EUROPEAN
COMMISSION

Brussels, XXX
[…](2024) XXX draft

ANNEX

ANNEX

to the

COMMISSION DELEGATED REGULATION

supplementing Regulation (EU) 2023/1542 of the European Parliament and of the Council by establishing the methodology for the calculation and verification of the rates for recycling efficiency and recovery of materials of waste batteries, and the format for the documentation

ANNEX

Methodology for calculation and verification of rates for recycling efficiency for lead-acid batteries, lithium-based batteries, nickel-cadmium batteries and other waste batteries and recovery of materials for cobalt, copper, lead, lithium and nickel, and the format for the documentation

1 **Definitions**

For the purposes of this Annex, the following definitions shall apply:

(1) **"lithium-based battery"** means any battery containing lithium in the active materials the reaction of which generates electrical energy;

(2) **"input fraction"** means the mass, on water-free basis, of waste batteries prepared for recycling and entering the waste battery recycling process per calendar year, measured in tonnes; input fractions include the mass of waste battery components dismantled during preparation for recycling, including storing, sorting, discharging, depollution and dismantling of waste batteries, whether or not all or only some of those operations are carried out, also where those components enter other recycling processes than a waste battery recycling process. Input fractions for the calculation of recycling efficiency include:

- dry mass of water-based fluids and acids, namely the mass of the solute;
- the mass of waste battery casing;
- cables that are integral part of the battery as made available on the market and necessary to its operation, excluding the cables required to connect the battery to the final equipment;
- any external part included in the battery as made available on the market, such as screens and printed circuit boards;
- waste modules and cells discarded from preparation for re-use or preparation for repurposing operations and sent to recycling;
- battery manufacturing waste, when it comes in the configuration of a waste cell, module or pack.

Input fractions for calculating the rate of recovery of material for cobalt, copper, lithium and nickel include mass of cobalt, copper, lithium and nickel from recycling waste anode and cathode active materials, current collectors and electrolyte salts. Input fractions for calculating the rate of recovery of material for lead include the mass of any component of lead-acid waste batteries;

(3) **"intermediate fraction"** means the mass of waste batteries which is neither an input nor an output fraction and is destined for subsequent step(s) in the waste battery recycling process, where the subsequent steps have the aim of converting the intermediate fraction into one or more output fractions;

(4) **"output fraction"** means the mass of waste batteries obtained from the recycling process derived from input fractions and which is converted into materials, substances or products to be used for their original purpose or other purposes but excluding landfill construction, backfilling operations, reprocessing into materials that are to be used as fuels and energy recovery; output fractions include:

- mass of converted casings and external parts;
- mass of converted plastics;
- mass of converted slag, only for the purpose of calculating recycling efficiency. Metals such as lithium contained in the slag are not taken into account in calculating the rate of recovery of materials;

(5) **“black mass”** means a mixture of cathodic and anodic materials liberated through (thermo-) mechanical treatment of any input fraction.

The recovery of the metals contained therein requires further processing to be taken into account in calculating the recovery of material. Hence black mass is an intermediate fraction and cannot be considered as output fraction until it fulfils the requirements for an output fraction.

(6) **“impurities”** means non-intended or non-targeted constituents that are detrimental to the recycling process and were not intentionally added. Impurities in the input fractions can be the result of missorting. Impurities in the output fractions can be the result of secondary or incomplete reactions during the recycling process and are present in the output fractions even if not sought by the recycler.

Impurities present in the input fractions are part of their mass. Impurities resulting from reactions (e.g. chemicals) are not considered to be part of the mass of output fractions;

(7) **“first recycler”** means a recycler who carries out recycling in the permitted facility where the recycling process commences if the same battery waste stream goes through more than one facility consecutively. A waste management operator who only conducts preparation for recycling, including the storage, handling and dismantling of battery packs or the separation of fractions that are not part of the waste battery itself, cannot be the first recycler.

2 Method for calculating the rate of recycling efficiency for waste batteries in relation to a recycling process

(1) The rate of recycling efficiency for waste batteries in relation to a recycling process shall be calculated in mass percentage as follows:

$$rRE = \frac{\sum m_{output,}}{m_{input}} \times 100, \text{ [mass \%]}$$

where:

rRE = rate of *recycling efficiency* for waste batteries in relation to a recycling process [in mass %];

m_{output} = output fractions taken into account for recycling per calendar year [in tonnes];

m_{input} = input fractions per calendar year [in tonnes].

(2) The rate of recycling efficiency shall be calculated separately for each input stream of the following waste battery chemistries:

- lead-acid batteries,
- lithium-based batteries,
- nickel-cadmium batteries,
- other batteries.

(3) The rate of recycling efficiency shall be calculated on the basis of the chemical composition of the input and output fractions. The following applies in respect of the input fractions:

- recyclers shall determine the share of different waste battery chemistries present in an input fraction by conducting a sorting analysis of the fractions by continuous or representative sampling;
- recyclers shall determine the overall chemical composition of the input fraction through at least one of the following, equivalent methods:
  - on the basis of information provided by the battery producers, where that information is available in an electronic record (for instance the battery passport referred to in Article 77 of Regulation (EU) 2023/1542);
  - by determining the chemical composition of all the output fractions plus emissions and waste resulting from treatment;
  - by sampling and analysing the input fraction.

(4) *[That is already provided for in section 1, no need to repeat that.]*Emissions to air, water and soil, as defined in Directive 2010/75/EU of the European Parliament and of the Council[1], shall not be taken into account in calculating recycling efficiency.

