Green Label Product

Reinforcement Round and Deformed Bars

(TGL-125/1-R1-25)

Revision Approved On

3 October 2025

Thailand Environment Institute (TEI)
16/151 Muang Thong Thani, Bond Street, Bangpood, Pakkred,
Nonthaburi 11120 Thailand
Phone: 0-2503-3333 ext. 521-529 Fax: 0-2504-4826
Website: https://greenlabel.tei.or.th

Table of Contents

Reinforcement and Deformed Bars
TGL-125/1-R2-25

1. Background

Steel for construction is one of the most widely used products in building construction and renovation. Reinforcing steel, which is commonly manufactured in the form of steel bars, steel wires, or steel mesh, is embedded in concrete in a manner that enables steel and concrete to work together to resist various forces acting on the concrete structure. When considering potential impacts across the product life cycle, reinforcing steel products may generate environmental impacts at multiple stages, including raw material production and manufacturing, transportation, use, and end-of-life management after service.

Therefore, the development of Green Label criteria for reinforcing steel products places strong emphasis on the environmental impact of the product throughout its life cycle. The criteria address key aspects including biodiversity conservation, labor safety and fairness, and consumer safety. In addition, the criteria require the implementation of management measures and preventive actions related to biodiversity impacts, efficient use of resources—such as promoting recycling and reuse, as well as energy and water management—control of greenhouse gas emissions, and reduction of pollutant emissions from manufacturing facilities.

2. Scope

This criterion covers round bars and deformed bars.

3. Definition

3.1 Scrap: Pieces of metal waste generated both during the production process and after use, such as scrap metal from building demolition or metal scraps from vehicles.

3.2 Post-Consumer Waste: Products that have become waste or have been used.

3.3 Post-Industrial Waste: Waste or by-products generated during the manufacturing or processing stages within a facility before reaching the consumer.

3.4 Letter for Declaration of Compliance: A certification document issued by the applicant or the manufacturer that meets the special requirements specified in the Green Label requirements for the applied product.

3.5 Certificate: A document issued by a certification body, which has been accredited by the National Accreditation Council (NAC) or another accreditation body under the IAF (International Accreditation Forum) agreement.

3.6 Legally Authorized person: A person authorized to sign under Civil and Commercial Law.

4. General requirements

4.1 The product must be certified according to the industrial product standard, specifically TIS 20 for concrete reinforcing steel: round bars, or TIS 24 for concrete reinforcing steel: deformed bars.

Verification method

Applicants shall submit documentation of the license to manufacture or import industrial products according to the standards TIS 20 for concrete reinforcing steel: round bars, or TIS 24 for concrete reinforcing steel: deformed bars (rebar).

4.2 Manufacturing, transportation and post-industrial waste disposal shall comply with national laws and regulations or the manufacturer shall be accredited by ISO14001**.**

Verification method

The applicant shall submit one of the following documents:

1. License or evidence to prove that manufacturing, transportation, and post-industrial waste disposal comply with national laws and regulations.
2. Certification of ISO14001 from the manufacturer

Remark: In the case of imported products, the manufacturing facility must be certified according to the following standards:

- ISO 9001 (Quality Management System)
- ISO 14001 (Environmental Management System)
- ISO 50001 (Energy Management System)
- TIS 18001 or OHSAS 18001 (Occupational Health and Safety Management System)

5. Environmental requirements

5.1 Raw Material Acquisition

(1) Mining (if applicable)

Manufacturers or facilities involved in raw material extraction shall prepare an Environmental Impact Assessment (EIA) report that identifies and assesses potential environmental and social impacts arising from the project. The EIA shall propose appropriate mitigation measures, management measures, and monitoring plans. The EIA must be conducted in accordance with the applicable laws and regulations of the country in which the site is located.

