

**Joint statement against restrictions imposed by the Dutch
government on the use of ferrous slags
– Requirements for provisional measures not fulfilled –**

Appendix II

October 7th, 2025

Appendix II summarizes the performed (eco-)toxicological tests used in registration dossier by REACH Ferrous Slag Consortium (RFSC). Results of the performed tests do not exhibit any adverse effects that lead to restriction under REACH or classification under CLP regulation.

Table 1. Name, abbreviation, EC number and CAS number of the members of REACH registered “Ferrous Slag” category.

IUPAC Name	Abbreviation	EC Number	CAS Number
Slags, ferrous metal, blast furnace	ABS/GBS	266-002-0	65996-69-2
Slags, steelmaking, converter	BOS	294-409-3	91722-09-7
Calcium-Iron-Silicium-Magnesium-Manganese-Aluminium oxide equivalent Slags, steelmaking, electric arc furnace (carbon steel)	EAF-C	932-275-6	-
Calcium-Silicium-Magnesium-Aluminium-Iron-Manganese oxide equivalent Electric-Arc Furnace Slag, Electric Oven Slag (Stainless Steel)	EAF-S	932-476-9	-
Slags, steelmaking	SMS	266-004-1	65996-71-6

Table 2. List of performed ecotoxicological studies by RFSC

Aquatic compartment (including sediment)		
Short-term toxicity to fish		
Method	Tested material	Results
<i>Leuciscus idus</i> , freshwater static OECD Guideline 203 (Fish, Acute Toxicity Test)	ABS, GBS, BOS, EAF-C, EAF-S, SMS	Essentially not toxic to fish in acute testing
Short-term toxicity to aquatic invertebrates		

<i>Daphnia magna</i> , freshwater, static OECD Guideline 202 (<i>Daphnia</i> sp. Acute Immobilisation Test)	ABS, GBS, BOS, EAF-C, EAF-S, SMS	Ferrous slags of all types tested are not toxic to aquatic invertebrates in short term studies
<i>Daphnia magna</i> , freshwater static NF EN ISO 6341 (Détermination de l'inhibition de la mobilité de <i>Daphnia magna</i> Strauss)	ABS, EAF-C, EAF-S	
<i>Daphnia magna</i> , freshwater, static DIN 38412-L30	ABS, BOS, EAF-C	
Long-term toxicity to aquatic invertebrates		
<i>Daphnia magna</i> freshwater, semi-static EU Method C.20 (<i>Daphnia magna</i> Reproduction Test) (Method equivalent to OECD Guideline 211)	ABS	No toxic effect, due to high pH population of the hydrozoan <i>Cordylophora caspia</i> were slightly lower than in controls with almost neutral pH
<i>Ceriodaphnia dubia</i> , freshwater, static Etude inter-Agences de l'Eau "Test de toxicité chronique - <i>Ceriodaphnia dubia</i> à 7 jours. Rapport des essais inter-laboratoires" Déc. 1995	ABS, EAF-C, EAF-S	
<i>Macroinvertebrates</i> , freshwater, flow-through Several methods applied e.g. collection of organisms in the environment from areas covered with slag or natural material (Greywacke)	BOS	
<i>Hydra littoralis</i> , freshwater, static Karbe L (1972) Marine Hydroids as test organisms for examining the toxicity of wastewater substances. The effect of heavy metals on colonies of <i>Eirene viridula</i> . Marine Biology 12, 316-328	EAF-C	
<i>Cordylophora caspia</i> (<i>Pallas</i>), freshwater static Chronic test with the Hydrozoan <i>Cordylophora</i> , in principle similar to chronic <i>Daphnia</i> test	EAF-C	
<i>Periphyton</i> , brackish water, flow-through Several tests on hydrology, ecotoxicology, periphyton (<i>Aufwuchs</i>) as indicator of ecological behaviour of slag; determination of biodiversity of periphyton on slags in comparison to periphyton on diabase	EAF-C	
<i>natural population of invertebrates</i> , brackish water, field study The colonization of EAF C and natural rock fields on banks of the Elbe River by sessile animal populations was examined qualitatively and quantitatively in field experiments.	EAF-C	
Algae and aquatic plants		
<i>Scenedesmus subspicatus</i> (new name: <i>Desmodesmus subspicatus</i>) (algae), freshwater, static OECD Guideline 201 (Alga, Growth Inhibition Test)	ABS, GBS, BOS, EAF-C, EAF-S, SMS	No acute toxicity to algae. The ecological properties of slag are virtually the same as these of natural rock e. g. basalt, diabase, granodiorite, and greywacke. substantiating that

