

**Reference Document on Best Available Techniques for the Production of  
Speciality Inorganic Chemicals (August 2007)**

§	Argomento	Paragrafo	Rif. BAT	Descrizione BAT	Applicata	Note
5	Raw and auxiliary materials supply, storage, handling and preparation	5.1		BAT is to: 5.1 reduce the amount of packaging materials disposed of by, e.g. recycling 'hard' and 'soft' used packaging materials (see Sections 4.2.1 and 4.2.2), unless safety or hazard considerations prevent it.	Non applicabile	Non sono previsti stoccaggi con imballaggi
	Synthesis/reaction/calcination	5.2		BAT is to: 5.2 reduce emissions and the amount of residues generated by implementing one or more of the following measures: a. using high purity feedstock (see Section 4.3.1) b. improving reactor efficiencies (see Section 4.3.2) c. improving catalyst systems (see Section 4.3.3).	Non applicabile	Il processo di produzione di idrogeno non prevede emissioni significative.
		5.3		For discontinuous processes, BAT is to: 5.3 optimise yields, lower emissions and reduce waste by sequencing the addition of reactants and reagents (see Section 4.3.4).	Non applicabile	Non è possibile valutare in questa fase le possibilità di ottimizzazione del processo
		5.4		For discontinuous processes, BAT is to: 5.4 minimise cleaning operations by optimising the sequences for addition of raw and auxiliary materials (see Section 4.3.4).	Non applicabile	Non è prevista l'aggiunta di reagenti durante l'elettrolisi
	Product handling and storage	5.5		BAT is to: 5.5 reduce the amount of residues generated by, e.g. using returnable product transportation containers/drums (see Section 4.2.1).	Applicabile	Lo stoccaggio è previsto in serbatoi ad alta pressione che saranno continuamente svuotati e riempiti a seconda della richiesta di gas.

	Waste gas emissions abatement	5.6		<p>BAT is to:</p> <p>5.6 minimise emissions of total dust in off-gases and achieve emission levels of 1 - 10 mg/Nm<sup>3</sup> by using one or more of the following techniques:</p> <ul style="list-style-type: none"> <li>a. cyclone (see Section 4.4.2.1.2)</li> <li>b. fabric or ceramic filter (see Section 4.4.2.1.5)</li> <li>c. wet dust scrubber (see Section 4.4.2.1.3)</li> <li>d. ESP (see Section 4.4.2.1.4). The lower end of the range may be achieved by using fabric filters in combination with other abatement techniques.</li> </ul> <p>However, the range may be higher, depending on the carrier gas and particle characteristics (see Section 4.4.2.1). Using fabric filters is not always possible e.g. when other pollutants have to be abated (e.g. SO<sub>x</sub>) or when the offgases present humid conditions (e.g. presence of liquid acid). The particulate matters recovered/removed are recycled back into production when this is feasible. The scrubbing medium is recycled when this is feasible.</p>	Non applicabile	Non sono previste emissioni gassose significative
		5.7		<p>BAT is to:</p> <p>5.7 reduce HCN emissions and achieve emission levels of &lt;1 mg/m<sup>3</sup> by scrubbing with an alkaline solution. The scrubbing medium is recycled when this is feasible (see Section 4.4.2.2.5).</p>	Non applicabile	Non sono previste emissioni di HCN

		5.8		BAT is to: 5.8 reduce NH <sub>3</sub> emissions and achieve emission levels of <1.2 mg/m <sup>3</sup> by scrubbing with an acidic solution. The scrubbing medium is recycled when this is feasible (see Section 4.4.2.2.5).	Non applicabile	Non sono previste emissioni di NH <sub>3</sub>
		5.9		5.9 reduce HCl emissions, e.g. by wet gas scrubbing under alkaline conditions (see Section 4.4.2.2.4). If HCl is the main pollutant to be treated and alkali scrubbing is used, BAT is to achieve 3 – 10 mg/Nm <sup>3</sup> HCl.	Non applicabile	Non sono previste emissioni di HCl
	Waste water management and water emissions abatement	5.10		As a general measure, BAT is to: 5.10 allocate contaminated waste water streams according to their pollutant load. Inorganic waste water without relevant organic components is segregated from organic waste water and ducted to special treatment facilities (see Section 4.4.1 and Figure 4.1).	Non applicabile	Non sono previste acque reflue di processo
		5.11		For rainwater, BAT is to: 5.11 minimise pollution to receiving watercourses by applying all of the following measures: a. minimising the contamination of rainwater from activities carried out at the installation in particular by applying measures for reducing fugitive and diffuse emissions (see BAT 5.12 and BAT 5.13 and BAT 5.17) b. ducting and storing rainwater (see Section 4.7.4) expected to be contaminated from activities carried out at the installation and treating it if necessary. Other rainwater may be directly discharged (see Section 4.7.4) c. monitoring the discharge of this other rainwater as outlined in Section 4.7.4.	Non applicabile	Non è previsto l'utilizzo di sostanze che potrebbero contaminare le acque di prima pioggia.

