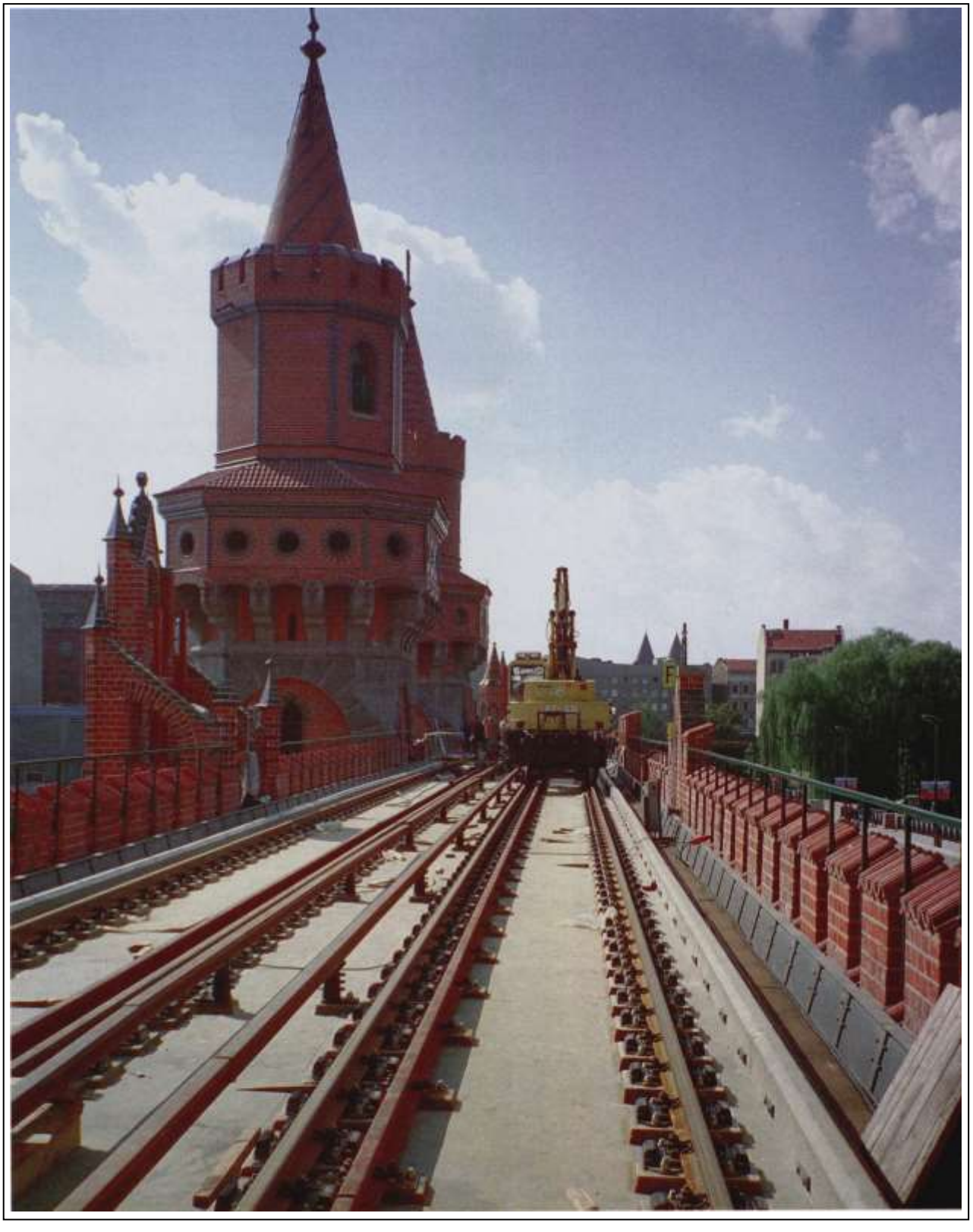
NORBERT ACKMANN · GMBH

Fabrikation technischer Gummi-Formartikel

Clouth Rail Fasteners

Product Line



General

Clouth Rail Fasteners are reliable and proven elastomer products for reducing structure-borne noise and secondary airborne noise or for providing the necessary elasticity of railway superstructures.

