

DEP SPECIFICATION

LAYOUT OF ONSHORE FACILITIES

DEP 80.00.10.11-Gen.

February 2017

DESIGN AND ENGINEERING PRACTICE

DEM1



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for layout of onshore facilities and specifically covers the following deliverables:

- a. Site master plans
- b. Plot plans
- c. Mechanical general arrangement drawings

This DEP is applicable both for new sites (greenfield projects) as well as for revamps or expansions of existing sites (brownfield projects). This DEP is applicable to commonly applied facilities and explicitly excludes Movable Modular Liquefaction Systems (MMLSS) and Modular Liquefaction Units (MLUs) for LNG. This DEP is applicable to artificial islands where the Principal has defined them to be onshore facilities. This DEP contains mandatory requirements to mitigate process safety risks in accordance with Design Engineering Manual (DEM) 1 – Application of Technical Standards. This DEP is a revision of the same number dated February 2016; see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorisation to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases, the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The capitalised term **SHALL [PS]** indicates a process safety requirement.

The word **should** indicates a recommendation.

The word **may** indicates a permitted option.

1.3.2 Specific definitions

Term	Definition
Building Risk	Explosion risk to an individual in the building, based on an occupancy rate of 40 hours/week.
Facility	Process and utility plants, tanks, buildings, marine structures, pipe racks and roads located within a site boundary.
Flammable	The term flammable is used to cover both flammable and combustible fluids which are classified as Class I,II or III(a) in DEP 80.00.10.10-Gen. (DEP 80.00.10.13-Gen.).
Layout	One or more of the following deliverables: site master plan, plot plans and mechanical general arrangement drawings.
Mechanical General Arrangement Drawings	Overall spatial arrangement of equipment within the available unit boundaries.
Minimum Separation Distances	Separation distances aim to ensure that the risk of escalation from a fire and/or explosion event(s) on an adjacent area are tolerable, for most common processes. These distances allow for safe SIMOPs during normal operations, construction and maintenance activities. The required protection measures for the construction workforce have to be assessed on a case-by-case basis

Term	Definition
Occupied building	Building that personnel occupy while doing a major part of their work, such as control rooms, laboratories, office buildings, maintenance work areas, outside operator buildings, etc.; or a building with a primary purpose that necessitates people to occupy it, such as field labs, lunch rooms, locker facilities used to change clothes, showers, restrooms or toilets (lightweight plastic porta-toilets are excluded from this definition), etc. Other buildings that have a primary purpose to house or store equipment or materials are considered an “occupied building” if an individual spends on average 10 hours or more a week inside the building, 10 or more people are in the building at any given time, or a group spends an average of 200 hours or more a week inside the building. Observation shelters provided for weather protection for the marine, road, or rail loading operator may, in consultation with the Principal’s relevant Technical Authority, be excluded from the definition of an occupied building. By nature, such buildings are small and require a large amount of window area to satisfy operational safety requirements with the loading operations. For the purpose of this DEP, the requirements for occupied buildings also apply to those buildings containing safety critical equipment
Plot Plan	Overall spatial arrangement of one or more unit(s) and related general facilities within a plot boundary, showing the arrangement of equipment within units.
Portable building	Portable buildings include office trailers, porta-cabins, shipping containers, modular buildings, truck trailers or lorry trailers, tool rooms, mobile homes, personnel shelters, etc.
Process unit	A process unit is a collection of Equipment within a Plant, arranged to perform a defined function. A process unit enables the execution of a physical, chemical and/or transport process, or storage of process material.
Property boundary	The location of the site fence line or area of control based on risk and radiation criteria as defined in this DEP.
Restricted plant road	A road which cannot be accessed without a permit and which has either physical barriers or signs posted.
Risk Contour	Iso-risk line on the map to indicate Location of the specific risk value.
Safety Critical Equipment (SCE)	Any equipment, structure, or system (including software logic) acting as a barrier to prevent or mitigate the uncontrolled release of a hazardous substance or release of energy leading to a worst case credible scenario with RAM red, yellow 5A or yellow 5B Risk. In the context of this DEP the requirements only apply to the Safety Critical Equipment that enables controlled process shutdown or potentially controls further incident escalation in the event of an incident.