				Rainwater found to be contaminated is treated as in b. above (see Section 4.7.4).		
	Infrastructure	5.12		<p>For diffuse emissions, BAT is to:</p> <p>5.12 minimise diffuse dust emissions where dust may arise (in particular from the storage and handling of materials/products) by applying one or more of the following techniques:</p> <p>a. storing materials in closed systems (e.g. silos, see Section 6.3.4.1)</p> <p>b. using covered areas protected from rain and wind (see Section 6.3.4.1)</p> <p>c. having production equipment, e.g. conveyors, totally or partially enclosed (see Section 2.2)</p> <p>d. having equipment designed with hooding and ducting to capture diffuse dust emissions (e.g. during loading into storage) and abating it (e.g. using a fabric filter, see Section 6.3.4.1)</p> <p>e. carrying out housekeeping regularly, e.g. by vacuuming (see Section 4.7.6).</p>	Non applicabile	Non è previsto l'utilizzo di sostanze solide che potrebbero provocare emissioni di polveri.
				<p>5.13 minimise fugitive gaseous and liquid emissions by applying (according to the substances that may require controlling) one or more of the following techniques:</p> <p>a. having periodic leak detection and repair programmes (see Sections 4.7.1 and 2.6.6)</p> <p>b. operating equipment at slightly below atmospheric pressure (see Section 6.3.4.16)</p> <p>c. replacing flanges by welded connections (see Section 2.6)</p>	Applicabile	La società porterà avanti un programma di manutenzione periodica delle apparecchiature critiche, al fine di prevenire eventuali perdite di gas

				<p>d. using seal-less pumps and bellow valves (see Section 2.6)</p> <p>e. using high performance sealing systems (e.g. effective gaskets and flanges, valves and pumps with high integrity packing, see Section 2.6)</p> <p>f. carrying out housekeeping regularly (see Section 4.7.6).</p>		
		5.14		<p>For new installations, BAT is to:</p> <p>5.14 use a computerised control system to operate the plant (see Section 4.5.2). However, this does not apply where safety issues do not permit automatic operations (e.g. in the production of SIC explosives).</p>	Applicabile	Il controllo del processo di elettrolisi avviene in modo automatizzato tramite PLC
		5.15		<p>For installations where solid hazardous compounds can build up in pipelines, machines and vessels, BAT is to:</p> <p>5.15 have in place a closed cleaning and rinsing system (see Section 4.5.1).</p>	Non applicabile	Non è previsto l'utilizzo di sostanze solide pericolose
	Energy	5.16		<p>BAT is to:</p> <p>5.16 reduce the consumption of energy by optimising plant design, construction and operation, e.g. by using pinch methodology, except if safety issues prevent it (see Section 4.6.1).</p>	Non applicabile	Il consumo di energia è direttamente connesso alla produzione di idrogeno. Non è possibile prevedere una riduzione di energia.
	Cross-boundary techniques			<p>BAT is to:</p> <p>5.17 minimise soil and groundwater pollution by designing, building, operating and maintaining facilities, where substances (usually liquids) which represent a potential risk of contamination of ground and groundwater are handled, in such a way that material escapes are minimised (see Section 4.7.1). This includes all</p>	Non applicabile	Non è previsto l'utilizzo di sostanze che potrebbero contaminare il suolo. L'area dell'impianto produttivo è impermeabilizzata.

