

Use of recycled & secondary aggregates in HA road pavements

Donna James

HA Pavement Team Leader

OUR GOALS

We provide a service our customers can trust

We set the standard for delivery

We deliver sustainable solutions

Our network is a dynamic and resilient asset

Our roads are the safest in the world



HA Approach

- Comprehensive research programme throughout 1990's
- Formal guidance issued in 1995 and updated in 2004
- Performance based approach



Performance approach

- Standards and specifications do not generally distinguish by source
- The use of secondary and recycled materials must comply with the relevant guidelines of the responsible agency (EA, SEPA)



2 Part Approach

- General guidance given in Design Manual for Roads and Bridges
- Detailed requirements given in the specification for Highway Works



Application and Series ▶	Pipe Bedding	Embankment and Fill	Capping	Unbound Mixtures for Sub-base	Hydraulically Bound Mixtures for Sub-base and Base	Bitumen Bound Layers	PQ Concrete
Material ▼	500	600	600	800	800	900	1000
Blast furnace Slag	✓	✓	✓	✓	✓	✓	✓
Burnt Colliery Spoil	x	✓	✓	✓	✓	x	x
China Clay Sand/Stent	✓	✓	✓	✓	✓	✓	✓
Coal Fly Ash/Pulverised Fuel Ash (CFA/PFA)	✓	✓	✓	x	✓	✓	✓
Foundry Sand	✓	✓	✓	✓	✓	✓	✓
Furnace Bottom Ash (FBA)	✓	✓	✓	x	✓	x	x
Incinerator Bottom Ash Aggregate (IBAA)	✓	✓	✓	✓	✓	✓	✓
Phosphoric Slag	✓	✓	✓	✓	✓	✓	✓
Recycled Aggregate	✓	✓	✓	✓	✓	✓	✓
Recycled Asphalt	✓	✓	✓	✓	✓	✓	✓
Recycled Concrete	✓	✓	✓	✓	✓	✓	✓
Recycled Glass	✓	✓	✓	✓	✓	✓	x
Slate Aggregate	✓	✓	✓	✓	✓	✓	✓
Spent Oil Shale/Blaise	x	✓	✓	✓	✓	x	x
Steel Slag	✓	✓	✓	✓	✓	✓	x
Unburnt Colliery Spoil	x	✓	x	x	✓	x	x

KEY:

- ✓ Specific (permitted as a constituent if the material complies with the Specification (MCHW 1)) or General Provision (permitted as a constituent if the material complies with the Specification (MCHW 1) requirements but not named within the Specification (MCHW 1)).
- x Not permitted.

Guidance in HD35 covers a wide range of materials

Specification example 1

Aggregate

6 (11/04) Aggregates for all pavement concrete, including wet lean, shall comply with BS EN 12620.

Crushed concrete, which complies with the quality and grading requirements of BS EN 12620 and Table 2 of BS 8500-2, may also be used in all pavement concretes except aggregate concrete surface complying with Clause 1044.

Specification example 2

(08/08) **Aggregates for Bituminous Mixtures**

3 (08/08) Natural, recycled unbound and manufactured (artificial) aggregates shall be clean, hard and durable and shall comply with BS EN 13043. Where recycled coarse aggregate or recycled concrete aggregate is used in bituminous mixtures, it shall have been tested in accordance with Clause 710 and the content of other materials (Class X) including wood, plastic and metal shall not exceed 1% by mass. Reclaimed asphalt shall comply with Clause 902.

BS EN 13043:

Approach reflected at all levels

BRITISH STANDARD

BS EN
13043:2002
*Incorporating
Corrigendum No.1*

Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas

Licensed copy: Mett Macdonald Ltd, 01/04/2012, Uncontrolled Copy, © BSI

The European Standard EN 13043:2002 has the status of a
British Standard

ISBN 01100120100000

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSi
British Standards

Joined up approach

“As well as familiar and traditional natural and manufactured aggregates...the Mandate included recycled aggregates and some materials from new or unfamiliar sources...”

Business as usual

- Recycled and secondary aggregates considered as “normal”
- Must comply with the same requirements (generally) as natural aggregates
- Choice of aggregates now a commercial decision



M25 Case study

- Highways Agency saved over £15m by recycling over 70% of waste produced during motorway widening scheme
- Implemented waste and materials procurement strategy, which included finding new uses for imported waste materials and recovering what it could on-site
- Builds on Agency's sustainable development plan
- HA commitment to WRAP's Halving Waste to Landfill voluntary agreement for construction waste.

