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☞ **JIS G 3112** : 2004
(JISF)

**Steel bars for
concrete reinforcement**

ICS 77.140.15; 91.080.40

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee, as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Iron and Steel Federation (JISF) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently JIS G 3112 : 1987 is replaced with this Standard.

This Standard has been made based on ISO 6935-1 : 1991 *Steel for the reinforcement of concrete—Part 1 : Plain bars* and ISO 6935-2 : 1991 *Steel for the reinforcement of concrete—Part 2 : Ribbed bars* for the purpose of making it easier to compare this Standard with International Standards, to prepare Japanese Industrial Standard conforming with International Standards; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Steel bars for concrete reinforcement

Introduction This Standard has been prepared based on **ISO 6935-1** *Steel for the reinforcement of concrete—Part 1 : Plain bars* and **ISO 6935-2** *Steel for the reinforcement of concrete—Part 2 : Ribbed bars* published in 1991 as the first edition with modifying some technical contents.

Portions sidelined or underlined with dots are the modified items of original International Standards. Comparison table is given in annex 1 (informative) with its explanations.

1 Scope This Japanese Industrial Standard specifies the round steel bar⁽¹⁾ and deformed steel bar⁽¹⁾ manufactured by hot rolling to be used for concrete reinforcement. However, those specified in **JIS G 3117** are excluded.

Note (1) The steel bars in coil form are included.

Remarks : The International Standards corresponding to this Standard are as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and **JIS** are **IDT** (identical), **MOD** (modified), and **NEQ** (not equivalent) according to **ISO/IEC Guide 21**.

ISO 6935-1 : 1991 *Steel for the reinforcement of concrete—Part 1 : Plain bars* (MOD)

ISO 6935-2 : 1991 *Steel for the reinforcement of concrete—Part 2 : Ribbed bars* (MOD)

2 Normative references The standards listed in attached table 1 contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) in attached table 1 shall be applied.

3 Grade and symbol The round and deformed steel bars shall be classified into two and five categories, respectively, and their symbols shall be as given in table 1.

Table 1 Symbol of grade

Division	Symbol of grade
Round steel bars	SR 235 SR 295
Deformed steel bars	SD 295 A SD 295 B SD 345 SD 390 SD 490

4 Chemical composition The round steel bars and deformed steel bars shall be tested in accordance with 9.1, and the cast analysis values shall conform to table 2.

Table 2 Chemical composition

Symbol of grade	Chemical composition %					
	C	Si	Mn	P	S	$C + \frac{Mn}{6}$
SR 235	—	—	—	0.050 max.	0.050 max.	—
SR 295	—	—	—	0.050 max.	0.050 max.	—
SD 295 A	—	—	—	0.050 max.	0.050 max.	—
SD 295 B	0.27 max.	0.55 max.	1.50 max.	0.040 max.	0.040 max.	—
SD 345	0.27 max.	0.55 max.	1.60 max.	0.040 max.	0.040 max.	0.50 max.
SD 390	0.29 max.	0.55 max.	1.80 max.	0.040 max.	0.040 max.	0.55 max.
SD 490	0.32 max.	0.55 max.	1.80 max.	0.040 max.	0.040 max.	0.60 max.

5 Mechanical properties The round and deformed steel bars shall be tested in accordance with 9.2, and their yield point or 0.2 % proof stress, tensile strength, elongation and bendability shall conform to table 3.

Furthermore, in the case of bend test, it shall be free from crack on the outside of the bent portion.

Table 3 Mechanical properties

Symbol of grade	Yield point or 0.2 % proof stress N/mm ²	Tensile strength N/mm ²	Tensile test piece	Elongation (%)	Bendability	
					Bend angle	Inside radius
SR 235	235 min.	380 to 520	No. 2	20 min.	180°	1.5 × Nominal diameter
			No. 14A	22 min.		
SR 295	295 min.	440 to 600	No. 2	18 min.	180°	1.5 × Nominal diameter for diameter 16 mm or less
			No. 14A	19 min.		2.0 × Nominal diameter for diameter more than 16 mm
SD 295 A	295 min.	440 to 600	Equivalent to No. 2	16 min.	180°	1.5 × Nominal diameter for diameter D 16 or under
			Equivalent to No. 14A	17 min.		2.0 × Nominal diameter for diameter over D 16
SD 295 B	295 to 390	440 min.	Equivalent to No. 2	16 min.	180°	1.5 × Nominal diameter for diameter D 16 or under
			Equivalent to No. 14A	17 min.		2.0 × Nominal diameter for diameter over D 16

Table 3 (concluded)

