ArcelorMittal Europe Long Products Rails & Special Sections



Transport Rail Brochure and Technical Manual



Introduction

ArcelorMittal is the world's leading steel company, with over 197,000 employees in more than 60 countries, and annual steel capacity production of 113 million tonnes.

ArcelorMittal is the leader in all major global steel markets, including automotive, construction, household appliances, packaging and rails, with leading R&D and technology, as well as sizeable captive supplies of raw materials and outstanding distribution networks. With an industrial presence in Europe, Asia, Africa and America, the Company covers all of the key steel markets, from emerging to mature.

With production sites in Gijón (Spain), Dabrowa Górnicza and Chorzów (Poland), Rodange (Luxembourg), and Steelton (USA), ArcelorMittal is part of a small group of rail manufacturers whose production has developed notably in the specialized high-speed and heavy transport sectors.

Arcelor Mittal has implemented and keeps updated a quality assurance system that complies with the requirements of the international standard ISO 9001, and is certified by

Leadership

Rails are a steel product of a high complexity, both as regards its technical design and manufacturing process, and the evergreater demands made on them in their service conditions. Rails must be capable of responding satisfactorily to the increase in the loads hauled, increases in speed, a higher train frequency, a higher level of comfort (on passenger lines) and, above all, to railroad safety requirements.

Today, only a very small group of rail manufacturers combines long experience with a dynamic of continuous improvement to their facilities and processes. The factor that differentiates this select group of manufacturers from their competitors is their high technological level, which allows them to supply a rail of excellent quality, capable of meeting the present and future needs of the most demanding users.



R&D

Rail manufacturing at ArcelorMittal is supported by Global R&D Rail Competence Center located in Aviles, Spain where continuous improvement in Railway Systems Engineering and Research takes place.

ArcelorMittal leads the efforts to continuously improve Rail steel production by studying on-track Real performance, its hardness and wear behavior to fatigue including weldability, highlighting the design, modelling & testing of the prototypes of CHHR line, and designed and built different equipment to support rail process like advanced testing & In-use properties (twin-disk & real size Rolling Contact Fatigue Bench), and the installation of a welding pilot plant. Rail Welding Competence Unit will allow to progress beyond it through the development of specific procedures to improve Flash Butt Welding and aluminothermic welding of today's rails.



Laboratory

The mechanical test laboratory carries out the mechanical and metallographic tests required to guarantee the quality of the final product.

The following stand out among the number of tests performed in these facilities:

- Tensile test at ambient temperature
- Hardness test (Brinell, Vickers and Rockwell)
- Impact / crash test
- Heat treatments (Specimen ageing)

Analyses are also made of the chemical composition (of heat and/or product) together with metallographic analyses.

- Bauman prints
- Micrographs
- Macroetching
- Inclusions rate
- Decarburisation

ArcelorMittal performs the suitability tests required in the European standard EN 13674-1. Moreover, ArcelorMittal issues certificates of all its products in accordance with EN 10204. We are carrying out the assessed trials for EN 13674, AREMA...etc.

Development of new products

ArcelorMittal participates in the efforts of the leading manufacturers to continuously improve rail steel by harmonising the set of characteristics that determine the rails' performance on the track, such as hardness, dry wear resistance or fatigue resistance and weldability.

In this area, ArcelorMittal has been conducting research and carrying out tests, requirements of the European standard, particularly:

- Oligocyclic fatigue test
- Fatigue crack growth test
- Fracture toughness test
- Weldability test
- Residual stress test

ArcelorMittal produces rails to the following Standards: Euronorm, ASCE, AREMA, Australian, British, Russian, Indian, and to the particular specifications of its customers and we are homologated in the main Railway Administrators.

Applications

The rails and track fittings manufactured by ArcelorMittal are not only supplied to the European market, but exported throughout the world for high speed tracks, heavy haul tracks, urban transport systems, etc.

The quality of the products developed by ArcelorMittal has earned us the full confidence of our customers, to whom we are able to offer the highest level of reliability to be found today on the market.

This is why our rails are used on both railway and urban underground lines in Europe, Asia, Africa and America.

