



Industrial Ecology Consultants

January 15, 2020

Ms. Amber Dzikowicz
Business Unit Manager | NSF International
789 N. Dixboro Rd. | Ann Arbor, MI 48105

Verification Report: Comparative LCA of Heat Transfer Fluids

NSF International commissioned a panel of experts to perform an external independent verification of the **Comparative LCA: Hydromx, Propylene Glycol, and Inhibited Water as Heat Transfer Fluids**. Mr. Jack Geibig of ecoform™ Clean Product Innovations completed the LCA study on behalf of Hydromx.

The review of the study was performed to demonstrate conformance with the following standards, Product Category Rules, and Program Operator Rules:

International Organization for Standardization. (2006). *Environmental management -- Life cycle assessment – Principles and framework* (ISO 14040:2006).

International Organization for Standardization. (2006). *Environmental management -- Life cycle assessment -- Requirements and guidelines* (ISO 14044:2006).

International Organization for Standardization. (2014). *Environmental management -- Life cycle assessment -- Critical review processes and reviewer competencies: Additional requirements and guidelines to ISO 14044:2006*. (ISO/TS 14071:2014).

International Organization for Standardization. (2007). *Sustainability in building construction – Environmental declaration of building products* (ISO 21930:2007).

International EPD System. (2018). *Efficient Heat Transfer Fluids for Heating and Cooling: Product Group Classification: UN CPC 35490* (2017:04 v1.01, January 30th).

NSF International (2019) *Addendum to Environdec Heat Transfer Fluid Product Category Rules – North America* (v1.2, February 23rd).

NSF International (2015) *NSF Program Operator Rules* (February 23rd).

The independent third-party verification was conducted by the following panel of experts per ISO 14044:2006 Section 6.2: Critical review:

Thomas P. Gloria, Ph.D.
Founder, Chief Sustainability Engineer
Industrial Ecology Consultants



Industrial Ecology Consultants

Brad McAllister, M.S.
Co-Founder and Managing Director
WAP Sustainability

William A. Stough
President
Sustainable Research Group

REVIEW SCOPE

The intent of this review was to provide an independent third-party external verification of a LCA study report in conformance with the aforementioned ISO standards, PCRs and Program Operator Rules. This review did not include an assessment of the Life Cycle Inventory (LCI) model, however, it did include a detailed analysis of the individual datasets used to complete the study.

REVIEW PROCESS

The review process involved the verification of all requirements set forth by the applicable ISO standards cataloged in comprehensive review table along with editorial comments. There was one round of comments by the reviewers submitted to the LCA practitioner. Responses by the LCA practitioner to each issue raised were resolved and acknowledged by the review panel to have been satisfactorily addressed.

VERIFICATION STATEMENT

Based on the independent verification objectives, the **Comparative LCA: Hydromx, Propylene Glycol, and Inhibited Water as Heat Transfer Fluids, December 2, 2019** was determined to be *in conformance* with the applicable ISO standards, PCRs and Program Operator Rules. The plausibility, quality, and accuracy of the LCA-based data and supporting information are confirmed.

As the Chair of the External Independent Third-Party Review Panel, I confirm that the members of the panel have sufficient technical knowledge and experience of heat transfer systems and the applicable ISO standards to carry out this verification.

Sincerely,

A handwritten signature in black ink, reading "Thomas P. Gloria". The signature is written in a cursive style and is enclosed in a thin black rectangular box.

Thomas P. Gloria, Ph.D.
Founder, Chief Sustainability Engineer
Industrial Ecology Consultants