

Guidance for Calculating Recycled Content in Aluminum Can Sheet (Version 1.2)

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CMI assumes many roles to meet the industry's needs. On both the national and state level, CMI actively participates in the exchange of ideas influencing legislative, regulatory and administrative policies of interest to can makers. CMI has also conducted and sponsored several innovative studies that led to promotional campaigns seeking larger market share for the can. CMI provides a statistical service by publishing monthly and annual shipment reports by product and marketing category and serves as the industry's technical forum.	
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1. Development Partners

The development of this guidance was led by the U.S.-based Can Manufacturers Institute (CMI) and is available for download from the CMI website, www.cancentral.com, at no charge. Feedback or questions can be directed to CMI via e-mail by contacting info@cancentral.com; please use “Recycled Content Guidance” in the subject line.

Development was assisted by GreenBlue, an environmental nonprofit dedicated to empowering a diversity of stakeholders to promote a more sustainable materials economy.

About the Can Manufacturers Institute

CMI is the national trade association of the metal can manufacturing industry and its suppliers in the United States. CMI is committed to fostering the prosperity of the metal can industry and engaging in initiatives to solidify the can as the superior sustainable package.

CMI assumes many roles to meet the industry's needs. On both the national and state level, CMI actively participates in the exchange of ideas influencing legislative, regulatory and administrative policies of interest to can makers. CMI has also conducted and sponsored several innovative studies that led to promotional campaigns seeking larger market share for the can. CMI provides a statistical service by publishing monthly and annual shipment reports by product and marketing category and serves as the industry's technical forum.

About GreenBlue

GreenBlue is an environmental nonprofit dedicated to the sustainable use of materials in society. Our mission is to promote the principles of sustainable materials management — use wisely, eliminate toxicity and recover more. Through our projects, we achieve our goal by influencing the debate, enhancing supply chain collaboration and creating action. GreenBlue is the parent nonprofit to The Sustainable Packaging Coalition, How2Recycle, CleanGredients, the Recycled Material Standard and other programs.

Advisory Committee Members

An advisory committee contributed to the development of this guidance from late 2022 through early 2025. CMI and GreenBlue would like to collectively acknowledge the contributions of the following individuals and the support of their respective organizations. Participation of contributors does not imply explicit agreement or endorsement by the individual or the entity they represent.

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2. Disclaimer and Authorization of Use

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3. Objective:

This voluntary guidance has been written specifically for the purpose of reporting percentage-based recycled content of aluminum can sheet used to make beverage containers. As a voluntary guidance, it provides a means to adopt a uniform, global calculation method among manufacturers of aluminum can sheet. The guidance is not intended to replace any regulatory requirements for reporting.

By adopting a consistent methodology, stakeholders have the ability to consistently track the utilization of recycled materials in aluminum beverage containers. This guidance is intended for business-to-business reporting purposes only and the results should not be used for consumer facing public claims because it may not reflect the actual composition (see section 5.5.2). Companies that choose to make public claims should do so in accordance with their national laws for environmental marketing.

This guideline is solely focused on the single attribute of recycled content and is not intended to address environmental attributes, claims or tradeoffs associated with the use of recycled materials (e.g., landfill avoidance, greenhouse gas emissions, water use, etc.).

The guidance includes a methodology for reporting the use of both pre-consumer and post-consumer aluminum scrap. The guidance also offers clarity regarding the use of rolling mill scrap as well as scrap generated from can making and filling operations.

Across the industry, there are varying degrees of co-location of casting and rolling processes used to make can sheet. In the development of this guidance, it was acknowledged that scrap generated within a facility maintains its known composition when reused within the same facility for the same alloy. In other words, it does not change its recycled content status when reused. Rolling mill scrap that crosses boundaries (i.e., transferred from one alloy to another within a company) does not contribute to the recycled content. A consensus was reached that recycled content may not be “generated” within the boundaries of an organization except for aluminum recovered from dross. For the methodology presented, all recycled material (except aluminum recovered from dross) must be received from outside of the calculation boundary.

4. Terms and Definitions

This guidance has been developed with the input of multiple trade associations and manufacturers representing the aluminum industry and beverage container manufacturing. Through multiple engagements, it became clear that there are several terms in the industry that are not used uniformly by various stakeholders, especially terms related to pre-consumer scrap such as “*in house*” scrap and “*runaround*” scrap. While ISO 14021 serves as an informative resource, that standard references the terms “*rework*” and “*regrind*.” Neither of these terms are employed within this protocol.

