

## Gantrex<sup>®</sup> Rail & Runway Glossary

*Last updated: 08-18-08*

A1-00 – ASTM standard for the production of Tee Rail Sections.

A307 – ASTM designation for typical carbon steel bolt. Similar to SAE Grade 2 bolt.

A325 – ASTM designation for carbon steel bolt. Similar to SAE Grade 5 bolt.

A490 – ASTM designation for high strength structural steel bolt. Similar to SAE Grade 8.

A759-00 – ASTM standard for the production of Crane Rail Sections.

AISC – American Institute of Steel Construction

AIST – Association for Iron and Steel Technology. Organization of metals industry professionals that have written consensus standards for cranes, mill buildings and bumpers. AIST Technical Report #6 is the specification for steel mill overhead cranes and bumpers. TR#13 is the specification for mill buildings. (Formerly AISE).

ANSI – American National Standards Institute

ASCE – American Society of Civil Engineers. Producers of T-Rail standards.

ASME – American Society of Mechanical Engineers

ASTM – American Society for Testing and Materials. Now ASTM International.

A-Rail – Rail profiles manufactured Germany DIN standards. Also known as DIN Rail.

Austempering – Heat treating process in which steel is quenched in a salt bath at high temperatures to increase ductility and hardness to provide higher impact and fatigue strength.

Back-Set – Distance that must be maintained between the front edge of the lower component and the edge of the rail flange to allow the locating lug to fit against the rail flange, also known as a rail clip lower offset.

Bay – Distance between 2 columns, usually the length of a runway girder.

Blank Ends – When the ends of rail are not drilled for mechanical splices because they are intended to be joined by welding.

Bolt Assembly – Assembly consisting of bolt, washer and nut.

Bolt Diameter – Typically the bolt thread diameter, to describe the bolt size.

Bolt Torque – Required force to properly secure a rail clip or tie-back bolt.

Brinell – Hardness test method and scale typically used to gauge the hardness of rail. Brinell Hardness Number, (BHN) is the 3-digit number that describes rail head hardness.

Bumper – Device used at the end of bridge or trolley travel (end stop) to absorb or dissipate the energy of impact produced by a crane striking and end stop. Also referred to as “buffer” or “shock absorber”. Bumpers can also be mounted on the crane or trolley.

C – Suffix used to describe a cut clip used close to the seam of mechanical splices.

Cam – Self-locking special cam which is part of the Gantrex® Stelcam™ rail clip.

Camber – Curvature of beam or girder in the plane of its web before loading. Positive camber of a girder is also known as “pre-loading” so when the load is applied during operation of the crane and the girder sags under the load, it does not pass the horizontal.

Capacity – Maximum load, in tons which a crane is designed to support.

Cap Channel – Also channel cap; an inverted section of rolled channel steel placed overtop of a runway girder to widen the girder and add strength to distribute the loads produced by a crane as it travels down a runway.

Capsule Bumper – Hydraulic bumper without mounting flanges, to be mounted in some type of bracket or holder.

Cast Iron – Ductile, Malleable and Nodular are all names for the material used to cast rail clip upper components.

Cement-Based Grout – Non-shrink cement grout that is pre-blended and ready to use once water is added. Contains non-ferrous fluidifiers and anti-shrinkage compounds accurately blended with graded siliceous aggregate.

Clip Body – Main component of a Stelcam™ rail clip that, along with the cam, is held together with a through bolt assembly to secure rail with positive lateral force.

Clip Bolt Cavity – Hex-shaped slotted hole that receives the bolt head prior to clip assembly.

Clip Face – Front portion of the rail clip upper component, including the nose and the locating lug that is removed to create a cut clip.

Clip Lower Component – Weldable forged steel bottom part of a Weldlok™ rail clip that is permanently fixed to a runway girder or soleplate. It holds the clip bolt in a slotted hole.

