Finished Basements – A Complete Guide

When you walk into a finished basement, most people admire the clean looking finishes, the wall to wall carpet, the added extra living space, and other such things. While these are valid considerations, most of the real important features of the finished basement are typically completely hidden from view – the moisture and waterproofing systems under and behind the walls of the basement areas.

Finishing a Basement: Materials

When finishing a basement area *(areas BELOW GRADE)* there are many considerations on HOW the basement is finished that can either help *PREVENT* or help *CAUSE* damage and added costs in the future.

The biggest consideration is MOISTURE – and not just in the form of water.

Moisture leaking in or building up behind walls, finishes and floors can cause hidden damage – and is often not detected until it is a major issue. Trapped condensation or moisture can damage and warp materials, ruin some types of insulation, and *CAUSE GROWTHS* such as ***MOLD***.

I classify basement finish materials into *two main categories*: **Sacrificial** and **Non-Sacrificial.**

Sacrificial finishes are any finishes that will be *damaged* by water or moisture or that can *promote mold growths if moist (such as sheetrock, plaster, fiberboard, wood, MDF, carpets, wood/laminate floors, etc)*.

Non-sacrificial finishes are materials that can be dried/cleaned/sterilized as needed and ***re-installed*** even if they are exposed to moisture (*closed cell foam, vinyl, ceramic tile, metal, etc*).

OBVIOUSLY sacrificial materials ***are a poor choice in basements*** - where the *HIGHEST* potential for moisture/water issues exists –

BUT THESE ARE STILL (UNFORTUNATELY) THE MOST COMMON MATERIALS USED IN BASEMENT FINISHES.

Vinyl clad closed cell foam board panels are "ideal" as they absorb no moisture. *Note: Most finish systems with porous facings/materials (such as cloth, wood fiber, gypsum, plaster, etc) are typically "sacrificial" as the porous materials usually will allow growths to occur if wet.*

Personally I prefer "Basement Finish Systems" which are insulated, moisture resistant/proof, and removable for both walls and ceilings. And in my opinion, floors are best finished with ceramic tile/sheet vinyl or other water-resistant materials that double as a form of vapor barrier (unless the slab is already fully sealed, drained and insulated). This makes all ceiling, wall and floor areas both fully sealed against water or moisture infiltration as well as making areas behind the finish readily accessible if needed.

REGARDLESS OF MATERIALS USED FOR FINISHES:

The **"*perfect*"** finished basement would have a **full drain system** installed with ***ALL* foundation and slab surfaces completely covered in waterproofing membrane – which then drains into the drain system**. **The *ENTIRE* system *(including the sump pump)* should be *sealed air and moisture tight*** (*this includes ALL seams and edges of the waterproofing membranes*). The finished areas should be **fully insulated** with **full proper vapor barriers installed** (*"thermally broken" – to prevent condensation on colder areas*). Over this sealed system can go almost any type of finish – *although as stated – I prefer the REMOVABLE and NON-SACRIFICIAL type finishes.*

If finishes and insulations are put up over bare masonry foundation walls – moisture is very LIKELY TO ACCUMULATE in the area.

Condensation can form in/on insulation, moisture from foundation surface evaporation can accumulate, moisture from warm living areas can penetrate poorly/un-insulated areas or areas with poor/missing vapor barriers and cause condensation when the moist warm air hits cold surfaces.

Note: *ANY* jointed foundation (*Concrete block, brick, stone, etc*) should NOT be permanently finished as ***REGULAR INSPECTION AND MAINTENANCE IS TYPICALLY NEEDED IN THE FUTURE*** and (costly) finish removal/re-installation would be needed.

