Best Available Techniques (BAT) Reference Document for the Production of Cement, Lime and Magnesium Oxide (CLM BREF)

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Sustainable Production and Consumption Unit
One of a series of sectoral BAT Reference Documents (33 + 2 BREFs) elaborated by the EIPPCB

CL BREF originally adopted in December 2001

First BAT Reference Document to be revised (under IPPC) – CLM BREF including Lime and MgO

Revision finalised under the Industrial Emission Directive 2010/75/EU (IED)
**IPPC approach and related legislation**


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Codified version

**CLM BREF revised under IPPC - BATC transformed under IED**

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Directive 2010/75/EU of 24 November 2010
On industrial emissions (integrated pollution prevention and control) (Recast)

IED Industrial Emissions Directive
The European Industrial Emissions Directive (IED)

Driving forces of the Industrial Emissions Directive 2010/75/EU:

- Give priority to intervention at source, e.g. efficiency of processes, management improvement
- Implement the Best Available Techniques (BAT)
- Assure compliance, enforcement and environmental improvements
- Provide a level playing field in the European Union by aligning environmental performance requirements for industrial installations
Article 13(1) of Industrial Emissions Directive 2010/75/EC:

“In order to draw up, review and, where necessary, update BAT reference documents, the Commission shall organise an exchange of information between Member States, the industries concerned, non-governmental organisations promoting environmental protection and the Commission”

The exchange of information should address:

- the performance of installations and techniques in terms of emissions and consumptions
- the techniques applied, associated monitoring, technical and economic viability
Sector-specific documents identifying Best Available Techniques (BREFs) with associated emission (and consumption) levels (BAT-AELs)
## BAT Reference documents publicly available

<table>
<thead>
<tr>
<th>Industry</th>
<th>BREF (MM.YYYY)</th>
<th>MR (MM.YYYY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Combustion Plants</td>
<td>BREF (07.2006)</td>
<td>MR (10.2011)</td>
</tr>
<tr>
<td>Large Volume Inorganic Chemicals – Ammonia, Acids and Fertilisers Industries</td>
<td>BREF (08.2007)</td>
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<tr>
<td>Large Volume Organic Chemical Industry</td>
<td>BREF (02.2006)</td>
<td></td>
</tr>
<tr>
<td>Management of Tailings and Waste-rock in Mining Activities</td>
<td>BREF (01.2009)</td>
<td></td>
</tr>
<tr>
<td>Manufacture of Glass</td>
<td>BATC (03.2012)</td>
<td>BREF (03.2012)</td>
</tr>
<tr>
<td>Manufacture of Organic Fine Chemicals</td>
<td>BREF (08.2006)</td>
<td></td>
</tr>
<tr>
<td>Production of Polymers</td>
<td>BREF (08.2007)</td>
<td></td>
</tr>
<tr>
<td>Production of Speciality Inorganic Chemicals</td>
<td>BREF (08.2007)</td>
<td></td>
</tr>
<tr>
<td>Refining of Mineral Oil and Gas</td>
<td>BREF (02.2003)</td>
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</tbody>
</table>

**Actors in the information exchange on BAT**

**EU Member States Committee (IED Article 75)**
- Members of the Committee
  - Vote the BAT conclusions

**‘Forum’ (IED Article 13)**
- Industry, Member States, Env. NGOs, Commission

**European IPPC Bureau (EIPPCB)**
- **GLS** (Glass)
  - Industry
  - Member States
  - Env. NGOs
  - Commission
- **I&S** (Iron and Steel)
  - Industry
  - Member States
  - Env. NGOs
  - Commission
- **REF** (Refineries)
  - Industry
  - Member States
  - Env. NGOs
  - Commission

**35 Technical Working Groups (TWGs)**
- **BREF authors**
  - Lead TWGs
  - Validate/check information
  - Draft BREFs
  - Present BREF to Forum
- **TWG members**
  - Research information
  - Peer review draft BREFs

**Forum members**
- Guidance to COM
- Nominate experts in TWGs
- Give formal opinion on BREFs
<table>
<thead>
<tr>
<th>Step</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactivation of the TWG (117 Members)</td>
<td>January-June 2005</td>
</tr>
<tr>
<td>Kick-off meeting</td>
<td>September 2005</td>
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<tr>
<td>Information and data collection (deadline)</td>
<td>June 2006</td>
</tr>
<tr>
<td>Final TWG meeting (under IPPC)</td>
<td>September 2008</td>
</tr>
<tr>
<td>Adoption (under IPPC)</td>
<td>May 2010</td>
</tr>
<tr>
<td>New Industrial Emissions Directive</td>
<td>December 2010</td>
</tr>
<tr>
<td>Transformation BAT conclusions</td>
<td>February 2012</td>
</tr>
<tr>
<td>TWG meeting on the BATC (under IED)</td>
<td>May 2012</td>
</tr>
<tr>
<td>Opinion of the Art. 13 Forum</td>
<td>September 2012</td>
</tr>
<tr>
<td>Vote of the Art. 75 Committee</td>
<td>November 2012</td>
</tr>
<tr>
<td><strong>Publication of BAT conclusions on EU OJ</strong></td>
<td>April 2013</td>
</tr>
</tbody>
</table>
Activities covered (IED - 3.1 Annex I):

