

**Federal Ministry for the Environment, Nature Conservation and Nuclear  
Safety, Germany**

**Promulgation of the New Version of the  
Ordinance on Requirements for the Discharge of Waste Water into Waters  
(Waste Water Ordinance - AbwV)  
of 17. June 2004<sup>1</sup>**

On the basis of Article 2 of the Sixth Ordinance for Amendment of the Waste Water Ordinance of 17 June 2004 (Federal Law Gazette I p. 1106), the wording of the Waste Water Ordinance in the version valid as of 1 January 2005 is promulgated below. The new version takes the following into account:

1. The version promulgated on 15 October 2002 (Federal Law Gazette I p. 4047, 4050) and
2. Article 1 of the aforementioned Ordinance, which article came into force on 1 January 2005.

The provisions have been issued on the basis of Article 7a (1) 3<sup>rd</sup> and 4<sup>th</sup> sentences and paragraph (2) of that Article of the Federal Water Act (*Wasserhaushaltsgesetz*) in the version promulgated on 12 November 1996 (Federal Law Gazette I p. 1695).

Bonn, 17.June 2004

Federal Minister  
for the Environment, Nature Conservation and Nuclear Safety (BMU)

Jürgen Trittin

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<sup>1</sup> Federal Law Gazette <BGBl. I > p. 1108

**Ordinance**  
**on Requirements for the Discharge of Waste Water into Waters**  
**(Waste Water Ordinance - AbwV)<sup>\*)</sup>**

**Article 1**  
**Scope of Application**

- (1) This Ordinance specifies the minimum requirements to be stipulated when granting a permit to discharge waste water from the source categories listed in the Appendices into water bodies.
- (2) The requirements pursuant to this Ordinance shall only be included in the permit for those parameters which are expected to occur in the waste water.
- (3) Any farther-reaching requirements pursuant to other legal provisions shall remain unaffected by this.

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<sup>\*)</sup> Parts of this Ordinance shall also serve to implement the following Council Directives:  
- 82/176/EEC of 22 March 1982 regarding limit levels and quality targets for mercury discharges from the industrial sector of chloralkali electrolysis (Official Journal of the EC No. L 81, page 29)  
- 83/513/EEC of 26 September 1983 regarding limit levels and quality targets for cadmium discharges (Official Journal of the EC No. L 291, page 1)  
- 84/156/EEC of 8 March 1984 regarding limit levels and quality targets for mercury discharges in industrial sectors other than chloralkali electrolysis (Official Journal of the EC No. L 74, page 49 and No. L 99, page 38)  
- 84/491/EEC of 9 October 1984 regarding limit levels and quality targets for discharges of hexachlorocyclohexane (Official Journal of the EC No. L 274, page 11 and No. L 296, page 11)  
- 86/280/EEC of 12 June 1986 regarding limit levels and quality targets for the discharge of certain hazardous substances as detailed in list 1 of the Appendix to Directive 76/464/EEC (carbon tetrachloride, DDT, pentachlorophenol) (Official Journal of the EC No. L 181, page 16)  
- 87/217/EEC of 19 March 1987 on the prevention and reduction of environmental contamination from asbestos (Official Journal of the EC No. L 855, page 40)  
- 88/347/EEC of 16 June 1988 regarding limit levels and quality targets for discharges of aldrin, dieldrin, endrin, isodrin, hexachlorobenzene, hexachlorobutadiene and chloroform (Official Journal of the EC No. L 158, page 35)  
- 90/415/EEC of 27 July 1990 regarding limit levels and quality targets for discharges of 1,2 dichloroethane, trichloroethene, tetrachloroethylene and trichlorobenzene (Official Journal of the EC No. L 219, page 49)  
- 91/271/EEC of 21 May 1991 regarding the treatment of communal waste water (Official Journal of the EC No. L 135, page 40).  
- 92/112/EEC of 15 December 1992 on procedures for harmonizing the programmes for the reduction and eventual elimination of pollution caused by waste from the titanium dioxide industry (Official Journal of the EC No. L 409, page 11) and  
- Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (Official Journal of the EC No. L 257, page 26),  
- Commission Directive 98/15/EC of 27 February 1998 amending Council Directive 91/271/EEC with respect to certain requirements established in Annex I thereof (Official Journal of the EC No. L 67 page 29), and  
- Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste (Official Journal of the EC No. L 332, page 91, 2001 No. L 145, page 52).

## **Article 2 Definition of terms**

In the sense of this Ordinance:

1. Random sample shall refer to a single sample taken from a waste water flow
2. Composite sample shall refer to a sample which is taken continuously over a given period, or a sample consisting of several samples taken either continuously or discontinuously over a given period and blended
3. Qualified random sample shall refer to a composite sample of at least five random samples taken over a maximum period of two hours at intervals of no less than two minutes, and blended
4. Production-specific load level shall refer to the load level (e.g. m<sup>3</sup>/t, g/t, kg/t) in relation to the production capacity on which the water discharge licence is based.
5. Site of occurrence shall refer to the place where the waste water has been treated prior to blending with other waste water; otherwise, the place where it is first collected
6. Blending shall refer to the merging of waste water flows from different origins
7. Parameter shall refer to a chemical, physical or biological measurement factor as listed in the Annex.
8. Alligation shall refer to the calculation of a permissible load or concentration derived from the requirements in this Ordinance concerning the individual waste water flows.

## **Article 3 General requirements**

- (1) Unless otherwise stated in the Appendices, a permit to discharge waste water into water bodies shall only be granted if the pollutant load, based on an examination of the conditions in each individual case, is kept as low as the use of water-saving procedures such as washing and cleaning operations, indirect cooling and the use of low-pollutant feedstocks and auxiliary materials permit.
- (2) The requirements of this Ordinance must not be met by means of procedures whereby environmental pollution is transferred to other environmental media such as air or soil, contrary to the state of the art.
- (3) Requirements specified in the form of concentration levels must not be achieved via dilution, contrary to the state of the art.
- (4) If requirements prior to blending are specified, then blending shall be permissible for the purpose of joint treatment, provided at least the same overall reduction of contaminant load per parameter is achieved as would be the case via separate compliance with the relevant requirements.

- (5) If requirements are specified for the site of occurrence of waste water, blending is only permissible provided these requirements are adhered to.
- (6) If waste water flows which are subject to differing requirements are discharged jointly, then the relevant decisive requirement for each parameter shall be determined by means of alligation. If requirements governing the site of occurrence of the waste water or prior to blending are imposed in the applicable Appendices, then paragraphs (4) and (5) above shall remain unaffected.

#### **Article 4**

##### **Analysis and measurement procedures**

- (1) The requirements in the appendices refer to the analysis and measurement procedures specified in the Annex. The Standard German Procedures for the analysis of water, waste water and sludge, the DIN, DIN EN and DIN EN ISO standards and the technical regulations of the Wasserchemische Gesellschaft – all as cited in the Annex and the appendices – are published by Beuth Verlag GmbH, Berlin, and by the Wasserchemische Gesellschaft in the Gesellschaft Deutscher Chemiker, Wiley-VCH Verlag, Weinheim (Bergstraße). The cited procedural regulations are archived at the German Patent Office in Munich.
- (2) Other, equivalent techniques may be specified in the permit.

#### **Article 5**

##### **Reference point of the requirements**

The requirements refer to the point at which the waste water is discharged into the water bodies and also, where specified in the Appendices to this Ordinance, to the site of occurrence of the waste water or the site prior to blending thereof. The point of discharge is synonymous with the outlet from the waste water plant where the waste water was last treated. The site prior to blending is also the point of discharge into a public waste water plant.

#### **Article 6**

##### **Compliance with the requirements**

- (1) If a level specified by this Ordinance is not complied with based on the results of analysis within the context of government monitoring, it shall nevertheless be deemed to have been met, provided the results of this and the four preceding government analyses do not exceed the level in four cases and no result exceeds the level by more than 100 percent. Analyses which were conducted more than three years ago shall be disregarded.
- (2) Determination of compliance with a value specified in the water discharge licence shall be based upon the number drawn from the significant sections, as specified in the relevant procedural regulation, of the relevant analysis and measurement procedure for determining the relevant parameter pursuant to the Annex to Article 4 (Analysis and Measurement Procedures). The values specified in the appendices

take the measurement uncertainties of the analysis and sampling procedures into account.

- (3) With due regard for paragraph (1) above, a chemical oxygen demand (COD) level specified in the water discharge permit shall also be deemed to have been met provided the quadruple amount of total organically bonded carbon (TOC), specified in milligrams per litre, does not exceed this level.
- (4) A defined value for toxicity to fish eggs, daphnia, algae and luminescent bacteria pursuant to numbers 401 to 404 of the Annex to Article 4 shall, with due regard to paragraph (1) above, be deemed to have been met if it has been exceeded due to its sulfate and chloride content. In such cases, the dilution factor is increased by the sum total of concentrations of sulfate and chloride in the effluent, expressed in grams per litre, divided by the organism-specific value  $x$ . If the quotient does not correspond to a dilution factor of the dilution sequence defined in the determination procedure, the next higher dilution factor shall apply. In defining the toxicity,  $x$  is filled with the value 3 for fish eggs, the value 2 for daphnia, the value 0.7 for algae and the value 15 for luminescent bacteria.
- (5) The individual *Länder* (federal states) may concede that results obtained by the discharger on the basis of an officially recognised monitoring technique are considered equal to the results of government monitoring.

## Annex (to Article 4)

### Analysis and Measurement Procedures

No.	Parameter	Procedure
<b>I GENERAL PROCEDURES</b>		
1	Instructions on sampling techniques	DIN EN 25667-2 (July 1993 edition)
2	Sampling of waste water	DIN 38402-A 11 (December 1995 edition)
3	Volumetric flow of waste water	In line with DIN 19559 (July 1983 edition)
4	Pre-treatment, homogenisation and division of heterogeneous water samples	DIN 38402-A 30 (July 1998 edition)
<b>II ANALYSIS PROCEDURES</b>		
1	ANIONS/ELEMENTS	
102	Chloride	DIN EN ISO 10304-2 (November 1996 edition)
103	Cyanide, easily released	DIN 38405-D 13-2 (February 1981 edition)
104	Cyanide in the original sample	DIN 38405-D 13-1 (February 1981 edition)
105	Total fluoride in the original sample	DIN 38405-D 4-2 (July 1985 edition)
106	Nitrate nitrogen (NO <sub>3</sub> -N)	DIN EN ISO 10304-2 (November 1996 edition)
107	Nitrite nitrogen (NO <sub>2</sub> -N)	DIN EN 26777 (April 1993 edition)
108	Total phosphorous, in the original sample	DIN EN 1189 (December 1996 edition)

With due regard for:  
Digestion in accordance with  
point 6.4

109	Phosphorous compounds as total phosphorous in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
110	Sulphate	DIN EN ISO 10304-2 (November 1996 edition)
111	Sulphide, easily released	DIN 38405-D 27 (July 1992 edition)
112	Sulphite	DIN EN ISO 10304-3 (November 1997 edition)
2	CATIONS/ELEMENTS	
201	Aluminium in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
202	Ammonia nitrogen (NH <sub>4</sub> -N)	DIN EN ISO 11732 (September 1997 edition)
203	Antimony in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
204	Arsenic in the original sample	DIN EN ISO 11969 (November 1996 edition) With due regard for: Digestion in accordance with point 8.3.1
205	Barium in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
206	Lead in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex

207	Cadmium in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
209	Chromium in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
210	Chromium (VI)	DIN 38405-D 24 (May 1987 edition)
211	Cobalt in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
212	Iron in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
213	Copper in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
214	Nickel in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
215	Mercury in the original sample	DIN EN 1483 (August 1997 edition)
216	Silver in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
217	Thallium in the original sample	DIN 38406-E 26 (July 1997 edition)
218	Vanadium in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
219	Zinc in the	DIN EN ISO 11885



	original sample	(April 1998 edition) With due regard for number 506 of this Annex
220	Tin in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 507 of this Annex
221	Titanium in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 508 of this Annex
222	Selenium in the original sample	DIN 38405-D 23-2 (October 1994 edition)
223	Gallium in the original sample	In line with DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
224	Indium in the original sample	In line with DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
225	Manganese in the original sample	DIN EN ISO 11885 (April 1998 edition) With due regard for number 506 of this Annex
<b>3</b>	<b>INDIVIDUAL SUBSTANCES, SUM PARAMETERS, GROUP PARAMETERS</b>	
301	Substances removable by filtration (suspended solids) in the original sample	DIN EN 872 (March 1996 edition)
302	Up to a chloride content of 5 g/l in the original sample:	DIN EN 1485 (November 1996 edition) With the following constraint: Adsorption pursuant to point 8.2.2 and number 501 of this Annex
	For a chloride content of more than 5 g/l	DIN 38409-H 22

	in the original sample:	(February 2001 edition)
303	Chemical oxygen demand (COD) in the original sample	DIN 38409-H 41 (December 1980 edition)
304	Chemical oxygen demand (COD) in the original sample without H <sub>2</sub> O <sub>2</sub>	DIN 38409-H 41 (December 1980 edition) With removal of the COD proportion caused by H <sub>2</sub> O <sub>2</sub> (see number 307)
305	Total organically bonded carbon (TOC), in the original sample	DIN EN 1484 (August 1997 edition) With due regard for number 502 of this Annex
306	Total bonded nitrogen (TN <sub>b</sub> ) in the original sample	DIN V ENV 12260 (June 1996 edition) With the following constraint: The combustion temperature must be kept above 700 °C so that complete mineralisation can take place.
308	Low-volatile lipophilic substances (extractable) in the original sample	DEV H 56 (46 <sup>th</sup> delivery, 2000)
309	Total hydrocarbons in the original sample	DIN EN ISO 9377-2 (July 2001 edition)
310	Directly separable lipophilic light solids in the original sample	DIN 38409-H 19 (February 1986 edition) With the following constraint: Mean from 2 samples. Use of petroleum ether, boiling-point range 40-60 °C, as the extracting agent
311	Phenol index after distillation and dye extraction in the original sample	DIN 38409-H 16-2 (June 1984 edition)
312	Total chlorine	DIN 38408-G 4-1 (June 1984 edition)
313	Free chlorine	DIN 38408-G 4-1 (June 1984 edition)

314	Hexachlorobenzene in the original sample	DIN 38407-F 2 (February 1993 edition)
315	Trichloroethene in the original sample	DIN EN ISO 10301 August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
316	1,1,1 trichloroethane in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
317	Tetrachloroethene in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
318	Trichloromethane in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
319	Tetrachloromethane in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
320	Dichloromethane in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
321	Hydrazine	DIN 38413-P 1 (March 1982 edition)
322	Surfactants, anionic	DIN EN 903

		(January 1994 edition)
323	Surfactants, non-ionic	DIN 38409-H 23-2 (May 1980 edition)
324	Surfactants, cationic	DIN 38409-H 20 (July 1989 edition)
325	Bismuth complexation index (I <sub>BIK</sub> )	DIN 38409-H 26 (May 1989 edition)
326	Aniline in the original sample	In line with DIN EN ISO 10301, Section 2 (August 1997 edition) With the following constraint: Extraction with dichloromethane at pH 12, GC separation e.g. at DB 17 and OV 101, detector: N-P detector
327	Hexachlorocyclohexane as the sum of all isomers	DIN 38407-F 2 (February 1993 edition) With due regard for number 504 of this Annex
328	Hexachlorobutadiene (HCBd) in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure
329	Aldrin, dieldrin, endrin, isodrin (drins) in the original sample	DIN 38407-F 2 (February 1993 edition) With due regard for number 504 of this Annex
330	Volatile (blowable) organically bonded halogens in the original sample, listed as chloride	DEV H 25 (proposal) (22 <sup>nd</sup> delivery); With the following constraint: In deviation from point 9.1: blow out for 10 minutes at room temperature.
331	1,2 dichloroethane in the original sample	DIN EN ISO 10301 (August 1997 edition) With the following constraint: Execution in accordance with the liquid/liquid extraction procedure

332	Trichlorobenzene as the sum of all isomers in the original sample	DIN 38407-F 2 (February 1993 edition) With due regard for number 504 of this Annex
333	Endosulphane as the sum of all isomers in the original sample	DIN 38407-F 2 (February 1993 edition) With due regard for number 504 of this Annex
334	Benzene and derivatives in the original sample	DIN 38407-F 9-1 (May 1991 edition) With due regard for number 504 of this Annex and with the following constraint: Use 2 to 3 g of sodium sulphate per 5 ml sample instead of potassium carbonate. In point 3.8.3, after the 5 <sup>th</sup> indentation mark, a level of "878 µg/l" shall apply instead of "8.78 µg/l".
335	Sulphide sulphur and mercaptan sulphur in the original sample	With due regard for number 503 of this Annex
336	Polycyclic aromatic hydrocarbons in the original sample (PAH) (fluoranthene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3 cd)pyrene)	DIN 38407-F 18 (May 1999 edition), with due regard for number 504 of this Annex
337	Chlorine dioxide and other oxidants, listed as chlorine	In line with DIN 38408-G 5 (June 1990 edition) With the following constraint: the fault-rectification measures pursuant to Section 4 shall not be performed.
338	Pigmentation	DIN EN ISO 7887, Section 3 (December 1994 edition)
339	Polychlorinated dibenzodioxins and polychlorinated dibenzofurans	DEV F 33 (53 <sup>rd</sup> delivery, January 2002)

#### 4 BIOLOGICAL TEST PROCEDURES

For the procedures outlined in numbers 401 to 404, and in 411, number 505 of this Annex (salt correction) and number 509 of this Annex (addition of neutralising agents) must be observed; for the procedure outlined in number 410, number 509 of this Annex (addition of neutralising agents) must be observed.

400	Directive on sampling and execution of biological test procedures	DIN EN ISO 5667-16 (February 1999 edition)
401	Toxicity to fish eggs $T_{\text{egg}}$ in the original sample	DIN 38415-T 6 (August 2003 edition) With the following constraint: The corpulence index and body length specified in point 9.1 are invalid. The fish should be one year old, but no older than 15 months, and should have a body length of between 5 and 12 cm.
402	Toxicity to daphnia $T_D$ in the original sample	DIN 38412-L 30 (March 1989 edition)
403	Toxicity to algae $T_A$ in the original sample	DIN 38412-L 33 (March 1991 edition) With the following constraint: In point 3.5, the statement "Insofar as no inhibition greater than 20% is ascertained for higher dilution factors" does not apply; in point 11.1, the note does not apply.
404	Toxicity to luminescent bacteria $G_L$ in the original sample	DIN 38412-L 34 (July 1997 edition) in conjunction with addition DIN 38412-L 341 (October 1993 edition) and with the following constraint: Salt-induced dilution should not be conducted with the prescribed cooking-salt solution, but instead with distilled water.
405	Ready aerobic biodegradability of substances	Annex to Directive 92/69/EEC of 31 July 1992

amending for the 17<sup>th</sup> time Council Directive 67/548/EEC (OJ EC No. L 383 p. 187)

406 Aerobic biodegradability of substances

DIN EN 9888  
(June 1999 edition)

With the following constraint: Biodegradability is specified as degree of DOC degradation over 28 days. Activated-sludge inoculum of 1 g/l dry mass per test. The water hardness of the test water may be up to 2.7 mmol/l. Blown-out and adsorbed substance portions are disregarded in the result. The result is specified as a degree of degradation. Pre-adapted inocula are not permitted.

407 Aerobic biodegradability in biological treatment plants (eliminability) of the filtrated sample

DIN EN 9888  
(June 1999 edition)

With the following constraint: The biodegradability is specified as the degree of COD or DOC degradation (degree of elimination). The inoculum from real treatment plants is used in the test with 1 g/l dry mass (point 8.3). The duration of the elimination test corresponds to the time required to achieve, in the test simulation for the total waste water, the real sewage treatment plant's degree of elimination of the total waste water. The COD concentration in the test (COD between 100 and 1000 mg/l) should largely correspond to the real waste water in the plant influent. The water hardness of the test water should not exceed the water hardness of the relevant real waste water. Blown-out substance portions are disregarded in the result. The rates of elimination are correlated to the COD

concentration at the start of the test, after deduction of the strip proportions. The result is specified as the degree of elimination.

408 Aerobic biodegradability (eliminability) of the filtrated sample in biological treatment plants

DIN EN 9888  
(June 1999 edition)  
With the following constraint:  
The biodegradability is specified as the degree of COD or DOC degradation (degree of elimination) over a maximum of 7 days. The inoculum from the real treatment plant is used in the test with 1 g/l dry mass (section 8.3). The COD concentration in the test (COD between 100 and 1000 mg/l) should largely correspond to the real waste water in the plant influent. The water hardness of the test water should not exceed the water hardness of the relevant real waste water. Blown-out substance portions are disregarded in the result. The rates of elimination are correlated to the COD concentration at the start of the test, after deduction of the strip proportions. The result is specified as the degree of elimination.

409 5-day biochemical oxygen requirement in the original sample

DIN EN 1899-1  
(May 1998 edition)

410 Mutagenic potential (umu-test)

DIN 38415-T 3  
(December 1996 edition)

### III Instructions and explanations

501 Instructions for the AOX procedure (number 302)

#### 1. Periodate concentrations



In the presence of periodates, the sodium sulphite must be hyperstoichiometrically added and must be permitted to have a reducing effect for at least 24 hours.

## 2. Chloride concentrations

In cases in which the chloride concentration is over 1 g/l, the sample for analysis is diluted so as to bring the chloride concentration to less than 1 g/l in the sample. The measurement result, adjusted by the blind reading, is multiplied by the dilution factor. The pertinent blind reading is the reading for a solution of 1 g/l chloride, as obtained on the relevant working day. In cases in which the chloride concentration is below 1 g/l in the undiluted sample, deionised water is used for the blind reading.

## 3. Nitrate wash solution

Samples with chloride concentrations less than 1 g/l are washed with 25 ml of nitrate solution. In the case of samples for analysis whose chloride concentrations are brought to less than 1 g/l, by means of dilution, the washing is carried out – in a departure from the norm – in portions, with a total of 50 ml of nitrate solution.

## 4. Results

The AOX contents of the pre-filter and of the first and second adsorption column must be added together in the results.

### 502 Instructions relative to the TOC procedure (number 305)

A TOC device with thermal catalytic combustion (minimum temperature: 670°C) must be used. The rules on homogenisation pursuant to DIN 38402 part 30, "Pre-treatment, homogenisation and division of heterogeneous water samples" (July 1998), and especially points 8.3 and 8.4.5, must be observed.

In studies of waste-water samples containing particles, control measurements pursuant to Annex C of DIN EN 1484 (August 1997) must be carried out.

### 503 Instructions for determination of sulphide sulphur and mercaptan sulphur (number 335)

#### 1. General information

Sulphide sulphur occurs in water bodies as dissolved hydrogen sulphide ( $H_2S$ ) in the form of hydrogen sulphide ions ( $HS^-$ ) or sulphide ions ( $S^{2-}$ ), depending on the pH level. Correspondingly, mercaptans (RSH) occur as RSH or as mercaptide ions ( $RS^-$ ). When atmospheric oxygen is added, both sulphides and mercaptans are rapidly oxidised to disulphides, thus eluding detection.

#### 2. Basis

Sulphides and mercaptans are titrated in an alkaline solution with silver nitrate. This produces low-soluble silver compounds. The end points of the respective reaction are indicated by the transition potential of a measuring chain.

## **Instructions**

As a result of the extremely alkaline analysis conditions, sulphide or mercaptide are generally determined, but not hydrogen sulphide and mercaptan. It is therefore advisable to calculate the result of the analysis as sulphide sulphur or mercaptan sulphur. It may also be expressed as hydrogen sulphide or ethanethiol, however.

If the pH level of the original sample is known, it is possible, if necessary, to calculate the actual proportions of sulphane, hydrogen sulphide, or sulphide on the one hand, and mercaptans or mercaptides on the other.

