StarSeal® PS

LEED® Guide

Committed to a better environment

VEXCON CHEMICALS, INC.

Protecting and improving concrete since 1974

ECO-FRIENDLY

U.S. GREEN BUILDING COUNCIL MEMBER

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I. Introduction

Vexcon Chemicals, a leading manufacturer of architectural protective treatments for the building industry, is dedicated to developing and producing materials that are high quality, meet the toughest performance standards as well as being “eco-friendly.”

Our commitment is to reduce the impact our products and processes have on the environment.

For additional information about Vexcon’s commitment to a better environment see Vexcon’s Environmental Policy Statement which is downloadable @ vexcon.com along with other information.

Why Choose a Starseal PS floor?

Starseal PS concrete floors can minimize energy consumption, reduce the release of harmful chemicals into the air, thereby increasing interior air quality, reduce the consumption and waste disposal of building materials and improve the thermal comfort of buildings occupants.

The Starseal PS polishing or burnishing process has advantages over other methods due to:

- Easier installation which will save time, cost and energy consumption.
- Consistently yields floors with higher gloss and longer longevity.
- Resistant to water, chemicals, oil and food staining.

Additional benefits over other flooring materials;

- Low life cycle costs
- Is a more efficient regulator of a buildings heating and cooling requirements.
- Allows for the rehabilitation of existing concrete floors.
- Very low maintenance
- Is zero or very low VOC
- Non slip
- A 20/10 year warranty
- Aesthetically pleasing

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II. US Green Building Council (USGBC) and LEED

According United States Green Building Council or USGBC, buildings today have a substantial impact on the environment.

Buildings:

- Account for 40-50% of all energy consumed
- Utilize valuable land resources
- Consume billions of gallons of water
- Generate a substantial amount of waste during the construction phase of a project.

U.S. BUILDINGS IMPACTS ON RESOURCES

39% of total energy consumption

71% of electricity consumption

39% CO_2 emissions

30% of raw materials use

30% of waste output

12% of potable water consumption

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The USGBC founded in 1993, is the leading organization that represents the building industry on environmental matters. Their goal is to transform the built environment to be energy efficient and environmentally friendly. The USGBC attempts to develop tools that project teams can utilize in the sustainable design, development, operation and maintenance of “green” buildings. To assist in this endeavor, Leadership in Energy and Environmental Design or LEED was developed and introduced in 2000.

LEED is a voluntary point’s based system based standard on accepted energy and environmental principles and standards which provides a framework for assessing a buildings performance and meeting sustainability standards. LEED provides project teams a practical set of design and performance goals and independent third party verification of their achievements. Although there is no governing body for “green” construction, LEED is considered by many as the defining standard for green building. For more information on USGBC and LEED visit www.usgbc.org.

There are six separate categories project teams can earn LEED points in:

- Sustainable Sites–seeks to limit development to only appropriate sites, reuse existing buildings, sites or both, protect natural and agricultural areas, and reduce the need for automobiles.
- Water Efficiency–seeks to reduce the quantity of water withdrawn from rivers, streams and reservoirs.
- Energy & Atmosphere–seeks to optimize energy efficiency, encourage renewable, and alternative energy sources.
- Materials & Resources–seeks to reduce the amount of materials needed, use materials with less environmental impact and reduce and manage waste.
- Indoor Environmental Quality–establishes indoor air quality, eliminates, reduces and manages the sources of indoor air pollutants, ensures thermal comfort and controllability, and provides for occupant connection to the outdoors.
- Innovation & Design Process–recognizes projects for innovative building features and sustainable knowledge.

The project must meet all prerequisites and a minimum of 26 points is required. There are four levels of certification:

- 26-32 points to get certified
- 33-38 points to receive a silver rating
- 39-51 points to receive a gold rating
- 52-69 points to receive a platinum rating

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In addition to the beneficial impact green building has on the environment, other attributes include:

- Positive health benefits of building occupants
- Potential improvement in productivity of building occupants
- Reduction in operating costs of a green building
- Enhanced marketability of a green building and the companies that occupy them.
- Meet social expectations of the market place
- Meet the increasing demand of international, federal, state and local green building codes.

