OFZ a.s.

PRODUCT DATA SHEET

MIKROSILICA – SIOXID

Rec. No.: TL-OFZ-5/03

Effective from: November 1, 2008

Replacing: Produkt Data Sheet TL-OFZ-5/03 r. 0

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Issue No.: Vale Symbol/Filing Term: A/10
Effective from: November 1, 2008
1. Introduction

Mikrosilica – Sioxid is a finely dispersed and powdered material of a gray colour. Mikrosilica – Sioxid consists of very small particles of amorphous silicon dioxide. The particles are of a spherical shape with a smooth surface and less than $10^{-6}$ m in diameter; thus, this material is highly puzzoulanic.

2. Production

Mikrosilica – Sioxid is a by-product originating from the production of ferrosilicon in electric arc furnace (EAF). Fine-grained condensed fumes of silicon dioxide are collected by bag house filters in dedusting units.

3. Technical Properties

3.1 Chemical Composition Mikrosilica – Sioxid, (w/w) %

<table>
<thead>
<tr>
<th>Typical</th>
<th>Guarantee</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO$_2$</td>
<td>91.0 %</td>
</tr>
<tr>
<td>Al$_2$O$_3$</td>
<td>0.30 %</td>
</tr>
<tr>
<td>CaO + MgO</td>
<td>1.50 %</td>
</tr>
<tr>
<td>Na$_2$O</td>
<td>0.50 %</td>
</tr>
<tr>
<td>K$_2$O</td>
<td>1.50 %</td>
</tr>
<tr>
<td>Annealing loss</td>
<td>1.3 %</td>
</tr>
</tbody>
</table>

3.2 Granulometric Composition

A grain size is submicroscopic. A grain diameter ranges from 0.1 to 0.2 $\mu$m, whereby 90 % of grains are below 0.2 $\mu$m.

3.3 Apparent Density

Dry Mikrosilica – Sioxid apparent density in its original undensificated form ranges from 0.15 to 0.35 t per m$^3$. Upon customer’s request, Mikrosilica – Sioxid apparent density can be increased by pelletizing, typically to 0.4 – 0.5 per m$^3$, or 0.55 – 0.65 t per m$^3$.

4. Hygiene and Health Aspects

Hygiene aspects of this product were reviewed by Institute for Preventive and Clinical Medicine in Bratislava. In its opinion, Mikrosilica – Sioxid is not fibrogenic because of being generated by condensation. Due to a high dispersion rate (90 % of particles are less than 2 $\mu$m in diameter); a respirator shall be used while handling this material. Hygiene and health aspects of Mikrosilica – Sioxid are described in detail in Mikrosilica – Sioxid Safety Data Sheet issued by OFZ a. s., dated January 24th, 2010 in accordance with REACH regulation.

5. Control

A producer shall ensure the proper system control. Significant properties of Mikrosilica – Sioxid as characteristic values are specified in STN EN 13263-1 – silica fume for concrete. Test sampling shall be in accordance with STN P EN 196-7.
5.1 Figure 2 shows the properties, testing methods, and minimum sampling frequency under in-house inspections:

<table>
<thead>
<tr>
<th>Property</th>
<th>Deliveries that need to be tested</th>
<th>Testing Methods</th>
<th>Minimum Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Typical</td>
</tr>
<tr>
<td>Silicon Dioxide</td>
<td>All</td>
<td>EN 196-2</td>
<td>1 per week</td>
</tr>
<tr>
<td>Basic Si</td>
<td>All</td>
<td>ISO 9286</td>
<td>1 per month</td>
</tr>
<tr>
<td>Free CaO</td>
<td>All</td>
<td>EN 451-1</td>
<td>1 per week</td>
</tr>
<tr>
<td>Sulphates</td>
<td>All</td>
<td>EN 196-2</td>
<td>1 per week</td>
</tr>
<tr>
<td>Total Alkali Content</td>
<td>All</td>
<td>EN 196-2</td>
<td>1 per month</td>
</tr>
<tr>
<td>Chloride</td>
<td>All</td>
<td>EN 196-2</td>
<td>1 per week</td>
</tr>
<tr>
<td>Annealing Loss</td>
<td>All</td>
<td>EN 196-2</td>
<td>1 per week</td>
</tr>
<tr>
<td>Specific Surface</td>
<td>All</td>
<td>ISO 9277</td>
<td>1 per month</td>
</tr>
<tr>
<td>Dry Content</td>
<td>Suspensions</td>
<td>5.3.2</td>
<td>1 per week</td>
</tr>
<tr>
<td>Activity Index</td>
<td>All</td>
<td>5.3.3</td>
<td>1 per month</td>
</tr>
</tbody>
</table>

5.2 The control, test sampling, scope and frequency of controls for silica fume are described in detail in PŠ 17/2001 and OTK-21/2004.

6. Storage

Store in closed covering (big bags, bags, barrels, silos) and in covered dry warehouses. Avoid dampening material. A maximum moistening of dry powdered Mikrosilica – Sioxid shall not exceed 1%.

7. Delivery and Packaging

The material is supplied in its original form packed in coverings such as big bags, bags, or barrels with loading onto motor vehicles. A loose material can be transported in cisterns. Mikrosilica – Sioxid can also be delivered as pelletized material available upon customer request.

8. Labelling

Identification No.: EINECS 273-761-1
CAS 69012-64-2

A delivery shall include the product labelling under delivery list, or more precisely labelling on cover which shall include the following:
- sort of material,
- form of material upon delivery (untreated, pelletized),
- serial number and year of manufacture,
- weight,
- name and brand of manufacturer,
- place and manufacturing location,
- stamp and final inspection signature.

9. Intended Use

The possible uses of Mikrosilica – Sioxid may include following:
Manufacturing of prefabricated materials intended for reconstructing and repaing of constructions made of concrete and reinforced concrete, the weight proportion of Mikrosilica – Sioxid is 2.5 – 10% out of binding material weight.

- Manufacturing of concretes with special properties, the weight proportion of Mikrosilica – Sioxid as additive into cement typically ranges from 5 to 15%.
- Cement manufacturing in accordance with STN P ENV 197-1.
- Rubber and woodworking industry, as well as non-construction sectors.

This Product Data Sheet shall replace „TL-OFZ-5/03 r. 0 Mikrosilica – Sioxid“, issued September 1, 2003.