PRTR Estimation Manual

12. Can Manufacturing Industry

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Can Manufacturing Institute of Japan

Contents

1 Subject of PRTR Reporting in Can Manufacturing Industry

1.1 Raw Materials

Typical raw materials containing the Class I Designated Chemical Substances based on the law for PRTR and Promotion of Chemical Management, in can manufacturing industry are as follows.

① Liquid

Raw materials	Name of substance (Typical example)	Cabinet Order No.
Paint	Ethylene glycol monoethyl ether	44
	Ethylene glycol monomethyl ether	45
	Xylene	63
	2-Ethoxy methyl acetate (Ethylene glycol monoethyl ether acetate)	101
	Toluene	227
Thinner	Ethylene glycol monoethyl ether	44
	Ethylene glycol monomethyl ether	45
	Xylene	63
	2-Ethoxy methyl acetate	101
	Toluene	227
Surface treatment	Hydrogen fluoride and its water-soluble salt (WFL, NH_4F,NaF,BeF_2,etc.)	283
	Polyoxyethylene alkyl ether (C12-C15)	307

② Solid not of specific shape (Powder, etc.)

Raw materials	Name of substance (Typical example)	Cabinet Order No.
Surface treatment	Polyoxyethylene alkyl ether(C12-C15)	307

③ Solid of specific shape that melts, evaporatios, or dissolves while handled

Raw materials	Name of substance (Typical example)	Cabinet Order No.
Soldering anti-oxidant	Zinc chloride [zinc compounds (water-soluble)]	1

1.2 Manufacturing Processes Related to PRTR

Typical processes related to PRTR in can manufacturing industry are as follows.

< Three-piece can >

Name of Process	Calculation Example
①Coating-Drying process of sheet	Coating/Printing
②Printing-Drying process of sheet	Coating/Printing
③Coating-Drying process of laminated sheet	Coating/Printing
④Printing-Drying process of laminated sheet	Coating/Printing
⑤Side seam striping-Drying process	Coating/Printing
⑥Spray coating-Drying process	Coating/Printing
⑦Soldering process	Soldering

<Two-piece can >

Name of Process	Calculation Example
①Can-washer process	Degrease/Cleaning
②Outside base coating-Drying process	Coating/Printing
③Printing-Drying process	Coating/Printing
④Inside spray coating-Drying process	Coating/Printing

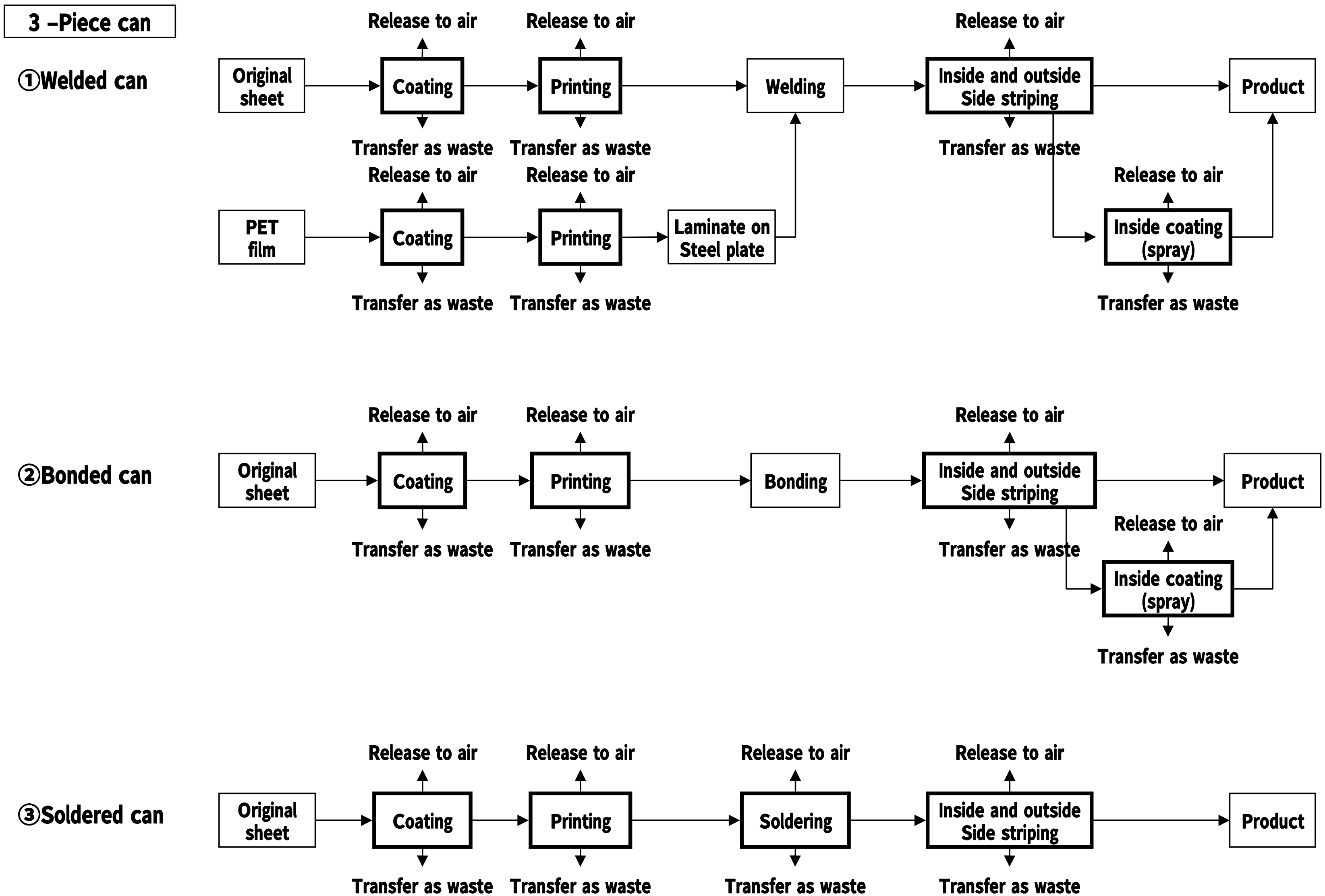
< End manufacturing process >

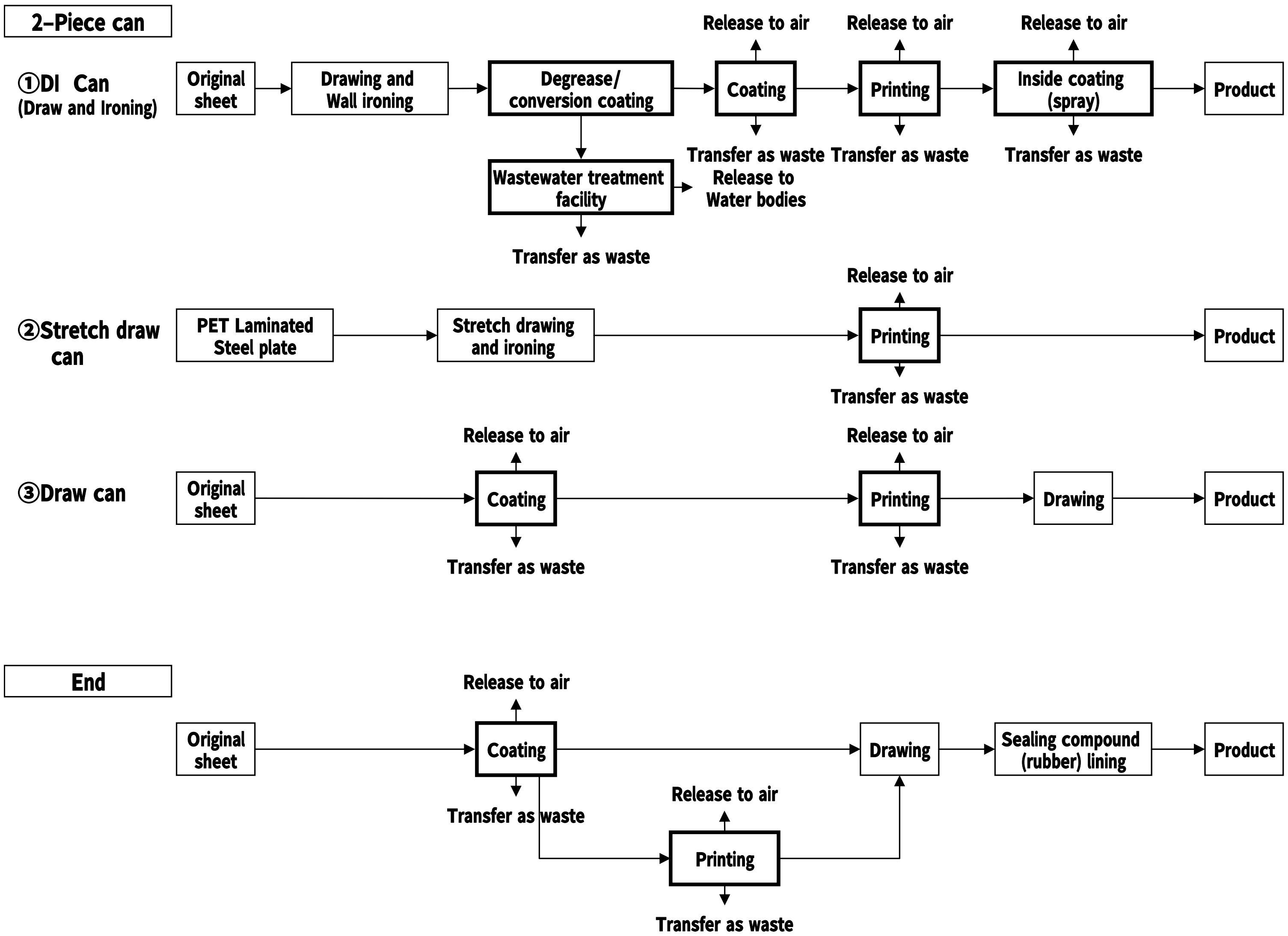
Name of Process	Calculation Example
①Coating-Drying process	Coating/Printing
②Printing-Drying process	Coating/Printing

< Waste treatment process >

Name of Process	Calculation Example
①Incinerator	Waste treatment

Fig.1 Flow Diagram and Check Points of Releases and Transfers




2-Piece can
①DI Can
(Draw and Ironing)
Original sheet
Drawing and Wall ironing
Degrease/ conversion coating
Wastewater treatment facility
Transfer as waste
Release to Water bodies
Release to air
Coating
Transfer as waste
Release to air
Printing
Transfer as waste
Release to air
Inside coating (spray)
Transfer as waste
Product
②Stretch draw can
PET Laminated Steel plate
Stretch drawing and ironing
Release to air
Printing
Transfer as waste
Product
③Draw can
Original sheet
Release to air
Coating
Transfer as waste
Release to air
Printing
Transfer as waste
Drawing
Product
End
Original sheet
Release to air
Coating
Transfer as waste
Release to air
Printing
Transfer as waste
Drawing
Sealing compound (rubber) lining
Product

1.3 Estimation Procedures for PRTR Reporting

(1) Prepare a list of all chemical products used in the facility.

(2) Check whether each chemical product contains the Class I Designated Chemical Substances or not, by MSDS issued by manufacturers.

- In case content of the Class I Designated Chemical Substances or the Specific Class I Designated Chemical Substances in products is not clear, consult the manufacturer of the chemical products.
- When the content of the Class I Designated Chemical Substances in MSDS of a product is shown in a range, ask the averaged value or representative value to the manufacturer.

(3) Prepare a list of all chemical products and content of the Class I designated Chemical Substances in products.

