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GLOSSARY OF INDUSTRY TERMS

A

A/F

An abbreviation for Across Flats. Used in reference to the dimensions on hexagon head products.

ACORN NUT

A nut (so-called because of its shape) that has a domed top so that it prevents contact with the external thread.

AIRCRAFT QUALITY

In the fastener industry, aircraft quality refers to parts that are made to more stringent specifications, and tested more thoroughly, than commercial fasteners because they are used in high-risk and/or high-stress applications requiring near-zero defects.

ALLOWANCE

An intentional clearance between internal or external thread and the design form of the thread when the thread form is on its maximum metal condition. Not all classes of fit have an allowance. For metric threads the allowance is called the fundamental deviation.

ALLOY STEEL

Alloy steel is steel containing alloying elements, other than carbon, which have been added to achieve defined mechanical or physical properties and performance. Alloy steel has greater tensile and yield strength than medium carbon steel.

ANAEROBIC ADHESIVE

An adhesive which hardens in the absence of air, such adhesives are often used as a thread locking medium.

ANGLE CONTROLLED TIGHTENING

A tightening procedure in which a fastener is first tightened by a pre-selected torque (called the snug torque) so that the clamped surfaces are pulled together, and then is further tightened by giving the nut an additional measured rotation. Frequently bolts are tightened beyond their yield point by this method in order to ensure that a precise preload is achieved. Bolts of short length can be elongated too much by this method and the bolt material must be sufficiently ductile to cater for the plastic deformation involved. Because of the bolt being tightened beyond yield, its re-use is limited.

ANGLE OF HEAD

Used in reference to countersunk fasteners. This is the angle from one side of the cone to the other. Standard angle for inch screws is 82 degrees & 90 degrees for metric screws.

ANNEALED

A fastener is considered in the annealed state when it has been heat treated and cooled to make it malleable, that is, free of hardness caused by working or previous heat treatment.

ANS

American National Standard

ANTI-FRICTION COATING

AF coatings are dry lubricants consisting of suspensions of solid lubricants, such as graphite, PTFE or molybdenum disulfide of small particle size in a binder. Such coatings can be applied to fastener threads to replace metallic coatings such as zinc and cadmium and offer maintenance free permanent lubrication. By careful selection of the lubricants, AF coatings can be designed to meet specific applications. The coatings are permanently bonded to the metal surface and provide a lubricating film preventing direct metal to metal contact.

ANTI-SEIZE COMPOUND

An anti-seize compound is used on the threads of fasteners in some applications. The purpose of the compound depends upon the application. It can prevent galling of mating surfaces - such compounds are frequently used with stainless steel fasteners to prevent this effect from occurring. In some applications it is used to improve corrosion resistance to allow the parts to be subsequently dis-assembled. Thirdly, it can provide a barrier to water penetration since the threads are sealed by use of the compound.

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B**BASIC THREAD PROFILE**

This is the theoretical profile of external and internal threads with no manufacturing tolerance applied.

BEARING STRESS

The surface pressure acting on a joint face directly as a result of the force applied by a fastener.

BEARING SURFACE

The bearing surface is the supporting or locating surface of the fastener with respect to the surface contact with the matting materials that are in contact.

BIHEXAGON HEAD

A bolt or screw whose cross section of its head is in the shape of a 12 pointed star.

BLACK BOLTS/NUTS

The word black refers to the comparatively wider tolerances and to some extent the color of the surface finish of the fastener.

BLANK

A fastener in a non-specific intermediate stage of manufacture.

BLIND RIVET

A tubular rivet designed for use where only one side of the work-piece is accessible for insertion.

BODY

The body of a threaded fastener is the unthreaded portion of the shank diameter.

BOLT

A bolt is the term used for a threaded fastener, with a head, designed to be used in conjunction with a nut to hold two or more objects together.

BREAKAWAY TORQUE

The torque necessary to put into reverse rotation a bolt that has not been tightened.

BREAKLOOSE TORQUE

The torque required to effect reverse rotation when a pre-stressed threaded assembly is loosened.

BUTTON HEAD

A button head as applied to threaded fasteners has a low rounded top surface with a large flat under head bearing surface.

C**CADMIUM ELECTROPLATING**

Coating of threaded fasteners with cadmium can provide the parts with excellent corrosion resistance. The appearance of the coating is bright silver or yellow if subsequently passivated. The friction values associated with this coating are also comparatively low. A chromate conversion coating is frequently applied to the surface to improve corrosion resistance. Cadmium is not now frequently used because of the environmental and worker health problems associated with the coating process and should not be used in applications above 250C or when contact with food is possible.

CAMOUT

The installing power tool with a low applied end loading can cause the driver tool bit to “slip” out of the recess during installation.

CAP NUT

Also referred to as an acorn nut. This type of nut has a domed top that covers the end of the bolt.



CAP SCREW

A term used to describe a machine bolt or machine screw. Usually preceded by a head style as in 'Hex cap screw'.

CAPTIVE SCREW

A threaded screw which is held captive to a panel and which, when disengaged from its main nut, remains fixed to that panel.

CARBON STEEL

Steel, which does not contain any substantial amounts of alloying elements, other than a defined measure of carbon.

CARRIAGE BOLT

A bolt with a smooth rounded head and a small square section under the head to prevent spinning during assembly. Used in wood.

CASE DEPTH

The area of a fastener, measured from the surface inward, which has a different hardness requirement than its core.

CASE HARDENED

A case hardened fastener is a steel fastener having a surface that has been made harder than its core by a heat treatment process which infuses a thin carbon layer into the fasteners surface.

CASTLE NUT

A hex nut with a slightly reduced slotted cylindrical section on one end. Used with a cotter pin and drilled fastener to prevent loosening.

CHAMFER POINT

A chamfer point is a truncated cone point, the end of which is flat and perpendicular to the fastener axis. The chamfer point is intended to facilitate the ease of entry of fasteners into holes on assembly.

CHAMFER

A beveled edge or corner.

CLAMPING FORCE

The compressive force which a fastener exerts on the joint.

CLASS OF FIT

The Class of Fit is a measure of the degree of fit between mating internal and external threads.

CLASS

Used in metric, class is a material designation equivalent to the US term grade.

CLEVELOC NUT

A torque prevailing nut of all metal construction. The collar of the nut is elliptical in cross section and it is this that provides the flexible locking element. The nut is pre-lubricated to reduce the torque needed when tightening and to minimize galling.

CLEVIS PIN

A pin with a head on one end and one or more drilled holes for a cotter pin.

