.
- J. In borderline cases, high value requires high hazard classifi-cation.
- K. Vertical storage tanks should be individually diked. If not, capacity in single dike should not exceed 3975 m³ per group, with 30 m between groups, or other suitable arrangements.
- L. For specific vertical tank, use 5 diameters.
- M. For specific vertical tank, use 4 diameters.
- N. For specific vertical tank, use 3 diameters.
- O. Standard firewall and sprinklered warehouse acceptable. Limit warehouse to maximum 2320 m² floor area.
- P. Two stations desirable.
- Q. Barricades desirable for hazardous reactors.
- R. Over 30 m² floor area special consideration.

APPENDIX A

TABLE A.4 - PROXIMITY OF REFRIGERATED STORAGE VESSELS TO BOUNDARIES AND OTHER FACILITIES

BOUNDARY LINES OR OTHER FACILITIES	MINIMUM SPACING OF DOME ROOF TANKS	MINIMUM SPACING OF SPHERES OR SPHEROIDS
Property lines adjacent to land which is developed or could be built upon public highways and main line railroads	60 m ⁽¹⁾	60 m ⁽¹⁾
Utility plants, buildings of high occupancy (offices, shops, labs, warehouses, etc.)	1-½ vessel diameter but not less than 45 m not exceed 60 m ⁽¹⁾	60 m ⁽¹⁾
Process equipment (or nearest process unit limits if firm layout not available)	1 vessel diameter but not less than 45 m need not exceed 60 m ⁽¹⁾	60 m ⁽¹⁾
Non-Refrigerated pressure storage facilities	1 vessel diameter but not less than 30 m need not exceed 60 m	¾ vessel diameter but not less than 30 m need not exceed 60 m
Atmospheric storage tanks (stock closed cup flash point under 55°C)	1 vessel diameter but not less than 30 m need not exceed 60 m	1 vessel diameter but not less than 30 m need not exceed 60 m
Atmospheric storage tanks (stock closed cup flash point under 55°C or higher)	½ vessel diameter but not less than 30 m need not exceed 45 m	½ vessel diameter but not less than 30 m need not exceed 45 m

Note:

1) Distance from boundary line or facility to centerline of peripheral dike wall surrounding the storage vessel shall not be less than 30 m at any point.

APPENDIX A

TABLE A.5 - PROXIMITY OF ATMOSPHERIC STORAGE TANKS TO BOUNDARIES AND OTHER FACILITIES

BOUNDARY LINES OR OTHER FACILITIES	MINIMUM DISTANCE FROM			
	LOW FLASH OR CRUDE STOCKS IN FLOATING ROOF TANKS	LOW FLASH STOCKS IN FIXED ROOF TANKS	CRUDE STOCKS IN FIXED ROOF TANKS	HIGH FLASH STOCKS ⁽¹⁾ IN ANY TYPE OF TANK
Property lines adjacent to land which is developed or could be built upon public highways, and main, line railroads and manifolds located on marine piers. Building of high occupancy (offices, shop, labs, warehouses, etc.)	60 m	60 m	60 m	45 m ⁽³⁾
Building of high occupancy (offices, shop, labs, warehouses, etc.)	1-½ tank diameter but not less than 45 m need not exceed 60 m	1-½ tank diameter but not less than 45 m need not exceed 60 m	60 m	1 tank diameter but not less than 30 m need not exceed 45 m ⁽³⁾
Nearest process equipment, or utility plant (or nearest unit limits if firm layout not available)	45 m	45 m	60 m	½ tank diameter but not less than 30 m need not exceed 45 m ⁽³⁾⁽⁴⁾

Notes:

- 1) When future change ("Switch Service") to low flash or crude service is specified, use other applicable columns of this Table.
- 2) Spacing may be reduced to 30 m for a tank or group of tanks meeting all of the following:
 - a) All tanks are an integral part of the given process operation.
 - b) Each tank is less than 15 m in diameter.
 - c) The total capacity of the group does not exceed 7950 m³ (50,000 bbl).
- 3) Spacing need not exceed 30 m provided that all of the following requirements are met:
 - a) The stock is stored at ambient temperature and the closed cup flash point is above 93°C; or if heated, not above 93°C and not within of its flash point.
 - b) The stock is not received directly from a process unit where upset conditions could lower its flash point.
 - c) The total capacity of any tank does not exceed 31800 m³ (200,000 bbl) and the total capacity of any group of tanks does not exceed 79500 m³ (500,000 bbl).
 - d) There are not tanks storing low flash stocks within the same group.
- 4) Spacing need not exceed 15 m provided that all of the following requirements are met:
 - a) The requirements given in Note 3, subpar. a, and above.
 - b) All tanks are an integral part of the given process operation.
 - c) Each tank is less than 25 m in diameter and the total capacity of a group of tanks does not exceed 7950 m³ (50,000 bbl).
 - d) There are not tanks storing low flash stocks within the same group.