The extent to which heavy-metal sulphides are also determined depends on the respective solubility product.

### **3. Scope of application**

A 0.02 molar silver nitrate solution is used for titration. 1 ml of this solution is equivalent to 0.32064 mg of sulphide sulphur or 0.64128 mg of mercaptan sulphur. Under the analysis conditions, and depending on the resolution of the titration equipment used (e.g. 100 microlitres), it is possible to identify 0.032064 mg in absolute terms or, when using a 100 ml sample, 0.32064 mg/l of sulphide sulphur (corresponding to 0.64128 mg/l of mercaptan sulphur).

### **4. Apparatus**

Solid silver electrode with sulphide coating,  
silver reference electrode, silver chloride with saturated potassium nitrate solution,  
as intermediate electrolyte, and ground diaphragms,  
Titration device,  
Magnetic stirrer.

### **5. Chemicals**

Nitrogen

Distilled water, N<sub>2</sub> saturated

Caustic soda solution 4 mol/l: 160 g of sodium hydroxide is dissolved in a 1 litre volumetric flask with 600 ml of distilled water, and then the flask is filled up to 1,000 ml with distilled water. The solution is kept in a 1 litre polyethylene flask.

Ammonia solution 0.5 mol/l: 40 ml of a 25 % ammonia solution are placed in a 1 litre volumetric flask and then the flask is filled up to 1,000 ml with distilled water. The solution is kept in a 1 litre polyethylene flask.

Silver nitrate solution 0.02 mol/l  $\text{AgNO}_3$

## 6. Sampling and preservation

The samples should be analysed immediately if possible. If this is impossible, the samples should be decanted in a manner appropriate for analysis. For this purpose, 25 ml of the caustic soda solution (as specified in number 5 of this section) should be placed in a 250 ml polyethylene flask and mixed with 100 ml of the sample, or with the sample which has been diluted to 100 ml with distilled water.

## 7. Execution

25 ml of the caustic soda solution (as specified in number 5 of this section) is placed in a 250 ml titration flask, unless the sample has already been pre-treated accordingly. 10 ml of the ammonia solution (as specified in number 5 of this section) is pipetted into this and then 100 ml of the sample is added. If pre-treated, the ammonia solution is placed in the flask and the preserved sample is added. If necessary, smaller quantities of sample may be added that have been diluted to 100 ml with distilled water (as specified in number 5 of this section). The titration flask is then sealed and a powerful flow of nitrogen is passed over the sample. During titration, the mixture should be mixed at medium speed. The immersing electrode should not lie in the mixing cone, and the tip of the pipette should be approximately 1 cm from the electrode and approximately 0.5 cm lower than the latter.

Titration may be either dynamic or via the addition of constant volumes. Since the transition potentials of the electrode may depend on the matrix, it would be useful to determine these potentials by adding known concentrations of sulphide or mercaptan.

## 8. Evaluation

The mass concentration of sulphide sulphur is calculated using the following equation:

$$c(S^{2-}) = \frac{VI \cdot F \cdot 320,64}{ml \text{ Probe}} [mg/l]$$

[Probe = sample]

The mass concentration of mercaptan sulphur is calculated using the following equation:

$$c(S - RSH) = \frac{(V2 - V1) \cdot F \cdot 641,28}{ml\ Probe} [mg/l]$$

- F : Factor of the 0.02 mol/l AgNO<sub>3</sub> solution  
V1 : Volume in ml of the 0.02 mol/l silver nitrate solution used up to the first equivalence point.  
V2 : Volume in ml of the 0.02 mol/l silver nitrate solution used up to the second equivalence point.

## 9. Specification of results

For the mass concentration of sulphide sulphur (S<sup>2-</sup>) or mercaptan sulphur (S-RSH), the levels stated are rounded to 0.1 mg/l with no more than 2 significant digits.

Example:

Sulphide sulphur            3.4 mg/l  
Mercaptan sulphur 0.6 mg/l

- 504 Instructions relative to the determination limit  
(numbers 327, 329, 332, 333, 334, 336)

Measurements of individual components are taken into account only if they are equal to or larger than the determination limit of the relevant analysis procedure.

- 506 Instructions on determination of elements  
(numbers 109, 201, 203, 205, 209, 211, 212, 213, 214, 216, 218, 219, 223 and 224)

The specification on the decomposition process in the first sentence of point 8.2.3 shall be replaced by:

To a 100 ml sample (7.4), add 1 ml nitric acid (5.2) and 1 ml hydrogen peroxide (5.3).

- 507 Instructions on determination of tin (number 220)

The following decomposition process is used in determination of tin:

To a 100 ml sample, add 1 ml sulphuric acid (5.4) and 1 ml hydrogen peroxide (5.3). If decomposition is incomplete, allow the residue to cool and then add a

small amount of water, and more hydrogen peroxide (5.3), and repeat the procedure. To the residue, add diluted hydrochloric acid (5.5) to fill to 100 ml.

508 Instructions on determination of titanium (number 221)

The following decomposition process is used in determination of titanium:  
To a 100 ml sample, add 2 g ammonium sulphate (5.6) and 3 ml sulphuric acid (5.4). Heat, stirring continually, until  $\text{SO}_3$  fog appears. If decomposition is incomplete, repeat the process with a smaller amount of sample. Add water to the residue to fill to 100 ml.

509 Instructions on determination via biological test procedures (numbers 401 to 404)

Volume changes that result from addition of neutralising agents, and that have a significant effect on measurements, must be taken into account in reporting of results. Acids and caustic solutions must be suitably chosen so that the sample undergoes no significant chemical or physical changes (especially precipitation and dissolution). Neutralising agents must be added in a manner that minimises local differences of pH value in the sample (fast stirring, slow addition).

## Appendix 1 Domestic and communal waste water

### A Scope of application

(1) This Appendix shall apply to waste water

1. originating primarily from households or similar facilities such as communal accommodation, hotels, restaurants, campsites, hospitals or office buildings (domestic waste water) or from facilities serving some purpose other than the ones stated, provided it is equivalent to domestic waste water
2. which is collected in the sewage system and originates primarily from the establishments and facilities specified in number 1 and from plants serving commercial or agricultural purposes, provided that the noxiousness of this waste water can be reduced by biological means with the same degree of success as for domestic waste water (communal waste water), or
3. which is treated in a river clarifying basin and whose origin corresponds to numbers 1 or 2.

(2) This Appendix shall not apply to small discharges as defined in Article 8 in conjunction with Article 9 (2) second sentence of the Waste Water Charges Act.

### B General requirements

Article 3 paragraph (1) shall not apply.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to waste water at the point of discharge into the water body:

Samples according to size categories of the waste water treatment plants	Chemical oxygen demand (COD) mg/l	5-day biochemical oxygen demand (BOD <sub>5</sub> ) mg/l	Ammonia nitrogen (NH <sub>4</sub> -N) mg/l	Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> ) mg/l	Total phosphorous (P <sub>tot</sub> ) mg/l
Qualified random sample or 2-hour composite sample					
Size category 1 Less than 60 kg/d BOD <sub>5</sub> (raw)	150	40	-	-	-
Size category 2 60 to 300 kg/d BOD <sub>5</sub> (raw)	110	25	-	-	-
Size category 3 greater than 300 up to 600 kg/d BOD <sub>5</sub> (raw)	90	20	10	-	-
Size category 4 greater than 600 up to 6000 kg/d BOD <sub>5</sub> (raw)	90	20	10	18	2
Size category 5 greater than 6000 kg/d BOD <sub>5</sub> (raw)	75	15	10	13	1

The requirements apply to ammonium nitrogen and total nitrogen, at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant. The 12°C threshold may be replaced by the following time limit: from 1 May to 31 October. The water discharge license may stipulate a higher concentration for total nitrogen, of up to 25 mg/l, provided the reduction of the total nitrogen load is at least 70 percent. The reduction shall refer to the ratio between the nitrogen load in the influent and that in the effluent, over a representative period of time not exceeding 24 hours. The load in the influent shall be based on the sum of organic and inorganic nitrogen.

(2) The allocation of a discharger to one of the size categories specified in paragraph (1) above shall depend on the assessment levels of the waste water treatment plant, using the BOD<sub>5</sub> load of the untreated waste water - BOD<sub>5</sub> (raw) - as a basis. In cases where only the BOD<sub>5</sub> level of the sedimented sewage is used as a basis for the assessment level of a waste water treatment plant, the following levels shall be decisive for classification:

Size category 1	Less than 40 kg/d BOD <sub>5</sub> (sed.)
Size category 2	40 to 200 kg/d BOD <sub>5</sub> (sed.)
Size category 3	Greater than 200 kg/d up to 400 kg/d BOD <sub>5</sub> (sed.)
Size category 4	Greater than 400 up to 4,000 kg/d BOD <sub>5</sub> (sed.)
Size category 5	Greater than 4,000 kg/d BOD <sub>5</sub> (sed.)

(3) In sewage lagoons designed for a detention time of 24 hours or more, where a sample is clearly coloured due to algae, the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l for COD and by 5 mg/l for BOD<sub>5</sub>.

(4) In the case of small discharges within the meaning of Article 8 in conjunction with Article 9 (2) second sentence of the Waste Water Charges Act (*Abwasserabgabengesetz*), the requirements for size category 1, pursuant to paragraph (1) above, shall be deemed to have been met if a waste water treatment plant authorised by a general building-inspectorate approval, by a European-oriented technical approval pursuant to provisions of the Act on Construction Products (*Bauproduktengesetz*) or otherwise authorised in accordance with *Land* law is installed and operated in keeping with the relevant authorisation. The relevant authorisation must also set forth the requirements for proper function of the facility, with respect to installation, operation and maintenance of the facility.

(5) For small discharges within the meaning of Article 8 in conjunction with Article 9 (2) second sentence of the Waste Water Charges Act (*Abwasserabgabengesetz*), the *Länder* may establish different requirements if connection to a public wastewater treatment facility is expected in the near future.

## **Appendix 2**

### **Brown-coal briquette production**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from brown-coal briquette production or arises in conjunction with production.

(2) This Appendix shall not apply to waste water from indirect cooling systems and process water treatment facilities, nor from flue-gas scrubbing.

## **B General requirements**

No requirements above and beyond Article 3 are imposed.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
	Concentration (mg/l)	Load (g/t)
Substances removable by filtration	50	18
Chemical oxygen demand (COD)	50	30

(2) The figures for production-specific load (g/t) refer to the maximum installed dryer capacity, expressed as the quantity of dry coal in 2 hours with a proportion by mass of water of between 16 and 18 %. If production capacities refer to dry coal with proportions by mass of water other than 16 to 18 %, then a figure of 17 % shall be used as a basis when calculating the dryer capacity. The contaminant load is determined from the concentration levels of the 2-hour composite sample or the qualified random sample and the volumetric flow of waste water during dry weather (dry-weather flow) over 2 hours.

## **Appendix 3 Milk processing**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in delivery, decanting or processing of milk and dairy products and that arises in milk-processing plants, dairies, cheese dairies and other plants of this sort.

(1) This Appendix shall not apply to waste water, from milk-processing plants, with a contaminant load in the raw waste water of less than 3 kg BOD<sub>5</sub> per day, to waste water from indirect cooling systems and to waste water from process water treatment facilities.

### **B General requirements**



No requirements above and beyond Article 3 shall be imposed.

### **C Requirements for waste water at the point of discharge**

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia nitrogen, nitrite nitrogen and nitrate nitrogen (N <sub>ges</sub> )	18
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant, provided the raw load of total nitrogen on which the water discharge license is based exceeds 100 kg per day. The water discharge license may concede a higher concentration for total nitrogen, of up to 25 mg/l, provided the reduction in the total nitrogen load is at least 70 percent. The reduction shall refer to the ratio between the nitrogen load in the influent and that in the effluent, over a representative period of time that shall not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis for calculating the loads.

(3) The requirement for total phosphorous shall apply if the raw load of total phosphorous on which the water discharge license is based exceeds 20 kg per day.

(4) In sewage lagoons designed for a retention time of 24 hours or longer, and in which the daily volume of waste water on which the water discharge license is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and the BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

### **D Requirements for waste water prior to blending**

The waste water shall be subject to no additional requirements prior to its blending with other waste water.

### **E Requirements for waste water at the site of occurrence**

No additional requirements shall be imposed on the waste water at the site of its occurrence.

## **F Requirements for existing discharges**

Notwithstanding Part C, for existing discharges of waste water from installations that were lawfully in operation prior to 1 June 2000 or whose construction had lawfully commenced by this date, a standard of 5 mg/l shall apply for total phosphorous, if the raw load of total phosphorous on which the water discharge license is based exceeds 20 kg per day and is less than 100 kg per day.

## **Appendix 4**

### **Processing of oilseeds, and refining of cooking fats and oils**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in processing of oilseeds, or in refining of cooking fats or oils.

(2) This Appendix shall not apply to waste water from indirect cooling systems, from process water treatment facilities and from steam-generation systems.

#### **B General requirements**

(1) The contaminant load shall be kept as low as the following measures permit, after investigation of the situation in each individual case:

1. Recycling of sub-streams, especially of hot-well water from distillative deacidification and steaming,
2. Prevention and reduction of substance-losses by means of process-internal recycling or recovery of by-products,
3. Use of low-phosphorous raw materials,
4. Use of water-saving techniques, such as countercurrent washing.

(2) Waste water from cleansing and disinfection processes may contain only surfactants that attain an 80 percent degree of DOC elimination after 28 days, pursuant to number 405 of the Appendix "Analysis and Measurement Procedures". Surfactants (tensides) are organic surface-active agents, with washing and wetting properties, that, at a concentration of 0.5 percent and a temperature of 20°C, reduce the surface tension of distilled water to 0.045 N/m or less.

**C Requirements for waste water at the point of discharge**

(2) The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample		
		Seed processing	Refining
5-day biochemical oxygen demand (BOD <sub>5</sub> )	g/t	5	38
Chemical oxygen demand (COD)	g/t	20	200
Total nitrogen as the sum of ammonia nitrogen, nitrite nitrogen and nitrate nitrogen (N <sub>ges</sub> )	mg/l	30	30
Total phosphorous	g/t	0.4	4.5
Specific waste water amount	m <sup>3</sup> /t	0.2	1.5

(2) The requirements for total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant, provided the raw load of total nitrogen on which the water discharge license is based exceeds 100 kg per day.

(3) The requirement for total phosphorous shall apply if the raw load of total phosphorous on which the water discharge license is based exceeds 20 kg per day.

(4) The production-specific requirements (g/t, m<sup>3</sup>/t) pursuant to paragraph (1) above are based on the charge-stock production capacity on which the water discharge license is based. The charge stock for seed processing is seed; for refining it is oil. If more than one type of charge stock is used, the requirements shall apply in proportion to the amounts of charge stocks used. The contaminant load shall be determined from the relevant concentrations of the qualified random sample or the 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

**D Requirements for waste water prior to blending**

The waste water shall be subject to no additional requirements prior to its blending with other waste water.

**E Requirements for waste water at the site of occurrence**

No additional requirements shall be imposed on the waste water at the site of its occurrence.

**F Requirements for existing discharges**

Notwithstanding Part C, for existing discharges of waste water from installations that were lawfully in operation prior to [the entry into force of this Ordinance] or whose construction had lawfully commenced by this date, the following requirements shall apply:

	Qualified random sample or 2-hour composite sample		
		Seed processing	Refining
5-day biochemical oxygen demand (BOD <sub>5</sub> )	g/t	13	38
Chemical oxygen demand (COD)	g/t	55	225
Total phosphorous	g/t	1.5	7.5
Specific waste water amount	m <sup>3</sup> /t	0.5	1.5

Hot-well water or other slightly contaminated waste water, where such water cannot continue to be used within the facility, must be discharged separately from other waste water, if for the raw waste water the COD value in the qualified random sample or 2-hour composite sample is less than 75 mg/l.

**Appendix 5  
Production of fruit and vegetable products**

**A Scope of application**

- (1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production of fruit and vegetable products and of ready meals largely based on fruit and vegetables.
- (2) This Appendix shall not apply to waste water originating from the production of baby food, tea and herbal remedies, nor from indirect cooling systems and process water treatment facilities.

**B General requirements**

No requirements above and beyond Article 3 are imposed.

**C Requirements for waste water at the point of discharge**

- (1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	18
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant, and provided the raw load of total nitrogen on which the water discharge licence is based exceeds 100 kg per day. The water discharge licence may concede a higher concentration for total nitrogen of up to 25 mg/l, provided the reduction in the total nitrogen load is at least 70 %. The reduction shall refer to the ratio between the total nitrogen load in the influent and that in the effluent over a representative period of time which shall not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as the basis when calculating loads.

(3) The requirement for total phosphorous shall apply if the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(4) In sewage lagoons designed for a detention time of 24 hours or more where the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

## **Appendix 6**

### **Production of soft drinks and bottling of drinks**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production of soft drinks and table water, the extraction and bottling of natural mineral water, spring water and medicinal water, and the bottling of all types of drinks, provided the water from bottling is not treated together with the waste water from the production of the basic ingredients of the drinks and the essences for soft drinks.

(2) This Appendix shall not apply to waste water from indirect cooling systems or process water treatment facilities.

#### **B General requirements**

No requirements above and beyond Article 3 are imposed.

## C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Total phosphorous	2

(2) The requirement for total phosphorous shall apply if the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(3) In sewage lagoons designed for a detention time of 24 hours or more in which the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

## Appendix 7 Fish processing

### A Scope of application

This Appendix shall apply to waste water whose contaminant load originates primarily in fish processing and in processing of shellfish and crustaceans, and to waste water whose contaminant load originates both in processing of fish, shellfish and crustaceans and in households and facilities as defined in Appendix 1, Part A, paragraph (1), where the COD load of the waste water from processing of fish, shellfish and crustaceans in the raw waste water generally accounts for more than two-thirds of the total load and the BOD<sub>5</sub> load is at least 600 kg per day.

### B General requirements

No requirements above and beyond Article 3 are imposed.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	25
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant and provided the raw load of total nitrogen on which the water discharge licence is based exceeds 100 kg per day. The water discharge licence may concede a higher concentration for total nitrogen of up to 40 mg/l, provided the reduction in the total nitrogen load is at least 70 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis when calculating the loads.

(3) The requirement for total phosphorous shall apply, provided the BOD<sub>5</sub> load in the influent of the waste water treatment plant on which the water discharge licence is based exceeds 600 kg per day. In the case of waste water whose (raw) BOB<sub>5</sub> load is 6,000 kg per day or more, a value of 1 mg/l shall apply for total phosphorous.

## **Appendix 8 Potato processing**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the processing of potatoes for human consumption.

(2) This Appendix shall not apply to waste water from potato processing in distilleries, starch factories, plants for drying vegetable products for feed production and plants for the production of fruit and vegetable products, nor to waste water from indirect cooling systems and from process water treatment facilities.

### **B General requirements**

No requirements above and beyond Article 3 are imposed.

### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	150
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	18
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant and provided the raw load of total nitrogen on which the water discharge licence is based exceeds 100 kg per day. The water discharge licence may concede a higher concentration for total nitrogen of up to 25 mg/l, provided the reduction in the total nitrogen load is at least 70 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis when calculating the loads.

(3) The requirement for total phosphorous shall apply where the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(4) In sewage lagoons designed for a detention time of 24 hours or more in which the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

## **Appendix 9**

### **Manufacture of coating materials and varnish resins**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in the manufacture of aqueous dispersion dyes, synthetic resin-bonded plaster and water-dilutable coating materials, varnish resins and solvent-based coating materials, together with the annexed auxiliary plants.

(2) This Appendix shall not apply to waste water from the manufacture of organic dye pigments and inorganic pigments, nor from indirect cooling systems or process water treatment facilities.

#### **B General requirements**



(1) In the event of generation of a vacuum during the production process, the waste water volume shall be kept to a minimum via the use of waste water-free techniques.

(2) The waste water must not contain any mercury compounds or organic tin compounds originating from use as preservatives or microbicide additives. Proof that the waste water contains no mercury or organic tin compounds may be furnished by presenting manufacturers' information showing that the input materials and auxiliary materials used for preservation or microbicide adjustment do not contain any such compounds.

(3) Waste water from the production of solvent-based coating materials with auxiliary plants, obtained by quenching the distillation bottom from solvent recovery, must not be discharged.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	120
5-day biochemical oxygen demand (BOD <sub>5</sub> )	mg/l	20
Toxicity to fish eggs (T <sub>egg</sub> )		2

(2) In the case of waste water flows whose COD concentration at the site of occurrence exceeds 50 g/l, the COD shall be reduced to at least 500 mg/l.

### D Requirements for waste water prior to blending

(1) The following requirements shall apply to waste water from the following areas prior to blending with other waste water:

	Aqueous dispersion dyes, synthetic resin-bonded plaster and water-soluble coating materials	Container cleaning with lye (lye cleaning) from the production of solvent-based coating materials with ancillary plants
	Qualified random sample or 2-hour composite sample mg/l	
Barium	2	2
Lead	0.5	0.5
Cadmium	0.1	0.1
Total chromium	0.5	0.5
Cobalt	1	1
Copper	0.5	0.5
Nickel	0.5	0.5
Zinc	2	2
Tin	-	1
Adsorbable organic halogens (AOX)	1	1
Volatile halogenated hydrocarbons (VHHC)	0.1	-

(2) The requirements for AOX and VHHC (sum total of trichloroethene, perchloroethane, 1,1,1-trichloroethane, dichloromethane - calculated as chlorine) refer to the random sample. The requirement for VHHC shall be deemed to have been met, provided proof is furnished that volatile halogenated hydrocarbons are not used either in production nor for cleaning purposes.

## **Appendix 10 Meat industry**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the slaughter, processing and treatment of meat, including processing the intestines, as well as the manufacture of ready meals based predominantly on meat.

(2) This Appendix shall not apply to waste water from small discharges as defined in Article 8 of the Waste Water Charges Act with a contaminant load in the raw waste water of less than 10 kg BOD<sub>5</sub> per week, nor from indirect cooling systems and process water treatment facilities.

### **B General requirements**

No requirements above and beyond Article 3 are imposed.

### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	18
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant and provided the raw load of total nitrogen on which the water discharge licence is based exceeds 100 kg per day. The water discharge licence may concede a higher concentration for total nitrogen of up to 25 mg/l, provided the reduction in the total nitrogen load is at least 70 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis when calculating the loads.

(3) The requirement for total phosphorous shall apply where the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(4) In sewage lagoons designed for a detention time of 24 hours or more in which the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

## Appendix 11 Breweries

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the brewing of beer. It shall also apply to the waste water from an integrated malt house, provided this only covers the demand of the brewery in question.

(2) This Appendix shall not apply to waste water from indirect cooling systems or process water treatment facilities.

### B General requirements

No requirements above and beyond Article 3 are imposed.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	18
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant, provided the raw load of total nitrogen on which the water discharge license is based exceeds 100 kg per day. The water discharge license may concede a higher concentration for total nitrogen, of up to 25 mg/l, provided the reduction in the total

nitrogen load is at least 70 percent. The reduction shall refer to the ratio between the nitrogen load in the influent and that in the effluent, over a representative period of time that shall not exceed 24 hours. Total bonded nitrogen ( $TN_b$ ) shall be used as a basis for calculating the loads.

(3) The requirement for total phosphorous shall apply where the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(4) In sewage lagoons designed for a detention time of 24 hours or more where the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

## Appendix 12 Production of alcohol and alcoholic beverages

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production, processing and bottling of alcohol from legally permitted distilling materials, as well as from the production, processing and bottling of alcoholic beverages.

(2) This Appendix shall not apply to waste water from distilleries with a special exemption <so-called 'Abfindungsbrennereien', with a maximum production limit of 50 litres of alcohol per annum> as defined in Article 57 of the Distilled Spirits Monopoly Act <Branntweinmonopolgesetz>, the preparation of wine and fruit wine, the brewing of beer, the production of alcohol from molasses, nor to waste water from indirect cooling systems and process water treatment facilities.

