TECHNICAL INFORMATION

LIMBOROUTE K828F AIRPORT

swarco

Road Marking Systems

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LIMBOROUTE K828F AIRPORT

Art.-No.: 14828F, white
Art.-No.: 23K828F....RAL

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Important Information:
Please consider our General Terms and Conditions and the general notes of the Technical Information Sheet! No liability is accepted for any errors! The information is provided to our best knowledge and experience. This information is, however, no warranty for any properties of the material. We provide this information without obligation, also regarding the rights of third parties. The user has to make sure that the material is appropriate for the respective application.

1 Main characteristics / Fields of application

LIMBOROUTE K828F airport…

- is a high quality, low-solvent, one-component high-solid-paint, free from aromatic compounds, developed especially for large scale applications and other specific requirements for airfields
- tried and tested, excellent thin-layered marking for runways, taxiways and airfield areas that are often renewed
- available in airport colors according to DIN 6171
- has been tested by the – Federal Institute of Materials Research and Testing – (BAM) regarding: determination of the color coordinates (DIN 5033), evaluation in line with ICAO-Annex 14-Aerodroms and according to STANAG 3711 (see BAM test report S1E1089)
- according to the requirements of chromaticity co-ordinates, luminance factor and resistance to chemicals of EASA (European Aviation Safety Agency (confirmation is conformed to the DSGS certificates)
- has been tested on the turntable simulator at the German Road Institute (BASt) as marking system with several high-index beads developed especially for airfield markings
- has been tested with good results for resistance against kerosene according to DIN EN ISO 2812-1 (LGA- test report BP015 1007/1) and chemical resistance based on DIN 68861, part 1 / DIN EN 12720 (test report ILF Magdeburg)
- has been tested according to the requirements of TT-P 1952F (Test Report No. 220147-1 for white and 221024-1 for colors yellow, red, green, blue and black). (According to TT-P 1952F, water-thinnable systems are intended. Since low-solvent high-solids systems are currently also used for airfields in Europe, the product was tested in accordance with TT-P 1952)
- suitable for bituminous and concrete surfaces
- is applicable with any airless and airspray application machines used at present

2 Technical Data

Color	white, RAL-colors, within limits of color coordinates, according to Annex 14 ICAO and EASA* (without chromaticity co-ordinates of the color sky blue and grass-green)
Colors according to ICAO-Annex 14 and EASA*	RAL 9016 traffic white RAL 1023 traffic yellow RAL 2009 traffic orange RAL 3020 traffic red RAL 9017 traffic black *see test report DSGS-02
Farbtöne nach TT-P 1952F und Fed. St. 595	ILF Test Report-Nr. 220147-1: FS 595 C 37925 white ILF Test Report-Nr. 221024-1: FS 595 C 33538 yellow FS 595 C 31136 red FS 595 C 34108 green FS 595 C 35180 blue FS 595 C 37038 black
Density	approx. 1.63 kg/l +/- 0.04 (other colors on request, see point 3)
Solid content	min. 75%
Solid body	approx. 54.23%
Solvent content	max. 25%
Thinner	When needed add max. 2% thinner for high solid paint (Art.-No.: 3080) for optimizing spray properties or add max. 2% thinner for high temperatures (Art.-No.: 3160) for optimizing bead

	embedment. For cleaning of the machine and tools use Special cleaner for marking machines, (Art.-No. 3086).
Storage stability	1 year, in sealed original packaging; protect from frost and direct sun light
Drying time / Trafficability	The drying time stated in the BASt test report are laboratory values that may differ from field conditions depending on climate (temperature, humidity, wind), material, layer thickness and road surface. In general, the marking's trafficability must be checked before exposing it to traffic impact.
Standard packaging	tin containers of 6 / 15 / 25 / 40 kg filling weight other container / filling weight on request **Drop-on material:** paper bags with PE-inlay – 25 kg filling weight
Identification	The regulations and instructions concerning appropriate transport, handling, storage, first aid measures, toxicology and ecology are stated in our material safety data sheets! The instructions stated on the product label and in the MSDS must be followed.
Processing temperature	min. +5°C
Surface temperature	+5°C to +45°C
Relative humidity	max. 75% (dew point spreadsheet has to be regarded)
Layer thickness / Theoretical consumption	Wet film thickness = Dry film thickness = Theoretical consumption 300 µm = 163 µm = approx. 0.489 kg/m² (0.3 l/m²) 400 µm = 217 µm = approx. 0.652 kg/m² (0.4 l/m²) 600 µm = 325 µm = approx. 0.978 kg/m² (0.6 l/m²) The actual consumption depends on the applied layer thickness and the type and state of the surface.