APPENDIX A

TABLE A.6 - PROXIMITY OF ATMOSPHERIC STORAGE TANKS TO EACH OTHERS

TYPE OF STOCKS AND TANKAGE	MINIMUM SPACING BETWEEN ^{(1) (2)}		
	SINGLE OR PAIRED TANKS	GROUPED TANKS	ADJACENT ROWS OF TANKS IN SEPARATE GROUPS ⁽¹⁾
Low flash or crude stocks in floating roof tanks	$\frac{3}{4}$ tank diameter need not exceed 60 m	$\frac{1}{2}$ tank diameter need note exceed 60 m	$\frac{3}{4}$ tank diameter not less than 25 m need note exceed 60 m
Low flash stocks in fixed roof tanks	1 tank diameter	$\frac{1}{2}$ tank diameter	1 tank diameter not less than 30 m
Crude oil stocks in floating roof tanks	$\frac{3}{4}$ tank diameter need not exceed 60 m	Not permitted	
Crude oil stocks in fixed roof tanks	1- $\frac{1}{2}$ tank diameter (pairing not permitted)	Not permitted	
High flash stocks in any type tank	$\frac{1}{2}$ tank diameter need not exceed 60 m	$\frac{1}{2}$ tank diameter need not exceed 60 m ^{(3) (4)}	$\frac{1}{2}$ tank diameter not less than 15 m need not exceed 60 m

Notes:

- 1) Spacing between high flash and low flash tank groups shall be governed by the low-flash criteria.
- 2) A minimum spacing of 3 m shall be provided between any tank shell and the peripheral dike or toe wall.
- 3) Finished stocks with a closed cup flash point above 93°C may be spaced a minimum of 2 m apart provided that all of the following requirements are met:
 - a) The stock is stored at ambient temperature: if heated, not above 93°C and not within 10°C of its flash point.
 - b) The stock is not received directly from a process unit where upset conditions could lower its flash point below the limits of subpar. above.
 - c) There are not tanks storing low-flash stocks within the same group.
- 4) Finished stocks with a closed cup flash point of 54°C or higher but less than 43°C may be spaced 1/6 of the rim of their diameters apart, except:

Where the diameter of one tank is less than one-half the diameter of the adjacent tank, the spacing between the tanks shall not be less than one half the diameter of the smaller tank, provided that all of the following requirements are met:

- a) The spacing between tanks is not less than 2 m.
- b) The stock is not heated above 93°C and not within 10°C of its flash point.
- c) Group Tanks do not exceed a total capacity of 15900 m³ (100,000 bbl) and there are no tanks storing low-flash stocks within the same group.
- d) The stock is not received directly/from a process unit where upset conditions could lower its flash point below the limits of subpar. b above.

APPENDIX A

TABLE A.7 - PROXIMITY OF NON - REFRIGERATED PRESSURE STORAGE VESSELS/DRUMS TO BOUNDARIES AND OTHER FACILITIES

BOUNDARY LINES OR OTHER FACILITIES	MINIMUM SPACING TO SPHERES, SPHEROIDS AND DRUMS
Property lines adjacent to land which is developed or could be built upon public highways, main railroads, and manifolds located on marine piers	60 m ⁽¹⁾
Building of high occupancy (offices, shop, lab, warehouses, etc.)	60 m ⁽¹⁾
Nearest process equipment, or utilities, point (or nearest unit admits if firm layout not available)	60 m ⁽¹⁾
Refrigerated storage facilities	$\frac{3}{4}$ tank diameter, but not less than 30 m need not exceed 60 m
Atmospheric storage tanks (stock closed cup flash point of 55°C and below)	1 tank diameter, but not less than 30 m need not exceed 60 m
Atmospheric storage tanks (stock closed cup flash point above 55°C)	$\frac{1}{2}$ tank diameter, but not less than 30 m need not exceed 45 m

Note:

1) Distance from boundary line or facility to centerline of peripheral dike wall surrounding the storage vessel shall not be less than 30 m at any point.

APPENDIX B

TABLE 1 - THE MINIMUM DISTANCES OF PRODUCTION UNITS FLARES FROM PUBLIC ROADS

FLARES	PUBLIC MAIN ROADS METERS	PRIVATE OR BRANCH ROADS METERS
OIL OR GAS BURNING PITS	200	200
GROUND LEVEL FLARES	200	150
HIGH LEVEL FLARES	150	100
UNITS COLD FLARES	100	50

Notes:

1) If the above figures can not be followed, the case shall be thoroughly examined by committee of production engineers and authorities concerned. The committee will prepare drawing of the area with detailed conditions stating why the above distances can not be observed and recommend the proposed distances.

2) Distances between flares shall not be less than 100 meters.

TABLE 2 - MINIMUM DISTANCES OF OIL/GAS WELLS FROM OTHER PRODUCTION FACILITIES

		STRUCTURES	
		ASMARI (METERS)	BANGESTAN (METERS)
1	Gas pipelines laid on the ground	200	200
2	Gas pipelines burried	60	60
3	Oil pipelines laid on the ground level	200	200
4	Burried oil pipeline	60	60
5	High tension electrical pole	200	200
6	Telephone lines	200	200
7	Oil & gas production units and facilities	400	400
8	Burning pits of productions units	300	300
9	Ground level flares	300	300
10	Production units flare stacks	150	150
11	Cold flares	300	300
12	Residential areas	400	400
13	Public roads	500	500
14	Private and branch roads	200	200
15	Oil/Gas wells	200	200