BRITISH STANDARD

BS 4483:2005
Incorporating Amendment No. 1

Steel fabric for the reinforcement of concrete — Specification

ICS 77.140.15; 91.080.40

BSI British Standards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee ISE/9, Steel for concrete reinforcement, to Subcommittee ISE/9/1, Bars, wire and fabric for concrete reinforcement, upon which the following bodies were represented:

British Coatings Federation

British Precast Concrete Federation

Concrete Society

Department of Transport — Highways Agency

Galvanizers Association

Institution of Structural Engineers

UK Certification Authority for Reinforcing Steels

UK Steel Association

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Contents

Foreword

This British Standard has been prepared by Subcommittee ISE/9/1, and is a revision of BS 4483:1998, which will be withdrawn on 1 January 2006. This edition incorporates a full revision of the standard. All steel fabric conforming to this standard is to be made using ribbed bar in accordance with BS 4449:2005 with the exception of the wrapping fabrics D49 and D98 where BS 4482 may be used.

The start and finish of text introduced by Amendment No. 1 is indicated in the text by tags [A1] 〈A1].

BS 4449:2005 grade B500A in sizes below 8 mm does not conform to BS EN 1992-1-1:2004 (Eurocode 2).

This standard has been written so that it can be used in conjunction with BS EN 10080:2005. Definitions, symbols, manufacturing processes, routine inspection and testing, test methods, identification of the manufacturer and technical class and verification in the case of dispute are all taken from BS EN 10080:2005.

BS EN 10080:2005 does not define steel grades or technical classes, and requires that these should be defined in accordance with BS EN 10080:2005, by specified values of R_e, R_m/R_e, A_{gt}, $R_{e,act}/R_{e,nom}$ (where appropriate), fatigue strength, bend performance, weldability, bond strength, tolerances and dimensions.

BS EN 10080:2005 contains an informative Annex ZA, which describes how that standard can be used for the purposes of CE marking of reinforcing steels. Annex ZA and **8.2**, **8.3** and **8.4** of BS EN 10080:2005 relate to the role of the notified body in assessing products for an EC certificate of conformity, and as such are not included in this standard. It is not a requirement of this British Standard that materials produced to it should meet the requirements for CE marking.

Where CE marking is required for the purposes of complying with the EU Construction Products Directive, reference ought to be made to BS EN 10080:2005.

It is recommended that purchasers specify reinforcing steel that has been manufactured and supplied to a recognized third party product certification scheme. **8.2** specifies the determination of the long term quality level under such a scheme. As an alternative, Annex B provides a batch testing method for material which has not been produced under such a scheme.

This standard comes into effect on 1 January 2006.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

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1 Scope

This British Standard specifies requirements for sheets of factory-made machine-welded steel fabric for the reinforcement of concrete, manufactured from ribbed bars conforming to BS 4449:2005, or manufactured from wire conforming to BS 4482 for wrapping fabrics D49 and D98.

NOTE Where the term "bar" is used in this standard, it includes bar or decoiled product conforming to BS 4449:2005. For clarity only, it can also include wire conforming to BS 4482 for wrapping fabrics only.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4449:2005*, Steel for the reinforcement of concrete — Weldable reinforcing steel — Bar, coil and decoiled product — Specification.*

BS 4482*, Steel wire for the reinforcement of concrete products — Specification.*

BS 8666*, Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete — Specification.*

BS EN 10080:2005*, Steel for the reinforcement of concrete — Weldable reinforcing steel — General.*

BS EN ISO 15630-1*, Steel for the reinforcement and prestressing of concrete — Test methods — Part 1: Reinforcing bars, wire rod and wires.*

BS EN ISO 15630-2*, Steel for the reinforcement and prestressing of concrete — Test methods — Part 2: Welded fabric.*

3 Terms and definitions

3.1
welded fabric
arrangement of longitudinal and transverse bars of the same or different nominal diameter and length that are arranged substantially at right angles to each other and factory electrical resistance welded together by automatic machines at all points of intersection

