ICAA 2021

BACK IN THE SADDLE

JW Marriott San Antonio Hill Country Resort & Spa | September 23–25, 2021

Spray Foam Applications, When, Where and How.

Setting up the optimal spray foam rig

Agenda

- **Rig Setup**
- **Efficient Spray Techniques and Proper Applications for a variety of conditions, substrates and climate.**
  - Proper Applications: Metal Buildings
  - Proper Applications: TDS
  - Proper Applications: Open Cell
  - Proper Applications: Results of Heat
  - Proper Applications: Results of Cold
  - Proper Applications: Quiz!
- **Maintaining Ratios**
- **Line Flushing**
- **Inspecting Installs**
- Inspecting Installs: What Went Wrong (organize these by too hot, too cold, off-ratio, too wet of surface, improper thickness, etc.)

Setting up the optimal spray foam rig

- Your Spray Foam rig is your money maker.
- They can cost upwards of $250K plus.
- Make sure it is set up to be productive and limit liability.
- And then…. Take care of it.

Setting up the optimal spray foam rig

- From the front fender to the rear bumper you should carefully plan out your rig.
- How far away do you travel?
- Load Capacity?
- CDL requirement's?
- Cabover or Conventional style Cabs?
- Box vs Trailer vs Portable vs ????
- Dual vs Single Rig?
- Commercial or Residential?

Setting up the optimal spray foam rig

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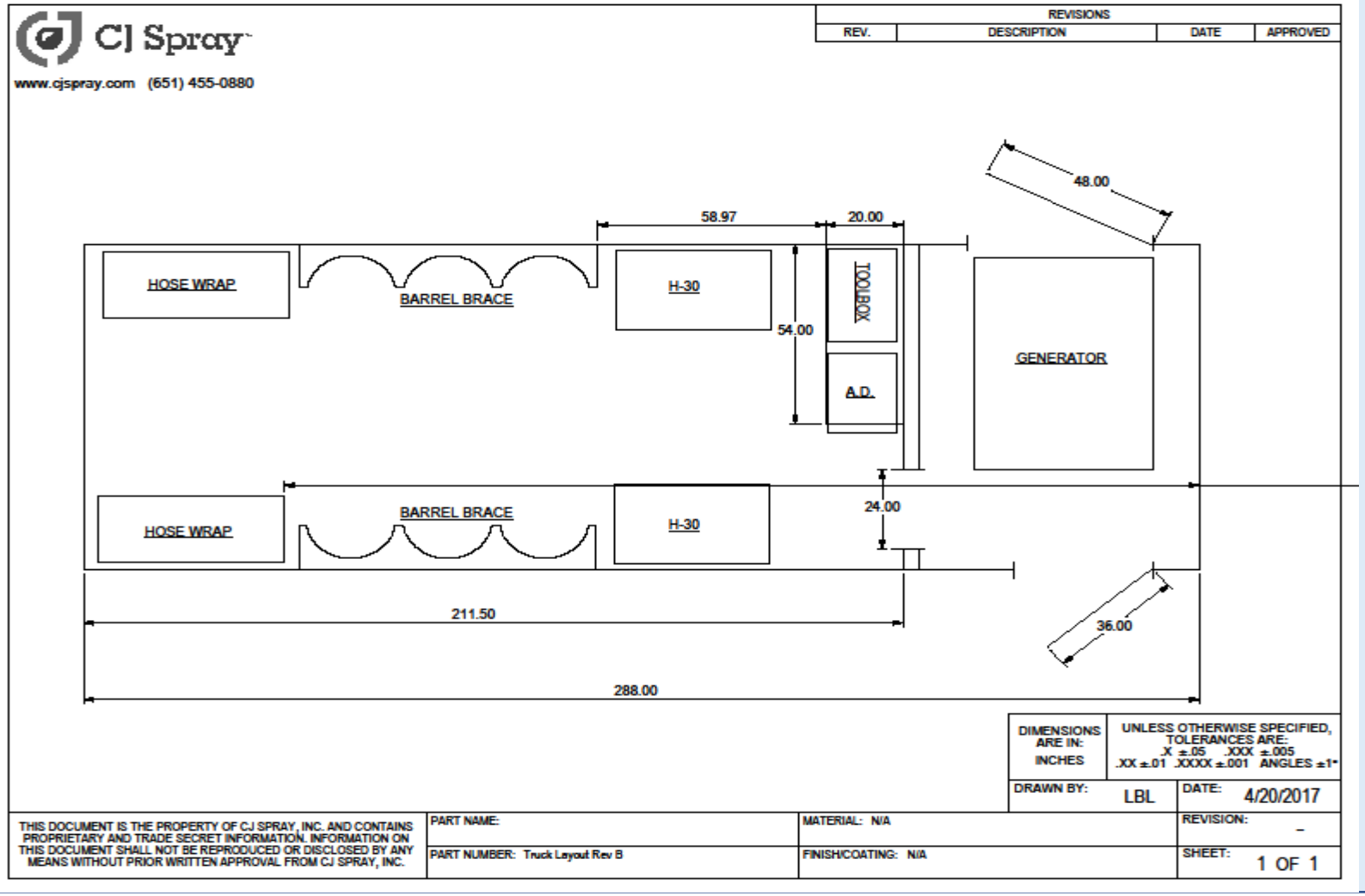

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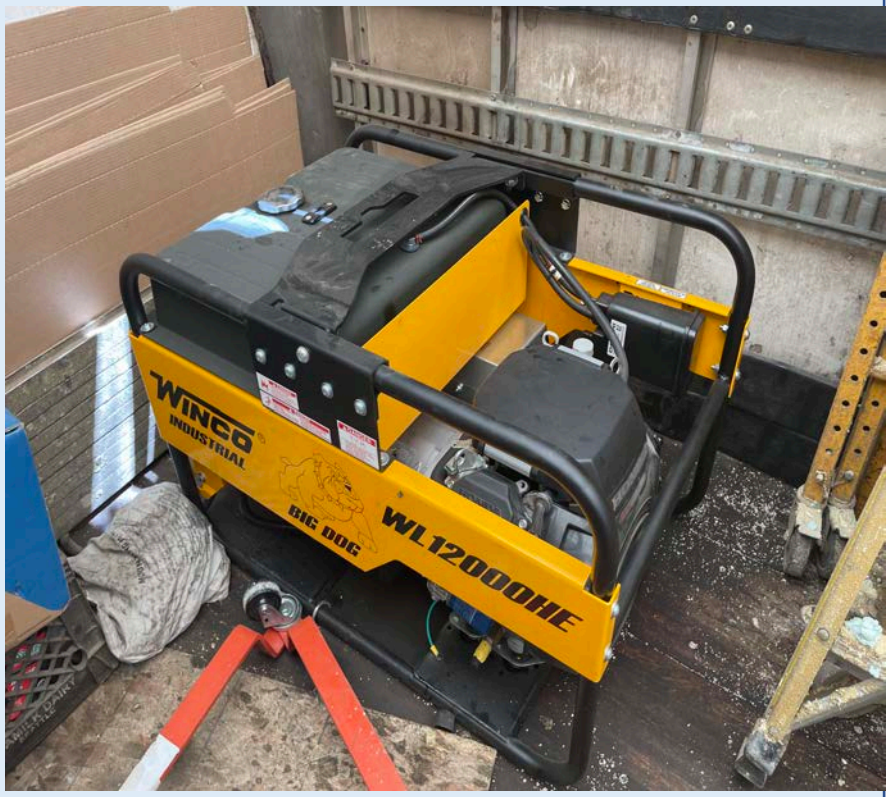

