

## Emission limit values: Comparative tables for basic chemicals, existing installations in the EU

The present document contains comparative tables of emission limit values for chemical industry in the EU. The sectors considered are basic chemicals, e.g. chemical installations for the production of *basic organic chemicals* (Category 4.1 as defined in Annex I of the IPPC Directive) and *basic inorganic chemicals* (category 4.2). The tables concern existing installations.

There is a [companion document](#) concerning new or substantially changed installations.

See below for further explanations.

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### Explanatory notes

The IPPC Directive 96/61/EC prescribes that member countries must report certain information on industrial activities to the European Commission. The information to be reported includes representative data on emission limit values. The data are classified according to categories of industrial activities, cf. Annex 1 of the directive.

The information presented has been compiled from EU Member States through a questionnaire, as prescribed by the IPPC directive. The reports from the member states have been compiled in the report:

*Analysis of Member States' first implementation reports on the IPPC Directive (EU-15)* by LDK-ECO Environmental Consultants S.A. Athens, Greece. (June 2004). The report was prepared for the European Commission, Directorate General Environment, Directorate G: Sustainable Development and Integration, Unit G.2 Industry and Environment. This report is available through

[http://europa.eu.int/comm/environment/ippc/ippc\\_ms\\_implementation.htm](http://europa.eu.int/comm/environment/ippc/ippc_ms_implementation.htm)

The information presented on the subsequent pages is extracted from that report, and concerns the sector Basic chemicals, existing installations.

Where "new" and "old" reports and limit values are referred to, it refers to the years 2003, respectively 2001.

The emission limit values in the tables are meant to be representative values of permits issued in the Member States. Ideally, they should represent the limit value for the median installation in a given category.

The abbreviations used in the subsequent tables have the following meaning:

No I.	No installations
C	Continuous measurement method including continuous sampling
P	Periodical measurement method
Calc	Calculation method using consumption of raw materials
HHAV	Half hourly average value
HAV	Hourly average value
DAV	Daily average value
MAV	Monthly average value
YAV	Yearly average value

Notes on remarks or text:

- Text in italics means that this text (remarks or ELV) was not comprised anywhere in the new reports of the Member States (MS). They are usually highlighted in yellow colour, but in some occasions in green colour as well (there is no difference concerning these colours)
- Yellow highlighted text means that this text (either remark or ELV) needs to be checked for small differences that are met between the two articles.
- Yellow highlighted remarks under the label "FOE". These remarks were made by the person that has checked the aggregated tables, in order to provide additional information.
- Green highlighted text means that this text (either remark or ELV) was found in the new reports of the Member States (MS) and added to the tables.

#### Notes on Pollutant's Cells:

- Grey cells in general indicate that new or different ELV are found in the new reports (under Article 16(3)) comparing to the old aggregated tables (Article 16(1)). Therefore, in most cases, there are two cells per pollutant, the one comprising the old ELV (where the values are in italics) and another one that comprises the new ELV. However, in some cases, the old values are not in italics and placed in a white cell, indicating that the new ELV (in grey cell) are additional ELV and do not replace the old ELV.
- Grey rows in particular, indicate that the comprised pollutants were not included in the old aggregated tables and are considered in the present tables, under Article 16(3).

#### Notes on columns:

- The columns referring to UK's ELV are in a pale-green colour that indicates the submission of ELV by this MS, for the first time.

## 4.1.1 Chemical installations for the production of benzene

Typically, there are two rows for each pollutant, corresponding to "old" and "new" reports from Member States. See the *Explanatory Notes* on the first page for explanation of color coding etc.

Air pollutant	A	B	DK	FIN	F <sup>F1</sup> , HHAV	D	EL	IRL
Particulates	No I.		No I.	None	100 <sup>1,2</sup>	50 <sup>DAV</sup>	No I.	No I.
					40 <sup>3</sup>	150 <sup>DAV</sup>		
					(mg/m <sup>3</sup> )	50 <sup>4 DAV</sup> HHAV		
						150 <sup>5</sup>		
						(mg/m <sup>3</sup> )		
CO	No I.		No I.	None	None	None	No I.	No I.
NO <sub>x</sub>	No I.		No I.	None	500 <sup>6,7</sup>	500 <sup>8 DAV</sup>	No I.	No I.
					HHAV	HHAV		
					(mg/m <sup>3</sup> )	(mg/m <sup>3</sup> )		
SO <sub>x</sub>	No I.		No I.	None	300 <sup>3,9</sup>	500 <sup>10 DAV</sup>	No I.	No I.
					HHAV	HHAV		
					(mg/m <sup>3</sup> )	(mg/m <sup>3</sup> )		
VOC	No I.		No I.	None	110 <sup>11,12</sup>	20-150 <sup>13</sup>	No I.	No I.
					HHAV			
						20 <sup>14 DAV</sup> HHAV		
				250 & 0.6		100 <sup>15</sup>		
				(t/a) & (kg/t)	(mg/m <sup>3</sup> )	150 <sup>16</sup>		
						(mg/m <sup>3</sup> )		
Benzene	No I.		No I.	60 & 0.14	None	5 <sup>17 HHAV</sup>	No I.	No I.
				(t/a) <sup>FOE</sup>		(mg/m <sup>3</sup> )		

F1 Reference conditions: 273k, 101.3 kPa

<sup>1</sup> for flows < 1 kg/h

<sup>2</sup> Values from national regulation

<sup>3</sup> for flows > 1 kg/h

<sup>4</sup> if mass flow > 0.5 kg/h

<sup>5</sup> if mass flow < 0.5 kg/h

<sup>6</sup> for flows > 1kg/h

<sup>7</sup> Values from national regulation.

<sup>8</sup> if mass flow > 5 kg/h

<sup>9</sup> Values from national regulation.

<sup>10</sup> if mass flow > 5 kg/h

<sup>11</sup> for flows > 2kg/h and with the exception of methane the limit value around 20 mg/m<sup>3</sup> for 39 VOC is considered to be dangerous

<sup>12</sup> Values from national regulation.

<sup>13</sup> TOC (Total Organic Compounds), valid for organic substances of different classes

<sup>14</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR 1

<sup>15</sup> sum of class II organic compounds if their mass flow is > 2 kg/h; also valid for sum of coinciding class I and II organic compounds

<sup>16</sup> sum of class III organic compounds if their mass flow is > 3 kg/h; also valid for sum of coinciding class I to III organic compounds

<sup>17</sup> sum of class III carcinogenic compounds if their mass flow is > 25 g/h; also valid for sum of coinciding class I to III carcinogenic

compounds; minimisation obligation

<sup>FOE</sup> Probably by mistake in the reporting tool the unit of 0.14 is kg/t and not T/a!!

