Technical Conclusion on Compliance

TN- KROVLYA Garant and TN-KROVLYA Expert PIR

supplied by TechnoNICOL-Stroitel'nye Sistemy OOO
for the erection of LEED®-certified facilities

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General information

This expert assessment was made in November 2016 by EcoStandard group for TechnoNICOL-Stroitel'nye Sistemy OOO.

The Contractor acted in accordance with the Law as an independent expert and has no financial, property or any other interest in the result of research.

This expert assessment was made only on the basis of the results of the performed research in accordance with the special knowledge of experts.

Purpose of research

Assessment of the products for compliance of the section Sustainable Sites (SS), Energy and Atmosphere (EA), Materials & Resources (MR), Indoor Environmental Quality (IEQ) with the criteria of the Leadership in Energy and Environmental Design standard (LEED, USA).

The research reviews the following standards: LEED 2009 for New Construction and Major Renovation Rating System or LEED 2009 for Core&Shell Development Rating System and LEED Reference Guide for Green Building Design and Construction, including the appendices thereto, and LEED v4 for New Construction and LEED v4 Reference Guide for Green Building Design and Construction.

Objects of research

The objects of this expert assessment are the **products:**

- TN- KROVLYA Garant system
- TN-KROVLYA Expert PIR system

Manufactured by **OOO «Zavod Logicroof»**

Manufacturers' addresses: 21, Vostochny Promuzel, Ryazan, Ryazan Region, 390047

Official website: http://logicroof.ru/

TN-KROVLYA Expert PIR system http://logicroof.ru/solution/roof/tn-krovlia-ekspert-pir/

TN- KROVLYA Garant system http://logicroof.ru/solution/roof/tn-krovlya-garant/

General information about the LEED standard, its application, and relevance

The LEED Green Building Rating System® is a voluntary standard that defines high-performance requirements for green buildings. The built environment has a profound impact on our natural environment, economy, health, and productivity.

Designers, builders, operators, and owners are transforming the built environment using the LEED® green building certification program developed by the U.S. Green Building Council (USGBC). They achieve this through the application of modern approaches to the design, taking into account natural and infrastructural features of a site, needs of end users. A considerable contribution to the creation of "green" building makes use of sustainable and safe construction and finishing materials.

LEED® system covers the various types of projects:

- Building Design and Construction,
- Building Operations and Maintenance,
- Interior Design and Construction,
- Homes,
- Neighborhood Development.

This is a rating system. Based on the number of points, the building can be rated:

- LEED Platinum (80+ points),
- LEED Gold (60-79 points),
- LEED Silver (50-59 points),
- LEED Certified (40-49 points).

The process of assessment and certification is rather complex. The estimated building must comply with the requirements that are called prerequisites and “credits”. Main sections (may vary depending on the version of LEED® and the type of project) are as follows:

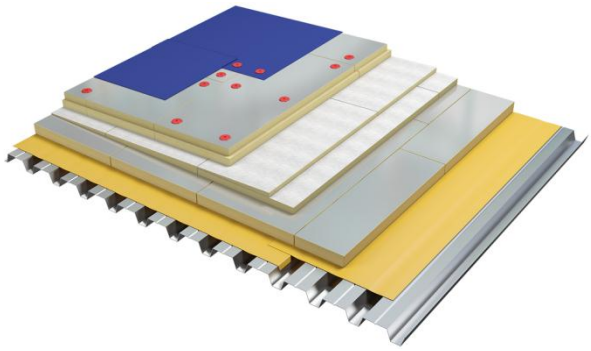
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation in Design
- Regional Priorities

LEED® Certification is only for projects, not products. But products used as project materials can contribute toward the rating points needed for the building certification.

Information about the material and its advantages for green building

1. TN-KROVLYA Garant system

TN-KROVLYA Garant is a system used on unexploited roofs and consists of a polymeric membrane and a polyisocyanurate foam insulation on a steel profile flooring.



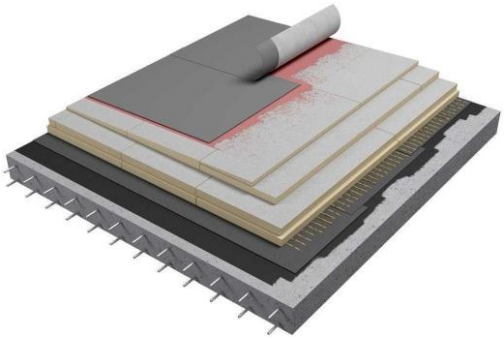
Structure:

1. Steel profile sheet
2. Vapor barrier sheet TechnoNICOL
3. Heat-insulating board LOGICPIR TechnoNICOL
4. Roof sloping LOGICPIR Slope TechnoNICOL
5. Mechanical fastening system TechnoNICOL
6. Polymeric membrane LOGICROOF or ECOPLAST

The system features: TN-KROVLYA Garant has an advanced reliability – it is recommended to apply the system on roofs that are frequently used by personnel for its service and maintenance.

