APPENDIX F

VESSEL NOMENCLATURE

Types of Vessels

Shop-Fabricated Pressure Vessels

1. Process vessels
   a. Trayed columns
   b. Reactors
   c. Packed columns
2. Drums and miscellaneous vessels
   a. Horizontal
   b. Vertical
3. Storage vessels
   a. Bullets
   b. Spheres

Field-Fabricated Pressure Vessels

- Any of the above listed vessels can be field fabricated; however, normally only those vessels that are too large to transport in one piece are field fabricated.
- Although it is significantly more expensive to field fabricate a vessel, the total installed cost may be cheaper than a shop fab that is erected in a single piece due to the cost of transportation and erection.
- There are always portions of field fab vessels that are shop fabricated. These can be as small as nozzle assemblies or as large as major vessel portions.

Classification of Vessels

Function: Type of vessel, i.e., reactor, accumulator, column, or drum
Material: Steel, cast iron, aluminum, etc.
Fabrication Method: Field/shop fabricated, welded, cast forged, multi-layered, etc.
Geometry: Cylindrical, spherical, conical, etc.
Pressure: Internal, external, atmospheric
Heating Method: Fired or unfired
Orientation: Vertical, horizontal, sloped
Installation: Fixed, portable, temporary
Wall Thickness: Thin/thick walled
Example: Vertical, unfired, cylindrical, stainless steel, heavy-walled, welded reactor for internal pressure

Vessel Parts

Vessel Heads (End Closures)

1. Types
   a. Hemi
   b. Elliptical
   c. Torispherical (flanged and dished)
   d. Conical, toriconical
   e. Flat (bolted or welded)
   f. Misc. (flanged and flued)
   g. Spherically dished covers
   h. Closures (T-bolt, finger pin, quick opening)
2. Types of manufacture
   a. Pressed
   b. Spun
   c. Bumped
   d. Forged
   e. Hot or cold formed
3. Terminology
   a. Knuckle radius
   b. Crown radius
   c. Dished portion
   d. Straight flange

Vessel Supports

1. Types
   a. Skirt (straight or conical)
   b. Legs (braced or unbraced)
   c. Saddles (attached or loose)
   d. Rings
   e. Lugs
   f. Combination (lugs and legs, rings and legs, rings and skirt)

Nozzles

1. Types
   a. Integrally reinforced
   b. Built-up construction
   c. Pad type (studding outlet)
   d. Sight glasses
   e. Elliptical manways

2. Types of service
   a. Manways
   b. Inspection openings
   c. PSV
   e. Instrument connections
   d. Vents
   f. Drains
   g. Process connections

Flanges

1. Types
   a. Slip on
   b. Weld neck, long weld neck
   c. Lap joint
   d. Blind
   e. Screwed
   f. Plate flanges
   g. Studding outlets
   h. Reverse-type flange
   i. Reducing flange
   j. Graylock hub connector
   k. Socket weld
2. Flange Facing
   a. Flat face
   b. Raised face
   c. Finish (smooth, standard, serrated)
   d. Ring joint
   e. Tongue and groove
   f. Male and female

Gaskets

1. Types
   a. Ring, nonasbestos sheet
   b. Flat metal
   c. Spiral wound
   d. Metal jacketed
   e. Corrugated metal
   f. Rings (hexagonal or oval)
   g. Yielding metal gaskets (lens ring, delta ring, rectangular ring)
   h. Elastomeric (rubber, cork, etc.)