· When the Class I Designated Chemical Substance is contained in the product in the mass percentage of less than 1% (in the case of the Specific Class I designated Chemical Substance, 0.1%), the product need not be listed.

· In case the Class I Designated Chemical Substance contained in the product is a metallic compound, calculate as a metallic element.

(4) Calculation of the annual quantity handled for raw materials (chemical products).

[Calculation procedure]

For each raw material (chemical product), the annual quantity handled is calculated as follows.

(Annual quantity handled) = (Annual quantity purchased) - (Quantity stored at the end of the fiscal year) + (Quantity stored at the beginning of the fiscal year)

*The amount recycled inside the facility should not be added.

(5) Calculation of the annual quantity handled for the Class I Designated Chemical Substance in raw materials (chemical products).

[Calculation procedure]

For each raw material, the annual quantity handled of the Class I Designated Chemical Substance should be calculated.

(Annual quantity handled of the Class I Designated Chemical Substance) =

(Annual quantity handled of the raw materials) × (Mass percent % of the Class I Designated Chemical Substance contained in the raw material) ÷ 100

- Annual quantity handled of the raw materials is calculated in (4).
- For the Specific Class I designated Chemical Substance, the same type of calculation should be done.

(6) Calculation of the total annual quantity handled for each Class I Designated Chemical Substance in the facility.

[Calculation procedure]

For each Chemical Substance, the total annual quantity handled should be calculated as follows.

(Annual quantity handled of the Chemical Substance A) = ∑(Annual quantity handled of the Chemical

Substance A in each raw material)

- Annual quantity handled of the Chemical Substance A in each raw material is calculated in (5).
- For the Specific Class I designated Chemical Substance, the same type of calculation should be done.

(7) Procedure for determining facilities requiring notification

In case the annual quantity handled of the Chemical Substance A calculated in (6) is equal to 1 ton or more, the Chemical Substance A should be reported.

(In case the annual quantity handled of the Specific Class I designated Chemical Substance B is equal to 0.5 ton or more, the Specified Chemical Substance B should be reported.)

2 Calculation Procedure of Releases and Transfers

2.1 Calculation procedure (printing/coating process)

Process of coating on original sheet, can surface etc. with a coating material by roll coater or spray coater.

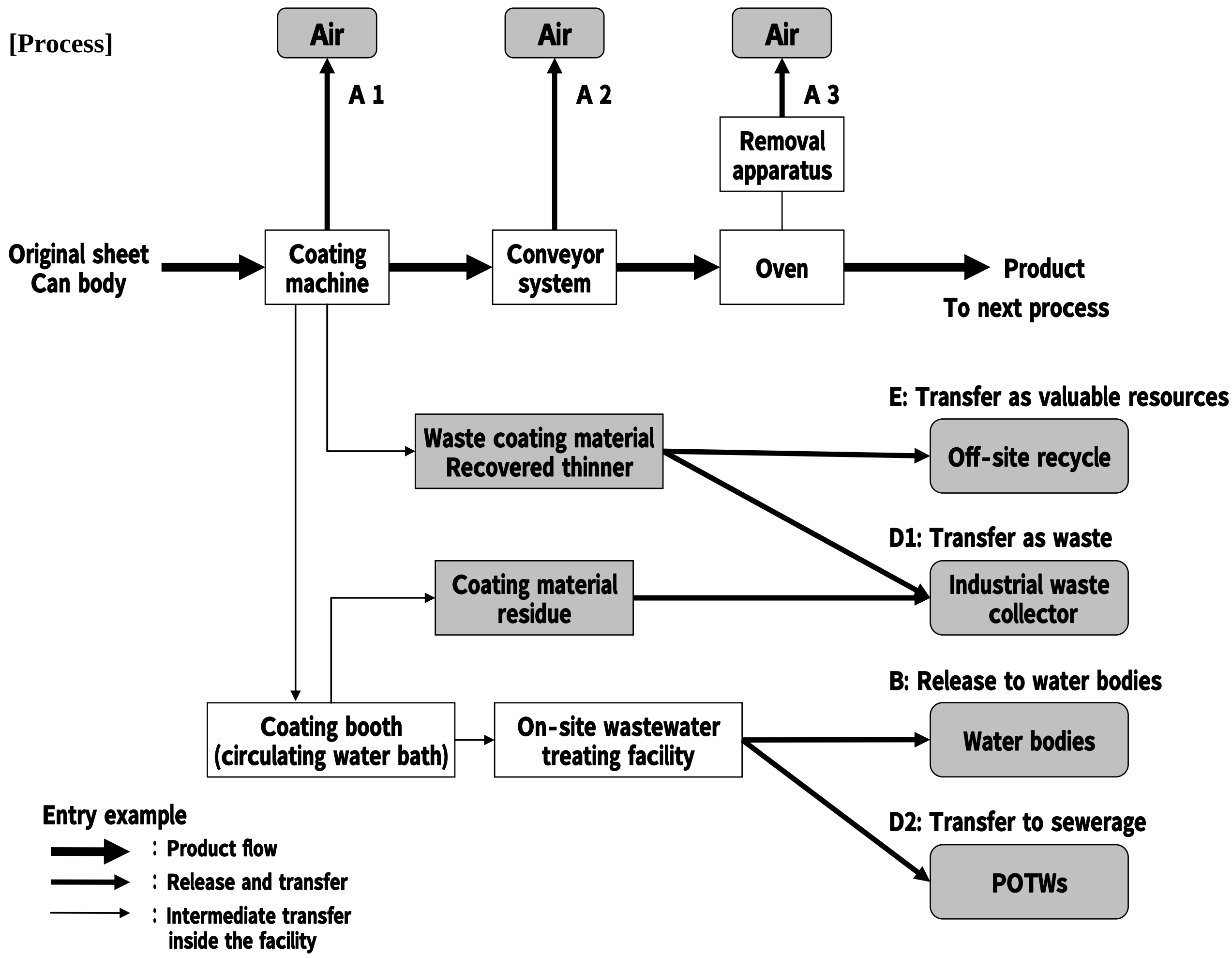
The Class I Substances in this process are the solvent ingredients contained in coating materials and thinner.

As releases to the environment, most solvent ingredients are vaporized and released to air, but when a wet booth is provided, they are mixed with wastewater or transferred as waste paints. There supposed to be no transfer of solvents by adhering to the products. (Consumption amount = 0)

[Example of the Class I Designated Chemical Substances]

Solvent ingredients: toluene, xylene, etc.

[Process]



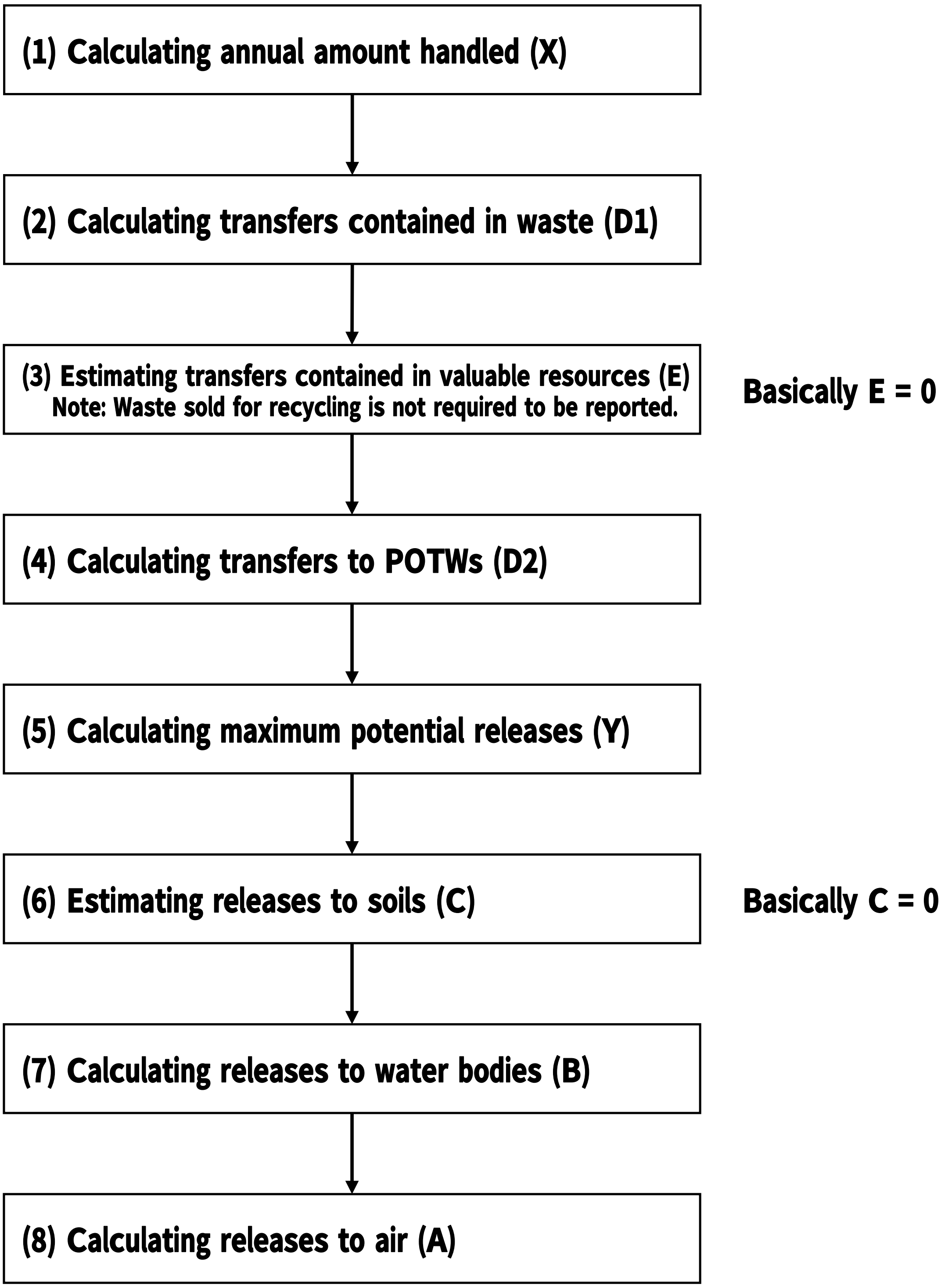
POTWs: Publicly Owned Treatment Works

Note:・The release to air from the conveyor system (A2) can be regarded as a part of release to air from the coating machine (A1), or as a part of release to air from the oven, if it is supposed to be appropriate, considering the structure of the removal apparatus, etc. or estimating the amount released.

・Under (1999) Law for PRTR and Promotion of Chemical Management, when waste chemicals are sold for off-site recycling, they are not subject to reporting. When they are carried out free of charge, they are regarded as waste and must be reported as transfers as waste.

[Calculation procedure flow]

The calculation procedure for the amounts of the Class I Substances (solvent ingredients) released and transferred in the coating and printing processes is shown below.



[Calculation procedure]

(1) Calculation of annual quantity handled (X)

The annual quantity handled is calculated from the amount of coating material/thinner used in the process and the content of the Class I Substances contained therein.

Annual quantity handled (X)

= ∑ ((coating material/thinner amount used) × (content))

(2) Calculating transfers contained in waste (D1)

This is calculated from the amount of waste coating material/thinner etc. and the content of the Class I Substances contained therein.

Transfers in waste (D1)

= ∑ ((amount of coating material/thinner waste handed over) × (content))

- The content in waste is assumed to be the same as the content in the stock solution. When this does not conform to the real situation, calculation should be done based on actual measurements.
- When various kinds of coating materials/thinners are used, and the amount of waste of each coating material/thinner cannot be identified, proportional distribution is performed based on the respective annual quantities used.

