

REGLEMENT D'APPLICATION	TRA	551
	REV 2	2021/3

TRA 551/2 (2021)

REGLEMENT D'APPLICATION
DE LA MARQUE BENOR
DANS LE SECTEUR
DES
ASSEMBLAGES MÉCANIQUES D'ACIERS POUR BÉTON ARMÉ
**Modalités de contrôle applicables
aux fabricants et aux distributeurs**

REVISION 2

BENOR asbl



Approuvé par le Conseil d'Administration le 19/03/2021

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Application Regulation TRA 551 Revision 02

Application regulation of the BENOR-mark in the sector of concrete reinforcements - Methods of assessment applicable to the “Users of the mark” – Producers and Distributors of mechanical connections of reinforcements¹

1 Introduction

This Application Regulation (TRA²) was prepared by the Technical bureau 1 of OCAB-OCBS, sectoral organization, “Concrete reinforcing steels” for the BENOR certification of concrete reinforcements.

According to the regulation of use and control of the BENOR-mark³ and its article 9, this Application Regulation of OCAB-OCBS constitutes the reference certification scheme to the BENOR-mark.

2 Reference documents and definitions

2.1 Reference documents

- Règlement d'usage et de control de la marque BENOR / Algemeen reglement voor het beheer van het Benor-merk⁴.
- Règlement général pour la gestion de la marque BENOR / Algemeen reglement voor het beheer van het Benor-merk⁵.
- Règlement particulier d'usage et de control de la marque BENOR dans le secteur des produits en acier laminés à chaud et dans le secteur des aciers écrouis à froid pour béton, / Bijzonder reglement voor gebruik en controle van het BENOR-merk in de sector de warmgewalste staalproducten en in de sector van het koudvervormde staal voor gewapend beton, BRP 279⁶.

In theory, the last edition of the standards and PTV applies. If necessary, an addendum to the present regulation would be published in the event of incompatibility following the revision of one of the documents quoted hereafter.

- NBN A 24-301, Produits sidérurgiques - Aciers pour béton armé - Barres, fils et treillis soudés - Généralités et prescriptions communes / Staalproducten - Betonstaal - Staven, draden en gelaste wapeningsnetten - Algemeenheden en gemeenschappelijke voorschriften.
- NBN A 24-302, Produits sidérurgiques - Aciers pour béton armé - Barres lisses et barres à nervures - Fils machine lisses et fils machine à nervures / Staalproducten - Betonstaal - Gladde en geribde staven - Gladde en geribde walsdraad.
- NBN A 24-303, Produits sidérurgiques - Aciers pour béton armé - Fils écrouis à froid lisses et fils écrouis à froid à nervures / Staalproducten - Betonstaal - Gladde en geribde koudvervormde draad.
- NBN EN ISO 15630-1, Aciers pour l'armature et la précontrainte du béton – Méthodes d'essai – Partie 1 : Barres, fils machine et fils pour béton armé / Staal voor de wapening en voorspanning van beton – Beproevingsmethoden, Deel 1: Staven, draad en draad voor gewapend beton.

¹ Table of contents at the end of the document

² **TRA: Toepassingsreglement – Règlement d'Application**

³ (Reference BENOR^{asblvzw} : NBN/RVB.CA/RM2012-10-02 and following editions in force)

⁴ (Reference: NBN/RVB.CA/RM2012-10-02 and following editions in force) with Document CM10 1998-12-09 in appendix

⁵ (Reference: NBN/RVB.CA/RG2012-10-02 and following editions in force) with Document CM10 1998-12-09 in appendix

⁶ According to the last edition in force

- PTV 302, Aciers pour béton armé, Barres à nervures ou à empreintes et fils à nervures ou à empreintes à haute ductilité / Gewapend betonstaal, Geribde of gedeukte staven en Geribde of gedeukte draad met hoge ductiliteit betonstaal.
- PTV 303, Aciers pour béton armé, Fils écrouis à froid à nervures à basse ductilité / Gewapend betonstaal, Geribde koudvervormde draad met lage ductiliteit.
- PTV 309, Assemblages mécaniques d'acier pour béton armé / Mechanische verbindingen van betonstaal.
- Manuel de qualité de l'OCAB-OCBS / Kwaliteitshandboek van het OCBS⁷.

