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Green Building Digest

Flat Roofing Membranes

Contents

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Product Table

Key

The environmental impacts of products are rated on a scale of zero to 4 under each impact category. Scores are relative within each heading. No judgement has been made on the relative importance of each heading. The reason behind each assessment is given in the Product Analysis section which follows.

Scale

● .....worst or biggest impact
● .....next biggest impact
• .....lesser impact
• .....small but still significant impact
[Blank].....No significant impact
☺.....Positive Impact

			Manufacture								Use				
		Unit Price Multiplier	Energy Use	Resource Use (bio)	Resource Use (non-bio)	Global Warming	Ozone Depletion	Toxics	Acid Rain	Occupational Health	Recycling/Reuse/Disposal	Health	Durability	Other	Alert!
Bitumen Felts															
Bitumen Felts	Organic Fibre	0.9	●	•	●	●		•	•		●		●	●	
	Polyester Fibre	1	●		●	●	●	•	•	●	●		●	●	
	Glass Fibre	1	●		●	●		•	•		●		●	●	
Blown Bitumen		-	●		●	●	•	•	•		●		●	●	
APP Modified Bitumen Felt		1.4	●		●	●		•	•		●		●	●	
SBS Modified Bitumen Felt		1.4	●		•	●		•	•		●		●	●	
Natural Rubber Modified Bitumen Felt		1.3	●	•	●	●		•	•		●		●	●	
Mastic Asphalt		0.6	●		●	●		•	•		●		●	●	
Single-Ply Polymeric Membranes															
PVC		0.8-1.2	●		•	●		●	•	●	●		•	●	Hormone Disrupters
CSM/CPE		-	●		•	●		?	•	?	●		•	●	Hormone Disrupters?
EPDM		0.8-1.2	●		•	●		•	•		●			●	
EPDM & Bitumen		-	●		●	●		●	•		●			●	
Polyester Reinforced EPDM		-	●		•	●	●		•	●	●			●	
Attachment															
Loose		0													
Mechanical		+0.1	●								●				
Fully Bonded		+0.3	●		•						●			●	
Ballasts															
Gravel		+0.1	•		•										
Liquid Applied															
Polyester Resin on Glass Fibre Mat					●		●		●	●	●		?		

Best Buys

The 'best buy' is to opt for a pitched roof, which is generally much more durable than a flat roof. During a fifty year period, a flat roof could be expected to be replaced a couple of times,[31] whereas a slate or clay tile roof may last up to 100 years (see GBD 11). Also, for flat roofing, one is limited to synthetic/petrochemical based sheet materials with relatively high environmental impact and little scope for reuse or recycling, whereas for pitched roofs there is the option of using materials such as slates and tiles, for which the potential for re-use is much greater.

Where flat roofing is unavoidable, a natural rubber membrane would be the preferred option, although we were unable to locate any suppliers. Therefore the 'best buy' roofing membrane is single ply EPDM (synthetic rubber), due to its relatively low impact in comparison to other membranes, its reported high durability and its reusability. Bitumen felts cannot be viewed as an environmentally preferable option due to their low durability, and APP bitumen should be preferred. Many of these products contain polyester, either as a felt or a base. The additional durability imparted by the polyester on a particular product should be weighed up against the additional impacts of polyester (see p.7); Specifiers may wish to avoid PVC and other chlorinated synthetic membranes due to their significant environmental impacts during manufacture and disposal, particularly as alternatives such as EPDM are available, with similar performance characteristics. Durability and ease of maintenance is essential for a 'green' option, reducing the frequency of replacement. To this end, good design and attachment are essential - BRE digests 372, 312 and 314 give guidance on these.

DURABILITY

Tests at BRE found EPDM and PIB sheets to be the most durable membranes over a range of temperatures. Reinforced PVC, CPE and CSM sheets showed slightly lower low-temperature durability. Bitumen felts were found to be least durable, with glass fibre felts performing worst, particularly at low temperatures. Polymer modified bitumen felts performd much better than unmodified felts.[3]
These results were for individual sheets rather than for built up systems, and there was no account for joints between sheets.[3]

The specifier must recognise the importance of high standards of workmanship in the installation of polymeric roof membrane systems. A well-trained workforce, with good understanding of the materials, is indispensible if required standards are to be achieved.

The Agrement certificate predictions for the service life of polymer modified bitumen systems, and single-ply polymeric sheetings, are around 20-25 years, but experience in Europe suggests that these are probably conservative estimates.[3]

Fixings

Mechanical fixings or loose laid membranes should be favoured where possible, as this allows the removal of the membrane intact for possible re-use.

Summary -

First Choice:	**Pitched Roof**
Second Choice:	**EPDM Sheet,** **Natural Rubber (if available)**
Third Choice:	**Modified Bitumen Felt**
Avoid:	**PVC,** **Chlorinated Polyethylene**