(5) Oxygen, carbon from carbon sources at cell level, iron from iron sources at cell level, phosphorus, chlorine, and sulphur may be taken into account in calculating recycling efficiency, in m_{input} and in m_{output}.

[1] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, p. 17, ELI: http://data.europa.eu/eli/dir/2010/75/oj).

3 Method for calculating the rates of recovery of materials (cobalt, copper, lithium, nickel and lead) from the recycling of waste batteries

(1) The rate of recovery of materials is calculated as follows:

$$\text{rRM (TM)} = \frac{\sum m_{TM,output-point}}{m_{TM,input}} \text{ x } 100, \text{ [mass \%]}$$

where:

TM = any of the target materials listed in in Part C of Annex XII to Regulation (EU) 2023/1542;

rRM = calculated rate of recovery of materials from waste batteries in relation to a recycling process [in mass %];

mTM, output–point = the mass of the target material in output fractions taken into account in the rate of recovery of materials, namely the mass of TM contained in the output fractions at the RM calculation-point per calendar year [in tonnes];

mTM, input = the mass of the target material in the input fraction , namely the yearly average mass of TM contained in the input fractions per calendar year [in tonnes].

(2) "The calculation point for the recovery of material (**RM calculation point**)" means the step in the waste battery recycling process at which the target materials listed in Part C of Annex XII to Regulation (EU) 2023/1542 are recovered as materials, substances or products that can substitute primary materials, substances or products in industrial processes of manufacturing. Output fractions at the RM calculation-point shall be the only output fractions to be taken into account in calculating the rate of recovery of materials.

(3) The recovered material shall have a TM content as high as technically feasible while avoiding excessive costs.

4 Format of documentation on the treatment of substances listed under point (5) and point (6) of Part A of Annex XII of Regulation (EU) 2023/1542

(1) The streams of substances listed under point (5) and point (6) of Part A of Annex XII of the Regulation resulting from the recycling of waste batteries and containing mercury and cadmium, shall be explicitly stated in the documentation in accordance with sections 8 and 9.

(2) The total amount of cadmium which is given a safe destination in accordance with point 6 of Part A of Annex XII to Regulation (EU) 2023/1542 shall be indicated as follows in the documentation in accordance with section 8 [of this Annex]:

$$Cd_R = \frac{\sum m_{Cd,output}}{m_{Cd,input}} \text{ x } 100, \text{ [mass \%]}$$

$$Cd_D = \frac{\sum m_{Cd,waste}}{m_{Cd,input}} \text{ x } 100, \text{ [mass \%]}$$

where:

Cd_R = calculated rate of recycled cadmium (Cd) from a waste battery recycling process [in mass %];

$m_{Cd,\ output}$ = the mass of Cd in output fractions taken into account for recycling, namely the share of Cd contained in those fractions which result from the recycling of nickel-cadmium batteries per calendar year [in tonnes].

$m_{Cd,\ input}$ = the mass of Cd in the input fraction, namely the yearly average Cd content of waste nickel-cadmium batteries, multiplied by the input mass of those batteries or fractions per calendar year [in tonnes].

Cd_D = calculated rate of cadmium (Cd) from a waste battery recycling process safely immobilised and disposed of [in mass %];

$m_{Cd,\ waste}$ = the mass of Cd in the waste fractions safely immobilised and disposed of at the exit of the waste battery recycling process[in tonnes].

(3) The total amount of mercury which is safely immobilised and disposed of in accordance with point 5 of Part A of Annex XII to Regulation (EU) 2023/1542 shall be indicated as follows in the documentation in accordance with section 9 of this Annex:

$$Hg_D = \frac{\sum m_{Hg,waste}}{m_{Hg,input}} \text{ x } 100, \text{ [mass \%]}$$

where:

Hg_D = calculated rate of mercury (Hg) from a waste battery recycling process safely immobilised and disposed of [in mass%];

$m_{Hg,waste}$ = the mass of Hg safely immobilised and disposed as waste at the exit of the waste battery recycling process [in tonnes].

$m_{\ Hg,input}$ = the mass of Hg in the input fraction, namely the yearly average Hg content of waste batteries multiplied by the input mass of mercury batteries per calendar year [in tonnes].

5 Method of filling in documentation for calculating recycling efficiency and recovery of materials from waste batteries

(1) Recyclers shall provide the data and information set out in sections 2, 3 and 4 every year, broken down by Member State in which the waste batteries were collected. They shall send it to the competent authorities of the Member States in which the waste batteries were treated. Those authorities shall give the information set out in this section to the competent authorities of the Member States in which the waste batteries were collected, if different. The data and information provided in accordance with this section may also be considered for the purposes of complying with the requirements of Article 75(5) of Regulation (EU) 2023/1542. The first period for which data and information shall be provided shall be the calendar year 2026.

(2) Data and information on the rates of recycling efficiency and recovery of materials shall cover all individual steps of the waste battery recycling process and all corresponding output fractions.

(3) Where a waste battery recycling process is carried out at more than one permitted facility, the first recycler shall be responsible for collecting and providing the information required under points 1 and 2 to the competent authorities of the Member State.

(4) Where waste holders other than waste management operators carrying out treatment and recyclers export waste batteries for treatment, they shall provide to the competent authorities of the Member States in which they are located data on the amount of separately collected waste batteries exported for treatment and the data on:

- the quantity of waste batteries that began to undergo preparation for re-use, preparation for repurposing or recycling processes;
- recycling efficiency for waste batteries, recovery of materials from waste batteries and the destination and yield of the final output fractions.

