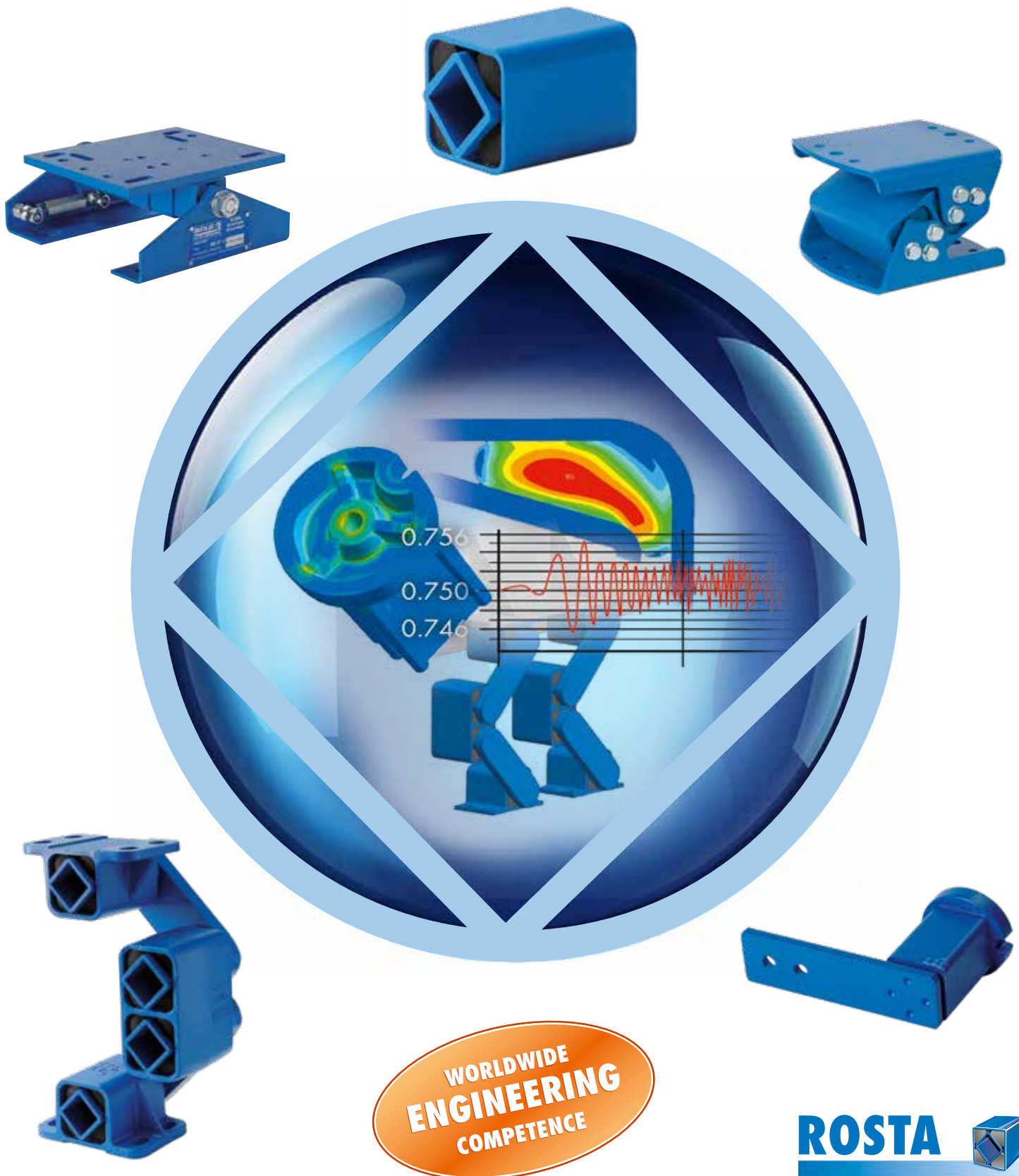


The Blue Ones from ROSTA



Components for machine construction



ROSTA – We are in our element

We are in our element, whenever there is a need for **resilient suspensions, elastic supports, cushioning mounts** or **smooth guidance** in the machine industry – there is always a cost-efficient solution with our ROSTA rubber suspension elements!

We are in our element, when long service life, resistance to wear, durability and less maintenance are demanded – our jointed, rubber-metal torsion bearings can withstand everything and achieve long service lifes!

We are in our element, when we have to develop customised machine designs for our customers using ROSTA rubber suspension units – anything is feasible; our wide range of ideas, our laboratory equipment and our individual manufacturing processes are the guarantee for unlimited solutions!

We are in our element, when oscillations, vibrations and agitating movements in the processing industry have to select, separate and convey bulky materials – our rubber mounts offer the ideal solution for the suspension of every type of screen, conveyor or sifting machine!

We are in our element, when our customers need direct support and help in order to find a solution – the Blue Ones from ROSTA are available from stock, and we also offer on-site customer service worldwide!

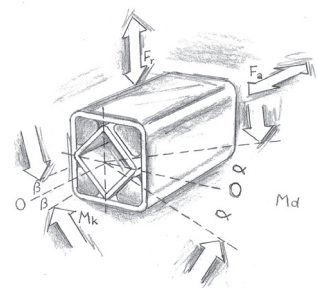


Your next project will be our new challenge!



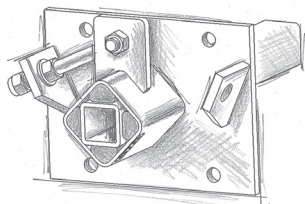
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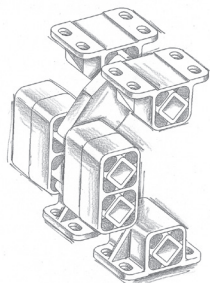
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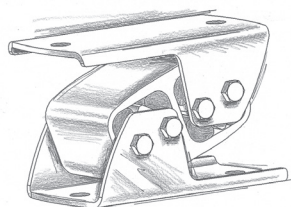
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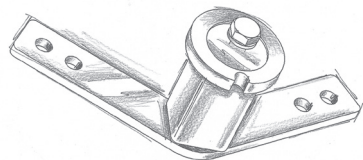
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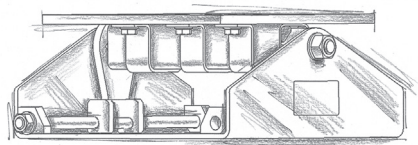
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Tensioner Devices