COEFFICIENT OF FRICTION

A dimensionless number representing the ratio of the friction force to normal force. Typically for threaded connections it is between 0.10 to 0.2 but can vary significantly depending upon the materials used and whether a lubricant has been used. In relation to threaded fasteners, the coefficient of friction can be further sub-divided into the coefficient of friction between the threads and the coefficient of friction under the nut face. There is in general a difference in values between the two coefficients due to typically the contact surfaces being different. For example, a zinc plated nut on a zinc plated bolt, the thread coefficient of friction would be due to zinc plating contacting zinc plating. The nut face coefficient of friction would be due to zinc plating contacting the joint surface finish.



COLD HEADING

Cold heading or forging is the process of forming ferrous and non-ferrous

COMMINGLING

A term used to describe the undesirable practice of mixing fasteners from different batches that are the same size and grade in the same container.

CONCEALED HEAD

A type of fastener which, when installed, is completely hidden when viewed from the reverse side.

CONE PROOF LOAD

This is an axial applied force applied to a nut when it is seated on a cone shaped washer which has an included angle of 120 degrees. Failure in this test is usually due to the nut splitting. The intention of the test is to introduce a nut dilation operation which will assess the potential detrimental effects of surface discontinuities. This type of test is sometimes applied to nuts which are intended for high temperature service.

CORE HARDNESS

The amount of resistance a fastener material has to being permanently deformed, the core hardness is measured at a spot deeper than the case depth.

COTTER PIN

A folded pin with a loop at one end designed to provide locking or aligning functions into the assembly.

COUNTERSINK

The counter sink is an internal chamfer or lead-in, into a preformed hole. The formation is carried out by a cutting or forming tool and provides a mating surface for a countersunk head type fastener.

COUNTERSUNK HEAD

The countersunk head has a flat top surface and a conical bearing surface with head angles or nominally 82 degrees for inch fasteners and 90 degrees for Metric fasteners.

CRACKS

Fractures passing through or across material grain boundaries without the inclusions of foreign elements.

CREST

The surface point, at which the thread joins the thread flanks.

CREEP

Creep is deformation with time when a part is subjected to constant stress. Metals creep can occur at elevated temperature however with gasket materials it can occur at normal ambient temperatures. Creep resistance is an important property of gasket materials. Gasket materials are designed to flow under stress to fill any irregularities in the flange surface. The amount of creep sustained tends to increase with temperature. However once the tightening is completed it is important that no further flow occurs since such deformation will lead to a reduction in bolt extension and subsequently the stress acting on the gasket. If this stress is reduced to below a certain minimum, which depends upon the type and construction of the gasket and the operating temperature, a high rate of leakage can be anticipated to occur.

CROSS DRILLED

A cross-drilled fastener is a fastener having one or more holes in the head or shank, at right angles to, and nominally intersecting the axis of the fastener.

CUT THREAD

A cut thread is a thread produced by removing material from the surface diameter with a form-cutting tool.



D**DACROMET**

A high performance surface coating that can be applied to fasteners. The coating consists of passivate zinc flakes that are stoved onto the metal surface. The coating can be colored and eliminates the risk of hydrogen embrittlement associated with electroplated metal. DACROM-ET is a registered trademark of Metal Coatings International, Inc. of Chardon Ohio.

DECARBURISED

A fastener has a decarburized surface when the carbon content of the surface is lower than the carbon content of the fastener's core.

DECOMPRESSION POINT

The point at which there is zero pressure at the joint interface as a result of forces applied to the joint. If the applied force is increased beyond the decompression point, a gap will form at the interface. Analytically, a criteria of joint failure is often taken as when the applied force on the joint reaches the decompression point. This is because forces acting on the bolt(s) can dramatically increase at this point. Loading beyond this point can also result in fretting at the interface that will lead to bolt tension loss that will subsequently lower the decompression point. This process can continue until bolt failure does occur. The failure can be by fatigue or other mechanism but the underlying cause was loading of the joint beyond the decompression point. It is for this reason that it is frequently taken as a failure criteria in analysis work.

DIN

An abbreviation for Deutsches Institute fur Normung, the German standards body. In reference to fasteners DIN indicates fasteners that conform to a specific metric standard and will be followed by the standard number.

DIRECT TENSION INDICATORS (DTI's)

Direct Tension Indicators (DTI's) is a term sometimes used to describe load indicating washers. Projections on the face of the washer (usually on the face abutting the bolt head or nut) that deform under loading as the bolt is tensioned. An indication of the tension in the bolt can be made by measuring the gap between the washer face and the nut or bolt head. The smaller the gap - the greater the tension in the bolt. Commonly used in civil rather than mechanical engineering applications.

DOG POINT

An unthreaded cylindrical tip that is smaller than the fastener minor diameter. Used to help speed alignment during assembly. Also called a Pilot Point.

DOWEL SCREW

A double ended screw with wood threads and points on both ends.

DRILLED HEAD

A fastener head with a hole drilled through it for a safety wire.

DRILLED SHANK

A fastener shank with a hole drilled through it for a pin or safety wire.

DUCTILE

Metal which is not brittle and can be easily formed or bent.

DYNAMIC FRICTION

Resistance to relative movement of two bodies that are already in motion.

E**EFFECTIVE DIAMETER**

This is the diameter of an imaginary cylinder coaxial with the thread, which has equal metal and space widths. It is often referred to as pitch diameter. Sometimes referred to as the simple effective diameter to differentiate from the virtual effective diameter.

EFFECTIVE NUT DIAMETER

Twice the effective nut radius.



EFFECTIVE NUT RADIUS

The radius from the center of the nut to the point where the contact forces, generated when the nut is turned, can be considered to act.

ELECTROLESS NICKEL

A relatively thin, hard coating that can be applied to threads and deposited uniformly. Bright metallic in appearance this coating has excellent resistance to wear and corrosion.

ELECTROPLATING

Electroplating is carried out in an electrolyte containing a chemical compound of the metal to be deposited. The fasteners to be plated are immersed in the plating bath and an electrical current is passed through the fasteners, acting as a cathode, attract the metal from the solution which builds up on the surface of the fasteners.

ELEVATOR BOLT

A bolt with a large flat disk on the top and a square section underneath, resulting in a flush finish.

ELONGATION

Longitudinal stretching of a fastener caused by a tensile load due either to tightening or to the external load.

