

Introduction to PAS 107

Specification for the manufacture and storage of size reduced tyre materials



Material change for
a better environment



Introduction

A Publicly Available Specification, PAS 107, has been prepared by The British Standards Institution (BSI) in collaboration with WRAP (Waste & Resources Action Programme) to provide a specification for producing grades of size-reduced tyre rubber of consistent and verifiable quality.

The PAS was prepared following exhaustive consultation with a wide range of stakeholders from the secondary tyre industry. The expert contributions made by all organizations and individuals in the development of PAS 107 are gratefully acknowledged.

Overview

The use of recycled tyre materials in a wide range of civil engineering and industrial materials and applications is well established and has grown considerably in the last decade.

PAS 107 sets out a formal material specification system and defines minimum requirements for the initial storage, production and final storage of size-reduced, tyre-derived rubber materials intended for a range of applications in existing and emerging secondary end markets.

The overall aim of the PAS is to provide a specification that can be adopted by suppliers for producing grades of size-reduced tyre rubber such that potential customers will be assured that they are procuring a material of consistent and verifiable quality.

The introduction of PAS 107 harmonizes the various independent specifications across the industry in the UK.

Scope

Exclusions

PAS 107 excludes the use of whole or baled tyres in end use applications. In conjunction with this document, a separate Publicly Available Specification for baled tyres (PAS 108) has been introduced.

PAS 107 does not cover the by-products of the size-reduction process, namely steel and textile fibre.

Process

All of the commercial size-reduction of tyres in the UK is currently by means of cutting and grinding, at or above ambient temperature, into increasingly smaller rubber particles for use in a range of new end use applications. This process, known as ambient size-reduction, is the subject of PAS 107. There is reference in the PAS to emerging new technologies to produce size-reduced rubber, such as cryogenic treatment and water jetting. Finally, PAS 107 excludes processes such as pyrolysis or microwave treatment which have yet to be commercially proven in the UK.

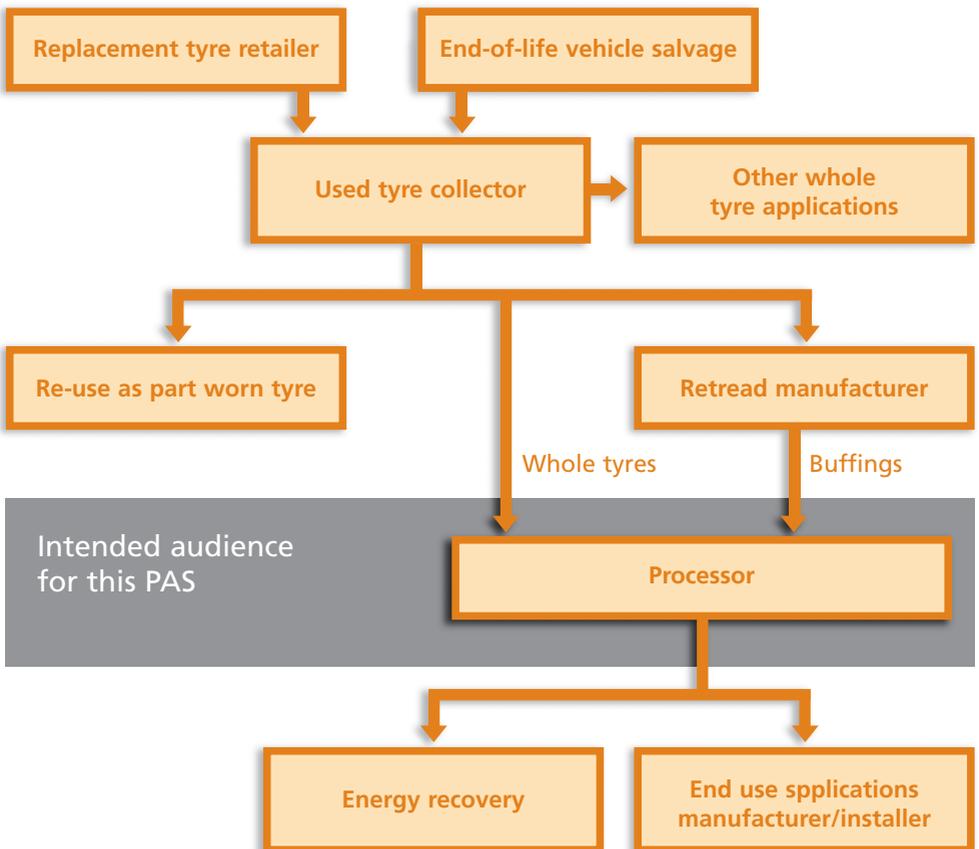
Source material

The source material covered by PAS 107 is end-of-life tyres that have been removed from road vehicles and off-road vehicles such as agricultural and earthmoving equipment. Used aircraft tyres, with their unique processing and relatively low level of arisings, are not included in PAS 107.

Applicability

The applicability of the PAS in the used tyre collection and recycling supply chain is set out in Figure 1.

Figure 1 – Applicability of PAS 107



Specification system

The PAS introduces a standardized material specification system which is based on characterization of the size-reduced materials, as follows:

- Material Category;
- Material Source;
- Processing Technology;
- Particle Size (defined by a range of sizes or by the nominal size of particles within a batch); and
- Other Chemical and Physical Properties (optional).

