TECHNICAL INFORMATION

LIMBOROUTE LW48F AIRPORT

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Road Marking Systems

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LIMBOROUTE LW48F AIRPORT

Art.-No.: 11702F
Art.-No.: 29F….. (RAL)
Art.-No.: 11702FS37925
Art.-No.: 29FS…..(Federal Standard)

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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 LW48F airport…

- is a water-thinnable, environmentally friendly waterborne paint
- is a tried and tested thin layer marking, well-suited for runways, taxiways and other airport operation areas that are often renewed
- available in airport colors according to DIN 6171
- has been tested by the German Road Institute (BASt) as a marking material and for airports with specially developed high-quality bead mixtures with a higher refractive index
- tested in accordance with the requirements of Federal Specification TTP-1952F, February 2015 edition, (ILF Report 210077-5 and 210077-6; Art.-No. 11702FS37925 / Art.-No. 29FS…..(RAL))
- is suitable for both bituminous and concrete surfaces
- has been tested with good results against chemical resistance according to DIN 68861, part 1 / DIN EN 12720 (test report ILF Magdeburg)
- 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)
- is suitable for applications with airless and atomizing techniques
- is characterized by good drying and bead embedment properties, excellent covering power and good resistance against abrasion

2 Technical Data

Color	White, RAL-colors within limits of color co-ordinates according to Annex 14 ICAO and EASA* (without chromaticity co-ordinates of the color sky blue and grass-green) white according to Federal Standard 595C 37925 other colors according to Federal Standard on request
Density	approx. 1.63 kg/l +/- 0.04 (other RAL-colors see point 3)
Solid content	≤ 80%
Volume solid content	approx. 67.02%
Solvent-content	< 2%
Thinner	Max. 2% water to optimize the material's properties. Clean equipment and machinery with water.
Storage stability	6 months (unmixed), in sealed original packaging; protect from frost and direct sun light
Trafficability / curing time	The drying times stated in the BASt test reports 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.
WOT (Wash-out-time)	approx. 30 minutes after application depending on layer thickness and climatic conditions.
Standard packaging	Plastic container with 25 kg filling weight. Larger container upon 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 and measures, toxicology and ecology are stated in detail in our material safety data sheets! The instructions stated on the product label and in the MSDS must be followed.
Processing temperature	min. +10°C
Surface temperature	+10°C to +45°C
Rel. humidity	max. 75 % - (dew point spreadsheet has to be regarded)

Layer thickness / Theoretical consumption	Layer thickness	=	dry film thickness	=	Theoretical consumption
	300 µm	=	200 µm	=	ca. 0.49 kg/m² (0.3 l/m²)
	400 µm	=	268 µm	=	ca. 0.65 kg/m² (0.4 l/m²)
	600 µm	=	400 µm	=	ca. 0.98 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		
		ca. kg/l	kg/m²	kg/m²	kg/m²
			0.3 mm	0.4 mm	0.6 mm
LIMBOROUTE LW48F airport white	9016	1.63	0.49	0.65	0.98
LIMBOROUTE LW48F airport traffic yellow	1023	1.60	0.48	0.64	0.96
LIMBOROUTE LW48F airport traffic orange	2009	1.62	0.49	0.65	0.97
LIMBOROUTE LW48F airport traffic red	3020	1.64	0.49	0.66	0.98
LIMBOROUTE LW48F airport sky blue	5015	1.69	0.51	0.68	1.01
LIMBOROUTE LW48F airport grass-green	6010	1.58	0.47	0.63	0.95
LIMBOROUTE LW48F airport traffic black	9017	1.60	0.48	0.64	0.96

* rounded theoretical 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 the ICAO-Annex national guidelines / recommendations regarding markings for aircraft operations areas or airport ramps, taxiways and runways have to be observed.

4.2 Preparation of material and drop-on material

LIMBOROUTE LW48F airport has to be **homogeneously** stirred in its original container. The exact machine adjustments have to be done according to the manufacturer's instructions. Layer thickness and quantity of drop-on material need to be evenly distributed.

The uniformity 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 material is listed:

- 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

Note: All devices and tubes must be totally free from paint residues and solvents before LIMBOROUTE LW48F airport is applied! Do not use equipment that has any brass or copper parts. Stainless steel parts are recommended.

