

1. Application Sector

DAMTEC® SBM K 20V is an isolation and protection mat for railway track constructions, proofed in accordance to DIN 45673-5 - mechanical vibrations – resilient element used in railway tracks – part 5: laboratory test procedures for under ballast mats.

Regarding the technical information of DB Netz AG the typical application for thickness 20mm is approved for main line railway with axle loads less than 25 tons and speeds lower than 200 km/h.

Higher axle loads up to 40 tons are suitable if speed is below 80 km/h. Other speeds have to be clarified if the material pressure on the UBM will be higher than 0.30 N/mm².

The sub ballast mat K mat absorbs vibrations and reduces acoustic emission as well as structure borne sound transmission. It is also effective in reducing the frequency of the ballast maintenance requirement through reduced vibration and better-balanced loading. It protects construction and waterproofing.



The quality capability of the manufacturer's product range „Under Ballast Mats“ were classified as Q1 by Deutsche Bahn AG.

2. Material

Special mixture of rubber granulate, cellular rubber and PU foam with a PU elastomer bonding agent.

3. Appearance

colour: multi coloured
surface: granular texture
surface is laminated with geotextile, white

4. Dimensions/Tolerances

width:	1,250 mm	± 1.5 %
length:	4,000 mm	± 1.5 %
thickness:	20 mm	± 1.0 mm
area weight:	approx. 13.0 kg/m ²	

(slabs and other lengths are possible on request for special projects)

5. Aptitude Test

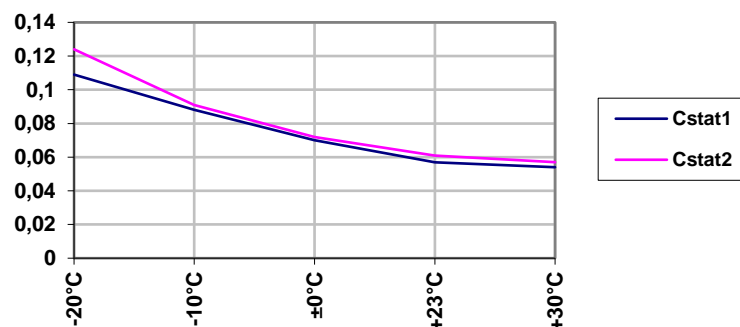
Test in accordance to E DIN 45673-5 (DBS 918071) at Technical University Munich, Technical University Dresden and at Müller BBM in Planegg.

6. Installation

The installation has to be in accordance to installation instructions **DAMTEC® SBM K**. Note that with application and installation for DB AG (German Railway) guidelines for sub ballast mats, „Unterschottermatten einbauen“ (824.1510), have to be observed. For structure borne noise insulation and isolation of secondary airborne noise an adhesion is not necessary.

7. Test Data

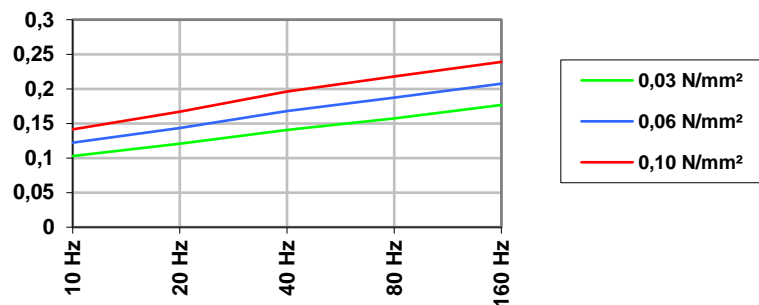
tensile strength:	0.15 - 0.55 N/mm ²	(ISO 1798)
elongation at break:	40 - 70 %	(ISO 1798)
burning behaviour:	E	(EN 13501-1)
thermal resistance:	- 30°C to + 80°C	
chemical resistance:	conditionally resistant to acids and bases	
environmental resistance:	oil-, aging-, rot-resistant and water-resistant	
static bedding modulus (C _{stat1}):	0.06 N/mm ³ ± 15%	
static bedding modulus (C _{stat2}):	0.061 N/mm ³	
influence of temperature on C _{stat} :		



dynamic bedding modulus (C_{dyn1}): ($\sigma_1 = 0.02 \text{ N/mm}^2$; $\sigma_2 = 0.10 \text{ N/mm}^2$)