EMBEDMENT

Localized plastic deformation which occurs in the vicinity of clamped fasteners or in the fastener threads. Embedding is local plastic deformations that occur under the nut face, in the joint faces and in the threads as a result of plastic flattening of the surface roughness. This occurs even when the loading is below the yield point of the bolt or limiting surface pressure of the joint material and is the result of the real area of contact between surfaces being less than the apparent area.

ENGAGEMENT

A measurement of how much is in the material being fastened.

ENVIRONMENTALLY ASSISTED CRACKING (EAC)

A process that can occur with the use of high strength steel fasteners in which crack initiation and growth occurs in the fastener at a comparatively low stress level as a result of interactions that occur with the environment. Hydrogen is suspected of causing EAC in high strength steel fasteners, the hydrogen being produced as a result of chemical reactions (galvanic corrosion in a moist environment) or being present from a plating process that may have been applied to the fastener.

EXTERNAL FORCE OR LOAD

Forces exerted on a fastener as a result of an applied loading to the joint.

EXTERNAL THREAD

A screw thread which is formed on an external cylinder, such as on bolts, screws, studs etc.

EYE BOLT

A bolt with a circular ring on the head end. Used for attaching rope or chain.

F**FASTENER**

A fastener is a mechanical device for holding two or more bodies in definite positions with respect to each other.

FATIGUE STRENGTH

Under variations in applied stress, a fastener experiences internal stretching that can cause rupture after a specific number of cycles. The number of cycles to failure for a specific load is the fatigue life of the fastener.

FERROUS

Related to or containing iron. When used in reference to fasteners, it denotes a fastener that contains more iron than any other element.





FILLET

A fillet (radii) is the concave section formed at the juncture of two intersecting surfaces on a fastener.

FILLISTER HEAD

Similar to a Cheese head but with a smaller head diameter and a taller head, with higher vertical sides.

FINISH

The term finish is commonly applied to the condition of the surface of fastener because of chemical or organic treatment, subsequent to the manufacture of the fastener.

FINISHING WASHER

A washer designed for the use with countersunk screws. Used to enhance appearance in some applications.

FIT

Fit is the general term used to signify the range of tolerance parameters.

FLANGE BOLT

A bolt with a built in washer-like flange just below the head.

FLAT HEAD

A flat head with a conical bearing surface. Designed to be countersunk.

FLEX LOCK

A type of lock nut where the top of the nut has been slotted and bent inward. When assembled the pressure of the threads prevent the nut from backing off.

FLOATING

The ability of the fastener to move in a direction parallel to the mounting panel and allow for mating hole misalignment.

FLOATING TYPE FLANGE JOINT

A conventional flanged joint in which a gasket is compressed by bolts - the gasket is not rigidly located. Calculation methods such as the ASME code in the USA and the EN1591 code in Europe.

FLUORO-CARBON THREAD COATING

A low friction coating applied to threads. This type of coating is frequently used to prevent thread fouling when an assembly containing threaded fasteners is painted. Unless masked in some way before painting, electro deposited primers can cover the threads. If this occurs assembly difficulties can result unless the expensive chore of cleaning the threads is completed. A fluoro-carbon thread coating eliminates the need for masking or cleaning since paint will not adhere to the coating. This type of coating can also prevent problems caused by weld splatter obstructing the threads of weld nuts during their placement. Such coatings also have the property of reducing the torque-tension scatter during tightening.

FLUSH

The ability of the fastener to be contained completely within the thickness of a panel. Also refers to the absence of a protrusion above of the surface of the panel.

FORGING

Forging is the process of forming a product by hammering or the displacement of material under force. When the material is forged below the re-crystallization temperature it is said to be cold forged. When worked above the re-crystallization temperature having been pre-treated, it is said to be hot forged.

FORM OF THREAD

The profile of a thread in an axial plane for a length of one pitch.



FRICTION

Mechanical resistance to the relative movement of two surfaces. There are two main types of friction; STATIC FRICTION and DYNAMIC FRICTION. Typically static friction is greater than dynamic friction.

FRICTION STABILIZERS

Coating materials used on fasteners with the intention of reducing the scatter in the thread and bearing surface friction coefficients.

FUNDAMENTAL DEVIATION

An intentional clearance between internal or external thread and the design form of the thread when the thread form is on its maximum metal condition. For metric threads the fundamental deviations are designated by letters, capitals for internal threads and small letters for external threads. For imperial threads the fundamental deviation is called the allowance.

FUNDAMENTAL TRIANGLE HEIGHT

The fundamental triangle height is normally designated with the letter H. This is the height of the thread when the profile is extended to a sharp vee form. For 60 degree thread forms such as metric and Unified thread series, H equals 0.866025 times the thread pitch.

G**GALLING**

A severe form of adhesive wear which occurs during sliding contact of one surface relative to another. Clumps of one part stick to the mating part and break away from the surface. (Can frequently occur when both the nut and bolt are made from stainless or high alloy steels, titanium or zinc coated fasteners.)

GALVANIZING

Galvanizing is the process of coating metal with molten zinc by hot dipping. Not to be confused with zinc plating which is an electrolytic process.

GIMLET POINT

A gimlet point is a threaded point on a fastener, usually having a point angle of 45-50 degrees. It is applied on woodscrews and Type AB self-tapping screws.

GRIP LENGTH

Total distance between the underside of the nut to the bearing face of the bolt head; includes washer, gasket thickness etc.

GRIP RANGE

The minimum and maximum thickness of materials a rivet can join together.

H**HANGER BOLT**

A double ended bolt with machined threads on one end (takes a nut) and wood threads on the other end.

HARD JOINT

A joint in which the plates and material between the nut and bolt bearing surfaces have a high stiffness when subjected to compression by the bolt load. A joint is usually defined as hard if the bolt is tightened to its full torque and it rotates through an angle of 30 degrees or less after it has been tightened to its snug condition.

HARDENED

A fastener that has been heat treated to improve its mechanical properties.

HARDENED WASHERS

The force under the head of a bolt or nut can exceed, at high preloads, the compressive yield strength of the clamped material. If this occurs excessive embedding and deformation can result in bolt preload loss. To overcome this hardened washers under the bolt head can be used to distribute the force over a wider area into the clamped material. A more modern alternative is to use a flange headed nuts and bolts.



HEAD DIAMETER

It is the diameter at the largest extremity of the head.

HEAD STYLE

The type of head or top that is on the fastener. Such as a Round head or Hex head.

HEADER POINT

A blunt point with chamfered edges. Usually found on machine screws.

HEADLESS FASTENER

A headless threaded fastener is a fastener normally having a slot, recess, or socket in one end to drive the fastener into the assembly.