<i>Desmodesmus subspicatus</i> (algae), freshwater, static DIN 38412-L33	ABS, BOS, EAF-C	slag stones are an excellent substrate for algal growth
<i>Pseudokirchnerella subcapitata</i> (algae), freshwater, static NF EN 28692 (Essay d'inhibition de la croissance d'algues d'eau douce avec Pseudokirchneriella subcapitata)	ABS, BOS, EAF-C, EAF-S, SMS	
<i>natural population of algae</i> (algae), brackish water, field study The colonization of EAF C and natural rock fields on banks of the Elbe River by sessile algal populations was examined qualitatively and quantitatively in field experiments by microscopic determination of algal species and counting of cells.	EAF-C	
Sediment organisms		
<i>microbial communities in river sediments</i> , freshwater, long-term toxicity (field study) flow-through field study	BOS	Organisms growing on slags (BOS) exhibited even greater species diversity and population density than on natural rock

Terrestrial compartment		
Toxicity to soil macro-organisms		
<i>Eisenia fetida</i> (annelids), short-term toxicity (laboratory study) Substrate: artificial soil, OECD Guideline 207 (Earthworm, Acute Toxicity Tests)	ABS, BOS, EAF-C, EAF-S, SMS	the results confirm that slags exert no acute toxicity to earthworms. All slags were not toxic against <i>Eisenia fetida</i> within 14 days. From studies with other soil invertebrates there is no evidence that slags may have a relevant inhibitory effect on terrestrial arthropods
<i>Eisenia fetida</i> (annelids), short-term toxicity (laboratory study) Substrate: artificial soil, ISO 11268-1 (Effects of Pollutants on Earthworms. 1. Determination of Acute Toxicity Using Artificial Soil Substrate)	ABS, EAF-C, EAF-S	
Toxicity to terrestrial plants		
<i>Triticum aestivum</i> (Monocotyledonae (monocots)), <i>Sinapis alba</i> (Dicotyledonae (dicots)) <i>Lepidum sativum</i> (Dicotyledonae (dicots)), short-term toxicity (laboratory study) seedling emergence toxicity / vegetative vigour test Substrate: artificial soil, OECD Guideline 208 (Terrestrial Plants Test: Seedling Emergence and Seedling Growth Test)	ABS	Ferrous slags are not toxic to terrestrial plants. Slags are efficient fertilizers for plants.
<i>Hordeum vulgare</i> (Monocotyledonae (monocots)), <i>Lactuca sativa</i> (Dicotyledonae (dicots)), short-term toxicity (laboratory study) seedling emergence toxicity / vegetative vigour test Substrate: artificial soil ISO 11269-2 and NF X 31201 (Determination of the effects of pollutants on soil flora - Part 2: Effects of chemicals on the emergence and growth of higher plants)	ABS, EAF-C, EAF-S	
<i>natural vegetation</i> (Monocotyledonae (monocots), (Dicotyledonae (dicots), Gymnospermae (conifers), (Cryptogamae, vascular (ferns and allies), Bryophyta or Hepatophyta (mosses or liverworts)) long-term toxicity (field study) Substrate: pure slag Ecological field study using the Zeigerwerte of Ellenberg (indicator values according to Ellenberg) to plants growing on a blast furnace slag deposit	ABS	
<i>Tilia cordata</i> (Dicotyledonae (dicots)) <i>Acer pseudoplatanus</i> (Dicotyledonae (dicots)) long-term toxicity (field study) vegetative vigour test Substrate: natural soi	ABS	
<i>Brassica rapa</i> (Dicotyledonae (dicots)) <i>Triticum aestivum</i> (Monocotyledonae (monocots)), long-term toxicity (field study) fertilisation study Substrate: natural soil Field studies examine the effects of ABS/GBS, BOS, and SMS (ladle slags) on plants and agricultural yield	ABS	

