

KLM Technology Group Project Engineering Standard	 www.klmtechgroup.com	Page : 1 of 51
		Rev: 01
		Sept 2012
KLM Technology Group #03-12 Block Aronia, Jalan Sri Perkasa 2 Taman Tampoi Utama 81200 Johor Bahru Malaysia	SPECIFICATION FOR MARINE LOADING/UNLOADING FACILITIES (PROJECT STANDARDS AND SPECIFICATIONS)	

TABLE OF CONTENT

1.0 SCOPE	2
2.0 WORK PROCEDURE	2
2.1 Input to the Design	2
2.2 Output from Design	3
2.3 Work Steps	3
3.0 SYSTEM DESCRIPTION	5
4.0 SYSTEM DESIGN	6
4.1 Mooring Facility	6
4.2 Loading/ Unloading Facility	8
4.3 Interconnecting Piping and Auxiliary Facility	12
4.4 Marine Loading Pump	17
5.0 LOADING ARM OPERATION PROCEDURES	18
5.1 Crude Oil and White and Black Oils	18
5.2 High Pressure LPG Loading	20
5.3 High Pressure LPG Unloading	21
5.4 Low Pressure LPG Loading/ Unloading	22
6.0 BERTHS AND SPOTS ARRANGEMENT	24
6.1 General	24
6.2 Basic Requirement of Design	24
6.3 Design Procedures	25
6.4 Related Figures and Tables	41
7.0 DEFINITIONS OF TERMS	45
8.0 REFERENCES	49
8.1 Related COMPANY	49
8.2 Related Standards	49

KLM Technology Group Project Engineering Standard	SPECIFICATION FOR MARINE LOADING/UNLOADING FACILITIES (PROJECT STANDARDS AND SPECIFICATIONS)	Page 2 of 51
		Rev: 01
		Sept 2012

1.0 SCOPE

This manual covers basic design procedures for marine loading/unloading facilities for flammable liquid except for LNG, Ethylene, liquid sulphur and etc. and should be used for the Front End Engineering or verification stage of the project.

Basic design of marine loading/unloading facilities is closely related to Civil and HSE engineering.

2.0 WORK PROCEDURE

2.1 Inputs to the Design

2.1.1 Data to be provided by The Client

1. Annual Shipment
Products handled and annual quantity
2. Lot Size of Loading/Unloading
Tanker size and/or lot size per product
3. Maximum berth occupancy time per shipment, if available
(Berthing/de-berthing time + Loading or unloading time)
4. Annual Berth Operation Time
 - Annual operation days
 - Daily operation hours
5. Ballast water disposal quantity
6. Required Utilities for tankers
7. Seasonal variations for each product, if available.

2.1.2 Process Conditions

1. Source of the data
The design data shall be obtained from, but is not limited to, the following documents:
 - Refinery Scheme including material balances for all operation cases.
 - The design philosophy of the process units (hereinafter called as “on-site”), product blenders, and marine loading/unloading facilities
 - Process Flow Diagram (PFD): Refer to Note 1
 - Basic Engineering Design Data (BEDD)
 - Piping & Instrument Diagram (P&ID): Refer to Note below.

Note: This manual includes a definitive study to determine berth spot arrangement. At this stage, Flow Schemes are not available.

KLM Technology Group Project Engineering Standard	SPECIFICATION FOR MARINE LOADING/UNLOADING FACILITIES (PROJECT STANDARDS AND SPECIFICATIONS)	Page 3 of 51
		Rev: 01
		Sept 2012

2. Design basis

Maximum, normal and minimum flow rate and corresponding physical properties should be used for designing loading pumps and Loading/unloading facilities.

