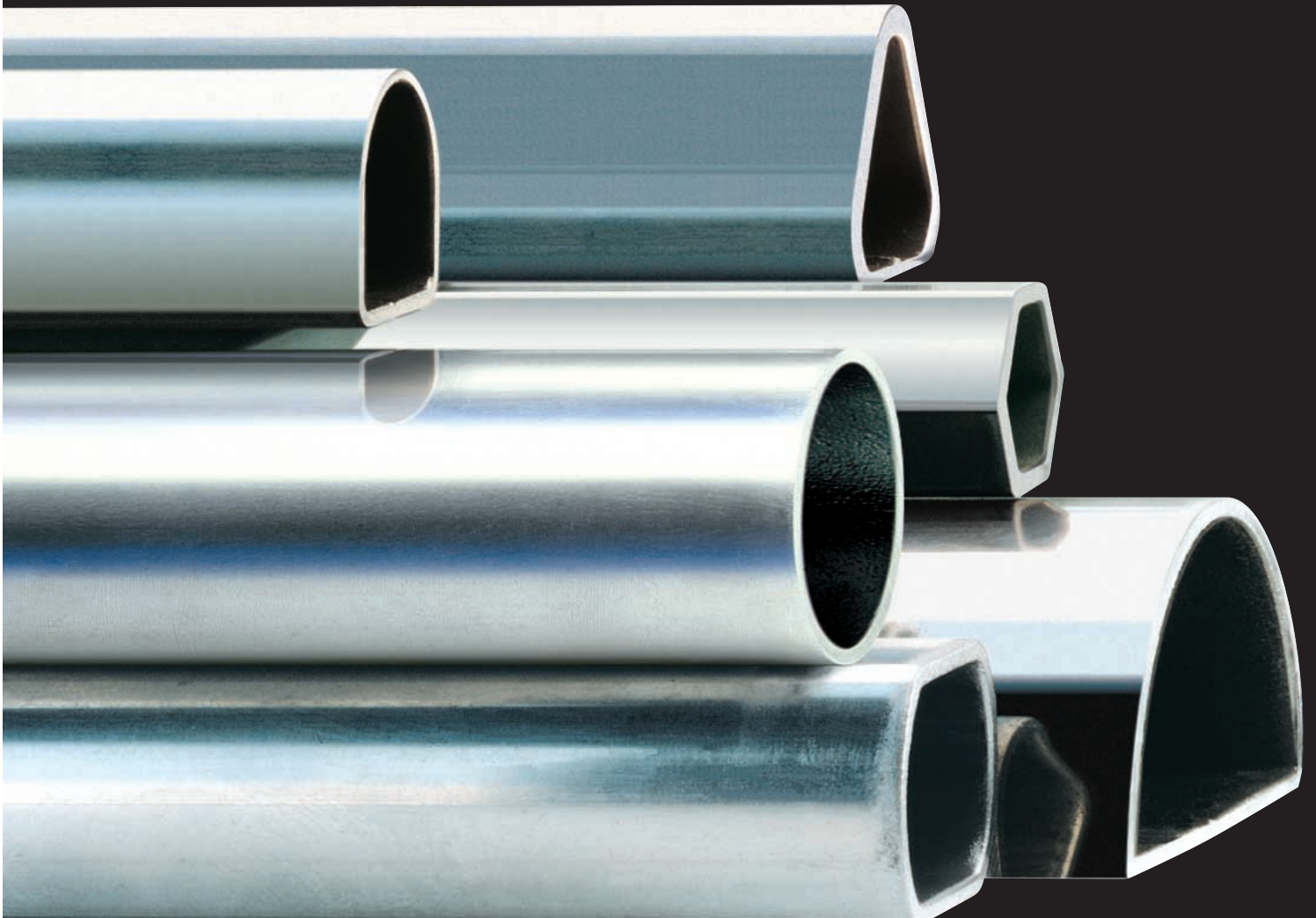


As-Welded Mechanical Steel Tubing



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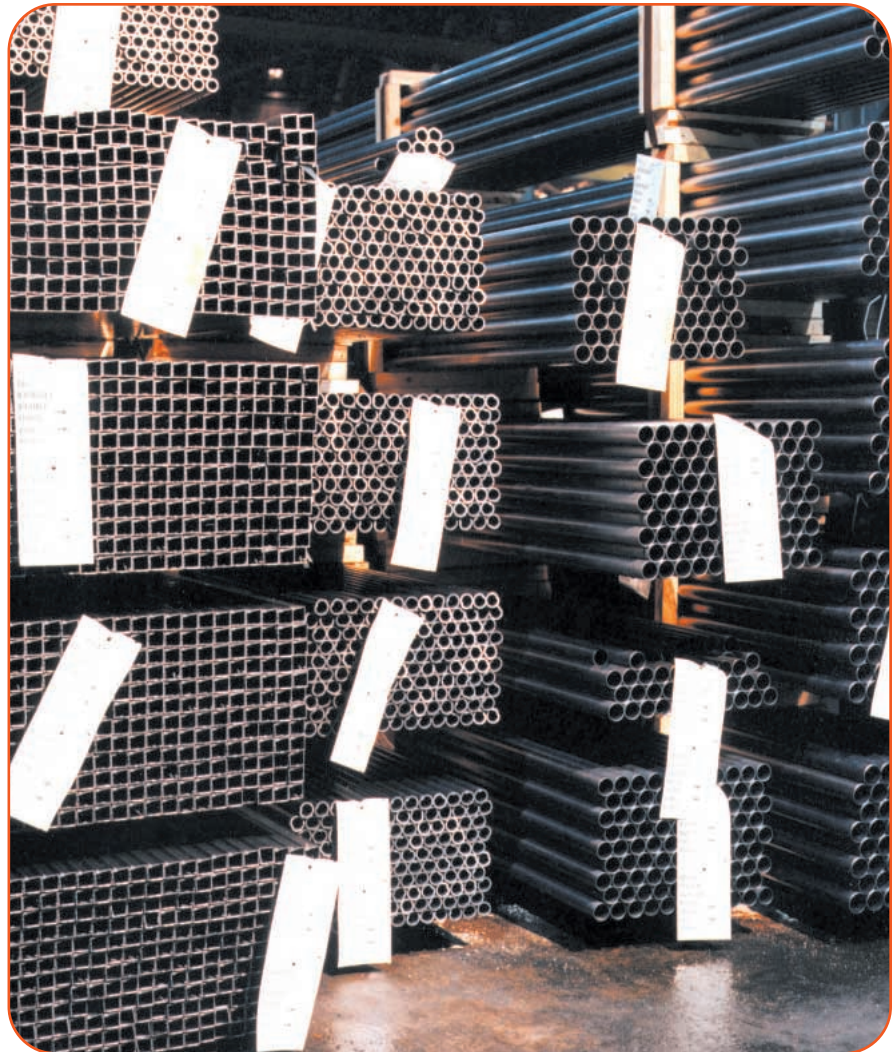
ArcelorMittal

Tubular Products Division of ArcelorMittal: A Pioneer in As-Welded Mechanical Tubing

Tubular Products is a North American pioneer in the manufacture of as-welded mechanical tubing, having produced this product for more than 60 years. During this period, we have forged a reputation for innovation and technical superiority in its production and use.

Today Tubular Products produces as-welded mechanical tubing at five of its locations—Shelby and Marion, Ohio; Brampton, and Woodstock, Ontario; and Escobedo, Mexico.

Our as-welded mechanical tubing is available in an extensive range of sizes—one that continues to grow. It is supplied as rounds, squares and rectangles and in a wide variety of special shapes. It can be fully annealed or stress relieved for improved formability.



Advantages of Our As-Welded Mechanical Tubing

Tubular Products manufactures as-welded mechanical tubing to ASTM specification A513 using the Electric Resistance Welding (ERW) process. This process produces the highest weld strength possible. Our as-welded mechanical product also offers a number of other advantages:

- Close dimensional tolerances, which may permit less stock removal and often eliminate machining operations

- Excellent concentricity, because of the uniform wall thickness of the high quality, flat-rolled steel from which it is made
- A smooth surface that can be readily plated, painted or enameled
- Ease in bending, machining, beading, expanding, swaging, spinning, flanging, upsetting, grooving, rolling, fluting, flattening, tapering and hydroforming
- An inside surface with the same surface quality as the outside, and which can be readily inspected during forming.