(3) Calculating the transfers of Class I Substances contained in valuable resources (wastes sold for recycling)

Note: Waste sold for recycling are not required to be reported as transfers.

Calculation is performed from the amount of valuable resources and the content of the Class I Substances contained therein.

Transfers (for off-site recycling) contained in valuable resources (E)

= ∑ ((amount of valuable resources handed over) × (content))

- The content of Class I Designated Substances contained in valuable resources is assumed to be the same as the content in the stock solution. When it does not conform to the realities, calculation is based on actual measurements.
- When various kinds of coating materials/thinners are used and the amount of valuable resources from each coating material/thinner cannot be estimated, proportional distribution is performed based on the respective annual quantities used.
- In the PRTR for the can manufacturing industry, basically E = 0.

(4) Calculating transfers to sewerage (D2)

When waste solution (circulating water in coating booth)/wastewater is transferred to sewerage,

Transfers to sewerage (D2)

= (annual quantity of wastewater) × (concentration of the Class I Substances in the wastewater)

- The annual quantity of wastewater and the concentration of the Class I Substances should be obtained at the same point of sampling.
- IF no actual measurement, use the solubility data of the Class I Substances.

- When wastewater is released to the wastewater treatment facility where the wastewater and the same Class I Substances from other facilities enter, the releases calculated by the concentrations of Class I Substances after treated and the final amount of wastewater should be proportionally distributed based on each load amount at the entrance of the wastewater treatment facility.

And also, in this case, reporting should be written as the amount released to water bodies, not transferred to sewerage.

- When wastewater is released after aeration treatment、the solvent (Class I Substance) concentration in released water (wastewater) is "less than minimum limit value of quantitative determination," but it is not regarded as "removed" by the wastewater treatment facility, but it is regarded as being released to air.

(5) Calculating maximum potential releases (Y)

The maximum potential amount released is calculated by subtracting the transfers contained in waste, the transfers contained in valuable resources, and the transfers to sewerage from annual quantity used.

Maximum potential releases (Y) = (X) - (D1) - (E) - (D2)

- When a removal (treatment) apparatus is not provided, the above described (Y) is the amount released.
- When a removal (treatment) apparatus is provided, the removal efficiency, or concentration of a subject chemical substance in wastewater should be estimated based on the following (7) and (8) by using guaranteed value of the apparatus specification or actual measurements.

(6) Releases to soils (C)

Releases to soils (C) = 0 (no stable landfills)

(7) Calculating releases to water bodies (B)

When wastewater is released to water bodies after waste treatment,

Releases to water bodies (B)

= (annual quantity of wastewater released) × (Class I Substance concentration in wastewater)

- Annual quantity of wastewater and the concentration of the Class I Substances should be obtained at the same point of measurement.
- IF no actual measurement, use the solubility data of the Class I Substances.

When wastewater is released after aeration treatment (activated sludge process etc.), the solvent (Class I Substance) concentration in the released water (wastewater) is "less than the minimum limit of quantitative determination", but it is not regarded as "removed" by the wastewater treatment facility, but is regarded as being released to air.

When the same Class I Substances enter the wastewater treatment facility from other apparatuses, the Class I Substances concentrations in the released water (wastewater) are proportionally distributed based on each load amount at the entrance of the wastewater treatment facility.

(8) Calculating releases to air (A) = (A1) + (A2) + (A3)

① Releases from the coating machine (coating booth) (A1)

(A1) = {(X) - (D1) - (E) - (D2) - (C) - (B)} × (coating machine evaporation ratio)

- The coating machine evaporation ratio is estimated from actual measurements or the following formula (i).

When the removal apparatus is provided, it is estimated by multiplying by (1 – removal efficiency).

② Releases from conveyor system

(A2) = {(X) - (D1) - (E) - (D2) - (C) - (B)} × (conveyor system evaporation ratio)

- The conveyor system evaporation ratio is estimated from actual measurements or the following formula (i).

When the removal apparatus is provided, it is estimated by multiplying by (1 – removal efficiency).

③ Releases from the oven

(A3) = {(X) - (D1) - (E) - (D2) - (C) - (B)} × (oven carried-in ratio) × (1 – removal efficiency)

- The oven carried-in ratio is calculated from actual measurements or the following formula (i).

Notes:・The coating machine evaporation ratio, the conveyor system evaporation ratio, and the oven carried in ratio are the ratios evaporatiod in the coating machine unit, the conveyor system unit, and the oven, which are expressed as a percentage, when the total value of evaporation components (solvent etc.) in the coating material and the thinner consumed by the coating film formation (attached to the products) and over-spray is assumed to be 100%, in the coating machine and printer.

- The coating adhesion efficiency of roll coating may be 100%. As for spray coatings, over-spray cannot be ignored in many cases, and research on the coating adhesion efficiency is sometimes necessary.

In the estimation of the amount released to air, the solvent ingredients in the coating material residue by over-spray has to be included in the calculation as an amendment term, to be exact, but the content in the coating material residue is generally low, and therefore it may be ignored.

- The relationship between the coating machine evaporation ratio, the conveyor system evaporation ratio, and the oven carried-in ratio is shown in the following formula:

Coating machine evaporation ratio + conveyor system evaporation ratio + oven carried-in ratio = 1

……………………………………………………(i)

- Air emissions from the conveyor system (A2) can be regarded as a part of air emissions from the coating machine (A1), or as a part of air emissions from the oven (A3) if it is appropriate when considering the structure of removal apparatus, etc. or estimating the amount released.
- The following methods are cited for calculation of vaporization ratio and carried-in ratio.
  - · Weight measurement by a can body or test piece.
  - · Release concentration and emission amount are measured in an exhaust duct etc. and then the calculation is performed.
- As for the removal ratio, the guaranteed values of the removal (treatment) apparatus specification or actual measurements are used.

- When the removal (treatment) apparatus is shared by other processes and apparatuses, outlet release amount is proportionally distributed according to each load amount at the entrance of the removal apparatus.
- When the removal apparatus is an activated carbon adsorption type, there is a transfer in waste.
- When the generatiod coating residual and waste thinner are incineratiod in the facility, the solvent ingredient is thermally decomposed, and therefore it has to be calculated as a removed amount and subtracted from the transfers.

2.2 Calculation procedure (degreasing/cleaning process)

Process of degreasing, cleaning and converting surfaces of 2–piece can-

The Class I Designated Chemical Substances in this process are contained in degreasing agents, cleaning agents and surface treatment agents.

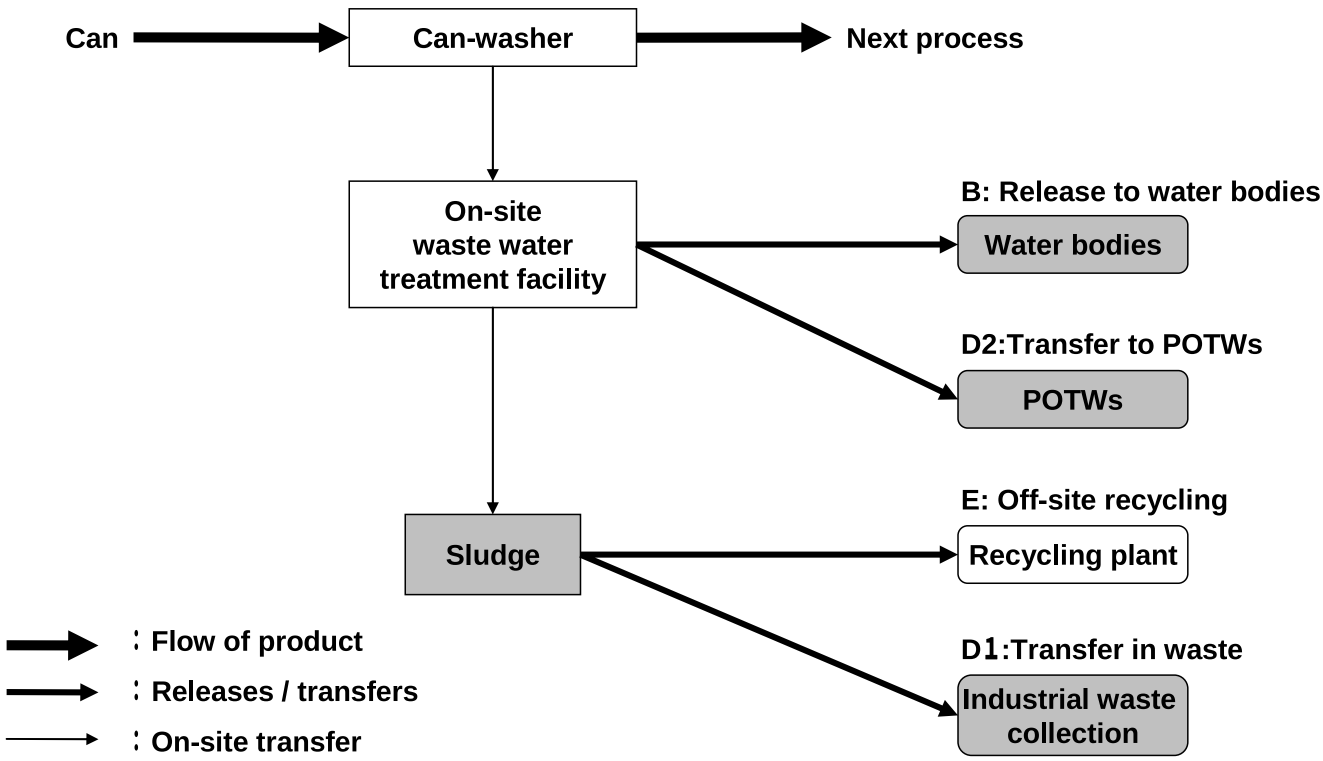
As releases to environment, releases to water bodies and transfers in waste (sludge) from wastewater treatment facility should be counted.

There is supposed to be no transfer of solvents by adhering to the products. (Consumption amount = 0)

[Example of the Class I Designated Chemical Substances]

- Polyoxyethylene alkyl ether (C12-C15)
- Hydrogen fluoride and its water-soluble salts (Calculation should be done by converted value to element F)

[Process]



Under (1999) Law for PRTR and Promotion of Chemical Management, when waste chemicals are sold for off-site recycling, they are not subject to reporting.

When they are carried out free of charge, they are regarded as waste and must be reported as transfers in waste.

[Calculation procedure flow]

The calculation procedure for the amounts of the Class I Substances released and transferred in the degreasing and cleaning process is shown below.

(1) Calculating annual quantity handled (X)

↓

(2) Calculating transfers contained in waste (D1)

↓

(3) Estimating transfers contained in valuable resources (E)
Note: Waste sold for recycling is not required to be reported.

Basically E = 0
Valuable Basically E = 0

↓

(4) Calculating transfers to POTWs (D2)

↓

(5) Calculating maximum potential releases (Y)

↓

(6) Estimating releases to soils (C)

Basically C = 0

↓

(7) Calculating releases to water bodies (B)

↓

(8) Calculating releases to air (A)

A = 0

[Calculation procedure]

(1) Calculation of annual quantity handled (X)

The annual quantity handled is calculated from the amount of chemical products used in the process and the content of the Class I Substances contained therein.

Annual quantity handled (X)

= ∑ ((Annual quantity of chemical product used) × (content))

- In case of metallic compounds, etc. use the converted value to element.

(2) Calculating transfers contained in waste (D1)

Calculate by ① or ②.

① Calculation from the amount of waste and the content of the Class I Substances contained therein.