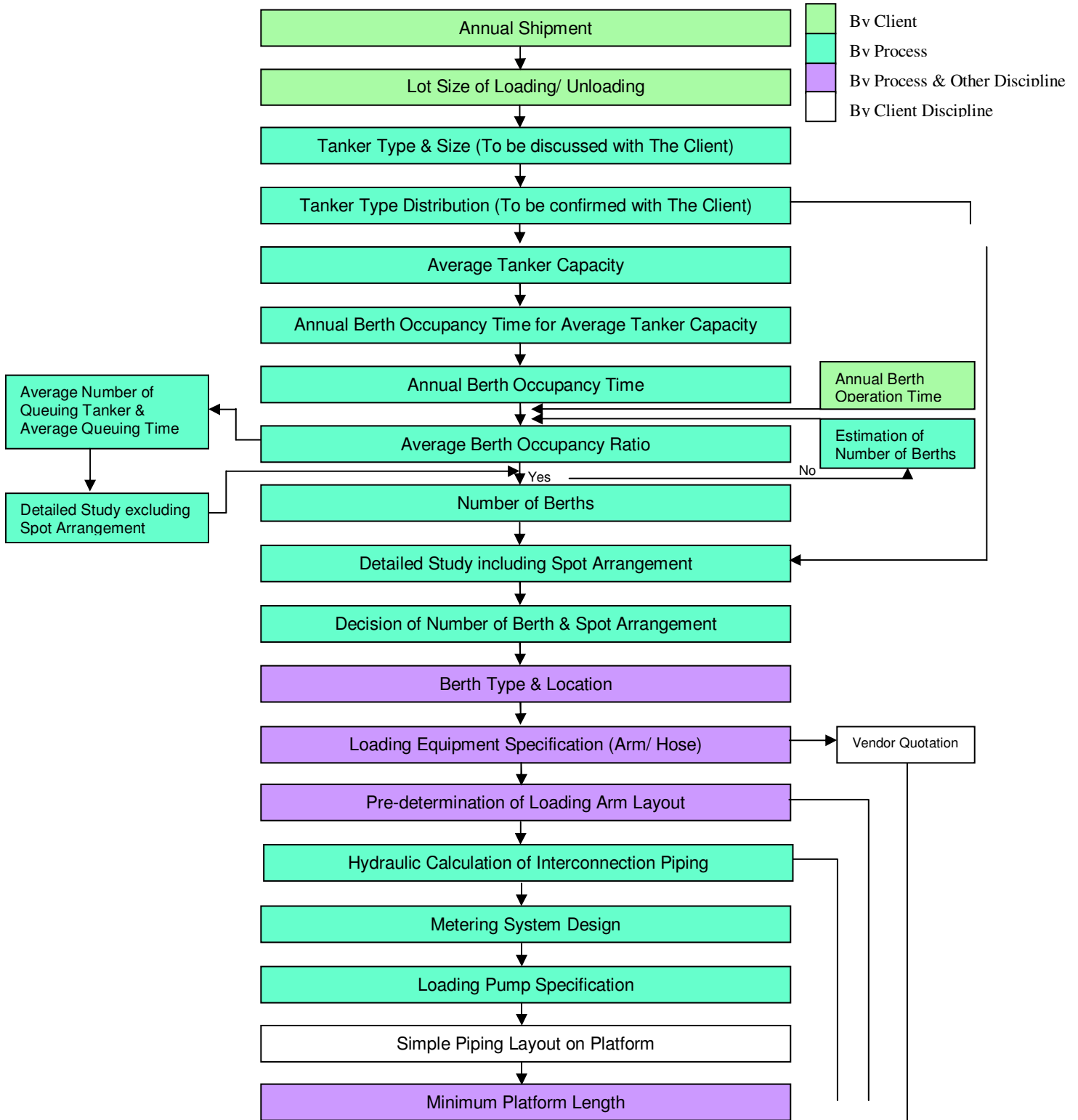
2.2 Output from Design

The process data to be prepared based on this manual should be as follows:

<u>Name of Facilities</u>	<u>Process Data</u>
1. Berth	Tanker size and number of berths
2. Loading/unloading facilities	Number, types and size of loading/unloading spots, and process conditions for loading arms.
3. Interconnecting piping	Number and size of piping and process conditions
4. Loading Pump	Pump data sheet
5. Measuring facilities	Number and type of facilities, and process conditions
6. Utility supply facilities	Type and quality of utility and conditions of tie-in with tankers and miscellaneous uses on platform
7. ESD Systems	ESV, Emergency Release Coupler, etc
8. Oily Sewer Systems	Oily water drainage system

2.3 Work Steps

As a guideline the design of marine loading/unloading facilities should be conducted according to the following work steps.



