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Specifications Template for Embodied Carbon of Building Façade Systems

Developed during the RMI Aluminum Buildings pilot (conducted with Alcoa, Oldcastle BuildingEnvelope, Arup, and Boston Properties)

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Context

This specifications document template was developed during the RMI Horizon Zero Aluminum Buildings pilot. The language is intended to be used in the Embodied Carbon Design Requirement documents to request carbon emissions related information of aluminum components in building façade systems. Bolded text indicates language that is specific to the façade system that can be copied into the relevant Embodied Carbon Design Requirement documents.

Submittals

Include bolded text in the "SUBMITTALS" section of Embodied Carbon Design Requirements documents.

1. Embodied Carbon Design Requirements: Submit for action product data which specifies full compliance with the Embodied Carbon requirements, including published product characteristics for each of the following:
    a. Environmental Product Declarations (EPDs): Provide manufacturers' product documentation for each product having an Environmental Product Declaration
        i. Documentation should confirm EPD conforms with ISO 14205, EN 15804 or ISO 21930
        ii. EPD shall have at least Cradle to Gate scope (A1 - A3). **If possible, the EPD shall declare the impacts from A1, A2, A3 categories separately**.
        iii. EPD shall report Global Warming Potential (GWP) in the form of kg CO_2e/yd3 for concrete, kg CO_2e/ton[1] for steel and steel deck, **kg CO_2e/m^2 or kg CO_2e/ linear m for a façade system, kg CO_2e/ton for aluminum billet that was used for making the façade system.**
    b. Provide manufacturers' product documentation that includes recycled content claims for the products. **This shall include the total recycled content in the product and the post-consumer recycled content in the product.**
    c. Concrete…
    d. Concrete reinforcement…
    e. Steel …
    f. Steel deck ….
    g. Façade System Summary Table: The façade manufacturer(s) shall provide a report to the General Contractor with façade system data submittals, and again at completion of the primary structural frame, summarizing all material quantities and associated embodied carbon values for the chosen façade system. The report shall be in tons of aluminum, glass, other materials and kgCO_2e. All information is itemized as required for each material/material grade. The façade manufacturer(s) would need to get the relevant information from their material supplier(s).

1 A 'ton' refers to a metric ton or 1000 kg

Products

Include bolded text in the "PRODUCTS" section of Embodied Carbon Design Requirements documents.

Façade system

1. **Provide facility-level Type III Environmental Product Declarations (EPDs) for all façade systems.**
    a. **Provide facility-level Type III Environmental Product Declarations (EPDs) for the aluminum billets that were used to make the aluminum extrusions for the façade system.**
    b. **The façade system manufacturer shall ensure that an optimal amount of aluminum and glass are used to build the façade as per the desired technical specifications. Out of all the façade systems that are considered for a project, the façade system that is installed shall result in the lowest amount of operational and embodied emissions for the building.**
    c. **The façade system manufacturer shall use a "low-carbon" aluminum billet with a cradle-to-gate emissions intensity of less than 6000 kg CO_2e/ton of aluminum[2] for making the aluminum components of the façade.**
    d. **The total recycled content in the billet and the post-consumer recycled content in the billet shall be reported.**
    e. **Aluminum is a highly recyclable metal. The façade system manufacturer shall ensure that the aluminum frame used for the façade can be disassembled easily at the façade's end-of-life. This ensures that all the aluminum used in the façade system is recycled at the end of its life.**

2 There is no standard definition of "low carbon" aluminum agreed upon by the aluminum industry. The cradle-to-gate emission intensity value of 6000 kg CO2e/ton (or 6tCO2e/ton) was calculated by assuming an emissions intensity value of 4tCO2e/ton of aluminum at the smelter (which is similar to definitions of low-carbon aluminum used by price reporting agencies like Fastmarkets and Platts) along with a mining and alumina refining emission intensity of 2tCO2e/ton of aluminum. This ensures that aluminum decarbonization is encouraged while also making sure that there is enough supply of billets that are below this 6tCO2e/ton of aluminum cradle to gate emission intensity threshold.