A Wide Variety of Shapes, Sizes, Materials and Surface Finishes

Round as-welded mechanical tubing is manufactured in a wide range of diameters from 0.469" to 12.500" and wall thicknesses from 0.035" to 0.685". This product is also manufactured in squares from 1/2" to 3" and in rectangles from 1/2" x 7/8" to 2" x 3". Wall thicknesses in both shapes range from .035" to .195".

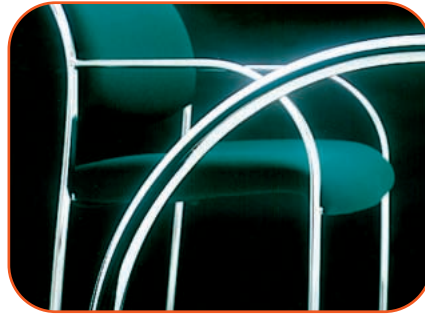


We also produce a number of special shapes including equilateral triangles, hexagons, octagons, quarter- and half-rounds, flat and elliptical ovals, oval-ended rectangles and D-shapes.

Our as-welded mechanical tubing is produced in a number of AISI grades including 1008, 1010, 1015 and 1020 and in HSLA (high-strength, low-alloy) grades.

A hot-rolled finish is provided when surface requirements are not critical. Two grades of cold-rolled finish can be specified—15 RMS or 20/35 RMS—depending upon the type of painting or plating required.

The appropriate surface finish is determined by the end use application. Hot-rolled finishes can be provided in hot-rolled black; shot blasted hot-



rolled black; or hot-rolled, pickled and oiled. Cold-rolled finishes typically offered range from 50 RMS to 20 RMS.

Applications of As-Welded Mechanical Tubing

Because of its cost effectiveness, strength, good surface finish and excellent machining characteristics, Tubular Products as-welded mechanical tubing is ideal for a wide range of end-use markets. These include:

- Automobile and truck components
- Construction and farm equipment
- Office, residential and institutional furniture
- Bicycles
- Motorcycles
- Exercise and recreational equipment
- Store fixture displays



- Material handling equipment
- Industrial machinery

Tubular Products' as-welded mechanical tubing may also be purchased—in less than mill production quantities—from leading steel service centers throughout North America and abroad.

Building Quality Into As-Welded Mechanical Tubing

Most of Tubular Products manufacturing facilities for as-welded mechanical tubing are certified as meeting ISO 9002 quality standards. Several also hold the auto industry's demanding QS-9000 certification, with Shelby also receiving the TS:16949 quality management system.

Statistical process and quality control techniques are utilized to maintain superior quality through every step of the manufacturing process. Extensive testing and inspection programs at each plant include sophisticated in-line equipment and fully equipped metallurgical laboratories. As a result, our as-welded mechanical tubing is subjected to a full range of nondestructive and destructive tests, as well as visual and instrumental inspection, to assure strict compliance with specifications.



The Manufacturing Process for As-Welded Mechanical Tubing

In the manufacturing process, flat steel strip is slit to the proper width and then passes through a series of rolls that progressively cold-form it into a tubular shape. The formed tube then enters the welding unit, where heat is generated by the natural resistance of the steel to an electric current.



When this heat, which is confined to a narrow band along both edges of the strip, reaches the proper temperature, the two edges are forced together by pressure rolls to create the weld. No extraneous metal is added during the process, so the weld has the same composition as the body of the tube. As a result, the weld is as strong as, or stronger than, the tube itself.

The pressure used to force the edges together creates a small amount of outside and inside weld flash. In most cases this is removed from the outside surface to maintain OD tolerances and give a smooth



contour. The inside weld flash may be treated in a number of ways depending on customer requirements.

When the ID is non-functional, or an inside fit is relatively unimportant, the specific application will determine the appropriate ID flash condition.



When the ID is functional, the flash is controlled to within a specified height from the tube's inside surface. There are several degrees of flash control available. They are discussed in detail in the as-welded specifications brochure.

Following the flash control process, the tube is cooled and sized to the specified dimensions by a series of finishing rolls and is then cut to the length ordered.

