TECHNICAL INFORMATION

LIMBOPLAST KSP 130 TOPLINE

swarco

Road Marking Systems

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LIMBOPLAST KSP 130 TOPLINE

Art.-No.: 5176R (reactive component)
5176NR (non-reactive component)
5176RW (reactive component, winter formulation)

Version: 2023-06-27

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 applications

LIMBOPLAST KSP 130 TOPLINE…

- belongs to the group of environmentally friendly, solvent-free, sprayable multi- component reactive systems
- consists of two or more components that chemically react with each other
- is suitable for both bituminous (e. g. mastic asphalt, asphaltic concrete) and concrete surfaces
- has been tested on the wear simulator at the German Road Institute (BASt)
- is appropriate for **universal** use with **all** common application techniques for cold spray plastics (system 98:2, system 1:1)
- is applied using the conventional spray technique or injection method and is gritted exclusively with high-quality drop-on materials
- is generally made in airless quality

2 Technical Data

Color	White, (other colors upon request)
Density	approx. 1.58 kg/l +/- 0.06
Potlife	min. 2-5 min. (depending on the added amount of hardener, the air- and material temperature)
Solvent content	Solvent-free
Solvent for cleaning	Special cleaner for marking machines Art.-No.: 3086
Storage stability	6 months (unmixed), in sealed original packaging; protect from frost and direct sun light
Overrollability / curing time	Depends on the climatic conditions (see tables under point 4.2.3). In general the markings`overrollability must be checked before exposing them to traffic impact.
Standard packaging	**2-C KSP 130 TOPLINE:** Tin container of 15/25/40 kg filling weight. Larger container upon request **3-C KSP 130 TOPLINE:** white container – 40 kg filling weight – non-reactive component blue container – 40 kg filling weight – reactive component larger container for reactive / non-reactive component: upon request **Hardener powder**: PE- bags, filling weight corresponds to cold spray plastic quantity and mixture ratio **Liquid hardener:** Plastic cans – 20 kg filling weight **Attention:** all hardener types are organic peroxides - they must be separately packaged, transported and stored from the cold spray plastics in special containers (special cartons and boxes). **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. + 5°C
Surface temperature	+5°C to +45°C
Rel. humidity	Max. 75% (dew point spreadsheet has to be regarded)
Layer thickness	0.3 - 1.2 mm depending on BASt-test report (dry layer thickness = wet layer thickness)
Theoretical consumption	0.47 – 1.89 kg/m² (0.3 – 1.2 l/m²) The actual consumption depends on the applied layer thickness and the type and state of the surface.

3 Mixture ratios / Application techniques / Hardener

Product	Art.-No.:	Technique	Hardener type
2-Comp. LIMBOPLAST KSP 130 TOPLINE **reactive component = base component** summer formulation winter formulation	 **5176R** **5176RW**	**Shielded mixture procedure,** Marking machine for system 98:2	Liquid hardener
Mixture ratio: **reactive component** (KSP 130 TOPLINE) **: liquid hardener = 98 : 2**			
3-Comp. LIMBOPLAST KSP 130 TOPLINE **reactive component = base component** **non-reactive component***	**5176R** **5176NR**	**Shielded mixture procedure,** 3-comp. special marking machines	Hardener powder
Mixture ratio : non-reactive component* + Hardener powder (BPO) : reactive component = 1 : 1 (2% - 4%)			
3-Comp. LIMBOPLAST KSP 130 TOPLINE **reactive component = base component** **non-reactive component***	**5176R** **5176NR**	**Shielded mixture procedure,** 3-comp. special marking machines	Liquid hardener
Mixture ratio : non-reactive component* + Liquid hardener : reactive component = 1 : 1 (2% - 4%)			

* non-reactive component, mixed with hardener gets a limited storage stability / pot life. Remaining quantity has to be as removed out of the machine after finishing marking job.
Between October and April LIMBOPLAST KSP 130 TOPLINE are delivered in winter formulation, due to weather conditions

4 Processing Instructions

4.1 Preparation of material and application techniques

LIMBOPLAST KSP 130 TOPLINE has to be homogeneously stirred in the original container. Use just the quantity needed for the next marking job. Then the wanted hardener type is added under homogeneous stirring.
It is important for 2-component marking machines with shielded mixture procedure (98:2 system) to ensure the machine is adjusted with the correct mixture ratio inside the mixing tube. Even with only short standstill times of the machine it is necessary to rinse the mixing and spray devices with **special cleaner for marking machines** (Art.-No.: 3086).