Air pollutant	I	L	NL	P	E	S	UK
Particulates	50 <sup>18</sup> 150 <sup>19</sup> (mg/m <sup>3</sup> )		0.041 <sup>NL1</sup> NL3 (kg/t benzene)		150 10-45 <sup>20</sup> 50-150 (mg/Nm <sup>3</sup> )	No I.	50 (mg/m <sup>3</sup> )
CO	None		None		100 (mg/Nm <sup>3</sup> )	No I.	None
NOx	500 <sup>21, 22</sup> (mg/m <sup>3</sup> )		150 <sup>23</sup> NL2 1.1 <sup>NL2</sup> NL3 (mg/m <sup>3</sup> ) (kg/t benzene)		616 <sup>24</sup> 3 <sup>25</sup> 450 <sup>26</sup> 36-164 (mg/Nm <sup>3</sup> )	No I.	350 <sup>UK1, 27</sup> (mg/m <sup>3</sup> )
SOx			1.5 <sup>NL2</sup> NL3 (kg/t benzene)		4300 <sup>28</sup> 300 <sup>29</sup> 240-1240 (mg/Nm <sup>3</sup> )	No I.	38 <sup>UK2, 30</sup> (mg/m <sup>3</sup> )
VOC	5-600 <sup>31</sup>		100 <sup>32</sup> NL1 0.57 <sup>NL1</sup> NL3		None	No I.	None
	5 <sup>33</sup> 20 <sup>34</sup> 150 <sup>35</sup> 300 <sup>36</sup> 600 <sup>37</sup> (mg/m <sup>3</sup> )		(mg/m <sup>3</sup> ) (kg/t benzene)		150 <sup>38</sup> 20 <sup>39</sup> (mg/Nm <sup>3</sup> )		
Benzene	5 <sup>40</sup> (mg/m <sup>3</sup> )		5 <sup>41</sup> (mg/m <sup>3</sup> )		None	No I.	None

<sup>18</sup> mass flow ? 0.5 kg/h

<sup>19</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>NL1</sup> Reference conditions: standard

<sup>NL3</sup> BTX from aromatic mixture; flare; process furnace; ELV only in kg/ton benzene

<sup>20</sup> focus from other process activities

<sup>21</sup> NO<sub>x</sub> + SO<sub>x</sub>

<sup>22</sup> mass flow ? 5 kg/h

<sup>23</sup> benzene from pygas; process furnace

<sup>NL2</sup> Reference conditions: standard, 3% O<sub>2</sub>

<sup>24</sup> focus from other process activities

<sup>25</sup> focus from other process activities

<sup>26</sup> furnace focus

<sup>UK1</sup> Reference conditions: 3% O<sub>2</sub>, dry

<sup>27</sup> min 10minute sample

<sup>28</sup> SO<sub>x</sub> as SO<sub>2</sub>

<sup>29</sup> SO<sub>x</sub> as SO<sub>2</sub>; furnace focus

<sup>UK2</sup> Standard Temp. & Pressure without correction for water vapour

<sup>30</sup> On gas firing

<sup>31</sup> Valid for substances of different classes

<sup>32</sup> benzene from pygas; vapour recovery unit on tank for benzene section

<sup>33</sup> valid for substances of class I and mass flow ? 25 g/h

<sup>34</sup> valid for substances of class II and mass flow ? 0.1 kg/h

<sup>35</sup> valid for substances of class III and mass flow ? 2 kg/h

<sup>36</sup> valid for substances of class IV and mass flow ? 3 kg/h

<sup>37</sup> valid for substances of class V and mass flow ? 4 kg/h

<sup>38</sup> focus from other process activities

<sup>39</sup> furnace focus

<sup>40</sup> mass flow ? 25 g/h

<sup>41</sup> benzene from pygas; vapour recovery unit on tank for benzene section

## 4.1.2 Chemical installations for the production of ethylene oxide

Air pollutant	A	B	DK	FIN	F <sup>F1, HHAV</sup>	D	EL	IRL
Particulates	No l.		No l.		100 <sup>42</sup> 43 40 <sup>44</sup> (mg/m <sup>3</sup> )	50 <sup>45</sup> DAV HHA V 150 <sup>46</sup> HHA V (mg/m <sup>3</sup> )	No l.	No l.
CO	No l.		No l.		None	None	No l.	No l.
NOx	No l.		No l.		500 <sup>47, 48</sup> (mg/m <sup>3</sup> )	500 <sup>49</sup> DAV HHA V (mg/m <sup>3</sup> )	No l.	No l.
SOx	No l.		No l.		300 <sup>50, 51</sup> (mg/m <sup>3</sup> )	500 <sup>52</sup> DAV HHA V (mg/m <sup>3</sup> )	No l.	No l.
VOC	No l.		No l.		110 <sup>53, 54</sup> 55	20-150 <sup>56</sup> 20 <sup>57</sup> DAV HHA V 100 <sup>58</sup> 150 <sup>59</sup> (mg/m <sup>3</sup> )	No l.	No l.
Methane	No l.		No l.		None	None	No l.	No l.
Ethylene	No l.		No l.		None	100 <sup>60, DAV</sup> None (mg/m <sup>3</sup> )	No l.	No l.
Formaldehyde	No l.		No l.		None	20 <sup>61, DAV</sup> 20 <sup>62</sup> DAV HHA V (mg/m <sup>3</sup> )	No l.	No l.
Ethylene oxide	No l.		No l.		None	5 <sup>63</sup> DAV HHA V (mg/m <sup>3</sup> )	No l.	No l.

<sup>F1</sup> 273k, 101.3kPa

<sup>42</sup> for flows < 1 kg/h

<sup>43</sup> Values from national regulation.

<sup>44</sup> for flows > 1 kg/h

<sup>45</sup> if mass flow > 0.5 kg/h

<sup>46</sup> if mass flow < 0.5 kg/h

<sup>47</sup> for flows > 1kg/h

<sup>48</sup> Values from national regulation.

<sup>49</sup> if mass flow > 5 kg/h

<sup>50</sup> for flows > 1kg/h

<sup>51</sup> Values from national regulation.

<sup>52</sup> if mass flow > 5 kg/h

<sup>53</sup> for flows < 2kg/h and with the exception of methane the limit value around 20 mg/m<sup>3</sup> for 39 VOC considered as dangerous

<sup>54</sup> for flows > 2kg/h and with the exception of methane the limit value around 20 mg/m<sup>3</sup> for 39 VOC considered as dangerous

<sup>55</sup> Values from national regulation.

<sup>56</sup> TOC (Total Organic Compounds), valid for organic substances of different classes

<sup>57</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR 1

<sup>58</sup> sum of class II organic compounds if their mass flow is > 2 kg/h; also valid for sum of coinciding class I and II organic compounds

<sup>59</sup> sum of class III organic compounds if their mass flow is > 3 kg/h; also valid for sum of coinciding class I to III organic compounds

<sup>60</sup> valid for sum of substances of this class

<sup>61</sup> for flows < 2kg/h and with the exception of methane the limit value around 20 mg/m<sup>3</sup> for 39 VOC considered as dangerous

<sup>62</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR 1

<sup>63</sup> sum of class III carcinogenic compounds if their mass flow is > 25 g/h; also valid for sum of coinciding class I to III carcinogenic compounds; minimisation obligation

Air pollutant	I	L	NL	P	E	S	UK
Particulates	50 <sup>84</sup> 150 <sup>85</sup> (mg/m <sup>3</sup> )		None	No I.	150 50-150 <sup>66</sup> (mg/Nm <sup>3</sup> )	None	None
CO	None		None	No I.	100 (mg/Nm <sup>3</sup> )	None	None
NO <sub>x</sub>	500 <sup>67, 88</sup> (mg/m <sup>3</sup> )		150 <sup>NL1 69</sup> (mg/m <sup>3</sup> )	No I.	616 <sup>70</sup> 3 <sup>71</sup> 450 <sup>72</sup> (mg/Nm <sup>3</sup> )	None	None
SO <sub>x</sub>			None	No I.	4300 <sup>73</sup> 300 <sup>74</sup> (mg/Nm <sup>3</sup> )	None	None
VOC	5-600 <sup>75</sup>		None	No I.	None	1.25 <sup>76</sup>	None
	5 <sup>78</sup> 20 <sup>79</sup> 150 <sup>80</sup> 300 <sup>81</sup> 600 <sup>82</sup> (mg/m <sup>3</sup> )				150 <sup>83</sup> 20 <sup>84</sup> (mg/Nm <sup>3</sup> )	100 <sup>85</sup> (kg/tonne) (tonnes/y)	
Methane	None		4500 <sup>NL2 86</sup> (mg/m <sup>3</sup> )	No I.	None	None	None
Ethylene	None		300 <sup>NL2 87</sup> 6 <sup>89</sup> (mg/m <sup>3</sup> ) (kg/h)	No I.	None	None <sup>88</sup>	None
Formaldehyde	20 <sup>90, 91</sup> (mg/m <sup>3</sup> )		-	No I.	None	None	None
Ethylene oxide	5 <sup>92</sup>		0.6 <sup>93</sup> 1 <sup>94</sup>	No I.	None	5 0,0625	1250 <sup>95</sup>

