



RIVA ACCIAIO



## Hot Rolled Round Steel Bars

Viale Certosa, 249 - 20151 Milano

Tel: +39 02 30 700 - Fax: +39 02 38000 346 - Mail: [commerciale.riva@rivagroup.com](mailto:commerciale.riva@rivagroup.com)

### Production Units:

Cerveno (BS), Italy

Lesegno (CN), Italy

Sellero (BS), Italy



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# Hot Rolled Round Steel Bars

## Products

STRUCTURAL AND GENERAL USE NON-ALLOY QUALITY STEEL	EN 10025-04
CASE HARDENING CARBON AND ALLOY SPECIAL STEELS	EN 10084/08 UNI 7846
QUENCHED AND TEMPERED CARBON AND ALLOY SPECIAL STEELS	UNI EN 10083-2 AND 3 UNI 7845 UNI 7847
QUENCHED AND TEMPERED QUALITY CARBON STEELS	UNI 10083-2/06
QUENCHED AND TEMPERED BORON STEEL	EN 10083-3
CARBON STEEL FOR PIPE FITTINGS	ASTM A105 ASTM A350-LF2
CASE HARDENING AND QUENCHED AND TEMPERED FREE CUTTING STEEL	ASTM A29
MN-SI, MN-SI-CR, CR, CR-V, CR-MO-V QUENCHED AND TEMPERED STEEL	UNI 3545 (FOR DRAG TRACTORS)
MICRO-ALLOYED STEEL	ACCORDING TO CUSTOMER SPECIFICATIONS

Semi-Product	section	Dimensions mm	Std. Deviation on the Section	Length m
ROLLED ROUND	ROUND	Ø 18 ÷ 160	EN10060	5 ÷ 12 / 3 ÷ 12 A DEPENDING ON PRODUCTION SITE

### STANDARD DIMENSIONS

#### DIAMETERS (mm)

18 - 19 - 20 - 21 - 22 - 23 - 24 - 25 - 26 - 27 - 28 - 29 - 30 - 32 - 33 - 34 - 35 - 36 - 37 - 38 - 39 - 40 - 42 - 43 - 44 - 45 - 46 - 47 - 48 - 49 - 50 - 51 - 52 - 53 - 54 - 55 - 56 - 57 - 58 - 60 - 61 - 62 - 63 - 65 - 67 - 68 - 70 - 72 - 73 - 75 - 78 - 80 - 82 - 83 - 85 - 88 - 90 - 93 - 95 - 98 - 100 - 103 - 105 - 110 - 115 - 120 - 125 - 130 - 140 - 150 - 160

### LENGTH

Length in as rolled condition

Lesegno: 5 ÷ 12 m

Cerveno: 3 ÷ 12 m

Sellero: 5 ÷ 12 m

Length in annealed condition: max 9,20 m

### END APPEARANCE

Shear cut with plane knives: 18 ÷ 23 mm

Shear cut with shaped knives: 24 ÷ 160 mm

Saw cut (only on customer request): 100 ÷ 160 mm

### SURFACE FINISHING

Sandblasted products may be supplied upon request.

Lesegno: from 30 to 70 mm in 4,6 - 7,5 m length

Cerveno: from 47 to 105 mm in 3 - 12 m length

Sellero: 100 ÷ 160 mm in 3 - 12 m length



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## SIZE TOLERANCE

Conforming to UNI 10060 standard for structural and general use steel;

Conforming to UNI 7620 - Gr.B e AFNOR A45-101 Cal.b standards on request for  $\emptyset \leq 70$  mm;

Restricted tolerance on straightness ( 2 mm/m) only with straightening operation.

## ROUND BARS METRIC WEIGHT

$\emptyset$ mm	Rounds	$\emptyset$ mm	Rounds	$\emptyset$ mm	Rounds	$\emptyset$ mm	Rounds
	Kg/m		Kg/m		Kg/m		Kg/m
18	2,00	39	9,37	61	22,94	100	61,62
19	2,22	40	9,86	62	23,69	103	65,41
20	2,46	42	10,87	63	24,46	105	67,94
21	2,72	43	11,39	65	26,04	110	74,56
22	2,98	44	11,94	67	27,68	115	81,50
23	3,26	45	12,48	68	28,49	120	88,74
24	3,55	46	13,04	70	30,20	125	96,29
25	3,85	47	13,61	72	31,95	130	104,14
26	4,17	48	14,20	73	32,83	135	112,31
27	4,49	49	14,80	75	34,66	140	120,78
28	4,83	50	15,41	78	37,49	145	129,56
29	5,18	51	16,04	80	39,44	150	138,65
30	5,55	52	16,66	82	41,43	160	157,75
32	6,31	53	17,31	83	42,45	170	178,09
33	6,71	54	17,98	85	44,52	180	199,66
34	7,12	55	18,64	88	47,72	190	222,46
35	7,55	56	19,34	90	49,91	200	246,49
36	7,99	57	20,03	93	53,30	-	-
37	8,44	58	20,73	95	55,61	-	-
38	8,90	60	22,18	98	59,21	-	-



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# Hot Rolled Round Steel Bars

## General Supply Conditions

### PRODUCTION CAMPAIGN

Rolled products	(round bars)	40 days
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### LENGTH

COMMERCIAL: 5 ÷ 8 m, with increases  $\geq 1$  m

FIXED: According to the product , with increase  $\geq 200$  mm

CROP BAR END: If agreed on order  $\geq 3$ m for max  $\leq 15$  % of the quantity.

### MINIMUM QUANTITY PER ORDER

round bars in carbon, general use or alloy steel	5 ton
other rolled products	80 ton

### WEIGHT TOLERANCES ON THE ORDERED QUANTITY

for order $\leq 5$ ton	$\pm 20\%$
for order $> 5 \div 25$ ton	$\pm 10\%$
for order $> 25$ t	$\pm 6\%$

### PACKING

BUNDLE WEIGHT: rolled products 2 ÷ 3 ton

WRAPPING: N°4 of wire rod  $\varnothing 7$  mm for each bundle or with 4 fastenings for each bundle.

