

## DOUBLE LAYER ROOFING MEMBRANES

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Industry standard throughout most of the World is to use double layer torch-on waterproofing membrane systems.

New Zealand has had a tendency to use only single layer for cost reasons and also some early companies promoted this economical version strongly.

### WHY USE DOUBLE LAYER SYSTEMS?

What are the problems with single layer systems? The main reason is to guarantee the integrity of the waterproofing system. Double layers, with staggered laps give the best result. Also the building needs to be closed in so the roofing membrane goes on early and is then subject to construction work and movement and the membrane (the finished item) is often damaged aesthetically and functionally. Torching of roofing membranes can produce missed joints and fine leaks. Torching of aggregate systems is often done carefully so as not to damage the appearance; this can lead to cold joints. Functionality is sacrificed for appearance.

DOUBLE LAYER	SINGLE LAYER
7 or 8mm finish	4mm finish
Sheet joints staggered by second layer	Sheet jointing critical
First layer can give initial water integrity and the second layer applied later.	Finished membrane will take construction traffic.
Staggered overlap highly unlikely to leak through.	Possibility of joint mis-welds.
First layer can be strongly torched for integrity.	First layer is the visual layer.
Can apply additional strips with first layer for waterproofing critical and difficult details.	Appearance is critical on first layer.
Ability to produce lower pitched roofs, Even flat roofs are possible. Torch on double layer systems are the only possible way to generate flat roofs.	Pitches must be steeper. Min 1 in 20

A study of all major suppliers international websites will promote double layer waterproofing systems. Nuplex strongly recommends double-layer torch-on membrane systems.



#### Double Layer system

1. Membrane Primer
  2. Ventilation sheet
  3. First layer
  4. Second layer
- A. Membrane Primer  
B. First Layer - upstand fillet  
C. Second layer - flashing

Legal requirements for falls under membrane roofs

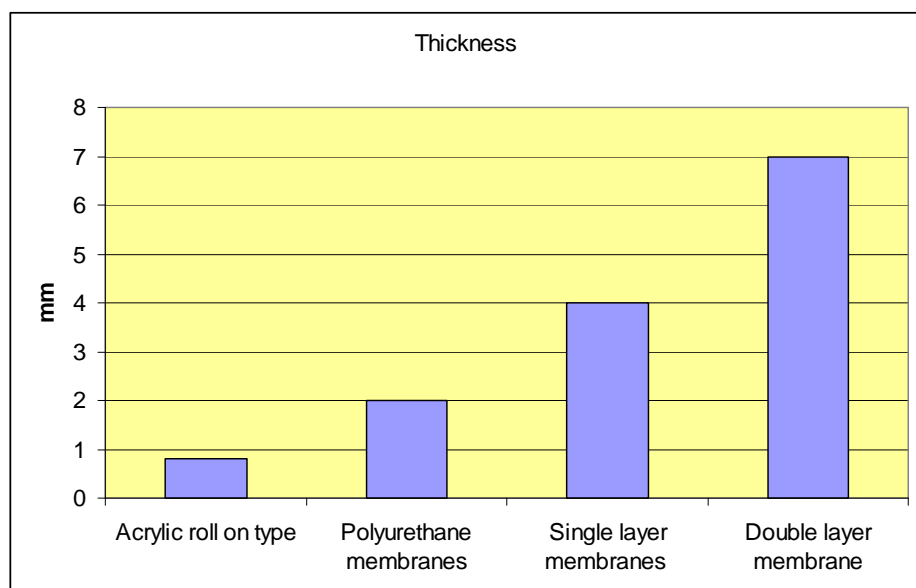


Year	NZ Law	Origin	Roof pitch
2000 approx	No, recommendations	BRANZ	1.5° 1:40 Also a comment that 3° is preferable.
2005 July	Yes	E2/AS1	Roofs 1.5° 1:40 Decks 1.0° 1:40 Gutters 1:100
2007 July	Local law	Auckland city council. Note #42	2° 1:30 No comment on gutters; so the presumption is the same at 1:30.
2011 Aug 1 <sup>st</sup>	Yes	E2/AS1 Sect. 8.5.1	Roofs 2° 1:30 Decks 1.5° 1:40 Gutters 1:100.  This implies still variances with Auckland council. Eg Gutters and decks.
	Nuplex recommendation		A double layer Soprema system will waterproof a flat roof and hold and be unaffected by standing water.

