Welcome

Syneffex™ Heat Shield™ EPX-H2O Application Training Overview

About Syneffex™ Coatings

Syneffex™ coatings are a patented thermal barrier technology that provide a unique combination of characteristics: Thermal insulation, mold resistance, corrosion prevention, moisture resistance, UV resistance, chemical resistance.

Insulate equipment

What is most exciting about these nanotechnology-based coatings is that they take a complex thermal barrier technology and deploy it **in a simple, paintable coating.** Though the application may be simple, the performance is powerful. This technology is able to achieve significant energy savings (typically between 10%-30%) for our customers with an exceptionally short payback period (typically less than 1 year).

Insulate buildings

Insulation Simplified

Insulation & Corrosion Control
Guadalajara, Mexico

Energy Sustainability for Airport
Bangkok, Thailand

Reduced Energy Cost for Boiler
Istanbul, Turkey

Insulation for High Humidity
Middle East

Insulation & Energy Savings
Sofia, Bulgaria

Condensation & Rust Prevention
Seattle, Washington

Insulation & Energy Efficiency
Middle East

Insulation & Energy Efficiency
Istanbul, Turkey

Corrosion Prevention & Insulation
U.A.E.

Pipe Insulation & Energy Savings
Middle East

Equipment Insulation Solutions

NOTE: These are example specifications based upon actual applications and reported energy savings. Each application is specified according to customer needs through our Gold Standard Application Program, and actual thickness may differ from those shown below.

	Heat Shield™ High Heat Typically used for equipment that needs the thinnest application choice or is subject to regular wash downs (food/beverage equipment).	**Heat Shield™ EPX-H2O** Typically used for equipment that is stationary. Provides higher thermal performance in fewer passes, and chemical and flame resistance.
Step 1	Clean surface according to application guide. The surface can be hand tool cleaned, and does not need to be sandblasted. No primer is needed.	Clean surface according to application guide. The surface can be hand tool cleaned, and does not need to be sandblasted. No primer is needed.
Step 2	Application is typically 8 to 12 coats, depending upon the temperature and needs for the application. Each coat is applied at 100 microns (4 mils) wet film thickness.	Application is typically 4 to 10 coats, depending upon the temperature and needs for the application. Each coat is applied at 254 microns (10 mils) wet film thickness
Step 3	No overcoat is needed. The coating is UV resistant.	If the application is outside, then 1-coat of either High Heat or Energy Protect™ should be used to protect the coating from UV.
Typical Energy Savings*	Between 10%-25%	Between 15%-35%
Finish	Translucent or opaque, smooth finish	White or Grey, Pebbled finish
	 	 
Chemical resistance	No	Yes, splash resistant to acids, bases and fuels
Final Dry Film Thickness (DFT) Estimate	10 coats applied at 100 microns (4 mils) per coat will dry to approximately 190 microns (7.5 mils) in dry film thickness (10 layers x 19 microns (or 7.5 mils) per layer)	It's difficult to measure a reduction from wet to dry film thickness with the EPX-H2O due to the rough, pebbled surface. While the resin part of the coat will slightly reduce from 254 microns (10 mils) wet applied thickness, the particle will not reduce.

*Based upon laboratory testing and field studies. Actual results are dependent upon environmental temperatures and elements.

EPX-H2O Application Overview

- ✓ Prepare the surface as you would for any coating project. Wire brush (hand tool clean), make sure surface is clean and dry for proper adhesion.
- ✓ Use texture sprayer for application.
- ✓ Measure film thickness with a wet film thickness gauge (10 mils/254 microns per coat)
- ✓ Allow each coat to completely dry to touch before applying the next coat.
- ✓ EPX-H2O has a 24 hour pot life after part A and part B are mixed. That means it has to be used within 24 hours after mixing.