Each bundle is identified with a metallic lable indicating heat n°, steel quality, order n°, steel grades, and 3 adhesive labels on bar end



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# Hot Rolled Round Steel Bars

## Quality Conditions

### SURFACE DEFECTS

Defects are allowed up to a depth  $\leq 0,8$  % of the diameter or of the section side, with min. 0,3 mm and max 0,6 mm conforming with the following standards:

- ISO 9443 - 91 - class 2
- EN 10221 class B
- NF A 35 - 552 class 2
- UNI 7845 - 7846 - 7847 - class A

For the sections 32 – 110 mm it is possible to perform 100% non destructive crack test and guarantee the following surface defects class:

- EN 10221 class C
- EN 10221 class D
- Max 0,3 mm

### INTERNAL DEFECTS

Macro cleanliness  $\leq 2$  grade according S.E.P. 1584 standard

Micro cleanliness  $< 2,5$  grade according ASTM E 45 or by K method according to values foreseen by the EN 10083-1/06, App E

Macrosegregation  $\leq C3-R2-S2$  according to ASTM E 381

Structure segregation  $\leq$  Grade IV UNI 8449 Standard

This conditions can be improved with vacuum degassing in order to comply with specific technical specifications or end use of the material.

For the sections 20 – 110 mm it is possible to perform 100% non destructive US test and guarantee the following inner defects class:

- EN 10308 class 2
- EN 10308 class 3
- EN10308 class 4
- SEP 1920 class C

### AUSTENITIC GRAIN SIZE SPECIAL STEEL

By Al + Ti a  $5 \div 8$  o  $6 \div 9$  conforming to EN ISO 643, UNI 3245 o ASTM E112 standards

### MANAGEMENT SYSTEM CERTIFICATION

ISO 9001 - Certification - Quality Management Systems

ISO 14001 - Certification - Environmental management system

ISO BH OHSAS 18001 - Certification - occupational health and safety management system

### INSPECTION CERTIFICATES

- 3.1.B conforming to EN 10204 standard
- TÜV - AD WO/TRD100 and directive 97/23/EC (PED) directive for rolled products suitable for pressure vessels manufactured
- Caterpillar qualification (1E1861)
- CE marking according to EN 10025-1/06 for structural steel rolled products.



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# Hot Rolled Round Steel Bars

## STRUCTURAL AND GENERAL USE NON-ALLOY QUALITY STEEL EN 10025-04

### DESCRIPTION AND APPLICATIONS

Non alloy quality steels suitable for the manufacturing of structural elements, as welded, bolted and riveted structures for room temperature applications.

### EN 10025-95 QUALITIES AND MAIN CORRESPONDING INTERNATIONAL STANDARDS

EN 10025-04	EN 10025-95	Italy UNI EN 10025-90	Germany DIN 17100	France AFNOR NF A 35.501	U.K. B.S. 4360	Spain UNE 36080	U.S.A. ASTM
S235JR	S235JR G2	Fe 360 B	RSt 37-2	-	40 B	AE 235 B-FN	-
S235J0	S235J0	Fe 360 C	St 37-3U	E 24-3	40 C	AE 235 C	-
S235J2	S235J2 G3	Fe 360 D	St 37-3N	E 24-4	40 D	AE 235 D	-
-	S235J2 G4	-	-	-	-	-	-
S275JR	S275JR	Fe 430 B	St 44-2	E 28-2	43 B	AE 275 B	A 36/A 283D
S275J0	S275J0	Fe 430 C	St 44-3U	E 28-3	43 C	AE 275 C	-
S275J2	S275J2 G3	Fe 430 D	St 44-3N	E 28-4	43 D	AE 275 D	A 633 GR. A
-	S275J2 G4	-	-	-	-	-	-
S355JR	S355JR	Fe 510 B	-	E 36-2	50 B	AE 355 B	A 572 GR.50/A 678 GR.A
S355J0	S355J0	Fe 510 C	St 52-3U	E 36-3	50 C	AE 355 C	-
S355J2	S355J2 G3	Fe 510 D	St 52-3N	-	50 D	AE 355 D	-
-	S355J2 G4	-	-	-	-	-	-
S355K2	S355K2 G3	Fe 510 DD1	-	E36-4	50 DD	-	-
-	S355K2 G4	-	-	-	-	-	-
E295	E295	Fe 490	St 50-2	A 50-2	-	A 490	-
E355	E355	Fe 590	St 60- 2	A 60-2	-	A 590	-
E360	E360	Fe 690	St 70-2	A 70-2	-	A 690	-
S450J0	-	-	-	-	55 C	-	-

NOTE: Correspondance based on minimum strength value (Rm) and on impact test temperature.



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# Hot Rolled Round Steel Bars

## HEAT CHEMICAL COMPOSITION

Quality	N°	C % Max			Mn % Max	Si % Max	P % Max	S % Max	N % Max
		Nominal Thickness (mm)							
		≤ 16	> 16 ≤ 40	> 40					
S235JR	1.0038	0,170	0,170	0,200	1,400	-	0,035	0,035	0,012
S235J0	1.0114	0,170	0,170	0,170	1,400	-	0,030	0,030	0,012
S235J2	1.0117	0,170	0,170	0,170	1,400	-	0,025	0,025	-
S275JR	1.0044	0,210	0,210	0,220	1,500	-	0,035	0,035	0,012
S275J0	1.0143	0,180	0,180	0,180	1,500	-	0,030	0,030	0,012
S275J2	1.0145	0,180	0,180	0,180	1,500	-	0,025	0,025	-
S355JR	1.0045	0,240	0,240	0,240	1,600	0,550	0,035	0,035	0,012
S355J0	1.0553	0,200	0,200	0,220	1,600	0,550	0,030	0,030	0,012
S355J2	1.0577	0,200	0,200	0,220	1,600	0,550	0,025	0,025	-
S355K2	1.0596	0,200	0,200	0,220	1,600	0,550	0,025	0,025	-
E295	1.0050	-	-	-	-	-	0,045	0,045	0,009
E335	1.0060	-	-	-	-	-	0,045	0,045	0,009
E360	1.0070	-	-	-	-	-	0,045	0,045	0,009
S450J0*	1.0590	0,200	0,200	0,220	1,700	0,550	0,090	0,090	0,025

NOTE: Limit on N content does not apply when minimum tot Al content is 0,20% or when other N binding elements are present.