Transfers in waste (D1)

= ∑ ((the amount of waste handed over) × (content))

- The content in waste is assumed to be based on actual measurements.

② By transfers to sewerage (D2), quantity contained in valuable resources(E) for off-site recycling(usually E= 0),and release to water bodies(B)

Transfers in waste (D1) = (X) - (E) - (D2) - (B)

- ② should be used in case either there is no data of content of the Class I Substances contained in waste, or data of content in waste fluctuate much ,and transfer to sewerage (D2), and release to water bodies (B) are considered to be more reliable.

(3) Calculating transfers contained in valuable resources (wastes sold for recycling)

Note: Waste sold for recycling are not required to be reported as transfers.

Calculation is performed from the amount of valuable resources and the content of the Class I Substances contained therein.

Transfers (for off-site recycling) contained in valuable resources (E)

= ∑ ((amount of valuable resources handed over) × (content))

- The content of Class I Designated Substances contained in valuable resources is based on actual measurements.

In can manufacturing industry, usually E= 0.

(4) Calculating transfers to sewerage (D2)

When wastewater is transferred to sewerage (POTWs),

Transfers to sewerage (D2)

= (annual quantity of wastewater) × (concentration of the Class I Substances in the wastewater)

- The annual quantity of wastewater and the concentration of the Class I Substances should be obtained at the same point of sampling.
- IF no actual measurement, use the solubility data of the Class I Substances.
- When wastewater is released to the wastewater treatment facility where the wastewater and the same Class I Substances from other facilities enter, the releases calculated by the concentrations of

Class I Substances after treated and the final amount of wastewater should be proportionally distributed based on each load amount at the entrance of the wastewater treatment facility.

And also, in this case, reporting should be written as the amount released to water bodies, not transferred to sewerage.

(5) Calculating maximum potential releases (Y)

The maximum potential amount released is calculated by subtracting the transfers contained in waste, the transfers contained in valuable resources, and the transfers to sewerage from the annual quantity used.

Maximum potential releases (Y) = (X) - (D1) - (E) - (D2)

- When a removal (treatment) apparatus is not provided, the above described (Y) is the amount released to water bodies.
- When a removal (treatment) apparatus is provided, the removal efficiency, or concentration of a subject chemical substance in wastewater should be estimated based on the following (7) by using guaranteed value of the apparatus specification or actual measurements.

(6) Releases to soils (C)

Releases to soils (C) = 0 (not stable landfills)

(7) Calculating releases to water bodies (B)

When wastewater is released to water bodies after waste treatment,

Releases to water bodies (B)

= (annual quantity of wastewater released) × (Class I Substance concentration in wastewater)

- Annual quantity of wastewater and the concentration of the Class I Substances should be obtained at the same point of measurement.
- IF no actual measurement, use the solubility data of the Class I Substances.
- When the same Class I Substances enter the wastewater treatment facility from other apparatuses, the Class I Substances concentrations in the released water (wastewater) are proportionally distributed based on each load amount at the entrance of the wastewater treatment facility.

(8) Calculating releases to air (A)

(A) = 0

2.3 Calculation procedure (On-site waste treatment process)

Process of on-site waste treatment.(incineration, on-site recycling, etc.)

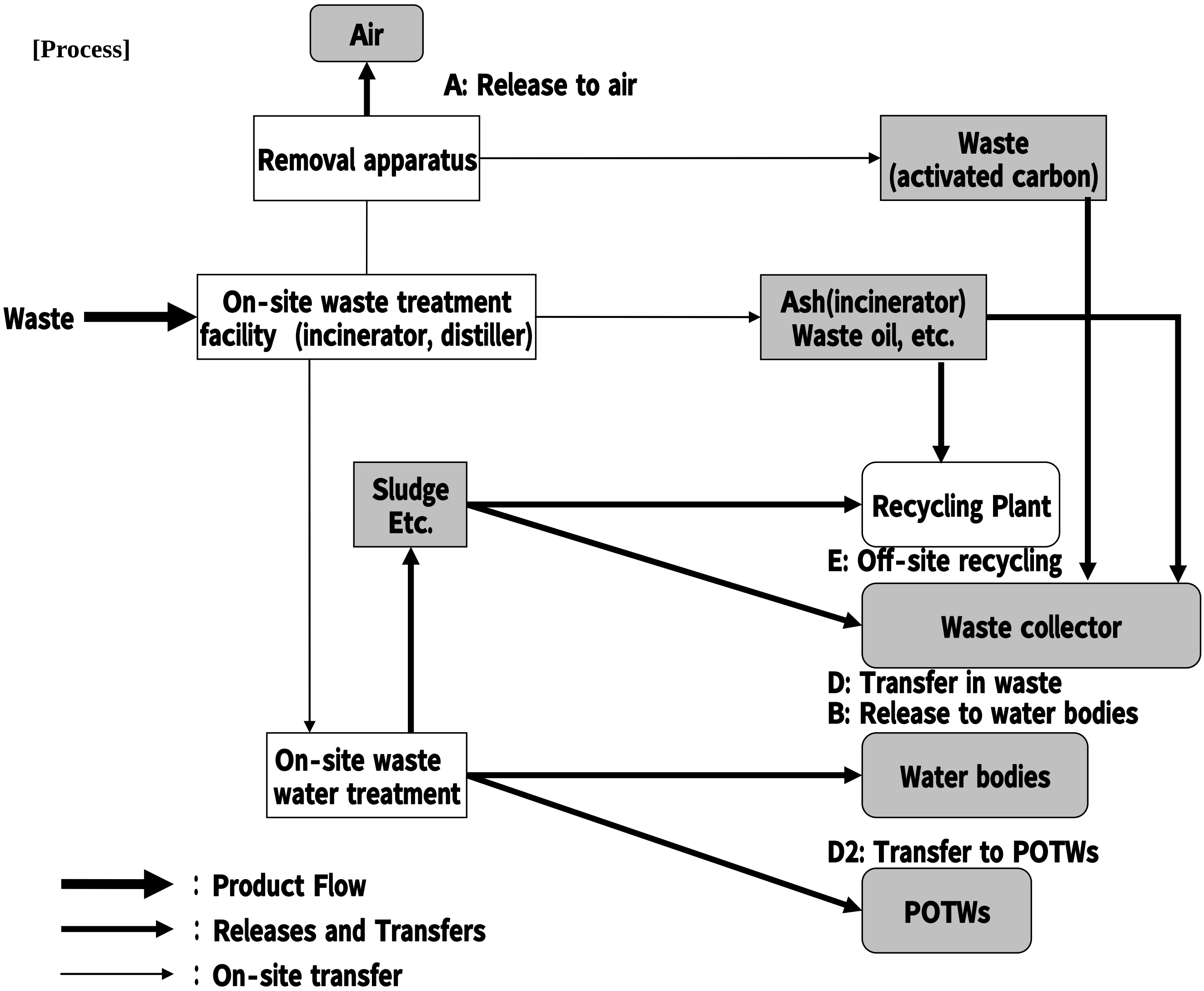
The Class I Designated Chemical Substances in this process are those contained in waste for recycling and dioxins from incinerator.

As releases to environment, releases to air, releases to water bodies and transfers in waste (ash) from incinerator should be counted.

[Example of the Class I Designated Chemical Substances]

- Solvents : Toluene, Xylene, etc.
- Dioxins

[Process]

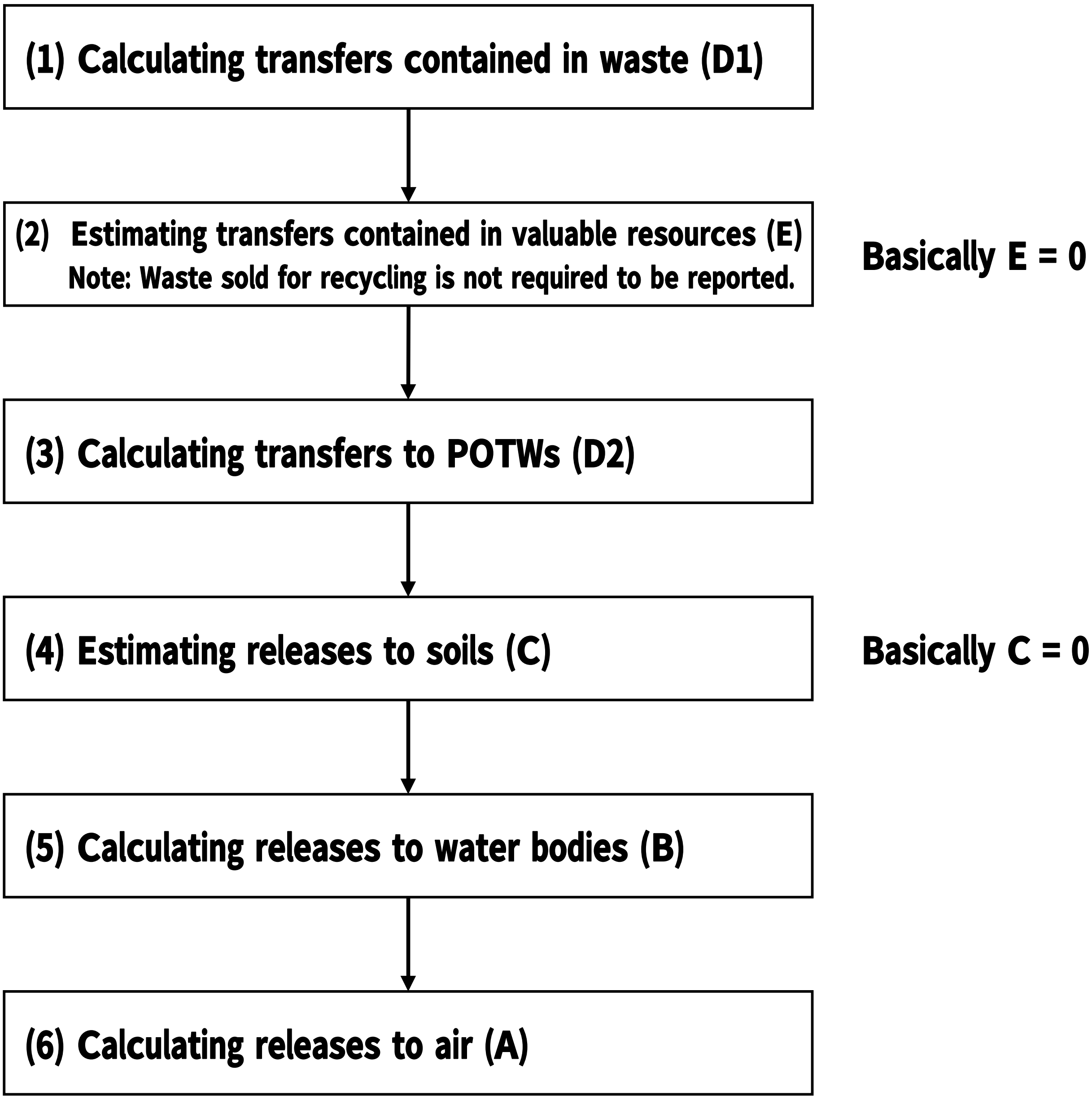


Under (1999) Law for PRTR and Promotion of Chemical Management, when waste chemicals are sold for off-site recycling, they are not subject to reporting.

When they are carried out free of charge, they are regarded as waste and must be reported as transfers in waste.

[Calculation procedure flow]

The calculation procedure for the amounts of the Class I Substances released and transferred in the on-site waste treatment process is shown below.



[Calculation procedure]

(1) Calculating transfers contained in waste (D1)

Calculate by the amount of waste handed over and the content of the Class I Substances contained therein.