However there does appear to be a confusion over the definition of a "membrane". Membrane has been used as the term to cover anything that is not roof tiles or roofing iron.

The differences in Membranes are largely based on thickness and the chemical composition.

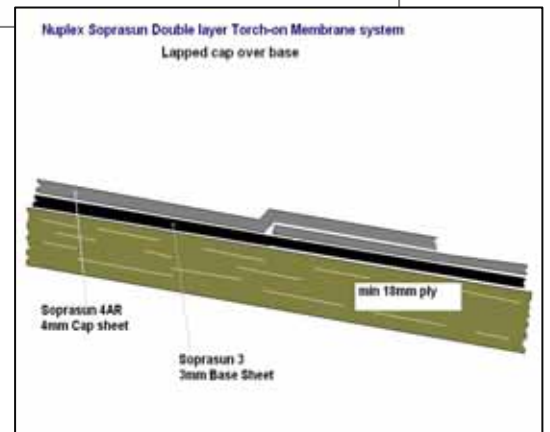
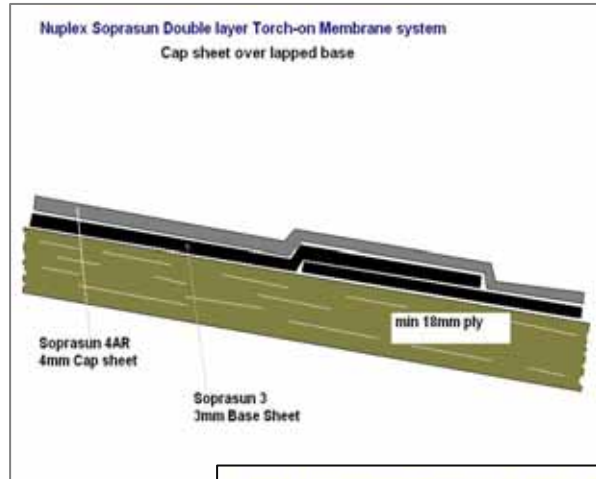
Type	Thickness	Composition	Water sensitivity	Water / UV sensitivity	Risk level
Acrylic roll on type	0.7-1.0mm	Waterbased Acrylic & Fiberglass.	Moderate	High if ponding water	High
Polyurethane membranes	2.0 mm+	Curing polyurethane. Un-reinforced.	Low	Medium if ponding water	High
Single layer membranes	4mm	Elastomeric Bitumen	Low	Low	Moderate
Double layer Membranes	7-8mm	Elastomeric Bitumen applied in two staggered layers	Low	Low	low



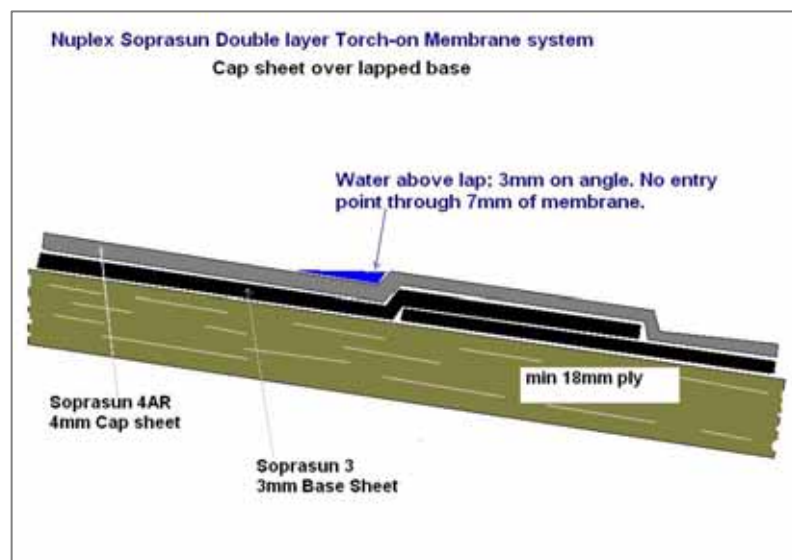
## The Case for Double layer Membranes on Flat or Flatter Roofs in Commercial applications.

