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Glossary of Carbon Steel Sheet and Strip Terms

RATIONALE

The technical report covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

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Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

- 1. Scope**—This glossary is intended to provide engineers, metallurgists, and production personnel with uniform definitions of commonly used carbon sheet and strip terms. The glossary serves to supplement information and photographs reported in SAE J810, J763, J877, J863, and J403.

Many of the terms listed apply only to hot-dipped zinc-coated products or to uncoated products. The letter C following the term identifies a term applying to coated materials, while the letters NC identify a term applying to uncoated materials. Where no identification is provided, the term is common to both.

2. References

- 2.1 Applicable Publications**—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

- 2.1.1 SAE PUBLICATIONS**—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J403—Chemical Compositions of SAE Carbon Steels
SAE J415—Definitions of Heat Treating Terms
SAE J448—Surface Texture
SAE J450—Use of Terms Yield Strength and Yield Point
SAE J763—Aging of Carbon Steel Sheet and Strip
SAE J810—Classification of Common Imperfections in Sheet Steel
SAE J863—Methods of Determining Plastic Deformation in Sheet Metal Stampings
SAE J877—Properties of Low Carbon Sheet Steel and Their Relationship to Formability

3. Definitions

- 3.1 Aging**—A term applied to changes in physical and mechanical properties of low carbon steel that occur with the passage of time. (See SAE J763.)
- 3.2 Annealing Border (NC)**—See Oxidized Surface. (See also SAE J810).
- 3.3 Annealing Stain (NC)**—A discoloration on annealed material which may occur anywhere on the sheet (usually lighter than annealing border). It results from residue, or oxidation, during annealing.

- 3.4 Arc (C)**—A narrow curved pencil-like line in the coating running transversely approximately 2 in from each edge of the strip.
- 3.5 Bake Hardenable Steels**—Those steels that increase in strength while undergoing a paint-baking cycle.
- 3.6 Band Mark**—An indentation caused by the packaging band resulting from external pressure on cut lengths or coils and may occur in handling, transit, and storing.
- 3.7 Batch Annealing**—See Box Annealing.
- 3.8 Beads (C)**—Small lumps in the coating surface. Particles of dross picked up in the coating or iron oxide particles embedded in the strip surface from the furnace hearth rolls. Also referred to as dross.
- 3.9 Black Spots (NC)**—Carbonaceous deposits caused by tightly wound areas in a coil not being exposed to the circulating gases during open coil type annealing. This condition is aggravated by poor strip shape.
- 3.10 Blank**—A flat piece of sheet steel produced in blanking dies or by shearing for an identified part. The blank is usually subjected to further press operations.
- 3.11 Blanking**—Cutting desired shapes out of flat sheet.
- 3.12 Blister**—A small raised area on the surface resulting from the expansion of gas concentrated at a subsurface inclusion or other imperfection. May occur as isolated spots, but often found in longitudinal streaks.
- 3.13 Box Annealing**—The process of softening steel by heating coils or stacks of sheets slowly in a closed container, through which, in most cases, a controlled atmosphere is circulated to prevent oxidation during the heating and cooling cycle. The time required may vary from one to several days. (See SAE J415.)
- 3.14 Breaks**—Creases or ridges usually in "untempered" or in aged material where the yield point has been exceeded. Depending on the origin of the break, it might be termed a crossbreak, a coil break, an edge break, a sticker break, etc. (See SAE J810.)
- 3.15 Bright Annealing (NC)**—Annealing in a protective atmosphere to prevent discoloration of the surface.
- 3.16 Bright Finish (NC)**—A high-quality finish produced on sheets by rolls which have been ground and polished. Suitable for electroplating.
- 3.17 Buckles**—A series of waves in sheets which are ordinarily transverse to the direction of rolling. (See SAE J810.) In formed panels, "excess metal" in the form of wrinkles, kinks, or folds.
- 3.18 Buildup (C)**—Localized lineal areas showing a difference in cross-sectional contour during coiling. Usually occurs on the edges of the strip.
- 3.19 Camber**—Deviation from a straight edge, usually referring to the greatest deviation of the concave side edge of a sheet or strip from a straight line.
- 3.20 Capped Steel**—This is a type of steel with characteristics similar to those of rimmed steels, but to a degree intermediate between those of rimmed and semikilled steels. It can be either mechanically capped or chemically capped when the ingot is cast, but in either case the full rimming action is stopped, resulting in a more uniform composition than rimmed steel.
- 3.21 Carbon Edge (NC)**—Carbonaceous deposits in a wavy pattern along the edges or coil. (See also Snaky Edges.)

- 3.22 Chatter**—A series of lines uniformly spaced appearing transverse to the rolling direction usually resulting from material being rolled on units having loose bearings. Results in a slight thickness variation where lines appear.
- 3.23 Checked Edges**—Sawtooth edges seen after hot rolling and/or cold rolling. (See also Ragged Edge in SAE J810.)
- 3.24 Coil Breaks**—Creases or ridges which appear as parallel lines across the direction of rolling and which generally extend across the width of the sheet. (See SAE J810.)
- 3.25 Coil Weld**—A joint between two lengths of metal within a coil. (See SAE J810.)
- 3.26 Cold-Rolled Sheets (NC)**—A product produced from a hot-rolled pickled coil which has been given substantial cold reduction at room temperature. The resulting product usually requires further processing to make it suitable for most common applications. The usual end product is characterized by improved surface, greater uniformity in thickness, and improved mechanical properties compared to hot-rolled sheet.
- 3.27 Continuous Annealing**—The process of passing a strand or sheet through a controlled atmosphere furnace that has both heating and cooling zones. Temperatures, line speeds, and cooling rates are varied to obtain the desired properties for the type of steel being heat treated. The time required for continuous annealing does not usually exceed a few minutes.
- 3.28 Continuous Casting**—This is a casting technique in which a cast shape is continuously withdrawn from a mold as it solidifies so that the length is independent of mold dimensions. The rapid solidification inherent in this process minimizes chemical segregation of the product.
- 3.29 Corrugations**—Transverse ripples caused by a variation in strip shape during hot or cold reduction.
- 3.30 Cross Breaks**—See Coil Breaks.
- 3.31 Curtains (C)**—An uneven pattern of the coating resulting from run-back of the applied material. Also called flowlines.
- 3.32 Cut Edge**—A mechanically sheared edge obtained by slitting, shearing, or blanking.
- 3.33 Deep Drawing**—An extreme condition of drawing. The term "deep drawing" is commonly used to describe metal stamping operations which are a combination of drawing and severe stretching.
- 3.34 Developed Blank**—See Finished Blank.
- 3.35 Differential Coating (C)**—A coated product that has different coating masses and/or different coating compositions on the two surfaces of the steel substrate.
- 3.36 Dimple**—A defect resulting from foreign matter being mechanically impressed into the sheet surface.
- 3.37 Dings**—Accidental impact damage, similar in appearance to dimples.
- 3.38 Drawability**—The ability of the sheet steel to be formed or drawn into the intended end product without fracturing.
- 3.39 Drawing**—The shaping of a flat blank into the desired contour by causing the metal to flow over a draw ring and round a punch. The flow of metal is restrained by sufficient blank holder pressure to prevent buckling.