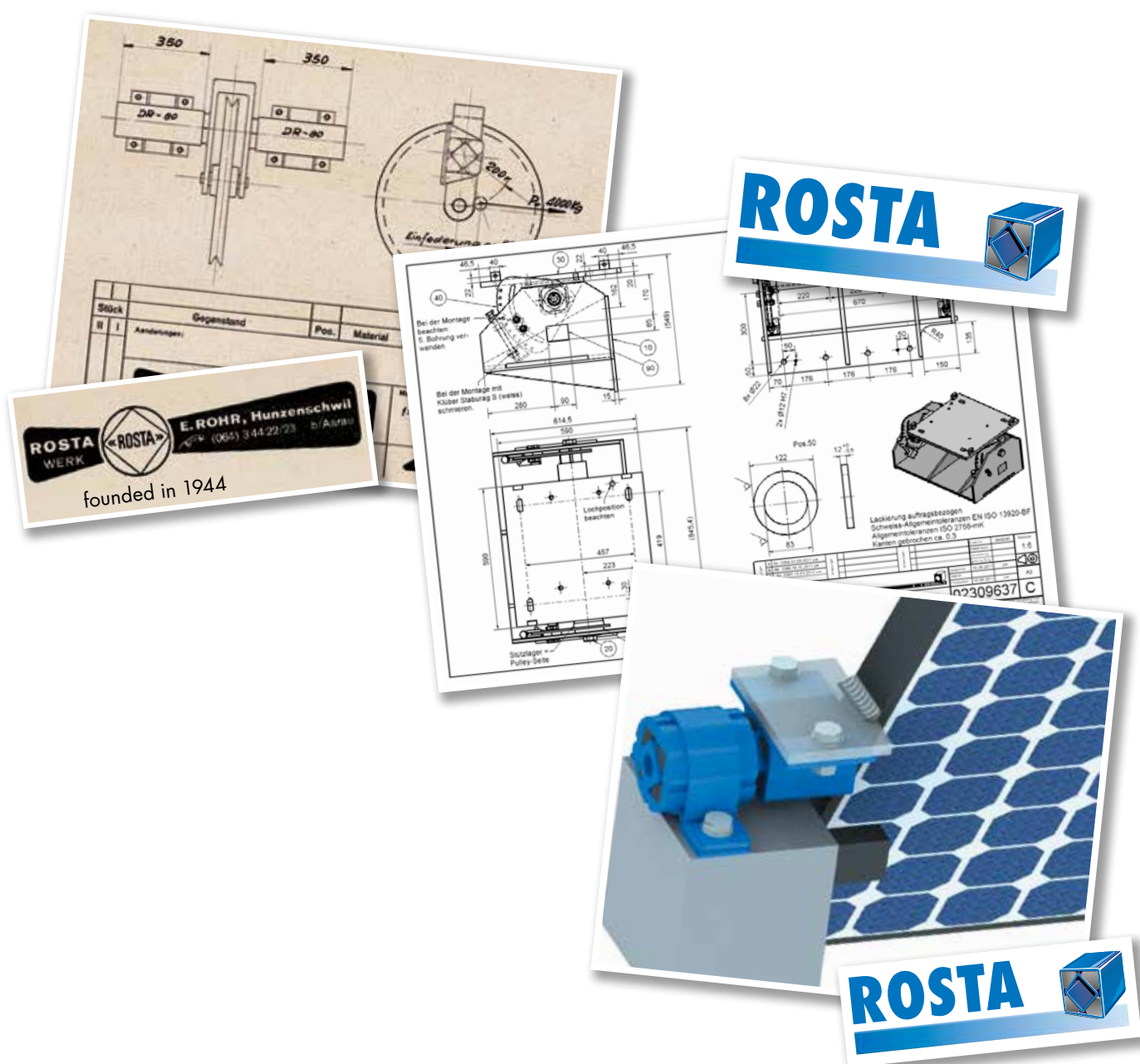
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Motorbases

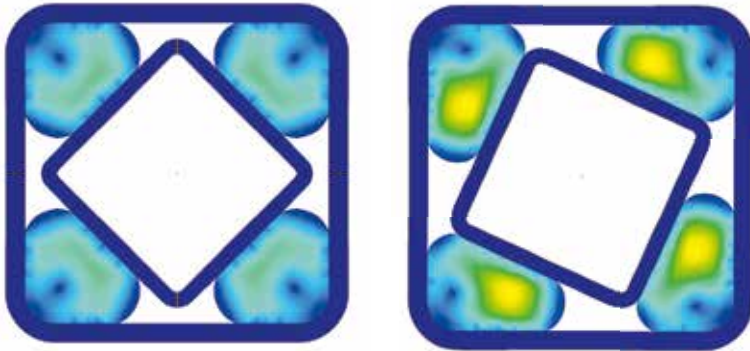
ROSTA – yesterday, today, tomorrow

It started in the mid forties with the production of a few elastic wheel suspensions and, over the years, developed into a company that manufactured standardised rubber suspension axes for trailers. But it was the design and marketing of machine components such as the unique **chain and belt tension elements** that opened up the world market for the ingenious ROSTA rubber suspension system. Best-selling machine components such as the vibratory suspensions **for screening technology** helped ROSTA rubber suspensions to achieve their international breakthrough. This was followed by **motorbases and anti-vibration mounts**, which have now become indispensable in general machine construction. ROSTA rubber suspension units will also make their mark in the future in machine construction technology – whether in the recycling industry or in the production of renewable energy – the **blue** spring-loaded assemblies from Hunzenschwil in Switzerland are already fully involved in these forward-looking technologies!



ROSTA – a unique spring system from experienced specialists

Quality validation obtains highest importance at ROSTA. The well-equipped Research and Development department leaves nothing to chance; the material tests that take place before and periodically during the series production are the guarantee for a **comprehensive quality standard** – a spare part element produced in ten years time will still have the same characteristics as the series product supplied today!



Today the industrialized world standards in many way become more and more important. For our customers ISO standards are a warrant for a constant quality and performance. Since 1992 ROSTA has been a ISO 9001 certified company. In 2015, we achieved the ISO 14001 (environmental management) certification.

