Patented Technology by Industrial Nanotech, Inc.

Nansulate® Bee Protect Application FAQ

Question: *How many coats are recommended to protect beehives?*

Answer: We recommend a minimum of 5 coats Nansulate® Bee Protect Clear

Question: *What is the coverage rate of Nansulate® Bee Protect?*

Answer: Coverage rate for one gallon of Nansulate® Bee Protect Clear is 450 S.F. per gallon at 1 coat., and 90 S.F. per gallon at the recommended 5 coats.

Question: *How should we apply the Nansulate® Bee Protect?*

Answer: Preferred application method is by brush, roller or an airless sprayer at low pressure can be used. Each coat should be applied at 3-5 wet mils (72-127 microns) in thickness. (TIP: Coats should remain clear as they are being applied). Recommended application is in the exterior of the hive, including top and bottom.

Care should be taken during mixing prior to application not to cause particle shear of the nanocomposite. Preferred method of mixing is using a mixing paddle at slow speed for approximately 1-2 minutes. Do Not thin the Bee Protect product with paint thinner or other medium.

It is recommended that each coat be allowed to dry for a minimum of 1-2 hours before applying an additional coat.

Proper surface preparation must be done to ensure proper adhesion of the coating. Painted Surfaces: Ensure paint is not flaking or peeling. Remove all loose dirt, oil, grease or other contaminates. Abrade the surface if needed prior to Nansulate® Bee Protect application.

Airless Spray Equipment Recommendations: Graco Silver Gun, 395, Titan 440i (or similar) with a 0.11 or 0.13 tip. Keep pressure low.

Important: If you are experiencing cracking, peeling or flaking this indicates your coat application is too thick. The application should not go below freezing until cure time of at least 30 days is complete, or you may experience cracking and peeling.

Question: *When will we see results?*

Answer: The full cure time of Nansulate® Bee Protect products is 30 - 60 days, depending on the humidity of the environment. Most customers begin to see a difference in thermal resistance approx. 2 weeks after application, which improves as the material cures. After full cure, Nansulate® Bee Protect reaches its full insulating ability.

Question: *Is this product safe to use on the beehives?*

Answer: Yes. Nansulate® Bee Protect is water-based and does not contain any toxic ingredients. There is no toxic off-gassing. It also holds NSF non-food compound registration as safe for food contact surfaces.

1925 Trade Center Way, Suite 1, Naples, FL 34109
Phone: 1- 239-254-0346 Toll Free: 800-767-3998 Fax: 1-239-254-1381

www.BeeProtect.org

NANSULATE® TRANSLUCENT PRODUCTS APPLICATION INSTRUCTIONS

(for all coatings except Nansulate® Crystal and Nansulate® EPX)

Nansulate® Energy Saving and Asset Protection Coatings offer highly effective insulation, corrosion resistance, mold resistance, UV resistance, lead encapsulation and chemical and flame resistance. This patented technology provides dramatic energy saving and sustainability solutions for industrial, commercial, government and residential customers.

TYPICAL APPLICATION THICKNESSES BY APPLICATION

Each coat of all products, except EPX, is applied at 3-5 wet mils (approximately 100 microns) in wet film thickness. It will dry to approximately 50% (50 microns) in dry film thickness. Nansulate® EPX will dry to approximately 60% of the wet film thickness).

Review the Temperature Gradient Chart at the end of the Application Instructions for information on expected reduction of surface temperature per number of coats (overall thickness).
Contact us at 800-767-3998 to request a suggested number of coats (overall thickness) recommendation.

Building Envelope (walls, ceilings, roofs):	**3 coats** **6 mils (150 microns) DFT (dry film thickness)**
Cold or Hot Water Pipes, Tanks:	**6-8 coats** **11.8-15.7 mils (300-400 microns) DFT**
Steam Pipes, Boilers, Curing Containers, Dye Machines, and similar heat process equipment: ***(Choices include application with or without use of Nansulate® EPX (rough surface, chemical resistant epoxy)***	**Spec #1 - 10-15 coats High Heat** **19.6-29.5 mils (500-750 microns) DFT** **Spec #2 - 5-10 coats High Heat** **9.8-19.6 mils (250-500 Microns) DFT** **PLUS** **1-2 millimeters EPX** **39.3-78.7 mils WET film thickness** **PLUS** **1 overcoat of Nansulate® High Heat for UV protection.**

Suggested Measuring Tools:

Wet Film Thickness Gauge to measure wet film thickness (use with EPX)

Dry Film Thickness Gauge to measure dry film thickness (use with our translucent coatings)

SUSTAINABILITY SIMPLIFIED™

Please call us and we can specify the best application for you based upon your equipment and environment, as well as any other tools that may be needed for a successful energy saving project.

