LEED® ASSESSMENT

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Client:

Agglotech S.p.A.

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Object:

LEED® assessment for LINEA SEMINATO VENEZIANO, LINEA UNICO, LINEA CLASSICO, LINEA MICRO TERRAZZO according to LEED® v4 Building Design and Construction Rating System

Casalecchio di Reno (BO), 17.02.2020

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SUMMARY

1. INTRODUCTION

The purpose of the analysis, carried out by TÜV Italia, is to assess the compliance of terrazzo recomposed stones with the environmental performance criteria of LEED® Protocol. This report details the audit conducted by TÜV Italia for the products manufactured by Agglotech spa for evaluation with respect to LEED® credits.

The objective of this evaluation is to determine how the aforementioned products contribute to the points of LEED® certification system. In particular the following product categories are analyzed:

- LINEA SEMINATO VENEZIANO,
- LINEA UNICO,
- LINEA CLASSICO,
- LINEA MICRO TERRAZZO

according to LEED® Protocol:

- LEED® v4 for Building Design and Construction.

TÜV Italia promotes Green Building by supporting companies interested in LEED® certification of buildings and, in relation to building materials, the certification of recycled content.

TÜV Italia and Agglotech have entered an agreement to evaluate the nominated products on the criteria of each LEED® category. The evaluation includes an inspection to confirm the production process and the revision of technical documents to confirm the compatibility of the products with LEED® requirements.

The points mentioned in this document represent the contribution to the score obtainable from a LEED® project of a building. This is determined by many different factors in addition to the use of the manufacturer's products named in this evaluation. A result of compliance of these products means that they can contribute to obtain LEED® points in the project of a new construction or a renovation, but the products don't get points for themselves. It is important to remember that products cannot be LEED® certified, but only buildings can.

The results of this report are guaranteed by an Accredited LEED® Professional (LEED® AP BD+C), who has analyzed the products and verified the compliance with the requirements of the identified credits, suggesting possible actions to improve the products in term of sustainability.

For the purposes of this analysis, no product tests have been performed directly by TÜV Italia, all the characteristics of the products are based on information provided by Agglotech. All the analysis and information contained in this report reflect the professional assessment of a LEED® AP and are based on an objective third part analysis.

LEED® is a registered trademark of the US Green Building Council.

2. INTRODUCTION TO LEED® CERTIFICATION

LEED® certification system (Leadership in Energy and Environmental Design) is a standard applied in over one hundred Countries worldwide and developed by US Green Building Council (USGBC), a non-profit organization that promotes and offers a global approach to sustainability giving recognition to virtuous performances in the key sectors of human and environmental health.

The LEED® standard, widespread in Italy thanks to the work of the italian Green Building Council (GBC Italia), states the requirements for sustainable buildings in terms of energy and consumption of all the environmental resources involved in the building process.

To gain LEED® certification, the project must meet the requirements and earn points to achieve different levels of certification. Prerequisites and credits are different for each certification system and the design team can choose the best solution for their project.

LEED® is a voluntary system for the design, construction and management of sustainable high-performance buildings, which is developing more and more all over the world with tailor-made protocols for different uses of buildings: LEED® for New Construction applies to the design and construction of both new buildings and major renovations of existing buildings, including the improvement of HVAC systems or major changes to the building envelope or interiors. LEED® for Existing Building applies to existing buildings that are subject to improvements with no or limited construction activity.

LEED® is aimed at different market niches with dedicated products. The standard currently in use is LEED® v4, whose structure is divided into the following sections:

- Integrative Process
- Location and Transportation
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation
- Regional Priority

There are LEED® credits within each section and the number of credits with possible contribution varies among the products. The number of points obtained by a building is related to one of the 4 certification levels: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points), Platinum (80-110 points).

Checklist LEED® v4 for Building Design and Construction:

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name:
Date:

Y	?	N			
			Credit	Integrative Process	1

0	0	0	Location and Transportation		16
			Credit	LEED for Neighborhood Development Location	16
			Credit	Sensitive Land Protection	1
			Credit	High Priority Site	2
			Credit	Surrounding Density and Diverse Uses	5
			Credit	Access to Quality Transit	5
			Credit	Bicycle Facilities	1
			Credit	Reduced Parking Footprint	1
			Credit	Green Vehicles	1

0	0	0	Sustainable Sites		10
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Site Assessment	1
			Credit	Site Development - Protect or Restore Habitat	2
			Credit	Open Space	1
			Credit	Rainwater Management	3
			Credit	Heat Island Reduction	2
			Credit	Light Pollution Reduction	1

