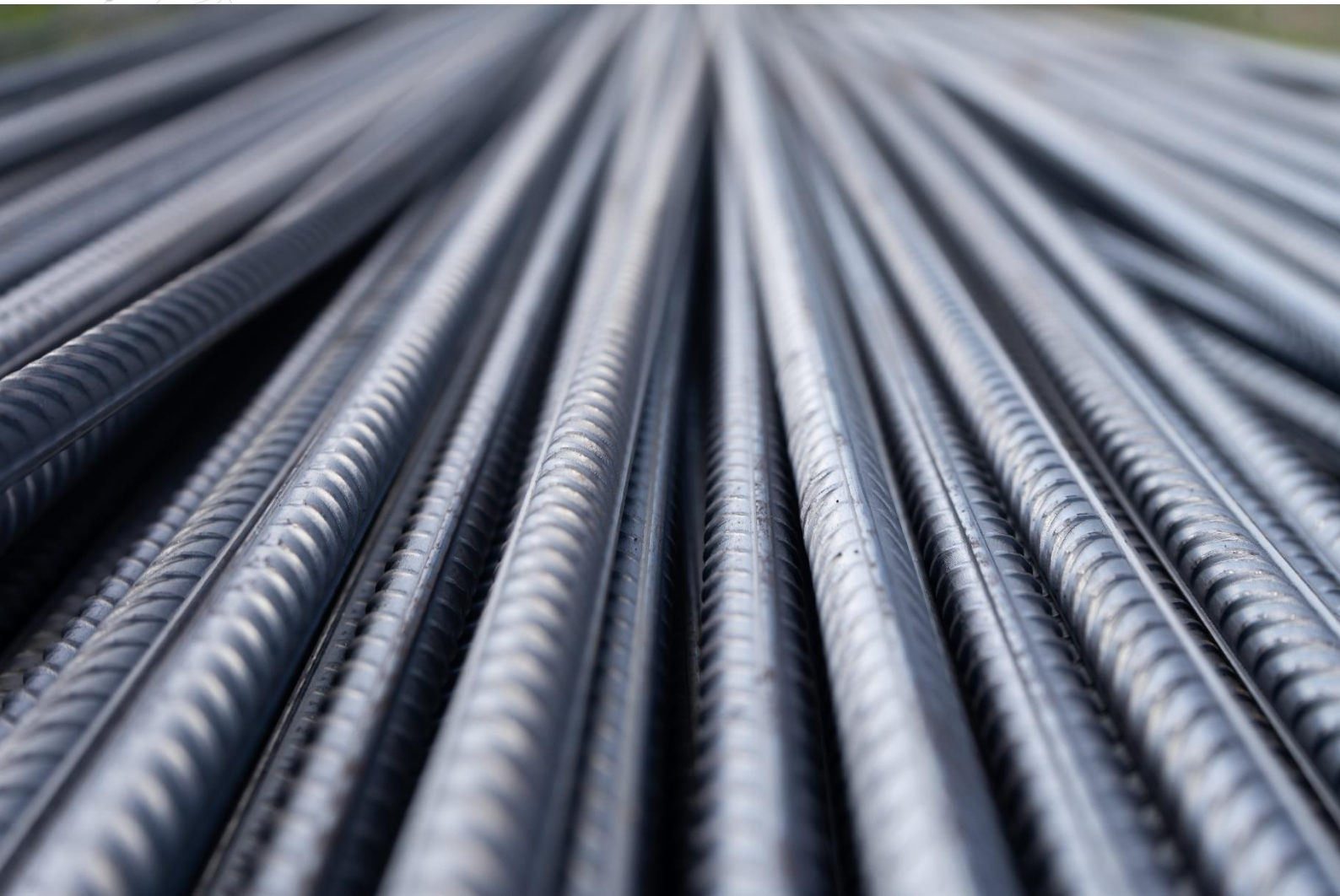




SCHEME DOCUMENT FOR THE CERTIFICATION OF STEEL FOR THE REINFORCEMENT OF CONCRETE

(18-01-06 Iss8)



Note: This document may be revised from time to time, for example to take account of improvements and amendments to test and assessment methods and material innovations.

