

PROPERTIES OF CONCRETE BLOCK PAVING

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Introduction

The use of small stone elements to create a hard surface for roads or pavements is an ancient tradition that can be traced back to the royal processional roads of ancient Babylon, continuing in Greek and Roman times. Concrete block paving continues this tradition and was first introduced in Holland after the Second World War followed by other countries (notably Germany) and its introduction to the UK in the 1970s. Concrete block paving is a unique material, exhibiting important differences to other small element paving such as stone and clay, as well as to formless materials such as asphalt and insitu concrete. It provides a hard surface which is good to look at, comfortable to walk on, extremely durable and easy to maintain. It adds a richness, complexity and human scale to any setting.

Blocks are fully engineered products manufactured in the factory to give consistency and accuracy. The resulting interlocking characteristics of concrete block paving give it a distinct advantage over other forms of surface. Laid on a granular laying course and with an edge restraint, individual blocks interlock with each other to act together, distributing large point loads evenly. Concrete block paving can be used immediately after the laying procedures have been completed and requires only minimal maintenance. Today, mechanical installation techniques allow large areas to be laid with a minimum of manpower saving both time and money.

Applications

Concrete block paving offers outstanding strength and durability, and is resistant to most chemicals, making it suitable for a range of applications from ultra-heavy duty areas such as industrial units, container stacking yards and airport pavements to lightly trafficked residential areas and hard landscaping projects. Block paving can also be used in conjunction with precast concrete flags, with coordinating sizes, to give variety combined with consistent surface characteristics.

Worn out road surfaces and other areas such as aircraft aprons, industrial hard-standings and car parks can be strengthened and reconditioned by an overlay of concrete block paving on a sand laying course. The new wearing surface uses the old pavement as the base course, providing it is structurally sound, and the design procedure is included in BS7533 2001. This cost-saving rehabilitation technique can be completed in sections with minimal disruption and has led to it being adopted extensively by airport operators such as BAA.

Reinstatement and Recycling

The structure of block paved areas allows sectional removal and reinstatement using the original blocks. The material's ability to accommodate reinstatement has been likened to 'unzipping' the surface without leaving evidence, in contrast to the patched or ribboned areas always apparent in an asphalt reinstatement. The re-use of concrete paving blocks contributes further to its impressive environmental credentials.

Colours, Finishes, Shapes and Sizes

Concrete block paving is available in a constantly expanding variety of shapes, sizes, colours and finishes and can be installed in numerous bonds and laying patterns, enabling it to delineate space or focus on specific features. Colours are formed from UV stable pigments which are an integral part of the block mix. Some blocks are multi-colour or brindle, formed from batches of two or more colours - such as black, red and buff - which are then blended together. Concrete block paving, often with an irregular or 'weathered' appearance, can match the look of stone setts, cobbles, clay bricks and other traditional surfaces while costing significantly less and providing better slip resistance and a more accessible surface for all pedestrians. Full details of special products and finishes can be obtained from individual Interpave manufacturer Members.

Performance

The new European Standard BS EN 1338: 2003, *Concrete Paving Blocks - Requirements and Test Methods* has introduced a different approach to the old British Standard that will give specifiers and suppliers more confidence in the use of concrete paving blocks. Whereas the BS EN stipulates that the manufactured concrete must conform to a wider range of performance characteristics, determined on actual manufactured concrete paving block. Additionally, instead of having "one size fits all", all the performance characteristics are classified into classes, which the manufacturer must declare, so that the specifier and supplier has the relevant information needed to make informed selections.

Before any product is launched it is subjected to the rigours of 'Initial Type Testing' which demonstrates conformity to the BS EN for a product family. A family of product types is best described as paving blocks manufactured to give a similar surface using the same equipment, process and raw materials, e.g. a paving block manufactured with a natural river gravel will belong to the same surface family (same performance characteristics) as a paving block manufactured with crushed granite/limestone. Each manufacturer will declare their definitions of product families when asked.

The continuing conformance of the concrete block paving to the BS EN is supported by 'Routine Type Testing' and additional measures established under 'Factory Production Control'. The BS EN describes how the performance characteristics are to be assessed with detailed test methods and procedures, as described below. These methods are to be used in all cases of dispute resolution. Other methods can be used routinely to check compliance with the BS EN provided correlation is established with the standard method.

Splitting Strength - is a measure of the ability of the concrete block paving to withstand load. It is determined under laboratory conditions applying a tensile splitting test. The concrete block paving is placed between two rigid bearers rounded to a radius of 75 ± 5 mm, after immersion in water for 24 hours, and a load uniformly applied at a rate which corresponds to an increase in stress of 0.05 ± 0.01 MPa/s until failure is reached. For each block the individual splitting strength in MPa is determined by calculation using the formula and a correction factor, and are recorded to check compliance with the BS EN. The number of blocks per sample will vary depending on previous production performance assessed statistically by attributes or variables.

Weathering Resistance - is a measure of the ability of the concrete paving block to withstand weathering where specific conditions exist such as frequent contact of the surfaces with de-icing salt under frost conditions. It can be assessed under laboratory conditions by measuring the amount of spalled material from a surface under the cycle of freezing/thawing action using a de-icing salt solution. Or, if no de-icing salt is used, then the measurement of the porosity by measuring the water absorption of the block should be used.

Abrasion Resistance - is a measure of the ability of the concrete paving block to withstand erosion caused by trafficking in service. It is assessed under laboratory conditions by abrading the surface of the block with a flow of a hard abrasive material while applying a known force. The resulting loss of material from the block surface is measured by determining the abraded width.

Slip/Skid Resistance - is a measure of the ability of the concrete block paving laid in service to withstand slipping for pedestrians and skidding for vehicles. The unpolished slip resistance value is determined using a "standard rubber" material attached to a Pendulum Friction Tester and tested under wet conditions. To determine the polished paver value (PPV) for all paving units BS 7932: 1998 should be used. This standard has formed the basis for the European Test Method DD ENV 12633:2003. This test method measures the slip resistance of the block paving after it has been synthetically trafficked (or polished) under laboratory conditions to replicate the performance of block paving during its life under traffic conditions. For more details please contact Interpave.