INTELLIGENT CONTROL OF RAIN - AIR- HEAT - VAPOUR

ARIDON®

SMART BUILDING SYSTEMS

ITS TIME OUR BUILDINGS EXPERIENCED A PARADIGM SHIFT - **ARIDON® SMART WALL**

Would you consider using the cell phone you had 20 years ago? Then why use building products from 20 years ago - when our life styles, climates and environments have changed?

The **ARIDON® SMART WALL** is the smart choice for every build – designed and developed for today's NZ environment.

INTELLIGENT CONTROL OF RAIN - AIR- HEAT - VAPOUR

ARIDON®

SMART BUILDING SYSTEMS

ISN'T IT TIME YOU DEMANDED BUILDING MATERIALS THAT COMPLIMENT YOUR DESIGN AND REDUCE YOUR RISK?

The **ARIDON® SMART WALL** System is a continuous layer of interlocking, rigid panels that wrap around the building frame, to form a weatherproof thermal shell. This shell acts as an intelligent control layer for the building – managing rain, air, vapour and heat movement through the building envelope.

This concept is recognised by international experts as "The Perfect Wall"- as it is the best way to minimise building envelope failure and provide a healthier, more energy efficient and sustainable building.

THE 2ND WAVE OF LEAKY HOMES IS HERE – INTERSTITIAL CONDENSATION – ENSURE YOUR DESIGN IS PROTECTED.

Leaky homes are commonly known to leak from the outside in – the disaster that hit our building trade in the 90's was largely addressed with the introduction of a Risk Matrix assessment of the building envelope and use of claddings with a drainage cavity in higher risk scenarios. However – the second wave of leaky homes is just coming to the surface – leaky homes caused by Interstitial Condensation - the same phenomena experienced in Canada. This 2nd wave of leaky homes emerging in colder NZ climates could be even more detrimental than the first wave of leaky homes, as it can only be seen once the mould and mildew has become established and the air contaminated.

Water vapour in the wall frame is not a problem in itself. Most walls are constructed from organic materials which are best kept in conditions which are healthy for humans. The problem occurs when water vapour meets cold surfaces (thermal bridges) or cold air and condensation (dew) forms. The term used to define when this occurs is the dew point.

This condensed water can then travel down through the wall assembly – often ending up in areas far removed from the original source. This moisture then causes rot, mildew and dampness to form within the wall and is much more difficult to remove than the original water vapour.

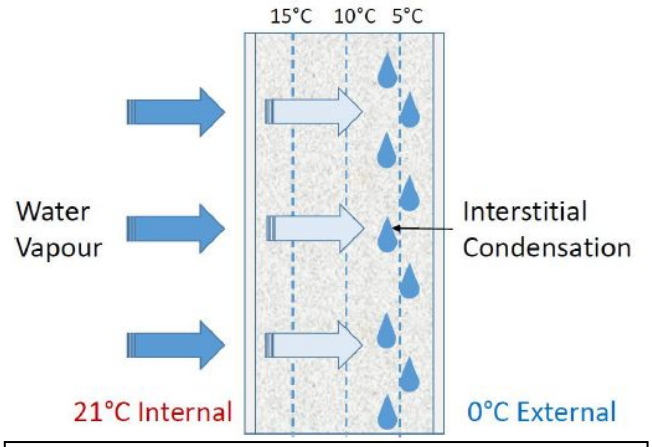


Figure 1: Section through an external wall illustrating the Dew Point. The drops show where the mould might grow within your wall.

Interstitial Condensation reduces insulation performance and causes fabric deterioration. If the relative humidity levels in the building exceed 70% for prolonged periods, there is a high probability that the condensation occurring on cold surfaces will lead to mould growth. This can seriously affect the quality of the air for the occupants and mould spores can have a detrimental effect on human respiratory system and with 1 in every 6 adults and 1 in every 4 children in NZ suffering from asthma - this emphasises the importance of managing condensation in building fabric.

The safest way to prevent condensation forming in wall cavities is to keep the wall frame and cavity warm, and ensure the dew point does not sit within the wall fabric (dry zone of the building envelope). The ARIDON® SMART WALL system wraps the building frame in a thermal weatherproof shell – (eliminating thermal bridging) which maintains the wall cavity at a temperature very similar to that of the room itself. The theoretical dew point of the SMART WALL system is near the exterior face (wet zone side) of the panel – exactly where it should be!

Check out some independent WUFI modelling demonstrating the superior long term performance of the ARIDON® Smart Wall system versus traditional building systems – you may be a little shocked at the results. It's also a gentle reminder that design and construction in colder climates should not replicate the successful techniques used in warmer climates. http://www.aridon.co.nz/vapour-condensation-control

ARIDON®
SMART BUILDING SYSTEMS

WUFI BIO-MODELLING: REPORT CONTENTS

- **QUEENSTOWN:**
  - Wall Construction: 140mm Framing +Cedar weatherboards + Building wrap + R4.0 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 900mm Framing +Cedar weatherboards + Building wrap + R2.8 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + ARIDON® SMART WALL + Plasterboard
- **CHRISTCHURCH:**
  - Wall Construction: 140mm Framing +Cedar weatherboards + Building wrap + R4.0 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + Building wrap + R2.8 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + ARIDON® SMART WALL + Plasterboard
- **WELLINGTON:**
  - Wall Construction: 140mm Framing +Cedar weatherboards + Building wrap + R4.0 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + Building wrap + R2.8 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + ARIDON® SMART WALL + Plasterboard
- **TAUPO:**
  - Wall Construction: 90mm Framing +Cedar weatherboards + Building wrap + R2.8 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + ARIDON® SMART WALL + Plasterboard
- **HAMILTON:**
  - Wall Construction: 90mm Framing +Cedar weatherboards + Building wrap + R2.8 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + ARIDON® SMART WALL + Plasterboard
- **AUCKLAND:**
  - Wall Construction: 90mm Framing +Cedar weatherboards + Building wrap + R2.8 Fibreglass cavity insulation + Plasterboard
  - Wall Construction: 90mm Framing +Cedar weatherboards + ARIDON® SMART WALL + Plasterboard

The experienced ARIDON® SMART WALL team are more than happy to discuss any future designs with you and your practice – including WUFI Modelling and customised R value calculations

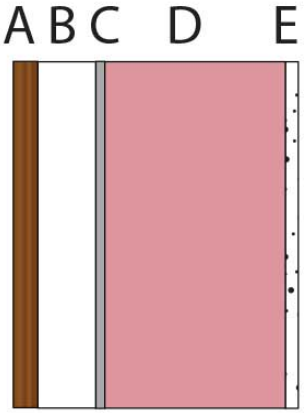
Phone: 0800 ARIDON (274-366) or info@aridon.co.nz

QUEENSTOWN:140MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R4.0 GLASS FIBRE CAVITY INSULATION

Product	EWT10
Date	15.04.13
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.14	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1694	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.19

R-Value [m^2K/W] 3.64

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	QTN, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

QUEENSTOWN: 140MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R4.0 GLASS GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

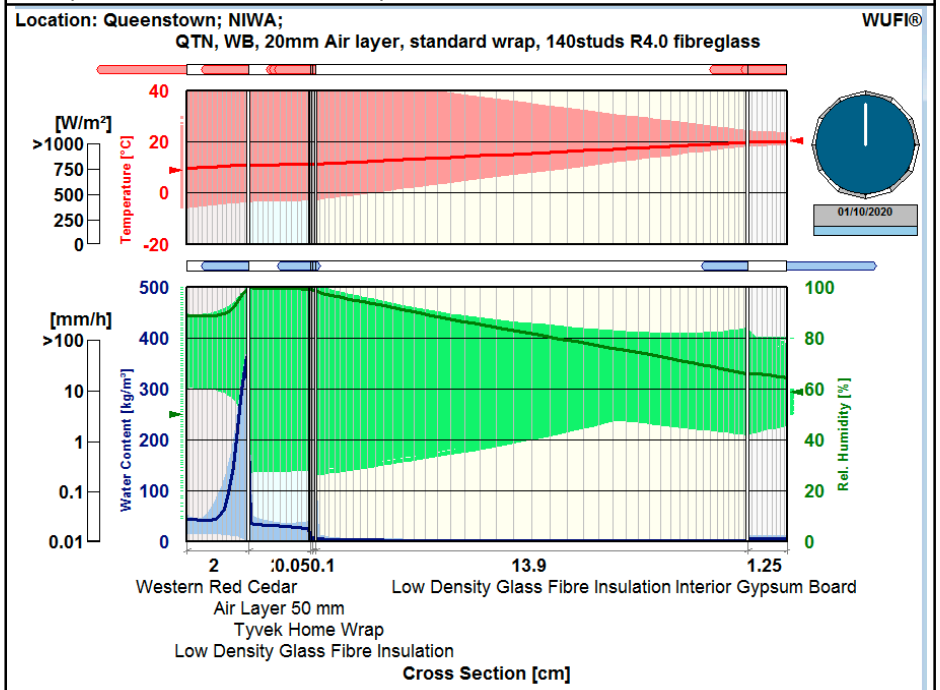


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 23°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Insulation, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

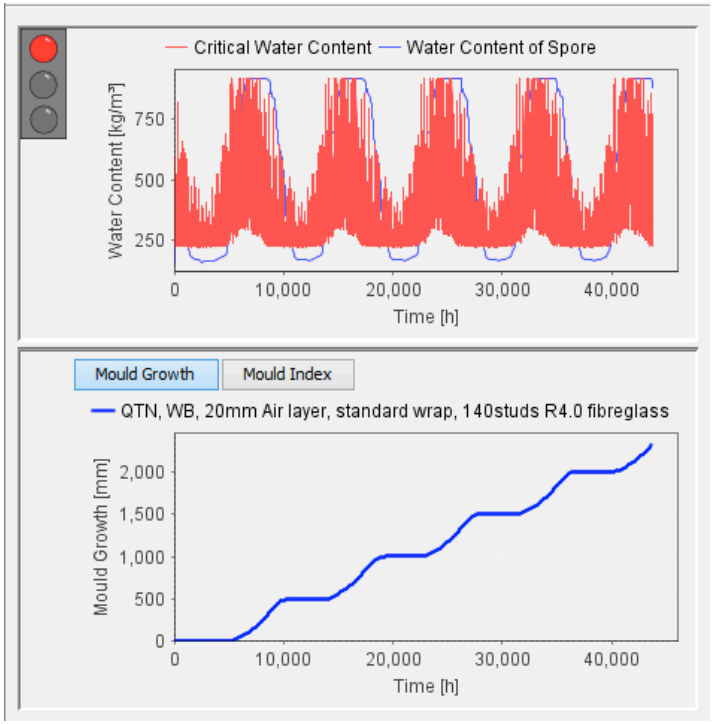


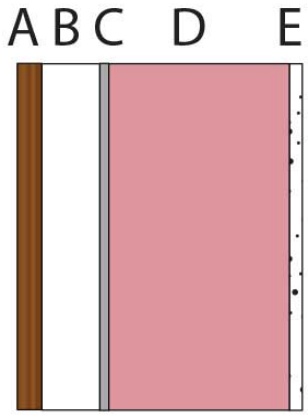
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Insulation, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is at high risk of mould growth and long term moisture loads in between the layers are likely.**

