

Steel reinforcements for window products

Technical Document 44-01

Certified characteristics and test methods

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MODIFICATION HISTORY

Revision no.	Application date	Modifications
00	01/10/2018	Creation of the document.
01	02/09/2019	Modification of thickness tolerances (§ 3.1)

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1. Purpose

The purpose of this technical document is to define:

- the different certified characteristics and the minimum requirements demanded,
- the criteria adopted for evaluation of the certified characteristics,
- all the inspections which will be carried out during manufacture and checked during audits,
- the methodology linked to sampling conducted during audits and surveillance of the contract,
- the tests relating to the samples taken,

as part of the evaluation of steel reinforcements used in windows.

2. Definition of the certified characteristics

2.1 Dimensional characteristics (Dim)

The dimensional characteristics concern both the geometry of the reinforcement and also verification of its thickness. This characteristic must be compliant with the measures in the technical appraisal, the technical application document or any technical evaluation of a window product including the product, that is acknowledged as positive or is subject to a usage exemption by the system process engineer.

The geometry and thickness of the reinforcements can be evaluated according to two principles:

- Based on the plans of the system process engineer: the dimensional characteristics are provided by the system process engineer to the reinforcement supplier for its manufacture and to CSTB for verification of the reinforcements as part of the evaluation.

This characteristic shall be defined by the term **Dim⁺**

- Based on the applicant/holder plan: the definition plans are not available on the premises of either of the stakeholders. In this case, the geometry can be evaluated based on the plan provided by the reinforcement supplier. The reinforcement must have a specific reference and the definition of the reinforcement must be specified on the certificate.

This characteristic shall be defined by the term **Dim**

2.2 Anticorrosion protection class (P)

This characteristic is used to define the coating applied to the products, and the related class.

Products which have not been zinc-coated are not concerned.

The class must be compliant with the technical appraisal, the technical application document and any technical evaluation of a window product including the product that is acknowledged as positive and compatible with the other procedures with which this procedure is combined to build a structure.

This characteristic shall be defined by the term **P + designation of the coating**

For example: A Z225 type reinforcement protection shall be defined by the designation P Z225

2.3 Tensile modulus (or Young's modulus) (Ytrac)

The tensile modulus is the basis for calculation allowing the reinforcement ready reckoner to be defined for the window products.

This value set at 210GPa for construction steels should not be less than 210.

This characteristic shall be defined by the term **YTrac**

3. Evaluation of the certified characteristics

Before evaluating the certified characteristics, the reinforcement definition plans sent by the system process engineer shall be checked.

For each window range, the plans of 50% of the product references shall be checked.

3.1 Dimensional characteristics

a) REINFORCEMENT GEOMETRY

Verification of the geometrical characteristics of the reinforcements shall be carried out based on the plans supplied during examination of the certification dossiers.

b) THICKNESS

The tolerances adopted for manufacture of the reinforcements taken from NF EN 10143, taking a nominal width w for reference which is strictly greater than 1500, are listed in the table below (data in mm):

Nominal thickness	Tolerances
$0.20 < t \leq 0.40$	± 0.07
$0.40 < t \leq 0.60$	± 0.07
$0.60 < t \leq 0.80$	± 0.08
$0.80 < t \leq 1.00$	± 0.09
$1.00 < t \leq 1.20$	± 0.11
$1.20 < t \leq 1.60$	± 0.14
$1.60 < t \leq 2.00$	± 0.16
$2.00 < t \leq 2.50$	± 0.18
$2.50 < t \leq 3.00$	± 0.20
$3.00 < t \leq 5.00$	± 0.25

3.2 Anticorrosion protection class

The coating weights shall be taken from standard NF EN 10346 and listed below:

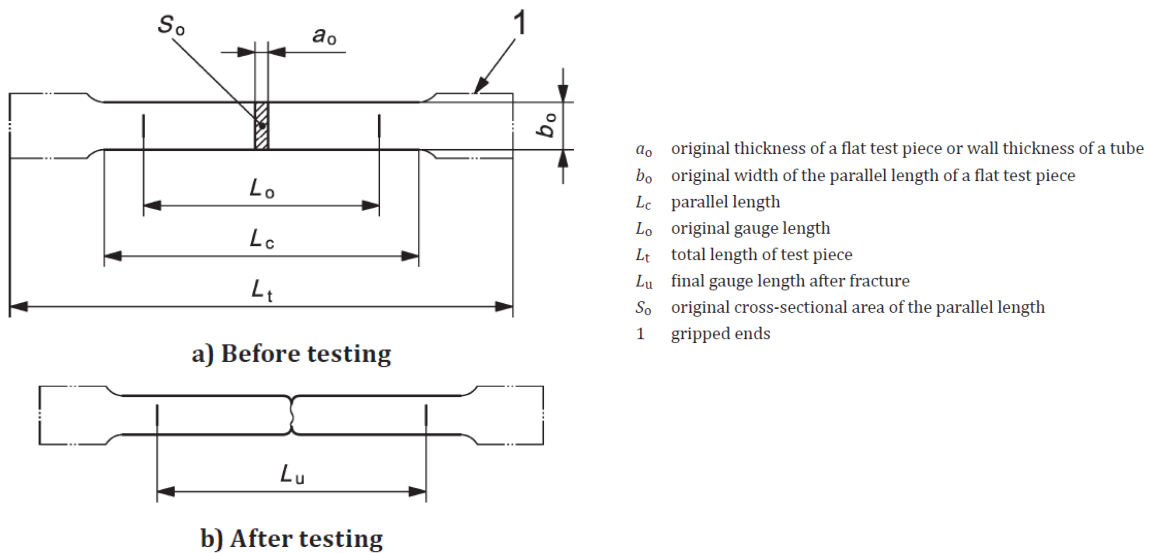
Designation of the coating	Coating weight for both sides g/m^2		Indicative values for the coating thickness per surface in the test at one point μm		Density g/cm^3
	Test at three points	Test at one point	Usual value	Range	
Z100	100	85	7	5 - 12	7.1
Z140	140	120	10	7 - 15	
Z200	200	170	14	10 - 20	
Z225	225	195	16	11 - 22	
Z275	275	235	20	13 - 27	
Z350c	350	300	25	17 - 33	
Z450c	450	385	32	22 - 42	
Z600c	600	510	42	29 - 55	