Production of cement clinker in **rotary kilns** with a production capacity exceeding 500 tonnes per day or in other **kilns** with a production capacity exceeding 50 tonnes per day

Activities not covered:

**Shaft kilns** for cement kiln production
**Definition of BAT in the IED**

**Best**
Most effective in achieving a **high general level** of protection of the environment **as a whole**

**Available**
Developed on a scale which allows implementation in the relevant industrial sector, under **economically and technically viable conditions**

**Techniques**
Both the technology used and the way in which the installation is **designed, built, maintained, operated and decommissioned**
Actions involved:

- **Evaluate performance** of candidate BAT

- **Establish Best Available Techniques (BAT)** for the sector

- Where possible, **define BAT-associated Emission Levels (BAT-AELs)** or other BAT-associated Environmental Performance Levels (BAT-AEPLs)
"BAT conclusions means:

A document containing the parts of BAT reference document laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, site remediation measures."
Transformation of the CLM BAT conclusions under IED

Formulation of the BAT conclusions in line with IED requirements and based on the Commission Decision 2012/119/EU, without altering the technical content of the conclusions as presented in the adopted CLM BREF (2010)

BAT conclusion: standalone document, containing the necessary information but without references to other BREF sections
Individual BAT formulation

The environmental objective of the BAT is given

In order to minimise the emissions of metals from the flue-gases of the kiln firing processes, BAT is to use on or a combination of the following techniques…..

In general, a list of techniques (BAT) is given; however:

- The list is neither prescriptive nor exhaustive

- Other techniques may be used that ensure at least an equivalent level of environmental protection
**Prevention measures:**

- **BAT on careful selection of raw materials**
- **BAT on the use of waste as fuel or raw material**
- **Analysis of any waste for: constant quality, physical and chemical criteria**

**Control and monitoring of emissions**

- **Periodic monitoring of metal emissions, including Hg**
- **Continuous monitoring of dust emissions**
- **BAT and BAT-AELs for metal emissions**
28. In order to minimise the emissions of metals from the flue-gases of the kiln firing processes, BAT is to use one or a combination of the following techniques:

<table>
<thead>
<tr>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Selecting materials with a low content of relevant metals and limiting the content of relevant metals in materials, especially mercury</td>
</tr>
<tr>
<td>b. Using a quality assurance system to guarantee the characteristics of the waste materials used</td>
</tr>
<tr>
<td>c. Using effective dust removal techniques as set out in BAT 17</td>
</tr>
</tbody>
</table>
**Table 4.5: BAT-associated emission levels for metals from the flue-gases of kiln firing processes**

<table>
<thead>
<tr>
<th>Metals</th>
<th>Unit</th>
<th>BAT-AEL (average over the sampling period, spot measurements, for at least half an hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg</td>
<td>mg/Nm$^3$</td>
<td>&lt;0.05 ($^2$)</td>
</tr>
<tr>
<td>$\sum$ (Cd, Tl)</td>
<td>mg/Nm$^3$</td>
<td>&lt;0.05 ($^1$)</td>
</tr>
<tr>
<td>$\sum$ (As, Sb, Pb, Cr, Co, Cu, Mn, Ni, V)</td>
<td>mg/Nm$^3$</td>
<td>&lt;0.5 ($^1$)</td>
</tr>
</tbody>
</table>

($^1$) Low levels have been reported based on the quality of the raw materials and the fuels.

($^2$) Low levels have been reported based on the quality of the raw materials and the fuels. Values higher than 0.03 mg/Nm$^3$ have to be further investigated. Values close to 0.05 mg/Nm$^3$ require consideration of additional techniques (e.g. lowering of the flue-gas temperature, activated carbon).
17. In order to reduce dust emissions from flue-gases of kiln firing processes, BAT is to use dry flue-gas cleaning with a filter.

<table>
<thead>
<tr>
<th>Technique (1)</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Electrostatic precipitators (ESPs)</td>
<td>Applicable to all kiln systems</td>
</tr>
<tr>
<td>b. Fabric filters</td>
<td></td>
</tr>
<tr>
<td>c. Hybrid filters</td>
<td></td>
</tr>
</tbody>
</table>

(1) A description of the techniques is given in Section 4.5.1.
**BAT-AELs for dust emissions from kilns**

**BAT-associated emission levels**

The BAT-AEL for dust emissions from flue-gases of kiln firing processes is $<10 - 20 \text{ mg/Nm}^3$ as the daily average value. When applying fabric filters or new or upgraded ESPs, the lower level is achieved.
Quality of available information

- Emission levels <0.05 mg/Nm³ reported as achievable; however, lack of evidence concerning the conditions for achieving these levels
- Levels of emissions mainly influenced by raw materials

Lack of information:

- Mercury emissions and link with technical options for Hg removal
- Monitoring techniques for Hg (continuous monitoring of Hg, suitability to be verified)
Collect information on the following topics:

- **Relationship between emissions and waste used in the process (type, amount)**
- **Data on process input, specifically for Hg**
- **“New” techniques for the reduction of mercury emissions**
- **Removal efficiencies and costs of abatement techniques**
- **Continuous monitoring of Hg in the cement industry**
Thank you for your attention

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