QUEENSTOWN: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

Product	EWT08
Date	15.04.13
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.09	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1089	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.14

R-Value [m^2K/W] 2.48

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	QTN, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

QUEENSTOWN: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

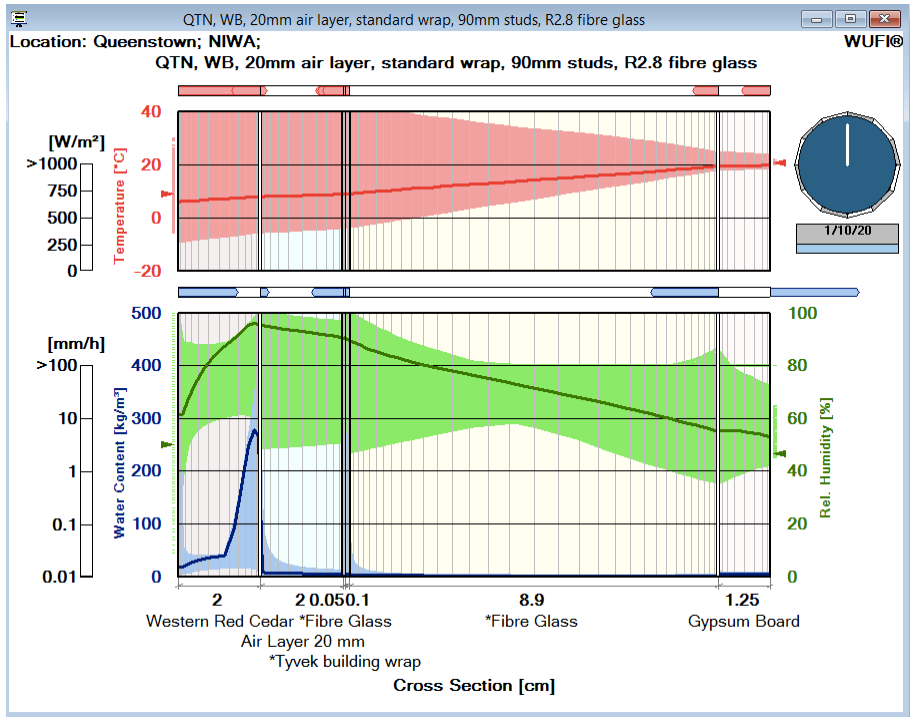


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 23°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Insulation, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

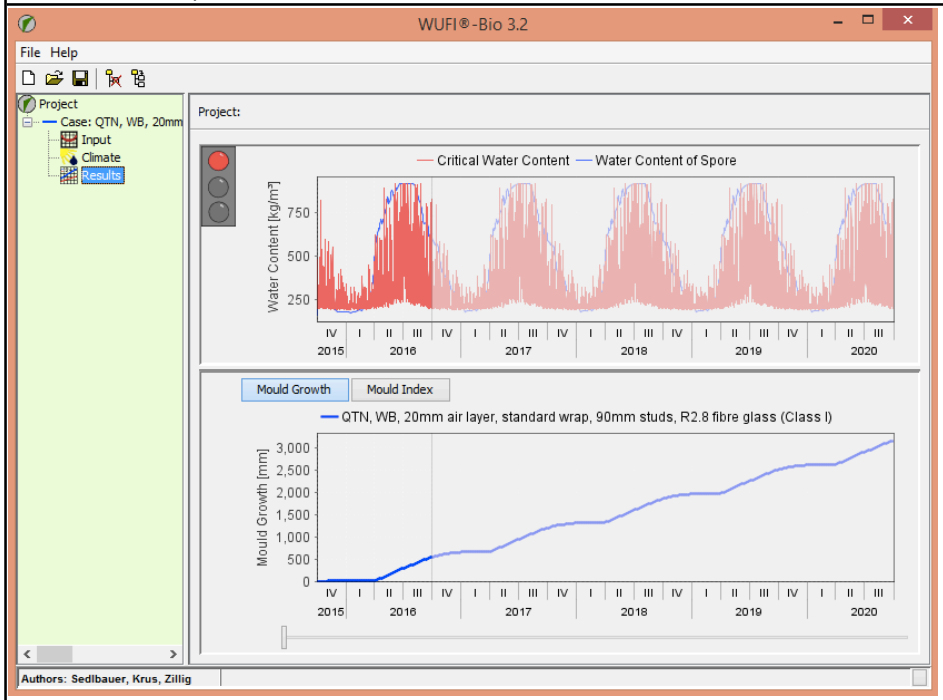


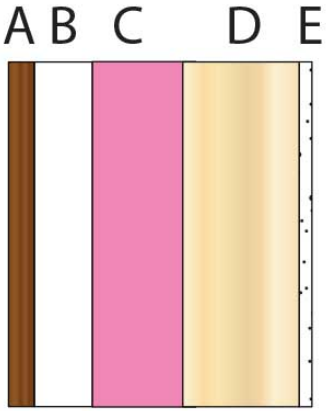
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 1 for the Glass Fibre Insulation, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is at high risk of mould growth and long term moisture loads in between the layers are likely.**

QUEENSTOWN - 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

Product	EWT06
Date	15.04.09
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.06	ARIDON	0.04	21.16	32	1500	0.168	0.95
D	0.09	Air layer	0.28	0.32	1.3	1000	0.0288	1
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.20

R-Value [m^2K/W] 2.06

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	QTN, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

QUEENSTOWN - 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

GREEN LIGHT - GO

WUFI Animation results

Temperature, Rel. Humidity and Water Content

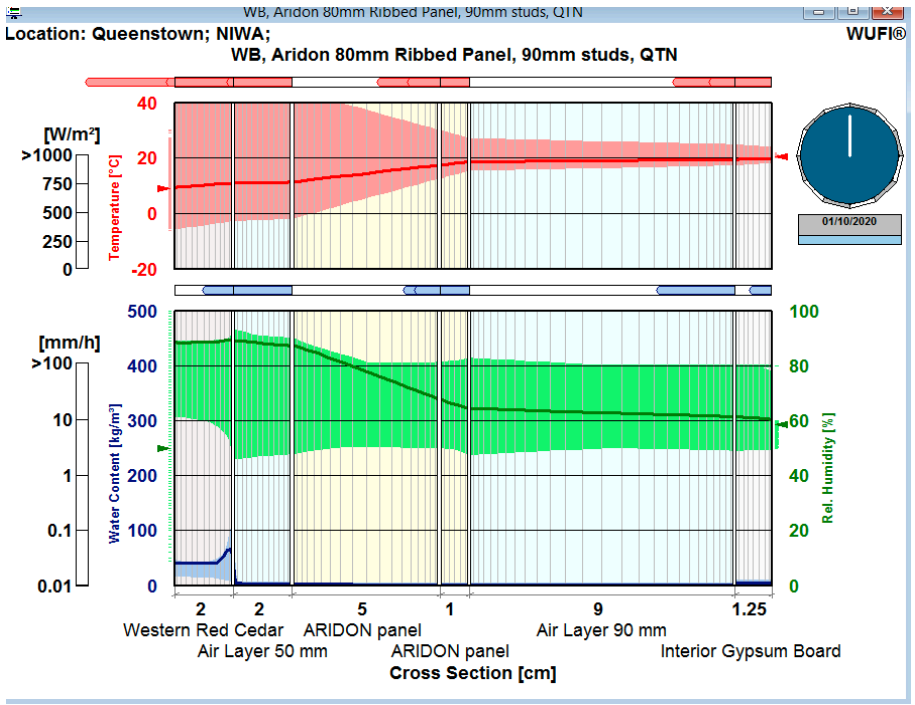


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 23°C. The RH is shifting between 50 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Aridon layer and the Air layer (inside), where there is a minor change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

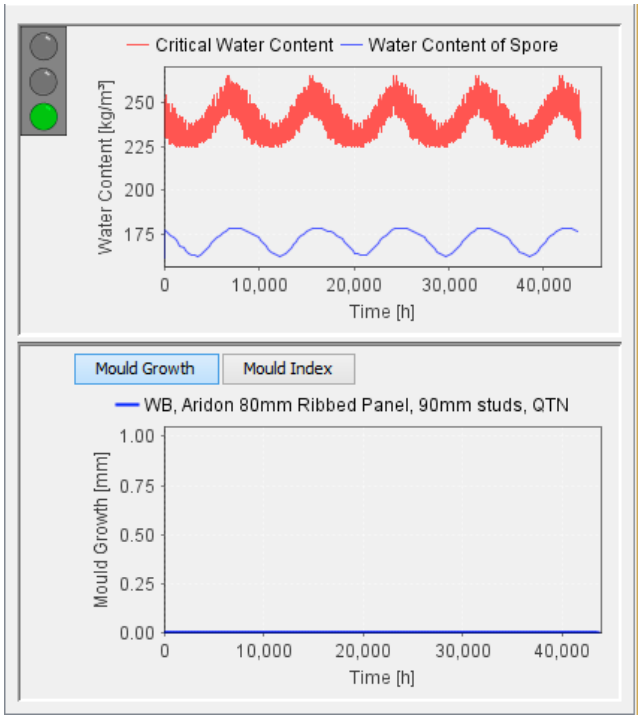


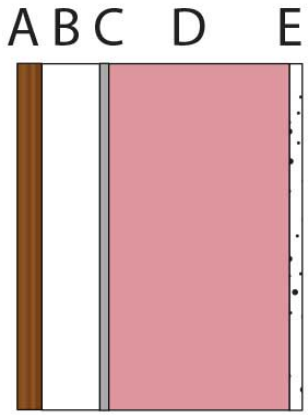
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Aridon panel, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is green, therefore the construction is predicted to be effectively free of mould growth and short term moisture loads are evaporated.**

CHRISTCHURCH: 140MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R4.0 GLASS FIBRE CAVITY INSULATION

Product	EWT09
Date	15.04.13
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.14	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1694	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.19

R-Value [m^2K/W] 3.64

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	CHC, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

CHRISTCHURCH: 140MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R4.0 GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