0.077 N/mm^3 (bei 1 Hz)	+/-15%
0.092 N/mm^3 (bei 5 Hz)	+/-15%
0.099 N/mm^3 (bei 10 Hz)	+/-15%
0.107 N/mm^3 (bei 20 Hz)	+/-15%
0.113 N/mm^3 (bei 30 Hz)	+/-15%
(at -20°C)	$C_{dyn1}(10\text{Hz}) = 0.386 \text{ N/mm}^3$
(at -10°C)	$C_{dyn1}(10\text{Hz}) = 0.232 \text{ N/mm}^3$
(at $\pm 0^\circ\text{C}$)	$C_{dyn1}(10\text{Hz}) = 0.153 \text{ N/mm}^3$
(at +30°C)	$C_{dyn1}(10\text{Hz}) = 0.094 \text{ N/mm}^3$

dynamic bedding modulus (C_{dyn2}):



[no difference within the results for $L_V = 100\text{dB}$ and $L_V = 90\text{dB}$]

horizontal static modulus (G_{stat}): 0.021 N/mm^3
 horizontal deflection: $s = 0.26\text{mm} < 0.4\text{mm}$
 mechanical fatigue strength: Load phase 1 – $F_0/F_U = 75/10\text{kN}$ – 10 million load changes
 Load phase 2 – $F_0/F_U = 100/10\text{kN}$ – 2.5 million load changes

(before load phase 1)	$C_{stat1} = 0.062\text{N/mm}^3$	$C_{stat2} = 0.065\text{N/mm}^3$
(after load phase 1)	$C_{stat1} = 0.063\text{N/mm}^3$	$C_{stat2} = 0.071\text{N/mm}^3 + 1.6\%$
(after load phase 2)	$C_{stat1} = 0.063\text{N/mm}^3$	$C_{stat2} = 0.070\text{N/mm}^3 + 1.6\%$

[After 12.5 Mio. load changes **DAMTEC® SBM K** slightly impressions due to the contact with the ballast. Not any cracks and perforations could be detected with the naked eye.]

water / frost resistance: -20 % for dynamic stiffness
 resistance for aging: change of static stiffness +6% at 23°C
 change of static stiffness +7% at -20°C
 change of weight -0,16%

resistance to oil:

After 7 days in mineral oil:

tensile strength: average 0.31N/mm²

elongation at break: average 43.16%

static stiffness for different load ranges:

max. load [N/mm ²]	secant modulus		C _{stat1} [N/mm ³]	secant modulus		C _{stat2} [N/mm ³]
	[N/mm ²]	[N/mm ²]		[N/mm ²]	[N/mm ²]	
0.15	0.02	0.06	0.060	0.02	0.12	0.062
0.20	0.02	0.08	0.059	0.02	0.16	0.061
0.25	0.02	0.10	0.057	0.02	0.20	0.062
0.35	0.02	0.14	0.056	0.02	0.28	0.066

8. Accessories

- adhesives for horizontal areas: Körapur 672 / Köracur TH 650
- adhesives for vertical area: Körapur 666 / Köracur TH 650
- adhesive tape: Gerband 613

9. Approval

The use of under ballast mat **DAMTEC® SBM K 20V** for ballasted track was approved by DB Netz AG in an individual case-related technical note under the TM-titel 2011-1022 I.NVT 4 to Ril 82002010 and Ril 824.1510. The approval shall apply provisionally to operational testing. During testing, each application requires the consent of DB Netz, Zentrale, I.NVT 41.

DISCLAIMER:

This information is based on our tests and experiences and is provided to the best of our knowledge and beliefs. However, KRAIBURG RELASTEC does not guarantee in each individual case the use and processing results of its DAMTEC® products, due to the huge number of various fields of application as well as storage, processing or construction conditions which are beyond our control. Own tests are to be conducted. Please contact our technical customer service for any further advice.

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