

Data sheet: F1.1

Round bar

Hot rolled round steel bar, carbon & low-alloy grades in lengths & coils

General description

ArcelorMittal South Africa, Newcastle Steel supplies round bar, defined as material with diameters ranging from a nominal 6 mm up to 106 mm, for applications such as general engineering and rods for grinding mills.

a Bars from 6 to 106 mm in diameter are rolled from cast blooms or rolled from billets to lengths and still air cooled on a cooling bed. Bars from 14,5mm to 33,5mm in diameter, required as coils, may be finished by coiling in a pouring reel.

b Bars 6mm and 8mm in diameter are rolled from billets into control cooled coils and thereafter cold straightened, but only in steel having a yield strength of 580 MPa maximum.

This data sheet contains only the standard manufactured specifications. Other steel grades, surface specifications, rolling tolerances, sizes and lengths may be considered on an enquiry basis.

Quality assurance

Quality assurance systems based on the requirements of SANS ISO 9001: 2000 are in operation.

Surface quality

Round bar is supplied to a maximum defect depth not exceeding 2%. For bars > 50 mm individual guide marks (caused by tackle) shall not exceed 3%.

Certification

Generally analysis certificates are supplied with each consignment whilst mechanical property test certificates can be supplied on request, except where the particular specification, such as for structural steels, calls for complete certification. The mechanical and chemical laboratories of ArcelorMittal South Africa, Newcastle Steel are SANAS accredited facilities.

Standard bar sizes (lengths^L and coils)

Diameter (mm)	Mass ¹ kg/m	Diameter (mm)	Mass ¹ kg/m	Diameter (mm)	Mass ¹ kg/m
6 ^L	0,222	27	4,495	60 ^L	22,195
8 ^L	0,395	28	4,834	63 ^L	24,470
10 ^L	0,617	28,5	5,008	64 ^L	25,253
12 ^L	0,888	30	5,549	65 ^L	26,049
14,0	1,208	31	5,925	66 ^L	26,856
14,5	1,296	32	6,313	68 ^L	28,509
16	1,578	33	6,714	70 ^L	30,210
16,5	1,679	33,5	6,919	73 ^L	32,855
17	1,782	34 ^L	7,127	75 ^L	34,680
17,5	1,888	35 ^L	7,553	76 ^L	35,611
18	1,998	36 ^L	7,990	76,5 ^L	36,081
18,5	2,110	36,5 ^L	8,214	78 ^L	37,510
19	2,226	38 ^L	8,903	80 ^L	39,458
19,5	2,344	40 ^L	9,865	83 ^L	42,473
20	2,466	42 ^L	10,876	89 ^L	48,836
20,5	2,591	43,5 ^L	11,666	90 ^L	49,940
21	2,719	45 ^L	12,485	92,0 ^L	52,184
22	2,984	46,5 ^L	13,331	95 ^L	55,643
23	3,261	48 ^L	14,205	100 ^L	61,654
23,5	3,405	50 ^L	15,413	102 ^L	64,145
24	3,551	51 ^L	16,036	103 ^L	65,408
24,5	3,701	52 ^L	16,671	105 ^L	67,973
25	3,853	53 ^L	17,319		
25,5	4,009	55 ^L	18,650		
26,5	4,330	57,15 ^L	20,137		

^L Diameters available in lengths only

¹ Nominal mass: calculated from a density factor of 7,85 tons/m³

Non-standard sizes - available on enquiry only

Diameter (mm)	Mass ¹ kg/m	Diameter (mm)	Mass ¹ kg/m	Diameter (mm)	Mass ¹ kg/m
10,5	0,680	37,0 ^L	8,440	63,5 ^L	24,860
11,0	0,746	38,5 ^L	9,139	67,0 ^L	27,676
13,0	1,042	39,0 ^L	9,378	72,0 ^L	31,961
15	1,387	41,0 ^L	10,364	82,0 ^L	41,456
21,5	2,850	44 ^L	11,936	85 ^L	44,545
22,5	3,121	44,5 ^L	12,209	88,0 ^L	47,745
26	4,168	46,0 ^L	13,046	93,0 ^L	53,324
26,5	4,330	47,0 ^L	13,619	101,0 ^L	62,893
29,0	5,185	56,0 ^L	19,335	106 ^L	69,274
29,5	5,365	57,0 ^L	20,031		
30,5	5,735	58 ^L	20,740		
31,5	6,118	62,0 ^L	23,700		

^L Diameters available in lengths only

¹ Nominal mass: calculated from a density factor of 7,85 tons/m³

Note: <14mm only lengths – non standard

>14 mm lengths and coils – non-standard

Rolling tolerances (coils and lengths)

Round bar is produced to the dimensional tolerances laid down in the following table.

