



EN 45545 - Who cares?

BATEGU shows a significant history. Development of EN 45545-compliant rubber.

Unique worldwide.

For more than 70 years, leading international manufacturers in the rail vehicle industry as well as railway operators all around the world have been relying on the dependable premium quality of BATEGU. Today, as a manufacturer of sealing, anti-vibration and drive elements, BATEGU supplies numerous industries worldwide with innovative, specialised products made of rubber.

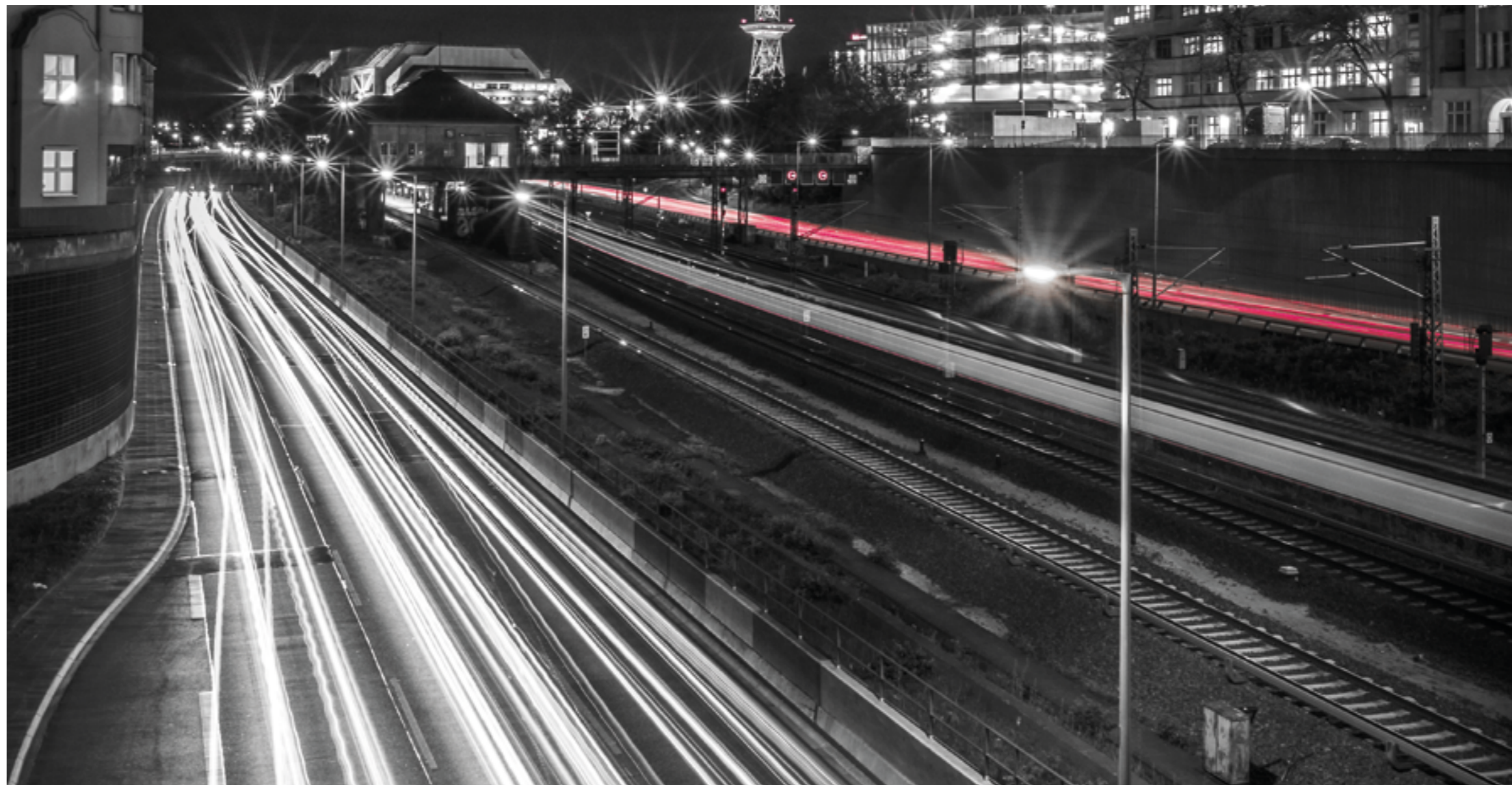
Rubber is the world of BATEGU – right from the beginning.

