APPLICATION STANDARD

FOR

SAFETY BOUNDARY LIMIT

ORIGINAL EDITION

MAR. 1996

This standard specification is reviewed and updated by the relevant technical committee on Nov. 2000. The approved modifications are included in the present issue of IPS.

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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 also a guide line for normal operations but each special case shall be carefully studied considering all factors of possible hazards.

Note:

This standard specification is reviewed and updated by the relevant technical committee on Nov. 2000. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No 127 on Nov. 2000. 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.

IPS-E-PR-190;

IPS-E-PR-470;

IPS-E-PR-800;

IPS-G-SF-900;

IPS-E-EL-110.

3. DEFINITIONS AND TERMINOLOGY

3.1 Blow down 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 or barrels of distillate.

3.3 Blending Tanks

A tank used for any mixture prepared for the special purpose "e.g." the product of a refinery are blended for marketing.

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 that 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-G-SF-900.

For wind direction, reference should be made to IPS-E-PR-190.

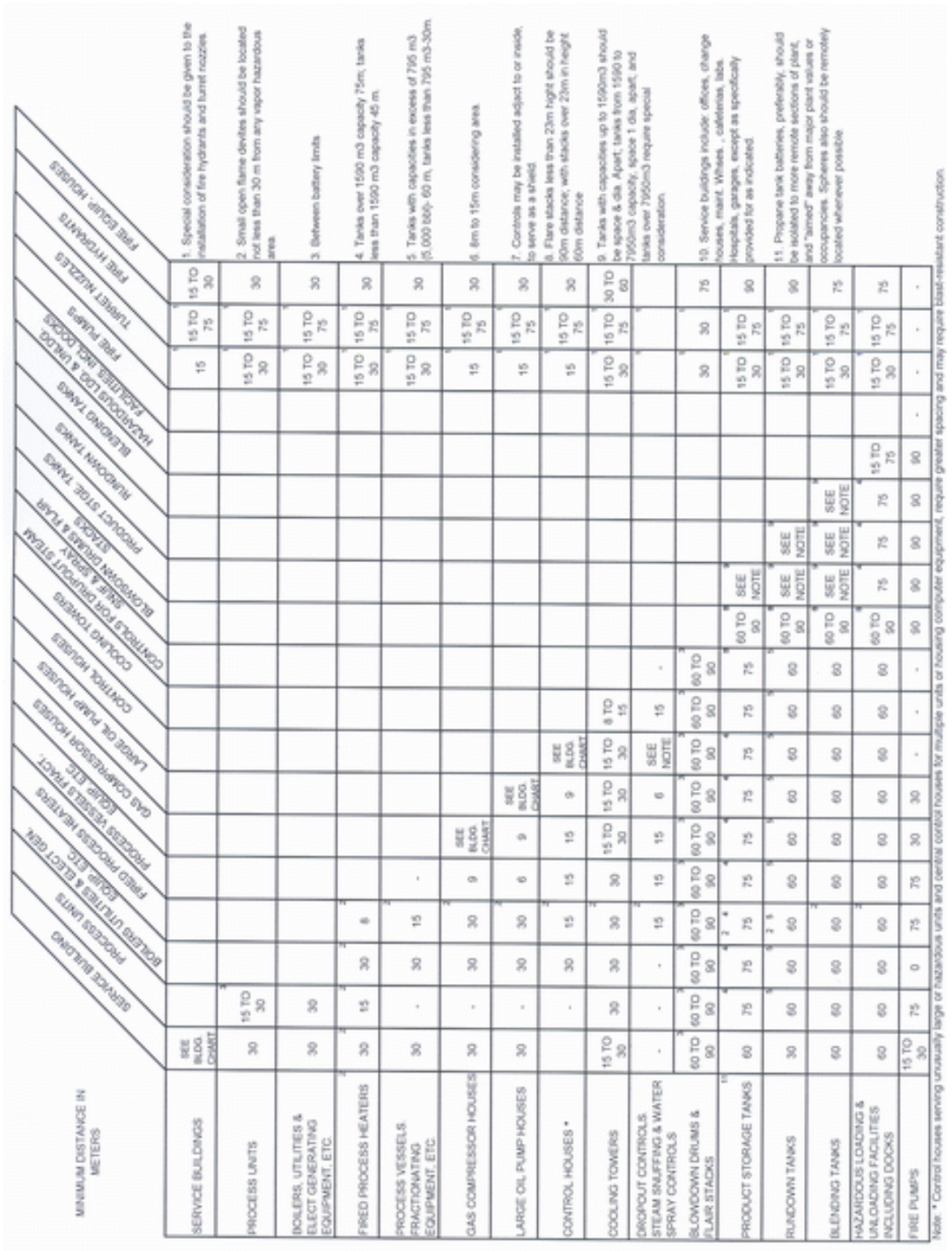
5.1.7 Blowdown drums

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



MINIMUM DISTANCE IN METERS	SERVICE BUILDINGS	PROCESS UNITS	BOILERS, UTILITIES & ELECT GENERATING EQUIPMENT, ETC.	FIRED PROCESS HEATERS	PROCESS VESSELS FRACTIONATING EQUIPMENT, ETC.	GAS COMPRESSOR HOUSES	LARGE OIL PUMP HOUSES	CONTROL HOUSES *	COOLING TOWERS	DROPOUT CONTROLS, STEAM SNUFFING & WATER SPRAY CONTROLS	BLOWDOWN DRUMS & FLAIR STACKS	PRODUCT STORAGE TANKS	RUNDOWN TANKS	BLENDING TANKS	HAZARDOUS LOADING & UNLOADING FACILITIES INCLUDING DOCKS	FIRE PUMPS
SERVICE BUILDINGS	SEE BLDG. CHART	30	30	30	30	30	30	-	30	-	60 TO 90	60	30	60	60	15 TO 30
PROCESS UNITS	30	15 TO 30	30	15	-	-	-	30	30	-	60 TO 90	75	60	60	60	75
BOILERS, UTILITIES & ELECT GENERATING EQUIPMENT, ETC.	30	30		8	15	30	30	15	30	-	60 TO 90	75	60	60	60	75
FIRED PROCESS HEATERS	30	15	8		-	30	30	15	30	-	60 TO 90	75	60	60	60	75