For **3-comp. marking machines** (mixture ratio 1:1) is additionally to consider:

- When preparing the non-reactive component hardener are added under homogenous stirring and then filled into the dedicated reservoir for non-reactive component. Then the reservoir must be sealed.
- Extremely clean working conditions are essential when processing the components. Smallest contaminations / intermixing of the components can lead to premature curing. Therefore, it is advisable to use different stirring devices and auxiliaries for different components.
- Even with only short standstill times of the machine it is necessary to rinse the mixing and spray devices with special cleaner for marking machines (Art.-No.: 3086).
- Non-reactive component has a limited storage stability / potlife when mixed with hardener. Therefore, it is necessary to remove residuals of the non-applied, premixed material from the machine. Otherwise, machine damage may occur as a result of polymerization.

Cold spray plastic (reactive systems) are solvent-free and must be applied without adding solvent (optimizing of material processability, point 4.2).
The cleaning must occur before the complete curing of the material takes place by using **special cleaner for marking machines** (Art.-No.: 3086).
The exact machine adjustments have to be done according to the manufacturer` instructions.

Layer thickness and quantity of drop-on material need to be evenly distributed. Scattering losses on both line sides make modified machine adjustments necessary.

Theoretical consumption of paint and drop-on material is listed:

- in the respective test reports by BASt
- in the table 1 “RPA – test reports by BASt” see point 7.1
- 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

4.2 Optimizing of application properties of cold spray plastic

4.2.1 General Information

The application properties and reactivity of the material depends on temperatures of cold spray plastic, air- and surface. Proper storage conditions improve application conditions partly.

In a limited context, the viscosity and reactivity / curing time of cold spray plastics can be adapted to the specific local processing conditions.

Attention: use methods described with 4.2.2 and 4.2.3 regarding agent quantities. When exceeding the mentioned quantities and simultaneous usage of two or more methods (agents) grave consequence of application properties or traffic technological properties will occur.

4.2.2 Viscosity

Increase of viscosity (e. g. high material- air- and surface temperatures): addition of max. 0.2% thixotropic agent (Art.-No.: RH13700 solid or RH10459 liquid).

Reduction of viscosity (e. g. low material- air- and surface temperatures) addition of max. 1% condenser (Art.-No.: 3044).

Attention: Add the needed agent quantity to the required amount of material for application only, otherwise viscosity or settle properties can change.

4.2.3 Reactivity / curing time

Acceleration of reactivity / curing time (e. g. spring/autumn application jobs with low temperatures)

a) addition of max. 0.2 % accelerator for cold spray plastic (Art.-No.: 8060) or
b) increase hardener quantity up to max. 2% by weight percentage

Retarding of reactivity / curing time (e. g. high temperatures in the summertime)

a) add max. 0.2 % retarder (Art.-No.: 8050) or
b) reduce hardener quantity but not below 0.5% by weight percentage

Attention: for ensuring proper chemical reaction don`t come under 0.5% by weight percentage and don`t exceed 2% by weight percentage for hardener.

Different potlife- and curing times depend on material- and surface temperatures, different hardener quantities, adding accelerator or retarder is shown in the spreadsheet.