The experience, technology and guaranteed quality of the rails manufactured by ArcelorMittal allow us to offer:

- A variety of sizes from 40 kg/m to 80 kg/m.
- A wide range of steel grades to international standards or to the customers' own technical specifications, both for the construction of newtracks and for revamping existing ones.
- Possibility to manufacture any new type of rail (4,000 tonnes minimum)
- Rails with very strict dimensional tolerancesfor high speed tracks.
- One-piece rails up to 120 metres long.
- Long welded rails (up to 288 metres)
- Asymmetric rails.

<image>

Public and urban transport lines

This market is expanding rapidly throughout the world, due to urban growth and the saturation that it originates, in order to provide transport services for the population living in the outskirts and peripheral towns.

Urban systems have a high service frequency and face a difficult topography, with sharp curves and steep gradients, as well as short braking and acceleration distances.

ArcelorMittal supplies rails for underground systems and intercity railways of cities such as Madrid, Barcelona, Bilbao, Seville, Paris, Buenos Aires, Rio de Janeiro, Fortaleza, Brasilia, Caracas, Medellin, etc.

Heavy haul lines

These lines carry great quantities of ores, containers and other products. The traffic is usually characterised by trains with a high number of wagons and high load per axle.

Rails with high wear resistance and high fatigue failure resistance are required for these tracks. They are made of very hard and very clean microalloyed steels or are head hardened.



It is a continuosly growing market in Europe and in most industrialised countries. with speeds over 350 km/h.

ArcelorMittal supplies rails that combine excellent reliability, geometrical precision, strict flatness tolerance and the highest quality on the market, for high speed lines in Spain, France, Germany, Portugal, Turkey, etc.

Traditional mixed-traffic systems

The operation of these systems involves a great variety of traffic conditions, different topographies and climates, frequently, in oneway routes and in a wide variety of densities.

Light railway lines

They are usually installed as temporary lines and designed for reallocation depending on the service requirements.

Switches and crossovers

ArcelorMittal has joined the group of worldclass manufacturers of rails for switches through the production of switch bars of up to 90 m from special asymmetric rails.

Flat Bottom Rails



TYPF			DIN		SECTIONS	MASS M		
OF RAIL	STANDARD	н	В	С	D	E	cm2	kg/m
EUROPEAN STAND	ARDS							
39E1 (BS80A)	EN 13674-4	133,35	117,47	63,50	42,47	13,10	50,66	39,77
45E1 (BS90A)	EN 13674-4	142,88	127,00	66,67	46,04	13,89	57,46	45,11
45E3 (RN45)	EN 13674-4	142,00	130,00	66,00	40,50	15,00	57,05	44,79
46E2 (U33)	EN 13674-1	145,00	134,00	62,00	47,00	15,00	58,94	46,27
49E1 (DIN S49)	EN 13674-1	149,00	125,00	67,00	51,50	14,00	62,92	49,39
49E5	EN 13674-1	149,00	125,00	67,00	51,50	14,00	62,59	49,13
50E2 (50EB-T)	EN 13674-1	151,00	140,00	72,00	44,00	15,00	63,65	49,97
50E6 (U50)	EN 13674-1	153,00	140,00	65,00	49,00	15,50	64,84	50,90
54E1 (UIC54)	EN 13674-1	159,00	140,00	70,00	49,40	16,00	69,77	54,77
54E2 (UIC54E)	EN 13674-1	161,00	125,00	67,00	51,40	16,00	68,56	53,82
54E3 (DIN S54)	EN 13674-1	154,00	125,00	67,00	55,00	16,00	69,52	54,57
54E4	EN 13674-1	154,00	125,00	67,00	55,00	16,00	69,19	54,31
54E5 (54E1AHC)	EN 13674-1	159,00	140,00	70,20	49,40	16,00	69,32	54,42
56E1 (BS113Lb)	EN 13674-1	158,75	140,00	69,85	49,21	20,00	71,69	56,30
60E1 (UIC60)	EN 13674-1	172,00	150,00	72,00	51,00	16,50	76,70	60,21
60E2	EN 13674-1	172,00	150,00	72,00	51,00	16,50	76,48	60,03
MAV48	EN 13674-1	148,00	120,00	66,80	50,00	14,00	61,78	48,50