Production machines, handling equipments, tooling machines and processing systems equipped with state-of-the-art technology can only function perfectly if reliable and motivated employees of the manu-

facturer stand fully behind even the smallest structural components. It is their competence, their quality considerations and their great willingness to work that lay the foundations for the production of high quality goods. At ROSTA AG, we enjoy a very low staff fluctuation and make every effort to treat our employees with great respect and ensure that they feel that they are part of a large family – **the Blue Ones from ROSTA**.

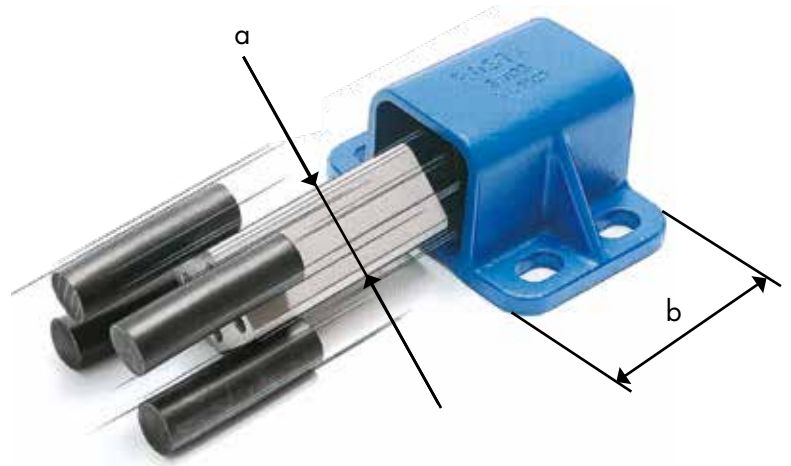


ROSTA Element Determination

The adjacent exploded view shows a rubber suspension **type DW-A 45 x 100**.

Wherefrom comes this (relatively old) designation **based on the German language?**

- "D"** stays for **D**rehelement (e: torsion-element)
- "W"** stays for **W**inkelsupport am Aussengehäuse (e: included fastening bracket)
- "A"** stays for **A**luminiuminnenvierkantprofil (e: core-profile made of aluminium)
- "45"** stays for the core dimension **45/45** mm (dimension a)
- "100"** stays for the effective element-length **100** mm (dimension b)



An **AB 50** is an **Ab**stützung = support element for oscillating screens with inner core dimensions 50/50 mm, etc., etc.

The following product catalogues are indicating the standardized element dimensions with numbers like **18** or **45** or **50** etc., always related to the dimension in mm of the inner element-core (dimension a). E.g. a type **AU 38** is a suspension for oscillating shaker troughs (g: **A**ufhängung = suspension) with inner core dimensions 38/38 mm.

Throughout the full product variety of ROSTA there are Rubber Suspension Units, Oscillating Mountings, Anti-vibration Mounts, Tensioner Devices and Motorbases in the following sizes (inner core dimension in mm): **DR 11, 15, 18, 27, 38, 45, 50, 60, 70, 80** and **100** (not all final products are available in all afore mentioned DR-sizes).

Supplier of rubber inserts and subsidiary company of ROSTA AG: *Compounds* rubber solutions

In the end, the ROSTA rubber suspension element is only as good, as the rubber inserts mounted in it. Or in other words: If the rubber quality is not very good, the ROSTA element will not be able to deliver the required performance and characteristics.

For many years, ROSTA AG has been supplied with high-quality rubber inserts for its component production by two leading Swiss manufacturers of rubber profiles. The cooperation with these two suppliers was always excellent and very tight. There has, however, always been one downside to this good cooperation: **the very high supplier dependency!**

In the spring of 2007, the unique opportunity arose for ROSTA AG to purchase both the rubber mixing plant of the one long-term supplier and the extrusion



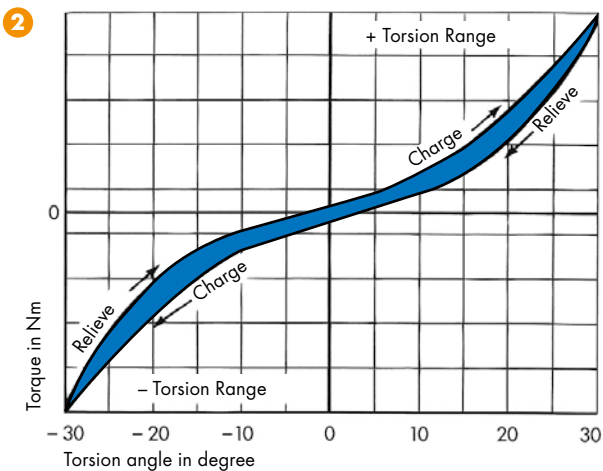
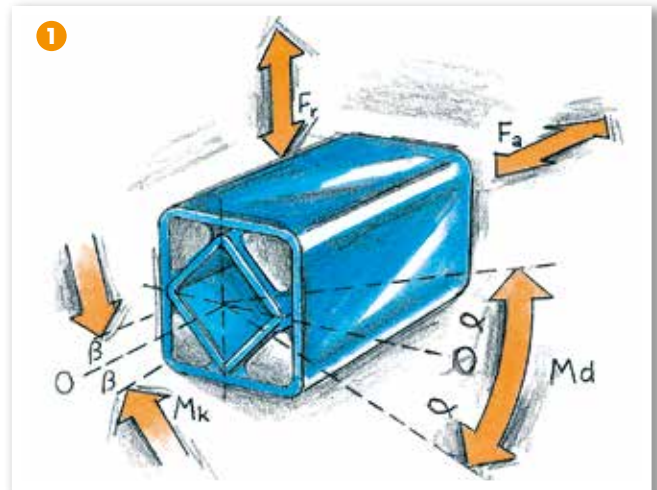
and vulcanisation operation of the other. The two production branches were then merged together, creating the COMPOUNDS AG. In the year 2010, the company moved into its new, spacious production and administration building in CH-8330 Pfäffikon. Besides the covering of the supply-continuity, many new possibilities for the improvement of the quality and of developing rubber inserts for specific and/or customized applications will arise from the close collaboration with the "own" rubber supplier.



www.rosta.com

1 Function

The ROSTA rubber suspension elements are mainly designed for applications as torsional spring devices offering operation angles of $\pm 30^\circ$. Depending on the particular function, not only torsional moments are generated by pivoting the spring device. According to the specific application additional radial F_r , axial F_a and/or cardanic M_k forces have usually to be taken in consideration. The occurring torques of the different element sizes and the additional load characteristics are indicated in the table on page 1.5.