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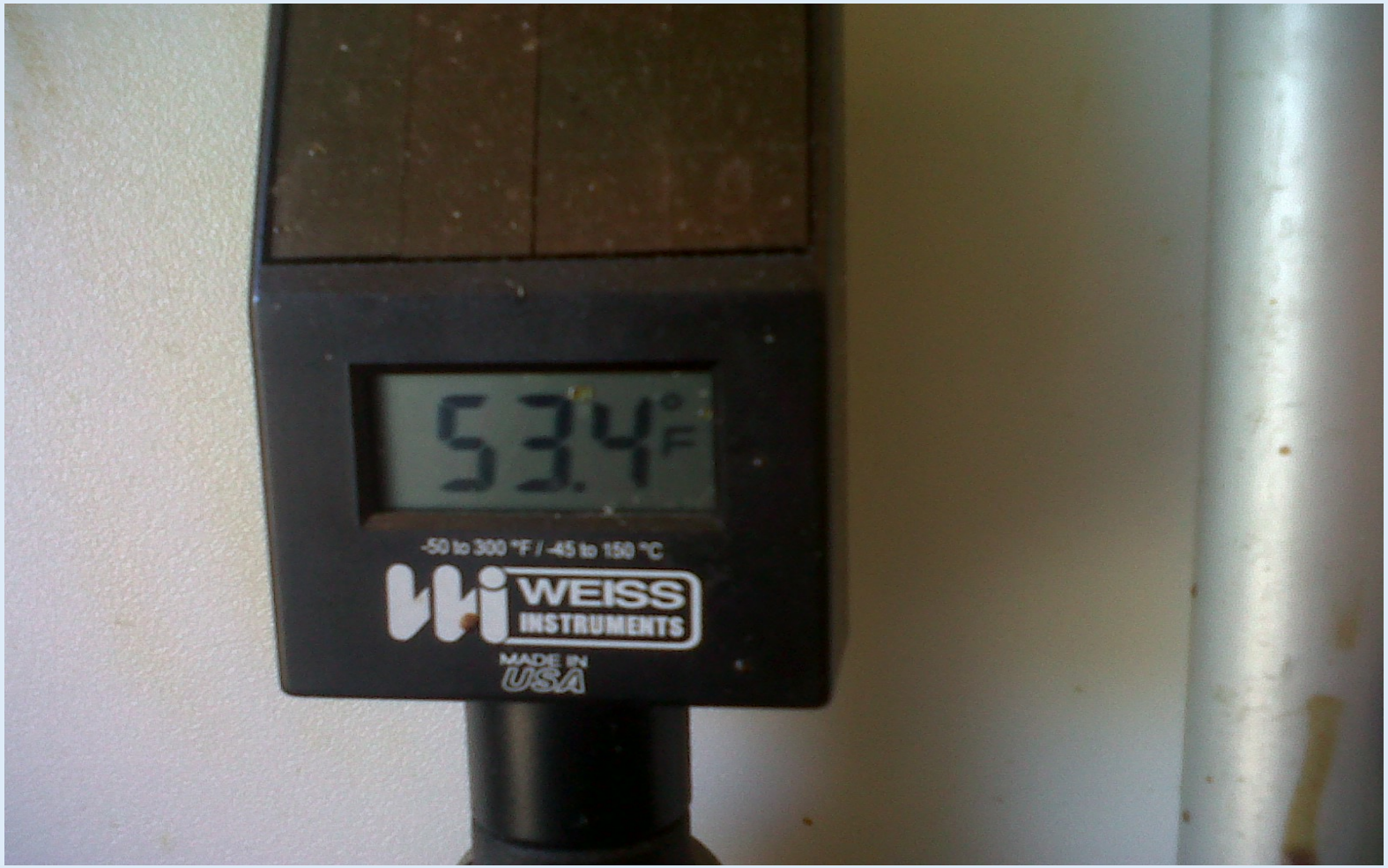

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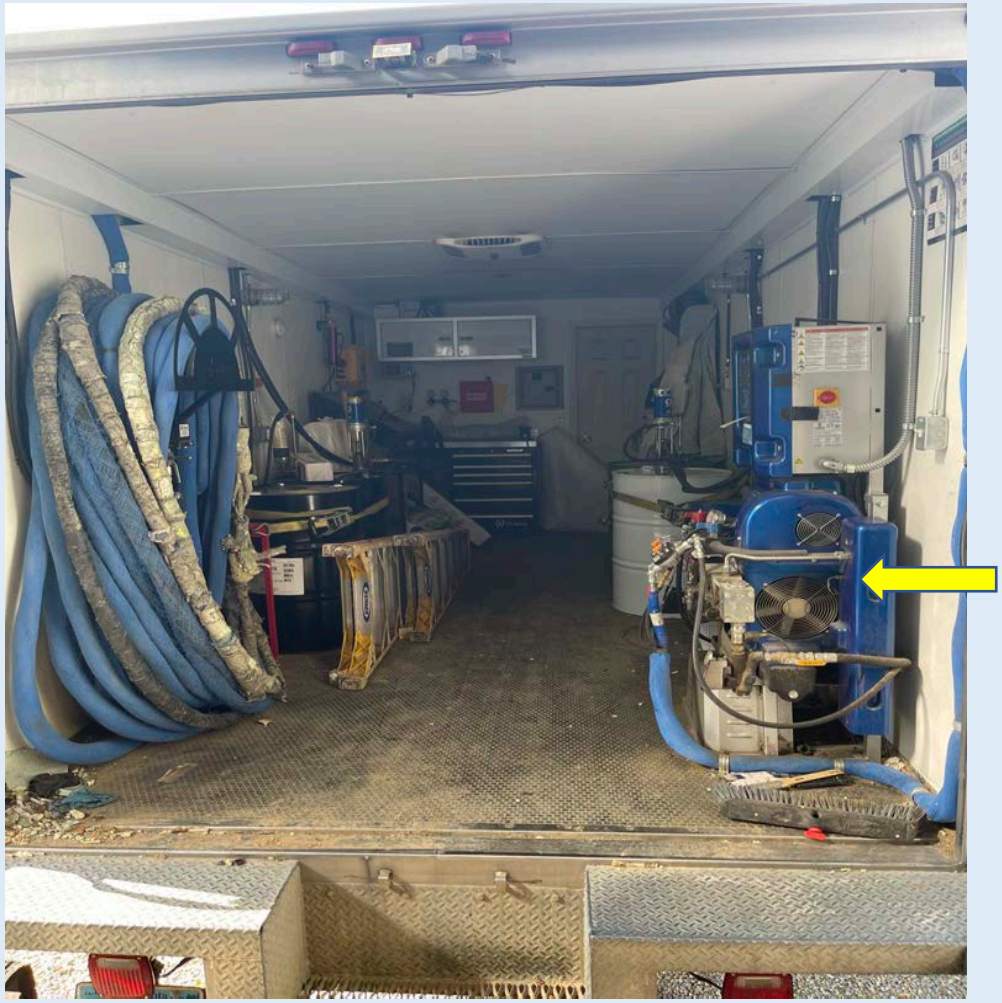

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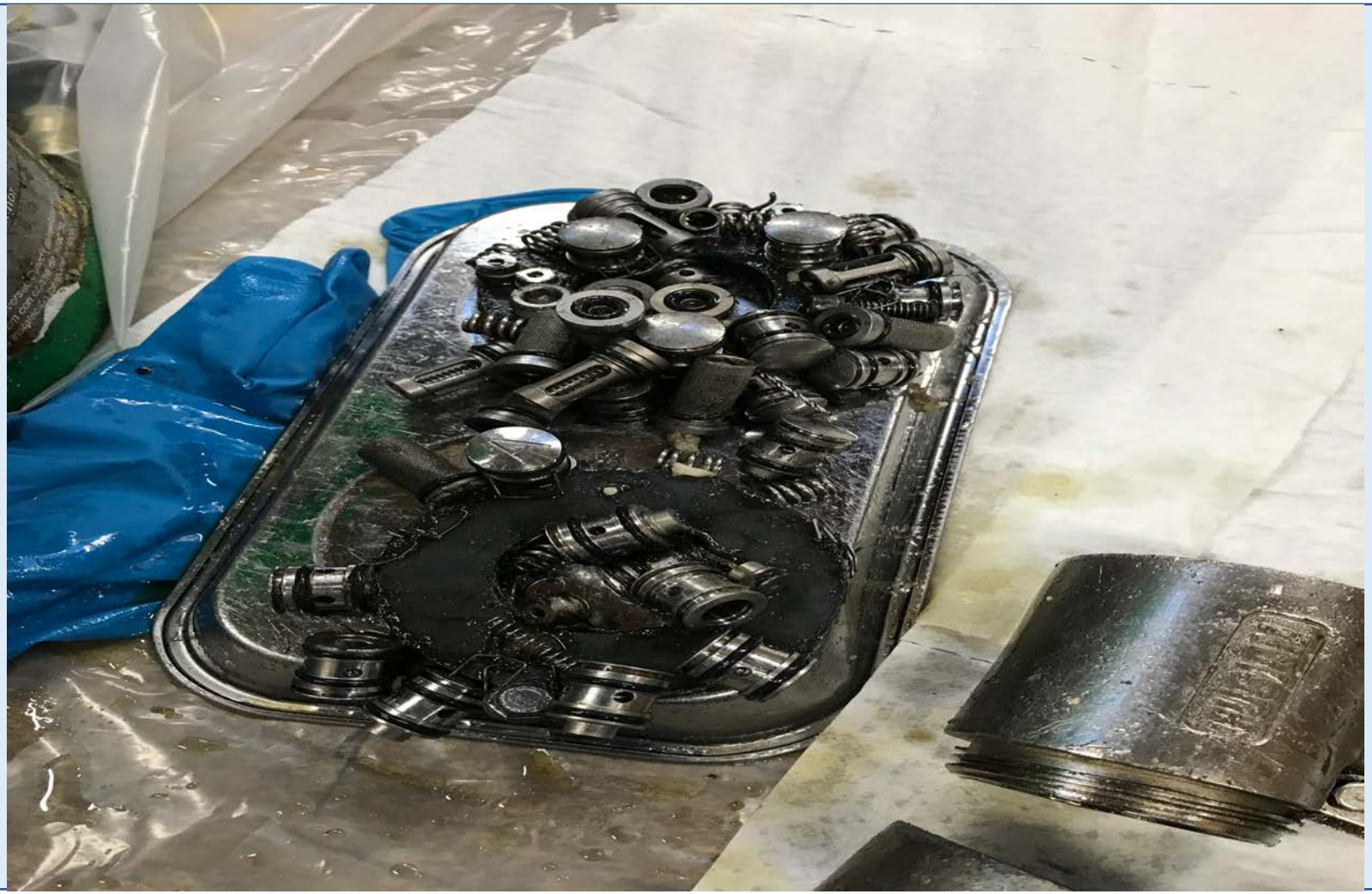


Setting up the optimal spray foam rig

Setting up the optimal spray foam rig

Equipment Maintenance Schedule

Trailer/Truck

Truck/Trailer#	Date
Maintenance Technician	

E-series

	Daily		
Check wet-cup TSL/DOP			
Check Y-strainer inlet screens			
Blow off dust from below reactor			
Blow off dust buildup from control boards and fan			
Inspect fluid lines for leaks			
Check spray hose for abrasions			
NOTE: *Use only zero moisture marine lithium grease*			
		Weekly	
Grease pressure relief valves (Fusion grease)			
		Bi-weekly	
Grease connecting rod bearing cup			
			Monthly
Remove shroud, blow off dust from electrical motor			
			Annually
Remove intake ball housing; inspect ball and seat			
Inspect all electrical connection and tighten			

H-series

	Daily	
Check wet-cup TSL/DOP		

Efficient Spray Techniques and Proper Applications for a variety of conditions, substrates and climate.