Internals

1. Types
   a. Trays, seal pans
   b. Piping distributors
   c. Baffles
   d. Demisters
   e. Packing
   f. Liquid distributors
   g. Vortex breakers
   h. Bed supports
   i. Coils

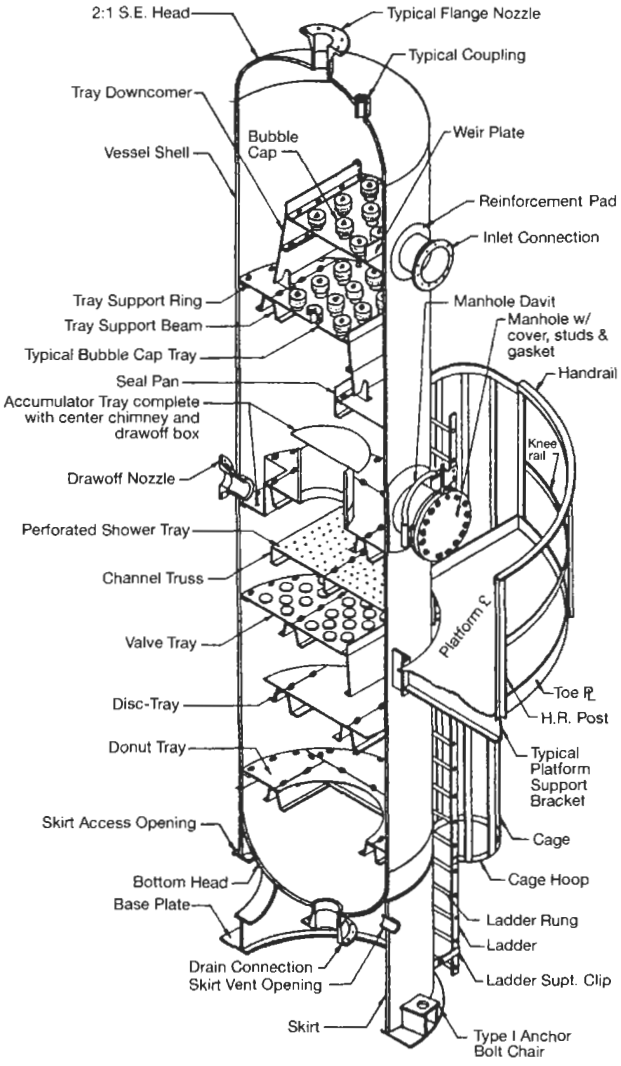

Figure F-1. Typical trayed column.

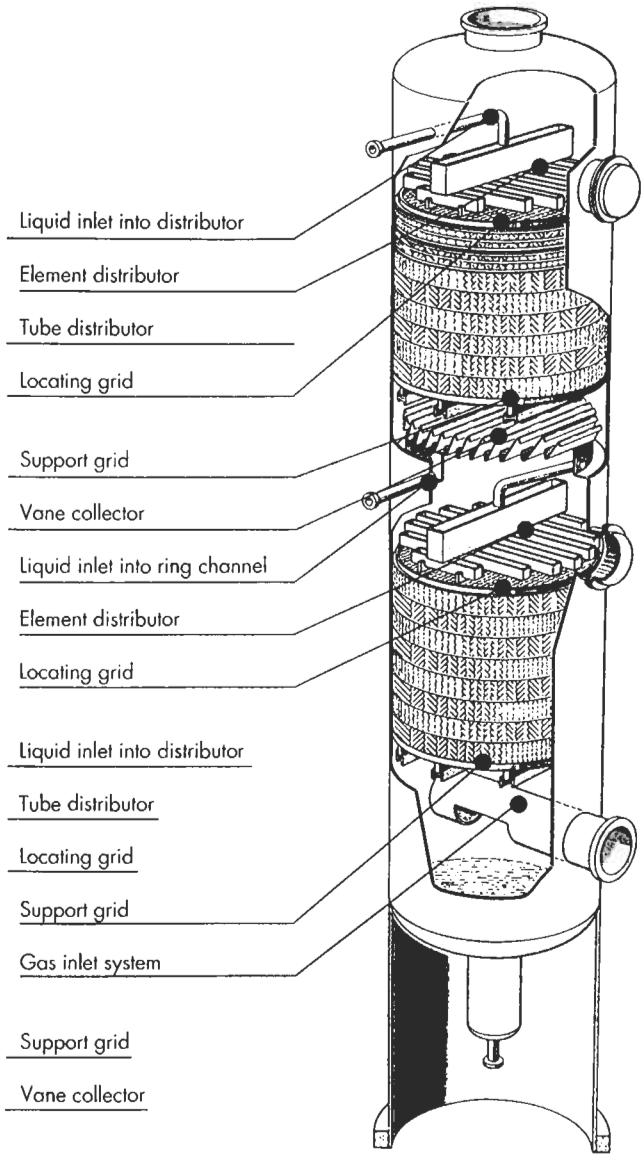

Figure F-2. Typical packed column.