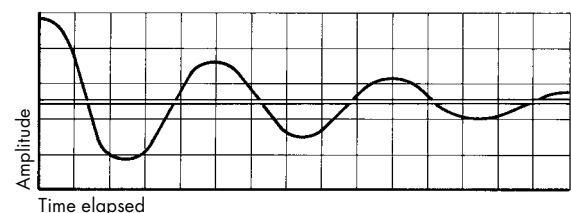
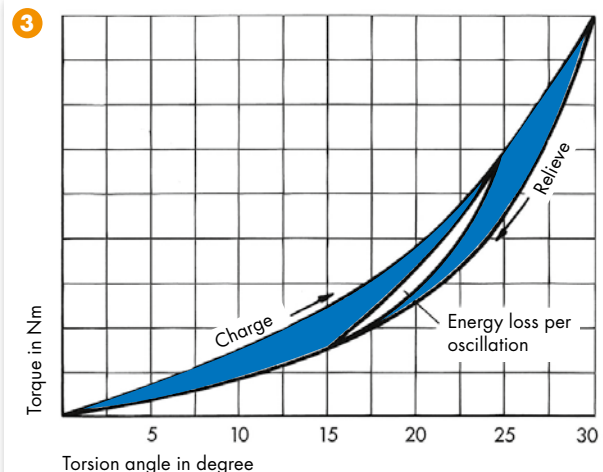
2 Spring Characteristic

By pivoting the unique ROSTA torsional spring device a virtually linear spring characteristic occurs with a slightly progressive upper end, when load is applied in the high pivoting range, close at 30° element rotation. If purely linear or even degressive spring characteristics are required, the design of the leverage has to be altered and/or a cam-disc has to be used as arm guidance in order to obtain a function adapted spring characteristic. Furthermore, please note that elastomeric bonds are incompressible, i.e. of constant volume.

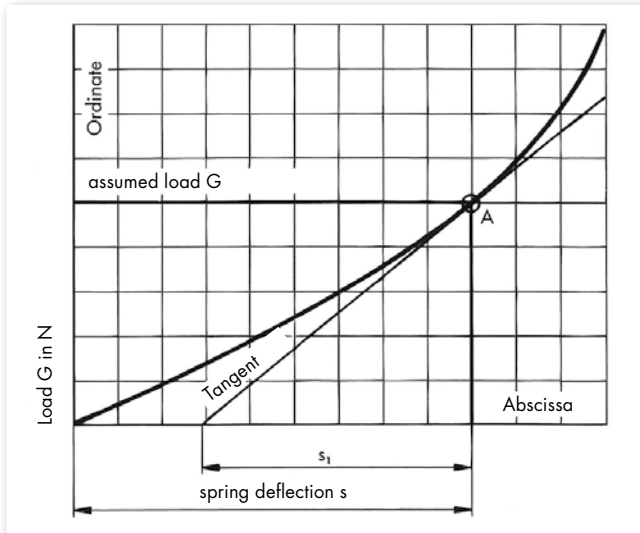
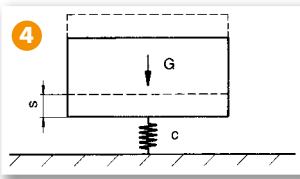
3 Internal element damping

The occurring energy damping in the ROSTA element is addicted to the resulting energy loss work in the rubber inserts during the pivoting activity of the spring device. In the process of the element actuation a part of the resulting energy is transformed into frictional work generating heat. The shaded surface between load and relieve headline indicates the effective energy loss. At element actuation out of the zero position up to 30° , the resulting average energy loss is at 15 to 20%. At the actuation of a **pre-tensioned** element, the resulting \pm working angle is usually only a few degrees, therefore the energy loss reduces within a limit (see graph: "Energy loss per oscillation").

Uniquely animated element oscillations fade within short term, due to the occurring energy loss at each following post-pulse oscillation. (Very important at the use of ROSTA screen mountings – during the operation procedure of the screen the resulting power loss in the ROSTA mountings is **negligible**; during the running down phase, close to the resonance frequency of the suspensions, an important amplitude exaggeration occurs. The high energy loss in the ROSTA screen mountings dampens and absorbs these exaggerations within only a few post-pulse oscillations.)



ROSTA Technology



4 Natural Frequency of a ROSTA suspension

The determination of the natural frequency of a ROSTA suspension has to be carried out by spreading the tangent at the loading point "A" on the **parabolic arc** of the load deflection curve. The resulting distance s_1 on the axis of abscissa comes up to the arithmetical spring deflection in mm, required for the determination of the natural frequency.

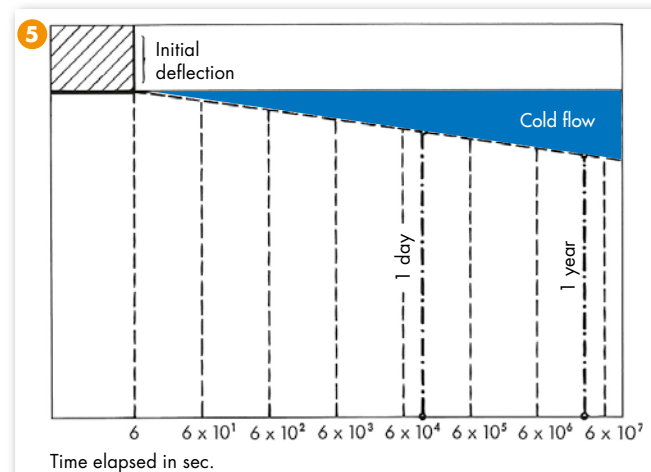
$$\text{Natural frequency } n_e = \frac{300}{\sqrt{s_1 \text{ (in cm)}}} = \text{min}^{-1}$$

$$\text{or } f_e = \frac{5}{\sqrt{s_1 \text{ (in cm)}}} = \text{Hz}$$

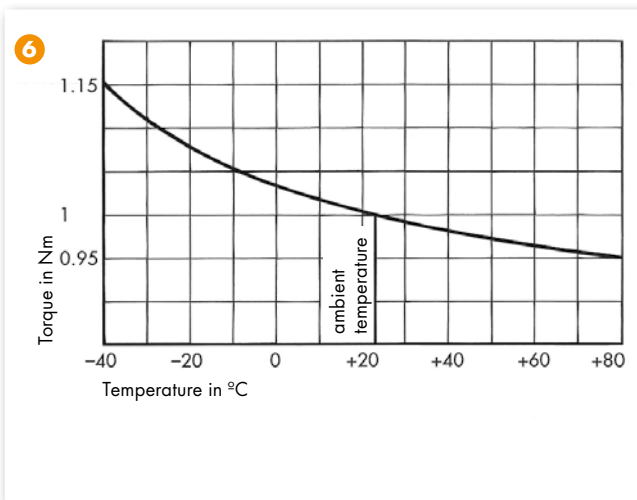
$$\text{Example } s_1 = 5 \text{ cm: } n_e = \frac{300}{\sqrt{5.0}} \approx 134 \text{ min}^{-1} \text{ or } 2.2 \text{ Hz}$$

