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Position Paper

Lead: Classification as environmentally hazardous and the consequences for transport

Background

- With the 21st ATP on the adaptation of Annex VI of the CLP Regulation, the EU Commission has made the following classification for lead:
    - **Aquatic Acute 1, M-factor 10 and Aquatic Chronic 1, M-factor 100 for lead powder (particle diameter < 1 mm)**
    - **Aquatic Chronic 1, M-factor 10 for lead solid (particle diameter ≥ 1 mm)**
- The 21st ATP was published in the European Official Journal on 05.01.2024 (EU 2024/197). The amendments came into force on January 25, 2024. The transitional period of 18 months for mandatory application in all EU Member States ends on September 1, 2025, after which all manufacturers, importers and downstream users of the substance in the EU must classify the substance in accordance with the entry in Annex VI.
- The classification only concerns pure lead as a substance as well as mixtures and alloys within the scope of the CLP Regulation. The existing harmonized CLP classification of lead compounds and the individual entries on lead-containing compounds remain unaffected.
- In terms of transport law, this classification nominally leads to a classification as *"UN 3077 Environmentally hazardous substance"*, taking into account the M-factors in accordance with ADR/RID number 2.2.9.1.10.5:
    - 0.025 % for lead powder (particle diameter < 1 mm)
    - 0.25 % for solid lead (particle diameter ≥ 1 mm).

➢ ***The extent to which this classification actually applies to lead as a substance and lead-containing mixtures, lead-containing articles and lead-containing waste in terms of transport law is the subject of this item.***

➢ ***The requirements of the CLP Regulation on labeling and the requirements of the REACH Regulation, e.g. on the creation and provision of safety data sheets for lead as a substance and lead-containing mixtures, continue to apply and are not covered by this item.***

1) Lead as a substance in the form of ingots

- Ingots, slugs, pigs etc. that are intended for remelting, e.g. in the context of battery or alloy production, are classified as substances or mixtures according to CLP, depending on their composition.
- The transportation of dangerous goods by road or rail is regulated internationally by ADR/RID, in which section 2.2.9.1.10.5 also refers to the classification as an environmentally hazardous substance in accordance with the CLP Regulation.
- Lead metal is neither listed as dangerous goods in Section 3.2 of the UN Model Regulations (UN transport recommendations) nor in Table A of Section 3.2 of ADR 2025.
- It is therefore the responsibility of the consigner to determine whether the product to be transported (in this case lead in solid form) meets one of the criteria for classification as dangerous goods.

- The "ILA guidelines for the transport classification of lead metal ingots[1] " contain a detailed description of an examination procedure for lead metal ingots (> 99.97 % lead, 25-45 kg) with regard to their environmentally hazardous properties. The background to this is the possibility provided for in ADR section 2.2.9.1.10.1.3[2] of classifying the material actually transported. As a result, the chronic aquatic toxicity according to section 2.2.9.1.10.3 ("*Categories and criteria for the classification of substances"*) of the ADR and the classification based on the CLP Regulation (see section 2.2.9.1.10.5) are overwritten.
- The water hazard classification for lead in solid form can therefore be derived directly from the comparison of the dissolution data of the transported material from the OECD *Transformation Dissolution protocol (T/Dp)* and the corresponding known ecotoxicity reference values (ERVs) of the soluble lead ion from acute and chronic aquatic toxicity test data. Since lead bars cannot be tested directly with the standardized T/Dp protocol due to their size and shape, the Critical Surface Approach (CSA) is also used. This is a method that was specially developed for evaluating poorly soluble inorganic substances. Typical lead ingots have a significantly smaller specific surface area (less than 0.0074 mm²/mg) than a standard solid sphere with a diameter of 1 mm (0.529 mm²/mg), as used as the basis for the CLP classification for solid lead.

➢ **The assessment according to Annex 10 of the GHS (T/Dp protocol) shows that commercial lead metal ingots transported by road or rail do not meet the classification criteria to be classified to the entry for "*UN 3077 Environmentally Hazardous Substance*". Accordingly, they are not dangerous goods within the meaning of ADR/RID.**

2) Lead-containing alloys (mixtures)

- The argument in favor of lead as a substance according to the ILA guidelines represents a worst-case scenario for pure lead. Studies on copper alloys[3] show that the specific lead migration, i.e. in relation to the lead content, is of the same order of magnitude as that from pure lead. Lead-containing alloys in a similar form therefore do not release more lead than pure lead ingots. It therefore makes no sense to classify lead-containing alloys in a similar form as *"UN 3077 Environmentally hazardous substance"* under dangerous goods legislation. This includes, for example, lead-based alloys with low proportions of other metals (e.g. tin or antimony in the low single-digit percentage range), copper-based brass ingots with a lead content of approx. 3.5% and other alloys that contain lead in contents of > 0.25%.
- Irrespective of this consideration, mixtures must be classified independently in accordance with the requirements of the CLP Regulation before being placed on the market, as they are not covered by the substance-related harmonized classification and labelling of the CLP Regulation. They can be classified on the basis of the individual components of the mixture, but also on the basis of information on the mixture itself. If test data on the mixture itself is available, it can usually be compared directly with the classification criteria for substances in Annex I of CLP and the mixture can then be classified accordingly (see section 1.6.3.1 of the *Guidance on the Application of the CLP Criteria*).