ICAA Spray Polyurethane Foam Installation Digest.

- Surfaces must be clean and dry, sufficient for good adhesion and good foam physical properties, as well as in accordance with manufacturer's recommendations.
- The substrate must be free of all frost, dust, oil, grease, oxidization, or any other element that may affect adhesion of the system; i.e., high moisture content.
- Ensure that work by other trades that may penetrate the substrate has been completed.
- Prepare surfaces by brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale, and other contaminants that will affect adhesion of the SPF.

Efficient Spray Techniques and Proper Applications for a variety of conditions, substrates and climate.

ICAA Spray Polyurethane Installation Digest Con't.

- Wipe down metal surfaces to remove release agents or other noncompatible coatings using a clean sponge or rag soaked in a solvent compatible with SPF.
- Metallic surfaces should be checked to ensure no oxidation has occurred. Use of a primer is typically recommended, but check first with the SPF manufacturer.
- For exterior applications, ensure veneer anchors are in place.
- Allow new concrete to cure for a minimum of 28 days prior to the SPF application.

Foam Applications best for Metal Buildings and Drywall.

1) Spray foam heats up when applied. This is called an “exothermic reaction”. What does this mean?

2) When the A chemical is mixed with the B chemical the reaction between the two creates heat, (as much as 300 degrees F) depending on the thickness of the pass.

3) When spraying onto Sheetrock or sheet metal surfaces, it is important to understand that this “exothermic reaction” can cause these products to warp.

4) Here are a few tips to applying Closed Cell Spray Foam to these materials

Foam Applications best for Metal Buildings and Drywall.

a) Metal, Make sure to check the thickness (gauge) of the metal. Applications work best on 26 gauge or thicker material. Application on thinner, 29 gauge and above are not recommended. Check with your SPF manufacturer for proper applications on this type of material.

b) Make sure all metals are clean and free of oils, greases or other contaminants as this will create issues with adhesion.

c) Inspect Sheetrock/metal for prior damage, take pictures and make notes of these areas. Show the builder or home owner these areas prior to application, this will help eliminate liability later.

Foam Applications best for Metal Buildings and Drywall.

a) Check the framing to make sure there is not too much distance between it. (Max 2’ on center). Lightly push on the sheetrock/metal to check for excess movement. Areas with too much deflection will need extra framing or bracing.

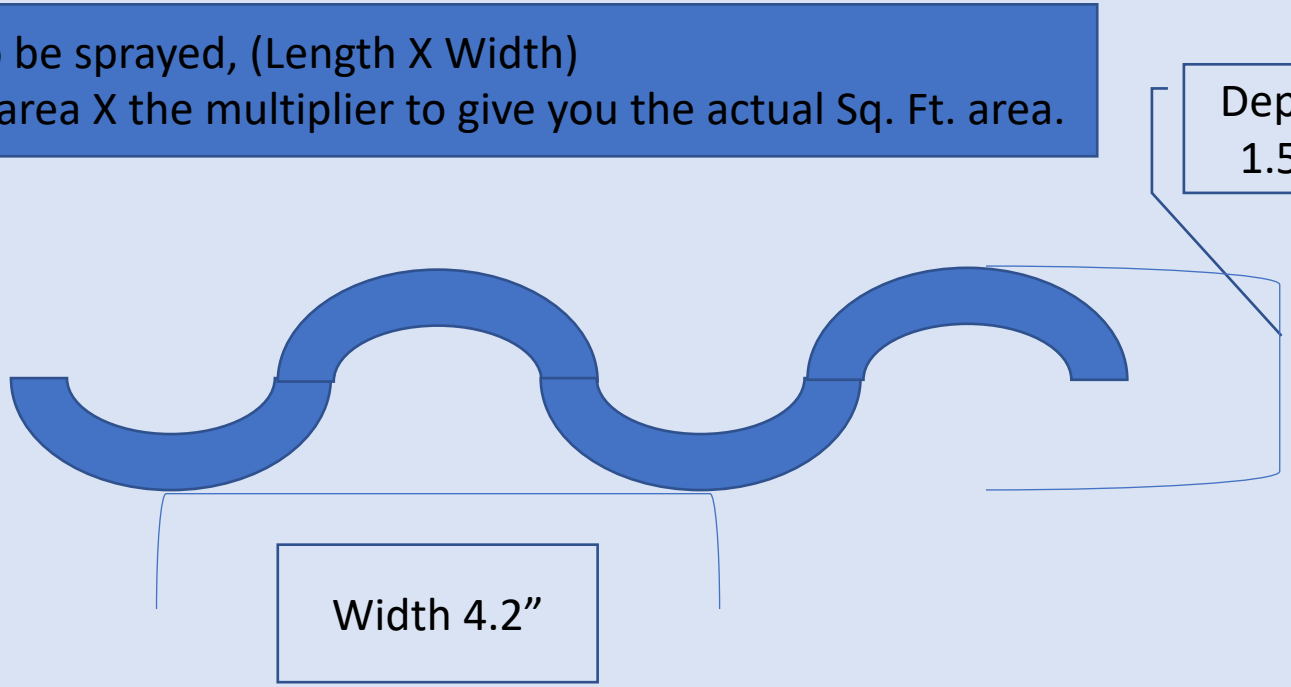
b) Make sure there are no areas that the Spray Foam can leak through or get under that will cause the sheetrock/metal to pop off or become deformed. If these areas exist, seal them with duct tape or canned spray foam.

Foam Applications best for Metal Buildings and Drywall.

- Use only a 00 or 01 mixing chamber.
- Your first pass should be ½ inch thick or less but thick enough to make foam.
- Once applied it should be left to cool down completely.
- Use a Meat thermometer to check the core temperature.
- Once this initial pass has cooled apply a second pass at the same thickness, (½ inch or less).
- Once this coat has completely cooled you may apply passes up to 1 inch at a time.
- **You must allow the passes to completely cool before applying more product.**
- Your sales team needs to account for this extra time and loss of yield due to thinner passes.

Foam Applications best for Metal Buildings and Drywall.

Find the Sq. Ft. area to be sprayed, (Length X Width)
Take the Sq. Ft. of the area X the multiplier to give you the actual Sq. Ft. area.



Depth/Width	Multiplier
0.16	1.06
0.18	1.08
0.2	1.09
0.22	1.11
0.24	1.13
0.26	1.15
0.28	1.17
0.3	1.19
0.32	1.22
0.34	1.24
0.36	1.27
0.38	1.29

Find the correct multiplier
1.5” divided by 4.2” = .36 or the multiplier of 1.27

Foam Applications best for Metal Buildings and Drywall.

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Foam Applications best for Metal Buildings and Drywall.

Ensuring Efficient Spray Techniques, Even Under Extreme Conditions.

Foam Applications best for Metal Buildings and Drywall.

Efficient Spray Techniques and Proper Applications for a variety of conditions, substrates and climate.

- *For instance, if a manufacturer states in their TDS that the product can be applied down to an ambient limit of 28 degrees, further down in the TDS it states the moisture limit is 18% and later the substrate limit is 32 degrees it would be ill advised to try and apply the product if all three limits exist simultaneously.*

- *Typically testing is done individually for certain circumstances. Trying to push more than one limit at a time increases the possibility of a failure.*

- *It is also important to understand that the closer you are to a limit the more things have to go right in the application or the larger the margin of error.*

Efficient Spray Techniques and Proper Applications for a variety of conditions, substrates and climate.

