1 - Goal:

Determination, when the compressive strength is draining surfaces Aquastone 'according to metod assay based on the procedure described in. § 9.2 - Compressive strength of test EN 196-1 standard (Methods of testing cement Part 1: Determination, to the mechanical resistances.).

The EN 196-1 standard and the applicable standard for the determination, the replacement of that property, to DIN 1164-7:1978 (Portland, Portland-iron, blast-furnace-, and trass cement; determination of strength).

2 - Equipment

i) universal testing Machine Instron electromecanica ®, Model 4208;

ii) load cell Instron ® 300 kN;

iii) self-aligning dispositive for application, to load;

iv) Plates action, the 50 x 50 x 2 mm3, the auxiliary load.

3 - Samples and Specimens

Were provided by the requesting entity 's SECC several test ; 6FS of three responses of draining pavement Aquastone , in the form of plates , where the specimens were to ens41io extrafdos . The three types of drainage pavement are:

i) Aquastone with inert crushed marmorite grading 2-6 mm;
ii) Aquastone with inert boulder sflica of grain size 2-6 mm ;
iii) Aquastone with inert boulder sflica of grain size 4-8 mm .

Whether the standard of DIN EN 196-1 or 1164.7 (1 or DIN EN 96-1) currently used in their substitutions , refer to the use of test geometry with prismatic sec ' , the cross 40 x 40 mm2 and length of
160 mm.

The realization , to the ' . compression test in accordance with the aforementioned rules requires the use , to the two halves of resulting prismatic specimens ruptured in a flexural test before or by means which do not impose the semi - prisms harmful tens6es . These " semi - prisms " correspond to two independent samples and are ordered in compression saber two major faces , between plates with an area of 40 x 40 mm2 .

The materials under test were provided in the form of plates and wanted to his characterization , the compression in requesting the material between the upper and lower faces (exposed at work) , and (in contact with superffcie where and applied) , ie , in Direcc , the normal to the plane of the plates .

Thus, samples with an area of 40 x 40 mm2 and thickness were machined from where plates were from

Then we present figures for the three floors and some samples (Fig. 1 .1 I Fig. 1 and Fig 1 .3 .21). The designation, to the specimens and dimens6es relevant to the three materials under test are presented nasi Table 1. Table 1 I 1 .2 and .3 Table 1.

Image 1.1 - Floor section Aquastone Marmorite with crushed grain size 2-6 mm and specimens.

Table 1.1 – Dimens6es dos provetes para Aquastone com marmorite britada de granulometria 2-6 mm.

Specimen	*Size 1 (mm)*	*Size 2 (mm)*	*Tickness (mm)*
A 01	41.6	40.2	24.9
A02	41.9	40.4	23.5
A03	42.3	41.4	22.0
A04	38.4	39.8	23.6
A 05	41.8	41.2	23.2
A06	42.1	41.6	22.4
Valor media	41.4.	40.8	23.3
Desvio Padrao	1.5	0.7	1.0

Image 1.2 – Section Aquastone pavement with boulder grain size 2-6 mm and specimens.

Table 1.2 – Dimensions of the test specimens for Aquastone pebbles taken from 2-6 mm grain size.

Specimen	*Size 1 (mm)*	*Size(mm)*	*Tickness (mm)*
B 01	40.9	4.2	24.1
B 02	41.6	42.5	24.9
B 03	40.8	40.4	24.4
B 04	40.3	38.2	24.3
B 05	42.2	43.0	23.8
B 06	41.2	44.8	22.4
Average Value	41.2	41.8	24.0
Standard deviation	0.7	2.3	0.9

Image 1.3 – Section Aquastone boulder pavement with grain size 4-8 mm and specimens..

Table 1.3 – Dimensions of specimens for Aquastone pebbles taken from 4-8 mm grain size.

Specimen	*Size 1 (mm)*	*Size 2 (mm)*	*Tickness (mm)*
C 01	40.8	38.3	30.1 C
02	39.9	384	30.5 C
03	38.8	40.4	31.2 C
04	39.1	42.2	31.1
COS	38:1	43.6	31.2
C 06	41.2	37.4	31.2
Average value	39.6	40.0	30.9
Standard deviation	1.2	2.5	0.5

The specimens were conditioned in a chamber at 23 (± 1) ° C and 50 (± 5) ° / o relative humidity for at least 48 hours before undergoing the test.

