ArcelorMittal

Relia®

Minimum wear, maximum payload

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Quality wear-resistant steels

Relia® is ArcelorMittal's range of high hardness, low-alloyed martensitic steels. The hardness of Relia® grades is obtained through intense water quenching during manufacturing.
As a result, Relia® offers outstanding resistance to especially abrasive wear – typically three to six times higher than classical construction steels in the 355 MPa range (note: actual performance may vary depending on the type of wear and operating conditions).

Advantages of Relia®

The use of Relia® wear-resistant steels will extend the service life of wear parts and machinery components without sacrificing the quick and easy fabrication in the workshop. The choice of Relia® during product design will bring benefits to the end user including:

- lower maintenance costs
- greater payload capacity
- lighter weight
- reduced fuel consumption.

A complete offer to meet a wide range of practical requirements

Relia® plates and cut-to-length sheets are available in three nominal hardness levels: 400, 450 and 500 HBW.

Relia® is carefully optimised to provide superior properties and a higher service level for easy and quick fabrication. In addition to their high superficial hardness, Relia® plates and cut-to-length sheets feature:

- a good level of toughness
- uniform hardness
- enhanced weldability
- improved cold formability
- narrow manufacturing tolerances.

Relia® wear-resistant steels are the preferred solution for consistent and reliable processing in the workshop and optimal in-service performance.

Dimensional feasibility

The Relia® range is available as both cut-to-length sheets and heavy plates, in a large dimensional range from 2 to 150 mm thick and up to 3800 mm wide.

For dimensions outside the limits described in this brochure, please contact us.

		Max. width (mm) per thickness (mm)												
	Thickness (mm)	2	3	4	5	6	8	9	10	12	25	50	60	150
Hot rolled direct quenched cut-to-length sheets	Relia® 400	1200	1600	1770	1790	1860	1750							
	Relia® 450	1200	1600	1770	1790	1860	1750							

Hot rolled quenched plates	Relia® 400			2000		2500		3100		3800				
	Relia® 450			2000		2500		3100		3800				
	Relia® 500						2500			3000				

Standard dimensional range On specific request

Also available as 2000 mm wide quenched cut-to-length sheets obtained from coils.

Technical characteristics

	Thickness in mm	Hardness level (HBW)	General description
Relia® 400	(2) 4-150	370 - 430	• Narrow tolerance for hardness range ± 30 HBW • Full chemical analysis and low carbon equivalent • Superior cold-formability (bending) For hot rolled quenched plates up to 20 mm • Through hardened to at least 90 % of the guaranteed minimum surface hardness • CVN-impact test absorbed energy of min. 27 J at -40 °C (except for Relia® 500) At the customer's request*: • Tight flatness tolerances, max. deviation of 6 mm/2 m • Tailored dimensions • Available from mill stock for quick delivery • Primer coating • Ultra-sonic control test
Relia® 450	(2) 4-50	420 - 480	
Relia® 500	8-60	470 - 530	

** Restrictions may apply, please contact us prior to ordering*

Delivery condition Q (quenched). Relia® is a series of proprietary grades developed by ArcelorMittal. There is no existing engineering standard for plates for wear-resistant applications.

Hardness

Guaranteed Brinell hardness ranges in the as-delivered condition are shown in the table above. Relia® products have a narrow hardness variation range to ensure better consistency from plate to plate.

Impact properties

For Relia® 400 and 450 up to 20 mm, Charpy-V-notch min. impact energy of 27 J will be achieved at -40 °C (from longitudinal full-size specimens of 10 x 10 mm).

Thickness tolerance

Unless otherwise agreed, tolerances on thickness for Relia® hot rolled quenched plates are determined according to EN 10029 Class A. If Class B, C, or D tolerances are required, this must be indicated at the time of enquiry and order. Tighter thickness tolerances, closer than those specified by EN 10051, are also available on request. On request, hot rolled direct quenched cut-to-length sheets can be supplied with thickness tolerances corresponding to ⅓ of Category D, EN10051 2010. For further information, please contact us.