The construction of commercial buildings often leads to height issues and the need for flatter pitched roofs. The building regulations 1992 calls for roofs to “provide adequate resistance to penetration” and to “shed precipitated moisture.”

Many of the “normal” membranes for decks, bathrooms (acrylic types) are not at all suitable for large commercial roofs that are subject to racking and settlement. Nuplex believe that a 7mm double layer system is in a completely different category than liquid products. The staggered lap system offers watertightness integrity that the other systems cannot.



The two layers provide more than the adequate resistance required by the code. In all areas there is a full 7mm of elastomeric membrane. Not shown in these diagrams is the triple layer required in coves, upstands and drain corners. There is concern that water will sit behind laps on low pitched roofs.



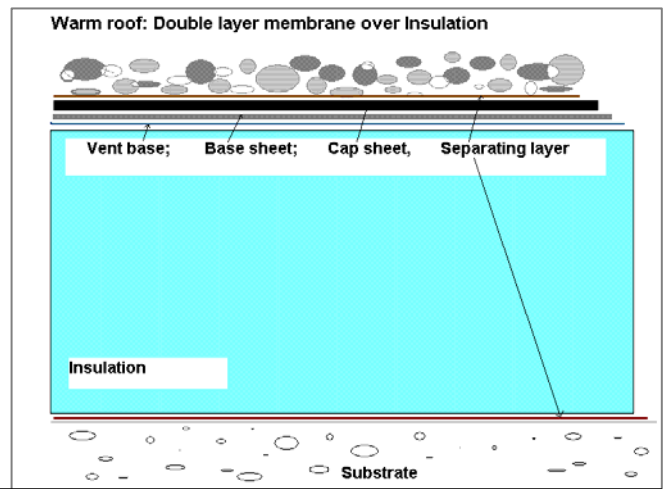
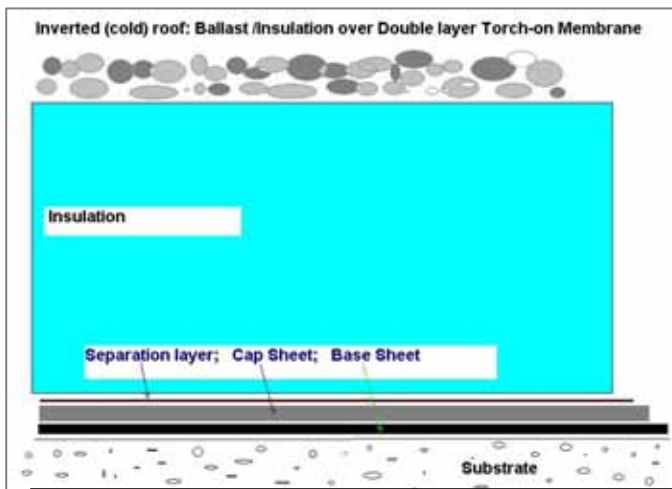
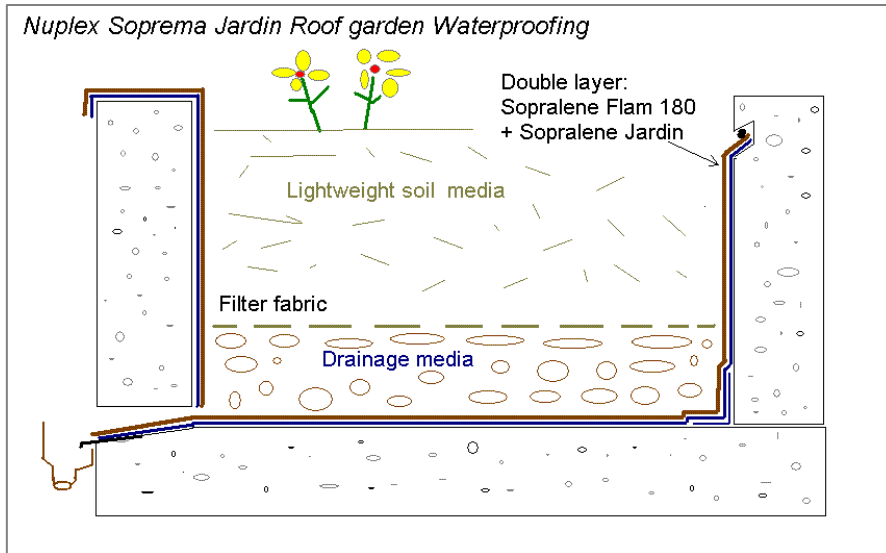
Nuplex state that roofs with double layer membrane will shed water. Water that sits behind laps is insignificant and will not affect or be able to penetrate the double layered staggered roof system. The sitting water will dry or be blown off with wind effects.