(\*) Microalloyed with Nb max 0,05%, V max 0,13% and Ti max 0,05%.



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# Hot Rolled Round Steel Bars

## MECHANICAL PROPERTIES

Quality	ReH (N/mm <sup>2</sup> ) Min								Rm (N/mm <sup>2</sup> ) *			Impact Strength KVL (J) Min		
	Nominal Thickness (mm)								Nominal Thickness (mm)			Temp. °C	Nominal Thickness (mm)	
	≤ 16	> 16 ≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 150	> 150 ≤ 200	> 200 ≤ 250	≤ 100	> 100 ≤ 150	> 150 ≤ 250		> 10 ≤ 150	> 150 ≤ 250
S235JR	235	225	215	215	215	195	185	175	360 ÷ 510	350 ÷ 500	340 ÷ 490	20	27	27
S235J0	235	225	215	215	215	195	185	175	360 ÷ 510	350 ÷ 500	340 ÷ 490	0	27	27
S235J2	235	225	215	215	215	195	185	175	360 ÷ 510	350 ÷ 500	340 ÷ 490	- 20	27	27
S275JR	275	265	255	245	235	225	215	205	410 ÷ 560	400 ÷ 540	380 ÷ 540	20	27	27
S275J0	275	265	255	245	235	225	215	205	410 ÷ 560	400 ÷ 540	380 ÷ 540	0	27	27
S275J2	275	265	255	245	235	225	215	205	410 ÷ 560	400 ÷ 540	380 ÷ 540	- 20	27	27
S355JR	355	345	335	325	315	295	285	275	470 ÷ 630	450 ÷ 600	450 ÷ 600	20	27	27
S355J0	355	345	335	325	315	295	285	275	470 ÷ 630	450 ÷ 600	450 ÷ 600	0	27	27
S355J2	355	345	335	325	315	295	285	275	470 ÷ 630	450 ÷ 600	450 ÷ 600	- 20	27	27
S355K2	355	345	335	325	315	295	285	275	470 ÷ 630	450 ÷ 600	450 ÷ 600	- 20	40	33
E295	295	285	275	265	255	245	235	225	470 ÷ 610	450 ÷ 610	440 ÷ 610	-	-	-
E335	335	325	315	305	295	275	265	255	570 ÷ 710	550 ÷ 710	540 ÷ 710	-	-	-
E360	360	355	345	335	325	305	295	285	670 ÷ 830	650 ÷ 830	640 ÷ 830	-	-	-
S450J0	450	430	410	390	380	380	-	-	550 ÷ 720	530 ÷ 700	-	0	27	-

(\*) The tensile tests values apply to longitudinal specimens (l).

However for flat products of 600 mm width transverse ones (t) are to be used.

Quality	A <sub>5</sub> % Min				
	Nominal Thickness (mm)				
	≤ 40	> 40 ≤ 63	> 63 ≤ 100	> 100 ≤ 150	> 150 ≤ 250
S235JR S235J0 S235J2G4	26	25	24	22	21
S275JR S275J0 S275J2G4	23	22	21	19	18
S355JR S355J0 S355J2 S355K2	22	21	20	18	17
E295	20	19	18	16	15
E335	16	15	14	12	11
E360	11	10	9	8	7
S450J0	17	17	17	17	-





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# Hot Rolled Round Steel Bars

## CASE HARDENING CARBON AND ALLOY SPECIAL STEELS EN 10084/08 UNI 7846

### DESCRIPTION AND APPLICATIONS

Other qualities conforming to the above standards have been omitted, being out of current use.  
Qualities up to a max. alloy content of 3% may be produced

