

## MILL TEST REPORT

Cement Type: **ASTM Type III, AASHTO Type III, CSA Type HE**  
**High Early Strength, Low Alkali Portland Cement**

Plant: **Bellingham, WA**

Certificate #: **B3-163**

Production Period:	Dec 01 2011	Dec 31 2011	Test Result	ASTM / AASHTO C150 / M85 Specification	CSA A3001 Specification
SiO <sub>2</sub> (%)	ASTM C114	CSA A3003	<b>20.3</b>	-	-
Al <sub>2</sub> O <sub>3</sub> (%)	ASTM C114	CSA A3003	<b>5.06</b>	-	-
Fe <sub>2</sub> O <sub>3</sub> (%)	ASTM C114	CSA A3003	<b>3.73</b>	-	-
CaO (%)	ASTM C114	CSA A3003	<b>64.2</b>	-	-
MgO (%)	ASTM C114	CSA A3003	<b>0.87</b>	max. 6.0	max. 5.0
SO <sub>3</sub> (%)	ASTM C114	CSA A3003	<b>2.93</b>	max. 3.5	max. 3.5
Na <sub>2</sub> O (%)	ASTM C114	CSA A3003	<b>0.33</b>	-	-
K <sub>2</sub> O (%)	ASTM C114	CSA A3003	<b>0.38</b>	-	-
TiO <sub>2</sub> (%)	ASTM C114	CSA A3003	<b>0.26</b>	-	-
C <sub>3</sub> S (%)	ASTM C150	ASTM C150	<b>58</b>	-	-
C <sub>2</sub> S (%)	ASTM C150	ASTM C150	<b>13</b>	-	-
C <sub>3</sub> A (%)	ASTM C150	CSA A3003	<b>6.9</b>	max. 15	-
C <sub>4</sub> AF (%)	ASTM C150	ASTM C150	<b>11.1</b>	-	-
<b>Total Alkalis (%)</b>	ASTM C114	CSA A3003	<b>0.58</b>	max. 0.60	-
<b>Loss on Ignition (%)</b>	ASTM C114	CSA A3003	<b>1.58</b>	max. 3.0	max. 3.0
<b>Insoluble Residue (%)</b>	ASTM C114	CSA A3003	<b>0.23</b>	max. 0.75	max. 1.5
<b>Free Calcium Oxide (%)</b>	ASTM C114	CSA A3003	<b>0.38</b>	-	-
<b>CO<sub>2</sub> in Cement (%)</b>	ASTM C114		<b>1.02</b>	-	-
<b>CaCO<sub>3</sub> in Limestone (%)</b>	ASTM C114		<b>98</b>	min. 70	
<b>Limestone in Cement (%)</b>	ASTM C150		<b>2.4</b>	max. 5.0	
<b>Blaine Fineness (m<sup>2</sup>/kg)</b>	ASTM C204	ASTM C204	<b>574</b>	-	-
<b>+325 mesh</b>	ASTM C430	CSA A3004-A3	<b>0.93</b>	-	-
<b>Vicat Setting Time</b>					
<b>Initial (minutes)</b>	ASTM C191	CSA A3004-B2	<b>67</b>	min. 45 max. 375	min. 45 max. 250
<b>Final (minutes)</b>	ASTM C191	CSA A3004-B2	<b>165</b>	-	-
<b>Air Content (%)</b>	ASTM C185	CSA A3004-C4	<b>7.03</b>	max. 12	-
<b>Autoclave Expansion (%)</b>	ASTM C151	CSA A3004-B5	<b>-0.03</b>	max. 0.80	max. 1.0
<b>Compressive Strength</b>			<b>MPa / psi</b>		
<b>1 Day</b>	ASTM C109/109M	CSA A3004-C2	<b>25.3 / 3669</b>	min. 12.0	min. 13.5
<b>3 Day</b>	ASTM C109/109M	CSA A3004-C2	<b>36.6 / 5307</b>	min. 24.0	min. 24.0
<b>28 Day (previous month)</b>	ASTM C109/109M	CSA A3004-C2	<b>47.7 / 6912</b>	-	-

This will certify that the above described cement meets the standard requirements and optional Low Alkali chemical requirements of ASTM Specification C-150 and AASHTO Specification M-85 for Type III Portland Cement, and CSA Specification A3001 and A5 for Type HE Portland Cement.  
 Note that CSA Specification A3001 superseded CSA Specification A5.

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January 9, 2012