

SPD0045ERN
PROCESS DESIGN MANUAL
GENERAL SELECTION OF TANKAGE

REV. : 3

DATE : 2013.06.07



SAMSUNG
ENGINEERING

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1. INTRODUCTION

The objection of the Storage Tank Design Manuals is to provide general guideline that wil aid in the selection and design of the proper type of storage tank to be used in a particular application.

The topic of storage tank design is presented in Four Design Manuals:

- (1) [General Selection of Tankage \(SPD0045ERN\)](#)
- (2) [Atmosheric Storage Tank \(SPD0046ERN\)](#)
- (3) [Pressurized Storage Tank \(SPD0047ERN\)](#)
- (4) [Refrigerated Storage Tank \(SPD0048ERN\)](#)

These manuals are concerned with bulk storage of raw materials, intermediates and products, mainly flammable hydrocarbons and petrochemical liquids.

2. GENERAL SELECTION OF TANKAGE

The various types of storage used for flammable hydrocarbons and chemicals are indicated in Figure 1, based on the vapor pressures of the materials to be stored.

Typical types of storage tanks required for crude oil and petroleum products are listed in Table 1. The final selection of the type of tank is sometimes dependent on local conditions and regulations or product purity requirements.

Many petrochemical compounds of low vapor pressure are stored in atmospheric storage tanks blanketed with inert gas to prevent the formation of explosive mixtures within the tanks or to prevent the ingress of air or its associated water vapor.

Underground storage of large volumes of crude oil, liquefied natural gas, etc is considered to be a specialized subject and is not covered by this manual.

Typical Reid vapor pressures of some petroleum liquids are given in [Table 2 and](#) the typical vapor conditions of some petroleum liquids with varying temperature are shown in Figure 2.

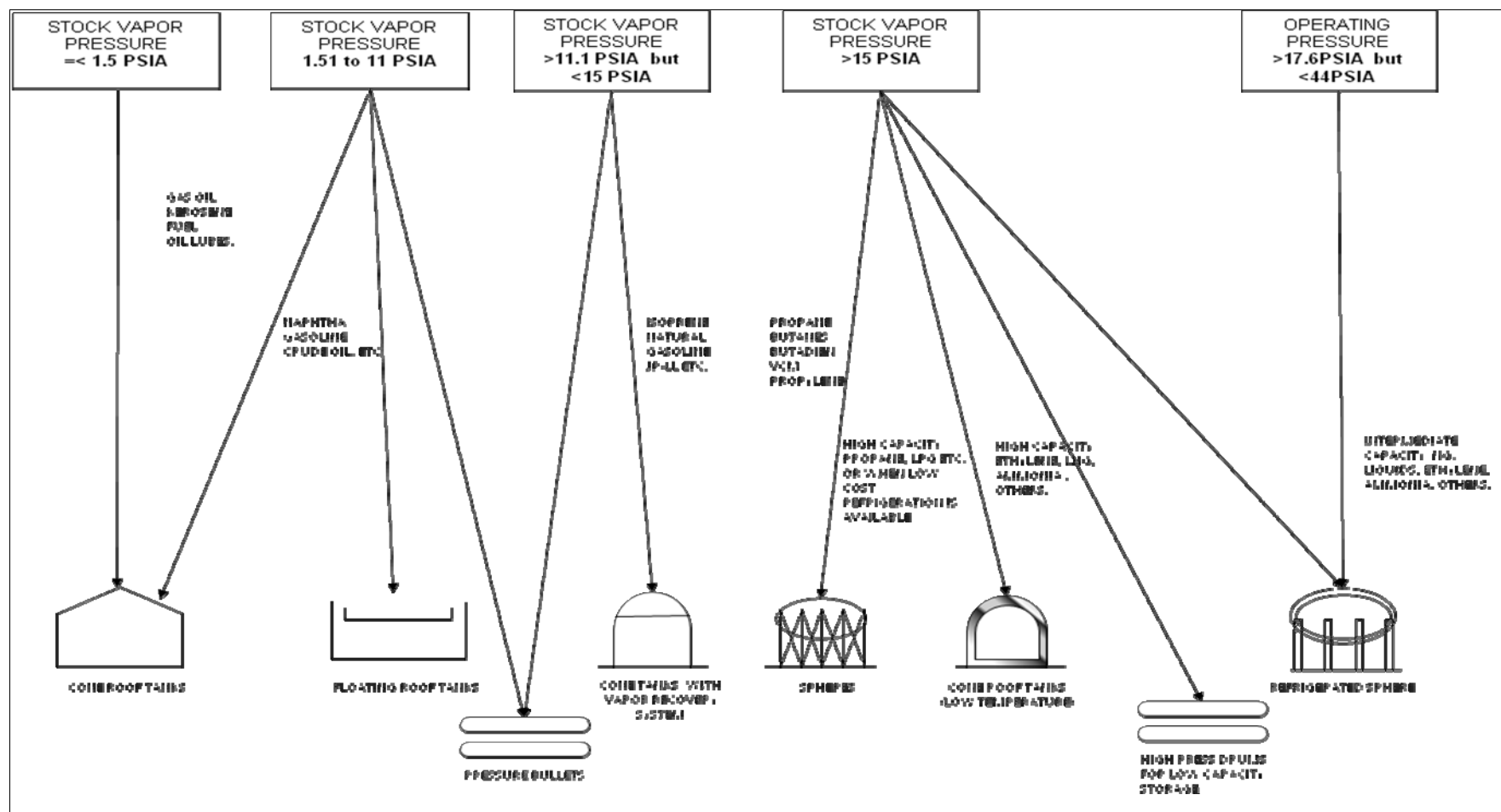
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3. REVISION HISTORY

