

focus

Paving the way for improved testing standards

We don't even see them and unless a vibration in our car alerts us to their presence, pavers are [mostly] an unacknowledged part of our daily lives. Yet they strengthen the road at intersections, create a breaking system at toll-gates and some communities even have entire roads made out of them. CEN talks to PMSA and the CMA about a machine that tests pavers' quality and the implementation of improved standards.

Pan Mixers South Africa [PMSA] was started in 1976 by Hans Ebeling, a mechanical engineer, developing a range of counter-current pan mixers and block making machines. In the early 90s his two sons took over the running of the business and today it is the largest manufacturer of concrete brick and block making machines in the southern hemisphere.

Walter Ebeling, Director, PMSA, says, "To enlarge their market share in the concrete industry, over the last two years, Pan Mixers has taken on the distribution of a range of products, mainly from Europe. We now represent companies that manufacture concrete pipe making machines, curb making machines, microwave moisture sensing equipment, chemicals for the concrete industry, concrete pumps from Sermac in Italy and more recently, Fiori, which is a self-loading concrete mixer." Walter believes that the Fiori mixer is ideal for the rural areas, where ready-mix concrete is not a viable option.

The Concrete Manufacturers Association [CMA] is a technical marketing organisation, started in

1973, to promote the benefits of precast concrete products supplied to the building and construction industry. Says John Cairns retired CMA Director and paving consultant, "CMA members are mainly the manufacturers – large and small – and the over-arching criteria of membership, is quality."

John continues, "We develop and update standards for precast concrete, both for product and method of installation/process." According to John, standards are developed by industry; through a combination of manufacturers and engineers. He adds, that although the SABS enforces the standards, "they are merely a secretariat; they ensure that the standards are entered and published in the correct format for the specific product viz an SANS [South African National Standard.]" John adds, "We are educating the engineers to design properly and the contractors to install correctly."

New standards

The SABS ensures that correct and accurate records are maintained and that companies comply with the set

standard, with the result that the [often costly] SABS mark on a product carries significant weight within industry in general.

The CMA has changed the SABS specifications for paving products and the new SABS standard will make way for concrete pavers that are specified – not only in crushing and breaking strength, but in abrasion resistance too.

"The reason is," says Walter, "that prior to this change, the quality of paving products was only ever checked on the breaking strength of the product; its crushing strength was checked for consistency. However, in some instances, its abrasion resistance characteristics failed. The new standard specifies a measurable standard for abrasion resistance and they more accurately reflect the environment under which pavers perform."

John adds, "This is a major revision which has been about five years in developing." Not only has the abrasion test been added, but the compression strength has also been changed to include tensile splitting strength testing. According to John this standard is now accepted as the yardstick world wide. He adds, "There's nothing new in our standards. We have taken the best processes from around the world eg the European standard for the tensile strength test combined with the Australian abrasion test."

After extensive research, the CMA determined that the most uniform method of testing abrasion to the new SABS standard would be to use ball bearings. "This technique simulates high-traffic areas such as loading yards, stock yards and intersections whereby abrasion is a problem," adds Walter.

"There is a difference to meeting a standard [and bearing the mark as proof] and complying with a set of specifications."

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A small opening on the plate to which the paver is bolted exposes the surface of the drum. Steel ball bearings are placed inside the drum and as the drum turns, the ball bearings fall onto and slide across the exposed areas of the pavers, thereby simulating the abrasion process in the field.



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According to John, for abrasion testing two considerations are made: testing the aggregate itself [small stones in the concrete] and the cement 'paste' that binds the aggregate together. He says, "Most of the tests conducted tested either one or the other, but you ideally need something to test both."

John adds that alternate methods of testing – such as wire brushing – are inferior, as there are too many variables that could influence the amount of wear on a paving surface. He says, "With the wire brush method you were only testing the paste of the paver." By using steel ball bearings however, these variables are covered, and a comprehensive test result is achieved.

Walter adds, "In our opinion, of all the tests, the ball bearing test produces the most consistent results."

With this end in mind, PMSA is manufacturing an abrasion testing machine that uses ball bearings in its process.

The abrasion machine

The abrasion testing machine is a square-shaped drum, onto which four pavers are bolted to each face of the machine. [Each paver has been weighed before being affixed to the machine.] A small opening on the plate to which the paver is bolted exposes the surface of the paver to the inside of the drum. Steel ball bearings are placed inside the drum and as the drum turns, the ball bearings fall onto and slide across the exposed areas of the pavers, thereby simulating the abrasion process in the field.

After a specified number of revolutions, the pavers are weighed again and the mass loss is measured



A selection of pavers showing various levels of abrasion after being tested on the abrasion machine.

against their weight before the test began. John says that on a set of eight pavers, the average weight loss must not exceed twelve grams. If the weight loss falls below the twelve gram mark, the pavers will be considered abrasion resistant.

The machine is manufactured locally by PMSA and the use of the machine is fully detailed, to ensure consistent working and testing conditions. John explains, "The conditions under which the specimens are prepared and tested is very specific and an SABS Inspector conducts an inspection twice a year to ensure that the strictest specifications are maintained. He goes through the company's testing records for the previous six months as well as taking samples of product with which to conduct his own tests."

Benefits

By conducting their own tests, in-house, companies are assured of a consistent standard, and should they choose [at a cost] they can have the SABS mark on their product. Walter adds, "Owing to the cost of acquiring the mark some companies may opt not to have it. However, they can still meet the specifications and are permitted to advertise as such." John adds, "I think those who choose not to have the mark are short-sighted in the long run." He continues,

"There is a difference to meeting a standard [and bearing the mark as proof] and complying with a set of specifications." John stresses, "As a consumer, you have to be more aware as to what is being offered."

He says that concrete paving blocks that are manufactured according to the new standard will provide the consumer with the means of being able to compare the performance of the various pavers on the market with more accuracy.

The CMA is attempting to enforce a strategy whereby the SABS promotes the necessity of having the mark on their concrete products, to ensure high quality in the industry and consistent performance all round.

Both men are in agreement that although the standards have been changed, they may well change further as the paving industry and its associated technologies remain a dynamic environment. Walter says, "There may well be other paver performance parameters that have not been taken into account, and the industry would then re-evaluate the environment and once again conduct relevant tests to improve the process."

Walter concludes, "The new abrasion standard is 'good news all round', as the industry has been pushing for higher standards for many years."