For this guidance, recycled material inputs and scrap sources are defined by the point of generation (e.g., rolling mill scrap) and further classified by their status as either pre-consumer or post-consumer materials (e.g., a remelt scrap ingot with 50% post-consumer content). The following terms and definitions have been established specifically for the purposes of this guidance and are not meant to replace or re-define terms and definitions from other standards or protocols.

- **Aluminum Alloy** - Aluminum that contains alloying elements, where aluminum predominates and the aluminum content is no greater than 99%. Examples of alloys used in beverage container manufacturing include 3004 for can bodies and 5182 for ends/lids.
- **Alloying Metals** - Alloys used for beverage containers consist mostly of aluminum but contain small amounts of other metals as well including magnesium, manganese, iron, silicon, copper and zinc. Alloying metals typically comprise 1-3% of the composition of alloys used in beverage containers.
- **Alloy Series** – The aluminum industry uses a four digit numerical system to help identify different materials. The first digit in the code reflects the principal element added to aluminum. For example, a 5 at the beginning of the code indicates that magnesium is the principal element. This would be referred to as a 5-series alloy or shown as 5xxx whereas 5182 is a specific alloy within the 5-series.
- **Aluminum Beverage Container** - Aluminum beverage containers include cans as well as aluminum bottles. These containers are used extensively for carbonated beverages (e.g., soft drinks and beer) as well as additional beverage markets including water, wine, coffee and plant-based drinks. Throughout this guidance, containers are referred to as an inclusive term representing both bottles and cans.
- **Beverage Container Manufacturer** (also referred to as canmaker) - Aluminum beverage container manufacturers convert can sheet material into components needed for assembling and filling cans including can bodies and can ends with tabs for opening. For aluminum bottles, rather than a can end, bottles are typically fitted with a cap or resealable screw top.
- **Can Sheet Coil** - Rolled product of an alloy suitable for use in beverage containers with a thickness ranging from roughly 0.15 mm to 6 mm in thickness. Rolled aluminum thinner than sheets are referred to as “foils” whereas thicker sheets are referred to as “plate.”
- **Cast House** - A facility that houses a furnace to melt different forms of aluminum into a molten (liquid) state and then pour the aluminum into a mold where it resolidifies into a specific shape. For a stand-alone cast house, the materials entering the facility include primary and/or recycled aluminum and alloying elements. For the beverage container industry, the finished product from a cast house is aluminum slabs, which will be further processed in a rolling mill.
- **Co-location** - When multiple processes are situated at the same facility, they are considered to be co-located. In some cases, co-location is also referred to as integration. For the beverage container manufacturing process, it is common for a cast house to be co-located with a rolling mill.
- **Container Blank** - The first step in making a beverage container is cutting a round circle (known as a blank) from a can sheet coil. The container blank is then mechanically formed or “drawn” into the shape of a can body or bottle.
- **Delacquering** – A high temperature process (typically a rotary kiln) that removes volatile organic compounds from the aluminum by converting them to a gaseous state; also referred to as “decoating.”
- **Dross** – A byproduct of the melting process formed at the surface of the molten metal. It is a combination of aluminum, oxides of aluminum and oxides of alloying elements and other impurities. The amount of dross formed is a function of many factors including process variables (temperature and mixing) as well as the size and type of materials entering the furnace.
- **External Inputs** - Materials that have been purchased from a supplier; also referred to as received weights.

- **Finished Rolled Product (FRP) Shipments** – The amount of finished product sold in rolled form to an external buyer for use in creating a new product (also referred to as coils).
- **Ingot** - A cast product intended for remelting. In this guidance, ingots only refer to products entering a cast house. An ingot is typically purchased as an external source. Ingots are formed in various shapes and sizes; small ingots are sometimes referred to as “pigs” and large ingots are sometimes referred to as “sows.”
- **Internal Scrap** - Scrap materials that are generated within a facility and recovered within the same facility regardless of the level of integration. This includes sawn slab ends, scalping material and other rolling mill scrap returned to a melting furnace.
- **Melt Loss** - A general term used to convey metal loss during the melting process in a cast house. These losses are caused by oxidation, volatilization, the formation of dross and other reactions that occur during smelting. Melt loss can be expressed as a whole number or as a percentage of input materials. The amount of melt loss depends on multiple factors and in general is higher for post-consumer scrap materials.
- **Melt Yield** - An expression of conversion efficiency for the melting and casting process that accounts for process losses from received goods through casting. Melt yield is expressed as a percentage of the total output of saleable products as compared to the total of external input materials.
- **Net Prime** – An expression used to represent the sum of primary aluminum, alloys and hardeners in a product from all external inputs (e.g., externally purchased ingots, RSI) into the calculation boundary that reflects the overall melt loss from materials that went through casting.
- **Net Weight** - For the purposes of this guidance document, the term “net weight” is used to convey the difference between received weight and the metal content in finished products. The “net” term can be applied to primary aluminum and alloying agents, pre-consumer or post-consumer aluminum.
- **Pre-Consumer Material** - Material diverted from the waste stream during a manufacturing process; only pre-consumer materials that enter from outside of the calculation boundary count toward the recycled content calculation. Examples include the pre-consumer content of remelt scrap ingots (RSIs) and of can sheet scrap from cutting container blanks.
- **Primary (metal)** - Primary metal is derived from ore rather than scrap and does not have recycled status. For example, unalloyed aluminum produced from alumina, typically by electrolysis, with an aluminum content of greater than 99%.
- **Prime** – An expression that represents the total of primary aluminum and alloying agents that do not have a recycled status (i.e., metals that are neither pre-consumer nor post-consumer are considered prime).
- **Post-Consumer Material** - Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product that can no longer be used for its intended purpose. This includes returns of material from the distribution chain. Examples include the post-consumer content of RSIs, used beverage containers, aluminum siding recovered from demolition and used printing plates (also referred to as lithographic plates).
- **Product** - An item or material that is manufactured for sale to a customer; often referred to as finished goods. In some cases, products may be transferred between locations within a company. Within the beverage can supply chain, one company’s products (outputs) become another company’s external inputs.