3.2
characteristic value
value of a material or product having a prescribed probability of not being attained in a hypothetical unlimited test series

3.3
minimum value
value below which no test result shall fall

3.4
maximum value
value which no test result shall exceed

3.5
batch
quantity of welded fabric of one type produced by one manufacturer and presented for examination at any one time

3.6
factory production control
permanent internal control of production performed by the manufacturer

3.7
standard property
property which is part of the routine inspection and test requirements for every test unit

3.8
special property
property which is not determined as part of the factory production control requirements for every test unit

3.9
standard welded fabric
welded fabric reinforcement where the bar and mesh arrangement can be defined by an identifiable fabric reference

3.10
purpose made welded fabric
welded fabric manufactured according to user's specific requirements

3.11
longitudinal bar
reinforcing steel in the manufacturing direction of the welded fabric

3.12
transverse bar
reinforcing steel perpendicular to the manufacturing direction of the welded fabric

3.13
pitch of welded fabric
centre-to-centre distance of bars in a sheet of welded fabric

3.14
overhang of welded fabric
length of longitudinal or transverse bars projecting beyond the centre of the outer crossing bar in a sheet of welded fabric

3.15
length of a welded fabric sheet
longest side of a sheet of welded fabric, irrespective of the manufacturing direction

3.16
width of a welded fabric sheet
shortest side of a sheet of welded fabric, irrespective of the manufacturing direction

3.17
bundle
two or more sheets of fabric bound together

3.18
nominal diameter
diameter of a circle with an area equal to the nominal cross-sectional area of the bar

4 Symbols

A list of symbols used in this standard, reproduced from BS EN 10080:2005, is given in Table 1.

Table 1 — List of symbols

Symbols	Description	Unit
A_n	Nominal cross-sectional area	mm^2
A_{gt}	Percentage total elongation at maximum force	%
B	Length of transverse bar in welded fabric	mm
C_v	Specified characteristic value	[a]
d	Nominal diameter of the reinforcing steel	mm
d_C	Diameter of transverse bars in welded fabric	mm
d_L	Diameter of longitudinal bars in welded fabric	mm
k	Coefficient as a function of the number of test results	—
$\overline{X}$	Average value of test results	[a]
R_e	Yield strength	MPa
R_{eH}	Upper yield strength	MPa
R_m	Tensile strength	MPa
R_m/R_e	Ratio tensile strength/yield strength	—
$R_{p0.2}$	0.2 % proof strength, non proportional extension	MPa
s	Estimate of the standard deviation	[a]
L	Length of longitudinal bar in welded mesh	mm
N_C	Number of transverse bars in welded fabric	—
N_L	Number of longitudinal bars in welded fabric	—
P_C	Pitch of transverse bars in welded fabric	mm
P_L	Pitch of longitudinal bars in welded fabric	mm
F_s	Shear force of welded connections in welded fabric	kN
$R_{e,act}$	Actual value of yield strength	MPa
$R_{e,nom}$	Specified value of yield strength	MPa
a_1, a_2, a_3, a_4	Increment (specified in product specification)	[a]
u_1, u_2	Overhang of the longitudinal bars in welded fabric	mm
u_3, u_4	Overhang of the transverse bars in welded fabric	mm

[a] The unit depends on the property.

A comparison between the symbols used in this standard and those used in BS 1992-1-1:2004 is given in Annex C.

5 Designation

Welded fabric shall be designated with the following information:

a) designation of the product form (welded fabric);

b) the number of this British Standard (i.e. BS 4483:2005);

c) the nominal dimensions of the product (dimensions of the bars, dimensions of the sheet, pitch of the bars, overhangs) (see Note);

d) the grades of the steel(s) to be used to manufacture the welded fabric.

For ordering purposes, the notation specified in BS 8666 shall be used.

NOTE Brief designations are widely used to describe standard welded fabric (see Annex A).

Purpose made welded fabric may be described using the indications given in Annex A, or by a fully dimensioned drawing (see Figure A.1) and should be identified by the user's reference.