Table 1: Curing times of 2-Comp. cold spray plastic system 98:2 with liquid hardener in relation to material and surface temperatures

Temp. (°C)	hardener quantity liquid (weight %)	Hardener time (min)
0°	2	23
5°	2	15
10°	2	13
15°	2	10
20°	2	9
25°	2	7
30°	2	5
40°	2	4
45°	2	3

Table 2: Curing times of 3-component cold spray plastic depending on material and road surface temperatures.

Temp. (°C)	Hardener quantity liquid / solid (weight %)*	Hardener time (min)
0°	4	35
5°	4	30
10°	4	15
15°	4	10
20°	2	6
25°	2	5
30°	2	5
30°	1	8
40°	1	5
45°	1	5

Table 3: Curing times of 3-component cold spray plastic depending on temperature while adding accelerator or retarder.

Temp. (°C)	Hardener quantity liquid / solid (weight %)*	Accelerator (weight%)	Retarder (weight%)	Hardener time (min)
0°	2	0,2	-	27
5°	2	0,2	-	22
10°	2	0,2	-	7
15°	2	0,1	-	6
20°	2	-	-	6
25°	2	-	0,1	7
30°	2	-	0,1	6
30°	2	-	0,2	5
40°	2	-	0,2	7
45°	2	-	0,2	7

* non-reactive comp. A

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 potential 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.

Information: LIMBOPLAST KSP 130 TOPLINE is not appropriate for large surface applications (e. g. playground, sportsground, cycle path or similar).

5.2 Concrete or 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). New washed concrete pavements (with chip seal surface) can still cause adhesion problems that are not due to the marking material / primer. We recommend conducting test applications.

Before applying LIMBOPLAST KSP 130 TOPLINE on concrete or cement-bound surfaces should be pretreated with primers,

a) by spray technique (paint spray machine) with 2-C EP-primer (Art.-No.: 8609000) or
b) manual (roller) with 2-C primer B71 for concrete (Art.-No.: 8010)

It is essential to have a sufficient and uniform coverage with primer in order to obtain an optimum bonding of the cold spray plastic and the concrete. Primer consumption may vary depending on the concrete`s porosity. The moisture of concrete must not exceed 4% during

when applying 2-C primer B71 for concrete. Primers based on epoxy resins are suitable for residual moisture surfaces.
Primers diminish formation of bubbles that are likely to occur when concrete surfaces are not primered.

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 or can cause discoloration of the striping. Since a mechanical removal is hardly possible, the surface should be exposed to traffic for 4 – 6 weeks or an initial marking of paint is to be applied. It is recommended to use the LIMBOROUTE 2-Comp. K809, instead of a one-component paint when applying an initial marking. A bonding check is required before applying the final marking.

5.4 Cobbled pavement

All kind of cobbled pavements are moveable surfaces. That can lead to crack formation or spallings on the marking. Material is used without any manufacture guarantee. Test applications, surface pretreatments are recommended. Cobbled pavement must ensure proper bonding.

Compound concrete stone pavements:
Pavement is to be primered by 2-component primer B71 for concrete (Art.-No.: 8010), see Technical Information). Afterwards cold spray plastic can be applied.

Natural or cast stone pavements (basalt, granite....):
Marking surface must be primed with 2-C primer B55 for cobbles (Art.-No.: 8011).
Afterwards apply cobblestone mortar (Art.-No.: 5232…) and pay attention to get an even and flat surface. The overall dimensions should protrude 2 – 3 cm over the marking surface. After curing cold plastic application follows. Consumption of primer and pavement mortar depends on shape of paving.

5.5 Floor coatings

For markings on floor coatings our indoor marking products should be used.

6 Application techniques

Application with 2-component or 3-component marking machines. Airless machines need airless products.

The quality of cured cold spray plastic is independent of chosen application technique and shows no differences. Powder or liquid hardener is chemically equivalent.

Following application techniques are used:

1. **3-component marking machine, 1 : 1 technique**

   Non-reactive component (mixed with 2-4% liquid or powder hardener) and the reactive component are conveyed from separate containers with mixture ratio 1 :1, then constantly mixed in a mixing tube and finally airless applied. The drop-on material is eventually broadcasted with the wanted quantity into the fresh layer.

