Chemical Engineering Knowledge Base: Search Results

Next
Back to record list
Record 1 of 3

| Home | Add | Search | Delete | Modify | List All | Admin | Log Off |
Contact the database administrator

ID: 98

Date: 2000-09-24

UserID: admin

Category: Equipment Design

Question: How do I design a vapor-liquid separator or a flash drum?

Answer: The size of a vapor-liquid separator should be dictated by the anticipated f vapor and liquid from the vessel. The following sizing methodology is base assumption that those flow rates are known.

Use a vertical pressure vessel with a length-to-diameter ratio of about 3 t the vessel to provide about 5 minutes of liquid inventory between the norr level and the bottom of the vessel (with the normal liquid level being at ab vessel's half-full level).

For the maximum vapor velocity (which will set the vessel's diameter), us equation:

$$V_{max} = (k) [(d_L - d_V) / d_V]^{0.5}$$

where:
V_{max} = maximum vapor velocity, ft/sec
d_L = liquid density, lb/ft3
d_V = vapor density, lb/ft3
k = 0.35 (when the vessel includes a de-entraining section)

The vessel should have a vapor outlet at the top, liquid outlet at the botto inlet at somewhat above the half-full level. At the vapor outlet, provide a mesh section within the vessel such that the vapor must pass through tha before it can leave the vessel. Depending upon how much liquid flow you liquid outlet line should probably have a level control valve.

As for the mechanical design of the vessel (i.e., materials of construction, thickness, corrosion allowance, etc.), use the same methodology as for an

vessel.

Also see the following references:

1. "Design Two-Phase Separators Within the Right Limits", W.Y. Svrcek an Monnery, Chemical Engineering Progress, October 1993

2. "Successfully Specify Three-Phase Separators", same authors, Chemica Progress, September, 1994.

3. Vapor-Liquid Separator Design Spreadsheet (Linked below)

Links: ChE Plus Subscribers - Vertical-Liquid Separator Sizing

Further Info: Google HTML Search for: vapor liquid separator sizing
Google PDF Search for: vapor liquid separator sizing