### HEAT CHEMICAL COMPOSITION

Quality	N°	C %	Mn %	Si %	P % Max	S %	Cr %	Ni %	Mo %
C10E	1.1121	0,07÷0,13	0,30÷0,60	≤0,40	0,035	≤0,035	-	-	-
C10R	1.1207	0,07÷0,13	0,30÷0,60	≤0,40	0,035	0,020÷0,040	-	-	-
C15E	1.1141	0,12÷0,18	0,30÷0,60	≤0,40	0,035	≤0,035	-	-	-
C15R	1.1140	0,12÷0,18	0,30÷0,60	≤0,40	0,035	0,020÷0,040	-	-	-
C16E	1.1148	0,12÷0,18	0,60÷0,90	≤0,40	0,035	≤0,035	-	-	-
C16R	1.1208	0,12÷0,18	0,60÷0,90	≤0,40	0,035	0,020÷0,040	-	-	-
16MnCr5	1.7131	0,14÷0,19	1,00÷1,30	≤0,40	0,035	≤0,035	0,80÷1,10	-	-
16MnCrS5	1.7139	0,14÷0,19	1,00÷1,30	≤0,40	0,035	0,020÷0,040	0,80÷1,10	-	-
20MnCr5	1.7147	0,17÷0,22	1,10÷1,40	≤0,40	0,035	≤0,035	1,00÷1,30	-	-
20MnCrS5	1.7149	0,17÷0,22	1,10÷1,40	≤0,40	0,035	0,020÷0,040	1,00÷1,30	-	-
16CrNi4	-	0,13÷0,18	0,70÷1,00	0,15÷0,40	0,035	≤0,035	0,80÷1,10	0,80÷1,10	-
16CrNiS4	-	0,13÷0,18	0,70÷1,00	0,15÷0,40	0,035	0,020÷0,035	0,80÷1,10	0,80÷1,10	-
20CrNi4	-	0,18÷0,23	0,80÷1,10	0,15÷0,40	0,035	≤0,035	0,90÷1,20	0,90÷1,20	-
20CrNiS4	-	0,18÷0,23	0,80÷1,10	0,15÷0,40	0,035	0,020÷0,035	0,90÷1,20	0,90÷1,20	-
20NiCrMo2.2	1.6523	0,17÷0,23	0,65÷0,95	≤0,40	0,035	≤0,035	0,35÷0,70	0,40÷0,70	0,15÷0,25
20NiCrMoS2.2	1.6526	0,17÷0,23	0,65÷0,95	≤0,40	0,035	0,020÷0,040	0,35÷0,70	0,40÷0,70	0,15÷0,25
18CrMo4	1.7243	0,15÷0,21	0,60÷0,90	≤0,40	0,035	≤0,035	0,90÷1,20	-	0,15÷0,25
18CrMoS4	1.7244	0,15÷0,21	0,60÷0,90	≤0,40	0,035	0,020÷0,040	0,90÷1,20	-	0,15÷0,25
18NiCrMo5	-	0,15÷0,21	0,60÷0,90	≤0,40	0,035	≤0,035	0,70÷1,00	1,20÷1,50	0,15÷0,25
18NiCrMoS5	-	0,15÷0,21	0,60÷0,90	≤0,40	0,035	0,020÷0,035	0,70÷1,00	1,20÷1,50	0,15÷0,25

NOTE: Processing at austenitic grain 5 or finer, conforming to EU103 standard. On request: grain 6 or finer.



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# Hot Rolled Round Steel Bars

## HARDNESS LIMITS AT JOMINY HARDENABILITY TEST (H TYPES)

Quality	HRC Hardness from Quenched End of Test < Piece (mm)														
	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
16MnCr5 16MnCrS5	39/47	36/46	31/44	28/41	24/39	21/37	≤35	≤33	≤31	≤30	≤29	≤28	≤27	-	-
20MnCr5 20MnCrS5	41/49	39/49	36/48	33/46	30/43	28/42	26/41	25/39	23/37	21/35	≤34	≤33	≤32	-	-
16CrNi4 16CrNiS4	38/47	35,5 /45,5	33/44	30/42	28/40	26/38	24/36	22/35	19/32	17 /29,5	≤28	≤26.5	≤26	≤25.5	≤25
20CrNi4 20CrNiS4	40/50	38,5 /49	36,5 /48	34/47	32/45	29/44	27/42	25,5 /41	23/38	21/35	19,5 /33	18/32	17/31	16 /30,5	15/30
20NiCrMo2.2 20NiCrMoS2.2	41/49	37/48	31/45	25/42	22/36	20/33	≤31	≤30	≤27	≤25	≤24	≤24	≤23	-	-
18CrMo4 18CrMoS4	39/47	37/46	34/45	30/42	27/39	24/37	22/35	21/34	≤31	≤29	≤28	≤27	≤26	-	-
18NiCrMo5 18NiCrMoS5	39/49	38 /48,5	36/48	34 /46,5	31/45	29 /43,5	27/41	25,5 /40	23/37	21 /35,5	20,5 /34,5	20 /33,5	≤33	≤32.5	≤32

NOTE: On request all the qualities can be processed with restricted hardenability at 2/3 of standard H range, that is HL (2/3 inferior) and HH (2/3 superior) types.  
Reference for Jominy test: EN ISO 642 standard.



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# Hot Rolled Round Steel Bars

## QUENCHED AND TEMPERED CARBON AND ALLOY SPECIAL STEELS UNI EN 10083-2 AND 3 UNI 7845 UNI 7847

### DESCRIPTION AND APPLICATIONS

Other qualities conforming to the above standards have been omitted, being out of current use.  
Qualities up to a max. alloy content of 3% may be produced.

### HEAT CHEMICAL COMPOSITION

Quality	N°	C %	Mn %	Si % Max	P % Max	S %	Cr %	Mo %
C22E	1.1151	0,17 ÷ 0,24	0,40 ÷ 0,70	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C22R	1.1149	0,17 ÷ 0,24	0,40 ÷ 0,70	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
C35E	1.1181	0,32 ÷ 0,39	0,50 ÷ 0,80	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C35R	1.1180	0,32 ÷ 0,39	0,50 ÷ 0,80	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
C40E	1.1186	0,37 ÷ 0,44	0,50 ÷ 0,80	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C40R	1.1189	0,37 ÷ 0,44	0,50 ÷ 0,80	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
C45E	1.1191	0,42 ÷ 0,50	0,50 ÷ 0,80	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C45R	1.1201	0,42 ÷ 0,50	0,50 ÷ 0,80	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
C50E	1.1206	0,47 ÷ 0,55	0,60 ÷ 0,90	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C50R	1.1241	0,47 ÷ 0,55	0,60 ÷ 0,90	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
C55E	1.1203	0,52 ÷ 0,60	0,60 ÷ 0,90	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C55R	1.1209	0,52 ÷ 0,60	0,60 ÷ 0,90	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
C60E	1.1221	0,57 ÷ 0,65	0,60 ÷ 0,90	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010
C60R	1.1223	0,57 ÷ 0,65	0,60 ÷ 0,90	0,40	0,03	0,020 ÷ 0,040	≤ 0,040	≤ 0,010
28Mn6	1.1170	0,25 ÷ 0,32	1,30 ÷ 1,65	0,40	0,03	≤ 0,035	≤ 0,040	≤ 0,010

NOTE: Processing at austenitic grain 5 or finer, conforming to EN ISO 643 standard.