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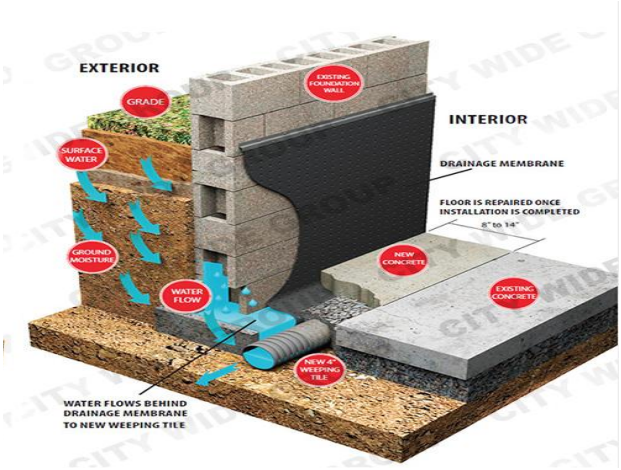
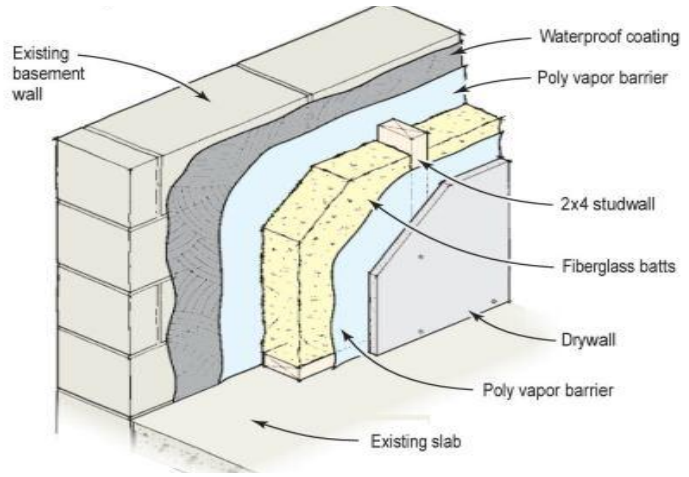
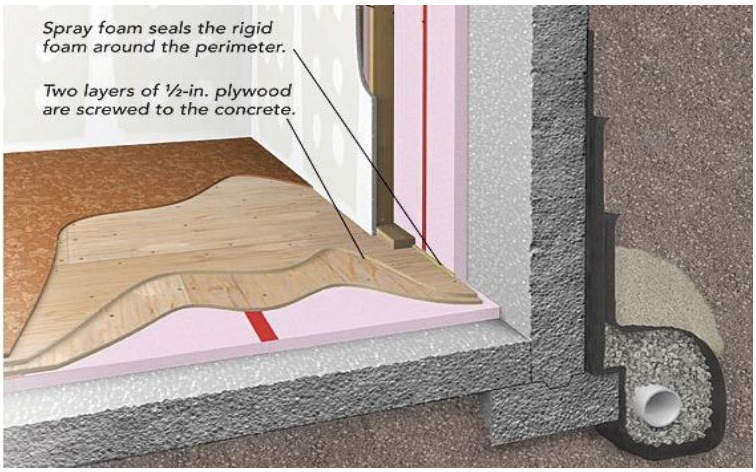
Some Examples of Various Types of Basement Interior Waterproofing:

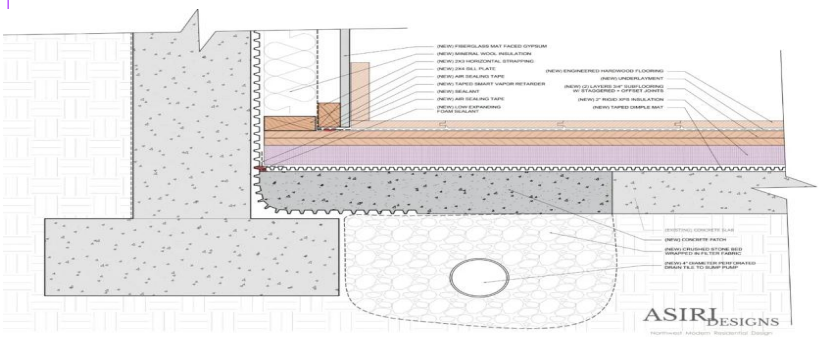


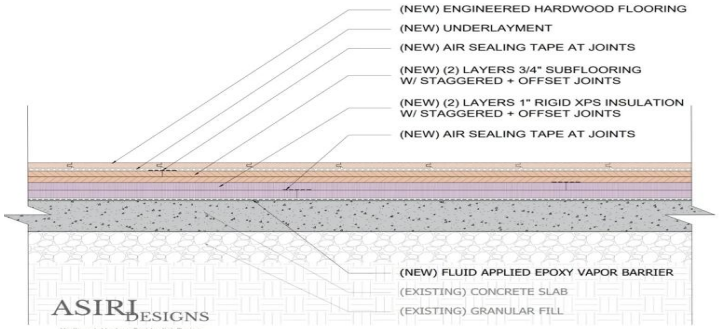
Above are examples of foundation interior wall drainage. Note that ALL of the edges and seams are sealed air/moisture tight, and the base of the membrane drains into a drain system. **THIS IS THE MOST EFFECTIVE WAY OF PREVENTING MOISTURE *(and RADON)* ENTRY INTO THE BASEMENT. IF ANY FORM OF FINISH IS INSTALLED IN BASEMENTS, THIS IS THE PREFERRED METHOD OF PROTECTION IN MY OPINION.** *(images are examples from web)*





Above are examples of finishes applied WITHOUT an interior drain system. Simply sealing the slab and foundation wall will not fully prevent water entry or moisture building up behind the surfaces. While this type of "waterproofing" may handle minor moisture/water amounts, without a drain system - it can be overwhelmed/"broken" and water can still potentially enter. ANY FINISHES APPLIED OVER "WATERPROOFING" WITHOUT A FULL DRAIN SYSTEM INSTALLED HAVE A POTENTIAL FOR FUTURE WATER ISSUES/DAMAGE – A POTENTIAL THAT INCREASES WITH THE LONGER THE AREA IS FINISHED. While this is better than having no protection, and MIGHT be OK in many basement situations, this is not a method I recommend.





Two examples of basement floor finish methods found on the web. The LEFT is the BETTER and MORE PROTECTIVE installation with full drainage membrane both on the floor and foundation wall – fully sealed and draining into a drain system. As discussed, this is the MOST PROTECTIVE type installation and is the only type I recommend for finished basements. The right style finish (coating and applying a sealed waterproof barrier/foam to the floor slab) is also typically "enough" in most situations to protect the floor area – and is a close "second place" to having drainage installed across the whole floor surface.

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AN IMPORTANT NOTE ABOUT FOAM INSULATION PRODUCTS

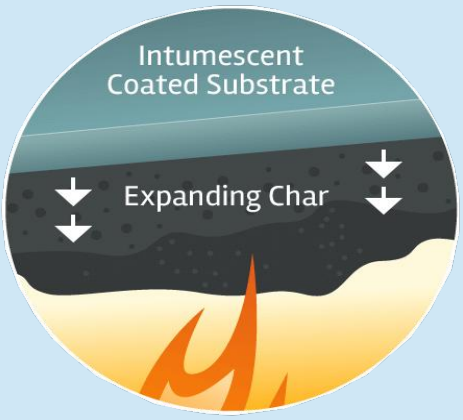
Foam insulation is COMBUSTIBLE: The foam itself **can burn**, and ***it needs to be completely coated in a special intumescent coating*** (JLC online) OR *with sheetrock*. This coating "puffs up" when exposed to heat and forms a heat barrier - to help prevent ignition of the foam and thus could help prevent fires from starting or help slow them down. We often find this coating *missing, poorly applied or incomplete*. Most foam products need to be protected from heat and flame *(see the warnings on foam boards)* and are a potential fire hazard without this protection.

While many people typically say *"Well... it's protected in the attic / crawlspace and because of that it does not need protection..."* Well, *Guess What?* *Fires **DO** happen in Attics and Crawlspaces and even behind walls…* so *in my opinion*:

NEARLY ALL spray or rigid foam NEEDS PROTECTION for SAFETY!

How does Intumescent paint actually help prevent fires?

Intumescent paint is a fire-resistant coating that swells up when exposed to high heat. The paint contains ingredients like a blowing agent and a char-forming substance. When heated, these chemicals react and expand the paint significantly, sometimes up to 100 times its original thickness. This expansion creates a thick, foamy layer that acts as an insulator. It blocks heat from reaching the underlying material, slowing down the fire's progress. As the heat intensifies, the foamy layer hardens into a carbonaceous char. This char layer is a poor conductor of heat, providing further protection. Overall, intumescent paint buys valuable time in a fire by delaying the structural damage and spread of flames. This allows for safe evacuation and for firefighters to contain the blaze.