HEAT TREATMENT

Surface treatment is any treatment, which changes the chemical, physical or mechanical properties of a surface.

HELICAL SPRING WASHER

A split type of spring washer whose purpose is to prevent self-loosening of the nut or the bolt. The idea or principle behind the helical spring washer is for one end of the tang of the washer to indent into the fastener (the nut or bolt head) and the other into the joint surface so that any loosening rotation is prevented.

HELI-COIL

A system used for re-threading stripped internal threads. A special size tap is used to re-thread the hole and a spring like insert is placed inside to make up the difference in width, allowing the original size bolt to be used.

HEX BOLT

A bolt with a six sided head.

HEXAGO (HEX) HEAD

A hexagon head has a flat or indented top surface, six flat sides and a flat bearing surface.

HEXALOBULAR INTERNAL DRIVE

Hexalobular internal drive feature for bolt and screws is an international standard. The recess socket is hexalobular (i.e. a hexagon profile with rounded edges). This is also a hexalobular external drive system.

HIGH STRENGTH FASTENER

A high strength fastener is a fastener having high tensile and shear strength attained through combination of material types, work hardening and heat treatment.

HIGH STRENGTH FRICTION GRIP BOLTS

Sometimes abbreviated to HSFG bolts. Bolts which are of high tensile strength used in conjunction with high strength nuts and hardened steel washers in structural steelwork. The bolts are tightened to a specified minimum shank tension so that transverse loads are transferred across the joint by friction between the plates rather than by shear across the bolt shank.

HOLD AND DRIVE BOLTS

Special bolts that have a tang at the threaded end of the shank. This tang is gripped by the tightening tool during assembly so that the reaction torque is absorbed whilst the nut is tightened from the same side. Such bolts allow what used to have to be done by two men to become a one-man task.

HOT BOLTING

This term is used for the completion of maintenance work on a bolted joint when the joint is under loading. This can involve the replacement of individual bolts. There are risks both to the joint itself and to health and safety associated with this technique.



HOT-DIP GALVANIZING

The process of coating iron or steel with zinc by means of hot dipping.

HYDRAULIC TENSIONER

A hydraulic tool used to tighten a fastener by stretching it rather than applying a large torque to the nut. After the fastener has been stretched, the nut is run down the thread to snug up with the joint, the hydraulically applied load is then removed resulting in tension being induced into the fastener.

HYDROGEN EMBRITTLEMENT

Steel fasteners exposed to hydrogen can fail prematurely at a stress level well below the materials yield strength. Hydrogen embrittlement occurs in fasteners usually as a result of the part being exposed to hydrogen at some time during its manufacturing process but it can also occur through in-service corrosion. Electroplating is generally considered to be a major cause of hydrogen absorption in steel fasteners due to the release of hydrogen during this process. Higher strength steels are more susceptible to hydrogen embrittlement than lower strength steels, however it is considered that there is no lower strength limit. As a rule of thumb, steels below Rockwell C 35 are considered to be far less susceptible. Tests such as the incremental load hydrogen embrittlement test can be completed to assess if hydrogen embrittlement is present in a batch of fasteners.

I**IMPACT WRENCH**

A wrench, usually powered by electricity or air, in which repeated blows from little hammers are used to generate torque to tighten fasteners. The torque applied to the fastener depends upon the time and the air pressure applied to the tool (for pneumatic wrenches). The torque applied by an impact wrench to a fastener is influenced by the joint stiffness.

INSTALLATION FORCE

A term expressed in pounds, tons or newtons applied axially to a self-clinching fastener to achieve proper installation.

INSTANTANEOUS CENTER OF ROTATION

The point in space that an eccentrically shear loaded joint rotates about. The deformation and the load sustained by an individual bolt in a bolt group is dependent upon the distance that the bolt is from the instantaneous center. The direction that the individual bolt force acts is perpendicular to a line joining that bolt to the instantaneous center.

INTEGRAL FASTENER

A term used to describe types of fasteners which are highly resistant to vibration loosening and/or removal. Some types have special thread forms.

INTERFERENCE FIT

The insertion of one member into another whose diameter is slightly smaller than the part being inserted. INTERNAL

THREAD

A screw thread which is formed in holes, such as in nuts.

ISO

International Organization for Standardization. A worldwide federation of national standardized bodies.

J**JOST EFFECT**

The name given to the reduction in the frictional resistance that occurs in a direction different to that in which slip is occurring. This effect is used in many applications including the removal of corks from bottles. If the cork is first rotated the force needed to pull the cork from the bottle is significantly reduced. It is also the fundamental reason why threaded fasteners experience self-loosening. Frictional resistance is first overcome in the transverse direction by slip occurring on the joint resulting in the frictional resistance in the circumferential direction reducing to a small value. The torque acting on the fastener in the loosening direction (as a result of its preload) that when coupled with the Jost Effect results in self-loosening occurring. The term is named after the Institute that completed research into this effect, the Jost Institute of Tribotechnology at the University of Central Lancashire in the UK.



K**K FACTOR**

The factor in the torque tightening equation: $T=KDF$ where T is the fastener tightening torque in Newton meters, D is the fastener diameter in meters, F is the fasteners preload in Newtons and K is a factor whose value is often taken as 0.2. The formula gives the approximate tightening torque for standard fasteners used under normal conditions. The K factor is also known as the nut factor and the torque coefficient.

KEPS

A pre-assembled nut and washer assembly (the washer is attached to the nut so that it won't fall off)- a trademark of ITW Shakeproof. The origin of the word came from ShaKEProof. The s on the end being acquired due to them being purchased in quantities usually greater than one.

KNURLED CLINCHING RING

The displacer portion of a fastener which has corrugations and is used to develop torque resistance when installed in sheet metal.

KNURLING

Knurling is the process of producing a shallow serration on the material surface by means of a forming tool. Particularly associated with hexagon socket cap screws to provide grip for installing the first few threads of the fastener hand. LEFT

HAND THREAD

A screw thread that is screwed in by rotating counterclockwise.

L**LENGTH**

The length of a headed fastener is the distance from the intersection of the largest diameter of the head with the bearing surface to the extreme point, measured in a line parallel to the axis of the fastener.

LENGTH OF ENGAGEMENT

The axial distance over which an external thread is in contact with an internal thread.

LOCKING ELEMENT

A device employed to restrict rotation of a threaded member while operating in adverse environments, such as vibration and temperature. The nut-locking element provides prevailing locking torque to the mating screw.