Quality	N°	C %	Mn %	Si % Max	P % Max	S %	Cr %	Mo %
34Cr4	1.7033	0,30 ÷ 0,37	0,60 ÷ 0,90	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	-
34CrS4	1.7037	0,30 ÷ 0,37	0,60 ÷ 0,90	0,40	0,025	0,020 ÷ 0,040	0,90 ÷ 1,20	-
3Cr4	1.7034	0,34 ÷ 0,41	0,60 ÷ 0,90	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	-
37CrS4	1.7038	0,34 ÷ 0,41	0,60 ÷ 0,90	0,40	0,025	0,020 ÷ 0,040	0,90 ÷ 1,20	-
41Cr4	1.7035	0,38 ÷ 0,45	0,60 ÷ 0,90	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	-
41CrS4	1.7039	0,38 ÷ 0,45	0,60 ÷ 0,90	0,40	0,025	0,020 ÷ 0,040	0,90 ÷ 1,20	-
25CrMo4	1.7218	0,22 ÷ 0,29	0,60 ÷ 0,90	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	0,15 ÷ 0,30
25CrMoS4	1.7213	0,22 ÷ 0,29	0,60 ÷ 0,90	0,40	0,025	0,020 ÷ 0,040	0,90 ÷ 1,20	0,15 ÷ 0,30
34CrMo4	1.7220	0,30 ÷ 0,37	0,60 ÷ 0,90	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	0,15 ÷ 0,30
34CrMoS4	1.7226	0,30 ÷ 0,37	0,60 ÷ 0,90	0,40	0,025	0,020 ÷ 0,040	0,90 ÷ 1,20	0,15 ÷ 0,30
42CrMo4	1.7225	0,38 ÷ 0,45	0,60 ÷ 0,90	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	0,15 ÷ 0,30
42CrMoS4	1.7227	0,38 ÷ 0,45	0,60 ÷ 0,90	0,40	0,025	0,020 ÷ 0,040	0,90 ÷ 1,20	0,15 ÷ 0,30
50CrMo4	1.7228	0,46 ÷ 0,54	0,50 ÷ 0,80	0,40	0,025	≤ 0,035	0,90 ÷ 1,20	0,15 ÷ 0,30

NOTE: Processing at austenitic grain 5 or finer, conforming to EN ISO 643 standard.



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## HARDNESS LIMITS AT JOMINY HARDENABILITY TEST (H TYPES)

Quality	HRc Hardness from Quenched End of Test Piece (mm)														
	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
C35E C35R	48/58	33/55	22/49	≤34	≤28	≤26	≤25	≤24	-	-	-	-	-	-	-
C40E C40R	51/60	35/59	25/53	23/39	21/31	≤29	≤28	≤27	-	-	-	-	-	-	-
C45E C45R	55/62	37/61	28/57	26/44	24/34	22/32	21/31	20/30	-	-	-	-	-	-	-
C50E C50R	56/63	44/61	31/58	30/50	28/36	26/34	25/33	24/32	23/31	≤20/29	≤28	-	-	-	-
C55E C55R	58/65	47/63	33/60	31/52	29/37	27/35	26/34	25/33	24/32	22/30	20/29	-	-	-	-
C60E C60R	60/67	50/65	35/62	32/54	30/39	28/36	27/35	26/34	25/33	23/31	21/30	-	-	-	-
28Mn6	45/54	42/53	37/51	27/48	21/44	≤41	≤38	≤35	≤31	≤29	≤27	≤26	≤25	≤25	≤24
34Cr4 34CrS4	49/57	48/57	45/56	41/54	35/52	32/49	29/46	27/44	23/39	21/37	20/35	≤34	≤33	≤32	≤31
37Cr4 37CrS4	51/59	50/59	48/58	44/57	39/55	36/52	33/50	31/48	26/42	24/39	22/37	20/36	≤35	≤34	≤33
41Cr4 41CrS4	53/61	52/61	50/60	47/59	41/58	37/56	34/54	32/52	29/46	26/42	23/40	21/38	≤37	≤36	≤35
25CrMo4 25CrMoS4	44/52	43/52	40/51	37/50	34/48	32/46	29/43	27/41	23/37	21/35	20/33	≤32	≤31	≤31	≤31
34CrMo4 34CrMoS4	49/57	49/57	48/57	45/56	42/55	39/54	36/53	34/52	30/48	28/45	27/43	26/41	25/40	24/40	24/39
42CrMo4 42CrMoS4	53/61	53/61	52/61	51/60	49/60	43/59	40/59	37/58	34/56	32/53	31/51	30/48	30/47	29/46	29/45
50CrMo4	58/65	58/65	57/64	55/64	54/63	53/63	51/63	48/62	45/61	41/60	39/58	38/57	37/55	36/54	36/54

NOTE: On request all the qualities can be manufactured with restricted hardenability at 2/3 of standard H range, that is HL (2/3 inferior) and HH (2/3 superior) types.  
Reference for Jominy test: EN ISO 642 standard.