<sup>84</sup> mass flow ? 0.5 kg/h

<sup>85</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>66</sup> focus from other process activities (This comment does not appear in the Reporting Tool))

<sup>67</sup> NO<sub>x</sub> + SO<sub>x</sub>

<sup>88</sup> mass flow ? 5 kg/h

<sup>NL1</sup> Reference condition: standard, 3% O<sub>2</sub>

<sup>69</sup> Process furnace

<sup>70</sup> focus from other process activities

<sup>71</sup> focus from other process activities

<sup>72</sup> furnace focus

<sup>73</sup> SO<sub>x</sub> as SO<sub>2</sub>

<sup>74</sup> SO<sub>x</sub> as SO<sub>2</sub>; furnace focus

<sup>75</sup> Valid for substances of different classes

<sup>76</sup> The specific value given here corresponds to permitted emission divided by total permitted production

<sup>77</sup> yearly emissions calculated from production data

<sup>78</sup> valid for substances of class I and mass flow ? 25 g/h

<sup>79</sup> valid for substances of class II and mass flow ? 0.1 kg/h

<sup>80</sup> valid for substances of class III and mass flow ? 2 kg/h

<sup>81</sup> valid for substances of class IV and mass flow ? 3 kg/h

<sup>82</sup> valid for substances of class V and mass flow ? 4 kg/h

<sup>83</sup> focus from other process activities

<sup>84</sup> furnace focus

<sup>85</sup> yearly emissions calculated from production data

<sup>NL2</sup> Reference condition: standard

<sup>86</sup> Regenox; only in permit application, not yet in permit

<sup>87</sup> Regenox; only in permit application, not yet in permit

<sup>88</sup> There is no condition for ethylene, but a limit value for ethyleneoxide is given in the permit: Ethyleneoxide: 0.0625 kg/tonne; (The specific value given here corresponds to permitted emission divided by total permitted production)

<sup>89</sup> only ELV's in the form of kg/hr; analysers

<sup>90</sup> +others

<sup>91</sup> mass flow ? 0.1 kg/h

<sup>92</sup> mass flow ? 25 g/h

<sup>93</sup> only ELV's in the form of kg/hr; analysers

<sup>94</sup> only ELV's in the form of kg/hr; scrubber loading station

<sup>95</sup> 24hr averaging period

	(mg/m <sup>3</sup> )		(kg/h)			(tonnes/y)	(mg/m <sup>3</sup> )
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### 4.1.3 Chemical installations for the production of formaldehyde

Air pollutant	A <sup>A1</sup> HHAV	B	DK	FIN	F <sup>F1</sup> HHAV	D <sup>HHAV</sup>	EL	IRL
Particulates	10 <sup>96</sup> or none		No I.	None	100 <sup>97, 98</sup> 40 <sup>99</sup>	50 <sup>DAV</sup> 150 <sup>DAV</sup>	100/150	No I.
	(mg/m <sup>3</sup> )				(mg/m <sup>3</sup> )	50 <sup>100 DAV</sup> 150 <sup>101</sup>	(mg/Nm <sup>3</sup> )	
CO	100 or none		No I.	None	None	None	None	No I.
	(mg/m <sup>3</sup> )					100 <sup>102 DAV</sup>		
NOx	100-350 or none		No I.	None	500 <sup>103</sup>	500 <sup>104 DAV</sup>	None	No I.
	(mg/m <sup>3</sup> )				500 <sup>105, 106</sup>			
VOC	20 <sup>107</sup> or none		No I.	None	110 <sup>108</sup>	20-150 <sup>109</sup>	None	No I.
	(mg/m <sup>3</sup> )			50	110 <sup>110, 111</sup>	20 <sup>112 DAV</sup> 100 <sup>113</sup> 150 <sup>114</sup>		
Formaldehyde	None or 5 <sup>115</sup>		No I.	None	None	20 <sup>116, DAV</sup>	None	No I.
	(mg/m <sup>3</sup> )					(mg/m <sup>3</sup> )		
Methanol	None		No I.	None	None	150 <sup>117, DAV</sup>	None	No I.
						(mg/m <sup>3</sup> )		
Dimethyl ether	None		No I.	None	None	150 <sup>118, DAV</sup>	None	No I.
						(mg/m <sup>3</sup> )		

A1 Reference conditions: 3% O<sub>2</sub>

F1 Reference conditions: 273 k, 101.3kPa

<sup>96</sup> Calculated value

<sup>97</sup> for flows < 1 kg/h

<sup>98</sup> Values from national regulation.

<sup>99</sup> for flows > 1 kg/h

<sup>100</sup> if mass flow > 0.5 kg/h

<sup>101</sup> if mass flow < 0.5 kg/h

<sup>102</sup> state of the art for catalytic waste gas cleaning

<sup>103</sup> for the flows > 2 kg/h

<sup>104</sup> if mass flow > 5 kg/h

<sup>105</sup> for the flows > 1 kg/h

<sup>106</sup> Values from national regulation.

<sup>107</sup> as organic C

<sup>108</sup> for flows > 1kg/h

<sup>109</sup> TOC (Total Organic Compounds), valid for organic substances of different classes

<sup>110</sup> for flows > 2kg/h and with the exception of methane the limit value around 20 mg/m<sup>3</sup> for 39 VOC considered as dangerous

<sup>111</sup> Values from national regulation.

<sup>112</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR

<sup>113</sup> sum of class II organic compounds if their mass flow is > 2 kg/h; also valid for sum of coinciding class I and II organic compounds

<sup>114</sup> sum of class III organic compounds if their mass flow is > 3 kg/h; also valid for sum of coinciding class I to III organic compounds

