



INDUSTRIAL
NANOTECH INC
A GLOBAL LEADER IN NANOSCIENCE SOLUTIONS

NANSULATE®

AWARD-WINNING ENERGY SAVING & ASSET PROTECTION COATINGS

Application Handbook for Homes/Buildings



FOR BUILDING ENVELOPE:

Nansulate® Energy Protect

Nansulate® HomeProtect

Nansulate® LDX

Nansulate® is Patented technology protected by U.S. and international Patents.

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This is the general specification covering materials and procedures for the thin-film, Nansulate® thermal insulation and protective coatings. More detailed, job-specific specifications may be obtained from Industrial Nanotech, Inc.

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NOTE: The information contained in this document is deemed to be accurate, however is not guaranteed. No warranty, expressed or implied is given regarding the accuracy of this information. Each application is unique and findings may be different due to environmental conditions. For questions, contact Industrial Nanotech, Inc. at 800-767-3998 or +1 239-254-0346.

Surface Preparation

Proper surface preparation must be done to ensure proper adhesion of the coatings. All surfaces must be clean, free of any residue, and dry prior to application.

<p>Metallic Surfaces:</p>	<p>Remove all loose contamination by wire brushing. Remove all dirt, grease, oil, soluble salts and other contamination by using a suitable cleaner/degreaser and clean water rinse.</p> <p>Remove all loose, flaking rust and/or paint by one of the following standards: SSPC-SP 2 Hand Tool Cleaning or SSPC-SP 3 Power Tool Cleaning (http://www.sspc.org/standards/spscopes.html)</p> <p>If doing sandblast use one of the following: SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning, SSPC-SP 7/NACE No. 4 Brush-Off Blast Cleaning, or SSPC-SP 10/NACE No. 2 Near-White Blast Cleaning. (http://www.sspc.org/standards/spscopes.html) (http://www.nace.org)</p> <p>Profile shall be 1-1.5 mils in depth and angular in appearance.</p>
<p>Painted/Coated Surfaces:</p>	<p>Ensure paint is not flaking or peeling. Remove all loose dirt, oil, grease or other contaminants. Abrade the surface prior to Nansulate® application if necessary.</p> <p>If applying over wood paneling or other surface with u/v cured or urethane coating use appropriate primer for that surface, which is compatible with water-based coatings. If you are painting Nansulate® over a pre-painted surface, make sure that the paint, coating, or sealant is compatible with a water-based acrylic latex. If it is not, then a suitable primer may be necessary (check with that product manufacturer for information).</p> <p>IMPORTANT: If you are unsure of the surface that you are overcoating, try Nansulate® on a small area first to ensure it is suitable for your application and has proper adhesion before coating a larger area. If painting over a non-water-based paint, you should test a small area for adhesion first by coating the area with three coats (1-2 hours dry time between each) and observing adhesion after 72 hours. Certain paints will not be compatible with water-based acrylic latex coatings, and require a suitable primer (such as Kilz or similar) to be used prior to coating Nansulate® over them.</p>
<p>Concrete and Porous Surfaces:</p>	<p>Concrete or other material should be fully cured. Be sure there is no moisture in the substrate that will escape after application, and interfere with proper adhesion of the coatings. Moisture escaping from the underlying surface causes loss of adhesion. Follow same surface preparation procedures as 'other surfaces'.</p>
<p>Glass/Smooth Non-Porous Surfaces:</p>	<p>Ensure surface is thoroughly clean and dry. Apply the first coat and allow to dry for 24 hours before applying the next coat. This can aid adhesion to these types of difficult to adhere to surfaces.</p>
<p>Lead Paint Surfaces: (LDX coating)</p>	<p>Ensure paint is adhering well to surface. If there is any flaking of paint, it should NOT be abated by encapsulation, as any encapsulant can only adhere as well as the surface to which it is applied. DO NOT sand or abrade surface, otherwise you could release dangerous lead dust into the air. If lead paint is adhering well with no peeling, cracking or flaking, clean the surface so it is free of any contaminants, and dry thoroughly.</p>
<p>Other Surfaces:</p>	<p>Remove all loose contamination by wire brushing. Remove any dirt, oil, grease, etc. using a suitable cleaner/degreaser that does not leave a residue. Surface should be clean and dry.</p>