SURFACE PREPARATION

Metallic Surfaces: 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.

Remove all loose, flaking rust and/or paint by one of the following standards:

If unable to sandblast use:

St 3 Power Tool Cleaning

If able to sandblast use one of the following:

Sa 1 Brush-Off Blast Cleaning

Sa 2 Commercial Blast Cleaning

Sa 2.5 Near-White Blast Cleaning

Profile shall be 1-1.5 mils in depth and angular in appearance.

Painted Surfaces: Ensure paint is not flaking or peeling. Remove all loose dirt, oil, grease or other contaminates. Abrade the surface prior to Nansulate® application if necessary.

Other Surfaces: Remove all loose contamination by wire brushing. Remove any dirt, oil, grease, etc. using a suit able cleaner/degreaser that does not leave a residue.

Proper surface preparation must be done to ensure proper adhesion of the coating. Metal Surfaces: 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. Remove all loose, flaking rust and/or paint by Hand Tool Clean or Power Tool Clean. Commercial Blast Clean may be done.

Painted/Coated Surfaces: Ensure paint is not flaking or peeling. Remove all loose dirt, oil, grease or other contaminate. Abrade the surface prior to Nansulate® application, if needed. 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 prepainted surface, make sure that that 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).

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.

Other Surfaces: Remove all loose contamination by wire brushing. Remove any dirt, oil, grease, etc. using a suitable cleaner/degreaser that does not leave a residue.

Concrete and Porous Surfaces: Be sure there is no moisture in the substrate that will escape after application, and interfere with proper adhesion of the coatings. Follow same surface prep procedures as ‘other surfaces’.

Glass or Very Smooth Non-Porous Surfaces: Apply the first coat very thinly (approximately 2-3 wet mils) 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.

Tape over any surfaces that you do not want coated.

Application Instructions - Nansulate® water-based acrylic latex products -*patented technology*

APPLICATION METHOD

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

The temperature extremes for the substrate to which the material can be applied are 4º C to 99º C (40º F to 210º F). If applying to surfaces over 100° C (212º F), see special misting instructions to HOT surfaces below.

Hard dry is in approximately 72 hours (normal humidity) and 6 days (high humidity). Full cure time is approximately 30-90 days, depending on climate, overall thickness of application, and humidity.

The product can be painted over with a water-based paint after is 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 60-90 days for coverages of higher number of coats). The product can be covered with tile, carpet, or other building material, after it has fully cured (approximately 30 days for a 3-4 coat coverage or 60-90 days for coverages of higher number of coats). Extra coats and higher humidity will increase dry and cure times. Application on warm or hot surfaces,and air movement (such as using fans) decrease dry and cure times.

NOTE: The product does not reach full insulating ability until the cure time is completed. No testing should be done prior to 30-90 days after application, depending upon overall thickness of application.
See our FAQ section at nansulate.com for testing tips and information regarding thermometers.

IMPORTANT: If you are experiencing cracking, peeling, or flaking this indicates your coat application is too thick. Each coat should be approximately 3-5 wet mils (76-127 microns) in thickness.

Coverage Rate: One gallon (3.79 litres) yields approximately 1 coat (100 microns wet film thickness) over 450 square feet (42 square meters) of surface area, depending on surface texture.

For application to surfaces above 212º F (100º C) the first coats should be applied as thinly as possible to prevent blistering, using a misting method with a paint sprayer. Each subsequent coat may be applied more thickly as the first coats will reduce surface temperature.

See our FAQ at www.nansulate.com for further application tips and information.

