Center for Products Utilization

FLY ASH INFORMATION FROM INTERNATIONAL SOURCES

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Report No. CBU-2003-21
REP-515
June 2003

A CBU Report

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UTILIZATION OF CCPs IN EUROPE [1]

In the year 2000, the amount of CCPs produced in the European Union power plants were 65 million tons, which constituted 66% fly ash, 18% FGD materials, 9.5% bottom ash, 4% boiler slag, 1.7% FBC ash, and 0.8% SDA product. Most of the CCPs produced were used in the building industry, in civil engineering and as construction materials in underground mining (53%), restoration of open mines, quarries, and pits (34%), 6% for temporary stockpile, and 7% landfilled.

Fly Ash

In Europe, the utilization rate for fly ash in the construction industry is approximately 46%. About 20 million tons of fly ash is utilized in the construction industry and in underground mining. Most of the fly ashes produced were used in concrete addition (33%), cement-mill raw-feed material (23%), road construction (22%), blended cement (11%), concrete blocks (6%), and others (5%).

Bottom Ash

Approximately 6 million tons of bottom ash was produced in Europe in the year 2000. About 2.5 million tons of wet bottom ash was used in the construction industry. Out of this, 46% was used as a fine aggregate in concrete blocks and in concrete, 43% in road construction, 7% in cement, 2% in lightweight aggregate, and 2% in other uses.
Boiler Slag

Approximately, 2.6 million tons of boiler slag was produced in Europe in the year 2000. Out of this quantity, 52% was used in road construction as a drainage layer, 31% in blasting grit, 7% in grouting, 7% in concrete, and 3% in other uses.

FBC Ashes

The amount of FBC ashes produced in Europe was approximately one million tons. Out of this, approximately 53% was landfilled, 27% used as general engineering fill, 9% as soil amendment, 6% in pavement base course, 4% in cement, and 1% in other uses.

FGD Materials

11.7 million tons of FGD materials were produced in Europe in the year 2000. Out of this, 59% was used in plasterboards, 17% in self-leveling floor slurry, 10% as set-retarders, 10% in plaster, and 3% in gypsum blocks.

SDA Products

In European power plants, using spray-dry absorption techniques for desulphurization of the flue gases, about 0.6 million tons of spray-dry absorption (SDA) product was produced. Out of this, 61% was used in landfilled, 20% in soil amendment, 7% in plant nutrition, 6% in general engineering, and 6% in other uses.

The physical and chemical properties of fly ash as per European Standards EN 450 are given in Table 1.
Reference


Table 1. Physical and Chemical Properties of Fly Ash as per European Standard*

<table>
<thead>
<tr>
<th>Property</th>
<th>European Standard (EN 450 Fly Ash)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum fineness - % retained on the 45 μm sieve</td>
<td>≤ 40%, must be within ± 10% of declared mean value</td>
</tr>
<tr>
<td>Soundness</td>
<td>≤ 10 mm based on 50% fly ash + 50% CEM 1**</td>
</tr>
<tr>
<td>Sulfur present as SO₃</td>
<td>≤ 3%</td>
</tr>
<tr>
<td>Chloride</td>
<td>≤ 0.1%</td>
</tr>
<tr>
<td>Calcium Oxide</td>
<td>&lt; 1% or ≤ 2.5% if soundness satisfactory – expressed as free CaO</td>
</tr>
<tr>
<td>Loss on Ignition</td>
<td>≤ 7%</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>N/R (No Requirement)</td>
</tr>
<tr>
<td>Water Requirement</td>
<td>N/R (No Requirement)</td>
</tr>
<tr>
<td>Activity Index</td>
<td>≥ 75% @ 28 days and ≥ 85% @ 90 days. 25% fly ash + 75% CEM 1**</td>
</tr>
</tbody>
</table>

** CEM 1 = 42.5 MPa class.