

REScheckBasics.wmv  
Transcription

**SLIDE 1**

This video is brought to you by the U.S. Department of Energy Building Energy Codes Program. My name's Pam Cole from the Pacific Northwest National Laboratory and this video is titled REScheck Basics.

**SLIDE 2 [0:00:13]**

REScheck is an actual energy code compliance tool. There are other several tools that are available out there and it all depends on how you go about showing compliance to the national energy codes. This is just a quick overview of the different paths that you might want to follow or that you could choose from when you're showing compliance to the national energy codes. A prescriptive path doesn't really require an actual software tool and you could do this by paper. The total building UA tradeoff approach, which I will get into more detail on what that means, kind of does require software because there are some calculations involved and that's what we'll be talking about as the REScheck software. And then there's the energy analysis approach, which is a whole building approach and that one does require some software because you're doing energy analysis that's based on the entire building. And there are examples of software which could be REM design, REM rate and Energy Gauge just to name a couple.

**SLIDE 3 [0:01:15]**

Where can you go get REScheck? And this is a screenshot of the [energycodes.gov](http://energycodes.gov) website. And you can get to REScheck in a couple of different ways. So, on the left hand side of the screen, the program is actually broken down into development, adoption, compliance, regulations and resource center. And you can find the compliance tools under the compliance section on that left-hand side. Or you can go to the popular links that are on the right hand side of the main screen and you'll see under tools the icon that takes you directly to REScheck.

**SLIDE 4 [0:01:52]**

Once you get to the REScheck page, here's another screenshot. You have some options to choose from. There's a windows app. which is a desktop version, and then there's a web based REScheck tool, which requires no download. And then there's technical support. On the Windows tab that you're looking at right here, it'll tell you what version's available. It'll tell you the supported codes that are within the tool. And then it'll tell you some new features or anything that's happening with the version that is out there as it's being released. The REScheck web, if you clicked on that tab, you would see another link that would take you right down to that web based version. The technical support tab provides a lot more information for you. Meaning, the entire methodology on how everything is calculated within the tool, the underlying assumptions for example, a wood frame wall and what all that includes in calculating the overall U-factor is within that document. What also is under the technical support tab is

to get you to, if you have a question regarding the software or national energy codes, you can send an e-mail directly into the building energy codes help desk.

#### **SLIDE 5 [0:03:05]**

So here are the two different options on how you can use REScheck. And up in the left-hand side of the screen is the screenshot of the desktop version. This requires that you'd have to download it to a Windows based computer and then there is the Web based, which is on the lower right-hand side of the screen, which requires no download, but you do want to log in and register yourself so you can save your projects either to our server or actually to your desktop.

#### **SLIDE 6 [0:03:05]**

Which brings me to since these are two different tools, can they interact with each other, and you can – you do what's called data exchange between these two tools. So if I had downloaded the desktop version of REScheck and I save my project and it actually saves it with a certain template, meaning it were an actual extension of the data file, a .rck file, and you'll see this again later on. And then let's say I go log in and I register and log in to the REScheck web tool, I can upload that data file into the REScheck web tool and they work the same. So you can change or interchange in between the two with your projects between these two tools.

#### **SLIDE 7 [0:04:24]**

So a quick basic walkthrough and the steps of REScheck. It's pretty simple. First thing you're going to do is that you want to make sure you select the appropriate code. As I showed you on the screenshot before, there are several codes that you can choose from within the tool. The next thing you'll want to do is enter your project information and this is in more detail is the location, the address, who the builder is and that sort of thing. Then it's entering those building components. The basis for REScheck is getting compliance for that building thermal envelope. So you have to enter those building components that would define that building envelope. And then that's optional for you to enter your mechanical equipment such as if you had a heat pump or a boiler or furnace or that sort of thing. And you can enter your systems in there. The mechanical systems have to meet minimum efficiencies regardless, but that is optional that you can enter in your mechanical system. And then last, but not least, there's a requirements tab where you will define further the overall compliance of your mandatory requirements. This isn't where you enter building components, but it's where you will confirm yes, I'm going to meet, for example, the air leakage testing that might be applicable based on the code that you're showing compliance to or the duct testing that's applicable, that you're going to meet these certain measures. And that's where you would go through and confirm these values or these code requirements within the requirements tab, and we're going to get more of a flavor of this when I do the live demonstration within the tool.

## **SLIDE 8 [0:06:04]**

So let's go through that first step, and it's selecting the appropriate code. Here's another screenshot. This takes you back out to the website again. And there is a link within REScheck that you can go right back out to the [energycodes.gov](http://energycodes.gov) that'll take you to the state pages. And it's really important because here's the screenshot shows you that not every state adopts the same code or version of code and some states have their own state specific code. So if you're an architect or a builder that's working across states or even jurisdictions in a home rule state, you might be dealing with a variety of different codes. So it's very important that you know that you have chosen the proper code from the code menu within the tool.

## **SLIDE 9 [0:06:50]**

And with that, there's preferences and preferences is an option within the tools where this allows you to customize your projects. So let's say that for example, that I'm only working in one location and I want to make sure every time I open the software and that I'm putting in my project information, I can save – it'll save my location. It'll save who the architect is, the designer, the contractor and those sort of things, so I don't have to repeatedly put those in every time I'm doing a project. So under preferences, there's some tabs that are involved. Under general, I can actually make it go to a certain file location, so I have file options that I can save and then it'll open it up from that same location every time, all my data files. There's a version update check where I can put in an Option to say, "I wanted to go out monthly, yearly, and check to see if there's a new version of this software and let me know." So if I'm within the tool and I'm connected to the internet and there's a new version, you will get a pop up that'll say, "Hey, there's a new version available. You might want to go upload that new version."

And then there's an upload usage data option to opt out and that's basically that saving projects, that data can be uploaded to our server and there can be some – some statistical analysis that can take place as far as looking at average insulation values across the U.S. Proprietary information doesn't get distributed anywhere and it's not saved. It's more of a high-level usage data that would be uploaded. The project tab that's within these preferences is where I can define it to say, "I only want this code every time I'm opening a project." And you can save it to that code or a location and you don't have to go find that location every time you open up the tool.

And then there's some envelope preferences that you can also put in there that will open up and save every time as well, such as if I want to have orientation defined for every one of my building projects, then you can have that as a preference as well.

The applicant, under preferences again, this is where I can go under project details and truly define out, I'm the same contractor, I'm the same builder, architect, whatever it might be, and I'm going to enter that detailed information. It saves it in preferences, and then I don't have to repeat that for every one of my projects. Again, these are preferences. If you don't save them under preferences, then you would have to enter that information for each new project that you would begin to complete.

Under reports, you can customize signatures. I can put my name on there before I sign it, if I'm the contractor, for example. And then emailing reports, like if it's to the same jurisdiction, I can put in that e-mail address and then I don't have to put that in repeatedly for each one of my projects.

#### **SLIDE 10 [0:09:46]**

Now under project information, which is after you selected your code, now you're going into looking at what you would put in for your project information. The first thing is, after the code is, well, where is the location of this place? Is it a city or is it as a county? In the desktop software, you will have a dropdown list of cities based upon the state that you've chosen. If your city is not listed in that dropdown, then you really need to go back to your jurisdiction and ask them, "Can I use a city that's an option within the tool that has the closest similar weather data. Or is it that you need to use the county option? It's not real easy in the desktop version to switch it over to counties, but in the REScheck web tool, it's an option feature that's available right from that project screen. So if you are using projects where you need to show compliance based on a county designation, then you might want to just go right to the REScheck web tool and use that software application.