5 Cold flow and settling of the rubber suspensions

If, over a certain period of time, load is permanently applied on an elastic component (e.g. rubber suspension) consistent deformation occurs (cold flow). Cold flow or settling appears during a linear logarithmic sequence. According to the respective diagram more than 50% of this overall settling or cold flow of a ROSTA element under load occurs after only one day of service. After approx. one year of operation the total cold flow deformation will be compensated (depending on environmental temperatures and applied frequencies). The empirical settling factor of a ROSTA rubber suspension lies within 3° to 5° , i.e. the inner core does not totally move back to the neutral 0° position of the element. In applications with series or parallel configurations of several elements (e.g. AB screen mountings) the effective cold flow factor lies at approx. +10% of the nominal deflection curve. This fact has to be taken into consideration while designing axle bearings or screen mountings with ROSTA elements.



ROSTA Technology

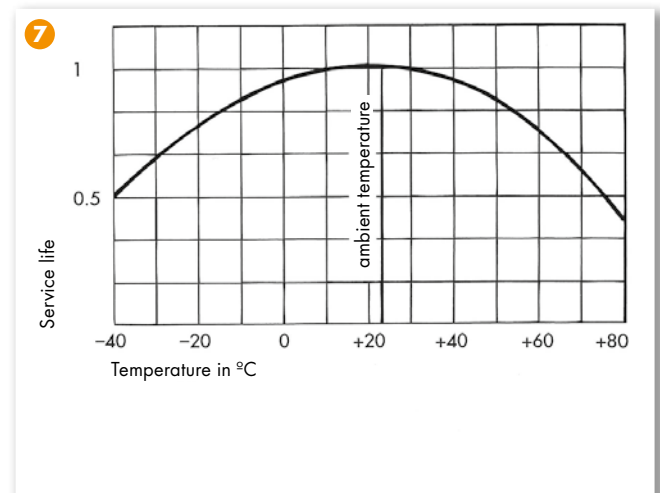


6 Temperature Influence

The ROSTA rubber suspension elements equipped with the standard rubber quality "Rubmix 10" are designed to be applied in the temperature range of -40 °C to $+80\text{ °C}$ (-40 °F to $+180\text{ °F}$). With rising temperatures the mechanical stiffness of the rubber inserts and consequently the resulting element torque decrease within acceptable tolerances (at $+80\text{ °C}$ approx. -5%). At lower temperatures (below the freezing point) the torsional element stiffness rises up to max. $+15\%$ at -40 °C . Furthermore, the internal damping factor (hysteresis) of the ROSTA rubber suspensions increases at lower temperatures and declines again at rising conditions. Due to the internal molecular friction through element torsion, the rubber inserts warm up in a continuous manner. Thus, the effective occurring element temperature can vary in relation to the environmental temperature.

7 Service Life

Provided the rubber suspension elements are selected according to our technical specifications, i.e. are operating within the given frequencies and oscillation angles and under the mentioned surrounding conditions, no loss of performance and functionality can be expected for many years. Extremely low or high **permanent** surrounding temperatures considerably shorten the lifetime expectancy of the rubber suspension elements. The opposite service life curve indicates the relevant life deduction at extreme \pm temperatures from **factor 1** at room temperature of $+22\text{ °C}$.



8 Quality Control and Tolerances

Since December 1992 ROSTA AG has been an ISO 9001 standard certified **development, manufacture** and **distribution** company. All products are submitted to a periodical function and quality controlling. On the test machines of the in-house laboratory the rubber inserts are continuously tested and controlled with regard to Shore A hardness, compression set, abrasive wear, rebound resilience, tensile strength, breaking elongation and aging behaviour. The dimensional tolerance of the rubber inserts is defined according DIN 7715 standard and the Shore A hardness according to DIN 53505

standard. The housings and the inner-core profiles of the rubber suspensions are subjected to the tolerance guidelines of the relevant production process and respective supplier (e.g. casted, extruded, edge rolled) and the individual material consistence (e.g. light metal casting, steel tube, nodular cast iron part, etc.). The resulting torsional moments and spring deflections of the ROSTA rubber suspension elements are residing in a tolerance range of $\pm 15\%$ **at most, but lie usually in an essentially narrower range!**