AUSTRALIAN STANDARD									
AS60	AS 1085. 1	170,00	146,00	70,00	49,00	16,50	77,25	60,60	
AS68	AS 1085.1	185,70	152,40	74,60	49,20	17,50	86,02	67,50	

RUSSIAN STANDAR	D							
P50 (R50)	GOST	152,00	132,00	72,00	42,00	16,00	65,99	51,80
P65 (R65)	GOST	180,00	150,00	75,00	45,00	18,00	82,65	64,88

AMERICAN STANDARD									
90ARA-A (TR45)	AREMA	142,90	130,20	65,10	37,30	14,30	56,90	44,65	
100 ARA-B	AREMA	143,30	130,66	67,50	43,30	14,30	63,29	49,64	
100RE	AREMA	152,40	136,52	68,26	42,07	14,29	64,19	50,35	
115RE (TR57)	AREMA	168,27	139,70	67,98	42,86	15,87	72,56	56,73	
119RE	AREMA	173,03	139,70	67,47	47,62	15,87	75,08	58,86	
132RE	AREMA	180,97	152,40	76,20	44,45	16,67	82,79	64,88	
136RE (TR68)	AREMA	185,70	152,40	74,60	49,20	17,50	85,98	67,40	
141AB	AREMA	188,91	152,40	77,79	54,77	17,46	89,01	69,74	

Switches & Crossing

	ТҮРЕ		TYPE DIMENSIONS mm								
	OF RAIL	STANDARD	н	В	с	D	E	cm2	kg/m		
	60 5472										
H - E	60 ETT2 (A74, UIC60A)	EN 13674-2	172,00	150,00	72,00	54,00	30,00	94,57	74,24		
B	136TW	AREMA	185,70	152,40	74,60	49,20	42,80	112,00	87,95		
	49E1A1 (Zu 2-49 DB)	EN 13674-2	116,00	140,00	67,00	53,50	40,00	80,43	63,14		
	49E1A3 (I49)	EN 13674-2	116,00	145,00	66,80	53,50	40,00	80,49	63,18		
	54 E1A1 (A69, UIC54B, ZuUIC54B)	EN 13674-2	129,00	147,00	70,00	49,40	40,00	87,83	68,95		
H • E	54 E1A3 (54D20)	EN 13674-2	129,00	145,00	69,91	56,50	32,50	87,41	68,62		
	60 A1E1 (A73, UIC60B, Zu 1 60)	EN 13674-2	134,00	140,00	72,00	53,00	44,00	92,95	72,97		
	60 E1A4 (60D)	EN 13674-2	142,00	150,00	71,91	51,50	32,50	88,95	69,83		
	60 E1A6 (I60)	EN 13674-2	139,00	160,00	72,00	53,00	40,00	67,08	76,21		
C											
	33C1	EN 13674-3	93,00	40,00	80,00	33,00	20,00	42,82	32,99		
	SBB Radlenker	EN 13674-3	104,00	40,00	80,00	45,00	20,00	51,66	40,56		
← C →											
	49E1F2 (KL49)	EN 13674-2	149,00	125,00	66,80	51,00	85,00	122,58	96,23		
→ B → →	60E1F2 (KL60)	EN 13674-2	172,00	150,00	72,00	50,00	90,00	153,56	120,55		

Conductor rail



ТҮРЕ			DIMENSIO	SECTIONS	MASS M				
OF RAIL	STANDARD	н	В	С	D	E	cm2	kg/m	
STR 40	-	105,00	80,00	80,00	43,00	18,00	51,30	40,27	
STR 74 (150 LBS MMC)	-	103,20	123,80	104,80	44,50	69,80	94,26	74,00	

