

P R O D U C T I N F O R M A T I O N



Eclipse®

Shrinkage Reducing Admixture

Description

Eclipse® Shrinkage Reducing Admixture is a liquid admixture for concrete (or virtually any portland cement based material) which dramatically reduces the materials shrinkage due to drying. Eclipse contains no expansive material, but instead acts chemically to attack the primary mechanism causing shrinkage. Concrete containing Eclipse at a dosage of 2% by weight of cement has been shown to reduce shrinkage, as measured per ASTM C 157, by as much as 80% at 28 days, and up to 50% at one year or beyond. This level of shrinkage reduction, in well proportioned concrete mixtures utilizing quality materials, has been demonstrated to eliminate cracking due to drying shrinkage in fully restrained concrete. One liter of Eclipse Shrinkage Reducing Admixture weighs approximately 0.93 kg (7.8 lbs/ gal).

Use

Eclipse Shrinkage Reducing Admixture may be used in any concrete, but will provide the most value in structures and environments where cracks due to drying shrinkage are prevalent and the repercussions are most severe. Some examples of applications where this is true are bridge decks,



parking garages, marine structures, high performance floors and containment structures. Eclipse has received certification by the National Sanitation Foundation (NSF) stating that it conforms to the requirements of NSF 61 – Drinking Water System Components – Health Effects. NSF, which is an important consideration when designing containment structures for potable water.

Chemical Action

Drying shrinkage of concrete is a complicated phenomena which is widely acknowledged to be the function of several mechanisms. The primary driver in the

predominant mechanism causing shrinkage for internal relative humidities in excess of 40% is the surface tension of water. As water-filled pores in the size range of 2.5 to 50 nm (nm = nanometers = one billionth of a meter) lose moisture, curved menisci are formed and the surface tension of water pulls the walls of the pores. (In pores greater than 50 nm, the magnitude of the tensile force, relative to the size of the pore, becomes negligible; pores smaller than approx. 2.5 nm will not support the formation of a meniscus.) Eclipse reduces the surface tension of water. With reduced surface tension, the force

pulling in on the walls of the pores is reduced, and the resultant shrinkage strain is reduced. With Eclipse at a dosage of 2% by weight of cement, this effect results in ultimate shrinkage reductions on the order of 25 to 50%.

Addition Rates

The recommended addition rate to maximize the effectiveness of Eclipse is 2% by weight of cement (or total cementitious material). This equates to 7 kg/m³ or 7.5 L/m³ for a concrete mixture with 350 kg/m³ of cementitious material (12 lbs/yd³ or 1.5 gal/yd³ for a concrete mixture with 600 lbs/yd³ of cementitious material). For the range of addition rates between 1% and 2.5%, shrinkage reduction as a function of dosage is relatively linear and any dosage within this range may be selected to obtain a desired level of shrinkage performance. Addition rates outside this range are not recommended unless adequately tested.

Compatibility With Other Admixtures

Eclipse Shrinkage Reducing Admixture is compatible with all conventional air entraining agents, water reducers, mid-range water reducers, superplasticizers, set retarders, accelerators, silica fume admixtures, and DCI[®] corrosion inhibitor. Precaution should be taken to avoid mixing Eclipse with other admixtures before they enter the concrete. However, once they have been separately added to the mixture, the products will not exhibit any incompatibility. Eclipse does have minor retarding properties (set times are typically extended less than one hour). If used in combination with other products

exhibiting retarding properties the net retardation may be more than the simple additive effect of the two products used separately.

Mixture Adjustment

Eclipse contains no water, but is added at fairly high dosages and should be accounted for in the mixture design. At a 2% dosage (by weight of cement) in a mixture with 350 kg/m³ of cement, the volume of the product is 7.5 L/m³ (600 lbs/yd³ of cement, the volume of the product is 1.5 gal/yd³). This liquid volume will contribute to the overall porosity of the concrete in the same fashion that an added 7.5 L/m³ (1.5 gal/yd³) of water will. In addition, the effect on concrete slump will be virtually the same as the equivalent volume of water. It is therefore recommended that when incorporating Eclipse into an established mixture design that it should replace an equal volume of water.

Impact on Fresh Concrete Properties

When substituted in a mixture design for an equivalent volume of water, Eclipse has little or no effect on concrete slump. It does however have a slight retarding effect (typically less than one hour extension of set time, see section on compatibility), and will aid in extending slump life. Where tested to date, mixtures containing Eclipse will require increased amounts of air entrainer to achieve a specified level of air.

Impact on Hardened Concrete Properties

The primary impact of Eclipse is the reduction in drying shrinkage as previously detailed, but other hardened concrete properties are affected as well. The addition of Eclipse may cause a reduction in

concrete compressive strengths. These reductions in compressive strengths vary from 0 to 15% depending on the mixture and materials used. The typical reduction is of 10% or less. In mixtures proportioned for durability, this level of strength reduction is typically not an issue. For established concrete mixtures where strength must be maintained, superplasticizers such as Daracem[®] 19 or ADVA[®] Flow may be used to cut water to offset the strength reduction of Eclipse, without compromising its shrinkage reducing capabilities. For more information on this topic consult your local Grace Sales Professional.

Packaging and Availability


Eclipse is currently available in bulk quantities by Grace metered systems, in 1041 L (275 gal) totes, or in 208 L (55 gal) drums.

Dispensing

Dispensing equipment will be provided by W. R. Grace & Co.-Conn. Eclipse may be introduced at any time in the batching cycle, but delayed addition has been shown to work best for controlling entrained air.

Flammability

Eclipse is a potentially combustible material with a flash point of 96°C (205°F). This is substantially above the upper limit of 60°C (140°F) for classification as a flammable material, and above the limit of 93°C (200°F) 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.

 Visit our web site at: www.graceconstruction.com

 printed on recycled paper

W. R. Grace & Co. - Conn. 62 Whittemore Avenue Cambridge, MA 02140

Eclipse, the Eclipse logo, DCI, Daracem and ADVA are registered trademarks of W. R. Grace & Co. - Conn.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co. - Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.

Copyright 2001. W. R. Grace & Co. - Conn. EC-1B Printed in U.S.A. 9/01 FA/GPS/2.5M

GRACE
Construction Products