A number of our tube mills are equipped with state-of-the-art, double-action, flying cut-offs that produce a dimple-free tube, cut to length, to a tolerance of ± 0.032 " in the 1/2" through 4" OD size range. Off-line tube cutting facilities are used for other sizes. Chamfering, reaming and



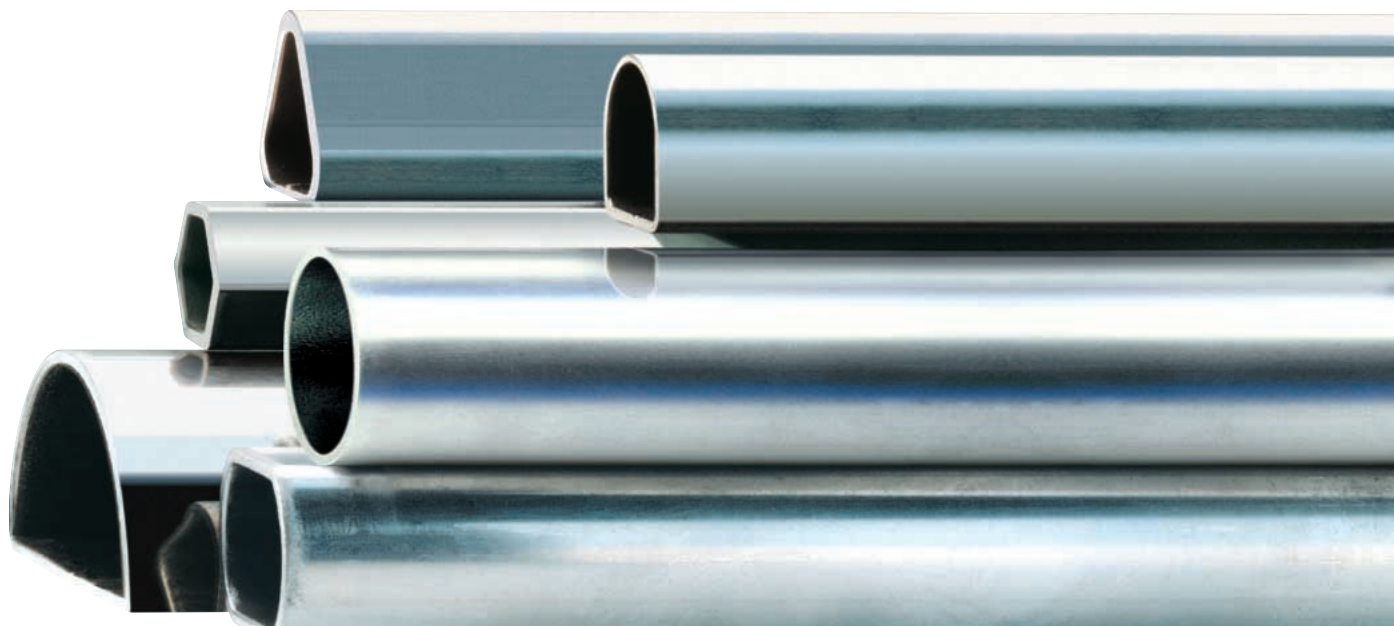
deburring of the OD and ID are also available for the entire round size range. Wire brush deburring is available for shapes and round sizes.

Tubing to be used in severe fabrication applications exceeding the capabilities of as-welded tubing is then annealed in a furnace equipped with an exothermic gas atmosphere that protects it from oxidation and scaling. The resultant metallurgical structure combines optimum hardness with ductility.

Customer Service Hot Lines At Tubular Products

Tubular Products operates a highly efficient, customer service organization for the convenience of as-welded mechanical tubing customers.

The telephone and fax numbers are listed on the back of this brochure.



As-Welded Mechanical Steel Tubing

MECHANICAL TUBING BUSINESS

Contact us at one of the following locations:

132 West Main Street, Shelby, OH 44875-1471
Telephone 800-345-8823 • Fax 800-552-9943

686 West Fairground Street, Marion, OH 43302-1706
Telephone 800-345-8823 • Fax 800-552-9943

www.arcelormittal.com/tubular



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