



# What is PVC Roofing?

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**Heidi J. Ellsworth:**

Hello and welcome to another Roofers Coffee Shop, Lunch & Learn. My name is Heidi Ellsworth and we are on the road with this Lunch & Learn. We are going to talk today about something that sometimes people just kind of skim over, but it is so important for everybody in your office, and that is what is a roofing product? And today specifically, what is PVC and how do we use it on the roof? What's it about? And so we have asked the experts at JM to come in and visit with us about PVC Roofing. So today I am thrilled to welcome Brandon Mark from Johns Manville. Brandon, welcome to our Lunch & Learn.\

**Brandon Mark:**

Thank you for having me.

**Heidi J. Ellsworth:**

I love these kind of Lunch & Learns. I love to learn, and you have such great information. I just think this is going to be something that people are going to watch over and over again, especially with new people coming into the industry.

**Brandon Mark:**

Oh yeah, no, it's definitely something that gets overlooked. I went to school for architecture and they really don't teach you about roofs when you're in school. So hopefully we can add a little bit of value to some people's days here.

**Heidi J. Ellsworth:**

Now, as a reminder to everyone, please watch us with your team over your lunch hour or whenever is available, and use our discussion sheets. We have a full discussion sheet, so at that as you go through with the learning objectives, you can make notes so you can have discussion afterwards as a team. This is also great for all your new employees coming in. So Brandon, let's get going.

**Brandon Mark:**

All right.

**Heidi J. Ellsworth:**

Okay. So we have three learning objectives today. The first one is understanding PCV single-ply roofing, the market, and PVC roofing history. Our second learning objective is be able to communicate roofing design considerations. And our third is recognize best practices, installation methods. Great learning objectives. So I want to get right into the first one, and that is understanding PVC single-ply roofing, the market, and the PVC roofing history. So Brandon, maybe you can start us off. I know there's a lot of great market data on what's happening out there, so maybe start us out with where we're at and then go into the history of PVC.

**Brandon Mark:**

Yeah, so PVC is one of three single-ply membranes that we use in the industry for low slope roofing applications. That's your roofs that don't have a lot of pitch to them, your big box stores, things like that, your Home Depots, Amazon warehouses. And as I said, PVC is one of three membranes. You have PVC, TPO, and EPDM. I specialize in the PVC world. I'm the PVC product manager here at Johns Manville. So I really have a tunnel vision towards that product and I'll pitch that one, but it's a great system. It goes

right along with the reflectivity capabilities of TPO. So that's why we see a lot of it in the industry right now. It's pretty advantageous to have a white reflective roof on top of your low slope building for a number of reasons, and we can get into those as we move forward today.

But PVC is also highly used in the industry for its chemical resistance. So we'll touch on that in a couple of points as we move forward today too. But we see it in a lot of states, California, Texas, Florida, those real sunny states. It's advantageous to have that reflective roof, as I said. But we also do see it in some kind of Midwest states where we have a lot of production facilities. Anywhere where you have those greases, oils, fats from animal processing facilities that can make it onto the roof, PVC is going to be your membrane of choice, so we see it a lot there. But overall, PVC is the second fastest growing single-ply membrane on the market. TPO holds the number one spot, but PVC took over number two last year over EPDM. So we're really starting to see the popularity of PVC grow.

**Heidi J. Ellsworth:**

Yeah, and maybe tell us just a little bit about the formulation of PVC and kind of how that's really come into the market. I know you talked a little bit about all the benefits [inaudible 00:04:31], but just maybe some basics about the PVC formulations.

**Brandon Mark:**

The first thing to understand about PVC is it really by itself, PVC is a rigid polymer. So just its basic ingredients, it's very rigid, it's hard to work with, not a lot of applications for it. It's pretty brittle. What we do to make that polymer into a sheet so it's flexible and we can use it on a roof, is we add plasticizers, it makes it soft, supple, malleable, and we can use it in membrane solutions on the roof. It kind of keeps it from becoming brittle, but we have to make sure that those plasticizers stay in the sheet. So there's some differences that we see there with liquid plasticizers versus solid state plasticizers. Those solid state plasticizers really have retention into the sheet so they don't migrate to the top and flake off. It's a unique formulation, gives chemical resistance with everything that we have in it that you don't get with TPO membranes.