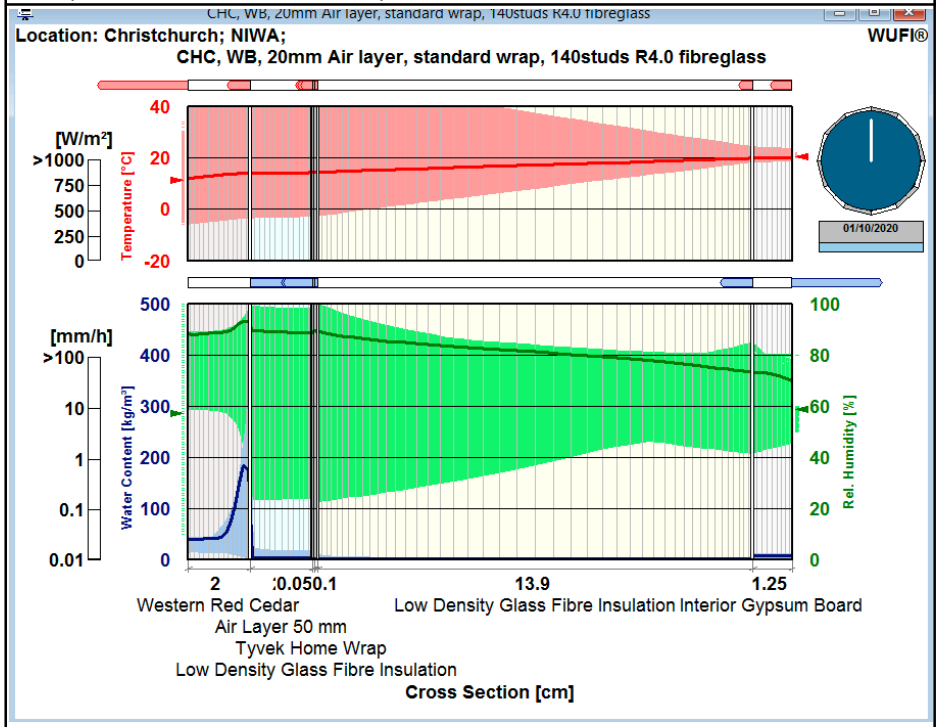


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 23°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Insulation, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

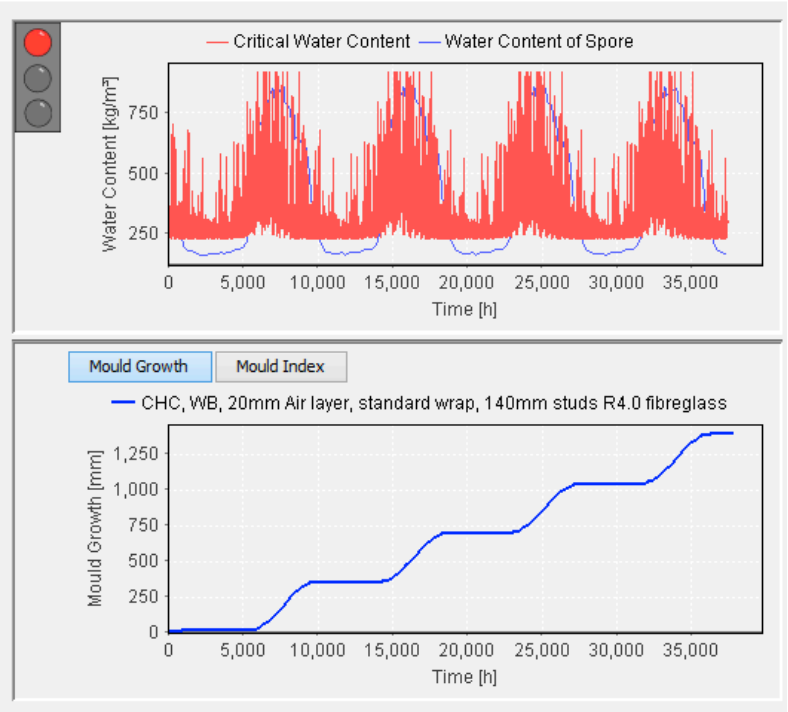


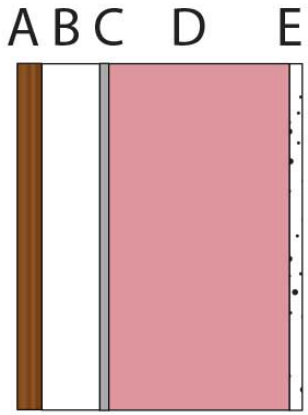
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Insulation, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is at high risk of mould growth and long term moisture loads in between the layers are likely.**

CHRISTCHURCH - 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & 2.8 GLASS FIBRE CAVITY INSULATION

Product	EWT07
Date	15.04.13
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.09	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1089	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.14

R-Value [m^2K/W] 2.48

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	CHC, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

CHRISTCHURCH - 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & 2.8 GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

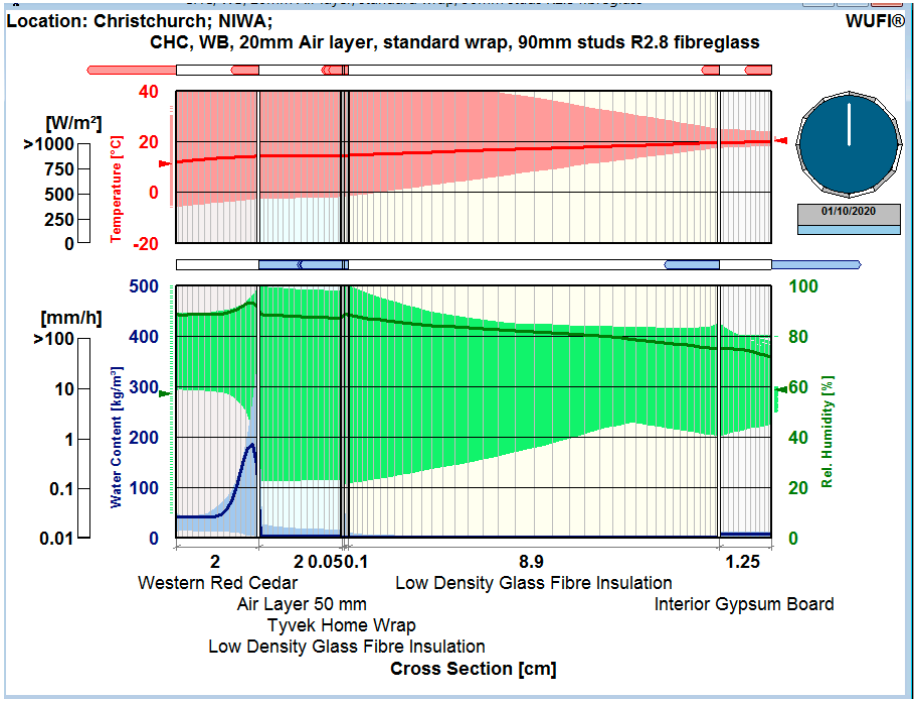


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 23°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Insulation, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

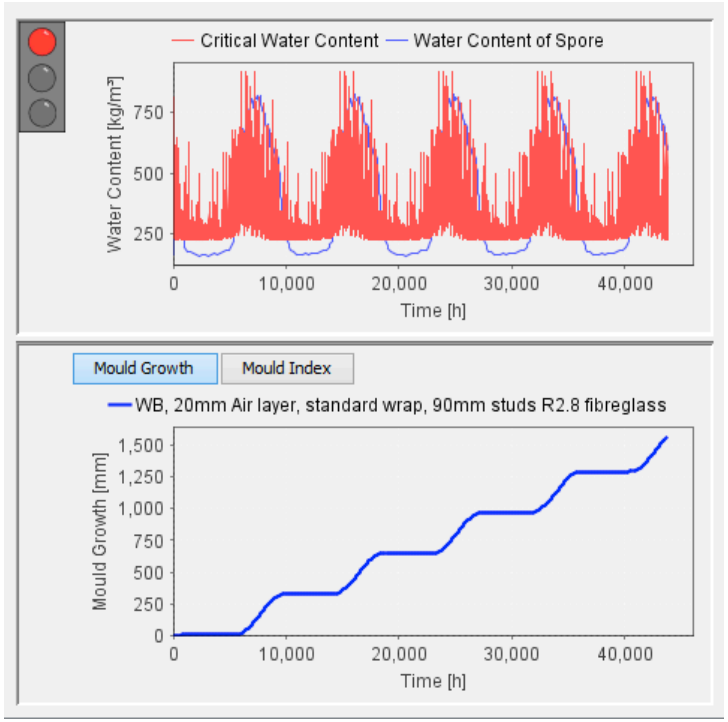
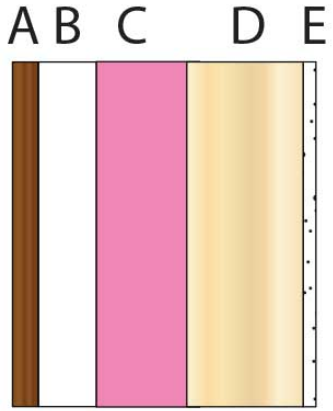


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Insulation, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is at high risk of mould growth and long term moisture loads in between the layers are likely.**

CHRISTCHURCH - 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

Product	EWT05
Date	15.04.13
Source/client	Aridon
Calcs By	DG



WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction

WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.06	ARIDON	0.04	21.16	32	1500	0.168	0.95
D	0.09	Air layer	0.28	0.32	1.3	1000	0.0288	1
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.20

R-Value [m^2K/W] 2.06

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	CHC, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