2. TN-KROVLYA Expert PIR system

TN-KROVLYA Expert PIR system is used in new construction and reconstruction of roofs where it is impossible or problematic to use mechanical fastenings.



Structure:

7. Bituminous primer TechnoNICOL №01
8. Technoelast PRAIM EMP 5,5
9. Mixed glue LOGICROOF Spray Glue-foam
10. Heat-insulating boards PIR
11. Heat-insulating boards PIR SLOPE
12. Mixed glue LOGICROOF Spray Contact glue
13. Polymeric membrane LOGICROOF V-RP FB

The system features: TN-KROVLYA Expert PIR is developed for the use in not easily accessible places (where it is difficult or impossible to use mechanical fastenings). Heat-insulating boards and waterproofing membrane are installed using the glue method.

Advantages of **TN-KROVLYA Garant** and **TN-KROVLYA Expert PIR systems** for green construction**:**

- **Energy efficiency**. Heat-insulating boards PIR TechnoNICOL with a low heat-conduction coefficient of 0,022 W/m°K are used in the systems.

  The systems improve thermal insulation properties of a building and positively affect the level of its energy efficiency. The level is obtained through the energy modeling during LEED certification and allows to lower the amount of energy resources consumed by the building.

- **Lightweight**. Low-weight systems allow to:
  - simplify the structure,
  - achieve savings on foundation laying,
  - lower the labor contribution level,
  - not to use heavy lifting machinery, that leads to fuel saving and emission reduction,
  - decrease emissions of product transportation.

- **Long lifetime**. Systems and their components are frost resistant, vapor- and waterproof with a high mechanical strength and a rigid base, that are not exposed to decay, aging, shrinking and breaking down over time. They are durable, do not change their physicotechnical properties under the effect of environment, assure a long lifetime of the building and minimize the necessity of repair, that consequently decreases their negative impact to the environment.
- **User safety:**
  - the material ensures necessary fire safety due to its high fire resistance level: К0(15);
  - dielectric.

- **Light reflection.** Used PVC membranes LOGICROOF are highly light-reflective. Solar reflectance index (SRI) is 102 for a white roof, 44 – for a light-gray flat roof, and 45 – for a light-gray corrugated roof.

  That improves thermal properties of the building in the summertime, creates a friendly environment for users and reduces the heat island effect when massively used in urban developments.

List of credits points in which can be earned with the help of the material to be assessed and material specification

The table below reviews relevant credits and categories of LEED standard, where, under certain conditions, points can be earned by using TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems.

LEED categories & credits	LEED requirements	Impact of PVC membranes LOGICROOF on the score
Sustainable Sites (SS)		
SS Credit 7.2 Heat island effect – roof (1 point)	Greening at least 50% of the total area of the roof. OR Installing a high Solar Reflectance Index (SRI) roof and greening the roof (the ratio is calculated individually for each case).	TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems use PVC roofing membranes LOGICROOF with high SRI. SRI of PVC membranes: 102 – white roof; 44- light-grey flat roof; 45 - light-grey ribbed roof.
Energy and Atmosphere (EA)		
EA Prerequisite 2 Minimum Energy Performance	10 % (18 %[1]) performance improvement for new buildings or 5% (14 %[1]) better performance for renovated existing buildings compared with the baseline building performance rating calculated as per the method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 for the whole building simulation model.	TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems form a thermal insulation layer in the roof. The low thermal conductivity of heat-insulating boards PIR helps to achieve a high thermal resistance of structures that consequently reduces the energy consumption of a heating system.
EA Credit 1 Optimize Energy Performance (1-19 Points)	Improved building performance rating compared with the baseline building performance rating, calculated as per the method in Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 for the whole project simulation model with the points awarded according to LEED® table.	Helps to reduce energy consumption and maximize thermal comfort. The final outcome depends on thermal resistance and thermal conductivity of all structural layers, features and design solutions altogether. The use of TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems helps to earn more points due to energy savings throughout the full-year cycle.
Indoor Environmental Quality (IEQ)		
IEQ Credit 7 / 7.1 Thermal Comfort – Design (1 Point)	Design HVAC systems and building envelope to meet the requirements of ASHRAE Standard 55-2004 (55-2010 in LEED v4), Thermal Comfort Conditions for Human Occupancy. Demonstrate design compliance in accordance with the Section 6.1.1 documentation.	As a part of the building envelope, TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems provide sufficient level of thermal comfort (due to light and heat reflectance).

