



PROSEAL LE™

INSTALLATION INSTRUCTIONS

Huntsman Building Solutions ProSeal LE™ (MD-C-200-v3™) is a closed cell, spray applied polyurethane foam insulation and air barrier material that can have an initial pass thickness of 4 inches. The insulation is applied at a density of 2.2 lb./ft.³ ProSeal LE™ (MD-C-200-v3™) is approved for use in residential and commercial construction, for interior and exterior applications both above and below grade. It is suitable for buildings built in accordance with the IRC and the IBC building Type I, II, III, IV & V construction. ProSeal LE™ (MD-C-200-v3™) can be applied in wall cavities, on flat walls, floor assemblies, ceiling assemblies, attics and crawlspaces.

Appearance:

• Huntsman Building Solutions ProSeal LE™ finished foam is cream in color. The Huntsman Building Solutions ProSeal LE™ Resin (B-side) is brown in color and the Base Seal® (A-side) is dark brown in color.

Storage:

• The Huntsman Building Solutions ProSeal LE™ Resin and Base Seal® (Component “A”, Isocyanate) should be stored between 60°F to 85°F.
• Huntsman Building Solutions ProSeal LE™ resin has a 12 month shelf life if stored as stated.

Mixing:

• Huntsman Building Solutions ProSeal LE™ does not require any mixing prior to or during application.

Note: In cooler weather the Huntsman Building Solutions ProSeal LE™ drums should be kept at the stated storage temperature range so that pre-heating is not necessary. Circulation to heat the resin will result in frothing in the drum.

Changeover:

• Before spraying Huntsman Building Solutions ProSeal LE™ you should remove any previous material from your system by slowly pumping it in to the correct resin (B-side) and MDI (A-side) drum. It is important not to mix one Component B (resin) in to the other. The resins are chemically different and should not be mixed together.
• Turn off/disconnect air to Resin transfer pump.
• Remove the drum pumps from the Resin and ISO drums and wipe pump/dip tube clean. Also make sure the drum pump housing is emptied of any resin.
• Allow some air into the drum pump or dip tube.
• Place the drum pumps/dip tubes in to the Huntsman Building Solutions ProSeal LE™ drums.
• Remove the gun from the manifold or side blocks.
• Re-connect or turn on the air to the drum pumps or diaphragm pumps.
• Use the drum pumps or diaphragm pumps to pump the current resin and ISO materials back to their corresponding drums or in to containers for re-use. Watch for a color change from the current resin to the new resin (brown) or until you reach the air pocket in the line. Count the strokes and use this for purging the ISO (MDI) as there is no color difference to note the change.

Note: If you currently have another Huntsman Building Solution product in your system, you do not have to changeover the Base Seal® (Component ‘A’, Isocyanate) as it is the same for all Huntsman Building Solutions products.

• Once the Huntsman Building Solutions ProSeal LE™ has pushed the previous material out of the spray hose, you will now see brown coloured liquid.
• There will be a 1 to 2 gal. mixture of materials during the changeover.
• Remember to also remove the old material from the re-circulation/pressure-relief hoses before spraying as pressure relief later may cause contamination.
• Always check and clean the A and B side Y-strainer screens prior to commencing the spray application.
• Note: Hose must be warm during flushing as the blowing agents will imbed in the hose cell wall when hot and will stay trapped when hose cools – only to come out again when hose re-heats.
• Note: If the first foam sprayed shows curling at the edges or shrinkage, there may still be some combined material in the spray hose and more material will need to be cleared from the hose prior to spraying.
• Note: If changing between Huntsman Building Solutions ProSeal™ and Huntsman Building Solutions ProSeal LE™ there is no need to changeover – just push one resin out with the other.
• You are now able to spray Huntsman Building Solutions ProSeal LE™.
• Follow the same procedure if you are switching back to another Huntsman Building Solutions product.

Drum Temperature (before and during application):

• During processing, both the Base Seal® (Component ‘A’, Isocyanate) and Huntsman Building Solutions ProSeal LE™ Resin (Component ‘B’) temperatures need to be in the range of 60° to 85°F. Be careful not to exceed 85°F as the blowing agent will start to come out of the resin blend which may lead to frothing, poor quality foam and a possible pressure build up in the drum. In-line temperature and pressure gauges should be used.

Proportioner Temperature (A + B + Hose – while spraying):

• The primary A and B heaters as well as the hose heat for Huntsman Building Solutions ProSeal LE™ should be set for an ideal application.