- **Recycled Content** - The proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials count as recycled content; internal scrap as defined above does not contribute to the recycled content calculation.
- **Recycled Material** - Includes both pre-consumer and post-consumer materials as defined above.
- **Remelt Scrap Ingot (RSI)** - Aluminum ingot produced from various scrap sources that may contain some primary aluminum.
- **Rolling Mill** - A facility where the function is to process solid aluminum alloys by passing the metal through a gap between rotating cylinders. Rolling processes can be done cold (without adding heat) or hot (where metal is pre-heated). Typically, the input to a rolling mill is aluminum slabs and the output is aluminum coils.
- **Rolling Mill Scrap** - Aluminum scrap generated at a rolling mill; abbreviated as RMS.
 - **RMS Input** – Rolling mill scrap that enters a calculation boundary from another alloy series. For example, if calculating the recycled content of Alloy Series B, RMS that enters the boundary from any alloy series other than B would be RMS Input.
 - **RMS Output** – Rolling mill scrap that leaves a calculation boundary and goes to a different alloy series or that becomes sold scrap. For example, if calculating the recycled content of Alloy Series B, RMS that leaves the calculation boundary and flows to another alloy series would be considered RMS Output.
 - **RMS Within Boundary** – Rolling mill scrap that does not leave the calculation boundary and flows to a cast house to be used in the same alloy series.
- **Slab** - The product of the aluminum casting process subsequently used for rolling into can sheet coils. In this guidance, slabs only refer to products manufactured at a cast house within the system boundary that then go to a rolling mill for production into a finished rolled product or to products purchased externally from a third party that go to the rolling mill. Slabs are generally rectangular in cross section and made in various lengths.
- **Sold Scrap** - Any scrap generated at a cast house or rolling facility that is sold to another organization for further processing. Sold scrap may include dross that is sent offsite for processing.
- **Stand-Alone** - A term used to represent a manufacturing facility that serves only one major processing step in the supply chain; also referred to as a non-integrated manufacturing facility.
- **Used Beverage Cans (UBCs)** - A form of post-consumer scrap aluminum collected through municipal and institutional recycling systems and/or container deposit schemes. UBC bale and briquette specifications are further defined by the Recycled Materials Association in its Scrap Specification Circular, which is updated on an annual basis.

5. Calculation Method

This guidance was developed to establish a consistent and transparent reporting methodology. As such, it is expected that there should be no deviations to stated definitions, calculation methods, boundaries, etc.

If any change to the method is made, that change should be transparently communicated including a justification for the change. For example, if a facility undergoes an extensive shutdown and there is not 12 months of data available, the period of the shutdown and startup time should be noted and the time frame for the calculation should be clearly specified. Or, if a company combines data across different geographic boundaries, the reason for that change should be identified and the regional boundaries should be made clear.

In all cases, if a regional factor for the composition of scrap is used instead of data provided by suppliers, it is recommended that this be disclosed.

In all cases, companies should be able to demonstrate that there is ***no double counting*** of recycled materials. For example, if a company makes a 5-series alloy that includes alloys used for markets other than cans, they must be able to demonstrate that there is no double counting of the recycled material attributed to the can sheet products within that series.

5.1. Time Frame

All reporting following this guidance shall be based on 12 months data using calendar years. For example, data shared in 2025 would be based on production from January 1 to December 31, 2024. Any company that prefers to report on a fiscal year basis should clearly note the time frame.