0	0	0	Water Efficiency		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
			Credit	Outdoor Water Use Reduction	2
			Credit	Indoor Water Use Reduction	6
			Credit	Cooling Tower Water Use	2
			Credit	Water Metering	1

0	0	0	Energy and Atmosphere		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
			Credit	Enhanced Commissioning	6
			Credit	Optimize Energy Performance	18
			Credit	Advanced Energy Metering	1
			Credit	Demand Response	2
			Credit	Renewable Energy Production	3
			Credit	Enhanced Refrigerant Management	1
			Credit	Green Power and Carbon Offsets	2

0	0	0	Materials and Resources		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
			Credit	Building Life-Cycle Impact Reduction	5
			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
			Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
			Credit	Building Product Disclosure and Optimization - Material Ingredients	2
			Credit	Construction and Demolition Waste Management	2

0	0	0	Indoor Environmental Quality		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
			Credit	Enhanced Indoor Air Quality Strategies	2
			Credit	Low-Emitting Materials	3
			Credit	Construction Indoor Air Quality Management Plan	1
			Credit	Indoor Air Quality Assessment	2
			Credit	Thermal Comfort	1
			Credit	Interior Lighting	2
			Credit	Daylight	3
			Credit	Quality Views	1
			Credit	Acoustic Performance	1

0	0	0	Innovation		6
			Credit	Innovation	5
			Credit	LEED Accredited Professional	1

0	0	0	Regional Priority		4
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1

0	0	0	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

3. CONTRIBUTION OF PRODUCTS TO LEED CREDITS

AGGLOTECH terrazzo is a recomposed stone which is firmly rooted in tradition, the result of a perfect mixture of only natural elements: marble chips, Portland cement and water.

By using an exclusive industrial process, bespoke materials can be created without resins.

Terrazzo blocks provide finished products in various shapes and sizes, including:

- Interior and exterior cladding
- Semi-finished slabs 253 x 142 cm
- Flooring
- Treads
- Processed solid pieces
- Window ledges
- Wainscoting
- Special pieces cut-to-size

In Grezzana (Verona) Agglotech produces only natural terrazzo, using high performance 52.5 R white Portland cement and marble chips.

Control of the production system is fully automatic and the “recipes” for each type of terrazzo, even when customised, are transmitted digitally, without direct manual intervention. The finished blocks are wrapped in a protective film and stored for curing, which lasts at least 28 days. During this time, and before they can be sawn and processed, all blocks should pass a stringent quality control.

After curing, the blocks are sawn using multi-blade gangsaws into slabs measuring 253 x 142 cm, which are then calibrated, polished and treated with a water repellent, stain resistant protective agent and then processed into finished products. State-of-the-art machinery is used throughout the production process to ensure high quality standards.

No product by itself can be LEED® certified and this report suggests potential areas of contribution to earn LEED® points using the Protocols mentioned in the previous chapter, keeping in mind that the products vary their contribution in terms of score from project to project.

3.1 Summary table

Agglotech products can be used for various purposes:

- *Slabs*: blocks are used to produce slabs measuring 253 x 142 cm in thicknesses varying from 2 to 20 cm. After surface processing (available in four finishes: honed, polished, brushed or bush hammered), the slabs are transformed into finished products or directly sold as semi-finished goods.
- *Cladding*: freeze-thaw strength and resistance to UV rays, colour uniformity and a flexible range of formats best express all technical qualities of Agglotech products.
- *Flooring:* Cement-based marble agglomerates enable indoor and outdoor flooring to be designed in total freedom in terms of choice of colour, sizes and finishes. The versatility of the terrazzo tiles (chips and cement) lends itself to the creation of interesting shapes, designed on custom drawings, amply recalling traditional Venetian terrazzo. Uniform colour, resistance to wear and easy maintenance make Agglotech's terrazzo floor particularly suitable for large surface areas subject to high pedestrian traffic.
- *Stairs*: is one of the typical uses of Agglotech terrazzo. Production is entirely cut-to-size, based on the dimensions supplied by the customer. In addition to size it is possible to customise the type of surface finish (honed, polished, brushed or bush-hammered) and also the profile.
- *Terrazzo Rainscreens*: with Agglotech terrazzo panels in all their various styles and colors, it is possible to clad the building with rainscreens together with the Fisher patented system. Rainscreens provide both esthetic and technical benefits, as they create an insulating layer that protects the building from water damage and enhances insulation during the winter months. In summer, heat generated by sunlight is kept away from the building, making it easier to cool. It is also an excellent way of making the building more environmentally friendly and eliminating dampness from the walls.

