

ArcelorMittal South Africa



Rail Products – Railway Industry



About Us

Worth 95 years of experience, ArcelorMittal South Africa is the largest steel producer in sub-Saharan Africa. It boasts 6 production parks across 4 provinces in South Africa, with an installed crude steel capacity exceeding 5 million tonnes. With a local employment base of about 10 000 people, we produce the broad spectrum of primary flat and long steel products, in a wide variety of grades and dimensions and with compliance to international specifications. Our products are used across over 20 market segments, predominantly in the African region but also in Europe, Asia and the Americas.

ArcelorMittal South Africa forms part of the ArcelorMittal Group, producing about 70 million tonnes of crude steel, transacting in over 155 countries and employing over 150 thousand people globally. The group is the largest by innovation and a leading producer in the Americas, Europe and Africa. The group is leader in all major global markets including Automotive, Construction, household appliance and packaging, with leading R&D and technology, as well as sizeable captive supplies of raw materials and outstanding distribution networks. Through this association, ArcelorMittal South Africa has access to world-class research and development, best practice processes, extensive procurement contracts and international market leverage to ensure the company remains at the cutting edge of the international steel industry.

Our Purpose

Championing Africa’s industrial ambitions through sustainable steel.

Our Values



Success starts with training, empowering and keeping all our employees safe.

Local leadership through visionary thinking and willingness to challenge the status quo and be open to doing things differently.



Quality is essential to our competitive edge.

Sustainability through our strive and actions to remaining competitive in the world of tomorrow.



Our Footprint



Pretoria Works
•Small section mill
•Focus on smaller long steel profiles for the windows and fencing industries
On care and maintenance



ArcelorMittal Rail and Structures (AMRAS)
•Heavy section rolling mill
•Heavy gauge mainline rail
•Focus on universal column and beams



Vanderbijlpark Works
•Two blast furnaces; three basic oxygen furnaces
•Slabs, plates
•Hot-rolled coil, cold-rolled coil, electrogalvanized steel, colour coated steel



Vereeniging Works
•Electric Arc Furnaces
•Long steel operation focusing on speciality steel products
•Seamless tube mill
•Forge



Newcastle Works
•One blast furnace; Two ladle furnaces
•Three basic oxygen furnaces
•RH Degasser
•Wire rod, structural Steel, reinforcing Steel
•Mining and Siding Rails



Saldanha Works
•Corex, Midrex continuous process
•Hot rolled coil
On care and maintenance



Commercial Coke and By - Products
•Pretoria, Newcastle & Vanderbijlpark
•Commercial coke production for Ferro-Alloy industry; metallurgical and steel by-products beneficiation, including coal tar



AMRAS

Mainline Rail
48kg/m
57kg/m



Steel Manufacturing Process Route

Liquid steel is manufactured via the Blast Furnace & Basic Oxygen Furnace route, followed by secondary treatment of steel, including ladle furnace refining, calcium treatment, inclusion control and slag manipulation followed by vacuum degassing. Fine grain steelmaking practices are followed. During these processes clean steel is manufactured with the best steelmaking practices to ensure quality conforming liquid steel. The liquid steel is converted into blooms via the Continuous Caster with electro-magnetic mold stirring limiting segregation.

Product Process

The 260 mm square blooms are manufactured at ArcelorMittal, Newcastle Works. These blooms are thermo mechanically rolled into rails at the Heavy Section Mill (AMRAS).

Rails are dimensionally inspected and mechanically tested to ensure conformance to specification. Rails are cut to ordered length before transferring to cooling beds. Hard die stamping and marking are done on the cooling beds after rolling.

AMRAS follows strict traceability practices. Surface inspections are carried out after straightening, that is done in both planes (Vertical and Horizontal), to ensure conformance to straightness specifications.

Drilling and finishing is done off-line.

Quality Assurance & Accreditation

Quality Assurance Systems are based on the requirements of ISO 9001:2015. The stringent requirements regarding rail section characteristics requires a broad quality control management system designed to guarantee the characteristics of the final product. ArcelorMittal Rail and Structures is accredited to: ISO 14001: 2015, ISO 9001: 2015, ISO 45001: 2018.

Test Certification (MTC)

Test and analysis certificates are supplied for all products ordered to international specifications. AMSA products are certified with an EN 10204: 3.1 Inspection Certificate. The material test certificate supplied by AMSA will represent the material supplied by AMSA "trustworthy MTC".