Film Thickness and Measurement

Measuring your overall thickness is important during your application to ensure you achieve your desired results. Each "coat" of Nansulate® is actually equivalent to a particular wet (applied) film thickness and dry film thickness. Each single "coat" of Nansulate® Coatings for building envelope applications correspond to the following approximate thickness. *NOTE: DFT has been updated per mid-2013 upgrades*

	<u>Wet Film Thickness (WFT)</u>	<u>Dry Film Thickness (DFT) after full cure</u>
Each Coat Measures:	100 microns (4 mils)	19 microns (0.75 mils) (DFT is 19% of wet film thickness)

All square foot coverage rates are based upon the applied thickness, which is the wet film thickness (WFT).

IMPORTANT: DO NOT apply each coat more than 5-6 wet mils/127-152 microns in thickness. If you are experiencing cracking, peeling, or flaking while the application is drying, this indicates your coat application is too thick.

ALSO, Measure either the applied Wet Film Thickness or cured Dry Film Thickness to ensure you've got the correct coverage. For example: It may only be the DFT equivalent of a one coat application, instead of a three or more coat application. **Therefore to avoid applications that are applied at less than the suggested thickness target, it is important to measure your film thickness during each coating pass.**



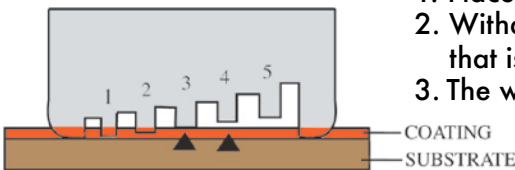
Wet Film Thickness Gauge

The wet film thickness gauge is used when the coating is still wet, immediately after application. It is placed into the surface of the coating and will leave a mark on the gauge which can be read. One side measures in microns, and the other side measures in mils.

It is difficult to read clear coatings with this gauge, however a light source can assist in reading the wet coating marks on the gauge.

How to read a Wet Film Thickness gauge:

1. Place gauge on wet film at 90° angle and press into film.
2. Withdraw and note deepest tooth having paint on it and next higher tooth that is not coated
3. The wet film thickness lies between these two readings



Dry Film Thickness Gauge

The dry film thickness gauge is used after the coating has completely dried and cured. Be sure to use a film thickness gauge that is meant for non-metal surfaces. It is placed on the surface of the coating and will display the dry film thickness in either microns or mils on the display

Typical Thickness by Application

	Building Envelope Insulation (walls, ceilings, attics, windows, skylights)	Lead Encapsulation	Building Mold Resistance Only
Typical Applied Film Thickness	3 coats, applied at 4 mils/100 microns wet film thickness each coat.	2 coats, applied at 4 mils/100 microns wet film thickness each coat.	2 coats, applied at 4 mils/100 microns wet film thickness each coat.
Measured Dry Film Thickness for Entire Application, AFTER full cure time of 30 days.	2.25 mils/57 microns Dry Film Thickness	1.5 mils/38 microns Dry Film Thickness	1.5 mils/38 microns Dry Film Thickness
Product Used:	Residential: Nansulate® Home Protect Commercial: Nansulate® Energy Protect	Nansulate® LDX	Residential: Nansulate® Home Protect Commercial: Nansulate® Energy Protect

Note: For application instructions for Nansulate® Crystal, clear insulating roof coating see:

http://www.nansulate.com/pdf/Nansulate_Crystal_Roof_Application_Handbook.pdf

COVERAGE RATES FOR ONE GALLON (3.79 LITRES):

Coverage rates are dependent upon surface texture, and may vary according to the substrate.

Applied Wet Film Thickness (WFT)	Coverage - Square Feet	Coverage - Square Meters	Number of Coats
4 mils/100 microns WFT	450 S.F.	42 m2	1
8 mils/200 microns WFT	225 S.F.	21 m2	2
12 mils/300 microns WFT	150 S.F.	14 m2	3
16 mils/400 microns WFT	112.5 S.F.	10.5 m2	4
20 mils/500 microns WFT	90 S.F.	8.4 m2	5
24 mils/600 microns WFT	75 S.F.	7 m2	6

Equipment, Mixing and Dry/Cure Times

PRODUCT DESCRIPTION:

One component water-based acrylic latex thermal insulation and protective coatings designed for use on a variety of metal and non-metal home and building surfaces.