EPX-H2O Application In Steps

1

Step 1 - Mixing:

✓ Open the Part A (larger bucket) and pour the smaller Part B into A. Mix thoroughly at low to medium speed with a paint mixer that attaches to a drill. Mix for about 5 minutes, until there is a consistent color indicating both parts are completely mixed. **Let set for 30 minutes** before using, this allows the product to slightly thicken.

2

Step 2 - Apply with Texture Sprayer:

✓ Use a texture sprayer for application. The Wagner Power Tex is shown in the photos. Use the smallest tip size for the best, most even finish. DO NOT brush or roll the surface smooth! The insulating particle causes the pebbled, rough finish and if the finish is smooth is means there is no insulating particle on the surface.

3

Step 3 - Allow Proper Dry Time:

✓ Dry times between coats will vary from 15 minutes (hot surface) to 3 or more hours (cool surface). Ensure the film is dry to touch and non-tacky prior to application of the next coat.

Tips for Success

Tip 1:

✓ **It is better to apply a pass/coat too thin than too thick (thick risks peeling). Apply more, thinner passes, rather than applying too thick.**

Tip 2:

✓ **Practice a pass with the sprayer, then measure thickness with a Wet Film Thickness Gauge. This will give you a feel for how you spray each coat and the resulting thickness. Each coat should be 254 microns (10 mils) wet film thickness. We've found that most people apply the first coat easily at the right thickness, but once they are applying another coat over the EPX and can no longer see the equipment surface, they tend to apply subsequent coats thicker than that.**

Tip 3:

✓ **If possible, apply to a hot surface (no higher than 400F/204C) for much faster dry times between coats.**

Tip 4:

✓ **Make repairs to coating film as needed. Repair of the coating is easily done by spraying back over the damaged area.**

Tips for Success

RIGHT

Measuring with wet film gauge.

RIGHT

Pebbled finish throughout application

WRONG!

Surface was smoothed with roller.
No insulating particle is there.

Application - Surface Preparation

Proper surface preparation is important for any coating application to ensure good adhesion.

BEFORE applying the coating, equipment surfaces should be:

CLEAN

- ✓ No Dirt
- ✓ No Caked on Dye Chemicals
- ✓ No Grease or Oil
- ✓ No Rust
- ✓ No Flaking Paint
- ✓ No Dry Cleaner Residue

DRY

- ✓ No Moisture
- ✓ No Dripping Water
- ✓ No Wet Dye Chemicals
- ✓ No Condensation
- ✓ No Wet Cleaner Residue

Methods for Cleaning:

Rotary grinders fitted with steel brushes.

Steel wool and wire brushes.

If you are worried about damage to surface with wire brush, detergent and water can be used with scrub brushes.

Wipe clean with wet towels using sufficient amounts of clean water.

Application - Preparation

BEFORE applying the coating:

PREPARE EQUIPMENT

- ✓ Tape off valves, gauges, etc...
- ✓ Cover any critical parts not meant to be coated

PREPARE ENVIRONMENT

- ✓ Cover any areas that may be subject to overspray, which you don't want coated
- ✓ Gather and place items such as drop cloths, extension cords, buckets and water for cleaning, safety items (glasses, gloves). Use an Equipment Check List
- ✓ Place industrial fans, if you have them to aid dry time, in appropriate areas
- ✓ Ensure personnel are clear on the machine temperature needs during and after application

Application - Types

Preferred Method

HOT Equipment Application

Surface Temperature 70C-177C (158F-350F)

Pros

- ✓ Shortest dry/cure times
- ✓ Zero or short amount of downtime
- ✓ Least amount of plant disruption

Cons

- ✓ May have slight smell due to coating drying on hot surface
- ✓ May need to use energy during application to keep equipment hot

NOTES:

It is okay for machines to cycle from hot to cold during application, but when they are cooler, dry times will take longer.