Clip Upper Component – Top part of a Weldlok™ rail clip that is adjustable to secure and realign the rail by putting pressure on the rail flange via the locating lug.

CMAA – Crane Manufacturers Association of America.

Column – Usually refers to a building column that supports the main structure, or a crane column that supports the runway girders. A tie-back assembly is installed between the building column and runway girder to provide a flexible connection and reduce fatigue related cracks that could occur with rigid connections.

Column Bracket - Portion of the tie-back assembly that bolts or welds to the building column.

Cone Head Bolt – Metric sized bolt used to join the upper and lower components of a weldable base rail clip together. Bolt head is conical in shape instead of hex head.

Continuous Support – Typically refers to a rail system using 10 foot-long soleplates to support the rail along its entire length.

Control Cooled – Term applies to rail that is allowed to slowly cool without a finishing process after it is rolled. Typical hardness is between 248 to 320 Brinell. This is the way rail is normally produced, unless it is head-hardened.

Cover Plate – The top or bottom plate of a box girder section.

Crane Rail (CR) – North American AISC designation for 104, 105, 135, 171 and 175 LB/YD rails recommended for crane runway use. Other rails commonly used for crane runways included ASCE Light and Standard rail sizes, DIN Rail (A Rails) and MRS Sections..

Cut Clip - Upper component of a rail clip that has the face of the clip removed so it will fit under a rail splice joint.

Dead Load – The loads on a structure which remain in a fixed position relative to the structure. On a crane bridge such loads include the girders, foot walk, cross shaft, drive units, panels, etc. The runway itself is a dead load to the building.

Deceleration – Decreasing rate of change in speed of a crane or trolley after it impacts a bumper and comes to a complete stop.

DIN - Deutsches Institut für Normung, translated in English, German Institute for Standardization. The German ISO body that produces standards.

Drive Down – Full drive down refers to a bumper that has been sized so that the entire plunger is compressed as the impact progresses to the end of the available bumper stroke.

Drive On – Condition in which a motor or propelling force is engaged at the time of bumper impact with the end stop. Propelling force could also be wind in outdoor applications.

E7018 - Low-hydrogen welding rod or electrode used to weld forged clip lowers.

Edge Seals – Raised edges of Gantrex® rail pad that helps keep contaminants, such as water and dirt from seeping in beneath the rail and causing fretting corrosion.

Effective Weight – Weight of bridge, trolley or transfer car that impacts the bumper on one rail of the runway. Weight of the load is not included if it is a swinging load.

Embedment – Length of an anchor bolt that is below the soleplate and fixed into the grout and concrete below.

End Force – Resultant force, in pounds remaining after the bumper has absorbed and dissipated all the energy it is designed to handle. This remaining force is passed into the end stop, crane and building structure.

Epoxy Grout – High strength, self-leveling, readily pourable, 100% solids grout consisting of epoxy resin, hardener and aggregate.

Fatigue - Weakening of metal caused by repeated and long-continued use or strain.

Flange – Lower part of a rail section upon which it rests. Rail clips act against the rail flange to hold the rail laterally. Sometimes called the rail foot. Also the mounting portion of a crane bumper, typically either front flange or rear flange to indicate how the bumper is secured to whatever it is mounted.

Flash Butt Rail Welding – The use of electric current and pressure via hydraulic rams to butt the rail ends together at the upset temperature while the arc formed between the 2 rail ends melds them together.

Force – The action of one body to another which changes or could change its state of rest or motion. Expressed in pounds or kips or other international units.

Compression Force – Acts on a body to compact or compress (push).

Shear Force – Acts on a body with a sliding motion.

Tension Force – Act on a body toward elongating it.

Torsion Force – Acts on a body in a twisting motion.

Forged Steel – Weldable steel for rail clips that is heated to a malleable temperature and hammered into the correct shape using a large forge press and special dies.

Forging Line – Horizontal line on top of the upper component of a Gantrex® Weldlok™ rail clip that indicates the edge of the locating lug. It should line up with the rail flange edge when the clip is properly seated against the rail.