### B General requirements

No requirements above and beyond Article 3 are imposed.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	18
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant, and provided the raw load of total nitrogen on which the water discharge licence is based exceeds 100 kg per day. The water discharge licence may concede a higher concentration for total nitrogen of up to 25 mg/l, provided the reduction in the total nitrogen load is at least 70 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis when calculating the loads.

(3) The requirement for total phosphorous shall apply where the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(4) In sewage lagoons designed for a detention time of 24 hours or more in which the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

(5) In the case of storage lagoons, the requirements shall refer to the random sample. They shall not be deemed to have been met if the storage lagoon is drained prior to reaching the set levels.

## **Appendix 13** **Fibreboard**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production of fibreboard.

(2) This Appendix shall not apply to waste water from indirect cooling systems and process water treatment facilities.

### **B General requirements**

No requirements above and beyond Article 3 are imposed.

### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
5-day biochemical oxygen demand (BOD <sub>5</sub> )	kg/t	0.2
Chemical oxygen demand (COD)	kg/t	1
Phenol index after distillation and dye extraction	g/t	0.3
Toxicity to fish eggs (T <sub>egg</sub> )		2

(2) In the case of hard fibreboard (with a density in excess of 900 kg/m<sup>3</sup>) which is produced using the wet-processing method and which has a fibre moisture level of more than 20 % at the mat forming stage, a COD level of 2 kg/t shall apply.

(3) The production-specific requirements (g/t; kg/t) pertaining to paragraphs (1) and (2) above refer to the production capacity of fibreboards (completely dry) in 0.5 or 2 hours on which the water discharge licence is based. The contaminant load is determined from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

#### **D Requirements for waste water prior to blending**

Prior to blending with other waste water, a requirement of 0.3 g/t of adsorbable organic halogens (AOX) shall apply to the waste water. This requirement refers to the production capacity of fibreboards (completely dry) in 0.5 or 2 hours on which the water discharge licence is based. The contaminant load is determined from the concentration levels of the random sample and from the volumetric flow of waste water corresponding to sampling.

### **Appendix 14**

#### **Drying of vegetable products for feed production**

##### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the direct and indirect drying of vegetable products for feed production.

(2) This Appendix shall not apply to waste water from the drying of vegetable products for feed production as a by-product, nor from indirect cooling systems and process water treatment facilities.

##### **B General requirements**

No requirements above and beyond Article 3 are imposed.

##### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Total phosphorous	2

(2) The requirement for total phosphorous shall apply where the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

(3) In sewage lagoons designed for a detention time of 24 hours or more in which the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

(4) In the case of storage lagoons, the requirements shall refer to the random sample. They shall not be deemed to have been met if the storage lagoon is drained prior to reaching the set levels.

## **Appendix 15**

### **Production of leather glue, gelatine and bone glue**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the processing of animal slaughter by-products and residue from leather manufacturing into leather glue, bone glue, gelatine or naturin (sausage casing).

(2) This Appendix shall not apply to waste water from indirect cooling systems or process water treatment facilities.

#### **B General requirements**

No requirements above and beyond Article 3 are imposed.

#### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110
Ammonia nitrogen (NH <sub>4</sub> -N)	10

Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	30
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant, and provided the raw load of total nitrogen on which the water discharge licence is based exceeds 100 kg per day. The water discharge licence may concede a higher concentration for total nitrogen of up to 50 mg/l, provided the reduction in the total nitrogen load is at least 85 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis when calculating the loads.

(3) The requirement for total phosphorous shall apply where the raw load of total phosphorous on which the water discharge licence is based exceeds 20 kg per day.

## **Appendix 16 Coal dressing**

### **A Scope of application**

This Appendix shall apply to waste water whose contaminant load originates primarily from coal dressing.

### **B General requirements**

No requirements above and beyond Article 3 are imposed.

### **C Requirements for waste water at the point of discharge**

The following requirements apply to the discharging of waste water at the point of discharge into the water body:

Chemical oxygen demand (COD)	100 mg/l	Qualified random sample or 2-hour composite sample
Substances removable by filtration	80 mg/l	Random sample

## **Appendix 17 Manufacture of ceramic products**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in commercial manufacture of ceramic products.



(2) This Appendix shall not apply to waste water from indirect cooling systems, to waste water from process water treatment facilities and to waste water from sanitary facilities.

**B General requirements**

(1) Waste water from refractory facilities and from manufacture of grinding tools, split tiles, tiles and bricks may not be discharged into water bodies. The first sentence shall not apply to cleaning and maintenance of production facilities and to washing of raw materials.

(2) Waste water may be discharged only if it has been recycled, to the following degrees in the following production sectors:

1. Manufacture of piezo-ceramics, to a degree of at least 50 percent,
2. Manufacture of dishes and related products, to a degree of at least 50 percent,
3. Manufacture of sanitary ware, to a degree of at least 30 percent.

**C Requirements for waste water at the point of discharge**

The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
Substances removable by filtration	50
Chemical oxygen demand (COD)	80
Total phosphorous	1.5

**D Requirements for waste water prior to blending**

(1) The following requirements shall apply to the waste water prior to its blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l
Adsorbable, organically bonded halogens (AOX)	0.1
Lead	0.3
Cadmium	0.07
Total chromium	0.1
Cobalt	0.1
Copper	0.1
Nickel	0.1
Zinc	2

The requirements for AOX shall refer to the random sample.

(2) The requirements pursuant to paragraph (1) above shall not apply if a total of no more than 4 m<sup>3</sup> of waste water is produced per day and none of the waste water originates through glazing.

(3) In the case of waste water production of up to 8 m<sup>3</sup> per day, the requirements of Part D (1), and those of Part C, for substances removal by filtration, shall also be deemed to have been met if a waste water treatment plant authorised by a general building-inspectorate approval or otherwise in accordance with *Land* law is installed, operated and maintained as per the licensing terms, and is checked both prior to commissioning and at regular intervals not exceeding five years, in accordance with *Land* law, in order to verify that it is proper working order.

## **E Requirements for waste water at the site of occurrence**

No additional requirements shall be imposed on the waste water at the site of its occurrence.

## **F Requirements for existing discharges**

For existing discharges of waste water from installations that were lawfully in operation prior to 1 June 2000 or whose construction had lawfully commenced by this date, the provisions of parts B, C and D shall apply only where no different requirements have been established in paragraphs (1) to (4) above.

(1) Notwithstanding Part B (1), waste water from manufacture of split tiles and tiles may be discharged if it has been reused to a degree of at least 50 percent during the manufacturing process.

(2) Notwithstanding Part B (2) No. 1, waste water from manufacture of piezo-ceramics may be discharged if it has been reused to a degree of at least 30 percent.

(3) Notwithstanding Part B (2) Nos. 2 and 3, waste water from the areas of sanitary ware and manufacture of dishes may be discharged without having been reused.

If more water is reused as is required by paragraphs (1), (2) and (3) above, higher AOX and COD concentrations than those specified in parts C and D may be permitted if the provisions of paragraphs (1), (2) and (3) above for the relevant resulting loads are complied with.

# **Appendix 18 Sugar manufacturing**

## **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the extraction of solid and liquid sugars and syrups from sugar beet and sugar cane.

(2) This Appendix shall not apply to waste water from indirect cooling systems, process water treatment facilities or flue gas scrubbing.

## B General requirements

The waste water must not contain any organically bonded halogens originating from the use of chlorine or chlorine-releasing compounds, with the exception of chlorine dioxide, in the hot well water cycle. Proof that this requirement has been met can be furnished by listing the input and auxiliary materials used in an operating journal and presenting manufacturers' information showing that these do not contain any of the substances or substance groups cited.

## C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	200
Ammonia nitrogen (NH <sub>4</sub> -N)	10
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	30
Total phosphorous	2

(2) The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant. The water discharge licence may concede a higher concentration for total nitrogen of up to 50 mg/l in the qualified random sample or composite sample, provided the reduction in the total nitrogen load is at least 70 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis when calculating the loads.

(3) In the case of storage lagoons, the requirements shall refer to the random sample. They shall not be deemed to have been met if the storage lagoon is drained prior to reaching the set levels.

## D Requirements for waste water prior to blending

Seal water and condensation water, where this cannot be re-used within the plant, may only be blended with waste water from other origins for the purpose of combined treatment provided the concentrations of the parameters specified in Part C, paragraph (1) exceed the levels in the raw waste water specified therein.

# Appendix 19

## Pulp production

## A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in production of bleached pulp by means of the sulfite or sulfate processes.

(2) This Appendix shall not apply to waste water from production of pulp from one-year-old plants, to waste water from indirect cooling systems and to waste water from process water treatment facilities.

## B General requirements

The contaminant load shall be kept as low as the following measures permit, after investigation of the situation in each individual case:

1. Largely waste-water-free decortication,
2. Optimised pulping of wood (extensive boiling, oxygen delignification),
3. Closed washing and sorting of unbleached pulp,
4. Collection of at least 98 percent of organic substance dissolved during boil-pulping, by means of water-saving washing procedures,
5. Recycling of by-products from pulp washing (for example, tall-oil collection in the sulfate procedure),
6. Neutralisation and evaporation of the washing solution,
7. Recycling of the evaporative concentrate (thickened liquor) and reclamation of pulping chemicals,
8. Stripping and reuse of highly concentrated evaporative condensates,
9. Use of bleach without elementary chlorine and chlorine-containing bleaching chemicals, with the exception of chlorine dioxide in manufacture of ECF sulfate pulp (elementary-chlorine-free pulp),
10. Avoidance of use and retention of organic complexing agents that do not attain an 80 percent degree of DOC degradation after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures".

## C Requirements for waste water at the point of discharge

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

	24-hour mixed sample	
Chemical oxygen requirement (CSB)	kg/t	25
Biochemical oxygen requirement in 5 days (BOD <sub>5</sub> )	mg/l	30
Total phosphorous	mg/l	2
Total nitrogen, as the sum of ammonium, nitrite and nitrate nitrogen (N <sub>total</sub> )	mg/l	10
Toxicity to fish eggs (T <sub>egg</sub> )		2

The requirement for toxicity to fish eggs (T<sub>egg</sub>) refers to the random sample.

(2) A standard defined for total nitrogen shall be considered complied with if the relevant value is measured as "total bound nitrogen (TN<sub>b</sub>)", and if the resulting measurement is in compliance.

(3) The production-specific load for CSB (kg/t) pursuant to paragraph (1) above shall refer to the capacity for production of final products (air-dried pulp), in tonnes per day, upon which the water discharge license is based. The contaminant load is determined from the concentration levels of the 24-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

#### **D Requirements for waste water prior to blending**

(1) Prior to blending with waste water from other origins, the waste water must not contain chlorine and chlorine-containing bleaches, or adsorbable organic halogens (AOX) from the bleach. Notwithstanding the first sentence above, waste water from production of ECF sulfate pulp (elementary-chlorine-free pulp) may contain up to 0.25 kg AOX per tonne of pulp in the 24-hour composite sample.

(2) The production-specific load for AOX (kg/t) pursuant to paragraph (1) above shall refer to the capacity for production of final products (air-dried pulp), in tonnes per day, upon which the water discharge license is based. The contaminant load is determined from the concentration levels of the 24-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

#### **E Requirements for waste water at the site of occurrence**

No additional requirements shall be imposed on the waste water at the site of its occurrence.

#### **F Requirements for existing discharges**

For existing discharges of waste water from installations that were lawfully in operation prior to 1 August 2001 or whose construction had lawfully commenced by this date, notwithstanding Part C a level of 40 kg/t shall apply for CSB and, notwithstanding Part D (1) second sentence, a level of 0,35 kg/t shall apply for AOX.

## **Appendix 20 Animal tankage industry**

#### **A Scope of application**

(1) This Appendix applies to waste water whose contaminant load originates primarily from the collection, storage and processing of animal carcasses, animal body parts and animal products in collection points, animal carcass disposal facilities and specialist and exempt plants as defined in the Act on the Disposal of Animal Carcasses of 2 September 1975 (Federal Law Gazette <BGBI.> I, page 2323, 2610).

(2) This Appendix shall not apply to waste water from indirect cooling systems.

## **B General requirements**

The contaminant load shall be kept as low as the following measures permit:

1. Refrigerating the raw material during storage, and ensuring prompt processing
2. Using non-denaturised salt for skin and hide preservation
3. Retaining the brine from skin curing by means of suitable techniques, such as dry disposal or returning to production.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
Chemical oxygen demand (COD)	150
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	50

(2) The requirements for total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant.

(3) In sewage lagoons designed for a detention time of 24 hours or more, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

## **D Requirements for waste water prior to blending**

Prior to blending with waste water from other origins, the waste water must not exceed a level of 0.1 mg/l of adsorbable organic halogens (AOX) in the random sample. This requirement shall also be deemed to have been met provided the cleaning agents and disinfectants or other feedstocks and auxiliary materials used do not contain any organically bonded halogen compounds or halogen-releasing substances. Proof may be furnished by listing the feedstocks and auxiliary materials used in an operating journal and presenting manufacturers' information showing that these do not contain any of the substances or substance groups cited in the first sentence above.

# **Appendix 21 Malt houses**

## **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production of malt from cereal.

(2) This Appendix shall not apply to the waste water from a malt house which is integrated into a brewery, insofar as this only covers the demand of the brewery in question, nor to waste water from indirect cooling systems and process water treatment facilities.

## **B General requirements**

No requirements above and beyond Article 3 are imposed.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Chemical oxygen demand (COD)	110

(2) In sewage lagoons designed for a detention time of 24 hours or more in which the daily volume of waste water on which the water discharge licence is based does not exceed 500 m<sup>3</sup>, where a sample is clearly coloured due to algae, then the COD and BOD<sub>5</sub> shall be determined from a sample not containing any algae. In such cases, the levels specified in paragraph (1) above shall be reduced by 15 mg/l in the case of COD and by 5 mg/l in the case of BOD<sub>5</sub>.

# **Appendix 22 Chemical industry**

## **A Scope of application**

(1) This Appendix shall apply to waste water originating primarily from the production of substances using chemical, biochemical or physical techniques, including the related pretreatment, intermediate treatment and after-treatment.

(2) This Appendix shall not apply to waste water discharges of less than 10 m<sup>3</sup> per day. Furthermore, this Appendix shall not apply to waste water originating in production of soda or of potash fertilisers.

(3) For waste water derived from formulation (i.e. the manufacture of substances and preparations by blending, dissolving or bottling) which is discharged without being blended with other waste water falling under the scope of application of this Appendix, only Part B of this Appendix shall apply. Part B shall apply to the site of waste-water origin.

## **B General requirements**

The contaminant load shall be kept as low as the following measures permit, after investigation of the situation in each individual case:

- Use of water-saving techniques, such as countercurrent washing
- Multiple use and recirculation, e.g. with washing and purifying processes
- Indirect cooling, e.g. to cool vapour phases instead of using jet condensers or jet coolers.
- The use of waste water-free techniques to generate vacuums and for waste air purification
- The retention or recovery of substances via the preparation of mother liquor and by means of optimised techniques
- The use of low-pollutant raw and auxiliary materials.

Proof of compliance with the general requirements shall be furnished in the form of a waste water register.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

### 1. Chemical oxygen demand (COD)

For waste water flows whose COD concentration at the site of occurrence of waste water is

- a) more than 50,000 mg/l, a COD concentration of 2,500 mg/l shall apply
- b) more than 750 mg/l, a COD concentration equivalent to a 90% reduction in COD shall apply
- c) 750 mg/l or less, a COD concentration of 75 mg/l shall apply
- d) less than 75 mg/l, the actual COD concentration at the site of occurrence shall apply.

The requirements shall also be deemed to have been met provided a COD concentration of 75 mg/l in the qualified random sample or 2-hour composite sample is adhered to, with due regard for Part B.

### 2. Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen ( $N_{\text{tot}}$ )

50 mg/l in the qualified random sample or 2-hour composite sample.



A higher concentration of up to 75 mg/l may be specified in the water discharge licence, provided a 75 % reduction in the nitrogen load is adhered to. The set value shall also be deemed to have been met, provided the level defined as "total bonded nitrogen (TN<sub>b</sub>)" is adhered to.

### 3. Total phosphorous

2 mg/l in the qualified random sample or 2-hour composite sample.

This requirement shall also be deemed to have been met provided the level defined as "phosphorous compounds as total phosphorous" is adhered to.

### 4. Toxicity

Toxicity to fish eggs	$T_{\text{egg}} = 2$
Toxicity to daphnia	$T_{\text{D}} = 8$
Toxicity to algae	$T_{\text{A}} = 16$
Toxicity to luminescent bacteria	$T_{\text{L}} = 32$
Mutagenic potential (umu test)	$T_{\text{M}} = 1.5$

The requirements refer to the qualified random sample or the 2-hour composite sample.

(2) If process-integrated measures are applied to reduce the COD load by arrangement with the water authority, then the decisive load prior to implementation of the measure shall be used as a basis.

(3) For chemical oxygen demand (COD), the total load in 0.5 or 2 hours shall be limited in the water discharge licence. The total load is the sum of the individual loads from the individual waste water flows. The total load which must not be exceeded refers to the concentration in the qualified random sample or 2-hour random sample and the volumetric flow of waste water in 0.5 or 2 hours corresponding to sampling.

## D Requirements for waste water prior to blending

(1) The following requirements apply to waste water prior to blending with other waste water:

### 1. Adsorbable organic halogens (AOX)

a) Waste water from the manufacture of epichlorhydrin, propylene oxide and butylene oxide	3 mg/l
b) Waste water from the two-stage manufacture of acetaldehyde	80 g/t
c) Waste water from the single-stage manufacture of acetaldehyde	30 g/t
d) Waste water from the manufacture of AOX-relevant organic colorants and aromatic intermediate products, where these are predominantly used to manufacture organic colorants	8 mg/l
e) Waste water from the manufacture of AOX-relevant active pharmaceutical ingredients	8 mg/l
f) Waste water from the manufacture of C1 chlorinated hydrocarbons by	10 g/t

means of methane chlorination and methanol esterification, and of carbon tetrachloride and perchloroethane by means of perchlorination  
 g) Waste water from the manufacture of 1,2 dichloroethane (EDC), including further processing to vinyl chloride (VC) 2 g/t

The load level refers to the production capacity for purified EDC. The capacity should be specified with due regard for the EDC portion which is not cracked in the VC unit linked to the EDC production unit and which is returned to the production cycle in the EDC purification plant.

h) Waste water from the manufacture of polyvinyl chloride (PVC) 5 g/t  
 i) Waste water flows with an AOX concentration of more than 0.1 mg/l and less than 1 mg/l without targeted measures 0.3 mg/l  
 j) Waste water flows from the manufacturing, further processing and application of substances which are not separately regulated elsewhere with a concentration of more than 1 mg/l is exceeded or less than 1 mg/l via targeted measures 1 mg/l or 20 g/t

The load level refers to the capacity of the organic target products. It does not apply to the application of substances.

## 2. Other substances

	Qualified random sample or 2-hour composite sample mg/l	
	I	II
Mercury	0.05	0.001
Cadmium	0.2	0.005
Copper	0.5	0.1
Nickel	0.5	0.05
Lead	0.5	0.05
Total chromium	0.5	0.05
Zinc	2	0.2
Tin	2	0.2

The requirements in column I apply to waste water flows from the manufacturing, further processing or application of these substances. The requirements in column II refer to waste water flows not originating from the manufacturing, further processing or application of these substances but which are nevertheless contaminated with such substances below the concentration levels in column I.

(2) Upon compliance with the AOX requirements and the general requirements pursuant to Part B, the requirements of Appendix 48, part 10 shall also be deemed to have been met.

(3) The AOX requirements shall not apply to iodo-organic substances in waste water from the manufacturing and bottling of X-ray contrast media.

(4) For adsorbable organic halogens (AOX) and the substances limited in paragraph (1), number 2 above, the total load per parameter in 0.5 or 2 hours shall be limited in the water discharge licence. The respective total load is derived from the sum of the individual loads of the separate waste water flows. The total load which must not be exceeded refers to the concentration in the qualified random sample or 2-hour composite sample and the volumetric flow of waste water in 0.5 or 2 hours corresponding to sampling.

(5) A waste water flow may only be blended with other waste water, subject to the furnishing of proof that the load of total organically bonded carbon (TOC) in this waste water flow ascertained for the site of occurrence is reduced by 80 % overall. This requirement shall not apply where the residual TOC load discharged from the respective waste water flow into water bodies does not exceed 20 kilograms per day or 300 kilograms per year or 1 kilogram per tonne of production capacity of the organic target product. When proving the reduction in load, in the case of physico-chemical waste water treatment plants, the TOC elimination level of such plants shall be used as a basis, whereas in the case of biological waste water treatment plants, the result of a study pertaining to number 407 of the Annex to Article 4 shall be used as a basis.

#### **E Requirements on the waste water at the site of occurrence**

(1) For chromium VI, a concentration of 0.1 mg/l in the random sample shall be adhered to.

(2) For volatile organically bonded halogens, a concentration of 10 mg/l in the random sample shall be adhered to. This requirement shall be deemed to have been met, provided it is achieved prior to the inlet into a sewage system without prior risk of leakage losses and without the waste water having been diluted.

#### **F Requirements for existing discharges**

(1) For existing discharges of waste water from installations which were lawfully in operation prior to 1 January 1999 or whose construction had lawfully commenced by this date, the provisions in parts A, B, C and D shall only apply insofar as no requirements to the contrary are specified in paragraphs (2) to (5) above.

(2) Notwithstanding Part B, proof of compliance with the general requirements in a waste water register must only be provided for 90 % of the parameter-related total loads in each case. The use of waste water-free techniques to generate a vacuum and for waste air purification must only be tested for the parameters specified in parts D and E. Additional testing with respect to other parameters is unnecessary.

(3) The requirements of Part C pertaining to COD shall not apply to waste water from the manufacture of polyacrylonitrile.

(4) Notwithstanding Part D, the following AOX requirements shall apply to the following waste water flows prior to blending with other waste water:

1. Waste water from the production of EDC, including further processing to VC: 5 g/t  
(production capacity of purified EDC)

2. Waste water from the manufacture of PVC: 1 mg/l or 20 g/t

(5) The requirements concerning mutagenic potential (umu test) pursuant to Part C, paragraph (1) and TOC pursuant to Part D, paragraph (5) shall not apply.

## Appendix 23

### Facilities for Biological Treatment of Waste

#### A Scope of application

(1) This Annex shall apply to

1. wastewater whose pollutant load originates mainly from facilities for biological treatment of waste from human settlements and for other waste that is to be treated like waste from human settlements, and
2. the precipitation water contaminated, through operations, within such facilities.

(2) This Annex shall not apply to wastewater from facilities for treatment of separately collected biological waste, from facilities for production of compost, from indirect cooling systems and from processing of process water.

#### B General requirements

(1) The stream volume and pollutant load of wastewater from facilities pursuant to Part A, paragraph (1) shall be kept as small as possible by means of the following measures:

1. Extensive recycling and multiple use of process water,
2. Prevention of entry of precipitation water into waste-storage and waste-treatment areas, by means of enclosures, roofs or covers.

(2) The wastewater may be discharged into water bodies only insofar as process water from process and waste-air treatment in mechanical-aerobic-biological treatment facilities cannot be used completely in internal processes. In such cases, the requirements pursuant to Part C and D shall apply.

#### C Requirements pertaining to wastewater for the point of discharge

(1) The following requirements shall apply to wastewater for the point of discharge into the relevant water body:

	Qualified random sample or 2-hour mixed sample	
Chemical oxygen requirement (CSB)	mg/l	200
Biochemical oxygen requirement in 5 days (BOD <sub>5</sub> )	mg/l	20
Total nitrogen, as the sum of ammonium, nitrite and nitrate nitrogen (N <sub>total</sub> )	mg/l	70
Total phosphorous	mg/l	3

Total carbon	mg/l	10
Toxicity to fish eggs ( $T_{\text{egg}}$ )		2

The requirement for total carbon refers to the random sample.