Nominal diameter (mm)	SPE 231		SPE 231 Kocks		DIN 1013 (lengths only)		DIN 59110 (coils only)		ASTM A29 (% : of nom. diameter)	
	diameter	ovality ¹⁾	diameter	ovality ¹⁾	diameter	ovality ¹⁾	diameter	ovality ¹⁾	diameter	ovality ¹⁾
6,0 – 8,0	± 0,15	0,25								
10 - 14	± 0,40	0,64			± 0,40	0,64	± 0,40	0,64	± 0,18	0,27
14,5 - 15	± 0,40	0,64	± 0,20	0,26	± 0,40	0,64	± 0,40	0,64	± 0,18	0,27
16 - 19	± 0,50	0,80	± 0,20	0,26	± 0,50	0,80	± 0,50	0,80	± 0,20	0,30
19,5 - 21,5	± 0,50	0,80	± 0,20	0,26	± 0,50	0,80	± 0,50	0,80	± 1,00 %	1,50 %
22 - 24	± 0,50	0,80	± 0,20	0,26	± 0,50	0,80	± 0,50	0,80	± 1,00 %	1,50 %
24,5 - 25	± 0,50	0,80	± 0,20	0,26	± 0,50	0,80	± 0,50	0,80	± 1,00 %	1,50 %
25,5 - 30	± 0,60	0,96	± 0,20	0,26	± 0,60	0,96	± 0,60	0,96	± 1,00 %	1,50 %
30,5 - 35	± 0,60	0,96	± 0,24	0,31	± 0,60	0,96			± 1,00 %	1,50 %
36 - 43,5	± 0,80	1,28	± 0,24	0,31	± 0,80	1,28			± 1,00 %	1,50 %
44	± 0,80	1,28	± 0,24	0,31	± 0,80	1,28			± 1,00 %	1,50 %
45 – 50	± 0,80	1,28			± 0,80	1,28			± 1,00 %	1,50 %
50,5 – 80	± 1,00	1,60			± 1,00	1,60			± 1,00 %	1,50 %
80,5 – 100	± 1,30	2,00			± 1,30	2,08			± 1,00 %	1,50 %
100,5 - 106	± 1,50	2,00			± 1,50	2,40			± 1,00 %	1,50 %

Note:

- 1 Ovality is the difference between maximum and minimum diameters measured in the same plane.
- 2 The table contains typical rolling tolerances. Other tolerances can be supplied on enquiry.

Standard lengths and length tolerances

- a** Bars 6 and 8 mm in diameter from 6 to 13m in increments of 100mm with a cutting tolerance of -0 +50 mm.
- b** Bars from 10 to 50mm in diameter are supplied in cold sheared standard lengths from 6 to 13 m in increments of 100mm with a cutting tolerance of -0 +50mm.
- c** Bars from > 50 to 10 mm in diameter are supplied in cold sawn standard lengths from 6 to 18 m in increments of 100mm with a cutting tolerance of -0 +50mm.
- d** **Grinding mill rods:** grade 400 Cr rods and grade SS10/25A rods are cold sawn or flame cut to length. Lengths are supplied from 3,15 to 18 m in increments of 100mm with a cutting tolerance of -0 + 50mm.

Bundle mass

Mill	Minimum	Maximum	Deviation from gross mass
Medium Mill	3 ton	5 ton	-10% on ordered bundle mass
Bar Mill	1,5 ton	2,5 ton	-10% on ordered bundle mass

- a** Bars from 6mm to 50mm in diameter can be supplied in bundles ranging from 1,5 to 2,5 tons within a tolerance according to the mass of individual bar lengths.
- b** Bars from > 50mm to 106mm can be supplied in bundles ranging from 3 to 5 tons within a tolerance according to the mass of individual rod lengths.

