Glossary

getzner
engineering a quiet future

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A-C

1/3 octave band

The range (bandwidth) between two frequencies, which are at a ratio of roughly 4:5, to be more precise $f_o = \sqrt[3]{2} f_u$; in a logarithmic representation the width of a 1/3 octave band is one-third of the width of an →*octave*.

Abrasion in mm^3

Parameter for the assessment of abrasion (abrasive wear) against abrasive loss; abrasion is the loss in volume in mm^3 of a defined testing body on a test emery surface with a defined attack strength, defined contact pressure over a pre-defined path.

Abrasion only reflects actual wear behavior under field conditions to a limited extent.

Airborne noise

Sound propagated in the air in the form of →*sound waves*, as opposed to sound transmission through liquids or solid bodies.

Ambient temperature in °C

The working temperature for elastomers manufactured by Getzner is between -30 °C and +70 °C. The data listed in the material data sheets is valid for room temperature. The mechanical properties of elastomers are dependent on the temperature.

At temperatures above the maximum limit permanent damage can occur to the elastomer, and at temperatures below the minimum limit the elastomer may freeze.

The maximum working temperature limit denotes the maximum temperature at which the material can be used without beginning to age, i.e. without an excessive loss of elastic properties.

Minimum working temperature: low temperatures reduce the mobility of the molecular chains, causing the elastomer to lose elasticity (this process is reversible for Sylomer® and Sylodyn®).

Amplitude

A quantity characterizing a →*vibration;* it is the maximum magnitude of variation of a physical quantity from its zero value to a positive or negative value; amplitude refers to a physical quantity (e.g. force, displacement).

Amplitude dependence

Amplitude dependence describes the dependence of the dynamic stiffness on the amplitude of vibration.

This characteristic is highly specific to the particular material. Sylomer® and Sylodyn® materials exhibit a negligible amplitude dependence. The dynamic stiffness of other elastic materials, such as compact, foamed and bonded rubber products (rubber granule), however, is significantly dependent on the amplitude of excitation.

Amplitude of vibration

See →*amplitude*.

Angle of loss d in degrees

The angle of loss d indicates the phase difference between the stress and strain in an oscillatory test and can be used as a measurement of material damping.

The relation between the mechanical loss factor h and the angle of loss d is characterised by h = tan(d).

Bedding modulus in N/mm^3

Also: Surface →*stiffness*; ratio of the →*specific load* to the resulting →*deflection*; a distinction is made between the →*secant modulus* and the →*tangent modulus*.

Center of gravity

The point to which the entire mass of a system can be reduced; the center of gravity is extremely important for the design of elastic equipment bearings.

C-D

Coefficient of friction

The coefficient of friction represents the relationship between frictional resistance to normal forces.

The coefficient of friction of an elastomer can be determined for materials such as steel, concrete, wood, etc.

A distinction is made between static friction and dynamic friction; in the material data sheets the values are stated for static friction.

Complex e-modulus in N/mm^2

Describes the properties of "spring" and "damping" in a complex notation $E^*=E\ (1 + i \cdot h)$; the real portion of the complex →*e-modulus* modulus is referred to as the storage modulus E (spring component), while the imaginary portion is referred to as the loss modulus ($i \cdot E \cdot h$, damping component).

Compression in %

The ratio of deformation of the elastomer under load to the unloaded thickness of the elastomer.

Compression set in %

Measures the recovery capacity of an elastomer; ratio of the sample body height before and after compression; testing procedure as per EN ISO 1856; test conditions: deformation to 50 % at 23 °C, duration of load 72 h and measurement 30 min after load removal.

Crest factor

Ratio of the crest value to the effective value of a vibration. For sinusoidal vibrations it is $\sqrt{2} = 1.41$.

Damping

Transformation of kinetic energy into another form of energy which is no longer relevant (reusable) for the oscillatory system (e.g. heat via abrasion, plastic deformation,...); damping (dissipation of energy) takes energy out of the mechanical system.

In order to limit resonant vibration to an acceptable range, a mechanical system requires adequate damping. Vibration damping and →*vibration isolation* are two different measures for isolating vibrations.