- *The closer to the limit also affects other parts of the application such as density and yield. A manufacturer who states their yield is 5000 bft has achieved that under near perfect conditions. Do not expect that at the products limits.*

- *During the winter months always try to have the area heated with as dry a heat as possible. "Heat Wagons" that vent outside the work area work very well.*

- *If possible, always try and have the contractor or homeowner cover the cost of heating.*

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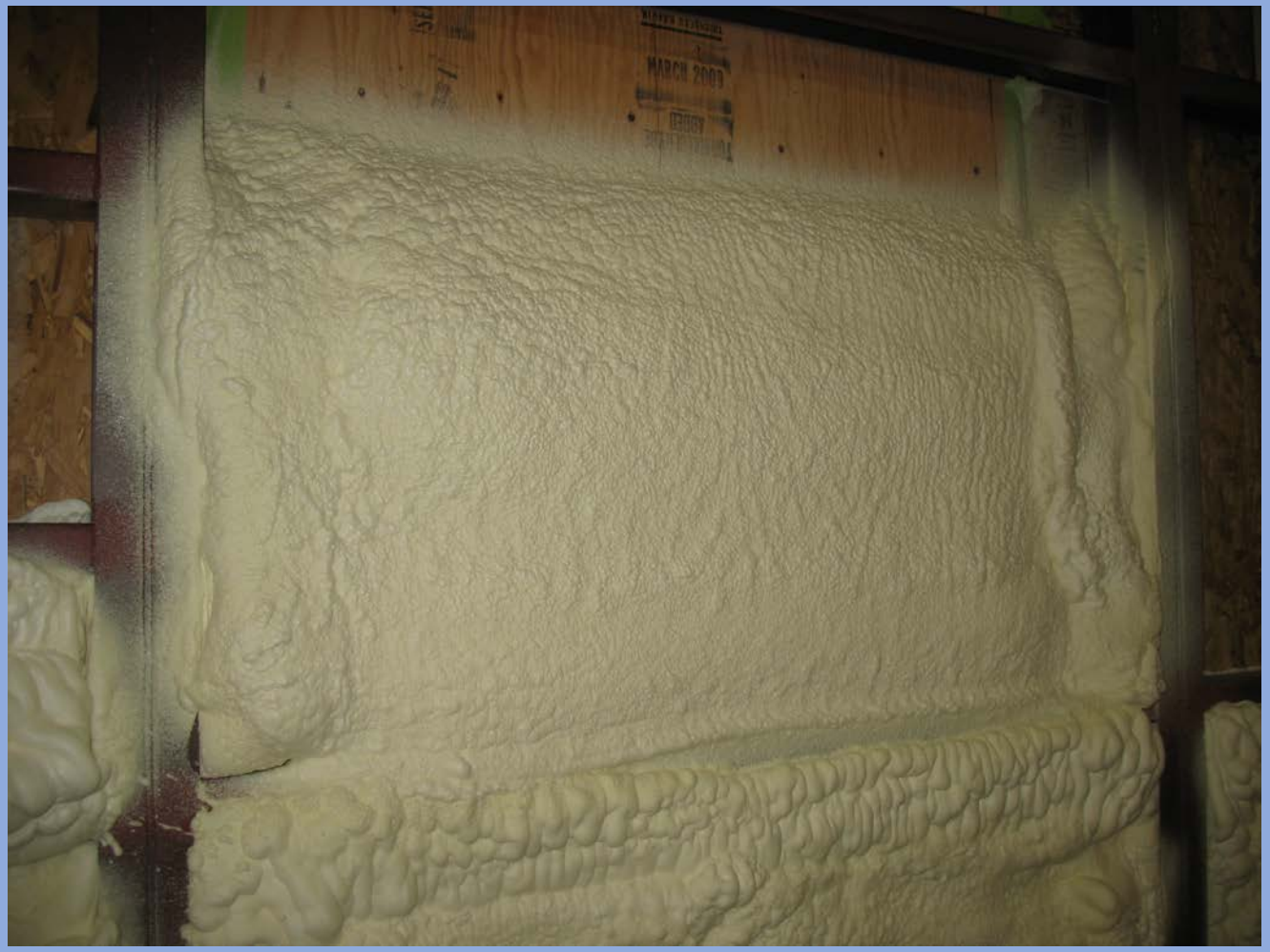

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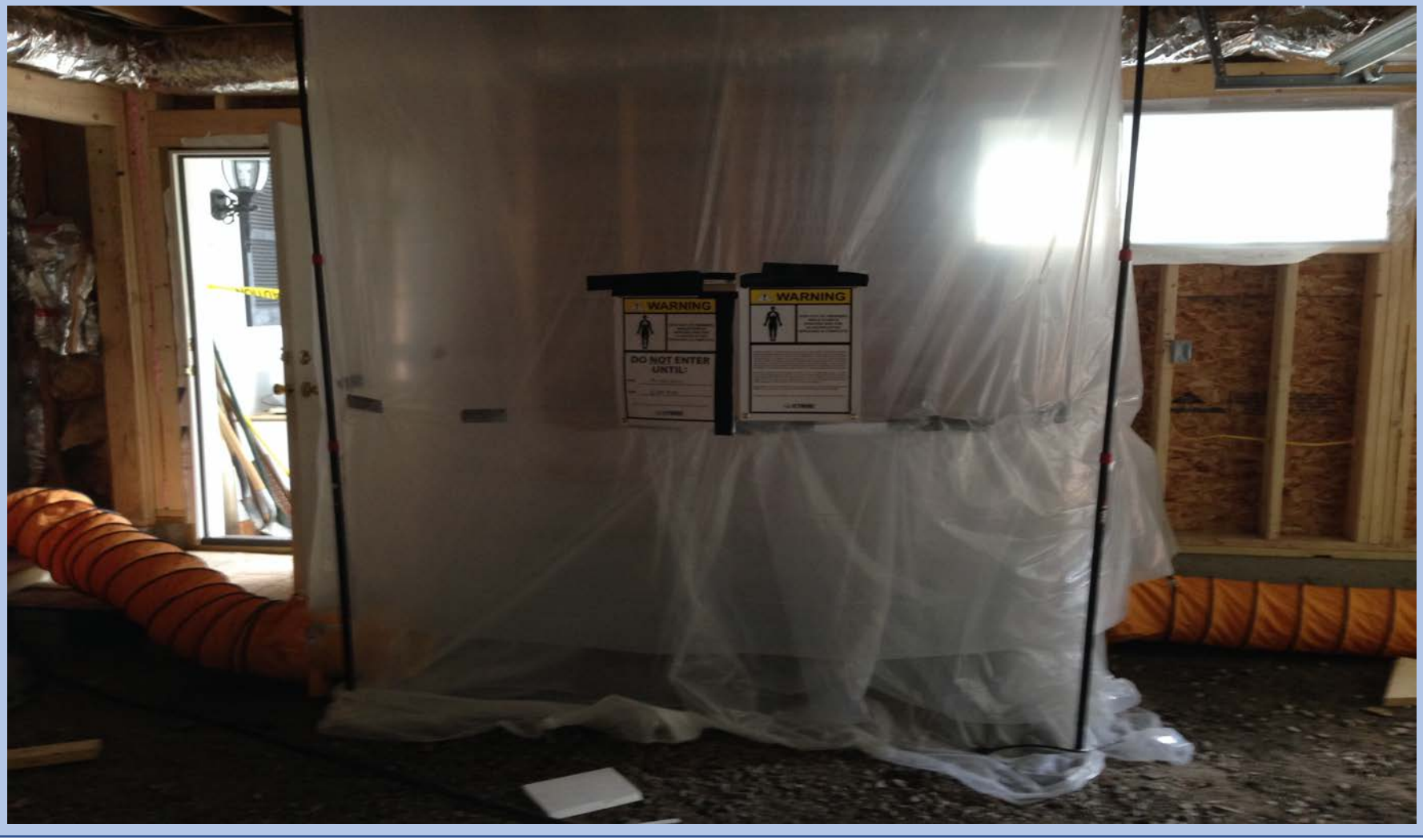

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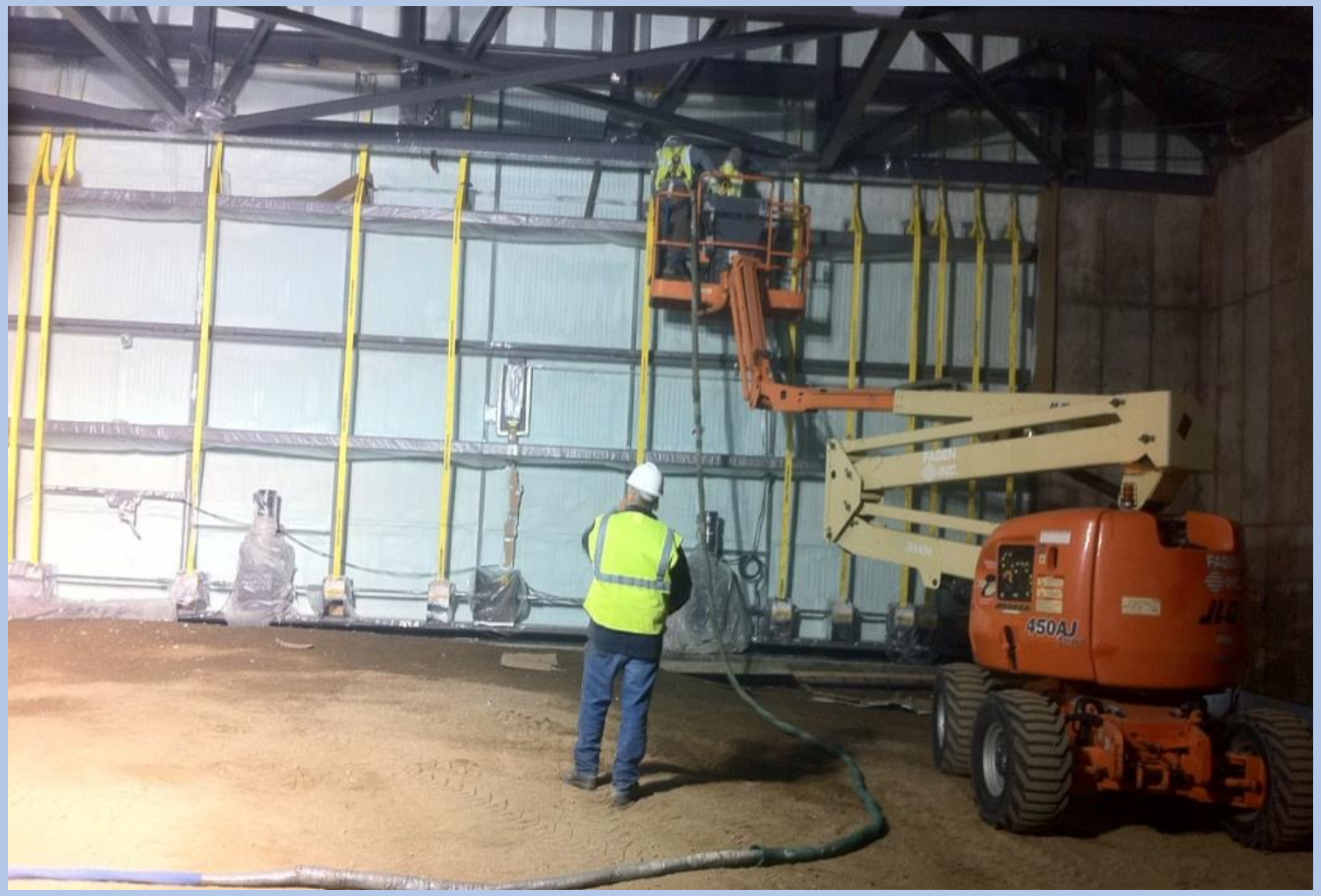