PROCESS VESSELS FRACTIONATING EQUIPMENT, ETC.	30	-	15	-		9	6	15	30	15	60 TO 90	75	60	60	60	75
GAS COMPRESSOR HOUSES	30	-	30	30	9		SEE BLDG. CHART	15	15 TO 30	15	60 TO 90	75	60	60	60	75
LARGE OIL PUMP HOUSES	30	-	30	30	6	SEE BLDG. CHART		9	SEE BLDG. CHART	6	60 TO 90	75	60	60	60	75
CONTROL HOUSES *		-	30	15	15	15	9		SEE BLDG. CHART	15						
COOLING TOWERS	15 TO 30	30	30	30	30	15 TO 30	15 TO 30	SEE BLDG. CHART		15	60 TO 90	75	60	60	60	75
DROPOUT CONTROLS, STEAM SNUFFING & WATER SPRAY CONTROLS	-	-	-	15	15	15	6	15	-							
BLOWDOWN DRUMS & FLAIR STACKS	60 TO 90	60 TO 90	60 TO 90	[2] *	60 TO 90	60 TO 90	60 TO 90	60 TO 90	60 TO 90							
PRODUCT STORAGE TANKS [11]	60	75	75	[2] *	75	75	75	75	75	75	60 TO 90	SEE NOTE				
RUNDOWN TANKS	30	60	60	[2] *	60	60	60	60	60	60	60 TO 90	SEE NOTE	SEE NOTE			
BLENDING TANKS	60	60	60	60	60	60	60	60	60	60	60 TO 90	SEE NOTE	SEE NOTE	SEE NOTE		
HAZARDOUS LOADING & UNLOADING FACILITIES INCLUDING DOCKS	60	60	60	60	60	60	60	60	60	60	60 TO 90	75	75	75	15 TO 75	
FIRE PUMPS	15 TO 30	75	0	75	75	30	30	-	-	-	90	90	90	90	90	-

1. Special consideration should be given to the installation of fire hydrants and turret nozzles.
2. Small open flame devites should be located not less than 30 m from any vapor hazardous area.
3. Between battery limits
4. Tanks over 1590 m3 capacity 75m; tanks less than 1590 m3 capacity 45 m.
5. Tanks with capacities in excess of 795 m3 (5,000 bbl)- 60 m; tanks less than 795 m3-30m.
6. 8m to 15m considering area.
7. Controls may be installed adjact to or inside, to serve as a shield
8. Flare stacks less than 23m hight should be 90m distance; with stacks over 23m in height 60m distance
9. Tanks with capacities up to 1590m3 should be space & dia. Apart; tanks from 1590 to 7950m3 capacity, space 1 dia. apart, and tanks over 7950m3 require special consideration.
10. Service buildings include: offices, change houses, maint. Whses. , cafeterias, labs. Hospitals, garages, except as specifically provided for as indicated
11. Propane tank batteries, preferably, should be isolated to more remote sections of plant, and "zoned" away from major plant values or occupancies. Spheres also should be remotely located wherever possible