(2) A standard defined for total nitrogen shall be considered complied with if the standard is measured and complied with as "total bound nitrogen ( $TN_b$ )".

#### D Requirements pertaining to wastewater prior to mixing

(1) The following requirements shall apply to wastewater prior to mixing with other wastewater:

	Qualified random sample or 2-hour mixed sample mg/l
Adsorbable organically bound halogens (AOX)	0.5
Mercury	0.05
Cadmium	0.1
Chromium	0.5
Chromium VI	0.1
Nickel	1
Lead	0.5
Copper	0.5
Zinc	2
Arsenic	0.1
Cyanide, easily released	0.2
Sulphide	1

For AOX, chromium VI, cyanide, easily released, and sulphide, the values apply to the random sample.

(2) The wastewater may be mixed with other wastewater, except for wastewater from above-ground storage of waste, for the purpose of joint biological treatment, only if it can be expected that at least one of the following prerequisites is fulfilled:

1. In determination of the toxicity to fish eggs, luminescent bacteria and daphnia of a representative wastewater sample, the following values are not exceeded, following execution of an elimination test with a biological, laboratory-scale continuous-flow treatment system (such as a system in keeping with DIN 38412 L26):

Toxicity to fish  $T_{\text{egg}} = 2$ ,  
 Toxicity to daphnia  $T_D = 4$  and  
 Toxicity to luminescent bacteria  $T_L = 4$ .

Measures such as nitrification in the biological laboratory-scale treatment system, or maintenance of a constant pH level, must be carried out to ensure that ammonia ( $NH_3$ ) does not cause the  $T_{\text{egg}}$  value to be exceeded. For start-up of the biological, laboratory-scale continuous-flow treatment system, the wastewater may be diluted to any extent. If

the wastewater lacks nutrients, nutrients may be added. No dilution water may be added during the test phase.

2. A DOC elimination degree of 75 percent, in keeping with Number 408 of the Annex "Analysis and measuring procedures", is achieved.

3. Prior to joint biological treatment with other wastewater, the wastewater already has a CSB concentration of less than 400 mg/l.

In cases of significant modifications, and at least every 2 years, proof of compliance with these prerequisites must be provided.

## **Appendix 24**

### **Iron, steel and malleable iron foundry**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from one of the following areas of iron, cast steel and malleable iron manufacturing:

1. Smelting plant
2. Casting, cooling and emptying area
3. Dressing plant
4. Mould manufacturing and sand conditioning
5. Core-moulding plant
6. System cleaning.

(2) This Appendix shall not apply to waste water from indirect cooling systems or process water treatment facilities.

#### **B General requirements**

(1) The waste water must not contain any organically bonded halogens originating from solvents and cleaning agents. Proof that this requirement has been met may be furnished by listing all solvents and cleaning agents used in an operating journal, and presenting manufacturers' information showing that these solvents and cleaning agents do not contain any organically bonded halogens.

(2) Waste water from sand regeneration must not be discharged.

(3) Waste water from the core-moulding plant must not be discharged unless it at least meets the requirements of Appendix 1, Part C for size category 4.

#### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to waste water from one of the areas cited in Part A, paragraph (1) for the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample
--	-------------------------------------------------------

Chemical oxygen demand (COD)	g/t	100
Iron	g/t	5
Total hydrocarbons	g/t	5
Phenol index after distillation and dye extraction	g/t	2.5
Cyanide, easily released	g/t	0.5
Toxicity to fish eggs ( $T_{\text{egg}}$ )		2

(2) The production-specific load levels (g/t) refer to the production capacity (good castings produced) on which the water discharge licence is based. The contaminant load is determined from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

(3) Toxicity to fish eggs refers to a production-specific volumetric flow of waste water of 0.5 m<sup>3</sup> per tonne of good castings produced. If the figure calculated for the respective production-specific volumetric flow of waste water does not correspond to a dilution factor of the dilution sequence specified in the determination procedure, then the next highest dilution factor shall apply.

#### D Requirements for waste water prior to blending

- (1) The following requirements shall apply to the waste water from one of the areas specified in Part A prior to blending with waste water from other origins:

	Qualified random sample or 2-hour composite sample g/t
Arsenic	0.05
Cadmium	0.05
Lead	0.25
Total chromium	0.25
Copper	0.25
Nickel	0.25
Zinc	1
Adsorbable organic halogens (AOX)	0.5

(2) The production-specific load levels (g/t) refer to the production capacity (good castings produced) on which the water discharge licence is based. The contaminant load is determined from the concentration levels of the qualified random sample or 2-hour composite sample, in the case of AOX from the random sample, and from the volumetric flow of waste water corresponding to sampling.

## Appendix 25

### Leather production, fur processing, leather fibreboard manufacturing

#### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from leather production, fur processing, leather fibreboard manufacturing and hide and pelt curing.

(2) This Appendix shall not apply to waste water from indirect cooling systems.

## B General requirements

(1) With hide and pelt curing, the contaminant load should be kept as low as the following measures permit:

1. Storing the hides and pelts at low temperature
2. Using non-denaturalised salt
3. Retaining brine from skin curing via suitable techniques such as dry disposal or returning to production.

(2) AOX pollution of the waste water should be kept as low as possible via the selection and use of appropriate cleaning agents and disinfectants or other feedstocks and auxiliary materials.

## C Requirements for waste water at the point of discharge

- (1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	250
5-day biochemical oxygen demand (BOD <sub>5</sub> )	mg/l	25
Ammonia nitrogen (NH <sub>4</sub> -N)	mg/l	10
Total phosphorous	mg/l	2
Adsorbable organic halogens (AOX)	mg/l	0.5
Toxicity to fish eggs (T <sub>egg</sub> )		2

(2) The requirement for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant.

(3) In the case of waste water whose chemical oxygen demand (COD) content in the influent of the biological stage is assumed to be in excess of 2,500 mg/l on a monthly average, notwithstanding paragraph (1) above, a COD discharge level in the 2-hour composite sample or qualified random sample shall apply which is equivalent to a reduction in COD of at least 90 %.

(4) In the case of waste water whose 5-day biochemical oxygen demand (BOD<sub>5</sub>) content in the influent of the biological stage is assumed to be in excess of 1,000 mg/l on a monthly average, notwithstanding paragraph (1) above, a BOD<sub>5</sub> discharge level in the 2-hour composite sample or qualified random sample shall apply which is equivalent to a reduction in BOD<sub>5</sub> of at least 97.5 %.

(5) The reduction in COD and BOD<sub>5</sub> shall refer to the ratio between the contaminant load in the influent of the biological stage and that in the effluent of the central waste water



treatment plant in 24 hours. When determining the contaminant load in the influent, the contamination of the biology on which the permit is based shall be decisive. The extent of reduction shall be evaluated based on the size and mode of operation of the waste water treatment plant.

(6) For the discharge of waste water from fur processing, a level of toxicity to fish eggs of  $T_{\text{egg}} = 4$  shall apply.

#### **D Requirements for waste water prior to blending**

The following requirements shall apply to the waste water prior to blending with other waste water:

1. Waste water from soaking, liming and deliming, each including rinsing, must not exceed a level of 2 mg/l sulfide in the qualified random sample or 2-hour composite sample.
2. Waste water from tanning, including dewatering, and from wet finishing (neutralising, retanning, dyeing, stuffing), each including rinsing, or from leather fibreboard manufacturing, must not exceed a level of 1 mg/l of total chromium in the qualified random sample or 2-hour composite sample.

#### **E Requirements for waste water at the site of occurrence**

(1) The waste water from fur degreasing must only contain those halogenated solvents which are permitted in accordance with the Second Ordinance for the Implementation of the Federal Immission Control Act as last amended. This requirement shall be deemed to have been met if proof is furnished that only permitted halogenated solvents are used. Otherwise, a level of 0.1 mg/l for volatile halogenated hydrocarbons (sum of trichloroethene, tetrachloroethene, 1,1,1-trichloroethane and dichloromethane calculated as chlorine) must not be exceeded in the random sample.

(2) Waste water from the bate from fur dyeing, including rinsing, must not exceed a level of 0.05 mg/l of chromium VI in the random sample. Article 6 (1) shall not apply.

## **Appendix 26 Stone and soil**

#### **A Scope of application**

(1) This Appendix shall apply to waste water, including production-specific contaminated precipitation water, whose contaminant load originates primarily from the following areas of production:

1. The extraction and processing of natural stone, quartz, sand and gravel and the production of bleaching soil, lime and dolomite.
2. The production of calcareous sandstone
3. The production of concrete and concrete products and
4. The production of asbestos cement.

(2) This Appendix shall not apply to

1. Waste water discharged into a water body above ground which is created during the course of mining mineral raw materials, provided the water is only used for washing the products extracted there and does not contain any substances other than those mined and as such, it can be guaranteed that such substances cannot enter other water bodies.
2. Sanitary waste water
3. Waste water from indirect cooling systems and process water treatment facilities or
4. Waste water from flue gas scrubbing.

**B General requirements**

No requirements above and beyond Article 3 are imposed.

**C Requirements for waste water at the point of discharge**

- (1) The following requirements apply to waste water from the areas cited in Part A, paragraph (1) at the point of discharge into the water body:

	Area 1	Area 2
	Qualified random sample or 2-hour composite sample mg/l	
Substances removable by filtration	100	100
Chemical oxygen demand (COD)		150

(2) During the production of concrete and concrete products, production water must not be discharged.

(3) During the production of asbestos cement, waste water must not be discharged.

(4) The requirements pursuant to paragraph (3) above shall not apply, provided the production unit is routinely cleaned or serviced. In such cases, the following requirements shall apply:

	Qualified random sample or 2-hour composite sample mg/l
Chemical oxygen demand (COD)	80
Substances removable by filtration	30

**D Requirements for waste water prior to blending**

The following requirements shall apply to waste water from the cleaning and servicing of plants for the production of asbestos cement prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l	Random sample mg/l
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AOX	-	0.1
Total chromium	0.4	-
Chromium VI	-	0.1

## Appendix 27

### Treatment of waste by means of chemical and physical processes (CP facilities) and processing of used oil

#### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in the following areas:

1. Pre-treatment and processing of used oil,
2. Waste treatment,
3. Regeneration of exhausted ion exchangers and adsorption materials,
4. Cleansing of the interiors of containers after storage and transport.

This shall also include any precipitation water contaminated via operations in the aforementioned areas.

(2) This Appendix shall not apply to waste water from indirect cooling systems, from process water treatment facilities, from biological waste treatment, from separate treatment of liquid waste from photographic processes using silver halide or from waste incineration. Furthermore, it shall not apply to waste water from facilities pursuant to paragraph (1) Nos. 2, 3 and 4 above that are operated in conjunction with production in areas (of waste-water origin) for which requirements are specified in another Appendix of this Ordinance, where the characteristics of such waste water are similar to those of waste water from such other areas.

#### B General requirements

The contaminant load is to be kept as small as is possible through reduction of the amounts of waste water produced in cleansing of containers after storage and transport, via multiple use and extensive recycling of cleansing water and via product retention and recovery.

#### C Requirements for waste water at the point of discharge

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	200
Nitrite nitrogen (NO <sub>2</sub> -N)	mg/l	2

Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen ( $N_{tot}$ )	mg/l	30
Aluminium	mg/l	3
Iron	mg/l	3
Total fluoride	mg/l	30
Total phosphorous	mg/l	2
Phenol index following distillation and dye extraction	mg/l	0.15
Toxicity to fish eggs ( $T_{egg}$ )		2
Toxicity to luminescent bacteria ( $T_L$ )		4
Toxicity to daphnia ( $T_D$ )		4

(2) Compliance with requirements for total nitrogen may be shown through determination of "total bonded nitrogen ( $TN_b$ )", if the resulting ( $TN_b$ ) value is in compliance.

#### D Requirements for waste water prior to blending

The following requirements shall apply to the waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l	Random sample mg/l
Adsorbable organically bound halogens (AOX)	1	-
Arsenic	-	0.1
Lead	-	0.5
Cadmium	-	0.2
Chromium	-	0.5
Chromium VI	0.1	-
Copper	-	0.5
Nickel	-	1
Mercury	-	0.05
Zinc	-	2
Cyanide, easily released	0.1	-
Sulfide, easily released	1	-
Chlorine, free	0.5	-
Benzene and derivatives	-	1
Total hydrocarbons	20	-

(2) The waste water may be mixed with other waste water, for purposes of joint biological treatment, only if at least one of the following two conditions is expected to be fulfilled:

1. In determination of the toxicity to fish eggs, luminescent bacteria and daphnia of a representative wastewater sample, the following values are not exceeded, following execution of an elimination test with a biological, laboratory-scale continuous-flow treatment system (such as a system in keeping with DIN 38412 L26):

Toxicity to fish  $T_{egg} = 2$ ,  
 Toxicity to daphnia  $T_D = 4$  and  
 Toxicity to luminescent bacteria  $T_L = 4$ .

Via such measures as nitrification in the laboratory's biological waste-water treatment plant or maintenance of constant pH value, it must be ensured that the  $T_{egg}$  value is not exceeded due to ammonia ( $NH_3$ ). The waste water may be diluted as required to start up the laboratory's biological waste-water treatment plant. In the event of a lack of nutrients, nutrients may be added. During the test phase, no dilution water may be added.

2. A DOC elimination level of 75% in accordance with number 408 of the Annex "Analysis and measurement procedures" is achieved.

Proof of compliance with the relevant criteria must be provided whenever any significant changes are made and, otherwise, at least every two years.

## **E Requirements for waste water for the site of occurrence**

Waste water occurring in CP facilities must not be discharged into water bodies if it originates from joint treatment of liquid waste from photographic processes using silver halide and waste of other areas of origin, and if it contains organic complexing agents that do not attain an 80 percent degree of DOC degradation after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures". The requirement pursuant to the first sentence above shall be deemed to have been complied with if proof is provided showing that the producers and suppliers of delivered waste have provided data documenting that none of the organic complexing agents mentioned in the first sentence above, from operating or auxiliary substances, have been used, or if it is assured that liquid waste from photographic processes will be incinerated.

## **F Requirements for existing discharges**

For existing discharges of waste water from installations that were lawfully in operation prior to [the date of entry into force of this Ordinance] or whose construction had lawfully commenced by this date, relevant COB requirements shall not apply to waste water from treatment of bilge, slop and ballast water on ships that accept and treat bilge oil.

# **Appendix 28**

## **Production of paper and cardboard**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in production of paper and cardboard.

(2) This Appendix shall not apply to waste water from indirect cooling systems or from process water treatment facilities.

### **B General requirements**

(1) The contaminant load in the waste water must be kept as low as the following measures permit, as revealed by examination of the circumstances of the relevant individual case:

1. Avoidance of use of auxiliary substances containing alkylphenol ethoxilates (APEO)
2. Avoidance of use of organic complexing agents that do not attain an 80 percent degree of DOC degradation after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures"
3. Avoidance of use of wet-strength agents that contribute to AOX.
4. Avoidance of use of halogen-separating operating and auxiliary substances to reduce smells in products,
5. Optimisation of closed cycles, of chemical use and of processes that contaminate waste water.

(2) The waste water must not contain organically bound halogen compounds, benzene, toluene or xylenes resulting from use of solvents and cleansing agents.

(3) Proof that the requirements pursuant to paragraph (1) above have been met may be provided by listing the operating and auxiliary materials used, in an operating journal, and reducing use of such materials to the greatest possible extent.

(4) Proof that the requirements pursuant to paragraph (2) above have been met may be provided by listing the operating and auxiliary materials used, in an operating journal, and by showing that such materials, pursuant to data provided by their manufacturers, contain none of the substances or substance groups listed in paragraph (2) above.

### C Requirements for waste water at the point of discharge

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
	mg/l	kg/t
Substances removable by filtration	50	-
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25	-
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	10	-
Total phosphorous	2	-
Chemical oxygen demand (COD)	-	3

(2) The requirement for substances removable by filtration shall not apply if the waste water is treated biologically.

(3) In production of wood-free papers, the water discharge license may specify a higher concentration for the 5-day biochemical oxygen demand (BOD<sub>5</sub>), of up to 50 mg/l, if the production-specific BOD<sub>5</sub> load does not exceed a level of 1 kg/t.

(4) The requirements for total nitrogen and total phosphorous shall apply only if the daily waste water amount on which the water discharge license is based exceeds 500 m<sup>3</sup>.

(5) If the waste water originates in the following areas:

1. Manufacture of paper, where over 50 percent of the fibre material is de-inked or bleached,
2. Manufacture of very fine papers from pure pulp,
3. Paper manufacture with more than one type change per day, on a yearly average, or
4. Manufacture of high-wet-strength tissue hygiene papers from pure pulp, using the through-air-drying (TAD) process,

then, paragraph (1) above notwithstanding, a higher COD load, of up to 5 kg/t, may be permitted.

(6) The production-specific load levels (kg/t) refer to the machine capacity upon which the water discharge license is based. The contaminant load is calculated from the concentration levels of the qualified random sample or the 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

#### **D Requirements for waste water prior to blending**

(1) Subject to the provisions of paragraph (2) below, the waste water, prior to blending with other waste water, must meet a level of 10 g/t, in the random sample, for adsorbable organically bound halogens (AOX).

(2) Taking into account the requirements pursuant to Part B (1) Nos. 3 and 4, a higher AOX load, up to the following levels, may be permitted:

	Wet-strength papers (less than 25% relative wet break resistance)	Wet-strength papers (at least 25% relative wet break resistance)	Decorative papers	Use of halogen-separating agents for smell reduction
	Random sample (g/t)			
Adsorbable organically bound halogens (AOX)	60	100	100	60

(3) The production-specific load levels (kg/t) refer to the machine capacity, for the end product, upon which the water discharge license is based. The contaminant load is calculated from the concentration levels of the random sample and from the volumetric flow of waste water corresponding to sampling.

## **Appendix 29 Production of iron and steel**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in one or more of the following production areas:

1. Sintering systems,
2. Pig-iron production in blast furnaces and slag granulation,
3. Desulphuration of pig iron,
4. Raw-steel production,
5. Secondary metallurgy,
6. Continuous casting, hot forming,
7. Hot-forming of pipes,
8. Cold-forming of strip steel,
9. Cold-forming of pipes, sections, bright steel and wire,
10. Continuous surface treatment of semi-finished steel and steel products.

(2) This Appendix shall not apply to waste water from coking plants nor to waste water from indirect cooling systems or from process water treatment facilities.

## **B General requirements**

(1) Waste water from sintering systems, from desulphuration of raw iron and from production of raw steel must not be discharged into water bodies.

(2) The contaminant load in the waste water must be kept as low as the following measures permit, as revealed by examination of the circumstances of the relevant individual case:

1. Extensive recycling of process water from gas scrubbers and of other process water,
2. Re-use of process water,
3. Slag granulation using process water or cooling water,
4. Collection and use of dirty rain water that runs off of the relevant facility's paved areas,
5. Multiple use of rinsing water by means of suitable methods such as cascade rinsing and recycling using ion exchangers,
6. Recovery or return of suitable bath constituents from rinsing baths into the process baths,
7. Reduction of escape of substances from surface-treatment baths, by means of suitable procedures such as spray protection and wiping,
8. Treatment of process baths by means of suitable methods/equipment such as membrane filtration, ion exchangers or electrolysis, in order to maximise the service life of the process baths.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements shall apply to the waste water, from production areas 2 and 5 to 10 pursuant to Part A (1), at the point of discharge into the water body:

Production areas	2	5	6	7	8	9	10
	Qualified random sample or 2-hour composite sample						
Chemical	100	50	40	200	200	300	300



oxygen demand (COD)							
Iron	5	5	5	5	3	5	5
Total hydrocarbons	-	-	5	10	10	10	5
Nitrogen from nitrite (NO <sub>2</sub> -N)	-	-	-	-	5	5	-
Total phosphorous	-	-	-	-	2	2	2
Fluoride	-	-	-	-	30	30	-
Toxicity to fish eggs (T <sub>egg</sub> ) as dilution factor T <sub>F</sub>	6	2	2	2	6	6	6

(2) For raw-iron production with coal injection, and for production of foundry raw iron with predominant use of iron-containing secondary raw materials, a COD level of 200 mg/l shall apply.

(3) For production area 10, the requirement for total phosphorous shall apply only for surface finishing with integrated phosphating.

(4) The requirements for total hydrocarbons refer to the random sample.

#### D Requirements for waste water prior to blending

(1) Prior to blending with other waste water, waste water from production areas 2 and 5 to 10 pursuant to Part A (1) must meet the following standards:

Production areas	2	5	6	7	8	9	10
	Qualified random sample or 2-hour composite sample						
Lead	0.5	0.5	-	-	-	-	0.5
Total chromium	-	0.5	0.5	0.5	0.5	0.5	0.5
Chromium VI	-	-	-	-	0.1	0.1	0.1
Copper	-	-	-	-	-	-	0.5
Nickel	-	0.5	0.5	0.5	0.5	0.5	0.5
Zinc	2	2	2	2	2	2	2
Tin	-	-	-	-	-	-	2
Cyanide, easily released	0.4	-	-	-	-	-	0.2
Adsorbable organically bound halogens (AOX)	-	-	-	-	-	-	1

(2) The requirements for AOX, chromium VI and cyanide, easily released, refer to the random sample.

(3) For production area 2, the water discharge license for the parameter cyanide, easily released, may specify a higher concentration, of up to 0.8 mg/l, if the production-specific cyanide load does not exceed a level of 0.12 g/t.

(4) Notwithstanding the requirements for production area 6, for hot wide-strip mill systems, a level of 0.2 mg/l shall apply for total chromium and for nickel (i.e. in each case).

(5) Notwithstanding the requirements for production area 2, for production of foundry pig-iron with predominant use of ferriferous secondary raw materials, a level of 4 mg/l shall apply for zinc.

**E Requirements for waste water for the site of occurrence**

(1) The waste water must not contain any organic complexing agents that do not achieve 80% DOC degradation after 28 days, in accordance with number 406 of the Annex "Analysis and Measurement Procedures".

(2) The waste water must not contain organically bound halogen compounds from solvents and cleansing agents.

(3) Proof that the requirements pursuant to paragraph (1) above have been met may be provided by listing the operating and auxiliary materials used in an operating journal and presenting manufacturers' information showing that these materials do not contain any of the substances or substance groups cited in paragraphs (1) and (2) above.

**F Requirements for existing discharges**

For existing discharges of waste water from installations that were lawfully in operation prior to [date of the entry into force of this Ordinance] or whose construction had lawfully commenced by this date, waste water from gas cleaning may occur in raw-steel production, the provisions of Part B (1) notwithstanding. In this case, the following provisions shall apply:

1. Requirements on the waste water at the point of discharge into the water body

Qualified random sample or 2-hour composite sample		
Chemical oxygen demand (COD)	mg/l	50
Iron	mg/l	5
Toxicity to fish eggs (T <sub>egg</sub> ) as dilution factor T <sub>F</sub>	2	

2. Requirements on the waste water prior to blending

Qualified random sample or 2-hour composite sample	
Lead	0.5
Total chromium	0.5
Nickel	0.5
Zinc	2

## **Water treatment, cooling systems, steam generation**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in

1. Treatment of drinking water, water for swimming pools and bathing pools (water for filling and circulation) and process water,
2. Cooling systems of power stations and cooling systems for indirect cooling of industrial and commercial processes, and
3. Other types of waste-water production in steam generation.

(2) This Appendix shall not apply to waste water from scrubbing of flue gases from firing systems, from scrubbing of flue or waste gases from incineration and co-incineration of waste and from controlled areas of nuclear power stations. It shall also not apply to waste-water discharges of less than 10 m<sup>3</sup> per week. Furthermore, it shall not apply to waste water produced in emptying swimming and bathing pools.

