

1.0 TERMS

ARC - The curved portion of a bend.

BACKWALL OR PIPE HEEL - The outside arc of the bend.

BEND DIE OR BEND FORMER - A wheel shaped die with a groove in the outer circumference that conforms to half the pipe circumference. It will most often have a straight section used as half of the clamp set for holding the pipe against the die.

BEND RADIUS - See Centerline Radius

BENDER – 1. A mechanical device capable of forming a bend in a straight length of material.

2. A commercial or industrial company engaged in the business of making bends.

BENDING MOMENT - The amount of force (foot pounds) required to initiate a change of direction in a straight length of material about the center of curvature.

BENDING PROCEDURE - A written procedure containing the parameters and information necessary to guide the operator in producing bends which meet the requirements of this Standard.

BUCKLING - Definite folds, creases, or wrinkles formed on the surface of the pipe or tube during the bending operation.

CENTER TO CENTER - The distance between the theoretical or calculated centers of two adjoining bends. Also used for diametric measurements between the centerlines of two tangent points of a bend.

CENTER LINE DIAMETER - The distance from the centerline axis of the pipe across to the other centerline of a 180-degree return bend.

CENTER LINE RADIUS - 1. The distance from the center of curvature to the centerline (axis) of the pipe, expressed as a number multiplied by the pipe or tube size.

2. The distance on a bend forming tool from the center of curvature to a point corresponding to the centerline of the tubular shape when mounted in the bend-forming tool--nominal CLR.

CHORD - The straight distance measured between the centerline points of any two points of a bend.

COLD BEND - The bending of pipe or shapes by cold working at ambient temperatures.

COMPRESSION - The forces which thicken the inside wall of the bend

D OF BEND - Centerline radius (CLR) divided by the tube diameter or nominal pipe size (i.e., 1.5D, 3D, 5D, etc.)

DEGREE OF BEND (DOB) - The angle, expressed in number of degrees, to which the bend is formed, (i.e., 45 degrees, 90 degrees, 180 degrees, etc.)

DISTANCE BETWEEN BENDS (DBB) - The actual length of the straight section between the tangent points of two adjoining bends (i.e. common tangent)

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DUCTILITY - The ability of the material to deform plastically without fracture, as measured by elongation or reduction of area in a tensile test.

ELONGATION - 1. The increase in length of a test specimen at failure in a tensile test, expressed as a percentage of the original length.

2. The increase in length of material fibers during bending, expressed as a percentage of the original length.

EXTRADOS - The outside arc of the bend.

FLAT PLANES - The deviation of the horizontal plane of a single bend between its tangent points, based on the theoretical centerline of the bend. (Out-of-Plane)

FLATTENING - The distortion of the cross section of pipe or tube from its normal (round) shape usually expressed as a percentage of the difference between the major and minor axes of the starting material compared to the O.D. before bending. (i.e. Ovality)

HOT BENDING - The bending of pipe or shapes through hot working methods.

HUMP - A rounded protrusion or bulge on the extrados.

I.D. - Inside diameter of the pipe or tube.

INDUCTION BENDING - A method or process of bending which employs an induction heating coil to create a narrow, circumferential, heated band around the material to be bent. When the appropriate temperature is reached, the material is pushed forward through the coil at a consistent speed and temperature while a bending moment is applied.

INNER RADIUS - The inside arc of the bend. (Intrados)

INTRADOS - The inside arc of the bend. (Inner Radius)

MINIMUM DESIGN WALL THICKNESS - The wall thickness specified on the fabrication drawing or computed in accordance with the applicable specification as the minimum acceptable for the design criteria.

NONDESTRUCTIVE TESTING (NDT) - Examination of materials or products in ways that do not impair future usefulness in order to detect, locate, measure, and evaluate defects and other indications.

NEUTRAL AXIS - That portion of the pipe or tube that is neither in compression nor in tension.

NOMINAL - Usually refers to pipe sizes up to and including 12-inch I.P.S. Also used in reference to wall thickness, generally as a "mean" or average measurement

NOMINAL O.D. - Usually refers to referenced pipe sizes, not actual O.D.

NOMINAL WALL - The mean or average measurement of the wall thickness.

O.D. - Outside diameter of the pipe or tube.

OUT OF PLANE - The deviation of the horizontal plane of a single bend between its tangent points, based on the theoretical centerline of the bend. (Flat Planes)

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OUT OF RADIUS - The outside arc of the bend. (Extrados)

OVER BEND - The amount that a pipe has to be bent past the desired bend angle to compensate for residual stresses in the bend. This allows the pipe to return to the desired bend angle after all external support from clamping has been removed.

PLANE OF BEND (POB) - The plane of a bend in relation to the axis of the straight section preceding it. Used specifically for changes of plane in successive bends.

RADIAL GROWTH - The difference between the actual CLR and the bend die CLR of a tubular shape after all external forces that restrained it are removed.

RADIUS - The distance from the center of curvature to the centerline (axis) of the pipe, expressed as a number multiplied by the pipe or tube size.

SPRINGBACK - The movement of the bent pipe or tube toward the original straight configuration after release of the bending moment.

TANGENT - A straight section of material on either end of the arc of a bend.

TANGENT POINT - The theoretical point at which the bend is started or ended.

TENSILE STRENGTH - The point at which the bend is started or ended.

TENSION - The force which thins the outside wall of the bend.

THROAT - The inner half of the pipe or the half undergoing compression during bending.

TRANSION ZONE - The area at the tangent points of a bend that covers the change from bent to unbent.

WALL - The thickness of tubular material, usually expressed in "nominal" or "minimum".

WALL FACTOR - The ratio of the pipe outside diameter (O.D.) to its wall thickness (t) (i.e. O.D./t)

WALL THINNING - The amount of reduction from original wall thickness of pipe or tube to the amount of wall thickness remaining in the extrados of a bend after forming.

WALL THICKNESS - The thickness of the material, usually stated as "Schedule" for pipe or "Gauge" for tube.

YIELD POINT - The point at which material permanently deforms during bending.

YIELD STRENGTH - The stress at which a material exhibits a specified deviation from proportionality as a result of stress and strain.

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