Table 1 – Material category codes

Category code	Material	Size range (maximum dimension) mm		Other characteristics
		Min	Max	
Rough cuts	RX	300	None	May contain exposed wire and textiles ¹⁾
Clean cuts	CX	300	None	May contain up to 5 % by length exposed wire and textiles ²⁾
Rough cut shred	RS	50	300	May contain exposed wire and textiles
Clean cut shred	CS	50	300	May contain up to 5 % by length exposed wire and textiles ²⁾
Rough cut chips	RC	10	50	May contain exposed wire and textiles
Clean cut chips	CC	10	50	No exposed wire. May contain up to 5% by length exposed textiles ²⁾
Granulate	G	1.0	10	Free from exposed wire and textiles
Powder	P	0	1.0	Free from exposed wire and textiles
Fine powder	FP	0	0.5	Free from exposed wire and textiles

1) All exposed wire and textiles shall be firmly attached to the body of the rubber fragments.

2) Upon visual inspection.

“There has been a long standing requirement, within the UK tyre recycling industry, for a document that will help to promote the use of recycled tyres, both in the supply and purchasing of reprocessed tyre materials. I feel that WRAP and BSI together the key stakeholders have achieved this with the development of PAS 107.”

Roger Hicks, Managing Director, Charles Lawrence International

Table 2 – Examples of specifications for specific materials

Material description	Particle size
Rough cut ambient shred, car tyres, size range 100 to 300 mm	200 mm
Clean cut ambient chips, car tyres, size range 30 to 50 mm, specified chemical and physical properties	40 mm
Ambient ground granulate, truck tyres, size range 1 to 3 mm, specified chemical and physical properties	1 mm – 3 mm
Ambient ground powder, car tyre buffings, size range 0.5 to 1.0 mm, specified chemical and physical properties	0.5 – 1.0 mm



End uses

The secondary end markets to which PAS 107 applies include, but are not limited to, the applications set out in Table 3.

Table 3 – Secondary end markets to which PAS 107 applies

Category					Application
Cuts	Shred	Chips	Granulate	Powder	
✓	✓	✓			Co-combustion with other fuels in the manufacture of cement and lime products
✓	✓	✓			Generation of energy by incineration
		✓			Clean cut, as the surface for equestrian ménages and pathways
	✓	✓			Leachate drainage layer in the construction of landfill cells
	✓	✓	✓		Aggregate replacement in civil engineering projects
		✓	✓	✓	Resin-bound as a shock absorbing layer for sports tracks and children's playgrounds
			✓	✓	Moulded products such as tiles, street furniture and level crossing platforms
			✓		Various horticultural applications such as mulching and soil amelioration
			✓		As a filler, with sand, in artificial turf for sports pitches
			✓	✓	In rubber modified bitumen for road surfacing and repair
			✓	✓	Carpet underlay and floor tiles
			✓		Aggregate replacement in construction products such as building blocks
				✓	Industrial adhesives and sealants

Processing, quality assurance testing and safety

PAS 107 covers in detail the specifications and parameters for processing, quality assurance testing and safety procedures. Particular attention is drawn to the minimization of the fire risks associated with the handling and processing of tyre materials.

In summary the PAS is structured as outlined in Table 4.

Table 4 – Structure of PAS 107

Section	Key Element	Summary Description
Initial storage of end of life tyres		Use of visual checks where practical and appropriate recording procedures. Separation of storage areas.
The production process	First stage size-reduction to cuts and shred	Preparation for further size-reduction or for shipping of cuts and shred. Quality checks and recording procedures.
	Second stage size-reduction and steel removal	Preparation for further size-reduction or for shipping of chips. Quality checks and recording procedures.
	Granulating and sieving stages	Final size-reduction process with quality checks, quarantine procedures and fire safety systems.
Final storage at the processing site	Handling and storage of cuts, shred and chips	Separation of storage areas with appropriate fire safety systems.
	Handling and storage of granulate and powder	Bagging and palletising processes.
Material quality assurance testing	Visual and magnetic checks	Applies to all processing stages.
	Confirmation of particle size for cuts, shred and chips	In-process particle size control.
	Confirmation of particle size for granulate and powder	Understanding of upper and lower defined limits and sample testing procedures.
	Determination of cleanliness, moisture, and metal and fibre content	Standard test procedures are identified for testing these parameters where required.
	Determination of other generic chemical and physical properties	Standard test procedures are identified for testing these properties, which are set by the nature of the source material. Users must be notified of significant changes in these properties.
	Other quality tests	Standard test procedures are identified for testing other chemical and physical properties where required.
Annexes	Sample goods receiving note	
	Fire safety	
	Particle size analysis of granulate and powder	
	Sample material safety data sheet	

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On the WRAP website you will find information on all aspects of tyres. Whether you're looking for a supplier, or you need detailed technical information – all the latest news, facts and guidance can be found at www.wrap.org.uk/tyres.

How to order a copy

Copies of PAS 107 can be obtained free of charge from WRAP.

E-mail: helpline@wrap.org.uk

Telephone: 0808 1002040

website: www.wrap.org.uk/tyres

Acknowledgements

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