REV NO.	DATE	SCOPE	DESCRIPTION
0	98.4.17	All Pages	- First Edition -Team: Process Engineering -Prepared by: H.N.Oh Y.S.Kim -Checked by: B.I.Lee, S.B.Jo, J.C.Ro -Approved by: S.G.Oh
1	2003. 6.18	3,4,5 Page	- Addition of Figure 1,2 and Table 1 -Team: System Eng'g Team -Prepared by: D.H.Cha -Checked by: J.C.Ro -Approved by: C.S.Jung
2	2010. 11.25	Revised for new Doc. Numbering System	Document number change due to new numbering system -Team: Process Engineering Department -Prepared by: C.H.Yun -Checked by: J.H.Park -Approved by: Y.Y.Koo
<u>3</u>	<u>2013.</u> <u>06.07</u>	<u>1 page</u>	<u>Addition of Introduction and Table 2</u> <u>-Team: Process Engineering Department</u> <u>-Prepared by: I.Hwang</u> <u>-Checked by: J.H.Park M.H. Oh, J.C.Ro</u> <u>-Approved by: S.B. LEE</u>

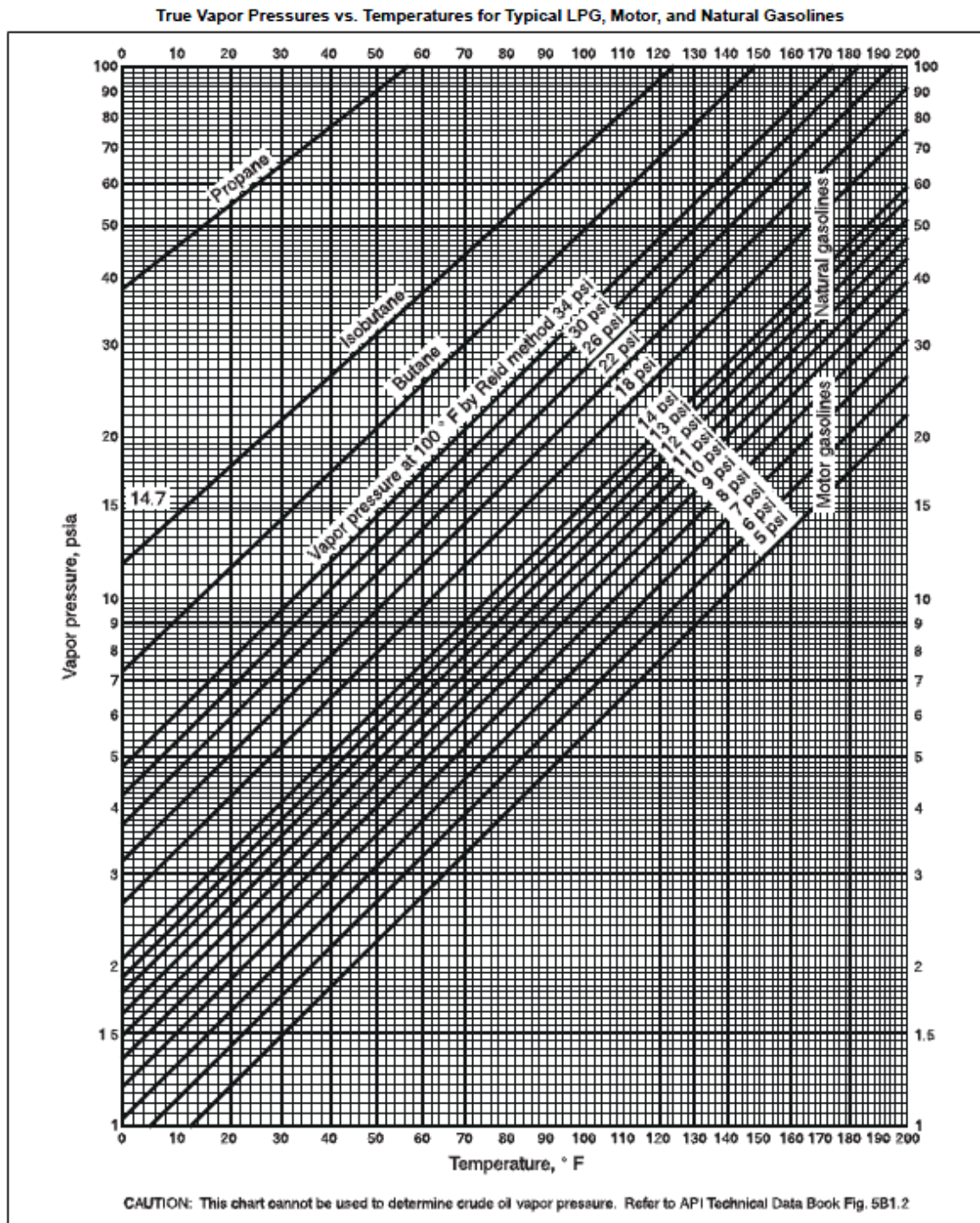
4. APPENDIX A: FIGURES AND TABLES

Figure 1: Selection of Storage Tank



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Figure 2: True Vapor Pressure



Refer to GPSA

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Table 1. Selection of Petroleum Storage Type¹

PEROLEUM LIQUID	TYPE OF STORAGE
<u>CLASS "A" (FLASH PT. BELOW 22.8 °C)</u> SOUR CRUDE OIL LIGHT CRUDE OIL MOTOR AND AVIATION GASLINE NAPHTHA,JP,LL.ETC. ALTERNATIVES	FLOATING ROOF - PAN OR OTHR TYPE FLOATING ROOF - PONTOON OR DOUBLE DECK TYPE FLOATING ROOF - PONTOON OR DOUBLE DECK TYPE C HIGH ANNUAL THROUGHPUT OR SPHERODS. LOW PRESSURE TANKS .ETC.(LOW ANNUAL THROGHPUT) NON PRESSURE FIXED ROOF TANKS WITH INTERNAL FLOATING DECKS
<u>CLASS "B" (FLASH PT. 22.8-65.6 °C)</u> KEROSENE, WHITE SPIRITS, TRACTOR VAPORIZING OILS .ETC. 1. FLASH PT. BELOW 37.8 °C(100 °F) 1. FLASH PT. ABOVE 37.8 °C(100 °F)	1.FLOATING ROOF TANKS 2.NON PRESSURE FIXED ROOF TANKS WITH INTERNAL FLOATING ROOF 3.LOW PRESSURE FIXED ROOF TANKS WITH ATMOSPHERIC TANKS 1.FLOATING ROOF TANKS 2.NON PRESSURE FIXED ROOF TANKS WITH ATMOSPHERIC VENTS