COOL Equipment Application

Surface Temperature 13℃ to 69℃ (55F-156F)

Pros

- ✓ Less smell due to equipment being cooler
- ✓ Do not need to use energy to run equipment

Cons

- ✓ Longer dry times/cure times
- ✓ Longer down time for equipment

NOTES:

If applying to cold equipment, ensure that the film is not subject to condensation while drying or loss of adhesion may occur. Film should be allowed to cure for 48-72 hours before being subject to condensation or freezing temperatures

Dry Times Guide

Drying Schedule per coat:	at 55F/13C	at 80F/27C	at 120F/49C
To Touch:	2 hours	1 hour	20 minutes
To Tack Free:	4 hours	2 hours	30 minutes
Minimum re-coat:	28 hours	18-24 hours	4 hours
To Cure:	20 days	14 days	7 days
Induction Time*:	60 minutes	30 minutes	30 minutes

(*The amount of time you must wait after Part A and B are mixed, BEFORE applying)

APPLICATION CONDITIONS:

Temperature:	55F (13C) minimum 400F (204C) maximum
Relative Humidity:	85% maximum. At least 5 deg. F (2.8 deg. C) above dew point

Equipment & Mixing

Heat Shield™ EPX-H2) is a 2-part system.

Open both cans pour Part B (smaller) into Part A, and mix thoroughly. It is important that the system is mixed well, no ribbons of colors.This is more difficult to note if using the white version of EPX. Mix for 5 minutes at slow/medium speed.

Remember, the product has a 24 hour pot life. Don't mix up more than you can use in a 24-hour period.

Allow EPX to set for 30 Minutes after mixing.

Note: Do not use a cage mixer. Mixer must be open faced to allow textured materials to be mixed.

DON'T DAMAGE THE INSULATING PARTICLE
When mixing, do not grind the mixer against the sides or bottom of the can or mix at high speed. This can cause damage to the insulating particle and diminish effectiveness.

Equipment & Mixing

SUGGESTED TIP:
Begin with the **smallest tip** that comes with the sprayer. In the case of the Wagner Power Tex, that will be the black tip. This will give you the most even finish. Control thickness of the application by doing shorter passes over the area for thinner coverage.

SUGGESTED FILM THICKNESS GAUGE:
WET FILM
Due to the pebbled finish of the Heat Shield™ EPX-H2O, it cannot be measured with a dry film thickness gauge. Care must be taken when using the wet film thickness after each pass to measure the main coating thickness rather than the top of the largest “pebble”, which is the insulating particle.

It’s easy during the first pass when you can see the surface beneath the coating to spray at the proper 10 mil/254 micron thickness, however it’s more difficult during subsequent passes to spray more thinly. People tend to over apply the thickness if not measured on subsequent passes.

SPRAYERS
Many different type of texture sprayers can be used for application. We recommend using one with a hopper feeder at the top of the gun to avoid clogged hoses.

Be sure to read the instructions on how to properly lock in the hopper, so you don’t end up with a mess on your hands.

Application - UV Resistant Top Coat

This step used only if needed for UV resistance.
Epoxies tend to chalk when exposed to UV for long periods of time, this is solved by applying 1 coat of either High Heat (if it is hotter surface of 256F/125C+) or Energy Protect™ if cooler.
Use airless sprayer to apply finish coat of High Heat or Energy Protect™ to equipment in 1 pass at 4 mils (100 microns)

APPLICATION METHOD:
A standard airless or High Volume Low Pressure (H.V.L.P.) paint sprayer - Coat is applied at approximately 100 microns (4 mils) wet film thickness and will dry to approximately 19 microns (0.75) dry film thickness.

IMPORTANT: Be sure the EPX-H2O surface is completely dry prior to application, otherwise “alligatoring” - Patterned cracking in the surface of the paint - can occur.

SUGGESTED TIP:
Begin with a 2-4 fan size and orifice between .012-.016. Adjust fan as needed for surface size.

The product will look milky in the can but will dry to a clear, matte finish.

