

Iron and steel products
Unalloyed drawing stock for welded
mesh and deformed wire

Fr: Produits sidérurgiques
Fil machine en acier non allié pour
treillis soudé et fils à haute adhérence

French standard certified by decision of the Director
General of Afnor on August 5 1987, effective from
September 5 1987.

Supersedes the certified standard of the same number
of December 1984.

Correspondence

As of the publication date of this standard there is no
European or International standard or draft standard on
this subject.

Analysis

This standard defines the mechanical and chemical
properties as well as the suitability for drawing
and welding of unalloyed steel for welded mesh and
deformed wire.

Descriptors

International Technical Thesaurus : Iron- and steel
products, wire rod, unalloyed steels, welded wire
lattice, grades : quality, chemical composition,
mechanical properties.

Published and distributed by l'Association Française de Normalisation (AFNOR),
Tour Europe, cedex 7, 92080 Paris la Defense - Tel: (1) 42 91 55 55

Translation: Technical Help to Exporters Service of BSI

Modifications

A single steel grade is suggested, with 2 variants, some details are also added concerning suitability for welding and drawing.

Corrections

CONTENTS

	Page
1. SCOPE	3
2. FIELD OF APPLICATION	4
3. REFERENCES	4
4. CHARACTERISTICS OF THE GRADES	6
4.1 Mechanical characteristics	6
4.2 Chemical composition	6
4.3 Weldability	7
4.4 Suitability for drawing	7
5. BATCH REQUIREMENTS - IDENTIFICATION	7
5.1 Batch requirements	7
5.2 Identification	7
6. PRODUCT TESTING	8

1. SCOPE

The purpose of this standard is to define the required characteristics of the qualities of wire rod which, after drawing and/or cold rolling, are used for making reinforcements for reinforced concrete, i.e. rod for making welded mesh (Appendices A and B of standard NF A 35-022) and deformed wire (standard NF A 35-019).

2. FIELD OF APPLICATION

2.1 This standard applies to the qualities of unalloyed steel used, after drawing and/or cold rolling, for making welded mesh and deformed rods.

2.2 This standard does not apply to wire rod covered by other standards such as :

- wire rod for drawing and cold rolling (NF A 35-051),
- smooth and deformed wire rod for reinforced concrete (NF A 35-015 and NF A 35-016),
- wire rod for reinforcing pre-stressed concrete (NF A 35-054),
- wire rod for free-cutting (NF A 35-561),
- carbon steel wire rod suitable for forging and heat treating (NF A 33-101),
- special alloy and unalloyed steel wire rod for case-hardening or heat treating on the finished product (NF A 35-551 and NF A 35-552),
- for covered electrodes (NF A 35-055) and for gas arc or submerged welding (NF A 35-056),
- wire rod intended for cold forming (A35-033)
- wire rod for the manufacture of wires for springs (A35-057)

3. REFERENCES

- | | |
|-------------|--|
| NF A 33-101 | Quality carbon steels suitable for forging and heat treatments - Semi-finished products and wire rods. |
| NF A 35-015 | Reinforcements for reinforced concrete - Plain round bars. |

NF A 35-016	Reinforcements for reinforced concrete (deformed bars).
NF A 35-018	Reinforcements for reinforced concrete - Weldability.
NF A 35-019	Reinforcements for reinforced concrete - Deformed wires.
NF A 35-022	Reinforcements for concrete - Welded wire mesh and components.
NF A 35-051	Non-alloy steel wire rod for drawing and cold-rolling - Grades.
NF A 35-053	Wire rod made of carbon steel for hot formed or cold formed products - Types.
NF A 35-054	Non-alloy wire rod for the manufacture of pre-stressing reinforcing wires - Qualities.
NF A 35-055	Non-alloy steel rods for covered electrodes - Grades and qualities.
NF A 35-056	Carbon steel and alloy steel wire rod for coiled electrodes for gas-shielded arc welding and submerged-arc welding - Grades and qualities.
NF A 35-057	Non-alloy steel wire rod for the manufacture of the wire for heavy-duty mechanical springs made by cold-forming - Qualities.
NF A 35-551	Special purpose unalloyed and alloy structural steels for case hardening - Grades - Semi-products, bars and wire rods.
NF A 35-552	Special purpose unalloyed and alloy structural steels for heat treatment - Grades - Semi-products, bars and wire rods.
NF A 35-561	General purpose free-cutting steel - Bars, wire rods and rods.
NF A 45-051	Iron and steel products - Carbon steel wire rod - tolerances.

4. CHARACTERISTICS OF THE GRADES

4.1 Mechanical characteristics

A single grade of wire rod is specified. This is subdivided into two variants A and B established according to conditions of use and defined by maximum and minimum tensile strength values, R_m , which are obtained on untreated wire rod in the as-delivered condition. These values are given in table 1.

Table 1 - Values for tensile strength (1)

Grade	R_m value (N/mm ²)	
	Minimum value (2)	Maximum value (2)
TSA	380	460
TSB	440	520
(1) The R_m values are calculated by relating the loads obtained to the actual cross section of the wire rod. (2) 1 N/mm ² = 1 MPa.		

4.2 Chemical composition

The maximum levels, expressed as a percentage, of the elements given in table 2 shall be no more than the upper values given in this table.

Table 2 - Chemical composition - Guaranteed maximum levels (%)

Element	Cast	Product
C	0.18	0.20
P	0.050	0.055
S	0.050	0.055
N ₂	0.012	0.014

4.3 Weldability

Wire rods shall satisfy the requirements of standard NF A 35-018. The value of the equivalent carbon content defined by the formula :

$$C_{eq} = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

and measured on the product, shall not be more than 0.45 %.

4.4 Suitability for drawing

Wire rods shall have no internal defects such as hollows, shrink cavities, etc. nor any surface defects such as scale, cracks, laps, hot tears etc. which could adversely affect drawing and/or cold-rolling, or cold notching that are required to obtain the mechanical characteristics of the finished product.

5. BATCH REQUIREMENTS - IDENTIFICATION

5.1 Batch requirements

Wire rod is normally delivered in batches.

5.2 Identification

Each coil shall bear a label or mark giving :

- the diameter of the wire rod
- the variant TSA or TSB
- identification of the factory of production

If painted clearly this shall be able to be erased by scaling.

6. PRODUCT TESTING

6.1 The wire rod covered by this standard is normally subjected to a non-specific test. However, an analysis certificate shall be supplied at the time of casting.

6.2 However, for specific tests or if there is a dispute, one sample per 10 tonnes shall be taken for testing mechanical characteristics. A minimum of 3.90 % of the samples shall conform with the requirements of table 1.

If the number involved is less than 10, as soon as a sample is found not to conform, a sufficient number of samples shall then be taken to bring it up to 10. All extra samplings shall satisfy the requirements.

The same rule shall apply if the number is greater than 10; the number of samplings to be considered shall be a multiple of 10.