(5) For the purposes of point 1 and point 2 of this section, the following data and information shall be provided using the documentation format set out in sections 6 to 9.

- full name, possible abbreviations and geographical location, including Member State(s) in which the process took place, of the first recycler;
- the calendar year for which the documentation is provided;
- battery chemistry (lead-acid, lithium-based, nickel-cadmium, others) treated and, for lithium-based batteries, also the main treated chemistry;
- a flowsheet for each treatment included in the documentation, from preparation for recycling to output fractions taken into account for the recovery of material or for safe destination, in accordance with sections 1 to 4;
- a detailed list of input, intermediate and output fractions;
- the rate of recycling efficiency and recovery of materials for each treatment carried out on each battery chemistry (lead-acid, lithium-based, nickel-cadmium, others) accepted at the recycling *[or 'permitted'?]* facility;
- the amount of cadmium recycled or disposed of and the amount of mercury safely immobilised and disposed of, in accordance with section 4.

6 Format of documentation for the rate of recycling efficiency and recovery of materials from lead-acid waste batteries

Part 1. For recycling of lead-acid waste batteries, the following shall be documented:

Rates of recycling efficiency and recovery of materials of a lead-acid waste battery recycling

Calendar year

Facility ([1])	
Name	
Street	
City	
Country	
Contact person	
Tel.	
Email	
Postal code	

Description of the complete battery recycling process ([2]):

Insert in this cell a flow-chart and/or a description of the recycling steps

Entering the complete waste battery recycling process ([3])

Type of waste batteries	EWC code	Mass ([4]): [t/a]

Elements or components **part of** the input fraction		
Element or compound	mass %	m_{input} [t/a] ([5])
Total lead (Pb)		
Dry sulphuric acid (H_2SO_4)		
Plastics ([6])		
Steel		
Other (please specify) ([7])		
Total	100	

*Elements or components **not part of** the input fraction*	
Element or compound	mass [t/a]
Impurities ([8])	
Water (H_2O) ([9])	
Other (please specify) ([7])	
Total mass not part of the input fraction	

RESULTS – calculated by first recycler:

Element or compound	**Output ([5]) generated in the Member State, in which the batteries were collected [t/a]**	**Output ([5]) generated in a Member State different from the Member State in which the batteries were collected [t/a]**	**list the Member State different from the Member State in which the batteries were collected**	**Output ([10]) generated outside the EU [t/a] ([10])**	**Total output m_{output} ([5]) [t/a]**	**rRE ([11]) [mass %]**	**rRM ([12]) [mass %]**
Total lead (Pb)							
Dry sulphuric acid (H2SO4)							
Plastics ([6])							
Steel							
Other (please specify) ([7])							
Total							

VERIFICATION – filled-in by the competent authority (authorities)

Verification techniques ([13])

☐ verification of overall calculations ☐ auditing by competent authority (including visits to sites)

☐ verification on proofs by documentation ☐ self-auditing by external companies

Notes

([1]) Facility treating the waste batteries after collection, eventual sorting and preparation for recycling.

([2]) Flowchart or description of the complete recycling , even if carried out in more than one facility, highlighting which are the processes carried out at the first recycler and which are the processes (if any) carried out outside the Union and the related output fractions.

([3]) Description of waste batteries as received after collection, eventual sorting and preparation for recycling.

([4]) Wet mass of waste batteries as received after collection, eventual sorting and preparation for recycling.

([5]) For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([6]) Plastics that are recycled and for which the m_{input} as well as the m_{output} are measured, are indicated in the list separately from carbon

([7]) Add other cells if necessary to specify other elements or compounds

([8]) For definition of impurities and instructions on how to account them in the calculations, see section 1, point 6.

([9]) Water (H_2O) content.

([10]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation.

([11]) Calculated in accordance with the formula of rRE in section 2 and in accordance with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([12]) Calculated in accordance with the formula for rRM(TM) in section 3 and in accordnace with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([13]) Indicate the number of verifications executed per techniques. For verification on overall calculations, the number shall be 1 corresponding to the mandatory verification on calculations reporting by first recyclers. For the other verification techniques, the number can vary from 0 -if none of these were carried out- to 1 -if these other techniques were carried out only on first recycler- to the total number of actors in the recycling chain -if they were carried out on all the actors of the recycling chain as indicated in part (2) of of this template.

Part 2. Individual steps of recycling, i.e. all recycling facilities involved, shall be documented:

Recycling step		**N**		
Calendar year				
Facility ([1])	Name			
	Street			
	City		Postal code	
	Country			
	Contact person			
	Tel.			
	Email			
Description of the individual process step(s):				
Insert in this cell a flow-chart and/or a description of the individual recycling process step				

Entering the process step(s) (waste batteries or their fraction) ([2]):

Type of input	EWC code	Mass ([3]): [t/a]

Recycling

(1) Intermediate fractions ([4])

Type of input	EWC code	Mass: [t/a]	Further treatment	Further operator ([5])	Further process step
					N_1
					N_2
					N_3
					N_4
					N_5

(2) Outputs that account for rRE and rRM calculations ([6])

Element or compound, targeted	Non-waste fraction containing the element or compound	Concentration of the element or compound in the fraction: [mass %]	Output generated in the Member State, in which the batteries were collected [t/a]	Output generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output ([8]) generated outside the EU [t/a] (10)	Total mass of the output generated [t/a]	Destination and yield of the fraction
Total lead (Pb)								
Dry sulphuric acid (H2SO4)								
Plastics ([9])								
Steel								
Other (please specify) ([10])								
	m_{output} from step N ([11]) [t/a]							

Notes

([1]) Facility carrying out an individual recycling process step .