Application - Tools

Airless Sprayer

Use with High Heat or Energy Protect for UV

- ✓ Extremely versatile for spraying
- ✓ Makes spraying fast and easy
- ✓ Consistent spray fan at all pressures

Texture Sprayer

Use with EPX-H2O

- ✓ No-tools pump removal
- ✓ Makes texture spraying fast and easy
- ✓ Delivers smooth material flow for uniform coverage

Wet Film Gauge

Use with EPX-H2O

Used by placing the edge in the wet coating film and seeing where the coating leaves a mark. The teeth measure one side in microns, and the other side in mils.

Used when coating is wet.

What to Watch Out For

We will show you what to watch out for so your application goes smoothly.

Application - Temperatures

When working with water-based coatings, temperatures during application are CRITICAL. For the preferred HOT application method, the surface needs to stay HOT during application or at least when application begins

DO NOT COAT A COOL SURFACE AND THEN BRING THE TEMPERATURE OVER 100C (212F) WHEN THE COATING IS STILL WET OR BLISTERING CAN HAPPEN.

REMEMBER:

- ✓ Start hot if you're going to do a hot application. Once the coating is applied to a hot surface it dries very quickly, so you can cycle down to a lower temperature. But do not start cool then go hot.
- ✓ It is better to keep equipment heated above 100℃ during entire application (even though this may be inconvenient for those hours) than to risk a mistake that will result in the need to remove and reapply coating.
- ✓ If you adhere to the temperature guidelines, your application has the best chance of success.

Correct

Panel was coated HOT (above 100℃) and the surface temperature was kept HOT throughout entire application. Adhesion is excellent.

Incorrect

Panel was coated COLD (below 100℃). Then before the coating was dry, panel was taken over 100℃. This caused the moisture still in the material to blister, and loss of adhesion occurred. Loss of adhesion.

Application - Pot Life

Heat Shield™ EPX-H2O is a 2-part water-based epoxy system. It has a pot life of 24 hours after the two components have been mixed together. Pot life is the period of time during which a material maintains its workable properties after it has been mixed.

WHAT HAPPENS WHEN YOU USE THE MATERIAL PAST ITS POT LIFE?

The application will experience hairline cracks throughout the film.

REMEMBER:

- ✓ Keep record on Project Application Log of the timing when components have been mixed, so you will know when pot life has expired.
- ✓ Just because the material still has a workable viscosity DOES NOT mean it can be used.
- ✓ Do not use EPX after pot life has expired - 24 hours after Part A and Part B have been mixed.

Example of hairline cracks on film when applied past 24 hr pot life.

Application - Moisture Damage

If you are coating equipment that is in operation over the application period then you will need to use care when operating not to damage the coating film or drip water or dye onto the not yet dry coating.

WHAT HAPPENS WHEN WATER OR DYE DRIP ONTO AN “IN PROGRESS” APPLICATION?

The application may crack and peel due to excess moisture in the film coverage. Loss of adhesion will occur and repair will be necessary.

REMEMBER:

✓ **The surface should not be subject to drips or contact with water, dye or other liquids during the first 72 hours after the application is completed.**

HOW TO REPAIR:

✓ **Repair by sanding or wire brushing away the damaged area. Smooth area, clean thoroughly, and dry completely. Reapply over damaged area.**

ISSUE

Water or dye dripped into the application that was still in progress.

Loss of adhesion due to moisture dripping on the surface of the application before it has thoroughly dried.

Application - Overspray

Heat Shield™ EPX-H2O is a more rugged thermal insulation coating and due to the thickness, there will be some overspray when applying.

Recommendations for protection of equipment from overspray during application:

Splatter Shields & Tarps:

Protect instrument panels, floors, and other areas with tarps or Splatter Shields. Splatter shields are simply portable shields created with plastic tubing and plastic tarps, which can be moved behind and around equipment being coated to protect from overspray.

