



<p>Purios Systems have hygienic certificate. Purios E – HK/B/0455/01/2017 valid until 2022-07-10 Purios ET – HK/B/0161/02/2017 valid until 2022-04-11 Purios FR – B-BK-60211-0060/21 valid until 2026-03-09 Purios F – BK/B/0469/01/2018 valid until 2023-06-25</p>	
<p>Please note that polyurethane foam spray systems on the structure of the cells open and closed subject to new regulations of the European Union "Regulation (EU) No 305/2011 of 9 March 2011" and „EN 14315-1 Thermal insulation products for buildings – In situ formed sprayed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products - Part 1: Specification for the rigid foam spray system before installation". These regulations require labeling of products with the CE mark.</p>	

Manufacturer Instruction

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Purios open – cells Systems

Purios open – cell Systems is a two - component polyurethane systems for producing of semi – rigid polyurethane foam with open cell structure, applied "in – situ" as spray thermal and acoustic insulation. Components Purios Systems do not contain blowing agents that deplete the ozone layer of the Earth.

Description of the components

Component A: mixture of polyols containing catalysts, flame retardants, and blowing agents.

Component B: Purocyn B – pMDI (polymeric diphenylmethane 4, 4' diisocyanate).

Application and advantages of Purios Systems

Components **Purios Systems** are applied by spraying using a dedicated spray equipment in relation metering 1: 1 by volume. The main purpose of the system is thermal and acoustic insulation inside the building.

Advantages of the systems:

- Very good adhesion to the surface - it does not require additional adhesives and connectors
- Acoustic and thermal insulation in a single application process obtained by the open-cell foam structure
- Speed applications not requiring the storage of dealing with large storage space, as in the case of mineral wool or polystyrene (EPS, XPS)

General rules and recommended application conditions

The foam quality is dependent on the following factors:

- Exact preparation of component A before use (preheating of materials in barrels to the recommended temperature before mixing and then mixing the already heated material)
- Weather conditions: temperature and humidity of environment and spray surface
- Setting the machine parameters of spray - the correct mixing ratio, pressure, temperature components and hoses correlated with the technological capabilities of the spraying machine used
- The proper application - the behavior of the recommended thickness of the layers ensures optimum parameters foams
- Behavior intervals between successive layers of spray, in order to obtain the correct temperature of the substrate

Surface preparation and application system

The surface which will be applied polyurethane Purios System must be clean, dry, stable surface free of dust, oil in order to ensure adequate adhesion to the substrate. In the case of metal surfaces, they should be free from metal oxides and rust.

Purios System can be applied to any type of substrate, except for substrates with a thermoplastic material, galvanized sheet (unprepared), glass and painted surfaces before they are matt by chemical or mechanical. In the case of internal

systems, secure windows and movable and immovable property which may become dirty during application.

Note: Regardless of the type of substrate is encouraged to try adhesion of polyurethane foam to the surface.

Note: Before starting the application is recommended to check the accuracy of the machine and system parameters by performing spray foam panel (e.g. OSB, gypsum - cardboard, cardboard), excision samples with dimensions 150 x 150 x 150 mm to measure apparent density foam and comparison the results with the values declared in the Technical Information.

A vapor barrier is recommended when applying open-cell systems.

The material must be heated before mixing begins in order to increase its effectiveness. However, care must be taken not to overheat the components of the system as, particularly in the case of polyol, this can lead to delamination and subsequent loss of product quality.

We recommend the use of recirculation, heating bands and heating baskets to heat components of the system

The thickness of the spray

The recommended thickness of the spray layer is controlled by choosing a suitable nozzle and the speed of the application and **should be in the range between 60 - 100 mm**. Keep in mind that the quality of the insulation is better, if the layers are applied comparable thickness. **One layer should not exceed the upper range of thickness** due to problems of heat release during the foaming reaction.

Too thick a layer may cause problems with heat generation during the foaming reaction, while too thin a layer may result in a higher density foam.

The impact of weather conditions on the system and application

Keep in mind that the temperature of the components has a big impact on response times.

On the cold surface of the first layer react longer and the foam usually not reaches 100% of the thickness.

Accordingly, the surface of the first layer is heated surface so that the next layer has increased accordingly. Too hot surface will appear problems with the adhesion of foam to the substrate.

Therefore, it is important to pay attention to the recommended surface temperature applications.