A temp = 115-125°F
B temp = 115-125°F
Hose temp = 115-125°F

• The temperature settings are a guideline and substrate temperatures may require temperature settings outside of these parameters.
• If the ambient temperature is TOO HIGH: decrease all temperatures gradually.
• If the ambient temperature is TOO LOW: increase all temperatures gradually.

Application:

- Experienced medium density sprayers should find that Huntsman Building Solutions ProSeal LE™ sprays the same or better than other 2 lb products they are used to. First time users of Huntsman Building Solutions ProSeal LE™ should contact Huntsman Building Solutions Technical Services for guidance.
- The two main factors in proper application will be the choice of mixing chamber and the material pressure on the spray lines you set. Below is a chart outlining recommended pressures and distances from the substrate to achieve a smooth spray surface:

MIX CHAMBER SIZE	PRESSURE (PSI)	DISTANCE
00	700-900	14" - 18"
01	900-1100	18" - 24"
02	1000-1300	18" - 24"
03	1200-1500	18" - 24"

- The spray gun should always be held perpendicular to the substrate being sprayed as different angle can cause elongation of cells diminishing the physical and thermal properties.
- Spraying too thick in one pass or spraying multiple passes without waiting for the foam to cool can cause the foam to scorch or even to catch fire due to excessive heat build up within the foam.
- Huntsman Building Solutions ProSeal LE™ can be sprayed up to 7 inches in one pass in either a full 7 inch lift or a combination of a 4 inch lift followed immediately by another 3 inch lift.
- Please be aware that if spraying multiple passes to obtain a 7 inch lift, there will be a slight reduction in yield.
- For thickness greater than 7 inches, the above procedure can be repeated after 30 minutes or once the surface temperature drops below 90°F.
- A minimum foam thickness of 1/2" is required so as not to affect the adhesion of the foam to the substrate.

General Application Guidelines:

The following areas are suitable for the installation of Huntsman Building Solutions ProSeal LE™:

- All wall, ceiling and floor spaces for the purpose of thermal insulation and air leakage control.
- It may be applied directly to wood, metal, masonry and concrete substrates.
- It may be applied in single and multi family residential buildings, commercial, industrial, institutional, and agricultural buildings of any type.
- It may be applied above or below grade; interior or exterior (see below).
- Air sealing and insulating attic spaces.

The following areas are not recommended for Huntsman Building Solutions ProSeal LE™:

- For roofing applications where the material is applied above the roof decking.
- Exterior applications where the material is exposed to ambient weather, unless material is coated with a protective coating.

There are potential, specialized applications that fall outside of the lists above. Whenever an application is proposed that is beyond the scope of this chapter, Technical or Engineering support is recommended from Huntsman Building Solutions.

Troubleshooting:

Good Material classification:

- Color: cream
- Cell structure: uniform, small and tight.
- Skin: smooth, orange peel like and dense
- Density: 2.0 – 2.2 lbs/ft³

These characteristics should be observed whenever spraying Huntsman Building Solutions ProSeal LE™.

Poor material classification:

ISO Rich: the resulting foam will be a darker brown color and may exhibit signs of shrinkage and be friable (chalky surface).

RESIN Rich: the resulting foam will be a darker color and may exhibit signs of shrinkage and will be tacky (sticky) to the touch.

The most common reasons for substandard material are mix or technique related:

- Mix related problems are a result of any one or both of the following:

1. Temperature: uneven temperatures of components A and B during application or insufficient heat in the drums.

2. Pressures: too low pressure, uneven pressures of components A and B, or uneven temperatures of the components which lead to one component developing a higher pressure than the other and poor mixing.

- Spray technique related problems are a result of any one of the following:

1. Distance: holding the gun too close to the substrate when spraying tends to blow material and air into the rising foam as you overlap to build thickness, and causes dripping when spraying overhead, holding the spray gun too far away from the surface allows the outer edges of the spray pattern to fall on part of the foam that is done expanding, making it a higher density material with a rough, popcorn like finish and lower yield, which also makes it difficult to cover when applying a coating over it.

2. Gun speed: moving the spray gun too slow causes the foam to ripple making a rough foam surface, affecting the density, cell structure and yield, and may also lead to dripping when spraying overhead.