CHRISTCHURCH - 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

GREEN LIGHT - GO

WUFI Animation results

Temperature, Rel. Humidity and Water Content

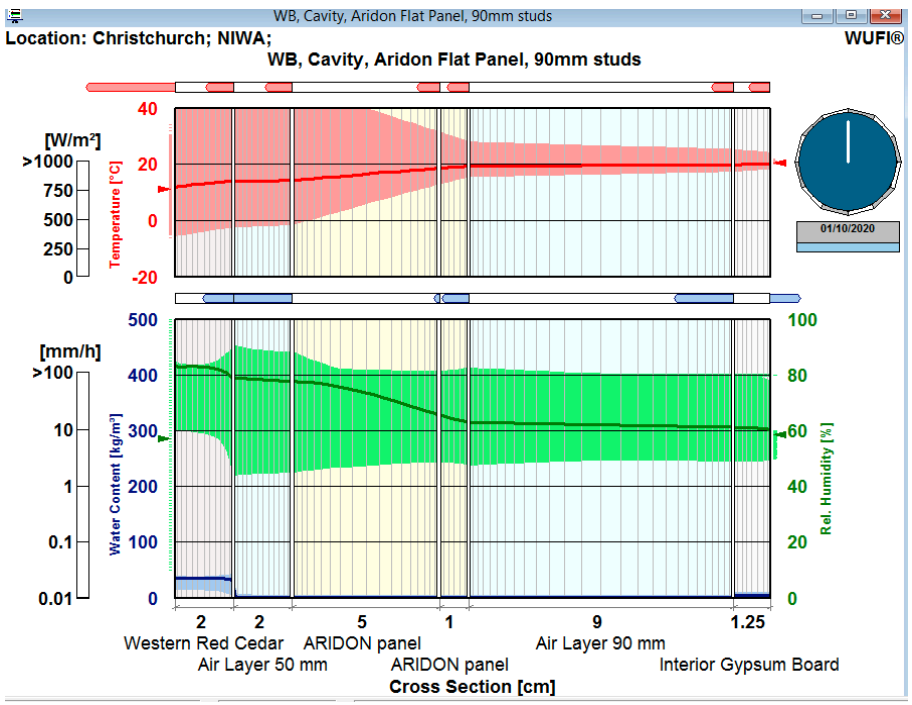


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 23°C. The RH is shifting between 50 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Aridon layer and the Air layer (inside), where there is a minor change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

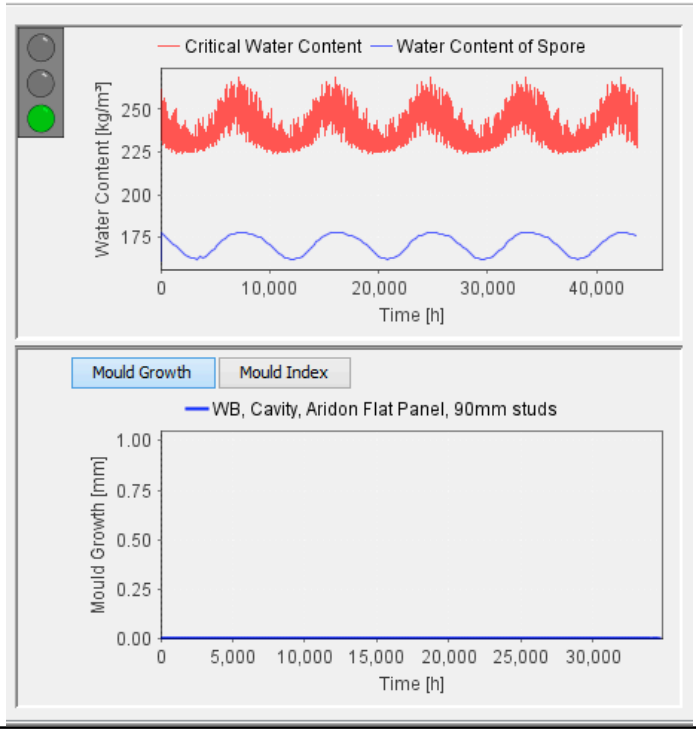


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Aridon panel, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is green, therefore the construction is predicted to be effectively free of mould growth and short term moisture loads are evaporated.**

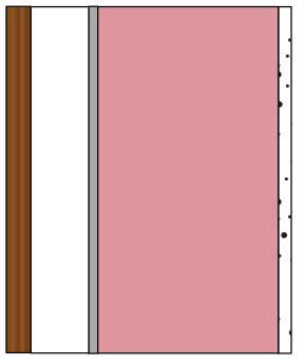
WELLINGTON: 140MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R4.0 GLASS FIBRE CAVITY INSULATION

ZED

Product EWT17
15.04.14
Aridon

Calcs By DG

A B C D E



WUFI Simulation Technical Sheet:
External wall, Timber Stud Construction

WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.14	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1694	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.19

R-Value [m²K/W] 3.64

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	WGT, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

WELLINGTON: 140MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R4.0 GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

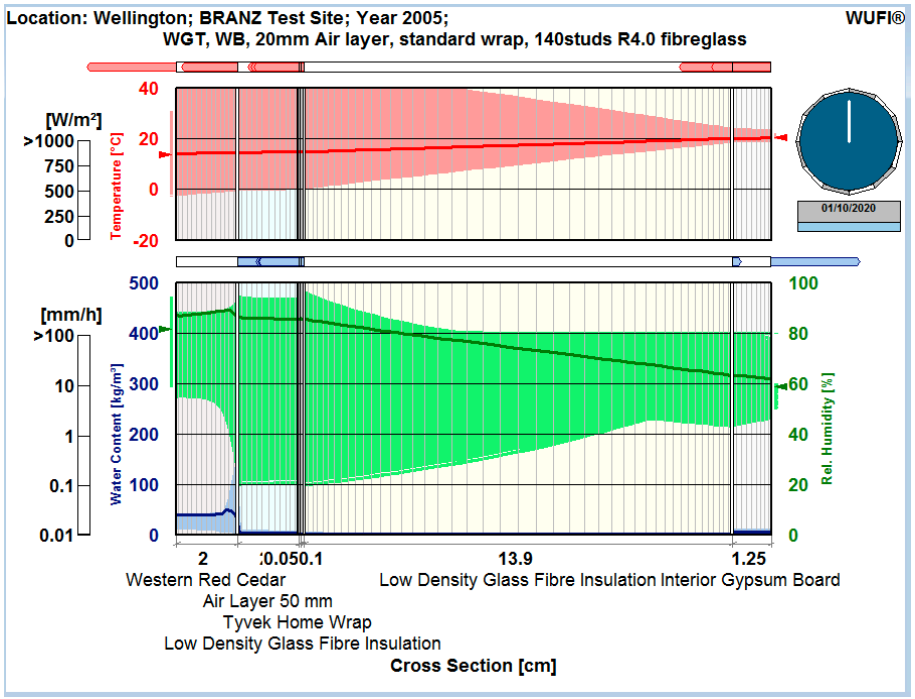


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Insulation, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

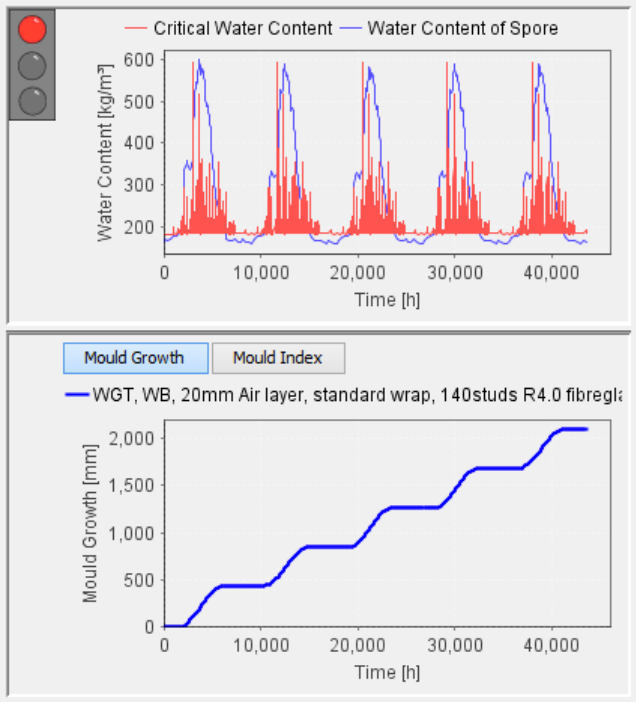
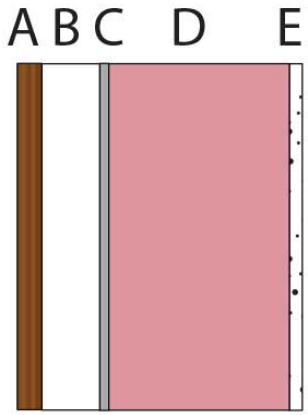


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Insulation, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is at high risk of mould growth and long term moisture loads in between the layers are likely.**

WELLINGTON: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

Product	EWT16
Date	15.04.14
Source/client	Aridon
Calcs By	DG



WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction

WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.09	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1089	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m]	0.14
R-Value [m²K/W]	2.48

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	WGT, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

WELLINGTON: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

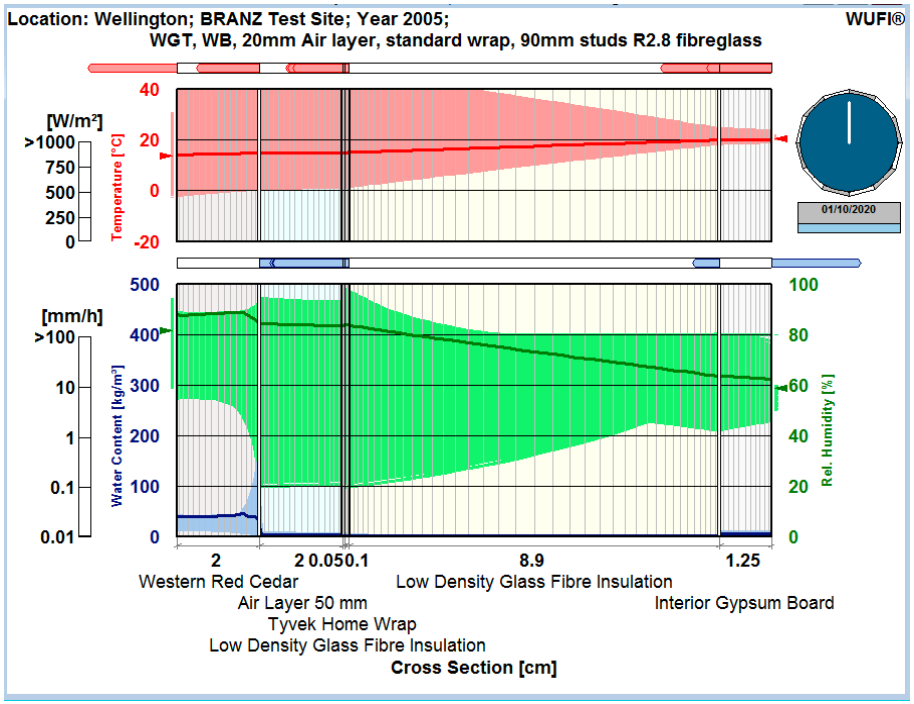


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Insulation, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