RECOMMENDED IN THE APPLICATION

TEMPERATURE	
Temperature components to the application (in barrels)	25 °C – 30 °C
The minimum surface temperature	15 °C
The maximum surface temperature	40 °C
The recommended range of surface temperature	15 °C – 25 °C
Minimum ambient temperature (where is an application)	15 °C
Recommended ambient temperature range (where is an application)	20 °C – 30 °C
HUMIDITY	
Relative humidity of air	max. 60 %
Relative humidity (measured at surface):	
Cardboard - gypsum plate	4,5 – 7,0 %
Semipermeable membrane *	0 - 0,5 %
Corrugated cardboard	4 – 7 %
Wood construction according to EC5**	12 % ***
Concrete (after aging for 28 days)	5 – 6 %

* Semipermeable membrane - refer to the manufacturer's instructions

** Polish Standard PN-EN 1995-1-1:2010 "Eurocode 5 Design of wooden structures Part 1-1: General principles and

rules for buildings"; National Annex NA 8.1 Moisture content of solid wood used for structural elements should not exceed: a) 18% in structures protected against moisture

*** For open-cell products of Purios series we recommend moisture content of the wood surface of 12% as it ensures the highest level of adhesion to the substrate and the best physical and mechanical parameters of ready foam.

Spraying in accordance with the guidelines of standard EC5, annex NA 8.1 item a) is acceptable; however, each time the applicator is obliged to perform a test spraying and check whether proper adhesion to the substrate is maintained. In the case of lack of adhesion, dry the substrate to a level allowing full adhesion of the Purios system to the substrate.

RECOMMENDED PARAMETERS SPRAY

TEMPERATURE HEATING BLOCKS	40 – 60 °C
TEMPERATURE HOSE	40 – 60 °C
WORKING PRESSURE	90 – 110 bar permissible 70 -110 bar

Please note that these are theoretical values and parameters depend on the outside conditions.

During the execution of the application should be corrected according to the changing external conditions.

When using a low working pressure and at the same time a large mixing chamber, there is a danger of a significant deterioration in the mixing of the components, resulting in a foam of reduced quality.

Note also the relative humidity of the air (max. 60%), especially for applications in confined spaces. Too high humidity adversely affects foam quality and adhesion to the surface. The relationship between air temperature and relative humidity is shown in **Table 1**.

Mixing of the material during operation should be done at a slow speed of the mixer to prevent excessive aeration.

After the end of the application is required period seasoning foam 48 h and time of airing investments 48 h in the conditions of carrying out the application. During this time, it is forbidden to cutting, grinding foam. During the seasoning foam should provide conditions similar to the conditions under which conducted the application (temperature and humidity of the application).

Mixing ratio

Preserve the stability of the mixing ratio during operation is very important for the quality and stability of the resulting foam.

Note: Before start working, it is recommended to check the correct operation of the machine by performing the spray test while observing the correct operation of the machine. A large pressure differential component (over 10% between the components) during spraying may indicate problems with the machine spray - is required the intervention of service - in this case, it is prohibited to continue the work until the removal of the cause.

Note: Due to the possibility of delamination of the component A in a barrel, in order to achieve optimum parameters of foam is necessary to the thorough mixing just before the start of spraying. The polyol should be stirred in the container provided, mechanical stirring until a homogeneous throughout the volume of liquid in the barrel. Heating the raw materials in the barrel greatly improves the quality of mixing of the ingredients.

Safety rules

Purios Systems for correct use does not pose a threat to human life and health.

Avoid contact of components with skin and eyes. During the application used clothing and gloves, use face protection and breathing apparatus.

All personal protective equipment should be used already during material preparation, execution works as well as after work completion, e.g. when rolling up the equipment, cleaning the spraying site and any other activities performed in

this environment with still increased concentration of gases.

Pay particular attention to regular replacement of filters in protective masks - in accordance with the manufacturers' recommendations.

Before working with the Purios System refer to the content and adhere to the recommendations contained in Material Safety Data Sheet, Declaration of Performance and Information Technology.

In case of doubt, or when disturbing adverse events during application, discontinue use and contact the manufacturer of the system.

The above recommendations are guidelines for companies implementing applications.

Purinova is not responsible for the preparation of the substrate prior to spraying, the processing and application of foam and the protective coating applied.

