



# Turning old tyres

into new roads



T3 Tarmac Ground Floor T3 Trinity Park  
Bickenhill Lane Birmingham B37 7ES  
[tpsmmailbox@tarmac.com](mailto:tpsmmailbox@tarmac.com)

[TARMAC.COM](http://TARMAC.COM)

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## Rubber modified asphalt





# introduction

Rubber modified asphalts incorporate recycled tyres combined with Tarmac's ULTILOW warm mix asphalt technology to provide an environmentally sustainable asphalt with a reduced carbon footprint.

## size of the problem

Around 40 million waste tyres are generated every year in the UK. Waste tyres are shredded and granulated to produce materials that can be used in sports pitches and safety surfaces under playground equipment.

Waste tyres are also used as a fuel for cement kilns and on a small scale for engineering and agricultural applications. Despite these alternative uses, around one in four of these waste tyres are still exported, mainly to Asia.



**40m**  
waste tyres  
produced  
every year

**1 in 4**  
waste tyres  
are exported



# Turning old tyres into new roads

Tarmac's rubber modified asphalts enable old tyres to be converted into new roads and footpaths. As a result, they help to offset the environmental impact of highways maintenance activities and send out a strong local sustainability message.

## Closing the loop on tyre recycling

Rubber modified asphalts incorporate the rubber from one tyre per tonne of asphalt, giving the potential to recycle about 500 tyres per kilometre of road, depending on layer thickness. Reinforcing steel from truck tyres is also recycled to make new steel. Fibres and fine dust from the

recycling process, which have no alternative uses, are used as a fuel in Tarmac's cement kilns.



**500**  
waste tyres  
= 1km of highway

**8%**  
reduction  
in CO<sub>2</sub>

**Fully**  
recycled  
in the UK

## **ULTILOW** warm mix technology



Tarmac rubber modified asphalts incorporate proven ULTILOW warm mix asphalt technology as standard. Warm mix asphalts are manufactured and laid at lower temperatures than conventional hot mix, resulting in lower CO<sub>2</sub> emissions during production. Site safety is also improved from reduced fumes and steam on site and a reduced risk of burns.

## Reduced carbon footprint

The typical carbon footprint of Tarmac's rubber modified SMA solution will be around 8% lower than the equivalent conventional SMA.

# CO<sub>2</sub>

# Long term development

Tarmac has been exploring the use of tyre rubber in asphalt since 2011 with a focus on using tyres that are recycled in the UK. The development has led to an optimised mix design, combined with a computer controlled process for direct addition of finely ground tyre rubber into the asphalt mixing plant.

The result is a high level of quality control and consistent product performance.



## Experience from the USA

In North America ground tyre rubber has been used in asphalt for many years, either pre-blended into the bitumen or added directly at the asphalt mixing plant.

Experience from North America suggests that rubber modified asphalt requires less maintenance interventions than standard asphalts. This is due to the ability to delay crack propagation and additional water proofing, as the rubber fills a percentage of what would have been air voids in the SMA mixture.



# Successful UK trials

The Tarmac rubber modified SMA is a direct alternative to 50 pen SMA and delivers the same performance and surface characteristics in terms of regularity and texture.

Tarmac laid a number of trial mixes on a site in North Tyneside in 2013. The site has been regularly inspected and is still in excellent condition indicating that it will give many more years of service. No maintenance interventions have been required since the trial sections were installed.

In 2018 Tarmac were approached by Coventry City Council who were keen to trial asphalt that provided additional environmental benefits to standard asphalts.

The first sites in Coventry to use rubber modified 10mm SMA were laid in May and July 2018, followed by a rubber modified 6mm SMA in August 2018. Further rubber modified SMA has been laid in 2019.

In May 2019 a Highways England funded trial of rubber modified asphalt was undertaken on a south bound section of the M1 near Leicester, between junctions 23 to 22.

This trial involved an even higher rubber addition rate as we explore further, with Highways England, the development of a higher flexibility mix delivering low grade pmb mix equivalence.

## National Availability

Tarmac rubber modified asphalts are available from a growing network of asphalt plants.

# Technical data

Rubber modified asphalts are available in a range of aggregate sizes, for use in highways and footways:

- 10mm stone mastic asphalts (SMA)
- 6mm stone mastic asphalts (SMA) for footways, cycle tracks and minor roads
- 14mm SMA and 20mm SMA options are suitable for thicker surface layers and can also be used in the binder course.

Tarmac rubber modified SMA is produced in accordance with European Standard EN13108-5 and meets the requirements of PD 6691.

Laboratory tests shows the performance of rubber modified asphalt compared to equivalent standard asphalt mixes:

Typical properties	Air voids	Water sensitivity	Stiffness	Wheel tracking	
Standard	BS EN 12697-8	BS EN 12697-12	BS EN 12697-26	BS EN 12697-22 Procedure B at 60°C	
	%	ITSR	ITSM	WTS <sub>AIR</sub>	PRD <sub>AIR</sub>
10mm SMA 10 rubber modified	3%	90%	3200 MPa	0.2mm/10 <sup>3</sup> load cycles	10%
10mm SMA 40/60 pen	4%	80%	3400 MPa	0.2mm/10 <sup>3</sup> load cycles	10%
AC close graded 100/150 pen	8%	80%	1300 MPa	0.6mm/10 <sup>3</sup> load cycles	27%



# Advocacy and industry response

Tarmac's rubber modified asphalts have already been welcomed by highways professionals and representatives of the UK recycling industry:

“Coventry City Council is delighted with the rubberised asphalt trial; we hope we can use more of the product across the city in the future to help divert waste tyres from landfill and incineration to reduce the carbon footprint for road construction projects in Coventry. We are proud to be leading with our partner Tarmac in providing road surfaces which are providing significant environmental benefits for our communities.”

**Rob Little - Senior Engineer**  
Highways Technical,  
Coventry City Council

“Highways England is committed to investing in innovation to help us meet the economic, environmental and efficiency challenges we face in our changing world and also to delivering environment improvements as we strive to ensure our road network works more harmoniously with its surroundings.

The economic and environmental benefits of this new asphalt could be very significant and we are delighted to be working with Tarmac to trial this new product”

**Martin Bolt - Corporate Group Leader**  
Operations Directorate (Midlands),  
Highways England

“While there has been significant progress in reusing and recycling waste tyres in the UK, there is still an over reliance on the export of used tyres to countries such as China, India and Pakistan, who are importing fewer tyres as they become self-sufficient. The UK needs a second disposal route for used tyres. Tarmac's commitment to developing rubberised asphalt provides an excellent opportunity to achieve this and deliver environmental savings for this under-used waste stream.”

**Peter Taylor OBE - Secretary General**  
of the Tyre Recovery Association



**Fully recycled**  
in the UK