LOCK NUT

There are two common usages of this term:

1. A nut which provides extra resistance to vibration loosening by either providing some form of prevailing torque, or, in free spinning nuts, by deforming and/or biting into mating parts when fully tightened.
2. The term is sometimes used for thin (or jam) nuts used to lock a thicker nut. When used in this way the thin nut should be adjacent to the joint surface and tightened against the thick nut. If placed on top of the thick nut the thin nut would sustain loads it was not designed to sustain.

M**MAJOR DIAMETER**

This is the diameter of an imaginary cylinder parallel with the crests of the thread; in other words it is the distance from crest to crest for an external thread, or root to root for an internal thread.

MEANSHIFT

The difference in tightening torque values produced by the same tightening tool on hard and soft joints. A hard joint typically gives a higher torque value than a soft joint. Generally speaking, the lower the meanshift of a tightening tool, the better it will be in achieving a specified torque value irrespective of the joint condition.

METAL TO METAL CONTACT FLANGE JOINT

A flanged joint in which a gasket is compressed by bolts - the gasket being located in a recess within the joint so that it is compressed by the bolt loads until metal to metal contact occurs. Unlike the FLOATING TYPE FLANGE JOINT, for metal to metal type joints there are no standardized gasket factor definitions, test procedures, nor generally acknowledged calculation procedures available.



MINOR DIAMETER

This is the diameter of an imaginary cylinder which just touches the roots of an external thread, or the crests of an internal thread.

MODEL ENGINEERS THREAD (M.E.)

A thread based upon the Whitworth thread form that was established in 1912. A very fine thread (a 3/32 inch thread having 60 tpi for example).

MOLYBDENUM DISULPHIDE

A solid lubricant that acts as a high pressure resistant film. Can be used by itself as a dry lubricant as well as in with other solid lubricants and in oils and greases. Used in threads, such lubricants act as a separating film to prevent corrosion formation on the thread surface (even under adverse temperature and environmental conditions) ensuring the release of the threaded connection. Such films can also act as friction stabilizers.

MOUNTING HOLE

A properly-sized round opening in a panel to receive the shank of a self-clinching fastener.

N**NECK**

Neck is used to define a reduced diameter for a portion of the shank of a fastener, which is required for design or manufacturing reasons.

NICKED THREADS

Nicks or indentations in threads can occur during the manufacturing process and during fastener transportation. In general, nicked thread problems tend to increase as the thread diameter increases and for fine pitches.

There are acceptance tests for nicked threads that involve measuring the maximum torque required to drive a GO gauge down the thread. Examples of acceptance tests are SAE J123 and the Ford Motor specification WA990 1993. Nicks and indentations in threads are sometimes referred to as gouges.

NOMINAL DIAMETER

The diameter equal to the external diameter of the threads.

NON-FERROUS METAL

Metals or alloys without an appreciable amount of iron. Examples are aluminum, brass, and copper.

NON-STANDARD FASTNER

A non-standard fastener is a fastener which differs in size, length, material or finish from established international standards.

NUT DILATION

Under load, the wedging action of the threads causes dilation of the nut resulting in an increase in the minor diameter of the nut, and reducing the effective shear areas of both the external and internal threads.

NUT RUNNER

A torque control fastener tightening tool that is usually powered by compressed air. The design of the tool is such that attempts are made to ensure that the applied torque is independent of joint stiffness.

NUT THICKNESS

Nut thickness is the overall distance from the top of the nut to the bearing surface, measured parallel to the axis of the nut.

NYLOC NUT

A torque prevailing nut that uses a nylon patented insert to provide a locking feature. The nylon insert, it is claimed, helps to seal the bolt thread against seepage of water, oil, petrol, paraffin and other liquids. The nut is covered by UK patent 8028437 and European patent 81303450-1. Nyloc is a registered trade name of Forest Fasteners.



O**OCTAGON HEAD**

A bolt or screw whose head cross section is a regular polygon with 8 sides.

OVER HEAD

A countersunk screw with a slightly rounded top surface for a more finished look.

OVERTAPPING

Tapping of a thread following a plating operation so that the thread tolerances comply within specification allowing the internal and external threads to assemble. It is normal practice to overtap the internal rather than the external thread.

P**PAN HEAD**

A head with a slightly rounded top surface and short vertical sides.

PANEL FASTENER

A threaded screw which is held captive to a panel and which, when disengaged from its main nut, remains fixed to that panel.

PHYSICAL PROPERTIES

Physical properties are the strength grade properties defining the basic characteristics of the material or fastener.

PILES

Term used in structural engineering for the joint plates.

PILOT POINT

An unthreaded cylindrical tip that is smaller than the fastener diameter. Used to help speed alignment during assembly. Also called a Dog Point.

PITCH

The nominal distance between two adjacent thread roots or crests.

PITCH DIAMETER

The diameter of a theoretical cylinder that passes through the threads in such a position that the width of the thread ridges and thread grooves are equal.

PLAIN FINISH

Plain, as applied to the finish of fasteners, is used to indicate that the fastener has had no supplementary surface treatment, such as plating or coating, other than being oiled. Sometimes referred to as self-color or black.

PLATING

Plating is the process of a metallic deposit on the surface of the fastener by electrolysis.

PLATING BUILD-UP

Plating build-up is the term used to describe the condition of excessive plating on threads, edges or corners.

PLOW BOLT

A bolt with a smooth flat countersunk head that has a small square section underneath. Used on plows.

PLY

A single thickness of steel forming part of a structural joint.

POINT ANGLE

The point angle is the included angle of the point.



POINTING

Pointing is a secondary machining operation consisting of cutting points on fastener blanks, which have not forge-pointed during heading operation.

POOCHING

Pooching is a term sometimes used to describe the effect of the area immediately surrounding a tapped hole being raised up as a result of the tension from the stud. Tapped holes are often bored out for the first couple of threads to eliminate this problem.

PRELOAD

The tension created in a fastener when first tightened. Reduces after a period of time due to embedding and other factors.

PREVAILING TORQUE

The torque required to run a nut down a thread on certain types of nuts designed to resist vibration loosening. The resistance can be provided by a plastic insert or a noncircular head.

PREVAILING TORQUE NUT

A type of lock nut which has a prevailing torque to assist in preventing self-loosening. There are two main categories of prevailing torque nuts, all metal and nylon insert. All metal torque prevailing nuts generally gain a prevailing torque by distorting the threads at the top of the nut by some means. Nylon insert torque prevailing nuts utilize a nylon (or other polymer) insert to achieve a prevailing torque.