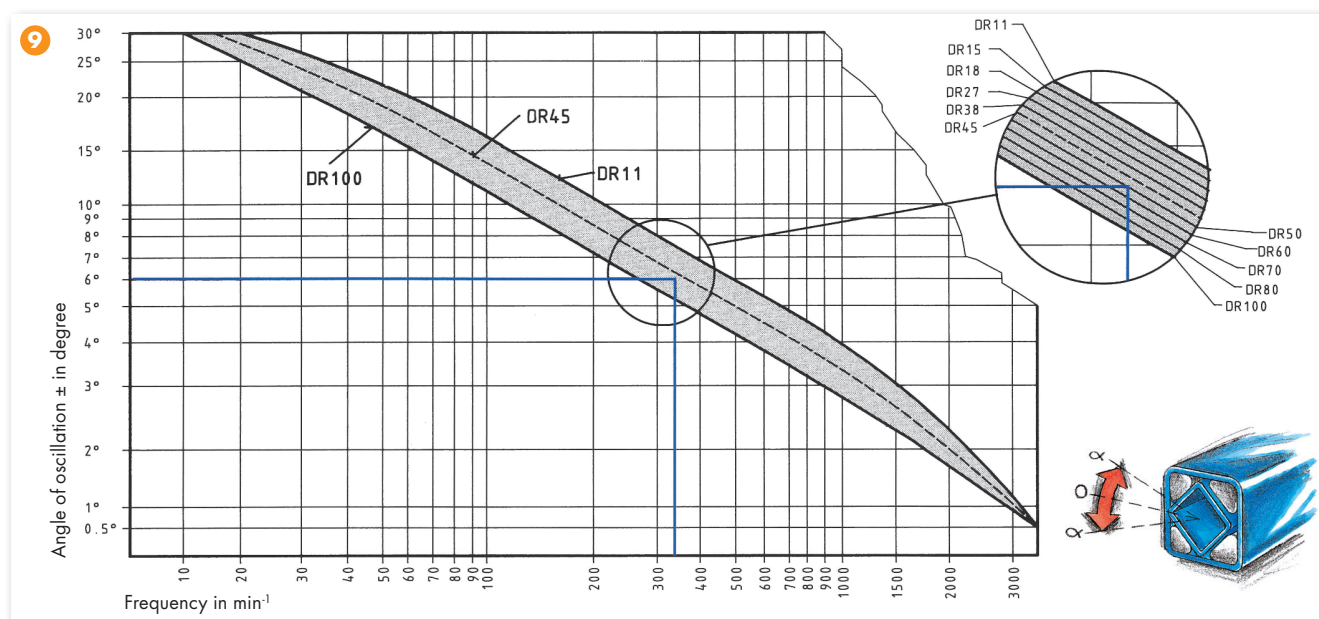
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9 Permissible Element Frequencies

Alignment chart for the determination of the permissible frequencies at different angles of oscillation in relation to the appropriate element size (DR 11, 15, 18, etc.). The higher the frequency in rpm, the lower the angle of oscillation has to be and vice versa.

Example: (see blue indication on chart) A rubber suspension of type **DR 50** may be rotated from the neutral position (0°) to an oscillation angle of $\pm 6^\circ$ by a max. frequency of **340 min⁻¹**.

For applications of “**pre-tensioned**” elements working, **e.g.** under 15° of pre-tension and describing oscillation angles of $\pm 5^\circ$ at 250 min^{-1} , it is **absolutely** necessary to consult ROSTA.



10 Rubber Qualities

Nearly 80% of all ROSTA rubber suspension elements are equipped with rubber inserts of standard quality “Rubmix 10”. This rubber quality based on a high content of **natural rubber** (caoutchouc) offers a good shape-memory, small settling factors (cold flow), high mechanical load capacities and

moderate aging behaviours (little hardening of the inserts). Where high **oil-consistency**, **heat-resistance** or **higher torque** is required, other qualities of elastomeric inserts can be applied in the ROSTA rubber suspension elements.



10

Rubber quality	Factor in relation to the list “torque and loads” (page 1.5)	Working temperature	Rubber	Specification
Rubmix 10	1.0	-40° to $+80^\circ \text{C}$	NR	<ul style="list-style-type: none"> Standard quality Highest elasticity Lowest cold flow
Rubmix 20	approx. 1.0	-30° to $+90^\circ \text{C}$	CR	<ul style="list-style-type: none"> Good oil-resistance Elements marked with yellow dot
Rubmix 40	approx. 0.6	-35° to $+120^\circ \text{C}$	EPDM-Silicone	<ul style="list-style-type: none"> High temperature resistance Elements marked with red dot
Rubmix 50	approx. 3.0	-35° to $+90^\circ \text{C}$	PUR	<ul style="list-style-type: none"> Max. oscillation angle $\pm 20^\circ$ Limited oscillation frequencies No permanent water contact Elements marked with green dot

11 Chemical Consistency

The standardized ROSTA rubber suspension elements are equipped with elastic inserts of quality type **"Rubmix 10"**. This rubber quality is based on a high content of natural rubber. It offers against large media a high chemical consistency. In some specific applications, however, some additional protective barrier or the application of elements with synthetical elastomeric inserts (qualities "Rubmix 20", Rubmix 40"

or "Rubmix 50") is required. Applying these alternative inserts, the general element characteristics slightly differ (see chapter 10 "rubber qualities"). The below indicated consistency table is merely a guideline and is incomplete. For specific applications please contact ROSTA and inform us about the environmental conditions and about the detailed concentration of liquid or aerial media being in contact with the rubber suspension elements.

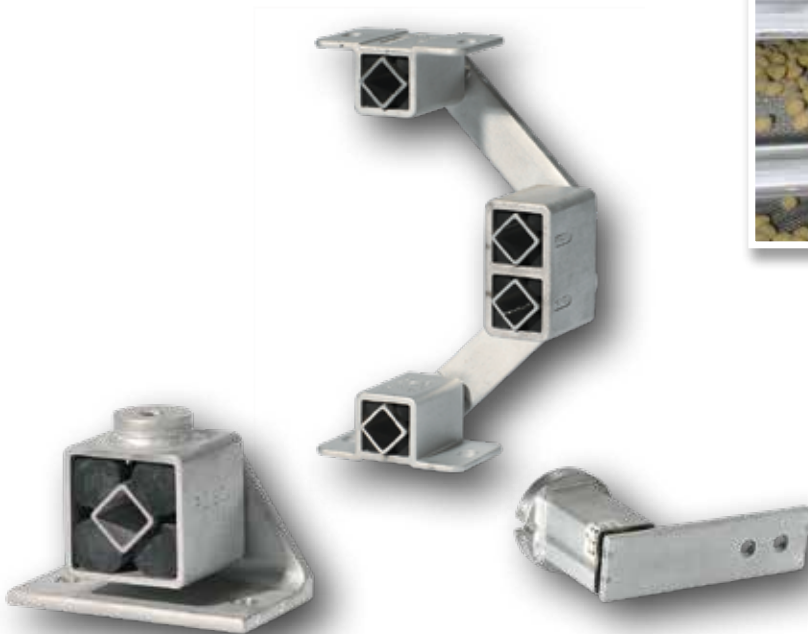
Rubmix	10	20	40	50
Acetone	+	oo	++	oo
Alcohol	++	++	++	o
Benzene	oo	oo	oo	oo
Caustic soda solution up to 25% (20°)	++	++	++	oo
Citric acid	++	+	o	oo
Diesel	oo	+	oo	+
Formic acid	+	+	o	oo
Glycerine	+	+	++	oo
Hydraulic fluid	o	+	oo	oo
Hydrochloric acid up to 15%	++	+	o	oo
Javelle water	o	+	++	oo
Lactic acid	++	++	++	+
Liquid ammonia	+	+	++	oo
Lubricating grease and oil	oo	+	oo	+
Nitric acid up to 10%	oo	+	+	oo
Nitro thinner	oo	oo	oo	oo
Petrol (fuel)	oo	o	oo	++
Petroleum	oo	+	oo	++
Phosphoric acid up to 85%	oo	oo	oo	oo
Seawater	++	+	++	oo
Sulphuric acid up to 10%	+	o	o	oo
Tannic acid	++	+	++	oo
Toluene	oo	oo	oo	oo
Treacle	++	++	++	o