Term	Definition
Site Master Plan	Overall spatial arrangement of all process and utility plants, tankage areas, buildings and connecting infrastructure (e.g., roads, pipe racks). The site master plan shows the individual plant boundaries within the overall site boundary.
Site	Plot of land with defined boundaries.

1.3.3 Abbreviations

Term	Definition
ALARP	As Low As Reasonably Practicable
BC-IR	Building Contribution to the Individual Risk, Annual frequency that an individual might be killed from an explosion while occupying a specific building. It is calculated by multiplying the building risk with the fraction of 40 hrs/week the individual is occupying the specific building.
BLEVE	Boiling Liquid Expanding Vapour Explosion, an explosion caused by the rupture of a vessel containing a pressurized liquid above its boiling point.
BRM	Blast resistant module per DEP 34.17.10.33-Gen.
CONOPS	Concurrent Operations, Concurrent Activities, equivalent to SIMOPS, but done under a single organization and management system.
ERC	Emergency Release Coupling
ESD	Emergency Shutdown
HFE	Human Factors Engineering
HSSE	Health, Safety, Security and Environment
IRPA	Individual Risk per Annum, Annual risk of fatality of a particular individual taking into account their exposure, throughout their working year, to all company- induced hazards.
ISBL	In Side Battery Limit
KO	Knock-Out
LEL	Lower Explosive Limit
LFL	Lower Flammability Limit
LSR	Location Specific Risk, Annual risk of fatality to a hypothetical individual at a location for 24 hours per day, 365 days per year, unprotected and unable to escape.
MLU	Modular Liquefaction Unit
MMLS	Movable Modular Liquefaction System
MOF	Material Off-Loading
ORP	Opportunity Realisation Process
Ro-Ro	Roll-Off Roll-On
SCE	Safety Critical Equipment

Term	Definition
SIMOPS	Simultaneous Operations Two or more sets of activities, carried out concurrently by different organizations or under different management systems that, because of their proximity or other factors, could interact with each other. May include simultaneous operation and maintenance activities as well as simultaneous operation and constructions activities.
STSC	Short Term Survivability Criteria at short term exposure (e.g., 5 minutes) that may be received with a negligible statistical probability of fatality and without impairment of individual ability to escape.

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section or clause number is shown in brackets (). Other documents referenced by this DEP are listed in (7).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number February 2016, including corrections to DEP cross-references that have changed. The following are the main non-editorial changes to the February 2015 version.

Section/Clause	Change
2	A site master plan also for the construction phase
3.2	Removed SHALL [PS] on Segregation, rewrote sub-sections on Toxics and on Safety critical equipment
3.3	Moved to Section 4.2 and clarified for Brownfield
4	New Figure 4.1
4.2	Amended tables and notes
4.5	Modified title and wording of SHALL [PS]
4.9	Modified to change to recommendations
4.10.2	Removed section on LPG bulk transfer via road or rail
4.11	Removed radiation criteria
4.12	Modified separation valued C, E and F and removed requirements for radiation
4.14	Modified Flowchart for building design and various distances in the sub-sections
4.16	Modified various distances in sub-sections
5.2.	Simplified requirement for drains
5.11	Revised recommendations to requirements
6.3	Deleted requirement to assess critical interventions
6.4	Simplified requirements
6.6	Simplification of various sub-sections and revision of SHALL [PS]

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://sww.shell.com/standards . Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com .

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.8 NON NORMATIVE TEXT (COMMENTARY)

Text shown in italic style in this DEP indicates text that is non-normative and is provided as explanation or background information only.

Non-normative text is normally indented slightly to the right of the relevant DEP clause.

2. LAYOUT STRATEGY

This DEP defines the requirements at the different stages of layout development in a project from the site master plan (4), into more defined plot plans (5) and finally the detailed mechanical general arrangements drawings (6).

General requirements are explained in (3) and further expanded in later sections as greater design definition is achieved.