Max.	Relia® 400	Relia® 450	Relia® 500
C	0.17	0.20	0.28
Mn	1.90	1.50	1.50
P	0.02	0.02	0.02
S	0.003	0.003	0.003
Si	0.60	0.60	0.60
Ti	0.05	0.05	0.05
Mo	0.2	0.2	0.5
Ni	0.8	0.8	0.8
Cr	0.50 (1)	0.50 (1)	1.0
B	0.004	0.004	0.004
CET (2)	0.31	0.35	0.45

(1) Valid up to sheet/plate thickness of 20 mm, otherwise 1.0 %.
(2) Typical values for maximum thickness of 20 mm

$$CET = C + \frac{Mn + Mo}{10} + \frac{Cr + Cu}{20} + \frac{Ni}{40}$$

Width tolerance

General tolerances on dimensions and shape are determined according to EN 10029. Plates obtained from cut-to-length strips may be delivered with untrimmed edges. In that case, the same tolerances on width as applicable for trimmed edges will be respected. For further information, please contact us.

Flatness

Unless otherwise agreed, flatness will conform to the provisions of EN 10029 Class N, steel type H. If agreed at the time of enquiry and order, Relia® can be delivered with an optional extra-close tolerance for flatness. This corresponds to the special tolerances defined in EN 10029 for Class S, steel type L. Some thickness limitation may apply, please contact us.

Surface

Relia® products are delivered in accordance with EN 10163-2 Class A, Sub-class 1. As a standard, Relia® cut-to-length sheets are delivered in brushed condition. Protection with shop primer is available on request. More details on the primer type and its characteristics are available on request.

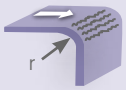
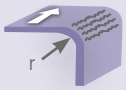
Fabrication guidelines

Thermal cutting

Relia® plates and cut-to-length sheets are compatible with all thermal cutting processes including oxy-fuel, plasma, and laser. Preheating at 100 to 150 °C is recommended for plates thicker than 40 mm (10 mm for Relia® 500) or in cold environments where the plate temperature is below 10 °C. Excess preheating above 200 °C may reduce the hardness of Relia®.

Cold formability

Thanks to their high internal cleanliness and uniform properties, Relia® products are specifically designed for improved formability. For cut-to-length sheets and plates up to 20 mm thick, the recommended minimum bending radius is summarised in the tables below. For plate thicknesses above 20 mm, please consult us.

	Min. internal bending radius (mm*)	
		
Relia® 400	3 (3)	4 (3)
Relia® 450	5 (4)	6 (5)
Relia® 500	6	8

** Refers to the minimum radius over the plate/sheet thickness The white arrow indicates the rolling direction. Values in brackets refer to hot rolled direct quenched cut-to-length sheets*

Welding

Due to its low carbon content and low carbon equivalent value, Relia® exhibits very good welding characteristics using any conventional fusion welding method.

The surfaces to be welded should be dry, clean and ground to eliminate rust, scale, grease or paint traces, as well as gas-cutting dross. In all cases, we recommend that welding is carried out above 5 °C. Heat input should be limited to 10-30 kJ/cm with a maximum interpass temperature of 220 °C. The manufacturer's recommendations should be strictly followed for the storage, handling, and use of welding consumables. For protection of weld against wear, hard welding products can be used for covering passes. For further information, please contact us.

Key application areas

Construction and transportation

Construction, public works and road transportation shape our world. The use of ArcelorMittal's special steels reduces costs and increases efficiency. Best results are achieved when you combine Relia® wear-resistant steel and Amstrong® Ultra high strength steel.

Excavation and bulk handling

Excavation, hauling and bulk material handling are the foundation of the mining, quarrying, and mineral industries. Reliable wear parts play a significant role to ensure safety and avoid costly machine downtime. In mobile equipment, payload and weight are also of primary concern. Relia® enables OEMs to design vehicles with optimum operational performance.

Crushing and screening

Raw mineral processing includes a large number of technologies for comminution and sizing. In operations where coarse and fine particles of different materials are processed, excessive wear can occur. Relia® can prevent excessive wear and ensure smooth and cost-effective industrial operations.

Demolition, waste and recycling

Heavy-duty demolition equipment, waste, and recycling machinery are subject to very severe service conditions. Abrasion and fatigue are often induced by the heavy cyclic loads in these operations. Relia® products are designed and produced to cope with these conditions.

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