6 Manufacturing processes

All welded fabric shall be factory made and machine welded. The joints, at the intersection of the longitudinal bars and the transverse bars, shall be made by electrical resistance welding to provide a specified shear resistance.

Welded fabric can be composed of a different steel grade in each direction.

7 Product characteristics

7.1 Chemical composition

The chemical composition of the bars shall conform to the requirements of BS 4449:2005.

7.2 Mechanical properties of welded fabric

7.2.1 *General*

The characteristic value is (unless otherwise indicated) the lower or upper limit of the statistical tolerance interval at which there is a 90 % probability ($1 - \alpha = 0.90$) that 95 % ($p = 0.95$) or 90 % ($p = 0.90$) of the values are at or above the lower limit, or at or below the upper limit respectively. This quality level refers to the long-term quality level of production.

〈A1〉 *Text deleted* 〈A1〉

7.2.2 *Conditions of testing*

All test pieces shall be in the aged condition.

Ageing method: heat the test piece to 100 °C, maintain at this temperature (±10 °C) for a period of 60^{+15}_{-0} mins, and then cool in still air to room temperature. The method of heating shall be left to the discretion of the manufacturer.

7.2.3 *Tensile properties*

The specified values for the tensile properties (R_e, R_m/R_e, A_{gt}) shall be the corresponding specified characteristic value with $p = 0.95$ for R_e and $p = 0.90$ for A_{gt} and R_m/R_e. Tensile properties (R_e, R_m/R_e, A_{gt}) shall comply with the requirements of **8.1.3.1**.

Determine R_e and R_m using the nominal cross-sectional area of the product.

For yield strength (R_e) the upper yield strength (R_{eH}) shall apply. Determine the yield strength (R_e) from the 0.2 % proof strength ($R_{p0.2}$) if a yield phenomenon is not present.

〈A1〉 For wrapping fabrics D49 and D98 a minimum yield strength only, in accordance with BS 4482, is required. 〈A1〉

7.2.4 *Shear force of welded joints*

The shear force of welded joints in welded fabric shall not be less than $0.25 \times R_e \times A_n$, where R_e is the specified characteristic yield strength, and A_n is the nominal cross-sectional area of the larger bar of the welded joint.

For standard fabrics B1131 and C785, the minimum shear force required shall be calculated using the nominal cross-sectional area of the smaller bar of the welded joint, unless otherwise agreed at the time of enquiry, in which case, the minimum shear force required may be calculated using the nominal cross-sectional area of the larger bar.

7.2.5 *Bend performance*

Bend performance shall be demonstrated by means of the following rebend test method (from BS EN ISO 15630-1).

Bend the test pieces through an angle of 90°, around a mandrel with a diameter not exceeding those specified in Table 2, age the test piece and then bend back by at least 20°. The bend test shall be conducted on the thicker bar.

After the test the specimen shall show no sign of fracture or cracks to a person of normal or corrected vision.

Table 2 — Mandrel diameter for the rebend test

Nominal diameter *d* mm	Maximum mandrel diameter
≤ 16	4*d*

7.3 Dimensions, mass and tolerances

7.3.1 The relative diameters of bars in a sheet of fabric shall meet the following requirement:

$d_{min} \geq 0.6 d_{max}$

where d_{max} is the nominal diameter of the thickest bar and d_{min} is the nominal diameter of the crossing bar.

Other requirements may be agreed at the time of enquiry and order.

7.3.2 The cross-sectional area and mass of an individual sheet shall be derived from the specified dimensions of the sheet, the nominal bar sizes and the specified pitches for the bars.

The pitch of longitudinal bars and transverse bars shall not be less than 50 mm.

The permitted deviations for welded fabric are:

Length and width	±25 mm or ±0.5 % whichever is the greater.
Bar pitch	±10 mm or ±5 % whichever is the greater.
Overhangs	to be agreed at the time of enquiry and order.

7.3.3 Missing bars resulting from test sampling in accordance with this standard shall not be considered a defect.

7.3.4 The number of broken welds shall not exceed 4 % of the total number of cross welded joints in the sheet, nor exceed half the number of cross welded joints along any one bar.