Information available on MTC:

- Supplying plant
- Material designation and dimensions
- Batch number
- Chemical composition
- Mechanical properties

Optional tests available:

- Hardness
- Cleanliness
- Grain size
- Decarburization

General

Changes within the manufacturing process:

AMRAS will inform the customer of any changes in the Quality Plan or Manufacturing Plan from the time of Quality approval. Declarations on not using conflict minerals, ELV & SOC as well as radioactive testing are available on request.



Metallurgical Properties

Reduction Ratio

The reductions ratio for 48 & 57 kg/m rail profiles rolled from the 260 mm square blooms are 11:1 and 9.3:1 respectively.

Chemical Composition

Chemical composition, ladle analysis (W%).

Rail	Specification Description	C	Mn	P	S	Si	Cr	V	N
48kg/m	AMRAS Grade R260	.67/.7	1.05/1.2	0/.02	0/.02	.4/.5	0/.15	.02/.03	0/.009
57kg/m	AMRAS Grade R260	.69/.71	1.1/1.15	0/.02	0/.02	.25/.35	0/.15	.02/.03	0/.009

Permissible deviations between specified analysis and product analysis as per table 4, page 12 of EN 10089:2003.

Micro Cleanliness

Non-metallic inclusions measured according to ASTM E45 method A2 max for fields A,B,C & D (Thin).

Grain Size

Austenite grain size: 5 -8 according to DIN EN 10083 / EN ISO 643.

Decarburisation

Partial 1.5% maximum.

Thermal Treatment / Delivery Condition

As rolled.
Rail drilling and cold saw available on enquiry

Lengths and Tolerances

Standard lengths are 9 & 12 m.
Available lengths range from 6 m to 24 m.
Lengths in increments of 50 mm.

Cutting tolerance of -0 + 100 mm apply for as rolled rails that was ordered without drilling & finishing.

Mechanical Properties

Steel Grade	R260
Hardness range	260 - 300 HBW (Brinell)
Tensile Strength (min)	880 MPa
Elongation (min)	10%

Surface Quality

Surface defects up to a maximum depth of 2% of the nominal thickness shall not be considered as a reason for rejection. Larger surface defects may be removed, providing the nominal thickness is not reduced by more than 7%.

Rust: The material will be inspected and handled according to the American Rust Standard Guide and all material up to a high B in the guide will not be considered a reason for rejection. Exceptions will be sections that were straightened, and the protective scale layer was removed during straightening, also sections that were cut to length and were exposed to water during cutting - material up to a high C in the guide will not be considered a reason for rejection.

Labels and Marking

One polyester label attached to each bundle. Labels will have a white backing.

