

Manway Is Not Only Man Way

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Introduction

Manways seem to be simply big nozzles on the vessel which are used during plant maintenance for entering equipment. Other than being door for vessel visitors, they have other functions which ensure safety of operator while working inside the vessel as well. Hence providing enough manways in correct size and location is important. This note reviews the purpose of manways, the importance of putting adequate number on them, their location and size.

Manways Importance

Manways are mainly used to provide access to different compartments of vessel for inspection, maintenance and cleaning. It is also used for installing and removal of internal parts, therefore if vessel internals hinder the access to the particular part of the vessel, manway should be provided for that compartment. This note usually appears on vessel datasheet "The design of vessel internals should meet easy removal of all them during maintenance through manway".

Manways are also provided to supply fresh air to the operator who is working inside the vessel. This is very vital for vessels in dirty, corrosive, toxic and sludgy hydrocarbon services and those handling particulate matter or volatile compounds which may deposit on the internals and contaminate the air by continuous gas emission. Cleaning equipment by use of steam (steam-out) prior to vessel entry can minimize the risk of being exposed to such hazardous conditions inside the vessel but steam is not always available in all plants.

And ultimately manways are needed to provide escape path within couple of meter from the place where operator works inside the vessel.

Manways Number, Size and Location

Manways are normally minimum 24" if they are used for vessel entry. Getting into the vessel even through 24" manway is not easy. Smaller man ways (18" and 20") may be used because only for inspection (without entry). Number of manways can be determined according to the followings guidelines:

- **Vessels**

One man way should be provided for vessel every 6 to 10 m.

For vessels with length/height higher than 10m, one manway should be provided every 6-10 m.

If vessel is equipped with internals (baffle, plate pack, coalescing mat, etc.) one manway should be provided for each compartment. If compartment length is more than 10m, manway should be provided every 6-10m.

- **Columns**

Manways should be provided at the top, below the bottom tray, at the feed tray.

Manways should be provided at any other tray at which removable internals are located.

Manways should also be provided at intermediate points so that the maximum spacing of manways does not exceed 15 trays.

Tray spacing where manway is provided between trays should be at least 900 mm.

For packed columns, one man way is required at top and bottom of each packed bed.

- **Hand Hole / Flanged Head**

For vessel with diameter less than 1000 mm with no internal, hand holes are usually provided. Recommended hand hole size is 8". This kind of vessels are also provided with flanged head if they have some internals like inlet device, plate pack, wire mesh which needs to be installed, inspected, maintained or removed. Filters are one of the most common equipment in this category.

For vessel with diameter less than 1000 mm with no internal in hydrocarbon service, it is good practice to provide flanged head for inspection.

- **Ventilation Nozzle**

To provide natural air circulation (ventilation) in vessels, an additional manway(s) should be provided on top of vessel for installing blower/fan to draw the air from other open manways into the vessel. Ventilation nozzles have been seen in a wide range of size from 6" to 24" depending on project specifications and Client requirement.

For vertical vessels with height less than 4 meters, ventilation nozzle may not be required. For longer vessel, a 12" nozzle on

top of vessel may be adequate.

For horizontal vessels, it is proposed to put first manway on vessel head and provide one manway every 6 to 10m depending on project requirement to supply air all along horizontal vessel. Ventilation nozzles/manways have to be on top of vessel. Ventilation nozzle can be put between two shell manways. Depending on vessel diameter and distance between two adjacent side manways, the ventilation nozzle size can vary from 12” nozzle to 24” manway. As a general recommendation, if the volume between two adjacent shell manways is more than 100 m³, one 24” ventilation manway is required between them on top of vessel. If the volume is less than 100 m³, one 12” ventilation manway will be sufficient.

• **Tanks**

Number and size of manways for tanks are mainly specified by project specification. In absence of such document, below table may be used.

TANK DIAMETER (m)	SHELL		ROOF			
	All Type of Tanks		Fixed Roof		Floating Roof	
	No	Size (in)	No	Size (in)	No	Size (in)
3 - < 6	1	24	1	20	1	36
6 - < 9	2	24	1	20	1	36
9 - < 12	2	24	2	20	2	36
12 - < 18	1 + 1	24 + 36	2	24	2	36
18 - < 27	1 + 1	24 + 36	2	24	2	36
27 - < 60	2 + 1	24 + 36	2	24	2	36
60	2 + 2	24 + 36	2	24	2	36

For external floating roof tanks, number and size of manways can be specified as shown in above table for fixed and floating roofs.

• **Clean-out Nozzle**

Tanks with possibility of accumulation of sludge at bottom are usually provided with a rectangular clean-out manway minimum 36” high by 48” wide. 48”x 48” opening has been also used if tank material permits.

Example

If project specification dictates one manway every 10m, for a horizontal vessel (ID = 4.0m, T/T = 16.0m) without any compartment manways can be arranged as shown in below figures. There should be ideally no place in vessel where air cannot reach; therefore the first manway has to be preferentially on vessel dish end.

Manways other than ventilation ones are normally located on vessel’s center line. For vessel up to 10m length, one man way on cylinder and one on top (opposite side) is sufficient but for such a long vessel arrangement used in figure 1 or 2 can be used.

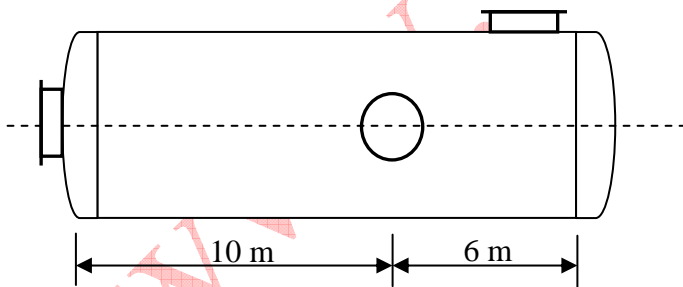


Figure 1 – Horizontal vessel without internal side view (all manway 24”)

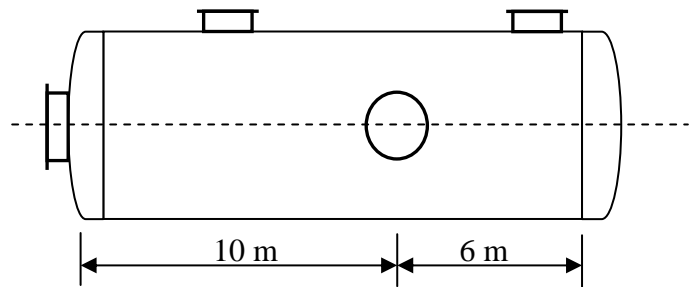


Figure 2 – Horizontal vessel without internal side view (manways 24”, ventilation nozzles 12”)

The arrangement shown in figure 1 ensures that a large fan with high capacity can be installed on top manway to supply enough air throughout length of vessel. The only disadvantage of this arrangement is that air may be circulated between closest side and top manways (farther manway is likely to be bypassed).

The arrangement depicted in figure 2 is better with respect to air circulation but number of nozzles are more.

Contact

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