PROOF LOAD

The proof load of a nut is the axially applied load the nut must withstand without thread stripping or rupture. The proof load of a bolt, screw or stud is the specified load the product must withstand without permanent set.

PROOF TEST

A proof test is any specific test required for a fastener to indicate that it is suitable for the purpose intended.

PROPERTY CLASS

A designation system which defines the strength of a bolt or nut. For metric fasteners, property classes are designated by numbers where increasing numbers generally represent increasing tensile strengths. The designation symbol for bolts consists of two parts:

1. The first numeral of a two digit symbol or the first two numerals of a three digit symbol approximates 1/100 of the minimum tensile strength in MPa.
2. The last numeral approximates 1/10 of the ratio expressed as a percentage between minimum yield stress and minimum tensile stress. Hence a fastener with a property class of 8.8 has a minimum tensile strength of 800 MPa and a yield stress of $0.8 \times 800 = 640$ MPa. The designation system for metric nuts is a single or double digit symbol. The numerals approximate 1/100 of the minimum tensile strength in MPa. For example a nut of property class 8 has a minimum tensile strength of 800 MPa. A bolt or screw of a particular property class should be assembled with the equivalent or higher property class of nut to ensure that thread stripping does not occur.

PRYING

The amplification of an external force acting on a bolt by a lever action which can occur when that force is an eccentric tensile load.

PULL-THROUGH

The resistance of a fastener to a force applies in the same direction to which it was installed.

PUSH-OUT FORCE

The force required to remove a fastener from a panel in a direction opposite to the way from which it was installed.

R**RECESSED DEPTH**

The recessed depth is the distance measured parallel to the fastener axis from the intersection of the fastener head, with the maximum diameter of the recess to the bottom of the recess.



RECESSED HEAD

A recessed head is a formed indentation or recesses centered in the head of the fastener.

REDUCED SHANK BOLT

A bolt whose shank diameter is smaller than the nominal diameter of the bolt (normally the shank diameter of such a bolt is approximately equal to the effective diameter of the thread).

RELAXATION

The loss of clamping force in a bolt that occurs typically without any nut rotation occurring. Commonly occurs as a result of embedment but can also be due to gasket creep, metal creep (at elevated temperatures), differential thermal expansion and stress relaxation.

REVERSE THREAD

Thread that is formed opposite to normal thread so it tightens counter clockwise. Used on spinning equipment to prevent loosening. Also called Left Hand Thread.

RIGHT HAND THREAD

A screw thread that is screwed in by rotating clockwise. The majority of screw threads are right handed.

ROCKWELL HARDNESS

A relative measure of hardness. Rockwell C Scale is used for hard materials. Rockwell B for softer materials, such as sheet metal.

ROLLED THREAD

A thread formed by plastically deforming a blank rather than by cutting. The majority of standard fasteners have their threads formed by rolling. Most threads are rolled before any heat treatment operation. Significant improvements in fatigue life can be achieved by rolling the thread after heat treatment, this improvement is due to compressive stresses being induced in the roots of the thread. However, because of the increased hardness of the bolt blank, the die life can be significantly reduced. Rolling the thread also generally improves the surface finish which can have a beneficial effect on fatigue life.

ROOT DIAMETER

See **MINOR DIAMETER**

S**SCREW**

A headed threaded fastener that is designed to be used in conjunction with a pre formed internal thread or alternatively forming its own thread. Historically, it was a threaded fastener with the thread running up to the head of the fastener that has no plain shank. However this definition has largely been superseded to avoid confusion over the difference between a bolt and a screw.

SCREW THREAD

A ridge of constant section which is manufactured so that a helix is developed on the internal or external surface of a cylinder.

SELF CLINCHING

The method by which a fastener is securely attached to a sheet of ductile material by causing the material to cold flow under pressure into an annular recess of the fastener thereby securely locking it in place.

SELF LOCKING

A locking element, formed as an integral part of a fastener, which provides force to restrict the rotational movement of a threaded member.

SELF LOOSENING

Threaded fasteners can come loose on occasions without human intervention. This loosening can be due to creep, embedding, stress relaxation or the fastener self-rotating (which is often called vibration loosening). Creep, embedding and stress relaxation will generally not completely loosen a fastener, these loosening mechanisms occur without the nut rotating relative to the bolt. The term self-loosening is sometimes used for the nut rotating relative to the bolt without human intervention. It is known that the fastener can self-rotate under the action of transverse joint movement that can completely loosen a tightened fastener such that the nut will become detached from the bolt.



SEMS

A screw and washer assembly. A screw or bolt which has a captive washer. The washer is frequently loose on the plain shank of the fastener, the shank diameter being equal to the effective diameter of the thread; the thread being rolled from this diameter. The origin of the word is said to come from the word "pre-asSEMBled" washers and screws. The s at the end of SEMs is thought to have been subsequently picked up because they are not usually purchased individually. In spite of the original patents and trademarks the word SEMS is generally recognized as a generic term applicable to screw and washer assemblies.

SET SCREW

A set screw is a threaded fastener that is typically used to hold a sleeve, collar or gear on a shaft to prevent relative motion. It is a threaded member that normally does not have a head. Unlike most other threaded fasteners it is basically a compression device normally used to generate axial thrust. Various socket types are provided to allow the set screw to be rotated. These types include hexagon socket, fluted socket, screwdriver slot and square head. Various point designs are available (the part of the set screw that rotates against the shaft being secured) and include:

Cup - Hollowed end, is the most commonly used point style. Used when the digging in of the point is not undesirable.

Cone - Pointed end, this type generates the highest torsional holding power and is typically used for a permanent connection.

Oval - Rounded end that is typically used when frequent adjustment is required. The oval end prevents/reduces indentation.

Flat - Cause little damage to the shaft and are used when frequent adjustment is required.

Dog - Flat end with the threads stopping short of the end with the end fitting into a hole.

SHANK

That portion of a bolt between the head and the threaded portion.

SHANK DIAMETER

The diameter of the shank or smooth part of the bolt above the threads.

SHOULDER SCREW

A threaded fastener with a plain, precision machined, shank that is used for location purposes. They are typically used for pulleys and linkages.

SKIDMORE BOLT TENSION CALIBRATOR

The Skidmore-Wilhelm bolt tension calibrator is a hydraulic load cell used to determine the tension in a bolt or other threaded fastener. The tension in the bolt compresses fluid in a hydraulic cylinder, a pressure gauge connected to the cylinder is then calibrated to read in terms of force rather than pressure.