Transfers in waste (D1)

= ∑ ((the amount of waste handed over) × (content))

- The content in waste is assumed to be based on actual measurements.

(2) Calculating transfers contained in valuable resources (wastes sold for recycling) (E)

Calculation is performed from the amount of valuable resources and the content of the Class I Substances contained therein.

Transfers (for off-site recycling) contained in valuable resources (E)

= ∑ ((amount of valuable resources handed over) × (content))

- The content of Class I Designated Substances contained in valuable resources is based on actual measurements.

In can manufacturing industry, usually E= 0.

(3) Calculating transfers to sewerage (D2)

When wastewater is transferred to sewerage (POTWs),

Transfers to sewerage (D2)

= (annual quantity of wastewater) × (concentration of the Class I Substances in the wastewater)

- The annual quantity of wastewater and the concentration of the Class I Substances should be obtained at the same point of sampling.
- Dioxins are designated as the Specific Class I Chemical Substances.
- Concentration of the Class I Substance in the wastewater is either based on actual measurements or solubility data.
- When wastewater is released to the wastewater treatment facility where the wastewater and the same Class I Substances from other facilities enter, the releases calculated by the concentrations of Class I Substances after treated and the final amount of wastewater should be proportionally distributed based on each load amount at the entrance of the wastewater treatment facility.

(4) Releases to soils (C)

Releases to soils (C) = 0 (not stable landfills)

(5) Calculating releases to water bodies (B)

When wastewater is released to water bodies after wastewater treatment,

Releases to water bodies (B)

= (annual quantity of wastewater released) × (Class I Substance concentration in wastewater)

- Annual quantity of wastewater and the concentration of the Class I Substances should be obtained at the same point of measurement.
- Concentration of the Class I Substance in the wastewater is either based on actual measurements

or solubility data.

- When wastewater is released to the wastewater treatment facility where the wastewater and the same Class I Substances from other facilities enter, the releases calculated by the concentrations of Class I Substances after treated and the final amount of wastewater should be proportionally distributed based on each load amount at the entrance of the wastewater treatment facility.

(6) Calculating releases to air (A)

Release to air (A) = (annual quantity of exhaust gas released) × (concentration of Class I Substance in exhaust gas)

- Concentration of Class I Substance in exhaust gas is based on actual measurements.

Note

- Dioxins are designated as the Specific Class I Chemical Substances and calculation procedure is the same as that of Class I Chemical Substances aforementioned.

2.4 Calculation procedure (Soldering process)

Process of soldering in soldered can manufacturing. The Class I Designated Chemical Substances in this process are those contained in antioxidant in solder bath.

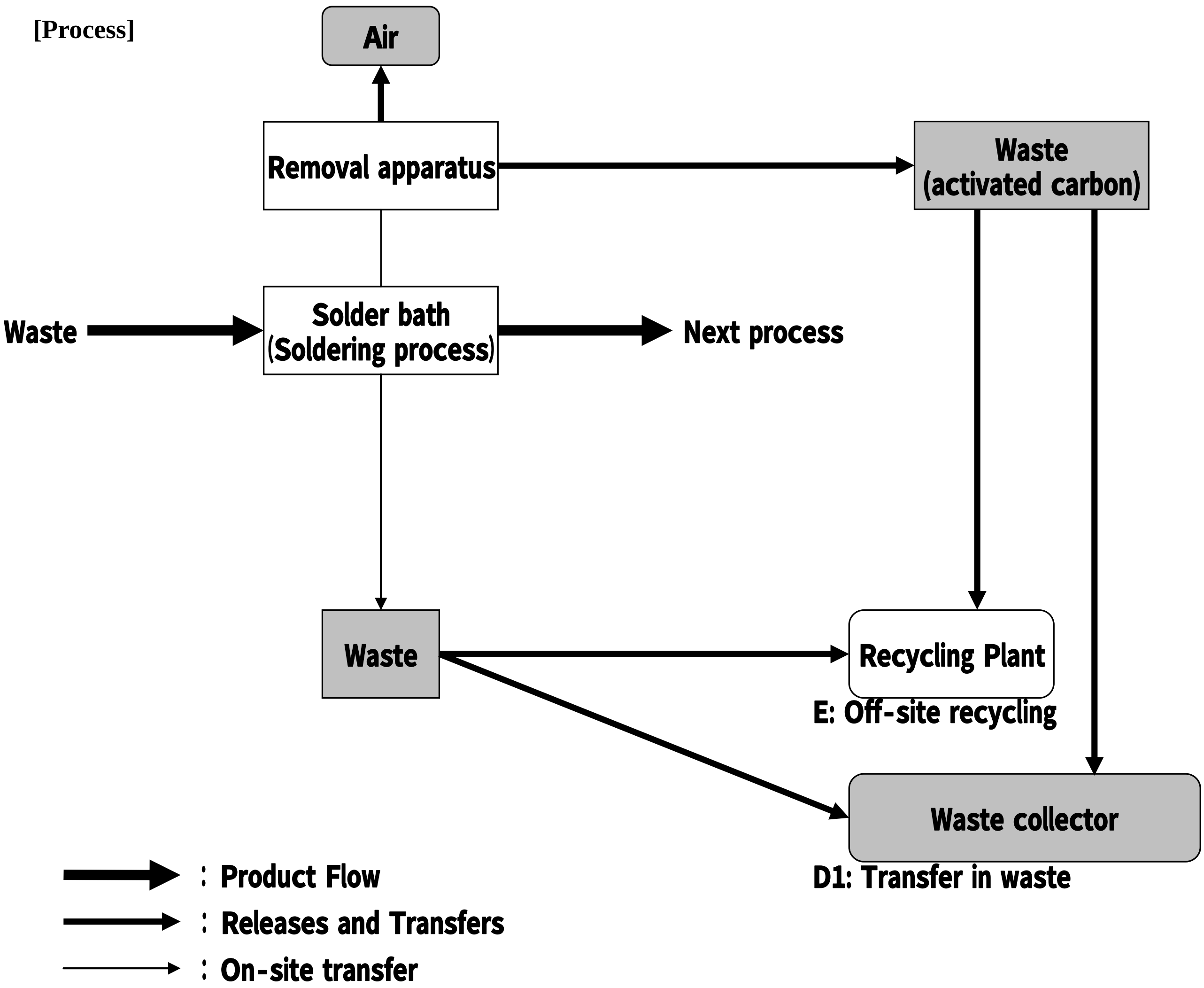
As releases to environment, releases to air and transfers in waste should be calculated.

Sticking to products is assumed to be zero. (The amount consumed = 0)

[Example of the Class I Designated Chemical Substances]

- Zinc chloride (zinc compounds (water-soluble))

[Process]



Under (1999) Law for PRTR and Promotion of Chemical Management, when waste chemicals are sold for off-site recycling, they are not subject to reporting.

When they are carried out free of charge, they are regarded as waste and must be reported as transfers in waste.

[Calculation procedure flow]

The calculation procedure for the amounts of the Class I Substances released and transferred in the soldering process in soldered can manufacturing, is shown below.

(1) Calculating annual quantity handled (X)

↓

(2) Calculating transfers contained in waste (D1)

↓

(3) Estimating transfers contained in valuable resources (E)
Note: Waste sold for recycling is not required to be reported. — **Basically E = 0**

↓

(4) Calculating maximum potential releases (Y)

↓

(5) Estimating releases to soils (C) — **Basically C = 0**

↓

(6) Calculating releases to air (A) — **A = 0**

[Calculation procedure]

(1) Calculation of annual quantity handled (X)

The annual quantity handled is calculated from the amount of antioxidant, etc. used in the process and the content of the Class I Substances contained therein.

Annual quantity handled (X)

= ∑ ((Annual quantity of antioxidant, etc used) × (content))

- In case of metallic compounds, etc. use the converted value to element.

(2) Calculation of transfers contained in waste (D1)

Calculation from the amount of waste and the content of the Class I Substances contained therein.

Transfers in waste (D1)

= ∑ ((the amount of waste handed over) × (content))

- The content in waste is assumed to be based on actual measurements.

(3) Calculation of transfers contained in valuable resources (wastes sold for recycling)

Calculation is performed from the amount of valuable resources and the content of the Class I Substances contained therein.

Transfers (for off-site recycling) contained in valuable resources (E)

= ∑ ((amount of valuable resources handed over) × (content))

- The content of Class I Designated Substances contained in valuable resources is based on actual measurements.

In can manufacturing industry, usually E= 0.

Note: Waste sold for recycling is not required to be reported as transfers.

(4) Calculation of maximum potential releases (Y)

The maximum potential amount released is calculated by subtracting the transfers contained in waste and the transfers contained in valuable resources from the annual quantity used.

Maximum potential releases (Y) = (X) - (D1) - (E)

- When a removal (treatment) apparatus is not provided, the above described (Y) is the amount released.
- When a removal (treatment) apparatus is provided, the removal efficiency, or concentration of a subject chemical substance in exhaust gas should be estimated based on the following (6) by using guaranteed value of the apparatus specification or actual measurements.

(5) Releases to soils (C)

Releases to soils (C) = 0 (no stable landfills)

(6) Calculation of releases to air (A)

Release to air (A) = (annual quantity of exhaust gas released) × (concentration of Class I Substance in exhaust gas)

* Concentration of Class I Substance in exhaust gas should be estimated by using guaranteed value of the apparatus specification or actual measurements.

* In case zinc chloride is used in soldering process, considering the rather high boiling point of it, release to air is assumed to be zero.

So, in this case, (A) = 0.

3 Determination of Chemical Substances Requiring Notification, and Calculation Example of Releases and Transfers.

3.1 Determination of Chemical Substances Requiring Notification

By the following example of raw materials used, requiring notification is determined for each chemical substance.

Raw materials	Name of chemical substance	Content (%)
Paint A	Toluene	10
	Xylene	8
	Ethylene glycol monoethyl ether	0.5
Paint B	Toluene	5
Paint C	Toluene	0.9
	Xylene	7
	Ethylene glycol monoethyl ether	1
Thinner a	Toluene	70
Thinner b	Xylene	50
Thinner c	Toluene	0.5
	Xylene	0.8

① Preparation of a list of chemical products used in the facility.

(Example)

Paint	Paint A
	Paint B
	Paint C
Thinner	Thinner a
	Thinner b
	Thinner c

② From MSDS, etc. issued by suppliers of each chemical product, content of the Class I Designated Chemical Substances contained in each chemical product should be listed.

(Example)

Raw materials	Name of chemical substance	Content (%)	Requiring notification
Paint A	Toluene	10	Required
	Xylene	8	Required
	Ethylene glycol monoethyl ether	0.5	Not required
Paint B	Toluene	5	Required
Paint C	Toluene	0.9	Not required
	Xylene	7	Required
	Ethylene glycol monoethyl ether	1	Required
Thinner a	Toluene	70	Required
Thinner b	Xylene	50	Required
Thinner c	Toluene	0.5	Not required
	Xylene	0.8	Not required

- In case content of the Class I Designated Chemical Substances or the Specified Class I Designated Chemical Substances in products is not clear, consult the manufacturer of the chemical products.
- When the content of the Class I Designated Chemical Substances in MSDS of a product is shown in a range, ask the averaged value or representative value to the manufacturer.

(Example) As the content of xylene in paint A was written as 5 ~15 % in MSDS, so, asked to manufacturer and got 8%. In this case write 8 % on the above table.

③ Preparation of the list of chemical products and the Class I Designated Chemical Substances contained therein.