8 Evaluation of conformity

8.1 Routine inspection and testing

8.1.1 *General*

Reinforcing steels shall be produced under a permanent system of routine inspection and testing, which shall include evaluation of specified properties, as described in **8.1.2** and **8.1.3**.

8.1.2 *Sampling and testing of finished product*

The test unit shall be composed of sheets with the same combination of reinforcing steel grades and diameters produced on the same welding machine of a maximum mass of 50 t.

NOTE Wherever practicable test samples should be taken from the edge of a sheet where it is likely to be lapped in use.

For verification of properties, samples shall be taken in accordance with Table 3. These samples may be taken according to the producer's choice, either from one sheet or from different sheets provided that different bars are tested.

All specified welded fabric dimensions (length, width, pitch, overhang) shall be measured.

The chemical composition (cast analysis) of the material shall be determined by the steel producer. Conformance shall be confirmed to the welded fabric manufacturer, which shall include a statement of the chemical composition, if required by the customer.

Table 3 — Sampling plan for welded fabric

Property	Number of samples per test unit
R_e	2[a]
R_m/R_e	2[a]
A_{gt}	2[a]
Dimensions	1
Shear force	2
Nominal mass[b]	2[a]
Rebend[c]	2[a]
Surface geometry	2[a]

[a] One sample for the longitudinal direction and one for the transverse direction.
[b] This may be measured before welding.
[c] This may be evaluated on constituent bars before welding.

8.1.3 ***Evaluaton of test results***

8.1.3.1 *Tensile properties*

8.1.3.1.1 Where the characteristic value C_v is specified in BS 4449:2005 as a lower limit, the results shall be deemed to conform to this standard if either:

a) all individual values are greater than or equal to the specified characteristic value C_v; or

b) $\bar{x} \geq C_v + a_1$

where

a_1 is 10 MPa for R_e, zero for R_m/R_e and 0 % for A_{gt},

and all individual values are greater than or equal to the minimum values given in Table 4.

Table 4 — Absolute minimum and maximum values of tensile properties

Performance characteristic	Minimum value			Maximum value		
	B500A	B500B	B500C	B500A	B500B	B500C
R_e, MPa	485	485	485	650	650	650
R_m/R_e	1.03[a]	1.06	1.13	N/A	N/A	1.38
A_{gt}, %	2.0[b]	4.0	6.0	N/A	N/A	N/A

[a] 1.01 for sizes below 8 mm.
[b] 0.8 % for sizes below 8 mm.

8.1.3.1.2 Where the characteristic value C_v is specified in BS 4449:2005 as an upper limit (i.e. for R_m/R_e of grade B500C), the results shall be deemed to conform to this standard if either:

a) all individual values of R_m/R_e are equal to or lower than the specified upper characteristic value of 1.35; or

b) $\bar{x} \leq 1.35$ for R_m/R_e and all individual values for R_m/R_e are equal to or lower than the maximum values given in Table 4.

8.1.3.2 *Bendability, shear force, geometry, nominal mass*

In the rebend test, all test pieces shall fulfil the requirements of BS 4449:2005.

If testing the shear force of the welded joints, all individual values shall fulfil the requirements of **7.2.4**.

If testing the surface geometry, the results shall meet the requirements of BS 4449:2005.

If testing the nominal mass of the individual bars, no individual value shall be outside the tolerances specified in BS 4449:2005.

8.1.3.3 *Retests*

Test units which do not conform to the requirements specified in **8.1.3.1** and **8.1.3.2** may be retested by selecting two further samples. If both additional test specimens meet the requirements, the batch shall be

deemed to conform to this standard. If either of the additional test specimens fail to meet the requirements, the batch shall be deemed not to conform to this standard.

8.1.4 *Traceability*

Delivered batches shall be identifiable and traceable to the manufacturer and to their production data. The manufacturer shall establish and maintain the records required and shall identify the products and their delivery documentation accordingly.