Our fasteners are manufactured from high quality cast iron components either bonded together by natural rubber (NR) or assembled with synthetic rubber (SBR, CR or EPDM).

Clouth Rail Fasteners can be used with different rail fastening systems according to various national standards.

The Clouth Rail Fastener types Cologne Egg®, Alternative I® and CRP® are available in diverse designs with different top plates with or without cant and, on request, lateral adjustment.

Clouth Fail fasteners have been tested according to the technical specifications of the DB AG as well as e.g. by the following testing institutes: Technical University Berlin, Technical University Munich, TÜV Rheinland, Polytechnic Institute Aachen, Bundeswehr Academy Hamburg, Unisearch Ltd. Sydney, STUVA Cologne.

The operative effectiveness of the installed rail fasteners has been confirmed through acoustic measurements by many experts and engineering offices, such as Engineering Office Uderstädt, R. Heggie Assoc., Wilson, Ihrig & Assoc., TÜV Rheinland e.V. and many others.

Areas of installation:

Resilient rail fasteners can be installed on bridges and viaducts, in tunnels and in the vicinity of vibration-sensitive buildings (in paved-in tracks, in green tracks and on concrete track slabs).

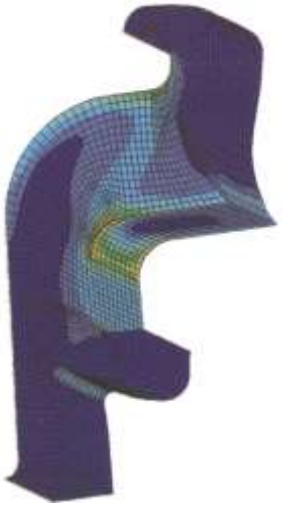
Features of the rail fasteners:

- Minimization of the superstructure height
- Reduction of the tunnel excavation costs
- Reduction of the bridge weight
- Reduction of rail wear
- Minimization of track maintenance
- Adaptable elasticity (by using different rubber compounds)
- Reduction of the dynamic stressing on the superstructure
- Saving of costly track regulation
- Maintenance-free
- Very high electrical insulation
- Long service life

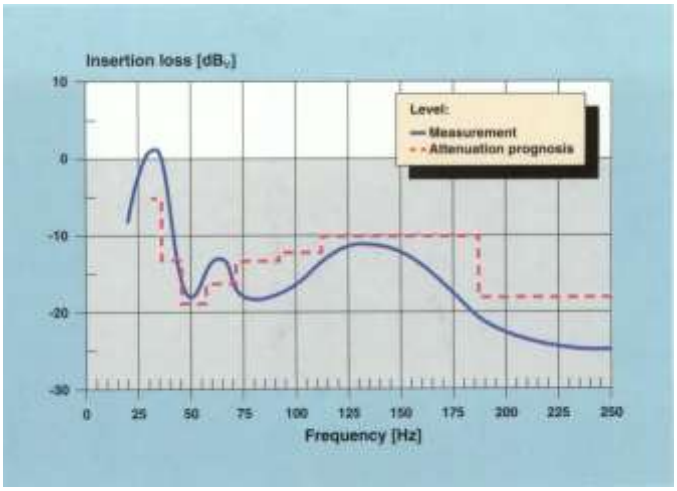
Easy installation on:

- Concrete track slabs
- Concrete longitudinal plinths
- Underpoured socles
- Steel structures
- Timber sleepers

With Clouth rail fasteners there is no through-going metallic connection between rail and foundation, thus they have a high electrical insulating resistance. By using different rubber compounds, the fastener stiffness can be adapted to the individual demand. The elastomers used are highly resistant to abrasion, ageing and weathering.