Some companies may request data based on a shorter time frame (e.g., quarterly). As noted above, if quarterly data is used instead of annual data, the specific time frame should be noted.

5.2. Calculation Boundaries

Calculations are conducted using the inputs and outputs for an alloy series across all of an organization's facilities within a region as the calculation boundary. The calculation boundary does not consider whether facilities are co-located or not (i.e., the boundary remains the same whether or not a cast house is co-located with a rolling mill).

5.3. Regional Boundaries

Companies should report data on a regional basis as defined by the eight world regions in the SDG framework of the United Nations, with one exception; this guidance treats Northern America and Europe as two separate regions. A map and listing of countries in these regional groupings can be found at: unstats.un.org/sdgs/indicators/regional-groups/

Thus, regions are defined as:

- Australia and New Zealand
- Central and Southern Asia
- Eastern and South Eastern Asia
- Europe
- Latin America and the Caribbean
- Northern Africa and Western Asia
- Northern America
- Oceania excluding Australia and New Zealand
- Sub-Saharan Africa

5.4. Units of Measure

Recycled content is calculated on a mass basis. All examples within this document are based on the metric system (using kilograms and metric tons) but other mass-based units are permissible.

5.5. Recycled Content Methodology

5.5.1 Net Weight Formula

Net weight reflects the weight of metal that remains in finished products at the cast house. The net weight must account for losses in various stages of pre-processing including moisture losses, shredding, sorting, delacquering and melt losses in a furnace.

Net Weight = Received Weight x Melt Yield

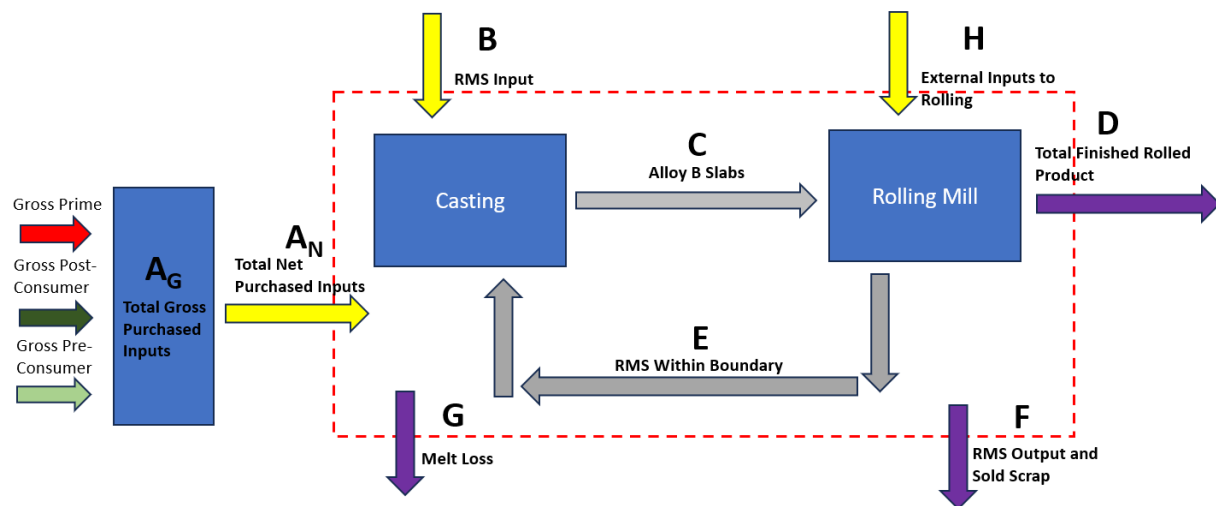
The net weight formula is applied to all input types to arrive at the net weights by recycled status (e.g., net prime, net pre-consumer and net post-consumer).

Melt loss is affected by a number of factors including material type, physical shape (e.g., ingot or shredded scrap), operating conditions and melting furnace type. However, by conducting material balances based on purchased inputs and sold goods, all facilities are able to calculate melt loss factors. For versions 2 and 3 explained below, manufacturers should use no less than four factors that represent melt losses for pre-consumer, UBC's, other post-consumer and prime. Manufacturers may apply more factors if desired. Manufacturers will use melt loss factors specific to their facilities.

For externally purchased materials that do not enter the cast house (e.g., a purchased roll or slab that goes to a rolling mill), the melt yield factor is presumed to be 1.0.