8.2 Assessment of the long term quality level

8.2.1 *Material produced under a third party certification scheme*

The results of tests on all test units of continuous production shall be collated and statistically evaluated for R_e, A_{gt}, and R_m/R_e taking either the number of results corresponding to the preceding six months operation or the last 200 results, whichever is the greater.

8.2.2 *Evaluation of the test results of the preceding six months operation*

The evaluation shall be carried out per nominal diameter.

The following requirements shall be satisfied for R_e, A_{gt} and R_m/R_e:

$$\bar{x} - ks \geq C_v$$

where

$\bar{x}$ is the average value;

s is the estimate of the standard deviation of the population;

k is the coefficient listed in Table 5 for R_e, and in Table 6 for A_{gt} and R_m/R_e;

C_v is the specified characteristic value.

The foregoing is based on the assumption that the distribution of a large number of results is normal but this is not a requirement of this standard. However, the following alternative methods may be used to establish conformity of the production with the requirements of this standard:

a) graphical methods including control charts;

b) non-parametric statistical techniques.

Table 5 — R_e coefficient k as a function of the number (n) of test results (for a reliable failure rate of 5 % [p = 0.95] at a probability of 90 %

n	k	n	k
5	3.40	30	2.08
6	3.09	40	2.01
7	2.89	50	1.97
8	2.75	60	1.93
9	2.65	70	1.90
10	2.57	80	1.89
11	2.50	90	1.87
12	2.45	100	1.86
13	2.40	150	1.82
14	2.36	200	1.79
15	2.33	250	1.78
16	2.30	300	1.77
17	2.27	400	1.75
18	2.25	500	1.74
19	2.23	1000	1.71
20	2.21	∞	1.64

Table 6 — A_{gt} and R_m/R_e coefficient k as a function of the number (n) of test results (for a reliable failure rate of 10 % [p = 0.90] at a probability of 90 %

n	k	n	k
5	2.74	30	1.66
6	2.49	40	1.60
7	2.33	50	1.56
8	2.22	60	1.53
9	2.13	70	1.51
10	2.07	80	1.49
11	2.01	90	1.48
12	1.97	100	1.47
13	1.93	150	1.43
14	1.90	200	1.41
15	1.87	250	1.40
16	1.84	300	1.39
17	1.82	400	1.37
18	1.80	500	1.36
19	1.78	1000	1.34
20	1.77	∞	1.28

9 Test methods

For welded fabric, the requirements of BS EN ISO 15630-2 apply regarding the tensile test, rebend test, the determination of shear force of joints and the methods for chemical analysis. Measurement of the surface geometry and the determination of the relative rib area f_R shall be in accordance with BS EN ISO 15630-1.

10 Identification of the manufacturer and steel grade

The manufacturer's identification mark applied to the individual bars shall be as described in BS 4449:2005.

In addition to the manufacturer's identification marks applied to the individual bars, a label shall be attached to the welded fabric to indicate the manufacturer of the welded fabric and the steel grade(s).

11 Verification of mechanical properties in the case of dispute

11.1 Whenever the determination of a property specified in this standard as a characteristic value creates a dispute, the value shall be verified by selecting and testing three test pieces from various sheets from the batch under examination.

If one test result is less than the specified characteristic value, both the test piece and the test method shall be carefully examined. If there is a local fault in the test piece or reason to believe that an error has occurred in the test, the test results shall be ignored. In this case a further single test shall be carried out.

If the three valid test results are equal or greater than the specified characteristic value the batch shall be deemed to conform to this standard. If not, the requirements of **11.2** shall apply.

11.2 If **11.1** is not fulfilled, 10 additional test pieces shall be selected from different sheets in the batch.

The batch shall be deemed to conform to this standard if the average test result of the 10 test pieces is higher than the characteristic value and the individual values are higher than the minimum and lower than the maximum values given in either BS 4449:2005 or this standard as appropriate.

If not, the batch shall be rejected.

Annex A (informative)
Notation and classification of fabric

A.1 General

Figure A.1 gives an example of notation that should be used for ordering sheets of fabric described and classified as specified in BS 8666.