1. A layout strategy shall be developed, documented in the Layout Dossier and implemented.

The layout strategy aims to achieve the following:

- *Safety and environmental risk levels for surrounding facilities and communities are tolerable and as low as reasonably practicable (ALARP)*
 - *Safety risk levels for “on site” workforce are tolerable and ALARP*
 - *Minimum cost by utilizing compact layouts with minimum hydrocarbon inventory and minimum required separation distances*
 - *Minimum lost production resulting from damage to facilities in the event of fire and/or explosion.*
2. Depending on the relevant stage of the Opportunity Realisation Process (ORP) one or more of the following deliverables shall be included:
 - a. Site master plan for the operational phase and for the construction phase
 - b. Plot plans
 - c. Mechanical general arrangement drawings
 3. The layout strategy, the site master plan, the plot plans and mechanical general equipment arrangement drawings shall incorporate and address the requirements of the Project Health, Safety, Security and Environment (HSSE) plan.
 4. Allowance for the defined future phases by the project, taking unhindered access during construction and sufficient separation distances considering Simultaneous Operations (SIMOPS), shall be taken into account.

3. GENERAL LAYOUT REQUIREMENTS

3.1 INTRODUCTION

The layout requirements, defined in this DEP, are applicable to all project phases and deliverables.

Additional requirements or exceptions for site master plans, plot plans or mechanical general arrangement drawings are specified in the relevant chapters.

3.2 HSSE

3.2.1 General

This DEP is based on the assumption that the measures described in DEP 80.47.10.30-Gen. are implemented.

3.2.2 Segregation inside the property boundary

1. The required segregation between all new, or between new and existing process and utility plants, tankage areas, buildings and supporting/connecting infrastructure shall be obtained either by providing:
 - a. adequate separation distance
 - b. a physical barrier (being a mitigation measure which reduces the likelihood of escalation between two units).
2. The barrier shall not increase the escalation risk associated with any increased confinement or obstruction of access.
3. The effectiveness of a barrier shall be demonstrated.
4. Adequate separation shall be provided by applying the minimum separation distances as defined within this DEP, including Table 4.1 and (4.3) to (4.16).

Defined minimum separation distances aim to ensure that the risk of escalation from a fire and/or explosion event(s) on an adjacent area are tolerable, for most common processes. The project hazard and effects management processes confirm this later in the project.

The separation distances have in general been arrived at through consequence modelling of relevant failure scenarios (e.g., tank top fire, or loss of containment via a 25 mm (1 inch) hole in a pressurized system), giving distances to blast overpressures and radiation levels.

These distances include allowance for safe SIMOPS during normal operations, construction and maintenance.

5. Increased separation, above the minimum distances specified, shall be provided to the extent required to allow for sufficient access and working space to support construction and maintenance activities.
6. Reduced minimum separation distances or physical barriers shall only be used when sufficient segregation is demonstrated to be ALARP by using appropriate consequence modelling or risk assessment.
 - a. The methodology and criteria to be used for the modelling or assessment, and the results, shall be subject to the approval of Principal's designated Technical Authority.
7. For plant, equipment, units, tankage, buildings and connecting/supporting infrastructure not included in Table 4.1 and (4.3) to (4.16), it SHALL [PS] be demonstrated that the risk of escalation from a fire and/or explosion event(s) on an adjacent area is ALARP.

The above approach typically applies for scenarios such as:

- *Products with particular reactive hazards, low ignition energy, high flammable range or high heat of combustion (e.g., Ethylene Oxide, Ethylene),*
- *Non-typical storage pressures or leakage scenarios.*

8. ALARP demonstration shall be executed in accordance with Principal's ALARP guide.
9. If a risk assessment is applied, it shall be used in conjunction with the project risk tolerability criteria.

3.2.3 Segregation outside the facility property boundary

1. Separation distances to facilities, people and buildings outside the property boundary SHALL [PS] be demonstrated to be ALARP in accordance with Principal's ALARP guide and include appropriate consequence modelling or risk assessment.
2. The ALARP methodology and results shall be subject to the approval of the Principal's designated Technical Authority.
3. If a risk assessment is applied, the assessment shall prove that the risks conform to the project risk tolerability criteria requirements and that the location specific risk (LSR) is ALARP.
4. Where local regulations specify risk contour limits and other risk criteria (e.g. societal risk), they shall be followed.