5.5.2 Versions of the Recycled Content Formula

The diagram below illustrates for "Alloy Series B" the flow of materials that enter and leave the calculation boundary, which is represented by the red, dotted line. The diagram is followed by three versions of a recycled content formula developed through discussions with the Advisory Committee. Examples in the following section will show that each of the three versions yields the same results as they are derived by rearranging terms.



A_G is defined as the total gross (i.e., received) weight of purchased inputs (Gross Prime + Gross Post-Consumer + Gross Pre-Consumer)

A_N is defined as the total net purchased inputs (Net Prime + Net Post-Consumer + Net Pre-Consumer)

H is part of A_G and A_N since A_G and A_N include all purchased inputs entering the calculation boundary, not just those entering the cast house. The full 1,000 mt of H is in both A_G and A_N because this material has no loss given it is not melted.

A_G = Total Gross Purchased Inputs. It is the sum of Gross Prime + Gross Post-Consumer + Gross Pre-Consumer

Gross inputs are the raw materials the organization purchases. These materials undergo various levels of pre-treatment before being remelted. For example, a bale of used beverage cans (UBCs) is typically sorted, dried, shredded and delacquered before entering a furnace where there are additional losses associated with melting (i.e., dross formation). The material removed from a gross input during pre-treatment and melting is reflected in the calculation of net weights. (See section 5.5.1 and example calculation in section 6.1).

A_N = Total Net Purchased Inputs. It is the sum of Net Prime + Net Post-Consumer + Net Pre-Consumer

B = RMS Input. The amount of rolling mill scrap from other alloys that enter the calculation boundary

C = Alloy B Slabs. The amount of slabs made of Alloy B going from the cast house to the rolling mill

D = Total Finished Rolled Product. The total amount of sold finished rolled products (i.e., coils)

E = RMS Within Boundary. The amount of Alloy B that is remelted back into Alloy B

Scrap (e.g., scalper chips, sawn ends) that stays within the boundary and is remelted into the same alloy are part of Flow E. This scrap material that leaves the boundary is counted in Flow F.

F = RMS Output & Sold Scrap. The amount of rolling mill scrap that leaves the calculation boundary to be used in another alloy within the organization or that is sold

G = Melt Loss. Melt losses from Flow B and Flow E

For this methodology, G represents only melt losses from rolling mill scrap—streams B and E. The melt losses from the purchased inputs are accounted for in the conversion of gross weight to net weight.

H = External Inputs to Rolling. Slabs and other external inputs entering the rolling mill from outside the calculation boundary

Because the materials represented by H do not enter a cast house, there is no pre-processing nor melt loss from these inputs. In other words, the net weight and gross weight of these materials is the same (as illustrated in the example in section 6.1).

The methodology is presented in three different versions of the formula to accommodate the different process data that manufacturers currently gather.

As noted in section 3, there was much debate among stakeholders about how to treat the use of rolling mill scrap that transfers across calculation boundaries. Some manufacturers do not fully segregate and track individual scrap streams as they flow to different alloys. With the adopted method, only external inputs (i.e., purchased materials) are needed to determine the prime, pre-consumer and post-consumer content in the finished rolled product. As a result, the formula does not always represent the total mass that is in an alloy production stream. In some cases, an alloy may be a net receiver of rolling mill scrap and in other cases it may be a net donator. Furthermore, the incoming composition of RMS input could be higher or lower than the average of the alloy that it is blended into. For these reasons, results derived from this guidance should not be used for consumer facing claims as it will not always reflect the actual composition of the alloys.

5.5.2.1 Version 1:

$$\text{Total Recycled Content} = 100 \times (D + F + G - B - \text{Net Prime}) / (D + F + G - B)$$

$$\text{Post-Consumer} = 100 \times (\text{Net Post-Consumer}) / (D + F + G - B)$$

$$\text{Pre-Consumer} = \text{Total Recycled Content} - \text{Post-Consumer}$$

5.5.2.2 Version 2:

$$\text{Total Recycled Content} = 100 \times (A_{\text{Net}} - \text{Net Prime}) / A_{\text{Net}}$$

$$\text{Post-Consumer} = 100 \times \text{Net Post-Consumer} / A_{\text{Net}}$$

$$\text{Pre-Consumer} = \text{Total Recycled Content} - \text{Post-Consumer}$$

5.5.2.3 Version 3:

$$\text{Total Recycled Content} = 100 \times (\text{Net Pre-Consumer} + \text{Net Post-Consumer}) / A_{\text{Net}}$$

$$\text{Post-Consumer} = 100 \times \text{Net Post-Consumer} / A_{\text{Net}}$$

$$\text{Pre-Consumer} = 100 \times \text{Net Pre-Consumer} / A_{\text{Net}}$$

6. Recycled Content Example Calculation

The following example is provided to illustrate calculation methods used to calculate the recycled content in can sheet coils. First, purchased inputs are converted to net weights and then each of the versions of the recycled content formula is applied demonstrating that each version delivers the same results.