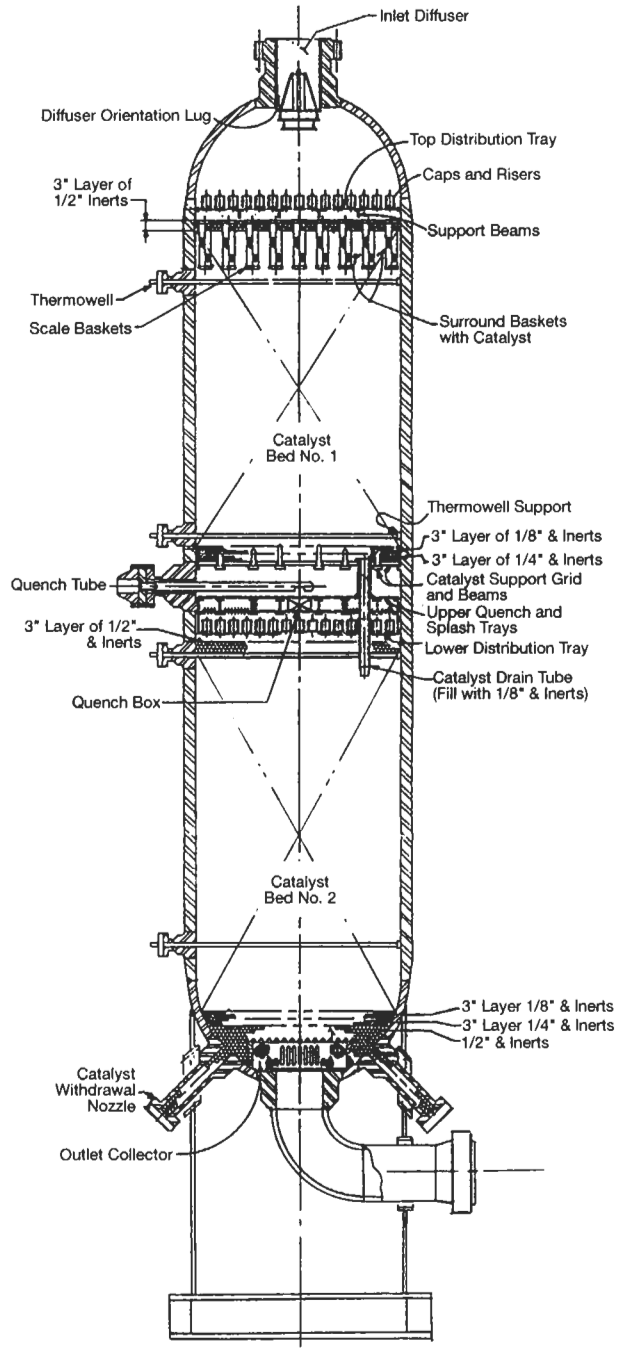

Figure F-3. Typical reactor internals.

Glossary of Vessels Parts

Anchor Bolt Chairs: Gussets and plates welded to base plate and skirt to provide for anchor bolt attachment.

Anchor Bolts: Bolts embedded in concrete foundation and bolted to vessel anchor bolt chairs.

Base Plate: Flat plate welded to the bottom of vessel supports and bearing on the foundation.

Chimney Tray: A tray composed of chimneys extending above the liquid level of the tray, permitting passage of the vapors upward. The tray collects and removes all liquid product from a specific portion of the vessel.

Column Davit: A hoisting device attached by means of a socket to the top of fractionation columns. Used for handling relief valves, bubble trays, bubble caps, etc.

Conical Head: Head formed in the shape of a cone.