**Heidi J. Ellsworth:**

Like you said, the second in the industry right now, we're continuing to see it really gain popularity with the roofing contractors and the specifiers across the board.

**Brandon Mark:**

Oh yeah, it's a highly specified system. Lot goes into it. So understanding the ins and outs is very important and being able to convey that to your building owners is also very important. Understanding when a project may need PVC versus TPO, restaurants, cafeterias on top of schools, things of that nature. Once again, wherever you have those potentials for chemical exposure to the membrane on the roof, PVC is going to be your best friend. So understanding how you write those specifications and the requirements is very important.

**Heidi J. Ellsworth:**

Well, and that's perfect. You're taking us right into our second learning objective, which is be able to communicate roofing design considerations. So understanding ASTM differences. Brandon, I mean, a lot of people out there I think hear this term ASTM all the time, but really may not totally understand what are the differences in there. So maybe you can launch us off on that.

Brandon Mark:

Of course. That goes kind of right along with an understanding what you're specifying with PVC products. So we have currently with PVC systems two ASTM testing standards. And by that I mean we have rigid guidelines in the industry depending on the ASTM standard that you have that talks to strength of the sheet, weathering of the sheet, UV exposure of the sheet. And the first ASTM for PVC is ASTM 4434. And that one really dictates the overall components of the system, the percentages of certain elements within there, such as your fillers, your fire-retardants, your basic PVC compounds, as well as how much percentage you have of what we call KEE, K-E-E, that is your Elvaloy in the product. This is really where the differences are going to come in your ASTM testing standards.

So I talked about the first one, 4434. There's a second ASTM testing standard 6754. And that second one really dictates the amount of that KEE product in the sheet, the Elvaloy. In order to meet that higher ASTM, the 6754, you're looking at a minimum of 50% by weight of the KEE material in that product. And that's really a key thing to understand when you're writing your specification, understanding if you really should lean towards the 4434 or lean more towards the 6754 and what those requirements are for your building, it can lean you one way versus the other. And that becomes very important for your building owner because one can be cheaper than the other.

Heidi J. Ellsworth:

Why is that high volume of KEE or Elvaloy important to the membrane?

Brandon Mark:

There's a lot of importance to understanding the amount of KEE in the membrane itself. KEE or Elvaloy does give added chemical resistance potentially to your sheet. So the less amount that you have in the sheet, the less likely it is to withstand certain chemicals or chemical exposure. You do have to be careful with that though. Too much KEE or Elvaloy within the system can be detrimental to the overall formulation. So there's kind of that balance right between the 4434 and the 6754. You want to make sure you don't have too much, but you don't want to have too little as well.

Heidi J. Ellsworth:

As you're communicating with the roofing design community, whether it's building owners or architects, what should they be talking about when it comes to different types of installations?

Brandon Mark:

Really the thing that you need to understand is, once again, I keep saying the term requirements, understanding though what the requirements are of your building, where the building's located, what the building's going to be used for. Uplift from wind pressures is a key thing to understand. If you are building on the coast in Florida, you may have the potential to see some hurricanes, right? So having the ability to withstand those added uplift pressures from wind from big storms is very critical. So once again, understanding the requirements of your project can lean you towards a certain attachment method, either mechanically fastened, fully adhered, hybrid systems, a little bit of both. So there's benefits to each of those, of course. We can add more mechanical fasteners to increase our uplift potentials. Fully adhered systems though, are seen as the premium in the industry. A fully adhered roof looks real good when it's done and has some great properties itself.

But then there are also hybrid systems that I had mentioned. You could do mechanically fastened portions of the system with a fully adhered membrane. You could mix and match systems with SBS on the bottom, which is a bituminous sheet, and then have a reflective cap sheet of PVC on top, gives you

multiple layers of waterproofing in a hybrid system with the cool roof reflective capabilities of that PVC on top. So understanding how you're going to attach it and then what the overall life cycle needs to be of that roof. It might lean you one way or another.

**Heidi J. Ellsworth:**

So it really means sitting down with your building owner or your design community, whoever that might be, roofing consultant or architect, and really talking through the uses of the building, like you said. Where it's at, how it's being used, is it going to have food involved, what kind of chemical issues are there? To really understand not just the type of roofing, but as you said, the installation requirements for that roof. So it's important for your team to understand that, obviously as a roofing company they do, but really then to be able to communicate it.