Material Trouble Shooting:

Poor material can be corrected or avoided by following some basic troubleshooting techniques. These are mainly preventive measures that ensure good quality material:

- Follow storage recommendations.
- Pre heat the components in the drums between 65°F to 85°F. Band heaters or drum blankets on the material drums may be necessary to aid the pre heating and to keep the material drums warm during the processing. When using heaters, be careful not to exceed the recommended drum temperatures which can cause frothing in the drum.
- Do not open the drums until needed. This will avoid airborne moisture getting into the ISO, A drum which will lead to crystallization of the ISO. This crystallization can clog filter screens and may damage equipment and spray gun parts. As well the resin can lose blowing agent resulting in loss of yield and poor quality foam.
- The entire length of hose should be uncoiled and strung out of the rig, the hose thermocouple unit should be within the same environment as the spray gun, this ensures a more accurate and even delivery of the heated material components to the spray gun.

Environmental Issues:

Ambient conditions:

- Huntsman Building Solutions ProSeal LE™ may be sprayed at ambient/substrate temperatures between 23°F to 122°F.

Humidity:

- Care should be taken whenever the relative humidity rises above 80% as high relative humidity could cause blistering and weaken foam adhesion.

Wind:

- Applications where wind speed is over 10 miles per hour require the use of windscreens. As the overspray will stick to almost any substrate, care must be taken to seal up the spray area when applying material in locations that are subject to wind or air movement.

Wet Surfaces:

- Wet, saturated substrates will cause bubbling in the foam, and loss of foam properties and adhesion. Surfaces should be clean and dry.

Flashing:

- A strategy to deal with cold substrates is a technique called flashing. Flashing is applying a thin layer of material to the cold substrate to warm it up and insulate, and then applying a second thicker pass, not to exceed 2 inches thick
- Flashing works well to warm cold surfaces, but tends to use extra material, as the flash coat does not expand into foam very well.

Metal and Steel

- Galvanized steel should be cleaned with mineral spirits, dried and a suitable primer applied.
- Bare steel should have loose scale and rust removed before application.
- Steel tanks must be primed before application, as per standard D.01.01.
- Aluminum should be cleaned with a mineral spirit. Do not use caustic solutions. Must always be primed prior to the application to prevent corrosion.
- Stainless steel surfaces should be cleaned with mineral spirits or xylene and then primed. In some cases, it may be necessary to sandblast.

Concrete and Masonry

- Surface to be sprayed must be completely cured and dry and free of release agents, grease, oils, dirt and other foreign matter or contaminants which will interfere with the total adhesion of Huntsman Building Solutions ProSeal LE™. A test spray should be performed if adhesion is suspect.
- Flashing is recommended for cold concrete and masonry.

Wood, gypsum board and fibreboard

- Wood-frame walls and ceilings are insulated by applying material to both the backing, and along the sides of the studs or joists, failure to apply material to the sides of the studs/joists may leave gaps between the wood members and the foam, these gaps may lead to air leakage in the wall or ceiling. As the medium density product requires greater distance for a smooth application, applying the material in an up and down motion rather than side to side would be helpful to minimize overspray on the face of the studs when doing wall cavities.
- The moisture content of wood, gypsum or fibreboard should be less than 19%. Special care should be taken in case of laminates with surface treatment, because the treatment may adversely affect adhesion of the insulation to the substrate.

Pre-painted Substrates

- The strength of adhesion can vary with the type of paint used. When the adhesion is uncertain, the paint should be mechanically scored or abraded by sand blasting

Glass

- Except for cleaning, no special preparation is required for glass. However, when the insulation is applied to the interior of a window, an ultraviolet-blocking coating should be applied to the glass prior to application to prevent degradation of the insulation by sunlight.

Polyvinyl Chloride (PVC)

- Washing with a mild solvent, such as mineral spirits, is sufficient to prepare the surface of PVC. Polyvinyl chloride should be used as a substrate with caution. If the plasticizer content is high, the plasticizer may migrate to the surface of the PVC after the application of the spray polyurethane foam and result in loss of adhesion. (Plasticizer content is usually highest in flexible PVC and is quite low in rigid PVC, which is used in pipes.)

Acrylonitrile Butadiene Styrene (ABS)

- Acrylonitrile Butadiene Styrene (ABS) — ABS surface should be cleaned with mineral spirit and primed.

Polypropylene and Polyethylene

- Adhesion of spray polyurethane foam to these two plastics is extremely poor. The only practical way to apply the insulation is to provide some sort of mechanical attachment to the substrate, such as chicken wire.