3.2.4 Toxics

1. For definitions of toxicity refer to DEP 01.00.01.30-Gen., Part III.
2. For "very toxic" services, the separation between plants, units, equipment and buildings SHALL [PS] be agreed with the Principal's designated Technical Authority.

3.2.5 Safety critical equipment

1. Safety Critical Equipment SHALL [PS] retain its safety critical functionality when subject to the hazard it is preventing or mitigating by means of one of the following:
 - a. Location in an area where emergency and/or unplanned events do not impact the safe operation
 - b. Protection from the hazard
 - c. Designed to function through the exposure (e.g. fail safe)
2. Access to Safety Critical Equipment which needs to be accessed during an unwanted event/hazard shall be unobstructed and permanent.
3. Refer to (4.14) for requirements for buildings housing Safety Critical Equipment.
4. The location of outdoor Safety Critical Equipment shall be demonstrated to be ALARP in accordance with (3.2.2)

3.2.6 Hazardous area classification

1. Hazardous area classification standards provide industry-accepted separation distances between ignition sources and likely sources of flammable release. The distances provided by the codes do not address the effects of larger (but less likely) failures. These shall be reviewed as part of an overall layout study.
2. Reference is made to DEP 80.00.10.10-Gen. and DEP 80.00.10.13-Gen., as applicable.

3.3 CONSTRUCTABILITY

1. Requirements as defined in the project or facility construction strategy (including pre-commissioning and initial start-up) shall be included in all layout activities to include optimal provisions for:
 - a. Human factors engineering to address accessibility (3.4.3),
 - b. Suitable (in terms of obstructions, slope, and bearing capacity) access for construction equipment (including cranes, heavy equipment and transporters),
 - c. Minimum workspace envelope (including turning radii) for construction equipment (including cranes, heavy equipment and transporters),
 - d. Areas for laydown, storage and temporary facilities (e.g., office, camps, welfare),
 - e. Material (off) loading facilities,
 - f. Safe SIMOPs,
 - g. Traffic and pedestrian management,
 - h. Security and exclusion requirements,
 - i. Desired construction strategy (stick built/modular), sequence and schedule.
2. During expansions of an existing site, the construction area should have a separate entrance, gatehouse and fence to keep free access for construction personnel and delivery of construction materials clear of the existing operating facilities.
3. A clear distinction shall be established by physical barriers between operating areas and construction areas for both security of operating facilities and to ensure control of hazards, e.g., vehicle traffic through the operating facility.

3.4 OPERABILITY AND MAINTAINABILITY

3.4.1 General

1. Requirements as defined in the project or facility operating and maintenance philosophy (including start-up and shutdown) shall be included in all layout activities to include optimal provisions for:
 - a. Human factors engineering to address accessibility (3.4.3)
 - b. Suitable (in terms of obstructions, slope, and bearing capacity) access for maintenance equipment (including cranes, heavy equipment and transporters)
 - c. Minimum workspace envelope (including turning radii) for maintenance equipment (including cranes, heavy equipment and transporters)
 - d. Areas for laydown, storage and temporary facilities (e.g., office, welfare)
 - e. Safe SIMOPs and Concurrent Operations (CONOPS)
 - f. Traffic and pedestrian management
 - g. Security and exclusion requirements

3.4.2 Expansion

1. Expansion (planned or future) requirements shall be taken into consideration in all layout activities to include optimal provisions for:
 - a. Construction (3.3)
 - b. General Operability and Maintainability requirements (3.4.1)
 - c. Tie-in to existing and new infrastructure (piperacks, piping, utilities, drainage, etc.)
 - d. On-going operation and maintenance activities of the existing facility

3.4.3 Human factors engineering

1. Refer to DEP 30.00.60.20-Gen. for the human factors engineering (HFE) requirements.

3.4.4 Emergencies, escape and evacuation

1. Safe means of escape and evacuation shall be provided for all credible emergency conditions, taking the following into account:
 - a. Escape and evacuation of all areas at all times throughout the year, whether or not they are regularly manned;
 - b. The effect on the ability of personnel to escape to safe areas of toxic releases or the heat flux and smoke from a fire;
 - c. The effect of flare radiation on escape and evacuation.
2. The road system shall be designed such that access to all areas is possible in case of an emergency, taking the different wind directions into account.
3. All access to plant areas shall be by paved walkways or hard standing with appropriate grade and width as outlined in DEP 30.00.60.20- Gen., avoiding the need to walk over rough or unmade ground
4. The location of helipad(s) and the facilities relative to water access shall be designed such that access to those is possible in case of an emergency taking the different wind directions into account.