- Experimental Realisation

The experimental procedure cons1st1u subjecting specimens to compression between two coplanar surfaces until rupture .

According to the procedure described in the test standard EN 196-1 testing should be carried out with charge control in such a way that uniformly increase the rate of 2.4 ± 0.4 kN.s - 1 to rupture .

The customer was informed that the equipment performs test avaiablel displacement control and not charging for what would be the control parameter in the realization the tests .

In order to approximate the conditions of realization , to those contained in the EN 196-1 standard test preliminary tests on additional specimens were carried out to determine a rate of callback request , which translates to a rate of application , the load on agreement with the limits specified in EN 196-1 . It was found that speeds necessary assay would involve assays Duration ; 3 s to 5 s for the breaking loads were in the neighbord ; that of 10 kN . The realization, the tests in such condition posed some problems .

In particular , given some irregularity of the upper and lower faces of the specimens , not prevent the proper sleeps , the application of the system, the load may result in improperly distributed loads and premature breakage .

It was therefore decided to opt for speeds callback request , the corresponding rates of evoluc , the lower load . The callback request speeds ; were selected so as to maintain constant the rate of DEFORMAC , to the specimens , COP1 calculated based on the average thickness of the samples for each type of pavement . The velocity values corresponding to a rate of DEFORMAC test ; o/os-1 to 0.11 (6.5 ° / o.min -1) are shown in Table 2.

Table 2 – Test speeds for a fee deforms <; 0:11 to x%. • s-1

Aquastone Pavement	*Test speed (mm.min-1)*
With Rubble marmorite grading 2-6 mm c/	1.5
With boulder grading 2-6 mm	1.5
With boulder grading 4-8 mm	2.0

Then are presented some photographic records obtained during realization, the tests which allow us to observe the experimental arrangement and different moments of the long-compression tests

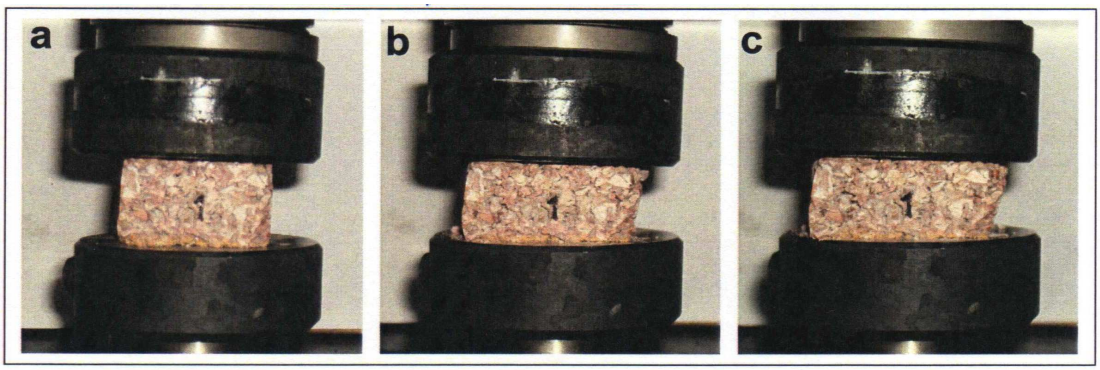

Image 2.1 – The test of specimen 01 in infcio (a), the maximum load ap6s (b) and final state (c).

