Concrete (inc. blocks, roof tiles, structural and reinforced concrete)

Concrete is classed as an Inert Waste and can therefore be sent to landfill, subject to a Landfill Tax rate of £2.50 per tonne. Concrete consists of cement (commonly Portland cement) as well as other cementitious materials such as fly ash and slag cement; aggregate (generally a coarse aggregate such as gravel limestone or granite, plus a fine aggregate such as sand or manufactured sand and water) and chemical admixtures. Concrete solidifies and hardens after being mixed and installed through a chemical process known as hydration.

Cement is the essential ingredient in concrete. Cement manufacture produces a variety of solid process wastes, air emissions, and wastewater streams, but most of its contaminants are released in cement kiln dusts (CKD). The main components in kiln dusts are alumina, silica, clay, and metallic oxides, but they may also contain trace amounts of dioxins and furans, cadmium, lead, selenium and radionuclides. With proper management, CKD is not hazardous to human health. The cement making process is an energy intensive process with associated carbon emissions.

Concrete manufacture generates air particulate emissions from cement and aggregate dusts. Other sources of contamination in concrete plants are solvents used in cleaning operations and the application of finishes to completed products. Most aggregate concrete blocks are manufactured using by-product, secondary or recycled materials reducing the need to use virgin materials.

Minimise:
The best way to minimise the amount of concrete materials entering the waste stream is through careful product specification and use. When using concrete blocks or pavement blocks / slabs on site, the design specification of the structure should take into consideration the product sizes available to reduce the amount of off-cuts produced. Ready mixed concrete is prone to drying out when used on site.

To avoid concrete waste on site, the site team should ensure that the correct amount of concrete is ordered in the first place and avoid over specification. Also the concrete pouring has to be done quickly to prevent the concrete setting before it is used. Pre-cast concrete elements are manufactured in a factory before they are being transported to site so this waste does not occur on site. The pre-cast concrete items should be stored in a designated storage area and protected from site traffic and movements. It is essential to transport pre-cast
concrete element to site at a time when they are needed in the construction process adhering to the principles of ‘just-in-time’ delivery.

**Reuse:**
If larger quantities of concrete tiles, blocks or pavement slabs were delivered to site than needed, the procurement teams should contact the manufacturer / supplier and negotiate the return of the extra materials delivered to site. If there is another site that uses and requires the same materials, the extra materials should be transported there. If the construction company cannot use the concrete tiles, blocks and pavement slabs on another project or send them back to their supplier, the materials should be taken to a material reuse centre and reclamation yard for reuse by other companies or the general public if possible.

The reuse of pre-cast concrete elements that were designed specifically for a certain project might be difficult to reuse on another project that has different design specification requirements. Standardized items such as concrete lintels, and pre-cast floor panels might be used on another project or the procurement teams should try to set up a take back scheme with the manufacturer in case of over ordering.

**Recycle:**
Ready mixed concrete waste can occur on site as a result of concrete spilt onto the ground during the pouring process. The concrete should be left on the ground to dry and once solid placed in the segregated inert skip for recycling along with residues of other concrete products used on site. All concrete materials should be sent for recycling and converted into recycled aggregates that can be further used by the construction industry as a resource. The use of recycled aggregates in construction is governed by quality standards such as the European Standards for Aggregates that came into force in June 2004.

As the European Standards apply to all aggregates produced across Europe, they allow for the specification of a wide range of aggregates with a number of properties. The 2004 European Standards for Aggregates for concrete is **BS EN 12620**. They can be purchased from demolition sites or from suitably equipped processing centres. The quality of the recycled aggregate is dependent on the quality of the materials that are processed, the selection and separation processing used, and the degree of final processing that these materials undergo.

There are two methods of producing recycled aggregates: in situ at the site of the arisings, usually a demolition site, or a central plant, usually smaller quantities of materials generated during the construction process of a building / structure.

**General advice:**
- Use blocks with a high percentage of recycled aggregate, e.g. Thermalite
- Water that comes into contact with cement powder or workable concrete can be highly alkaline and therefore is defined as hazardous waste.
• Concrete contains chromium, which is polluting to watercourses and groundwater.
• Washout water from trucks and mixers must never enter storm water drains.
• Where possible, store and re-use washout water, allowing the silt to settle.

Sources:  
www.pavingexpert.com/manuf01.htm  
www.envirotools.org/factsheets.html

Useful figures

| Wastage rate* | 2.5% by weight (structural) |
|              | 5.0% by weight (blocks)     |
|              | 7.5% by weight (paving)     |
| SMARTWaste benchmark** | 3.307 tonnes/100m² (Non-residential projects) |
|                | 3.290 tonnes/100m² (Residential projects) |

Notes:
* Taken from BRE’s Green Guide to Specification  
** Based on completed projects on BRE’s SMARTWaste database (28th February 2010)

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