

# RUSSTECHNICAL NOTES

## SRA-157-EXT

### Shrinkage Reducing Admixture

#### OVERVIEW:

**SRA-157-EXT** is a liquid shrinkage-reducing admixture which can be used in any Portland cement-based product to significantly decrease cracking caused by drying shrinkage, curling, and volume reduction. **SRA-157-EXT** functions by blocking capillaries of pore water which is the major mechanism that causes drying shrinkage in concrete. **SRA-157-EXT** is specifically designed for air entrained concrete exposed to freeze-thaw conditions. **SRA-157-EXT** can reduce shrinkage (ASTM C-157) by up to 80% at 28 days of age and by up to 50% at one year of age. This document reviews performance data, mix design considerations, and other technical information.

#### APPLICATIONS:

- Where volume reduction or shrinkage of the concrete or grout mix needs to be reduced
- Where cracking is a durability or aesthetic concern & needs to be greatly reduced or possibly eliminated
- Where a reduction in creep or curling of concrete slabs is desired
- Where the effects of high shrinkage aggregates need to be offset

#### DOSAGE:

**SRA-157-EXT** is recommended for use at a dose of 1.0% to 2.5% by weight of cementitious materials. For maximum effectiveness use 2.5% by weight of cementitious. For example, a mix containing 600 lbs. /yard the 2% equates to 12 lbs. /yard or 1.5 gals. /yard. The shrinkage reduction is generally linear with the dosage within the recommended dosage range so any dosage within this range can be selected based on the degree of shrinkage reduction desired. Drying shrinkage testing prior to the project is highly recommended to determine actual shrinkage rates of the specific concrete mix.

#### PLASTIC CONCRETE:

The impact on slump when **SRA-157-EXT** is substituted in the mix would be similar to an equal volume of water. The initial set times typically are retarded less than 1 hour and will improve slump retention. Air entrainment dosage requirements are slightly higher when incorporating **SRA-157-EXT** to reach normal air contents.

Tighter air content tolerances are recommended in concrete that will be exposed to freezing and thawing environmental conditions. Listed below are the minimum plastic air contents based on the maximum aggregate top size:

Maximum Aggregate Top Size	Minimum Fresh Concrete Air Content
3/8" (9.5 mm)	7.5%
1/2" (12.5 mm)	7.0%
3/4" (19 mm) or larger	6.0%

Please note that the minimum plastic air content is the measured air content of the plastic concrete **at the point of placement**.

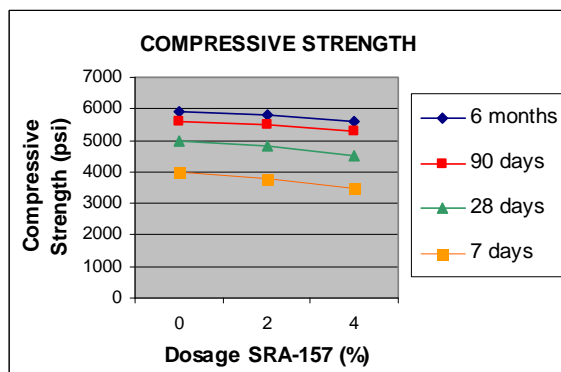
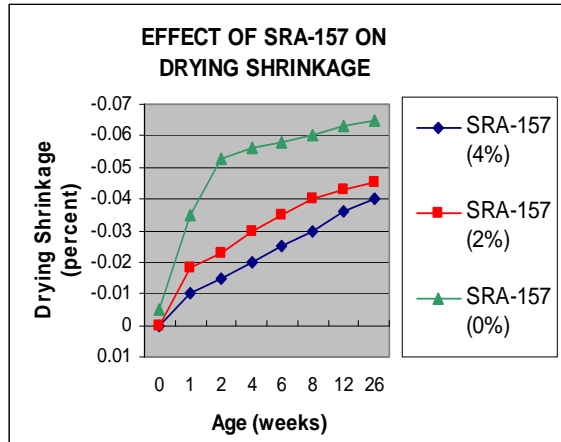
#### MIX PERFORMANCE DATA:

Mix designs incorporating **SRA-157-EXT** will significantly reduce drying shrinkage consequently reducing or possibly eliminating drying shrinkage cracks.

In mix designs incorporating **SRA-157-EXT** compressive strengths may be slightly less than normal. It is reasonable to expect less than 10% strength loss, but this is usually not an issue. For mixes where strength must be maintained a mid-range water reducer such as **FINISHEASE-NC** or super plasticizers such as **SUPERFLO 443**, **SUPERFLO 2000RM**, or **SUPERFLO 2000SCC** are compatible and can be incorporated to offset any strength reduction from **SRA-157-EXT** and use of higher air contents in the mix design.

## TEST MIX EVALUATION:

611 lbs. of Type I cement per cubic yard  
5 ounces/cwt. of **SUPERFLO 2000RM**  
Air Content: 6.0%  
Slump Plain: 5.0 inches (25.4 mm)  
Water/cementitious ratio 0.44



## MIX RECOMMENDATIONS:

Mix designs achieving reduced shrinkage should follow these parameters:

1. Create a mix design with a low water content utilizing a mid-range water reducer (MRWR) or high range water reducer (HRWR).
2. A water adjustment must be made to allow for the **SRA-157-EXT** in the mix. The water in the mix should be *reduced* by as much as the volume added through the addition of the shrinkage-reducing admixture.
3. For best results, **SRA-157-EXT** should be added at the end of the batch sequence.
4. Utilize the largest coarse aggregate top size possible.

5. Incorporate a higher percentage of coarse aggregate (62% to 65%). Adding more coarse aggregate will reduce the water and paste contents of the concrete mix.
6. Wet cure the concrete for as long and as soon as possible. If wet curing is not feasible apply two coats of a quality curing compound such as **CURE & SEAL 300** or **CRETESEAL 30**.
7. Avoid the use of admixtures such as Accelerators, Granulated Blast Furnace Slag and some pozzolans as *increased* drying shrinkage will occur with their use.

## BATCH SEQUENCING:

**SRA-157-EXT** should be added after all dry materials are in and damp. Different sequencing can be incorporated if local testing shows improved performance. **SRA-157-EXT** should not come in contact with any other admixture before or during discharge. In central mixing vessels mixer should be thoroughly cleaned to prevent residual **SRA-157-EXT** in the next batch.

## STORAGE TEMPERATURE:

**SRA-157-EXT** is a potentially combustible material with a flash point of 97C (207F). This is substantially above the upper limit of 60C (140F) for classification as a flammable material, and above the limit of 93C (200F) where DOT requirements would classify this as a combustible material. Nonetheless, this product must be treated with care and protected from excessive heat, open flame, or sparks. For more information consult the MSDS.

## TRIAL MIX REQUIREMENT:

It is strongly recommended that at least one trial mix be run prior to actual placement. This will allow the contractor and producer to determine mix adjustments and optimize amounts of other admixtures to provide a concrete mix that will meet the requirements of the project.



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