See also →*loss factor*, →*damping ratio*.

Damping coefficient in 1/s

Unit for characterizing the damping of a free oscillator with speed-proportionate damping; it is calculated as time-related amount of damping; "d" describes the (exponential) time-related damping of an oscillation from the initial value "A_0" ($t = 0$) to the value "A" at the time "t" $A=A_0 \cdot e^{-d \cdot t}$

Note: not the same as spatial damping coefficients a (e.g. degree of absorption in acoustics).

Damping ratio D

Unit of measurement for characterizing the damping of a free oscillator with a speed-proportionate damping; also known as the degree of damping.

The damping ratio D is directly related to the →*loss factor* h by the equation

$$D = \frac{\eta}{2}$$

Decade

The interval at which the upper interval limit is 10 times higher than the lower limit; decades are used for time and also for frequencies. For example, an interval of 100 to 1000 has a bandwidth of one decade, while an interval of 50 to 5000 has a bandwidth of two decades.

D

Decibel in dB

Unit for expressing the ratio against some physical quantity in terms of the base 10 logarithm of that ratio 10 log(v_1/v_2). Logarithmic ratios are described as levels or amounts, e.g. →*velocity level*, →*insertion loss*, etc. For example, sound pressure levels are usually put in ratio as a square equation. The 2 of the square equation in the Log will be set in front of the same becoming 20 log (...).

Example: the →*velocity level*:
$L_v = 10 \cdot \log(v^2/v_0^2) = 10 \cdot \log(v/v_0)^2 =$
$20 \cdot \log(v/v_0)$dB.

Deflection in mm

The distance which an elastomer is compressed under a specific →*load* or force.

Deformation energy in Nm

The energy necessary to cause deformation of an elastomer; can be determined based on the surface area under the force-deformation curve (→*load deflection curve*).

Degree of freedom

Describes the possible directions of motion of an oscillatory system; there are 3 translational degrees of freedom in the 3 spatial axes and 3 rotational degrees of freedom around the 3 spatial axes.

Degree of transmission in dB

In respect of →*vibration isolation* characterizes the isolation efficiency as a ratio of input and response forces and/or input and output amplitudes.

Density in kg/m³

The density (volume weight or specific mass) is the ratio of the mass to the volume for elastomers; testing procedure as per DIN 53420.

Design load in N/mm²

To verify the →*ultimate bearing capacity*, characteristic loads E_k will be subject to partial safety factors ψ.

Design value of resistance in N/mm²

The characteristic bearing resistance R_k, needs to be reduced by a material property safety factor γ_m to verify the →*ultimate limit bearing states*.

Disturbing frequency in Hz

→*Frequency* applied to excite an oscillatory system, e.g. cyclical forces generated by a machine.

Dynamic load

The elastomer is subject to a forced sinusoidal vibration. The test parameters are →*frequency*, →*pre-load* and →*amplitude*.

Based on the force and deformation result, the dynamic →*stiffness*, the dynamic →*modulus of elasticity or dynamic* →*bedding modulus* and the → *mechanical loss factor* can be derived.

The data sheets usually use the frequencies 10 and 30 Hz with a →*velocity level* of 100 dBv. Testing procedures similar to DIN 53513.

Dynamic range of use

This is the load range for an elastomer bearing, which includes both the →*static loads* and the →*dynamic loads*; static loads should be lower than the upper limit of the →*static load range of use*; dynamic loads should fall in the range between the maximum static load limit and the maximum dynamic load limit.

Elastomer bearings are particularly elastic in this range, i.e. the →*vibration*

E-F

isolating effect of the elastomer is utilized to the fullest extent.

Elastic force in N

Recovery force of an elastomer from an external force due to its elastic property.

Elasticity

Material property which causes elastomers to return to the original form following deformation.

Elongation at rupture under tensile stress in %

Also: Elongation at tear; maximum elongation at which a standardized cross-section of the material tears; elongation at rupture is a minimum value; testing procedure as per DIN EN ISO 527.

Elongation at tear in %
See →*elongation at rupture*.