Verification method

1. Environmental Impact Assessment (EIA) Report. The EIA report shall include, at a minimum, the following components:

☐ Project Summary
☐ Policy, Legal, and Administrative Framework
☐ Project Description
☐ Baseline Environmental Information
☐ Environmental and Social Impact Assessment
☐ Analysis of Alternatives

2. Environmental Monitoring and Compliance Report

A report on the implementation of environmental impact prevention and mitigation measures and environmental quality monitoring measures, as approved by the Office of Natural Resources and Environmental Policy and Planning (ONEP); or
evidence of submission of environmental monitoring reports (Monitoring Reports) as displayed on the Environmental Impact Assessment Information Center (SMART EIA Plus) website of ONEP for two consecutive years.

3. Newly Opened Mines (Operational period of less than two years)

In the case of newly opened mines (with an operational period of less than two years), applicants shall submit either:

- The report on the implementation of environmental impact prevention and mitigation measures and environmental quality monitoring measures, as approved by ONEP; or
- Evidence of submission of environmental monitoring reports as displayed on the SMART EIA Plus system of ONEP, covering the period from the commencement of mining operations to the present.

(2) Biodiversity Protection

Applicants shall ensure that raw material acquisition processes comply with, and do not conflict with, the national biodiversity policy and action plans. In addition, applicants shall ensure that mining activities (if applicable) or manufacturing facilities implement environmentally sound site rehabilitation and restoration measures.

Verification method

1. Raw Material Sourcing Information

Information on raw material sourcing (as specified in Clause 5(1)), including records of suppliers, as well as the characteristics and geographical origin of raw materials extracted from mines under valid mining licenses.
In cases where the raw material supplier has been certified under the Green Label program, supporting evidence may be submitted in the form of the supplier's Green Label certificate.

2. Environmental Management Plans and Evidence

Plans and supporting evidence demonstrate the implementation of management measures to mitigate negative impacts related to **noise, vibration, dust**, and **discharges to water bodies and soil**.

3. Evidence of Biodiversity Conservation Promotion (at least one of the following):

- ☐ Mine rehabilitation and restoration documentation.
- ☐ Activities promoting biodiversity conservation, such as biodiversity surveys and inventories, or the establishment of local biodiversity learning centers.
- ☐ Community participation activities aimed at promoting biodiversity conservation.

(3) Labor Responsibility and Social Welfare

3.1 Applicants shall ensure that the company is certified under relevant ISO management system standards, including environmental management, occupational health and safety, and quality management systems.

3.2 Applicants shall ensure that workers receive fair wages, work in a safe working environment, and are provided with protection of labor rights in accordance with national and international labor standards.

<u>Verification method</u>

1. ISO Certification

Certificates for ISO 14001 (Environmental Management System), ISO 45001 (Occupational Health and Safety Management System), and ISO 9001 (Quality Management System); or an **on-site assessment report** conducted by the Green Label assessment team.

2. Supporting Documentation

Applicants shall provide the following supporting documents:

- ☐ Documentation on wage and salary rates in accordance with the company's remuneration structure.
- ☐ Employment contracts and evidence of compliance with national and international labor rights conventions, such as ILO standards.
- ☐ Reports on working conditions and regular labor compliance inspections.
- ☐ Evidence of an employee grievance mechanism for addressing worker concerns.
- ☐ Records or results of employee job satisfaction surveys.
- ☐ Documentation demonstrating labor responsibility and social welfare practices.

5.2 Manufacturing Process

(1) Use of Recycled Materials

1.1 Manufacturers using steel scrap shall implement procedures to separate and remove undesirable materials, including radioactive materials and polychlorinated biphenyls (PCBs), from raw materials.

1.2 Raw materials used in the production of steel pipe products shall have radiation levels not exceeding five times the background radiation level of the raw materials used, in accordance with the Guidelines on the Prevention of Radioactive Material Contamination in the Scrap Metal Industry, issued by the Nuclear and Radiation Inspection Bureau, Office of Atoms for Peace.

Verification method

1. Standard Operating Procedures (SOPs)
Standard operating procedures describing the **raw material segregation processes** and **radiation measurement procedures** for products.

2. Radiation Measurement Records
Records of **radiation measurements of raw materials** conducted in accordance with the established radiation measurement procedures.