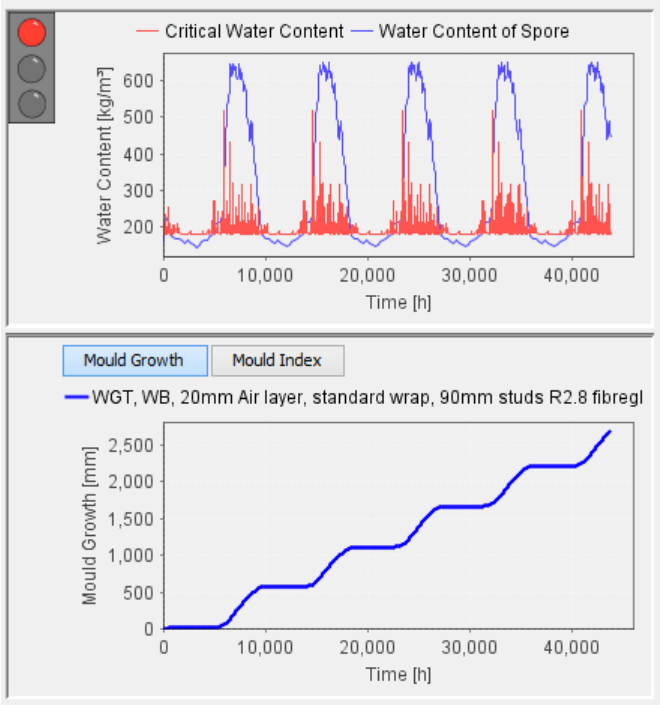


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Insulation, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is at high risk of mould growth and long term moisture loads in between the layers are likely.**

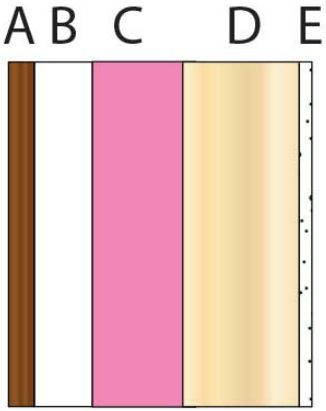
WELLINGTON - 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

2ZED

Product	EWT15
Date	15.04.14
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.06	ARIDON	0.04	21.16	32	1500	0.168	0.95
D	0.09	Air layer	0.28	0.32	1.3	1000	0.0288	1
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.20

R-Value [m^2K/W] 2.06

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	WGT, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

WELLINGTON - 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

GREEN LIGHT - GO

WUFI Animation results

Temperature, Rel. Humidity and Water Content

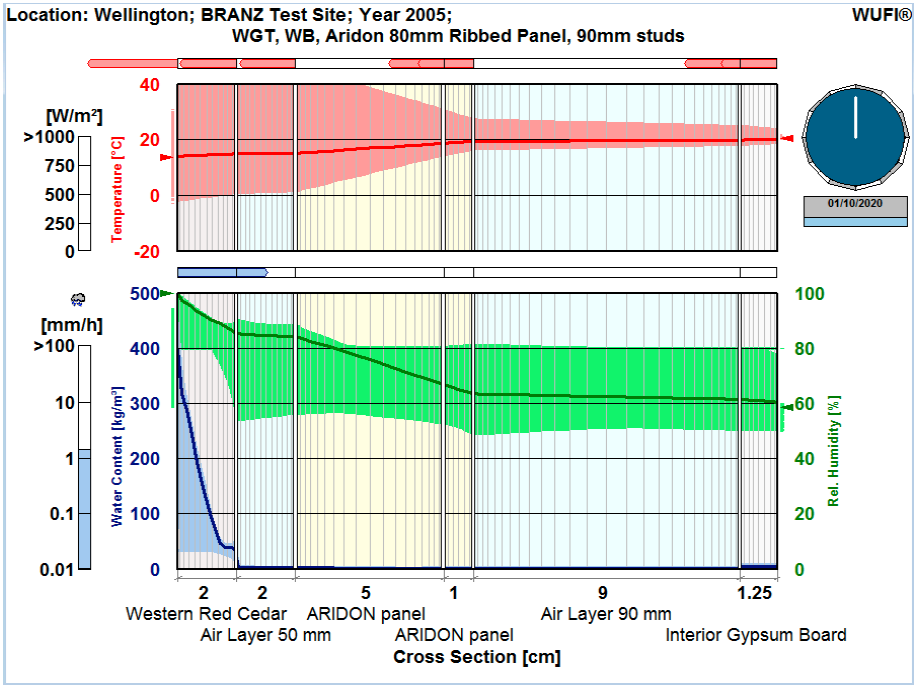


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 50 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Aridon layer and the Air layer (inside), where there is a minor change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

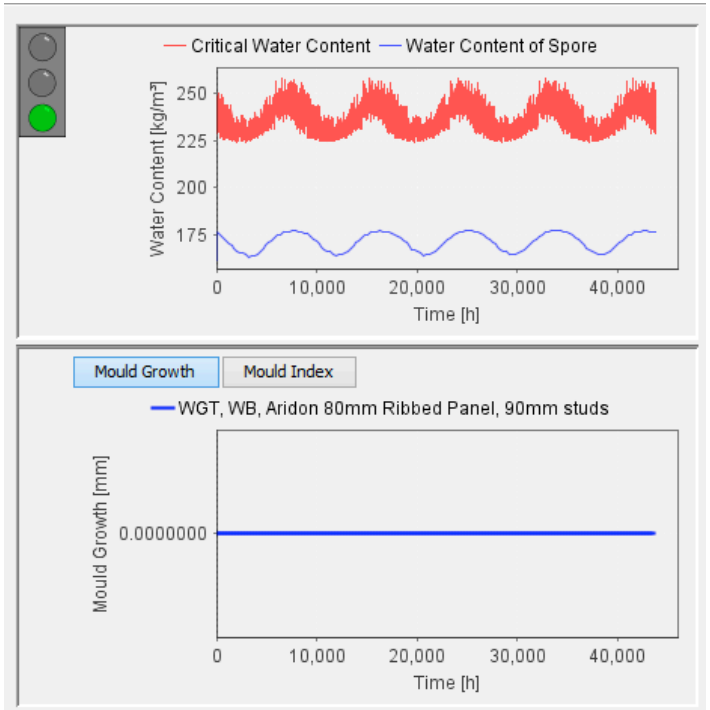
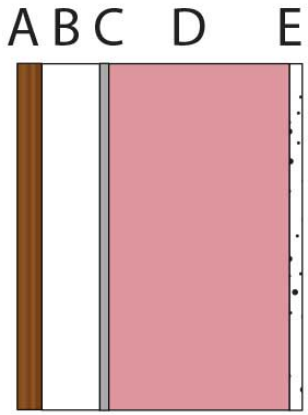


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Aridon panel, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is green, therefore the construction is predicted to be effectively free of mould growth and short term moisture loads are evaporated.**

TAUPO: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

Product	EWT19
Date	15.04.14
Source/client	Aridon
Calcs By	DG



WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction

WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.09	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1089	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.14

R-Value [m^2K/W] 2.48

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	RTR (Taupo), NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

TAUPO: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION
RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

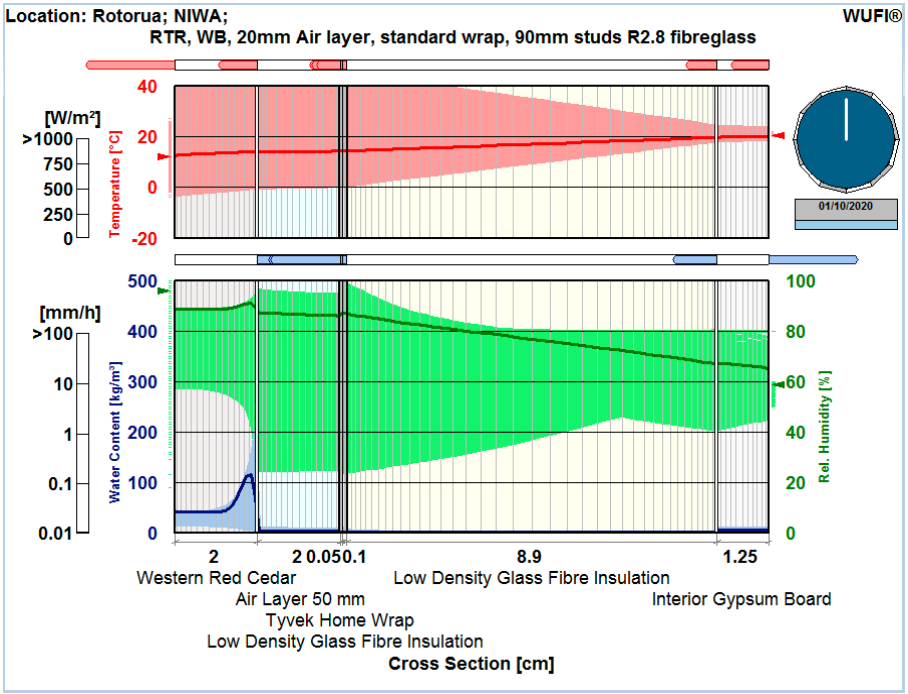


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Batt, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

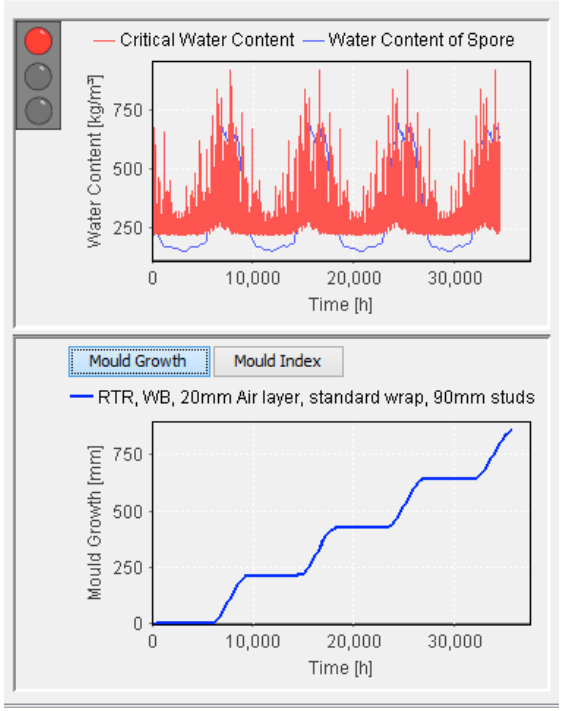
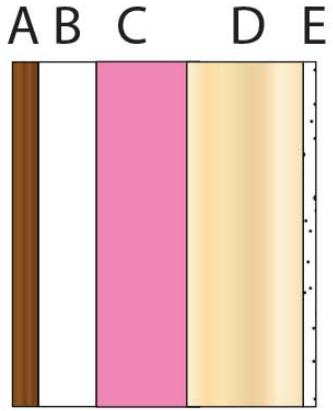


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Batt, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is of mould growth and long term moisture loads in between the layers are existing.**