### **B General requirements**

(1) The waste water must not contain the following substances and substance groups which result from use of operating and auxiliary substances:

1. Organic complexing agents (except for phosphonates and polycarboxylates) that do not attain an 80 percent degree of DOC degradation after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures";
2. Chromium and mercury compounds, nitrite, organometallic compounds (metal-carbon compounds) and mercaptobenzthiazol;
3. Zinc compounds from cooling-water conditioning agents released in draining main cooling circuits in power stations;
4. Microbicidal agents in used in through-flow fresh-water cooling of power stations.

(2) Through-flow or effluent waste water from fresh-water cooling of industrial and commercial processes, as well as effluent waste water from power stations and waste water from draining of main cooling circuits in power stations, may contain microbicidal agents only after having undergone shock treatment with microbicides. This shall not apply to use of hydrogen peroxide or ozone.

(3) Proof that the requirements pursuant to paragraph (1) above have been met may be provided by listing the operating and auxiliary substances used in an operating journal and presenting manufacturers' information showing that these do not contain any of the substances or substance groups cited in paragraph (1) above.

(4) The water discharge license may take account of the contaminant loads, per relevant parameter, present in water prior to removal from a water body (initial contamination), if such initial contamination is still present upon discharge of the water into the water body.

(5) For holding tanks, all of the values specified in parts C, D and E shall apply for the random sample. The values refer to the waste water's characteristics prior to release.

**C Requirements for waste water at the point of discharge**

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

1. Water treatment

- a) For substances removable by filtration, a value of 50 g/l in the qualified random sample or 2-hour composite sample shall apply. This requirement shall not apply to discharges of waste water resulting from treatment of water from flowing waters whose runoff (Q) exceeds mean water (MQ) at the time of removal; the requirement shall also not apply to water from filter-sieve-cleaning.
- b) Waste water from filter backwashing must be returned to the treatment process. This shall not apply to filter-backwash water from treatment of process water from surface water, well water and drainage water, where such water has been mechanically processed without additives, nor shall it apply to drinking water and water from swimming and bathing pools.
- c) For waste water from treatment of water for use in swimming and bathing pools, a chemical oxygen demand (COD) level of 30 mg/l shall apply in the qualified random sample or 2-hour composite sample.

2. Cooling systems

	Drainage of main cooling circuits of power stations (drainage water from cooling circuits)	Drainage of other cooling circuits
	Random sample mg/l	
Chemical oxygen demand (COD)	30	40 After cleansing with dispersants, a value of 80 shall apply.
Phosphorous compounds as total phosphorous, pursuant to number 109 of the Appendix "Analysis and Measurement Procedures"	1.5 If only inorganic phosphorous compounds are used, a value of 3 shall apply.	3 If only zinc-free cooling-water conditioning agents are used, a value of 4 shall apply.  If the zinc-free cooling-water conditioning agents that are used contain only inorganic phosphorous compounds, a value of 5 shall apply.

3. Steam generation

	Waste water from other sources in steam generation	
	Qualified random sample or 2-hour composite sample (mg/l)	
Chemical oxygen demand (COD)	50	For waste water from condensate desalination, a value of 80 shall apply.
Phosphorous compounds as total phosphorous, pursuant to number 109 of the Appendix "Analysis and Measurement Procedures"	3	
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	10	

The requirement for the parameter total nitrogen shall apply only to power stations with an installed thermal output of at least 1000 MW. A standard defined for total nitrogen shall be considered complied with if the relevant value is measured as "total bound nitrogen (TN<sub>b</sub>)", and if the resulting measurement is in compliance.

### D Requirements for waste water prior to blending

Prior to blending with other waste water, the waste water must meet the following standards:

#### 1. Water treatment

	Qualified random sample or 2-hour composite sample (mg/l)	Random sample (mg/l)
Arsenic	0.1	-
Adsorbable organically bound halogens (AOX)	-	0.2
Adsorbable organically bound halogens (AOX) in regeneration water of ion exchangers	-	1

These requirements shall not apply to discharges of water from filter-sieve-cleaning.

#### 2. Cooling systems, for drainage of other cooling circuits

	Random sample (mg/l)
Zinc	4
Adsorbable organically bound halogens (AOX)	0.15

#### 3. Steam generation

	Waste water from other sources in steam generation	
	Qualified random sample or 2-hour composite sample (mg/l)	Random sample (mg/l)
Zinc	1	-
Total chromium	0.5	-
Cadmium	0.05	-
Copper	0.5	-
Lead	0.1	-

Nickel	0.5	-
Vanadium	4	-
Hydrazine	-	2
Free chlorine	-	0.2
Adsorbable organically bound halogens (AOX)	-	0.5

## E Requirements for waste water for the site of occurrence

(1) Waste water from one of the following areas must meet the following requirements following shock treatment with microbicidal agents:

		Waste water from freshwater cooling of industrial and commercial processes and effluent of power stations	Drainage of main cooling circuits of power stations (drainage water from the cooling circuit)	Drainage of other cooling circuits
		Random sample		
Adsorbable organically bound halogens (AOX)	mg/l	0.15	0.15	0.5
Chlorine dioxide and other oxidants (given as chlorine)	mg/l	0.2	0.3	0.3
Toxicity to luminescent bacteria (T <sub>L</sub> )		-	12	12

(2) The requirement for toxicity to luminescent bacteria shall also be deemed complied with if drainage water remains contained until, in keeping with manufacturer's data regarding operating concentration and decomposition behaviour, a G<sub>L</sub> value of 12 or less is achieved and this is documented in an operating journal.

## F Requirements for existing discharges

For existing discharges of waste water from installations for treating water for swimming or bathing pools (circulating water), and that were lawfully in operation prior to [date of the entry into force of this Ordinance] or whose construction had lawfully commenced by this date, only the requirements pursuant to Parts B and C shall apply.

## Appendix 32 Processing of caoutchouc and latex, manufacture and processing of rubber

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in one or more of the following areas:

1. Processing of solid caoutchouc
  - 1.1 Caoutchouc mixtures, blanks and caoutchouc solutions
  - 1.2 Extruded articles
  - 1.3 Rubber and rubber-metal articles in moulding tools
  - 1.4 Rubberised fabrics and other reinforcement materials
  - 1.5 Tyres
2. Processing of latex

- (2) This Appendix shall not apply to waste water from treatment of metal parts prior to bonding with rubber, from indirect cooling systems, from production of backings of textile flooring materials and other surfacing products and from process water treatment facilities.
- (3) For waste water discharges of less than 1 m<sup>3</sup> waste water per day, only Part B of this Appendix shall apply. Part B shall apply to the site of waste water origin.

## B General requirements

The contaminant load shall be kept as low as the following measures permit, after investigation of the situation in each individual case:

1. Use of water-saving techniques in direct cooling of caoutchouc mixtures, including pertinent application of aqueous separating agents,
2. Use of waste-water-free procedures in cleansing of internal mixers (kneaders),
3. Use of waste water-saving procedures in washing and cleansing of rubber products,
4. Reduction of waste-water contamination through mechanical separation of salt adhesions after salt-bath vulcanisation,
5. Multiple use of rinsing water in cleansing of forms and mandrels,
6. Use of waste water-saving procedures in treatment of waste air in the areas of caoutchouc solutions, rubberised fabrics and other reinforcing materials, in the application areas 1.1 and 1.4,
7. Waste-water-free floor cleansing in the application area 1.1,
8. Avoidance of high-molecular, water-soluble separating agents (polyglycols) which do not achieve a dissolved organic carbon (DOC) elimination level of 80 % after 7 days, in accordance with number 408 of the Annex "Analysis and Measurement Procedures".

## C Requirements for waste water at the point of discharge

- (1) The following requirements shall apply to waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	150
5-day biochemical oxygen demand (BOD <sub>5</sub> )	mg/l	25
Total nitrogen, as the sum of ammonium, nitrite and nitrate nitrogen (N <sub>total</sub> )	mg/l	20
Total phosphorous	mg/l	2
Toxicity to fish eggs (T <sub>egg</sub> )		2

(2) For waste water from salt-bath vulcanisation, a concentration level for nitrite nitrogen ( $\text{NO}_2 - \text{N}$ ) of 3 mg/l shall also apply.

#### **D Requirements for waste water prior to blending**

(1) The following requirements shall apply to waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l
Zinc	2
Lead	0.5
Adsorbable organically bound halogens (AOX)	1

For AOX, the values for the random sample shall apply.

(2) In the qualified random sample or 2-hour composite sample, for waste water from the areas 1.1 and 1.4 pursuant to Part A (1), a concentration level of 0.1 mg/l shall apply for benzene and derivatives, and for waste water from drainage of direct cooling-water circuits, a dilution factor of  $T_L = 12$  shall apply for toxicity to luminescent bacteria ( $T_L$ ).

### **A p p e n d i x 3 3**

#### **Scrubbing of waste gases from waste incineration**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in scrubbing of flue or waste gases from incineration and co-incineration of waste pursuant to Article 2 of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste (Official Journal of the EC No. L 332, page 91, 2001 No. L 145, page 52).

(2) This Appendix shall not apply to waste water from other industrial waste-gas-scrubbing systems, from cooling-circuit systems of power stations and industrial processes, from other sources in steam generation and from scrubbing of flue gases from firing systems.

#### **B General requirements**

Waste water from scrubbing of waste gases of facilities for incineration of household waste must not be discharged into water bodies.

#### **C Requirements for waste water at the point of discharge**

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:



	Qualified random sample or 2-hour composite sample mg/l
Chemical oxygen demand (COD)	
- Use of burnt lime	80
- Use of limestone	150
sul fate	2000
Sulfite	20
Fluoride	30
Toxicity to fish eggs (T <sub>egg</sub> )	2

(2) In derogation of Article 6 (3), the chemical oxygen demand (COD) level shall also be deemed to have been met provided the triple amount of total organically bonded carbon (TOC), specified in milligrams per litre, does not exceed this level. In derogation of Article 6 (1), the maximum amount by which any parameters may be exceeded is 50%. The requirements for the chemical oxygen demand shall apply after deduction of the initial COD contamination introduced with the process water.

#### D Requirements for waste water prior to blending

(1) Prior to blending with other waste water, the waste water must meet the following standards:

	24-hour composite sample	
Mercury	mg/l	0.03
Cadmium	mg/l	0.05
Thallium	mg/l	0.05
Arsenic	mg/l	0.15
Lead	mg/l	0.1
Chromium	mg/l	0.5
Copper	mg/l	0.5
Nickel	mg/l	0.5
Zinc	mg/l	1.0
Dioxins and furans as the sum of the individual dioxins and furans calculated pursuant to Annex I of Directive 2000/76/EC	ng/l	0.3

(2) In the 24-hour composite sample, substances removable by filtration must meet a standard of 30 mg/l in 95 % of all measurements and a standard of 45 mg/l in all measurements; Article 6 (1) shall not apply.

(3) For the parameters mentioned in paragraphs (1) and (2) above, the total load in 24 hours shall be limited in the water discharge license. The contaminant load is derived from the concentrations of the 24-hour composite sample and the volumetric flow of waste water corresponding to sampling.

(4) In derogation of Article 6 (1), the standards for heavy metals shall be deemed complied with if the standards are not exceeded more than once per year or, for more than 20 instances of sampling per year, not exceeded in more than 5 % of all cases. In derogation of Article 6 (1), the standard for dioxins and furans must not be exceeded if only two measurements are carried out per year.

## **E Requirements for waste water at the site of occurrence**

No additional requirements shall apply to the waste water at the site of occurrence.

## **F Requirements for existing discharges**

(1) For existing discharges of waste water from scrubbing of waste gases of facilities for incineration of household waste that were lawfully in operation prior to [the date of entry into force of this Ordinance] or whose construction had lawfully commenced by this date, Part B shall not apply if the waste generated in operation of the waste-gas-scrubbing system cannot be properly and safely recycled, or cannot be disposed of in some other manner in harmony with the public interest. In this case, Parts C and D, and the following additional requirements, shall apply:

	Load in milligrams per tonne of waste
Cadmium	15
Mercury	9
Chromium	150
Nickel	150
Copper	150
Lead	30
Zinc	300
Sulfide	60

(2) The waste amount used as the reference for the load shall refer to the capacity, of the facility for incineration of household waste, upon which the water discharge license is based.

In derogation of Article 6 (1), the maximum amount by which any parameter may be exceeded is 50%. The contaminant load (mg/t) shall be calculated from the concentration levels of the qualified random sample or the 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

## **Appendix 36 Production of hydrocarbons**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the following areas of hydrocarbon production:

1. The production of certain hydrocarbons, primarily olefin hydrocarbons, with 2 to 4 carbon atoms, as well as benzene, toluene and xylene from mineral oil products by cracking with the aid of steam (steam cracking).

2. The production of pure hydrocarbons or certain blends of hydrocarbons from mineral oil products using physical separation methods.

3. The conversion of hydrocarbons into other hydrocarbons using the chemical techniques of hydration, dehydration, alkylation, dealkylation, hydrodealkylation, isomerisation or disproportionation.

This shall also include any precipitation water coming into contact with hydrocarbons in the process area of the production plant.

(2) This Appendix shall not apply to waste water from the production of pure paraffins from slack wax, from petroleum refining, from indirect cooling systems or from process water treatment facilities.

## **B General requirements**

No requirements above and beyond Article 3 are imposed.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
Chemical oxygen demand (COD)	120
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	25
Total phosphorous	1.5
Total hydrocarbons	2

(2) For COD, a concentration of up to 190 mg/l in the qualified random sample or 2-hour composite sample may be conceded, provided the COD load is reduced by at least 80 % in a central waste water treatment plant. The reduction in COD load refers to the ratio between the COD load in the effluent of the gravity-type oil-water separator and that of the effluent from the biological waste water treatment plant over a representative period of time not exceeding 24 hours.

(3) For total nitrogen, a higher concentration is permissible, provided the nitrogen load is reduced by at least 75% in a central waste water treatment plant. The reduction in the nitrogen load refers to the ratio between the nitrogen load of the effluent from the gravity-type oil-water separator and that of the effluent from the biological waste water treatment plant over a representative period of time which should not exceed 24 hours. Total bonded nitrogen (TN<sub>b</sub>) should be used as a basis when calculating the loads.

## **D Requirements for waste water prior to blending**

The following requirements shall apply to the waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l	Random sample mg/l
Adsorbable organically bound halogens (AOX)	-	0.1
Phenol index after distillation and dye extraction	0.15	-
Benzene and derivatives	0.05	-
Sulfide sulphur and mercaptan sulphur	0.6	-

If hydrocarbon production also includes the manufacture of ethylbenzene and cumene, an AOX level of 0.15 mg/l shall apply.

## **E Requirements for waste water for the site of occurrence**

Waste water from the production of ethylbenzene and cumene must not exceed a level of 1 mg/l for adsorbable organic halogens (AOX) in the random sample.

## **Appendix 37 Production of inorganic pigments**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production of inorganic pigments from the following areas:

1. Lead and zinc pigments
2. Cadmium pigments
3. Lithopones, zinc sulfide pigments and precipitated barium sulfate
4. Silicate fillers
5. Iron oxide pigments
6. Chromium oxide pigments
7. Mixed phase pigments, pigment and colouring body mixtures and frits.

(2) This Appendix shall not apply to waste water from the production of highly disperse oxides and sound carrier pigments, nor from indirect cooling systems and process water treatment facilities.

### **B General requirements**

No requirements above and beyond Article 3 are imposed.

### **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to waste water from the areas cited in Part A, paragraph (1) at the point of discharge into the water body:

Areas		1	2	3	4	5	6	7
		Qualified random sample or 2-hour composite sample						
Chemical oxygen demand (COD)	mg/l	100	150	100	-	-	70	100
	kg/t	-	-	-	0.6	4	-	-
Ammonia nitrogen (NH <sub>4</sub> -N)	mg/l	-	-	-	-	10	-	-
Sulfate	kg/t	-	-	-	600	1600	1200	-
Sulfite	mg/l	-	-	20	-	-	20	-
Iron	kg/t	-	-	-	-	0.5	-	-
Toxicity to fish eggs (T <sub>egg</sub> )		2	2	2	2	2	2	2

(2) The contaminant load is calculated from the concentration levels of the qualified random sample or the 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

(3) In the case of iron oxide pigment production (area 5), the requirement for sulfate shall only apply to production based on the precipitation method and the Penniman method. For production based on the aniline method, a level of 40 kg/t shall apply to sulfate. The requirement for iron shall only apply to iron oxide pigments and technical iron oxides. For transparent and high-purity iron oxide pigments, a value of 1 kg/t shall apply to iron.

#### D Requirements for waste water prior to blending

(1) The following requirements apply to the waste water from the areas cited in Part A, paragraph (1) prior to blending with other waste water:

Areas		1	2	3	5	6	7	
		Qualified random sample or 2-hour composite sample						
Aniline	kg/t	-	-	-	0.2	-	-	
Barium	mg/l	-	-	2	-	-	-	
Lead	kg/t	0.04	-	-	-	-	-	
Cadmium	mg/l	-	-	0.01	-	-	-	
	kg/t	-	0.15	-	-	-	-	
Total chromium	mg/l	-	-	-	-	-	0.5	
	kg/t	0.03	-	-	-	0.02	-	
Cobalt	mg/l	-	-	-	-	-	1	
Copper	mg/l	-	-	-	-	-	0.5	
Nickel	mg/l	-	-	-	-	-	0.5	
Mercury	g/t	-	-	-	-	-	-	
Sulfide	mg/l	-	-	1	-	-	-	
Zinc	mg/l	2	2	2	-	-	0.5	

(2) In the case of iron oxide pigment production (area 5), the requirement pursuant to paragraph (1) above for aniline shall only apply to production based on the aniline method.

(3) The production-specific load levels (kg/t) for the production of cadmium pigments shall refer to the quantity of cadmium used.

(4) The contaminant load is calculated from the concentration levels of the qualified random sample or the 2-hour composite sample and the volumetric flow of waste water corresponding to sampling.

## **Appendix 38**

### **Textile manufacturing and finishing**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in commercial and industrial treatment and processing of textile materials and threads/yarns and in textile finishing.

(2) This Appendix shall not apply to waste water

1. From washing of raw wool,
2. From the area of photographic processing and electroplating (such as manufacture of printing templates and impression cylinders),
3. From chemical dry cleaning of textiles that uses solvents with halogenated hydrocarbons pursuant to the Second Ordinance for Execution of the Federal Immission Control Act as last amended,
4. From process water treatment facilities and from indirect cooling systems.

(3) Discharges of less than 5 m<sup>3</sup> of waste water per day shall be subject only to Part B and to the COD requirements pursuant to Part C of this Appendix.

#### **B General requirements**

The contaminant load must be kept as low as the following measures permit, as revealed by examination of the circumstances of the relevant individual case:

1. Processing and reuse of the wash water from the printing plant that is used for washing printer's blankets and for cleaning printing equipment (templates, cylinders, frames, treatment tubs, etc.),
2. Avoidance of use of synthetic size products that do not attain an 80 percent degree of DOC elimination after 7 days, pursuant to number 408 of the Appendix "Analysis and Measurement Procedures",
3. Avoidance of use of organic complexing agents that do not attain an 80 percent degree of DOC degradation after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures". This shall not apply to use of phosphonates, polyacrylates and maleic-acid copolymeres for textile finishing,
4. Avoidance of use of surfactants that do not attain an 80 percent degree of DOC elimination after 7 days, pursuant to number 408 of the Appendix "Analysis and Measurement Procedures". Surfactants (tensides) are organic surface-active agents, with washing and wetting properties, that, at a concentration of 0.5 percent and a temperature of 20°C, reduce the surface tension of distilled water to 0.045 N/m or less,
5. Avoidance of use of chlorinating pressure-pre-treatment of wool and mixed-wool substrates,
6. Avoidance of use of alkylphenol ethoxilates (APEO), except for polymerdispersions that are applied to textile surfaces and that remain on such surfaces to a degree of 99 percent,
7. Minimisation of the amounts, and retention or reuse, of:
  - 7.1 Synthetic size products from desizing,
  - 7.2 Left-over dye liquors,

- 7.3 Left-over finishing padding baths,
  - 7.4 Left-over baths from coating and backing,
  - 7.5 Left-over baths from back-coating of textile floor coverings and other sheet materials,
  - 7.6 Left-over printing pastes,
8. Treatment of the separate melt streams listed under number 7, where reuse is not possible, by means of processes that guarantee at least 80 percent elimination of the COD or TOC or, in the case of left-over dye liquors and left-over printing pastes, that guarantee at least 95 percent elimination of the pigments.

Proof of compliance with the relevant general requirements must be provided in a waste water cadastre.

### C Requirements for waste water at the point of discharge

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	160	mg/l
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25	mg/l
Total phosphorous	2	mg/l
Ammonia nitrogen (NH <sub>4</sub> -N)	10	mg/l
Total nitrogen as the sum of ammonia nitrogen, nitrite nitrogen and nitrate nitrogen (N <sub>ges</sub> )	20	mg/l
Sulfite	1	mg/l
Toxicity to fish eggs (T <sub>egg</sub> )	2	
Pigmentation: Spectral absorption coefficient at		
436 nm (yellow range)	7	m <sup>-1</sup>
525 nm (red range)	5	m <sup>-1</sup>
620 nm (blue range)	3	m <sup>-1</sup>

The requirements for ammonia nitrogen and total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant.

(2) The requirement for total phosphorous shall not apply to waste water from use of organic phosphorous compounds for flameproof finishing.

### D Requirements for waste water prior to blending

(1) The following requirements shall apply to the waste water prior to its blending with other waste water:

	Qualified random sample or 2-hour composite sample (mg/l)
Adsorbable, organically bonded halogens (AOX)	0.5
Sulfide	1
Total chromium	0.5

Copper	0.5
Nickel	0.5
Zinc	2
Tin	2

The requirements for AOX shall refer to the random sample.

(2) Waste water from the following areas may not contain a contaminant load that is larger than the load resulting from the following concentration levels and from the waste water volumetric flow rate derived from Part B:

	Total chromium mg/l	Copper mg/l	Nickel mg/l
Left-over dye liquors	0.5	0.5	0.5
Dye baths with more than 3% extraction dyes and less than 70% fixing rate	0.5	0.5	0.5
Left-over printing pastes, not reusable	0.5	0.5	0.5

Proof of compliance with the requirements must be provided in a waste water cadastre.

(3) In the case of continuous pre-treatment of knitted/stitched textiles made of synthetic fibres, or of fibre unions that consist mainly of synthetic-fibre components, the total concentration of hydrocarbons in the waste water may not exceed 20 mg/l.

## **E Requirements for waste water at the site of occurrence**

(1) The waste water may not contain

1. Organic chlorine carriers (dye accelerators),
2. Chlorine-separating bleaches, except for sodium chlorite for bleaching of synthetic fibres,
3. Free chlorine from the use of sodium chlorite,
4. Arsenic, mercury and their compounds, or organic tin compounds from use as preservatives,
5. Alkylphenol ethoxilates (APEO) as washing and cleansing agents,
6. Chromium VI compounds from use as oxidants for sulphur dyes and vat dyes,
7. EDTA, DTPA and phosphonates from use as water softeners in process water,
8. Unused, left-over amounts of chemicals, dyes and textile auxiliaries and
9. Left-over printing pastes in printing equipment, from printing.

(2) The waste water may contain only those halogenated solvents that, pursuant to the Second Ordinance on the Execution of the Federal Immission Control Act as last amended, may be used in (chemical) dry-cleaning. This requirement shall be deemed to have been met if proof is provided that only approved halogenated hydrocarbons are used.



(3) The concentration of chromium VI in the waste water may not exceed a level of 0.1 mg/l in the random sample. Article 6 (1) shall not apply.