Agglotech material lines are:

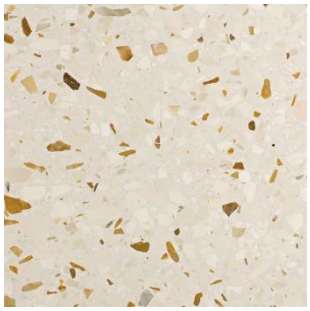
- Linea Classico;
- Linea Unico;
- Linea Microterrazzo;
- Linea Seminato Veneziano.

Below are some examples of material lines that Agglotech produces:

SB105 ANTRACITE

SB 111 VERDE

SB 114 MULTICOLOR GRIGIO



SB 140 CA' D'ORO

SB 151 ZINCO

SB 210 MURANO

SB 124 GRIGIO ROTONDO

SB 143 BIANCO CARRARA 25

SB134 CREMA

The LEED credits to which the products can contribute are shown in the following table:

SS – Sostenibilità del Sito **SS – Sustainable Sites**	**LEED V4 NC**
Riduzione dell'effetto isola di calore Heat Island Reduction	1-2 points
EA – Energia e Atmosfera **EA – Energy and Atmosphere**	**LEED V4 NC**
Prestazioni Energetiche Minime Minimum Energy Performance	prerequisite
Ottimizzazione delle Prestazioni Energetiche Optimize Energy Performance	1-18 points
MR - Materiali e Risorse **MR – Materials and Resources**	**LEED V4 NC**
Pianificazione della Gestione dei Rifiuti da Costruzione Construction and Demolition Waste Management Planning	prerequisite
Dichiarazione e Ottimizzazione dei Prodotti da Costruzione – Provenienza delle Materie Prime Building Product Disclosure and Optimization – Sourcing of Raw Materials	1-2 points
Gestione dei Rifiuti da Costruzione e Demolizione Construction and Demolition Waste Management	1-2 points
EQ – Qualità Ambientale Interna **EQ – Indoor Environmental Quality**	**LEED V4 NC**
Materiali basso emissivi Low-emitting materials	1-3 points

3.2 Analysis of the LEED credits involved

SS credit - Heat Island Reduction

Intent

To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

Requirements

Option 1. Nonroof and Roof

Meet the following criterion:

$$\frac{\text{Area of Nonroof Measures}}{0.5} + \frac{\text{Area of High-Reflectance Roof}}{0.75} + \frac{\text{Area of Vegetated Roof}}{0.75} \geq \text{Total Site Paving Area} + \text{Total Roof Area}$$

Use any combination of the following strategies.

a) Nonroof Measures

- Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf.
- Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines.
- Provide shade with architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation,
- Provide shade with vegetated structures.
- Use paving materials with a three-year aged solar reflectance (SR) value of at least 0.28. If three- year aged value information is not available, use materials with an initial SR of at least 0.33 at installation.
- Use an open-grid pavement system (at least 50% unbound).

b) High-Reflectance Roof

Use roofing materials that have an SRI equal to or greater than the values in Table 1. Meet the three-year aged SRI value. If three-year aged value information is not available, use materials that meet the initial SRI value.

Table 1. Minimum solar reflectance index value, by roof slope

	Slope	Initial SRI	3-year aged SRI
Low-sloped roof	≤ 2:12	82	64
Steep-sloped roof	> 2:12	39	32

Potential contribution of Agglotech products

The nature and color of the materials with which the buildings are built influence the heat island effect. The parameter used to evaluate the contribution of materials to the heat island effect is the Solar Reflectance Index (SRI).

Agglotech carried out the tests to determine the solar reflectance index and the thermal emissivity for the white and gray colored concrete agglomerate slabs. The results are reported in the test reports respectively n. 16-2944-001 dated 20.05.2016 issued by Ecamricert srl and n. 1291/LAP dated 26.03.2019 issued by Veneta Engineering srl.

Product	Average Solar Reflectance, a	Thermal emissivity, Ɛ
White color slab	0,75	0,83
Gray color slab	0,35	0,83

Both materials meet the requirement to have an initial solar reflectance value of at least 0.33.

EA Prerequisite: Minimum Energy Performance
EA Credit: Optimize Energy Performance

Intent

To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

Requirements

Demonstrate an improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.), using a simulation model.