EQUIPMENT:

Application method is by brush, roller, or paint sprayer. Use either airless sprayer at low pressure, or HVLP (high volume low pressure) sprayer.

Nansulate® coatings can be applied with standard paint spray equipment. Equipment size and performance varies widely, so it is our intention to provide the following suggestions for various sizes of equipment which may be used for the coatings, in addition to other important items to ensure proper application.

Airless or H.V.L.P. sprayer:

- a) Graco Silver Gun, 395, Titan 440i (or similar)
Wagner/Spraytech hand held sprayers are suitable for small areas.
- b) Wagner Project Pro 115, or Paint Crew
- c) Graco Minimax-battery operated is also suitable.

Tips & Extensions for Airless Sprayers:

You may need various tip fan sizes depending upon surface; such as 2, 4, 8 inch, and a 0.015-0.019 tip. Smaller surfaces require smaller fan widths, larger surfaces require larger fan widths. Refer to your paint sprayer documentation for suggested tip fan sizes according to surface area to be coated.

Tape over or cover any surfaces that you do not want coated to protect them from any overspray.

For a complete list of equipment, please download our Recommended Equipment Checklist:
http://www.nansulate.com/pdf/Recommended_Equipment_List.pdf

MIXING AND PREPARATION:

DO NOT thin the product with paint thinner or other medium. Thinning product can negatively effect insulating properties and void warranty.

Product should be stirred in the can prior to application or after sitting overnight. Care should be taken during stirring prior to application not to cause particle shear of the nanocomposite. Preferred method of stirring is using a mixing paddle (also known as hurricane mixer) at slow speed for approximately 3-5 minutes. Do not scrape the sides of bottom of the can, but rather, lightly scrape/mix any solids into the middle.

SUBSTRATE APPLICATION TEMPERATURE:

The temperature extremes for the substrate to which the material can be applied are 4°C to 99°C (40°F to 210°F). If applying to surfaces over 100°C (212°F), see special HOT MISTING TECHNIQUE on page 10 of our Industrial Application Handbook: http://www.nansulate.com/pdf/Nansulate_Application_Handbook.pdf .

DRY AND CURE TIMES:

The touch dry time between individual “coats” of approximately 4 mils (100 microns) in thickness is 1-2 hours, depending upon humidity and air movement.

DO NOT apply the next coat/pass until the surface is completely dry to touch and non-tacky.

Hard dry/return to service is in approximately 72 hours (normal humidity) and 6 days (high humidity). Full cure time is approximately 30 days, for a 2-3 coat coverage, depending on climate, overall thickness of application, and humidity. Additional coats past three will increase cure time.

NOTE: The product does not reach full insulating ability until the full cure time is completed. No testing should be done prior to 30 days after application, depending upon overall thickness of application. See our FAQ section at nansulate.com for testing tips and information regarding thermometers.

IMPORTANT: DO NOT APPLY EACH COAT MORE THAN 5-6 WET MILS/127-152 MICRONS IN THICKNESS. If you are experiencing cracking, peeling, or flaking this indicates your coat application is too thick. Each coat/pass should be approximately 4 wet mils (100 microns) in thickness. Use a Wet Film Thickness Gauge as you are applying to ensure each coat is being applied within that range and that you have the correct coverage.

PAINTING OVER/COVERING THE COATINGS:

The product can be painted over with a water-based paint after it has dried for at least 72 hours. It can be painted over with a non-water-based paint after it has fully cured (approximately 30 days for a 3-coat coverage, or longer for thicker coverages).

The product can be covered with tile, carpet, or other building material, after it has fully cured (approximately 30 days for 3-coat coverage). Thicker coverages and higher humidity will increase dry and cure times. Application on warm or hot surfaces, and air movement (such as using fans) will decrease dry and cure times.

