INSULATION SYSTEMS

Thanks very much to the cellulose supply industry who have highlighted all the deficiencies and myths of fibreglass insulation. This is what we have been seeing for a long while and now finally the anecdotal examples are being truly quantified with real tests.

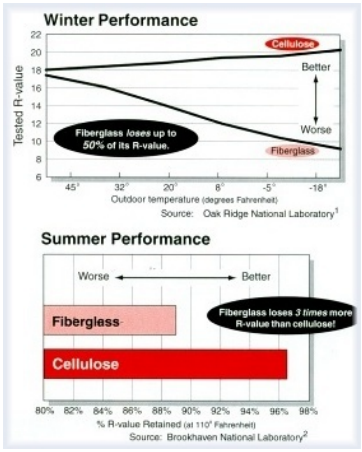
Bottom line is get air out of wall and roof systems and occupy the space with solids. You can do your own research. Start by Googling "fibreglass insulation air content"

Action summary is simple: Get the air out of insulation systems; use insulating materials that are hydrophobic; Use insulating materials that will not support mould even if they get wet; Use materials that do not off-gas; Use materials that do not loose R-value over time; Use cost effective insulation when calculated on $ per R value per ft2.

SIP's with EPS foam cores offer all of the above as well as improved job site labour, strength and stability, and decreased site waste, and improved (guaranteed no drywall cracking for SIP walls). Get all the R value that is claimed.

Conclusions from readings of Scientific Facts on Fiberglass Insulation

1. Air is a great insulator, which fibreglass relies on trapping in still air conditions.



2. Air motion within a fibreglass insulated wall and roof cavity is necessary to avoid building rot -as sited in leaky condo conditions.

3. Air motion within the wall or roof can loose more than 50% insulation not including framing losses.

4. Analytical software does not account for R value losses due to air motion within walls and roof systems.

5. Air motion cannot be quantified by analytical software since variables of air tightness vary greatly from one system to another based on methods and quality of workmanship.

6. Formaldehyde is used by most fibreglass insulations. Reputable manufacturers claim it is dispersed soon after installation. We tend to agree with that since there is a lot of air moving through walls –WHICH is why fibreglass does not insulate as claimed. One also has to sympathise with fibreglass installers that have to battle not only the fines that fall out of fibreglass as it is installed, but the formaldehyde off-gassing at time of installation. And what about total VOC's net contribution?

7. Hermetic sealing of a fibreglass insulation cavity would be excellent –but not possible using current practices and would be cost impractical by any means.

8. Framing losses in most homes average about 50% of heat loss in an insulating system.

9. Wiring and any venting pipes or other objects in (see picture) → fibreglass walls and roofs are pathways and draft generators for air motion and condensation and rot.

10. Just 4% moisture can lower thermal efficiency, in that area, by up to 70%. Cellulose insulation fibres are also naturally "hygroscopic". This means they are very effective at absorbing and retaining moisture.

11. Any air channel larger than 1 centimetre is a path for the air pump to start working in a wall as the heat of the day comes on and the space warms up, voids become the path for air movement.

This Photo shows a home suffering from condensation in the ceiling from truss heels that were too shallow to insulate at the walls. Also discovered was the usual pathway of air travel along the wiring. This home was only 18 years old and another case in point of why our homes are averaging less than 50 years and less.

12. Only one source was readily found on the R value losses of fibreglass insulation when it is moistened and that was on a pipe insulation company supporting closed cell foams.
    Click on the following information paste or manually go to web page:

http://www.kflexusa.com/pdf/TA54_Effects_of_Moisture_on_Insulation_0408.pdf

Thermal Performance – Thermal performance is determined through test methods such as ASTM C177 or ASTM C518. Test samples are pre-conditioned and k-factors are determined using "dry" insulation. It is generally recognized that every 1% of water vapor intrusion into an insulation material may increase the thermal conductivity of the insulation by 7.5%. While fiberglass may have a better R-value than closed-cell insulation when no moisture is present, the comparison changes quickly when moisture is introduced.