Chemical composition

STEEL							м	ECHANI	CAL PR	OPERTI	ES					
STANDARD	GRADES															MAX O ppm
	700	0,40 0,60	0,8 1,25	0,05 0,35	MAX 0,05	MAX 0,05	-	-	-	-	-	-	-	-	-	-
UIC 860-0 1986-2008	900A	0,60 0,80	0,8 1,3	0,1 0,5	MAX 0,04	MAX 0,04	-	-	-	-	-	-	-	-	-	-
	900B	0,55 0,75	1,3 1.7	0,1 0,5	MAX 0,04	MAX 0,04	-	-	-	-	-	-	-	-	-	-
	R200	0,40 0,60	0,70 1,20	0,15 0,58	MAX 0,035	MAX 0,035	MAX 0,10	MAX 0,02	MAX 0,02	≤ 0,15	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,01	3,0	20
	R260	0,62 0,80	0,70 1,20	0,15 0,58	MAX 0,025	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	≤ 0,15	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,01	2,5	20
EN 13674-1 2011	R260 MN	0,55 0,75	1,30 1,70	0,15 0,60	MAX 0,025	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	≤ 0,15	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,01	2,5	20
	R350 HT	0,72 0,80	0,70 1,20	0,15 0,58	MAX 0,02	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	≤ 0,15	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,04	2,5	20
	R350 LHT	0,72 0,80	0,70 1,20	0,15 0,58	MAX 0,02	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	≤ 0,30	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,04	2,5	20
	R260	0,62 0,80	0,70 1,20	0,15 0,58	MAX 0,025	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	MAX 0,15	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,01	2,5	20
EN 13674-2 2006	R350 HT	0,72 0,80	0,70 1,20	0,15 0,58	MAX 0,020	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	MAX 0,15	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,04	2,5	20
	R350 LHT	0,72 0,80	0,70 1,20	0,15 0,58	MAX 0,020	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	MAX 0,30	MAX 0,03	MAX 0,009	MAX 0,15	MAX 0,04	2,5	20
	А	0,65 0,80	0,80 1,30	0,10 0,50	MAX 0,040	MAX 0,040	-	-	-	-	-	-	-	-	-	-
BS 11 1965	В	0,55 0,75	1,30 1,70	0,10 0,50	MAX 0,040	MAX 0,040	-	-	-	-	-	-	-	-	-	-
	STANDARD CHEMYSTRY	0,74 0,84	0,75 1,25	0,10 0,50	MAX 0,020	MAX 0,020	MAX 0,25	MAX 0,06	MAX 0,06	MAX 0,25	MAX 0,01	-	-	-	-	-
AREMA 2006	LOW ALLOY RAIL STEEL	0,72 0,82	0,80 1,10	0,10 0,50	MAX 0,020	MAX 0,020	MAX 0,15	MAX 0,05	MAX 0,05	0,25 0,40	MAX 0,01	-	MAX 0,40	-	-	-
	STANDARD CHEMYSTRY	0,74 0,86	0,75 1,25	0,10 0,60	MAX 0,020	MAX 0,020	MAX 0,25	MAX 0,06	MAX 0,06	MAX 0,30	MAX 0,01	-	-	-	-	-
AREMA 2007	LOW ALLOY RAIL STEEL	0,72 0,82	0,80 1,10	0,10 0,50	MAX 0,020	MAX 0,020	MAX 0,15	MAX 0,05	MAX 0,05	0,25 0,40	MAX 0,01	-	MAX 0,40	-	-	-
AS 1085.1 2002	ALL RAIL	0,65 0,82	0,70 1,25	0,15 0,58	MAX 0,025	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	MAX 0,15	MAX 0,03	MAX 0,01	MAX 0,15	MAX 0,010	2,5	-
	MICROALLOYED	0,74 0,82	0,80 1,30	MAX 0,50	MAX 0,025	0,01 0,025	-	-	-	MAX 0,30	MAX 0,08	-	-	MAX 0,035	2,0	-
AM	900ACRV	0,74 0,84	0,80 1,25	0,10 0,60	MAX 0,025	0,008 0,025	MAX 0,10	MAX 0,02	MAX 0,02	MAX 0,35	MAX 0,07	MAX 0,009	MAX 0,15	MAX 0,010	2,0	20
	B1000	0,62 0,82	0,70 1,20	0,15 1,0	MAX 0,025	MAX 0,025	MAX 0,10	MAX 0,02	MAX 0,02	0,40 0,80	0,04 0,20	MAX 0,009	MAX 0,15	MAX 0,010	2,0	20