[1] For facilities registered with LEED Online after April 07, 2016

IEQ Credit 10 (Schools only – LEED for Schools 2009 New Construction) Mold Management (1 point)	Added to IEQ Credits 3.1, 7.1, and 7.2, HVAC systems/controls limit RH to 60% and IAQ program based on U.S. EPA document, Building Air Quality: A Guide for Building Owners and Facility Managers, EPA reference number 402-F-91-102, December 1991.	TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems do not decay, are fungi-proof and do not provide breeding grounds for mold and bacterial growth.

Conclusion, calculation of possible score and summary of the assessment performed

As a result of the assessment, TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems of TechnoNICOL-Stroitel'nye Sistemy OOO provide a number of advantages, if used properly: they are energy efficient, reflect heat and sunlight, durable, vapor- and waterproof, fire-safe, dielectric and keep comfort conditions in buildings.

TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems, produced by OOO «Zavod Logicroof» at the address: 21, Vostochny Promuzel, Ryazan, Ryazan Region, 390047 **are suitable for use** in the construction of «green» buildings to be certified under international certification systems, including LEED.

Therefore, utilization of TN-KROVLYA Garant and TN-KROVLYA Expert PIR systems may help to earn up to **22 points** and to comply with requirements of prerequisite on energy efficiency depending on the type and version of LEED and on the number of design solutions involving utilization of roofing PVC membranes LOGICROOF.

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Preparation of the information

Information about the applicability of PVC-membrane roofing material LOGICROOF in the construction of objects certified in accordance with LEED® is prepared by specialists of Certification department of EcoStandard group:

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Company **EcoStandard group** has been working successfully throughout Russia and the CIS since 1997. This is the leader in the field of environmental monitoring and expertise services, in the field of occupational safety, engineering studies, development of project documentation, implementation of "green" technologies, international certification, environmental PR.

EcoStandard group has successful experience as with objects of federal importance, projects of the largest Russian and International corporations, as well as in providing services to small and medium businesses. Among our clients there are:

- OOO «Directorate Sochi-2014»,
- RAO «UES of Russia»,
- OAO «Gazprom»,
- ZAO «UralSib»,
- OAO «Russian Railways»,
- OAO «Norilsk Nickel»,
- Banks OAO «Alfa Bank», «VneshEconomBank», «Swiss Credit First Boston», «Mezhprombank»,
- Telecompany «CNN»,
- «IKEA», «Leroy Merlin», «Media Markt», hypermarkets «O'key», «Decatlon»
- Hotels «Ararat Park Hyatt Moscow», «Novotel»,
- Companies «Siemens», «SAS», «ТНК-BP», "Evrocement", «FM Logistic Vostok», «Office Solutions», «BBDO», «Deloitte», «Xerox», «Mail.ru», «Nestle», «Coalco Development», «Rosgossrrakh».

EcoStandard group is…

- Member **of the US Green Building Council**,
  Council on "green" construction (NP SPZS)
  International Alliance «Active House»
- Accredited certification body of the
  Center for Environmental Certification "Green Standards"
- One of the developers of green standards
  assessment of low-rise suburban real estate **EcoVillage,**
  assessment of building materials **EcoMaterial,**
  assessment of environmental sustainability **"SAR-SPZC".**

EcoStandard group provides a full range of consulting services for the project certification according to standards LEED, BREEAM, and DGNB and has **a unique practical experience** – it is the first company in Russia that successfully certified the building according to LEED 2009 NC with a LEED Silver certificate**.**

Objects certified by EcoStandard group:

- Scientific-industrial complex Hamilton Standard Nauka, LEED
- VIP eco-office Sberbank of Russia, BREEAM
- Raymond, the plant for production of fasteners, Nizhny Novgorod region, LEED
- Administrative building Clinic new medical technologies (Klinika novyh meditcinskyh tekhnologiy), BREEAM

Nowadays EcoStandard group conducts certification in accordance with LEED and BREEAM of several different by functional purpose buildings in Russia:

- **Multifunctional center R&D Renova, Skolkovo,**
- **Multifunctional complex, Moscow (confidential information);**
- **Full-cycle confectionary factory OOO «Mondēlez Rus'»;**
- **RS Partners OOO (Q1), the office of top-company;**
- **Development company, a fast food restaurant (confidential information);**
- **Development company, administrative building with underground parking to accommodate units of the Bank, Moscow (confidential information);**
- **And others.**