<sup>115</sup> Limit value in the exhaust air

<sup>116</sup> valid for sum of substances of this class

<sup>117</sup> valid for sum of substances of this class

<sup>118</sup> valid for sum of substances of this class



Air pollutant	I	L	NL <sup>NL1</sup>	P	E	S	UK
Particulates	50 <sup>119</sup> 150 <sup>120</sup> (mg/m <sup>3</sup> )		10 <sup>NL2</sup> None <sup>NL3</sup> (mg/m <sup>3</sup> )	No data	150 50-150 <sup>121</sup> (mg/Nm <sup>3</sup> )	None	20 (mg/m <sup>3</sup> )
CO	None		None <sup>NL2</sup> 75 <sup>NL3</sup> HHAV (mg/m <sup>3</sup> )	No data	100 (mg/Nm <sup>3</sup> )	None	100- 150 <sup>122</sup> (mg/m <sup>3</sup> )
NOx	500 <sup>123, 124</sup> (mg/m <sup>3</sup> )		None <sup>NL2</sup> 25 <sup>NL3</sup> HHAV (mg/m <sup>3</sup> )	No data	616 <sup>125</sup> 3 <sup>126</sup> 450 <sup>127</sup> (mg/Nm <sup>3</sup> )	None	None
VOC	5-600 <sup>128</sup>		None <sup>NL2</sup> 150 <sup>NL3</sup> HHAV	No data	None	None	20-80 <sup>129</sup>
	5 <sup>130</sup> 20 <sup>131</sup> 150 <sup>132</sup> 300 <sup>133</sup> 600 <sup>134</sup> (mg/m <sup>3</sup> )				150 <sup>135</sup> 20 <sup>136</sup> (mg/Nm <sup>3</sup> )		(mg/m <sup>3</sup> )
Formaldehyde	20 <sup>137, 138</sup> (mg/m <sup>3</sup> )		5-20 <sup>NL2</sup> 0 <sup>NL3</sup> HHAV (mg/m <sup>3</sup> )	No data	None	20 0.02 <sup>139</sup> 5 (mg/Nm <sup>3</sup> ) (kg/tonne) (tonnes/y)	5 <sup>140</sup> (mg/m <sup>3</sup> )
Methanol	150 <sup>141, 142</sup> (mg/m <sup>3</sup> )		5 <sup>NL2</sup> HHAV 0 <sup>NL3</sup> HHAV (mg/m <sup>3</sup> )	No data	None	None	5 <sup>143</sup> (mg/m <sup>3</sup> )
Dimethyl ether	600 <sup>144, 145</sup> (mg/m <sup>3</sup> )		15 <sup>NL2</sup> HHAV None <sup>NL3</sup> (mg/m <sup>3</sup> )	No data	None	None	None

NL1 Reference condition: standard

<sup>119</sup> mass flow ? 0.5 kg/h

<sup>120</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

NL2 metal oxide process

NL3 silver process

<sup>121</sup> focus from other process activities (this does not appear anywhere)

<sup>122</sup> Median range – small sample available

<sup>123</sup> NO<sub>x</sub> + SO<sub>x</sub>

<sup>124</sup> mass flow ? 5 kg/h

<sup>125</sup> focus from other process activities

<sup>126</sup> focus from other process activities

<sup>127</sup> furnace focus

<sup>128</sup> Valid for substances of different classes

<sup>129</sup> Median range – small sample available

<sup>130</sup> valid for substances of class I and mass flow ? 25 g/h

<sup>131</sup> valid for substances of class II and mass flow ? 0.1 kg/h

<sup>132</sup> valid for substances of class III and mass flow ? 2 kg/h

<sup>133</sup> valid for substances of class IV and mass flow ? 3 kg/h

<sup>134</sup> valid for substances of class V and mass flow ? 4 kg/h

<sup>135</sup> focus from other process activities

<sup>136</sup> furnace focus

<sup>137</sup> +others

<sup>138</sup> mass flow ? 0.1 kg/h

<sup>139</sup> The specific value given here corresponds to permitted emission divided by total permitted production

<sup>140</sup> 2hr rolling average

<sup>141</sup> +others

<sup>142</sup> mass flow ? 2 kg/h

<sup>143</sup> 2hr rolling average

<sup>144</sup> +others

<sup>145</sup> mass flow ? 4 kg/h

## 4.1.4 Chemical installations for the production of vinyl chlorine monomer

Air pollutant	A	B	DK	FIN	F <sup>1</sup> HHAV	D <sup>1</sup> HHAV	EL	IRL
Particulates	No l.		No l.		100 <sup>146</sup> , 147 40 <sup>148</sup>	50 <sup>149</sup> DAV 150 <sup>150</sup> DAV	No l.	No l.
					(mg/m <sup>3</sup> )	50 <sup>149</sup> DAV 15 <sup>150</sup> FOE (mg/m <sup>3</sup> )		
CO	No l.		No l.		None	None	No l.	No l.
NOx	No l.		No l.		500 <sup>151</sup> , 152 (mg/m <sup>3</sup> )	500 <sup>153</sup> DAV (mg/m <sup>3</sup> )	No l.	No l.
SOx	No l.		No l.		300 <sup>154</sup> , 155 (mg/m <sup>3</sup> )	500 <sup>156</sup> DAV (mg/m <sup>3</sup> )	No l.	No l.
VOC	No l.		No l.		110 <sup>157</sup> , 158	20-150 <sup>159</sup>	No l.	No l.
					(mg/m <sup>3</sup> )	20 <sup>160</sup> DAV 100 <sup>161</sup> 150 <sup>162</sup> (mg/m <sup>3</sup> )		
HCl	No l.		No l.		50 <sup>163</sup> , <sup>164</sup> (mg/m <sup>3</sup> )	30 <sup>165</sup> DAV (mg/m <sup>3</sup> )	No l.	No l.
HF	No l.		No l.		5 <sup>166</sup> , <sup>167</sup> (mg/m <sup>3</sup> )	5 <sup>168</sup> DAV (mg/m <sup>3</sup> )	No l.	No l.
Vinyl chloride monomer	No l.		No l.		None	5 <sup>169</sup> DAV (mg/m <sup>3</sup> )	No l.	No l.
Ethylene dichloride	No l.		No l.		None	150 <sup>170</sup> DAV 20 <sup>171</sup> DAV	No l.	No l.

F<sup>1</sup> Reference conditions: 273 °K, 101.3 kPa

<sup>146</sup> for flows < 1 kg/h

<sup>147</sup> Values from national regulation.

<sup>148</sup> for flows > 1 kg/h

<sup>149</sup> if mass flow > 0.5 kg/h

<sup>150</sup> if mass flow < 0.5 kg/h

FOE BELIEVE THAT IT IS A TYPING ERROR, CONSIDERING THE VALUES OF RELEVANT INDUSTRIES (4.1.1, 4.1.2, 4.1.3)

<sup>151</sup> for flows > 1 kg/h

<sup>152</sup> Values from national regulation.

<sup>153</sup> if mass flow > 5 kg/h

<sup>154</sup> for flows > 1 kg/h

<sup>155</sup> Values from national regulation.

<sup>156</sup> if mass flow > 5 kg/h

<sup>157</sup> for flows > 2 kg/h and with the exception of methane the limit value is around 20 mg/m<sup>3</sup> for 39 VOC considered as dangerous

<sup>158</sup> Values from national regulation.

<sup>159</sup> TOC (Total Organic Compounds), valid for organic substances of different classes

<sup>160</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR 1

<sup>161</sup> sum of class II organic compounds if their mass flow is > 2 kg/h; also valid for sum of coinciding class I and II organic compounds

<sup>162</sup> sum of class III organic compounds if their mass flow is > 3 kg/h; also valid for sum of coinciding class I to III organic compounds

<sup>163</sup> for flows > 1 kg/h

<sup>164</sup> Values from national regulation.

<sup>165</sup> sum of vapourous or gaseous inorganic chlorine compounds (class III gaseous inorganic compounds) if their mass flow is > 0.3 kg/h; also valid for sum of coinciding class I to III inorganic compounds

<sup>166</sup> for flows > 500 g/h

<sup>167</sup> Values from national regulation.

<sup>168</sup> sum of Br, F and its vapourous or gaseous compounds as well as Cl<sub>2</sub>, H<sub>2</sub>S and HCN (class II gaseous inorganic compounds) if their mass flow is > 50 g/h; also valid for sum of coinciding class I and II inorganic compounds

<sup>169</sup> sum of class III carcinogenic compounds if their mass flow is > 25 g/h; also valid for sum of coinciding class I to III carcinogenic compounds, sum of vapourous or gaseous inorganic chlorine compounds (class III gaseous inorganic compounds) if their mass flow is > 0.3 kg/h; also valid for sum of coinciding class I to III inorganic compounds

<sup>170</sup> 1,2-ethylene dichloride

<sup>171</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR 1

Air pollutant	A	B	DK	FIN	F <sup>172</sup> HHAV	D <sup>172</sup> HHAV (mg/m <sup>3</sup> )	EL	IRL
PCDD/PCDF	No I.		No I.		None	None <sup>172</sup>	No I.	No I.
Chlorine	No I.		No I.		None	5 <sup>173</sup> DAV (mg/m <sup>3</sup> )	No I.	No I.

