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Bulletin 24-1

# PQ<sup>®</sup> Soluble Silicates in Refractory and Chemical- Resistant Cements

## INTRODUCTION

PQ Soluble Silicates are used effectively as binders where heat stability or resistance to chemicals is required. Silicate binders develop high green strength by air-setting without heat. They also impart increased fired strength, are easy and safe to handle, low in price, non-corrosive, form no fumes or fire hazards and resist deterioration after placement. Consequently, air-setting specialties containing soluble silicates are used in refractory mortars and ramming, gunning and patching mixes in practically all refractory or chemical-resistant construction and in their maintenance. Some examples include:

<b>boilers</b>	<b>heat treating furnaces</b>
<b>incinerators</b>	<b>ladle linings</b>
<b>cupolas</b>	<b>catalytic cracking chambers</b>
<b>smelting furnaces</b>	<b>sewage works</b>
<b>coke ovens</b>	<b>chimney construction</b>
<b>blast furnaces</b>	<b>sulfite digesters</b>
<b>open-hearths</b>	<b>electrolytic cells</b>
<b>electric steel furnaces</b>	<b>acid manufacturing</b>
<b>oxygen converters</b>	<b>soaking pits</b>

The liquid sodium silicates are solutions of water soluble glasses manufactured from varied proportions of  $\text{Na}_2\text{CO}_3$  and  $\text{SiO}_2$ . They are available in a variety of  $\text{SiO}_2/\text{Na}_2\text{O}$  weight ratios ranging from 1.6 (highly alkaline) to 3.22 (highly siliceous). In addition to the liquid sodium silicates, PQ produces a wide variety of solid products to meet the needs of different formulations. They range from highly soluble powders to lumps of transparent glass.

The potassium silicates are solutions manufactured from varied proportions of  $\text{K}_2\text{CO}_3$  and  $\text{SiO}_2$ . They are available in  $\text{SiO}_2 : \text{K}_2\text{O}$  weight ratios of 2.5 and 2.1. Table 1 lists the compositions and properties of the PQ sodium and potassium silicates used in refractory and chemical resistant cements.

## EFFECTS OF SILICATE COMPOSITION

The highly siliceous (high  $\text{SiO}_2/\text{Na}_2\text{O}$  ratio) sodium silicates tend to air dry rapidly. They are the most refractory of the sodium silicates as well as the most resistant to acids. Because the total solids of these high ratio silicate solutions are relatively low, compared to the lower ratio solutions, a cement containing a high ratio solution will necessarily contain more water.

# Soluble Silicates

**James Garrett Vail**



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