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## MECHANICAL PROPERTIES IN THE QUENCHED AND TEMPERED CONDITION (\*)

Tensile Test	Tensile Test				Impact Test KV <sub>20</sub> Min J	Thermal Treatment	
	Rm N/mm <sup>2</sup>	Re Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	Z Min %		Hardening (1) °C	Tempering °C
C22E	500 ÷ 650	340	20	50	50	880 ± 20	550 ± 660
C22R	500 ÷ 650	340	20	50	50	880 ± 20	550 ± 660
C35E	630 ÷ 780	430	17	40	35	860 ± 20	550 ± 660
C35R	630 ÷ 780	430	17	40	35	860 ± 20	550 ± 660
C40E	650 ÷ 800	460	16	35	30	850 ± 20	550 ± 660
C40R	650 ÷ 800	460	16	35	30	850 ± 20	550 ± 660
C45E	700 ÷ 850	490	14	35	25	840 ± 20	550 ± 660
C45R	700 ÷ 850	490	14	35	25	840 ± 20	550 ± 660
C50E	750 ÷ 900	520	13	30	-	830 ± 20	550 ± 660
C50R	750 ÷ 900	520	13	30	-	830 ± 20	550 ± 660
C55E	800 ÷ 950	550	12	30	-	830 ± 20	550 ± 660
C55R	800 ÷ 950	550	12	30	-	830 ± 20	550 ± 660
C60E	850 ÷ 1000	580	11	25	-	830 ± 20	550 ± 660
C60R	850 ÷ 1000	580	11	25	-	830 ± 20	550 ± 660
28Mn6	800 ÷ 950	590	13	40	40	860 ± 20	540 ± 680
34Cr4	900 ÷ 1100	700	12	35	40	850 ± 20	610 ± 70
34CrS4	900 ÷ 1100	700	12	35	40	850 ± 20	610 ± 70
37Cr4	950 ÷ 1150	750	11	35	35	845 ± 20	610 ± 70
37CrS4	950 ÷ 1150	750	11	35	35	845 ± 20	610 ± 70
41Cr4	1000 ÷ 1200	800	11	30	35	840 ± 20	610 ± 70
41CrS4	1000 ÷ 1200	800	11	30	35	840 ± 20	610 ± 70
25CrMo4	900 ÷ 1100	700	12	50	50	860 ± 20	610 ± 70
25CrMoS4	900 ÷ 1100	700	12	50	50	860 ± 20	610 ± 70
34CrMo4	1000 ÷ 1200	800	11	45	40	850 ± 20	610 ± 70
34CrMoS4	1000 ÷ 1200	800	11	45	40	850 ± 20	610 ± 70
42CrMo4	1100 ÷ 1300	900	10	40	35	840 ± 20	610 ± 70
42CrMoS4	1100 ÷ 1300	900	10	40	35	840 ± 20	610 ± 70
50CrMo4	1100 ÷ 1300	900	9	40	30	840 ± 20	610 ± 70

(\*) The tensile test values apply to reference specimens Ø 16 mm.

NOTE: (1) Quenching: in water for qualities C22 ÷ C45 and 28Mn6; in oil for qualities C50 ÷ C60 and 34Cr4 ÷ 50CrMo4.



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## MECHANICAL PROPERTIES IN THE NORMALIZED CONDITION

Quality	Tensile Test						Normalization °C
	On Reference Specimen Ø 16 mm			On Rolled Product Ø or Thickness 16 ÷ 100 mm			
	R <sub>m</sub> Min N/mm <sup>2</sup>	R <sub>e</sub> Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	R <sub>m</sub> Min N/mm <sup>2</sup>	R <sub>e</sub> Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	
C22E	430	240	24	410	210	25	880 ± 940
C22R	430	240	24	410	210	25	880 ± 940
C35E	550	300	18	520	270	19	860 ± 920
C35R	550	300	18	520	270	19	860 ± 520
C40E	580	320	16	550	290	17	850 ± 510
C40R	580	320	16	550	290	17	850 ± 910
C45E	620	340	14	580	305	16	840 ± 900
C45R	620	340	14	580	305	16	840 ± 900
C50E	650	355	13	610	320	14	830 ± 890
C50R	650	355	13	610	320	14	830 ± 890
C55E	680	370	11	640	330	12	825 ± 885
C55R	680	370	11	640	330	12	825 ± 885
C60E	710	380	10	670	340	11	820 ± 880
C60R	710	380	10	670	340	11	820 ± 880
28Mn6	630	345	17	600	310	18	850 ± 890

NOTE: The normalization may be substituted by a "thermomechanical controlled rolling" (Reference: Table 1 EN 10083-1 standard).

Table values conform to the following standards: EN 10083 - 2 - UNI 7845.



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## QUENCHED AND TEMPERED QUALITY CARBON STEELS UNI 10083-2/06

### DESCRIPTION AND APPLICATIONS

Other qualities conforming to the above standards have been omitted, being out of current use.

### HEAT CHEMICAL COMPOSITION

Quality	N°	C %	Mn %	Si % Max	P % Max	S % Max
C35	1.0501	0,32 ÷ 0,39	0,50 ÷ 0,80	0,40	0,045	0,045
C40	1.0511	0,37 ÷ 0,44	0,50 ÷ 0,80	0,40	0,045	0,045
C45	1.0503	0,42 ÷ 0,50	0,50 ÷ 0,80	0,40	0,045	0,045
C55	1.0535	0,52 ÷ 0,60	0,60 ÷ 0,90	0,40	0,045	0,045
C60	1.0601	0,57 ÷ 0,65	0,60 ÷ 0,90	0,40	0,045	0,045

### MECHANICAL PROPERTIES IN THE NORMALIZED CONDITION

Quality	Tensile Test						Normalization °C
	On Rolled Product Ø or Thickness > 16 ÷ 100 mm			On Rolled Product Ø or Thickness > 100 ÷ 250 mm			
	Rm Min N/mm <sup>2</sup>	Re Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	Rm Min N/mm <sup>2</sup>	Re Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	
C35	520	270	19	500	245	19	860 ± 920
C40	550	290	17	530	260	17	850 ± 910
C45	580	305	16	560	275	16	840 ± 900
C55	640	330	12	620	300	12	825 ± 885
C60	670	340	11	650	310	11	820 ± 880

NOTE: The normalization may be substituted by a "thermomechanically controlled rolling" (Reference Table 1 EN 10083-2 standard).

