



TECHNICAL BULLETIN AD-05

SHRINKAGE CONTROL ADDITIVES

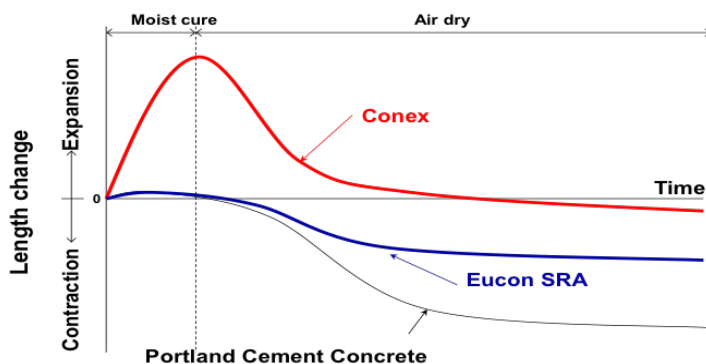
EUCLID CHEMICAL

Euclid Chemical offers a number of additives to help control the shrinkage of concrete and / or compensate for it. Recently there has been some confusion or questions regarding when to use which shrinkage control additive. This technical brief has been developed to help explain the benefits of each additive and give some examples of when or how to use them.

The additives most commonly used to control shrinkage are; **EUCON™ SRA-XT / Floor**, **CONEX®** and **TUF-STRAND™ SF** macro fibers.

EUCON SRA-XT / Floor are shrinkage reducing admixtures intended to reduce the amount of shrinkage normally experienced as concrete hydrates and dries. These types of materials use the reduction of pore water hydrostatic / surface tension to reduce the amount of stress exhibited on the wall of the capillary pores as water leaves the system. As concrete dries, the level of capillary water lowers and this action 'pulls' on the walls of the capillary pores due to the normal surface tension of the water. EUCON SRA-XT / Floor should be used when shrinkage requirements mandate up to 50% reduction in shrinkage values.

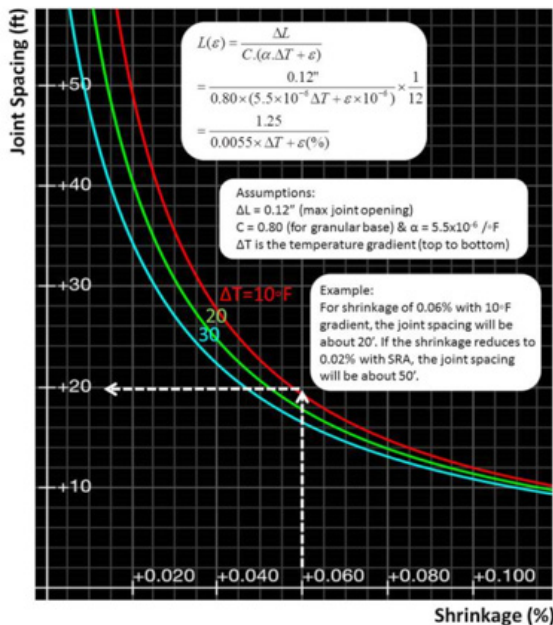
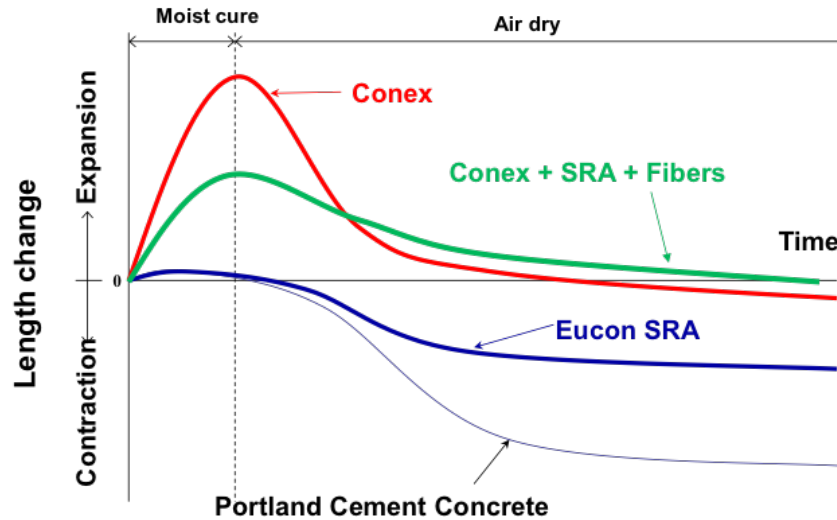
CONEX is a dry powdered material that has early expansive characteristics. When CONEX comes into contact with water one of the components reacts immediately, similar to cement, and has an initial expansive quality. CONEX can function as a shrinkage reducing material when used at the lower rate of its suggested dosage range (3-6 % by weight of cement). Shrinkage compensation is achieved when using CONEX at the higher rate of the recommended dosage range (6-10% by weight of cementitious). When used correctly, this early expansion is enough to compensate for typical shrinkage which will be experienced within the concrete pore structure, resulting in greatly reduced overall shrinkage of the concrete. The reaction of CONEX is generally complete in the first 24 hours after exposure to water. For this reason, when performing length change testing in accordance with ASTM C-157, the specimens must be demolded and initial reading taken at 12 hours. If the initial shrinkage reading is delayed, the shrinkage results will appear as though the CONEX did not perform. CONEX should be used when shrinkage requirements demand shrinkage reduction of greater than 50% when compared to a reference concrete of the same design and materials.



The graph on the left shows the shrinkage typically experienced in reference Portland cement based concrete and concrete utilizing *Shrinkage Reducing admixtures and Shrinkage Compensating materials*.



Fibers do not effectively reduce the amount of shrinkage of concrete. When used appropriately however, they increase the concrete's ability to withstand the stresses of concrete shrinkage which results in less and smaller cracks.



This graph shows typical recommended joint spacing criteria (Darter and Barenberg, 1977) and has been used in FHWA reports and multiple publications.

This graph is based on an empirical equation and assumed criteria; the values may change based on assumed parameters and conditions.

**Use as comparative reference only*