The anticorrosion protection class shall be determined at one point using a measuring device by magnetic induction and eddy currents. If the value obtained with this device is strictly less than the median for the class adopted (e.g. 16 μm for a reinforcement in class Z225), a supplementary test according to standard NF EN 10346 (appendix A) shall be carried out.

3.3 Tensile modulus (or Young's modulus)

The tensile modulus (or Young's modulus) shall be conducted according to NF EN ISO 6892-1.

This test consists in placing a test specimen under traction according to the model described below at room temperature (between 10°C and 35°C) to determine one of its mechanical properties.



The dimensional characteristics of the test specimens are listed in appendix B of this standard.

Table B.1 — Dimensions of test pieces

Dimensions in millimetres

Test piece type	Width b_o	Original gauge length L_o	Parallel length L_c		Free length between the grips for parallel sided test piece
			Minimum	Recommended	
1	12,5 ± 1	50	57	75	87,5
2	20 ± 1	80	90	120	140
3	25 ± 1	50 ^a	60 ^a	—	Not defined

^a The ratio L_o/b_o and L_c/b_o of a type 3 test piece in comparison to one of types 1 and 2 is very low. As a result, the properties, especially the elongation after fracture (absolute value and scatter range), measured with this test piece, will be different from the other test piece types.

Table B.2 — Tolerances on the width of the test piece

Dimensions and tolerances in millimetres

Nominal width of the test piece	Machining tolerance ^a	Tolerance on shape ^b
12,5	±0,05	0,06
20	±0,10	0,12
25	±0,10	0,12

^a These tolerances are applicable if the nominal value of the original cross-sectional area, S_o , is to be used in the calculation of results without having to measure each test piece.

^b Maximum deviation between the measurements of the width along the entire parallel length, L_c , of the test piece.

4. Production inspections

4.1 Inspections upon receipt

The applicant/holder, manufacturer of the steel reinforcements is required to ensure by verification upon receipt and before manufacture, that the raw material used for its production is compliant with the specifications defined in the initial call for tenders and the order placed.

According to NF EN 10346, the following information shall be supplied by the purchaser at the time of the call for tenders and/or the order:

- the amount to be delivered;
- the type of product (strip, sheet or slit strip cut to length);
- the number of the dimensional standard (EN 10143);
- the nominal dimensions and the tolerances on the dimensions and the shape and, if applicable, the letters indicating the corresponding special tolerances;
- the number of the standard relative to the technical conditions of delivery (EN 10346);
- the symbol or number designation for the steel and the symbol for the type of hot-dip coating as stated in Tables 1 to 5;
- The number corresponding to the nominal weight of the coating (e.g. 275 = 275 g/m² for both sides;
 - o the letter indicating the coating appearance (N, or M);
 - o the letter indicating the surface quality (A, B or C);
 - o the letter indicating the surface treatment (C, O, CO, P, PO or S).

4.2 Quality assurance operations during production

The table below lists the obligatory inspections to be carried out during manufacture:

Thickness of the strip	1 per parent coil
Thickness of anticorrosion coating	1 per parent coil
"Essential" dimensional characteristics of the reinforcement	2 / coil (start and end of coil)
Certification marking	For each production batch

Note: The test equipment must be checked once a year internally for the coating thickness measurement and once every three years externally for the callipers.

5. Sampling

5.1 During audits

During admission or follow-up audits, sampling will be carried out and the following tests will be conducted by the mark laboratory.

Inspections	Applicable text	Frequency
Dimensional characteristics of the reinforcement: - Reinforcement geometry - Thickness of the reinforcement	NF EN 10143	1 reference / production line*
Anticorrosion protection class	NF EN 10346	
Tensile modulus (or Young's modulus)	NF EN ISO 6892-1	

* sampling, taken directly from the production line, of a piece of reinforcement of at least 50 cm in length and with marking. With a minimum of 2 samples per site.

A sampling sheet will be systematically drafted for sending the products.

During the audit, the dimensional characteristics and the anticorrosion protection class shall be checked and the results stated in the audit report.

5.2 Sampling for surveillance of the contract

In the context of surveillance of the contract, the holder undertakes to provide the tonnage of reinforcement produced at the start of each year, together with the list of clients supplied and the amounts of products delivered. In view of these elements, the certifying body shall carry out a sampling plan.

The following tests are carried out in the laboratory of the mark.

Inspections	Applicable text or § of the QB reference system, etc.	Frequency	Certified characteristic
Dimensional characteristics of the reinforcement: - Reinforcement geometry - Thickness of the reinforcement	NF EN 10143	1 reference * / 1000 t of reinforcements for the field concerned / year	Dim
Anticorrosion protection class	NF EN 10346		P
Tensile modulus (or Young's modulus)	NF EN ISO 6892-1		YTrac
Certification marking	2.5.2.1		-

* sampling of a piece of reinforcement of at least 50 cm in length and with marking.

A sampling sheet will be systematically drafted for sending the products.