3 Object

This Application Regulation lays down detailed rules for the controls to be carried out on mechanical assemblies of reinforcements to verify that these products comply with the technical requirements applicable to them.

4 General control procedures

4.1 General requirements

The samples subject to the controls for the authorization of use of the BENOR-mark shall be obtained exclusively from mechanical assemblies of reinforcements, namely:

- a set consisting of the sleeve and BENOR reinforcements made of bars or wires.

The conformity of the products with the requirements covered by ISO 15835-1 standards and OCAB-OCBS normative documents including PTV 309 is verified by a preliminary examination for the granting of the BENOR-mark.

The authorization to use the mark shall be granted per product. Products manufactured by different systems, products manufactured by different manufacturing processes are considered as different products.

The controls for the granting of the BENOR-mark shall include:

- verification of the conformity of the origin of the components of mechanical reinforcement assemblies
- verification of the nominal dimensions of the components of the mechanical assemblies of steel for concrete
- verification on the basis of simple manipulation in order to show that the components of mechanical assemblies of reinforcement can be easily assembled
- where appropriate, the verification of the capacities to carry out the deformation and resistance tests, if not the availability of the results of those tests by a laboratory recognized by OCAB-OCBS.

4.2 Marking and identification

Each part of the coupler shall be marked legibly and durably (e.g. by punching) with the manufacturer's identification, type and a mark relating to the lot for traceability purposes. Each coupler must be able to be connected to its manufacturing data.

Each load of mechanical assemblies shall be labeled with the name of the manufacturer, the number of the load, the nominal diameter of the bars and wires, the steel quality according to the Belgian designation of the bars and wires and an identification number ensuring the traceability of the manufacturer's self-control. After the granting of the BENOR-mark, the labels shall bear the BENOR logo with the distinguishing number of the user of the mark.

⁷ According to the last edition in force

5 Initial Control

5.1 Terms

For the initial inspection, the manufacturer shall submit to the sectoral organization or his representative⁸ the different products and, for each of the products, the different diameters (bars or wires) for which the application for the use of the BENOR-mark is requested.

By different products, all possible variants of the components of the different mechanical assemblies of steel for concrete must be understood in terms of

- system
- production process
- shape and dimensions of reinforcing couplers (for a given diameter of BENOR reinforcement)
- grade of BENOR reinforcements (in the form of bars or wire).

The manufacturer may subdivide his range of diameters into sub-groups of diameters.

5.2 Examination for the issue of a first authorization for use of the mark BENOR

In the examination for the issue of a first authorization for use of the mark BENOR,

- if the product comprises 4 or more diameters, the sectoral organization shall designate for the sampling three diameters distributed in the range of diameters (one on minimum diameters, one on intermediate diameters and one on maximum diameters).
- if the product comprises only three diameters or less, all diameters shall be designated for sampling.

5.3 Examination in connection with an extension to another product

Where the producer applies for the granting of the BENOR-Mark in respect of a product other than the one authorized for initial use, the sectoral organization shall designate a diameter from among the small ones and a diameter from among the large ones.

5.4 Examination in connection with an extension to another diameter

When the producer requests the granting of the mark for an extension of the range of diameters of an already recognized product:

- the extreme diameter is controlled
- if the extension covers both small and large diameters, both extreme diameters are controlled.

5.5 Tensile tests and slip measurements (category B)

In each of the designated diameters, the producer shall present at least ten mechanical assemblies of BENOR reinforcements.

A series of tests, for a designated diameter, shall consist of ten samples from, as far as possible, different casts.

