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Detecting Column Distributor Defects

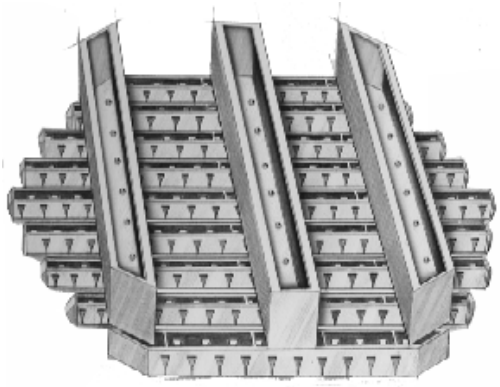
In the design of a packed column, even the most thoughtful design has no chance of success without properly distributed liquid flowing down through the tower. Before even beginning, ask yourself two questions about the liquid:

1. Are there currently (or is there the potential for) solids being present?

2. Will there be any vapor present in the liquid upon entry to the column

Examining Question #1

Seems like an easy questions to answer. However, simple inquiry is not sufficient. First, take a sample of the stream and examine it closely for solids that may already exist. For new installations, try to examine all conceivable ways that solids may be present. Remember to think about rust, catalyst fines, polymerization, precipitation, and biological growth. When possible, filter the liquid feed to the column. Most importantly, report your final assessment to the column supplier.



Examining Question #2

It's not sufficient to merely determine if the feed stream in the pipe is single or two-phase, however that is an obvious starting point. If the feed stream is found to be all liquid, then perform a flash calculation for when the feed enters the column. Remember that the presence of vapor in the feed will increase its velocity thus the distributors must be designed for this condition. Again, report your findings to the column supplier.

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Now, along with the normal specifications that are needed, you have given the tower supplier every opportunity to succeed at designing and manufacturing a packed tower that will work flawlessly. Will they succeed? In short…..no! Now, is this because the supplier is incompetent? Not at all. It's because predicting such complex hydraulics is nearly impossible. To combat this, after fabrication is complete, every distributor should be water tested at the supplier's shop. **To emphasize, EVERY distributor should be tested.** Even if they appear to be identical, they are not.

In his October 1999 article in *CEP Magazine* entitled "Detect Distributor Defects Before They Cripple Columns", Mr. Fred Olsson goes so far as noting:

"VERY FEW DISTRIBUTORS HAVE PASSED WATER TESTS WITHOUT MODIFICATIONS (ZERO, THAT I'M AWARE OF)"

When witnessing the water testing, observation is naturally key. Notice where the water actually goes versus where it is supposed to go over the entire design flow range. Take quantitative measurements of the liquid flow from the feed pipe, drip points, and any leakage areas.

Following the advice given here will give the best opportunity to install a properly functioning packed column. Remember, the tower cannot do its job if you don't make a reasonable attempt to ensure proper liquid distribution.

Reference:

"Detect Distributor Defects Before They Cripple Columns", Fred Ronald Olsson, *Chemical Engineering Progress Magazine*, October 1999, p. 57.

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