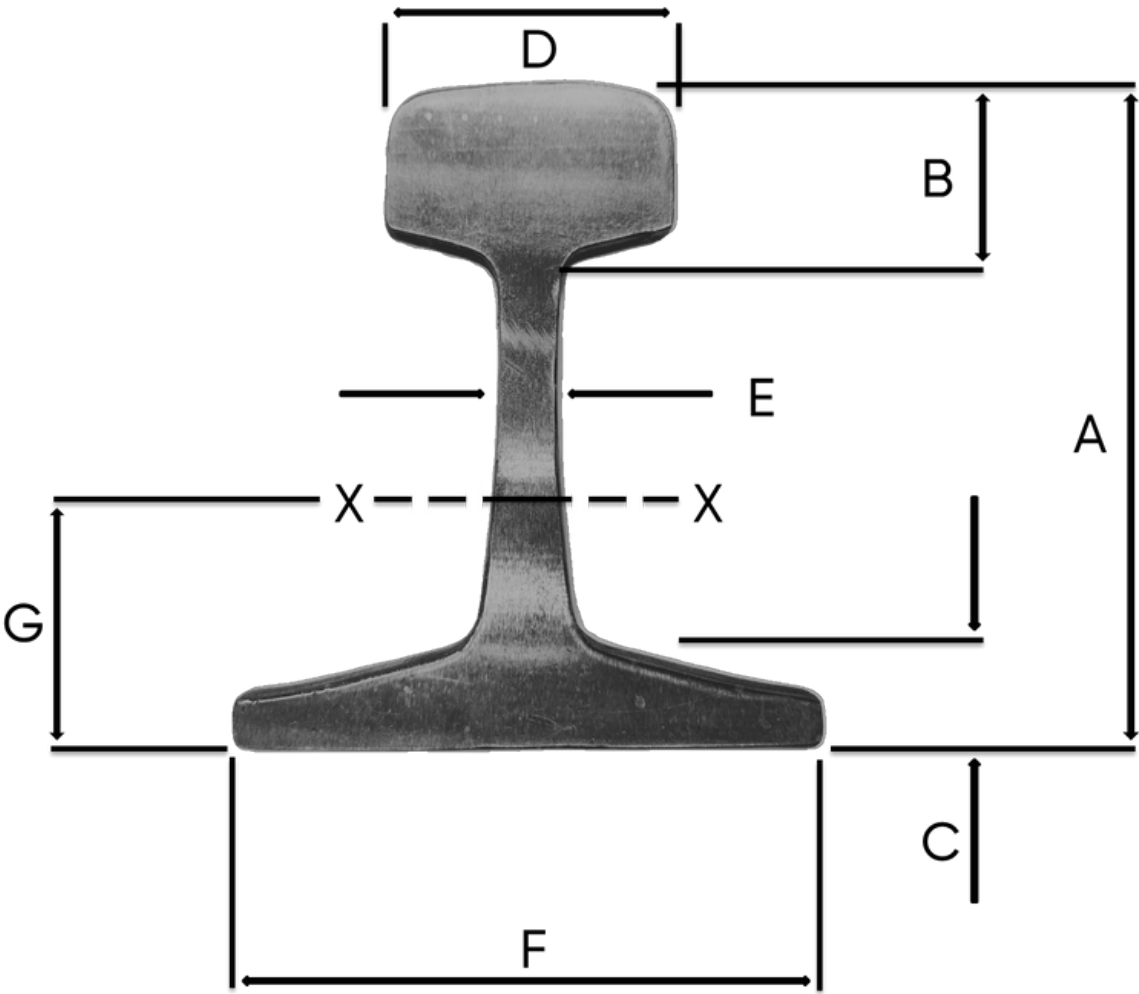
The following standard information will normally be stated:

- AMRAS order confirmation number.
- Customer's order number/mark.
- Port of destination(export).
- Cast number.
- Steel specification, grade and size.
- Bundle mass.
- Bundle number (also printed on bar code).



Dimensions

Dimensions in mm	Size (kg/m)	
	48	57
A = Height of rail	150	165
B = Height of head	43	47.5
C = Height of foot	25	26.5
D = Head width	68	71.1
E = Web thickness	14	16
F = Flange width	127	140
G = Distance to neutral axis	71.33	78.78



Design Data

Data	Size (kg/m)	
	48	57
Nominal mass (kg/m)	48.07	57.38
Area (cm ²)	61.24	73.09
Centroid (mm)	71.33	78.78
Moment of inertia (cm ⁴): X-X	1854.9	2644.7
Moment of inertia (cm ⁴): Y-Y	322.5	440.7
Section modules (cm ³): X-X (Head)	260	335.8
Section modules (cm ³): X-X (Base)	235.8	306.7
Section modules (cm ³): Y-Y (Axis)	50.8	63

Rolling Tolerances

Profile Tolerance Class Y		
Height of rail	+1.2 mm	-0.5 mm
Width of flange	+1.6 mm	-1.6 mm
Width of head	+1.6 mm	-1.6 mm
Thickness of web	+1.2 mm	-0.8 mm
Off centre of head/flange (verticality)	1.6 mm max	
Fishing angle stand off	4.0 mm max	
Concavity on base	1.0 mm max	
End squareness	1.2 mm max	

Tolerances Drilled, Cold Sawn & Finished Rails

Tolerance for Drilled & Cold Sawn Rail		
Length tolerance	+10.0 mm	-10.0 mm
Hole diameter tolerance	+2.0 mm	-2.0 mm
Hole position tolerance	+2.0 mm	-2.0 mm

Rail Drill Patterns		
Section	48 kg/m	57 kg/m
First hole distance from rail end	67 mm	67 mm
Distance between holes	100 mm	100 mm
Height of centre of hole	66.72 mm	70.00 mm
Diameter of holes	32 mm	35 mm