<sup>172</sup> minimisation obligation

<sup>173</sup> sum of vapourous or gaseous inorganic chlorine compounds (class III gaseous inorganic compounds) if their mass flow is > 0.3 kg/h; also valid for sum of coinciding class I to III inorganic compounds

Air pollutant	I	L	NL <sup>NL1</sup> NL <sup>2</sup>	P	E	S	UK
Particulates	50 <sup>174</sup> 150 <sup>175</sup> (mg/m <sup>3</sup> )		None	No I.	150 10-45 <sup>176</sup> (mg/Nm <sup>3</sup> )	None	20 <sup>177</sup> (mg/m <sup>3</sup> )
CO	None		100 (mg/m <sup>3</sup> )	No I.	100 (mg/Nm <sup>3</sup> )	None <sup>WAV</sup>	None
NO <sub>x</sub>	500 <sup>178, 179</sup> (mg/m <sup>3</sup> )		500 <sup>180</sup> 105 <sup>181</sup> (mg/m <sup>3</sup> )	No I.	616 <sup>182</sup> 3 <sup>183</sup> 450 <sup>184</sup> (mg/Nm <sup>3</sup> )	None <sup>WAV</sup>	None
SO <sub>x</sub>			None	No I.	4300 <sup>185</sup> 300 <sup>186</sup> (mg/Nm <sup>3</sup> )	None	None
VOC	5-600 <sup>187</sup>		None	No I.	None	0.59 <sup>WAV</sup> / MAV / TAV	None
	5 <sup>188</sup> 20 <sup>189</sup> 150 <sup>190</sup> 300 <sup>191</sup> 600 <sup>192</sup> (mg/m <sup>3</sup> )				150 <sup>193</sup> 20 <sup>194</sup> (mg/Nm <sup>3</sup> )	0.3 <sup>WAV</sup> / MAV / TAV / Y	
HCl	30 <sup>195</sup> (mg/m <sup>3</sup> )		30 <sup>MAV</sup> (mg/m <sup>3</sup> )	No I.	None	None <sup>WAV</sup>	None
HF	5 <sup>196, 197</sup> (mg/m <sup>3</sup> )		None	No I.	None	None	None
Vinyl chloride monomer	5 <sup>198, 199</sup>		5 <sup>MAV</sup>	No I.	43.3	0.25 <sup>WAV</sup> / MAV / TAV	None
	(mg/m <sup>3</sup> )		(mg/m <sup>3</sup> )		(mg/Nm <sup>3</sup> )	0.15 <sup>WAV</sup> / MAV / TAV / Y	
Ethylene dichloride	30 <sup>200</sup> (mg/m <sup>3</sup> )		5 <sup>MAV</sup> (mg/m <sup>3</sup> )	No I.	None	<sup>201</sup>	None
PCDD/PCDF	0.01 <sup>202</sup> (mg/m <sup>3</sup> )		None	No I.	None	None	None

NL1 Reference conditions: standard

NL2 ELVs will be revised within 1 year

<sup>174</sup> mass flow ? 0.5 kg/h

<sup>175</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>176</sup> focus from other process activities

<sup>177</sup> Standard Temp. and Pressure without correction from water vapour

<sup>178</sup> NO<sub>x</sub> + SO<sub>x</sub>

<sup>179</sup> mass flow ? 5 kg/h

<sup>180</sup> general chlorinated compounds incinerator (continuous)

<sup>181</sup> EDC cracker (continuous)

<sup>182</sup> focus from other process activities

<sup>183</sup> focus from other process activities

<sup>184</sup> furnace focus

<sup>185</sup> SO<sub>x</sub> as SO<sub>2</sub>

<sup>186</sup> SO<sub>x</sub> as SO<sub>2</sub>; furnace focus

<sup>187</sup> Valid for substances of different classes

<sup>188</sup> valid for substances of class I and mass flow ? 25 g/h

<sup>189</sup> valid for substances of class II and mass flow ? 0.1 kg/h

<sup>190</sup> valid for substances of class III and mass flow ? 2 kg/h

<sup>191</sup> valid for substances of class IV and mass flow ? 3 kg/h

<sup>192</sup> valid for substances of class V and mass flow ? 4 kg/h

<sup>193</sup> focus from other process activities

<sup>194</sup> furnace focus

<sup>195</sup> mass flow ? 0.3 kg/h

<sup>196</sup> HF + others

<sup>197</sup> mass flow ? 50 g/h

<sup>198</sup> + others

<sup>199</sup> mass flow ? 25 g/h

<sup>200</sup> mass flow ? 0.1 g/h

<sup>201</sup> Incl. in VOC

<sup>202</sup> mass flow ? 0.02 g/h

Chlorine	5 <sup>203</sup> (mg/m <sup>3</sup> )		5 <sup>MAV</sup> (mg/m <sup>3</sup> )	No I.	None	None	None
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## 4.2.1 Chemical installations for the production of ammonia

Air pollutant	A <sup>A1 A2</sup>	B	DK	FIN	F <sup>F1 HHAV</sup>	D <sup>D HHAV</sup>	EL	IRL <sup>IRL7</sup>
Particulates	None		No I.		100 <sup>204</sup> , 205 40 <sup>206</sup>	50 <sup>DAV, HHAV</sup> 150	100/150	20
					(mg/m <sup>3</sup> )	50 <sup>207 DAV</sup> 100 <sup>208</sup> (mg/m <sup>3</sup> )	(mg/Nm <sup>3</sup> )	(kg/h)
CO	None		No I.		None	None	None	100
NOx	200		No I.		500 <sup>209</sup> , 210	500 <sup>DAV HHAV</sup>	None	300
	(mg/m <sup>3</sup> )				(mg/m <sup>3</sup> )	50 <sup>211 DAV</sup> (mg/m <sup>3</sup> )		
SOx	None		No I.		300 <sup>212</sup> , 213	500 <sup>DAV HHAV</sup>	None	5
					(mg/m <sup>3</sup> )	50 <sup>214 DAV</sup> (mg/m <sup>3</sup> )		
H <sub>2</sub> S	None		No I.		None	5 <sup>215 HHAV</sup> (mg/m <sup>3</sup> )	None	None
Amines	None		No I.		None	20 <sup>216 HHAV</sup> 100 <sup>217</sup> 150 <sup>218</sup>	None	20
						20 <sup>219</sup> 100 <sup>220</sup> 150 <sup>221</sup> (mg/m <sup>3</sup> )		(kg/h)
Ammonia	10 (mg/m <sup>3</sup> )		No I.		50 <sup>222</sup> (mg/m <sup>3</sup> )	None	None	12 (kg/h)

A1 Reference conditions: 3% O<sub>2</sub>

A2 measurement every ¼ year

F1 Reference conditions: 273 °K, 101.3 kPa

IRL<sup>7</sup> for combustion gases –273K, 101.3 kPa, dry gas, 3% O<sub>2</sub> for liquid and gas fuels, 6 % O<sub>2</sub> for solid fuels;

For non-combustion gases –273 K, 101.3 kPa, no correction for O<sub>2</sub> or water

<sup>204</sup> for flows < 1 kg/h

<sup>205</sup> Values from national regulation.

<sup>206</sup> for flows > 1 kg/h

<sup>207</sup> if mass flow > 0.5 kg/h

<sup>208</sup> if mass flow < 0.5 kg/h

<sup>209</sup> flows > 1 kg/h

<sup>210</sup> Values from national regulation.