Table 1. Dew point temperature table

DEW POINT TEMPERATURE WITH RELATIVE HUMIDITY											
Air temperature (°C)	Relative humidity of air (%)										
	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
2°C	-7,77	-6,56	-5,43	-4,40	-3,16	-2,48	-1,77	-0,98	-0,26	+0,47	+1,20
4°C	-6,11	-4,88	-3,69	-2,61	-1,79	-0,88	-0,09	+0,78	+1,62	+2,44	+3,20
6°C	-4,49	-3,07	-2,10	-1,05	-0,08	+0,85	+1,86	+2,72	+3,62	+4,48	+5,38
8°C	-2,69	-1,61	-0,44	+0,67	+1,80	+2,83	+3,82	+4,77	+5,66	+6,48	+7,32
10°C	-1,26	+0,02	+1,31	+2,53	+3,74	+4,79	+5,82	+6,79	+7,65	+8,45	+9,31
12°C	+0,35	+1,84	+3,19	+4,46	+5,63	+6,74	+7,75	+8,69	+9,60	+10,48	+11,33
14°C	+2,20	+3,76	+5,10	+6,40	+7,58	+8,67	+9,70	+10,71	+11,64	+12,55	+13,36
15°C	+3,12	+4,65	+6,07	+7,36	+8,52	+9,63	+10,70	+11,69	+12,62	+13,52	+14,42
16°C	4,07	5,59	6,98	8,29	9,47	10,61	11,68	12,66	13,63	14,58	15,54
17°C	5,00	6,48	7,92	9,18	10,39	11,48	12,54	13,57	14,50	15,36	16,19
18°C	5,90	7,43	8,83	10,12	11,33	12,44	13,48	14,56	15,41	16,31	17,25
19°C	6,80	8,33	9,75	11,09	12,26	13,37	14,49	15,47	16,40	17,37	18,22
20°C	7,73	9,30	10,72	12,00	13,22	14,40	15,48	16,46	17,44	18,36	19,18
21°C	8,60	10,22	11,59	12,92	14,21	15,36	16,40	17,44	18,41	19,27	20,19
22°C	9,54	11,16	12,52	13,89	15,19	16,27	17,41	18,42	19,39	20,28	21,22
23°C	10,44	12,02	13,47	14,87	16,04	17,29	18,37	19,37	20,37	21,34	22,23
24°C	11,34	12,93	14,44	15,73	17,06	18,21	19,22	20,33	21,37	22,32	23,18
25°C	12,20	13,83	15,37	16,69	17,99	19,11	20,24	21,35	22,27	23,30	24,22
26°C	13,15	14,84	16,26	17,67	18,90	20,09	21,29	22,32	23,32	24,31	25,16
27°C	14,08	15,68	17,24	18,57	19,83	21,11	22,23	23,31	24,32	25,22	26,10
28°C	14,96	16,61	18,14	19,38	20,86	22,07	23,18	24,28	25,25	26,20	27,18
29°C	15,85	17,58	19,04	20,48	21,83	22,97	24,20	25,23	26,21	27,26	28,18
30°C	16,79	18,44	19,96	21,44	23,71	23,94	25,11	26,10	27,21	28,19	29,09
32°C	18,62	20,28	21,90	23,26	24,65	25,79	27,08	28,24	29,23	30,16	31,17
34°C	20,42	22,19	23,77	25,19	26,54	27,85	28,94	30,09	31,19	32,13	33,11
36°C	22,23	24,08	25,50	27,00	28,41	29,65	30,88	31,97	33,05	34,23	35,06
38°C	23,97	25,74	27,44	28,87	30,31	31,62	32,78	33,96	35,01	36,05	37,03
40°C	25,79	27,66	29,22	30,81	32,16	33,48	34,69	35,86	36,98	38,05	39,11
45°C	30,29	32,17	33,86	35,38	36,85	38,24	39,54	40,74	41,87	42,97	44,03
50°C	34,76	36,63	38,46	40,09	41,58	42,99	44,33	45,55	46,75	47,90	48,98

From the table you can read at what surface temperature (depending on the air temperature and its relative humidity) the condensation occurs. For example, at an air temperature of 20 °C and a relative humidity of 70%, condensation will appear on non-drinking surfaces at a substrate (floor) temperature of less than 14.4 °C

For a practical safety margin, the substrate temperature must be at least 3°C above the dew point.