SLOTTED NUT

A nut with slots cut into it for the insertion of a cotter pin. Used with a drilled shank fastener. Similar to a castle nut.

SNUG TORQUE

The torque required to pull plates together so that direct contact occurs; often used in angle control tightening. The snug torque ensures that metal to metal contact occurs at all the interfaces within the joint. It is only at this point that the required angle of rotation start in order that the bolt is tightened sufficiently. The snug torque is usually determined experimentally on the actual joint.

SNUGGING

The process of pulling parts of a joint together, most of the input turn during this process is absorbed in the joint with little tension being given to the bolt.

SOCKET DEPTH

The socket depth is the distance measured parallel to the fastener axis from the socket head face to the extreme end of the socket. In socket head cap screws, the effective socket depth is most often specified as "key engagement" as related to the hexagon wrench used for insertion.

SOCKET HEAD CAP SCREW

A screw with a round head, usually with a hexagon indentation in the head for tightening purposes. Used on machine parts and is typically made from high strength steel.



SOFT JOINT

A joint in which the plates and material between the nut and bolt bearing surfaces have a low stiffness when subjected to compression by the bolt load. In such a joint, the bolt (or nut) typically has to be tightened by two or more complete turns, after it has been torqued to the snug condition, before the full tightening torque is achieved. Often the placement of a gasket in a joint results in a soft joint.

SOFT TORQUE

An alternative name, used by some manufacturers, for snug torque.

SPIRAL WOUND GASKET

A type of gasket that is made by winding V-section metal strip and a softer filler material together. Support or retaining rings, inside and/or outside the spiral, improve the gasket's handling and fitting. The filler material used is typically graphite or PTFE. The metal strip and retaining rings being typically made from stainless steel.

SQUARE BOLT

A bolt with a four sided head.

STANDARD FASTENER

A standard fastener is a fastener, which conforms in all respects to recognized international standards.

STANDOFF

A tubular device, usually threaded, for spacing or stacking components.

STATIC FRICTION

Friction at rest; a force is required to initiate relative movement between two bodies - static friction is the force that resists such relative movement. Sometimes referred to as stiction.

STEP-LOCK BOLT (SLB)

The Step-Lock Bolt (SLB) is a thread form that has been modified to resist vibration loosening. The thread has several horizontal portions (i.e. no lead angle) whose purpose is to prevent torsion being developed in the bolt as a result of the loosening purpose. It is these horizontal portions that are known as steps. Published literature indicates that the thread form performs well when tested on a transverse vibration test machine. However manufacturing difficulties may prevent its widespread adoption.

STIFFNUT

A term used to describe a lock nut which has a prevailing torque.

STOVE BOLT

Machine screws, generally slotted, packaged with nuts.

STRENGTH GRADE

See **PROPERTY CLASS**

STRESS AREA

The effective cross sectional area of a thread when subjected to a tensile force. It is based upon a diameter which is the mean of the pitch (or effective) and the minor (or root) diameters of the thread.

STRESS RELAXATION

A significant problem with bolting at high temperatures is a phenomenon known as stress relaxation. Creep occurs when a material is subjected to high temperature and a constant load. Stress relaxation occurs when a high stress is present that is relieved over time; the stress is relaxed with a subsequent reduction in the bolt's preload. The only way to minimize the effects of stress relaxation is to use materials that have an adequate resistance to it at the product's operating temperature. The effect of bolt stress relaxation is to reduce the clamp force provided by the bolts; this phenomena alone will not fully loosen a joint.



STRUCTURAL BOLT

A structural bolt is a heavy hexagon head bolt having a controlled thread length intended for use in structural connections and assembly of such structures as buildings and bridges. The controlled thread length is to enable the thread to stop before the joint ply interface to improve the fastener's direct shear performance. This term is used in civil and structural engineering but is not frequently used in mechanical engineering.

STUD

A fastener which is threaded at both ends with an unthreaded shank in between. One end (which often has a thread tolerance which results in more thread interference) is secured into a tapped hole, the other is used with a nut.

SURFACE TREATMENT

Surface treatment is any treatment which changes the chemical, physical or mechanical properties of the surface of a fastener (e.g. phosphate, zinc plating and anodizing).

SWAGGING

An operation whereby a reduced diameter of a fastener is deformed to secure in to a panel. (Opposite of self-clinching)

SYMMETRICAL THREAD

A symmetrical thread is one which has both flanks of the thread profile inclined at the same angle.

T**T NUT**

A thin nut with a flange on one end. Intended to be inserted in a hole, in wood, with the flange on the surface. Used to allow a bolt to be fastened in wood without a protruding nut.

TAMPER PROOF

A fastener designed so it can be installed with a screw driver or other special tool and cannot be removed without destroying the screw. Used to prevent tampering.

TAP BOLT

A fully threaded bolt.

TAPER

Taper may refer to the geometry of the head, shank or some other feature of a fastener.

TAYLOR-FORGE METHOD

A method developed by four engineers of the Taylor-Forge Company in Chicago in the 1930's that subsequently formed the basis of the ASME code for flanged joint design. The assumptions made by the method are now generally regarded as too simplistic. This method gives rise to the m and y gasket factors.

TEMPER

Temper is a process that is carried out after hardening whereby the fastener is reheated for a controlled period in order to refine the grain structure and acquire certain mechanical properties.

TENSILE STRENGTH

Tensile strength is the maximum tension (pull or tautness) applied as a loading, that a fastener can support prior to, or coincidental with, its fracture.

TENSION WASHERS

A general name given to spring washers, curved washers, Belleville washers and disc springs. This type of washer provides a relatively low stiffness (compared to the joint stiffness) and can be used to act as a spring take-up with a bolt to prevent movement between parts.



THREAD

A thread is a triangle profile of uniform in the form of a helix in the external or internal surface of a cylinder. This is known as a straight or parallel thread to distinguish it from a taper thread, which is formed on a cone or frustum.

THREAD CREST

The top part of the thread. For external threads, the crest is the region of the thread which is on its outer surface, for internal threads it is the region which forms the inner diameter.

THREAD ENGAGEMENT

The percentage of the thread height that is in the material being fastened. For full thread engagement the pilot hole should be equal to or smaller than the root diameter of the fastener.

THREAD FLANK

The thread flanks join the thread roots to the crest.

THREAD HEIGHT

This is the distance between the minor and major diameters of the thread measured radially.

THREAD LENGTH

Length the portion of the fastener with threads.

THREAD ROOT

The thread root is the bottom of the thread, on external threads the roots are usually rounded so that fatigue performance is improved.