A.2 Standard fabric

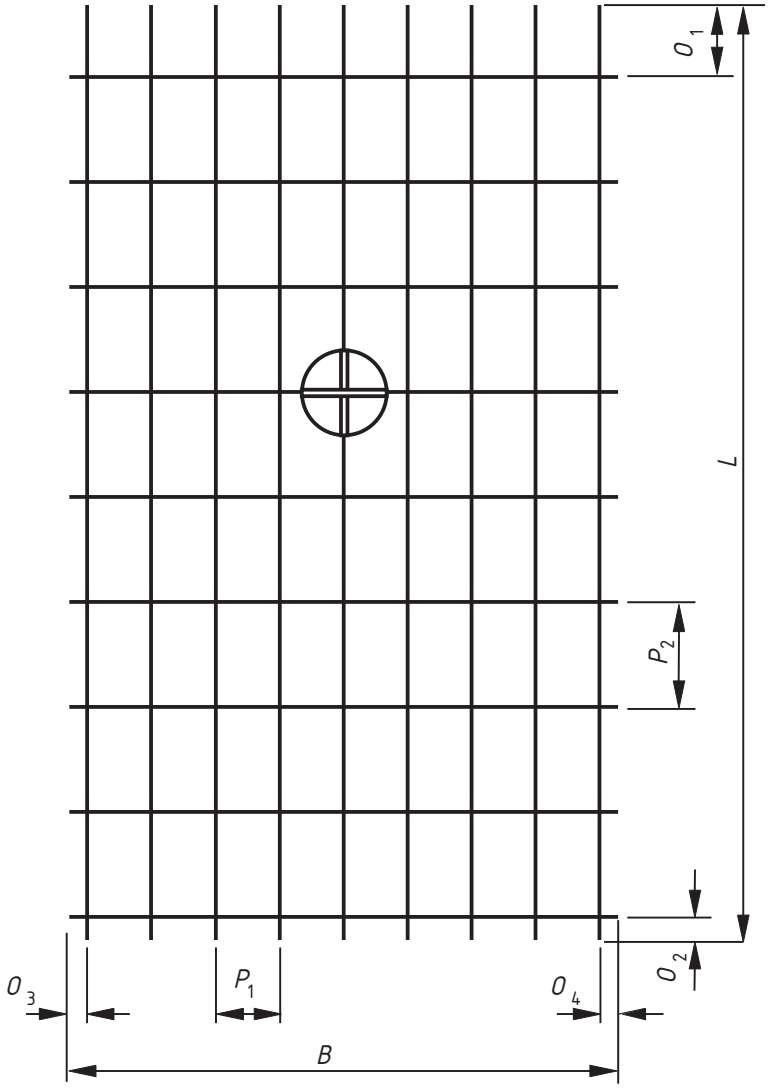
Standard fabric has defined mesh arrangements and bar sizes and should be specified by designated reference numbers. BS 8666 gives a table of standard fabrics with an alphanumeric reference to define the size and pitch of the longitudinal bars and cross bars. This is reproduced in Table A.1.

Table A.1 — Preferred range of designated fabric types and stock sheet size

	Longitudinal bars			Transverse bars			
Fabric Reference	Nominal bar size	Pitch	Area	Nominal bar size	Pitch	Area	Mass
	mm	mm	mm^2/m	mm	mm	mm^2/m	kg/m^2
Square mesh							
A393	10	200	393	10	200	393	6.16
A252	8	200	252	8	200	252	3.95
A193	7	200	193	7	200	193	3.02
A142	6	200	142	6	200	142	2.22
Structural mesh							
B1131	12	100	1131	8	200	252	10.9
B785	10	100	785	8	200	252	8.14
B503	8	100	503	8	200	252	5.93
B385	7	100	385	7	200	193	4.53
B283	6	100	283	7	200	193	3.73
Long mesh							
C785	10	100	785	6	400	70.8	6.72
C636	9	100	636	6	400	70.8	5.55
C503	8	100	503	6	400	49	4.51
C385	7	100	385	6	400	49	3.58
C283	6	100	283	6	400	49	2.78
Wrapping mesh							
D98	5	200	98	5	200	98	1.54
D49	2.5	100	49	2.5	100	49	0.77
Stock sheet size: length, 4.8 m; width, 2.4 m; sheet area, 11.52 m^2.							