(Example)

Raw materials	Name of chemical substance	Content (%)	Requiring notification
Paint A	Toluene	10	Required
	Xylene	8	Required
Paint B	Toluene	5	Required
Paint C	Xylene	7	Required
	Ethylene glycol monoethyl ether	1	Required
Thinner a	Toluene	70	Required
Thinner b	Xylene	50	Required

- From ①~②､prepare a list of all chemical products and content of the Class I designated Chemical Substances contained therein.
- When the Class I Designated Chemical Substance is contained in the product in the mass percentage of more than 1% (in the case of the Specific Class I designated Chemical Substance, 0.1%), the product should be listed.

④ Calculation procedure of the annual quantity handled for raw materials.

[Calculation procedure]

For each paint and thinner, etc. calculate as follows.

(Annual quantity handled)

= (Annual quantity purchased) - (Quantity stored at the end of the fiscal year)

+ (Quantity stored at the beginning of the fiscal year)

[Calculation result]

Raw materials	Calculation of annual quantity handled			
	Annual quantity purchased(kg/Y)	Quantity stored at the end (kg/Y)	Quantity stored at the beginning (kg/Y)	annual quantity handled (kg/y)
Paint A	50,000	600	1,600	51,000
Paint B	10,200	200	400	10,400
Paint C	10,000	1,000	1,000	10,000
Thinner a	50,000	400	200	49,800
Thinner b	10,000	600	400	9,800

- Raw materials containing the Class I Designated Chemical Substance in the mass percentage of more than 1% (in the case of the Specific Class I designated Chemical Substance, 0.1%) should be listed.
- The amount on-site recycled need not be calculated.

⑤ Calculation procedure of the annual quantity handled of the Class I Designated Chemical Substance in raw materials.

[Calculation procedure]

For each paint and thinner, calculate as follows.

(Annual quantity handled of the Class I Designated Substance for each raw material)

= (Annual quantity handled of the raw materials)

× (Mass percent % of the Class I Designated Chemical Substance contained in the raw material) ÷ 100

[Calculation result]

Raw materials		Name of class I chemical substance		
Name of raw materials	Annual quantity handled (kg/y)	Name of substance	Content (%)	Annual quantity handled (kg/y)
Paint A	51,000	Toluene	10	5,100
		Xyrene	8	4,080
Paint B	10,400	Toluene	5	520
Paint C	10,000	Xyrene	7	700
		Ethylene glycol monoethyl ether	1	100
Thinner a	49,800	Toluene	70	34,860
Thinner b	9,800	Xyrene	50	4,900

- For each raw material, the annual quantity handled is calculated in ④.

⑥ Calculation of the total annual quantity handled of the Class I Designated Chemical Substances in the facility.

[Calculation procedure]

For each Class I Designated Chemical Substance, the total annual quantity handled is calculated as follows.

(total annual quantity handled of the Class I Designated Chemical Substances)

= ∑ (annual quantity handled of the Class I Designated Chemical Substance in each raw material)

[Calculation result]

Name of chemical substance	Raw materials	Annual quantity handled (kg/y)	Total Annual quantity handled (kg/y)
Toluene	Paint A	5,100	40,480
	Paint B	520	
	Thinner a	34,860	
Xylene	Paint A	4,080	9,680
	Paint B	700	
	Thinner b	4,900	
Ethylene glycol monoethyl ether	Paint C	100	100

⑦ Determination of Chemical Substances Requiring Notification

[Determination procedure]

In case the annual quantity handled for the Class I Designated Chemical Substance is more than (or equal to) 1 ton (1,000 kg), that substance should be reported. For the Specific Class I Designated Chemical Substance, when the annual quantity handled is more than (or equal to) 500 kg, reporting is required.

[Determination result]

Name of chemical substance	Annual quantity handled (kg/y)	Requiring notification
Toluene	40,480	Required
Xylene	9,680	Required
Ethylene glycol monoethyl ether	100	Not required

3.2 Calculation Examples

3.2.1 Printing/Coating process

(a) Outline of the facility

Examples of calculation method for the releases and transfers in the following facility with use conditions shown below.

・Process: Airless spray coating on a can inside surface

・Used facility: Airless spray (local exhaust, with a wet type booth)

・Exhaust gas treatment equipment:

Coating machine exhaust unit Provided (wet type booth)

Transfer gas exhaust unit Not provided

Oven exhaust unit Provided (direct combustion type treatment equipment: removal efficiency 0.99)

Note: The removal efficiency of 0.99 is the guaranteed value of the direct combustion type treatment equipment specification

・Coating material used:

Raw material		Class I Designated Chemical Substance	
Name of raw material	Annual quantity handled (kg/year)	Name of Class I Designated Chemical Substance	Content (%)
Paint A	30,000	Toluene	10
		Xylene	8
Thinner a	20,000	Toluene	70

- The paint A is assumed to be used after being diluted with thinner a.

・Waste amount

・Waste paint A: 300kg/year (toluene content 10%)

・Waste thinner a: 200kg/year (toluene content 70%)

・Waste of coating material: 2,000kg/year (toluene content 1%)

Note: As the content of toluene in waste paint A and waste thinner, contents in raw materials are used.

The toluene content of the waste of coating material is an actually measured.

・Amount of wastes sold for recycling

・Amount of wastes sold for recycling E: 0 kg/year

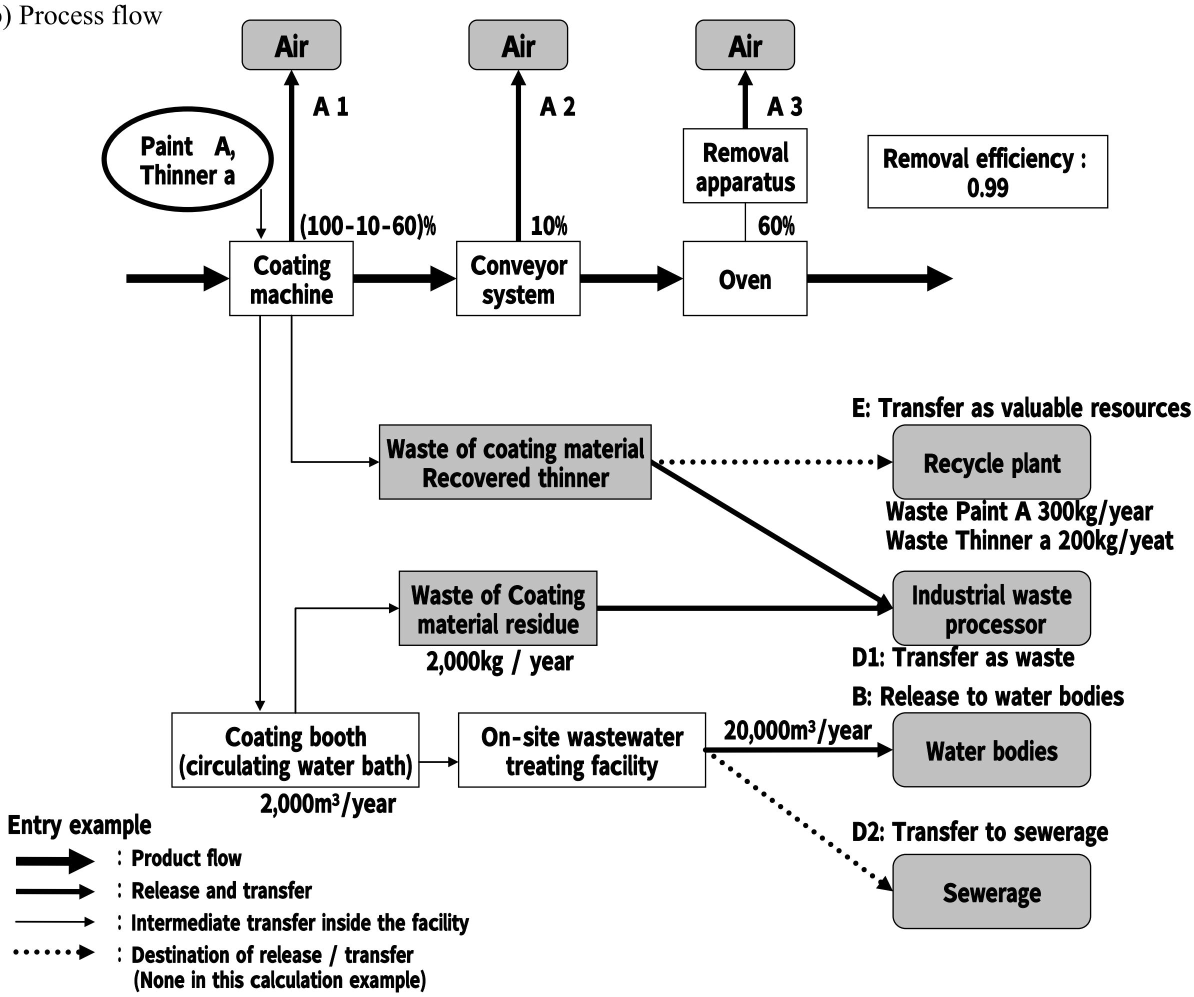
・Annual amount of waste water from the wet booth: 2,000 m^3/year

・Annual amount of wastewater from wastewater treatment facility: 20,000m^3/year

Note: Wastewater amount of 2,000m^3/year from wet type booth is included.

With aeration treatment, the toluene concentration in the wastewater was lower than the minimum limit of determination.

(b) Process flow



Note: Under (1999) Law for PRTR and Promotion of Chemical Management, when chemical substances are sold for recycling as valuables, they are not subject to reporting. However, when they are carried out free of charge or with disposal fees, they are required to be reported as transfers in wastes.

(c) Calculation examples of the amount of toluene released/transferred

(1) Calculation of annual quantity handled (X)

The annual quantity handled is calculated from the amount of paint/thinner used in the apparatus and content of the Class I Substances contained therein.

Annual quantity handled (X)

= ∑ ((amount of paint/thinner used) × (content))

= 30,000 (kg/year) × 10 (%) ÷ 100 + 20,000 (kg/year) × 70 (%) ÷ 100

= 17,000 kg/year

(2) Calculation of transfers contained in waste (D1)

This is calculated from the amount of the waste of coating material/thinner etc. and the content of the Class I Substances contained therein.

Transfers in waste (D1)

= ∑((amount of the waste of coating material/thinner waste handed over) × (content))

= 300 (kg/year) × 10 (%) ÷ 100 + 200 (kg/year) × 70 (%) ÷ 100 + 2,000 (kg/year) × 1 (%) ÷ 100

= 190 kg/year

(3) Calculation of transfers as waste sold for recycling (E)

Transfers of wastes sold for recycling (E)

= ∑ ((amount of wastes sold for recycling) × (content))

= 0

- No valuable resource is handed over.

(4) Calculation of transfers to sewerage (D2)

Transfers to sewerage (D2)

= (annual amount of wastewater generatiod)

× (concentration of the Class I Substances in wastewater)

= 0

* No wastewater is released to sewerage.

(5) Calculation of maximum potential releases (Y)

The maximum potential amount released is calculated by subtracting the transfers contained in waste and the amount contained in wastes sold for recycling from the annual amount of the Class I Substances handled.

Maximum potential releases (Y)

= (X) - (D1) - (E) - (D2)

= 17,000 (kg/year) - 190 (kg/year) - 0 (kg/year) - 0 (kg/year)

= 16,810 kg/year

(6) Releases to soils (C)

Releases to soils (C) = 0 (No on-site landfills either)

(7) Calculation of releases to water bodies (B)

Waste water is released to water bodies after wastewater treatment.