Even when the company was founded in Vienna in 1948, at BATEGU it was always just about one material:

rubber. After building and expanding the business, the first automated production started in 1975.

In 2011, BATEGU radically changed the rubber production.

BATEGU is the first and - as far as known - also the only who has succeeded in developing a flameretardant rubber that meets the requirements of EN 45545 R9 AND is suitable for use in a variety of M1 components in the bogie.



Rubber technology in the change of time.

The EN 45545 calls for fire protection in rail vehicles.

Again and again it comes to fire disasters in rail vehicles. People are dying from toxic fumes. Conventional rubber/metal components, especially made of natural rubber (NR), ignite in case of fire and burn under high heat and heavy smoke. Each train wagon consists of up to two hundred kilos of rubber, which can burn, causing fatal effects on passengers and staff. Therefore, fire protection is indispensable.

Publication of the CEN/TS 45545 as a harmonized railway fire safety standard. For the first time, fire protection in bogies is required throughout Europe.

2009

BATEGU is the world's first and only enterprise to develop a patented fire protection solution that meets both the CEN/TS 45545 fire safety requirements as well as the functional properties required for use in bogies.

2011

In August 2013, the standard EN 45545 „Railway applications - Fire protection on railway vehicles“ was published.

2013

BATEGU develops a flame retardant and a highly dynamically resistant EPDM rubber for the production of anti-vibration components (M1 components) in rail vehicles that meets the requirements of the EN 45545. Patent was granted.

2015





The journey into the future has already started. For BATEGU already more than 7 years ago.

Since 2011 BATEGU represents fire protection in rail vehicles.

The high demands for fire protection in railway applications were already published by the CEN in 2009. Since then, bogie components must be flame retardant. A challenge that confronted the rubber technologists worldwide with a seemingly unsolvable problem.

In 2011 BATEGU achieved the breakthrough. With a patented rubber compound BTG®9713 and a sophisticated manufacturing process, it was possible for the first time to combine both the new fire protection requirements of CEN/TS 45545 and the mechanical-dynamic properties required for use of M1 components in the bogie.

In 2015, another BATEGU development followed. The rubber compound BTG®9559 is also ideally suited for M1 components in the bogie. It is EN 45545-compliant, highly dynamically resistant and patented.

Environmentally friendly material

During the development of the materials, not only the technical but also the most up-to-date environmental requirements were considered. The new materials are halogen-free, free of nitrosamine-forming raw materials and comply with the strict RoHS directives, the REACH requirements, the UNIFE guidelines (Railway Industry Substance List) and the internal environmental guidelines of rail vehicle manufacturers.



Pull the emergency brake **BEFORE** it burns!

Fire endangers humans and the environment.

Numerous studies show that a fire is usually attributed to technical causes, such as brakes, cables, switchgear or engines.

The development and spread of fire in rail vehicles can lead to severe health effects and even death for passengers and train staff. In particular, the danger arising from toxic fumes is still underestimated. This is proven by disasters, such as in the year 2000 in Kaprun or 2002 in France where many people died.

In many fire accidents, it is pure coincidence that no people are harmed. For example, this was the case when the regional train was burning on an

open track in Biesdorf in Germany in 2016, during which around 180 passengers managed to escape from the fire into the open.

The use of flame retardant material can prevent such catastrophes.

The variety of BATEGU materials.

Fire protection according to EN 45545.

Today BATEGU has the largest range of elastomer materials (hardness 40 to 85 Shore A +/-5), compliant to EN 45545 R9, HL2 resp. 3 (hazard level).