Proper Taping of Equipment Parts:

Make sure when taping over plates or other equipment parts that you don't tape onto the surface of the machine. Otherwise, when you remove the tape, you may have a bare area that you will need to coat.

Tape was incorrectly placed on machine surface, causing a bare spot when it was removed

Painter's tape works very well. Tape over bolts, gauges, equipment name plates, and any other areas that you want to protect from being coated.

Tape was correctly cut not to lay onto machine surface.

Application Best Practices

Use Practice Surface Before Spraying Equipment

If you haven't used a texture sprayer before, it is a good idea to practice spray on boards, cardboard, or other 'practice' surfaces. This will allow you to get familiar with the spray equipment and how to get an even spray pass across the surface BEFORE spraying the equipment.

Practice with Texture Sprayer during a large multinational training.

Application Best Practices

Industrial fans decrease dry time between coats.

Turn fans OFF when you are applying the coatings to the equipment, so that the fan doesn't interfere with the spraying process.

Turn fans ON when you are finished with a coat to help decrease dry time with air circulation.

Use a Low Fill for Tight Spots

If you need to tip the texture sprayer up to get to a particular area, only fill the hopper with a small portion of the EPX-H2O. You want enough to feed into the spray tip but not so much that it will spill when you tip the hopper. (see photo)

Damage Repair

Repair of a damaged application area is done easily.

REPAIR STEPS:

- ✓ **Remove Damaged Coating By Sanding or Wire Brushing**
- ✓ **Clean and Dry Area**
- ✓ **Reapply Coating Over Area**

Project Application Log

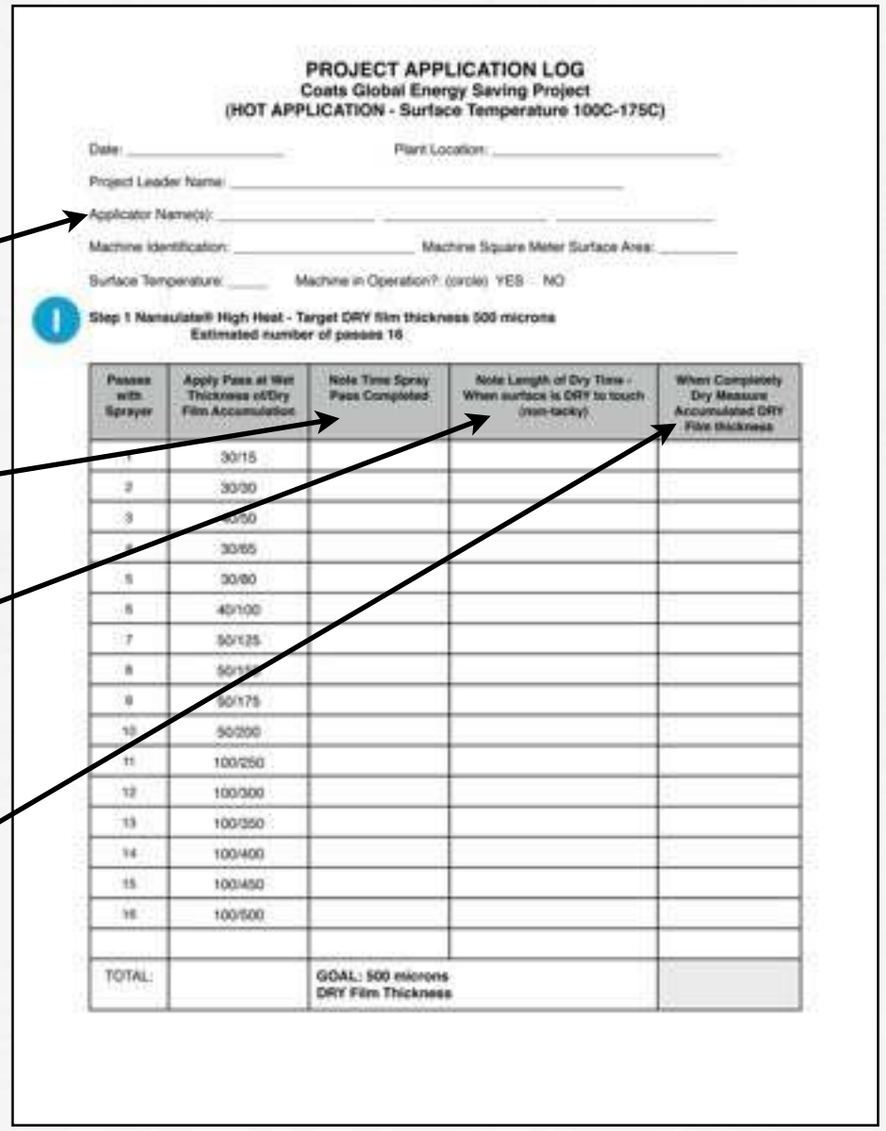
We have created a Project Application Log to make it easy for your team to track application information for project.