<u>CLASS "C" (FLASH PT. ABOVE 65.6 °C)</u> DIESEL OILS, GAS OILS, MEDIUM AND HEAVY FUEL OILS, LUBRICATING OILS, WAXES, ASPHALTS, ETC.	2.NON PRESSURE FIXED ROOF TANKS WITH ATMOSPHERIC VENTS TANKS WHICH CONTAIN HEAVY FUELS, WAXES, ASPHALTS ETC. ARE INSTALLED AND HEATED.
<u>NATURAL GASOLINE</u>	FLOATING ROOF TANKS ,PRESSURE TANKS SPHEROIDS , SPHERES: DEPENDING OON VAPOUR PRESSURE.
<u>LPG BUTANE.PROPANE</u>	SPHERES,"BULLET"
<u>VOLATILE PRODUCTS.</u> LOW THROUGHPUT FOR VAPOR CONSERVATION ON EXISTING TANK	LIFTER ROOFS .VAPOR DOMES AND VAPOR SPHERES

REFERENCES

1. STORAGE AND HANDLING OF PETROLEUM LIQUIDS PRACTICE & LAW" JR. HUGHES
2. PETROLEUM PROCESS HANDBOOK" WF BLAND & R.L.DAVISON. McGRAW-HILL

¹ This table needs further verification and revisions.

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[Table 2. Approximate Reid Vapor Pressure of Petroleum Liquids](#)

PETROLEUM LIQUID	REID VAPOR PRESSURE	
	LB F/IN ² ABS	EQUIV. BAR ABS
PROPANE	190	13.1
BUTANE	52	3.59
CRUDE OIL (AS USUALLY SHIPPED)	1 - 12	0.07 - 0.83
MOTOR GASOLINE	6 - 12	0.41 - 0.83
AVIATION GASOLINE	5.5 - 7	0.38 - 0.48
CATALYTIC REFORMATE	4 AND ABOVE	0.28 AND ABOVE
AVIATION TURBINE FUEL	2 - 3	0.14 - 0.21
SPECIAL BOILING POINT SPIRITS AND CERTAIN LIGHT DISTILLATES	1 - 4	0.07 - 0.28
KEROSENE ,EHITE SPIRIT, TRACTOR VAPORIZING OIL.	0.05 - 0.5	0.003 - 0.034
GAS OIL, DIESEL OIL HEAVY FUEL OILS, LUBRICATING OILS, WAXES, ASPHALT, ETC	BELOW 0.1	BELOW 0.007

[REFERENCE](#)

["STORAGE AND HANDLING OF PETROLEUM LIQUIDS. PRACTICE AND LAW", J.R. HUGHES.
PUBL. CHARES GRIFFIN &Co.](#)