Emission isolation

Vibration isolation consisting of an elastic bearing system for an oscillatory system, so that no disturbing vibrations are emitted into the surroundings.

Energy absorption in Nm

The energy absorption is defined as dissipated kinetic energy during impact or intense dynamic load. The elastic material is able to convert a large part of the kinetic input energy into inelastic energy by inner damping mechanism, which is an irreversible process. See also →*shock isolation*.

Energy dissipation in Nm

The energy dissipation is the loss of energy per cycle of motion in an oscillatory test due the conversion of mechanical energy into thermal energy (area of displacement-force hysteresis loop). See also →*loss factor*.

Energy equivalent mean level

An energy equivalent mean level depicts the temporally different noise events in an individual numeric value. The energy equivalent mean level includes the strength and duration of each individual sound during the evaluation period.

Evaluation level in dB

The →*energy equivalent mean level* is frequently used to describe and evaluate immission situations; the energy equivalent mean level is calculated averaging the individual frequency and periodic levels for a defined reference period (evaluation period). The evaluation level is compared to certain reference values as a basis for evaluating the noise situation.

Excitation frequency in Hz
See →*disturbing frequency*.

Fatigue test

A method of testing the long-term behavior of an elastomer by subjecting it to a static and simultaneous dynamic load; for rail applications up to 12.5 million load cycles (oscillations) are usually necessary.

Finite Elements Method (FEM)

The Finite Elements Method is a method for numerical modeling of problems in various physical disciplines, in particular strains and deformations of all kinds in elastic and plastic spaces.

Form factor q

Form factor is a geometric measurement for the form of an elastomer bearing and is defined as the quotient of the loaded surface to the exterior housing surface of the bearing. An elastomer with a form factor of greater than 6 can be characterized as a plane.

F-I

Cellular materials, such as Sylomer® SR11, SR18 and SR28, are volume compressible and hence the influence of the form factor on →*stiffness* can be neglected.

By contrast, the form factor plays an increasingly important role as the compactness of the elastomer increases, because in such cases a compression load can lead to bulging of the elastomer resulting in transverse forces in the elastomer. This in turn can mean that the force or the compression required to deform the elastomer can vary, depending on the form factor.

Frequency in Hz

Number of oscillations per second in a periodic signal.

Hooke's Law

Describes the linear relationship between →*specific load* and →*strain*; valid for Sylomer® and Sylodyn® in the linear range of the →*load deflection curve*.

Immission isolation

Vibration isolation of a system (recipient) against disturbing vibrations from the surroundings.

Impact noise level in dB

Measurement of disturbing noise from structure-borne noise generation in ceilings, indicated in dB; in this respect it should be noted that high values represent a lower level of protection against impact noise.

Impact

See →*shock*.

Impedance in Ns/m

Also known as 'characteristic acoustic impedance'. The greater the difference between the characteristic acoustic impedances of two media, the more sound energy will be reflected at the boundary surface between the two media, i.e. less sound energy is transmitted.

Conversely, this also represents better →*vibration isolation*; For good damping there is a so-called 'jump in impedance', i.e. a significant difference between the characteristic acoustic impedance of the two media involved.

Insertion loss

Ratio of the power of the vibrations (e.g. power of the structure-borne noise) which is transmitted into the adjacent structure without an elastic element or mounting to that which is transmitted when an elastic element or mounting is present.

Note: insertion loss is only independent of the selected site of measurement if the boundary conditions (e.g. subgrade, building design, tunnel design, etc.) are identical.

Insertion loss in dB

10 base decade logarithm of →*insertion loss*. Core quantity for characterizing the efficiency of measures to reduce structure-borne noise.

Insertion loss can be measured as the difference between the level of structure-borne noise with and without resilient mounting. Insertion loss is frequency dependent.

Isolating vibration

See →*vibration isolation.*

Isolation

See →*vibration isolation.*

Isolation efficiency

See →*isolation factor*.

I-M

Isolation factor in %

In respect of →*vibration isolation* this factor characterizes the →*isolation efficiency* as a ratio of input and response forces and/or input and output amplitudes.