3.4.5 Natural ventilation

1. Where practicable, natural ventilation shall be used, to reduce the likelihood of potential accumulations of explosive hydrocarbon/air mixtures or toxic acute substances.
2. Equipment should be oriented to minimise disruption of natural ventilation.
3. Designs shall avoid dead pockets where explosive mixtures or toxic acute substances can remain for extended periods of time.
 - a. In cases that this cannot be avoided (e.g., sumps), the location shall be treated as a confined space.

4. SITE MASTER PLAN

4.1 INTRODUCTION

The site master plan of a facility gives the overall spatial arrangement of all process and utility plants, tankage areas, buildings and connecting infrastructure (e.g., roads, pipe racks).

The site master plan shows the individual plot boundaries within the overall site boundary.

The site master plan indicates relevant surrounding local geographic features (e.g., rivers, coastline, slopes).

4.2 MINIMUM SEPARATION DISTANCES AND SITING REQUIREMENTS

This section is to be read in conjunction with (3.2.2).

Figure 4.1 clarifies the interpretation of separation distances for process plants/utility areas handling flammable material as provided in Table 4.1. The figures are provided in SI and in USC versions and are different for greenfield or brownfield applications.

The distances in Table 4.1 and more generally in this DEP are horizontally projected distances.

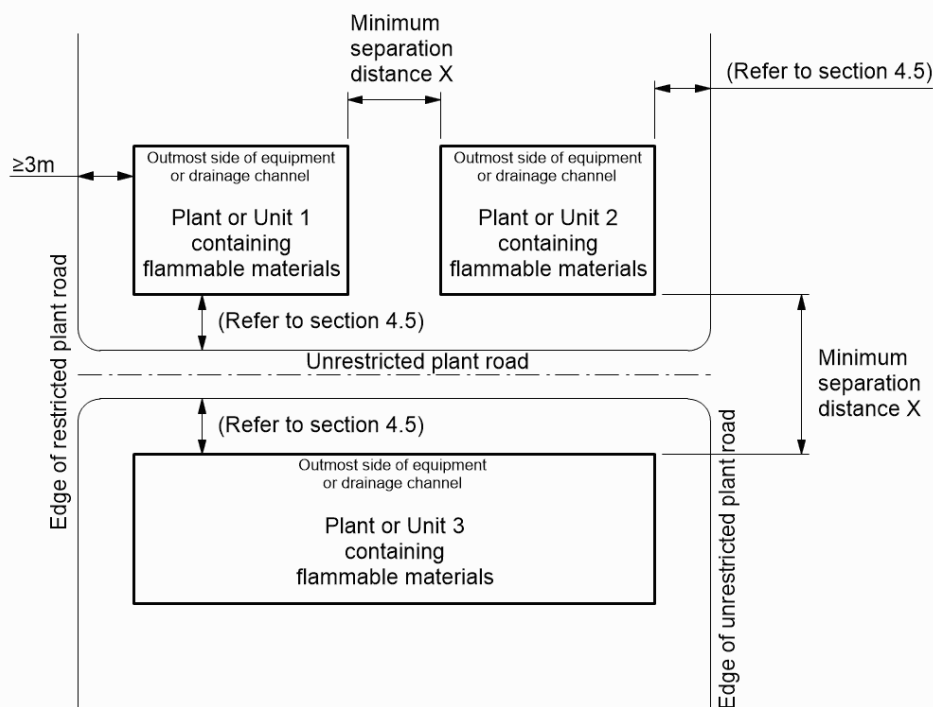
The brownfield approach can normally not be used for greenfield applications since the required data is not available at the early stages of the project.

For greenfield applications, the separation distance "X" is defined as the distance between ISBLs of adjacent hydrocarbon containing units or plants.

For brownfield expansions, the separation distance "X" is defined as the distance between the outmost sides of equipment or drainage channels of adjacent hydrocarbon containing units or plants.