A.3 Purpose-made fabric

When the standard form of schedule is used to define more complicated arrangements, involving longitudinal bars of different sizes or irregular spacings in one or both directions, a fully dimensioned diagram should supplement the schedule (see for example Figure A.2).



Key

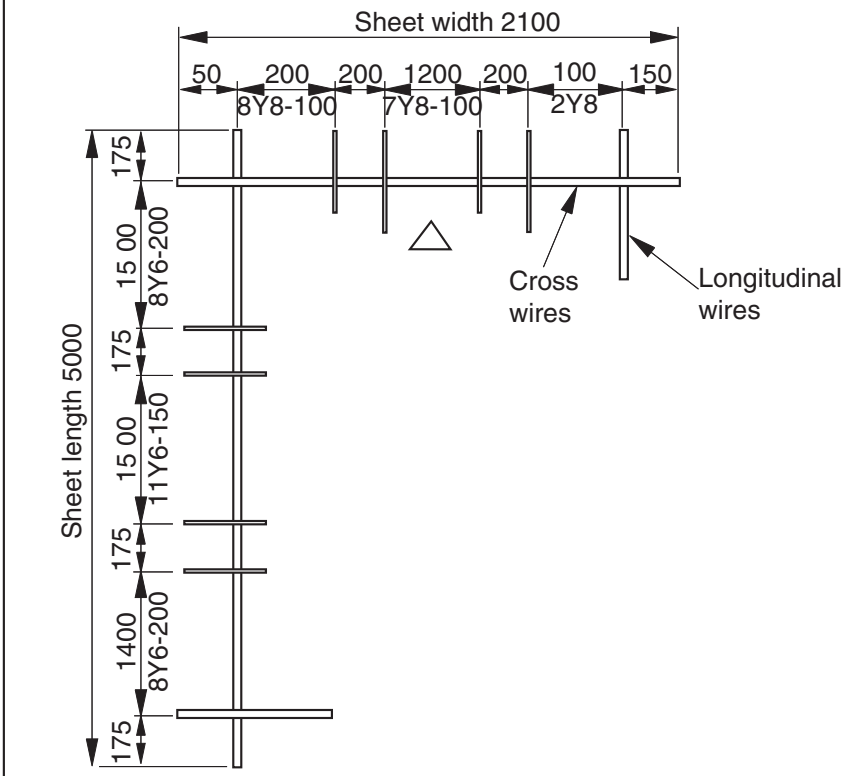
N_L	Number of longitudinal bars	L	Length of longitudinal bar
P_L	Pitch of longitudinal bars	B	Length of transverse bar
d_L	Diameter of longitudinal bars	u_1	Overhang of the longitudinal bars
N_C	Number of transverse bars	u_2	Overhang of the longitudinal bars
P_C	Pitch of transverse bars	u_3	Overhang of the transverse bars
d_C	Diameter of transverse bars	u_4	Overhang of the transverse bars

Figure A.1 — Geometric characteristics of purpose-made welded fabric

Title of project: Physics block, Eastford
Name of client: Eastford University
Name of structural designer: Jim Smith
Preparation by: A. Jones

Drawing No 046
Sheet No 03 Revision B
Status C

Preparation date: 15.04.04
Date revised: 16.06.04



	No. per sheet	Size mm	Length m	Mass kg/m	Mass/ sheet kg	No. of sheets	Total mass t	
Longitudinal	12	F8	5000	0.395	23.700	15	0.355	
Cross	27	F6	2100	0.222	12.587		0.189	
Fabric to BS 4483 Bending to BS 8666					36.287		0.544	

Figure A.2 — Purpose-made fabric example

Annex B (normative)
Material not covered by a third party product certification scheme

B.1 General

Material not covered by a third party product certification scheme shall be assessed by acceptance tests on each batch. Sampling and testing shall be carried out by an independent organization at the producer's works or in the stockholder's yard.