Isolation of impact noise in dB

Measurement for the efficiency of dampening by a partition element which is located between the concrete sub base and the flooring material; dampening of impact noise is frequency dependent.

Level in dB

Logarithmic ratio of a quantity to a reference quantity of the same dimension, See →*decibel*.

Load deflection curve

See →*quasi-static load deflection curve*.

Load peaks in N/mm²

Load peaks are maximum loads which occure for short-term and infrequent and can be absorbed by the material without relevant changes of the material properties. Cellular elastomers can absorb load peaks of well over 20 times the →*static range of use* stated in the material data sheets without suffering damage. More compact elastomers can absorb load peaks of 5 to 10 times the static load range.

Loss factor h

The mechanical loss factor η is a measure of mechanical damping of viscoelastic materials. With respect to harmonic loads, the mechanical loss factor η can be calculated by the dissipated energy per cycle (hysteresis) related to stored energy during loading by the following formula η = dissipated energy / (2 · ϖ · stored energy).

Furthermore the mechanical loss factor η can be derived by measuring the angle of loss δ, when harmonic loads are applied. The tangent of angle of loss δ corresponds to the mechanical loss factor η ($\eta = \tan(\delta)$). Test methods in accordance to DIN 53513; see also →*damping ratio, angle of loss*.

Loss modulus

See →*complex e-modulus*.

Mass-spring system

A mass-spring system is a type of superstructure for permanent way consisting of a reinforced concrete trough or slab and a spring (for example an elastomer bearing). The large mass of the concrete trough allows for very low tuning frequencies.

Mechanical loss factor

See →*loss factor*.

Modal analysis

A method to experimentally determine modal quantities such as →*natural frequencies* and natural damping of a complex →*multiple mass oscillator* (oscillating system); the quasi-numerical counterpart of modal analysis is →*FEM analysis* (Finite Elements Method).

Modulus of elasticity in N/mm²

The modulus of elasticity (e-modulus) is a material property and describes the relationship between →*specific load* and →*strain* (→*Hooke's Law*).). The e-modulus is dependent on the →*specific load* and load acceleration.

A distinction is made between static e-modulus (→*quasi-static deformation*) and the dynamic e-modulus (→*dynamic load*). Testing procedures similar to DIN 53513. See also →*complex e-modulus*.

Multiple mass oscillator

An oscillatory system consisting of several linked oscillating sub-systems with various masses and springs, whereby each sub-system consists of a mass and a spring (→*single mass oscillator*); a multiple mass oscillatory system has as many →*natural frequencies* as it does sub-systems.

N-Q

Natural frequency in Hz

→*Frequency* of a system's free vibration after one excitation; the period of the vibration is dependent on the →*damping*.

Natural mode

Vibratory systems have natural modes, which can be described by →*natural frequency*, natural damping and vibratory form. A system can have natural modes in the form of translation, rotation or bending as well.

Noise emission

Noise emission refers to →*structure-borne noise* or → *airborne noise* emitted by a sound source; the sound source is located at the emission location.

Noise immission

Noise immission is the →*structure-borne noise* or →*airborne noise* striking a recipient, regardless of the location of the →*noise emission* (source of the structure-borne or airborne noise).

The location of the recipient is referred to as the immission location and the level of sound measured there is known as the immission level.

Noise pollution

Noise is defined as →*airborne sound*, which may be disturbing, annoying, hazardous or damaging. Perception of sounds and noise depends to a great degree on the individual and is thus subjective.

Octave

An octave is the range (frequency band) between a →frequency and twice or one-half of that frequency, i.e. $f_o = 2 \cdot f_u$ bzw. $f_u = 1/2 \cdot f_o$.

For example, one octave above and below the frequency 1000 Hz is covered by the intervals to 2000 Hz and 500 Hz. In acoustic measurements, standardized mean octave frequencies (f_m) are usually used (f_m = 16, 31.5, 63, 125, 250, 500, 1000, 2000 Hz).

Periodic duration in s

Time duration of one whole harmonic oscillation; the reciprocal value is →*frequency*.

Plasticity

Material property which leaves an elastomer in a deformed state following deformation.