WEATHER CONSIDERATIONS:

Temperature and weather conditions are considerations for any exterior painting project. Weather conditions should be above freezing for at least 30 days after application. Optimum temperature for exterior painting is between 50°F-85°F (10°C-29°C). Rain is also a factor, you will want to check the weather forecast and choose a timeframe with no rain in the forecast for the day of and for three days after your planned application.

Apply only at temperatures above 50°F (10°C). Do not apply late in the afternoon or early evening when a heavy dew could develop on the coating surface before it completely dries.

IMPORTANT: Do not allow an application to be exposed to rain, condensation, or moisture during application or within the first 72 hours after application, nor be exposed to below freezing temperatures during the first 30 days after application. Either of these situations could cause loss of adhesion, peeling or flaking. Do not apply the coating over a wet or moist surface - the surface should be completely dry prior to application to ensure proper adhesion.

STEP BY STEP:

STEP 1:

Thoroughly clean and dry surfaces. See "Surface Preparation" on page 3 for full details.

STEP 2:

Apply a first coat pass of 4 wet mils/100 microns to the entire substrate. If using a roller to apply it is recommended to use the shortest nap size (approximately 1/4") to begin and move up as needed. Measure wet film thickness immediately after applying the coating, note whether you need to increase, decrease, or maintain the pass thickness, and adjust accordingly to meet the applied wet film thickness of 4 mils/100 microns.

STEP 3:

Allow coat to completely dry to non-tacky (1 to 2 hours) before applying the next coat.
IF YOU ARE APPLYING TO GLASS, PLEXIGLASS OR SIMILAR SURFACE, allow to dry for 24 hours.
Whenever possible, always apply the next coat in a cross-coat method to the previous coat.

STEP 4:

Apply second coat pass at 4 wet mils/100 microns to the entire substrate until you have achieved your target film thickness.

STEP 5:

Allow coat to completely dry to non-tacky (1 to 2 hours) before applying the next coat.

STEP 6:

Apply third coat pass (if doing insulation application) at 4 wet mils/100 microns to the entire substrate until you have achieved your target film thickness. Allow to dry thoroughly.

Limitations and Safety Precautions

Substrate must be structurally sound, cured and free of bond inhibiting contaminants.

During installation and initial cure cycle substrate and ambient air temperature must be at a minimum of 10°C/ 50°F. Substrate temperature must be at least 3°C/5°F above the dew point.

Nansulate® is not meant to be used in an underwater or submerged environment.

Strictly adhere to published coverage rates.

Do not thin product with paint thinner, water or other medium.

DO NOT ALLOW PRODUCT IN THE CAN TO FREEZE.

SAFETY PRECAUTIONS

Follow all MSDS/label precautions even after container is emptied because it may retain product residues. Avoid contact with skin and eyes.

FIRST AID: In case of skin contact, flush with plenty of water. Remove contaminated clothing. Seek medical attention if irritation develops or persists. For eye contact, flush immediately with large amounts of water. Obtain medical treatment. If swallowed, DO NOT induce vomiting, obtain medical treatment immediately. If inhalation causes physical discomfort remove to fresh air. If symptoms persist, get medical help. **KEEP OUT OF THE REACH OF CHILDREN.** Wear gloves and goggles during application. For additional safety information, refer to Material Safety Data Sheet for this product. **IMPORTANT!** Spray equipment must be operated with care in strict accordance with manufacturer's instructions. Use of an approved dust/mist respirator during spray application is recommended. Wear approved dust respirator when grinding or sanding on cured product. Follow respirator manufacturer's directions for respirator use.

IN CASE OF SPILL: Keep material away from drains. Absorb with inert material and dispose of in accordance with applicable regulations.

DISPOSAL: Contains no chromium, lead or mercury. Consult your sanitation department for more information on disposal of empty containers. Disposal of waste containing free-liquids in landfills is prohibited. Contact your state-designated environmental agency for information concerning re-use, recycling or disposal of unused paint.

CLEAN UP:

Nansulate® coatings are water-based and cleanup can be done with soap and water. If coating is spilled or splashed, remove it at once, using water and mild detergent. Clean hands, brushes, rollers, tools and other equipment immediately after use in warm, soapy water.

WARRANTY:

You can find a full copy of product warranty information at www.nansulate.com or request a printed copy by calling 1-800-767-3998 or +1-239-254-0346.