3. Calibration Certificates
Calibration certificates for radiation measurement instruments.

(2) Resource Efficiency

In cases where steel scrap is used in the melting process to produce steel pipe products, manufacturers shall use **scrap steel derived from post-consumer products** or **scrap steel generated as production residues** from manufacturing processes, in accordance with the following criteria.

1. For steel produced by the Electric Arc Furnace (EAF) method, at least 90% of the raw material must be scrap steel.
2 For steel produced by the Basic Oxygen Furnace (BOF) process, the use of scrap steel is not required.

Remark: 1. Effective from 1 January 2027, manufacturers shall use a minimum of 10 percent steel scrap in the steel melting process using the Basic Oxygen Furnace (BOF) process.

2.This requirement applies only to manufacturers that operate steel melting

processes within their own facilities.

Verification method
applicants shall submit a certification letter confirming that the product complies with the requirements specified in Clause 5.2 (2). The certification letter shall be affixed with the official company seal and signed by an authorized signatory in accordance with the company's legal registration documents.

(3) Control of Hazardous Substances

3.1 Product coatings (if applicable) shall contain the following substances **at levels not exceeding the specified limits**, as follows:

- Chromium hexavalent: no more than 1,000 mg/kg
- Cadmium: no more than 100 mg/kg
- Mercury: no more than 1,000 mg/kg
- Lead: no more than 1,000 mg/kg
- The total content of volatile organic compounds (VOCs) shall not exceed the following limits:

Coating type	Limit (g/l)
Coatings for architectural purposes	50
Solvent-based coatings except for architectural purposes	450
Water-based coatings except for architectural purposes	180

Verification method
1. A description of the policies, procedures, and programs implemented to reduce the presence of undesirable heavy metals in raw materials and finished products.
2. The applicant must submit test results for the heavy metal content in the product coatings, including:
   1. Test results for chromium hexavalent content according to the testing method in ISO 3856-5 **or** another method capable of measuring hexavalent chromium levels.
   2. Test results for cadmium content according to the testing method in ISO 3856-4 **or** ASTM D3335, **or** another method that can measure cadmium levels.
   3. Test results for mercury content according to the testing method in ISO 3856-7 **or** ASTM D3624, **or** another method capable of measuring mercury levels.
   4. Test results for lead content according to the testing method in ISO 3856-1 **or** ASTM D3335, **or** another method that can measure lead levels.

5. A report from the coating manufacturer specifying the formulation and composition of the coating used, together with a report on the measurement or calculation of VOC levels, or VOC test results conducted in accordance with the standard test methods ISO 11890-1 or ISO 11890-2, or other test methods capable of determining VOC content in coatings, such as internationally recognized international or national standards.

3.2 Prohibited Substances in Manufacturing

The following substances **shall not be used** in the manufacturing process:

1) Substances or mixtures that degrade or may degrade into substances classified as endocrine disruptors, carcinogenic, mutagenic, or toxic to reproduction (CMR), whether known or suspected, including:
   - Substances classified as R45 (H350), R46 (H340), R48 (H372, H373), R49 (H350);
   - Substances classified in **Group 1 or Group 2A by the International Agency for Research on Cancer (IARC)**;
   - Substances listed in the **European Union's consolidated list of Category 1 or Category 2 CMR substances**.
2) Substances of Very High Concern (SVHCs) listed on the REACH Candidate List (http://echa.europa.eu/candidate-list-table).
3) The intentional addition or use of toxic heavy metals and their compounds, or mixtures containing heavy metals and their compounds, including mercury (Hg), arsenic (As), selenium (Se), cobalt (Co), tin (Sn), and antimony (Sb), is prohibited.
4) Halogenated organic compounds.
5) Solvent oils.
6) Hydrofluoric acid.

Verification method

Applicants shall submit a certification letter confirming that the product complies with the requirements specified in Clause 3.3, together with the following supporting evidence:

- Policies, procedures, and programs implemented to ensure that hazardous substances are not used in the manufacturing of the product.
- A list of product ingredients and Safety Data Sheets (SDS) for each ingredient.
- Documentation identifying hazardous substances used in the manufacturing process, if any.

