

Use of recycled aggregates in concrete

Introduction

There is a public will to reduce the use of primary aggregates in construction, including concrete. Inert, construction and demolition waste (and especially crushed concrete) forms a possible source for recycled aggregates and in the UK this is produced in accordance with a WRAP Quality Protocol. Over 60% of this type of material is used as aggregate, general fill or land reclamation. New British Standards permit the use of recycled aggregates in some forms of new construction. Around 17% of UK aggregate needs are already met from recycled material.

What is recycled aggregate?

Recycled aggregate is derived from crushing inert construction and demolition waste. It may be classified as recycled concrete aggregate (RCA) when consisting primarily of crushed concrete or more general recycled aggregate (RA) when it contains substantial quantities of materials other than crushed concrete. Currently, only the use of *coarse* aggregate derived from construction or demolition waste is recommended for use in new concrete construction.

RCA is not the same as reclaimed or recovered aggregate, where these materials are obtained from either the fresh or hardened ready-mixed concrete returned to the concrete producer.

How are recycled aggregates covered by existing standards?

The British/European harmonised product standard, BS EN 12620, for *Aggregates for concrete*, makes no distinction, in terms of properties covered, between: natural, manufactured or recycled materials and mixtures of these aggregates. The British Standard for Concrete, BS 8500 (the complementary UK Standard to BS EN 206-1) and, in effect a 'national Code of Practice' for concrete, applies product-specific, and specification-specific, conditions on the use of recycled aggregates in new concrete construction.

RCA conforming to the requirements of BS 8500-2 can be used in both Designated and Designed concretes. In Designated concretes RC25 to RC50, a maximum of 20% of the natural coarse aggregate can automatically be replaced by RCA. For Designated GEN concrete or Designed concrete there are no general restrictions in the standard on the proportion of RCA, as long as any aggregate durability criteria (e.g. frost resistance) are satisfied. RCA can be used in concretes of strength classes up to C 40/50 and in most exposure classes, except exposure to salt (XS, XD), severe freeze-thaw (XF2 - XF4) or aggressive ground more severe than DC-1.

As the potential composition of RA is so wide the additional specification requirements should be assessed on a case-by-case basis taking into account the specific composition of the RA.

Where can I find out more?

Contact: Dr Chris A Clear at BRMCA, Tel: 07976 546941, chris.clear@mineralproducts.org.

Further reading

WRAP, The Quality Protocol for the production of aggregates from inert waste, September 2005.

Building Research Establishment Digest 433 (1998), *Recycled Aggregates*

MPA Cement

Mineral Products Association

Gillingham House

38 - 44 Gillingham Street

London SW1V 1HU

Tel +44(0)20 7963 8000

Fax +44(0)20 7963 8001

<http://cement.mineralproducts.org>

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