Fretting Corrosion - Fretting is a wear process that occurs at the contact area between the rail and girder under load as these members are subject to minute relative motion by vibration or other forces produced by crane movement. Small particles of both the rail and girder break off and form an abrasive dust that leads to accelerated wear and oxidation.

G – Suffix used to designate a rail clip, bolt, sole plate, etc. has been galvanized.

Girder – Sometimes called a crane beam or runway girder. The main support beneath the crane runway rails. Also refers to bridge girder, on which the trolley rails are supported. Girders are either rolled to their final shape or fabricated from individual pieces of steel.

Girder Bracket – Portion of the tie-back assembly that bolts or welds to the runway girder.

Grade 2 – See A307.

Grade 5 – See A325.

Grade 8 – See A490.

Haunch – Deepened portion of a building column designed to accommodate the higher bending moment, such as a crane runway girder.

Head Box – A container, typically constructed of wood, used to develop head pressure to control and facilitate quicker flow while pouring grout.

Head-Hardened – Term that applies to rail that has been subjected to a post-rolling process to increase the hardness of the rail head to a range of 321 to 388 Brinell. Applies only to crane rail (CR) sections.

HHCS – Hex Head Cap Screw. The North American size bolt typically used in a Weldlok™ rail clip to join the upper and lower components together.

High Carbon Rail – A newer grade of North American crane rail that has achieved hardness levels ranging from 352 to 410 BHN.

Hook Bolt – Also called a J-bolt because of its shape. A bolt that is inserted through a hole in the rail web and around the ends of channel cap or girder top flange on lighter duty cranes and shorter runway cranes to restrain the rail from moving.

Horizontal Guide Rollers – Wheels mounted on or near the end trucks which roll against the side of the rail to restrict the lateral movement of the crane.

Hybrid Support – System to support rail on concrete that incorporates intermittent soleplates but includes grout between the support platforms so the rail rests totally on a solid surface.

Hydraulic – Refers to the operational type of bumper, supplied by Gantrex® that provides energy absorption and dissipation via a plunger moving through a hydraulic fluid (oil).

I-Beam – Hot rolled beam with narrow tapered flanges. Also called an S beam.

Impact Force – The compression force a crane bumper exerts on an end stop.

Impact Load – Dynamic load resulting from the motion of a body against another. Also called live load. The forces created by these loads change based on the location of the moving body in reference to a stationary body.

Intermittent Support – System to support rail on platforms spaced a distance apart from each other. Uses shorter soleplates than continuous support, with the rail spanning the platforms.

Jam Nut – Hex nut about half the height of structural nut used with a shorter bolt to reduce overall clip height, particularly when side rollers are used, rather than flanged wheels.

J-Bolt – See Hook Bolt

Jump Girder – Larger girder used to span a larger space between two columns.

K3 – Formula designation for Gantrex® Epoxy Grout.

Kinetic Energy – Amount of energy in ft-lb produced by a bumper impact that must be absorbed or dissipated as heat.

Kip – 1,000 pounds

KSI – Kips per square inch. A measurement of stress intensity.

Lateral Force/Load – Force measured in kips acting in either direction applied perpendicular to the crane rail head and wheel flanges.

Lateral Rail Float – Amount, which should be zero that the rail is permitted to move side to side.

Lineal Feet – The total distance, in feet, of a runway or rail. 2 x the rail length per side.

Link - Portion of the tie-back assembly that includes the spherical bearings to provide flexibility in 3 planes between the runway girder and building column.

Locating Lug – The part of the upper component that protrudes down in the front of the rail clip into the back-set space. The locating lug is what contacts the rail flange edge to exert the lateral holding force of the clip.

Longitudinal Force – The force that moves a rail section in a direction parallel to travel. Caused by thermal expansion/contraction, wheel skid or wheel spin.