([2]) For step 1 = the same as input into the complete waste battery recycling in part (1) of the template. For subsequent steps = intermediate fractions coming from the previous process step.

([3]) Mass of intermediate fraction entering the invidual recycling process step. For step 1 = the same as input into the complete waste battery recycling in part (1).

(4) For the definition of 'intermediate fraction', see section 1, point 3. For black mass, see section 1, point 5 and ensure that the chemistry of the waste battery, or the main chemistry in mass% in case of mixtures, is indicated next to the term 'black mass', e.g. "black mass-ZnC" or "black mass-NMC".

([5]) Facility where the intermediate fraction is treated, including name, street, city, postal code, country, contact person, telephone, email. If the further process step is carried out at the same facility as the preceding step, insert "same as preceding".

([6]) For the definition of 'output fraction', see section 1, point 4.

([7]) Elements and compound recovered from the input waste battery. For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([8]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation.

([9]) Plastics that are recycled and for which the minput as well as the moutput are measured, are indicated in the list separately from carbon

([10]) Add other cells if necessary to specify other elements or compounds

([11]) The addition of N m_{output} from N steps shall equal the total m_{output} of the rRE calculations

7 Format of documentation for the rate of recycling efficiency and recovery of materials from lithium-based waste batteries

Part 1: For recycling of lithium-based waste batteries, the following shall be documented:

Rates of recycling efficiency and recovery of materials of a lithium-based waste battery recycling

Calendar year

Facility ([1])				
	Name			
	Street			
	City		Postal code	
	Country			
	Contact person			
	Tel.			
	Email			

Description of the complete battery recycling process ([2]):

Insert in this cell a flow-chart and/or a description of the recycling steps

Entering the complete waste battery recycling process ([3]):

Type of waste batteries	EWC code	Mass ([4]): [t/a]

Elements or components **part of** the input fraction		
Element or compound	mass %	m_{input} [t/a] ([5])
Cobalt (Co)		
Copper (Cu)		
Lithium (Li)		
Nickel (Ni)		
Manganese (Mn)		
Aluminium (Al)		
Steel		
(list all metals)		
Plastics ([6])		
Oxygen (O_2) ([7])		
Carbon from carbon sources at cell level (C) ([7])		
Iron from iron sources at cell level (Fe) ([7])		
Phosphorus (P) ([7])		
Chlorine (Cl) ([7])		
Sulphur (S) ([7])		
Other (please specify) ([8])		
Total	100	

*Elements or components **not part of** the input fraction*	
Element or compound	mass [t/a]
Impurities ([9])	
Water (H_2O) ([10])	
Other (please specify) ([8])	
Total mass not part of the input fraction	

RESULTS – calculated by first recycler:

Element or compound	Output ([5]) generated in the Member State, in which the batteries were collected [t/a]	Output ([5]) generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output ([5]) generated outside the EU [t/a] ([11])	Total output m_{output} ([5]) [t/a]	rRE ([12]) [mass %]	rRM ([13]) [mass %]
Cobalt (Co)							
Copper (Cu)							
Lithium (Li)							
Nickel (Ni)							
Manganese (Mn)							
Aluminium (Al)							
Steel							
(list all metals)							
Plastics ([6])							
Oxygen (O_2) ([7])							
Carbon from carbon sources at cell level (C) ([7])							
Iron from iron sources at cell level (Fe) ([7])							
Phosphorus (P) ([7])							
Chlorine (Cl) ([7])							
Sulphur (S) ([7])							
Other (please specify) ([8])							
Total							

VERIFICATION – filled-in by the competent authority (authorities)

Verification techniques [14]

☐ verification of overall calculations ☐ auditing by competent authority (including visits to sites)

☐ verification on proofs by documentation ☐ self-auditing by external companies

Notes

(1) Facility treating the waste batteries after collection, eventual sorting and preparation for recycling.

([2]) Flowchart or description of the complete recycling , even if carried out in more than one facility, highlighting which are the processes carried out at the first recycler and which are the processes (if any) carried out outside the Union and the related output fractions.

([3]) Description of waste batteries as received after collection, eventual sorting and preparation for recycling.

([4]) Wet mass of waste batteries as received after collection, eventual sorting and preparation for recycling.

([5]) For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([6]) Plastics that are recycled and for which the m_{input} as well as the m_{output} are measured, are indicated in the list separately from carbon

([7]) If not taken into account in calculating recycling efficiency in accordance with section 2, point 5, leave empty.

([8]) Add other cells if necessary to specify other elements or compounds

([9]) For definition of impurities and instructions on how to account them in the calculations, see section 1, point 6.

([10]) Water (H_2O) content.

([11]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation.

([12]) Calculated in accordance with the formula of rRE in section 2 and in accordance with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([13]) Calculated in accordance with the formula for rRM(TM) in section 3 and in accordnace with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([14]) Indicate the number of verifications executed per techniques. For verification on overall calculations, the number shall be 1 corresponding to the mandatory verification on calculations reporting by first recyclers. For the other verification techniques, the number can vary from 0 -if none of these were carried out- to 1 -if these other techniques were carried out only on first recycler- to the total number of actors in the recycling chain -if they were carried out on all the actors of the recycling chain as indicated in part (2) of of this template.