2. **2-component marking machine, 98 : 2 technique**

   Reactive component and the liquid hardener are stirred up inside the mixing tube and applied by airless – or air spray technique. The drop-on material is eventually broadcasted with the wanted quantity into the fresh layer.

7 Test reports

7.1 Table 1: RPA – test reports by BASt (German Road Institute)

Test report-no.	Layer thick-ness	consumption		Drop-on material (DOM)	Traffic technological properties	
	mm	Material kg/m²	DOM kg/m²	Identification (divergent identification possible – see relevant test report)	New condition	Used condition
Type I markings						
2021 1DY 08.20	0,40	0,632	0,32	SWARCO SOLIDPLUS 100 300-1000 T18 MK30	P7, S1, R5, Q5, T3	P7, S1, R5, Q5
Type II markings						
2022 1DY 04.06	0,60	0,948	0,60	SWARCO SOLIDPLUS 100 425-1400 T18 MK30	P7, S1, R5, RW6, Q5, T2	P7, S1, R5, RW3, Q5
Type II markings Injection						
2008 1DY 03.11	0,6 wet (1,6 with Injection)	0,948	0,50 0,50	MEGALUX-BEADS 600-1400 T18 MK35 (Injection) SWARCO SOLIDPLUS KSP 130 TOPLINE (after gritted)	P7, S4, R5,RW4, Q5,T2	P7, S2,R5,RW3, Q5
2022 1DY 02.10**	0,6 nass (1,6 mit Injektion)	0,948	0,4 0,6	SWARCO SOLIDPLUS NEXT 100 425-1400 T18 MK30 (Injection) SWARCO SOLIDPLUS NEXT 100 425-1400 T18 MK30 (after gritted)	P7, S3, R5, RW6, Q5, T2	P7, S1, R5, RW6, Q5
Irregular agglomerates with white base line (KSP 130 TopLine)						
2009 1DK 11.10 KSP 130 (wet in wet) G501	0.3 -	0.474 2.7-2.8	- 0.50	- SWARCO SOLIDPLUS 100 212-850 T18	T2 P7, R5, RW6, Q5, T4	P7, R5, RW6, Q5
Regular agglomerates with white base line (KSP 130 TopLine)						
2009 1DK 11.06 KSP 130 (wet in wet) G501	0.3 -	0.474 2.4-2.8	- 0.50	- SWARCO SOLIDPLUS 100 212-850 T18	T2 P7, R5, RW6, Q5, T4	P7, R5, RW6, Q5
Refurbishment of irregular agglomerates with KSP 130 TopLine						
2009 1DK 11.11 KSP 130 (wet in wet) G501 KSP 130	0.3 - 0.3	0.474 2.7-2.8 0.474	0.50 0.40	- SWARCO SOLIDPLUS 100 212-850 T18 SWARCO SOLIDPLUS 100 212-850 T18	T2 P7, R5, RW6, Q5, T4 T2	P7, R5, RW6, Q5
Refurbishment of regular agglomerates with KSP 130 TopLine						
2009 1DK 11.08 KSP 130 (wet in wet) G501 KSP 130	0.3 - 0.3	0.474 2.4-2.8 0.474	0.50 0.40	- SWARCO SOLIDPLUS 100 212-850 T18 SWARCO SOLIDPLUS 100 212-850 T18	T2 P7, R5, RW6, Q5, T4 T2	P7, R5, RW6, Q5
2021 1DY 08.13	0,40	0,632	0,32	SWARCO SOLIDPLUS 100 300-1000 T18 MK30	*	

*only confirmation

** This BASt confirmation was issued on behalf of Rijkswaterstaat within the framework of a research project of the Netherlands and may be used by SWARCO LIMBURGER LACKFABRIK GmbH. It was tested according to EN 1436 (not according to ZTVM), therefore only one BASt confirmation was made.