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[1] https://ila-reach.org/wp-content/uploads/2024/06/UN-Transport-of-Dangerous-Goods_Lead-Ingots_20_5_24.pdf

[2] While the following classification procedure is intended to apply to all substances and mixtures, it is recognized that in some cases, e.g. metals or poorly soluble inorganic compounds, special guidance will be necessary [This can be found in Annex 10 of the GHS].

[3] K. Delbeke et al. Regulatory Toxicology and Pharmacology 117 (2020) 104754

- Alloys are considered mixtures for the purposes of classification and labeling (CLP Article 2 (27)). However, they are not simple mixtures of metals or metal compounds, as the alloy has significantly different properties compared to a classical mixture of its metal components. In particular, the solubility properties may differ significantly from those observed for each individual component of the alloy. The rate and extent to which the components of the alloy react to convert to water-soluble forms can be determined using the T/Dp protocol according to Annex 10 of the GHS or Annex IV.5.6 of the *Guidance on the Application of the CLP Criteria*, *Parts 4 and 5* for environmentally hazardous properties. If such data are available and the criteria for environmental classification are not met, lead-containing alloys do not have to be classified. In this case, all possible consequences linked to the classification in downstream legal areas, including the assessment of mixtures for transportation, will no longer apply.
- The REACH consortia have already carried out such T/Dp tests for most base metals and important lead-containing alloy groups. According to our information, this has not yet resulted in any indications for a classification as environmentally hazardous with regard to lead in alloys.
- The presence of other components that are classified as hazardous according to ADR may have transport law implications in mixtures. These are not considered in the context of this item.

➢ **Lead-containing mixtures in the form of solid alloys (alloy blocks) are not dangerous goods in the sense of ADR/RID. Significantly smaller forms of alloys may have to be assessed individually.**
➢ **Alloys can be classified on the basis of tests according to the T/Dp protocol. If such data are available and the criteria for environmental classification are not met, alloys do not have to be classified in accordance with the CLP Regulation and are therefore not dangerous goods within the meaning of transport law.**

3) Articles containing lead according to CLP

- Articles are excluded from the scope of the CLP Regulation. In Article 3 No. 3 of the REACH Regulation, an article is defined as an object whose external form is decisive for its function. The chemical composition only plays a subordinate role. This is also the decisive criterion for differentiation from substances or mixtures. This does not mean that the chemical composition is not a characteristic of an article, but it is not the determining factor. The following, for example, are therefore to be regarded as articles: sheets, profiles, rods, tubes, wire (not welding wire), foils or castings, regardless of their lead content.

➢ **The CLP Regulation does not apply to articles. A conclusion on transportation law cannot be derived from this.**
➢ **If test results in accordance with the T/Dp protocol are available for the alloys of which the articles are made and the criteria for environmental classification are not met, the corresponding articles are not dangerous goods in the sense of transport law.**

4) Articles according to ADR/RID containing lead

- ADR/RID 2.1.5.1 describes articles as machinery, apparatus or other devices containing one or more dangerous goods (or residues thereof) that are an integral element of the article, necessary for its functioning and that cannot be removed for the purpose of carriage.
- In the ADR/RID, dangerous goods (substances or articles) can be found in Chapter 3.2 Table A, the list of dangerous goods. This means that special requirements are listed for objects if there are relevant hazards for transportation. Articles containing lead are not listed in Table A of Chapter 3.2 of the ADR/RID.
- In addition, the requirements of section 2.2.9.3 apply to substances and articles not listed by name in Table A of Chapter 3.2. With reference to the environmentally hazardous properties (classification

code: solid M7), however, only substances are relevant. A general extension of the scope of the ADR/RID to articles does not result from this either.