(4) Proof that the requirements pursuant to paragraph (1) above have been met may be provided by listing the operating and auxiliary substances used in an operating journal and presenting manufacturers' information showing that these do not contain any of the substances or substance groups cited in paragraph (1) above.

## **F Requirements for existing discharges**

For existing discharges of waste water from installations that were lawfully in operation prior to 1 June 2000 or whose construction had lawfully commenced by this date, the following different provisions shall apply:

1. The requirements pursuant to Part D (2) for dye baths with more than 3% extraction dyes and less than 70% fixing rate, and Part E (1) No. 9 shall not apply.
2. Notwithstanding Part D (1), a level of 1 mg/l in the random sample shall apply for AOX.
3. Notwithstanding Part D (1) and (2), a level of 1 mg/l shall apply for copper.

## **Appendix 39 Non-ferrous metal production**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production and casting of the non-ferrous metals lead, copper, zinc, aluminium and the by-products thus incurred, as well as from the production of semi-manufactured goods.

(2) This Appendix shall not apply to waste water from the production of ferro-alloys, the production and casting of non-ferrous metals other than those cited in paragraph (1) above, nor from indirect cooling systems or process water treatment facilities.

### **B General requirements**

The contaminant load must be kept as low as the following measures permit, as revealed by examination of the circumstances of the relevant individual case:

1. Extensive recirculation of wash and cooling water and series connection e.g. of cooling water
2. Multiple use of treated water and use of precipitation water where conditions allow
3. Separation of waste water flows requiring treatment from those not requiring treatment
4. Avoidance of process technologies which incur high volumes of waste water and
5. Use of low-pollutant feedstocks and auxiliary materials.

### **C Requirements for waste water at the point of discharge**

(1) The following requirements shall apply to waste water from the areas cited in Part A, paragraph (1) at the point of discharge into the water body:

		Production and casting of the non-ferrous metals lead, copper, zinc and by-products, as well as production of semi-manufactured goods	Aluminium oxide production	Aluminium smelting	Casting of aluminium and production of semi-manufactured aluminium goods
	Qualified random sample or 2-hour composite sample				
Chemical oxygen demand (COD)	kg/t	1.5	0.5	0.3	0.5
Iron	kg/t	0.1	-	-	-
Total hydrocarbons	kg/t	-	-	0.02	0.05
Aluminium	kg/t	-	0.009	0.02	-
Fluoride	kg/t	-	-	0.3	0.3
Toxicity to fish eggs (T <sub>egg</sub> )		4	-	-	-

(2) The production-specific load levels (kg/t) refer to the production capacity of lead, copper, zinc, aluminium and by-products on which the water discharge licence is based. The contaminant load is calculated from the concentration levels of the qualified random sample or the 2-hour composite sample and the volumetric flow of waste water corresponding to sampling.

#### D Requirements for waste water prior to blending

(1) The following requirements shall apply to waste water from the production and casting of the non-ferrous metals lead, copper, zinc and by-products as well as the production of semi-manufactured goods prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l
Cadmium	0.2
Mercury	0.05
Zinc	1
Lead	0.5
Copper	0.5
Arsenic	0.1
Nickel	0.5
Thallium	1
Total chromium	0.5
Cobalt	1
Silver	0.1
Tin	2
Sulfide, dissolved	1
Adsorbable organically bound halogens (AOX)	1

For sulfide, dissolved and AOX, the levels of the random sample shall apply.

(2) Insofar as the production capacity of lead, copper, zinc and by-products on which the water discharge licence is based exceeds 10 tonnes per day, in addition to the requirements on pollutant concentration cited in paragraph (1) above, those load levels

resulting from application of measures to reduce contaminant loads outlined in Part B shall also apply. In this respect, the following production-specific load levels must not be exceeded:

	Production-specific load g/t
Cadmium	3
Mercury	1
Zinc	30
Lead	15
Copper	10
Arsenic	2
Nickel	15
Total chromium	10

(3) The production-specific load levels (g/t) refer to the production capacity of lead, copper, zinc and by-products on which the licence is based. The contaminant load is calculated from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

(4) Notwithstanding Article 6 (1), the maximum permissible amount by which the level may be exceeded is 50 % for cadmium and mercury.

## E Requirements for waste water at the site of occurrence

(1) Waste water from the production and casting of the non-ferrous metals lead, copper, zinc and by-products and the production of semi-manufactured goods must not exceed a level in the random sample of 0.1 mg/l in the case of chromium VI and a level of 0.1 mg/l in the case of readily released cyanide at the site of occurrence. Article 6 (1) shall not apply.

(2) Waste water from waste air treatment in the chlorine refinement of aluminium may be discharged only subject to the requirement that the use of chlorine and chlorine-releasing substances and of fresh water is kept to a bare minimum. In this respect, the following requirements must be complied with:

Free chlorine	0.5 mg/l	Random sample
Hexachlorobenzene (HCB)	0.003 mg/l	Qualified random sample or 2-hour composite sample
Adsorbable organically bound halogens (AOX)	1 mg/l	Random sample

For hexachlorobenzene, a production-specific load level of 0.3 mg per tonne of chlorinated aluminium (alloy) must be complied with.

## Appendix 40 Metal finishing, metal processing

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from one of the following source categories, including the related pretreatment, intermediate treatment and after-treatment:

1. Electroplating
2. Pickling
3. Anodising
4. Browning
5. Hot-dip zinc coating, hot-dip tinning
6. Hardening
7. Printed circuit board production
8. Battery production
9. Enamelling
10. Mechanical workshops
11. Grinding
12. Paintshops

(2) This Appendix shall not apply to waste water from cooling systems and process water treatment facilities, nor to precipitation water.

## **B General requirements**

The contaminant load shall be kept as low as the following measures permit:

1. Treatment of process baths by means of suitable methods such as membrane filtration, ion exchangers, electrolysis and thermal processes, in order to maximise the service life of the process baths.
2. Retention of bath constituents by means of suitable methods such as low-entrainment transportation of goods, spray protection, optimised bath composition.
3. Multiple use of rinsing water by means of suitable methods such as cascade rinsing and recirculation rinsing technologies using ion exchangers.
4. Recovery or return of suitable bath constituents from rinsing baths into the process baths.
5. Recovery of EDTA (ethylene diamine tetraacetic acid) and its salts from chemical copper baths and associated rinsing baths.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to waste water from one of the source categories specified in Part A, paragraph (1) at the point of discharge into the water body:

Source category	1	2	3	4	5	6	7	8	9	10	11	12
	Qualified random sample or 2-hour composite sample											
Aluminium mg/l	3	3	3	-	-	-	-	-	2	3	3	3
Nitrogen from ammonia compounds mg/l	100	30	-	30	30	50	50	50	20	30	-	-
Chemical oxygen demand (COD) mg/l	400	100	100	200	200	400	600	200	100	400	400	300

Iron mg/l	3	3	-	3	3	-	3	3	3	3	3	3
Fluoride mg/l	50	20	50	-	50	-	50	-	50	30	-	-
Nitrogen from nitrite mg/l	-	5	5	5	-	5	-	-	5	5	-	-
Hydrocarbons mg/l	10	10	10	10	10	10	10	10	10	10	10	10
Phosphorous mg/l	2	2	2	2	2	2	2	2	2	2	2	2
Toxicity to fish eggs (T <sub>egg</sub> )	6	4	2	6	6	6	6	6	4	6	6	6

(2) The requirement for hydrocarbons refers to the random sample.

(3) When electroplating glass, only the requirement for toxicity to fish eggs with a dilution factor  $T_{\text{egg}} = 2$  shall apply.

#### D Requirements for waste water prior to blending

(1) The following requirements apply to waste water from one of the source categories specified in Part A, paragraph (1) prior to blending with another waste water, subject to the provisions of paragraphs (2) to (5) below:

Source category	1	2	3	4	5	6	7	8	9	10	11	12
	Qualified random sample or 2-hour composite sample											
AOX mg/l	1	1	1	1	1	1	1	1	1	1	1	1
Arsenic mg/l	0.1	-	-	-	-	-	0.1	0.1	-	-	-	-
Barium mg/l	-	-	-	-	-	2	-	-	-	-	-	-
Lead mg/l	0.5	-	-	-	0.5	-	0.5	0.5	0.5	0.5	-	0.5
Cadmium mg/l	0.2	-	-	-	0.1	-	-	0.2	0.2	0.1	-	0.2
kg/t	0.3	-	-	-	-	-	-	1.5	-	-	-	-
Free chlorine mg/l	0.5	0.5	-	0.5	-	0.5	-	-	-	0.5	-	-
Chromium mg/l	0.5	0.5	0.5	0.5	-	-	0.5	-	0.5	0.5	0.5	0.5
Chromium VI mg/l	0.1	0.1	0.1	0.1	-	-	0.1	-	0.1	0.1	-	0.1
Cobalt mg/l	-	-	1	-	-	-	-	-	1	-	-	-
Cyanide, readily released mg/l	0.2	-	-	-	-	1	0.2	-	-	0.2	-	-
Copper mg/l	0.5	0.5	-	-	-	-	0.5	0.5	0.5	0.5	0.5	0.5
Nickel mg/l	0.5	0.5	-	0.5	-	-	0.5	0.5	0.5	0.5	0.5	0.5
Mercury mg/l	-	-	-	-	-	-	-	0.05	-	-	-	-
kg/t	-	-	-	-	-	-	-	0.03	-	-	-	-
Selenium mg/l	-	-	-	-	-	-	-	-	1	-	-	-
Silver mg/l	0.1	-	-	-	-	-	0.1	0.1	-	-	-	-
Sulfide mg/l	1	1	-	1	-	-	1	1	1	-	-	-
Tin mg/l	2	-	2	-	2	-	2	-	-	-	-	-
Zinc mg/l	2	2	2	-	2	-	-	2	2	2	2	2

(2) The requirements for AOX and free chlorine, as well as all requirements for batch installations, refer to the random sample. In the case of chemical-reductive nickel separation, a level of 1 mg/l shall apply for nickel.

(3) For electroplating glass, only the requirements for copper and nickel shall apply.

(4) A cadmium level of 0.1 mg/l shall apply to the production of primary cells (source category 8).

(5) The AOX requirements in the source categories electroplating and mechanical workshops shall be deemed to have been met, provided

1. The hydraulic oils, greasing agents and water displacers used in production do not contain any organic halogen compounds

2. The hydrochloric acid used in production and in waste water treatment does not display any greater contamination with organic halogen compounds and chlorine than is permitted under DIN 19610 (November 1975 edition) for hydrochloric acid for the treatment of process water.

3. The iron and aluminium salts used in waste water treatment do not display an organic halogen compound load of more than 100 milligrams in relation to one kilogram of iron or aluminium in the treatment agents used.

4. After investigating feasibility in each individual case

a) Cyanide baths are replaced by cyanide-free baths

b) Cyanides are detoxified without the use of sodium hypochlorite and

c) Only cooling lubricants are used which do not contain any organic halogen compounds.

(6) The requirements given as production-specific load levels in the table under paragraph (1) above, column 1 for cadmium and column 8 for cadmium and mercury refer to the respective quantity of cadmium or mercury used. They shall also be deemed to have been met, provided the requirements pursuant to Part B and Part E, paragraphs (2) or (4) and the respective concentration levels for cadmium or mercury given in columns 1 and 2 of the table in paragraph (1) above are not exceeded.

## **E Requirements for waste water at the site of occurrence**

(1) The waste water must only contain those halogenated solvents authorised for use in accordance with the Second Ordinance for the Implementation of the Federal Immission Control Act as last amended. This requirement shall also be deemed to have been met, provided evidence is furnished that only permitted halogenated solvents have been used. Otherwise, for volatile halogenated hydrocarbons (sum of trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, dichloromethane - calculated as chlorine), a level of 0.1 mg/l must be complied with in the random sample.

(2) For waste water containing mercury, a level of 0.05 mg/l mercury in the qualified random sample or 2-hour composite sample must be complied with.

(3) The waste water from degreasing baths, demetallising baths and nickel baths must not contain any EDTA.

(4) For waste water from baths containing cadmium, including rinsing, a level of 0.2 mg/l cadmium in the qualified random sample or 2-hour composite sample must be complied with.

(5) The site of occurrence of the waste water is the outlet from the pre-treatment plant for the parameter in question.

**Appendix 41**  
**Production and processing of glass and artificial mineral fibres**

**A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production and processing of glass and artificial mineral fibres, including machining.

(2) This Appendix shall not apply to waste water from indirect cooling systems and process water treatment facilities, nor from the electroplating of glass and mechanical machining of optical glasses at the point of sale for the purpose of adapting to spectacle frames.

**B General requirements**

The waste water must not contain any halogenated hydrocarbons originating from auxiliary materials and additives such as cooling lubricants. Evidence that the water does not contain any halogenated hydrocarbons may be furnished by presenting manufacturers' information showing that the input or auxiliary materials used do not contain any halogenated hydrocarbons.

**C Requirements for waste water at the point of discharge**

The following requirements apply to waste water at the point of discharge into the water body:

	Random sample mg/l	Qualified random sample or 2-hour composite sample mg/l
Substances removable by filtration	30	-
Chemical oxygen demand (COD)	-	130
Sulfate	-	3000
Fluoride	-	30

**D Requirements for waste water prior to blending**

(1) The following requirements apply to waste water from mechanical machining in the area of lead glass, special glass, optical glass and plate glass prior to blending with other waste water:

1. Waste water should be recirculated, unless incurred during the operation of manual grinding equipment. Waste water must only be discharged where absolutely necessary, in the case of closed cycles as a result of entrainment and splashing, or in the case of complete renewal of the cycle due to longer periods of shutdown (e.g. annual holiday closure), maintenance, cleaning and production changeovers, or in cases where circulation is impossible due to harmful effects on the machinery, in the case of burning off and grinding machines. Where water is discharged, the following requirements shall apply:

	Qualified random sample or 2-hour composite sample mg/l
Arsenic	0.3
Antimony	0.3
Barium	3
Lead	0.5

2. Where auxiliary materials or additives are used which contain one or more of the heavy metals listed below, then the following requirements shall apply to the waste water:

	Qualified random sample or 2-hour composite sample mg/l
Copper	0.5
Nickel	0.5
Total chromium	0.5
Cadmium	0.1

3. In the case of discharge volumes of less than 8 cubic metres of waste water per day, the concentration levels in number 1 for arsenic, antimony, barium and lead and the heavy metals cited in number 2, as well as the substances removable by filtration listed in Part C, shall also be deemed to have been met if a waste water treatment plant authorised by a general building-inspectorate approval or otherwise in accordance with *Land* law is installed, operated and maintained as per the licensing terms, and is checked both prior to commissioning and at regular intervals not exceeding five years, in accordance with *Land* law, in order to verify that it is proper working order.

(2) The following requirements shall apply to waste water from chemical surface treatment in the area of lead glass, special glass and optical glass prior to blending with other waste water:

1. For lead and arsenic, a load level of 50 g/t shall apply in each case, with reference to the use of hydrofluoric acid (HF).

2. For plants with an acid consumption of less than 1 t HF (100%) per 4 week period, a load level of 250 g/t of HF used shall apply both to lead and to arsenic.

3. The requirements pursuant to numbers 1 and 2 refer to the contaminant concentration in the qualified random sample or 2-hour composite sample (C) in grams per cubic metre, a waste water volume over the 4 weeks prior to sampling (Q) in cubic metres, a hydrofluoric acid input over the 4 weeks preceding sampling (HF) in tonnes, and an acid concentration given as a percentage (P). The specific contaminant load (F) is calculated using the following formula:

$$F = (C \times Q \times 100) / (HF \times P)$$

4. For barium, a concentration level of 3 mg/l in the qualified random sample or 2-hour composite sample shall apply.



5. Where auxiliary materials or additives are used which contain one or more of the heavy metals cited below, then the following requirements shall apply to the waste water:

	Qualified random sample or 2-hour composite sample mg/l
Copper	0.5
Nickel	0.5
Total chromium	0.5
Cadmium	0.1

(3) For waste water from the silver- and copper-plating of plate glass (mirror manufacturing), a level of 6 mg/m<sup>2</sup> copper, 3 mg/m<sup>2</sup> silver and 30 mg/m<sup>2</sup> zinc shall apply, each in relation to the hourly production capacity of glass in square metres. The production-specific load levels refer to the production capacity on which the water discharge licence is based. The hourly contaminant load is calculated from the contaminant concentration (qualified random sample or 2-hour composite sample) and the hourly volumetric flow of waste water.

#### **E Requirements for waste water at the site of occurrence:**

(1) The waste water must not contain:

1. Grinding sludge from mechanical machining in the areas of lead glass, special glass, optical glass and plate glass, nor caustic sludge from chemical surface treatment in the areas of lead glass, special glass and optical glass.
2. Sludge containing silver and copper from the silver and copper-plating of plate glass.

(2) In the case of chemical surface treatment in the areas of lead glass, special glass and optical glass, no waste water must be incurred as a result of waste gas scrubbing.

## **Appendix 42 Chloralkali electrolysis**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from chloralkali electrolysis.

(2) This Appendix shall not apply to waste water from cooling systems or process water treatment facilities, nor from fused-salt electrolysis of sodium chloride or chloralkali electrolysis for the production of alcoholates.

### **B General requirements**

As far as technical factors allow, waste water from the chloralkali electrolysis unit shall be returned to the production process.

### C Requirements for waste water at the point of discharge

The following requirements apply to waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	50
Toxicity to fish eggs ( $T_{egg}$ )		2

### D Requirements for waste water prior to blending

No requirements are placed on waste water prior to blending with other waste water.

### E Requirements for waste water at the site of occurrence

(1) The waste water must not contain any mercury or asbestos used as feedstocks or auxiliary materials in the production process. These requirements shall also be deemed to have been met, provided mercury and asbestos are not used as feedstocks or auxiliary materials in the production process in the "chloralkali electrolysis" unit.

(2) The waste water must not contain more than 2.5 mg/l AOX and 0.2 mg/l free chlorine in the random sample.

### F Requirements for existing discharges

#### I. Existing discharges from plants based on the mercury-cell process

(1) In derogation of Part C, the following requirements shall apply to waste water from plants based on the mercury-cell process at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand	mg/l	50
Total mercury	mg/l	0.05
	g/t	0.3
Sulfide	mg/l	1
Toxicity to fish eggs ( $T_{egg}$ )		2

(2) In derogation of Part D, the following requirements shall apply to waste water from the chloralkali electrolysis unit based on the mercury-cell process prior to blending with other waste water:

Total mercury	0.04 g/t	Qualified random sample or 2-hour composite sample
AOX	3.5 mg/l	Random sample

(3) The requirements for mercury given as production-specific load levels refer to the chlorine production capacity in 24 hours.

(4) Part E shall not apply.

## II. Existing discharges from plants based on the diaphragm cell process

(1) In derogation of Part C, the following requirements shall apply to waste water from plants based on the diaphragm cell process at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	130
Toxicity to fish eggs ( $T_{\text{egg}}$ )		2

(2) In derogation of Part D, the following requirements shall apply to waste water from the chloralkali electrolysis unit based on the diaphragm cell process prior to blending with other waste water:

AOX	3 mg/l	(Random sample).
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(3) Part E shall not apply.

## Appendix 43 Production of chemical fibres, films and sponge cloth based on the viscose process and of cellulose acetate fibre

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from one or more of the following manufacturing sectors, including the associated preliminary stages:

1. Viscose continuous filament yarn
2. Artificial sausage skin and sponge cloth based on viscose
3. Cellophane
4. Cellulose acetate fibre.

(2) This Appendix shall not apply to waste water from indirect cooling systems and process water treatment facilities.

### B General requirements

(1) The waste water may only be discharged provided its contaminant load is kept as low as the following measures permit, after having examined the available options in each individual case:

1. The use of water-saving techniques during washing and purification processes (e.g. package-washing, tow-washing, filtration cloth washing), such as countercurrent washing and recirculation.
2. Condensation of exhaust steam (e.g. during spinning bath preparation) via indirect cooling or via cooling tower circulation.
3. The use of waste water-free techniques to generate a vacuum.
4. The reduction of spinning bath losses (e.g. during trough washing)
5. The reprocessing and recirculation of excess lye
6. The recovery and reuse of acetic acid and acetone in the manufacture of cellulose acetate fibres
7. The use of cellulose whose content of organically bonded halogens, measured as AOX (in accordance with DIN 38414, part 18 [November 1989 edition]), does not exceed 150 g per tonne of cellulose
8. The use of bleaching liquor which does not contain any chlorine or chlorine-releasing agents
9. The use of preparations which achieve a dissolved organic carbon (DOC) elimination level of 80 % after 7 days, in accordance with number 408 of the Annex "Analysis and measurement procedures", or the retention, recycling, separate disposal or treatment of unused preparations from the application onto fibres or films from the formulation station and from the supply lines.

(2) Evidence that the requirement concerning leaching liquors has been met may be furnished by listing the leaching liquors used in an operating journal and keeping records of their usage, and presenting manufacturers' information showing that the bleaching liquors do not contain any chlorine or chlorine-releasing agents.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to waste water from one of the areas cited in Part A, paragraph (1) at the point of discharge into the water body:

Areas		1	2	3	4
		Qualified random sample or 2-hour composite sample			
Chemical oxygen demand (COD)	kg/t	20	20	50	2
5-day biochemical oxygen demand (BOD <sub>5</sub> )	mg/l	25	25	25	25
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	mg/l	10	50	10	10
Total phosphorous	mg/l	2	2	2	2
Sulfide	mg/l	0.3	0.3	0.3	-
Toxicity to fish eggs (T <sub>egg</sub> )		2	2	2	2

(2) The production-specific load levels for COD (kg/t) refer to the production capacity of the organic target products on which the water discharge licence is based. The contaminant load is determined from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

## D Requirements for waste water prior to blending

(1) The following requirements apply to waste water from one of the areas cited in Part A, paragraph (1) prior to blending with other waste water:

Manufacturing areas		1	2	3	4
		Qualified random sample or 2-hour composite sample			
Zinc	mg/l	1	-	-	-
Copper	g/t	-	-	-	7
Adsorbable organically bound halogens (AOX)	g/t	40	30	30	8

(2) For AOX, the values for the random sample shall apply.

(3) For waste water from package-washing, tow-washing, spinning and spinning bath preparation, a production-specific load for zinc of 8 kg/t in the qualified random sample or 2-hour composite sample shall apply to the manufacture of viscose continuous filament yarn.

(4) The production-specific load levels (g/t; kg/t) shall apply to the production capacity of the organic target products on which the water discharge licence is based. The contaminant load is determined from the concentration levels of the qualified random sample or 2-hour composite sample, in the case of AOX from the random sample, and from the volumetric flow of waste water corresponding to sampling.

## E Requirements for waste water at the site of occurrence

The waste water from scouring and rinsing baths must only contain organic complexing agents which achieve 80 % DOC degradation after 28 days, in accordance with number 406 in the Annex "Analysis and measurement procedures".

## F Requirements for existing discharges

For existing discharges of waste water from package-washing, tow-washing, spinning and spinning-bath preparation for the manufacture of viscose continuous filament yarn, in derogation of Part D, a production-specific load level of 12 kg/t zinc in the qualified random sample or 2-hour composite sample shall apply to the manufacturing technique with integral thread washing in the spinning machine.

# Appendix 45 Petroleum refining

## A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the refining of petroleum (crude oil) and related products in refineries. This shall also include refineries with the partial or sole production of lubricating oil.

(2) This Appendix shall not apply to waste water from the manufacture of hydrocarbons, or from indirect cooling systems or process water treatment facilities.

**B General requirements**

No requirements above and beyond Article 3 are imposed.

**C Requirements for waste water at the point of discharge**

(1) The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
Chemical oxygen demand (COD)	80
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	40
Total phosphorous	1.5
Total hydrocarbons	2

(2) For COD, a concentration of 100 mg/l in the qualified random sample or 2-hour composite sample is admissible, provided the COD load is reduced by at least 80 % at a central waste water treatment plant. The reduction in the COD load refers to the ratio between the COD load in the effluent from the gravity-type oil-water separator and that in the effluent from the biological waste water treatment plant over a representative period of time not exceeding 24 hours.