1. If the data is available for greenfield applications, the brownfield approach may be applied.
2. Minimum separation distances and siting requirements specified in Table 4.1 with a [BOLD] annotation SHALL [PS] be met.
3. Minimum separation distances and siting requirements specified in Table 4.1 with a normal annotation shall be met.

Figure 4.1A Minimum separation distances (SI) for process plants (brownfield)



ISBL = InSide Battery Limit

Figure 4.1B Minimum separation distances (USC) for process plants (brownfield)

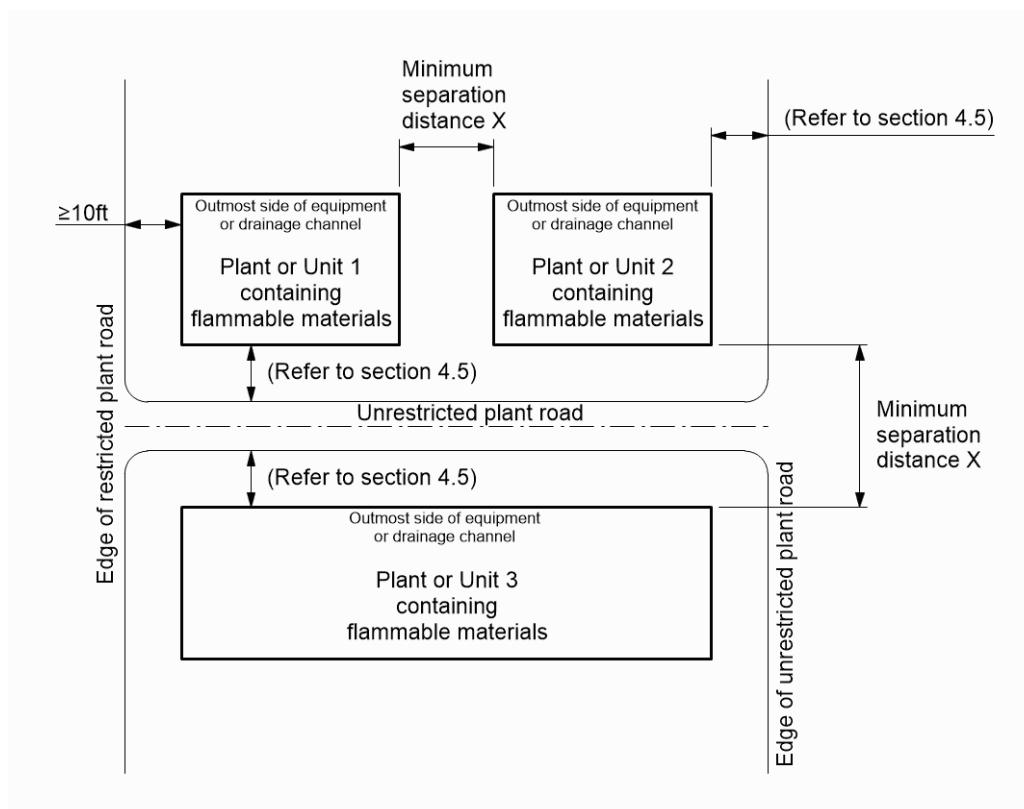


Figure 4.1C Minimum separation distances (SI) for process plants (greenfield)

