DISTILLATION COLUMN CHECKLIST

There are several important questions that must be answered before designing a distillation column. In "A Stepwise Procedure for Continuous Distillation Column Design," distillation expert Dr. Terry Tolliver summarized the five major steps required in any industrial distillation column design.

Organizing Tolliver's insights, we've created a checklist outlining the top ten questions to ask yourself when reviewing your preliminary distillation column model design.

☐ **Have you selected the correct distillation system for your process?**	Consider the number of chemicals you need to separate and how many stages this will require. A fractionating column is appropriate for separating several components in one column. A continuous distillation system maintains a steady state and is usually used to separate one chemical of interest. Other types of distillation include: steam distillation, vacuum, zone, reactive distillation, catalytic, azeotropic distillation, pervaporation, flash, freeze and extraction distillation.
☐ **Did you use the correct activity coefficients when determining volatility?**	Calculating your coefficients correctly is critical to the success of your project. If you've estimated this yourself, it's a good idea to bring in an outside source to double-check your work.
☐ **Have you selected the correct pressure or vacuum?**	It's important to allow for an appropriate temperature difference between the distillation process and the utility process that occurs within the column. Cooling water, steam supply and hot oil systems all have a bearing on your column operations. Atmospheric or pressure operation of a column is usually less expensive, but vacuum distillation can be more energy efficient.
☐ **Is your process heat sensitive?**	If the answer is yes, go back and verify your pressure requirements. You may have to operate at a lower pressure to avoid discoloration, fouling or decomposition.
☐ **Is your reflux ratio approximately 1.2 times the minimum reflux ratio?**	If yes, you've probably selected the optimal number of stages and the correct feed location. If no, consider if the trade-off between utility usage and the number of stages is optimal.
☐ **Do you have an appropriate superficial vapor velocity selected?**	Superficial vapor velocity has a strong bearing on the distillation column design for diameter and width.
☐ **Are your trays spaced correctly?**	Did you account for flooding, weeping, and poor distribution in your distillation column design? Getting liquid to distribute correctly within the column can be difficult and will affect the purity of your distillation.
☐ **Did you select a packing size that is appropriate to the column diameter?**	Smaller diameters can use smaller packing sizes. Packing has an impact on HETP and pressure drops.
☐ **Does your column height include a sump volume that provides 2-3 minutes holdup at 50% level, based on internal liquid flow from the bottom tray?**	The last two items both affect distillation column size requirements and can contribute to less than optimal separation if performed improperly.
☐ **Do you have vapor space of two column diameters, or two feet (max), at each liquid/vapor distribution point and above the top tray?**	See above comment.