Coupling: A fitting welded into the vessel to which the piping is connected either by screwing or welding. This type of fitting is generally used for pipe sizes 1½ in. and smaller.

Distributor Tray: A perforated tray that provides equal distribution of liquid over the vessel area. Risers on the tray extend above the liquid level to permit passage of vapors rising upward.

Downcomers: Rectangular flat plates bolted, welded or clamped to shell and trays inside of fractionation columns. Used to direct process liquid and to prevent bypassing of vapor.

Flanged and Dished (Torispherical) Head: Head formed using two radii, one radius called crown radius, and another called knuckle radius, which is tangent to both the crown radius and the shell.

Flanges (or Pipe Flanges): Fittings used to connect pipes by bolting flanges together.

Flat Head (or Cover Plate): Flat plate welded or bolted to the end of a shell.

Fractionating Trays: Circular flat plates bolted, welded or clamped to rings on the inside of fractionation columns. Used to obtain vapor liquid contact, which results in fractionation.

Head: The end closure of a vessel.

Hemispherical Head: Head formed in the shape of a half sphere.

Insulation Rings: Rings made of flat bar or angle attached around the girth (circumference) of vertical vessels. Used to support the weight of the vessel insulation.

Ladders and Cages: Rung-type ladders with cages built of structural shapes to prevent a man from falling when climbing the ladder. Bolted to and supported by clips on the outside of the vessel. Used for vertical access to the platforms.

Manhole Hinges or Davits: Hinges or davits attached to manhole flange and cover plate which allow cover plate to swing aside from the manhole opening.

Mist Eliminator (or Demister): A wire mesh pad held in place between two light grids. The mist eliminator disengages liquids contained in the vapor.

Nozzle: Generally consists of a short piece of pipe welded in the shell or head with a flange at the end for bolting to the piping.

Pipe Supports and Guides: Supports and guides for attached piping that is bolted to clips, which are welded to the vessel.

Platforms: Platforms bolted to and supported by clips on the outside of the vessel. Generally located just below a manhole, at relief valves, and other valves or connections that need frequent service.

Reinforcing Pad: Plate formed to the contour of shell or head, welded to nozzle and shell or head.

Saddles: Steel supports for horizontal vessels.

Seal Pans: Flat plates bolted, welded, or clamped to rings inside of fractionation column shell below downcomer of lowest tray. Used to prevent vapor from bypassing up through the downcomer by creating a liquid seal.

Shell: The cylindrical portion of a vessel.

Skirt: Cylinder similar to shell, which is used for supporting vertical vessels.

Skirt Access Opening: Circular holes in the skirt to allow workers to clean, inspect, etc., inside of skirt.

Skirt Fireproofing: Brick or concrete applied inside and outside of skirt to prevent damage to skirt in case of fire.

Skirt Vents: Small circular holes in the skirt to prevent collection of dangerous gases within the skirt.

Stub-end: A short piece of pipe or rolled plate welded into the vessel to which the piping is connected by welding.

Support Grid: Grating or some other type of support through which vapor or liquid can pass. Used to support tower packing (catalyst, raschig rings, etc.).

Support Legs: Legs made of pipe or structural shapes that are used to support vertical vessels.

Toriconical Head: Head formed in the shape of a cone and with a knuckle radius tangent to the cone and shell.

2:1 Semielliptical Head: Head formed in the shape of a half ellipse with major to minor axis ratio of 2:1.

Vacuum Stiffener Rings: Rings made of flat bar or plate, or structural shapes welded around the circumference of the vessel. These rings are installed on vessels operating under external pressure to prevent collapse of the vessel. Also used as insulation support rings.

Vessel Manhole: Identical to a nozzle except it does not bolt to piping and it has a cover plate (or blind flange), which is bolted to the flange. When unbolted it allows access to the inside of the vessel. Generally 18 in. or larger in size.

Vortex Breaker: A device located inside a vessel at the outlet connection. Generally consisting of plates welded together to form the shape of a cross. The vortex breaker prevents cavitation in the liquid passing through the outlet connection.