Part 2: Individual steps of recycling, i.e. all recycling facilities involved, shall be documented:

Recycling step	**N**			
Calendar year				
Facility ([1])	Name			
	Street			
	City		Postal code	
	Country			
	Contact person			
	Tel.			
	Email			

Description of the individual process step(s):

Insert in this cell a flow-chart and/or a description of the individual recycling process step

Entering the process step(s) (waste batteries or their fraction) ([2]):

Type of input	EWC code	Mass ([3]): [t/a]

Recycling

(1) Intermediate fraction ([4])

Type of input	EWC code	Mass: [t/a]	Further treatment	Further operator ([5])	Further process step
					N_1
					N_2
					N_3
					N_4
					N_5

(2) Output that accounts for rRE and rRM calculations ([6])								
Element or compound, targeted or non targeted ([7])	Non-waste fraction containing the element or compound	Concentration of the element or compound in the fraction: [mass %]	Output generated in the Member State, in which the batteries were collected [t/a]	Output generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output generated outside the EU [t/a] ([8])	Total mass of the output generated [t/a]	Destination and yield of the fraction
Cobalt (Co)								
Copper (Cu)								
Lithium (Li)								
Nickel (Ni)								
Manganese (Mn)								
Aluminium (Al)								
Steel								
(list all metals)								
Plastics ([9])								
Oxygen (O_2) ([10])								
Carbon from carbon sources at cell level (C) ([10])								
Iron from iron sources at cell level (Fe) ([10])								
Phosphorus (P) ([10])								
Chlorine (Cl) ([10])								
Sulphur (S) ([10])								
Other (please specify) ([11])								
Total								
		m_{output} from step N ([12])[t/a]						

([1]) Facility carrying out an individual recycling process step .

([2]) For step 1 = the same as input into the complete waste battery recycling in part (1) of the template. For subsequent steps = intermediate fractions coming from the previous process step.

([3]) Mass of intermediate fraction entering the invidual recycling process step. For step 1 = the same as input into the complete waste battery recycling in part (1).

(4) For the definition of 'intermediate fraction', see section 1, point 3. For black mass, see section 1, point 5 and ensure that the chemistry of the waste battery, or the main chemistry in mass% in case of mixtures, is indicated next to the term 'black mass', e.g. "black mass-ZnC" or "black mass-NMC".

([5]) Facility where the intermediate fraction is treated, including name, street, city, postal code, country, contact person, telephone, email. If the further process step is carried out at the same facility as the preceding step, insert "same as preceding".

([6]) For the definition of 'output fraction', see section 1, point 4.

([7]) Elements and compound recovered from the input waste battery. For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([8]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation.

([9]) Plastics that are recycled and for which the minput as well as the moutput are measured, are indicated in the list separately from carbon

([10]) If not taken into account in calculating recycling efficiency in accordance with section 2, point 5, leave empty.

([11]) Add other cells if necessary to specify other elements or compounds

([12]) The addition of N m_{output} from N steps shall equal the total m_{output} of the rRE calculations

8 Format of documentation for the rate of recycling efficiency and recovery of materials from nickel-cadmium waste batteries

Part 1: For recycling of nickel-cadmium waste batteries, the following shall be documented:

Rates of recycling efficiency and recovery of materials of a nickel-cadmium waste battery recycling

Calendar year

Facility ([1])		
	Name	
	Street	
	City	
	Country	
	Contact person	
	Tel.	
	Email	

Postal code

Description of the complete battery recycling process ([2]):

Insert in this cell a flow-chart and/or a description of the recycling steps

Entering the complete waste battery recycling process ([3]):

Type of waste batteries	EWC code	Mass ([4]): [t/a]

Elements or components **part of** the input fraction		
Element or compound	mass %	m_{input} [t/a] ([5])
Cobalt (Co)		
Copper (Cu)		
Lithium (Li)		
Nickel (Ni)		
Manganese (Mn)		
Aluminium (Al)		
Metal 1 (e.g. Fe)		
(group of) metal 2 (e.g. REE)		
Cadmium (Cd)		
Steel		
(list all metals)		
Electrolyte (KOH)		
Plastics ([6])		
Other (please specify) ([7])		
Total	100	

Elements or components ***not part of*** *the input fraction*	
Element or compound	mass [t/a]
Impurities ([8])	
Water (H_2O) ([9])	
Other (please specify) ([7])	
Total mass not part of the input fraction	

RESULTS – calculated by first recycler:

Element or compound	Output ([5]) generated in the Member State, in which the batteries were collected [t/a]	Output ([5]) generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output ([5]) generated outside the EU [t/a] ([10])	Total output m_{output} ([5]) [t/a]	rRE ([11]) [mass %]	rRM ([12]) [mass %]	Total Cadmium (Cd) ([13]) safely immobilised and disposed [t/a]
Cobalt (Co)								
Copper (Cu)								
Lithium (Li)								
Nickel (Ni)								
Manganese (Mn)								
Aluminium (Al)								
Metal 1 (e.g. Fe)								
(group of) metal 3 (e.g. REE)								
Cadmium (Cd) ([13])								
Steel								
(list all metals)								
Electrolyte (KOH)								
Plastics ([6])								
Other (please specify) ([7])								
Total								

	[mass %]	Indicate in part(2) the Cd content in each output fraction for Cd containing flows
Cd_D ([13])		
Cd_R ([13])		

VERIFICATION – filled-in by the competent authority (authorities)

Verification techniques [14]

- ☐ verification of overall calculations
- ☐ verification on proofs by documentation
- ☐ auditing by competent authority (including visits to sites)
- ☐ self-auditing by external companies

Notes

([1]) Facility treating the waste batteries after collection, eventual sorting and preparation for recycling.