Example 6.1 Determining net weights for purchased inputs

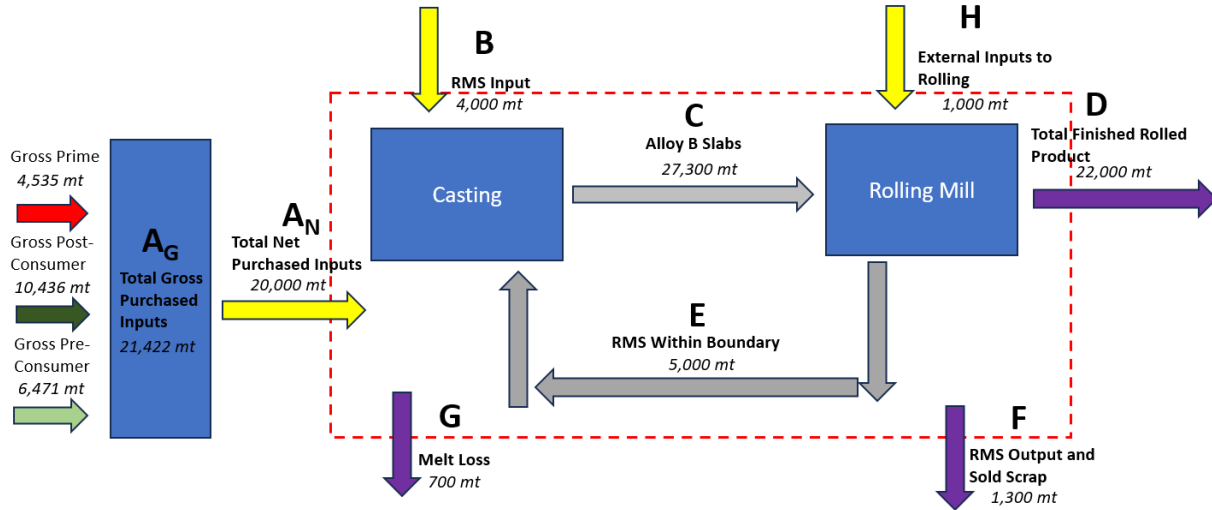
Company Z uses a combination of primary metals (including alloying metals and hardeners) and recycled aluminum sources including both pre-consumer and post-consumer materials.

To calculate the total recycled content in the sold finished rolled product made by Company Z, the melt yields are applied to get net weights and then the % recycled content is determined using each version of the recycled content formula.

The table below shows the various purchased material inputs and the resulting net weights of primary, pre-consumer and post-consumer materials. External inputs to rolling is a separate row because the materials do not flow to the casting process. The composition data and melt yield factors provided are specific to this example..

Purchased Material and Composition	Received Weight (mt)	Melt Yield	Net Weight (mt)	Net Prime (mt)	Net Post-Consumer (mt)	Net Pre-Consumer (mt)
Prime Metals (Al and alloying metals) <i>100% prime</i>	3,535	0.99	3,500	3,500	0	0
Remelt Scrap Ingots <i>85% post-consumer, 15% pre-consumer</i>	7,917	0.96	7,600	0	6,460	1,140
Used Beverage Containers (UBCs) <i>100% post-consumer</i>	3,707	0.82	3,040	0	3,040	0
Scrap from Canmaking Operations <i>100% pre-consumer</i>	5,283	0.92	4,860	0	0	4,860
External Inputs to Rolling <i>100% prime</i>	1,000	1.0	1,000	1,000	0	0
Total			20,000	4,500	9,500	6,000

Company Z sells 22,000 mt of finished rolled product for a can body alloy. They are able to track the inputs and outputs of rolling mill scrap that enter and leave the calculation boundary for the can body alloy, which are 4,000 mt and 1,300 mt, respectively. The diagram below shows this example with the mass flows included.



A_G is defined as the total gross (i.e., received) weight of purchased inputs (Gross Prime + Gross Post-Consumer + Gross Pre-Consumer)

A_N is defined as the total net purchased inputs (Net Prime + Net Post-Consumer + Net Pre-Consumer)

H is part of A_G and A_N since A_G and A_N include all purchased inputs entering the calculation boundary, not just those entering the cast house. The full 1,000 mt of H is in both A_G and A_N because this material has no loss given it is not melted.