<sup>211</sup> if mass flow > 5 kg/h

<sup>212</sup> for flows > 1 kg/h

<sup>213</sup> Values from national regulation.

<sup>214</sup> if mass flow > 5 kg/h

<sup>215</sup> if mass flow > 50 g/h

<sup>216</sup> valid for different classes

<sup>217</sup> valid for different classes

<sup>218</sup> valid for different classes

<sup>219</sup> sum of class I organic compounds if their mass flow is > 0.1 kg/h; see class definition in Annex E of GBR 1

<sup>220</sup> sum of class II organic compounds if their mass flow is > 2 kg/h; also valid for sum of coinciding class I and II compounds

<sup>221</sup> sum of class III organic compounds if their mass flow is > 3 kg/h; also valid for sum of coinciding class I to III compounds

<sup>222</sup> Values from national regulation.

Air pollutant	I	L	NL	P	E <sup>E1</sup>	S	UK <sup>UK1</sup>
Particulates	50 <sup>223</sup> 150 <sup>224</sup> (mg/m <sup>3</sup> )		20 <sup>NL1 225</sup> (mg/m <sup>3</sup> )	No data	130 <sup>226</sup> (mg/Nm <sup>3</sup> )	No I.	None
CO	None		None	No data	100 <sup>227</sup> (mg/Nm <sup>3</sup> )	No I.	20 (mg/m <sup>3</sup> )
NO <sub>x</sub>	500 <sup>228, 229</sup> (mg/m <sup>3</sup> )		100-330 <sup>NL2 230</sup> HHAV (mg/m <sup>3</sup> )	No data	650 <sup>231</sup> 450 <sup>232</sup> (mg/Nm <sup>3</sup> )	No I.	1000 (mg/m <sup>3</sup> )
SO <sub>x</sub>			None	No data	5200 <sup>233</sup> 2000 <sup>234</sup> 700 <sup>235</sup> (mg/Nm <sup>3</sup> )	No I.	None
H <sub>2</sub> S	5 <sup>236, 237</sup> (mg/m <sup>3</sup> )		None	No data	None	No I.	None
Amines	None <sup>238</sup>		None	No data	None	No I.	None
Ammonia	250 <sup>239</sup> (mg/m <sup>3</sup> )		30 <sup>NL1 240</sup> HHAV (mg/m <sup>3</sup> )	No data	None	No I.	None

E1 furnace focus

UK1 Reference conditions: standard Temp. And Pressure; 3% O<sub>2</sub>, dry

223 mass flow ? 0.5 kg/h

224 mass flow ? 0.1 kg/h and < 0.5 kg/h

NL1 Reference conditions: standard

225 Process furnace of the reformer

226 liquid fuels; P > 5 MWt

227 gaseous fuels

228 NO<sub>x</sub> + SO<sub>x</sub>

229 mass flow ? 5 kg/h

NL2 Reference conditions: standard, 3% O<sub>2</sub>

230 Process furnace of the reformer

231 P > 5 MWt (fueloil)

232 P > 5 MWt (gasoil)

233 heavy fuel

234 low sulphur content fuels

235 gasoil

236 + others

237 mass flow ? 50 g/h

238 LV for single substances

239 mass flow ? 2 kg/h

240 CO<sub>2</sub> removal

## 4.2.2 Chemical installations for the production of nitric acid

Air pollutant	A	B	DK	FIN	F <sup>F1</sup> HHAV	D <sup>HHAV</sup> DAV, HHAV	EL	IRL
Particulates	None		No I.	None	100 <sup>241</sup> , 242 40 <sup>243</sup>	50 150	100/150	None
					(mg/m <sup>3</sup> )	50 <sup>244</sup> DAV 150 <sup>245</sup> (mg/m <sup>3</sup> )	(mg/Nm <sup>3</sup> )	
N <sub>2</sub> O	None		No I.	None	7 (kg/t)	None	None	None
NO <sub>x</sub>	450		No I.	200	500 <sup>246</sup> , 247	450 <sup>DAV</sup> HHAV	5/8	300 <sup>248</sup>
	(mg/m <sup>3</sup> )			1.9 (t/a)	(mg/m <sup>3</sup> )	(mg/m <sup>3</sup> )	(kg/t) <sup>249</sup>	(mg/m <sup>3</sup> )
				(kg/t)				
HNO <sub>3</sub>	None		No I.	None	1.3 (kg/t)	None	None	None

F<sup>1</sup> 273 °K, 101.3 kPa

<sup>241</sup> For flows < 1 kg/h

<sup>242</sup> Values from national regulation.

<sup>243</sup> for flows > 1 kg/h

<sup>244</sup> if mass flow > 0.5 kg/h

<sup>245</sup> if mass flow < 0.5 kg/h

<sup>246</sup> for flows > 1kg/h

<sup>247</sup> Values from national regulation.

<sup>248</sup> -273K, 101.3kPa, no correction for water or O<sub>2</sub>

<sup>249</sup> of nitric acid, 100%



Air pollutant	I	L	NL	P	E	S	UK
Particulates	50 <sup>250</sup> 150 <sup>251</sup>		- <sup>NL1</sup>	No data	130 <sup>252</sup>	No I.	30
	(mg/m <sup>3</sup> )		None		(mg/Nm <sup>3</sup> )	None	(mg/m <sup>3</sup> )
N <sub>2</sub> O	None		2800 <sup>NL2</sup>	No data	None	No I.	None
			None <sup>253</sup> (mg/m <sup>3</sup> )			None	
NO <sub>x</sub>	500 <sup>254</sup>		450-600 <sup>NL2</sup> NL2 WAV 452 <sup>NL2</sup> HAV 1232 <sup>NL2</sup> 255 HHAV	No data	650 <sup>256</sup> 450 <sup>257</sup>	No I.	600- 1600 <sup>258</sup>
	(mg/m <sup>3</sup> )		(mg/m <sup>3</sup> )		(mg/Nm <sup>3</sup> )	190-3800 <sup>MAV</sup> 115-320 <sup>MAV</sup> (mg/Nm <sup>3</sup> ) (g/t HNO <sub>3</sub> )	(mg/m <sup>3</sup> )
HNO <sub>3</sub>	None		None	No data	205	No I.	None
					(mg/Nm <sup>3</sup> )	None	

<sup>250</sup> mass flow ? 0.5 kg/h

<sup>251</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>NL1</sup> Reference conditions: standard

<sup>252</sup> furnace focus; liquid fuels; P > 5 MWt

<sup>NL2</sup> Reference conditions: standard, 3% O<sub>2</sub>

<sup>253</sup> study and/or N<sub>2</sub>O reduction plan

<sup>254</sup> mass flow ? 5 kg/h

<sup>255</sup> Single plant with higher emissions. Study for reduction

<sup>256</sup> furnace focus; P > 5 MWt (fueloil)

<sup>257</sup> furnace focus; P > 5 MWt (gasoil)

<sup>258</sup> Median range – small sample

### 4.2.3 Chemical installations for the production of phosphoric acid

Air pollutant	A	B	DK	FIN	F <sup>F1</sup> HHAV	D <sup>HHAV</sup>	EL	IRL
Particulates	No l.		No l.	None	100 <sup>259</sup> 260 40 <sup>261</sup>	50 <sup>DAV, HHAV</sup> 150	100/150	No l.
					(mg/m <sup>3</sup> )	50 <sup>262</sup> DAV 150 <sup>263</sup> (mg/m <sup>3</sup> )	(mg/Nm <sup>3</sup> )	
HF	No l.		No l.	10 <sup>MAV</sup>	10 <sup>264</sup> 265	5 <sup>264</sup> DAV, HHAV	80/100 <sup>267</sup>	No l.
				(mg/m <sup>3</sup> (n))				
				10-15 & 54	(mg/m <sup>3</sup> )	(mg/m <sup>3</sup> )	(mg/Nm <sup>3</sup> )	
				(t/a) & (g/t)				

<sup>F1</sup> Reference conditions: 273 k, 101.3 kPa

<sup>259</sup> for flows < 1 kg/h

<sup>260</sup> Values from national regulation.