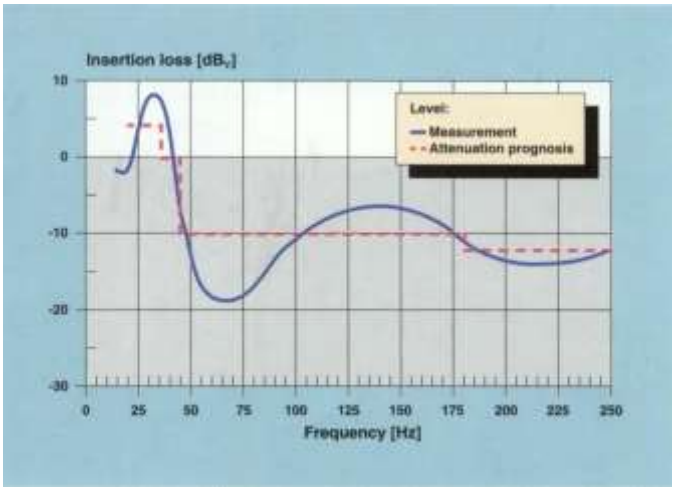


Optimization of rubber part profiles by FEM structure analysis



Isolating effect of Cologne Egg, type CF 1572 (Subway tunnel KVB/Cologne)

Reaction forces in the uplift restraint of Alternativ I



Isolating effect of Cologne Egg, type SL '052 (Subway tunnel, ANA Hotel/Sydney)

More than 300,000 Clouth rail fasteners have been installed worldwide since 1980. 200,000 Alternative I® fasteners and over 100,000 Cologne Egg® fasteners (5,000 of them for switches) have proved their long-time performance, even under severe operating conditions. In many places these rail fasteners are now considered an indispensable part of the superstructure.

Clouth, of course, is continuously developing and optimizing its products by means of advanced calculation methods and structure analyses, such as finite element structure analysis (FEM). The knowledge so gained on theoretical models of the rubber part profiles of rail fasteners is then tested on prototypes – a prerequisite of the high quality of our products. This procedure ensures that our rail fasteners can be adapted to market requirements and are always at the forefront of today's technology.

Rail fastener type 1403/c Cologne Egg

Cologne Egg, type '052 on timber sleepers

Cologne Egg on the Sydney Harbour Bridge

Cologne Egg®

The rail fastener type 1403/c Cologne Egg® is a one-piece, highly resilient rail support consisting of a top plate and a frame. These two components are durably vulcanized together by means of a rubber collar. This ensures a high resistance to slipping and lateral displacement of the rails and thus a most accurate position of the track. Cologne Egg® rail fasteners are distinguished from other systems by a structure-borne noise isolation in all six degrees of freedom. Due to the low dynamic stiffening of natural rubber (NR), the Cologne Egg® fastener achieves high insertion loss values. These properties will not be affected by low temperatures.

