

## EFFECTS OF INTENSITY OF LOAD IN RESULTS OF SCLEROMETRY APPLIED TO SPECIMENS OF CONCRETE

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### Abstract

Nondestructive testing (NDT) techniques are essential for determination of certain concrete properties, with applications in the field and allowing the integrity of structural elements. In the development of this research, two groups of concrete of compressive strength of 21.3 MPa and 41.5 MPa were studied. For the purposes of sclerometric impacts, the specimens (150 mm x 300 mm) were submitted to three loading levels. We conclude that the sclerometric indexes are less affected by intensity of loading, than by the compressive strength of concrete.

Key words: *Surface hardness, nondestructive testing, compressive strength.*

### Introduction

The sclerometry is a NDT technique used to evaluate the surface hardness of the concrete, which has the results affected by moisture and carbonation, by the type of cement and of aggregate, as well as, by the age of concrete (1).

According to (2), the stress to restrain the specimens during the test must be equal to 15% of the estimated rupture stress of the concrete.

In this research was evaluated if the sclerometric impacts are affected by loads applied to elements of concrete.

### Results and Discussion

Two groups of concrete specimens were produced with strengths of 21.3 MPa and 41.5 MPa. Each group was composed of 15 specimens, that were prepared (polished, demarcated the points, identified) and fixed in universal testing machine (EMIC, Brazil). Three loading levels were applied (5%, 15% and 50% of the estimated compressive stress of the concrete). For each load level the specimens received 10 impacts (Digital Silver Schmidt BN, PROCEQ, Switzerland).

**Image 1.** Sclerometric impact test.



**Table 1.** Sclerometric Index – 1st Group.

Applied load level (%)	5	15	50
Mean (SI)	19.3	18.5	17.7
Standard deviation	2.2	1.9	2.1
Coefficient of variation (%)	11.8	10.7	12.0

**Table 2.** Sclerometric Index – 2nd Group.

Applied load level (%)	5	15	50
Mean (SI)	41.9	40.9	43.4
Standard deviation	4.5	5.3	3.8
Coefficient of variation (%)	10.7	13.0	8.8

The results evidence that the sclerometric index increases with compression strength of the concrete, with observed variations in the order 117-145%. In the 1st Group, we note that there was a decrease in the values of (SI), with the increase of applied load level. Already, for the 2nd Group when the load was increased to the highest level (50%), there was an increase in the value of the sclerometric index.

### Conclusions

We concluded that the sclerometry results are less affected by the intensity of the load than the strength class of concrete.

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<sup>1</sup> ABNT NBR 7584 Hardened concrete - Evaluation of surface hardness by reflecting sclerometer - Test method. Brazilian Technical Standards Association, Rio de Janeiro. 2012. (in Portuguese)

<sup>2</sup> Evangelista, A.C.J. Evaluation of concrete strength using different Non-destructive testing. PhD thesis. UFRJ, Rio de Janeiro. 2002. (in Portuguese)