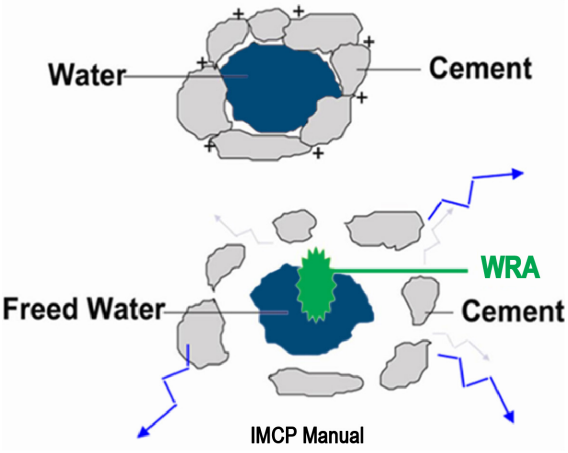
WATER REDUCING ADMIXTURES FOR CONCRETE

REDUCE THE AMOUNT OF WATER NEEDED WHILE MAINTAINING WORKABILITY

Water Reducing Admixtures (WRAs), sometimes referred to as plasticizers, are designed to free trapped water that is present in concrete mixtures and are used in a variety of applications to ensure or improve workability. When cement clinker is ground, electrical charges are created on the surface of the particles. During concrete mixing, cement particles bond together and trap water. The WRA breaks the bond and frees the trapped water which is then available to aid workability and increase cement hydration.



REASONS TO USE WRAs

Water Reduction (AASHTO M 194): The amount of water in the mixture is reduced while maintaining the same slump and workability. This results in a lower water/cementitious ratio. The effect will be an increase in concrete strength and lower permeability.

Plasticizing (AASHTO C 1017M): The amount of water in the mixture is kept constant with the goal of increased slump and workability. The term "plasticizer" is used when a water reducer is used to increase slump at a constant water content.

Increase Cement Efficiency: When WRAs break up the clustered cement particles, additional surface area becomes available to hydrate.

(AASHTO specifications are not Federal requirements)

CLASSIFICATIONS

- Conventional water reducers: The most common type of WRA, these reduce water by 5-10 percent.
- Mid-range water reducers: These reduce water by 6-12 percent and avoid the retardation that may occur with high doses of conventional water reducers.
- High-range water reducers: These reduce water by 12-40 percent and are generally not used in paving concrete (stiffer mixes are used for paving).

SOLUTIONS IN ACTION

WRAs improve concrete durability by lowering the water/cementitious ratio, reducing permeability, increasing air content, and creating a concrete mix with improved workability.

LIMITATIONS

Incompatibilities can be created when accelerating compounds added to some WRAs may speed up the aluminate phase, leading to a false or early set. The incompatibility may also be exacerbated during hot weather, when some supplementary cementitious materials, particularly Class C fly ash, are also contributing to the sulfate imbalance.

LEARN MORE ABOUT CHEMICAL ADMIXTURES FOR CONCRETE:

FHWA Tech Brief | *ACI Education Bulletin E4-12*

LEARN MORE ABOUT CONCRETE TECHNOLOGIES AT **WWW.FHWA.DOT.GOV/MCTC**

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