THREAD RUNOUT

The portion at the end of a threaded shank which is not cut or rolled to full depth, but which provides a transition between full depth threads and the fastener shank or head.

THREADLOCKER

Can be a term used for a number of vibration resistant products but is now usually reserved for threadlocking adhesives. Specifically, a liquid anaerobic adhesive applied to nut or bolt thread, once hardened it fills the inner spaces between the threads to produce a solid plastic of a known shear strength.

THREAD SERIES

A term used to describe the number of threads per inch for a given diameter.

THROUGH HARDENED

A bolt that has been heat treated all the way through. More brittle but stronger than a case hardened bolt. Also called fully hardened.

THROUGH HOLE

A hole, threaded or not threaded, which traverses the entire length of a part and is usable from either end.

TIN/ZINC ALLOY ELECTROPLATING

Tin/zinc alloy coatings (typically 70% tin and 30% zinc) are applied to threaded fasteners to provide a corrosion resistant coating. One of the advantages of such coatings is that bimetallic corrosion will not occur when placed into contact with such metals as aluminum or steel.

TOLERANCE CLASS

A combination of tolerance grade and a fundamental deviation which is given to an internal or external thread. A tolerance class for an internal thread when combined with the tolerance class for an external thread gives the class of fit for the mating threads.

TOLERANCE GRADE

The difference between maximum and minimum metal conditions for a tolerance applied to a screw thread. For metric threads the tolerance grade is given a number.



TORQUE

A rotational moment; it is a measure of how much twisting is applied to a fastener. The units used to measure torque are in the form of force x length. Usually measured in newton-meters (Nm) if metric units are used or pounds feet (lb-ft) when imperial units are used.

TORQUE MULTIPLIER

A gearbox used to increase the torque produced by a small hand wrench.

TORQUE WRENCH

A manual wrench which incorporates a gauge or other method to indicate the amount of torque transferred to the nut or bolt.

TORSION

Twisting movement of force applied to a fastener during tightening.

TRUSS HEAD

An extra wide low profile head with a slightly rounded top surface.

TWELVE-POINT HEAD

A fastener with a twelve-point head has a flat or indented top surface, twenty-four flat sides, and a circular collar at the bottom of the head and a flat bearing surface. It is sometimes called a "Double Hexagon Head".

U**U BOLT**

A U shaped fastener threaded at both ends used primarily in suspension and related areas of vehicles.

ULTRASONIC EXTENSOMETER

An instrument which can measure the change in length of a fastener ultrasonically as the fastener is tightened or measure the length before and after it is tightened).

UNC

Unified National Coarse (UNC) is a thread form with a 60 degree flank angle rounded roots and flat crests. For a given diameter it has a larger thread pitch than an equivalent diameter UNF thread. The unified thread is based on inch sizes and was first standardized in 1948 unifying the Whitworth and American standard thread forms.

UNDER HEAD FILLET

An under head fillet (radius) is the fillet at the juncture of the head and shank of a headed fastener.

UNDERCUT HEAD

A countersunk head that has been cut off at 70% of the normal height.

UNEF

Unified National Extra Fine (UNEF) is a Unified thread form with a very fine (small) pitch that are typically used on instruments and parts requiring a fine adjustment.

UNF

Unified National Fine (UNF) is a thread form with a 60 degree flank angle rounded roots and flat crests. For a given diameter it has a smaller thread pitch than an equivalent diameter UNC thread.

UNR

Unified National (UN) thread form with a rounded root contour, applies only to external threads. (The UN thread form has a flat, or optionally, a rounded root contour.) The majority of fasteners with a Unified thread form have a rounded root contour i.e. are UNR threads.



V**VIRTUAL EFFECTIVE DIAMETER**

The effective diameter of a thread but allowing for errors in pitch and flank angles.

W**WAISTED SHANK BOLT**

A bolt whose diameter is less than the minor diameter of the thread. Frequently the shank of the bolt is 0.9 times the root diameter.

WASHER FACE

A washer face is a circular boss under the head of the fastener, providing a bearing surface. Applicable for a bolt or nut.

WASHER HEAD

A washer head is a fastener head having a flanged collar under the head of the fastener to provide a bearing surface. Commonly known as a flanged head, relative to the generic product type.

WASHER

A washer is a part having a centrally located hole. The washer performs various functions when assembled between the bearing surface of a fastener and the part being attached.

WIDTH ACROSS CORNERS

The width across corners of a hexagon, square or rectangular geometry measured from corner to corner.

WIDTH ACROSS FLATS

The width across flats of hexagon or square heads of fasteners is the distance measured across the flats of the fastener head.

WING NUT

A nut with “wings” for easy manual assembly.

WIRE THREAD INSERT

A threaded insert that is typically used for tapped hole repair or to improve the thread stripping strength of softer metals such as zinc and aluminum. The inserts are assembled into a previously tapped hole using a special driving tool. A thread locking compound is frequently used to secure the insert if the assembly is subject to vibration.

WORK HARDENING

Work hardening is the increase in hardness and hence strength, resulting from plastic deformation at a temperature below the recrystallization range.

Y**YIELD CONTROLLED TIGHTENING**

A fastener tightening method which allows a fastener to be tightened to yield. The angle of rotation of the fastener is measured relative to the applied torque, yield being assessed when the slope of the relationship changes to below a certain value. Sometimes called joint controlled tightening.

YIELD POINT

The stress necessary to produce elongation under load of 0.5% of the specimen’s original length. Expressed in N.mm².

YIELD STRENGTH

The maximum load at which a material exhibits a specified permanent deformation. It is usually at a point of 0.2% permanent strain.





Z

ZINC ELECTROPLATING

Zinc electroplating is a common way to protect threaded fasteners from the effects of corrosion. Zinc electroplating can be completed in acid chloride, alkaline or cyanide baths. Supplemental coatings are frequently applied to zinc electroplating. These coatings, such as zinc phosphate or chromate conversion, provide a protective passivation layer on the zinc which assists in reducing the corrosion rate.

ZINC/COBALT ALLOY ELECTROPLATING

This coating is similar to zinc electroplating completed in an acid chloride bath - a small amount of cobalt (typically about 1%) is added to increase the plating speed.

ZINC PHOSPHATE CONVERSION COATING

A zinc phosphate conversion coating is frequently added to zinc electroplated parts, such as bolt threads, to improve corrosion resistance. This type of chemical conversion coating provides a protective passivation layer on the zinc improving its corrosion resistance.