This variety of materials enables BATEGU to produce just about any anti-vibration M1 component used in rail vehicles, both for Original Equipment Manufacturers as well as for spare parts.

BATEGU EN 45545-compliant elastomer materials according to shore hardness:					
Shore Hardness A	40*	45	50	55	60
Classification	HL 2	HL 2	HL 2	HL 2	HL 2
Shore Hardness A	65	70	75	80	85
Classification	HL 3	HL 3	HL 3	HL 3	HL 3

* in case of material combination with BTG®9713, 40 shore HL 3 can be achieved.

Depending on the requirements, one of the following rubber compounds is used:

Material/requirement	BTG®9713	BTG®9713	BTG®9559 A	BTG®9559 B-Z ²
Requirements for flexible rubber/metal components	R 8 ¹	R 9	R 9	R 9
Classification	HL 2	HL 3	HL 2	HL 2 / HL 3

¹ R9 corresponds to the current set of requirements of the EN 45545-2 (previously R8 according to prEN 45545-2 but with 50 kW/m2 and 20 minutes).

² The technical details of the individual materials BTG®9559 are available upon request.





Drive on the safe track.

Advantage. Benefit. Characteristics.

Numerous advantages of BATEGU materials:

- Excellent compression set
- Very low damping (hysteresis) and low self-heating
- High elasticity
- High resistance to the development and growth of cracks
- Excellent ozone, ageing and weather resistance and media resistance (e.g. detergents, salt)
- Heat resistant: -50°C to +120°C (continuous operation)
- Maintenance-free
- Compliant to EN 45545-2, R9, HL2 and HL3
- No corrosive combustion gases, no dripping
- RoHS Directive, REACH Regulation and Unife Railway Industry Substance List are fulfilled

For more safety on the train.

Smoke reduced to a minimum.

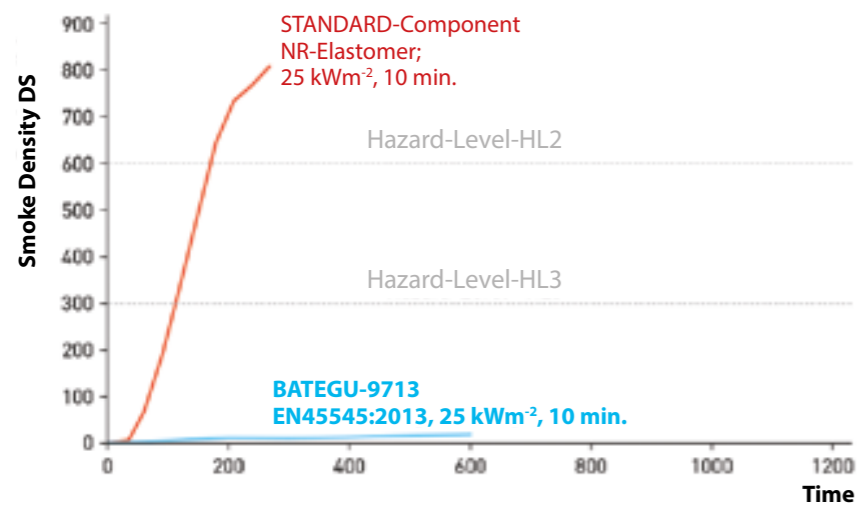
BATEGU rubber reduces toxicity and heat generation to a minimum. The graph shows the significant improvement between a conventionally used and an EN-compliant material developed by BATEGU.

Test method/ Test result	BATEGU 9713	BATEGU 9559
ISO 5660-1: Rate of heat release	HL 2/3	HL 2/3
ISO 5659-2: Optical smoke density	HL 2/3	HL 2/3
ISO 5659-2: Toxicity	HL 2/3	HL 2/3

HL 2/3: depending on the shore hardness
Testing institute: OFI Technologie & Innovation GmbH, Versuchsanstalt TGM Kunststofftechnik

Tests show the excellent results of the BATEGU products:

EN ISO 5659-2, SMOKE DENSITY



Proven Quality.