B.2 Extent of sampling and testing

For testing purposes, the batch shall be divided into test units with a maximum mass of 50 t. Each test unit shall comprise products of the same steel grade (or grades) and type of fabric. The manufacturer shall certify that all products in the test unit originate from the same production batch.

Test specimens shall be taken from each test unit as follows

a) twenty specimens [or 80 specimens if appropriate, see **B.4.1**b)] from different sheets of fabric, for testing in accordance with **B.3**a) and **B.3**b);

b) four test specimens, from different fabrics, for testing in accordance with **B.3**c).

Preparation of the test specimens shall be carried out as described in **7.2.2**.

B.3 Properties to be tested

Specimens selected in accordance with **B.2** shall be tested for the following.

a) *Inspection by variables:*
   1) yield strength R_e;
   2) tensile/yield strength ratio R_m/R_e;
   3) total elongation at maximum force A_{gt}.

b) *Inspection by attributes:*
   1) behaviour in the rebend test;
   2) deviations from the nominal cross section;
   3) rib geometry/bond test;
   4) shear force of welded joints.

c) *Chemical composition according to the product analysis.*

   All elements listed in BS 4449:2005 or BS 4482, as appropriate, and the carbon equivalent shall be determined.

The test procedures shall be in accordance with Clause **9**.

B.4 Evaluation of results

B.4.1 *Inspection by variables*

Inspection by variables shall be carried out as follows:

a) The following shall be determined for the performance characteristics listed in **B.3**a):
   1) all individual values for each of the performance characteristics;
   2) the mean value m_{20} for each of the performance characteristics;
   3) the standard deviation S_{20} for each performance characteristic.

The test unit shall be deemed to conform to this British Standard if the following conditions are met

$m_{20} - 2.21 \times S_{20} \geq c_v$ for R_e, and

$m_{20} - 1.77 \times S_{20} \geq c_v$ for R_m/R_e and A_{gt}.

b) If the conditions in a) are not fulfilled, a secondary calculation (the acceptability index k) shall be determined, where:

$$k = \frac{m_{20} - c_v}{S_{20}}$$

If $k \geq 2$, for R_e, and $k \geq 1.6$ for R_m/R_e and A_{gt}, testing shall continue. Sixty further test specimens shall be taken and tested from different sheets in the test unit, so that a total of 80 test results are available ($n = 80$).

The test unit shall be deemed to conform to this British Standard if the following conditions are fulfilled:

$m_{80} - 1.89 \times S_{80} \geq cv$ for R_e, and

$m_{80} - 1.49 \times S_{80} \geq cv$ for R_m/R_e and A_{gt}.

B.4.2 ***Inspection by attributes***

Either:

a) if the results of tests on the properties listed in **B.3**b) conform to the appropriate material standard, i.e. BS 4449:2005 or BS 4482, for all 20 test specimens, the test unit shall be deemed to conform to this British Standard; or

b) if a maximum of two of the 20 results do not conform to a), 60 further test specimens shall be taken and tested from different fabrics in the test unit, making 80 test results available; the unit shall be deemed to conform to this British Standard if no more than two of the 80 test specimens fail the tests.

B.5 Test report

A test report shall be produced containing the following data:

a) the name of the fabric manufacturer;
b) the place of manufacture of the fabric;
c) the type of fabric;
d) the grade of the reinforcing steel;
e) the date of testing;
f) the mass of the test unit;
g) results of tests in accordance with **B.3**;
h) an official stamp of the inspection authority; and
i) marking on the reinforcing steel (if appropriate).

Annex C (informative)
Comparison of symbols used in this standard with those used in BS EN 1992-1-1:2004

	BS 4483	BS EN 1992-1-1:2004
Yield strength	R_e	f_y
0.2 % proof strength	$R_{p0.2}$	$f_{p0.2}$
Tensile strength	R_m	f_t
Ratio tensile strength/yield strength	R_m/R_e	f_t/f_y
Percentage total elongation at maximum force	A_{gt}	ε_u
Nominal diameter	d	ϕ

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