



## The new wheelset for a low-noise freight wagon

# 75 dB(A) at 80 km/h

75 dB(A) is not really audible. Every passenger car is louder. And, compared to the familiar rattling of freight wagons, it sounds like hissing. This, certainly, does not solve all of the freight traffic problems at once, but it defuses the most important one for the residents.

BVV is a pioneer in the reduction of noise emissions. Now, we transfer the positive results from passenger transport to freight traffic, and the experience so far is good.

We achieve a reduction of noise emissions for wheelsets with axle brake discs by a package of measures, which did not exist so far:

- with noise absorbers on the inside of the wheels
- by coating axle and wheels with Relest® New Generation, specially developed by BASF
- with special, stress-balanced wheels.

Fire protection, corrosion protection and impact protection complete the service package, which also achieves a mileage well above average with wheels in Excellent® quality.

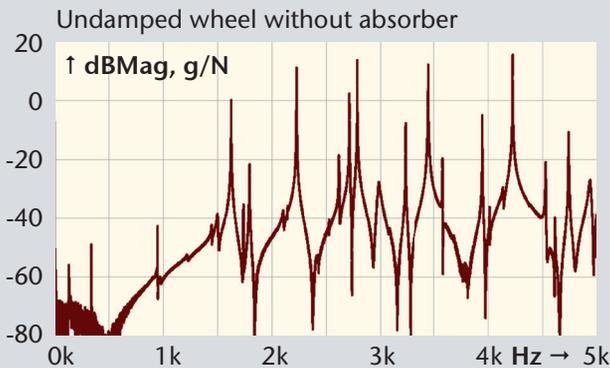
Therefore, profitable freight traffic and low noise emission are no longer a contradiction in terms - good news for the operator. And an even better one for people and the environment.

Noise emission	↘
Service life	↗
Corrosion protection	↗

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## Facts & Figures

### Clear advantages in the noise reduction with absorbers



Noise absorbers lead to a high internal damping of the wheel, thus reducing the natural oscillation of the wheel, the oscillation amplitudes of the wheel surfaces and thus the radiated sound power. The damping effect can be illustrated by means of the transfer function. Here, the logarithmic ratio of the



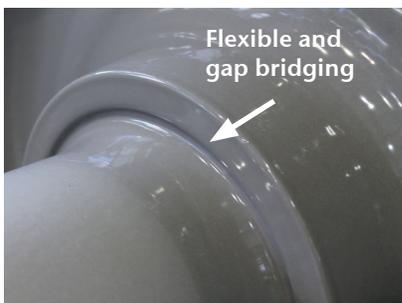
oscillation amplitude and the acting force are applied (always on the wheel tread) to the excitement frequency on a stress-balanced wheel without and with absorbers. Clearly visible is the significant level reduction, especially for the natural frequencies of the wheel.

### Excellent protection against mechanical and chemical attacks

Unlike conventional coatings, e.g. on epoxy resin basis, Relest, a PUR polyurea combination, reduces the risk of mechanical damage considerably. The tests\* also prove the excellent adhesive tension remaining even after corrosion tests and rotating bending test. The results of immersion tests barely survived by conventional coatings prove the specific suitability for extreme fields of application with chemical load. In addition, the fire protection certificate according to TSI 321 / 2013 has been furnished.

Property according to EN 13261	Performing the test according to standard	Result Relest NG (SK 2)	Remark regarding the test
Thickness of the protection coating	DIN EN ISO 2808	Layer thickness 1-3 mm	Test on the component and the samples
Adhesion of the protection coating	Adhesion test... ISO 4624:2003	Adhesive tension 7 ... 20 MPa	Adhesive tension before and after the corrosion test
Resistance against blasting abrasives (sand, grit)	DIN EN 13261, Item 3.9.1.5 and Appendix D	Verification furnished, no flaking	safely achievable
Behaviour towards salt spray DIN EN 13261, Item 3.9.1.6	Salt spray test according to DIN EN ISO 922710 - (NSS)	Resistance for 1000 hours	Protection against rust penetration
Resistance against specific corrosive media DIN EN 13261, Item 3.9.1.7 and Appendix E	Test medium 1 3% H <sub>2</sub> SO <sub>4</sub> Test medium 2 10% KCl Test medium 3 10% NaOH	32 test cycles per medium 4 h immersion time / 4 h surfacing time resistant	No embrittlement Constant adhesion
Resistance to cyclic mechanical loading	DIN EN 13261:2006, Item. 3.9.1.8 and Appendix F	10 load levels: Surviving 170 to 260 MPa with 13x10 <sup>6</sup> load cycles and trickling water	No disbondment or embrittlement

\* Tests mostly carried out by external institutes



### Complete coat from the axle to the inner clamping edge

The Relest coating is applied as a complete coat from the axle via the sensible area of the interference fit to the inner clamping rim within the wheel flange. The corrosion protection also secures the mechanically highly stressed area between interference fit and transition radius to the axle body - this shows the special suitability of the low-noise wheelset for use in vehicles transporting chemically aggressive substances such as fertilizers or salts.