6.1.1 Using Version 1

$$\begin{aligned} \text{Total Recycled Content} &= 100 \times (D + F + G - B - \text{Net Prime}) / (D + F + G - B) \\ &= 100 \times (22,000 + 1,300 + 700 - 4,000 - 4,500) / (22,000 + 1,300 + 700 - 4,000) = 77.5\% \end{aligned}$$

$$\begin{aligned} \text{Post-Consumer} &= 100 \times (\text{Net Post-Consumer}) / (D + F + G - B) \\ &= 9,500 / (22,000 + 1,300 + 700 - 4,000) = 47.5\% \end{aligned}$$

$$\text{Pre-Consumer} = \text{Total Recycled Content} - \text{Post-Consumer} = 77.5\% - 47.5\% = 30.0\%$$

6.1.2 Using Version 2

$$\begin{aligned} \text{Total Recycled Content} &= 100 \times (A_{\text{Net}} - \text{Net prime}) / A_{\text{Net}} \\ &= 100 \times (20,000 - 4,500) / 20,000 = 77.5\% \end{aligned}$$

$$\begin{aligned} \text{Post-Consumer} &= 100 \times \text{Net Post-Consumer} / A_{\text{Net}} \\ &= 100 \times 9,500 / 20,000 = 47.5\% \end{aligned}$$

$$\begin{aligned} \text{Pre-Consumer} &= \text{Total Recycled Content} - \text{Post-consumer} \\ &= 77.5\% - 47.5\% = 30.0\% \end{aligned}$$

6.1.3 Using Version 3

$$\begin{aligned} \text{Total Recycled Content} &= 100 \times (\text{Net Pre-Consumer} + \text{Net Post-Consumer}) / A_{\text{Net}} \\ &= 100 \times (6,000 + 9,500) / 20,000 = 77.5\% \end{aligned}$$

$$\begin{aligned}\text{Post-Consumer} &= 100 \times \text{Net Post-Consumer} / A_{\text{Net}} \\ &= 100 \times 9,500 / 20,000 = 47.5\%\end{aligned}$$

$$\begin{aligned}\text{Pre-Consumer} &= 100 \times \text{Net Pre-Consumer} / A_{\text{Net}} \\ &= 100 \times 6,000 / 20,000 = 30.0\%\end{aligned}$$

7. Guidance on material streams

The aluminum industry uses many sources of recycled aluminum including used beverage containers, automobiles, building materials, wires and cables. In some cases, scrap is delivered in the form of a used product (like a beverage can) and in other cases the materials are melted down into standardized shapes and sizes referred to as ingots and sows.

The preferred method for accounting is to have the composition of input streams provided by the supplier. Externally verified compositional data is preferred but not required.

To make calculations more accurate, it will become increasingly important for suppliers at every point in the supply chain to adopt higher levels of transparency and tracing of materials.

This section clarifies how the recycled content status of different input streams should be treated for this calculation method.

7.1 Scrap from can making operations

All scrap from can manufacturing and filling operations that goes to a cast house for melting is considered an external input and is classified as pre-consumer material.

7.2 Remelt Scrap Ingots

Remelt scrap ingots (RSI's) may have a mix of primary aluminum, pre-consumer scrap and post-consumer scrap. There are multiple suppliers of ingots for the industry and determining the specific scrap composition of the recycled aluminum source can be challenging.

It is well understood that RSI's use a high level of post-consumer content in the U.S. and Europe where there are well established household recycling systems.

Unlike all other external inputs, in the absence of data from suppliers, can sheet makers may apply regional factors that represent the average composition of RSI's by alloy series as listed below. Harbor Aluminum conducted research in February 2025 to generate the regional factors. These regional factors will be updated every 3 years and will be publicly listed on the CMI website (www.cancentral.com).

U.S. Regional Data

3x series RSI's: 80% post-consumer, 20% pre-consumer

5x series RSI's: 3% primary aluminum, 97% pre-consumer

EU Regional Data

3x series RSI's: 98% post-consumer, 2% pre-consumer

5x series RSI's: 3% primary aluminum, 97% pre-consumer

In regions other than the U.S. or Europe, manufacturers should rely only on data provided by suppliers. If data is not available, effort should be undertaken to establish regional factors and the source of the factors should be made publicly available.

7.3 Purchased rolls and slabs

Purchased rolls and slabs are external inputs. All external inputs need to be adjusted to net weights in the respective categories of prime, pre-consumer and post-consumer.

One of the general principles behind this method is that the recycled status should never be overstated if it is not known. Therefore, if the composition of a purchased roll or slab is not known, it should default to 100% prime.