<sup>261</sup> for flows > 1 kg/h

<sup>262</sup> if mass flow > 0.5 kg/h

<sup>263</sup> if mass flow < 0.5 kg/h

<sup>264</sup> for flows > 500 g/h

<sup>265</sup> Values from national regulation.

<sup>266</sup> alternative ELV: 50 g/h

<sup>267</sup> F, HF, F- inorganic compounds

Air pollutant	I	L	NL	P	E	S	UK
Particulates	50 <sup>268</sup> 150 <sup>269</sup> (mg/m <sup>3</sup> )		No I.	No I.	130 <sup>270</sup> (mg/Nm <sup>3</sup> )	No I.	
HF	5 <sup>271, 272</sup> (mg/m <sup>3</sup> )		No I.	No I.	None	No I.	

<sup>268</sup> mass flow ? 0.5 kg/h

<sup>269</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>270</sup> furnace focus; liquid fuels; P > 5 MWt

<sup>271</sup> HF + others

<sup>272</sup> mass flow ? 50 g/h

## 4.2.4 Chemical installations for the production of sulphuric acid

Air pollutant	A	B	DK	FIN	F <sup>F1 HHAV</sup>	D	EL	IRL
Particulates	None or 20 <sup>273</sup> HHAV		No I.	None	100 <sup>274</sup> , 275 40 <sup>276</sup>	DAV, HHAV 50 150	100/150	No I.
	(mg/m <sup>3</sup> )				(mg/m <sup>3</sup> )	50 <sup>277</sup> DAV HHAV 150 <sup>278</sup> HHAV (mg/m <sup>3</sup> )	(mg/Nm <sup>3</sup> )	
SO <sub>x</sub>	279 1000- 2000 <sup>HHAV</sup> 99.5		No I.	2000	2.6 <sup>280</sup>	None <sup>281</sup>	6/10 0.5/0.8	No I.
	(mg/m <sup>3</sup> )			(t/a)		97.5% - 99.6% <sup>282</sup>		
	(% Process efficiency)			3 2 <sup>283</sup>	(kg/t)	Conversion factor	(kg/t of sulphuric acid)	
				(kg/t)				
H <sub>2</sub> SO <sub>4</sub>	None or 0.4 (kg/t H <sub>2</sub> SO <sub>4</sub> )		No I.	None	None	None	None	No I.

F1 Reference conditions: 273 k, 101.3 kPa

<sup>273</sup> because there are only few plants it is not possible to report representative ELVs

<sup>274</sup> for flows < 1 kg/h

<sup>275</sup> Values from national regulation.

<sup>276</sup> for flows > 1 kg/h

<sup>277</sup> if mass flow > 0.5 kg/h

<sup>278</sup> if mass flow < 0.5 kg/h

<sup>279</sup> depends on date of permit

<sup>280</sup> Values from national regulation.

<sup>281</sup> regulation according conversion rate

<sup>282</sup> value of minimum conversion factor depending on the process applied

<sup>283</sup> target value

Air pollutant	I	L	NL	P	E <sup>E1</sup>	S	UK
Particulates	50 <sup>284</sup> 150 <sup>285</sup> (mg/m <sup>3</sup> )		None	No I.	130 <sup>286</sup> (mg/Nm <sup>3</sup> )	None	None
SO <sub>x</sub>	1200 <sup>287</sup>		200-260 NL1 288 MAV / DAV 16.4 <sup>289</sup>	No I.	5200 <sup>290</sup> 2000 <sup>291</sup> 700 <sup>292</sup> 190-1900	1 <sup>MAV</sup>	1500
	(mg/m <sup>3</sup> )		(mg/m <sup>3</sup> ) (kg/ton H <sub>2</sub> SO <sub>4</sub> )		(mg/Nm <sup>3</sup> )	0.9 <sup>MAV</sup> 1.2 <sup>MAV</sup> (kg/t H <sub>2</sub> SO <sub>4</sub> )	(mg/m <sup>3</sup> )
H <sub>2</sub> SO <sub>4</sub>	80-100		5 <sup>293</sup> 0.5 <sup>294</sup>	No I.	None	None	None
	(mg/m <sup>3</sup> )		5-260 <sup>295</sup> (mg/m <sup>3</sup> ) (kg/ton H <sub>2</sub> SO <sub>4</sub> )				

E1 furnace focus

<sup>284</sup> mass flow ? 0.5 kg/h

<sup>285</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>286</sup> liquid fuels; P > 5 MWt

<sup>287</sup> Yields limit

NL1 Reference conditions: standard

<sup>288</sup> contact H<sub>2</sub>SO<sub>4</sub> plant

<sup>289</sup> special type of H<sub>2</sub>SO<sub>4</sub> plant (Molybdenum oxide production)

<sup>290</sup> heavy fuel

<sup>291</sup> low sulphur content fuels

<sup>292</sup> gasoil

<sup>293</sup> contact H<sub>2</sub>SO<sub>4</sub> plant; parameter only in 2 permits

<sup>294</sup> special type of H<sub>2</sub>SO<sub>4</sub> plant

<sup>295</sup> contact H<sub>2</sub>SO<sub>4</sub> plant; parameter only in 2 permits

## 4.2.5 Chemical installations for the production of titanium dioxide

Air pollutant	A	B	DK	FIN	F <sup>F1</sup> HHAV	D	EL	IRL
Particulates	No l.		No l.	50 <sup>296</sup> 150 <sup>297</sup>	50	50 <sup>D1, D2</sup> DAV <sup>HHAV</sup>	No l.	No l.
				50 <sup>298</sup> 50 <sup>299</sup> (mg/m <sup>3</sup> (n) )	50 (150) 300 (mg/m <sup>3</sup> )	(mg/m <sup>3</sup> )		
SO <sub>x</sub>	No l.		No l.	10 <sup>301</sup> 5 <sup>302</sup> 4 <sup>305</sup>	10 <sup>303</sup> 500 <sup>304</sup>	10 <sup>D1</sup> 500 <sup>D1, DAV</sup>	No l.	No l.
				See footnotes	(kg/t) (mg/m <sup>3</sup> )	(kg/t TiO <sub>2</sub> ) (mg/m <sup>3</sup> )		
Cl <sub>2</sub>	No l.		No l.	None	None	5 <sup>D2, DAV</sup> (mg/m <sup>3</sup> )	No l.	No l.