The measured characteristics shall be compared for each test series with the specifications of the technical requirements (PTV 309). A series of tests shall be accepted if all the results are satisfactory. Otherwise, a new series of tests shall be sampled and tested after compulsory verification and possible modification of the production system concerned.

5.6 Fatigue tests (category FX)

Where the tensile and slip tests show positive results for all the designated diameters of a product, the fatigue tests may be carried out.

⁸ In the following of the text and for simplification reasons, the term "sectoral organization" includes her representative as well as the inspection body and his representative, as it is defined in the quality handbook of OCAB-OCBS.

For each designated product, a series of tests shall be carried out on at least three diameters of the range or of each subgroup defined by the manufacturer. A series of tests consists of three samples.

For each series, the producer defines a double amplitude (accepting) according to the FX class chosen according to the PTV309:

- If the three tests reach at least 2,000,000 cycles for the chosen amplitude, this double amplitude ($\Delta\sigma$) is considered as the reference value for fatigue resistance.
- If for the chosen amplitude one of the three tests does not reach at least 2,000,000 cycles, the results are reported on the EXCEL sheet "Specific S-N curve" (cf. PTV 309) in terms of ($\Delta\sigma$) and number of cycles at failure. The lower boundary of the results shall be calculated using this sheet and this value shall be considered as the reference value for fatigue resistance. In this case, the manufacturer may decide to carry out more tests in order to obtain a higher reference value.
- In all cases, all fatigue tests are considered valid and to be retained unless an explanation for the rejection of a test is provided. The assessment of this justification is the responsibility of Technical Bureau 1 and then the Certification Committee.

6 Industrial Control

This control shall be exercised by the producer on an ongoing basis.

The test pieces shall be taken from the current production. The measured characteristics shall be compared for each test series with the specifications of the technical requirements (PTV 309).

6.1 Tensile tests and slip measurements (categories B or FX)

For each product and for each diameter, the test frequency shall be 1 per 1000 pieces manufactured. Each sample shall be taken at the beginning of each series of 1000 pieces.

If a test result does not conform, the cause must be investigated, and corrective actions taken. Three additional test samples of the same mechanical assembly combination shall be tested successfully.

7 Periodic inspection by the sectoral organization (OCAB-OCBS)

The conditions for the attribution of the use of the BENOR-mark (regularity in the manufacture of the products and conformity of the products with the standards referred to by the BENOR-mark) shall be controlled periodically by the sectoral organization.

This control shall verify:

- If the producer has all BENOR delivery forms of any reinforcement for the products he has processed
- If the producer has at his disposal all the documents of conformity of any steel of the sleeves for the products he has processed
- Marking and labeling of parts
- If the industrial self-control is carried out correctly
- If the results of industrial self-control have been interpreted correctly
- If all measures have been taken to ensure that products which are already bearing the BENOR-mark, but which must be scraped (because as declared defective), are not stored with products complying with the BENOR requirements.

The producer shall take all steps to facilitate such control it will communicate to the sector organization in particular:

- the name of the head of the factory control services
- the date on which a slight change in the manufacturing conditions took place, in particular those products which fall within the scope of the certification but which have shown minor changes.

The producer shall make available all the results of industrial self-control according to the Chapter 6.

It shall indicate for each monthly period from the date on which the authorization for use of the BENOR-mark was granted, the quantity of the products falling under the cover of the BENOR-mark and those scrapped. These quantities are subdivided by product type (manufacturing process, geometrical profiles) and by diameter.

Controls carried out by the sectoral organization shall normally be carried out four times a year. During the period following a first certification decision, the user of the mark shall be subject to a probationary period of one year comprising six visits. During this period, documentary audits or additional visits may be applied based on the results of the initial audit (in particular on the basis of the number of non-compliances) and a decision of the certification committee. The same principles shall apply in the event of an extension during a period of one year, in which case the number of basic visits is limited to 4. The frequency shall be increased once a month where situations allow the sectoral organization to question the quality of the products or the regularity of the quality.