Cologne Egg on a concrete base

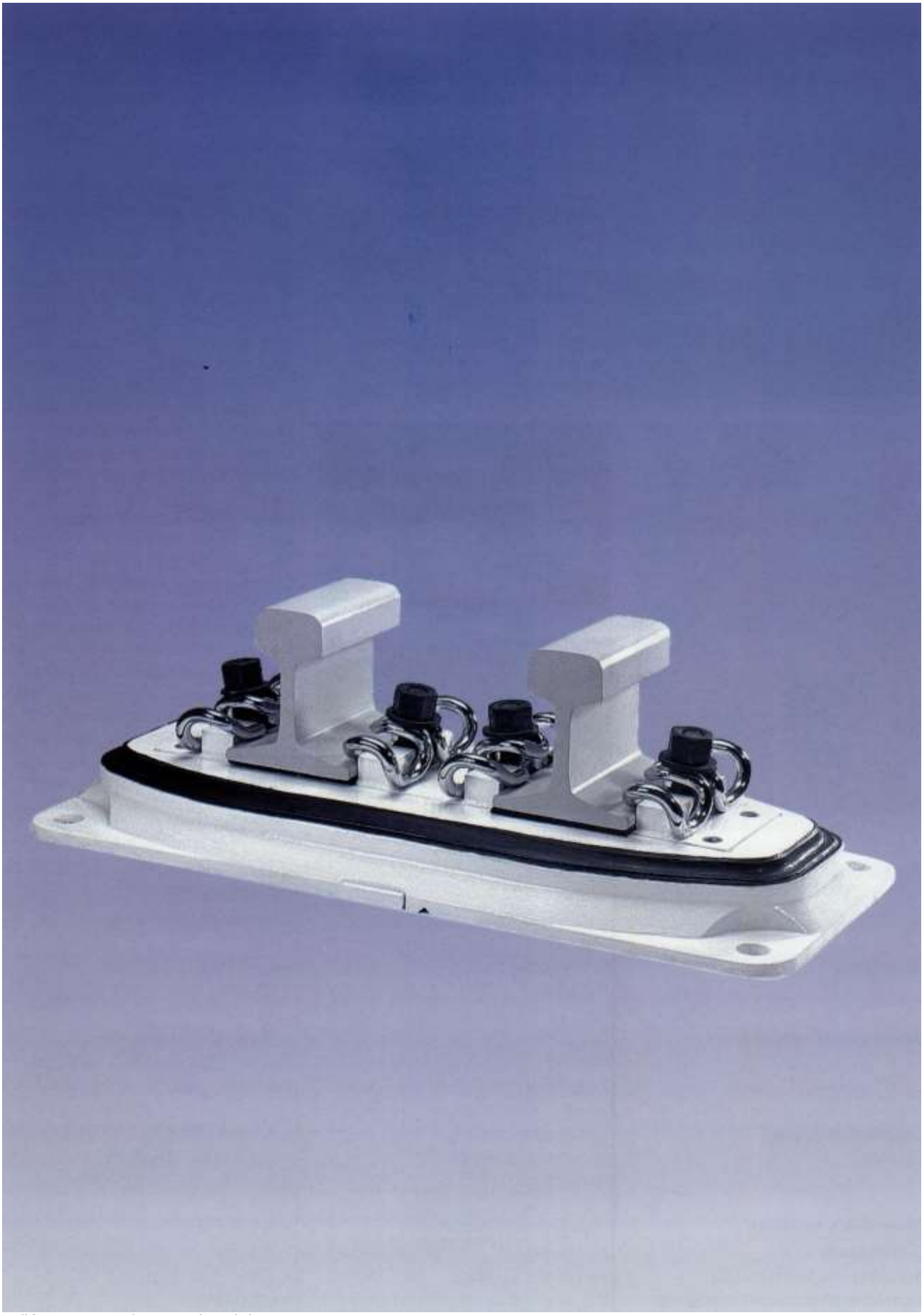
Cologne Egg, type CF1572 on concrete longitudinal plinths

As the main load direction is vertical, the rubber collar of the Cologne Egg® fastener is exposed to compression shear stress. This leads to a linear spring characteristic, i.e. a constant stiffness of the fastener over a wide load range. Some fastener variants are available with a two-stage spring characteristic. Compression shear stressing is appropriate for the material involved and will guarantee best mechanical properties of the elastomers and a long life of the rubber-to-metal bonding. The elastomers used are highly resistant to ageing and weathering. On request or for an installation in open tracks the rail fasteners will be provided with a high-quality anticorrosive paint. Should the stiffness requirements of the Cologne Egg® be changed due to changes in axle loads or speeds, the rubber collar can be renewed.

