



# CompressedAirFoam.com

## **Welcome to CompressedAirFoam.com**

CompressedAirFoam.com is an instructional organization. We are organized to promote a focused effort to deliver accurate information about the benefits and usage of Compressed Air Foam Systems. Our intent is to convey industry knowledge in an objective way to allow for pressure free education on this modern-day method of firefighting.



# Foam Equipment Selection

The spec'ing and purchasing of a Foam / CAFS equipped apparatus can be a daunting endeavor that keeps apparatus committee members awake at night. Just when they think they've got everything lined up and all the decisions made, along comes additional information that brings up more questions and more contentious discussions accompanied by possibly unanticipated expenditures.

These CompressedAirFoam.com presentations should help clarify some of the additional hardware and foam concentrate products that will be required to make your Class A foam capable apparatus operate safely and to its maximum capability. It is highly recommended that you include ***certified Foam / CAFS on-site instruction*** in your apparatus specifications.

Without a doubt these decision processes will generate additional questions. That being the case, we encourage you to reach out to CompressedAirFoam.com personnel who are globally considered "Subject Matter Experts" in the Class A foam and CAFS world.

**We're here for you!**

# Compressed Air Foam System Nozzle Selection

- Currently there is **NOT** a single “Do all, Be all” Smooth Bore foam nozzle on the market! There are numerous tactical uses for Class A foam and many of these require specific nozzle types to maximize the benefits of Class A additives. A few common uses are:
- Gross Decontamination on the scene.
- Fire ground operations with CAFS Smooth Bore nozzles in concert with “Nozzle Aspirated Foam Systems” (NAFS).
- Pretreatment of various Class A fuel types with CAFS.  
( Structural, Wildland & WUI )
- All fire ground operations with “Compressed Air Foam Systems”
- Use of “Air Only” for pneumatic tools, water and ice rescue or wildland work such as cutting line or firing operations.

**The following primer will introduce CAFS capable nozzles:**



# CompressedAirFoam.com

Presents

**CAFS Smooth Bore Nozzles**

**Principles and Applications**



# Why “Old School Nozzles” on new technology?

- Basically... many types of equipment serve the same purpose yet have drastically different results i.e. -



Head Protection



Nozzles



**Proper equipment selection will make or break your CAF fire attack!**

# CAFS Smooth Bore Nozzle Selection

- **Fog Nozzle** – Designed to break a solid stream of water into smaller droplets to increase surface area per gallon. This mechanism also *destroys* CAF bubbles.
- **Smooth Bore** – Designed to shape stream and via bore diameter to alter the consistency and types of foam. Increased surface area is accomplished by the bubbles, which pass smoothly through the bore.



# CAFS Smooth Bore Nozzle Selection

- Some of the most *basic principles* for CAFS nozzle selection are:
  1. *Anything* that gets in the way of the stream, after leaving the hose, is going to pop bubbles and cause degradation of the surface area being generated... PERIOD. This includes any components within the nozzle. This bubble destruction is known as “Stripping”.
  2. The *larger* the nozzle orifice = “*Dryer*” foam capabilities for fuels protection.  
The *smaller* the nozzle orifice = “*Wetter*” foam capability for suppression.
  3. Each attack line *hose diameter* has a specific “Flow Rate” operating range and different corresponding tip sizes that change the foam types (wet -vs- dry).

# CAFS Smooth Bore Nozzle Evaluation

- Beware the statement that “CAF will go through any nozzle”. Indeed, it will. The question that should then be asked is “What product is then going to be discharged from that nozzle” CAF or has it been “Stripped” back to foam solution?
- CAF bubbles are generated in the hose, not in the truck or nozzle. So again... Anything that impacts the CAF bubbles, including nozzle components, prior to hitting the target will *destroy* the CAF bubbles resulting in *lost surface area, thus lost effectiveness of the firefighting product*.
- We recommend evaluating nozzles side by side onto real world targets such as wood siding, vehicles and typical wildland / WUI fuels. Observe the different foam / bubble qualities and drain times. Spraying it on grassy station yards or asphalt parking lots gives you very limited data, but it does clean up the area.