Releases to water bodies (B)

= (annual amount of wastewater released)

× (Class I Substance concentration in wastewater)

= 20,000 (m^3/year) × 0 (kg/m^3)

= 0kg/year

Since aeration treatment is performed at the wastewater treatment facility, the concentration of the Class I Substances is below the minimum limit of determination and there is no release to water bodies.

The emission to air from this wastewater is included in the evaporation in A1.

(8) Calculation of releases to air (A) = (A1) + (A2) + (A3)

① Releases from the coating machine (coating booth) (A1)

(A1) = {(X) - (B) - (C) - (D1) - (D2) - (E)} × (coating machine evaporation ratio)

= {17,000 (kg/year) - 0 (kg/year) - 0 (kg/year) - 190 (kg/year) - 0 (kg/year) } × (1 - 0.1 - 0.6)

= {16,810 (kg/year)} × (0.3)

= 5,043 kg/year

- The coating machine evaporation ratio

  = 1 - the conveyor system evaporation ratio - oven carried- in ratio

② Releases from the conveyor system

(A2) = {(X) - (B) - (C) - (D1) - (D2) - (E)} × (conveyor system evaporation ratio)

= {16,810 (kg/year)} × (0.1) = 1,681 kg/year

③ Releases from the oven

(A3) = {(X) - (B) - (C) - (D1) - (D2) - (E)} × (oven carried- in ratio) × (1 - removal efficiency)

= {16,810 (kg/year)} × (0.6) × (1 - 0.99)

= 100.86 kg/year

- The relationship among the coating machine evaporation ratio, the conveyor system evaporation ratio, and the oven carried-in ratio is shown below:

  Coating machine evaporation ratio + conveyor system evaporation ratio + oven carried in ratio = 1

Note: In the above calculations ①, ②, and ③, the solvent amount in the waste of coating material should be added to the numeric value in parentheses { } as an amendment term, but it is within the error range and at an ignorable level as shown in the results on the following page, and is therefore omitted.

(8’) Calculation of releases to air (A) = (A1) + (A2) + (A3)

The example in which the toluene amount in the waste of coating material by over-spray is considered as the amendment value is shown in the following.

① Releases from the coating machine (coating booth) (A1)

(A1) = {(X) - (B) - (C) - (D1) - (D2) - (E) + (solvent amount in coating material residue)}

× (coating machine evaporation ratio) - (solvent amount in coating material residue)

= {17,000 (kg/year) - 0 (kg/year) - 0 (kg/year) - 190 (kg/year) –0(kg/year)

+ (2,000 (kg/year) × 1%÷ 100)} × (1 - 0.1 - 0.6)

- (2,000 (kg/year) × 1%÷ 100) = {16,830 (kg/year)} × (0.3) - 20 (kg/year)

= 5,029 kg/year

- The coating machine evaporation ratio

  = 1 - the conveyor system evaporation ratio - oven carried-in ratio

② Releases from the conveyor system

(A2) = {(X) - (B) - (C) - (D1) - (D2) - (E) + (solvent amount in waste of coating material)}

× (conveyor system evaporation ratio)

= {16,830 (kg/year)} × (0.1) = 1,683 kg/year

③ Releases from the oven

(A3) = {(X) - (B) - (C) - (D1) - (D2) - (E)} + (solvent amount in waste of coating material)}

× (oven carried-in ratio) × (1 – removal efficiency)

= {16,830 (kg/year)} × (0.6) × (1 - 0.99)

= 100.98 kg/year

- The relationship among the coating machine evaporation ratio, the conveyor system evaporation ratio, and the oven carried-in ratio is shown in the following formula:

Coating machine evaporation ratio + conveyor system evaporation ratio + oven carried-in ratio = 1

3.2.2 Degreasing – Cleaning process

(a) Outline of the facility

Examples of calculation method for the releases and transfers in the following facility with use conditions shown below.

・Process: Degreasing , cleaning and surface treatment of a can

・Used facility: Can washer

・Wastewater treatment facility: Equipped

・Chemical products used

Raw materials		The Class I Chemical Substances	
Name of raw materials	Annual quantity handled (kg/y)	Name of chemical substance	Content (%)
Degreasing agent A	10,000	Hydrogen fluoride	10

Note; Content (%) is the converted value to element F.

・Amount of waste: Sludge from wastewater treatment 20,000 (kg/y)

Content of F 4.89% (measured value)

・Amount of wastewater from can washer: 50 (m^3/day) × 200 (working Days/year)

・Other amount of wastewater: 60 (m^3/day) × 200 (working Days/year)

・Annual amount of wastewater from wastewater treatment:

Amount of wastewater

= 50 (m^3/day) × 200 (working Days/year)

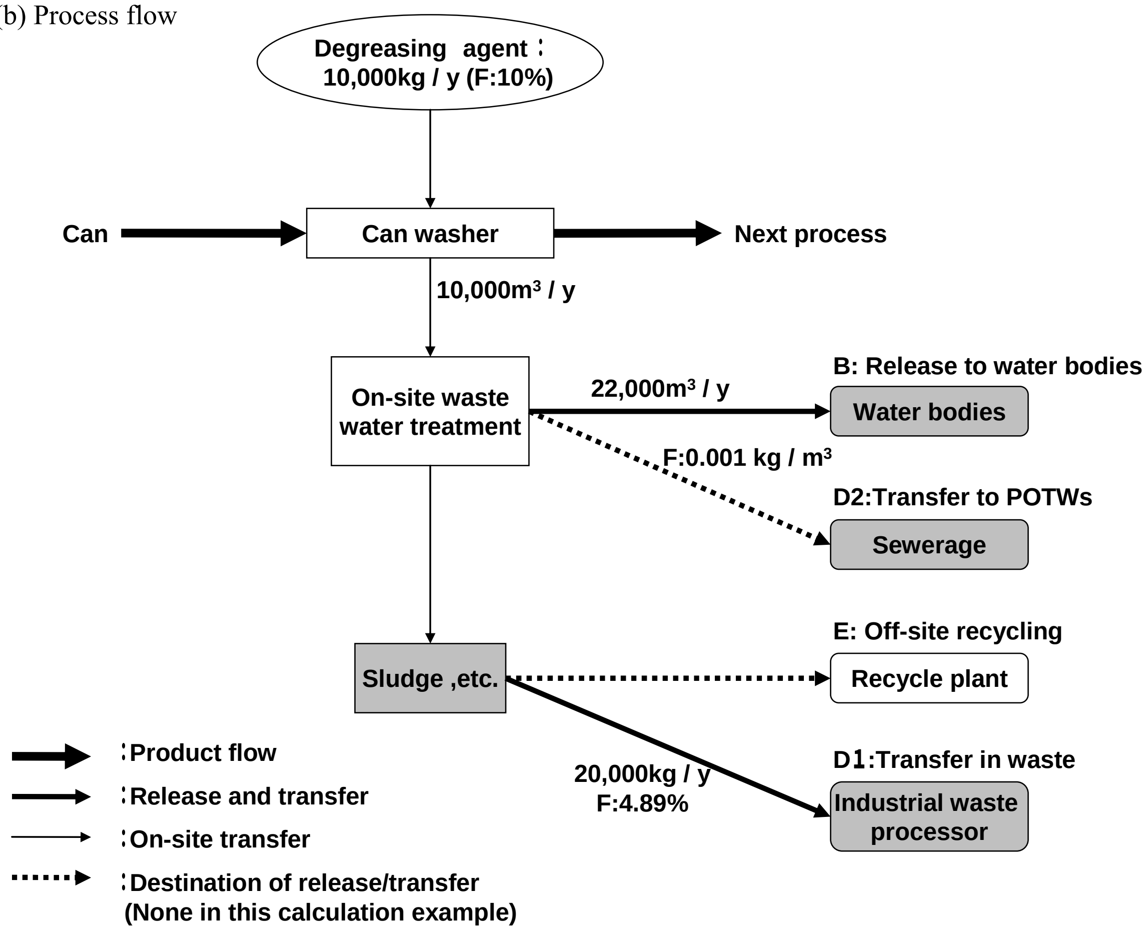
+ 60 (m^3/day) × 200 (working Days/year)

= 22,000 m^3/y

・Content of F in water released to water bodies: 0.001kg/m^3 (1mg/L)

- The averaged value measured : sampled at the outlet of wastewater treatment equipment.

(b) Process flow



(c) Calculation example of release and transfer of fluoride salts.

(1) Calculation of annual quantity handled

Annual quantity handled is calculated by the annual amount of raw materials used at the subject process and content of the Class I Chemical Substances contained therein.

Annual quantity handled of fluorine

= ∑ [(the annual amount used of the raw material)

× (content of fluoride salts contained therein)]

= 10,000 kg/y × 10 (%) ÷ 100

= 1,000 kg/y

(2) Calculation of transfers contained in waste (D1)

① In case the data of the concentration of F in waste is known.

In this case transfers contained in waste is calculated from amount of the waste and the content of F contained therein.

Transfers in waste (D1)

= ∑((amount of the waste handed over) × (content of F))

= 20,000 (kg/year) × 4.89 (%) ÷ 100 = 978 kg/year

② In case the data of the concentration of F in waste is unknown.

Transfers in waste (D1)

= (X) - (E) - (D2) - (B)

= 1,000 (kg/y) – 0(kg/y) – 0(kg/y) – 22(kg/y)

= 978 kg/year

- ② should be used in case either there is no data of content of the Class I Substances contained in waste, or data of content in waste fluctuate much ,and release to water bodies (B) is considered to be more reliable.

(3) Calculation of off-site recycling (E)

This is assumed to be 0 in this case,

(E) = 0

(4) Calculation of transfers to sewerage (D2)

This is assumed to be 0 in this case.

(D2) = 0

(5) Calculation of maximum potential releases (Y)

The maximum potential amount released is calculated by subtracting the transfers contained in waste and the amount contained in wastes sold for recycling from the annual amount of the Class I Substances handled.

Maximum potential releases (Y)

= (X) - (D1) - (E) - (D2)

= 1,000 (kg/year) – 978 (kg/year) - 0 (kg/year) - 0 (kg/year)

= 22 kg/year

- In case no wastewater treatment facility is equipped, (Y) equals to B.