([2]) Flowchart or description of the complete recycling , even if carried out in more than one facility, highlighting which are the processes carried out at the first recycler and which are the processes (if any) carried out outside the Union and the related output fractions.

([3]) Description of waste batteries as received after collection, eventual sorting and preparation for recycling.

([4]) Wet mass of waste batteries as received after collection, eventual sorting and preparation for recycling.

([5]) For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([6]) Plastics that are recycled and for which the m_{input} as well as the m_{output} are measured, are indicated in the list separately from carbon

([7]) Add other cells if necessary to specify other elements or compounds

([8]) For definition of impurities and instructions on how to account them in the calculations, see section 1, point 6.

([9]) Water (H_2O) content.

([10]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation.

([11]) Calculated in accordance with the formula of rRE in section 2 and in accordance with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([12]) Calculated in accordance with the formula for rRM(TM) in section 3 and in accordnace with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([13]) For documentation of Cd, see section 4. Competent authorities have to verify that the total amount of CdR + CdD corresponds to the amount of Cd in the m_{input} .

([14]) Indicate the number of verifications executed per techniques. For verification on overall calculations, the number shall be 1 corresponding to the mandatory verification on calculations reporting by first recyclers. For the other verification techniques, the number can vary from 0 -if none of these were carried out- to 1 -if these other techniques were carried out only on first recycler- to the total number of actors in the recycling chain -if they were carried out on all the actors of the recycling chain as indicated in part (2) of of this template.

Part 2: Individual steps of recycling, i.e. all recycling facilities involved, shall be documented:

Recycling step	**N**
Calendar year	

Facility ([1])				
	Name			
	Street			
	City		Postal code	
	Country			
	Contact person			
	Tel.			
	Email			

Description of the individual process step(s):

Insert in this cell a flow-chart and/or a description of the individual recycling process step

Entering the process step(s) (waste batteries or their fraction) ([2]):

Type of input	EWC code	Mass ([3]): [t/a]	Cd content per fraction [t/a] (only for for Cd-containing flows)

Recycling

(1) Intermediate fraction ([4])

Type of input	EWC code	Mass: [t/a]	Further treatment	Further operator ([5])	Further process step
					N_1
					N_2
					N_3
					N_4
					N_5

(2) Output that accounts for rRE and rRM calculations ([6]) and safely disposed Cadmium ([7])

Element or compound, targeted or non targeted ([8])	Non-waste fraction containing the element or compound	Concentration of the element or compound in the fraction: [mass %]	Output generated in the Member State, in which the batteries were collected [t/a]	Output generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output generated outside the EU [t/a] ([9])	Total mass of the output generated [t/a]	Total Cadmium (Cd) safely immobilised and disposed [t/a]	Destination and yield of the fraction
Cobalt (Co)									
Copper (Cu)									
Lithium (Li)									
Nickel (Ni)									
Manganese (Mn)									
Aluminium (Al)									
Metal 1 (e.g. Fe)									
(group of) metal 3 (e.g. REE)									
Cadmium (Cd)									
Steel									
(list all metals)									
Electrolyte (KOH)									
Plastics ([10])									
Other (please specify) ([11])									
	m_{output} from step N ([12]) [t/a]								

Notes

([1]) Facility carrying out an individual recycling process step .

([2]) For step 1 = the same as input into the complete waste battery recycling in part (1) of the template. For subsequent steps = intermediate fractions coming from the previous process step.

([3]) Mass of intermediate fraction entering the invidual recycling process step. For step 1 = the same as input into the complete waste battery recycling in part (1).

(4) For the definition of 'intermediate fraction', see section 1, point 3. For black mass, see section 1, point 5 and ensure that the chemistry of the waste battery, or the main chemistry in mass% in case of mixtures, is indicated next to the term 'black mass', e.g. "black mass-ZnC" or "black mass-NMC".

([5]) Facility where the intermediate fraction is treated, including name, street, city, postal code, country, contact person, telephone, email. If the further process step is carried out at the same facility as the preceding step, insert "same as preceding".

([6]) For the definition of 'output fraction', see section 1, point 4.

([7]) For documentation of Cd, see section 4. Competent authorities have to verify that the total amount of CdR + CdD corresponds to the amount of Cd in the minput.

([8]) Elements and compound recovered from the input waste battery. For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([9]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation

([10]) Plastics that are recycled and for which the minput as well as the moutput are measured, are indicated in the list separately from carbon

([11]) Add other cells if necessary to specify other elements or compounds

([12]) The addition of N m_{output} from N steps shall equal the total m_{output} of the rRE calculations

9 Format of documentation for the rate of recycling efficiency and recovery of materials from other waste batteries

Part 1: For recycling of other waste batteries, the following shall be documented:

Rates of recycling efficiency and recovery of materials of a (other) waste battery recycling process				
Calendar year				
Facility ([1])	Name			
	Street			
	City		Postal code	
	Country			
	Contact person			
	Tel.			
	Email			

Description of the complete battery recycling process ([2]):

Insert in this cell a flow-chart and/or a description of the recycling steps

Entering the complete waste battery recycling process ([3]):

Type of waste batteries	EWC code	Mass ([4]): [t/a]