Coil mass and dimensions

Coils are formed in an anti-clockwise direction, which means that coils must be unwound for processing from the top downwards in a clockwise direction.

Bar Mill material can be supplied in coils in diameters from 14,5mm up to 33,5mm.

Coils are supplied as compacted individual coils to the mass and dimensions given in the table below:

Characteristic	Bar mill 14,5mm to 33,5mm diameter	
	14,5 - 29,5 mm	30,0 - 33,5 mm
Average mass (kg)	1850	1850
Tolerance on mass	Within 10% from nominal mass	
Min inside diameter (mm)	1100	1100
Max outside diameter	1400	1400
Maximum height (mm)	1300	1300

Note: All coils will be within 10% of the nominal mass.

Steel specifications for grinding mill rods

Specification	Code	Guaranteed Brinell hardness
SS 10/25 A Mod	307 592	250 - 320 max
400 Cr	854 381	370 - 450

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⊗ Non-standard quality - available on enquiry only

Steel specifications for structural applications

Ladle analysis and mechanical properties certificates will be supplied for **bars in lengths only**.

Specification	Code	Tensile strength (MPa)	Yield strength (MPa)	Elongation Lo = $5,65\sqrt{So}^1$
SANS 1431: 1987 Gr 300WA	376 002	450 - 620	300 min ≤ 50 mm 290 min >50 to 63 mm 280 min >63 to 100 mm 270 min >100 to 105 mm	22% min
ASTM A36 - 93A	371 002	402 - 550	250 min	20% min
BS 4360 Gr 50B (thickness: ≤ 30 mm)	475 002	490 - 640	355 min ≤ 16 mm 345 min > 16 mm	20% min
BS 4360 Gr 50C (thickness: ≤ 50 mm)	859 008	490 - 630	355 min ≤ 16 mm 345 min > 16 mm	22% min
⊗ BS 4360 Gr 55C (thickness: ≤ 25 mm)	155 001	550 - 700	450 min ≤ 16 mm 430 min > 16 mm	19% min
SANS 50025/EN 10025 S275JR	064 002	410 - 560	275 min ≤ 16 mm 265 min: >16 to 40mm 255 min: >40 to 63mm 245 min: >63 to 80mm 235 min: >80 to 100mm 225 min: >100 to 106mm	23% min 23% min 22% min 21% min 21% min 19% min
SANS 50025/EN 10025 S235JR (Thickness: ≤25 mm)	016 001	360 - 510	235 min ≤ 16 mm 225 min: >16 to 25mm	26% min
SANS 50025/EN 10025 S355JR (Thickness: ≤ 30mm)	078 678	470 - 630	255 min ≤ 16 mm 345 min: >16 to 30mm	22% min
SANS 50025/EN 10025:1993 S355JO	101 008	470 - 630	255 min ≤ 16 mm 345 min: >16 to 40mm 335 min: >40 to 63mm 325 min: >63 to 80mm 315 min: >80 to 100mm 295 min: >100 to 106mm	22% min 22% min 21% min 20% min 20% min 18% min

⊗ Non-standard quality - available on enquiry only

Steel grades

Note: The following table of steel grades is not intended to serve as a list of equivalent grades. It is merely a list of generically similar steel grades available in each geographic region.

Americas	European community	Pacific rim
3.4.1 Round bar for general use and re-forging		
SAE 1010		
SAE 1015	DIN 17210 C 15	
SAE 1020		JIS G 4051 S20C
SAE 1040		JIS G 4051 S45C
	BS 970 070M20	
	BS 970 080M40	
	BS 970 070M55	
	BS 970 709M40	
3.4.2 Round bar for structural applications		
ASTM A 36 - 93A	DIN 17100 RST 44-2	JIS G 3101 SS 400
	BS 4360 Gr 43A	
	BS 4350 Gr 50B	
	DIN 17100 RST 37-2	
	DIN 17100 RST 52-3	

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. Effective date: Nov 2016

Steel specifications for general use and forging

Only a ladle analysis certificate will be supplied.