- **There are no explicit specifications in the ADR/RID for articles containing lead.**
- **If the ADR/RID requirements for articles containing lead are applied to articles containing lead in accordance with CLP, this does not result in classification as dangerous goods within the meaning of transport law.**

5) Waste containing lead

- According to the Waste Catalogue Ordinance (AVV), a waste must be assigned a waste code number. The AVV provides for three types of waste codes: absolutely non-hazardous waste (waste code number without an asterisk), absolutely hazardous waste (waste code numbers with an asterisk) and waste code numbers with a mirror entry (can be hazardous or non-hazardous waste depending on the actual composition). Waste code numbers typical for non-ferrous metal waste, such as 12 01 03 (*non-ferrous metal filings and turnings*), 12 01 04 (*non-ferrous metal dust and particles*), 16 01 18 (*non-ferrous metals*), 17 04 01 (*copper, bronze, brass*), 19 10 02 (*non-ferrous metal waste*) and 19 12 03 (*non-ferrous metals*) are absolutely non-hazardous waste code numbers.
- If the assignment of waste to a waste code number is not clear, the waste must be assessed individually. According to the AVV, there is an exemption for pure metal alloys in solid form in the annex "*List of Wastes*" number 2.2.4, as long as they are not contaminated with hazardous substances. By hazardous contaminants, we mean hazardous substances adhering to the surface, e.g. certain oils, emulsions or coatings, and not the components of the metal alloy itself that are to be classified as hazardous, e.g. lead in an alloy. The exemption thus expressly applies only to metal alloys in solid form, i.e. it does not apply to powdered metal alloys.
- The term "solid form" is not defined in the AVV. Based on the procedure according to the CLP Regulation, it can be assumed that metals or metal alloys are present in solid form from a particle size of 1 mm. For example, according to Table 3 in Annex VI of the CLP Regulation, solid lead is defined by the particle size ≥ 1 mm.
- It follows that: Alloy components classified under chemicals legislation (deliberately added) never make scrap a hazardous waste. This also applies analogously to alloys of two or more substances classified as hazardous substances. Logically, this must also apply to minor traces of hazardous classified metals that are contained as impurities in an alloy or a pure metal. These scrap metals are also not to be classified. This also applies to metals classified as hazardous in pure form (e.g. lead scrap, unalloyed).
- However, this exception does not apply to "non-massive" (dispersed) lead-containing waste such as dust, slag or sludge. For these wastes, the AVV must be applied in conjunction with Annex III of the Waste Framework Directive (Directive 2008/98/EC) on the hazard criteria (HP criteria). Here, substances of categories 1A and 1B (HP 10) in waste that are toxic to reproduction must be classified as hazardous waste under waste legislation from contents of 0.3 % and substances classified as hazardous to the environment (HP 14) from the respective applicable contents.
- All these arguments point to a low risk in the handling of this waste. The risk for transportation must also be regarded as correspondingly low. However, an automatic transfer to the area of transport law cannot be derived from this. From a risk point of view, it nevertheless seems logical not to trans-port such waste as hazardous goods.
- In principle, lead and alloy scrap can also be assessed under dangerous goods legislation on the basis of tests in accordance with the T/Dp protocol (see sections 1 and 2). If such data is available and the criteria for environmental classification are not met, these scrap metals are not dangerous goods in the sense of transportation law.
- Notwithstanding this, the provisions of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal apply.

- **Waste in the form of lead or lead-containing scrap that is assigned an "absolutely non-hazardous" waste code number in accordance with the Waste Framework Directive poses a low risk during handling.**
- **For certain wastes, the alloy exemption of the Waste Catalogue Ordinance applies with regard to the classification of lead as environmentally hazardous or toxic to reproduction, i.e. these hazard criteria are not applicable to pure metal alloys in solid form (usually metal scrap).**
- **Lead or alloy scrap that does not have to be classified as environmentally hazardous on the basis of tests for the alloys in accordance with the T/Dp protocol is not a hazardous good within the meaning of transport law.**

POSITIONS ON LEAD CLASSIFICATION AND TRANSPORT LAW

- Commercial lead metal ingots do not meet the classification criteria to be assigned to the entry for "*UN 3077 Environmentally Hazardous Substance*" according to ADR/RID.
- Lead-containing alloys (mixtures) in a similar form to lead ingots, e.g. brass ingots, can never release more lead than pure lead ingots. Therefore, these alloys are not dangerous goods either. Irrespective of this, alloys can be tested as such in accordance with the requirements of the CLP Regulation. If such data is available for alloys and the criteria for environmental classification are not met, they do not have to be classified. In this case, all consequences linked to the classification in downstream legal areas are also waived.
- The CLP Regulation does not apply to articles. Products containing lead are not dangerous goods in the sense of transportation law.
- Lead or alloy scrap that does not have to be classified as environmentally hazardous on the basis of tests in accordance with the T/Dp protocol is not a dangerous good within the meaning of transport law.

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