Effect of Moisture on R-Value*						
	Moisture Content, % Wt.					
Material	**0**	**1**	**2**	**3**	**4**	**5****
Fiberglass***	4.3	4.0	3.7	3.5	3.2	3.0
Closed-cell	4.0	4.0	4.0	4.0	4.0	4.0

*Based on nominal 1" flat sheet. **5% is the industry established maximum moisture content for fiberglass. Actual moisture content can be much higher if the protective jacket is damaged.
*** Fiberglass initial R-value range is 3.6 – 4.3 depending upon product and manufacturer.

Information from the North American Insulation Manufacturers Association

INSULATION FACTS #26

NAIMA
North American Insulation Manufacturers Association

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Facts About Moisture and Fiber Glass Metal Building Insulation

Information from NAIMA

Unlike many other insulation products, fiber glass metal building insulation is often visible to the occupants of the building. Making sure that roofs and walls do not leak, that the product is clean and dry prior to installation, and that condensation is controlled after installation is critical to the insulation performance and to the building's interior aesthetics. Because of performance requirements, fiber glass metal building insulations are most frequently installed with a facing material laminated to the surfaces that may be visible. This facing serves several purposes:

- Provides vapor retarder protection to retard passage of water vapor through the insulation to cold surfaces where condensation can occur
- Protects the insulation from damage
- Provides light reflectivity
- Provides an aesthetic appearance

Fiber glass metal building insulation will provide long service life and optimum performance when a few simple precautions are followed. The insulation should be kept clean and dry prior to installation and applied only to clean and dry surfaces. Care should be taken to protect the insulation from the incursion of water during the installation process. If adequately designed, regular inspection and maintenance of the vapor retarder will protect the integrity of the system after installation.

Q What effect does moisture have on insulation performance?

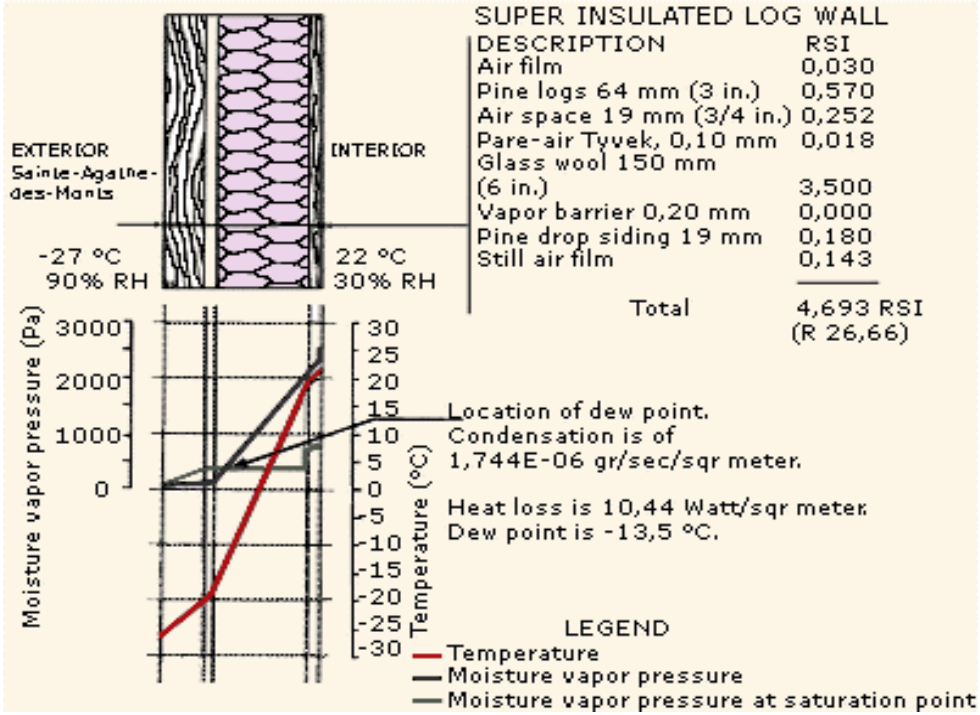
A Moisture from rain, ground water, humidity or other forms of condensation creates the potential for several problems in metal buildings. First, the presence of water (or ice) in the insulation seriously degrades the thermal performance and can degrade the effective service life of the insulation system. Second, water in contact with metals can contribute to corrosion and degrade the service life of the building. Third, collection of water can lead to dripping, staining, and other undesirable effects such as mold, mildew and odors, which degrade the building's intended service.