Specification	Code	%C	%Mn	%P	%S	%Si	%Al (aim)
SAE 1006	285 180	0,08x	0,40/0,60	0,030x	0,030x	0,20x	-
SAE 1008	098 180	0,10x	0,30/0,50	0,030x	0,030x	0,35x	-
SAE 1010	758 140	0,08/0,13	0,40/0,60	0,030x	0,030x	0,15/0,25	-
SAE 1012	357 210	0,10/0,15	0,40/0,60	0,030x	0,030x	0,35x	-
SAE 1015	112 101	0,13/0,18	0,40/0,60	0,030x	0,030x	0,15/0,35	-
SAE 1018	747 219	0,15/0,20	0,60/0,90	0,030x	0,030x	0,15/0,35	-
SAE 1020	916 160	0,18/0,23	0,30/0,60	0,030x	0,030x	0,15/0,35	-
SAE 1040	925 683	0,37/0,44	0,60/0,90	0,040x	0,050x	0,15/0,35	-
SAE 1045	521 500	0,43/0,50	0,60/0,90	0,030x	0,030x	0,35x	-
⊗ BS 970 070 M20 (EN 3A)	050 302	0,16/0,24	0,50/0,90	0,025x	0,025x	0,15/0,35	0,02/0,04
BS 970 080 M40 (EN 8)	581 683	0,37/0,44	0,60/0,90	0,040x	0,050x	0,15/0,35	-
⊗ BS 970 709 M40 ² (EN 19)	473 502	0,36/0,44	0,70/1,00	0,035x	0,035x	0,10/0,35	0,02/0,04
DIN 17140 D53-2	226 608	0,50/0,54	0,60/0,80	0,025x	0,025x	0,15/0,30	-
DIN 17140 D63-2	229 613	0,60/0,64	0,60/0,80	0,020x	0,020x	0,15/0,30	-
DIN 17140 D68-2	232 624	0,65/0,69	0,60/0,80	0,020x	0,020x	0,15/0,30	-
DIN 17140 D73-2	239 550	0,70/0,74	0,60/0,80	0,020x	0,020x	0,15/0,30	-
Commercial Quality	250 555	0,30x	CE = 0,51max CE=C + Mn/6 + (Cr+Mo+V)/5 + (Ni+Cu)/15				

⊗ Non-standard quality - available on enquiry only

1 Cr: 0,15/0,25

2 Cr: 0,90/1,20; Mo: 0,25/0,35

Bundling

Coils:

Individual coils are strapped with four steel straps or wire ties evenly spaced around the periphery, an additional 2 wire ties can be added if required. Straps are prevented from slipping by means of an additional wire tie around the periphery.

Lengths:

Lengths are securely tied in bundles normally containing a standard number of bars per size and length. Bundles are secured with wire ties or steel straps depending on bar diameter, two adjacent straps approximately 150 - 250 mm from each end and intermediate straps at approximately 1,5 meter intervals.
(A list of standard bundles is available on request)

Labels

One polyester label on a metal backing will be tied to each end of the coil/bundle by means of wire ties or laced to bundle straps at works' option.

Coloured metal backings are available in: white, blue, green, purple, grey, brown, orange, pink, black, beige, light green, light blue and red.

Where no metal backing colour is specified on orders, white labels will normally be used at the works' discretion.

Labels will bear information to a maximum of four lines with a maximum of forty-five characters per line.

The following standard information will normally be stated, but can be altered to suit the purchaser's need:

- ArcelorMittal South Africa's order confirmation number
- Port of destination (export)
- Cast number
- Steel grade and bar diameter
- Coil/bundle weight
- Number of bars per bundle (if specifically requested)
- Coil/bundle number
- Coil/bundle numbers are also printed on a bar code.

Colour marking

Water based paint marking is available in single colours or up to three stripes in two colours or up to three stripes in three colour combinations, for customer's identification purposes.

Colours available: red, green, blue, pink and white

Coloured lines/bands are approximately 50 or 100 mm wide and are applied through approximately 180 degrees. Colour splashes are approximately 100 mm in diameter.

Supply conditions

Round bar is supplied in terms of ArcelorMittal South Africa's price list 231series and General Conditions of Sale.