7.1 Tensile tests and slip measurements (categories B or FX)

During the visit, two sets of three samples are taken to perform a tensile and slip test.

These two series are chosen arbitrarily in two diameters of the same product or in two equal or different diameters from two separate products.

If one test result does not conform, three additional samples of the same combination of mechanical assembly shall be tested successfully.

If more than one test result does not comply, the cause must be investigated and corrective actions taken. For each series concerned, six additional samples of the same combination of mechanical assemblies must be tested successfully.

If, over a period of two years, no results of non-compliant tests have been found, the number of samples per series shall be reduced from three to two (two sets of two samples shall be taken per visit).

Samples are always selected in such a way that over a two-year period, all diameters of each product are examined.

7.2 Fatigue tests (category FX)

Once a year, a series of three test pieces for each mechanical assembly variant shall be sampled and tested.

These tests shall be carried out on each variant of mechanical assembly with the largest diameter, then the smallest diameter and then the intermediate diameter of the certified variant, respectively, over a period of three years.

If this test program then meets the criteria in force, it is thus presumed that the other diameters of the type and series also meet the requirements concerned.

If one series of tests does not meet the criteria, then the series concerned shall be extended to three additional test pieces for which no failure shall be found.

If the results of at least two test pieces do not meet the test result, the cause shall be investigated first and appropriate corrective actions taken. Two additional test series of three test pieces shall be evaluated (with the other two diameters) for each concerned test series, for which no failure shall be found.

8 Authorization for use of the mark

The conformity of the properties of the products with the technical requirements and the proper management of the certification file are the two criteria for obtaining and maintaining the authorization of use of the BENOR-mark.

In the event of a duly identified deficiency, the OCAB-OCBS Certification Committee shall decide on corrective measures or sanctions on the basis of advice from the sectoral organization or the Technical Bureau 1.

The producer is duly informed by the present regulation of the possible scope of the sanctions that would be imposed, which could include the temporary suspension or the definitive withdrawal of the authorization of use of the BENOR-mark.

9 Inspection bodies

The inspection bodies operating on behalf of OCAB-OCBS under this document are listed in OCAB-OCBS Document N° 503.

10 Checklist for initial, follow-up or extension audits

The checklist that follows, is not exhaustive, but should be included in each audit report, as a full part for initial and extension audits, as a part for follow-up audits.

Theme	Response	Documentation or reference	Assessment					
Assembly Type	Screwed, Welded, Compressed, Other	Delete left and complete here						
Technical Folder	Available?							
Coupler	Steel, Other	Standard:						
	CE marking?	Yes (DoP), No						
	Inspection document	2.1 3.1 other						
	Tracking							
	Marking							
	Other							
BENOR reinforcement	Grade(s)							
	Diameters	mm						
	Heat Treatment	Yes? Possible effect						
	Thread	Yes?, Mode, Possible effect						
	Welding	Yes?, Mode, Possible effect						
	Compression	Yes?, Mode, Possible effect						
	Other	Yes?, Mode, Possible effect						
Mechanical properties	Slip							
	Resistance							
	Ductility							
	Fatigue	Yes?, Level						
Technical Folder	Complete?							
	Right?							
	...							
Initial Audit								
Diameters presented and tested	Slip							
	Resistance							
	Ductility							
	Fatigue							
Follow-up audit								
Diameters presented and tested	Slip							
	Resistance							
	Ductility							
	Fatigue							
Industrial control								
Production		By diameter in mm: number of parts manufactured and rejected per period						
D	10	12	14	16	20	25	32	D
N	N	N	N	N	N	N	N	N
R	R	R	R	R	R	R	R	R
BENOR steels delivery forms								
Documentation, Evaluation								
Couplers								
Documentation, Evaluation								

11 Revision History

11.1 Revision 0

- Document Creation,

11.2 Revision 1:

- Update of document based on revision of ISO 15835 series standards.

11.3 Revision 2:

- Change in product definition, sampling procedures and self-control.

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