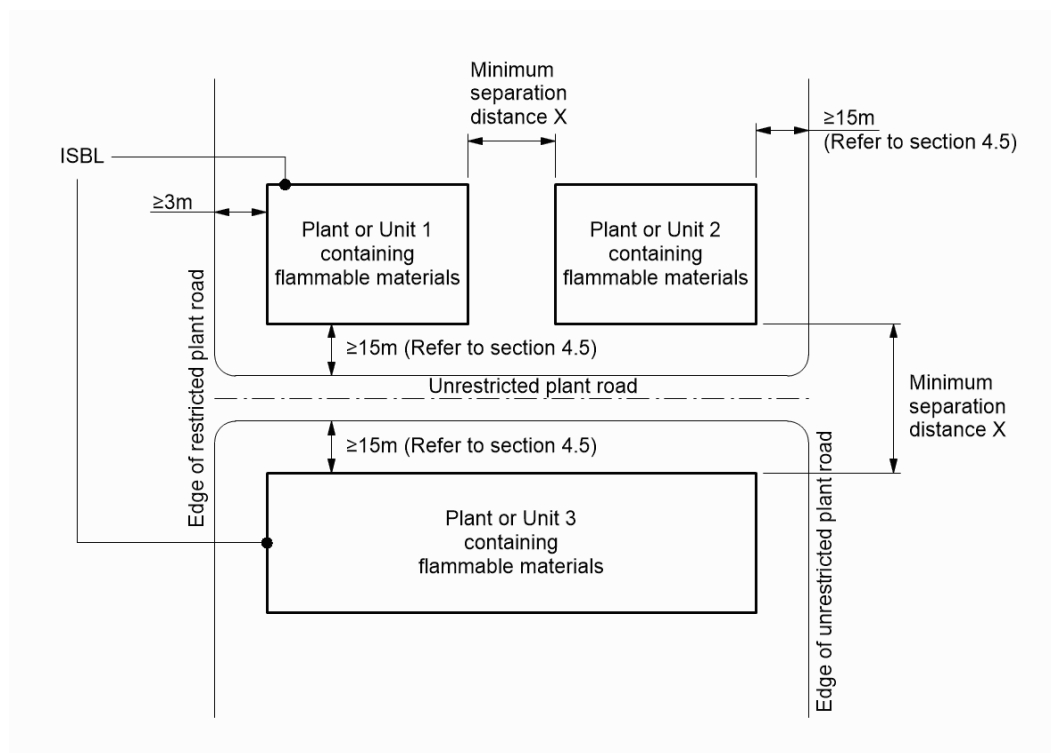
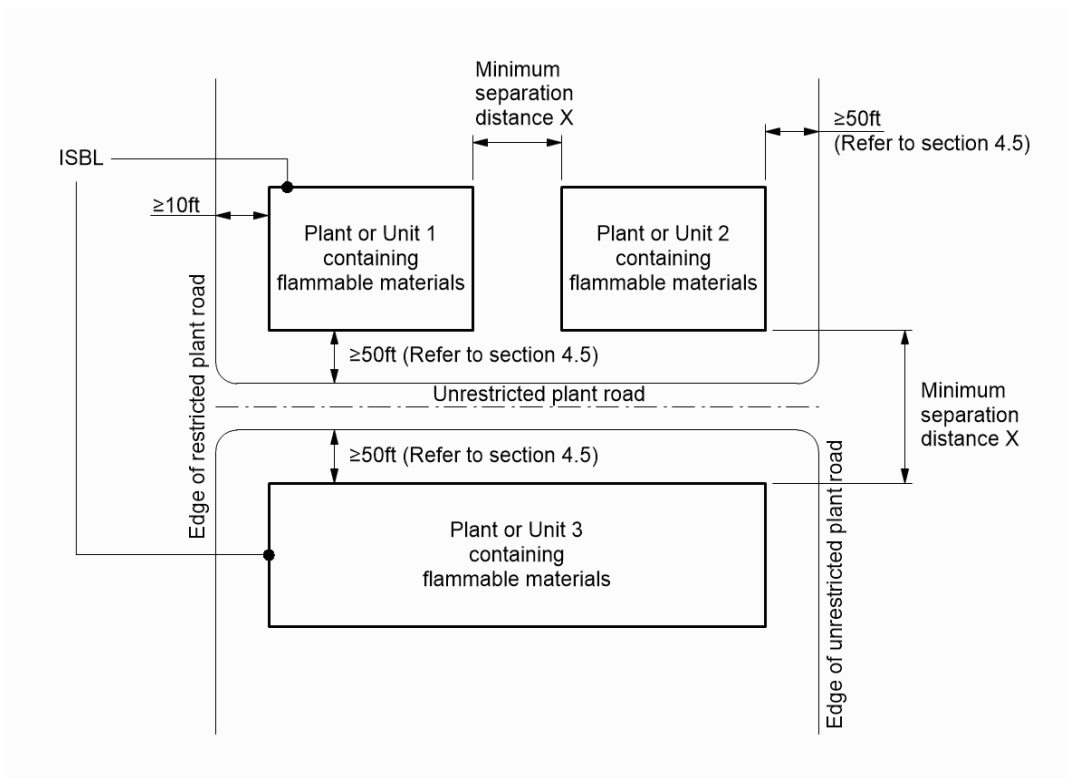


