Appendix U.5.12 – PrEN 1338

Generic Name of Test	*Sliding* Fine Abrasive : Abrasion Test
Principle of Test	Rotating steel disc causes abrasive to roll / slide across face of loaded specimen
Historic Development of Test	This test method detailed in the European Standard *PrEN 1338:1996 "Concrete Paving Blocks. Requirements and Test Methods"* was adopted from the French standard NF P 98-303: Concrete paving blocks, with a few modifications, and was first adopted as a draft European Standard in 1996.
Apparatus and Abrasives	The apparatus (shown in figure U.5.12.1 and U.5.12.2) consists of a steel disk with a diameter of 200mm and a width of 70mm. The concrete specimen (100 x 100mm) is clamped in a vertical position on a sliding trolley. A counterweight provides a constant force on the abrasion wheel. Abrasive grit is stored such that a constant flow rate can be achieved. [Vallès (1997)]

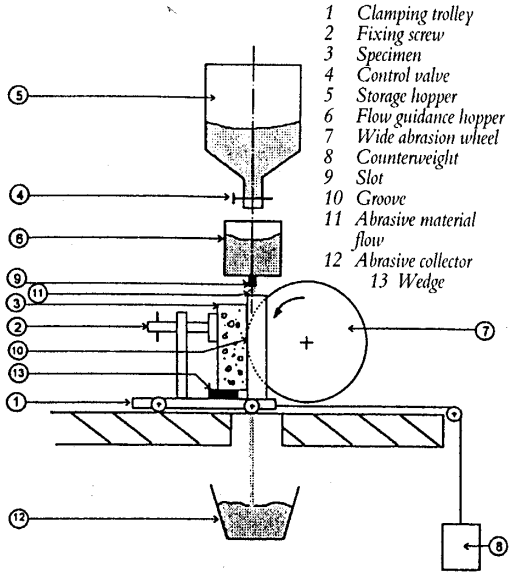

Figure U.5.12.1 Schematic representation of abrasion machine

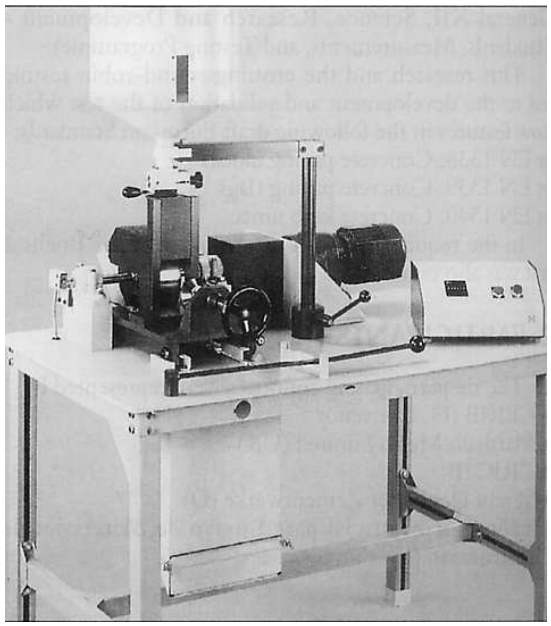

Figure U.5.12.2 The abrasion testing machine

Test Method	The test specimen is clamped in the sliding trolley and the abrasive wheel is rotated at 75 rpm. The abrasive flow is set at 1g per revolution and the test consists of 75 revolutions. The counterbalance weight is determined during the calibration of the machine. [Vallès (1997)]
Abrasion Wear	The length of the groove cut into the specimen is measured as indicated in figure U.5.12.3 [Vallès (1997)]
References	Author — Comment Vallès (1997) — Source document Alexander (1984) — Source document Dowson (1994) — Source document van der Vringe (1994) — Source document

APPENDIX U.5.12

Wear Mechanisms according to Author
(i) Alexander (1984): The grinding action is that of friction, scraping and attrition.
(ii) Visual Effects: None available.

Wear Mechanisms according to writer [R2 S2 I0]

(i) Rolling and Skidding: The mechanism of wear is one of microscopic crushing and shearing at the contact points, as the steel disk forces the sand to move across the face of the specimen (see figure U.5.12.3). The sand will both skid and roll. The predominant action in the case of skidding/sliding will be shearing in the form of scratching, scraping and cutting of the asperities. In the case of rolling, sharp points are likely to generate high compressive stress, resulting in microscopic crushing in very localised areas. The corresponding abrasion wear may be referred to as $Q_{Crushing} \propto W_{n+1}$ and $Q_{Shearing} \propto F_n = \mu W_n$

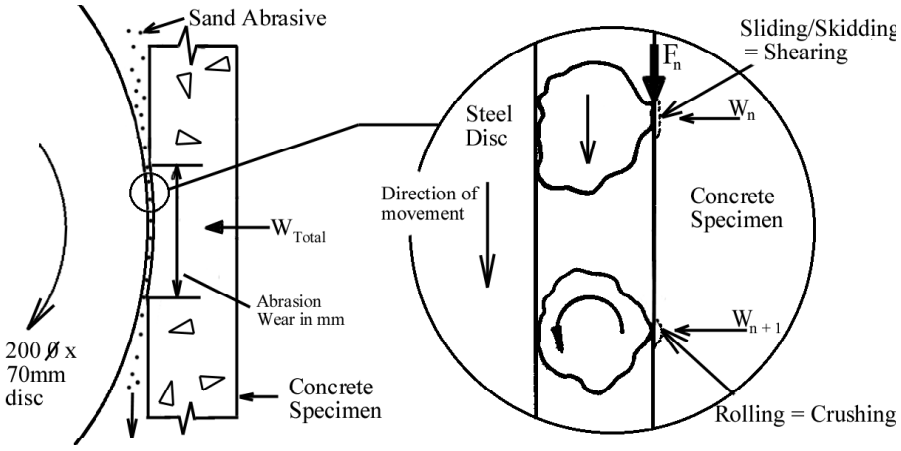

Figure U.5.12.3 Rolling and sliding wear mechanism

Note: This test does not measure the aggregate/paste bond. The aggregate particles that are loosened during the abrasion process are unable to 'escape'. In effect they contribute to an unrealistically high 'abrasion resistance' result, whereas in practise they would be plucked out of the matrix by traffic etc. The size of loose aggregate that is in effect 'trapped' will depend on the gap between the test sample and the grinding disc, and this in turn is determined by the size of the abrasive particles.

(ii) Adhesion and deformation: See note 1 in introduction to appendix U