The project tab is also where you define the project type. So is this a single family, a multi-family, an addition or an alteration? Those are your choices. And then what are those definitions for those different project types, and do I have multiple things going on if this is an existing building? And then there are project details, which are optional, where you can put in a more detailed – maybe the address of the location, maybe you have a site plot that you want to put in or the plot number that you want to put in, all the way to if you already have an existing permit. You could put it under project details.

#### **SLIDE 11 [0:11:28]**

So back to the project type. And these are just some helpful hints and I'm going to have some screenshots before we get into the live demonstration, of things that from history of questions that have come up through the help desk, that should be helpful as far as when you're a first time user is defining what my building type is and some other things and some other screens that I'll go through as far as helpful hints that might help you when you're a first time user, and multi-family is one of them. What does that mean? And by definition of code, that is a building that is three stories or less in height above grade. If that doesn't define your building, then it's not multi-family and you should not be choosing that as your option. If it's greater than three stories, it might be a high rise, and if it is, then it might be that the COMcheck software, which is the commercial energy code compliance software, might be able to be used. It also is that it contains three or more attached dwelling units for a multi-family. And then there's some examples here, such as apartments, condominiums, townhouses, dormitories and row houses.

#### **SLIDE 12 [0:12:32]**

More helpful hints as far as on the project information. We've discussed the single family, multifamily, but additions, alterations. On the project screen still, an addition can be shown by itself. So if you do have an addition to an existing home, you can choose addition as your project, but you would only

define that part of the new part of the addition for your compliance. However, that doesn't mean that you can also not do an addition plus the existing home and do all your takeoffs for the entire home. But that's a little more difficult if you don't know what those values are on the existing windows, if those aren't being replaced and the existing insulation levels. But that is an option.

And then there's alterations, which is different than an addition. So alterations means that if you are touching part of that existing building envelope. If I'm doing a roof replacement, if I'm replacing windows and doors, or I'm taking the siding off and I'm exposing all the way down to the studs of those walls, that's considered an alteration. That's a good example of an alteration. And there's an option to choose alterations within the tool.

### **SLIDE 13 [0:13:45]**

So I'm getting a little deeper into – I've talked about the project information. Now, let's go into that building thermal envelope. So we've gone through locating what your code is, your project location, your project information and now let's go into the building envelope information that you actually need to complete your compliance project within REScheck. And it truly starts out with what is that building thermal envelope and what you need to have in front of you when you're going through and doing your takeoffs in REScheck is really those building plans and specs if you have some specs for the windows and doors because you're going to need that information as well.

### **SLIDE 14 [0:14:29]**

So what is the building thermal envelope and what are the applicable building components that make up that building envelope? It's defining the condition from unconditioned space or conditioned from outside air. It does not include interior walls or interior floors. So you have to be very careful and get that building thermal envelope defined before you start running your takeoffs, which will make it much easier when you start entering your building assembly components into REScheck.

### **SLIDE 15 [0:14:57]**

So some more helpful hints here. So within the tool, the first thing that typically comes up is, as you'll see down below, is there's a ceiling, skylight, wall, window, all these buttons. You don't have to choose every one of them. Skylight is the example that's shown here. If I don't have a skylight, then I'm not going to click on that button to enter it into my building component project. The other nice helpful hint is, let's say I have all two by six walls as the example. Well, if I have two by six walls, above grade walls, and they're all insulated with the same R-value, I can group that together. I could total up the square footage of all my exterior walls and enter it as one line item.

Another hint is there's some square footages that are involved that have to be entered. So when you're doing your takeoffs, you've got to do the square footage for your ceiling, your walls, but the floor and for slab on grade is the only assembly in here where it changes from square footage to linear feet. So keep that in mind. That's been, you know, historically as a first time user, someone will put a slab on

grade into the tool and they'll show total square footage of that slab, and really, it's asking for linear feet. It's just the exposed edge.

And then there's an option if – what are the assemblies, and there are several assemblies you can choose from such as, for example, a 16-inch on center wood frame, or 24 inch on center wood frame wall. If one of those doesn't fit your assembly type, each one of them, the ceiling, the walls, the windows, the basement, the floor, those buttons that show on the screen below, has the option for you to choose other. However, when you choose other, this is where you have to provide your calculated U-factor for that entire assembly. And that also means that you should be providing that calculation to the jurisdiction on how you came up with that U-factor as a backup documentation to your calculation.

#### **SLIDE 16 [0:17:07]**

So some more envelope helpful hints. Fenestration. So this is all your windows and doors regardless if they are glass or not. That's kind of the definition of what fenestration means. Is by most of the codes that historically have been in the past few versions of the energy codes is that you've got to have that U-factor and solar heat gain coefficient if it has glass rating and that's through the NFRC labeled product. If you don't have those ratings, those NFRC labels that you can pull this information from, there is default tables in the codes and those are all different depending on the code version, but they're not favorable and with the newer codes, it's much, much harder if you were to use the default values from that table to even get your building into compliance. So that's what I mentioned about having those building plans in front of you and also having the specs that already have the windows and doors picked out with that NFRC labeled information.

Another one is cavity R-value versus continuous R-value. Cavity R-value, what that means is it's insulation between the structural members. So you're placing insulation between thermal breaks, so to speak. There is a difference when you get into continuous R-value insulation. Continuous insulation is insulation that is across the structure with no thermal breaks. It's not between structural members, not between framing. And that's, for example, rigid insulation or rigid foamboard.

So another one is after you've entered all the building thermal envelope components and you'll see this again when we get into the software is the critical part is it's calculating compliance as you're entering each one of your building envelope assemblies, but when you're done, it's hitting that check compliance button and what are you looking for if something comes up in some certain color or it's not showing a passing grade? You're going to look for things that might show up in red. And you also look for missing data. Maybe you forgot to enter a particular U-factor on one of your windows. And we'll play around with this a little bit when we get into the tool.

#### **SLIDE 17 [0:19:23]**

Here's the example for the fenestration again of just an NFRC labeled product. It's showing you that U-factor, solar heat gain coefficient if that's applicable. There's some other performance ratings that might come into play if you're doing a different type of compliance. But the U-factor and SHGC are the important ones that you need this when you're entering your data into REScheck.

**SLIDE 18 [0:19:48]**

Here's just another example of cavity versus continuous. So these are two walls that are showing insulation between the structural members and one where it's outside the structural members.

**SLIDE 19 [0:20:02]**

Foundations is another one, is how are you defining that building thermal envelope, again? Where is the floor? Is it the basement? Do you have a basement that's conditioned? And then there's a button for that, from the last screenshot that I showed. Is it a floor that's over an unconditioned space such as a crawlspace that's vented to the outside and it's completely insulated and mechanically ventilated. Or do I have a slab on grade? So the foundation one is very important, and you might have multiple different foundation assemblies that are going on and the software makes some assumptions on certain things when it comes to basements, floors and crawl walls within the program and we'll go through that.

**SLIDE 20 [0:20:51]**

So what's a basement wall? By definition of code, a basement wall or below grade wall is a wall that is greater than 50 percent below grade. So, if you had a walkout basement, you might have three walls that are considered that below grade wall or a basement wall. And then you might have an above grade wall which is the walkout portion if it's considered less than 50 percent below grade. And with that, that walkout portion of this basement would then have an exposed edge of slab. And that exposed edge of slab would be slab on grade and would need to be entered into the program in linear feet as that exposed edge.

**SLIDE 21 [0:21:35]**

So some helpful hints with basements. We get a lot of questions on different scenarios and different things when it comes to conditioned basements or whether they're not conditioned and you have mechanical equipment down in that basement. But if you do have a conditioned basement, it really is critical that you are defining the wall height which is from the top of the wall to the basement floor. And if it's – and then it's also defining that depth below grade. So, if you're really looking at – if it's not uniform and it's a step down basement, a walk out basement, then take an average height. If you're doing an assumption to say the step down basement, the majority is greater than 50 percent below grade, you would take an average height of that depth below grade and that's what you would enter into the software.

