



ArcelorMittal

Relia[®]

Minimum wear, maximum payload



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Quality wear-resistant steels

Relia® is the ArcelorMittal's range of high hardness, low-alloyed martensitic steels. Relia® grades obtain their hardness through intense water quenching during manufacturing.

As a result, Relia® offers outstanding resistance to abrasion – 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 steel will extend the service life of wear parts and machinery components without affecting the quick and easy fabrication techniques 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 are available in three nominal hardness levels: 400, 450, and 500 HBW. Two product specification levels are available to meet a wide range of practical requirements:

- **Relia® Standard** offers entry-level products with the main emphasis on hardness.
- **Relia® Premium** is carefully optimised to provide superior properties and a higher service level for easy and quick fabrication. In addition to high superficial hardness, Relia® Premium plates feature:
 - a good level of toughness
 - uniform hardness
 - enhanced weldability
 - improved cold formability
 - narrow plate manufacturing tolerances.

Relia® Premium is the preferred solution for consistent and reliable processing behaviour in the workshop and optimal in-service performance.

Dimensional feasibility

The Relia® range is available as both cut-to-length sheets and heavy plates, and in a wide dimensional range from 3 to 150 mm thick. The Relia® Standard series is only available in standard plate sizes. Length is typically 6000, 8000, or 12000 mm, while width ranges from 1500 to 3500 mm in increments of 500 mm. Tailored dimensions are available in the Relia® Premium series. For dimensions outside the limits displayed in this brochure, please contact us.



	Max. width (mm) per thickness (mm)													
	2	3	4	5	6	8	9	10	11	12	25	50	60	150
Relia® 400 Standard		1500	2000	2500		3000					3500			
Relia® 450 Standard		1500	2000	2500		3000					3500			
Relia® 500 Standard					2000	2500				3000				
Relia® 400 Premium			1650	2500		3100				3800	3680			
Relia® 450 Premium			1650	2500		3100				3800	3680			
Relia® 500 Premium						2500				3000				

Technical characteristics

Product specification level		Thickness in mm	Hardness level (HBW)	CVN impact ⁽¹⁾	General description
Standard	Relia® 400	3 - 150	360 - 440		<ul style="list-style-type: none"> Basic and versatile wear plate, with emphasis on hardness level Standard mill plate dimensions Produced to order in standard mill delivery time
	Relia® 450	3 - 60	410 - 490		
	Relia® 500	6 - 60	460 - 540		
Premium	Relia® 400 P	4 - 50	370 - 430	-20 °C min. 27 J ⁽²⁾	<ul style="list-style-type: none"> Narrow tolerances for hardness Close chemical composition, adjusted depending on thickness Maximum carbon equivalent Deep-hardened plates: through-thickness minimum hardness guarantee Superior bending and impact properties Tight flatness tolerances 6 mm/2 m Tailored plate dimensions Available from stock for quick delivery
	Relia® 450 P	4 - 50	420 - 480		
	Relia® 500 P	8 - 50	470 - 530		

¹ optional guarantee subject to prior agreement; thickness limitation may apply

² in the longitudinal direction

Delivery condition Q (quenched). Relia® 400, 450, 500 and Relia® Premium series are 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® Premium plates have a narrow hardness variation range to ensure better consistency from plate to plate. In addition, Relia® Premium plates are through-hardened to at least 90% of the guaranteed minimum surface hardness.

Impact properties

The Relia® Premium series offers an optional guarantee for impact toughness. Please note that thickness limitations may apply and prior agreement is required at order confirmation.

Thickness tolerance

Unless otherwise agreed, tolerances on thickness 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 10029, are also available on request. Plates obtained from cut-to-length strips are delivered with a thickness tolerance of ±0.2 mm. For further information, please contact us.

Max. %	Relia® 400 Standard	Relia® 400 Premium	Relia® 450 Standard	Relia® 450 Premium	Relia® 500 Standard	Relia® 500 Premium
C	0.18	0.17	0.20	0.20	0.30	0.28
Mn	1.90	1.90	1.70	1.70	1.50	1.50
P	0.02	0.02	0.02	0.02	0.02	0.02
S	0.005	0.003	0.005	0.003	0.005	0.003
Si		0.60		0.60		0.60
Al		0.060		0.060		0.060
Nb		0.03		0.03		0.03
V		0.03		0.03		0.03
Ti		0.05		0.05		0.05
Cr		1.0		1.0		1.0
Mo		0.2		0.2		0.5
Ni		0.8		0.8		0.8
Cu		0.4		0.4		0.4
B	0.004	0.004	0.004	0.004	0.003	0.003
N		0.008		0.008		0.008
Cr + Ni + Mo	1.5		1.6		2.0	
Nb + V + Ti	0.10		0.12		0.12	
CEV ⁽¹⁾		0.45 ⁽²⁾		0.52 ⁽²⁾		0.67

¹ $CEV = C + Mn/6 + (Cr+Mo+V)/5 + (Cu+Ni)/15$

² Up to 20 mm; otherwise maximum 0.56 and 0.62 for 400 and 450 class respectively.



Fabrication guidelines

Thermal cutting

Relia® plates 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® Standard 500 and Relia® 500 Premium) 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 cleanliness and uniform properties, Relia® Premium plates are specifically designed for improved formability. They are always recommended over the Relia® Standard plates when subsequent cold forming is required. For plates up to 20 mm thick, the recommended minimum bending radius and die opening are summarised in the table below. For plate thicknesses above 20 mm, please consult us.

	Min. internal bending radius T/(L)	Min. die opening T/(L)
Relia® 400 Premium	3 (4)	10 (12)
Relia® 450 Premium	5 (6)	12 (14)
Relia® 500 Premium	6 (8)	14 (18)

** All values represent the minimum ratio over the plate thickness. First values shown are for bending perpendicular to the plate rolling direction. Values in brackets are for bending along the rolling direction.*

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

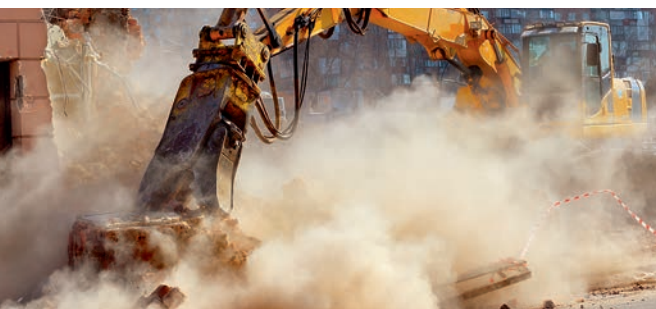
Unless otherwise agreed, flatness will conform to the provisions of EN 10029 Class N, Steel Type H. If agreed at the time of enquiry and order, Relia® Premium grades include an optional, extra-close flatness tolerance of 3 mm per metre.

Surface

Relia® plates are delivered in accordance with EN 10163-2 Class A, Sub-class 1. Relia® Premium series is delivered in shot-blast or brushed condition and, if requested, protected with shop primer. More details of primer type and its characteristics are available on request.

Welding

Due to its low carbon content and low carbon equivalent value, Relia® exhibits very good welding characteristics using any conventional fusion welding methods. Weld surfaces 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 can deliver solutions that reduce costs and increase efficiency. Best results are achieved when you combine Relia® wear-resistant steel and Armstrong® 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.



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