Figure 4.1D Minimum separation distances (USC) for process plants (greenfield)



Figures in Meters
NA = Not Applicable

Non –blast resistant Occupied Building (e)	A	NA																			
Fire Station, Fire Pumps (e)	B	NA	NA																		
Main Electrical Station	C	NA	30	NA																	
Utilities Area not handling flammable products	D	30	30	30	NA																
Cooling Towers	E	[15]	[15]	[60]	[30]	15															
Process Plants/Utility Areas handling flammable products	F	[(h)]	[(h)]	[60]	[50/25 (c)]	[50/25 (c)]	[50/25 (c)]														
Control Room (e)	G	NA	NA	30	30	[30]	[30]	NA													
Non-refrigerated atmospheric/low pressure flammable or combustible liquid storage tanks (j)	H	[(i)]	[(i)]	[60]	[(i)]	[75]	[(i)]	[(i)]													
Oily Water Interceptors (CPI/API)	I	[15]	[15]	[15]	[15]	[15]	[15]	[15]	NA												
Road/Railcar loading station for LPG	J	[60]	[60]	[60]	[(f)]	[(f)]	[(f)]	[(f)]	[(f)]	NA											
Road/Railcar loading station except LPG	K	[30]	[30]	[30]	[(f)]	[(f)]	[(f)]	[(f)]	[(f)]	[(f)]	NA										
Elevated Flare	L	[100]	[100]	[100]	[60/100 (a)]	[60/100 (a)]	[60/100 (a)]	[60/100 (a)]	[60/100 (a)]	[60/100 (a)]	[60/100 (a)]	NA									
Transfer Pumps in tank farms	M	[60]	[60]	[60]	[30]	[30]	[50/25 (c)]	[30]	[15]	[15]	[(f)]	[(f)]	[60/100 (a)]	NA							
Main Pipeway	N	[15]	[15]	[15]	[15]	[7.5]	[15]	[7.5]	[15]	[15]	[(f)]	[(f)]	[60/100 (a)]	NA	NA						
Unrestricted plant road	O	3	3	3	3	[(k)]	[(k)]	3	[(k)]	[(k)]	[(k)]	[(k)]	[60/100 (a)]	[(k)]	Note p	NA					
Restricted plant road	P	3	3	3	3	(l)	(l)	3	(l)	(l)	(l)	(l)	[60/100 (a)]	(l)	(l)	NA	NA				
Property Boundary	Q	10	10	10	30	[(m)]	[(m)]	30	[(m)]	[(m)]	[(f)]	[(f)]	[150/250 (b)]	[(m)]	[15]	3	3	NA			
Pressurized LPG Storage	R	[(60) (n)]	[(60) (n)]	[(60) (n)]	[(g)]	[50]	[(g)]	[(g)]	[(g)]	[(o)]	[(g)]	[(g)]	[60/100 (a)]	[60]	[(g)]	[(g)]	[(g)]	[(m)]	[(g)]		
Refrigerated Storage (d)	S	[100]	[100]	[100]	[80]	[45]	[80]	[45]	[45]	[60]	[(f)]	[(f)]	[60/100 (a)]	[30]	[30]	[30]	[15]	[(m)]	[(g)]	[45]	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S		
	Non –blast resistant Occupied Buildings (e)	Fire Station, Fire Pumps (e)	Main Electrical Station	Utilities Area not handling flammable products	Cooling Towers	Process Plants/Utility Areas handling flammable products	Control Room (e)	Non-refrigerated atmospheric/low pressure flammable or combustible liquid storage tanks (j)	Oily Water Interceptors (CPI/API)	Road/ Railcar loading station for LPG	Road/Railcar loading station except LPG	Elevated Flare	Transfer Pumps in tank farms	Main Pipeway	Unrestricted plant road	Restricted plant road	Property Boundary	Pressurized LPG Storage	Refrigerated Storage (d)		