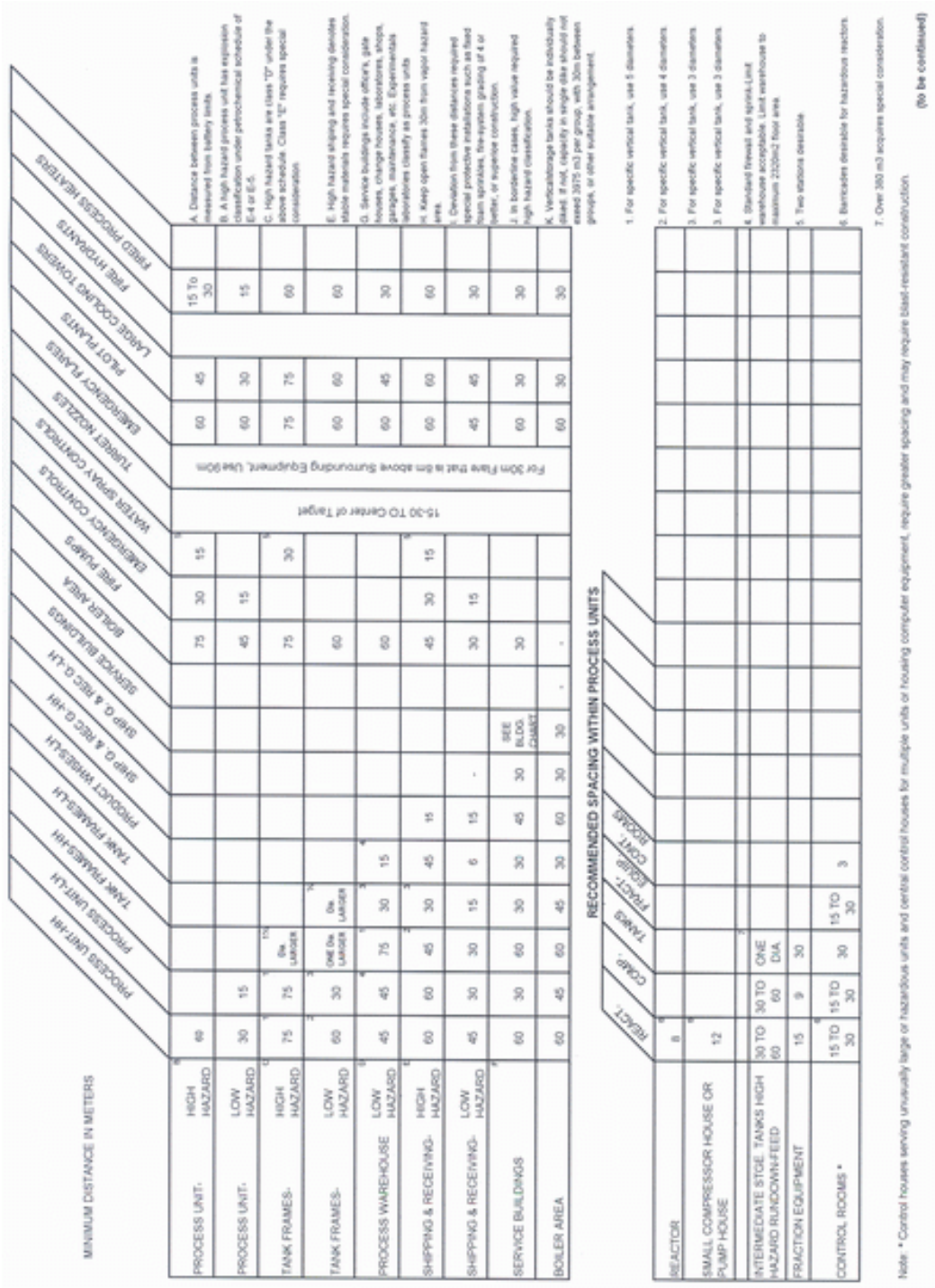
Note * Control houses serving unusually large or hazardous units and central control houses for multiple units or housing computer equipment, require greater spacing and may require blast-resistant construction.