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SCHEME FOR THE CERTIFICATION OF STEEL FOR THE REINFORCEMENT OF CONCRETE

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1 DEFINITIONS

- BBA – British Board of Agrément
- Applicant – the Client, specifically prior to Certification
- Client – the party who applies for, or holds, Certification to the Scheme
- Scheme – The BBA Scheme for Certification of Steel for the Reinforcement of Concrete
- Scheme Document – this document
- Certificate – the approval document issued by the BBA after successful assessment to the requirements of the Scheme
- Standard – a recognised British, European or International norm

Additional terms and definitions are taken from BS4449, BS4482, BS4483 BS EN 10080 and the two parts of BS EN ISO 17660.

2 SCOPE

2.1 This scheme is appropriate for use wherever the following are specified:

2.1.1 Product Conformity Certification – Standards of assessment:

- BS 4449:2005
- BS 4482:2005
- BS 4483:1998
- BS 4483:2005
- BS 6744: 2016
- Plain round coil feedstock for BS 4449 and BS 4482
- BS 8548: 2017
- ISO 17660-1: 2006 Structural
- ISO 17660-2: 2006 Locational
- BS 8597:2015

2.1.2 Process Certification – Standards of assessment

- BS 8666:2005
- BS 8666:2020

2.2 The scheme is directed towards the issue of Product and Process Conformity Certification, confirming steel for the reinforcement of concrete's compliance with requirements as defined by the BBA.

2.3 The scheme covers the steel for the reinforcement of concrete supply chain by breaking down and modularising the assessment methodology into the 'manufacturing scope' components:

2.3.1 *Underpinning Scheme Requirements* – ISO 9001: 2015 accredited certification for a relevant scope is a requisite of the scheme. During the assessment, unless existing Certification to this Standard with a suitably accredited body can be confirmed, the quality management system must be assessed and so certified before Certification against this scheme can be awarded.

This is carried out in combination with assessment as detailed in 3.2.1.

2.3.2 *Production and cold rolling* – Confirmation of manufacture and / or supply of products that conform with relevant standards including:

- BS 4449: 2005 *Steel for the reinforcement of concrete — Weldable reinforcing steel — Bar, coil and decoiled product — Specification.*
- BS 6744: 2016 *Stainless steel bars. Reinforcement of concrete. Requirements and test methods*
- BS 4482: 2005 *Steel wire for the reinforcement of concrete products. Specification.*

2.3.3 *Fabrication – Confirmation of manufacturing and / or supply of products that conform with relevant standards including:*

- BS 4483: 1998 *Steel fabric for the reinforcement of concrete. Specification.*
- BS 4483: 2005 *Steel fabric for the reinforcement of concrete. Specification.*
- BS 8548: 2017 *Guidance for arc welding of reinforcing steel*
- BS EN ISO 17660-1: 2006 *Welding. Welding of reinforcing steel. Load-bearing welded joints*
- BS EN ISO 17660-2: 2006 *Welding. Welding of reinforcing steel. Non-load-bearing welded joints*
- BS 8597: 2015 *Steels for the reinforcement of concrete. Reinforcement couplers. Requirements and test methods.*
- BS 8666: 2005 *Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. Specification.*
- BS 8666: 2020 *Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. Specification.*

2.4 Note: the European standard covering steel for the reinforcement of concrete is BS EN 10080:2005 *Steel for the reinforcement of concrete. Weldable reinforcing steel. General.* It is under review and is not currently implemented as a Harmonised or Designated Standard. Should the Standard be published as a Harmonised Standard in the future, and should this be adopted in the UK as a Designated Standard, this Scheme and its requirements will be updated to reflect the Standard.

3 INTRODUCTION

3.1 The objective of this scheme is to provide confidence that steel reinforcement products manufactured within its scope meet the appropriate Standard(s) as certified. The scheme provides assurance of consistent compliance with the appropriate Standards, through initial and ongoing auditing of a formal management system of quality and process control, alongside appropriate product testing at regular intervals against the requirements determined by the appropriate product Standard(s).

3.2 The assessment and certification procedure shall be undertaken in four stages for each manufacturing location, as follows:

- Stage 1 – Assessment of Applicant's data
- Stage 2 – Assessment of the quality management system and relevant standards
- Stage 3 – Review of sampling, and in-house and laboratory testing
- Stage 4 – Certification

3.3 Generally, each stage shall be successfully completed prior to the commencement of the next stage. However, Stages 1 to 3 may, at the request of the Applicant, be undertaken concurrently. The Applicant shall have the option of withdrawing from the programme at any stage should the subject fail to comply with the requirements.