Currently or in development, USGBC offers specific rating systems for:

New Construction

LEED for New Construction and Major Renovations is designed to guide and distinguish high-performance commercial and institutional projects.

Existing Buildings

LEED for Existing Buildings: Operations & Maintenance provides a benchmark for building owners and operators to measure operations, improvements and maintenance.

Commercial Interiors

LEED for Commercial Interiors is a benchmark for the tenant improvement market that gives the power to make sustainable choices to tenants and designers.

Core & Shell

LEED for Core & Shell aids designers, builders, developers and new building owners in implementing sustainable design for new core and shell construction.

Schools

LEED for Schools recognizes the unique nature of the design and construction of K-12 schools and addresses the specific needs of school spaces.

Retail

LEED for Retail recognizes the unique nature of retail design and construction projects and addresses the specific needs of retail spaces.

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Healthcare

LEED for Healthcare promotes sustainable planning, design and construction for high-performance healthcare facilities.

Homes

LEED for Homes promotes the design and construction of high-performance green homes.

Neighborhood Development

LEED for Neighborhood Development integrates the principles of smart growth, urbanism and green building into the first national standard for neighborhood design.

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III. Short Spec

StarSeal PS: Master Format section 03 35 00 Concrete Finishing and/or 03 01 30 Maintenance of Cast in Place Concrete.

Part 1 General

System Description

- Polished or burnished Concrete:
  - Non-Slip: ASTM D 2047, minimum coefficient of friction value of 0.5 or greater.
  - Scrub (or wash-ability) resistance: ASTM D 2486, minimum of 5,000 cycles.
  - Stain resistance: Food, Chemical, Oil and common stain resistance.
  - Meets South Coast Air Quality Management Board (SQACMD) VOC rule #1113 July 2006-Waterproofing Sealers, Concrete/Masonry.

Quality Assurance:

- Installer Qualifications: Manufacturer's letter of certification required.

Warranty:

- Manufacturer's standard 20/10 warranty

LEED submittals:

- Product data sheet(s), MSDS, obtain manufacturer's LEED certification letter for referenced standard, if applicable.

Part 2 Products:

Manufacture:

- Vexcon Chemicals Inc. 7240 State Road Phila. PA 19135; telephone (888).Vexcon1, fax (215).332.9997, web site vexcon.com, email sales@vexcon.com.

Hardener, Sealer, and Densifier system:

Acceptable material(s): StarSeal PS Clear, StarSeal PS Clear FSR

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■ LEED-NC (For New Construction & Major Renovations)

Analysis based on version 2.2-Projects registering after June 26, 2007

Starseal PS polished or burnished concrete floors can potentially contribute 14 or more LEED points in the following categories.

- EA Credit 1 Optimize Energy Performance (Minimum 2 points)
- MR Credit 1.1 Building Reuse: Maintain 75% of Existing Structural Walls, Floors and Roof. (1 point)
- MR Credit 1.2 Building Reuse: Maintain 95%of Existing Structural Walls, Floors and Roof. (1 point)
- MR Credit 1.3 Building Reuse: Maintain 50% of Interior Non-Structural Elements (1 point)
- MR Credit 3.1 Materials Reuse: 5% (1 point)
- MR Credit 3.2 Materials Reuse: 10% (1 point)
- MR Credit 2.1 and 2.2 Construction Waste Management (1 point each)
- MR Credit 4.1 and 4.2 Recycled Content (1 point each)
- MR Credit 5.1 and 5.2 Regional Materials (1 point each)
- EQ Credit 4.1 Low Emitting Materials: Adhesives & Sealants (1 point)
- EQ Credit 7.1 Thermal Comfort Design (1 point)
- EQ Credit 7.2 Thermal Comfort: Verification (1 point)
- ID Innovation in Design (1-4 points)

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IV. Energy & Atmosphere (EA)

Buildings consume 60-70% of all electricity produced annually in the US. An effective strategy which contributes to the reduction in the amounts of energy used saves resources, and reduces the long term operational costs of a building.

The project team must comply with the prerequisite number 2 of this section.

Referenced Standard:

ASHRAE/IESNA 90.2-2004-Energy standard for buildings except low-rise residential and informative. Appendix G-Performance rating method.