Rework/Repair:

The need for Rework/Repair of the coating would be indicated by the following:

- Cracking, peeling, or blistering (bubbling) of coating surface
- Scratch or other damage on coating surface
- Other non-coating related rework to parts which cause a loss of coating adhesion or film to become damaged. (For example, if dyes or chemicals were spilled on the coating before it had a chance to properly dry and cure.)

1. Total Removal and Recoat:

This would be indicated by large scale damage to coating, where repair could not be limited to only one area.

- The coating can be removed by solvents (paint strippers specific for removal of water-based coatings) or sanding.
- Area should be washed and dried thoroughly.
- Coating should be reapplied.

2. Repair of Damaged Area:

This would be indicated by damage to only a small area of the coating surface.

- The damaged coating can be removed by solvents or small scale sanding.
- Area should be washed and dried thoroughly.
- Coating should be reapplied over area.

Measuring Performance

Measurements for surface temperature difference are not typically a way that building energy efficiency is tested. If you are testing for performance, we recommend doing an assessment of energy used either for heating or cooling, after the coating has fully cured.

Industrial Nanotech, Inc. through its Gold Standard Application Program has Performance Measurement Log Sheets available to our customers. You can download these from:

http://www.nansulate.com/Tools/Nansulate_Performance_Measurement_Logs.pdf or call us at 800-767-3998 to request a copy.

The Energy Consumption Performance Log provides a chart for measuring and comparing energy consumption data on any surfaces or equipment where the entire envelope is coated. For accuracy of measurement, the entire envelope (building, pipe or equipment) should be coated in order to properly gauge performance. Any "holes" in the thermal envelope, for example, if you only coat a small section, instead of an entire envelope, will not give you an accurate measure of energy efficiency.

Typical Painting Issues and Solutions

ISSUE	DESCRIPTION	POSSIBLE CAUSE	SOLUTION
Alligatoring	Patterned cracking in the surface of the paint film resembling the scales of an alligator.	1) Application of a top coat before the undercoat is completely dry.	Remove loose and flaking coating with a scraper or wire brush, sand the surface smooth. Thoroughly clean and dry surface. Reapply.
Blistering	Bubbles resulting from localized loss of adhesion and lifting of the coating film from the underlying surface.	1) Exposure of the coating film to moisture shortly after paint has been applied and/or before it has thoroughly dried.	Remove blisters by scraping and sanding. Thoroughly clean and dry surface. Remove source of moisture. Reapply.
Cracking/ Flaking	The splitting of a dry coating film through at least one coat. Begins as cracking of coating film which results in flaking.	1) Thinning or over spreading of the coating. 2) Inadequate surface preparation.	Remove loose and flaking coating with a scraper or wire brush, sanding the surface. Thoroughly clean and dry surface. Repaint. Ensure no thinning of the coating is being done.
Mud Cracking	Deep, irregular cracks resembling dried mud, in dry paint film.	1) Coating is applied too thickly, can occur with inexperienced use of airless sprayer. 2) Coating is allowed to build up in corners or crevices upon application.	Remove excess coating by scraping and sanding. Thoroughly clean and dry surface. Reapply.
Sagging	Downward drooping/movement of the coating immediately after application, resulting in an uneven coating.	1) Application of too heavy a coat. 2) Application in excessively humid and/or cool conditions. 3) Thinning of coating. 4) Airless spraying with the gun too close to the substrate being painted or moving the gun too slowly.	If coating is still wet, immediately brush out to redistribute the excess evenly. If the coating has dried, sand, thoroughly clean and dry surface, and reapply. The coating should be applied at its recommended spread rate: avoid "heaping on" the coating. Two coats at the recommended thickness are better than one heavy coat.
Wrinkling	Rough, crinkles in the coating surface, which occurs when uncured paint forms a "skin."	1) Coating applied too thickly. 2) Painting during extremely hot weather or cool damp weather, which causes the coating film to dry faster on the surface than under the surface. 3) Exposing uncured coating to excess moisture. 4) Painting over a contaminated surface (e.g. dirt or wax).	Scrape or same to remove wrinkled coating. Thoroughly clean and dry surface. Reapply.

Source: The Paint Quality InstituteSM