### MECHANICAL PROPERTIES IN THE QUENCHED AND TEMPERED CONDITION (\*)

Quality	Tensile Test					Thermal Treatment
	Rm N/mm <sup>2</sup>	Re Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	Z Min N/mm <sup>2</sup>	Quenching (1) N/mm <sup>2</sup>	Tempering
C35	630 ÷ 780	430	17	40	840 ± 880	550 ± 660
C40	650 ÷ 800	460	16	35	830 ± 870	550 ± 660
C45	700 ÷ 850	490	14	35	820 ± 860	550 ± 660
C55	800 ÷ 950	550	12	30	810 ± 850	550 ± 660
C60	850 ÷ 1000	580	11	25	810 ± 850	550 ± 660

(\*) The tensile test values apply to reference specimens Ø 16 mm

NOTE: (1) Quenching: in water for qualities C35 ÷ C45; in oil for qualities C55÷C60.



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## QUENCHED AND TEMPERED BORON STEEL EN 10083-3

### DESCRIPTION AND APPLICATIONS

Other qualities conforming to the above standards have been omitted, being out of current use.

### HEAT CHEMICAL COMPOSITION

Quality	N°	C %	Mn %	Si % Max	P % Max	S % Max	Cr %	B %
30MnB5	1.5531	0,27 ÷ 0,33	1,15 ÷ 1,45	0,40	0,035	0,040	-	0,0010 ÷ 0,0050
38MnB5	1.5532	0,36 ÷ 0,42	1,15 ÷ 1,45	0,40	0,035	0,040	-	0,0010 ÷ 0,0050
27MnCrB5-2	1.7182	0,24 ÷ 0,30	1,10 ÷ 1,40	0,40	0,035	0,040	0,30 ÷ 0,60	0,0010 ÷ 0,0050
33MnCrB5-2	1.7185	0,30 ÷ 0,36	1,20 ÷ 1,50	0,40	0,035	0,040	0,30 ÷ 0,60	0,0010 ÷ 0,0050

### HARDENABILITY JOMINY TEST HARDNESS LIMITS (H TYPES)

Quality	HRc Hardness from Quenched End of Test Piece (mm)												
	1,5	3	5	7	9	11	13	15	20	25	30	35	40
30MnB5	47/56	46/55	45/55	44/54	42/53	39/51	36/50	31/47	22/40	≤37	≤33	-	-
38MnB5	52/60	51/60	50/59	49/58	47/57	44/57	41/55	35/53	28/48	24/41	20/37	≤33	≤31
27MnCrB5-2	47/55	46/55	45/55	44/54	43/54	41/53	39/52	36/51	30/47	24/44	20/40	≤37	-
33MnCrB5-2	48/57	47/57	47/57	46/57	45/57	44/56	43/55	41/54	36/53	31/50	25/47	20/45	-

NOTE: For earth-moving and tractors applications more than 100 steel qualities may be produced upon customers specifications.





RIVA ACCIAIO

# Hot Rolled Round Steel Bars

**CARBON STEEL FOR PIPE FITTINGS**  
**ASTM A105**  
**ASTM A350-LF2**

## DESCRIPTION AND APPLICATIONS

Other qualities conforming to the above standards have been omitted, being out of current use.

## HEAT CHEMICAL COMPOSITION

Quality	C % Max	Mn %	Si %	P % Max	S % Max	Cu % Max	Ni % Max	Cr % Max	Mo % Max	V % Max	Cb % Max
A105	0,35	0,60÷1,05	0,10÷0,35	0,035	0,040	0,40	0,40	0,30	0,12	0,08	-
LF2	0,30	0,60÷1,35	0,15÷0,30	0,035	0,040	0,40	0,40	0,30	0,12	0,08	0,02

## MECHANICAL PROPERTIES IN THE NORMALIZED CONDITION

Quality	Tensile Test				Impact Test	Hardness	Normalization
	Rm MPa	Re Min MPa	A <sub>5</sub> Min %	Z Min %	KV <sub>-46°</sub> Min J	HB Max	°C
A105	≥ 485	250	22	30	-	187	880 ± 920
LF2	485/655	250	22	30	27	-	880 ± 920



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## CASE HARDENING AND QUENCHED AND TEMPERED FREE CUTTING STEEL ASTM A29 (SAE SERIES 1100, UNI 4838)

### DESCRIPTION AND APPLICATIONS

Other qualities conforming to the above standards have been omitted, being out of current use.

### HEAT CHEMICAL COMPOSITION

Quality	C %	Mn %	Si % Max	P %	S %
SAE 1117	0,14 ÷ 0,20	1,00 ÷ 1,30	0,15 ÷ 0,35	0,040	0,08 ÷ 0,13
SAE 1118	0,14 ÷ 0,20	1,30 ÷ 1,60	0,15 ÷ 0,35	0,040	0,08 ÷ 0,13
SAE 1137	0,32 ÷ 0,39	1,35 ÷ 1,65	0,15 ÷ 0,35	0,040	0,08 ÷ 0,13
CF35SMn10	0,32 ÷ 0,39	1,35 ÷ 1,65	≤ 30	0,040	0,08 ÷ 0,13
SAE 1141	0,37 ÷ 0,45	1,35 ÷ 1,65	0,15 ÷ 0,35	0,040	0,08 ÷ 0,13

### MECHANICAL PROPERTIES IN THE NORMALIZED CONDITION

Quality	Tensile Test			Hardness	Normalization
	Rm N/mm <sup>2</sup>	Re Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	HB Max	°C
SAE 1117	450 ÷ 550	280	26	155	900 ± 20
SAE 1118	480 ÷ 580	300	25	165	900 ± 20
SAE 1137	650 ÷ 760	380	16	230	880 ± 20
CF35SMn10	650 ÷ 760	380	16	230	880 ± 20
SAE 1141	680 ÷ 790	400	15	240	870 ± 20