TAUPO: 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

Product	EWT18
Date	15.04.14
Source/client	Aridon
Calcs By	DG



WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction

WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.06	ARIDON	0.04	21.16	32	1500	0.168	0.95
D	0.09	Air layer	0.28	0.32	1.3	1000	0.0288	1
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.20

R-Value [m^2K/W] 2.06

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	RTR (Taupo), NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

TAUPO: 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

GREEN LIGHT - GO

WUFI Animation results

Temperature, Rel. Humidity and Water Content

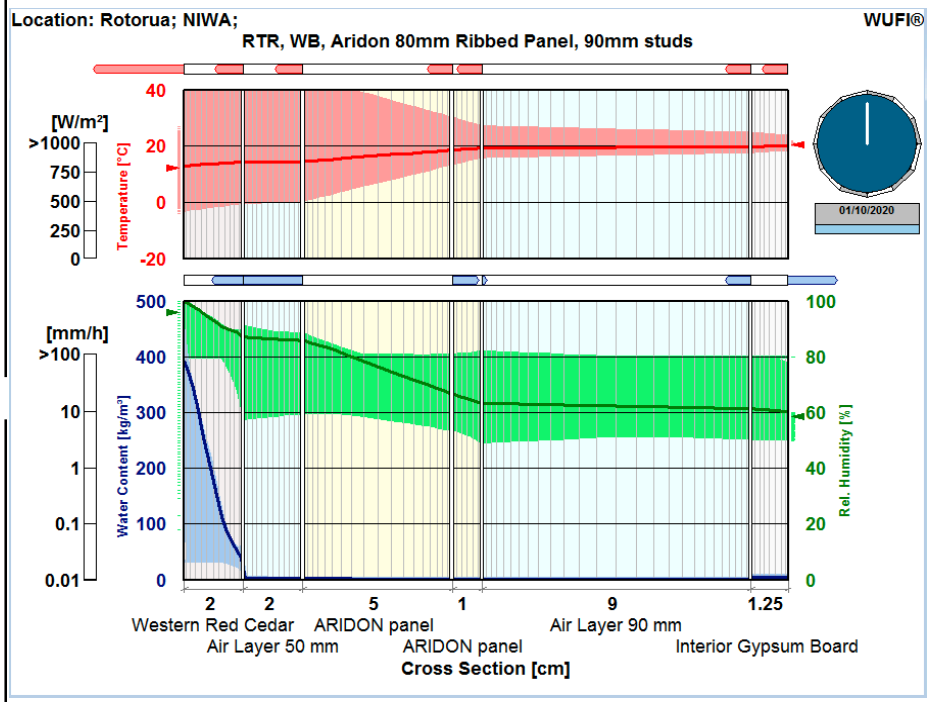


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 50 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Aridon layer and the Air layer (inside), where there is a minor change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

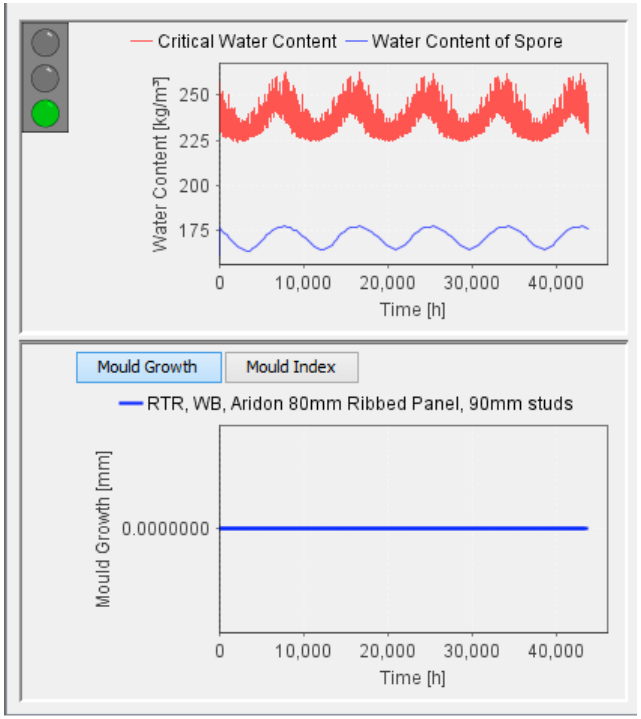


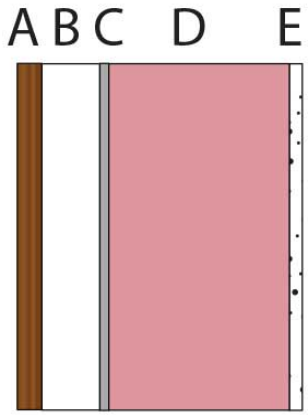
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Aridon panel, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is green, therefore the construction is predicted to be effectively free of mould growth and short term moisture loads are evaporated.**

HAMILTON: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

Product	EWT22
Date	15.04.14
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.09	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1089	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.14

R-Value [m^2K/W] 2.48

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	RKR (Hamilton), NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

HAMILTON: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

RED LIGHT - STOP

WUFI Animation results

Temperature, Rel. Humidity and Water Content

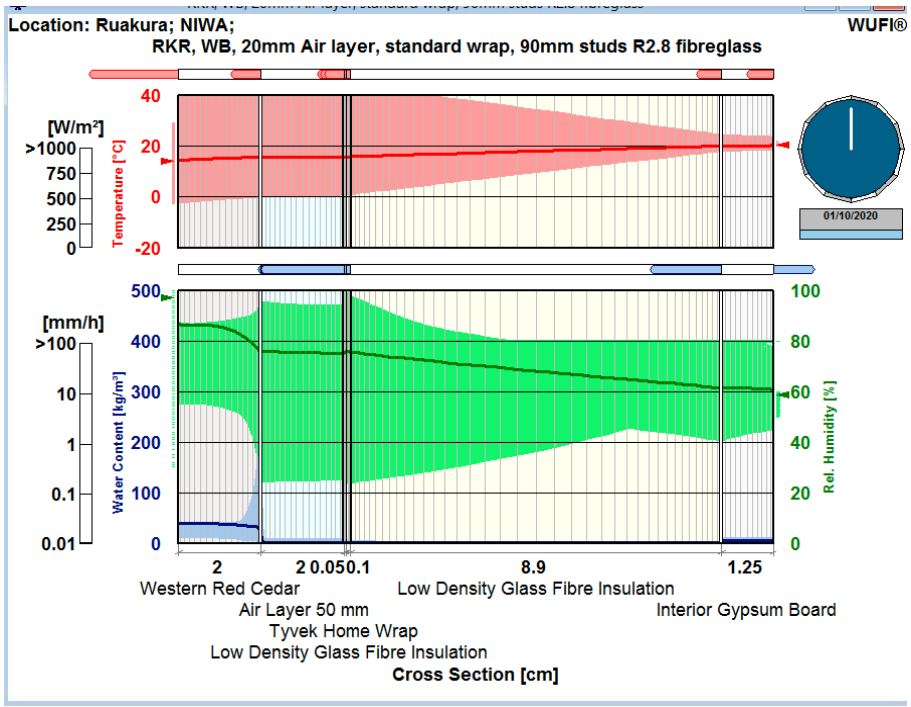


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Batt, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

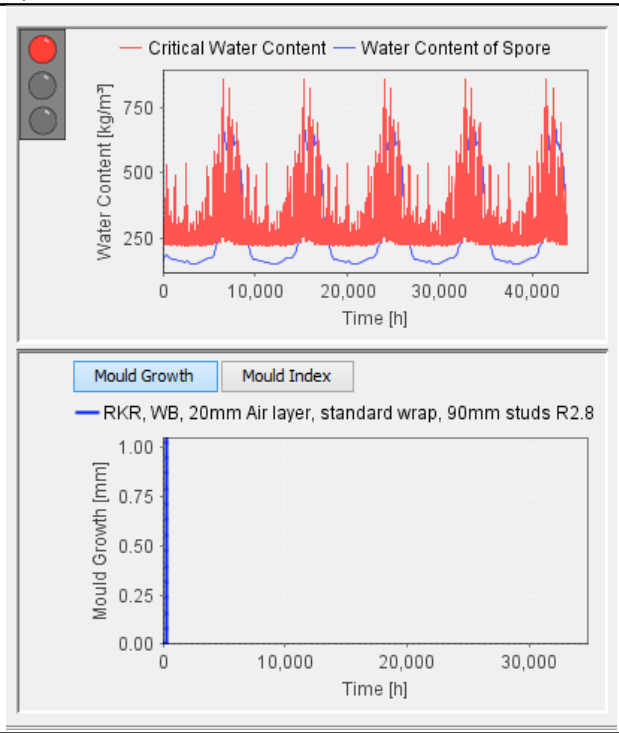


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Batt, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is red, therefore the construction is of mould growth and long term moisture loads in between the layers are existing.**

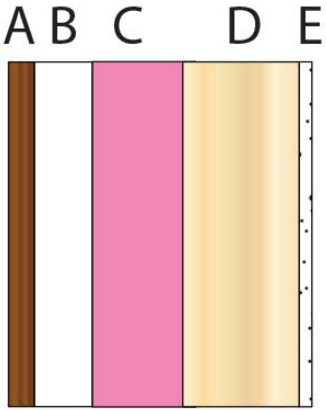
HAMILTON: 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

2ZED

Product	EWT21
Date	15.04.14
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.06	ARIDON	0.04	21.16	32	1500	0.168	0.95
D	0.09	Air layer	0.28	0.32	1.3	1000	0.0288	1
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.20

R-Value [m^2K/W] 2.06

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	RKR (Hamilton), NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

HAMILTON: 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

GREEN LIGHT - GO

WUFI Animation results

Temperature, Rel. Humidity and Water Content

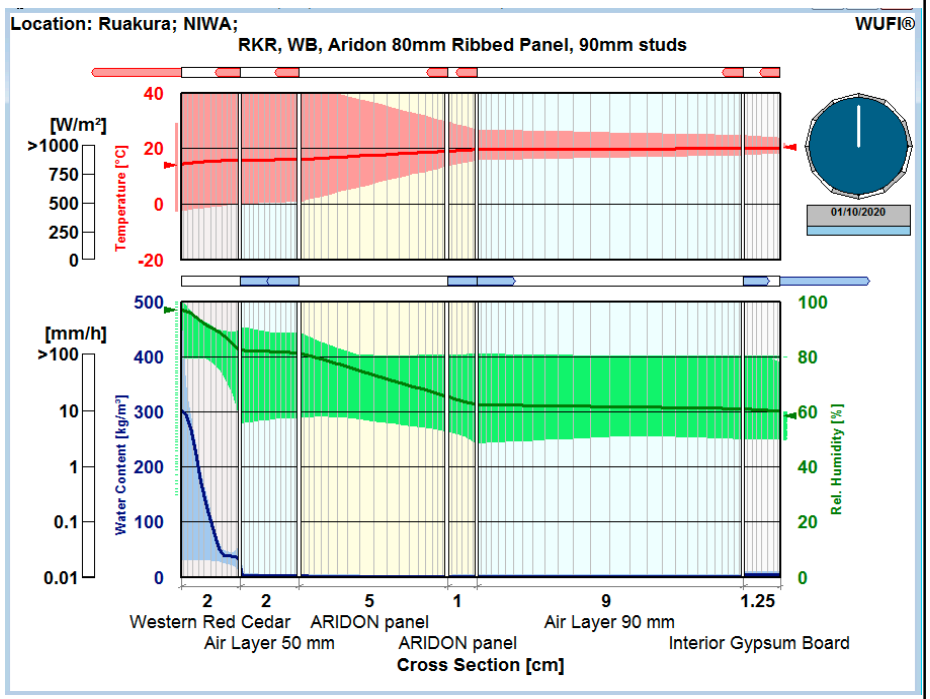


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 50 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Aridon layer and the Air layer (inside), where there is a minor change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