Fill in the project and equipment information.

Chart the time that each spray pass was made.

Note the actual dry time when coat was dry to touch (non-tacky) and ready for the next coat to be applied.

Keep a running total of your film thickness so that you will know when the TARGET thickness is reached and that Step is complete.



PROJECT APPLICATION LOG
Coats Global Energy Saving Project
(HOT APPLICATION - Surface Temperature 100C-175C)

Date: _____ Plant Location: _____

Project Leader Name: _____

Applicator Name(s): _____ _____ _____

Machine Identification: _____ Machine Square Meter Surface Area: _____

Surface Temperature: ____ Machine in Operation?: (circle) YES NO

Step 1 Nansulate® High Heat - Target DRY film thickness 500 microns
Estimated number of passes 16

Passes with Sprayer	Apply Pass at Wet Thickness of/Dry Film Accumulation	Note Time Spray Pass Completed	Note Length of Dry Time - When surface is DRY to touch (non-tacky)	When Completely Dry Measure Accumulated DRY Film thickness
1	30/15			
2	30/30			
3	30/50			
4	30/65			
5	30/80			
6	40/100			
7	50/125			
8	50/150			
9	50/175			
10	50/200			
11	100/250			
12	100/300			
13	100/350			
14	100/400			
15	100/450			
16	100/500			
TOTAL:		**GOAL: 500 microns DRY Film Thickness**		

Tips for a Successful Application

The coatings are very easy to apply, if you follow a few simple tips.

- ✓ **Do Proper Surface Preparation**
- ✓ **Mix Coatings Thoroughly, but do not damage the nanocomposite. Mix at low to medium speed, do not drag the mixer onto the sides of the bucket.**
- ✓ **Chart pot life for EPX**
- ✓ **Adhere To Application Temperature Guidelines**
- ✓ **Measure Film Thickness Throughout Application**
- ✓ **Protect Application From Water/Dye Spillage**

Temperature Testing Notes

It's always a good idea to measure the surface temperature BEFORE and AFTER application. If you're doing a trial, it will also be important for charting the results for your customer.

✓ **Use a surface contact thermometer, not laser. Or if you have the proper equipment, a Flir camera.**

✓ **Take several measurements so you can average them together. Many boilers, pipes, tanks and other equipment will cycle and change internal temperature while running and will have different "hot spots". Be aware of these!**