EQUIPMENT

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 recommendations 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) Recommended: 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 will need various tip fan sizes depending upon surface; such as 2, 4, 8 inch, and 0.011-0.013 tip.

Application Instructions - Nansulate® water-based acrylic latex products -*patented technology*

TWO APPLICATION OPTIONS

There are two different main application options for Nansulate® coatings - depending upon whether the coatings are applied to a surface over or under the boiling point of water (100°C/212°F)

1. "Hot Surface" - a surface temperature between 100°C and 175°C (212°F and 347°F)
(i.e. steam pipes, heat exchangers, boilers, manufacturing equipment)

This is the preferred method if you have equipment that runs at 100°C/212°F and above,and desire no downtime - application to hot surfaces will provide faster dry and cure time, however more and thinner passes will be needed to complete the same application thickness. The coating is non-toxic, however there is also a more noticeable smell when applying to a hot surface. Equipment must remain over 100°C/212°F throughout the application, and for at least 4 hours after the last pass of the day has been completed. Application should be done with sprayer to ensure the misting of the coats is not done too thickly, otherwise blistering could occur. Be sure to measure to ensure appropriate overall target Dry Film Thickness (DFT) is achieved. Using a Hot Surface Application Method, it will take approximately 16 passes to build to a typical 10 coat thickness.

Example:
First coat applied at 30 microns
Second coat applied at 45 microns
Third coat applied at 60 microns
Fourth coat applied at 75 microns
Fifth coat applied at 90 microns
etc.. *(Download or Request Project Application Log Sheet)*

2. "Cool Surface" - a surface temperature between 4°C and 99°C (40°F and 210°F)
(i.e. walls, ceilings, fuel tanks, silos, water pipes, etc..)

Application to cool surfaces will have a longer dry and cure time, however fewer passes will be needed to complete the same application thickness. Application can be done via brush, roller, or sprayer.

Example:
Apply first coat at 100 microns. Allow to dry thoroughly.
Apply second coat at 100 microns. Allow to dry thoroughly.
Apply third coat at 100 microns. Allow to dry thoroughly.
Repeat for each additional coat. *(Download or Request Project Application Log Sheet)*

IMPORTANT: If applying to cold equipment (surface temperatures between 4°C - 99°C (40°F - 210°F), the equipment cannot be operated to a temperature of 100°C/212°F or above for 30-60 days, to allow the application to fully cure and ensure no blistering or loss of adhesion occurs. If you bring the surface over the boiling point before the coating has completely cured (with too much moisture still in the system) cracking or peeling may occur.

LIMITATIONS

Substrate must be structurally sound, cured and free of bond inhibiting contaminates.
During installation and initial cure cycle substrate and ambient air temperature must be at a minimum of 40°F (4°C). Substrate temperature must be at least 5°F above the dew point. When required, adequate ventilation and proper clothing shall be used.

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

Do not allow an application to be subject to rain, condensation, or moisture within the first 72 hours after application. Exposure to rain, condensation, or moisture within the first 72 hours may result in cracking, blistering or peeling.

The application should not go below freezing (0ºC/32°F) until it has had a chance to cure for at least 30-60 days after application, or you may experience blistering, cracking and/or peeling.

For exterior painting be sure to check upcoming weather and overnight temperatures ahead of time .

DO NOT ALLOW PRODUCT IN THE CAN TO FREEZE.

Application Instructions - Nansulate® water-based acrylic latex products -*patented technology*

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.

WARRANTY

Manufacturer's Limited Warranty: Is for 5 years when applied as instructed (Nansulate® HomeProtect Clear Coat, Nansulate® Translucent PT, Nansulate® Translucent GP, Nansulate® Translucent High Heat, NanoBoost™, Nansulate® Solar, Nansulate® EPX, Nansulate® Bee Protect).

Nansulate® LDX, Lead Encapsulation Coating has a 20 year warranty when applied as instructed and covers interior applications only.
Nansulate® Crystal, Clear Roof Insulation Coating has a 10 year warranty when applied as instructed.

See full copy of Warranty for details. (For a copy of full warranty go to www.nansulate.com or call 1-800-767-3998 or +1-239-254-0346.)