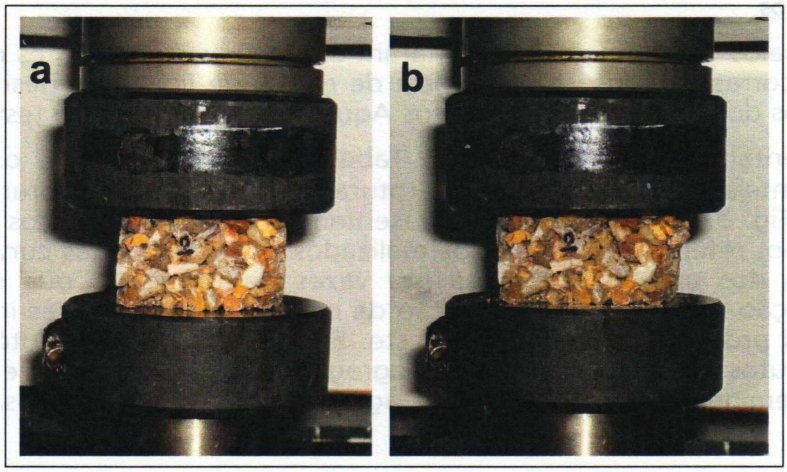

Image 2.2– Test of specimen B 02no infcio (a), the maximum load after (b).

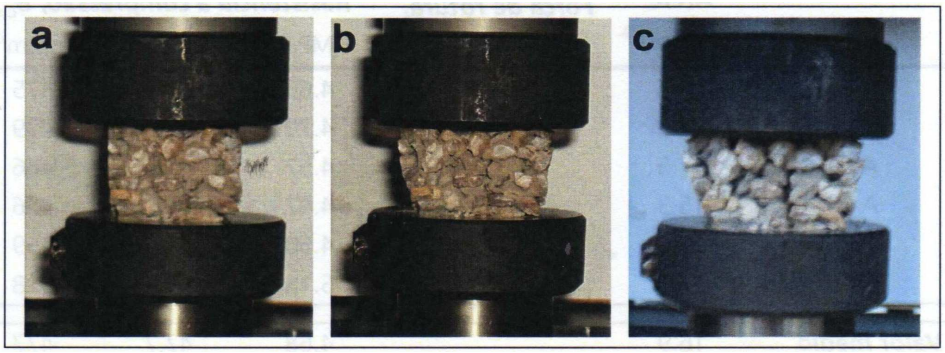

Image 2.3– Test the sample at 04 C infcio (a), the maximum load ap6s (b) and final state (c).

The tests took place in a laborat6rio with temperature and relative humidity controlled "lated and adjusted to the values of 23 (± 1) ° C and laborat6rio
55 (± 5) o / o, respectively.

Results

The compression tests resulted in ruptures coincident with the maximum load corresponding to occurrence of fracture league <; 6ES adhesive between
Aquastone aggregates of different flooring undergoing test.

Are shown in, Table 3.1, • Table 3.2 and Table 3.3, including the experimental results is <; the at break (Fe r) and tensile strength (acc. r> In Figure 3.1, Figure 3.2. and Figure 3.3, the graphs are presented for voltage records
- Extension, referring to tests. The evolution <; the load curves of the long tests has often disturbs <; 6FS which accommodates result of <; applies to the <system, the load to the irregularities intrfnsecas
Faces of products undergoing testing. This aspect of the case and more not6rio
products containing Aquastone boulder clusters and between
more prominent in the product with larger aggregates (ie, the 4
8 mm).

Table 3.1 – Results of compressive strength is to Aquastone marmorite with crushed grain size 2-6 mm..

Specimen	*Area, A (cm²)*	*Out of rupture, Fe.,(kN)*	*Compressive strength, Uc.* r (MPa)	(kg.cm-²)	(ton.m-²)
A 01	16.7	7.79	4.66	47.5	475
A02	16.9	7.96	4.70	47.9	479
A03	,'	8.00	4.57	46.6	466
A04	15.3	6.83	4.47	45.6	456
A05	17.2	7.75	f 4.50	45.9	459
A06	17.5	9.07	5.18	52.8	528
Average value	16.9		4.68	47.7	477
Standard deviation	0.8		0.26	2.6	26