Note:

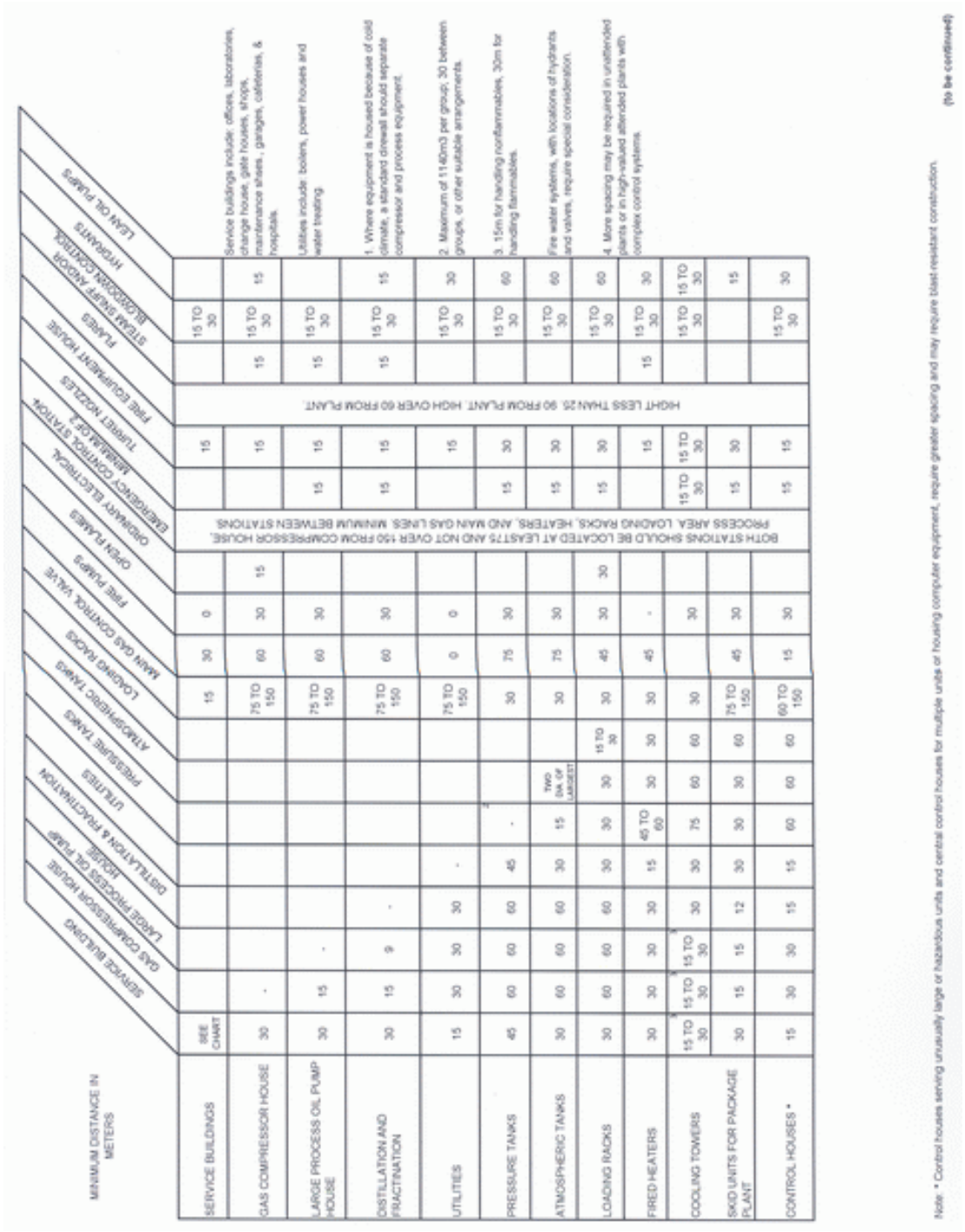
*** Control houses serving unusually large or hazardous units and central control houses for multiple units or housing computer equipment, require greater spacing and may require blast-resistant construction.**

APPENDIX A

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



APPENDIX A
TABLE A.3 - GENERAL RECOMMENDATIONS FOR SPACING IN GAS PLANTS



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.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 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 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 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.

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 whic is developed or could be built upon public highways, 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 butnot 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, subpara. 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 INSEPARATE GROUPS (1)
Low flash or crude stocks in floating roof tanks	¾ tank diameter need not exceed 60 m	½ tank diameter need not exceed 60 m	¾ tank diameter not less than 25 m need not exceed 60 m
Low flash stocks in fixed roof tanks	1 tank diameter	½ tank diameter	1 tank diameter not less than 30 m
Crude oil stocks in floating roof tanks	¾ tank diameter need not exceed 60 m	Not permitted	
Crude oil stocks in fixed roof tanks	1-½ tank diameter (pairing not permitted)	Not permitted	
High flash stocks in any type tank	½ tank diameter need not exceed 60 m	½ tank diameter need not exceed 60 m (3) (4)	½ 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 subpara. 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 subpara. 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	¾ 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)	½ 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	200	200
PITSGROUNDLEVEL 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 buried	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	300	300
14	Private and branch roads	200	200
15	Oil/Gas wells	200	200