

INDUSTRIAL  
CHEMICALS  
DIVISION



Bulletin 12-33

# Extrusion Additive and Antiquing for Clay Products

## N<sup>®</sup> SODIUM SILICATE - EXTRUSION ADDITIVE FOR CLAY PRODUCTS

N<sup>®</sup> sodium silicate is an effective, inexpensive additive in the forming of clay products, especially in the extrusion of brick, tile or sewer pipe. It is an excellent plasticizing and deflocculating agent. The amount of water that is needed to be added at the pug mill is reduced, and the silicate imparts plasticity to the clay body which results in greater ease of extrusion.

**Reduced Wear:** In many operations the lubricating effect permits a stiffer column to be extruded more readily. The column is cooler and the forming machine runs smoother at lower amperage. The life of augers and dies thus may be extended. In some instances, the use of lubricating oil can be discontinued.

**Better Green Strength:** Green brick, as well as dry brick, have shown greater handling strength so that breakage may be reduced.

**Better Quality Ware:** With certain types of clays, which cause high shrinkage, N<sup>®</sup> silicate has improved dimensional stability because the body is denser and there is less water to be removed. In addition, the fluxing action of N<sup>®</sup> silicate can reduce high water absorption by reducing porosity. Sodium silicate does not alter the fired color of the ware.

In ware, which is dried before glazing, silicate will not cause the glaze to peel. The silicate, being entirely mineral, remains in the fired body in bound form rather than migrating to the surface and burning out.

**Suggested Dosage:** Because of the variance in clay and shale materials, it is suggested that trials be made of different dosages of PQ silicates between 0.1 and 0.4% based on the fired weight of the raw material. For standard brick this concentration corresponds to 3 to 11 pints of silicate per 1,000 brick. Larger dosages are rarely needed, but even in excess, N<sup>®</sup> sodium silicate does not cause glazing or discoloration.

**Usage in the Plant:** A simple method of feeding silicate in the plant is to pump it directly into the pugging water line by means of a proportioning pump. This insures rapid dispersion and avoids slow dissolving and spotting that is sometimes encountered when dry additives are used.

Because raw materials vary significantly and react differently to extrusion additives, it is recommended that pilot tests be run to determine actual results for your formulations.

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PQ Corporation is a privately held global enterprise operating in 20 countries, with annual revenues in excess of \$500 million. PQ is a leading producer of silicate, zeolite, and other performance materials serving the detergent, pulp and paper, chemical, petroleum, catalyst, water treatment, construction, and beverage markets.

Potters Industries, PQ's wholly owned subsidiary, is a leading producer of engineered glass materials serving the highway safety, polymer additive, fine abrasive, and conductive product markets.

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**TYPICAL PROPERTIES OF N® SODIUM SILICATE**

<b>Wt. Ratio SiO<sub>2</sub>/Na<sub>2</sub>O</b>	3.22
<b>%SiO<sub>2</sub></b>	28.7
<b>%Na<sub>2</sub>O</b>	8.9
<b>Density @ 68°F, °Be</b>	41.0
<b>Density @ 68°F, lb/gal</b>	11.6
<b>Density @ 68°F, g/cm<sup>3</sup></b>	1.38
<b>pH</b>	11.3
<b>Viscosity, cp</b>	180
<b>Characteristics</b>	Syrupy Liquid

**BRICK ANTIQUING**

Sulfate heptahydrate has been shown to be an excellent and easy to use antiquing agent for brick. The main advantage of using this product is that the antiquing is evident throughout the structure of the brick. If the brick cracks or a half brick is required the antiquing is seen through the entire brick and not just the surface.

**Suggested Dosage:** Magnesium sulfate heptahydrate (Epsom) is added dry to the clay before water addition. One pound of Epsom is added to 4500 pounds of clay, which is the equivalent of 1000 bricks. The clay is produced normally. The Epsom "bleaches" the brick throughout its structure. The Epsom, when fired, forms a white "scum" that is aesthetically appealing, creating an antique appearance.

**ENVIRONMENTAL CONSIDERATION**

Sodium silicate solutions and magnesium sulfate heptahydrate are generally considered to be non-toxic and non-corrosive. They are considered to be free of health hazards and environmental effects. Please refer to the product Material Safety Sheets (MSDS) for these products for specific information concerning the safe handling of these products.

**TECHNICAL ASSISTANCE**

PQ's sales representatives, backed by the knowledge and experience of our technical staff, welcome the opportunity to discuss your needs and offer suggestions for using PQ sodium silicate to meet your specific application requirements.

For information or application's assistance, contact:

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