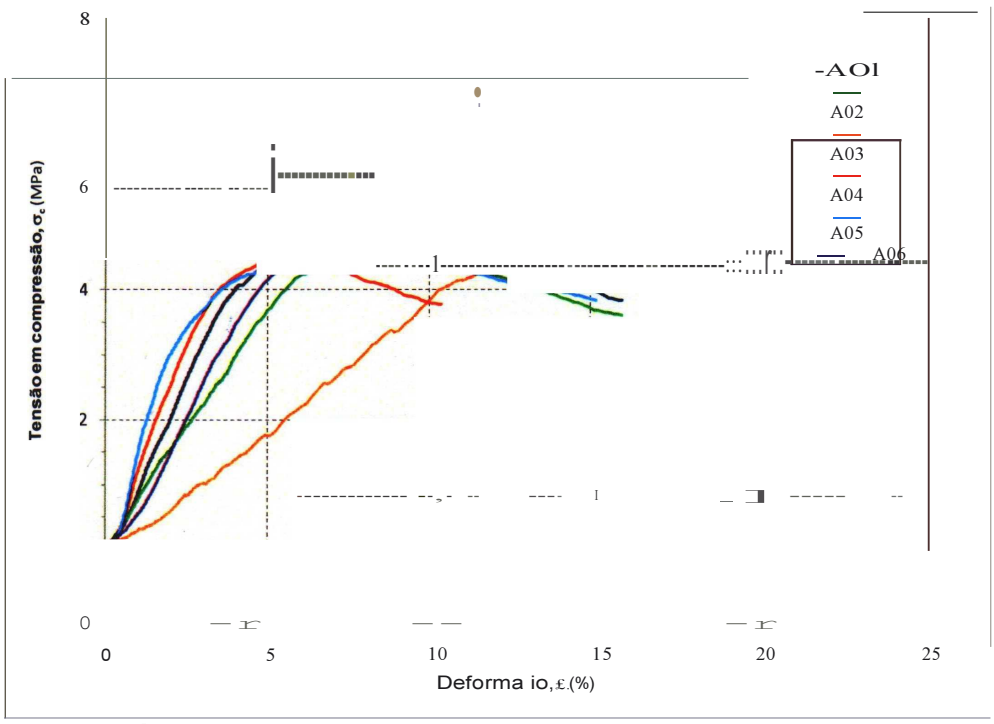

Image 3.1 – Registration Graphical vs crc. Ec for the tests of the specimens with crushed Aquastone marmorite grain size 2-6 mm.

Table 3.2 – Resultados de resistencia à compressao para

Provete	Area, A (cm^2)	Out of roture, Fe.,(kN)	Compression strength, ere., (MPa)	(kg.cm^{-2})	(tonnes.m^{-2})
B 01	17.3	7.06	4.09	41.7	417
B 02	17.7	6.62	3.74	38.2	382
B 03	16.5	7.13	4.32	44.1	441
B 04	15.4	7.57	4.92	50.1	501
B 05	18.1	7.54	4.15	42.4	424
B 06	18.5	8.51	4.61	47.0	470
Valormedio	17.2		4.31	43.9	439
Desvio Padrao	1.1		0.41	4.2	42