Asphalt and Tar

- The asphalt or tar must be solvent-free when the insulation is applied over it. Therefore, the asphalt or tar must be old enough to assume that there is no solvent present. Spray polyurethane foam should not be applied over fresh asphalt or tar.

Solvents

- The presence of solvents in the substrate or on the surface of it must be avoided. Many primers are solvent-borne and thus adequate time for the complete evaporation of the solvent should be allowed prior to application of the insulation.

Spray Polyurethane Foam

- Areas that show ultraviolet degradation (as evidenced by chalking at the surface) should be cleaned by wire brushing prior to the application of more insulation.

Earth

- No special requirements are needed when installing spray polyurethane foam in contact with earth. The manufacturer shall be consulted in cases where a constant hydrostatic pressure will be exerted on the spray polyurethane foam.

Modified Bitumen Membrane

- The modified bitumen membrane must be adhered to the substrate. The installer shall have the membrane manufacturer confirm that the material has been installed properly.

Spray application of Huntsman Building Solutions ProSeal LE™

Keep other trades away from applicator:

- All other personnel must be kept at least 50ft away from the applicator while spraying. It is the responsibility of the helper to ensure that all other trades and spectators are kept away from the applicator while spraying. The sprayer and helper shall wear a full-face, fit tested supplied air respirator (SAR) or hood, as well as full skin protection when working within 50ft of applicator while spraying.
- Installer's shall post warning signs that read:
 - "Do not enter while spraying in progress"
 - "Respiratory protection must be worn while entering work area"
 - "No smoking, eating or drinking"

Masking:

- Mask off all areas that are not to be sprayed. This is very important, as overspray will stick to most surfaces. Ensure that any surface and finish is carefully covered to avoid damage from overspray.

Spray Technique:

Building thickness:

- To build thickness it is necessary to spray on the material as it is expanding, how much you overlap on the expanding material depends on gun speed, distance from substrate and the thickness required, for instance; for a 3" pass you may need to overlap about a third of the spray pattern over the expanding material, and two thirds on the substrate ahead of it, and if you need to build a 4" pass, you overlap about half of the spray pattern over the expanding material, and so on, the thicker the pass you are trying to build, the more you overlap on the expanding material. It's important to remember to overlap only on the cream part of material (the transition from liquid to foam) and not on the foam that is done expanding, as any material sprayed on the foam will increase the density and lower the yield. Spraying on the cream material does not kill the expansion nor will it blow it off, unless you are too close and or are using excessively high pressure.

Smoothness:

- When it comes to Medium Density Material, there are good reasons to try to spray smooth foam:
 - Yield: the smoother the surface of the foam the better the yield. Look at it this way, when you measure across corrugated metal and keep the measuring tape flat you get one figure, but if you measure following the curve of the corrugation, you'll find that it is a bigger surface, the same goes for the foam surface.
 - Coating: if the foam is to be coated with a thermal coating or any other type of protective coating, it would take a lot less coating material to cover a smooth surface than a rough uneven surface, as well as being able to coat the entire surface and not leave any exposed foam.

2 Hour Re-occupancy Considerations:

Before and during spraying

- Place warning signs on the attic access door (hatch) and all entry points.
- Shut off all forced-air HVAC systems.
- Seal off all vents and intakes in the work area (e.g. soffits, areas over unheated porches, garages, etc.)
- Place a suitably-sized exhaust fan(s) (capable of removing at least 40 Air Changes per Hour (ACH) from the work area) such that it vents directly to the exterior away from the building and begin exhausting air from the space.

Attic volume can be calculated when the roof pitch is the same on both sides of the roof, you can multiply the length of the roof times half the building width times the height of the roof.