Mechanical properties

	STEEL	MECHANICAL PROPERTIES								
STANDARD	GRADES			НВ						
	700	680 830	14	-						
UIC 860-0 1986-2008	900A	880 1030	10	-						
	900B	880 1030	10	-						
	R200	MIN 680	14	200-240						
	R260	MIN 880	10	260-300						
EN 13674-1 2011	R260 MN	MIN 880	10	260-300						
	R350 HT	MIN 1175	9	350-390						
	R350 LHT	MIN 1175	9	350-390						
	R260	MIN 880	10	260-300						
EN 13674-2 2006	R350 HT	MIN 1175	9	350-390						
	R350 LHT	MIN 1175	9	350-390						
DC 11 1005	А	MIN 880	8	-						
R2 11 1902	В	MIN 880	8	-						
	STANDARD CHEMYSTRY	MIN 983 MIN 1180	10	MIN 300 STANDARD S. RAIL MIN 370 HIGH S. RAIL						
AREMA 2006	LOW ALLOY RAIL STEEL	MIN 983 MIN 1014 MIN 1180	10 8 10	MIN 300 STANDARD S. RAIL MIN 325 INTERMEDIATE S. RAIL MIN 370 HIGH S. RAIL						
	STANDARD CHEMYSTRY	MIN 983 MIN1180	10	MIN 310 STANDARD S. RAIL MIN 370 HIGH S. RAIL						
AREMA 2007	LOW ALLOY RAIL STEEL	MIN 983 MIN 1014 MIN 1180	10 8 10	MIN 300 STANDARD S. RAIL MIN 325 INTERMEDIATE S. RAIL MIN 370 HIGH S. RAIL						
46 4005 4 2002	ALL RAIL	MIN 880	8	MIN 260						
AS 1085.1 2002	MICROALLOYED	780 1130	9	MIN 340						
	900ACRV	MIN 1040	9	320-360						
AM	B1000	MIN 966	9	MIN 315						
	900ACRV	MIN 1080	9	320-360						

References and global presence

Rails manufractured by ArcelorMittal are used worldwide, for high speed railways as well as for heavy hauls, urban transport, etc.

The quality of our products allows us to enjoy total trust from our customers, to whom we can offer the highest possible reliability in the present market.

This is the reason why our rails are present in railways as well as underground lines in Europe, Asia, Africa and America.



Available now for download at your app store, it allows rail key players to:

- get interactive information regarding standards and profiles for different rail product typology.
- calculate rail length or tonnage for different types of railway projects (rail calculator available online and offline).
- download the dimensional profile drawing for transport, crane, light and tram applications.

Additional information can be found on: http://rails.arcelormittal.com November 2019



AMERICA

Canada USA Chile Colombia Venezuela Brazil Mexico Argentina Peru Uruguay Bolivia Ecuador Dominican Republic

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Spain

Belgium

Turkey

France

Denmark

Germany

Portugal

Greece

Finland

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Lithuania

Netherlands

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Algeria Morocco Tunisia Egypt Senegal Madagascar South Africa Liberia Mozambique Ghana Cameroon Guinee

ASIA

Saudi Arabia Bangladesh Taiwan Thailand Malaysia Türkmenistan India Pakistan China Iran South Korea Philiphines Madagascar

OCEANIA

Australia

SALES OF TRANSPORT RAILS

ArcelorMittal Commercial RPS

Sales | Rails | Apartado 570 (P.O. Box 570). Edificio de Energías, 2ª P. 33691 GIJÓN (Asturias-SPAIN) Tfno.: +34-985 18 71 67 Fax: +34-985 18 75 43 rails.specialsections@arcelormittal.com

ArcelorMittal Commercial Long Poland

Sales | Rails | Al. Piłsudskiego 92 41-308 Dabrowa Górnicza Tel: +48 32 7768216 Fax: +48 32 7767067 rails.specialsections@arcelormittal.com



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