Low Profile - Rail clip, such as Gantrex® Weldlok™ 18 or 32 that use a jam nut and shorter bolt instead of a heavy hex nut to secure the clip components together. For use with horizontal or guide roller applications.

M16, M20, etc. – Metric bolt diameter measurement in millimeters.

MBMA – Metal Building Manufacturers Association

MK2 – Gantrex® rail pad sections for intermittent support applications.

MK6 – Heavy duty Gantrex®, steel reinforced synthetic rubber rail pad.

Moment – Tendency of a force to cause rotation about a point or axis.

Nitrogen Return Spring – Fatigueless method used instead of a mechanical spring in Gantrex® hydraulic bumpers to return the plunger to the ready position after the impacting force has been removed.

NN – Suffix used to indicate a Gantrex® rail clip upper component manufactured without a rubber nose.

Offset – The distance from the center line of the bolt hole of a boltable rail clip to the edge of the rail flange.

OSHA – Occupational Safety and Health Administration

P – Suffix used to indicate a Gantrex® clip assembly has been sized for use with rail pad beneath rail.

Projection – Distance from the back of the mounting flange to the outside of the head of a bumper. For front flanges, this is the portion that is in front of whatever it's mounted to.

Puddle-Arc Rail Welding – A rarely used electro-slag process join rails. It is skill dependent, where weld is puddled into the rail gap and retained by “coppers” matched to the rail profile. The “coppers” are individually shaped by the welder to match his own “puddling” technique.

Rail Clip – The Gantrex® engineered adjustable rail fastener used to restrain lateral rail movement, allow longitudinal rail movement for expansion and contraction, and permit easy adjustability and rail replacement.

Rail Flange Width – The width of the bottom of a given rail section. Also called base width.

Rail/Girder Centering – AIST TR#13 recommendation that crane rails shall be centered on crane girder webs whenever possible. In no case shall the rail eccentricity be greater than  $\frac{3}{4}$  of the girder web thickness.

Rail Pad – Rubber or steel-reinforced rubber pad used beneath rail to distribute pressure, reduce noise and vibration and seal the surface between the rail and girder.

Rail Separation – Reference to CMAA specification that runway rails are a maximum of  $\frac{1}{16}$ <sup>th</sup> of an inch apart at the splice joints. Cut rail clips should be used at splice joints to prevent any side to side motion from separating the rails at the seam. Cut clips are particularly important when rail pad is used to help retain the pad at the splice.

Reaction – Resisting forces at a column and girder tie-back holding the structural system in equilibrium under given loading conditions.

Rubber Nose – Synthetic rubber block attached to the underside of the rail clip upper component used to absorb rail uplift, or bow wave without overstressing the rail clip as the wheels pass on the rail.

Runway – The portion of the building + crane or transfer car system consisting of the rails, rail clips and pad, soleplates, channel cap, crane girders, tie-backs, crane and building columns.

Runway Bracket – Method of attaching a bracket to the building column to support a light duty crane runway beam.

Runway Inspection – Process of inspection all of the components of a runway for fitness for duty and condition. Includes rail, rail clips, girders, connections and columns. Should be performed by a qualified inspector at least once a year.

S – Suffix to indicate that the rubber nose of a Gantrex® rail clip has been mechanically fastened with a screw, rather than hot vulcanize bonded.

Service Temperature – The rating on rubber noses or pad, typically -15°F to 210°F.

Spherical Bearing – Lifetime lubricated rotating bearing that is an integral part of the Gantrex® tie-back assembly. Extends above the tie-back link and held against the girder and column brackets to allow movement of the link to absorb forces imparted to the building column and crane girder.

Shim – Thin piece of steel used to take up space or level between two other members.

Side Thrust/Side Load – see lateral force/load

Soleplate – Steel plate that rail sometimes rests on. Function is to distribute pressure caused by wheel loads against the grout and concrete, or whatever is below it. Also used as a wear plate on steel runways.