				<p>of the following:</p> <ul style="list-style-type: none"> <li>a. having facilities sealed, stable and sufficiently resistant against possible mechanical, thermal or chemical stress. This is particularly important for highly toxic substances – e.g. cyanides, phosphorus compounds</li> <li>b. providing sufficient retention volumes to safely retain spills and leaking substances in order to enable treatment or disposal</li> <li>c. providing sufficient retention volume to safely retain fire fighting water and contaminated surface water</li> <li>d. carrying out loading and unloading only in designated areas protected against leakage run-off</li> <li>e. storing and collecting materials awaiting disposal in designated areas protected against leakage run-off</li> <li>f. fitting all pump sumps or other treatment plant chambers from which spillage might occur with high liquid level alarms or having pump sumps regularly inspected by personnel</li> <li>g. establishing programmes for testing and inspecting tanks and pipelines including flanges and valves</li> <li>h. providing spill control equipment, such as containment booms and suitable absorbent material</li> <li>i. testing and demonstrating the integrity of bunds</li> <li>j. equipping tanks with overfill prevention</li> <li>k. storing materials/products in covered areas to keep rainfall out.</li> </ul>		
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	Cross-boundary techniques	5.18		<p>BAT is to: 5.18 have a high level of education and continuous training of personnel (see Section 4.7.2). This includes all of the following:</p> <ul style="list-style-type: none"> <li>a. having personnel with sound basic education in chemical engineering and operations</li> <li>b. continuously training plant personnel on the jobs</li> <li>c. regularly evaluating and recording the performance of personnel</li> <li>d. regularly training personnel on how to respond to emergency situations, health and safety at work, and on product and transportation safety regulations.</li> </ul>	Applicabile	La società provvederà ad impiegare personale formato opportunamente sugli aspetti tecnici e di sicurezza inerenti il processo.
	Cross-boundary techniques	5.19		<p>BAT is to: 5.19 apply, if available, the principles of an Industry Code (see Section 4.7.3). This includes all of the following:</p> <ul style="list-style-type: none"> <li>a. applying very high standards for safety, environmental and quality aspects in the production of the SIC substances</li> <li>b. carrying out activities such as auditing, certification, training of plant personnel (related to BAT number 5.18 and 5.22).</li> </ul>	Applicabile in parte	La società valuterà la possibilità di utilizzare elevati standard di sicurezza e proporre attività di formazione.
	Cross-boundary techniques	5.20		<p>BAT is to: 5.20 carry out a structured safety assessment for normal operation and to take into account effects due to deviations of the chemical process and deviations in the operation of the plant (see Section 4.7.5).</p>	Applicabile in parte	In fase di progettazione sono state valutate tutte le tecniche disponibili per garantire un elevato livello di sicurezza legato alla presenza di idrogeno.

	Cross-boundary techniques	5.21		<p>In order to ensure that a process can be controlled adequately, BAT is to:</p> <p>5.21 apply one individual or a combination of the following techniques (without ranking, see Section 4.7.5):</p> <ul style="list-style-type: none"> <li>a. organisational measures</li> <li>b. concepts involving control engineering techniques</li> <li>c. reaction stoppers (e.g. neutralisation, quenching)</li> <li>d. emergency cooling</li> <li>e. pressure resistant construction</li> <li>f. pressure relief.</li> </ul>	Applicabile	<p>In fase di progettazione sono state valutate tutte le tecniche disponibile per garantire un elevato livello di sicurezza legato alla presenza di idrogeno. Sono previsti inoltre sistemi di sicurezza automatizzati in grado di interrompere la produzione e inertizzare le apparecchiature in caso di emergenza.</p>
	Cross-boundary techniques	5.22		<p>A number of environmental management techniques are determined as BAT. The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have. BAT is to:</p> <p>Three further features, which can complement the above stepwise, are considered as supporting measures. However, their absence is generally not inconsistent with BAT. These three additional steps are:</p> <ul style="list-style-type: none"> <li>f. having the management system and audit procedure examined and validated by an accredited certification body or an external EMS verifier</li> <li>g. preparation and publication (and possibly external validation) of a regular environmental statement describing all the significant environmental aspects of the installation, allowing for year-by-year comparison against environmental objectives and targets as well as with sector</li> </ul>	Non applicabile	<p>Essendo l'impianto in fase di progettazione non è al momento possibile valutare l'applicazione di sistemi EMS</p>



				<p>benchmarks as appropriate</p> <p>h. implementation and adherence to an internationally accepted voluntary system such as EMAS and EN ISO 14001:1996. This voluntary step could give higher credibility to the EMS. In particular EMAS, which embodies all the abovementioned features, gives higher credibility. However, non-standardised systems can, in principle, be equally effective provided that they are properly designed and implemented.</p> <p>Specifically for the SIC sector, it is also important to consider the following potential features of the EMS:</p> <p>i. the environmental impact from the eventual decommissioning of the unit at the stage of designing a new plant</p> <p>j. the development of cleaner technologies</p> <p>k. where practicable, the application of sectoral benchmarking on a regular basis, including energy efficiency and energy conservation activities, choice of input materials, emissions to air, discharges to water, consumption of water and generation of waste.</p>		
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