(3) A higher concentration for total nitrogen is admissible, provided the nitrogen load is reduced by at least 75 % at a central waste water treatment plant. The reduction in the nitrogen load refers to the ratio between the nitrogen load in the effluent from the gravity-type oil-water separator and that in the effluent from the biological waste water treatment plant over a representative period of time not exceeding 24 hours. Total bonded nitrogen (TN<sub>b</sub>) shall be used as a basis for the loads.

(4) In addition to the requirements pursuant to paragraphs (1) to (3) above, the contaminant loads should be specified which result from the concentration levels specified therein and a specific waste water volume of 0.5 m<sup>3</sup>/t of input product. For the production of lubricating oil, a specific waste water volume of 1.3 m<sup>3</sup>/t of input product should be used as a basis.

**D Requirements for waste water prior to blending**

(1) The following requirements apply to the waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l
Phenol index after distillation and dye extraction	0.15

Adsorbable organically bound halogens (AOX)	0.1
Sulfide sulphur and mercaptan sulphur	0.6
Cyanide, easily released	0.1

The requirements for AOX and cyanide apply to the random sample.

(2) In addition to the requirements pursuant to paragraph (1) above, loads should be specified obtained from the concentration levels specified therein and a specific waste water volume of 0.5 m<sup>3</sup>/t of input product. For the manufacture of lubricating oil, a specific waste water volume of 1.3 m<sup>3</sup>/t of input product should be used as a basis.

## E Requirements for waste water at the site of occurrence

For waste water from deparaffinisation, a level of 0.5 mg/l for adsorbable organic halogens (AOX) in the random sample must be complied with.

## Appendix 46 Coal coking

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from coal coking.

(2) This Appendix shall not apply to waste water from the processing of coal chemicals such as tar, phenolate lye, crude phenol oil and crude benzene, coke quenching, nor from indirect cooling systems and process water treatment facilities.

### B General requirements

No requirements above and beyond Article 3 are imposed.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to waste water at the point of discharge:

	Qualified random sample or 2-hour composite sample	
	(g/t)	(mg/l)
5-day biochemical oxygen demand (BOD <sub>5</sub> )	9	-
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	9	-
Total bonded nitrogen (TN <sub>b</sub> )	12	-
Total phosphorous	-	2

(2) For chemical oxygen demand (COD), an effluent level in the qualified random sample or 2-hour composite sample should be specified which is equivalent to a reduction in COD of at least 90 %. The reduction refers to the ratio between the COD load in the influent and that in the effluent of the waste water treatment facility over a representative period of time not exceeding 24 hours.

(3) The production-specific load levels (g/t) refer to the coking capacity on which the water discharge licence is based, expressed as the quantity of input coal with a proportion by mass of water of 10 % in 2 hours. If coal with a lower water content is used, then the coking capacity shall be converted to this water content. The contaminant load is calculated from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

#### **D Requirements for waste water prior to blending**

(1) The following requirements apply to the waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample	
Benzene and derivatives	g/t	0.03
Sulfide	g/t	0.03
Polycyclic aromatic hydrocarbons (PAH)	g/t	0.015
Phenol index after distillation and dye extraction	g/t	0.15
Cyanide, easily released	g/t	0.03
Toxicity to fish eggs ( $T_{\text{egg}}$ )		2

(2) The requirements for the parameters phenol index, cyanide, easily released and toxicity to fish eggs ( $T_{\text{egg}}$ ) shall not apply if the waste water is additionally treated together with other waste water in a biological sewage treatment plant prior to discharge into a water body and meets the requirements of Appendix 1, Part C for the size category 4 after treatment.

(3) The production-specific load levels (g/t) refer to the coking capacity on which the water discharge licence is based, expressed as the quantity of input coal with a proportion by mass of water of 10 % in 2 hours. If coal with a lower water content is used, then the coking capacity shall be converted to this water content. The contaminant load is calculated from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

### **A p p e n d i x 47**

#### **Scrubbing of flue gases from firing systems**

##### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in scrubbing of flue gases from firing systems.

(2) This Appendix shall not apply to waste water from other industrial waste-gas-scrubbing systems, from cooling circuits of power stations and industrial processes, from other sources in steam generation and from scrubbing of flue or waste gases from incineration and co-incineration of waste.



## B General requirements

No requirements above and beyond Article 3 are imposed.

## C Requirements for waste water at the point of discharge

The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
Substances removable by filtration	30
Chemical oxygen demand (COD)	
- Use of burnt lime	80
- Use of limestone	150
sul fate	2000
Sulfite	20
Fluoride	30
Toxicity to fish eggs ( $T_{\text{egg}}$ )	2

(2) In derogation of Article 6 (3), the chemical oxygen demand (COD) level shall also be deemed to have been met if the triple amount of total organically bonded carbon (TOC), specified in milligrams per litre, does not exceed this level. The requirements for the chemical oxygen demand shall apply after deduction of the initial COD contamination introduced with the process water.

(3) In derogation of Article 6 (1), the maximum amount by which any parameter may be exceeded is 50%.

## D Requirements for waste water prior to blending

(1) The following requirements shall apply to the waste water prior to its blending with other waste water:

	Qualified random sample or 2-hour composite sample		
	Concentration (mg/l)	Hard-coal-fired power stations Milligrams of contaminant load per kilogram of chloride	Lignite-fired power stations Contaminant load, in grams per hour and per 300 MW of installed electrical output
Cadmium	0.05	1.8	0.1
Mercury	0.03	1.1	0.1
Chromium	0.5	18	1
Nickel	0.5	18	1
Copper	0.5	18	1
Lead	0.1	3.6	0.2
Zinc	1.0	36	2
Sulfide	0.2	7.2	0.4

(2) For hard-coal-fired power stations, the chloride reference level for the contaminant load shall be calculated from the following data upon which the water discharge permit is

to be based: rate of hard-coal firing at full load (t/h), and chloride content in the hard coal used. If the waste-water chloride concentration caused by the process water exceeds a value of 2 g/l, then the chloride content above this level is to be added, as a contaminant load, to the chloride load calculated for the fired hard coal.

## **Appendix 48**

### **Use of certain hazardous substances**

#### **Part 1 Scope of application**

(1) This Appendix serves to implement Council Directives 76/464/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC, 87/217/EEC, 88/347/EEC and 92/112/EEC, as well as the obligations of the contracting states pursuant to the amendment to Appendix IV of 10 July 1990 of the Agreement on the Protection of the Rhine Against Contamination. It shall apply to waste water whose contaminant load originates primarily from the use of substances listed in this Appendix.

(2) "Use" shall refer to any industrial process whereby the substances or compounds listed in this Appendix are manufactured or used, or any other industrial process in which these substances occur.

(3) This Appendix shall not apply in cases where its application is explicitly precluded or another Appendix is applicable and the requirements specified therein are equally stringent as, or more stringent than, those of this Appendix.

#### **Part 2 General provisions**

(1) For production areas where a substance load is specified over 24 hours, a substance load may also be specified with reference to the 2-hour composite sample or qualified random sample and the volumetric flow of waste water over 24 hours preceding sampling. In such cases, the double load level and the substance concentration for the 2-hour composite sample or qualified random sample derived from the double load level in 24 hours and the production-specific volumetric flow of waste water over 24 hours shall apply.

(2) For those production areas not cited where waste water is incurred with the specified substances or its compounds, individual requirements for the concentration and load shall be drawn up on the basis of Article 7a (1) of the Federal Water Act. If the conditions in such areas are comparable to those of the areas specified, corresponding requirements shall be drawn up.

(3) The requirements refer to the waste water in the effluent from the plant or operating unit in which the substances or their compounds are used, prior to blending with other waste water. If the waste water is treated outside of the plant or operating unit in a waste water treatment plant designed to treat waste water contaminated with the specified substances or their compounds, then the levels stated shall refer to the waste water in the effluent from this waste water treatment plant.

### Part 3 Requirements for mercury from plants other than chloralkali electrolysis

(1) Subject to the provisions of paragraphs (2) to (5) below, a requirement of 0.05 mg/l in the 2-hour composite sample or qualified random sample shall apply to mercury (Hg).

(2) For the use of catalysts containing mercury, a requirement of 0.1 g/t of production capacity shall apply to vinyl chloride production, and a requirement of 5 g/kg of mercury used in other branches of production.

(3) For the production of catalysts containing mercury for use in vinyl chloride production, a requirement of 0.7 g/kg of mercury used shall apply.

(4) For the production of mercury compounds other than the products cited in paragraph (3) above, a requirement of 0.05 g/kg of mercury used shall apply.

(5) The requirements cited in paragraphs (2) to (4) above refer to the usage capacity for mercury over 24 hours on which the water discharge licence is based.

### Part 4 Requirements for cadmium

(1) A requirement of 0.2 mg/l in the 2-hour composite sample or qualified random sample shall apply to cadmium (Cd). The first sentence above shall not apply to the production of phosphoric acid and phosphate fertilisers from phosphorous minerals.

(2) In addition, the following requirements shall apply:

	Cadmium (kg/t)
Production of cadmium compounds	0.5
Pigment production	0.15
Production of stabilisers	0.5

The requirements refer to the usage capacity for cadmium over 24 hours on which the water discharge licence is based.

### Part 5 Requirements for hexachlorocyclohexane

(1) The following requirements shall apply to hexachlorocyclohexane (HCH):

	HCH (g/t)
Production of HCH	2
Extraction of lindane	4
Production of HCH and extraction, combined	5

The requirements refer to the usage capacity for HCH over 24 hours on which the water discharge licence is based. The requirements shall also apply if lindane formulation is performed directly with the production of HCH or extraction of lindane. If only lindane is formulated, no waste water must be incurred.

(2) HCH comprises the isomers of 1,2,3,4,5,6-hexachlorocyclohexane.

## Part 6 Requirements for DDT, pentachlorophenol

(1) Waste water arising during the production, use and formulation of DDT (including dicofol), pentachlorophenol and its salts must not be discharged into water bodies.

(2) The following compounds shall be defined as "DDT":

1. The sum of the isomers 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane
2. The chemical compound 1,1,1-trichloro-2-(o-chlorophenyl)-2-(p-chlorophenyl)ethane
3. The chemical compound 1,1-dichloro-2,2-bis-(p-chlorophenyl)ethylene and 1,1-dichloro-2,2-bis-(p-chlorophenyl)ethane

(3) Dicofol is the chemical compound 2,2,2-trichloro-1,1-bis-(4-chlorophenyl) ethanol.

(4) Pentachlorophenol (PCP) is the chemical compound 2,3,4,5,6-pentachloro-1-hydroxybenzene and its salts.

## Part 7 Requirements for endosulphane

(1) The following requirements shall apply to endosulphane:

	Endosulphane	
	g/t	µg/l in the random sample
Production and formulation of endosulphane in the same plant	0.23	15
Formulation of endosulphane	0.03	30

The production-specific load levels refer to the production capacity for the use of endosulphane over 0.5 or 2 hours on which the water discharge licence is based, with reference to the random sample and the volumetric flow of waste water over 24 hours corresponding to sampling.

(2) Endosulphane is the chemical compound (C<sub>9</sub>H<sub>6</sub>Cl<sub>6</sub>O<sub>3</sub>S<sub>9</sub>) 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexa-hydro-6,9-methano-2,3,4-benzo- (e)-dioxathiepin-3-oxide.

## Part 8 Requirements for aldrin, dieldrin, endrin, isodrin

(1) A production-specific load level of 3 g/t for the sum of the following substances shall apply to the use of: aldrin, dieldrin and endrin, including the formulation of these substances. This level refers to the total usage capacity for aldrin, dieldrin and endrin over 24 hours on which the water discharge licence is based. If the waste water also contains isodrin, then the requirement shall apply to the sum of the substances aldrin, dieldrin, endrin and isodrin.

(2) Aldrin is the chemical compound (C<sub>12</sub>H<sub>8</sub>Cl<sub>6</sub>), 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4-endo-5,8-exo-dimethanonaphthaline.

(3) Dieldrin is the chemical compound (C<sub>12</sub>H<sub>8</sub>Cl<sub>6</sub>O), 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-5,8-exodimethanonaphthaline.

(4) Endrin is the chemical compound (C<sub>12</sub>H<sub>8</sub>Cl<sub>6</sub>O), 1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo-5,8-endo-dimethanonaphthaline.

(5) Isodrin is the chemical compound (C<sub>12</sub>H<sub>8</sub>Cl<sub>6</sub>O), 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4-endo-5,8-exo-dimethanonaphthaline.

## Part 9 Requirements for asbestos

(1) Waste water from the production of asbestos cement, asbestos paper and board must not be discharged into water bodies. The provisions of the Ordinance on Dangerous Substances shall remain unaffected.

(2) The following silicates with a fibrous structure shall be classified as asbestos:

1. Crocidolite (cape blue)
2. Actinolite
3. Anthophyllite
4. Chrysotile (Canadian asbestos)
5. Amosite
6. Tremolite

## Part 10 Requirements for organohalogen compounds

(1) The provisions of this part apply to the following individual substances:

1. Tetrachloromethane (carbon tetrachloride) (CCl<sub>4</sub>)
2. Hexachlorobenzene (HCB)
3. Hexachlorobutadiene (HCBD)
4. Trichloromethane (chloroform) (CHCl<sub>3</sub>)
5. Trichloroethane (TRI)
6. Tetrachloroethylene (perchloroethylene) (PER)
7. 1,2 dichloroethane (EDC)
8. Trichlorobenzene (TCB).

(2) The following requirements apply to the substances listed in paragraph (1) above:

Production area	CHCl <sub>3</sub> g/t	CCl <sub>4</sub> g/t	HCB g/t	HCBD g/t	TRI g/t	PER g/t	EDC g/t	TCB g/t
Production of chloromethane via methane chlorination (including high-pressure chlorolysis processes) and methanol esterification	7.5	10	-	-	-	-	-	-
Production of tetrachloroethylene (perchloroethylene) (PER) and tetrachloromethane (CCl <sub>4</sub> ) via perchlorination	-	2.5	1.5	1.5	-	2.5	-	-
Production of hexachlorobenzene and subsequent processing of hexachlorobenzene	-	-	10	-	-	-	-	-
Production of tetrachloroethylene								

(perchloroethylene) (PER) and trichloroethene (TRI)	-	-	-	-	2.5	2.5	-	-
Production of 1,2 dichloroethane (EDC)	-	-	-	-	-	-	2.5	-
Production of 1,2 dichloroethane (EDC) and subsequent processing and use, excluding the production of ion exchangers	-	-	-	-	-	-	5	-
Processing of 1,2 dichloroethane (EDC) into substances other than vinyl chloride (VC)	-	-	-	-	-	-	2.5	-
Production of trichlorobenzene (TCB) via dehydrochlorination of HCH and/or processing of TCB	-	-	-	-	-	-	-	10
Production and/or processing of chlorobenzene via chlorination of benzene	-	-	-	-	-	-	-	0.5

(3) If the water discharge licence specifies a substance load relating to the qualified random sample and relating to the volumetric flow of waste water in the 24 hours preceding sampling, for the production of chloromethane via methane chlorination and methanol esterification, a load level of 10 should be used as a basis instead of 7.5 g/t  $\text{CHCl}_3$ . The requirements refer to the production capacity for the substances listed in paragraph (1) above over 24 hours on which the water discharge licence is based.

#### Part 11 Requirements for titanium dioxide

(1) The provisions in this part apply to waste water whose contaminant load originates primarily from the production of titanium dioxide pigments. These shall not apply for waste water from production of titanium dioxide micro-rutiles or from indirect cooling systems and from process water treatment facilities.

(2) The waste water must not be discharged unless targeted pollutant reduction for the substances iron, titanium and vanadium has been implemented.

(3) The waste water must not contain solid waste, highly acidic waste or treated waste as defined in Article 2 of Council Directive 92/112/EEC of 15 December 1992 on procedures for harmonizing the programmes for the reduction and eventual elimination of pollution caused by the titanium oxide industry (Official Journal of the EC No. L 409, page 11).

(4) The following requirements shall apply to the waste water at the point of discharge into the water body:

		Chloride method	Sulfate method	
			Stepped seeding technique	Combined seeding technique
		Qualified random sample or 2-hour composite sample		
Chemical oxygen demand (COD)	kg/t	8	8	8

Chloride				
- when using natural rutile	kg/t	130		
- when using synthetic rutile	kg/t	228		
- when using slags	kg/t	450	70	165
Sulfate	kg/t	-	500	500
Toxicity to fish eggs ( $T_{\text{egg}}$ )		2	2	2

The requirements for chloride in the "chloride method" column shall apply only to the chloride method within the meaning of Article 6, letter b, of the Directive cited in paragraph (3) above. If metal chloride or hydrochloric acid is produced as a by-product, the permitted chloride levels shall be reduced by the relevant chloride load from such production. If more than one charge material is used, the chloride-load levels shall apply in proportion to the amount of charge materials used.

(5) The following requirements shall apply to the waste water prior to its blending with other waste water:

		Chloride method	Sulfate method
		Qualified random sample or 2-hour composite sample	
Lead	kg/t	0.005	0.03
Cadmium	g/t	0.2	2
Total chromium	kg/t	0.01	0.05
Copper	kg/t	0.01	0.02
Nickel	kg/t	0.005	0.015
Mercury	g/t	0.1	1.5

In the case of the sulfate method, a concentration of 0.5 mg/l for total chromium may also be permitted in the water discharge license.

(6) The production-specific requirements (g/t; kg/t) pursuant to paragraphs (4) and (5) refer to the production capacity on which the water discharge license is based. The contaminant load is calculated from the concentration levels of the qualified random sample or 2-hour composite sample and from the volumetric flow of waste water corresponding to sampling.

## Appendix 49

### Waste water containing mineral oil

#### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from facilities in which waste water containing mineral oil is produced regularly in degreasing, cleaning, maintenance, repair and recycling disassembly of vehicles and vehicle parts.

(2) This Appendix shall not apply to waste water from

1. Treatment of bilge, slop and ballast water from ships,
2. Metal finishing and processing and from paint shops,
3. Cleaning of the interiors of transport containers.

#### B General requirements

(1) The contaminant load must be kept as small as is possible by means of the following measures:

1. The largest-possible degree of recycling of wash water in automated vehicle-washing facilities,
2. Avoidance of additional waste-water contaminants by means of measures to reduce the growth of micro-organisms in water-circulation systems.

(2) Above and beyond the requirements of paragraph (1) above, the contaminant load must be kept low by means of the following measures, in keeping with the circumstances of the relevant individual case:

1. Waste-water-free operation of the workshop,
2. Recycling of wash water from cleaning of vehicle parts and from degreasing,
3. Minimisation of mineral-oil contamination of rain/snow water,
4. Discharge of waste water, from water-circulation systems of automated vehicle-washing facilities, only from water seals.

(3) The waste water may not contain

1. Organic complexing agents that do not attain an 80 percent degree of DOC elimination after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures",
2. Organically bonded halogens originating in washing and cleansing agents or other operating and auxiliary substances.

Proof that the requirements have been met may be provided by listing all relevant washing and cleansing agents or other operating and auxiliary substances used in an operating journal and presenting manufacturers' information showing that these do not contain any of the cited washing and cleansing agents or substances or substance groups.



### C Requirements for waste water at the point of discharge

The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample (mg/l)
Chemical oxygen demand (COD)	150
5-day biochemical oxygen demand (BOD <sub>5</sub> )	40

### D Requirements for waste water prior to blending

No additional requirements shall apply to the waste water prior to its blending with other waste water.

### E Requirements for waste water at the site of occurrence

(1) For total hydrocarbons in the waste water, the random sample must show a level of no more than 20 mg/l. This requirement shall not apply in cases in which less than 1 m<sup>3</sup> of waste water is produced per day.

(2) The requirement of paragraph (1) first sentence above, shall also be deemed to have been met if a waste water treatment plant, authorised by a general building-inspectorate permit for facilities for limiting hydrocarbons in waste water containing mineral oil, or otherwise in accordance with *Land* law, is installed, operated and maintained as per the licensing terms, and is checked both prior to commissioning and at regular intervals not exceeding five years, in accordance with *Land* law, in order to verify that it is proper working order.

(3) The only waste water that may be diverted from systems for separating light liquids is waste water that contains easily separable detergents and cleansing agents or instable emulsions that do not impair the system's cleaning performance. "Easily separable" within the meaning of this Appendix applies to cleansing agents that, in conjunction with light liquids, form temporarily stable or instable emulsions, i.e. that de-emulgate following the cleaning process.

(4) The requirement of paragraph (1) first sentence above shall also be deemed to have been met for waste water from automatic vehicle-washing systems, if the excess water is diverted from the water seal of the circulation system.

(5) The site of waste-water occurrence is the effluent of the pre-treatment system for the waste water containing hydrocarbons.

### F Requirements for existing discharges

For existing discharges of waste water from installations that were lawfully in operation prior to 1 June 2000 or whose construction had lawfully commenced by this date, the following different provisions shall apply:

1. The requirement for the contaminant load pursuant to Part B (1) No.1 shall apply following review of the available possibilities in the relevant individual case.
2. For waste water from automatic vehicle-washing systems, the standard for total hydrocarbons, pursuant to Part E (1), shall be deemed to have been met.
3. In calculation of waste water production pursuant to Part E (1) second sentence, waste water from automatic vehicle-washing systems shall not be considered.

## **Appendix 50** **Dental treatment**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from treatment stations in dental practices and dental clinics where amalgam is incurred.

(2) This Appendix shall not apply to waste water from film development nor to sanitary waste water.

### **B General requirements**

No requirements above and beyond Article 3 are imposed.

### **C Requirements for waste water at the point of discharge**

No additional requirements are placed on the waste water at the point of discharge into the water body.

### **D Requirements for waste water prior to blending**

No additional requirements are placed on the waste water prior to blending with other waste water.

### **E Requirements for waste water at the site of occurrence**

(1) The amalgam load of the raw waste water from treatment stations shall be reduced by 95 % at the site of occurrence of the waste water.

(2) The requirement pursuant to paragraph (1) above shall be deemed to have been met, provided if

1. an amalgam separator authorised by a building inspectorate approval, or in accordance with *Land* law, is built into the waste water outlet from the treatment stations upstream from the point of blending with other sanitary waste water and is operational and achieves a separation efficiency of at least 95%,

2. Waste water incurred when handling amalgam is routed via the amalgam separator

3. Techniques are employed to extract the waste water from the treatment stations which reduce the use of water to such an extent that the amalgam separator is able to maintain its prescribed level of efficiency.
4. The amalgam separator is regularly serviced and emptied as per the licensing terms and written records to this effect (service report, certificate of acceptance for separated material) are kept.
5. In accordance with *Land* law, the amalgam separator is checked to ensure that it is in proper working order, both prior to commissioning and at intervals of no more than 5 years.

## **F Requirements for existing discharges**

No deviating requirements are placed on existing discharges.

## **G Waste law requirements**

The separated amalgam shall be collected in a suitable container and, above and beyond the requirements of Part E, shall be recycled in accordance with the valid hygiene provisions and also, where the separated material is waste as per the definition of the Closed Substance Cycle and Waste Management Act, in accordance with the provisions under waste law.

# **Appendix 51 Storage of waste above ground**

## **A Scope of application**

This Appendix shall apply to waste water whose contaminant load originates primarily from the storage of waste above ground.

## **B General requirements**

The volumetric flow and contaminant load of the leachate shall be kept as low as the state of the art permits, by employing suitable measures in the establishment and operation of landfill sites.