REWORK/REPAIR PROCESS

The need for Rework/Repair of the coating would be indicated by the following:
1) Cracking, peeling, or blistering (bubbling) of coating surface
2) Scratch or other damage on coating surface
3) 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.)

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 removers specific for removal of water-based coatings) or sanding.
- Area should be washed and dried thoroughly.
- Coating should be reapplied.

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.

Application - Film Thickness

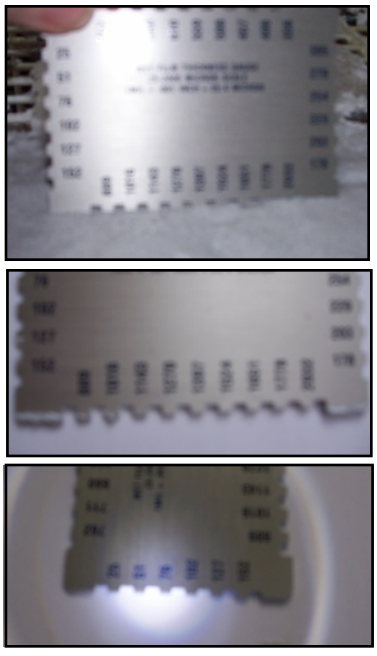
For water-based coatings, the Dry Film Thickness (after moisture has dissipated) is typically less than the applied Wet Film Thickness. Coverage rates are always specified in wet film thickness, as applied. Corresponding dry film thicknesses are then given.

For example:	Wet film thickness	Dry film thickness
Nansulate® High Heat *(Dry thickness is 50% of wet thickness)*	100 microns	50 microns
Nansulate® EPX *(Dry thickness is 60% of wet thickness)*	1000 microns	600 microns

Dry Film Thickness Gauge

The dry film thickness gauge is used after the coating has completely dried to touch (non-tacky). It is placed on the surface of the coating and will display the thickness in either microns or mils on the display.

You will use the Dry Film Thickness Gauge when measuring each of the three Steps: 1, 2 & 3 to chart the accumulated dry film thickness of the application.



Wet Film Thickness Gauge

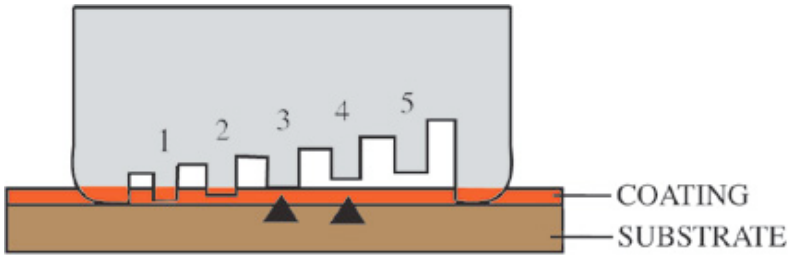
The wet film thickness gauge is used when the coating is still wet, immediately after application. It is placed into the surface of the coating and will leave a mark on the gauge which can be read. One side measures in microns, and the other side measures in mils.

You will use the Wet Film Thickness Gauge when measuring the EPX coverage in Step 2 only.

A light source can assist in reading the wet coating marks on the Wet Film Thickness Gauge.

How to read a Wet Film Thickness gauge:

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



The drawing indicates that tooth marked 3 mils is covered with the wet paint and tooth marked 4 mils is not covered. This indicates that the true wet film thickness of the material is between 3 and 4 mils thick.