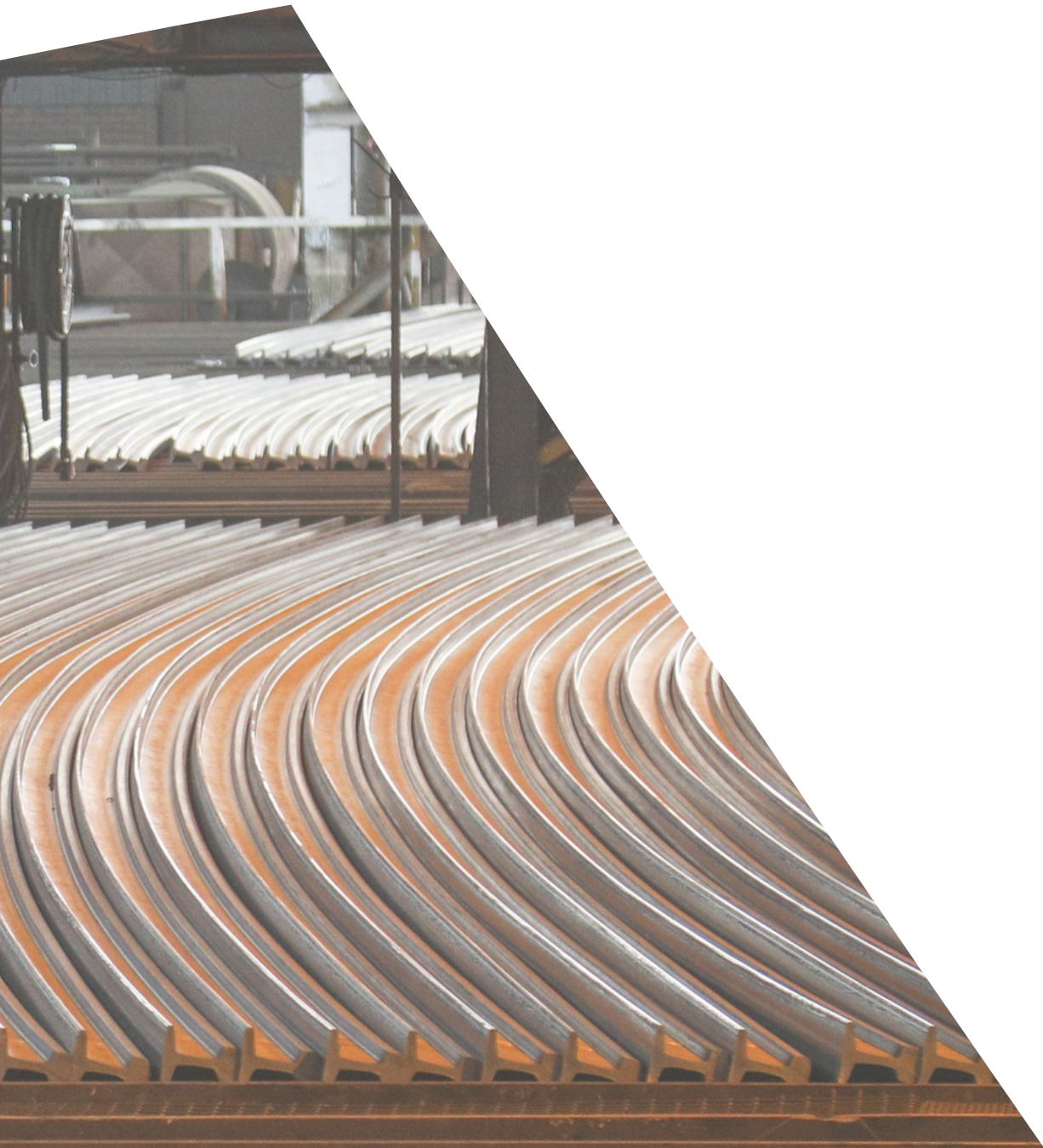
Straightness After Cutting & Drilling	
Waviness (Over 1.5m)	1.0 mm max
Corrugation (Over 1.5m)	1.0 mm max
Sideways deviation of end (Over 1.5m)	1.2 mm max
Lift of ends	3.0 mm max
Dips of end	3.0 mm max

Branding - Rail Identification

The rails will be identified with the following markings or branding hot rolled onto the rail web:

48 — AMRAS YY

Branding	Detail
48 or 57	48 or 57 kg/m rail profile
—	Grade R 260
AMRAS	Manufacturer
YY	Manufacturing Year



Mining & Siding Rails

Hot Rolled Steel Sections
for Railway

15kg/m
22kg/m
30kg/m
40kg/m



General Description

Rails for use in mines are supplied to ArcelorMittal Steel South Africa's own specification as Mines and Sidings rails in 15 kg/m, 22 kg/m, 30 kg/m and 40 kg/m sizes. This data sheet contains only the standard manufactured specifications. Other steel specifications, surface specifications, rolling tolerances, sizes and lengths may be considered on an enquiry basis.