(6) Releases to soils (C)

Releases to soils (C) = 0

(7) Calculation of releases to water bodies (B)

As there is no release to air and no release to soil either,

Releases to water bodies (B) = (Y)

(8) Release to air (A)

(A) = 0

3.2.3 On-site waste treatment process

(a) Outline of the facility

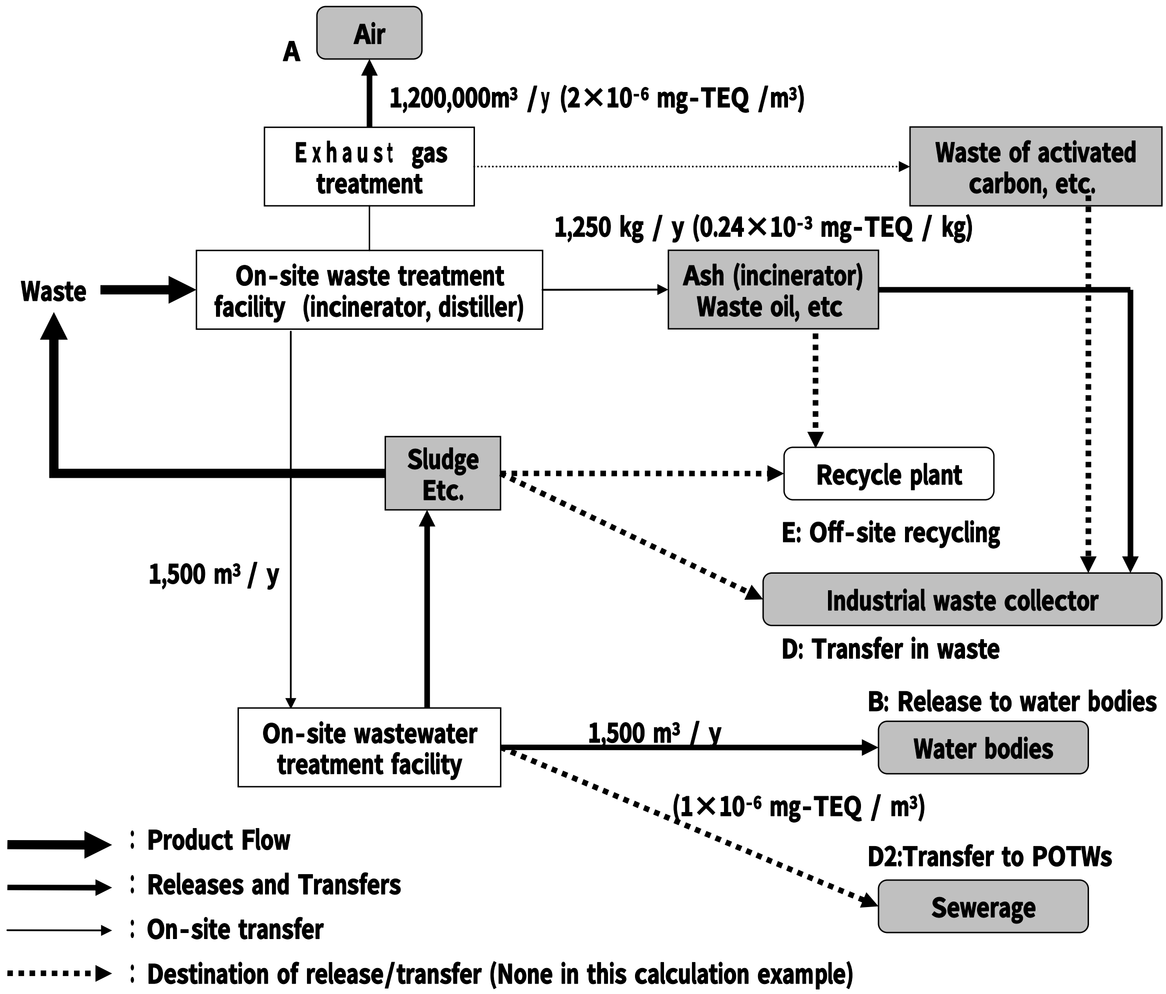
Examples of calculation method for the releases and transfers in the following facility with use conditions shown below.

・Process: On-site incineration of waste

・Used facility: Incinerator

・Exhaust gas treatment apparatus: Bag filter → Venturi scrubber
・Wastewater treatment facility: Coagulation-Precipitation
・Working hours: 1,500hours/year
・Amount of exhaust gas: $800m^3$/hour
$1,200,000m^3$/year (Working hours; 1,500hours/year)
・Concentration of dioxins in exhaust gas: 2ng-TEQ/m^3(= 2 × 10^{-6}mg-TEQ/m^3)
・Amount of wastewater: $1m^3$/hour
$1,500m^3$/year (Working hour: 1,500hours/year)
・Concentration of dioxins in wastewater: 1 pg-TEQ/L(= 1 × 10^{-6}mg-TEQ/m^3)
Concentration in wastewater released to water bodies after treated.
・Amount of ash generatiod by incinerator: 1,250 kg/year
・Concentration of dioxins in ash: 0.24ng-TEQ/g(= 0.24 × 10^{-3}mg-TEQ/kg)
Note: All the data of dioxins concentration above mentioned are the measured values.

(b) Process flow



(c) Calculation example: releases and transfers of dioxins

(1) Calculation of transfer in waste (D)

Transfer in waste is calculated from the amount of waste and concentration of the subject substance in waste.

Transfer in waste (D) = ∑((amount of the waste handed over) × (concentration))

$= 1{,}250\ (kg/year) \times 0.24 \times 10^{-3} mg\text{-}TEQ/kg$

= 0.3mg-TEQ/year

(2) Calculation of transfers contained in valuable resources.

Calculation is performed from the amount of valuable resources and the content of the Class I Substances contained therein.

Transfers (for off-site recycling) contained in valuable resources (E)

= ∑ ((amount of valuable resources handed over) × (content))

= 0

(3) Releases to soils (C)

Releases to soils (C) = 0 (not stable landfills)

(4) Releases to water bodies (B)

Releases to water bodies (B)

= (annual quantity of wastewater released)

× (Class I Substance concentration in wastewater)

$= 1{,}500\ (m^3/year) \times 1 \times 10^{-6} mg\text{-}TEQ/m^3$

= 0.0015mg-TEQ/year

(5) Release to air (A)

Release to air (A)

= (annual quantity of exhaust gas released)

× (Class I Substance concentration in exhaust gas)

$= 1{,}200{,}000\ (m^3/year) \times 2 \times 10^{-6} (mg\text{-}TEQ/m^3)$

= 2.4mg-TEQ/year

3.2.4 Soldering process

(a) Outline of the facility

Examples of calculation method for the releases and transfers in the following facility with use conditions shown below.

Process: Soldering process of soldered can

Used facility: Solder bath

Amount of exhaust gas: 0

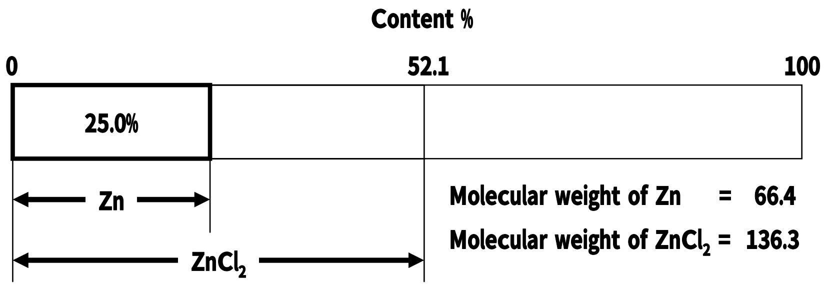
Exhaust gas treatment apparatus: Not equipped

Chemical product used

Raw materials		The Class I Chemical Substances	
Name of raw materials	Annual quantity handled (kg/y)	Name of chemical substance	Content (%)
Antioxidant for soldering	5,000	Zinc chloride	25

* Content is the converted value as element Zn.

In antioxidant for soldering, 52.1% of zinc chloride ($ZnCl^2$) is contained, and so (as the converted value to element), 25% of Zn is contained.

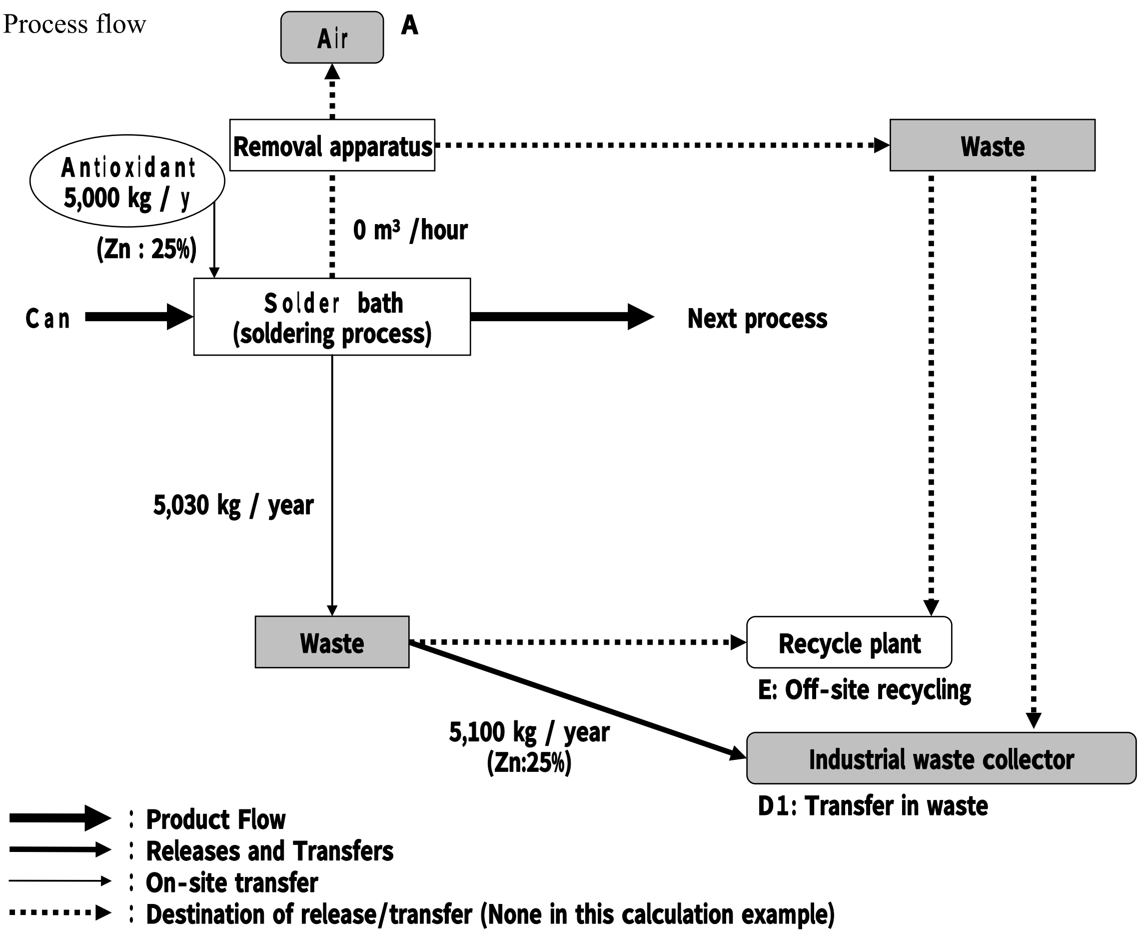


Amount of waste : Waste from solder bath 5,100 kg/year

Concentration of zinc 24.5%

* Concentration of zinc is the measured value.

(b) Process flow



(c) Calculation example of release and transfer of zinc.

(1) Calculation of annual quantity handled (X)

Annual quantity handled is calculated by the annual amount of antioxidant ,etc. used at the subject process and content of the Class I Chemical Substances contained therein.

Annual quantity handled (X)

= ∑((the annual amount used of the chemical product) × (content))

=5,000 kg/y × 25.0 (%) ÷ 100

= 1,250 kg/y

(2) Calculation of transfers contained in waste (D1)

Transfers in waste is calculated from the amount of waste and the content of the subject substance contained therein.

Transfers in waste (D1)

= ∑((amount of the waste handed over) × (content))

= 5,100 (kg/year) × 24.5 (%) ÷ 100

= 1,250 kg/year

(3) Calculation of transfers contained in valuable resources (E)

Calculation is performed from the amount of valuable resources and the content of the Class I Substances contained therein.

Transfers (for off-site recycling) contained in valuable resources (E)

= ∑ ((amount of valuable resources handed over) × (content))

= 0

(4) Calculation of maximum potential releases (Y)

The maximum potential amount released is calculated by subtracting the transfers contained in waste and the amount contained in wastes sold for recycling from the annual amount of the Class I Substances handled.

Maximum potential releases (Y)

= (X) - (D1) - (E)

= 1,250 (kg/year) – 1,250 (kg/year) - 0 (kg/year)

= 0 kg/year

(5) Releases to soils (C)

Releases to soils (C) = 0

(6)Releases to air (A)

Releases to air (A) = 0