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

Mn-Si, Mn-Si-Cr, Cr, CR-V, Cr-Mo-V QUENCHED AND TEMPERED STEEL  
UNI 3545 (SUITABLE FOR DRAG TRACTORS ONLY)

## HEAT CHEMICAL COMPOSITION

Quality	C %	Mn %	Si %	P % Max	S % Max	Cr %	Mo %	V %
48Si7	0,42 ÷ 0,52	0,50 ÷ 0,80	1,50 ÷ 2,00	0,035	0,035	-	-	-
55Si7	0,52 ÷ 0,60	0,60 ÷ 0,90	1,50 ÷ 2,00	0,035	0,035	(0,15 ÷ 0,45)	-	-
60Si7	0,57 ÷ 0,64	0,60 ÷ 0,90	1,50 ÷ 2,00	0,035	0,035	-	-	-
60SiCr8	0,57 ÷ 0,64	0,70 ÷ 1,00	1,70 ÷ 2,20	0,035	0,035	0,25 ÷ 0,40	-	-
55Cr3	0,52 ÷ 0,59	0,70 ÷ 1,00	0,15 ÷ 0,40	0,035	0,035	0,60 ÷ 0,90	-	-
50CrV4	0,47 ÷ 0,55	0,70 ÷ 1,10	0,15 ÷ 0,40	0,035	0,035	0,80 ÷ 1,20	-	0,10 ÷ 0,20
51CrMoV4	0,48 ÷ 0,56	0,70 ÷ 1,00	0,15 ÷ 0,40	0,035	0,035	0,90 ÷ 1,20	0,15 ÷ 0,25	0,07 ÷ 0,12

NOTE: The values in brackets are to be intended as optional.

Can be also supplied qualities conforming to the following standards: NF A35-552; NF A35-553; NF A35-571; DIN 17221.

## MECHANICAL PROPERTIES IN THE QUENCHED AND TEMPERED CONDITION (\*)

Quality	Tensile Test			Thermal Treatment	
	Rm N/mm <sup>2</sup>	Rp <sub>0,2</sub> Min N/mm <sup>2</sup>	A <sub>5</sub> Min %	Quenching °C	Tempering °C
48Si7	56/64	52/61	42/56	36/52	32/47
55Si7	57/65	55/63	49/62	43/59	37/57
60Si7	58/66	56/65	50/63	45/62	39/61
60SiCr8	58/66	58/66	57/65	51/64	45/63
55Cr3	57/65	56/65	55/64	54/63	52/63
50CrV4	57/65	56/65	56/64	55/64	53/63
51CrMoV4	57/65	56/65	56/64	55/64	53/63

NOTE: The tensile test values apply to reference specimens Ø 10 mm.

## HARDNESS LIMITS AT JOMINY HARDENABILITY TEST (H TYPES)

Quality	HRc Hardness from Quenched End of Test Piece (mm)														
	1,5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
48Si7	56/64	52/61	42/56	36/52	32/47	29/43	27/41	26/38	22/35	21/33	≤ 32	≤ 31	≤ 29	≤ 28	≤ 27
55Si7	57/65	55/63	49/62	43/59	37/57	34/55	32/53	31/50	28/43	27/41	26/38	26/37	25/36	24/35	24/35
60Si7	58/66	56/65	50/63	45/62	39/61	36/59	34/55	33/51	31/44	29/40	28/38	27/36	26/35	25/34	25/33
60SiCr8	58/66	58/66	57/65	51/64	45/63	40/61	38/59	37/57	33/50	30/45	29/43	28/41	27/40	26/39	25/39
55Cr3	57/65	56/65	55/64	54/63	52/63	48/62	43/61	39/60	33/57	30/52	28/48	27/45	26/42	25/40	24/39
50CrV4	57/65	56/65	56/64	55/64	53/63	50/62	46/61	43/60	37/57	35/53	33/50	32/48	30/45	29/44	28/43
51CrMoV4	57/65	56/65	56/64	55/64	53/63	52/63	51/63	50/62	48/62	47/62	46/62	46/61	45/61	44/61	44/60



RIVA ACCIAIO

# Hot Rolled Round Steel Bars

## DELIVERIES IN COLD SHEARING SUITABLE CONDITIONS

Cold shearing of the material is guaranteed with hardness HB max 220. Depending on steel grades and sizes the material is suitable for cold shearing with or without an annealing treatment.

## DELIVERIES IN ANNEALED CONDITIONS

Brinell Hardness		Case Hardening Steel	Quenched and Tempered Steel
HB Max	~ Rm		
207	710	16MnCr5 18CrMo4	-
210	720		25CrMo4
217	740	20MnCr5 16CrNi4	C50
223	760	20CrNi4	28Mn6 34Cr4 34CrMo4
229	780	18NiCrMo5	C55 41Cr4
235	800	-	37Cr4
241	810	-	C60 42CrMo4
248	840	-	50CrMo4

Table values conform to the following standards: EN 100084 - UNI 7846 – EN 100083-2 - EN 100083-3 - UNI 7845.  
Max length of rolled material: 9,20 m.

## DELIVERIES IN FERRITE-PERLITE ANNEALED (FP) CONDITIONS

Case hardening steels (sections 18-120 mm) can be supplied in +FP annealing conditions according to EN10084 table 7

## DELIVERIES IN NORMALIZED (N) CONDITIONS

Sections 18 – 120 mm can be supplied in normalized conditions according to International Standard (EN10025 – EN100883 – EN10273...)

## DELIVERIES IN QUENCH AND TEMPERED (QT) CONDITIONS

Sections 18 – 120 mm can be supplied in quench and tempered conditions according to International Standard (EN10025 – EN100883 – EN10273...)