Elements or components **part of** the input fraction		
Element or compound	mass %	m_{input} [t/a] ([5])
Cobalt (Co)		
Copper (Cu)		
Lithium (Li)		
Nickel (Ni)		
Manganese (Mn)		
Aluminium (Al)		
Metal 1 (e.g. Fe)		
(group of) metal 3 (e.g. REE)		
Steel		
(list all metals)		
Electrolyte (NaOH)		
Plastics ([6])		
Oxygen (O_2) ([7])		
Carbon from carbon sources at cell level (C) ([7])		
Iron from iron sources at cell level (Fe) ([7])		
Phosphorus (P) ([7])		
Chlorine (Cl) ([7])		
Sulphur (S) ([7])		
Other (please specify) ([8])		
Total	100	

*Elements or components **not part of** the input fraction*	
Element or compound	mass [t/a]
Impurities ([9])	
Water (H_2O) ([10])	
Mercury (Hg) ([11])	
Other (please specify) ([8])	
Total mass not part of the input fraction	

RESULTS – calculated by first recycler:

Element or compound	Output ([5]) generated in the Member State, in which the batteries were collected [t/a]	Output ([5]) generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output ([5]) generated outside the EU [t/a] ([12])	Total output m_{output} ([5]) [t/a]	rRE ([13]) [mass %]	rRM ([14]) [mass %]	Total Mercury (Hg) ([11]) safely immobilised and disposed [t/a]
Cobalt (Co)								
Copper (Cu)								
Lithium (Li)								
Nickel (Ni)								
Manganese (Mn)								
Aluminium (Al)								
Metal 1 (e.g. Fe)								
(group of) metal 3 (e.g. REE)								
Mercury (Hg) ([11])								
Steel								
(list all metals)								
Electrolyte (NaOH)								
Plastics ([6])								
Oxygen (O_2) ([7])								
Carbon from carbon sources at cell level (C) ([7])								
Iron from iron sources at cell level (Fe) ([7])								
Phosphorus (P) ([7])								
Chlorine (Cl) ([7])								
Sulphur (S) ([7])								
Other (please specify) ([7])								
Total								

	[mass %]	Indicate in part(2) the Hg content in each output fraction (only for Hg-containing flows)
Hg_D ([11])		

VERIFICATION – filled-in by the competent authority (authorities)

Verification techniques [(15)]

- ☐ verification of overall calculations
- ☐ verification on proofs by documentation
- ☐ auditing by competent authority (including visits to sites)
- ☐ self-auditing by external companies

Notes

(1) Facility treating the waste batteries after collection, eventual sorting and preparation for recycling.

([2]) Flowchart or description of the complete recycling , even if carried out in more than one facility, highlighting which are the processes carried out at the first recycler and which are the processes (if any) carried out outside the Union and the related output fractions.

([3]) Description of waste batteries as received after collection, eventual sorting and preparation for recycling.

(4) Wet mass of waste batteries as received after collection, eventual sorting and preparation for recycling.

([5]) For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([6]) Plastics that are recycled and for which the m_{input} as well as the m_{output} are measured, are indicated in the list separately from carbon

([7]) If not taken into account in calculating recycling efficiency in accordance with section 2, point 5, leave empty.

([8]) Add other cells if necessary to specify other elements or compounds

([9]) For definition of impurities and instructions on how to account them in the calculations, see section 1, point 6.

([10]) Water (H_2O) content.

([11]) For documentation of Hg, only for Hg-containing batteries, see section 4. Competent authorities have to verify that the total amount of HgD (in mass%) corresponds to 100% of the Hg in the minput.

([12]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation. [To address input from DG TRADE]

([13]) Calculated in accordance with the formula of rRE in section 2 and in accordance with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([14]) Calculated in accordance with the formula for rRM(TM) in section 3 and in accordance with data from part (2) of this template on individual steps of the (correlated) waste battery recycling.

([15]) Indicate the number of verifications executed per techniques. For verification on overall calculations, the number shall be 1 corresponding to the mandatory verification on calculations reporting by first recyclers. For the other verification techniques, the number can vary from 0 -if none of these were carried out- to 1 -if these other techniques were carried out only on first recycler- to the total number of actors in the recycling chain -if they were carried out on all the actors of the recycling chain as indicated in part (2) of this template.

Part 2: Individual steps of recycling, i.e. all recycling facilities involved, shall be documented:

Recycling step	**N**			
Calendar year				
Facility ([1])	Name			
	Street			
	City		Postal code	
	Country			
	Contact person			
	Tel.			
	Email			

Description of the individual process step(s):

Insert in this cell a flow-chart and/or a description of the individual recycling process step

Entering the process step(s) (waste batteries or their fraction) ([2]):

Type of input	EWC code	Mass ([3]): [t/a]	Hg content per fraction [t/a] (only for for Hg-containing flows) ([4])

Recycling

(1) Intermediate fraction ([5])

Type of input	EWC code	Mass: [t/a]	Further treatment	Further operator ([6])	Further process step
					N_1
					N_2
					N_3
					N_4
					N_5

(2) Output that accounts for rRE and rRM calculations ([7]) and safely disposed Mercury (Hg) ([4])									
Element or compound, targeted or non targeted ([8])	Non-waste fraction containing the element or compound	Concentration of the element or compound in the fraction: [mass %]	Output generated in the Member State, in which the batteries were collected [t/a]	Output generated in a Member State different from the Member State in which the batteries were collected [t/a]	list the Member State different from the Member State in which the batteries were collected	Output generated outside the EU [t/a] ([9])	Total mass of the output generated [t/a]	Total Mercury (Hg) ([4]) safely immobilised and disposed [t/a]	Destination and yield of the fraction
Cobalt (Co)									
Copper (Cu)									
Lithium (Li)									
Nickel (Ni)									
Manganese (Mn)									
Aluminium (Al)									
Metal 1 (e.g. Fe)									
(group of) metal 3 (e.g. REE)									
Mercury (Hg) ([4])									
Steel									
(list all metals)									
Electrolyte (NaOH)									
Plastics ([10])									
Oxygen (O_2) ([11])									
Carbon from carbon sources at cell level (C) ([11])									
Iron from iron sources at cell level (Fe) ([11])									
Phosphorus (P) ([11])									
Chlorine (Cl) ([11])									
Sulphur (S) ([11])									
Other (please specify) ([12])									
Total									
m_{output} from step N ([13]) [t/a]									

Notes

([1]) Facility carrying out an individual recycling process step .