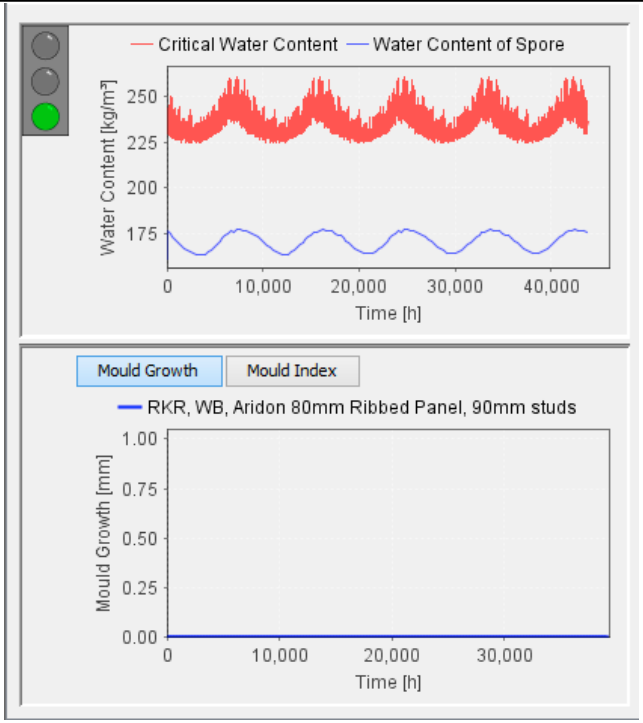


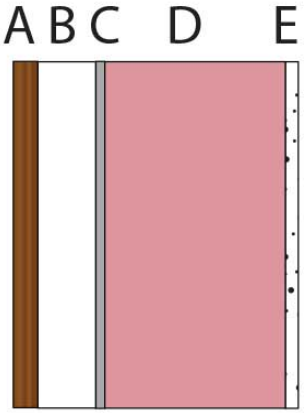
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Aridon panel, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is green, therefore the construction is predicted to be effectively free of mould growth and short term moisture loads are evaporated.**

AUCKLAND: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

Product	EWT25
Date	15.04.14
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.0005	Tyvek building wrap	12	129.5	280	1500	0.06475	0.001
D	0.09	Glass Fibre Insulation	0.043	1.21	8.8	840	0.1089	0.999
E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.14

R-Value [m^2K/W] 2.48

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	AKL, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

AUCKLAND: 90MM FRAMING: CEDAR WEATHERBOARDS & BUILDWRAP & R2.8 GLASS FIBRE CAVITY INSULATION

YELLOW LIGHT - AT RISK

WUFI Animation results

Temperature, Rel. Humidity and Water Content

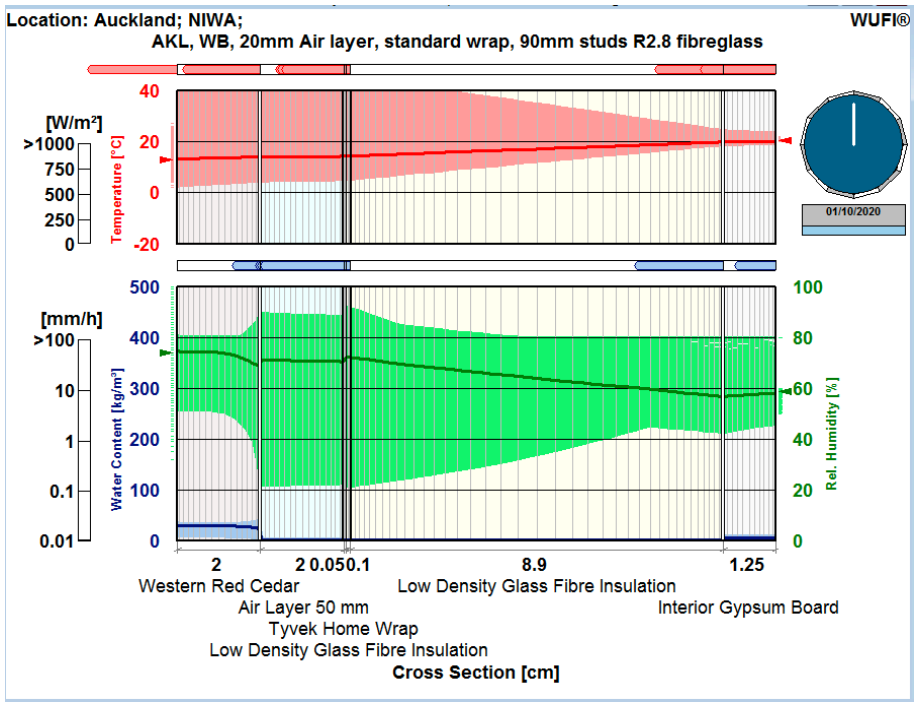


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 45 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Tyvek building wrap and the Glass Fibre Batt, where there is a distinct change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

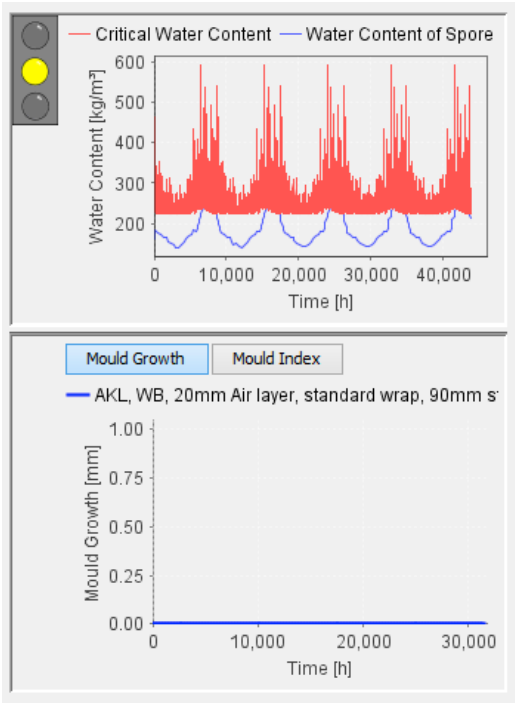


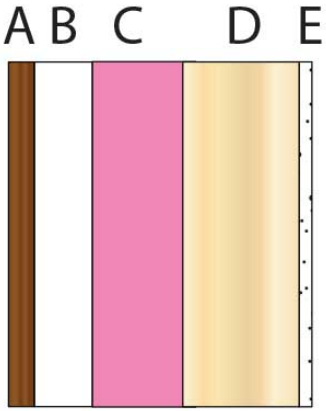
Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Glass Fibre Batt, because it is defined as a less bio-utilizable substrate for mould growing. **For this construction the signal light is yellow, therefore the construction is at risk of mould growth and short term moisture loads in between the layers are apparent.**

AUCKLAND: 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

Product	EWT24
Date	15.04.14
Source/client	Aridon
Calcs By	DG

WUFI Simulation Technical Sheet:

External wall, Timber Stud Construction



WUFI Thermal performance material properties

Layer	Thickn. [m]	Building Material	λ [W/mK]	μ-v. [-]	ρ [kg/m³]	c [J/kgK]	sd-v. [m]	Porosity [-]
A	0.02	Western Red Cedar	0.084	1963	350	1880	39.26	0.8
B	0.02	Air layer*	0.28	0.32	1.3	1000	0.0064	1
C	0.06	ARIDON	0.04	21.16	32	1500	0.168	0.95
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E	0.0125	Interior Plasterboard	0.16	7.03	625	870	0.087875	0.71
F	-							
G	-							
H	-							
I	-							

Thickness [m] 0.20

R-Value [m^2K/W] 2.06

note - The R Value is calculated to ISO 6946 through the slice indicated, thermal bridging from stud framing is not considered

Climate zone:	AKL, NZ
Orientation:	South-West, driving rain
Fraction of rain [-]:	0
Initial RH layer [-]:	0.8
Simulation period:	5 years
Internal climate RH [%] and T [°]:	55 and 21
***Air exchange rate [1/h]:**	1

Critical Information: The initial moisture content of the materials has an effect on the overall critical moisture limits over time. The materials should therefore be well sheltered from external weather during construction. We recommend ensuring the insulation layer, in particular, is kept below 80% RH when being installed and prior to closing in. The exterior cladding is assumed to be fully weathertight and does not act as a rainscreen.

