

NATURAL STONES – HISTORIC MATERIALS AND SUSTAINABLE RESOURCES

Ákos Török¹

¹ Budapest University of Technology and Economics, Department of Construction Materials and Engineering Geology, H-1111 Budapest, Hungary, torokakos@mail.bme.hu

ABSTRACT: The first stone structures have been erected more than 5000 years ago and since then stone became a key material in human culture and contributed to the evolution of human well-being. Emblematic monuments and symbolic pieces of art have been made of stone throughout human history. The use of stone has changed with time and at present great demand for prestigious stone materials and bulk quantities of stone exists in the modern society. Various applications of stones include dimension- and ornamental stone, wall cladding and paving stone, but the largest amount of all is aggregate. Till the 19th century the cities and stone structures were mostly made of local stones, but after the implementation of new transportation facilities such as rail, road or intense shipping stones were transported to longer distances. Another significant change in the appearance of cities came in the late 1980'ies when new stone producing countries from Asia, Africa and the Americas appeared in the global market providing great quantities of stones. This led to a more global distribution of stone, exploration and exploitation of resources. Despite the fact that from at about one third of the quarried material became the final stone product, stone is still a very sustainable material in comparison with other building materials such as concrete or glass. Although stone is often a symbol of eternity and durability, many natural stone varieties are sensitive to environment and show signs of damage and decay in time. The paper also provide an overview on how the quality of stones can be checked in situ and under laboratory conditions and which environmental conditions, man-made pollutants and human effects lead to the damage of stone structures. To avoid the damages in stone structures and to minimize losses, proper selection of stone is necessary based on standardized or non-standardized testing procedures. Use and limitations of available techniques will be outlined. Diagnostic methods at raw material scale and at processed stone of the buildings will be also discussed with illustrated examples. In summary, the proper stone selection for the new buildings or the selection of the appropriate remediation and conservation method of damaged stone structures allow the long-term use and survival of historic and new stone structures even in the modern society.

KEYWORDS: STONE TESTING, MONUMENTS