Materials	Elastomer	manly NR
	Metal	GGG 40/40.3/50 **(nodular graphite cast iron)**
	Surface finish	Zinc primer and top coat
Geometry (1)	Lateral adjustability	up to +/- 15 mm
	Cant	1:20, 1/40, 0
Rail fastenings	Vossloh	e. g. Skl 12, Skl 3
	Pandrol	e. g. 'e' 1809, 'e' 18xx, 'e' 20xx
	Thyssen Krupp Hoesch	e. g. Kpo 3, Kpo 6
Anchoring of fasteners	Threaded bolts	e. g. to DIN 976-B M 22/24 – 8.8
alternatively	Screw spikes (2)	e. g. 8/135, SS 8/150
	Rail anchor	e. g. HRT, HRA, HRC (Hilti)
Electrical insulation	Insulating resistance	> 9 x 10^9 Ω
Deflection	Spring excursion	< 4.5 mm
Dynamic stiffening	Ratio C_{dyn}/C_{stat}	< 1.5
Static stiffness of fasteners	C_{stat}	5 – 20 kN/mm

(1) not available with all fastener variants

(2) e. g. together with Sdü 9/135 or 9/150 or equivalent



Rail fastener type Cologne Egg for switches

Rail expansion joint with Cologne Egg

Cologne Egg for switches
In addition to the conventional Cologne Egg type, several special types are available for different applications. Their structure and function correspond to those of the conventional Cologne Egg. These rail fastener are called Cologne Egg for switches and come in three fixed sizes. Their top plates are with zero cant and a cast in recess with three fixed lengths. The track components of the switches or crossing are attached by conventional means to rip plates (base plates). These are then bolted into the recess of the plate. This allows for easy and simple interfacing of the switch or crossing to the Cologne Egg elastic fastener during track design and construction.

Possible applications:

- Frogs
- Base plates with guard rail fixing
- Switch blades/slide plates
- Stock rail supports
- Safety rails

Others applications:

- Crossings
- Rail expansion joints

Derailment guard with Cologne Egg

Cologne Egg under switches

Switch blade with Cologne Egg

The Cologne Egg fastener for switches ensures an effective, continuous vibration isolation, also in tracks with irregularities due to discontinuous running edges. These rail fasteners are easy to install. The elastomers employed are highly resistant to ageing, weathering and ozone.

Materials	Elastomer	mainly NR
	Metal	GGG 40/40.3/50
	Surface finish	Zinc primer and top coat
Geometry	Top plate recess	126 mm x 561/731/871 mm
	Cant	0
Rail fastenings	Free choice	
Anchoring of fasteners	Threaded bolts	e. g. to DIN 976-B M 22/24 – 8.8
alternatively	Screw spikes (3)	e. g. 8/135, SS 8/150
	Rail anchor	e. g. HRT, HRA, HRC (Hilti)
Electrical insulation	Insulating resistance	> 9 x 10^9 Ω
Deflection	Spring excursion	< 3.5 mm
Dynamic stiffening	Ratio C_{dyn}/C_{stat}	< 1.5
Static stiffness of fasteners	C_{stat}	8 – 15 kN/mm

(3) e. g. together with Sdü 9/135 or Sdü 9/150 or equivalent for installation on a concrete base

Rail fastener type 1403/d Alternative I

Alternative I, type SL ’092 on timber sleepers

Alternative I on underpured socles

Alternative I
The rail fastener type 1403/d, Alternative I, is a one-piece rail support of low height and solidly vulcanized together by means of a rubber “boot”. The bottom side of this rubber components of the fastener design and application. A laterally integrated uplift restraint stabilizes the top plate.

The design of the Alternative I, with the outer frame encompassing the top plate on both ends, makes the unit fail-safe.

Alternative I rail fasteners ensure the necessary resilience in all six degrees of freedom required in the reduces the dynamic stress

Alternative I, type SL ’025 on a concrete base

Ballastless track with Alternative I

on the anchoring elements and the base. As the profiled rubber on the bottom side of the Alternative I fastener is only exposed to compression load, the spring characteristic will become more progressive in higher load ranges. This will also avoid excessive deflections in the event of a short-time overloading of the rail fastener.