# CAFS Smooth Bore Nozzle Evaluation

Side by side comparison of a variety of nozzles will show variations in stream quality, bubble type, reach, break over and nozzle reaction. Ensure testing is at equal pressures and flow rates and all bore sizes are the same.





## CAFS Smooth Bore Nozzle Selection

- Having the ability to quickly and easily change nozzle orifice sizes and other applicators on the fire ground via a “Break-a-Part Nozzle” may be a tactical advantage and good use of manpower but is not a *requirement*. Each has advantages and disadvantages.





# CAFS Smooth Bore Tip Selection

- As you chose different diameters of hose line to achieve your flow rate needs so should the smooth bore tip diameters change. The old school rule of thumb for smooth bore water flows is applicable with CAFS as well: Tip sizes should be approximately  $\frac{1}{2}$  the hose line diameter. ( Freeman Ratio )



- Easy starting point for **WET CAF!**  
*Check with your CAFS OEM for any specific tip size recommendations. Ask for their reasons for recommending specific sizes.*

# Nozzle Selection Affects Foam Type

- Smooth Bore Tip's:
  - CAFS “Flow Rates” must be programmed with proper sized nozzle & hose diameter *prior* to the fire call.
  - Flow rates can be programmed using electronic discharges or “Cheater Marks” on the pump panel discharge actuators. This prevents the engine operator from chasing the GPM numbers and allows for consistently reproducible foam production with the various foam types.
  - Changing *foam types* via GPM increase or decrease also requires changing Tip Sizes for greatest effect. This requires clear communication between the nozzle operator and engine operator.
    - This rule of thumb applies to *all* CAF discharges and all flow rates. From 1.0-inch wildland lines to elevated master streams.



# CAFS Smooth Bore Nozzle Operation

- Safety:
  - How to *safely* operate a CAFS smooth bore nozzle:
  - Due to the increased horsepower of CAF lines ( Thus Nozzle Reaction ), it is recommended to utilize a “Pistol Grip” equipped nozzle.
  - *Always* keep both hands in control of the nozzle due to a more flexible hose line filled with CAF bubbles.



# CAFS Smooth Bore Nozzle Operation

- Many CAFS instructors will advise you to operate all CAF handlines at approximately 100+ PSI panel pressure. This pressure is not due to the brand of CAF unit, type of foam or pump model. It is due to the fire hose. Most North American departments utilize flexible, collapsible flat loading hose in order to carry as much as possible. This flexibility can cause kinking of the line and loss of adequate flow when the pump is below 100 PSI ( or while using *Dry CAF* ). Always check with your CAFS manufacturer for system specific discharge pressure recommendations.
- Operating above 100 PSI allows the CAF bubbles to recompress and pass by a hose kink. After passing the kink the product then “Scrubs” back into finished foam bubbles with a high surface to mass ratio.
- This PSI rule is specific to CAFS use **in IDLH atmospheres**. PSI may be reduced if desired when operating in safer exterior positions or is OEM recommended.

# CAFS Nozzle Selection - Summary

- The best practice in the creation of the ultimate Class A foam based firefighting product is to utilize a **Smooth Bore** nozzle. The brand and style are personal preferences.
- Selection of the Smooth Bore Tip is based on hose line size, your desired flow rate, desired foam type ( wet -vs- dry ) and flexibility in changing tips / applicators on the fire ground.
- Arrange to have a variety of makes and models available to be evaluated and test flowed on the same day if possible. Video all of them in action and document the performance data for each!
- Contact experienced trainers and users at [CompressedAirFoam.com](http://CompressedAirFoam.com) for further information and tips. **Remember... We're Here For You!**

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## Presents

An Introduction to:

**CAFS Smooth Bore Nozzles**

**Principles and Applications**

