



Date
Gothenburg, 20 October 2021

Your date

Our reference.
Håkan Stripple

Your reference
Boris Wu

Gränges Aluminium (Shanghai) Co., Ltd.
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Review of study - Carbon footprint assessment of Gränges aluminium products

Carbon footprint study for review and verification

Carbon footprint assessment of Gränges aluminium products - Climate impact of flat rolled aluminium products made by Gränges Aluminium (Shanghai) Co., Ltd. in Shanghai. Version: 1.0, Date: 12 October 2021, Issued by: SVP Technology & Innovation.

Gränges' internal LCA/CF tool - Routines and procedures, Gränges Aluminium (Shanghai) Co., Ltd., Version: 1.0, Date: 12 October 2021, Issued by: Boris Wu (Senior Account Manager), Approved by: President Gränges Asia.

Author(s)

The Carbon footprint study is prepared by:

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Study commissioned by:

Gränges Aluminium (Shanghai) Co., Ltd., Shanghai, China.

Date of the study:

12 October 2021

Verifiers

Håkan Stripple, IVL Swedish Environmental Research Institute Ltd., Gothenburg, Sweden is the verifier. Håkan Stripple is an LCA expert and reviewer, and an independent external verifier in the International EPD system¹.

Yuqing Zhang, IVL Swedish Environmental Research Institute Ltd., Shanghai, China office, is an LCA professional and reviewer.

¹ <https://www.environdec.com/Creating-EPDs/List-of-verifiers/Individual-verifiers-in-Sweden/>

Background and Scope

Gränges focuses on rolled aluminium products for heat exchangers and selected niche applications. Gränges' advanced aluminium products are the result of a long-term commitment to research and innovation, and of close development work with customers. Gränges' production site in Shanghai, China, manufactures flat rolled aluminium products. Gränges is focused on rolled products for heat exchangers and selected niche applications such as automotive applications but also for other segments. Gränges offers a comprehensive range of clad and unclad rolled aluminium products applications with a high degree of functionality and performance.

Gränges has a strong commitment to develop sustainable products, minimize the environmental impact of its operations, uphold ethical business practices, and provide a safe and good working environment. Gränges also has a long experience of efforts to reduce the environmental impacts from its production as well as developing new aluminium products in collaboration with their customers along the entire value chain.

In this case, the environmental performance of a large number of products at product article level have been studied by the development of a calculation model to calculate carbon footprints (CF) for different products produced by Gränges Aluminium (Shanghai) Co., Ltd. at Shanghai, China. This work is based on a similar development work done by Gränges, Sweden. The CF model and methodology aims to, on demand, be able to calculate CFs for the various products that Gränges Aluminium (Shanghai) Co., Ltd. manufactures (more than 2000 different products are available). CFs have thus not been calculated for all the products, but the review instead aims to review the calculation model and the methodologies used as well as the instructions and routines that exist to ensure and verify the development of future CFs for Gränges products. This includes the calculation and control of the CFs as well as the operation and maintenance of the model, including annual updates and changes as well as requirements for reverification. This review thus has some similarities with the EPD Process Certification that exists within the international EPD system. Gränges will mainly use and communicate the CFs for the products in a Carbon footprint certificate for each or several products but other use may also exist.

The task of the verifier was to review the study including layout and methodology of the study, the CF report, the CF model, Gränges' internal LCA/CF tool - Routines and procedures, the CF background information, underlying data, and general calculations. The product groups included in the verification are unclad and clad aluminium sheet and strip products produced by Gränges Aluminium (Shanghai) Co., Ltd. in Shanghai, China. The verification is

performed in order to check and verify the calculations and validity of the system boundaries chosen and product model defined, as well as consistency with the steering documents, which mainly are ISO14040:2006, ISO14044:2006, and ISO14067:2018.

Review process

The review has been carried out as a normal review of an LCA/CF study but in this case, the final results of each product has not been reviewed because the final results for each product was not calculated in the study. Only example products were calculated. The focus for the review has instead been the methods and model to be used in the calculation of the carbon footprint for each product. If the entire calculation chain of the carbon footprints can be ensured and verified, the final results from the calculations will also be ensured.

Gränges Aluminium (Shanghai) Co., Ltd. in China has developed this study according to the ISO standard procedures for LCA and Carbon footprint and with addition of standardised procedures, documentation and their updated internal and external data covering their production in a system perspective. IVL and Håkan Stripplé have reviewed the study according to the standardised procedures for a critical review for LCA and CF described in the ISO standards. The review is based on the written materials from the study (the LCA/CF report, internal routine report, CF model and CF certificate) and sample checks of this and other materials. Thus, not all data and calculations are checked. The review statement and conclusions are given with regard to the current state of art and the information, which has been received from Gränges Aluminium (Shanghai) Co., Ltd. in China. The comments and corrections are documented directly in the documents. The information in the review process is thus traceable throughout the entire review process.

The final documentation was sent to the verifier for review by e-mail. After reading and comments, the different remarks were discussed and commented by Gränges' personnel online as well as in an internet review meeting held 12 October 2021. The report *Carbon footprint assessment of Gränges aluminium products - Climate impact of flat rolled aluminium products made by Gränges Aluminium (Shanghai) Co., Ltd. in Shanghai* and the internal governing document *Gränges' internal LCA/CF tool - Routines and procedures, Gränges Aluminium (Shanghai) Co., Ltd.* were mainly reviewed.

The reports explain the goal and scope, methodologies, and main assumptions. After discussions and request in the review process, satisfactory changes were made. The reviewer has checked the entire product chain including upstream data, core processes, and downstream data (recycling data). The reviewer has checked the product specifications, the product systems and boundaries, the data

gaps and cut offs, the methodology applied, the data used, and assumptions made in the study, electricity production, and end-of-life treatment. The procedure for calculations and the selection of studied product has also been checked. In this review, a special focus has been on Gränges' internal calculation procedures for carbon footprint including the CF calculation model and the internal governing documents for performing the calculation and maintaining and upgrading the procedure. The review process also includes minor editorial changes.

All remarks were accounted for in a satisfactory manner in the revised versions of the CF models, LCA/CF report, and governing documents.

Statement

The verification covers the above-mentioned study *Carbon footprint assessment of Gränges aluminium products - Climate impact of flat rolled aluminium products made by Gränges Aluminium (Shanghai) Co., Ltd. in Shanghai* including the internal governing document *Gränges' internal LCA/CF tool - Routines and procedures, Gränges Aluminium (Shanghai) Co., Ltd.* The undersigned verifier verifies that the attached study LCA/CF report is in consistency with the steering documents identified under the above-mentioned scope of this review and has relevant data sources. Also, the sample check of methodology and calculations are reasonable and acceptable.

IVL Swedish Environmental Research Institute Ltd.



Håkan Stripple

LCA/CF reviewer



Yuqing Zhang

LCA/CF reviewer