Symbol of grade	Yield point or 0.2 % proof stress N/mm ²	Tensile strength N/mm ²	Tensile test piece	Elongation ⁽²⁾ %	Bendability	
					Bend angle	Inside radius
SD 345	345 to 440	490 min.	Equivalent to No. 2	18 min.	180°	1.5 × Nominal diameter for diameter D 16 or under
			Equivalent to No. 14A	19 min.		2.0 × Nominal diameter for diameter over D 16 up to and incl. D 41
						2.5 × Nominal diameter for diameter D 51
SD 390	390 to 510	560 min.	Equivalent to No. 2	16 min.	180°	2.5 × Nominal diameter
			Equivalent to No. 14A	17 min.		
SD 490	490 to 625	620 min.	Equivalent to No. 2	12 min.	90°	2.5 × Nominal diameter for diameter D 25 or under
			Equivalent to No. 14A	13 min.		3.0 × Nominal diameter for diameter over D 25

Note (2) For the deformed steel bar exceeding designation D 32, 2 shall be deducted from the elongation value of table 3 for each increase of 3 in the number of the elongation. However, the limit of reduction shall be 4.

Remarks : 1 N/mm² = 1 MPa

6 Shape, dimension, mass and tolerances

6.1 Shape, dimension, mass and tolerances for round steel bars The shape, dimension, mass and tolerances for round steel bars shall conform to JIS G 3191. However, the standard length and its tolerance shall conform to tables 5 and 6.

6.2 Shape, dimension, mass and tolerances for deformed steel bars

6.2.1 Shape The shape shall be in accordance with the following.

- a) The deformed steel bar shall have protrusions⁽³⁾ on the surface.

Note (3) Protrusions in axial direction are referred to "ribs", and those in other directions "knots".

- b) Knots of the deformed steel bar shall be distributed at about a fixed interval throughout the whole length and shall have the identical shapes and dimension. However, in the case where letters or the like are indicated in the form of raised mark, the knots in that part may be lacked.
- c) The root parts of the knots of the deformed steel bar of designation D 16 or over shall be so shaped as to minimize the stress concentration.

6.2.2 Shape, dimension, mass and tolerances Shape, dimension, mass and tolerances of the deformed steel bars shall be as follows:

- a) Dimension, mass and allowable limits of knot for deformed steel bars shall conform to table 4.

Table 4 Dimension, mass and allowable limits of knot

Designation	Nominal diameter (d) mm	Nominal peripheral length (l) cm	Nominal section area (S) cm ²	Unit mass kg/m	Maximum value of mean interval between knots mm	Height of knot		Maximum value of sum of clearance between knots mm	Angle between knot and axial line
						Minimum value mm	Maximum value mm		
D 4	4.23	1.3	0.140 5	0.110	3.0	0.2	0.4	3.3	45° min.
D 5	5.29	1.7	0.219 8	0.173	3.7	0.2	0.4	4.3	
D 6	6.35	2.0	0.316 7	0.249	4.4	0.3	0.6	5.0	
D 8	7.94	2.5	0.495 1	0.389	5.6	0.3	0.6	6.3	
D 10	9.53	3.0	0.713 3	0.560	6.7	0.4	0.8	7.5	
D 13	12.7	4.0	1.267	0.995	8.9	0.5	1.0	10.0	
D 16	15.9	5.0	1.986	1.56	11.1	0.7	1.4	12.5	
D 19	19.1	6.0	2.865	2.25	13.4	1.0	2.0	15.0	
D 22	22.2	7.0	3.871	3.04	15.5	1.1	2.2	17.5	
D 25	25.4	8.0	5.067	3.98	17.8	1.3	2.6	20.0	
D 29	28.6	9.0	6.424	5.04	20.0	1.4	2.8	22.5	
D 32	31.8	10.0	7.942	6.23	22.3	1.6	3.2	25.0	
D 35	34.9	11.0	9.566	7.51	24.4	1.7	3.4	27.5	
D 38	38.1	12.0	11.40	8.95	26.7	1.9	3.8	30.0	
D 41	41.3	13.0	13.40	10.5	28.9	2.1	4.2	32.5	
D 51	50.8	16.0	20.27	15.9	35.6	2.5	5.0	40.0	

Remarks 1 The method of calculating the nominal sectional area, nominal peripheral length and unit mass shall be as follows:

In addition, the nominal section area (S) shall be rounded off to 4 places of significant figures, the nominal peripheral length (l) to 1 place of decimal, and the unit mass to 3 places of significant figures.

$$\text{Nominal sectional area (S)} = \frac{0.7854 \times d^2}{100}$$

$$\text{Nominal peripheral length (l)} = 0.3142 \times d$$

$$\text{Unit mass} = 0.785 \times S$$

- 2 The interval between the knots shall be 70 % or under of the nominal diameter and the calculated value shall be rounded off to 1 place of decimal.