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A quick comparison of Open Cell foam vs. Closed Cell foam:

Insulation:

- **Closed Cell:** **Winner** - Closed cell foam has a higher R-value (resistance to heat flow) per inch, typically around 6.0 per inch compared to 3.5 per inch for open cell. This translates to better overall insulation, keeping your home warmer in winter and cooler in summer.

Cost:

- **Open Cell:** **Winner** - Open cell foam is generally less expensive due to its lower material cost and easier application process (it expands more).

Moisture Resistance:

- **Closed Cell:** **Winner** - Closed cell acts as a vapor barrier, preventing moisture from passing through. This is crucial in preventing condensation and mold growth, especially in humid climates. Open cell foam absorbs moisture and requires an additional vapor barrier in some applications.

Weight:

- **Open Cell:** **Winner** - Open cell foam is much lighter due to its open cell structure. This can be an advantage for applications where weight is a concern, such as attics.

Soundproofing:

- **Open Cell:** **Winner** - Open cell foam excels at sound absorption due to its open cells that trap sound waves. Closed cell foam offers some soundproofing but not to the same extent.

Moisture Permeability:

- **Open Cell:** **Winner** - Open cell allows air and moisture to pass through, promoting better ventilation within a structure. Closed cell foam traps air and moisture, potentially requiring additional ventilation.

Applications:

- **Closed Cell:** Ideal for attics, basements, crawlspaces, and exterior walls where a *vapor barrier* and *high R-value* are needed.
- **Open Cell:** Well-suited for un-ventilated attics, cathedral ceilings, and interior walls where soundproofing and breath-ability are priorities. *MUST HAVE FULL COMPLETE VAPOR BARRIER INSTALLED*

In summary:

- Choose closed cell foam for superior insulation, vapor barrier properties, and some soundproofing, despite the higher cost and weight. ***(I personally PREFER closed cell foam over open cell)***
- Opt for open cell foam for affordability, moisture permeability, and excellent soundproofing, but be aware of its *lower* R-value and *lack* of inherent vapor barrier.

How Can I tell if my spray foam insulation is Open Cell or Closed Cell:

Visual Inspection:

- **Closed Cell:** This type of foam has a smoother, somewhat shiny surface, and it's firmer. You can try pressing your fingernail into it - it should leave a slight indentation but not break through.
- **Open Cell:** This foam has a rougher, lumpy, popcorn-like texture. It's much softer and easier to dent. You should be able to push your finger into it and leave a noticeable indentation.

Other clues:

- **Documentation:** If you have any paperwork related to the insulation installation, it might specify the type of spray foam used.
- **Contractor:** If you can get in touch with the contractor who installed the insulation, they should be able to tell you what type they used.
- **R-Value:** This number indicates the insulation's resistance to heat flow. Closed cell foam typically has a higher R-value per inch than open cell foam (around 6.0 vs 3.5). If you know the overall R-value of your insulation and the thickness, this might be a clue (though not definitive).

Destructive Test (not recommended):

If you have a small leftover piece of the foam, you can try snapping it in half. Closed cell foam will be more brittle and snap cleanly, while open cell foam will tear. However, this is not ideal as it destroys the insulation material. Also – placing a sample of each in water, then after 1-2 hours the open cell foam will be HEAVY due to all the water it absorbs (it may also sink).

If you're unsure or can't easily perform a visual inspection, it's best to consult with a qualified insulation contractor. They can help identify the type of foam and advise you on any maintenance or upgrades needed.

