

EXPANSION PRESSURES, PORE SIZE DISTRIBUTION, AND DURABILITY PROPERTIES OF ROCKS

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Dominant pore size, total pore volume, and pore size distribution govern the expansive behaviour of rocks as their temperature and moisture environment changes. Rock cylinders have been confined to a constant strain level, and the pressure changes were measured as the rocks were saturated, frozen, and exposed to salt solutions.

The pore characteristics of rock are determined by their origin and subsequent geologic history. The rocks with dominantly small pores in less than 5 micron diameter range tend to be most expansive on wetting. The rocks with intermediate pore sizes in the capillary range contract on wetting, then relax. The expansive/tensional pressure developed is a function of the confining pressure, and in extreme cases can be more than double the initial pressure. The pressure increase or decrease can cause both compressive and tensional failure of the confined rock.

The findings are important in durability of rock used as construction aggregate, and the techniques can predict the behaviour of rock pillars exposed to temperature/humidity changes.