



Date  
Gothenburg, 18 September 2023

Your date

Our reference.  
Håkan Stripple

Your reference  
Henrik Göhl

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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 Finspång AB in Finspång. Version: 1.0, Date: Dec 18, 2020, Issued by: SVP Technology & Innovation.

Gränges' internal LCA/CF tool - Routines and procedures, Gränges Finspång, Version: 1.0, Date: Dec 18, 2020, Issued by: Managing Director Gränges Finspång, approved by: President Gränges Europe.

### *Author(s)*

The Carbon footprint study is prepared by:

Kent Schölin, SVP Technology & Innovation, Gränges AB, Finspång, Sweden.

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### *Study commissioned by:*

Gränges Finspång AB, Finspång, Sweden.

### *Date of the study:*

18 December 2020

### *Verifier*

Håkan Stripple, IVL Swedish Environmental Research Institute Ltd. is the verifier. Håkan Stripple is an LCA reviewer and an independent individual verifier in the International EPD system<sup>1</sup>.

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

### *List of Revisions*

<b>Revision No.</b>	<b>Revision date</b>	<b>Revision item</b>	<b>Revision by</b>	<b>Comments</b>
Original	2020-12-29		Håkan Stripple	Original reviewed models and documents
1	2022-08-24 2022-10-27	Model master and emission factors sheet	Håkan Stripple	GHG Protocol Scopes implemented, Minor algorithm change
2	2023-09-18	Model master (ver. 1.10 2022, 2023-09-15) and emission factors sheet (ver. 1.04, 2022, 2023-08-23)	Håkan Stripple	Data check, editorial changes, check of calculation of Scope 3, decimals in result tables, emission factors. Checked formulas for internal transport and main consumables in Summary sheet. Checked corrected emission factors for diesel in Emission Factors' sheet.

#### **Comments to revision No. 1**

The LCA/CF model tool and the Emission factor sheet have been updated in year 2022 with the latest yearly production data from year 2021. In this revision, the result presentation in the model is changed to also include a split of the greenhouse gases into Scope 1 (direct emissions from owned or controlled sources), Scope 2 (indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the reporting company), and Scope 3 (all other indirect emissions that occur in a company's value chain) from the Greenhouse Gas (GHG) Protocol. In the revision, it was also discovered that the algorithm for calculation of Process Yield in Virtual Yield: Scalp to pack & slab includes a minor error in the formula that gave deviating values for some yields. The yield values in the current production however result in only a small deviation. The formula is now changed and gives correct values for all yields. The revision can conclude that the updates are performed and implemented correctly according to standards and documentation. A minor update of the emission factor for aluminium scrap was also performed for the revision 2022-10-27. The latest revised versions of the model and the emission factors sheet to the model is now as follows.

Master 2021\_v1.14.xlsm

220520\_2021 Emission factors v8.xlsx

**Comments to revision No. 2**

The LCA/CF model tool and the Emission factor sheet have been updated in year 2023 with the latest yearly production data from year 2022. Gränges has corrected formulas for internal transport and main consumables in Summary sheet and corrected emission factors for diesel in Emission Factors' sheet. The update of the model and the emission factor sheet were checked, and no major errors were found. However, some minor issues were found including editorial changes, check of calculation of Scope 3, decimals in result tables. The latest revised versions of the model and the emission factors sheet to the model is now as follows.

master 2022\_v1\_10.xlsm

230620\_2022 Emission factors Finspång v1\_04.xlsx

***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 Finspång manufactures flat rolled aluminium products primarily for automotive applications but also for other segments.

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 Finspång AB at Finspång, Sweden. The CF model and methodology aims to, on demand, be able to calculate CFs for the various products that Gränges Finspång manufactures (more than 1000 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 products produced by Gränges Finspång AB in Finspång, Sweden. 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 critical review of this study has been carried out as a parallel review, i.e. the reviewer was engaged early in the study and has thus reviewed the study step by step to ensure a good final result. 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 three 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 Finspång AB in Sweden 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 Stripple 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 Finspång AB. The comments and corrections are documented directly in the documents. The information in the review process is thus traceable throughout the entire review process.

Due to the use of a parallel review and verification process, several online meetings were held in order to follow up the development process of the LCA/CF study. The final documentation was sent to the verifier for review by e-mail. (Before that, other draft documents have been reviewed in the parallel review process). After reading and comments, the different remarks were discussed and commented by Gränges' personnel online as well as in a review meeting. The report *Carbon footprint assessment of Gränges aluminium products - Climate impact of flat rolled aluminium products made by Gränges Finspång AB in Finspång* and the internal governing document *Gränges' internal LCA/CF tool - Routines and procedures, Gränges Finspång* were mainly reviewed.

The reports explain the goal and scope, methodologies, and main assumptions. After discussions and request in the review process, including editorial aspects and layout, report title, result figures and tables, recycling in production, production reject handling, system boundaries and completeness, minor auxiliary products and processes, specification of CH<sub>4</sub>, N<sub>2</sub>O and PFCs (CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub>), use of captions, operation of buildings at production site, internal and external recycling, allocation at production site, use of units, naming of the study (LCA/CF or carbon footprint, CF), 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 Finspång AB in Finspång* including the internal governing document *Gränges' internal LCA/CF tool - Routines and procedures, Gränges Finspång*. 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.

A handwritten signature in blue ink that reads "Håkan Stripple". The signature is written in a cursive style with a prominent initial 'H'.

Håkan Stripple

M.Sc.Chem.Eng. LCA specialist