Q Should wet insulation be replaced?

A Yes. When fiber glass metal building insulation is exposed to storm waters or flood damage, the wet insulation should be removed and replaced since the water may carry with it any number of unknown contaminants.

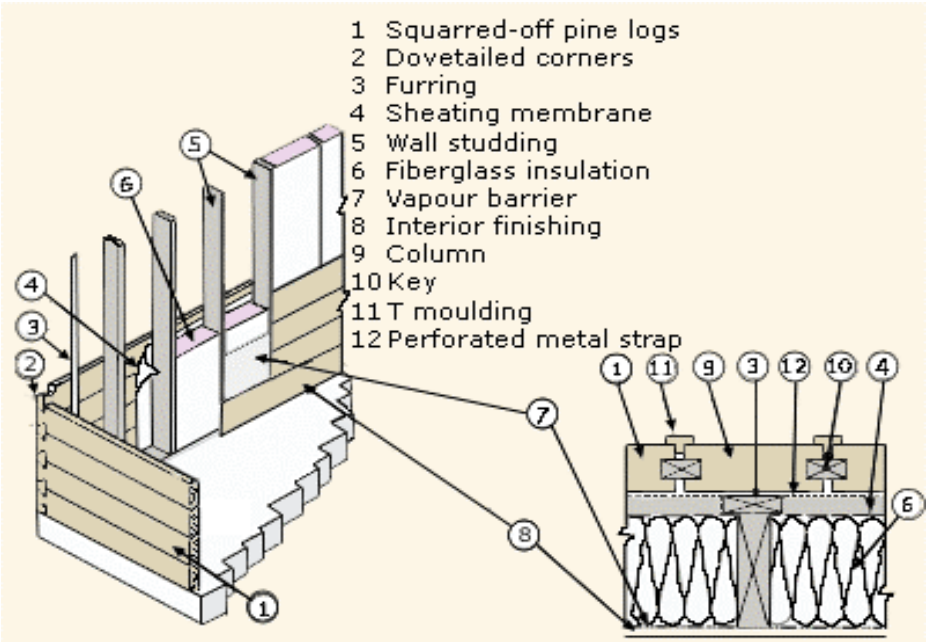
Although it is possible for the thermal and acoustical performance of fiber glass insulation to return if the material is allowed to completely dry out, there is no assurance that the drying method used will be effective. There is also no assurance that the forces acting on the wet insulation will not result in loss of thickness, or

The marketing department of this un-named company is giving insulation credit to the outside air, the log siding, the vented air space between the wall, and the inside air space as a film. These areas are non insulating -and the air films on the outside exist with zero wind and the inside if there is no ventilation moving the air. Furthermore they are not including the stud losses creating thermal bridging.



To the diagrams credit, this is a good technical example showing dew point location within the wall cavity and why solid foam in walls avoids this. The dew point occurs in a space that is majority air space (fibreglass or rock wool insulation). Building practices rightfully promote breathing of this space to outside since the condensation will occur within the wall cavity at the dew point -which brings us back to the catch 22 of fibreglass needing to trap air to insulate.

GET THE AIR OUT OF THE WALL WITH SIPS -SO SIMPLE. Really what is the net insulation in this space? One day it may be R14 after system effects occur & the next day with more air movement the insulation factor is much lower. Then what about when the fiberglass gets damp -it looses most of its insulation ability?



The other alternative to get more air out is to pack cellulose in the walls

Conveniently stud loss factors are not subtracted from the above insulation factor. There is some degree of air movement in this wall section and condensation as noted above is guaranteed -more so in summer months actually.

Good diagrams to show the challenges of a framed wall

On a good day with dry insulation and without thermal cycling within the wall (cycling occurs best on cold days with sunshine warming the outside of the wall) this assembly might be around R14