EA Credit 1:

Optimize Energy Performance: (1-10 point based on energy cost savings, 2 points minimum required)

Design Intent:

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excess energy use.

Requirements:

Option 1–Whole Building Energy Simulation-Demonstrate a percentage improvement in the buildings performance rating compared to the baseline building performance rating standard. The minimum energy cost savings is 14% for which 2 LEED points are earned.

Efficient use of energy is a requirement for new construction, under LEED Energy Optimization Credit EA 1, and StarSeal PS polished concrete can contribute to this end by reducing the amount of energy needed to light, heat and cool buildings.

StarSeal PS can contribute to the reduction of energy consumption by increasing the amount of natural light entering an interior space due to its high light reflectively thereby reducing the internal loads of interior "regulated (non-process)" lighting.

Depending on the level of shine desired, Silver, Gold or Platinum level, you can expect a change in gloss from 4-10, typical gloss of unpolished concrete, to 30 to 80 when measured using a gloss meter in accordance with ASTM D523, Standard Test Method for Specular Gloss.

A StarSeal PS polished or burnished concrete floor will also contribute to the reduction of the amount of heating and cooling a building requires due to the thermal properties of concrete while maintaining an aesthetically pleasing floor which can increase building occupants comfort levels. (See related discussion at EQ 7.1 and 7.2 below, Thermal Comfort).

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Efficient use of energy is required for this credit and concrete can contribute to this end by reducing the amount of energy needed to heat and cool buildings. Concrete can serve as either a heat source or a heat sink, and it offers thermal performance advantages due to its ability to absorb, retain, and radiate heat energy. Concrete is ideal for thermal mass design and building because of its high specific heat, high density, and low thermal conductivity, but benefits can be enhanced based on design, construction, and climate.

Concrete thermal mass designs reduce the need for active heating and cooling systems and the consumption of active solar, renewable energy and especially fossil fuel technologies, with significant results:

- Reduced demand spikes for heating and cooling energy
- Reduced heat transfer (loss) through concrete mass, especially walls
- Peak energy demands shifted to off-peak utility hours

Thermal mass is the ability of a material to retain heat, or to absorb heat energy and re-radiate it, especially back into a building throughout the night. Concrete and masonry have high thermal mass, so it takes a lot of heat to warm them up, and they give off heat for a longer time when the rest of the building is cooling down. This evens out the temperature extremes, which can improve comfort and stabilize heating and air conditioning costs.

Thermal mass stabilization is most effective when there are significant differences between daytime and night time temperature, or when outside temperatures fluctuate widely from the building's internal temperature or balance point (55-65 degrees F). It allows the concrete mass to absorb and store heat energy during the winter daytime and re-radiate it out during the night. In summer, the thermal mass is shaded or shielded by insulation so that it remains cool and will not radiate heat at night.

Standard principles of passive solar design are used in conjunction with concrete thermal mass to optimize these effects, especially in colder areas where supplementary heat is used in the winter. Classic thermal mass building principles are used in hot, arid climate; adobe, concrete and rammed earth are typical examples. Thermal mass design is somewhat less useful in hot, humid, tropical climates.

Radiant flooring systems in particular are designed with the thermal mass of concrete in mind, as are fireplaces and chimneys. Proper use of these principles will allow HVAC requirements and equipment to be downsized or scaled down compared with conventional buildings. In conjunction with passive design techniques for window glazing, shading, and insulation, taking full advantage of concrete thermal mass can contribute significant energy savings and improved thermal environmental conditions for building occupants.

Benefits can be optimized by proper design and orientation of the building to the sun, type and area of window glazing, and insulation methods and materials. These factors can take advantage of thermal mass properties of concrete by reducing temperature swings and peak energy demands in buildings, resulting in reduced energy consumption. Concrete thermal mass can require a lot of space, so architects will often concentrate the concrete mass where it can serve other functions, such as walls and flooring.

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V. Material & Resources (MR)

In the United States alone, buildings consume 30% of all raw materials produced and contribute 30% of total waste output. An effective strategy incorporates minimizing the environmental impacts of material use and to reuse existing buildings.