3.3 Ink, dye or pigments used for printing on labels shall not contain heavy metals including chromium hexavalent, cadmium, mercury, and lead.

In cases where contamination with heavy metals occurs in the product due to impurities or contamination from raw materials, it must not exceed 0.01% by weight (100 milligrams per kilogram) (if relevant).

Verification method

The applicant shall submit test results for heavy metals in the inks, dyes, or pigments used

for printing on labels, including:

1. Test results for the concentration of hexavalent chromium according to the testing method in standard ISO 3856-5 **or** other methods capable of testing for hexavalent chromium.
2. Test results for the concentration of cadmium according to the testing method in standard ISO 3856-4 **or** ASTM D3335 **or** other methods capable of testing for cadmium.
3. Test results for the concentration of mercury according to the testing method in standard ISO 3856-7 **or** ASTM D3624 **or** other methods capable of testing for mercury.
4. Test results for the concentration of lead according to the testing method in standard ISO 3856-1 **or** ASTM D3335 **or** other methods capable of testing for lead.

(4) Energy Management

4.1 Manufacturers shall establish and implement an effective energy management policy and procedures, or an energy management system, to ensure efficient energy use.

4.2 The specific energy consumption (SEC) per unit of product in the reinforcing steel manufacturing process, limited to the rolling process, including energy use for furnaces, rolling operations, and other related activities, shall not exceed 2,100 megajoules per tonne of steel product (total energy), calculated as a 12-month average.

Verification method

Applicants shall submit supporting evidence and/or certification documents demonstrating compliance with the requirements specified in Clause 4, duly affixed with the official company seal and signed by an authorized signatory in accordance with the company's legal registration documents, as follows:

☐ Energy efficiency management policy and procedures.

☐ Energy consumption reports or records.

☐ Documentation demonstrating the implementation of energy efficiency improvement measures and/or process improvements, such as:

- Adoption of energy-efficient technologies and processes.
- Waste heat recovery.
- Use of alternative fuels.
- Transition to renewable energy sources, such as solar energy and wind energy.
- Other relevant energy efficiency practices.

(5) Water Management

5.1 Manufacturers of steel products shall establish and implement systems for the recovery and/or management of sludge generated from wastewater treatment processes. The sludge shall be properly treated and disposed of or recovered for beneficial use, as appropriate.

(Reference: Factory Act B.E. 2535 (1992) and the implementation of sludge management in accordance with the Notification of the Ministry of Industry on the Management of Waste or Unused Materials B.E. 2566 (2023).)

5.2 The freshwater consumption used in the manufacturing process shall not exceed 15 cubic metres per tonne of steel produced, calculated based solely on freshwater input to the steel production process, specifically the melting and rolling processes.

Verification method

Applicants shall submit the following documents:

- ☐ A description, accompanied by photographs, of the systems implemented and/or planned for the recovery of sludge and wastewater sludge generated from the production process.
- ☐ A description, accompanied by photographs, of the systems implemented for water recycling and water reuse.
- ☐ Calculation results of the water recycling rate.
- ☐ Credible evidence demonstrates that water consumption in the manufacturing process does not exceed 15 cubic metres per tonne of steel produced, calculated based solely on freshwater input to the production process, duly affixed with the official company seal and signed by an authorized signatory in accordance with the company's legal registration documents.

(6) Control of Air and Water Pollution

Where air emissions and wastewater discharges are released outside the factory, manufacturers shall ensure that emission control measures and wastewater discharge management are implemented in accordance with the Notifications of the Ministry of Industry. In addition, pollutants specifically regulated under the Green Label requirements shall not exceed the prescribed limits, as specified below:

Air Pollutants	CO	SO_2	NO_x	Particulate Matter (PM)
Emission limit (ppm)	70	190	370	50
Emission limit (mg/Nm^3)	100	500	500	50

Note: Reference conditions are 25°C, 1 atmosphere (760 mmHg), on a dry basis, with 7% excess oxygen.