Legend:

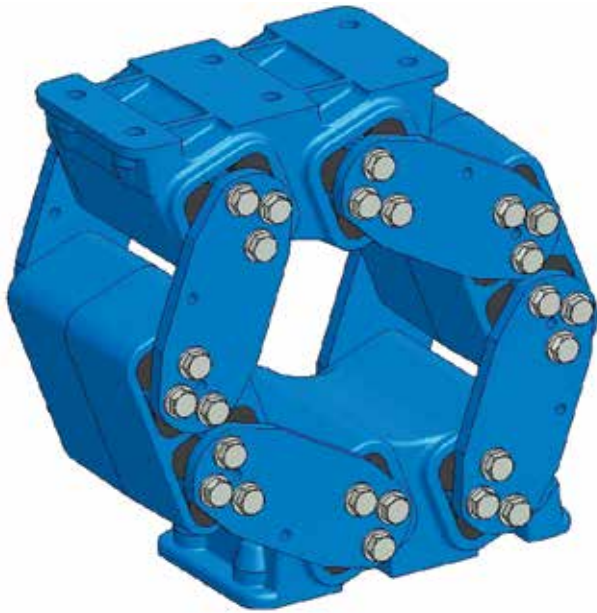
- ++ excellent consistency
- +
- o sufficient consistency
- oo insufficient consistency

ROSTA Stainless Steel Range

In the food processing and pharmaceutical industries the very high hygienic standards are raising permanently. We accommodate these facts in our component development through expanding and improving continuously our range of stainless steel machine components. As a result, many of the ROSTA oscillating and tensioning elements are as standard elements in stainless steel material available from stock. For production-related reasons some dimensions of our stainless steel elements do slightly differ from the measurements of the standard range (steel versions).



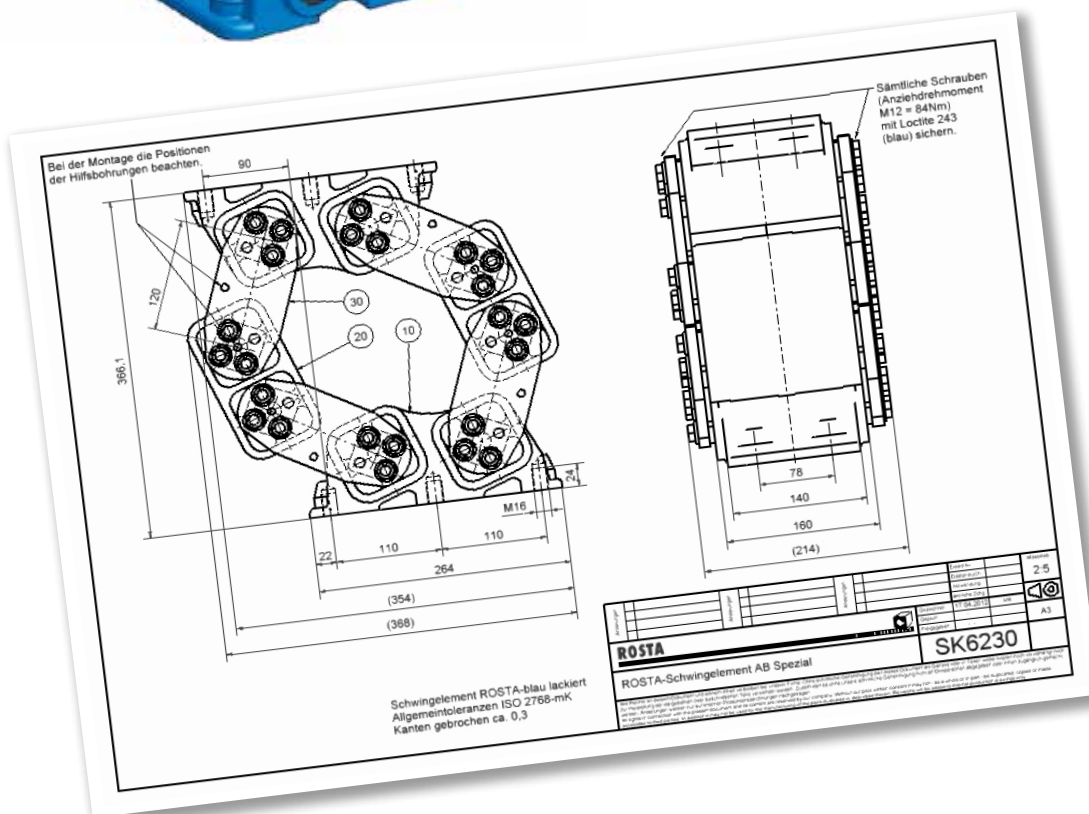
ROSTA Customized Elements



Does the ready-made suit not fit your requirements, we will "tailor" it!

The proverbially worldwide availability of our **standardized rubber suspension elements** is one of the most positive arguments for the application of our products. By large batch production of machines and installations, however, a **"tailored"** and **customized** system component can significantly reduce the assembly time. In addition, the original equipment manufacturer gets the certitude that its customized ROSTA component is supplied **exclusively** to its organisation and consequently the potential spare part business stays under its own survey.

Please ask for a consulting call! We will be pleased to take measurement on your specific machine configuration for designing your customized ROSTA built-in part!



ROSTA Rubber Suspensions

Springing – cushioning – guiding all three functions in one machine component! This proverbial triple function is raising the ROSTA rubber suspension system in the status of uniqueness among the machine components. The ROSTA technology, for years solely focusing on mechanical engineering and machine construction, is now continuously finding admission in equipments of human bodybuilding. Besides amusement installations, innumerable **open-air gymnastic parks** are raising up like mushrooms in our contemporary agglomerations. As expander hinge, as see-saw bearing or as stepping-stone cushion, the threefold function of the **indestructible** rubber suspension encouraged the relevant industries for the use of **the Blue Ones from ROSTA**.