([2]) For step 1 = the same as input into the complete waste battery recycling in part (1) of the template. For subsequent steps = intermediate fractions coming from the previous process step.

([3]) Mass of intermediate fraction entering the invidual recycling process step. For step 1 = the same as input into the complete waste battery recycling in part (1).

([4]) For documentation of Hg, only for Hg-containing batteries, see section 4. Competent authorities have to verify that the total amount of HgD (in mass%) corresponds to 100% of the Hg in the minput.

([5]) For the definition of 'intermediate fraction', see section 1, point 3. For black mass, see section 1, point 5 and ensure that the chemistry of the waste battery, or the main chemistry in mass% in case of mixtures, is indicated next to the term 'black mass', e.g. "black mass-ZnC" or "black mass-NMC".

([6]) Facility where the intermediate fraction is treated, including name, street, city, postal code, country, contact person, telephone, email. If the further process step is carried out at the same facility as the preceding step, insert "same as preceding".

([7]) For the definition of 'output fraction', see section 1, point 4.

([8]) Elements and compound recovered from the input waste battery. For definitions of 'input' and 'outptut' fractions and in particular which fractions are accountable for RE and/or RM calculation, see section 1, points 2 and 4.

([9]) Provide documentary evidence in accordance with Art 72, paragraph 3, together with this data documentation.

([10]) Plastics that are recycled and for which the minput as well as the moutput are measured, are indicated in the list separately from carbon

([11]) If not taken into account in calculating recycling efficiency in accordance with section 2, point 5, leave empty.

([12]) Add other cells if necessary to specify other elements or compounds

([13]) The addition of N m_{output} from N steps shall equal the total m_{output} of the rRE calculations

10 Method for verifying rates of recycling efficiency and recovery of materials from waste batteries

(1) Verification of the rates of recycling efficiency and recovery of materials from waste batteries, as documented by the first recycler, shall cover at least the following areas:

- documentation;
- data confidentiality;
- verification techniques.

(2) Verification of the overall calculations shall be carried out by the competent authority (or authorities) of the Member State in which the waste battery treatment is performed. That authority shall forward data to the Member States in which the waste batteries were collected (if different).

(3) Documentation shall be provided by the first recycler to the competent authority (or authorities) of the Member State in which the waste battery treatment is performed, in accordance with the following requirements:

- the layout for the documentation shall comply with the templates set out in sections 6 to 9. In particular, it shall cover, in a comprehensive and structured way, all individual steps of the waste battery recycling process and the corresponding input, intermediate and output fractions, in accordance with Article 75(5) of Regulation (EU) 2023/1542;
- the format of the documentation shall be electronic, and it shall be such to be handled through world-deployed software.

(4) Where waste holders other than waste management operators carrying out treatment and recyclers export batteries for treatment, verification shall be carried out by the competent authority of the Member States in which those waste holders exporting the waste batteries are located.

(5) The competent authority (or authorities) shall treat all the data and information examined for the verification procedures confidentially and shall use them only for the verification procedure itself.

(6) The competent authority (or authorities) shall apply at least the following techniques for verification:

- verification of the completeness, accuracy and consistency of the overall calculations and information contained in the documentation (see sections 6 to 9);
- aggregation and verification of the consistency and completeness of all the data supplied by the various first recyclers.

(7) The competent authority (or authorities) may also verify the accuracy, reliability and traceability of the recycling process and the corresponding rates provided by requesting evidence from relevant parties in the recycling chain (such as a contract, transportation document, or contact details of other recyclers in the recycling process) documenting the existence of the flows during the documentation period. The competent authority (or authorities) may also carry out verification by auditing relevant parties in the recycling chain, in accordance with the decisions of the Member States. In any case, this shall not exclude visits to recycling facilities as part of the auditing procedure.

(8) Recyclers may also carry out self-auditing through external companies. In this case, recyclers may provide the competent authority (or authorities) with the results of the auditing process at the time of the minimum verification. If notified of the results, the competent authority (or authorities) shall fill in the appropriate section on verification in the corresponding documentation (see sections 6 to 9).

(9) Verification of the overall calculations and information shall be carried out every calendar year, on the basis of the documentation provided by first recyclers (see sections 6 to 9). Additional verification [techniques] referred to in point (7) may be carried out whenever requested by the competent authority (or authorities) of the Member State. Self-auditing referred to in point (8) may be carried out by recyclers whenever they find it appropriate.

(10) After, at least, the minimum verification and before forwarding the verified documentation to the Member State in which the waste battery was collected (if different), the competent authority (or authorities) shall [properly] complete the documentation by filling in the results of the minimum verification and indicating the number of verification techniques carried out.

(11) The verification may be carried out per battery chemistry (lead-acid, lithium-based, nickel-cadmium, others) or per specific chemistry of the different families.