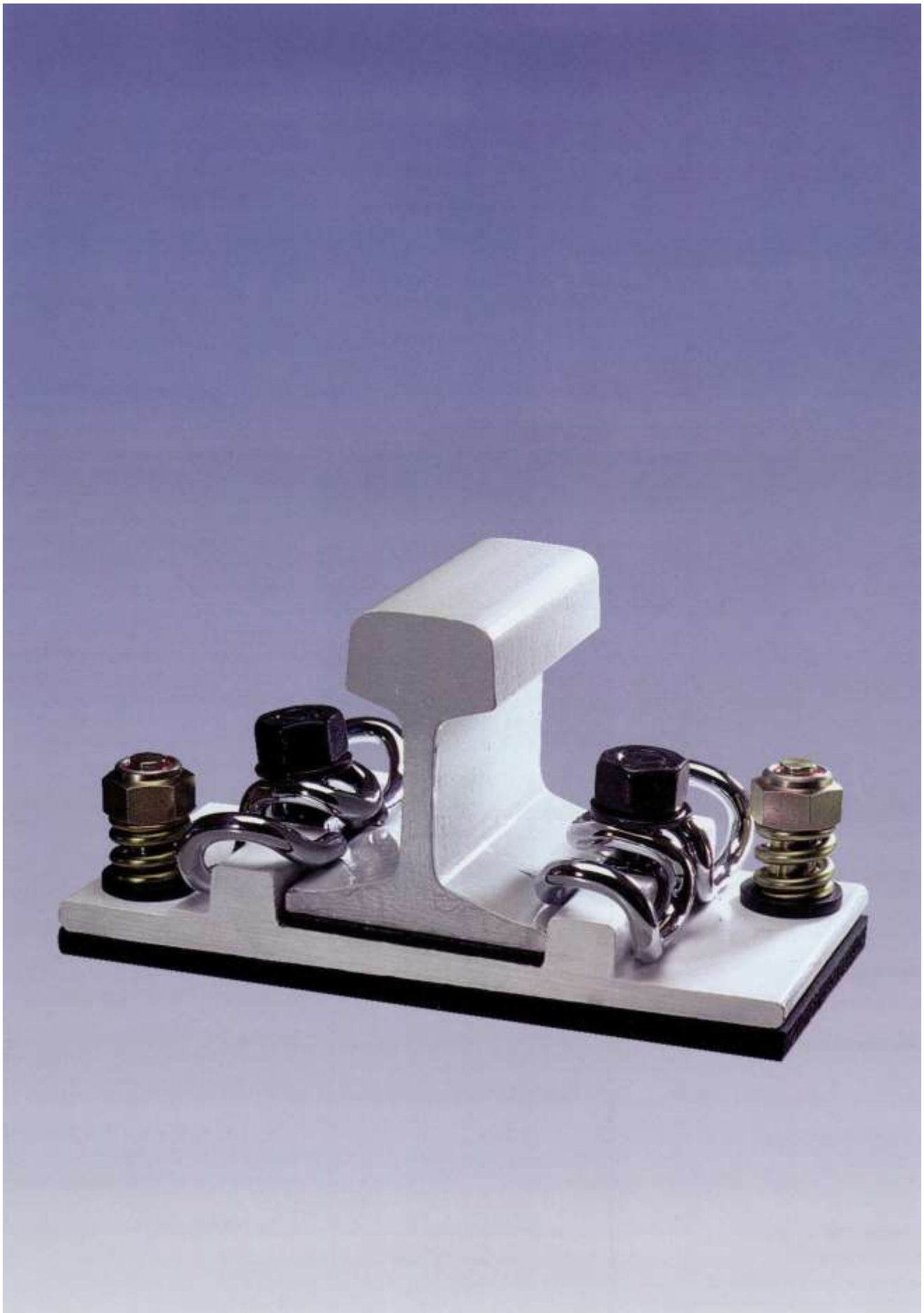
The material used for the metal components (spheroidal or nodular graphite cast iron) and a protective paint constitute an excellent protection against corrosion. In addition to this, a long-time condition of the elastomer in the installed rail fastener.

