

# JIS

1998年7月21日

## JAPANESE INDUSTRIAL STANDARD

### Small size-deformed steel bars for prestressed concrete

### JIS G 3137—1994

1999年11月1日

2004年2月6日

2004年2月8日

Translated and Published

by

Japanese Standards Association

2005年4月12日



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

## JAPANESE INDUSTRIAL STANDARD

J I S

Small size-deformed steel bars  
for prestressed concrete

G 3137-1994

1. Scope This Japanese Industrial Standard specifies small size-deformed steel bars (hereafter referred to as "steel bar") intended for the use of prestressing of concrete.

Remarks 1. The standards cited in this Standard are given in the following:

JIS G 0303 General rules for inspection of steel

JIS G 1214 Methods for determination of phosphorus in iron and steel

JIS G 1215 Methods for determination of sulfur in iron and steel

JIS G 1219 Methods for determination of copper in iron and steel

JIS G 1252 Emission-spectroscopic analysis for carbon steel and low alloy steel

JIS G 1253 Method for photoelectric emission spectrochemical analysis of iron and steel

JIS G 1256 Method for X-ray fluorescence spectrometric analysis of iron and steel

JIS G 1257 Iron and steel — Methods for atomic absorption spectrometric analysis

JIS Z 2201 Test pieces for tensile test for metallic materials

JIS Z 2241 Method of tensile test for metallic materials

2. The International standard corresponding to this Standard is given in the following:

ISO 6934-3: 1991 Steel for the prestressing of concrete —  
Part 3: Quenched and tempered wire

2. Grade, symbol and designation

2.1 Grade and symbol The steel bar shall be classified into 6 grades and symbols thereof shall be as given in Table 1.

Table 1. Grade and symbol

| Grade   |         | Symbol          |
|---------|---------|-----------------|
| Grade B | Class 1 | SBPDN 930/1080  |
|         |         | SBPDL 930/1080  |
| Grade C | Class 1 | SBPDN 1080/1230 |
|         |         | SBPDL 1080/1230 |
| Grade D | Class 1 | SBPDN 1275/1420 |
|         |         | SBPDL 1275/1420 |

2.2 Designation The designation of the steel bar shall be as given in Table 2.

Table 2. Designation

| Designation |        |         |         |
|-------------|--------|---------|---------|
| 7.1 mm      | 9.0 mm | 10.7 mm | 12.6 mm |

3. Chemical composition The phosphorus, sulphur and copper deemed as impure element in the chemical composition of the steel bar shall be tested in accordance with 8.1, and the cast analysis values thereof shall be as given in Table 3.

Table 3. Chemical composition

| Unit: %    |            |           |
|------------|------------|-----------|
| P          | S          | Cu        |
| 0.030 max. | 0.035 max. | 0.30 max. |

4. Mechanical properties The mechanical properties of the steel bar shall be tested in accordance with 8.2, and the tested values shall conform to those in Table 4.

Table 4. Mechanical properties

| Symbol          | Yield stress<br>N/mm <sup>2</sup> | Tensile strength<br>N/mm <sup>2</sup> | Elongation<br>% | Relaxation<br>% |
|-----------------|-----------------------------------|---------------------------------------|-----------------|-----------------|
| SBPDN 930/1080  | 930 min.                          | 1080 min.                             | 5 min.          | 4.0 max.        |
| SBPDL 930/1080  |                                   |                                       |                 | 2.5 max.        |
| SBPDN 1080/1230 | 1080 min.                         | 1230 min.                             | 5 min.          | 4.0 max.        |
| SBPDL 1080/1230 |                                   |                                       |                 | 2.5 max.        |
| SBPDN 1275/1420 | 1275 min.                         | 1420 min.                             | 5 min.          | 4.0 max.        |
| SBPDL 1275/1420 |                                   |                                       |                 | 2.5 max.        |

Remarks: The yield stress is given by the stress corresponding to 0.2 % permanent elongation.

5. Configuration and dimensions

5.1 Configuration The steel bar shall be in bar form or in coil form with approximately round cross section, and it also shall have either uniform projections or indents continuously or at a certain interval.

5.2 Dimensions The dimensions of the steel bar shall be expressed as the nominal diameter, and they shall be as given in Table 5. The tolerances, however, are not specified.

5.3 Nominal cross-sectional area The nominal cross-sectional area of the steel bar shall be as given in Table 5.

Table 5. Nominal diameter and cross-sectional area of steel bar

| Designation | Nominal diameter<br>mm | Nominal cross sectional area<br>mm <sup>2</sup> |
|-------------|------------------------|---|
| 7.1 mm      | 7.1                    | 40.0  |
| 9.0 mm      | 9.0                    | 64.0  |
| 10.7 mm     | 10.7                   | 90.0  |
| 12.6 mm     | 12.6                   | 125.0   |

5.4 Straightness The straightness of the steel bar shall be not more than 30 mm in any 1 m length.

6. Appearance The steel bar shall be free from harmful flaws and other defects.

7. Method of manufacture The steel bar shall be manufactured from killed steels by hot-rolling followed by quenching and tempering. The deforming work is applied during either hot-rolling or post process of hot-rolling.

8. Test

8.1 Chemical analysis

8.1.1 General requirements for chemical analysis and sampling method of specimen for analysis The chemical composition of the steel product shall be determined by cast analysis, and the general requirements for chemical analysis and the sampling method of the specimen for analysis shall be as specified in 3. of JIS G 0303.

8.1.2 Method for chemical analysis The method for chemical analysis shall be in accordance with any suitable one(s) of the following standards:

JIS G 1214, JIS G 1215, JIS G 1219, JIS G 1252, JIS G 1253, JIS G 1256,  
JIS G 1257

8.2 Mechanical test

8.2.1 Sampling method of test piece The sampling method of the test piece shall be in accordance with the following:

- (1) Each test piece for the tensile and straightness tests shall be taken from each lot which consists of steel bars of the same heat, heat-treated in the same conditions and designation, in accordance with Table 6.

Table 6. Sampling method of test piece

| Product form | Designation         | Tensile strength, elongation and straightness  | Yield stress   |
|--------------|---------------------|--|--|
| Bar          | For all designation | Take one test piece from one end of one steel bar arbitrarily selected out of every 1000 pieces or its fraction. | Take one test piece from one end of one steel bar arbitrarily selected out of every 6000 pieces or its fraction. |
| Coil         | For all designation | Take one test piece from one end of one steel coil arbitrarily selected out of every 5 coils or its fraction.    | Take one test piece from one end of one steel coil arbitrarily selected out of every 30 coils or its fraction.   |

Remarks: In the case of the steel bar which is cut to lengths from a steel coil, the requirements on sampling method for steel coil shall be applied to those for the original steel coil.

- (2) The test pieces to be used for tensile, yield stress and elongation tests shall be No. 2 test piece specified in JIS Z 2201 with mutatis mutandis disregarding the dimensions of the steel bar.
- (3) The test piece for relaxation test shall be taken from one end of one piece or one coil of the steel bar selected arbitrarily when the material or manufacturing process is changed.

In addition, the test piece to be used for relaxation test shall be appropriate one in length which enables to carry out the test specified in 8.2.3.

8.2.2 Tensile test The tensile test shall be as given in the following:

- (1) The tensile test method shall be as specified in JIS Z 2241.
- (2) The tensile strength is given by dividing the maximum load achieved during the test by the nominal cross-sectional area (Table 5).
- (3) The yield stress is given by dividing the load corresponding to 0.2 % permanent elongation by the nominal cross-sectional area (Table 5).
- (4) The gauge length for measurement of elongation shall be 8 times the nominal diameter.

8.2.3 Relaxation test For relaxation testing, the test piece shall be gripped at positions with appropriate distance at ordinary temperature, applied with load (movable load) obtained by multiplying the value equivalent to 70 % of the tensile strength given in Table 4 by the nominal cross-sectional area at a loading rate of  $200 \pm 50$  N/mm<sup>2</sup>/min, stressed with the said load for  $120 \pm 2$  s, gripped for ensuing 1000 h, maintaining the gripping distance as it is, then measure the amount of decrease of the load. The relaxation value is the ratio of the amount of decrease of the load to the initial movable load expressed in percentage.

8.3 Measurement of straightness For measurement of straightness, the test piece shall be laid down without restriction as practically as possible to determine the maximum arc depth in any 1 m length of the chord.

## 9. Inspection

9.1 Inspection The inspection shall be carried out as follows:

- (1) General requirements for inspection shall be as specified in JIS G 0303.
- (2) The chemical composition shall conform to the requirements specified in 3.
- (3) The mechanical properties shall conform to the requirements specified in 4.
- (4) The configuration and dimensions shall conform to the requirements specified in 5.
- (5) The appearance shall conform to the requirements specified in 6.

9.2 Reinspection In the case where the test results relating to the initial test piece fail to satisfy the requirements specified in 4., a retest may be made. In this case, one additional test piece shall be taken from the identical steel bar or coil from which initial test piece have sampled, and further two additional test pieces shall be taken from each one end of two other steel bars or coils, respectively, of the same lot specified in Table 6. As a result of retesting, when all tested values satisfy the requirements, the said lot is acceptable, and when the test result on any test piece does not meet the requirement, the test lot is not acceptable.

10. Marking The steel bar which has passed the inspection shall be marked on each bundle with the following items by suitable means:

- (1) Symbol of grade
- (2) Designation
- (3) Quantity or mass
- (4) Identification number by which the manufacturing process(es) of product is traceable
- (5) Manufacturer's name or identifying brand

11. Report The manufacturer shall submit to the purchaser an itemized report which describes the symbol of grade, designation, quantity, mass, identification number by which the manufacturing process(es) of the product, mechanical properties (yield stress, tensile strength and elongation) and chemical composition (relating to phosphorus, sulphur and copper) are traceable.

G 3137-1994  
Edition 1

---

Japanese Text

Established by Minister of International Trade and Industry

Date of Establishment: 1994-06-01

Date of Public Notice in Official Gazette: 1994-06-07

Investigated by: Japanese Industrial Standards Committee

Divisional Council on Iron and Steel

---

This English translation is published by:  
Japanese Standards Association  
1-24, Akasaka 4, Minato-ku,  
Tokyo 107 Japan  
© JSA, 1994

Printed in Tokyo by  
Hohbunsha Co., Ltd.