Conversion from mg/Nm³ to ppm

The conversion from mg/Nm³ to ppm shall be calculated as follows:

$$\text{Concentration (ppm)} = \frac{24.45 \times \text{Concentration (mg/m}^3\text{)}}{\text{Molecular weight of the substance}}$$

Water Pollutants	Zinc	Cadmium	Hexavalent	Lead	Mercury	Selenium

	(Zn)	(Cd)	Chromium (Cr^{6+})	(Pb)	(Hg)	(Se)*
Permissible limit (ppm)	0.01	0.01	0.05	0.10	0.005	0.01

* Note: For selenium, reporting shall be required only in cases where environmental label recognition by member countries under a Mutual Recognition Arrangement (MRA) is sought.

Verification method.
Applicants shall submit the following documents:

- A certification letter signed by an executive officer of the manufacturer, confirming compliance with the pollution control requirements, which have been monitored and reported in accordance with applicable national laws and standards.
- Test results of air pollutant concentrations, conducted in accordance with the test methods referenced in the Notification of the Ministry of Industry on the Specification of Air Pollutant Emission Limits from Reinforcing Steel Bar and Small Billet/Reinforcing Steel Bar Manufacturing Plants B.E. 2564 (2021), using the reference test methods prescribed by the United States Environmental Protection Agency (U.S. EPA).
- Test results of arsenic, cadmium, hexavalent chromium, lead, mercury, and selenium in wastewater, conducted in accordance with the test methods referenced in the Notification of the Ministry of Industry on the Specification of Wastewater Discharge Standards from Factories B.E. 2560 (2017), using the reference methods specified in Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), 2017 Edition, Method 3120B.

(7) Reduction of Greenhouse Gas Emissions and Product Carbon Footprint

7.1 Manufacturers shall measure, report, and verify (MRV) the carbon footprint of products using internationally recognized methodologies, such as ISO 14064-1 (Greenhouse Gas Inventories), ISO 14067 (Carbon Footprint of Products), or ISO 14025 (Environmental Product Declaration).

7.2 Manufacturers shall establish clear greenhouse gas emission reduction targets and demonstrate the ability to achieve emission reductions in line with such targets, for example through the adoption of carbon capture and storage (CCS) technologies.

7.3 Steel production shall result in a carbon dioxide emission intensity not exceeding 1.00 tCO_2eq per tonne of steel produced.

Note: The equations used for the calculation of greenhouse gas emissions shall be based on the IPCC 2006 Guidelines, and the emission factors shall be referenced from the Thailand Greenhouse Gas Management Organization (Public Organization).

Verification method.
Applicants shall submit the following documents:

☐ Documentation specifying the established targets for greenhouse gas emission reduction.

☐ Records of regular monitoring and performance evaluation demonstrate progress toward achieving the established targets.

☐ Records of corrective actions and continuous improvement measures.

☐ Verified results of greenhouse gas emission calculations, certified by a third party, such as a Carbon Footprint Reduction Label certificate, product carbon footprint data, or an Environmental Product Declaration (EPD) report.

6. Testing and Certificate

6.1 Testing

6. 1. 1 Must be a government laboratory or a laboratory under the supervision of the government that has been appointed according to Section 5 of the Industrial Product Standards Act B.E. 2511 (and the amendments) or a laboratory that has been certified as a testing laboratory according to TIS 17025[1] or ISO/IEC 17025[2].

6.1.2 Testing result

6.1.2.1 The testing reports that the method specified in the green label requirements.

6.1.2.2 In case the applicant submits the testing report according to other test methods equivalent to the method specified in the green label requirements, the applicant shall submit the document as follows.

1) The certified signature document of the applied product from the laboratory that is equivalent to the test method standard specified in the green label requirements.

2) The method validation document of the product specified in the green label requirements.

6.1.2.3 The test report must not be more than 1 year up to the date of application for green label certification.

6.2 Declaration letter to verify compliance with green label requirements

6.2.1 The declaration letter shall not exceed 1-year duration from the apply date

6.2.2 The declaration letter by the legally authorized person and stamped with the company hallmark (if any)

[1] TIS 17025 General Requirements for the Competence of Testing and Calibration Laboratories

[2] ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories.