

JIS

JAPANESE INDUSTRIAL STANDARD

**Nickel Chromium Molybdenum
Steel Forgings for
General Use**

JIS G 3222—1988

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Nickel Chromium Molybdenum Steel Forgings G 3222-1988
for General Use

1. Scope

This Japanese Industrial Standard specifies the nickel chromium molybdenum steel forgings, hereinafter referred to as the "steel forgings", formed into rod, ring and disc shapes for general use as rods, shafts, cranks, pinions, gears, flanges, rings, wheels, discs, etc.

Remark: The units and numerical values given in { } in this Standard are based on the International System of Units (SI) and are appended for informative reference.

Further, the traditional units accompanied by numerical values in this Standard shall be converted to the SI units and numerical values on Jan. 1, 1991.

2. Definition of Terms

The definitions of the major terms of rod shape, ring shape and disc shape used in this Standard shall be as given in 2. of JIS G 0306.

3. Type Symbols

The steel forgings shall be classified into the rod-shaped, ring-shaped, and disc-shaped steel forgings according to their shapes, and shall further be subclassified each into nine types according to their tensile strength. The symbols denoting the types shall be as shown in Table 1-1 or Table 1-2. However, the cylindrical steel forgings shall be classified as the rod-shaped forgings.

Applicable Standards: See page 12.

Table 1-1. Type Symbols
(Applicable till the end of 1990)

Type symbol		
Rod-shaped steel forgings	Ring-shaped steel forgings	Disc-shaped steel forgings
SFNCM 70 S	SFNCM 70 R	SFNCM 70 D
SFNCM 75 S	SFNCM 75 R	SFNCM 75 D
SFNCM 80 S	SFNCM 80 R	SFNCM 80 D
SFNCM 85 S	SFNCM 85 R	SFNCM 85 D
SFNCM 90 S	SFNCM 90 R	SFNCM 90 D
SFNCM 95 S	SFNCM 95 R	SFNCM 95 D
SFNCM 100 S	SFNCM 100 R	SFNCM 100 D
SFNCM 105 S	SFNCM 105 R	SFNCM 105 D
SFNCM 110 S	SFNCM 110 R	SFNCM 110 D

Table 1-2. Type Symbols
(Applicable on and after Jan. 1, 1991)

Type symbol					
Rod-shaped steel forgings		Ring-shaped steel forgings		Disc-shaped steel forgings	
SI unit	(Reference) Traditional unit	SI unit	(Reference) Traditional unit	SI unit	(Reference) Traditional unit
SFNCM 690 S	SFNCM 70 S	SFNCM 690 R	SFNCM 70 R	SFNCM 690 D	SFNCM 70 D
SFNCM 740 S	SFNCM 75 S	SFNCM 740 R	SFNCM 75 R	SFNCM 740 D	SFNCM 75 D
SFNCM 780 S	SFNCM 80 S	SFNCM 780 R	SFNCM 80 R	SFNCM 780 D	SFNCM 80 D
SFNCM 830 S	SFNCM 85 S	SFNCM 830 R	SFNCM 85 R	SFNCM 830 D	SFNCM 85 D
SFNCM 880 S	SFNCM 90 S	SFNCM 880 R	SFNCM 90 R	SFNCM 880 D	SFNCM 90 D
SFNCM 930 S	SFNCM 95 S	SFNCM 930 R	SFNCM 95 R	SFNCM 930 D	SFNCM 95 D
SFNCM 980 S	SFNCM 100 S	SFNCM 980 R	SFNCM 100 R	SFNCM 980 D	SFNCM 100 D
SFNCM 1 030 S	SFNCM 105 S	SFNCM 1 030 R	SFNCM 105 R	SFNCM 1 030 D	SFNCM 105 D
SFNCM 1 080 S	SFNCM 110 S	SFNCM 1 080 R	SFNCM 110 R	SFNCM 1 080 D	SFNCM 110 D

4. Chemical Composition

The steel forgings shall be tested in accordance with 10.2 and the resulting ladle analysis values shall conform to Table 2.

Table 2. Chemical Composition

Unit: %

C	Si	Mn	P	S	Ni	Cr	Mo
0.50 max.	0.15 to 0.35	0.35 to 1.00	0.030 max.	0.030 max.	0.40 to 3.50	0.40 to 3.50	0.15 to 0.70

Remarks 1. Cu as an impure content shall not exceed 0.03 %.

2. The chemical composition may be decided within the ranges shown in Table 2 by agreement between the purchaser and the manufacturer.

5. Mechanical Properties

The steel forgings shall be tested in accordance with 10.3 and the resulting proof stress or yield point, tensile strength, elongation, reduction in area, Charpy impact value and hardness shall conform to Table 3-1 or Table 3-2 for the rod-shaped forgings, conform to Table 4-1 or Table 4-2 for the ring-shaped forgings and conform to Table 5-1 or Table 5-2 for the disc-shaped forgings.

The mechanical properties of the steel forgings subjected to heat treatments other than hardening and tempering shall be decided by agreement between the purchaser and the manufacturer.

6. Shapes, Dimension and Tolerances

The steel forgings shall be tested in accordance with 10.4 and the shapes, dimensions and the tolerances shall be as agreed upon by the parties concerned.

7. Appearance

The steel forgings shall be tested in accordance with 10.5 and they shall be externally well-finished and shall be free from cracks, flaws, etc. harmful to practical use.

8. Soundness

The steel forgings shall be subjected to the ultrasonic flaw detection test in accordance with 10.6 or by other suitable methods, and shall have no internal defects harmful to practical use.

Further, the soundness conformance criteria of the steel forgings shall be as agreed upon by the parties concerned.

9. Manufacturing Methods

9.1 General Matters of Manufacturing Methods General matters of the manufacture of the steel forgings shall be as specified in 3. of JIS G 0306. However, when part of the steel forgings is formed by means of gas cutting, agreement shall be made between the purchaser and the manufacturer.

9.2 Heat Treatment The steel forgings shall be subjected to heat treatments of hardening and tempering at the tempering temperature of 550°C or higher.

When heat treatments other than the above are to be carried out, agreement shall be made between the purchaser and the manufacturer.