<i>Sorghum</i> (species not reported) (Dicotyledonae (dicots)) short-term toxicity (extended laboratory study) agricultural yield Substrate: natural soil Evaluation of the effect of steelmaking slags (SMS), added to oxisol soil, on sorghum yield	SMS	
<i>Tilia cordata</i> (Dicotyledonae (dicots)) <i>Acer pseudoplatanus</i> (Dicotyledonae (dicots)) long-term toxicity (field study) vegetative vigour test Substrate: natural soil no guideline available for road-side planting of trees	SMS	
<i>Sorghum bicolor</i> (Dicotyledonae (dicots)) short-term toxicity (extended laboratory study) agricultural yield Substrate: natural soil Evaluation of the effect of steelmaking slags (SMS), added to oxisol soil, on sorghum yield	SMS	
Toxicity to soil micro-organisms		
Species/Inoculum: soil EU Method C.22 (Soil Microorganisms: Carbon Transformation Test) EU Method C.21 (Soil Microorganisms: Nitrogen Transformation Test)	ABS	Ferrous slags are not inhibitory to key metabolic activities of soil microorganisms
Species/Inoculum: soil Review of studies done at the Sommerland Agricultural Research Station. Measurement of metabolic potential of soil microorganims as respiration rate and cellulose degradation.	ABS, BOS, SMS	
Toxicity to aquatic micro-organisms		
activated sludge, freshwater static OECD Guideline 209 (Activated Sludge, Respiration Inhibition Test)	ABS, BOS, EAF-C, EAF-S	No relevant effect was observed
<i>Vibrio fisheri</i> , brackish water, static DIN EN ISO 11348-2	ABS, BOS	
<i>Vibrio fisheri</i> , saltwater, static NF T90320	ABS, EAF-C, EAF-S	
<i>Vibrio fisheri</i> , saltwater, static DIN EN ISO 11348-1-3	ABS, EAF-C	
<i>Photobacterium phosphoreum</i> Saltwater, semi-static Krebs F 1985 Oekotoxikologische Bewertung von Abwaessern und Umweltchemikalien. Forschungsvorhaben W 10205115 BfG Koblenz	BOS	
microbial communities in Rhine water freshwater, semi-static, DIN 38414-12 Assimilation respiration test	BOS	
<i>Photobacterium phosphoreum</i> Saltwater static Microtox	EAF-C, SMS	

Conclusion on the environmental hazard assessment and on classification and labelling:
No classification required for the environmental properties of slag

Table 3. Human toxicological study on the oral route of exposure performed by RFSC.

Method	Principle	Tested material	Results
OECD 401 In vivo testing on rats	Administration of finely ground material in a dose of > 2000 mg/kg body weight	ABS, GBS, BOS, EAF-C, SMS	No classification and labeling for acute oral toxicity are required for all ferrous slag.

Table 4. Human toxicological study on the dermal route of exposure performed by RFSC.

Method	Principle	Tested material	Results
OECD 431 In vitro testing for skin corrosion	Finely ground material (moistened with H ₂ O) is applied to a skin model	EAF-C, EAF-S	Not corrosive
EU-Method B.46	A shake eluate (L/S = 5, 24 h) was prepared from 1 g of material (< 90 µm) and applied to a skin model.	BOS, SMS	Non-irritating
OECD 404 In vivo testing on rabbits	Both finely ground material and the shake eluate (L/S = 5) were applied to the skin of a rabbit.	ABS, BOS, EAF-C, EAF-S, SMS	Non-irritating
OECD 406 In vivo guinea pig test (Buehler test)	The shaken eluate (L/S = 10) was repeatedly applied to the skin of guinea pigs	ABS, BOS, EAF-C, EAF-S, SMS	Not sensitizing
OECD 402 In vivo testing on rats	Finely ground material was applied to the skin of rats	BOS, SMS	No acute toxicity: LD50: > 4000 mg/kg

Table 5. Human toxicological study on the respiratory route of exposure performed by RFSC.

Method	Principle	Tested material	Results
OECD 412 In vivo testing on rats (repeated dose)	Rats were exposed to inhalation (aerosol)	GBS	No evidence of absorption and no signs of toxicity
In vitro tests Advance Liquid Interface (ALI) IUF Institut in Düsseldorf, Germany	Investigation using cultured cells (primary macrophages and NR8383 cells) Use of fine particles directly on different lung cells	ABS, GBS, BOS, EAF-C, EAF-S, SMS	Ferrous slag behaves similarly to natural rock used as control, and inhaled slag particles can be efficiently removed by physiological cleansing mechanisms.
Cohort study on long term occupational exposure	Done by the Finnish stainless steel production chain from chromite mining to cold rolling of stainless steel during the period 1967–2004 The risk of cancer was assessed, with special reference to cancers of the nose and lung.		No adverse effect observed

Table 6. Human toxicological study on genotoxicity of slags performed by RFSC.

Method	Principle	Tested material	Results
EU Method B.13/14 OECD Guideline 471 In vitro Ames Test	Reverse Mutation Test Using Bacteria <i>S. typhimurium</i>	ABS, BOS, EAF-C, EAF-S, SMS	No genotoxicity
EU Method B.17 In vitro mammalian cell gene mutation assay	Chinese hamster lung fibroblasts (V79)	ABS	No genotoxicity
OECD Guideline 473 In vitro mammalian chromosome aberration test	lymphocytes: human (all strains/cell types tested)	ABS	No genotoxicity
OECD Guideline 474 In vivo testing on mouse	Mammalian Erythrocyte Micronucleus Test with 3 consecutive concentrations including 2000 mg/kg body weight using a single treatment	BOS, SMS	No mutagenicity