Steel Making

Liquid steel is manufactured via the Blast Furnace, Basic Oxygen Furnace route followed by secondary treatment of steel, including ladle furnace refining, calcium treatment, inclusion control and slag manipulation followed by vacuum degassing. Fine grain steel making practices are followed. During these processes clean steel are manufactured with the best steel making practices to ensure quality conforming liquid steel.

The liquid steel is then continuously cast into blooms before rolling.

Quality Assurance & Accreditation

Quality Assurance Systems are based on the requirements of ISO 9001:2015. The stringent requirements regarding rail section characteristics requires a broad quality control management system designed to guarantee the characteristics of the final product. ArcelorMittal Rail and Structures is accredited to: ISO 14001: 2015, ISO 9001: 2015, ISO 45001: 2018.

Test Certification (MTC)

Test and analysis certificates are supplied for all products ordered to international specifications. AMSA products are certified with an EN 10204: 3.1 Inspection Certificate. The material test certificate supplied by AMSA will represent the material supplied by AMSA "trustworthy MTC".

Information available on MTC:

- Supplying plant
- Material designation and dimensions
- Batch number
- Chemical composition
- Mechanical properties

Optional tests available:

- Hardness
- Cleanliness
- Grain size
- Decarburization

Surface Quality

Surface defects up to a maximum depth of 2% of the nominal thickness shall not be considered as a reason for rejection. Larger surface defects may be removed, providing the nominal thickness is not reduced by more than 7%.

Rust: The material will be inspected and handled according to the American Rust Standard Guide and all material up to a high B in the guide will not be considered a reason for rejection. Exceptions will be sections that were straightened, and the protective scale layer was removed during straightening, also sections that were cut to length and were exposed to water during cutting - material up to a high C in the guide will not be considered a reason for rejection.

Labels and Marking

One polyester label attached to each bundle. Labels will have a white backing.

The following standard information will normally be stated:

- AMRAS order confirmation number.
- Customer's order number/mark.
- Port of destination(export).
- Cast number.
- Steel specification, grade and size.
- Bundle mass.
- Bundle number (also printed on bar code).

Steel Specification

Specification	Code	Rail Size	% Carbon Equivalent ¹
Mines and Sidings: Grade 700	512 300	15 kg/m	0.63/0.74
Mines and Sidings: Grade 700	512 300	22 kg/m	0.63/0.74
Mines and Sidings: Grade 700	512 550	30 kg/m	0.67/0.82
Mines and Sidings: Grade 900A	C01 555	40 kg/m	

1% Carbon equivalent = % C + $\frac{\% \text{ Mn }}{4}$ + $\frac{(\% \text{ Cr} + \% \text{ Mo} + \% \text{ V})}{5}$ + $\frac{(\% \text{ Ni} + \% \text{ Cu})}{15}$

Mechanical Properties

Modern testing and analysis facilities are used to ensure compliance with the rail specifications.

Specification	Tensile Strength (min) MPa	Elongation (min) %	Yield Strength ¹ (min) Mpa
Mines and Sidings: Grade 700	680	10	400
Mines and Sidings: Grade 900A	880	10	

1 Typical values, not guaranteed.

Design Data

Data	Size (kg/m)			
	15	22	30	40
Nominal mass (kg/m)	14.905	22.542	30.250	40.3
Total Cross Section Areas (x10 ³ mm ²)	1899	2872	3853	5153
Moments of inertia; x : (10 ⁶ mm ⁴)	1.49	3.51	6.25	
Moments of inertia; y : (10 ⁵ mm ⁴)	3.86	8.61	15.58	

Note : See the cross sectional drawings for other dimensions.