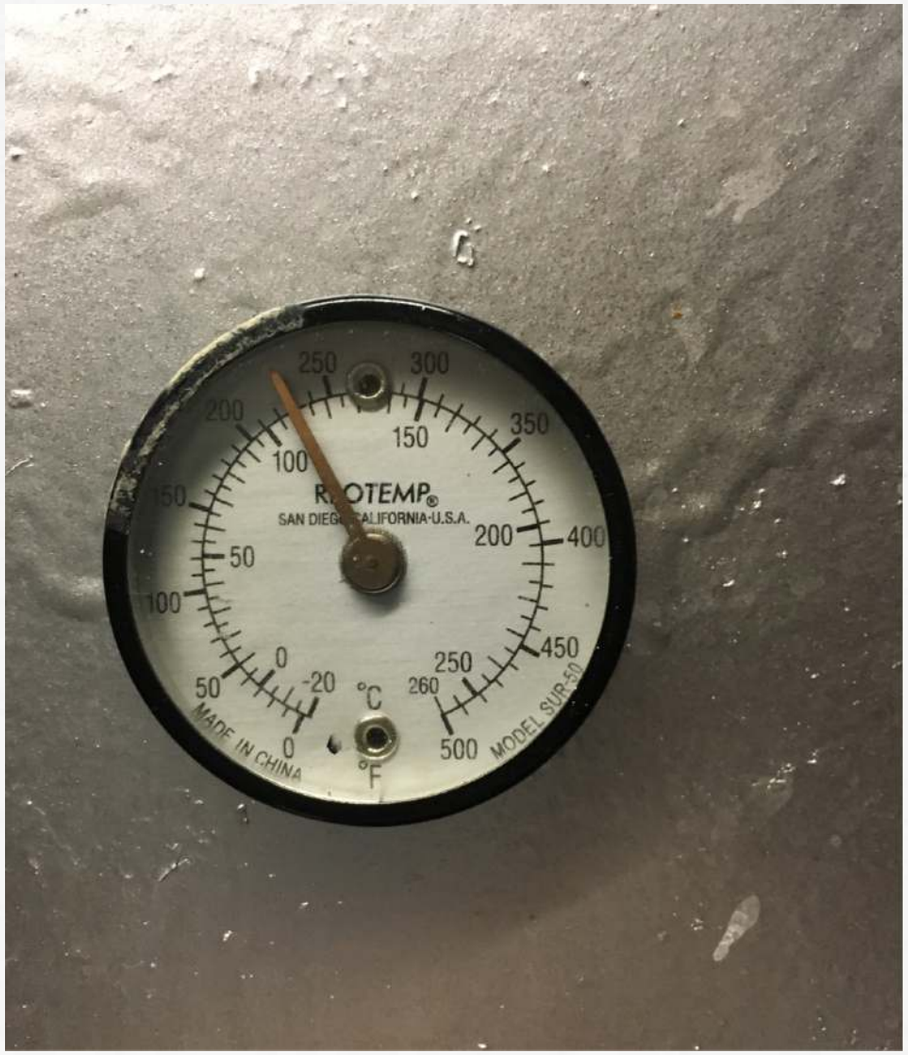
✓ **Allow the coating to cure before taking the AFTER temperatures. If you're coating on a hot surface, that can be 4-24 hours. If you're coating on a cooler surface, give it at least 72 hours to ensure you're getting proper readings.**

✓ **Chart all readings before, during and after so you can provide a detailed report later. The more data points, the better.**

✓ **Note things that can cause wrong readings such as:**

- **Steam blowing in front of your surface**
- **Using a laser thermometer (when we told you not to), they're not accurate on many surface types**
- **Different internal equipment operating temperature than when you took earlier readings**
- **Not allowing the coating to fully cure before measuring temperature**
- **Not applying the proper film thickness as the specification**