The rubber component of Alternative I rail fasteners can be renewed or exchanged in order to modify the stiffness of the fastener. In both cases, the metal parts can be reused.

Materials	Elastomer	mainly NR
	Metal	GGG 40/40.3/50
	Surface finish	Zinc primer and top coat
Geometry (4)	Lateral adjustability	up to +/- 15 mm
	Cant	1:20, 1:40, 0
Rail fastenings	Vossloh	z. B. Skl 12, Skl 3
	Pandrol	z. B. ’e’ 1809, ’e’ 18xx, ‘e’ 20xx
	Thyssen Krupp Hoesch	z. B. Kpo 3, Kpo 6
Anchoring of fasteners	Threaded bolts	e. g. to DIN 976-B M 22/24 – 8.8
alternatively	Screw spikes (5)	e. g. SS 8/135, SS 8/150
	Rail anchor	e. g. HRT, HRA, HRC (Hilti)
Electrical insulation	Insulating resistance	> 9 x 10^9 Ω
Deflection	Spring excursion	< 3 mm
Dynamic stiffening	Ration C_{dyn}/C_{stat}	< 1.5
Static stiffness of fasteners	C_{stat}	8 – 30 kN/mm

(4) not available with all fastener variants

(5) e. g. together with Sdü 9/135 or Sdü 9/150 or equivalent for installation on a concretion base



Rail fastener type Clouth-CRP

CRP on an underpoured socle

CRP

The rail fastener type CRP (Clouth-Rail-Pad) differs, as to structure and function, basically from the Cologne Egg and the Alternative I fastener types. CRP is a multipart rail support, consisting of a ribplate and a resilient rubber pad. This floating support is anchored to the base by means of heat-treated, threaded bolts or rail anchors and special torsion/compression spring.

Plastic collar-bushes insulate the ribplate from the anchoring elements and prevent stray or creep current flow.

The rubber pad is a composite of different elastomers. To enhance its wear resistance, the pad is provided with two wear resisting covers.

The rubber pads are damping-optimized, thus ensuring a high acoustic efficiency of these rail fasteners, even at critical excitation frequencies. In order to cover different requirements as to axle loads and stiffnesses, these rail fasteners are available with resilient pads in various heights and stiffnesses.

The Clouth-CRP is a low-cost rail fastener of simple design, based on standard components. As the size and the properties of the rubber pad (e.g. bearing surface, form, thickness and elasticity) can be freely chosen in accordance with a ribplate, this rail fastener type offers solutions to a wide field of trackwork problems.

Materials	Elastomer	EPDM, SBR/CR
	Metal (6)	z. B. rolled steel
	Surface finish	-
Geometry	Lateral adjustability	-
	Cant	1:20, 1:40, 0
Rail fastenings	Vossloh	e. g. Skl 12, Skl 3
alternatively	Pandrol	e. g. ’e’ 1809, ’e’ 18xx, ‘e’ 20xx
	Thyssen Krupp Hoesch	e. g. Kpo 3, Kpo 6
Anchoring of fasteners	Threaded bolts	e. g. to DIN 976-B M 22/24 x 220/240 – 8.8
alternatively	Rail anchor	e. g. HRT, HRA, HRC (Hilti)
Electrical insulation	Insulating resistance	> 9 x 10^9 Ω
Deflection	Spring excursion	< 3,5 mm
Dynamic stiffening	Ratio C_{dyn}/C_{stat}	< 2
Static stiffness of fasteners	C_{stat}	6 – 25 kN/mm

(6) Standard ribplates can be used

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