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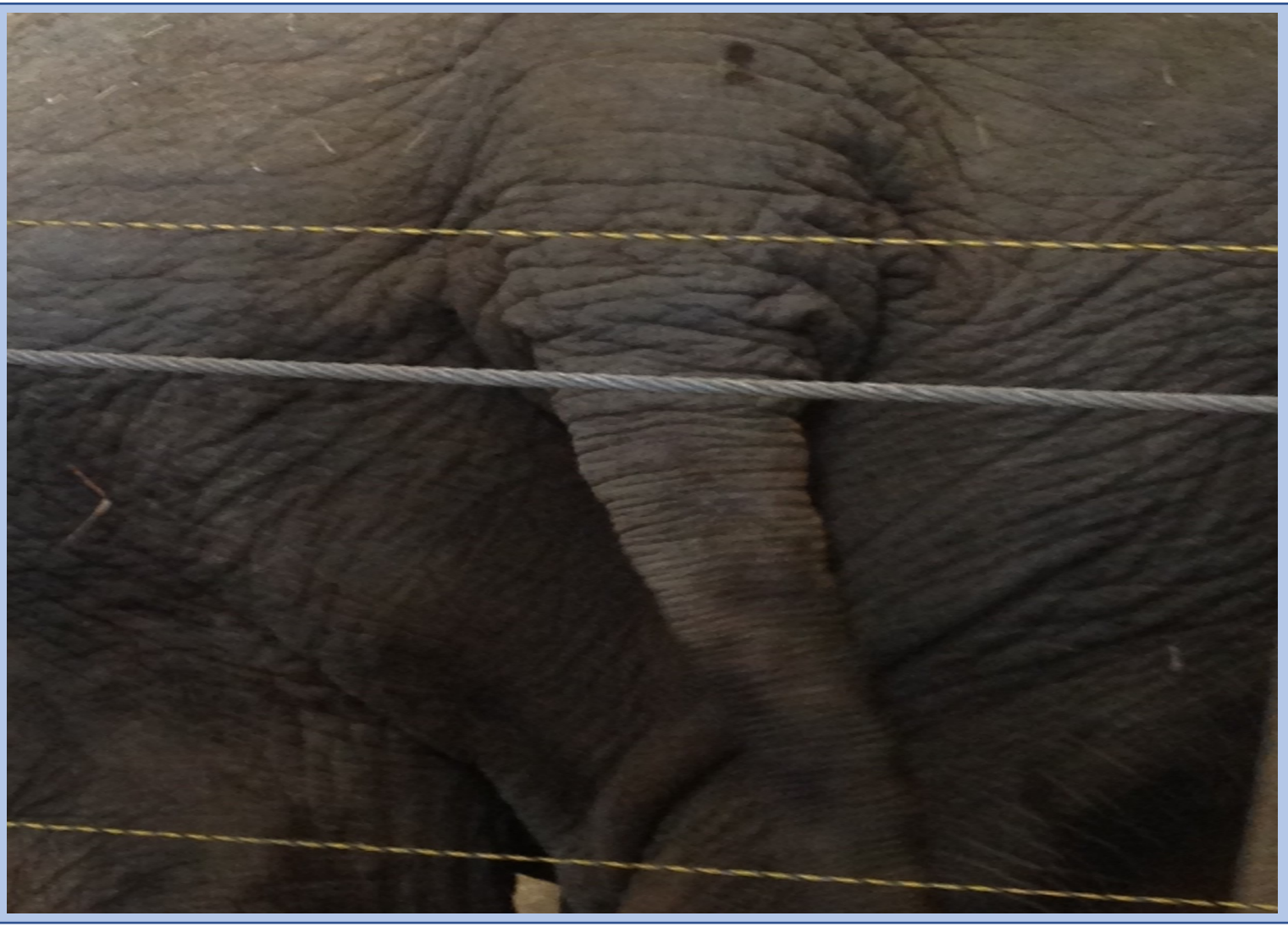


Efficient Spray Techniques and Proper Applications for a variety of conditions, substrates and climate.

Maintaining Ratio

Maintaining Ratio

Ratio monitoring is vital to your success.

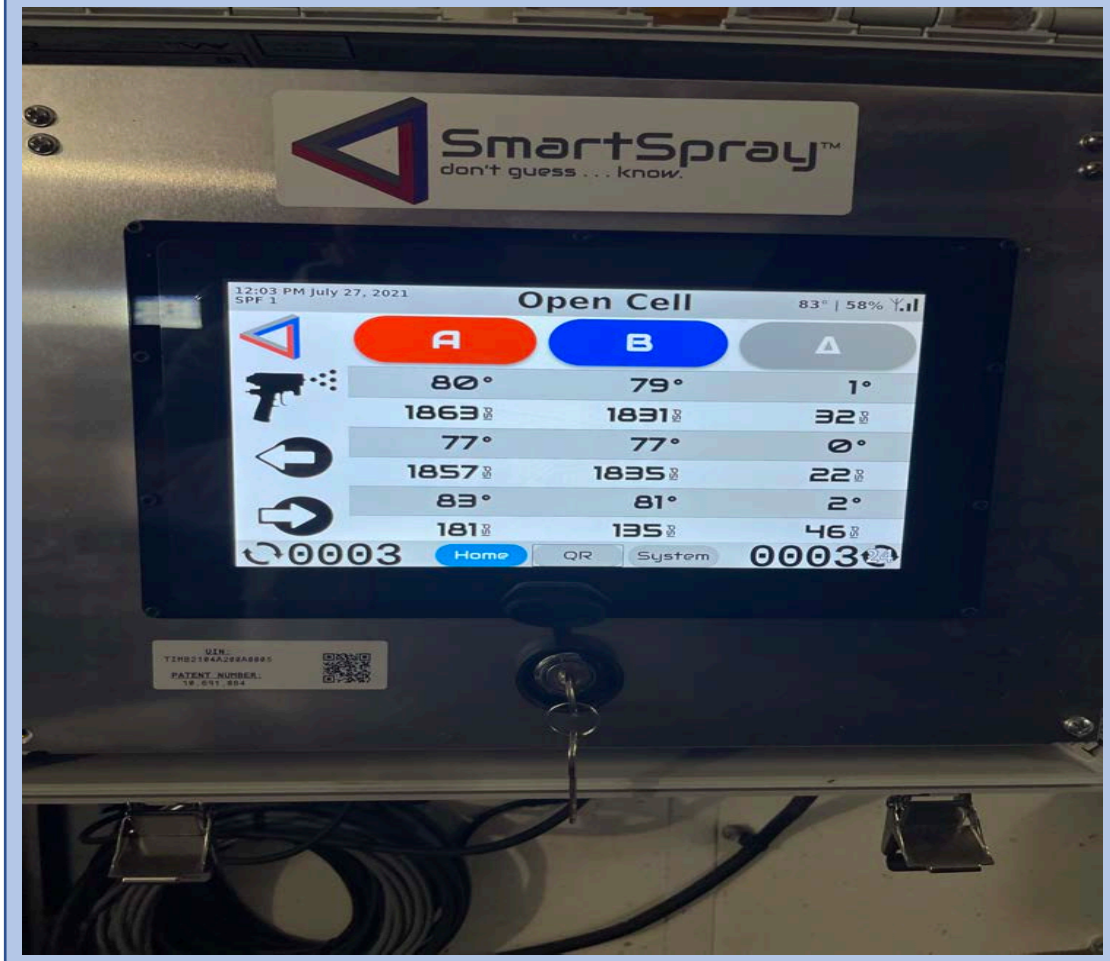
- Due to the difference in the viscosities of the chemicals we use, it is difficult to maintain ratio during the application without mechanical help.
- Heat and pressure play a large part in helping maintain the correct ratio.
- Proper equipment maintenance like insuring the screens in the gun or Y strainer are clean also are key.
- Drum storage is also very important.
- Understanding the Delta T of your equipment plays a role in ratio.