Temperature Testing Images

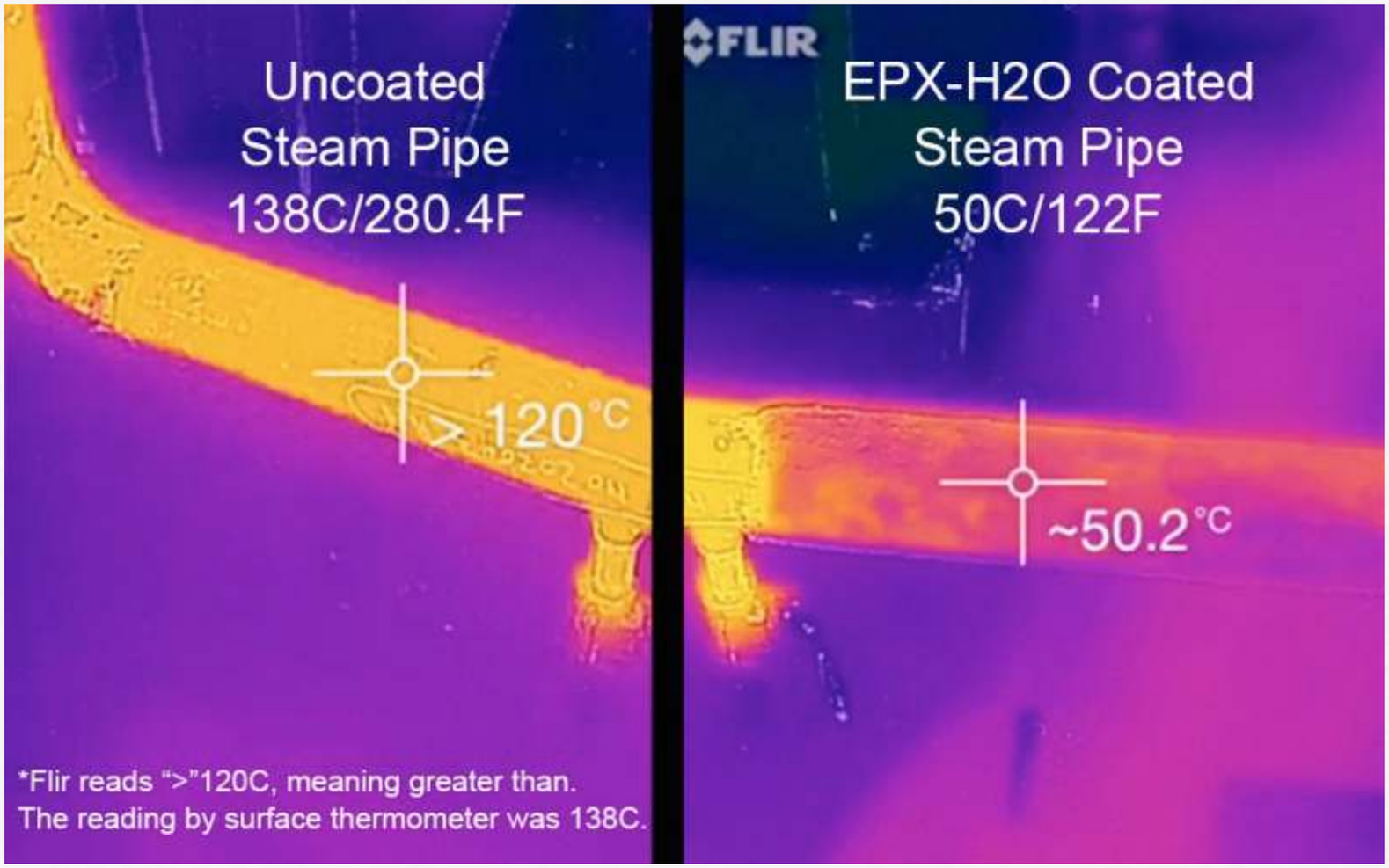


Surface contact, magnetic thermometer.
Allowed to come to a steady state temperature for 20 minutes.

BEFORE: 240F (115.5C)

AFTER 6-coats: 150F (65.5C)

Temperature Testing Images



Flir camera taking photos & movie image of an uncoated and coated section of the same steam pipe.

Contact & Links

Syneffex™ Technical Team
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Product videos can be found at www.syneffex.com/product/heat-shield-epxh2o-thermal-insulation-protective-coating/

The EPX-H2O Application & Mixing Guide can be found at https://www.syneffex.com/application-guides/