*In order to simplify color selectin: in practice RAL colors with color co-ordinates within limits of Annex 14 ICAO and EASA are used. The colors sky blue and grass-green are recommended due to improved recognizability.

3 Theoretical consumption of material

Product	RAL color	Density	Theoretical Consumption* / layer thickness		
		kg/l	kg/m²	kg/m²	kg/m²
			0.3 mm	0.4 mm	0.6 mm
LIMBOROUTE K828F airport white	9016	1.63	0.49	0.65	0.98
LIMBOROUTE K828F airport traffic yellow	1023	1.57	0.47	0.63	0.94
LIMBOROUTE K828F airport traffic orange	2009	1.56	0.47	0.62	0.94
LIMBOROUTE K828F airport traffic red	3020	1.59	0.48	0.64	0.95
LIMBOROUTE K828F airport sky blue	5015	1.63	0.49	0.65	0.98
LIMBOROUTE K828F airport grass-green	6010	1.59	0.48	0.64	0.95
LIMBOROUTE K828F airport traffic black	9017	1.65	0.50	0.66	0.99

*rounded consumption
The actual consumption depends on the applied layer thickness and the type and state of the surface

4 Processing instructions

4.1 General information

In addition to ICAO-Annex 14 national guidelines / recommendations regarding markings for aircraft operations areas or airport ramps, taxiways, runways have to be observed.

4.2 Preparation of material and application techniques

Before processing LIMBOROUTE K828F airport must be **homogenously** stirred in its original container. The exact machine adjustments depend on the application conditions, type of machine, requested wet film thickness, type and quantity of drop-on material and need to be made according to the machine manufacturer's instructions.

The uniform distribution of marking material and drop-on material over the entire application surface must be observed. Losses of drop-on material must be regarded when adjusting bead pistol or bead dispenser.

Theoretical consumption of material and drop-on materials are stated in:

- In the respective test reports by BASt
- In the table “RPA-test reports by BASt see point 7.1
- In the table “Theoretical consumption of material” see point 3
- In the table “Theoretical consumption of material and drop-on materials” on our website in kg/m² as well as in kg/km of line to be marked depending on typical line width

Cleaning of machine (paint tank and hoses) and tools must take place before drying takes place with Special cleaner for marking machines (Art.-No.: 3086) or with Thinner for high solid paint (Art.-No.: 3080).

4.3 Optimizing application properties

The paint LIMBOROUTE K828F airport is ready for processing in its delivery state. In general, it is not necessary to add thinner but for optimizing the material’s spray properties max. 2 % Thinner for high solid paints (Art.-No.: 3080) can be added. When processing LIMBOROUTE K828F airport at temperatures exceeding 25°C it is recommended to add max. 2% thinner for high temperatures (Art.-No.: 3160) to prevent the "peeling". Only use thinners recommended by the manufacturer.

5 Road surface / pretreatment

5.1 General information

The surface must be dry, clean, free from grease, oil and loose gravel and other contaminations. The surface and potentially existing old markings must be checked for their carrying capacity and compatibility with the material to be applied. In case of doubt, test applications and adhesion tests are required. Ideally, old markings should be removed with appropriate mechanical procedures in order to ensure that no marking parts are sucked into aircraft engines.

Colored marking materials may fade after some time of outside exposure. This is a normal effect caused by sun exposure, water, road salt, dew, condensed water and heat. Constant traffic impact reduces bleaching and shift of color intensity but will not prevent fading completely. See our elaborations on that subject in our “General notes on technical information sheets”.
If necessary-colored markings are to be renewed. Annex 14 ICAO describes under 3, “Colors for markings, signs and panels“, that color shade can fade, therefore specifications for paints are valid for **freshly** applied paint only.

5.2 Concrete and cement-bound surfaces

The pavement components that prevent good bonding, especially on new concrete, including fine mortar layers, concrete slurries, concrete after-treatments as setting retarders, paraffin, impregnations on silicate basis etc. must be appropriately removed (e. g. with high pressure waterjet, fine millcut or similar). We recommend conducting test applications. In case of doubt about bounding properties communicate your concerns in written form.