3.4 In the event of an Applicant offering a system under the Reinforcing Steel Scheme including multiple in-scope products at a manufacturing location, the BBA shall define the number of Certificates required and the range of tests to be performed to allow the acceptance of the various materials and / or processes.

3.5 Certification specific to each manufacturing location shall only be awarded on the successful completion of stages 1 to 3.

4 ASSESSMENT AND CERTIFICATION PROCESS

4.1 STAGE 1: ASSESSMENT OF APPLICANT'S DATA

- 4.1.1 Applicants shall submit at least the details on the Application Form for evaluation by the BBA. If they are found to be acceptable, they shall form the basis of the subsequent assessment contract. Further data will be requested during the assessment should it proceed, including materials gathered during audit visits.
- 4.1.2 Should there be, during the assessment, the need to modify the product defined by the Applicant (for example as a result of failure of the product to meet the requirements) the content of the assessment and additional work required shall be reconsidered by the BBA. The cost of additional work shall be borne by the Applicant, at the BBA's then current rate for the work.
- 4.1.3 If the product includes hazardous substances, e.g. that require special precautions to be taken under the COSHH Regulations, the Applicant shall supply all the relevant data. No formal assessment of the suitability of these data, in terms of the COSHH Regulations, shall be undertaken by the BBA. However, these data shall always be required by the BBA, and its subcontractors, to ensure the safe use and testing of the product in their laboratories.

4.2 STAGE 2: ASSESSMENT OF QUALITY MANAGEMENT SYSTEM

- 4.2.1 Existing certification to ISO 9001: 2015⁽¹⁾ will be taken as evidence of the suitability of the quality management system for the scheme, provided the certificate is issued by a Certification Body accredited by UKAS or an equivalent National Accreditation Body that is a signatory to an applicable mutual recognition agreement, and provided that the scope of the certification is appropriate to the Scheme.

(1) Note: If ISO 9001: 2015 certification is not in place, or if the Client wishes to transfer ISO 9001: 2015 certification to the BBA at any point, the BBA will carry out this assessment. This shall include at least one visit to the factory. Initial assessment of the quality management system shall form the basis for subsequent ongoing surveillance visits, as well as providing the baseline requirement for the Scheme. A closing meeting will be held at the end of the visit, and any non-conformances with requirements will be agreed with the Client. A report will be provided by the BBA to the client, and evidence of any corrective actions required shall be provided to the BBA within ten working days.

4.3 STAGE 3: SAMPLING, REVIEW OF IN-HOUSE TESTING, ACCREDITED TESTING

4.3.1 Initial assessment – sampling⁽²⁾

- a. The BBA shall select samples for testing during an initial visit to the site. Samples shall be selected and identified as required by the relevant product Standard. Samples shall be labelled with a unique reference and the manufacturer's production batch number documented.
- b. Sampling requirements for each production site shall be agreed and detailed in a Quality Plan document.
- c. On this initial visit, sampling shall be carried out across the products under assessment. A full set of product characterisation and performance tests, as required by the relevant product Standard(s), shall be conducted for each product under assessment.
- d. Sample preparation and conditioning shall be carried out by the manufacturer according to the relevant product Standards.

- e. One half of each sample shall be retained by the manufacturer, for in-house testing. The other half of each sample shall be sent by the manufacturer to a laboratory that is UKAS accredited, or mutually recognised equivalent, or otherwise approved by the BBA.
- f. Provided that the manufacturer has been operating under a UKAS (or equivalent) scheme acceptable to the BBA, and can provide copies of previous test reports, BBA may at its discretion accept sampling of only one product size from the range as part of the initial audit. However, the whole range of products must still be tested within a 5-year window. If production of any product sizes is discontinued for two years, then that product shall be removed from the scope of the Certificate.

(2) Note: points a to f above apply only if applicable to the product Standard(s) in question.

4.3.2 Initial assessment – performance testing⁽³⁾

- a. All product testing shall be carried out according to the relevant product Standards.
- b. In-house testing shall be witnessed by the BBA during the initial visit.
- c. A review of in-house testing shall be carried out by the BBA assessors, including an evaluation of the frequency, equipment, calibration, competency, data, product coverage, compliance, reporting and corrective actions associated with in-house testing.
- d. Test data from the in-house testing carried out during the initial visit shall be provided to the BBA.
- e. The Applicant must commission the testing from a laboratory accredited by UKAS or equivalent, or otherwise approved by the BBA.
- f. Costs for the commissioned accredited testing are to be met by the Applicant.
- g. Test reports from the accredited testing shall be provided to the BBA with the results being made available to the BBA within four months of the sample selection.
- h. The Applicant shall provide evidence that the test data are within the requirements of the relevant product Standards.
- i. The BBA shall assess the in-house and accredited test data for compliance against the requirements of the relevant product Standards.

