



MIXING INSTRUCTIONS FOR FLASH 21 FUEL GELLING AGENT USING ETHANOL BLENDED FUEL MIXTURES

When conducting gel mixing operations with Flash 21 and ethanol blended gasoline, it will be necessary to add a certain amount of fresh water to the fuel mixture after mixing in the Flash 21 gelling agent.

Water molecules serve to “tie” the organic component (i.e. ethanol) in the fuel and will then allow the gelling process to take place. Normally, it will also be required to increase the quantity of the Flash 21 product to the mixture in order to complete the gelling process when mixing with ethanol blended gasoline.

The amount of fresh water and Flash 21 required will depend on the specific type of mix ratio (i.e. Diesel or Jet A to Gasoline), type of equipment used, and the specific percentage of ethanol that is present in the source fuel. Operational results will vary, and some initial trials may be required in order to “prime” the system and dial in the exact ratios for your particular operation. Below, are some general guidelines:

NOTE: Before attempting any mixing with Flash 21, you must first completely flush out any previously gelled product (non-Flash 21) from your existing mixing system – including all mixing equipment (batch mixers), supply lines, and the delivery equipment - heli or terra torch, etc. Flush out as much of the previously mixed, non-Flash 21 gel products as possible before proceeding to mix with Flash 21.

- 1) Depending on your preferences in terms of gelled fuel ignition and burning properties (“volatility”), you first should determine the ratio of diesel or Jet A fuel (for example) to ethanol blended, unleaded gasoline. Most operators prefer a 50/50 mixture at the high end, or perhaps a 60/40 or 70/30 mixture of diesel fuel to gasoline, as a percentage mixture ratio.
- 2) Next, determine the amount of ethanol in the overall mix by percentage. Is the gasoline 2%, 3%, 5%, or 10% ethanol content? Many times this number is not exactly known. Lower ethanol content will require less water to tie up the ethanol in the mix. Best gel properties will be observed at lower water concentrations, however for ease of application, a good rule of thumb is to add 5% water based on the ethanol blended fuel content percentage (see example below).

If your fuel vendor cannot establish the percentage for sure, then it may be best to assume the LOWEST amount by percentage you think it may be and start from there. In the example below, if 5% is used as a baseline, then the amount of water required would be 1 US Gallon.

- 3) You must “tie up” the amount of ethanol in the fuel with the equivalent amount of fresh water. For example:

QUICK METHOD: For a 30 gallon diesel (non bio) to 20 gallons of (presumed) 5% ethanol unleaded gasoline mixture, you are going to need to add 1 U.S. gallon of fresh water to the mixture AFTER adding the Flash 21. ($20 \times 5\% = 1$ gallon)

OPTIMIZED METHOD: If you have the time to make some trial batches, for the same 20 gallons of gasoline in the example above, start with a presumed 3% ethanol content and add water from there until you have the optimal gel mix. So: $20 \text{ Gallons} \times 3\% = .60$ gallons of water. Add .30 gallons of water after the Flash 21 (A and B parts) is in the mixture and allow that to mix in for 10-20 seconds. Add the second half of the water, or another .30 gallons if the mixture viscosity is still not thick enough and test your resulting product.

- 4) When you have made the above calculations and you are ready to mix, add Flash 21 A to the fuel mix – allow the mixer to run 10-20 seconds
- 5) Then add Flash 21 B – allow the mixer to run 10-20 seconds

In the example mixture above, it will likely be necessary to add approximately 1.5 the standard amount of Flash 21 in order to achieve a consistent viscosity gelled product. So, 1.5 bottles of Flash 21 A and 1.5 bottles Flash 21 B in the example (50 US gallon total mix) noted above.

- 6) Add Fresh Water (tap water may be fine, but bottled water is preferred if available) - allow the mixer to run until you have a consistent gelled product.

NOTE: Finished “gelled product” viscosity will vary based on several factors – from the consistency of a “honey like” fluid to a thicker “jelly like” fluid depending on a few key variables. Gel times should be from as quickly as 1 minute, to upwards of 5 minutes based on the fuel temperature at the time of mixing.

- 7) As noted above, it will very likely be necessary to increase the amount of Flash 21 product (both parts “A” and “B”) when mixing with ethanol content fuel sources. As a general rule:

-Add 1.5 times the amount of Flash 21 normally required for non-ethanol mixing, when using ethanol blended gasoline at 2%, 4%, and 6% content. This will produce a “honey like” consistency product. Add 2.0 times the Flash 21 for a thicker “jelly like” gelled product with the same ethanol percentages noted above.

-Add 2.0 times the amount of Flash 21 normally required for non-ethanol mixing, when using ethanol content gasoline at 8% or 10% content for the “honey like” consistency. Use 3.0 times the Flash 21 for a thicker “jelly like” product at these ethanol content percentages.

Other Notes:

Testing has shown, that even after 2 weeks of “aging”, the Flash 21 mixed gel product will retain its consistency with little effort except for a quick remixing or recirculating of the batch. You may see separation of the water/ethanol component from the overall mixture within a few hours after your initial mixing procedure. This is normal, and a recirculation of the batch will take care of the separation and provide for a consistent viscosity throughout the operational period.

If the ethanol component by percentage in the gasoline is not known, it is best to start at the lower end of the spectrum and work your way up in terms of water content. Too little water will not allow the product to gel properly, and too much water content will leave too much “free water” in the mixture and may negatively affect ignition and burn properties of the final gelled product. If the initial mixtures are too thin, slowly add a set amount of water to the overall mixture to tie up more of the ethanol. This can be done after the Flash 21 product is already in the mix. Keep track of your results until the total amount of water and Flash 21 added provides the proper gel characteristics for your operation.

High percentage ethanol component fuels such as “E85” (85% ethanol content gasoline) will not gel properly and should not be used.

The above information is a general recommendation only. Specific individual results may vary based on a number of variables. Please contact Type One for more details and assistance with your particular operation.

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