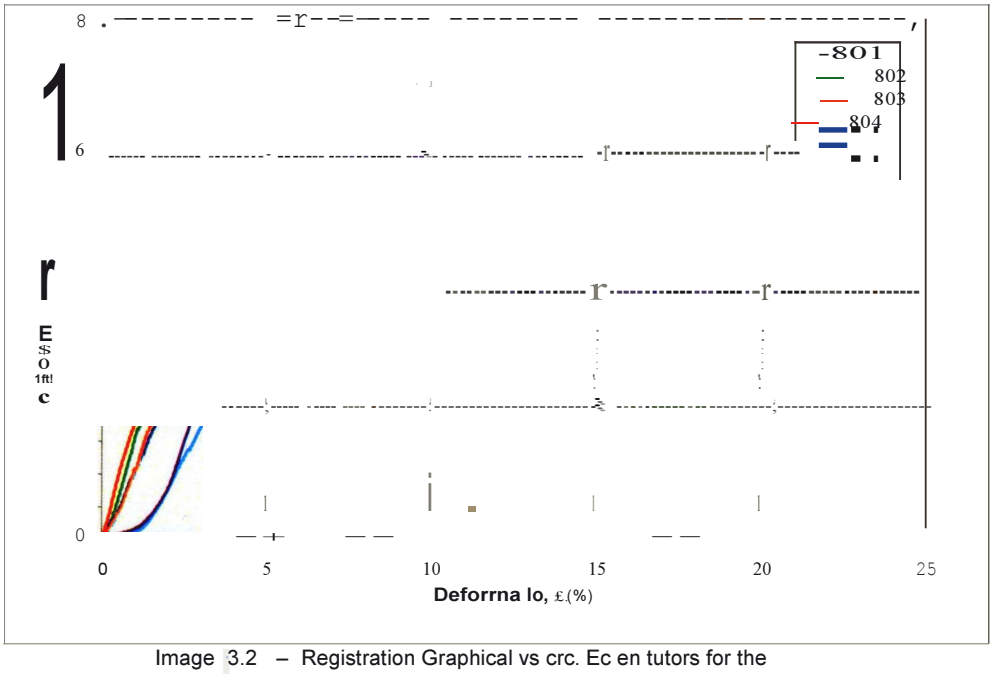

Image 3.2 – Registration Graphical vs crc. Ec en tutors for the specimens of Aquastone with boulder grain size 2-6 mm.

Table 3.3- Results of compressive strength is to Aquastone pebbles taken from 4-8 mm grain size.

Provete	)Area, A (cm^2	Out of roture, Fe., (kN)	Compressive strength, uc., (MPa)	(kg.cm-^{2})	(ton.m-^{2})
C 01	15.6	8.49	5.43	55.4	554
C 02	15.3	6.97	4.55	46.4	464
C 03	15.7	7.75	4.95	50.4	504
C 04	16.5	9.80	5.94	60.6	606
C 05	16.6	7.92	4.77	48.6	486
C 06	15.4	7.04	4.57	46.6	466
Average value	15.9		5.03	51.3	513
Stadard deviation	0.6		0.55	5.6	56

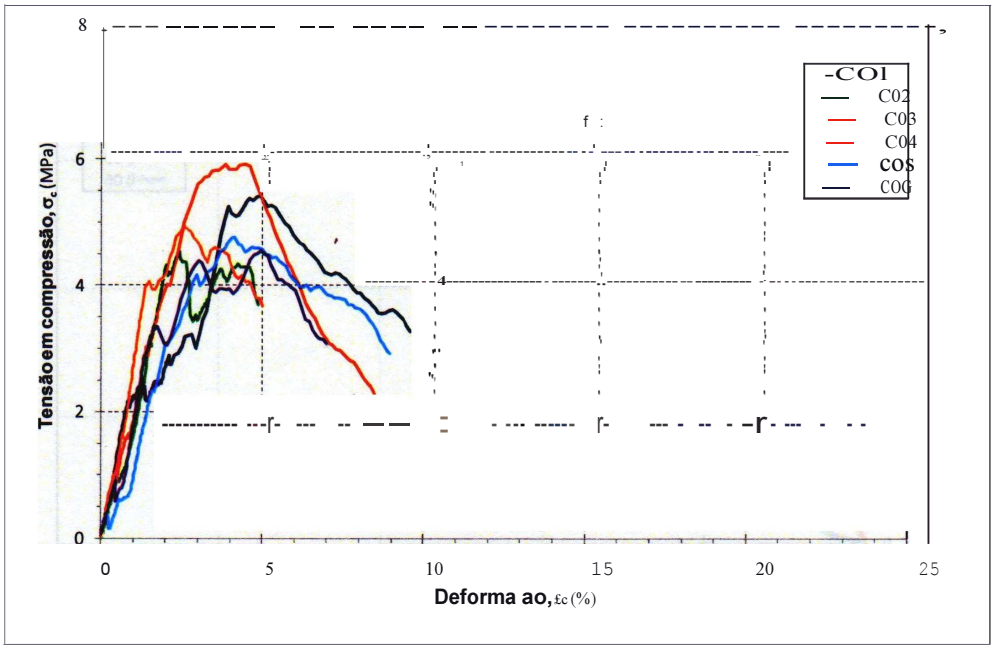

Image 3.3 – Register Graphical vs ac. Ec for esaios of samples of pebbles taken Aquastone grain size 4-8 mm.

Laboratory responsible

(Paulo Jo ge R. O N6oa)