Maintaining Ratio

Mechanical help:

- Systems like Accurate Dynamics, Graco R-2000, Smart Spray can all help you with ratio maintenance.

Maintaining Ratio



Maintaining Ratio

- Following the manufactures specific guidelines when processing will help you stay on ratio.
- Because of viscosity you may be required to run one chemicals temperature higher then the other.

Maintaining Ratio

- Keeping your equipment maintained is imperative.
- Check Valves, Y-strainers, Side seals all affect ratio.

Maintaining Ratio

- **Hot or Cold outside, proper storage is a must.**

Maintaining Ratio

Delta T is not a rock band from the 6

- In a nutshell.. Delta T is the amount of temperature change your Reac of for the chemical coming through it.
- If your drums are stored too cold your reactor may not be able to increase the temperature to the manufacturer's specifications no matter how high you set the temperatures.
- Example; If you are using a Graco E-30 which has a Delta-T of 50 degrees and you are spraying a product that requires a temperature of 135 degrees then your drum temperature would have to be a minimum of 85 degrees. Any less then that and you will not be able to heat the chemical up no matter how hot you set the temperature.

Maintaining Ratio

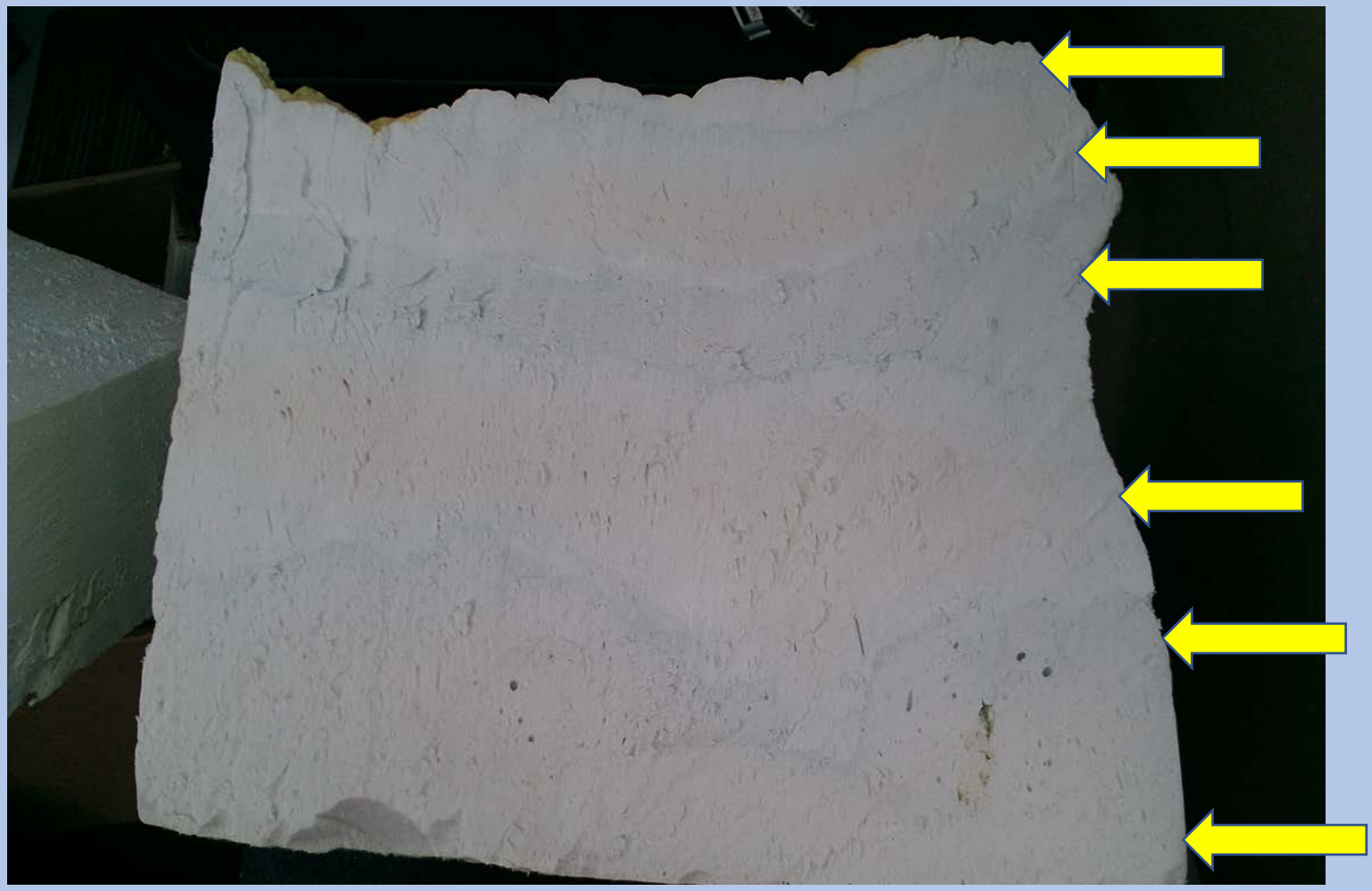
Lets look at some examples of what can happen when your ratio is off.

Maintaining Ratio

Maintaining Ratio

Maintaining Ratio

Maintaining Ratio



Line Flushing Protocols

Steps to Flush the System;

- Calculate how much liquid material each spray hose holds.
- Put your drum pump in a clean 5 gallon pail with the solution your manufacturer recommends to flush the lines with.
- Start to pump chemical through the hose back into the drum or another clean bucket.
- By calculating the amount your hose will hold you will be able to stop pumping just prior to the flushing solution starts to come out. The chemical in that bucket is still good to use and should be poured back into the drum for future use.

Line Flushing Protocols

When changing from on system to another (Example; open to closed cell, one manufacturer to another) you may need to flush the lines.

- Two terms you may hear are flush and purge of the lines.
- Flush mean exactly that, flushing the line with an appropriate cleaning material. This may be water, DOP or another system the manufacturer suggests.
- Purge is when you put the drum pump in the chemical you plan to use and you push the existing material out through the line until the chemical you want to use comes out.
- Most manufacturer's do not approve of purging the system. Check with the manufacturer of the chemicals you are using to find the correct method for you.

Line Flushing Protocols

For complete recirculation of a sitting system.

- Recirculate through the manifold process for 1 gallon of combined material.
- If you need to recirculate through the hose block for 4 gallons of combined material. This process should take 25-45 minutes.
- Primary and hose heat zones can be powered on to 75 degree max to help speed up the process.

Line Flushing Protocols

To recirculate through the gun manifold:

- (When not in use, the recirculation manifold should be covered with the provided block).
- Procedure is the same as above, though the valves on the heated hose recirculation manifold must be opened. (The handles will be pointing up and down).
- Turn Pressure Relief/Spray valves to pressure relief direction. And then run material with the feed pumps or the Reactor pumps.
- If using an E-30, run the machine in Jog Mode. If using an H-30 set the hydraulic pressure as low as possible to keep pump pressure below 600 psi.

Apply lithium grease to any exposed sealing surfaces, replace block when complete.

Line Flushing Protocols

To recirculate through the fluid manifold:

- Turn Pressure Relief/Spray valves to pressure relief direction.
- Then run material with the feed pumps or the Reactor pumps.
- If using an E-30, run the machine in Jog Mode. If using an H-30 set the hydraulic pressure as low as possible to keep pump pressure below 600 psi.
- If you are using a different manufactures equipment follow their procedures.

Line Flushing Protocols

Recirculation

- Most spray foam rigs incorporate a Manifold and Heated Hose recirculation kits. These kits are configured to save material during pressure bleed off, to heat up the hose quicker or to circulate material weekly (in the event a rig sits unused).

- There are two ways to recirculate material:

Through the fluid manifold (from the machine pressure relief valves *Red & Blue) or
Through the gun manifold (mounted on the spray hose rack).

For a rig that is sitting, both procedures should be executed.

Line Flushing Protocols

Long term truck shut down (6 or more weeks)

- Flush A-side with iso neutralizer. (5 gal per machine)
- Flush A and B with a lubricating fluid like hydraulic fluid. (10 gal per machine)
- Dis-assemble, clean and grease gun.

Line Flushing Protocols

Short term truck shut down (less than 6 weeks)

- Fill generator fuel tank.
- Dis-assemble, clean and grease gun.
- Hook up hose to re-circulation block on hose wrap.
- Re-circ machine for 30 minutes, make sure we are set to run material from barrel to machine through the hose and back to the barrels.
- Clean and inspect Y-strainers once truck is scheduled to return to service.
- Plan on having one person perform the re-circulation process every week.

Line Flushing Protocols

Most hoses hold approximately:

Feet of Hose	Amount in Gallons.	
50 feet	0.29 gallons	
100 feet	0.58 gallons	Do not forget to add the
150 feet	0.87 gallons	whip amount to the length
200 feet	1.15 gallons	of hose you have.
250 feet	1.44 gallons	
300 feet	1.73 gallons	Example 200' + whip = 1.208 gal.
10 foot whip	0.058 gallons	

Line Flushing Protocols

- Sometimes we may have to shut our rigs down for an extended period of time.
- During these times it is important to follow a few simple rules to eliminate damage to your equipment when you start it back up.
- We will now talk about short and long term shut-downs, recirculation and flushing out your lines when changing from one system/manufacturer to another.
- These are basic guidelines. Always refer to your equipment manufacturer and chemical manufacture for specific requirements regarding flushing and short/long term shut-down.
- Refer to the ICAA Rig Shut-down documents for further information.
- The following procedures are based on Graco equipment. If you have a different manufactures equipment, please refer to their procedures when performing short/long term shutdowns and re-circulation.