(3) Note: points a to i above apply only as applicable to the product Standard(s) in question.

4.3.3 Initial assessment – processing (dimensioning, bending and cutting)

- a. Processing shall be assessed, where relevant, for compliance with BS8666 *Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. Specification*.
- b. Assessment / inspection shall be based on Annex A of the standard *Third party certification and batch testing*

4.3.4 Identification and traceability assessment

- a. The BBA will assess the manufacturer's ability to comply with Section 6 of this Scheme Document. BBA identification marks, including the BBA rolling mark (section 6.2 c and d), shall only be applied after product and / or process certification is granted. Compliance shall be assessed as per section 5 of this scheme document (maintenance).

4.4 NON-CONFORMANCES

4.4.1 At each Stage, any non-conformances found against the product Standards, the Scheme

Requirements, or the manufacturer or applicant's own management system will be raised. Non-conformances are raised at three levels.

Major non-conformance: this is where an activity or product does not comply with the technical product Standards or Scheme requirements, and in particular where the non-conformance could have an impact on the product, its performance, the sampling, testing regime or test results. Multiple minor non-compliances that together could indicate a more serious management system failure could also be combined as a major non-conformance. A proposed action to address the non-conformance will be agreed with the manufacturer and should be resolved and evidence provided within the requested timescale.

Minor non-conformance: this is where there is a non-compliance that does not impact on compliance with technical product Standards or Scheme requirements. An example might be a minor documentation issue in the management system or required updates to the Quality Plan (where this does not impact on the product). A proposed action to address the non-conformance will be agreed with the manufacturer and should be resolved and evidence provided within the requested timescale.

Observation: these are either recommendations for improvements or alternative approaches, or information the assessor feels is worth noting, either for future reference or as information to the BBA. In general, no action is likely to be required to address an Observation.

4.5 STAGE 4: CERTIFICATION

4.5.1 The above Stages will result in a number of documents supporting the Certificate decision. These will include (where applicable to the site)

- Audit reports
- Quality Plans
- Sampling records and test request records
- In-house testing reports
- Accredited test reports
- Technical sign-off of the audit documents, and technical acceptance of the test reports.

4.5.2 On successful completion of the above Stages, and a review of the required documentation, a Scheme Certificate will be prepared and issued to the Client. The Certificate will identify the manufacturer / Client name, the manufacturing location, the products covered, and the relevant scope of the Certification.

4.5.3 Should the BBA have carried out assessments for certification of a quality management system to ISO 9001: 2015 as part of the project, as per clause 3.2.1, these Certificates will be separately issued to the Client, identifying the Client name, manufacturing location, and agreed scope.

4.5.4 Product and Process Conformity Certification is continuous and not limited by an expiry date. Certificates are issued subject to the Terms and Conditions of the relevant contract with the BBA, including ongoing obligations of the BBA and the Client.

5 MAINTENANCE OF CERTIFICATION

5.1 In addition to the Scheme requirements, ongoing validity of the Certificate is subject to the requirements described in Section 5 and 6, and compliance with the Terms and Conditions as provided in the contract for the assessment, and as amended from time to time at the sole discretion of the BBA.

5.2 For maintenance of Scheme Certification, the BBA shall perform visits at a frequency prescribed by the relevant Standards, at a minimum of twice per annum.

5.3 The BBA will assess evidence of the ongoing certification to ISO 9001: 2015 at the twice-yearly audits. It is the Client's responsibility to maintain the manufacturer's certification to ISO 9001: 2015 by a Certification Body accredited by UKAS or an equivalent National Accreditation Body that is a signatory to a mutual recognition agreement, and to ensure that the scope of the certification is appropriate to the Scheme.

5.4 In-house test data and summaries of the data and calculations required for monitoring long-term quality levels shall be provided to the BBA, in accordance with the Quality Plan Document and the applicable product Standards.