MR Credit 1.1:

Building Reuse: Maintain 75% of Existing Structural Walls, Floors and Roof. (1 point)

MR Credit 1.2:

Building Reuse: Maintain 95%of Existing Structural Walls, Floors and Roof. (Additional 1 point)

Referenced Standard:

There is no standard reference

Design Intent:

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduces environmental impacts of new buildings as they relate to materials manufacturing and transport.

Requirements:

Maintain at least 75% & 95%, based on surface area, of existing building structure, and envelope, including structural floor and roof decking. By considering the reuse of an existing building verses building new structures, project teams can earn LEED points when the surface area to be retained is at least 75% concrete or more during a major renovation.

StarSeal PS concrete floors will greatly extend the life cycle of a buildings concrete floor due to the nature of the concrete resurfacing and hardening process.

StarSeal PS will reduce the long-term life cycle costs of maintaining the floor and on a long-term basis, is a less expensive alternative compared to other flooring materials. (See related discuss below, Life Cycle Analysis).

StarSeal PS will also reduce the amount of construction waste during a major renovation because the concrete floor structure can be renewed without demolishing the existing floor therefore reducing waste deposits in landfills. (Note: Project teams that do not qualify for this credit may qualify for points under MR credit 2.1 or 2.2)

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MR Credit 1.3:

Building Reuse: Maintain 50% of Interior Non-Structural Elements (1 point)

Referenced Standard:

There is no standard reference

Design Intent:

Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduces environmental impacts of new buildings as they relate to materials manufacturing and transport.

Requirements:

Use existing interior non-structural elements, such as flooring in at least 50% of the completed building.

A StarSeal PS interior concrete floor can benefit the project team by contributing to the retention of the overall total existing elements of the project. Concrete floors can make up a large portion of the total square footage of a buildings interior. A StarSeal PS floor can contribute a significant portion of the total percentage of all reused elements.

MR Credit 3.1:

Materials Reuse: 5% (1 point)

MR Credit 3.2:

Materials Reuse: 10% (Additional 1 point)

Referenced Standard:

There is no standard reference

Design Intent:

Reuse materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin resources.

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Requirements:

Use salvaged, refurbished or reused materials such that the sum of these materials constitutes at least 5% and 10% respectively, based on cost, of the total value of materials on the project. (You can only include permanently installed materials.)

A project team needs to calculate the total cost of all materials used on the project and determine the material “replacement value” of comparable concrete material. The total cost of these materials and other salvaged, refurbished or reused materials must be a minimum of 5% to earn one point and 10% to earn an additional point. (Note: Project teams that do not qualify for this credit may qualify for points under MR credit 2.1 or 2.2)

Because an existing concrete floor, which is a finished material found on site, is a permanently installed component of the building, and can be re-furbished (re-surfaced), a StarSeal PS floor will contribute to the reduction in demand for new virgin materials by re-using the existing concrete floor.

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VI. Indoor Environmental Quality (EQ)

Materials used in buildings can emit harmful air pollutants potentially reducing the health, well being and productivity of building occupants. Project teams can improve indoor environmental quality and provide optimal air quality by incorporating the usage of materials that have zero or low Volatile Organic Compounds (VOC'S)

EQ Credit 4.1:

Low Emitting Materials: Adhesives & Sealants (1 point)

Referenced Standard:

South Coast Air Quality Management District (SCAQMD) rule# 1113. January 2004.

Design Intent:

Reduce the quality of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well being of installers and building occupants.

Requirements:

All adhesives and sealants used on the interior of the building shall comply with the requirements of the referenced standard.

StarSeal PS applied on-site has zero or little VOC's and meets the reference requirements of this section as a sealer.

StarSeal PS floors require little on-going cleaning further reducing the amount of potential contaminants that may arise from cleaning compounds. It is recommended that the project team specify Vexcon's Starseal EF Degreaser & Cleaner, an eco-friendly product made from soy oil a rapidly renewable material, as part of the every day cleaning program.

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EQ Credit 7.1:

Thermal Comfort Design (1 point)

Referenced Standard:

ASHRAE Standard 55-2004-Thermal Comfort Conditions for Human Occupancy.

Design Intent:

Provide a comfortable thermal environment that supports the productivity and well being of building occupants.

Requirements:

Design HVAC systems and the building envelop to meet the requirements of the referenced standard.