Line Flushing Protocols

- Now, continue to pump into a new bucket until the flushing solution is coming out clearly or until it runs out.
- Now put the drum pump into the material you intend to use and start to pump again. Continue until the new chemical is coming out and the flushing solution in no longer evident.
- It is best to spray out test material onto plastic and check the cell structure and mix before using it on the job.

Line Flushing Protocols

What to do with the waste chemical?

- If you are successful you now have a little waste material to get rid of.

- The easiest (and most cost effective) method to dispose of waste is to mix it with the opposite chemical (A mixed with B) to create reacted solids. Once this happens it can be cut up to release the exothermic reaction and put in the garbage.

Inspecting Installs

Inspect
What you Expect
To get Respect

Inspecting Installs

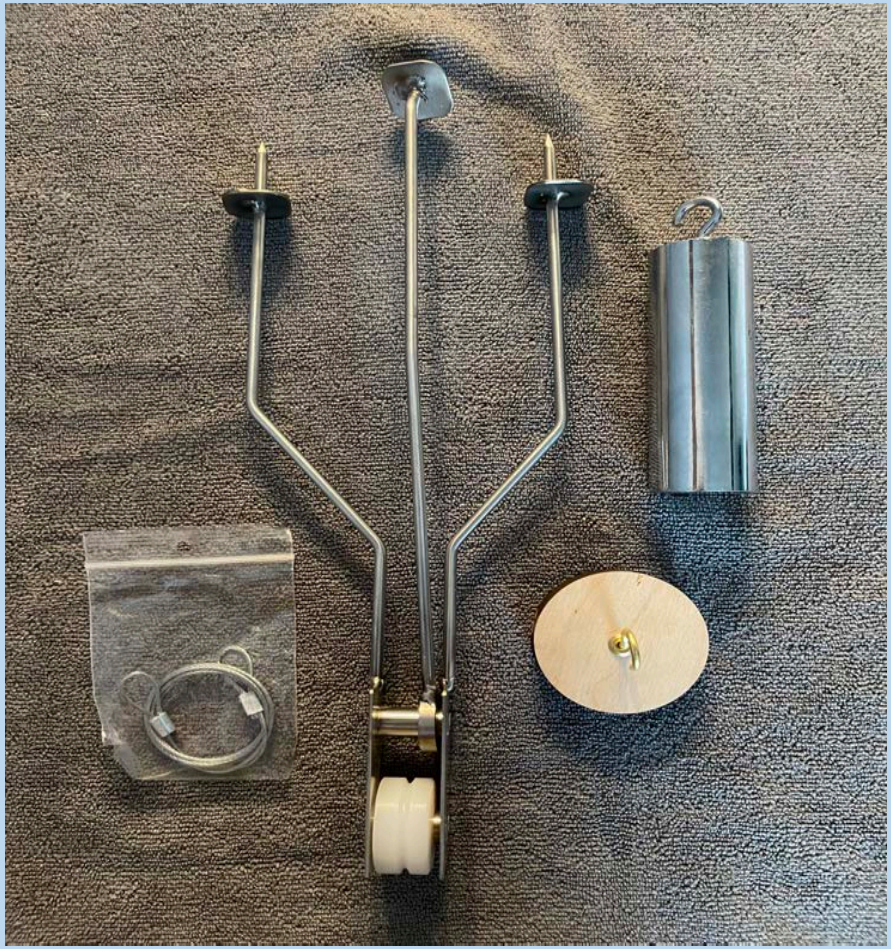
- Whether it is you as the owner, your production team, site supervisor or the installer you should be constantly and consistently inspecting your work.
- This will save you money, time and your reputation.
- Many of todays organizations or projects require some sort of inspection at various times of the install.
- At a minimum manufacturer’s require a daily jobsite log which is the first step to an install inspection.

Inspecting Installs

Lets look at some of the tools that are available for you to help make quality inspections.

Inspecting Installs

Inspecting Installs



Inspecting Installs

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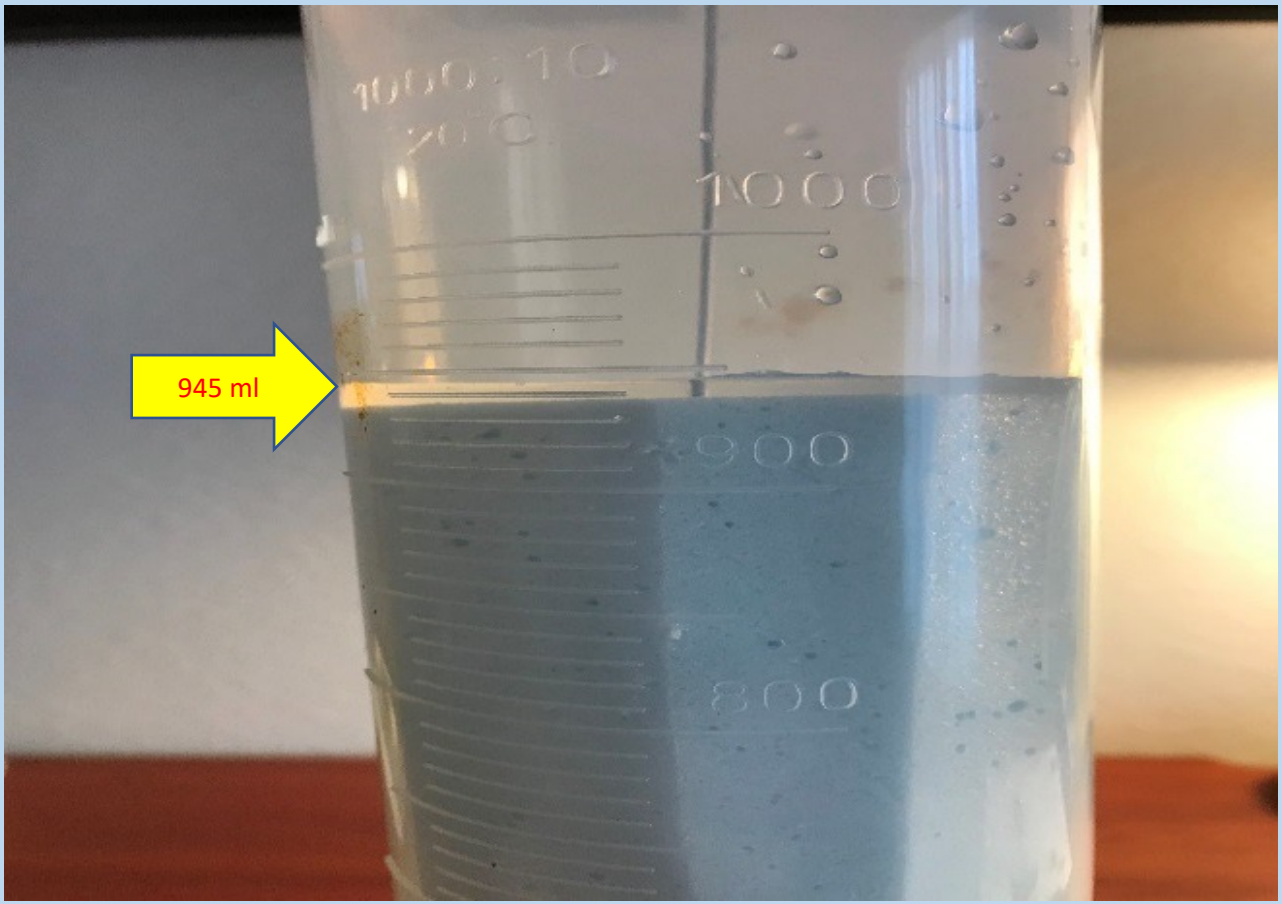
9.57g divided by 245 ml = 0.039
X 62.4 = 2.43 lb. density.



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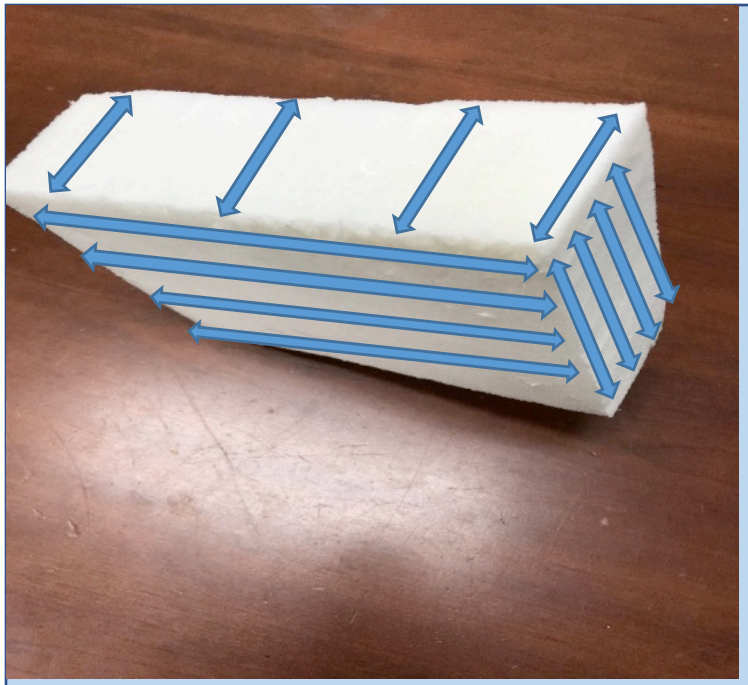

Measure the Length, Width and Height. Take a minimum of 4 measurements of each.

Inspecting Installs

Weight in grams	Length in centimeters		Width in centimeters		Height in centimeters		Conversion factor to pounds cubic foot	
	L1	10.1	W1	9.9	H1	5.4	Always 62.4	
	L2	10.2	W2	9.8	H2	5.3		
	L3	10.1	W3	9.6	H3	5.5		
5.70g	L4	10.1	W4	9.8	H4	5.5		
	L5		W5		H5			
	Average= 10.125		Average= 9.775		Average= 5.425			

Grams	÷	Length	÷	Width	÷	Height	×	pcf 62.4	=	Density
5.70g		10.125cm		9.775cm		5.425cm		62.4pcf		0.66lb density

5.70g divided by 10.125 divided by 9.775 divided by 5.425 times 62.4 equal's 0.66lb density foam.

Inspecting Installs

Inspecting Installs

Now, lets look at some installs gone wrong and why.

Inspecting Installs

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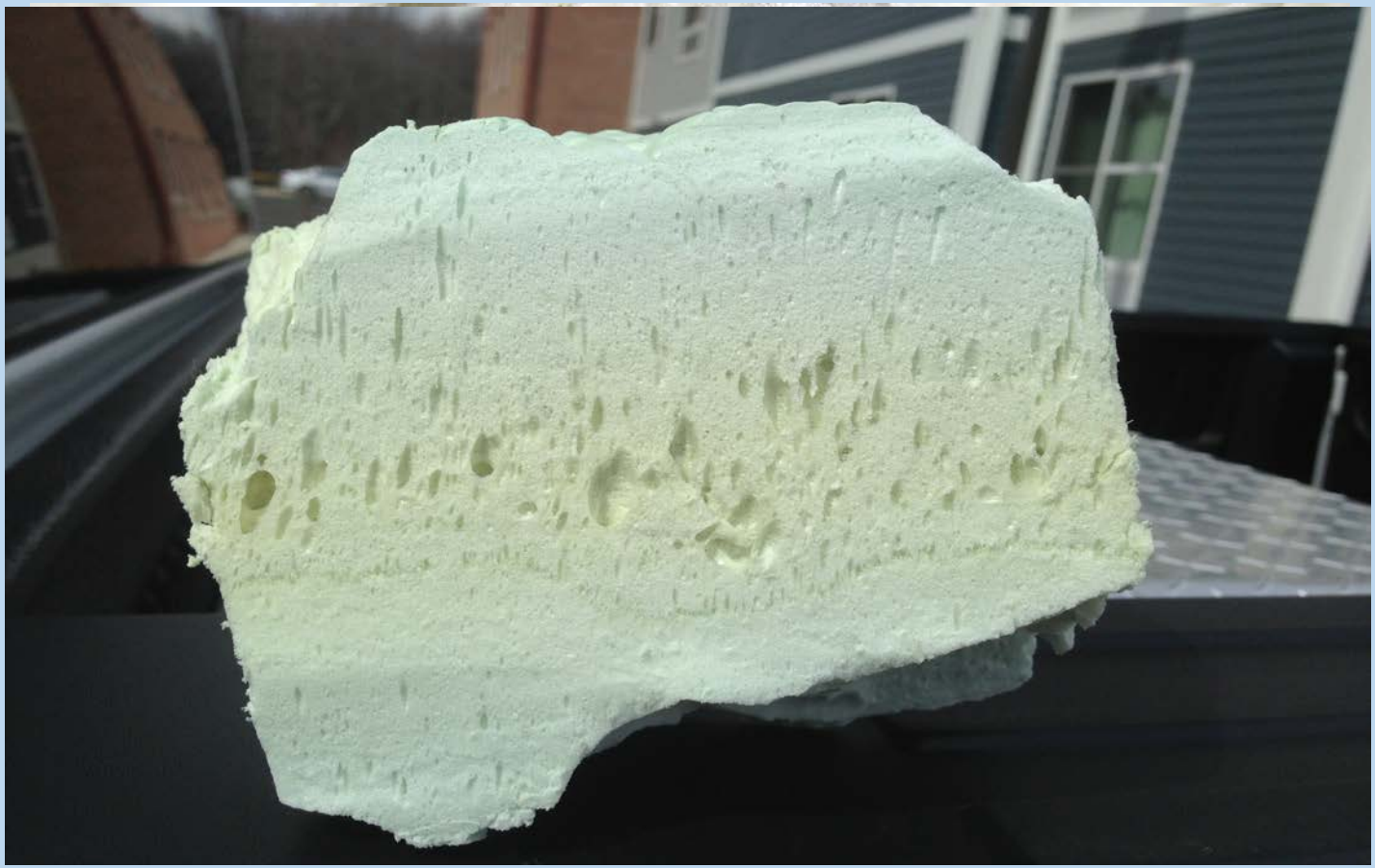

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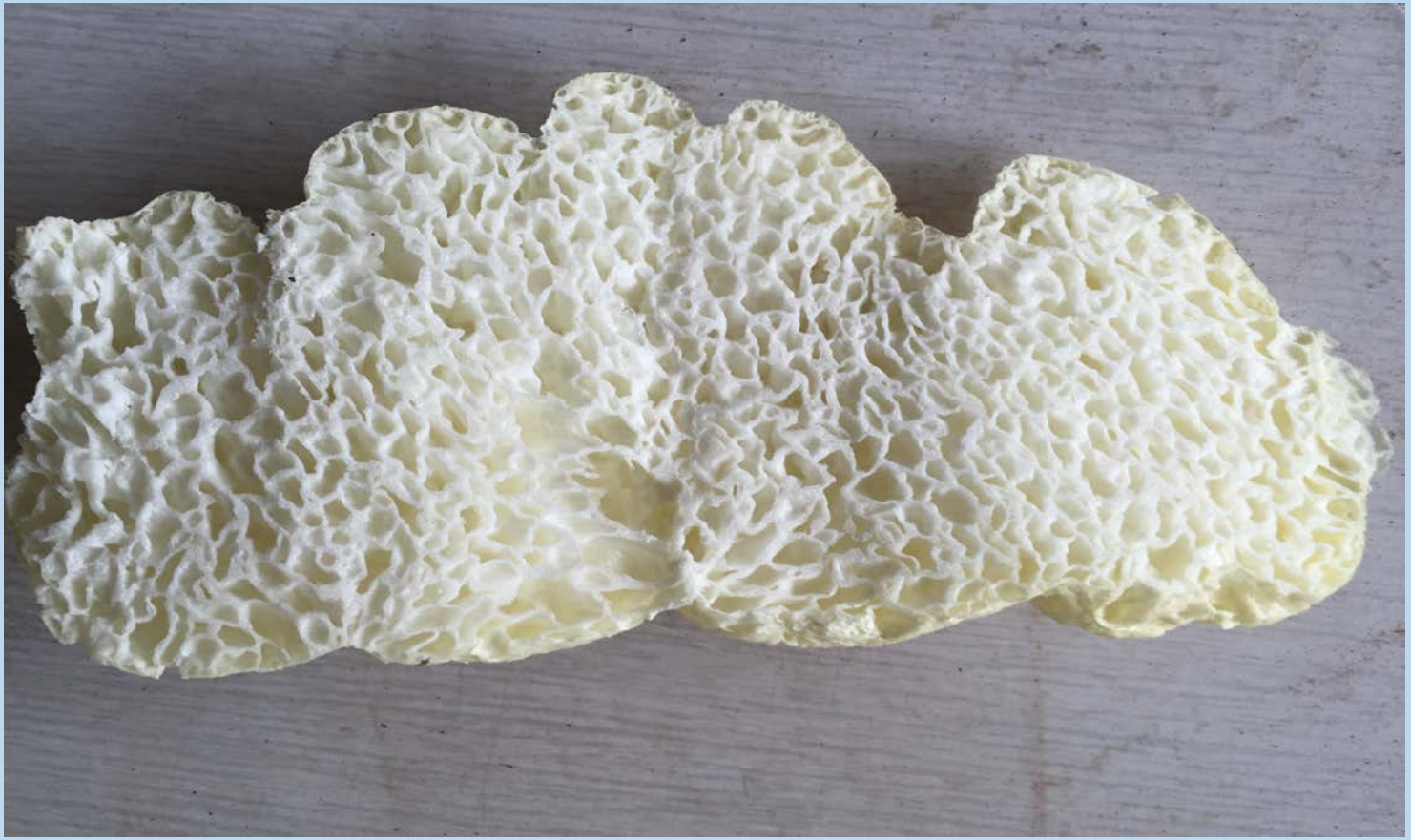

Inspecting Installs

Inspecting Installs

If Your Lucky!!

THANK YOU