**Protective
stepping
cushion**



Expander



See-saw bearing



Administrative and Technical Information

1. Guidance, services and offers

Please contact your local ROSTA representative listed in our representatives list on the back of the catalogue if you have any questions or concerns.

We require a full list of technical specifications including any available sketches and data sheets for the preparation of an appropriate offer. This information makes it possible for us to determine whether a standard or custom element is the most cost-effective solution for you. For complex applications, our representative or the home office will send you a questionnaire about the exact specifications for what you need.

Terms and conditions for payments and deliveries are included with our offer or available on our website at www.rosta.com → Company → General Terms.

2. Orders and deliveries

Please include the offer number on your order along with the exact quantity, product name and number. Please send your order to your local ROSTA representative.

3. Availability

Most of the standard products listed in our catalogue are available from stock through your local representative or directly from ROSTA AG.

Custom pieces for a specific customer requirement are produced and delivered as specified in your order confirmation. The delivery time for special custom pieces can be reduced by signing a call order agreement (make-and-hold-order) with ROSTA AG. Please contact us if you would like to discuss this.

4. Technical information

Please observe the capacity limits for our elements as specified in the catalogue. If you are in doubt, please contact us or your ROSTA representative.

Please follow the assembly instructions detailed in the catalogue. Make sure that your assembly workers are instructed correctly. If you have any questions, please contact us or your ROSTA representative.

Assembling elements: To attach our elements or mounts, please always use the largest dimensioned standard machine bolts possible with strength class of 8.8 that fit into the drilled holes in the elements or attachment clamps. Use the screw supplier's guidelines for the maximum tightening torque.

If in doubt, control your bolt attachments using the VDI Guidelines 2230.

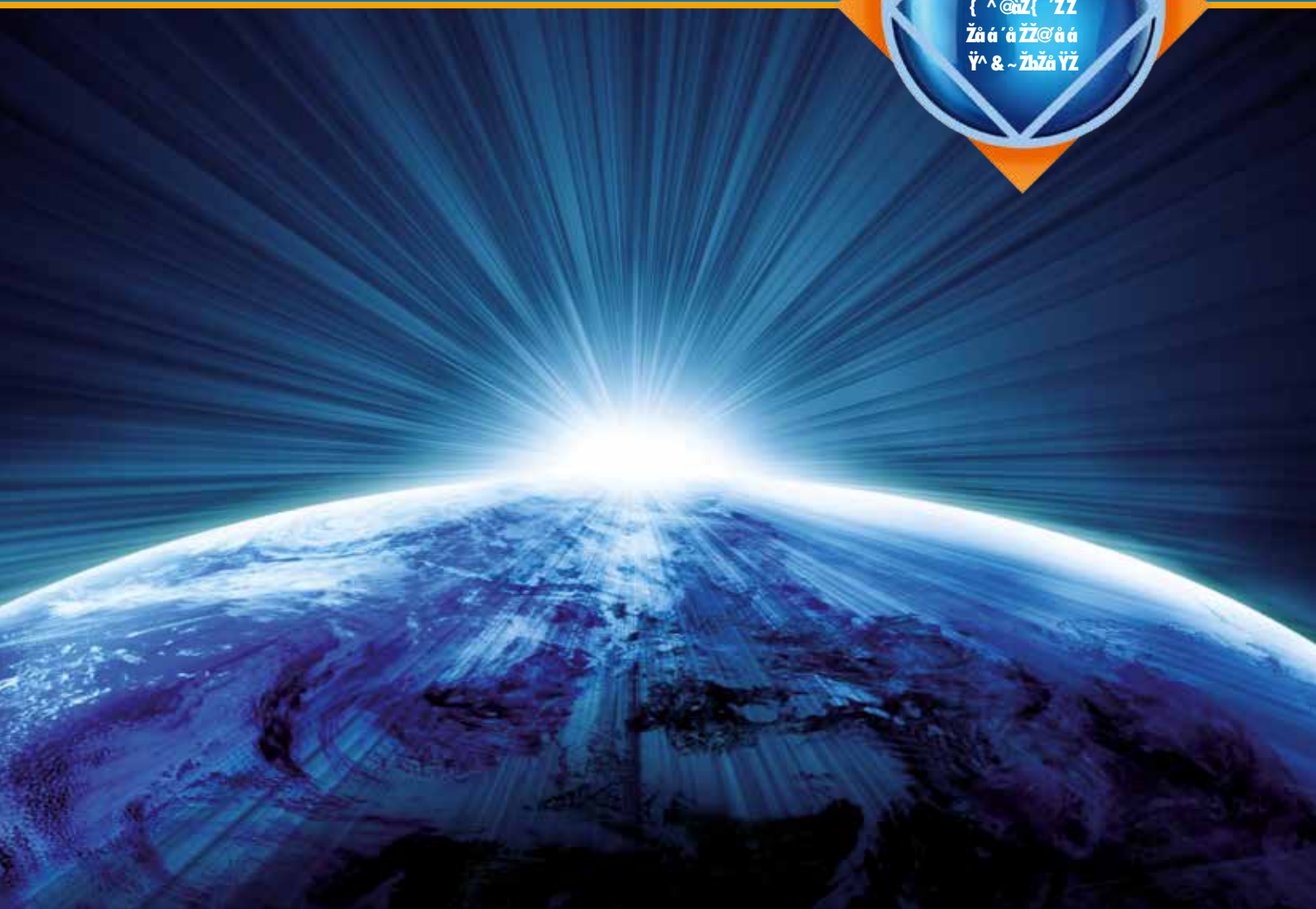
Use washers with hardness class at least 200HV to attach housings with unworked drilled holes in the casting (for example AB 50) or oblong holes (for example MB supports). We recommend to inspect the screw connections after approx. 100 operating hours.

5. Proviso

This catalogue and our other technical information are intended solely for your orientation and information; they may not be construed as absolutely binding in any way. We ask that you adapt the assembly and use of our products in a way suited to the prevailing conditions and situation.

The reproduction of this document in full or in part may only be done with our expressed written permission.

The leading manufacturer
of torsional rubber springs



ROSTA



T2018.952