Modified Soprema bituminous membranes are unaffected by water, UV and/or hydrolysis.

Many flat roof buildings are constructed around the world. They are very common as they now attracted Green roof credits. Some of these are:

- Roof gardens
- Roof planters
- Roofs with gravel ballast onto the membrane.
- Roofs with a layer of "cold roof" insulation (75mm polystyrene) over the double layer membrane and ballast.

These roofs will shed water through a complex arrangement of drainage materials but will remain wet. Only double layer torch on systems will provide long-term water tightness integrity



The two diagrams above show common insulated roof systems that are in common use around the world. These roofs will shed water well but the membrane may stay continually wet. Only double layer torch-on systems can form roofs such as these. Roofs such as these are never formed in butyl or liquid membranes.

## Installation

Complex commercial roofs can only be installed by highly competent contractors. There has been a remarkable tendency in the past to allocate complex roofs to budget conscious tradesmen. The rules are:

- Use licenced contractors. Nuplex Contractors federation members are the only ones who can install and receive Nuplex systems and warranties.
- Use contractors who have been long term.
- Use contractors who have an relationship with the builder.

- Be aware that commercial roofs can have a maintenance plan applied . As the membrane is exposed it is far simpler to undergo repair work (as outlined in B2 the durability code).

Compare this to decking membranes and bathroom membranes which will often be covered and/ or hidden. These surfaces are also often not subject to a commercial design teams critical appraisal.

Consequently it is far easier to apply the 15year Durability required by B2 to an exposed double layer roofing membrane than it is to complex over-laid traffic decks.

## Wind Uplift on Roofing membranes Systems

1. *Soprafix, a mechanically fastened base sheet overlaid with a cap sheet to form the double layer.*
2. *Vented roofing, usually on concrete, based on Aerisol Flam.  
This sheet has vent holes. This is overlaid with the base sheet and second layer cap sheet.  
The Aerisol allows moisture from concrete to dissipate to exit points or vents.*

The following literature stipulates the fixing distances in the Soprafix systems in different wind zones. The increased numbers of fixings reduces wind uplift effects.

Torched systems are stronger than mechanically fastened. So a fully torched roof will resist most normally expected wind events.

Partially bonded Aerisol flam vent sheets also have a high adhesion. Considered as attachment points the adhesion of the base sheet through the vent sheet is at the following points:

- 120 holes/ m<sup>2</sup>
- Holes at 100mm centres

Therefore with reference to the maximum fixing loading on the Soprafix chart (separate) (highest wind zone), there is more torched fixings, at closer centres with the Aerisol Flam vented systems.

We therefore state Aerisol Flam vented double layer roof systems will resist uplift pressures in all normally expected zones.

## Conclusion

Nuplex soprema systems are suitable for flat or low pitched roofs. The history of membranes in NZ has been poorly dominated by companies promoting single layer systems for economy reasons only and to compete with thin Butyl rubber roofs. Double layer systems dominate the world in commercial construction. Butyl roofs do require strong falls as they are only single layer systems, with laps and are prone to damage.

These double layer systems are suitable for tanking and will hold ponded water without deterioration.