On newly washed concrete surfaces (with grit) poor bonding properties may occur, not caused by marking paint quality. Therefore, we recommend applying test markings.

When applying the paint to concrete or cement-bound surfaces, the formation of bubbles is likely to occur. In order to prevent bubble formation the concrete should be pre-treated with LIMBOROUTE K828F airport blended 1 : 1 with Thinner for HS-Paints (Art.-No.: 3080) and sprayed with approx. 200µm wet film thickness. Once dried, a second, undiluted layer can be applied. The humidity of concrete must not exceed 4% during application.

5.3 Bituminous surfaces

Any loose components such as chippings must be removed. Fluxoils, releasing agents for road rollers, are detrimental to good bonding of markings and can cause discoloration of the striping. Since airfields with new surfaces cannot be left unused and unmarked for 4–6 weeks, test markings and bonding checks are required before applying the final marking.

5.4 Floor coatings

For markings on floor coatings our SWARCO SAFETY-LINE products should be used. LIMBOROUTE K828F airport is not suitable for indoor markings and floor coatings.

6 Application technique

With conventional marking machines (airless or atomizing technique), manually with brush or roller. For airless machines use airless quality only.
Attention: when applying with brush, roller or spray gun (e. g. jobs with stencils) consider the paint's fast drying time.
Adding Thinner for 2-C EP (Art.-No.: 3130) partly improves processing properties. Drop-on material must be broadcast immediately. Otherwise, the drop-on material will not be properly embedded, which leads to poor traffic technological properties. Two-layer applications are an option (first layer + drop-on materials, second layer + drop-on material). Well embedded drop-on beads from the first layer become visible when the second layer is worn. If necessary, the formation of peels can also be prevented by adding thinner for high temperatures (Art.-No.: 3160).

7 Test reports by BASt

Test report no.	Thick-ness	Consumption		Drop-on material (DOM)	Traffic technological properties	
	mm	material	DOM	Identification (divergent identification possible - see relevant test report)	New condition	Used condition
		kg/m²	kg/m²			
Type I marking white						
2020 1DS 05.10	0.3	0.49	0.30	**Airport beads Type I T14 M30**	P5, S1, R5, Q5, T2	P5, S2, R5, Q5
2007 1DS 08.11	0.4	0.65	0.32	**Airport beads Type I T14 M30**	P5, S1, R5, Q5, T2	P5, S1, R5, Q5
2009 1DS 03.11	0.4	0.65	0.32	SWARCOFLEX 100-600 T14 M25	P5, S1, R5, Q5, T3	P5, S1, R5, Q5
2010 1DS 07.03	0.4	0.65	0.32	SWARCOLUX P21 T14 M25	P5, S1, R5, Q5, T3	P5, S1, R5, Q5
2012 1DS 01.06	0.4	0.65	0.32	**Airport beads Type I T14 M30**	P5, S1, R5, Q5, T2	P5, S1, R5, Q5
2022 1DS 01.15	0.4	0.65	0.32	**Airport Beads 300-850 acc TT-B-1325-D Typ III**	P5*	
Type I marking yellow						
2021 1VS 05.07	0.3	0.47	0.30	**Airport beads Type I T14 GG30**	P5*	
2022 1VS 01.12	0.3	0.47	0.30	**Airport beads Type I T14 GG30**	P5*	
2021 1VS 05.08	0.4	0.63	0.40	**Airport beads Type I T14 GG30**	P5, S1, R5, Q3, T2,Y2	P5, S1, R5, Q3
2022 1VS 01.11	0.4	0.63	0.32	**Airport Beads 300-850 acc TT-B-1325-D Typ III**	P5*	
Type II marking white						
2012 1DS 01.10	0.6	0.98	0.50	**Airport beads Type II T14 M25**	P6, S1, R5, RW6, Q5,T2	P6,S1, R5,RW5,Q5
Type II marking yellow						
2012 1VS 01.09	0.6	0.94	0.50	**Airport beads Type II T14 GG30**	P6, S1, R5, RW4, Q3, T2, Y2	P6,S1, R5,RW5,Q3

*only confirmation