Nansulate® Temperature Gradient Chart

Temperatures are shown in Celsius

No.of Coats	Initial Surface Temp. / C	200	190	180	170	160	150	140	130	120	110	100	95	90	85	80	75	70	65	60	55	50	45
1		182	173	164	155	146	137	128	119	110	101	92	88	83	79	74	70	65	61	56	52	47	43
2		166	158	150	142	133	125	117	109	101	93	85	81	77	73	69	65	61	56	52	48	44	40
3		151	144	137	129	122	115	107	100	93	86	78	75	71	67	64	60	56	53	49	46	42	38
4		138	132	125	118	112	105	99	92	86	79	72	69	66	63	59	56	53	50	46	43	40	36
5		126	120	114	109	103	97	91	85	79	73	67	64	61	58	55	52	50	47	44	41	38	35
6		116	110	105	100	94	89	84	78	73	68	63	60	57	55	52	49	47	44	41	39	36	33
7		106	101	97	92	87	82	77	73	68	63	58	56	53	51	49	46	44	42	39	37	34	32
8		97	93	89	85	80	76	72	67	63	59	54	52	50	48	46	44	42	39	37	35	33	31
9		90	86	82	78	74	70	66	63	59	55	51	49	47	45	43	41	39	37	35	34	32	30
10		83	79	76	72	69	65	62	58	55	51	48	46	44	43	41	39	37	36	34	32	30	
11		76	73	70	67	64	61	58	55	51	48	45	44	42	40	39	37	36	34	33	31		
12		71	68	65	62	60	57	54	51	48	45	43	41	40	38	37	36	34	33	31	30		
13		66	63	61	58	56	53	51	48	45	43	40	39	38	37	35	34	33	31	30			
14		61	59	57	54	52	50	47	45	43	41	38	37	36	35	34	33	31	30				
15		57	55	53	51	49	47	45	43	41	39	36	35	34	33	32	31	30					
16		53	52	50	48	46	44	42	40	39	37	35	34	33	32	31	30						
17		50	48	47	45	43	42	40	38	37	35	33	33	32	31	30							
18		47	46	44	43	41	40	38	37	35	34	32	31	31	30								
19		44	43	42	40	39	38	36	35	34	32	31	30										
20		42	41	39	38	37	36	35	33	32	31	30											
21		40	39	38	36	35	34	33	32	31	30												
22		38	37	36	35	34	33	32	31	30													
23		36	35	34	33	32	32	31	30														
24		34	34	33	32	31	30	30															

Temperature After Coated/Cured

Temperatures are shown in Fahrenheit

No.of Coats	Initial Surface Temp. / F	392	374	356	338	320	302	284	266	248	230	212	203	194	185	176	167	158	149	140	131	122	113
1		360	343	327	311	295	279	262	246	230	214	198	190	181	174	165	158	149	142	133	126	117	109
2		331	316	302	288	271	257	243	228	214	199	185	178	171	163	156	149	142	133	126	118	111	104
3		304	291	279	264	252	239	225	212	199	187	172	167	160	153	147	140	133	127	120	115	108	100
4		280	270	257	244	234	221	210	198	187	174	162	156	151	145	138	133	127	122	115	109	104	97
5		259	248	237	228	217	207	196	185	174	163	153	147	142	137	131	126	122	117	111	106	100	95
6		241	230	221	212	201	192	183	172	163	154	145	140	135	131	126	120	117	111	106	102	97	91
7		223	214	207	198	189	180	171	163	154	145	137	133	127	124	120	115	111	108	102	99	93	90
8		207	199	192	185	176	169	162	153	145	138	129	126	122	118	115	111	108	102	99	95	91	88
9		194	187	180	172	165	158	151	145	138	131	124	120	117	113	109	106	102	99	95	93	90	86
10		181	174	169	162	156	149	144	137	131	124	118	115	111	109	106	102	99	97	93	90	86	
11		169	163	158	153	147	142	137	131	124	118	113	111	108	104	102	99	97	93	91	88		
12		160	154	149	144	140	135	129	124	118	113	109	106	104	100	99	97	93	91	88	86		
13		151	145	142	137	133	127	124	118	113	109	104	102	100	99	95	93	91	88	86			
14		142	138	135	129	126	122	117	113	109	106	100	99	97	95	93	91	88	86				
15		135	131	127	124	120	117	113	109	106	102	97	95	93	91	90	88	86					
16		127	126	122	118	115	111	108	104	102	99	95	93	91	90	88	86						
17		122	118	117	113	109	108	104	100	99	95	91	91	90	88	86							
18		117	115	111	109	106	104	100	99	95	93	90	88	88	86								
19		111	109	108	104	102	100	97	95	93	90	88	86										
20		108	106	102	100	99	97	95	91	90	88	86											
21		104	102	100	97	95	93	91	90	88	86												
22		100	99	97	95	93	91	90	88	86													
23		97	95	93	91	90	90	88	86														
24		93	93	91	90	88	86	86															

Temperature After Coated/Cured