Span - Horizontal distance center to center of runway rails. Runway span must match crane span, the distance between centers of crane wheels in order for a crane to travel properly.

Stelcam™ - Type of Gantrex® engineered adjustable rail fastener utilizing a through bolt to join the clip components together. Used to restrain lateral rail movement, allow longitudinal rail movement due to expansion and contraction, and permit easy adjustability and rail replacement.

Straight Tread Wheels – Crane wheels with flat machined treads and double flanges.

Stroke – Available distance of travel of a bumper plunger before complete compression. The stroke length determines the deceleration rate for a given force applied to the bumper.

Stud – Threaded steel rod welded to runway support member instead of using a through bolt.

Survey – To use a laser or transit to exactly measure the control points of a building and runway for accurate girder and rail alignment.

Tapered Tread Wheels – Crane wheels that are angled creating a larger and a smaller diameter. Used to steer the travel of a crane.

Tee Rail – Rail constructed primarily for railroads and for use with lighter crane loads. Also referred to as ASCE sections.

Thermal Rail Welding – Thermal-slag process in which a charge is ignited in a crucible and molten material flows down to join the ends of rail sections in a type of casting. Also called aluminum exothermic welding, Calorite or Thermite welding.

Tie-Back Assembly – Consisting of the girder and column brackets and links, the pre-assembled unit that is installed between runway girders and building column to provide a flexible connection to reduce fatigue related damage to the structural members.

UBA – Upper and Bolt Assembly. Includes the rail clip upper component, clip bolt, washer and nut. Used when rail is changed and existing welded lower components are re-used.

Vertical Wheel Load – Sometimes just, “wheel load”. A measurement of the vertical force, without impact produced on any bridge or trolley wheel by the sum of the rated load and the weights of the bridge and/or trolley so positioned as to give the maximum loading. Approximated by the total weight of the crane and load divided by the number of wheels.

Vulcanize-Bonded – Process that combines heat, pressure and adhesive to permanently attach the rubber noses on Gantrex® rail clips.

Walkway – Fixed horizontal surface, typically made of thin plate, diamond plate or grating that is placed between the runway girder and inside edge of the building to allow access to the runway. Also called a walk plate or foot walk.

W-Beam – Rolled or fabricated beam with parallel flanges used as a crane or runway girder. Sometimes called a wide-flange beam, plate girder or built-up girder.

Web – The middle section of a beam or rail, either between the flanges of a beam, or between the head and the foot of rail.

Web Plate - The vertical plate connecting the upper and lower flanges or cover plates of a girder or column.

Weep Hole – The recessed cavity on the bottom of the lower component which allows drainage of excess galvanizing material from the clip bolt cavity.

Weldlok™ - The type of Gantrex® engineered adjustable rail fastener utilizing a welded base and bolt assembly to join the clip components together. Used to restrain lateral rail movement, allow longitudinal rail movement for expansion and contraction, and permit easy adjustability and rail replacement.

Z – Suffix used to describe a Gantrex® rail clip upper component made of ductile cast iron.

For more information about these definitions, or to make a comment, please contact Gantrex Inc.

*GANTREX INC. - A MEMBER OF THE GANTRY GROUP*



Ajax Plant & Warehouse  
12 Barr Road  
Ajax, ON L1S 3X9 Canada  
Tel: 1 905 686 0560  
Fax: 1 905 686 0962

Pittsburgh Corporate Office  
275 Curry Hollow Road  
Pittsburgh, PA 15236 - USA  
Tel: 1 412 655 1400  
Fax: 1 412 655 3814

Sales Offices:  
Atlanta, Buenos Aires, Chicago,  
Halifax, Houston, Los Angeles,  
Monterrey, Montreal, Phoenix,  
Portland, Rio de Janeiro, Santiago  
Seattle, Toronto, Vancouver

E-mail: [sales@gantrex.com](mailto:sales@gantrex.com)  
Website: [www.gantrex.com](http://www.gantrex.com)