KLM Technology Group Project Engineering Standard	SPECIFICATION FOR MARINE LOADING/UNLOADING FACILITIES (PROJECT STANDARDS AND SPECIFICATIONS)	Page 5 of 51
		Rev: 01
		Sept 2012

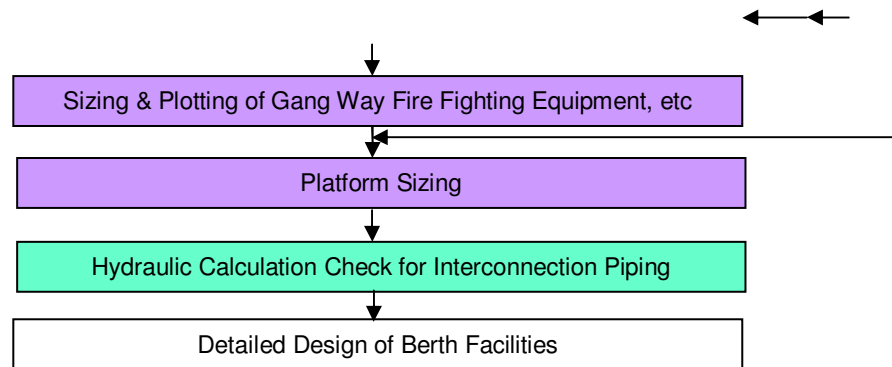


Fig. 2.3 Work Steps for Marine Loading/Unloading Facilities

3.0 SYSTEM DESCRIPTION

The marine loading/unloading facilities are mainly composed of the followings:

1. Berth
Fixes tankers at a certain point to connect with the loading/unloading facilities that are of a fixed type and include a specific mooring type.
2. Loading/Unloading Equipment
Connects loading/unloading piping with the tanker and shall compensate for tanker movements.
3. Interconnecting Piping
Connects loading/unloading equipment and refinery/oil terminal pumps and tanks.
4. Loading/Unloading Pumps
The loading pumps such as centrifugal or rotary types shall be provided. However, pumps provided on the tanker are used for unloading, therefore, a new pump for the unloading operation will not be necessary.
5. Measuring Facilities
Measures the volume of oil for the custody transfer of oil loaded or unloaded. The following methods shall be used to measure the volume of oil loaded or unloaded.
 - Special flow meters such as PD meters or turbine meters should be used when a higher accuracy is required. A flow meter shall also be used for loading flow rate control.
 - Tank level gauges on cargo tanks or shore tanks

KLM Technology Group Project Engineering Standard	SPECIFICATION FOR MARINE LOADING/UNLOADING FACILITIES (PROJECT STANDARDS AND SPECIFICATIONS)	Page 6 of 51
		Rev: 01
		Sept 2012

6. Ballast Water Facilities

Ballast water is to stabilize the empty tanker by seawater. Therefore, the necessity for ballast water facilities shall be confirmed with the Client.

7. Utility Supply Facilities

Piping systems in the berth area for supplying bunker fuel oil, potable water, and other water necessary for tanker navigation and general uses shall be necessary. However, there is a case that bunker fuel is supplied using a supply boat. When a buoy mooring type berth is used, utilities are supplied using small ships; therefore, utility supply facilities should not be necessary. A utility supply facility to the small ships, such as tag boats, is considered, if necessary.

8. ESD Systems

For safety isolation of the tanker and berthing facilities as well as for the refinery and interconnecting piping.

4.0 SYSTEM DESIGN

4.1 Mooring Facility

4.1.1 Type of Berth

The type of berth can be classified into one of the following groups.

1. Fixed Type
 - a. Dolphin Type
 - b. Pier Type
2. Buoy Mooring
 - a. Single Point Mooring Type
 - b. Multi Buoy Mooring Type

On the basis of conditions for selecting a berth type, the type of a berth most suitable for the job concerned should be selected by the project team members and respective disciplines or a marine consultant. Table 4.1.1 below shows a comparison between the fixed and floating types for reference.