5.5 Ongoing Scheme visits will include the following activities:


- BBA will select samples for in-house and accredited testing at a laboratory accredited for the testing by UKAS, or equivalent, or otherwise approved by the BBA.
- Sampling and testing will be carried out in accordance with the relevant product Standards, and in line with the activities described in section 4.3 above.
- Processed elements (dimensioning, bending, cutting) will be inspected.
- A proportion of in-house testing will be witnessed. Additional witnessing may be carried out, as determined by the BBA, should non-conformities or issues of concern be identified in the standard witnessing.
- A review of in-house testing activities will be carried out, on a sampled basis.
- The Client shall provide the BBA with in-house test results, any accredited test results since the previous visit, and data and calculations supporting the monitoring long-term quality level.
- Identification and traceability assessment – The BBA will assess compliance with Section 5 of this Scheme Document.
- A review of complaints, resolutions and feedback received in relation to products under certification.
- An annual charge will cover planned visits and the BBA licence fee. Additional activities required will be charged to the Client at the BBA's then current rates.

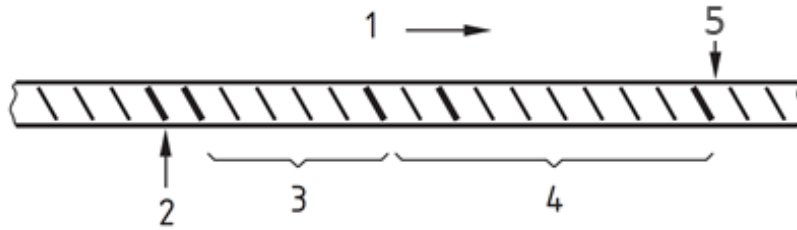
6 IDENTIFICATION AND TRACEABILITY

6.1 CAST / HEAT IDENTIFICATION

Cast identification (also known as a 'Heat Number') shall be retained and verifiable at all points during the production and delivery processes.

6.2 ROLLING MARKS / APPLIED MARKS

- a. Product rolling marks / applied marks must be applied in accordance with the relevant product Standard.
- b. Identification of steel grade must be applied in accordance with the relevant product Standard.
- c. Designation must be applied in accordance with the relevant product Standard (e.g. Clause 5 in BS 4482 and BS 4483).
- d. The BBA rolling mark shall be shown as:  (this symbol will be known as the BBA ribbon)
- e. For all material certified by the BBA to BS 4449 and BS 4482, the BBA rolling mark must be applied in the ribs following the rolling mark works number:



Key

- 1 Direction of reading
- 2 Start
- 3 Country number
- 4 Works number
- 5 BBA Rolling Mark

- f. The country of origin of the reinforcing steel shall be rolled on to the surface of the bar in accordance with BS EN ISO 3166-1:2020, and BS EN ISO 3166-2:2020 – *country abbreviations*.

6.3 TRACEABILITY

- 6.3.1 All products at any stage in the supply chain, including testing, storage, distribution or fabrication shall be fully traceable to their production, by means of identification of batch numbers or equivalent, and / or as required by the relevant product Standard and this Scheme document.

6.4 LABELLING

- 6.4.1 All BBA approved product shall be adequately labelled to ensure product traceability. The labels shall bear at minimum the:
 - BBA Reinforcing Steel Scheme Certification Mark
 - BBA Reinforcing Steel Scheme unique Certificate number
 - Product specification Standard
 - Steelmaking process used (hot rolling and cold rolling only)
 - Company name
 - Consignment number
 - Grade (hot rolling and cold rolling only)
- 6.4.2 BBA approved product labelling should be sufficiently durable to maintain traceability throughout future transport, handling and storage. If assessment to BS 8666 is included, the labels shall be durable and securely tied to the reinforcement products.

6.5 BBA REINFORCING STEEL SCHEME CERTIFICATION MARK

- 6.5.1 While the Certificate is valid, the BBA grants to the Certificate holder a non-exclusive licence to use the BBA Reinforcing Steel Scheme Certification Mark strictly in accordance with the then current versions of the “BBA Brand Guidelines” document (a copy of which is on the BBA’s website). The BBA Reinforcing Steel Scheme symbol shall only be used in conjunction with the unique number of the relevant Certificate. Further information on this is included in the BBA Brand Guidelines and in the Scheme contract.