OPEN CELL FOAM IS MUCH LIKE A SPONGE AND WILL ABSORB AND HOLD MOISTURE

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Charts of Basement Finish Materials and Their Pros and Cons:

Basement Floors

Material	Pros	Cons
 **Concrete** *(stained, painted, or stamped)*	Durable Low maintenance Versatile Cost-effective	Cold Hard Can crack Susceptible to stains if not sealed
 **Ceramic Tile**	Durable Water-resistant Stylish Easy to clean	Cold Hard Expensive to install and repair Can crack
 **Engineered Wood** *(wood based laminates)*	Warm Comfortable Aesthetically pleasing	Susceptible to water damage Can expand and contract More expensive than other options
 **Cork**	Warm Comfortable Environmentally friendly Sound-absorbing	Can be scratched or dented May require more maintenance
 **Carpet**	Warm Comfortable Soft Sound-absorbing	Susceptible to Stains, Mold, and Allergens Can be difficult to clean

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Basement Walls

Material	Pros	Cons
 **Drywall**	Affordable Easy to install Versatile Provides insulation	Susceptible to water damage Can crack Requires additional finishing Can grow mold
 **Concrete** *(exposed or painted)*	Durable Low maintenance Industrial look	Cold Hard Can be difficult to insulate Limited design options
 **Wood paneling**	Warm Aesthetically pleasing Can add character	Can be expensive Susceptible to moisture damage May require maintenance Can grow mold
 **Brick or stone veneer**	Durable Visually appealing Adds value to home	Expensive Heavy – additional support often needed Can be difficult to install VERY difficult to remove if needed for repairs
 **Basement Finish**	Durable Often washable Built-In Insulation Removable for access/inspection	Expensive Professional Installation typically needed Not as visually attractive *(with some exceptions)*

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Systems		

Basement Ceilings

Material	Pros	Cons
 **Drywall / Plaster**	Affordable Versatile Easy to paint or texture	Susceptible to water damage Can crack Requires additional finishing Can grow mold Requires access panels be installed for plumbing, electrical and other system components when finishing
 **Drop ceiling tiles**	Easy to install Affordable Can hide imperfections	Limited design options Can look cheap or institutional *Fiber-type* panels can grow mold and warp
 **Exposed beams or joists**	Industrial or rustic look Can add character	May require additional support Can be difficult to insulate
 **Painted Framing**	Most Inexpensive Quickest Finish	Looks “cheap” and not visually attractive

Some Final Notes on Basement Finish Materials - My Opinions:

- **Removable is preferred over Permanent finishes.**
- **Non-Sacrificial is preferred over Sacrificial finishes.**
- **Full Drainage system should be installed to control water.**
- **Full foundation drainage/protection should be installed and fully sealed.**
- **Carpeting should be avoided on floors** *(except on insulated or heated floor slabs)*.

ALWAYS USE DEHUMIDIFIERS AND MONITOR FOR ANY SIGNS OF MOISTURE IN ALL BASEMENTS

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Chart of Potential Hidden Problems in Finished Basements

Problem	Potential Signs
Moisture/Water Issues	Mold or mildew growth Dampness or musty smell Peeling paint or wallpaper Condensation on windows Water stains on walls or ceilings Excessive insects in basement areas
Poor Insulation	Drafts Uneven temperatures High energy bills Condensation on windows/surfaces
Inadequate Ventilation	Mold or mildew growth Musty/"damp" smells Condensation on windows/cold surfaces Discomfort
Structural Issues	Cracks in walls or floors Uneven floors Bowing walls Sagging ceilings Sags in visible beams/framing
Pest Infestation	Signs of rodents or insects Droppings Damage to wood Unusual noises NOTE: *TERMITES ARE USUALLY HIDDEN BY FINISHES AND DIFFICULT TO FIND IN FINISHED BASEMENTS.* See our Termite Tip Sheet online: TERMITE TIP SHEET
Radon	No visible signs - **requires testing** *(more likely in areas with ledge outcroppings and in basements with cracked or jointed foundations)*
Asbestos	No visible signs - **requires testing** *Clearly visible asbestos-like or possibly asbestos containing materials need testing to determine asbestos content.*
Mold	Discolorations or "fuzzy" areas on surfaces *Mold growths often occur BEHIND finishes and in inaccessible areas where moisture accumulates. Testing (air or samples taken from the site) is required to confirm a growth is actually mold.* *(But remember: ALL growths on surfaces ARE BAD!)*