The ANSI/ASHRAE Standard 55-2004, *Thermal Environmental Conditions for Human Occupancy,* addresses several facets of temperatures inside buildings. This standard addresses temperature, thermal radiation, humidity and air speed, along with personal factors such as activity and clothing. Specifications include combinations of indoor thermal environmental factors and personal factors that will produce thermal environmental conditions acceptable to a majority of the occupants within the space.

EQ Credit 7.2:

Thermal Comfort: Verification (1 point)

Referenced Standard:

ASHRAE Standard 55-2004-Thermal Comfort Conditions for Human Occupancy.

Design Intent:

Prove an assessment of a buildings thermal comfort within a period of six to 18 months after occupancy.

Requirements:

Implement a thermal comfort survey of building occupants. The survey should collect anonymous responses about thermal comfort in the building including an assessment of overall satisfaction with thermal performance and identification of thermal comfort related problems. Building owners must agree to develop a corrective plan of action if survey results indicate that more then 20% if occupants are dissatisfied with the thermal comfort of the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with the referenced standard.

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A StarSeal PS polished or burnished concrete floor is an attractive flooring alternative. The thermal mass of concrete provides heating and cooling benefits along with the highly attractive and pleasing nature of the finished Starseal PS floor. The finished StarSeal PS floor can yield a comfortable and pleasing work environment for a majority of building occupants.

The project team may want to consider utilizing other Vexcon "Eco-Friendly" cleaning products which are VOC free and can help maintain the buildings LEED interior air comfort levels.

VII. Other Possible LEED Points:

The above referenced sections are intended as suggestions only. The ultimate responsibility for compliance is that of the project teams. The team may want to consider the use of an accredited LEED professional to assist in interpretation, design and documentation of all potential credits. An added benefit of utilizing a LEED professional would be the addition of 1 LEED point per ID Credit 2: LEED Accredited Professional.

MR Credit 2.1 and 2.2 Construction Waste Management (1 point each)

Design Intent:

Divert construction and demolition debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Requirements:

Recycle and/or salvage at least 50%/75% of non hazardous construction and demolition debris. Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled. Calculations can be done by weight or volume, but must be consistent throughout.

StarSeal PS is supplied in 5-gallon plastic containers which can be diverted from landfill disposal by recycling.

The 5-gallon pail is a Type 2 high-density polyethylene (HDPE) pail. This type of container is a preferred plastic for recycling. The recycle code is molded into the container bottom, and the symbol is easily visible for sorting purposes. The metal handle is also recyclable.

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MR Credit 4.1 and 4.2 Recycled Content:

The concrete industry consumes vast amounts of virgin materials and energy as part of the concrete manufacturing process. According to the American Coal Ash Association in 2006 over 15 billion pounds of fly ash, was used as a substitute material in concrete products. Fly Ash is a combustionable by-product from coal produced energy. The use of this by product as a substitute material in concrete offers environmental advantages by diverting this material from the waste stream. It also reduces the amount of energy and resources consumed as part of the concrete manufacturing process.

When project teams specify a StarSeal PS polished or burnished concrete floor and the use of Fly Ash in the concrete mix design addition LEED points can be earned in this category.

MR Credit 5.1 and 5.2 Regional Materials:

Centrally located between New-England and the mid south-eastern corridor protect teams can earn addition points if the project is within a 500 mile radius of our manufacturing plant.

ID Innovation in Design (1-4 points)

Life Cycle Analysis of StarSeal PS floor:

A life cycle analysis evaluates the environmental impact of a product throughout its life cycle. From extraction of raw materials through processing, manufacturing, use and disposal or re-cycling.

Project teams may earn additional points as a StarSeal PS polished or burnished concrete floor has a low environmental impact vis-à-vis a long life cycle due to the sustainable and renewable nature of concrete and the StarSeal PS polishing process. A StarSeal PS concrete floor outlasts and out performs most other types of floors and has the ability to be refurbished "re-cycled" many times. Contact Vexcon for additional information.

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As the awareness of the long term benefits of green sustainable building become more popular the demand for high performing building material that have minimal impact on the environment will continue to grow exponentially. Vexcon is committed to producing products that are safe for all users, building occupants and the environment. We welcome your suggestions and comments.

For questions contact us at:

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