Legend Material Constants: λ = thermal conductivity, μ = water vapour diffusion resistance factor, ρ = bulk density, c = specific heat capacity, sd-value = vapour diffusion x thickness (μ x thickness), porosity = void fraction of a material

AUCKLAND: 90MM FRAMING: CEDAR WEATHERBOARDS & ARIDON SMART WALL

GREEN LIGHT - GO

WUFI Animation results

Temperature, Rel. Humidity and Water Content

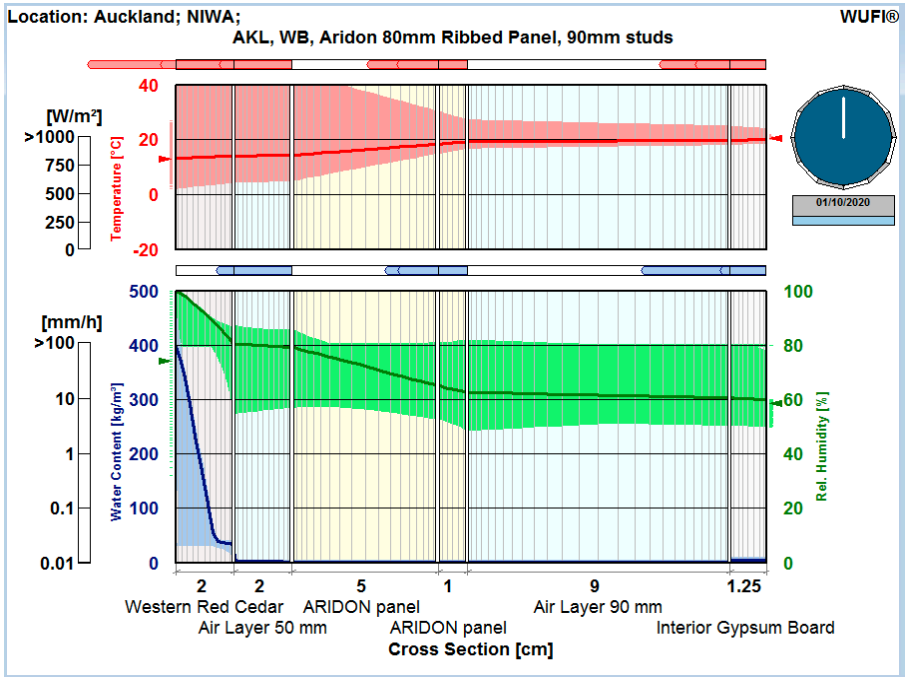


Chart interpretation: Analysing the chart from exterior (left) to indoor (right) demonstrates how the temperature, water content and relative humidity is dynamic and constantly changing over the simulation time period. The indoor environmental temperature is assumed to be relatively constant, between 20 and 26°C. The RH is shifting between 50 and 80%. Both values are in the normal range of indoor temperature and humidity variations. The critical water content layer is between the Aridon layer and the Air layer (inside), where there is a minor change in moisture content. This area is analysed more in detail with WUFI Bio.

WUFI Bio Output

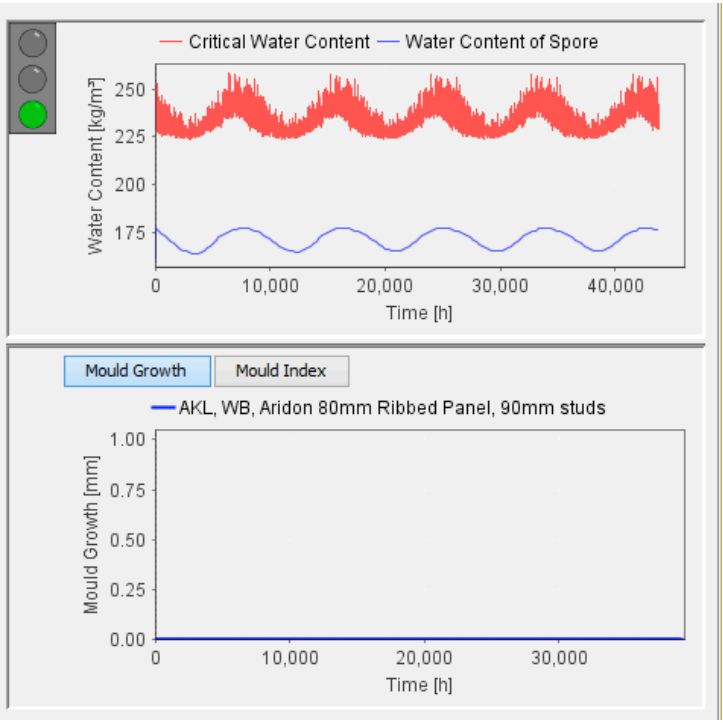
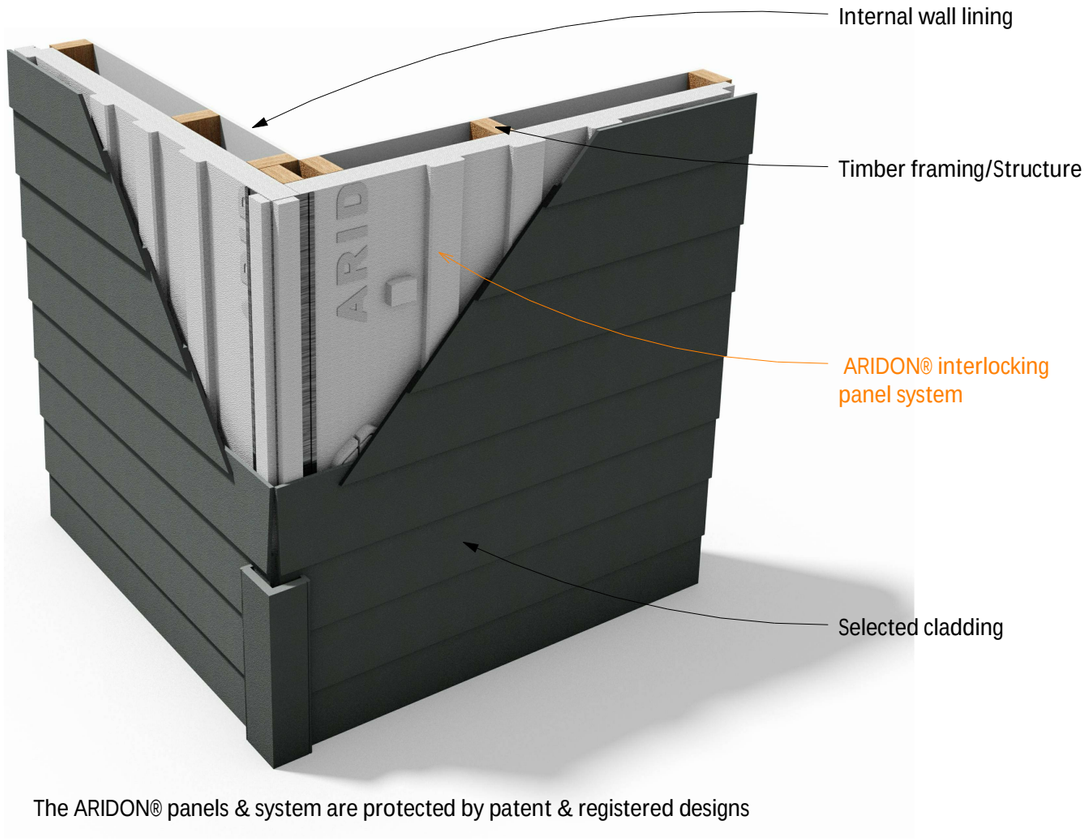


Chart Interpretation: Mould spores are endemic in the environment. They flourish once there is adequate moisture vapour. The top diagram shows the computed water content in the spore (blue) and the critical water content (red) over time in the selected critical layer. The bottom diagram shows the potential mycelium growth of the mould. The substrate class is set as 2 for the Aridon panel, because it is defined as a less bio-utilizable substrate for mould growing. For this construction the signal light is green, therefore the construction is predicted to be effectively free of mould growth and short term moisture loads are evaporated.

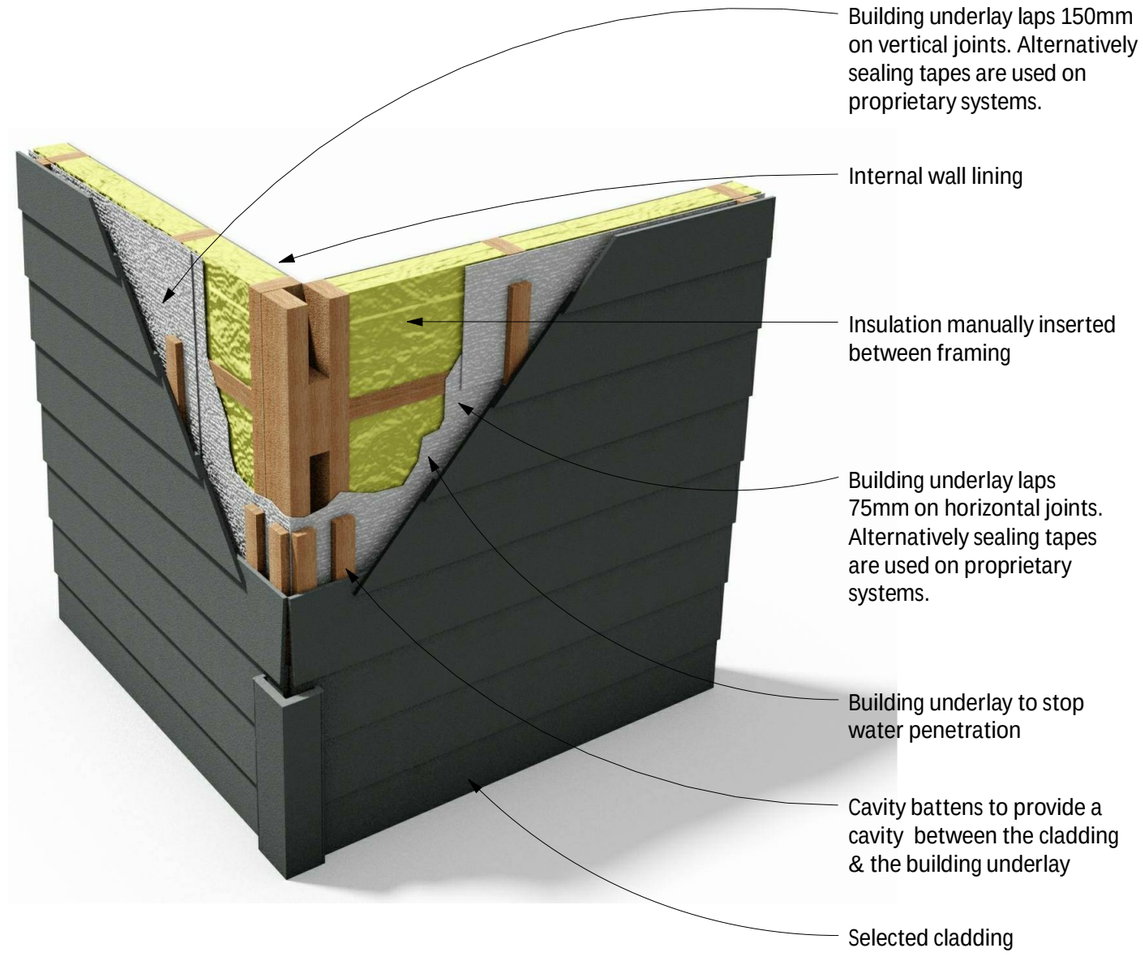
ARIDON® SMART WALL - THE SMART CHOICE FOR EVERY BUILD

ARIDON® SMART WALL ALL IN ONE CONTROL LAYER



The ARIDON® panels & system are protected by patent & registered designs

TRADITIONAL BUILDING ENVELOPE



DESIGNED AND DEVELOPED FOR ALL NEW ZEALAND CONDITIONS