**Brandon Mark:**

Yes, very much so. Never hurts to have a conversation with your roofing manufacturer of choice. Every manufacturer is more than willing to provide assistance and walk you through writing the correct specification, translating that to the owner and really getting down to the nitty gritty and figuring out what that building owner really needs out of that roofing system.

**Heidi J. Ellsworth:**

Excellent. Okay. Well, let's go to our third learning objective, and that is recognize best practice installation methods. Let's kind of talk about that. One of your items that you talk about a lot Brandon, is technology and robotics. One of my favorite things to talk about too. So maybe kind of start off with what are some of those best practices?

**Brandon Mark:**

You have some great capabilities with PVC membranes, also with TPO, they are thermoplastics. So by that I mean you can heat the system up and when it's nice and hot and soft, you can stick two pieces of it together, and then when it cools, it hardens and becomes monolithic again. So you can really get just this single roofing membrane across your entire structure. The way that we can advance our overall installation capabilities and quality is with a number of different ways. The first being a robotic system, as you had mentioned. It's actually a mechanical system that will walk itself along the seam of a roof. You just have to make sure that you line it up, you set the temperature of that system, the overall speed that it's going to walk itself and it will walk itself right along the seam of that membrane, heating it up and sticking itself together.

So you see contractors using that all the time right now to, once again save on labor, but also add quality to the overall installation, taking inconsistencies out of that installation. One of the other things that we're seeing now is RhinoBond systems. Those are fantastic. So what that entails is your mechanical fastener with its plate that is holding down the components to the roof, that plate actually has PVC compound around the ring on the top of it. So when you mechanically fasten down the substrate, lay the membrane over that, you then come back over with a machine that heats the membrane up from the top surface and will actually create a chemical bond between the PVC plate below and the bottom side of the membrane at the top. So you have less penetrations in your roof, which is always a advantageous, less opportunities for leaks.

But the big advantage to that is the more of those plates that you have around the roof and more of those induction welds that you do with the RhinoBond system, the system actually starts to act like a fully adhered roofing membrane. So you get better uplift potentials from wind. Very good system, very

good system. And then I had also mentioned the hybrid system. You can put down a base sheet with the bituminous and hot asphalt. You could also then put your top membrane down in asphalt if that has got a fleece-back to it. So there's a wide variety of options for your roofs now that we didn't used to have back in the day. So we've got better quality, better capabilities to install your roof systems.

**Heidi J. Ellsworth:**

For those out there who maybe are not as familiar with thermoplastics and the heat welding element, you've talked about this a lot, how they come together, make a single bond across the roof. But let's talk just a little bit about the labor part of that and best practices insulation. So we have the RhinoBond, which is awesome and the robotics, but you also need to have some well-trained installers who understand heat welding and understand the best practices of laying that roof. Maybe talk just a little bit about that.

**Brandon Mark:**

Yeah, very much so. It is a special system, specialized system, and you do need to be trained on that because you can overheat the system, you could actually melt through it, make it too thin, and then you have issues. But with a quality crew, you do have the ability now with every manufacturer out there to weld your details as well around your roof. So we have pre-molded details that most manufacturers have developed now for your pipe boots on your roof, universal corners for around skylights, tee patches around multiple sheets coming together, things of that nature. And you can use a handgun, it's a heat gun itself, it fits in your hand and physically weld all of those details together. And because you're making a monolithic system, you're sticking those two sheets together, those details are very robust. You get these waterproofing details around unique conditions that is very hard to do with standard bituminous sheets. So thermoplastics just once again, continue to show their value in the industry right now, especially to your building owners.

**Heidi J. Ellsworth:**

I have to put a plug in here for NRCA, which I know Johns Manville is very involved with the pro certification program and training in thermoplastics so that our workforce and all these amazing craftsmen and women are able to really install these top quality products and be certified for it.

**Brandon Mark:**

Yeah, no, great program by the way.

**Heidi J. Ellsworth:**

Yeah. We just had to get a little bit in there, so check that out because there is both. And this is the other thing that I wanted to talk a little bit about with you, Brandon, is training. And Johns Manville is also on the forefront of training for the industry. So let's talk just a little bit about that. How can contractors take advantage of getting training for not only their installation crews, but also for their sales crews, on exactly what we're talking about right now?

