WINTEK
CORPORATION

Inquiry for Biodiesel Dehydration
or
Methanol Recovery System

The following information is required to properly design and price a system to your requirements.
Please complete and fax to 973-252-8233 or email to paul@wintek-corp.com

Customer Information

Customer Name: _____ Title:_____ Date: _____

Company Name: _____ Type of Business: _____

Company Address: _____

City:_____ State: _____ Zip: _____ Country: _____

Email Address: _____

Telephone Number: _____ Cell Number: _____

Fax: _____

Type of Proposal Required? (preliminary, budget, Firm Price)

Date Proposal required? _____

Date expect to select vendors and place orders? _____

Date equipment needed on site? _____

Requirements (see notes on following page)

	Feed Oil Dehydration	*MeOH removal from **Biodiesel***	*MeOH removal from **Glycerin***	*Biodiesel Dehydration*
****Flow Rate to Wintek (gpm)**				
****Starting Concentration % (specify wt or vol %?)**	% water	% MeOH	%MeOH	% water
****Requirement: maximum remaining wt% or ppm(wt)?**	% water	% MeOH	%MeOH	% water
Any vapor emissions limitation?				
Other components in feed?				
Does feed contain solids? (explain)				
Is feed corrosive?				
Feed temperature? (^{o}C or ^{o}F ?)				
Materials of Construction required? (Stainless or Carbon Steel)?				

Items marked with ** must be specified.

Heating Source?	(Steam, Hot Oil, Hot Water)?
Heating Supply Temperature? (^{o}C or ^{o}F ?)	
Maximum Cooling or Chilled Water Temperature?	
Type of coolant? % EG or % PG	
Other cooling water temperature available?	
Instrument Air Supply Pressure? Psig	
Electrical	__ ph, ____ Hz, _____ Volts
Area Electrical Classification and Division?	
Who is to supply control system?	Wintek or Customer?

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Notes:

"Excess Methanol" Vs "Methanol % in biodiesel and glycerin" after separation.

After separation, the **Biodiesel** typically will contain 2-7vol% un-reacted methanol, which is 35-40% of the total *Excess Methanol* added to the reaction.

After separation, the **Glycerin** typically will contain 20-55vol% un-reacted methanol, which is 60-65% of the total *Excess Methanol* added to the reaction.

A biodiesel reaction for full completion, requires ~12.9vol% Methanol; so 1000 liters of oil, requires addition of 129 liters of methanol = 129/1000 = 12.9% for a total batch of 1129 liters.

This volume will make: 1000 liters of biodiesel, plus ~129 liters of Glycerin.

Typically there is an *excess* amount of methanol added to the process to force reaction to completion.

> This excess methanol is what Wintek removes; ***however- how the customer defines (or tries to explain, will make a big difference)***. For example if he says there is 40% extra methanol, is that 40% of the 129 liters, **or** is that 40(vol or wt)% of the total batch of oil of 1000 liters?

The excess methanol divides between the Biodiesel and the Glycerin at ~35-40vol% in biodiesel and 60-65% in the Glycerol.

Example:

So if customer added 100vol% *Excess methanol* 129 liters of which 35% (0.35 x 129= 45.2 liters) goes into the Biodiesel (45.2 / 1045.2 = 4.3vol%). So in this case, the feed to Wintek's removal system would be 4.3vol% methanol in biodiesel. 65% of the Excess Methanol goes with the Glycerin, so 0.65 x 129 = 83.9 liters. 83.9 liters MeOH with 129 liters of Glycerin = 83.9/(129+83.9) = 39.4vol%. So in this case, the feed to Wintek's removal system would be 39.4vol% methanol in the Glycerin.

Methanol *Removal* vs Methanol *Recovery*

Although most manufacturers supply an integrated system to *Remove* and *Recover* the excess methanol, there is a big difference between methanol *removal* and methanol *recovery*. The customer should clearly understand what *his* objectives are because these are two different objectives, and the design of each of these operations are separately affected. Typically a biodiesel manufacturer is primarily concerned with the *removal* step, because it is this step which gives him a saleable biodiesel product. The *recovery* step affects the customers cost of operation (and emissions), because the amount recovered methanol can typically be reused in the process.

The ***removal*** is how much needs to be removed from the biodiesel or the glycerin to meet the customers' requirements, and is usually specified in the maximum allowable % that can remain. This step is usually done separately on the biodiesel and glycerin after separation, although removal can performed on the combined stream prior to a centrifuge separation.

> Note: By removing and recovering the methanol prior to a water wash, the methanol can be recovered in relatively pure form with a "simple to operate system". If the removal of the methanol is to be performed after a water wash, the resulting condensate is a mix of methanol and water, which requires a distillation column (much more complex in design, cost and operation).

In biodiesel, the amount of methanol allowable in final biodiesel product is dictated by ASTM by Flash point. However, this is *after* the water wash, if used, (which picks up the final traces of methanol and other impurities). In the initial methanol removal step (after separation, but prior to a water wash) a typical maximum allowable remaining is 0.5- 0.1wt%. However to meet the ASTM flash point requirement of 130^{o}C, a final concentration of less than 0.08 wt% is required.

Note: the removal system design (and cost) is greatly affected by this customer specified %. The design/cost is significantly different if the specification allows 0.2wt% methanol remaining vs 0.05wt% methanol remaining.

Methanol **Recovery** is condensing/collecting the methanol which was removed from the biodiesel or glycerin. By recovering the methanol without water, this can then be reused in the process. Typical recovery rates is to recover 93-97wt% of the *removed methanol*. Wintek always designs to "recover as much methanol as practical". The "recover as much methanol as practical" design is governed by the temperature of the available cooling water or chilled water – the colder the better, but is also affected by the *removal requirement* (a very stringent *removal* requirement may reduce the recovery efficiency) . Also, if the customer has an environmental limitation on vapor emissions, then the design of the recovery system may be more complex.

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