Thousandfold field-tested.

Passenger safety and error-free service life throughout the component's lifetime are the focus of products developed and manufactured by BATEGU for the rail industry. Anti-vibration elements made by BATEGU protect against shock, dampen vibrations and noise, therefore improving the smooth running and safety. They reduce wear, are reliable and comply with the EN 45545.

This is impressively confirmed by the lifetime-tests, by the fire protection certificates from accredited testing institutes and by thousands of components in practical use.



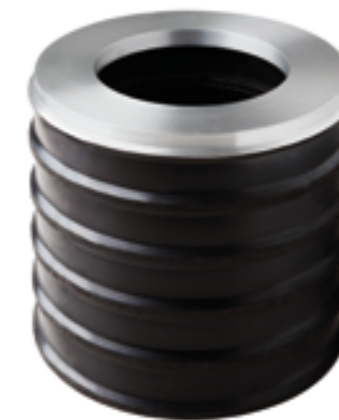
THREE EXAMPLES OF THE EXTENSIVE PROGRAM OF BATEGU RUBBER/METAL COMPONENTS:



LAYER SPRING



CONICAL SPRING



PRIMARY SPRING

Fire protection without ifs and buts.

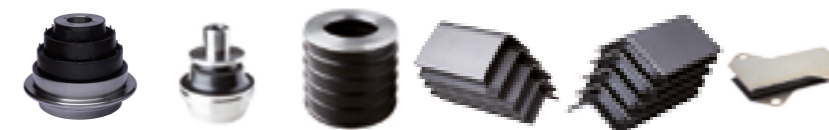
Examples of the BATEGU product range.

BATEGU delivers compliant with the EN.

BATEGU rail vehicle components are used in both interior and exterior applications within a wide range of vehicles and bogies, such as subways, trams, railcars and locomotives.

The high quality of BATEGU is confirmed by single and multi-axial lifetime-tests as well as thousands of EN 45545-compliant components in operation.

PRIMARY SPRINGS



SECONDARY SPRINGS

spring pad



BUSHINGS

assembled / bonded



SPHERICAL BEARINGS/ DOG-BONE BUSHINGS



WHEELSET SPRINGS

rubber element with/without power bridge and rubber ring in V-form for wheels in bogies



LATERAL BUMPERS/ SHOCK MOUNTS



HOLLOW SPRINGS



ENGINE MOUNTS

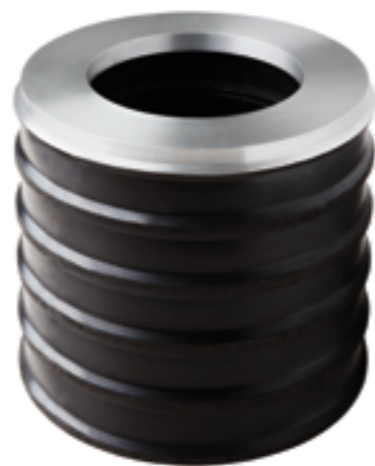


Highly dangerous before – safe afterwards.

Retrofitting is possible at any time.

Existing components can be produced 1:1 compliant to EN 45545, maintaining or improving properties and not altering the installation space required.

This means for OEM's that expensive changes of proven technical solutions are not necessary. And vehicle operators can easily retrofit their existing vehicles compliant to the EN 45545, this way they meet the legal requirements.



Primary spring in vehicle type "ULF" with a rubber weight of about 5000 g
EN 45545-compliant HL2





Typical applications.

Almost every rail vehicle can be retrofitted with EN 45545-compliant components.

- Primary springs
- Layer springs
- Conical springs
- Bushings
- Dog-bone bushings
- Seals
- Wheelset springs
- Lateral bumpers
- Spherical bearings



**We are ready for the future.
Are you ready for the EN 45545?**

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