**Brandon Mark:**

JM has actually been doing a program called BURS, Better Understanding of Roofing Systems Institute. Been doing it for over 50 years now. We bring everyone from architects and specifiers to contractors in-house to our facility at JMTC here in Colorado. And we do a two-day course. Lots of classroom training through every single system, roof membranes, bituminous, to single-ply membranes, excuse me, to your

cover boards, your installation to all of your attachment methods. Like I said, it's a two-day course, but we also do a lot of hands-on demonstrations as well in our facility. So you get right in there, you can weld some of these membranes together, throw some adhesive down on the ground. Very good program, big plug for BURSI here. I highly recommend it. Along with that, we also do lots of training in the field. Our field tech team will go out to distribution locations to contractors' yards.

We'll provide hands-on demonstrations with a multitude of different products that JM offers. We also have a facility in Rockdale, Illinois that we'll bring contractors into. That is a multiple day course as well. Lots of hands-on demonstrations there. We have a very large deck in that facility. We roll full membranes out and you get to use the torch with the bituminous systems. But once again, I got to plug PVC and the thermoplastics. You get to get in there with a lot of mock-ups and hand weld all those details that I had talked about. It's a fantastic system. Or I'm sorry, training course. So if you've got contractors or anyone that needs education hands-on, please reach out to JM. We've got resources for you.

#### Heidi J. Ellsworth:

This Lunch & Learn just kind of wets the appetite, right? It gets you knowing about PVC and then wanting to really make that a big part of your sales system, working with your building owners and being out there. So I would say let's kind of as to kind of on this last learning objective of recognized best practice installation methods, let's just kind of recap for everyone out there, some of those advantages of the PVC system and why they should really be looking at using it as part of their program.

#### Brandon Mark:

So PVC, once again, being a thermoplastic, we can weld it to itself and if you've got enough of those welds across the entire roof, you have one monolithic system across your entire structure. It can handle ponding water conditions. You have the reflective capabilities then across your whole roof with that white reflective membrane. You really though we're going to lean on PVC because of its chemical resistance. So you'll see it all the time. If you're flying in to an airport and you're looking out the window, more than likely you're going to see 90% of the roofs around you are going to be white reflective roofs. And I bet you a big portion of those are going to be PVC because you have the greases, oils, fuels coming off the planes, and you need to be able to withstand that exposure at those locations so that you get the full 20 to 30 year lifespan out of your roof.

Also, if you've got facilities where you're going to process oils or greases, processing facilities, always use PVC, restaurants as well. Really got to plug PVC for that chemical exposure potential. One thing to really consider, however, is you could do a hybrid system between TPO and PVC if you need to. If you're looking to cut down on costs, you could do maybe 90% of your roof being TPO. If you've got a design curb right over your cafeteria, potentially, if you've got those chemicals, then you can put PVC. So work with your manufacturer, you can work through these details and understand how we can best develop a system that meets the requirements of those owners. And then remembering you've got multiple abilities or multiple ways to fasten adhere RhinoBond, put down a system in a multitude of fashions. Very, very good system, PVC, big plug to it today.

#### Heidi J. Ellsworth:

I love it. It's great. Thank you so much. I've learned quite a bit here today. This is excellent. So Brandon, thank you. Thank you so much for sharing your wisdom and your knowledge about PVC, and also about BURSI. Very exciting. And for everyone out there watching, this is a great way to continue the education.

Brandon Mark:

Yeah, well thank you. I appreciate this today. Yeah, please reach out. Any questions, any desires to have that extra education come under your roof, please reach out. Our team is more than willing to put some boots on the ground, come into a local facility by one of our viewers, give a Lunch & Learn presentation in person if that's a big thing that your team would like. More than happy to do that. But yeah, thank you again for having me today and hopefully we get a lot of value for a lot of viewers out of this today.

Heidi J. Ellsworth:

Thank you so much. Thank you. And I just want to recap for everyone, your three learning objectives, understanding PVC single-ply roofing, the market and PVC, roofing history, being able to communicate roofing design considerations, and finally recognizing best practice installation methods. And boy, we hit every spot of those today, Brandon. Thank you so much. And thank you everybody out there for watching this. Please pull out your discussion sheets, talk about this, how does this fit into your company, and then be sure to take a picture and send it in. And you may win a free lunch on all of us. Special thanks to Johns Manville as a sponsor of this Lunch & Learn this month and special thanks to all of you for being on and watching. We will continue to bring you great education every lunch, every month. Have a great day.