Potential contribution of Agglotech products

By using Agglotech slabs it is possible to cover buildings through the technology of ventilated facades in collaboration and with the system patented by Fisher. This technique allows advantages both from an aesthetic and a technical point of view.

This coating, in fact, creates a thermal insulation layer, which protects from humidity and improves thermal insulation during the winter.

In the summer, instead, the heat caused by solar radiation is kept outside the building, making it cooler.

A great way to make the building even more eco-friendly and eliminate wall moisture.

MR Prerequisite: Construction and Demolition Waste Management Planning
MR Credit: Construction and Demolition Waste Management

Intent

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

Requirements

Develop and implement a construction and demolition waste management plan and provide a final report detailing all major waste streams generated, including disposal and diversion rates.

Recycle and/or salvage nonhazardous construction and demolition materials. Calculations can be by weight or volume but must be consistent throughout.

Potential contribution of Agglotech products

All Agglotech products are delivered to the construction site with recyclable packaging, such as paper/cardboard, films or plastic bags. The packaging material can be recycled by the construction site manager. There are no processing scraps as the products arrive already shaped.

MR Credit: Building Product Disclosure and Optimization – Sourcing of Raw Materials

Intent

To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

Requirements

Option 2. Leadership Extraction Practices

Use products that meet at least one of the responsible extraction criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project.

- Extended producer responsibility. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. Products meeting extended producer responsibility criteria are valued at 50% of their cost for the purposes of credit achievement calculation.
- Bio-based materials. Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material. Products meeting bio- based materials criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- Wood products. Wood products must be certified by the Forest Stewardship Council or USGBC- approved equivalent. Products meeting wood products criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- Materials reuse. Reuse includes salvaged, refurbished, or reused products. Products meeting materials reuse criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- **Recycled content**. *Recycled content is the sum of postconsumer recycled content plus one-half the pre-consumer recycled content, based on cost. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.*
- USGBC approved program. Other USGBC approved programs meeting leadership extraction criteria.

For credit achievement calculation, products sourced (extracted, manufactured and purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

Potential contribution of Agglotech products

The percentage of recycled material contained in Agglotech products is demonstrated through the certificate n. TUVIT-LMR-0022 issued by TÜV Italia. This certificate validates Agglotech's environmental product self-declarations, defining the percentage of pre- and/or post-consumer recycled content in the products, in accordance with ISO 14021.

EQ credit – Low-Emitting Materials

Intent

To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

Requirements

This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials.

Option 1. Product Category Calculations

Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed in Table 2.

Table 1. Thresholds of compliance with emissions and content standards for 7 categories of materials

Category	Threshold	Emissions and content requirements
Interior paints and coatings applied on site	At least 90%, by volume, for emissions; 100% for VOC content	• General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings • VOC content requirements for wet applied products
Interior adhesives and sealants applied on site (including flooring adhesive)	At least 90%, by volume, for emissions; 100% for VOC content	• General Emissions Evaluation • VOC content requirements for wet applied products
Flooring	100%	General Emissions Evaluation
Composite wood	100% not covered by other categories	Composite Wood Evaluation
Ceilings, walls, thermal, and acoustic insulation	100%	• General Emissions Evaluation • **Healthcare, Schools only** Additional insulation requirements
Furniture (include in calculations if part of scope of work)	At least 90%, by cost	Furniture Evaluation
Healthcare and Schools Projects only: Exterior applied products	At least 90%, by volume	Exterior Applied Products

Table 2. Points for number of compliant categories of products

Compliant categories	Points
New Construction, Core Shell, Retail, Data Centers, Warehouse and Distribution Centers, Hospitality projects without furniture	
2	1
4	2
5	3
New Construction, Core Shell, Retail, Data Centers, Warehouse and Distribution Centers, Hospitality projects with furniture	
3	1
5	2
6	3
Schools, Healthcare without furniture	
3	1
5	2
6	3
Schools, Healthcare with furniture	
4	1
6	2
7	3

Potential contribution of Agglotech products

Agglotech has tested its product Sb 104 Dark Gray according to the AgBB scheme and exceeding all the required requirements, as reported in test report n. 52540-001 II issued by eco-INSTITUT Germany GmbH on 10.11.2017.

The AGGLOFIX S2 adhesive has been tested according to UNI EN 16000-9: 2006 with a positive result, as reported in test report no. 20190814/1 issued by Modena Centro Prove srl on 11.02.2019.

Casalecchio di Reno (BO), 17.02.2020

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