**SLIDE 22 [0:22:29]**

There's also some other issues when it comes to basement walls and it's depth of insulation. Most codes start out at full depth, which is requirements for a wall to up to ten feet. And you can do tradeoffs. Let's say if you're not insulating that entire basement wall, you might be able to tradeoff not insulating that entire basement wall with other parts of your assembly or building envelope. Maybe you increased your ceiling insulation higher than the minimum requirements based on your code and climate zone and you can trade off some of that depth of insulation that it would be required on that

basement wall. So how do you do that? So you're measuring for the depth of insulation. You measure actually from the top of the wall down. And I have some more screen shots I'll show you how that's done. It's not from the foundation floor up. It's from the top down.

So when you're entering it, the depth starts at zero and the program assumes no insulation. As you increase that R-value, so let's say you're doing a cavity insulation on the interior of this basement wall and you're doing an R-15, then you would put R-15 in the value that it's asking for, the insulation levels.

For continuous insulation, that's also an option on these basement walls. And let's say you're putting rigid foam on the outside and for continuous, when you do a continuous R-value that you enter into the tool, the software assumes that it is on the exterior of that basement wall. Again, cavity, the software assumes that you're furring it out on the interior.

### **SLIDE 23 [0:24:03]**

So some colors, basic colors that are applicable to the REScheck tool. Red really means bad. It's either failing a compliance and it would show up in red or it's missing information and in this example, it shows under gross area that the gross area square footage for this ceiling hasn't been entered and it can't calculate compliance if it's missing information. So that's showing up in red as that it needs the square footage for this ceiling area. That's the example there. For green, green is good. And basically with green, the only place you're probably going to see that is down in the lower bottom of the software. It will say whether it's passing, and if it is, it'll show it in green, and then the percentage better than code that shows you here on the right hand side. The color blue is really for missing information. TBD means to be determined. Maybe you haven't defined your project type, whether it's single family, multi-family. That's missing information. Or certain assemblies haven't been specified, meaning if you're doing a performance analysis, it needs an entire building envelope to do that and if you're missing a floor, well, then it might come up in blue to say, "There's an envelope assembly that needs to be specified here."

### **SLIDE 24 [0:25:24]**

Screen operations, so we're getting a little into compliance here and here's just an example of one project, but the important part of what I want to explain here is that there's a compliance bar at the bottom and a status bar and this compliance bar at the bottom gives you whether it's a passing or fails compliance result and over on the right, this one's showing you in red, the other one was an example of green, that this one is failing 4.3 percent worse than code. And then the status bar is a feature that depending on where you are in the program, meaning if I was putting in a ceiling, there's little information that can come up as far as to help assist you with your building envelope components on where you're at and what it needs that it's looking for to calculate compliance and that's the status bar.

### **SLIDE 25 [0:26:17]**

So we're talking about compliance and this percentage better than code or percentage worse than code and I've thrown around the term U-factor and now we're looking at UA. What is UA? And UA is very important in this tool because REScheck is a tradeoff based on total UA of your building envelope

assembly. So what does that mean? U-factor times area is for each building assembly. So my ceiling will have a UA. My walls will have a UA. But what the program does is it totals up all the UAs and then it looks at the proposed total UA of your building project and it will go to the UA from a building conforming to code and compare it against your building UA. And that's where you get either passing or fail from the compliance result.

**SLIDE 26 [0:27:10]**

There's another option in the tool for certain codes, and that's the performance alternative approach and it's the simulated performance of your building compared to an equivalent code building. And it requires additional inputs. It's a little bit more than a UA approach. You have to define orientation meaning this is where I talk about with this approach, you have to have a minimum of four walls. They have to be oriented. You have to have a minimum of a roof and a floor and then you can check your compliance. The big thing to consider with this performance alternative approach for compliance is it's considering the whole building, but what it's really looking at with this one is the orientation and the fenestration ratings you have on that orientation and the thermal conductance of your envelope components.

**SLIDE 27 [0:28:01]**

So we've talked about the building envelope and entering these components and we'll go in more detail when we get into REScheck, but what happens if you know, another helpful hint that you're failing compliance. It's having those building plans in front of you and making sure that you've entered all the appropriate components correctly, confirming your takeoffs is a big one, that your square footages are correct, especially if it goes to plan review and then it comes back and some of those square footages are incorrect, you could be out of compliance. And then confirming your insulation and fenestration values, always double check that those insulation values meet what you have on your plans, and also the fenestration as well.

If you were to put in some windows and you had a U-factor in there, but those windows get changed and the U-factor is a higher U-factor than what that compliance report that got submitted to the building department is, then you could be out of compliance with that project.

**SLIDE 28 [0:29:02]**

So the next one is, once you have – here's an example, again, of that project that's entered into REScheck. If you know that you've double-checked all of your components, your square footages, your insulation and your fenestration and you're still not sure why the project is failing, another helpful hint is to look at the UA column. And that's the total UA for each assembly and then the overall UA is down at the bottom where it's showing you the max UA of 582 and then your UA, which is this project of 607. That's the total UA. But you can look at the big hitters. The bigger the UA, the more it's adding to your overall proposed UA and those might be helpful to you if you're looking at how you can decrease those total UAs if you can from your overall compliance results and for this ceiling that's circled for the UA of

85, if they were to maybe possibly install be an R-38 in that ceiling, that's going to bring that UA down and might just get them into compliance for this project.

**SLIDE 29 [0:30:06]**

So, last, but not least, we've talked about the envelope and now there – and the project tab and there's a requirements tab in the tool. And the requirements tab is, you enter your building envelope, thermal building envelope, but there's mandatory requirements that still apply based on your code and your climate zone. And that's where the requirements tab comes in. This is where you'll confirm, "Am I meeting my air leakage requirements based on code? Am I building mechanical systems, have I defined them and I'm going to confirm that I'm meeting the loads on the building and my duct design and my duct testing and my duct construction, service water heating efficiencies and those sort of things and piping. Your piping on service water heating system. This is – the requirements for this, it goes into detail to give you some options. You can confirm whether you're going to meet these mandatory requirements, but there might be an exemption and for example, there are requirements for sunrooms and if you're not putting a sunroom on your house, then you'd want to show that doesn't apply to my building, and that will show up on the report. Or there are some pool requirements and if you're not installing a pool, then you want to show that doesn't apply either and it makes it so much easier for that plan reviewer to go through that you've defined what you're going to meet and what's exempt or what doesn't apply to your building. When he's going through the process of looking at the inspection checklist that you've further defined through this requirements tab.

**SLIDE 30 [0:31:43]**

So after the requirements tab, you've entered all your building information. You've gone through and confirmed and defined maybe things that didn't apply to your project and now you want to save that project and get that report. So here is just a very quick overview, that you do have choices for what type of reports that you can actually produce from REScheck. There's the compliance certificate. Well, that's very important because that definitely gets submitted to the building department and you need to sign it. The inspection checklist, I get a lot of questions on that. Do I need to print that out? Do I need to give that to the building department? Really, the inspection checklist is – that's where it gives you all the mandatory requirements outside of what you've defined for your building envelope within the tool and it's a good sheet to keep out on site, to list out all those mandatory requirements, to make sure you're going to meet them all, but it definitely is good to submit that to that jurisdiction so they can use that to help them go through the process of plan review and the on field inspections.

And then there's the option to print out a panel certificate and these are for the newer codes where it will give you your average values of insulation and fenestration that you can put by the electrical panel box or on the panel box for what the building has in that building.

**SLIDE 31 [0:32:58]**

So, on the requirements tab yet again, I just want to go into what that inspection checklist gives you. So the compliance report is what you sign and has your proposed building envelope assemblies. The

inspection checklist which is the next option that you could go through is broken really out by phases of construction. It has an inspection checklist for plan review, foundations, rough-in and final. And it's really nice because yet again when you have those inspection checklists out on site and you have the inspector come out, you guys are on the same page. You're looking at the same information. So the inspection checklist that goes through these phases of construction can be quite valuable.

**SLIDE 32 [0:33:44]**

Here's an example of what a compliance certificate looks like. So, this gives you the same project screenshot that I showed you is you're looking at the energy code. You want to verify that. The type of construction, this is new construction. And the square footage of conditioned floor area and this one shows a passing. And there have been projects where they've submitted and not realized that they need to have a passing grade, really, before they submit it to that building department and then a signature line.

**SLIDE 33 [0:34:13]**

And here is that signature line that should be signed and verified that you are – you're verifying that this building is going to meet the energy code, that it's complying to. As far as on the plan review side, the important information here is that you're going through and verifying that the square footages, the insulation, and the fenestration values meet the plans that have also been submitted on this project.

**SLIDE 34 [0:34:41]**

So, we go from the compliance report to the inspection checklist and this is where this is just an example of that requirements tab, going through and filling it out. On the mandatory requirements, then, for example, a mandatory requirement would be this second row down saying, "Slab insulation installed by per manufacturer's instructions." That's an actual code provision. And it can be that you would say, "I'm going to meet that requirement," and I do have slab insulation. But this one gives you an example of, I don't have a slab or I do have a slab and that requirement will not be met. It's been already populated over on the column that says comments and assumptions that this requirement will be met. And additional information can be entered in that requirements tab that will automatically get populated into that comments assumptions column, such as if you wanted to show where on the plans certain assemblies are, that might be applicable to these requirements within these inspection checklists. That can be entered there.

**SLIDE 35 [0:35:49]**

So let's get a little deeper as far as this example, this inspection checklist so you can kind of understand what's on it. And on the first column is – it's showing you the code and this one's referring to the 2009 IECC, but below that, that 402.1.1, it's the section that is actually in the code where you could go if you had your code book that gives you the provisions for slab edge insulation.

So the inspection type actually is that we are looking at slab edge, so that's the next column or the next item. Then on the value, this is for the plan reviewer that they would be entering that I have verified on

the plans that the slab edge insulation R-value is meeting code per the plans. And the unheated/ heated is just where you would check, does this slab have hydronic heat. If it did, installed in the slab, then you would check that it's a heated slab. If it doesn't have some sort of hydronic heating system, then it would be checked unheated.

The field verified value is actually for the field inspector to go out and go, okay, it's been plan reviewed at let's for example say R-10. You go out on site and it's R-5. Then you're putting your field verified value in that box as far as what it is, and let's hope that it's R-10 as though it was during plan review, the same value once they get out in the field.

And then compliance. Did it comply, not comply, couldn't observe it? These are options that are actually for that inspector to go through and choose what was happening out on site.

### **SLIDE 36 [0:37:34]**

Here's an example of a panel certificate that was the last option when you go to your file view reports or save your reports that you could print out this certificate and when I say panel certificate, because by code, this code, you're putting it at or near the electrical panel or on the electrical panel and this provides you the average values for your insulation. So for here, example, it's showing you wall, the R-value 20, the floor, 30, the ceiling at an R-49. And the same thing goes when you go down to the glass and door rating. It's giving you those averages if there was more than one, so this average it out that the windows average out to a U-factor of a .30 and then the solar heat gain, and in the doors, you know, similar – it gives you a U-factor of a .50.

And then the heating and cooling equipment, since it's optional, these are values that would have to be entered by hand on this panel certificate and then the name and comments as well, those would have to be entered by hand.

### **SLIDE 37 [0:38:33]**

So one feature – it's a tool that's within REScheck that I won't be going into during this REScheck basics video is area calc. And it's an actual tool within only the desktop version which will help you calculate your building areas and you can actually save your window and doors into a library. Let's say that you're using the same window and door schedule and you're a custom builder or even you're doing a huge amount of track homes somewhere and you're doing the same window schedule and you want to save it so you can move it over into your REScheck project, you can save them within this tool and so it makes it kind of nice that you can save those windows and doors and move them in. You don't have to enter them every time.

### **SLIDE 38 [0:39:19]**

Here's a screen shot of what AreaCalc looks like. And again, if you are using this tool, it's really quite simple and it does have a help, software help, to the tool itself. You can send those questions into the help desk if you have questions and you're using these takeoffs and saving some of your windows and doors into your library.

**SLIDE 39 [0:39:43]**

Now, here's a case study that I'm just going to go through real quick that goes into a little more detail on how to do your takeoffs and then we'll open up REScheck and I'll show you how to run and put those building envelope assemblies into REScheck.

**SLIDE 40 [0:40:00]**

So here's an example of a building envelope and that big, big part of this is defining the building envelope. And where's the floor, where's – is there a conditioned basement and with this one, it's kind of a mixed building. It does have a conditioned basement. It does have a walkout basement, so it has a slab on grade and it has a crawlspace. So you're going through and you're defining really where that building envelope is. That's the first step.

**SLIDE 41 [0:40:25]**

So part of that is where's my ceiling and what's the square footage of my ceiling and where am I placing my insulation? If the insulation is placed at the ceiling level, then that's what you are calculating your square footage to. So in this example, as quickly as just showing you that the total square footage for this ceiling is at 2,415 square feet.

**SLIDE 42 [0:40:49]**

And where are your exterior walls? And do you have any knee walls, meaning you have sections where you might have a living room that has a 12-foot ceiling here and you go down to a 9-foot ceiling in the master bedroom. So if you have knee walls and those knee walls separate conditioned from unconditioned space or outside air, you need to make sure you enter those knee walls that are insulated and sealed properly to code. So these take offs are giving you these examples of the two different wall heights, the square footages and the orientation, where the entire building has been defined and the knee walls.

**SLIDE 43 [0:41:30]**

And here is an example, a couple pictures that show you where are these knee walls at, how to insulate those batts in this knee wall and not – you know, don't cut them too short, needs to be the full height within those knee walls and sealed properly. But the lower left-hand side as defining these knee walls really are separating conditioned from unconditioned space, not outside air. This is a vented attic and so those knee walls do need to be insulated and they're not considered part of the ceiling area because it looks at the degree angle of that component and that is considered a wall if it's greater than 60 degrees.

**SLIDE 44 [0:42:11]**

So let's get back to basements because this is one of probably the biggest issue when you're dealing with takeoffs with basements so I can't speak enough on how you define these. And I talked about the below grade wall consists of by code if it's more than 50 percent below grade.

**SLIDE 45 [0:42:30]**

Here's some examples on different ways to insulate and what REScheck assumes. So if you are showing cavity insulation, it assumes that that's interior, that you're furring out to the interior. If you're showing continuous, it assumes that it is exterior insulation.

**SLIDE 46 [0:42:45]**

What if you have a two-story house. The main point I want to bring up here is that you do not want to forget – by code, you need to insulate that rim joist, but how and where do you do the takeoffs for that rim joist? So by this diagram here, you would include the rim joist area as part of your main level floor. So if I had a nine foot wall such as that master bedroom I showed you on the diagram, but I need to include my rim joists and let's say it's a one foot rim joist, then I have a ten foot height wall and that's how I run my takeoffs 'cause I need to include the rim joist area and it should, hopefully, be insulated to the same level as your exterior wall. Then the portion of the basement wall if it's defined as a below grade wall, that is below the floor joist there, the rim joist, floor joist, and that's calculated separately.

**SLIDE 47 [0:43:43]**

So basement walls, I won't go into a lot of detail here. You can – we're going to have these case studies in this presentation with a video that you can go back out and look at this. These basement walls, this is a walkout basement, so – and you're doing your takeoffs for your square footage. You have two sidewalls which are highlighted in blue, and a back wall that's fully below grade and running those square footages. Those have different wall heights. The back wall will have to be entered into REScheck separately because its wall height and depth below grade is different than those sidewalls, which will have an average depth below grade of that wall. And then you have an above grade wall, which is highlighted in red which really is – would be considered, of course, an above grade wall with the slab on grade. You have an exposed edge of slab.

**SLIDE 48 [0:44:40]**

So here is a screenshot of basement walls and when I get into – when I'm talking about wall height as you're measuring from the top of the wall down, depth below grade and if you have different depths below grade, then you need to separate out those basement walls and have them on each line item within the tool separately. If they're the same, like I said you can match same components and add them together. Then you could add those two walls together if they are the same, exactly the same. And then, of course, depth of insulation and your insulation value. So you can combine like components, but with basement wall, that typically doesn't happen because you're dealing with different depths below grade, especially on a walkout.

**SLIDE 49 [0:45:24]**

And then here's another example of that you would be entering on the side below grade basement walls that if you had to enter these, you're going to do them separately and the screenshot below showing you that every time you go to enter a basement wall, this popup will come up for you to define out each one.

**SLIDE 50 [0:45:44]**

Now to floor area. I talked about this case study had a couple different floor assemblies and with this one, the crawlspace is vented to the outside. So, we're looking at square footage of not the crawlspace wall, but the crawlspace – what would you call it. It's the floor above the crawlspace 'cause it's a floor that's over unconditioned space and it needs to be insulated. So with this one, it's calculating the 16 feet on the left-hand side and the 24 feet length and then the floor area itself.

**SLIDE 51 [0:46:20]**

So here's an example though of if you had a crawlspace that was fully insulated, not vented to the outside and mechanically conditioned. That's not part of this, but if you did, you would be defining your crawl walls –

**SLIDE 52 [0:46:36]**

And here is a screenshot of that you've got one more piece of information when you're doing crawlspace walls that you need to define and that's that depth of inside grade measured from the inside grade to the top of the footing. So there is one more calculation or actually feet that you have to enter if you had a crawlspace that's fully conditioned and you wouldn't be showing the floor above the crawlspace at this point. It would only be those crawl walls.

**SLIDE 53 [0:47:05]**

On this case study, I kept talking about that slab on grade and now here is the example of where you would calculate only in linear feet. It's the only assembly in REScheck where you would define it in linear feet. The rest of them are gross square footage.

**SLIDE 54 [0:47:22]**

When you do enter slabs in REScheck, it will bring up yet another pop up diagram to say, well, how are you insulating this slab? And there are some helpful hints on this too as far as depth of insulation and how you're going about insulating it because you can insulate slabs in various ways. You could do horizontal, horizontal plus vertical. You could do a beveled edge. But the important thing here also is that you are entering what's the depth of insulation and by code, it starts out, you know, no insulation required in your lower climate zones or all the way up to in your really cold climates, up to maybe four feet of depth of insulation. And it needs to be defined here as far as how you're insulating or you're wrapping it around two feet, four feet, or zero.

**SLIDE 55 [0:48:12]**

This just gives you the overall view of – I talked about on the building plans that you run your takeoffs for the building envelope, but you might have somewhere else where all the insulation levels and fenestration is and you need those. You've got to make sure that when you're starting to run your takeoffs, that you also have in front of you those insulation levels for defining that building envelope.

**SLIDE 56 [0:48:39]**

And you also need it for all the fenestration and again, this is just showing you all the square footages for this case study and the U-factors and solar heat gains that would go into this building.

**[0:48:51]**

So now I've quickly taken you through that case study. Let's go into REScheck and I will go through some of these helpful hints again and we will start entering some actual assemblies and then I'm going to open up this case study again and we'll play around with it and look at the reports and it really will give you just the functionality of how REScheck can be used.

**[0:49:16]**

Okay, so I've opened up the desktop software and let's go over some of these basics and functionality of the desktop tool itself. So, at the very top of the program is called the title bar and in that title bar is – it will show you if you had a project opened – this one doesn't 'cause I just opened it, this untitled.rck is the project name. And since I don't have one, of course it says the name untitled, but that .rck is the extension of the data file and that's what runs, you know, as far as these data files, it's a certain format for REScheck and that .rck is the REScheck format.

**[0:50:00]**

Then it'll give you the REScheck version and I'm on the most recent version of this video today, which is the 444. And then the code that's already defaulted as I opened this 'cause there are several codes, it's on the 2009 IECC. Over to the very far right, you can expand this program and make it large and I would advise that, especially as you start getting into if you're defining your basement walls 'cause you're going to get more and more columns that will show up in your envelope section and you don't want to lose putting that data in. So you'll want to make sure that it's, you know, expanded entirely on your monitor on your screen.

The next row is the – is the actual menu bar and this one gives you the file, edit, view options. It's more or less the basic functionality of the overall REScheck tool. So we'll go into each one of these. The second line or the third line down is the toolbar.

**[0:51:00]**

This is a Windows app where you can open up a new project, you can save this project, you can cut, paste, duplicate. You could print from here. And then down below that, this is where you start getting

into the actual application and it has four tabs, project, envelope, mechanical and requirements, which I've already kind of gone through these as far as what would go into each one of these tabs.

So let's take a look at the file menu. If you click on the file menu, this is where you can save your projects as a data file under save. You can open recent ones and I'll open up a recent one, save them as a data file here, save to a certain location, view print your report and if you save this report, it will save it as a PDF. So it will bring it up and it'll ask you what all do you want to save, but this gives you an option that it would create it as a PDF format. You definitely want to make sure you save it as a data file first in case you have to go back and change anything.

**[0:52:00]**

Then also, you have e-mail report and in this functionality, after you've created a project, instead of driving down to the building department, you can e-mail the entire compliance certificate, inspection checklist and if you wanted to, the panel certificate directly to the building department. And you would have to come up to the next screen and it would ask you, well, where are you sending your report. So you enter the recipient's name, their e-mail address and then of course, where it's from, your name or the company and the e-mail address that it's coming from and any notes that you want to add to that compliance report and then go ahead and submit it directly into that jurisdiction. You'll want to verify that the jurisdiction will allow you to electronically submit your compliance report to them.

On the edit dropdown, this is more functionality of a cut, copy, paste, delete rows, duplicate, but this is where those preferences are that I talked about where let's say I want to really customize and I want some information that I don't have to keep duplicating on my projects every time.

**[0:53:05]**

And that's those four tabs that I'd mentioned about general project applicant and reports. Under general, I can default to a certain file location, so I can save my projects to the same location and open it every time if I want. I can actually show the full path of that name and when I click on this show full path names of the data files in the title bar, that's at the very top of this program where I talked about the untitled .rck. It will show the entire path meaning it's going to show exactly where I saved it. That's a feature that you might want to play with to see if you really want that to show up on your reports.

The version update, I can choose whether I want to do it every week for it to go out and see if there's a new version, every month, every six months or never, if I want. Mine is put onto every month.

And then the upload uses data, and this is where it will upload the project data for statistical analysis, but you can default off of that if you don't want it to upload that project data.

**[0:54:06]**

Under the project tab, this is where if I want to get some settings that will come up every time I can have it bring up the same code. And there are drop down lists of code options. These come from the code menu that we'll get to. Or I can look up my code. If I clicked here, it's going to take me and I'm

connected to the internet. It'll take me back out to the [energycodes.gov](http://energycodes.gov) website, to that status of state code page that I showed you with all the different states and I can find my state and location and applicable code if I need to.

Then I can default the actual state I want to work within and then the actual city. And then this will come up every time 'cause I'm now saving this as preferences. I've mentioned about envelope preferences and this is where I want, if I wanted to, enable orientation.

Orientation is just an option. If you do enable orientation, a lot more information is required, meaning you have to define out every wall, how they're oriented, the overhang and projection factor.

**[0:55:06]**

This is code driven. And that might not be an option for you depending on the code where you can even enter your overhang and that's called a projection factor in how that's calculated.

And then comments and comments really gives you an additional column in the envelope section where you might want to define out a certain area or you have a specialty system that you're building and you want to give that more detail in the comments section of the report, then you can do that here.

Under applicant, this one's nice because I can go in and define if I'm the same owner agent, designer contractor and I don't want to enter it every time, if I save it here under preferences, it'll populate for everyone of my projects that same information. So this is a really nice feature.

Under reports, I can customize my signature lines. So instead of saying name dash title, I can come down below and put in on that first line who is that person.

**[0:56:06]**

And I want to make sure that I put that in, what their title is and I can add additional lines. Let's say there's three contractors working on one site and I want them all to be signing on this project and I want it customized to what their names are, so when I go to them, I know that John Doe needs to sign this, then I can do that here.

And then the emailing reports feature where I had mentioned, if I'm only working with one jurisdiction and I don't want to keep entering that recipient's name and e-mail address, if I put it here in preferences, then I don't have to enter it every time for every project that I'm doing within REScheck.

So under the view menu is a tool and status bar. I wouldn't unclick those. What the toolbar is the one that's right below here and the status bar is if you unclick you won't see them. And the status bar is, to me, a very critical part of REScheck because it gives you information, especially if you're missing something.

**[0:57:05]**

It might be telling you something and it's going to give you where you're at with your project. Glazing requirements, this comes in and it's more or less by code, but it will start calculating your area weighted average of your U-factor and your area weighted average of your solar heat gain values based upon what's allowed by code and climate zone. So after you've done it in your information, you could come back up and actually look at your glazing requirements. And again, this is code driven.

Under options, I talked about these compliance methods, the UA tradeoff really is the basis of REScheck which is looking at overall UA, your proposed UA versus max UA. And Max UA is really the code-defined building and then looking at your overall, what you've proposed.

**[0:57:57]**

But you do have an option to do the performance alternative, which is that simulated performance analysis where then you do have to do orientation and you've got to define out at least four walls, a roof and a floor and it's really going to look at calculations that are based on the glazing of your building and how it's oriented and the loads on that building.

There's also under options, a comments description for envelope. I showed you this under preferences that you can have that come up every time and it's kind of grayed out here because I'm not in the envelope tab, but when I get over to the envelope tab in this project, I'll come back up here and I'm going to click on it so you can see it will bring this column down called comments and descriptions into my envelope where I'm entering my assemblies.

The code menu gives you a drop down list of all those choices of codes. These change depending and here are the most recent codes and state codes that are within the tool and again, you can go out and look for your code. It's the last option here at the end of this where if I'm not sure what my code is, it'll take you back out to the website.

**[0:59:00]**

Under tools is the area calc takeoff tool. This is where if I wanted to get some help running my building envelope square footages, it'll help you with that. But it's also where you could actually save your library of windows and doors and then move them over into REScheck. You just got to be very careful that when you do start moving envelope assemblies, windows and doors into REScheck from that tool and you have a whole bunch of windows, it doesn't know where to put those windows if you have more than one wall. And it will put them under the first wall that it sees. So pay attention as you're playing around with AreaCalc or you're using it, how it's moving those assemblies over into REScheck.

And then the help section is really where you can go check for updates. You can look for solutions, frequently asked questions. It takes you back out to [energycodes.gov](http://energycodes.gov), but the main important one is the help topics, which is the entire software users' guide. And this is where maybe I don't understand one of the assemblies in there and I don't understand how I enter that assembly.

**[1:00:03]**

You can go into the REScheck help, go through this software users' guide and hopefully find what you're looking for that can help you further identify some of your inputs and how to do these takeoffs.

So now, let's get down to the project envelope and mechanical and requirements tabs. So we've talked a lot about this and in the project tab, you want to define your location, so your state and city. You want to define your project type, so you have options for new construction, addition and alteration. New construction is entire building, the entire building thermal envelope. Addition would be just the portion of that addition. And then alterations would be just those portions of that building thermal envelope that you're touching, not the existing part. If you aren't replacing windows on the north side of a building, then you wouldn't show those. You would only show, for example, if you're replacing windows, it would only be the windows you're replacing that you would show.

**[1:01:00]**

And then building characteristics. So one and two family and multi-family and we discussed what defines a multi-family. It's three stories. That three stories is the threshold for that multi-family whether it becomes a high rise when it's greater than three stories or not. And then conditioned floor area and the conditioned floor area here in the project tab is not the main – the bottom floor that defines a building envelope. Conditioned floor area is if you have a two-story house and it's all conditioned and you add up each floor. So this is total conditioned floor area. It also will ask you if you have your ducts, air handlers within the conditioned space. You'll want to click that because then there are certain code requirements that might not be applicable such as insulating those ducts, if they're within the building thermal envelope.

Over on the right hand side is your project details. This is where if I go up and click on the edit project details, I have three more tabs.

**[1:02:00]**

And it's optional, but this helps for the jurisdictions to give a little bit of understanding of where the construction site is, the address and you might not have a permit number, but if you did, you could enter it there. Any notes, I could also put in again this is not preferences. Under preferences, this would already be populated for every one of my projects, but for this one, let's say it's very specific so I would enter the owners' name, if I wanted to, and location and address if it's in a different location than the owner is. And then I could come over to the designer, contractor, builder and enter that information as well, and it'll all show up on the report.

Down at the bottom, I showed you a screenshot of the compliance and status bar and you'll see, it says invalid assembly types and it's in red. Red is bad, again. It says TBD. I haven't entered anything. We haven't put any assemblies in yet so that's why it's in red.

**[1:03:00]**

And then you have the next row down is the compliance method UA tradeoff and the max UA and your UA and the numbers will start calculating here as we start entering building assemblies. And then that status bar where it's giving you a little information as far as you go along entering your project information and assemblies. You'll want to pay attention to that 'cause it might help you as far as going through and getting compliance results.

So let's go over to the envelope tab. Here is where you have those blue and white buttons that you can choose from to define your building thermal envelope and or addition or alternations, whatever it might be. And if one of those is not applicable to your project, then you wouldn't choose it as part of your project. So the skylight was the example I showed you that was in the screen shot earlier. I'm going to highlight this row and I'm going to come up to the function that I showed you as far as how you can delete a row and delete it.

**[1:04:03]**

So now let's take a look at what is really within some of these drop down buttons here. Let's take a look at ceiling. Each one of these has a drop down list of assembly types you can choose from. And if one of those assembly types matches your construction, then you'll want to choose it because what it has is the underlying assumptions for all the calculations for that assembly, except for the square footage and how you're proposing to insulate it. Those come from ASHRAE Fundamentals and as I mentioned earlier, if you want to know what all those calculations are, such as the air films, to the siding, to the framing, percentage of framing, that's in that technical support document that was in that tab that I showed you a screen shot of where you would go get REScheck. You can go into that and get all the details of how each one of these are calculated.

**[1:05:00]**

So right now, it doesn't have a U-factor. It shows zero U-factor, zero UA. And here's that cavity column, continuous insulation column, my gross square footage and I'm getting ready to choose what my ceiling assembly is. So, I will just choose flat ceiling and once I do that, as I mentioned, it already has a calculated U-factor here. That is a typical construction type for that ceiling, for a flat ceiling or scissor truss, but that calculation is going to change once I start entering the square footage and when I'm proposing to insulate that ceiling to. So I would enter my – just a hypothetical thousand square feet, I will hit my tab button. And I'll move over. Now the cavity and continuous for a ceiling, for a first time user has brought confusion as far as do I separate out my insulation? I know I'm going to have insulation way above my trusses. I'm going to put in, let's say for example R-49.

**[1:06:00]**

And I know that there is no – I mean there's no thermal break. I mean I got full continuous insulation. There are some different assumptions that are made for a flat ceiling in the back end of the software. First of all, whatever the application of the installation of insulation that you're doing is, it goes under

one value only. So I'm blowing in cellulose at R-49, I put it all under cavity. The software already will make some assumptions based on that R-value of how much is depth above the trusses. That gives you that credit for no thermal break and it also starts calculating the decreased amount of insulation towards the eave because I didn't choose from the dropdown here that I had a raised hill or energy truss, which gives you full height, full credit for insulation in that ceiling area.

As you'll see when I entered the ceiling, the U-factor did change after I entered the overall R-value.

**[1:07:00]**

It was a lot higher and now I have a UA. And this is where you just start going through and entering all your assemblies of that building thermal envelope. I don't have a skylight, so I'm going right to walls. Here are my choices. You won't see a two by four or two by six because here's another assumption that the software makes. It's based on the R-value of insulation. It needs to know the framing of that wood frame wall or whether it's solid concrete, masonry, whatever it might be, each one of these has options, but let's just choose 16 inch on center. And here again, it has a calculated U-factor without insulation, just includes air films, the gyp board. And let's say – well, how do I know? I have a two by six wall and by code, you should completely fill between those framing members that two by six wall. The software will assume that if you have greater than an R-15 in a wall, it will run as it's a two by six wall so your percentage of framing members is based on a two by six wall.

**[1:08:00]**

And again, all those details of these in-depth calculations you can find them in that technical support document.

I'll just enter an arbitrary value of 1,500 and then I'll put an insulation value. Let's just put it at a cavity of R-19. Windows, pretty straightforward. You define the type of your assembly, so I could do wood frame, vinyl frame, double pane, single pane, double pane with Low-e. What the real calculation that will happen here is it's not based upon the assembly type you choose with this one because it doesn't calculate anything except what the overall rating is on that entire window. And that's a value that the user has to enter. So the square footage is the rough opening, including framing of that window. Just put in 40. And then I go out and look for that NFRC labeled product or it's in my specs with my plans and put in that U-factor.

**[1:09:00]**

I've talked a lot about this solar heat gain coefficient and you don't see the value that's showing up here, but depending on code, will bring in that extra column that will come down that we might have it where you have to enter that value as well and it's all based on code provisions.

Doors, similar things, solid or glass. And this all depends on the fifty percent above or below for glazing. And then you would enter your square footage of that door and the U-factor from hopefully the manufacturer product label. And now let's get into these basement floor and crawl wall that I talked about in these screen shots. So let's go take a look at basements. So let's say I have a conditioned

basement and this conditioned basement is fully below grade. You have a drop down list of choices to choose from again as far as what that basement wall is constructed out of, so if it's solid concrete, again, here's what the additional information you'll need to input is that wall height.

**[1:10:03]**

And let's say it's an eight-foot wall so I'll put eight feet in. And depth below grade, so by code, it has to be greater than 50 percent below grade to become a basement wall or below grade wall. So I will put that it is six feet below grade. And my depth of insulation, I'm going to say it's full height, so I'll put eight feet. And I can click okay.

Now if I have not all my walls have the same depth below grade, then I am going to have to go up and click on basement wall again and enter my second basement wall in here and define out that wall height, depth below grade, which could be different, and the depth of insulation and hopefully you're doing full height insulation, but if not, you've got to make sure that you're defining out each one of those walls separately if they have different values.

So I can come back up here again and I can put in my eight-foot wall.

**[1:11:02]**

I could say that the wall height of this one, it's six and a half. A little bit different, and that my depth of insulation is still full height. And you'll see that these values now are different on the column that shows the depth below grade. So, let's go over to the floor options. With the floor, defining your building thermal envelope, you could have a floor over unconditioned space, so what if I have an all wood joist truss? Then your options are, it could be, or it could be over outside air. Maybe you have a cantilever, an exposed garage area that you have. That's where you would define this floor area based on those two options.

It could be steel frame and with steel frame, then there are definitely some more options to choose from for steel frame because it's based on the framing. So you've got two by six, two by eight. And then again over unconditioned space or outside air.

**[1:12:00]**

It could be that you have a floor that's that slab on grade and if it's a slab on grade and let's say it doesn't have hydronic heating and I choose unheated, this is where you will actually then have to define a little bit further that depth of insulation. It gives you some diagrams on the different ways you can insulate that slab edge. And I will put up in the box up here that I'm going to do four feet, my depth of insulation, 48 inches of insulation on that slab edge and I'm going to hit okay.

Now we come over and now that I have slab on grade, this is the only assembly within the tool where if you look at the column here that shows square feet, now I'm in linear feet. And this is where I'm only adding up that linear edge which of course would not be a thousand square feet if I had a single story. It's going to be, you know, probably less than a hundred square feet.

The thing that's nice is that we do have some pop-ups that give you little warnings in the tool.

**[1:13:00]**

And this is one of them because as a first time user, we know that this can be one that is overlooked on a first case scenario, so we have it that says, "Be careful. Make sure you're doing the perimeter length."

Then you only have the option because it's foam board that would go on a slab edge to enter that R value of that rigid foam board, which is typically it's an R-10, you know, for a really good four feet of insulation or an R-5, but I'll put in an R-10.

Now, I don't have a complete building here and we only went through some of these. I've given screen shots of some of those drop downs and how you define that building envelope, but I mentioned to you about things that are in red. I've purposely left stuff blank which I can't get it overall compliance result and I come down here at the bottom of the screen and it has invalid areas. This is helping me as far as why am I not getting a compliance result and it says TBD over here on the right hand side.

**[1:14:00]**

Because I haven't entered all the information needed for it to finish compliance of this make believe building, which I'd have to enter these two other basement walls, the square footage and the insulation values before – well, it would go ahead and calculate if I didn't have insulation there, but it's a fake building and it wouldn't really comply. But it's showing you an example of that you look for things in red, look for things in blue before you go ahead and do that overall compliance and make sure that you've entered all your square footages properly, you have all your proposed insulation values that are correct and they're in the proper column, cavity and/or continuous. And your fenestration, the U-factor and solar heat gain if applicable, that those meet the specs of what you're proposing for the building.

So let's go over now that we've taken a look at the envelope tab. I want to show you the difference between new construction and addition because for an addition, you're doing the same thing. You're only defining those new assemblies of the addition.

**[1:15:00]**

You might have a new roof. You might have just two or three new exterior walls and a floor and some windows. But alterations are a little bit different so with alterations, it will actually give you general requirements of what alterations are meant within the software and how they work. And it's good to read those. And we want to continue and if you choose alterations, you'll lose any other project information, so you want to be careful. Don't go in between these project types.

We'll come over to envelope and now it's left this information in here, but I have a new column that's showing up and it says, "alteration details." And this is where with alterations you do have some exemptions that might apply based upon what you're altering on that building.

So let's just click on the ceiling here that I've already entered and I'm just clicking where I had that little box with those little dot, dot, dots and here each one of these depending on the assembly the component, whether it's a ceiling, wall, floor, whatever it might be, these come from code. And let's say I have the ceiling I'm doing, the alteration does not expose the framing cavity. Well, if that's the case, I can choose that and I can click okay. And then it tells me the exemption applies, framing cavity not exposed. This was the only alteration I was doing on a project and let me highlight the rest of these rows. So all I'm doing is I'm going down and I'm going to highlight row two and I'm going to delete it. It's not part of my project. I can do the same for the next ones. All the way down, I'm going to delete them and all I have is a ceiling as part of my alteration project. I can create my report and submit this so for permitting purposes, and it's on file, they know that yes, I just did new roofing, but it didn't expose the cavity, so I was exempt from having to meet the energy code, and you're done.

**[1:17:02]**

There's more to alterations and I won't go into a lot of detail, but it's a lot of code driven as far as what – and depending on what you're doing with that building as far as maybe it's just window replacement, whatever it might be, that you can go through, but it's pretty simple. I mean, you either have an exemption or you don't and if you don't have an exemption that applies, so I click no exemptions, then that ceiling or that component must meet code and now I'll need to make sure I put in my insulation value here and whatever – it'll tell you whether it's going to meet code or not because it's more or less pretty prescriptive. In this one, it brought up the old value of 49 that I had, so it's showing compliance passes.

Again, I don't have to put the entire building. I can print this just for my ceiling 'cause it's an alteration, not a complete new construction or an addition and you can have your compliance report.

**[1:18:00]**

So let's go take a look at a real project, this new construction and let's look at this requirements tab that I've talked about. So I'm going to go to open a recent project that I have. And I'm not going to save the one I have. And this one – I need to enter my conditioned floor area. I'll just put 4,500 in there. This project here is a conglomerate of the case study that I showed you. So the ceiling's showing you, this shows you to R-49, the square footage. My exterior walls have been defined out. I've done orientation and I've defined if I do orientation, I need to separate out my windows and doors under the appropriate wall, which have been done here, so exterior wall one, I've put my appropriate windows and doors under that wall. Then wall two, then I have some knee walls, and that was in the case study example that I've defined these out separately to show where the knee walls and where they are. My basement walls are also defined.

**[1:19:00]**

And my wall height, depth below grade and depth of insulation and this is a walkout basement on the case study, so there are different depths below grade here. Those sidewalls plus the fully below grade wall, which shows the seven foot – not fully below grade, but close to fully below grade. And then my

two different floors. I had a floor over the crawlspace and then the crawlspace was vented to the outside, so I've defined it here. And then I have that slab on grade in linear feet and then my foamboard that I'm insulating it to and that depth of insulation for that slab.

And at the very bottom, this project passes and as you'll see, you can look at the max UA and your UA and the proposed UA that I have is lower than the code UA and I'm 2.1 percent better than code. So I could go up and go to file view and print report, but let's go over and take a look at this requirements tab.

**[1:20:00]**

In the requirements tab, this is where you have all the rest of the mandatory requirements that you can confirm whether you're going to meet, whether they're exempt or whether they don't comply. So, it's defined by the stages of construction as I mentioned again, so let's take a look at air leakage. The first one that comes up here has to do with fenestration. Will the requirements be met as far as the air leakage rates on the NFRC labeled product? And I can click that yes, the requirements will be met. Let's just go down a little bit further. Let's look at recessed lighting. This is another code provision for recessed lighting. If my requirements will be met, I confirm it, but another nice feature that I have in here is that I can specify where on the plans that those recessed cans show up. So I could put in here, you know, plan E-4 and they could go take a look at plan E-4 on my plans and find those recessed cans and right where I'm confirming that I'm meeting this provision.

**[1:21:08]**

Fenestration comes down here and I'm not going to go through each one of these provisions 'cause again, these are based on the code and what's in that code, but each one of these has a grouping, so you have fenestration, you have insulation, and then you have plan review down a little bit further. The sunrooms, if you don't have a sunroom, this is where you have that option to say it's not applicable and the requirements, I don't have a sunroom. And that will show up on the compliance report so it makes it easier for the plan reviewer.

So this just gives you a brief overview of the requirements tab and how this will get populated. The same applies to systems. So for your mechanical systems, if you don't have a swimming pool, you don't have a snow ice melt system control outside, heat pump thermostat, all these provisions that have to do with mechanical systems fall under this requirements tab here.

**[1:22:03]**

And you can define those out further. So let's go take a look at the compliance – a compliance report and finish off the basics of REScheck.

Okay, so here is this case study that is the example report that can be created and again, you're looking at the project title, which gives you what this is. It's Jones residence and then what the plan number is. The energy code that's specified, the location, construction type, the project type, which is important. This is new construction. Conditioned floor area and this is a quite large residential building, so right off

the bat, if I look at 4,000 square feet, I'm thinking that it has multiple stories, if I'm in plan review and I'm looking at this.

**[1:23:01]**

And then other things such as your glazing percentage, heating and degree days and climate zone based on the code. And then as we scroll down a little bit further, shows you the compliance results that was taken from the REScheck value that we looked at, 2.1 percent better than code. The max UA and your UA. The envelope assemblies are the same ones that were entered into the envelope tab. And this is where going through plan review and inspection that they're going to verify that these values meet what's on the plans, the square footage, the insulation values, as far as fenestration, the square footage and the U-factors. And then as we keep scrolling down, if you look at the basement walls, are the depth of below grade, the height of those walls defined properly. Make sure that it's signed by the contractor, whoever it might be.

**[1:24:00]**

And then we get into for plan review and inspections and this also is good for to keep on site as I mentioned before, so you're all looking at the same level playing field, that you have the same provisions as they go out on site, but here is really where you start getting into the provisions, the mandatory provisions of the code, which is a lot more detailed than just doing the insulation and fenestration. This is – are the insulation installed by manufacturer instructions? Did comply or not comply? Things on such as protective covering, exposed exterior insulation. All depends on how complex the building is and what's going on with that building, but this is where it really gets into the meat of all the other requirements. And as I mentioned before, we have what code it is, the component, the plans verified would be for a plan reviewer to go through this, the field verified and then whether it complies or not, but the comments and assumptions column, this is where the user that enters the information in REScheck can put that valuable information for that plan reviewer or inspector such as right here on the second line that says requirements will be met.

**[1:25:12]**

That was one that was identified when I went through the list to go, "Yep, I'm going to make sure that this slab edge is going to be installed per manufacturer's instructions." And then so forth, so you can enter in the plan, the pages on the plans and that sort of thing under the comments and assumptions column.

So this gives you a really good brief overview of the compliance inspection checklist and then we'll scroll down and you will see that it also provides that final certificate and this is that panel certificate that I talked about earlier that has pretty much embedded from the compliance report the average insulations, if it's more than one wall, the R-value for the walls, the floor, the roof, windows, doors.

**[1:26:02]**

It also has the heating systems identified, water heater would have to be entered separately and any comments that you'd want to have and this could be printed out and put into the home.

So this ends what the actual compliance report would look like. Let's get back over and take a look one more time at the desktop tool. Okay, I'm back over on the desktop tool. And we still have this project in here and I showed you an example of the compliance report but just as a reminder, let's go back up to file and let's make sure that we have saved it as a data file, so we can save our project and that we also, if we wanted to, we could save it as a report which gives us a PDF type of extension where you can open it in any Adobe reader. And/or I could email that report right from within the tool.

**[1:27:00]**

And that would be your final results of knowing you have a passing score and where you could submit that electronically into that billing department. And that ends the basics of REScheck. Again, if you have any questions, you can always go back out to [energycodes.gov](http://energycodes.gov) and submit those through the help desk electronic form and someone will help answer those for you.

*[End of Audio]*