Before using waterborne paints, we recommend to clean equipment and machinery used earlier for solvent-based paints following these steps:

1. Rinse thoroughly with solvent (Art.-No.: RH10010 Acetone)
2. Rinse with industrial alcohol or an alcohol / water mix (Art.-No.: RH10070 Ethanol)
3. Rinse with plenty of water

At each work interruption the nozzles must be cleaned. Once the work is completed, the machine must be thoroughly rinsed.
Immediately after the application of waterborne paints, equipment and machinery must be cleaned in reverse order to prepare them for the use of solvent based paints.

4.3 Optimizing application properties

LIMBOROUTE LW48F airport is ready for processing in its delivery state. Usually the addition of thinner is not necessary. It is, however, possible to optimise the material's spray properties by adding max. 2 % water as thinner.

4.4 WOT – Wash-out-time (rain sensitivity)

All waterborne paints remain sensitive to rain and moisture for some time after they have dried. Therefore, dry conditions are required before the paints achieved washout. It is recommended that LIMBOROUTE LW 48F is applied only during dry and stable weather conditions.

5 Road surface / pretreatment

5.1 General information

The surface must be dry, clean and 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 bonding checks are required. Ideally, old markings should be removed with appropriate mechanical procedures.
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 is not able to prevent fading completely. See our elaborations on that subject in our “General notes on technical information sheets”.
If necessary, colored markings have to be renewed. Annex 14 ICAO describes under 3, “Colors for markings, signs and panels“, that color shades can fade, therefore specifications for paints are valid for freshly applied paint only.

5.2 Concrete and cement-bound surfaces

The pavement components in new road surfaces that prevent good bonding (fine mortar layer, concrete slurries) must be appropriately removed (e. g. with high pressure waterjet, fine millcut or similar). When applying the paint to concrete or cement-bound surfaces, bubble formation is likely occurred. In order to prevent the formation of bubbles the concrete should be pretreated with LIMBOROUTE LW48F airport blended 1:1 with water as a primer (approx. 200 µm).

The humidity of the concrete must not exceed 4% during the application of the marking. After precipitation a waiting period of a minimum of 48 hours is recommended.

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 indoor marking products should be used.
LIMBOROUTE LW48F airport is not suitable for floor coatings.

6 Application technique

With conventional marking machines (airless or atomising technique), manually with brush or roller. For airless machines use airless quality only.
Attention: when applying with brush or roller or spray gun (e. g. jobs with stencils) consider the paint's fast drying time.
Immediate broadcasting of drop-on materials is absolutley necessary. Otherwise the drop-on material will not be embedded properly, 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.

7 Test reports

7.1 Table: RPA – test reports by BASt (German Road Institute)

Test report-no.	Layer thickness	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						
2006 1DW 01.04	0.3	0.489	0.23	SWARCOLUX P21 T14 M25	P5, S1, R5, Q5, T2	P5, S1, R5, Q5
2013 1DW 07.14	0.3	0.489	0.24	SWARCOFLEX 100-600 T14 M25	P5, S2, R5, Q5, T2	P5, S2, R4, Q5
2020 1DW 05.06	0.3	0.489	0.30	**Airport beads type I T14 M30**	P5, S1, R5, Q5, T3	P5, S2, R5, Q5
2013 1DW 07.15	0.4	0.652	0.32	SWARCOFLEX 100-600 T14 M25	P5, S1, R4, Q5, T3	P5, S1, R4, Q5
Type I marking yellow						
2021 1VW 05.14	0,3	0,480	0,30	**Airport beads type I T14 GG30**	P5, S1, R5, Q3, T3, Y2	P5, S1, R5, Q3
2018 1VW 06.16	0.4	0.640	0.40	**Airport beads type I T14 GG30**	P5, S1, R5, Q3, T3, Y2	P5, S1, R5, Q3
Type II marking white						
97 1W 12.07	0.6	0.978	0.60	MEGALUX-BEADS 600-1400 T14 K25	P6, S1, R5, RW5, Q5, T2	P6, S1,R5,RW3, Q5
2021 1DW 05.16	0.6	0.978	0.45	**Airport beads Type II T14 M25**	P6, S1, R4, RW4, Q5, T3	P6, S1,R4,RW3, Q5