Poisson Number n

Ratio of the lateral deformation to the axial deformation; for elastomers the Poisson number (also: Poisson's ratio) depends to a great degree on the cellular structure and load.

Polyurethane

Abbreviation: PUR. Polyurethanes are manufactured by poly addition of isocyanates and polyalcohols and can be produced with cellular structures or compact structures. A distinction is made between polyether urethanes and polyester urethanes.

Pre-load in N

Static load which is applied to an elastomer before the application of a dynamic load.

Quasi-static deformation

One time application of a load onto an elastomer, whereby the time period for application of the maximum load is 20 s; see →*quasi-static load deflection curve*.

Q-S

Quasi-static load deflection curve

Describes the relationship between →*specific load* and →*deflection* in graphic form; depending on the load speed; depending on load acceleration, a distinction is drawn between quasi-static and dynamic load deflection curves.

In the data sheets the load deflection curve is usually depicted with compression deformation of 40 %, with 20 s rise and decay duration of the load ramp. The elastomer is usually pre-stressed with two preliminary cycles, and measurements are carried out for the third cycle.

Resistance to strain in N/mm^2

→*Specific load* that is necessary to compress an elastomer to a certain →*compression set*.

Resistance to tear propagation in N/mm

Maximum tensile strength of a standardized sample that resists the propagation of a tear; denotes a minimum value; testing procedure as per DIN 53515.

Resonance

When the →*disturbing frequency* of a system is equal to the natural frequency of the system, resonance occurs. Occurrence of resonance can lead to the destruction of the entire oscillating system.

By →*damping* the vibratory system it is possible to limit resonance vibrations to an acceptable degree. Flexibility to a changing force is particularly strong with the resonance range.

Resonant frequency in Hz

Frequency, at which →*resonance* occurs.

Secant modulus in N/mm^3

Denotes the surface-related →*stiffness* of an elastomer bearing; a secant is drawn through the interface points of two defined secant points (→*specific loads*) with the →*load deflection curve*. The rise in the secant is referred to as the secant modulus or →*bedding modulus*.

Secant stiffness in kN/mm

Denotes the →*stiffness* of an elastomer bearing; a secant is drawn through the interface points of two defined secant points (forces) with the →*load deflection curve*; the rise in the secant is referred to as the secant stiffness.

Shear modulus in N/mm^2

Elastomer bearings are able to absorb shearing forces and →*shearing stress*.

The ratio between shearing stress and horizontal deflection of the elastomer is referred to as the shear modulus.

Fundamentally speaking, an elastomer bearing is softer with regard to shearing loads than with regard to compression loads. The relationship of compression to shearing stiffness ranges between factor 4 and 10, depending on the cellular structure and geometry of the bearing. The quasi-static shearing deflection curve exhibits relatively linear deformation behavior. A dynamic shearing modulus can be calculated from the dynamic shearing load.

Testing procedures similar to DIN ISO 1827.

Shearing stress in N/mm^2

Shearing force per unit of surface area of the elastomer.

Sh-So

Shock

Sudden occurred impact force between two or more bodies; the impact force is defined by the shock duration, maximum impact force and the impact shape (half-sine, triangle, rectangle, trapezoidal,...). See also →*shock isolation*.

Shock absorbing elements

Components which are used to reduce the force, path or delay associated with individual or repetitive shock pulses and to transform the impact energy of the impacting mass into heat and additional →*deformation energy*.

Shock absorption

See →*shock isolation*.

Shock isolation

Shock isolation is a special case of the vibration isolation, where the transmission of sudden impact forces (see →*shock*) is reduced by the installation of elastic components; the short impact force with a relatively high force peak gets transformed into a longer-term pulse with lower forces.

The energy absorption is defined as the dissipated kinetic energy during impact or intense dynamic load. The elastic material is able to convert a large part of the kinetic input energy into inelastic energy by inner damping mechanism, which is an irreversible process. See →*energy absorption*.

Shore hardness

Shore hardness is a measurement for the hardness of rubbers for example and can only be used to a limited degree with foamed elastomers. The measurement of Shore hardness is the resistance to indentation of a body of defined shape with force applied by a calibrated spring.