## **C Requirements for waste water at the point of discharge**

(1) The following requirements apply to waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	200
5-day biochemical oxygen demand (BOD <sub>5</sub> )	mg/l	20
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	mg/l	70
Total phosphorous	mg/l	3
Total hydrocarbons	mg/l	10
Nitrogen from nitrite (NO <sub>2</sub> -N)	mg/l	2

Toxicity to fish eggs ( $T_{\text{egg}}$ )		2
--------------------------------------------	--	---

(2) In the case of waste water whose chemical oxygen demand content (COD) prior to treatment is assumed to be in excess of 4000 mg/l, in derogation of paragraph (1) above, an effluent level for COD in the qualified random sample or 2-hour composite sample shall apply which is equivalent to at a reduction in COD of at least 95 %. The reduction in COD shall refer to the ratio between the contaminant load in the influent and that in the effluent from the waste water treatment plant over 24 hours. For the contaminant load of the influent, the capacity utilisation of the plant on which the permit is based shall be decisive. The scope of the reduction shall be evaluated on the basis of the dimensioning and mode of operation of the waste water treatment plant.

(3) The requirement for total hydrocarbons shall apply to the random sample. It shall not apply to waste water from the storage of domestic waste.

(4) The requirement for total nitrogen shall apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant. A value specified for total nitrogen shall also be deemed to have been met in accordance with the definition of "total bonded nitrogen ( $TN_b$ )". A higher concentration of up to 100 mg/l may be conceded for total nitrogen in the water discharge licence, provided the reduction in the nitrogen load is at least 75 %. The reduction refers to the ratio between the nitrogen load in the influent and that in the effluent over a representative period of time not exceeding 24 hours. Total bonded nitrogen ( $TN_b$ ) shall be used as a basis for calculating the loads.

#### D Requirements for waste water prior to blending

(1) The following requirements apply to the waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l
Adsorbable organically bound halogens (AOX)	0.5
Mercury	0.05
Cadmium	0.1
Chromium	0.5
Chromium VI	0.1
Nickel	1
Lead	0.5
Copper	0.5
Zinc	2
Arsenic	0.1
Cyanide, easily released	0.2
Sulfide	1

In the case of AOX, chromium VI, easily released cyanide and sulfide, the values for the random sample shall apply.

(2) Waste water, except for waste water from installations for biological waste treatment, may be blended with other waste water for the purpose of joint biological treatment only if at least one of the following requirements is expected to be met:

1. In determination of the toxicity to fish eggs, luminescent bacteria and daphnia of a representative wastewater sample, the following values are not exceeded, following execution of an elimination test with a biological, laboratory-scale continuous-flow treatment system (such as a system in keeping with DIN 38412 L26):

Toxicity to fish	$T_{\text{egg}} = 2,$
Toxicity to daphnia	$T_{\text{D}} = 4$ and
Toxicity to luminescent bacteria	$T_{\text{L}} = 4.$

Via such measures as nitrification in the laboratory-type biological sewage treatment plant or pH value maintenance, steps are taken to ensure that the  $T_{\text{egg}}$  value is not exceeded due to ammonia ( $\text{NH}_3$ ). The waste water may be diluted as required to start up the laboratory-type biological sewage treatment plant. In the event of a lack of nutrients, nutrients may be added. During the test phase, no dilution water may be added.

2. A DOC elimination level of 75% in accordance with number 406 of the Annex "Analysis and measurement procedures" is achieved.

3. Prior to joint biological treatment with other waste water, the waste water already indicates a COD concentration level of less than 400 mg/l.

## **Appendix 52**

### **Chemical cleaning**

#### **A Scope of application**

This Appendix shall apply to waste water whose contaminant load originates primarily from the chemical cleaning of textiles and carpets and of goods made from fur and leather using solvents with halogenated hydrocarbons in accordance with the 2<sup>nd</sup> Ordinance for the Implementation of the Federal Immission Control Act as last amended.

#### **B General requirements**

No requirements above and beyond Article 3 are imposed.

#### **C Requirements for waste water at the point of discharge**

No additional requirements shall apply to the waste water at the point of discharge into the water body.

#### **D Requirements for waste water prior to blending**

- (1) Prior to blending with other waste water, the waste water must not exceed the following levels for adsorbable organic halogens (AOX):

Filling volume capacity of the chemical	Concentration in the	1-hour load with reference to the filling
-----------------------------------------	----------------------	-------------------------------------------

cleaning machine	random sample mg/l	volume capacity of material to be treated from the random sample and the 1-hour water volume mg/kg
Up to 50 kg material to be treated	0.5	-
More than 50 kg material to be treated	0.5	0.25

(2) If several chemical cleaning machines are operated in the same establishment, then the size category shall be decisive. This is calculated from the sum of the filling volume capacities of material to be treated of the individual machines.

(3) An AOX level determined in paragraph (1) above shall also be deemed to have been met, provided the content of halogenated hydrocarbons in the waste water is determined via the individual substances used and the sum total of these, calculated as chlorine, does not exceed the levels specified in paragraph (1) above.

(4) A level specified in paragraph (1) above shall also be deemed to have been met if a waste water treatment plant authorised by a building inspectorate approval or otherwise in accordance with *Land* law is installed, operated and maintained as per the licensing terms, and is checked in accordance with *Land* law to ensure it is in proper working order, both prior to commissioning and at regular intervals not exceeding 5 years.

## **E Requirements for waste water at the site of occurrence**

The waste water must only contain those halogenated solvents permitted for use in chemical cleaning establishments in accordance with the Second Ordinance for the Implementation of the Federal Immission Control Act as last amended. This requirement shall be deemed to have been met, provided proof is furnished that only authorised halogenated hydrocarbons are used.

## **Appendix 53 Photographic processes (silver halide photography)**

### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in photographic processes in silver halide photography or the treatment of liquid residues from such processes. Part B shall apply to the site of occurrence of the waste water.

(2) This Appendix shall not apply to waste water from

1. Indirect cooling systems and process water treatment facilities
2. Other photochemical processes not attributable to paragraph (1) above
3. Plants with a film and paper throughput of no more than 200 m<sup>2</sup> per annum, provided no waste water is incurred from the treatment of baths.

### **B General requirements**

(1) The contaminant load shall be kept as low as is possible by means of the following measures:

1. Separate collection of fixing, developing, bleaching and bleach-hardening baths and their bath overflows for bath treatment
2. Minimisation of bath entrainments by means of appropriate techniques, such as splash protection and low-entrainment film and paper transportation
3. Saving on rinse water by means of appropriate techniques such as cascade rinsing, water-saving programs and recirculation.
4. Recirculation of fixing baths, with the exception of the X-ray and microfilm sector, into a recycling process, for plants with a paper and film throughput in excess of 3,000 m<sup>2</sup> per annum.
5. Recirculation of fixing baths, bleaching-fixing baths, bleaching baths and colour developers into a recycling process, for plants with a paper and film throughput in excess of 30,000 m<sup>2</sup> per annum.

(2) The waste water from the treatment of bleaching and bleaching-fixing baths must not contain any organic complexing agents which do not achieve 80 % DOC degradation after 28 days, in accordance with number 406 of the Annex "Analysis and Measurement Procedures".

(3) Chlorine or hypochlorite must not be used in the treatment of baths.

(4) Proof that the requirements pursuant to paragraphs (2) and (3) above have been met may be furnished by listing the feedstocks and auxiliary materials used in an operating journal and verifying their use, and presenting manufacturers' information showing that the feedstocks and auxiliary materials used do not contain any inadmissible substances.

### **C Requirements for waste water at the point of discharge**

No additional requirements are placed on the waste water at the point of discharge into the water body.

### **D Requirements for waste water prior to blending**

(1) The following requirements apply to the waste water prior to blending with other waste water:

1. Waste water from the treatment of baths

	Qualified random sample or 2-hour composite sample mg/l	Random sample mg/l
Silver	0.7	-
Adsorbable organically bound halogens (AOX)	-	0.5
Total chromium	0.5	-
Chromium VI	-	0.1
Tin	0.5	-
Mercury	0.05	-
Cadmium	0.05	-

Total cyanide	2	-
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## 2. Rinsing water

In plants with an annual film and paper throughput of more than 3,000 m<sup>2</sup>, the following load levels for silver must not be exceeded at the point of discharge for rinsing water, depending on the size of the plant:

Film and paper throughput in m <sup>2</sup> per annum	Silver load mg/m <sup>2</sup>
More than 3,000 up to 30,000 - Black-and-white and X-ray photography - Colour photography	50 70
More than 30,000	30

(2) A certain requirement for silver, specified in paragraph (1) above for a film and paper throughput of more than 3,000 to 30.000 m<sup>2</sup> per annum, shall also be deemed to have been met, if a waste water treatment plant authorised by a building inspectorate approval or otherwise in accordance with *Land* law, or other equivalent installation for reducing the silver load, is installed and operated, is regularly serviced in accordance with the relevant licensing terms, and is checked both prior to commissioning and at regular intervals not exceeding five years, in accordance with *Land* law, in order to verify that it is proper working order.

## Appendix 54 Production of semi-conductor components

### A Scope of application

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the production of semi-conductor components and solar cells, including the related pretreatment, intermediate treatment and after-treatment.

(2) This Appendix shall not apply to waste water from indirect cooling systems or process water treatment facilities, including retained substances from the preparation of ultrahigh-purity water using membrane techniques.

### B General requirements

The contaminant load must be kept as low as the following measures permit, as revealed by examination of the circumstances of the relevant individual case:

1. The use of a water-saving rinsing system (e.g. clocked rinsing, dip-spray rinsing system, conductivity soaking).
2. Multiple use of suitable rinsing water after appropriate processing, such as recirculation via ion exchangers, membrane technology
3. Multiple use of suitable rinsing water by reusing in other areas, such as cooling or process water for generating steam, in recooling plants, in electroplating shops, PCB production



4. Recirculation of waste air scrubbing water
5. Reuse or recycling of process baths (e.g. acids, organic solvents).

### C Requirements for waste water at the point of discharge

A limit for toxicity to fish eggs of  $T_{\text{egg}} = 2$  shall apply to the waste water at the point of discharge into the water body.

### D Requirements for waste water prior to blending

The following requirements apply to the waste water prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l	Random sample mg/l
Adsorbable organically bound halogens (AOX)	-	0.5
Arsenic	0.2	-
Benzene and derivatives	0.05	-

### E Requirements for waste water at the site of occurrence

(1) At the site of occurrence, the waste water from cleaning processes must only contain those halogenated solvents permitted in accordance with the Second Ordinance for the Implementation of the Federal Immission Control Act as last amended. This requirement shall also be deemed to have been met, provided proof is furnished that only permitted halogenated solvents are used. In addition, a level of 0.1 mg/l of volatile halogenated hydrocarbons (sum of trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, dichloromethane - calculated as chlorine) in the random sample must be complied with.

(2) Notwithstanding the requirements pursuant to paragraph (1) above, the following levels must be complied with in waste water from electroplating processes:

	Random sample mg/l
Lead	0.5
Total chromium	0.5
Chromium VI	0.1
Copper	0.5
Nickel	0.5
Silver	0.1
Tin	2
Sulfide	1
Cyanide, easily released	0.2
Free chlorine	0.5

Ethylenediaminetetraacetic acid (EDTA) and its salts must not be present in the waste water. For chromium VI and cyanide, easily released, the levels must not be exceeded; Article 6 (1) shall not apply.

(3) For waste water containing arsenic from the production of gallium arsenide semiconductor components, a level of 0.3 mg/l arsenic in the random sample must be complied with.

(4) For waste water containing cadmium and selenium, a level of 0.2 mg/l cadmium and 1 mg/l selenium in the random sample must be complied with.

## **Appendix 55**

### **Laundries**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily from the washing of dirty textiles, carpets, mats and non-woven fabrics in plants and public institutions.

(2) This Appendix shall not apply to waste water from

1. Wool scouring plants
2. Textiles cleaning in non-aqueous liquors
3. Textiles manufacturing and refinement
4. The preparation and processing of textile fibres and natural hair
5. The washing of filter textiles and filter fleece
6. The washing of household textiles in coin-operated laundrettes with self-service washing machines
7. The washing of household textiles, hotel and restaurant textiles or other comparable textiles where no organic chlorine or chlorine-releasing detergents and washing adjuvants or elementary chlorine are used
8. Indirect cooling systems.

#### **B General requirements**

(1) The waste water must not contain

1. Organic complexing agents (with the exception of phosphonates) which achieve a DOC elimination degree of less than 80 % after 28 days, in accordance with number 406 of the Annex "Analysis and measurement procedures"
2. Residues from filters and sieves, as well as detergent, washing adjuvant and other auxiliary material residues arising from the emptying of packets, drums and feed chambers
3. Biocides from the finishing of washed items in standing baths
4. Organically bonded halogens originating from use as solvents during pre-cleaning of the laundry
5. Organic chlorine and chlorine-releasing compounds or chlorine from the use of detergents and washing adjuvants, where these are not used in the clear rinsing zone or the clear rinsing bath when washing hospital and residential home laundry as well as working clothes for the meat and fish-processing industry.

(2) If chlorination chemicals are used to prepare the process water, these should be metered in such a way as to ensure a maximum anticipated concentration of 1 mg/l free chlorine in the influent to the washing machine.

(3) Proof that the requirements pursuant to paragraph (1) above have been met may be furnished by listing the detergents and washing adjuvants used in an operating journal and presenting manufacturers' information showing that these do not contain any of the substances and groups of substances cited in paragraph (1) above.

### C Requirements for waste water at the point of discharge

The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample mg/l
Chemical oxygen demand (COD)	100
5-day biochemical oxygen demand (BOD <sub>5</sub> )	25
Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen (N <sub>tot</sub> )	20
Total phosphorous	2

### D Requirements for waste water prior to blending

(1) The following requirements apply to waste water from the following areas prior to blending with other waste water:

	AOX g/t
Hospital and residential home laundry	18
Working clothes from the meat and fish-processing industry	40

The requirements shall not apply if the proportion of such laundry accounts for 10 % or less of the plant's washing capacity.

(2) The requirements pursuant to paragraph (1) above shall also be deemed to have been met, provided the discharger is able to furnish proof of anticipated compliance with the AOX load in the waste water flow, owing to the use of suitable washing techniques.

(3) The specific load levels in paragraph (1) above refer to the washing capacity (dry weight of the laundry) on which the water discharge licence is based. The contaminant load is determined

- In the case of continuously operating laundry lines, from the concentration level of the random sample and the volumetric flow of waste water corresponding to sampling
- In the case of discontinuously operating spinner-washers, from the concentration level of the random sample from the combined waste water of the washing process and the volumetric flow of waste water thereby incurred.

(4) The AOX requirement pursuant to paragraph (1) above for the waste water from hospital and residential home laundry shall not apply in the event of an epidemic of notifiable infectious diseases.

(5) The following requirements shall apply to waste water from the washing of cleaning cloths, working clothes<sup>\*)</sup>, carpets and mats prior to blending with other waste water:

	Qualified random sample or 2-hour composite sample mg/l
Total hydrocarbons	20
AOX	2
Copper	0.5
Total chromium	0.5
Nickel	0.5
Lead	0.5
Cadmium	0.1
Mercury	0.05
Zinc	2
Arsenic	0.1

The requirements for total hydrocarbons and AOX refer to the random sample.

(6) The requirements pursuant to paragraph (5) above shall also be deemed to have been met if a waste water treatment plant authorised by a general building-inspectorate approval, or otherwise permitted under *Land* law, is installed, operated and maintained as per the licensing terms, and is checked both prior to commissioning and at regular intervals not exceeding five years, in accordance with *Land* law, in order to verify that it is in proper working order.

## **A p p e n d i x 5 6**

### **Production of printing blocks, publications and graphic-arts products**

#### **A Scope of application**

(1) This Appendix shall apply to waste water whose contaminant load originates primarily in the following areas, including printing-block production and the pertinent pre-treatment, intermediate treatment and finishing:

1. Setting and reproduction,
2. Letterpress printing,
3. Flatbed printing (offset printing),
4. Screen printing and
5. Intaglio printing.

(2) This Appendix shall not apply to waste water from textile print shops, except for facilities for printing-block production (such as printing templates and cylinders), from silver-halide photography and from indirect cooling systems and from process water treatment facilities.

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<sup>\*)</sup> From the areas of metal processing, mechanical engineering, motor vehicle plants and chemical plants

(3) This Appendix shall also not apply to waste water from facilities in the areas of setting and reproduction, letterpress printing, offset printing and screen printing, if the amount of fresh water needed for production is less than 250 m<sup>3</sup> per year, the waste water is treated in a biological waste water treatment facility and the following waste water stream types are not discharged:

1. Area of setting and reproduction

Waste water containing chromium or zinc, from processing of cartography transparencies or colour transparencies

2. Area of letterpress printing

a) Waste water from processes for cleaning machines, systems and printing forms with adhesions of printing inks, or waste water from cleaning processes that use hydrocarbons

b) Waste water from production of metal printing blocks

3. Area of offset printing

a) Waste water from etching of multi-metal plates

b) Waste water from processes for cleaning machines, systems and printing forms with adhesions of printing inks and that involve simultaneous use of cleansing chemicals

c) Negative-plate developers containing copper

d) Damping water

4. Area of screen printing

a) Waste water from cleaning or coating-removal processes, with use of substances containing heavy metals (with the exception of copper from phthalocyanine pigments)

b) Waste water from cleaning or coating-removal processes that involve simultaneous use of hydrocarbons, halogenated hydrocarbons or active chlorine

c) Waste water from production of metal screens

## **B General requirements**

(1) The contaminant load must be kept as small as is possible with the following measures:

1. Lengthening of the retention time of process solutions, by means of multiple use or of recycling via regeneration or cleansing units,
2. Separation and treatment of aqueous and solvent-containing separate melt streams in intaglio printing,
3. Avoidance of rinsing water by returning water to the process baths, in intaglio printing,
4. Separate collection and use of preheating water, in intaglio printing,
5. Reduction of rinsing water in finishing of printing blocks, in offset and screen printing, by means of suitable measures such as cascade rinsing and circulating-rinsewater systems.

(2) The waste water may not contain:

1. Organic complexing agents that do not attain an 80 percent degree of DOC elimination after 28 days, pursuant to number 406 of the Appendix "Analysis and Measurement Procedures",
2. Operation and auxiliary substances that contain chlorine or chlorine-separating substances, and organically bonded halogens from solvents, detergents and cleansers,
3. Arsenic, mercury, cadmium and their compounds, and pigments containing lead or chromium, except for lead, cadmium and their compounds from pigments used in ceramic screen printing,
4. Organic solvents from textile damping-cylinder cleaning in offset printing, and
5. Residues of process chemicals, paints or auxiliary substances arising via emptying of packages, large package units and receiving tanks.

The requirements pursuant to numbers 1 to 4 shall be deemed to have been met if the operation and auxiliary substances and process chemicals used are listed in an operating journal, their use is proven and manufacturers' information is available to show that they do not contain any of the substances and substance groups cited in the first sentence above.

### C Requirements for waste water at the point of discharge

The following requirements shall apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
Chemical oxygen demand (COD)	mg/l	160
5-day biochemical oxygen demand (BOD <sub>5</sub> )	mg/l	25
Phosphorous compounds, as total phosphorous	mg/l	2
Total nitrogen as the sum of ammonia nitrogen, nitrite nitrogen and nitrate nitrogen (N <sub>ges</sub> )	mg/l	50
Total hydrocarbons	mg/l	10
Iron	mg/l	3
Aluminium	mg/l	3
Toxicity to fish eggs (T <sub>egg</sub> )		4

The requirement for hydrocarbons refers to the random sample.

### D Requirements for waste water prior to blending

- (1) Waste water from the areas cited in Part A (1) shall be subject to the following requirements prior to its blending with other waste water:

Areas	1	2	3	4	5
	Qualified random sample or 2-hour composite sample mg/l				
Adsorbable, organically bonded halogens (AOX)	-	1	1	1	1
Lead	-	-	-	1	-
Cadmium	-	-	-	0.1	-
Total chromium	1	1	1	1	1
Cobalt	-	-	1	1	-
Copper	1	1	1	1	1
Nickel	-	-	-	-	2
Silver	-	-	-	0.5	0.5
Zinc	2	2	2	2	2

The requirement for AOX, and all requirements for batch installations, refer to the random sample.

(2) In cases in which pigments containing heavy metals are used in ceramic screen printing, in area 4, a level of 30 mg/l in the qualified random sample or 2-hour composite sample shall apply for substances removable by filtration.

### **E Requirements for waste water at the site of occurrence**

(1) For waste water that contains benzene and derivatives, the random sample may contain no more than 10 mg/l of benzene and derivatives.

(2) For waste water containing chromium, the random sample may contain no more than 0.1 mg/l of chromium VI.

(3) For waste water containing cyanide, from intaglio printing, the random sample may contain no more than 0.2 mg/l of cyanide, easily released.

## Appendix 57 Wool scouring plants

### A Scope of application

(1) This Appendix applies to waste water whose contaminant load originates primarily from the scouring and carbonisation of raw wool and the antifelting finish of top.

(2) This Appendix shall not apply to waste water from process water treatment facilities or indirect cooling systems, nor to precipitation water.

### B General requirements

(1) With the exception of rinsing water, waste water from the scouring of raw wool must not be discharged into water bodies.

(2) The contaminant load shall be kept as low as the following measures permit:

1. Waste water-free pre-cleaning of barrels and drums
2. The use of organic complexing agents which a DOC degradation degree of 80 % after 28 days, in accordance with number 406 of the Annex "Analysis and measurement procedures".

(3) The waste water must not contain the following:

1. Alkylphenol ethoxilates (APEO) from detergents and cleansing agents.
2. Surfactants or other interfacially active substances which fail to meet the requirements on biodegradability pursuant to Article 3 of the Act on the Environmental Compatibility of Washing and Cleansing Agents in conjunction with the Ordinance on the Degradability of Anionic and Nonionic Surface-Active Agents in Detergents of January 30, 1977 (Federal Law Gazette <BGBI.> I, page 244), most recently amended by the Ordinance of 4 June 1986 (Federal Law Gazette <BGBI.> I, page 851).

(4) Proof that the requirements pursuant to paragraph (3) above have been met may be furnished by listing the operating and auxiliary materials used in an operating journal and presenting manufacturers' information showing that these do not contain any of the substances or substance groups cited in paragraph (3) above.

### C Requirements for waste water at the point of discharge

(1) The following requirements apply to the waste water at the point of discharge into the water body:

	Qualified random sample or 2-hour composite sample	
	mg/l	kg/t
Chemical oxygen demand (COD)	150	1.5
5-day biochemical oxygen demand (BOD <sub>5</sub> )	10	0.1



Total nitrogen as the sum of ammonia, nitrite and nitrate nitrogen ( $N_{\text{tot}}$ )	30	0.3	
Total bonded nitrogen ( $TN_b$ )	40	0.4	
Total phosphorous	2	0.02	
Toxicity to fish eggs ( $T_{\text{egg}}$ )			2
Toxicity to daphnia ( $T_D$ )			2

(2) The production-specific load levels (kg/t) in paragraph (1) above refer to the processing capacity of raw wool on which the water discharge licence is based.

(3) The requirements for total nitrogen and total bonded nitrogen ( $TN_b$ ) apply at a waste water temperature of 12°C and above in the effluent from the biological reactor of the waste water treatment plant.

#### **D Requirements for waste water prior to blending**

Prior to blending with other waste water, the waste water must not exceed a dilution factor of  $T_D = 2$  in its toxicity to daphnia. The requirement shall not apply where a representative waste water sample - either an original sample or after conducting an elimination test with the aid of a laboratory-type continuous biological sewage treatment plant (e.g. in accordance with DIN 38 412-L26) - is not expected to exceed a level of  $T_D = 2$  for daphnia toxicity.

#### **E Requirements for waste water for the site of occurrence**

The waste water from antifelting finish of combed top must not contain chlorine or chlorine-releasing compounds from the pre-treatment of the top. This requirement shall be deemed to have been met, provided proof is furnished that chlorine or chlorine-releasing compounds are not used.