F1 Reference conditions: 273 k, 101.3 kPa

<sup>296</sup> particulates in normal situation

<sup>297</sup> spray drying and spray grinding

D1 sulphate process

D2 chloride process

<sup>298</sup> titanium dioxide plant

<sup>299</sup> grinding of ilmenite FeTiO<sub>3</sub>

<sup>300</sup> 50 pour les sources principales et 150 pour les autres sources (sources diffuses)

<sup>301</sup> TiO<sub>2</sub> plant; unit = kg/t TiO<sub>2</sub>

<sup>302</sup> H<sub>2</sub>SO<sub>4</sub> plant; unit = kg/t H<sub>2</sub>SO<sub>4</sub>

<sup>303</sup> for units of digestion and calcination

<sup>304</sup> for units of concentration of acid refuse

D1 sulphate process

<sup>305</sup> H<sub>2</sub>SO<sub>4</sub> plant; unit = kg/t H<sub>2</sub>SO<sub>4</sub>

D2 chloride process

Air pollutant	I	L	NL <sup>NL1</sup>	P	E <sup>E1</sup>	S	UK
Particulates	50 <sup>306</sup> 150 <sup>307</sup> (mg/m <sup>3</sup> )		10-15 <sup>NL2</sup> HAV (mg/m <sup>3</sup> )	No I.	130 <sup>308</sup> (mg/Nm <sup>3</sup> )	No I.	50 (mg/m <sup>3</sup> )
SO <sub>x</sub>	10 <sup>309</sup> 500 <sup>310</sup> (kg/t TiO <sub>2</sub> ) (mg/m <sup>3</sup> )		None	No I.	5200 <sup>311</sup> 2000 <sup>312</sup> 700 <sup>313</sup> 190-1900 (mg/Nm <sup>3</sup> )	No I.	125 (mg/m <sup>3</sup> )
Cl <sub>2</sub>	5 <sup>314, 315</sup> (mg/m <sup>3</sup> )		5 <sup>NL2, DAV</sup> 10 <sup>NL2, HAV</sup> (mg/m <sup>3</sup> )	No I.	None	No I.	40 (mg/m <sup>3</sup> )

NL1 Reference condition: standard

E1 furnace focus

<sup>306</sup> mass flow ? 0.5 kg/h

<sup>307</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

NL2 chloride process

<sup>308</sup> liquid fuels; P > 5 MWt

<sup>309</sup> Emissions from digester and calcination

<sup>310</sup> emissions from concentration of acid residual

<sup>311</sup> heavy fuel

<sup>312</sup> low sulphur content fuels

<sup>313</sup> gasoil

<sup>314</sup> + others

<sup>315</sup> mass flow ? 50 g/h

## 4.2.6 Chlor-alkali manufacture processes

Air pollutant	A	B	DK	FIN	F <sup>F1 HHAV</sup>	D	EL	IRL
Particulates	None <sup>316</sup>		No l.	None	100 <sup>317</sup> 318 40 <sup>319</sup> (mg/m <sup>3</sup> )	50 <sup>320 HHAV</sup> (mg/m <sup>3</sup> )	100/150 (mg/Nm <sup>3</sup> )	None
Asbestos	None		No l.	None	0.1 <sup>321</sup> (mg/m <sup>3</sup> )	0.1 <sup>322 HHAV</sup> (mg/m <sup>3</sup> )	None	None
Cl <sub>2</sub>	None		No l.	None	None	1 <sup>HHAV</sup> 6 <sup>323 HHAV</sup> (mg/m <sup>3</sup> )	None	10 <sup>HHAV</sup> (mg/m <sup>3</sup> ) 324
Mercury	None		No l.	140	2 <sup>325</sup>	1.5-2.0 <sup>326 YAV</sup> 0.2 <sup>HHAV, 327</sup>	2	None
				2		2.0 <sup>328 YAV</sup> (g/t) 1.5 <sup>329 YAV</sup> (g/t) 0.2 <sup>330 HHAV</sup>		
				(kg/a)	(g/t)	(g/t)	(MPb/m <sup>3</sup> )	
				(g/t)				

F<sup>1</sup> Reference conditions: 273 k, 101.3 kPa

<sup>316</sup> membrane cell, no use of mercury and asbestos; no emission to atmosphere

<sup>317</sup> for flows < 1 kg/h

<sup>318</sup> Values from national regulation.

<sup>319</sup> for flows > 1 kg/h

<sup>320</sup> if mass flow > 0.5 kg/h

<sup>321</sup> reconversion in progress by alternate procedes without asbestos

<sup>322</sup> valid for the sum of class I carcinogenic compounds at a mass flow of 0.5 g/h or more; minimisation obligation

<sup>323</sup> for total liquefaction

<sup>324</sup> 273K, 101.3kPa, no correction for water or O<sub>2</sub> one plant only using electrolysis (no mercury, no asbestos)

<sup>325</sup> Values from national regulation.

<sup>326</sup> off-gas cellroom

<sup>327</sup> point sources different from cellroom

<sup>328</sup> for plants in operation before 1972, valid for the off-gas of the cellroom; production-specific load value refers to the authorised production capacity

<sup>329</sup> valid for the off-gas of the cellroom; production-specific load value refers to the authorised production capacity

<sup>330</sup> point sources except for the cellroom



Air pollutant	I	L	NL	P	E <sup>E1</sup>	S	UK
Particulates	50 <sup>331</sup> 150 <sup>332</sup> (mg/m <sup>3</sup> )		None	No data	130 <sup>333</sup> (mg/Nm <sup>3</sup> )	None	10 <sup>334</sup> (mg/m <sup>3</sup> )
Asbestos	5 <sup>335, 336</sup> (mg/m <sup>3</sup> )		0.015 <sup>337</sup> (fibres/ cm <sup>3</sup> )	No data	None	None	None
Cl <sub>2</sub>	1 6 <sup>338</sup>		None <sup>339</sup> 0.1 <sup>NL1 340</sup> 5-6 <sup>NL1 341</sup> DAV / YAV	No data	150	2.5 <sup>342</sup>	10
	(mg/m <sup>3</sup> )		30 <sup>343</sup> (mg/m <sup>3</sup> )		(mg/Nm <sup>3</sup> )	1.5-3 <sup>344</sup> MAV 3 <sup>345</sup> MAV (mg/Nm <sup>3</sup> dg)	(mg/m <sup>3</sup> )
Mercury	1.5-2		50 <sup>NL2 346</sup> DAV 2 <sup>NL1 347</sup> DAV 1.5 <sup>348</sup> YAV	No data	2	0.8 <sup>349</sup>	Hg: 0.2- 1.5 <sup>350</sup>
	(g/t product)		None (µg/t) (mg/m <sup>3</sup> ) (g/ton Cl <sub>2</sub> cap.)		(g/t)	0.3-0.9 <sup>351</sup> YAV (g/t <span style="background-color: #90EE90;"> </span> )	(mg/m <sup>3</sup> )

E1 furnace focus

<sup>331</sup> mass flow ? 0.5 kg/h

<sup>332</sup> mass flow ? 0.1 kg/h and < 0.5 kg/h

<sup>333</sup> liquid fuels; P > 5 MWt

<sup>334</sup> 30minute sample

<sup>335</sup> + others

<sup>336</sup> mass flow ? 0.5 g/h

<sup>337</sup> diaphragm cell installation

<sup>338</sup> installation for Cl<sub>2</sub> total liquefaction

<sup>339</sup> diaphragm cell installation

NL1 Reference conditions: standard

<sup>340</sup> membrane cell installation; emission from cell room ventilation

<sup>341</sup> membrane cell installation; mercury cell installation; emission from chlorine destruction unit

<sup>342</sup> ventilation from cellrooms; Reference conditions: continuous

<sup>343</sup> membrane cell installation; emission from cell room ventilation

<sup>344</sup> mercury

<sup>345</sup> membrane

NL2 Reference conditions: actual

<sup>346</sup> mercury cell installation; emission from cell room ventilation; unit = µg/m<sup>3</sup>

<sup>347</sup> mercury cell installation; emission from end box ventilation; unit = mg/m<sup>3</sup>

<sup>348</sup> mercury cell installation; unit = g/ton Cl<sub>2</sub> cap.

<sup>349</sup> Total, all sources; Reference conditions: annual total

<sup>350</sup> 95%ile compliance

<sup>351</sup> mercury