There are two hardness scales: the "Shore A" scale for soft (rubbery) materials and the "Shore D" scale for harder materials. The measurement for the hardness or elasticity of foamed elastomers is the →*modulus of elasticity*.

Single-mass oscillator

Applications for vibration isolation are often postulated on an oscillatory system with →*one degree of freedom* consisting of a mass and a spring.

Sound

Smallest pressure and density oscillations in an elastic medium in the audible range of humans from approximately 16 Hz to 20,000 Hz, e.g. airborne sound, structure-borne noise, sound transmitted through liquids.

Lower frequencies are referred to as infrasound and higher frequencies as ultrasound.

Sound isolation in dB

The level of sound isolation is defined as the 10 base logarithm of the ratio of the sound energy striking a component (exterior) (power: W_1) to the amount of sound energy transmitted by the components (power: W_2).

$R = 10 \cdot \log(W_1/W_2)$

Sound pressure in Pa

Changes in the static air pressure due to oscillation of the air molecules in a sound field.

Sound pressure level in dB

is twenty times the 10 base logarithm of the ratio of the instantaneous sound pressure to the reference sound pressure (audible threshold); For practical applications in noise abatement and evaluation, the frequency sensitivity of the ear is realized via the so-called "A-weighting", and reference is made to the "A-weighted sound level (also known as "sound level in dB A").

In addition to this frequency weighting, there are also three different time averaging options that can be selected in the measurements.

These three options are: Fast: Rise duration = 125 ms; Decay duration = 125 ms; Slow: Rise duration = 1.0 s; Decay duration = 1.0 s; and impulse: Rise duration = 35 ms; Decay duration = 1.5 s; it is particularly important to indicate the time averaging for impulse and burst sound events.

Sound spectrum

A graphic representation of sound as a function of frequency. Depending on the type of frequency filter used in the analysis, one can primarily distinguish between →*spectra* in →*octaves*, →*1/3 octave bands* or narrow band spectra.

In comparing various spectra, it is important to take into account the bandwidth of the filter used in the analysis.

Sound wave

A motion with periodic changes in the position of molecules (vibration), whereby the energy of this →*vibration* propagates at the speed of sound while the individual molecules (e.g. air molecules) oscillate around a static point.

Specific load in N/mm²

Force per unit of surface area.

Spectrum

Graphic representation of a physical quantity (ordinate) as a function of →*frequency* (abscissa). A pure sinusoidal vibration, for example, is represented as a line in a line spectrum.

Naturally occurring vibrations are rarely pure sinusoidal vibrations; therefore, in order to determine the frequencies comprising the largest portion of the vibration it is expedient and/or necessary to represent it graphically as a spectrum. The largest portions are visible at the →*natural frequencies*.

Spring deflection in mm

See →*deflection*.

Static range of use in N/mm²

The maximum compression stress for stationary loads up to which the elastomer will retain its elastic properties; resilient bearings are generally designed for the upper limit of the static range of use in order to achieve maximum →*vibration isolation*.

Static creep behaviour in %

Increase in deformation under steady, long-term load. When Sylomer® and Sylodyn® are subjected to loads as stated in the →*static range of use*, the deformation is lower than 20 % even after 10 years. Deformations of this order of magnitude have also been observed in elastomer bridge bearings. Testing procedure as per DIN ISO 8013.

Stationary loading

The elastomer is subject to a static load which does not vary over time. If the →*specific load* and the resulting →*deflection* are known, it is possible to determine the static →*stiffness*, the static →*modulus of elasticity* or the static →*bedding modulus*. Normally, elastomers begin to experience creep after a load is applied.

Stiffening factor

The spring deflection properties of elastomers depend on the acceleration of deformation. The ratio between the dynamic and static →*stiffness* stiffness is referred to as the stiffness factor (or ratio of dynamic to static).

St-T

Stiffness in kN/mm

Describes the elasticity of an elastomer to deformation; can be determined using force-displacement measurement; the steepness of the force-displacement curve (see →*load deflection curve*) represents the stiffness; stiffness is dependent on load acceleration (quasi-static or dynamic).