6.6 DELIVERY DOCUMENTATION

- 6.6.1 All BBA Certified Product shall be accompanied by documentation stating the following:

- Product specification standard
- Steelmaking process used (hot rolling and cold rolling only)
- Company name (supplier)
- Consignment number
- Grade (hot rolling and cold rolling only)
- Customer
- Supply Date
- Quantity of product

7 APPENDIX A – SYMBOLS RELEVANT TO REINFORCING STEEL

Symbol	Description	Unit
A_n	Nominal cross-sectional area	mm ²
A_{gt}	Percentage total elongation at maximum force	%
b	Width of indentation	mm
c	Transverse rib or indentation spacing	mm
C_{eq}	Carbon equivalent value (CEV)	% by mass
C_v	Specified characteristic value	^a
d	Nominal diameter of the reinforcing steel	mm
e	Gap between rib or indentation rows	mm
f_R	Relative rib area	-
f_P	Relative indentation area	-
h	Rib height	mm
k	Coefficient as a function of the number of test results	-
\bar{x}	Average value of test results	^a
R_e	Yield strength	MPa ^b
R_{eH}	Upper yield strength	MPa ^b
R_m	Tensile strength	MPa ^b
R_m/R_e	Ratio tensile strength/yield strength	-
$R_{p0,2}$	0,2 % proof strength, non proportional extension	MPa ^b
s	Estimate of the standard deviation	^a
α	Transverse rib flank inclination	°
β	Angle of transverse rib or indentation inclination	°
$2\sigma_a$	Stress range in the axial load fatigue test	MPa ^b
$\sigma_{max.}$	Specified maximum stress in the fatigue test	MPa ^b
B	Length of transverse wire in welded fabric	mm
d_C	Diameter of transverse wires in welded fabric	mm
d_L	Diameter of longitudinal wires in welded fabric	mm
L	Length of longitudinal wire in welded fabric, or length of lattice girder	mm
N_C	Number of transverse wires in welded fabric	-
N_L	Number of longitudinal wires in welded fabric	-
P_C	Pitch of transverse wires in welded fabric	mm
P_L	Pitch of longitudinal wires in welded fabric	mm
F_s	Shear force of welded connections in welded fabric	kN
$R_{e,act.}$	Actual value of yield strength	MPa ^b
$R_{e,nom.}$	Specified value of yield strength	MPa ^b
$R_{e,act.}/R_{e,nom.}$	Ratio actual value of yield strength / specified value of yield strength	-
a_1, a_2, a_3, a_4	Increment (specified in the product specification)	^a
u_1, u_2	Overhang of the longitudinal wires in welded fabric or length of the diagonals beyond the upper or lower chord of a lattice girder	mm
u_3, u_4	Overhang of the transverse wires in welded fabric	mm
A_{Ch}	Cross-sectional area of chord	mm ²
A_{Di}	Cross-sectional area of diagonal	mm ²
B_1	Design width of lattice girder	mm
B_2	Overall width of lattice girder	mm
F_d	Shear force of a clamped joint in lattice girder	kN
F_w	Shear force of a single weld in lattice girder	kN
H_1	Design height of lattice girder	mm
H_2	Overall height of lattice girder	mm
P_s	Pitch of diagonals of lattice girder	mm
$R_{e,Ch}$	Yield strength of the chord in lattice girder	MPa ^b
$R_{e,Di}$	Yield strength of the diagonal in lattice girder	MPa ^b
t	Depth of indentation	mm
t_s	Thickness of metal strip in lattice girder	mm
ϑ	Inclination of the diagonals in lattice girder	°

Symbol	Description	Unit
b	Width of the beam (beam test)	mm
d_m	Bend diameter (beam test)	mm
F_a	Total force applied (beam test)	kN
F_a	Tension force (pull-out test)	kN
f_c	Average of concrete strength (pull-out test)	MPa ^b
f_{cm}	Target value of the concrete strength class (pull-out test)	MPa ^b
F_i	Force in hinge and bar or wire (beam test)	kN
v_p	Loading rate (pull-out test)	N/s
Δ_o	Slip (pull-out test)	mm
σ_s	Stress in the bar or wire (beam test)	MPa ^b
τ_b	Bond stress (beam test)	MPa ^b
τ_{bu}	Bond stress at maximum force (beam test)	MPa ^b
τ_{dm}	Bond stress (pull-out test)	MPa ^b
$\tau_{0,01}, \tau_{0,1}, \tau_1$	Bond stress at 0,01 mm, 0,1 mm and 1 mm slip (beam test)	MPa ^b
^a	The unit depends on the property.	
^b	1 MPa = 1 N/mm ² .	