7.4 Coated scrap generated by the manufacturer

Coated scrap is typically delacquered before it can be added to a remelt furnace. The delacquering process is considered an integral part of casting. In some cases, coated scrap may be sent to a toll processor. In either case, the composition of the scrap is known to the facility and it returns to the boundary of the calculation just like other rolling mill scrap flows. If it returns to the same alloy series, it is not part of the calculation method (i.e., it wouldn't alter the composition of an alloy that it came from). If it flows to another alloy series, it would be treated as RMS input to the receiving alloy. In other words, the consumption of coated scrap generated by the manufacturer is not considered an external input.

7.5 Sold Scrap

In some cases, companies will sell scrap instead of consuming it within their own process. Some companies may know how much scrap from a given alloy is sold and others do not segregate scrap materials and cannot quantify specifically how much of a given alloy's scrap is sold. Regardless, any sold scrap is considered part of the RMS Output. In our example diagram, RMS Output is labeled as stream F, which represents scrap that leaves the calculation boundary.

7.6 Dross and Recovered Aluminum

The process of treating dross is not within the boundary of the calculation method. Dross that leaves casting from purchased materials is accounted for as part of the net weight calculation. Recovered aluminum from dross that enters the calculation boundary is considered an external input and is considered recycled material. If the dross (and recovered aluminum) has a known composition of post-consumer content, it can be maintained. Otherwise, the recovered aluminum is considered 100% pre-consumer.

Example for Dross Recovery

A cast house is equipped with a rotary furnace to process dross and recover aluminum on site. All the dross processed comes from within the facility, which has a known average content of 25% post-consumer material.

10,000 metric tons of dross is processed with an aluminum yield of 15% resulting in 1,500 mt of aluminum. Because the input was known to be 25% post-consumer, this level of post-consumer can be maintained while the remainder of the aluminum (75%) is considered pre-consumer. Therefore, when the aluminum is added back into the process it is treated as 375 tons of post-consumer and 1,125 tons of pre-consumer material.

7.7 Determining mass flows for rolling mill scrap

Version 1 of the recycled content formula requires companies to know or estimate how much mass is associated with Flow B (RMS Input) and Flow F (RMS Output and Sold Scrap). The following outlines a potential way to calculate Flows B and F.

RMS Input and RMS Output may not be readily known since organizations differ to what extent they can track scrap flows within the organization. It is particularly difficult to trace scrap flows within co-located facilities and at organizations with multiple stand-alone sites within one region. However, Flows B and F can be estimated indirectly, as detailed below in sections 7.7.1 and 7.7.2.

7.7.1. RMS Input

To solve for RMS Input (Flow B), an organization could use an equation that captures what composes all inputs to the cast house: Total Gross Inputs to Casting = $(A_{\text{Gross}} - H) + E + B$. This equation can be rearranged to get an equation for B:

Equation 1: $B = \text{Total Gross Inputs to Casting} - (A_{\text{Gross}} - H) - E$

$B = (\text{Gross Prime} + \text{Gross Pre} + \text{Gross Post} - \text{External Inputs to Rolling Mill} + \text{RMS Input} + \text{RMS Within Boundary}) - (\text{Gross Prime} + \text{Gross Pre} + \text{Gross Post} - \text{External Inputs to Rolling Mill}) - (\text{RMS Within Boundary})$

H needs to be subtracted out from the gross external inputs (A_{Gross}) because while H is an external input to the calculation boundary, it is not an input to casting.

An organization could use the above to solve for B if it knows Total Gross Inputs to Casting, A_{Gross} , E, and H.

7.7.2. RMS Output and Sold Scrap

RMS Output and Sold Scrap (Flow F) is calculated by taking the total slabs used at the rolling mill (Flows C + H) and subtracting the total FRP Shipments (Flow D) and the RMS Within Boundary (Flow E). Written as a formula:

Equation 2: $F = C + H - D - E$

An organization typically knows and tracks flows C, H, D, and E in its operations. These numbers can be used to solve for F.

8. Key Resources

Multiple references were consulted during the development of this guidance; however, it was determined that no existing standards or protocols fully met the needs of the industry sector. In order to serve a global stakeholder group, the existing ISO standard for environmental claims was built upon and the expertise of the individual contributors on the committee was utilized.

Definitions for recycled material, as established in ISO 14021: Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling), Second edition, published in 2016 (specifically section 7.8.1).

9. Revisions

V1.1 of this document added wording on pages 10-11 to further clarify the definitions of three terms used in formula version 1:

- A_G = Total Gross Purchased Inputs
- G = Melt losses from Flow B and Flow E
- H = External inputs to Rolling

V1.2 added language on page 10 about how to treat scrap (e.g., scalper chips, sawn ends) that stays within the boundary and is remelted into the same alloy versus this scrap material that leaves the boundary.

These clarifying, non-substantive changes do not impact calculation results.