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JIS

JAPANESE INDUSTRIAL STANDARD

Manganese Steels and Manganese Chromium Steels for Machine Structural Use

JIS G 4106-1979

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JAPANESE INDUSTRIAL STANDARD J I S

Manganese Steels and Manganese Chromium Steels for Machine Structural Use

G 4106-1979

1. Scope

This Japanese Industrial Standard specifies manganese steels and manganese chromium steels for machine structural use manufactured by hot forming such as hot rolling and forging, ordinarily used after further process of forging, cutting and heat treatment, hereinafter referred to as the "steel".

2. Classification and Symbol

The steel shall be classified into 6 classes with respective symbols as given in Table 1.

Table 1. Classes and Symbols

Symbol of class	Reference	Application
	Previous symbol	
SMn 420	SMn 21	SMn 420 is used mainly for case hardening.
SMn 433	SMn 1	
SMn 438	SMn 2	
SMn 443	SMn 3	
SMnC 420	SMnC 21	SMnC 420 is used mainly for case hardening.
SMnC 443	SMnC 3	

3. Method of Manufacture

3.1 The steel shall be manufactured from killed steel ingot.

3.2 The steel shall be rolled or forged from steel ingot to forging ratio not less than 4 S. However, when the forging ratio of the billet for forging or rolling is less than 4 S, a prior agreement between the purchaser and the manufacturer is necessary.

3.3 Unless otherwise specified, the steel shall be left in the state as rolled or as forged.

4. Chemical Composition

The chemical composition of the steel shall be determined by the ladle analysis and the value shall be as given in Table 2.

Applicable Standards and Reference Standard: See page 11.

Table 2. Chemical Composition

Symbol of class	Reference Previous symbol	Chemical composition % C	Si	Mn	P	S	Cr
SMn 420	SMn 21	0.17 ~ 0.23	0.15 ~ 0.35	1.20 ~ 1.50	0.030 max.	0.030 max.	—
SMn 433	SMn 1	0.30 ~ 0.36	0.15 ~ 0.35	1.20 ~ 1.50	0.030 max.	0.030 max.	—
SMn 438	SMn 2	0.35 ~ 0.41	0.15 ~ 0.35	1.35 ~ 1.65	0.030 max.	0.030 max.	—
SMn 443	SMn 3	0.40 ~ 0.46	0.15 ~ 0.35	1.35 ~ 1.65	0.030 max.	0.030 max.	—
SMnC 420	SMnC 21	0.17 ~ 0.23	0.15 ~ 0.35	1.20 ~ 1.50	0.030 max.	0.030 max.	0.35 ~ 0.70
SMnC 443	SMnC 3	0.40 ~ 0.46	0.15 ~ 0.35	1.35 ~ 1.65	0.030 max.	0.030 max.	0.35 ~ 0.70

Remarks 1. As impurities, Ni and Cu shall not exceed 0.25 % and 0.30 %, respectively, throughout all classes. SMn 420, SMn 433, SMn 438 and SMn 443 shall not contain Cr exceeding 0.35 %.

2. When the product analysis on steel is requested by the purchaser, the tolerance for the product analysis shall conform to Table 3 in JIS G 0321.

5. Appearance, Shape, Dimension and Dimensional Tolerance

5.1 Hot Rolled Steel Bar and Wire Rod

5.1.1 Appearance The appearance of the hot rolled steel bar and wire rod shall be well finished and free from harmful defects in use. However, the steel bar which is supplied in coil is possibly inclusive of some abnormal points.

5.1.2 Reference of Flaw Dressing The reference of the flaw dressing of the hot rolled steel bar shall be as follows:

(1) Steel Bar for General Forging Use The flaw dressing of the steel bar for general forging use shall be made smoothly and to the depth not exceeding 4 % of nominal size (maximum value 5 mm) below nominal size, and the total width not exceeding 1/4 of the circumferential length of the same section. If the dressed portions are within the dimensional tolerance, they shall not be considered as the portions dressed.

The permissible amount of remaining flaw shall be as agreed upon between the purchaser and the manufacturer.

(2) Round Bar for Direct Machining The permissible depth of flaw of round bar for direct machining shall conform to the value given in Table 3 deducted from the nominal size.