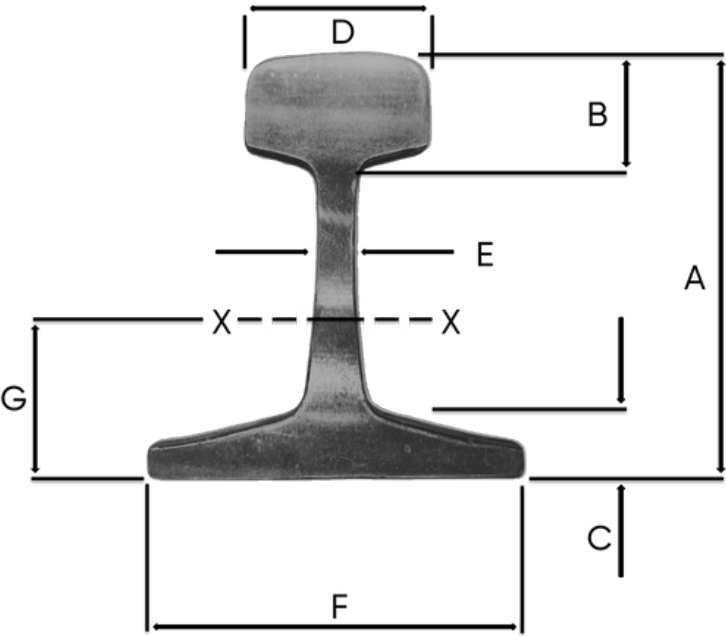
Welding

Rails produced by ArcelorMittal South Africa can be welded by "flash-butt" or "thermite" techniques. For practical details it is recommended that an authority should be consulted. The following table gives an indication of the minimum cooling time recommended for the heat-affected zone.

Specification	Minimum cooling time from 800°C to 500°C in seconds	
	1000°C	850°C
Mines and Sidings: Grade 700	35	26
Mines and Sidings: Grade 900A		

1 Austenitising temperature.

Dimensions in mm	Size (kg/m)			
	15	22	30	40
A = Height of rail	76.2	95.25	109.54	127
B = Height of head	25.4	31.35	34.93	40.48
C = Height of foot	13.1	15.48	17.64	19.45
D = Head width	41.28	50.01	57.15	63.5
E = Web thickness	7.54	9.92	11.5	13.9
F = Flange width	76.2	95.25	109.54	127
G = Distance to neutral axis				53.98



Tolerances

Tolerances for 15, 22, 30 & 40 kg/m rails.

	Min (mm)	Max (mm)
Overall height	-0.5 mm	+1.2 mm
Width of the base/flange	-2.0 mm	+2.0 mm
Width of the head	-1.6 mm	+1.6 mm
Thickness of the web	-0.8 mm	+1.2 mm
Corner radius	-1.0 mm	+1.0 mm
Length	0.0	+50.0 mm
Head & Flange off centre (vertically)	1.6	
Fishing angle – stand off	4.0	

Camber rails are supplied as rolled to a max camber 6 mm per meter of length.

Lengths

15, 22 & 30 kg/m: 5 to 18 m in increments of 50 mm.
40 kg/m: 9 & 12 m. Non-standard lengths are available from 6 m up to 24 m in increments of 50 mm.

Cutting tolerance of -0 + 50 mm apply for as-rolled rails that was ordered without drilling & finishing (Length tolerance for cold sawn rail is -10 + 10 mm). As-rolled rails are friction saw cut and the squareness of the cut is not guaranteed. Burrs resulting from the cutting and punching process are not removed.

Designated Mass (kg/m)	Number Of Holes (2 per end)	Height Of Hole From Foot (mm)	Distance Between Hole Centres (mm)	Hole Position Tolerances (mm)	Hole Diameter (mm)	Hole Diameter Tolerances (mm)	Start Distance (mm)
40	4	54	101.6	±2	25.4	±2	47.63
30	4	46.03	101.6	±2	22.22	±2	47.63
22	4	49.4	101.6	±2	22.22	±2	47.63
15	4		101.6		20	±1	35.6-39.6
15	4		88.9		20	±1	29.3-33.3

Straightness After Cutting & Drilling

Waviness (Over 1.5 m)	1.0 mm max
Corrugation (Over 1.5 m)	1.0 mm max
Sideways deviation of end (Over 1.5 m)	1.2 mm max
Lift of ends	3.0 mm max
Dips of end	3.0 mm max

Supply Conditions

AMRAS Rails including Mining & Siding Rails are supplied in accordance with ArcelorMittal Steel South Africa's General Conditions of Sale and Price List on Rails Number 240.

All rails supplied with process burrs as a semi-finished product.

Disclaimer

Care has been taken to ensure that the information in this data sheet is accurate. ArcelorMittal South Africa Limited does not, however, assume responsibility for any inaccuracies or misinterpretations of this data. We are continuously engaged in product development and revised data sheets will be issued from time to time. Please ensure that you have the most recent issue.







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