A distinction is drawn between →*secant stiffness* and →*tangent stiffness*.

Storage modulus

See →*complex e-modulus*.

Structure-borne noise

Are →*vibrations* transmitted via solid or liquid bodies

Structure-borne noise isolation in dB

Structure-borne noise isolation involves the prevention of the propagation of →*structure-borne noise* by reflection at an impedance jump, in practice usually at an elastic layer. In general, it can be stated that the softer the elastic layer, i.e. the lower the →*impedance* (in relation to the impedance of the adjacent media), the greater the isolation of the structure-borne noise.

Note that structure-borne noise isolation should not be confused with structure-borne noise damping.

Sum level L_{tot}

Is formed from the addition of n partial levels L_i levels (sound pressure levels) according to the formula L_{tot} =10 log /$10^{0,1L_i}$, expedient for multiple sound sources.

Tangent modulus in N/mm^3

See →*tangent stiffness*, but the stiffness pertains to the elastomer surface.

Tangent stiffness in kN/mm

Denotes the →*stiffness* of an elastomer bearing at a certain working point; the steepness of the tangent is determined in relation to the →*load deflection curve* at the working point.

Tensile strength in N/mm^2

See →*elongation at rupture*.

Tensile stress at rupture in N/mm^2

The force that must be applied per unit of a standardized cross-section to cause the elastomer to rupture; tensile stress at rupture is a minimum value; testing procedure as per DIN EN ISO 527.

Thermal conductivity in W/mK

Is determined by the thermal conductivity in watts through a 1 meter thick flat layer of a material with a surface area of 1 m^2, when the temperature difference of the surface in the direction of conductivity is one Kelvin, testing procedure as per DIN IEC 60093.

Transmission function

In respect of →*vibration isolation* the isolation efficiency as a ratio of input and response forces and/or input and output amplitudes.

Tuned mass damper

A method of vibration reduction involving the removal of energy from an oscillatory system by the attachment of an vibration dampener; the dampener consists of an oscillatory system (e.g. mass, spring and damper) and vibrates at its resonance.

Tuning frequency in Hz

Lowest vertical →*natural frequency* of an elastically-mounted system (ma-

T-V

chine, track superstructure, building, etc.); the lower the tuning frequency, the higher the level of →*vibration isolation*.

Tuning ratio

Ratio of the →*disturbing frequency* to the →*tuning frequency* of an elastically-mounted system; also known as frequency ratio; the disturbing frequency and the tuning frequency must be separated by at least a factor of $\sqrt{2}$ to achieve isolation of the system.

Ultimate limit states

Structural safety as well as the durable integrity of a construction must be given. Therefor the ultimate bearing capacity needs to be verified with →*design loads* on the action side E_d smaller-equal than the →*design value of resistance* R_d. This method bases on the semi-probabilistic safety concept according to EN 1990.

Velocity level in dB_v

Used in acoustics to denote vibration velocity in the form of a →*level* (logarithmic ratio); it is defined as twenty times the logarithm of the ratio of the effective vibration velocity to the reference velocity of $5 \cdot 10^{-8}$ m/s.

A velocity level of 100 dBv at a →*frequency* of 10 Hz represents an oscillation amplitude (crest value) of approximately 0.1 mm, or at a frequency of 100 Hz of approximately 0.01 mm.

Vibration isolation

Reduction of the transmission of mechanical vibrations by the installation of elastic components; a distinction is drawn between the reduction of vibration transmission from a source of vibration into the surroundings (reduction of emissions, isolation of the emission source) and the shielding of an object from the impact of vibrations from the surroundings (reduction of immissions, isolation of an object). See also →*immission isolation* and →*emission isolation*.

Vibrations

Vibrations are processes in which a physical quantity changes periodically depending on time; these physical quantities can be displacements, accelerations, forces, momentum.

Volume resistivity in Ωcm

Is determined by resistance of an elastomer which is placed between two electrodes with a defined voltage, multiplied by the thickness of the elastomer and the distance between the two electrodes; specific volume resistance depends strongly on temperature and humidity. Testing procedures similar to DIN IEC 93.

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