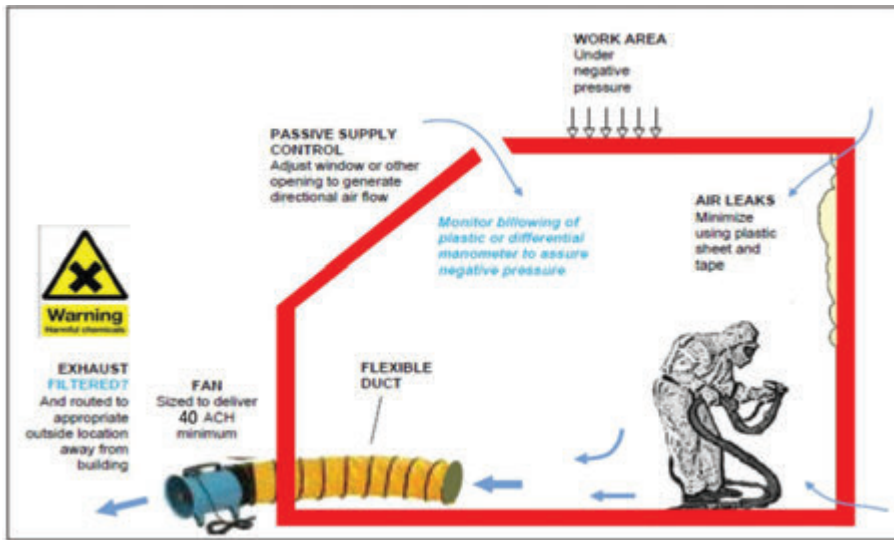
For a roof section 42 ft. long by 28 ft. wide by 6.5 ft. high, the calculation would be: $42 \times 14 \times 6.5 = 3,822 \text{ ft}^3$

To achieve 40 ACH, the fan required = $3,822 \text{ ft}^3 \times 40 \text{ ACH} \div 60 \text{ mins} = 2,548 \text{ cfm}$. Therefore the fan must have a capacity of 2,548 cfm or greater.

Attic Volume (cu. ft.)	Fan Capacity for 40 ACH (cfm)
1000	667
2000	1334
3000	2001
4000	2668
5000	3335



- Seal any openings that separate the work area from the rest of the building.
- Ensure Sprayer and Helper are wearing full Personal Protective Equipment (PPE) including a Supply-Air Respirator (SAR)
- Remove any insulation from the floor of the attic
- Apply thermal barrier on exposed foam if area is going to be accessed for storage or other uses or if it is designated as a plenum area.



- After spraying
- Ventilate for a minimum of 1 hour for re-entry and 2 hours for re-occupancy at 40ACH to control odors.
 - After 2 hours of 40 ACH ventilation:
 - Remove any sealing between work area and living space.
 - Turn on the HVAC system.
 - Repair any ventilation or access holes created to carry out the work.
 - Remove all tarps and signs from the work area.

Re-entry and re-occupancy periods (based upon ventilating during and after spray application):

Ventilation Rate (Air Changes per Hour)	Re-entry period for sprayers, helpers, informed trade workers and contractors	Re-occupancy period for all others
At 0.3 ACH	24 hours	24 hours
At 1.0 ACH	12 hours*	24 hours
At 10.0 ACH	4 hours*	24 hours
At 10.0 ACH For Classic Ultra and Proseal HFO	1 hour*	2 hours
At 20.0 ACH For OC No Mix and Classic Ultra Select	1 hour**	4 hours**
At 40.0 ACH	1 hour**	2 hours**

* Twelve (12) and four (4) hour re-entry for trades applies to all Huntsman Building Solutions products sold in the United States.
 ** One (1) hour re-entry and two (2) hour re-occupancy applies only to Low VOC products
 • Huntsman Building Solutions Classic Ultra and ProSeal HFO at 10 ACH
 • Huntsman Building Solutions ProSeal and Icynene ProSeal LE at 40 ACH
 *** One (1) hour re-entry and two (4) hour re-occupancy applies only to only OC No-Mix and Classic Ultra Select at 20 ACH

Huntsman Building Solutions safe distance recommendations remain unchanged as follows:

Distance from SPF application	Safe distance where no PPE is required when there is no barrier between non-SPF workers and spray activities	Safe distance from exhaust discharge of SPF ventilation system where no PPE is required
	50 feet	25 feet

If the spray area is contained and exhaust ventilated as prescribed herein, or there is a sealed partition (Engineering Control) enclosing the work area such as a floor or wall, there is no need to vacate adjacent spaces (i.e. floors above/below the work area and/or adjacent units) provided air from the work area does not circulate to these spaces.

For further considerations on ventilation for spray polyurethane foam, please visit:

<http://polyurethane.americanchemistry.com/Spray-Foam-Coalition/Guidance-on-Ventilation- During-Installation-of-Interior-Applications-of-High-Pressure-SPF.pdf>

<http://www.epa.gov/oppt/spf/ventilation-guidance.html>

As with all of our products, if you have any questions, please do not hesitate to contact Huntsman Building Solutions Technical Services and ask to speak to a Technical Services Representative.