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September 1984

Reinforcing steel

Grades, properties, marking

DIN 488 Part 1

Betonstahl; Sorten, Eigenschaften, Kennzeichnung

Supersedes April 1972 edition

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

This standard has been recommended to the Laender building inspectorates by the *Institut für Bautechnik* (Institute for Building Technology), Berlin, for inclusion in the *Laender* building regulations.

The April 1972 edition of this standard, which has been superseded, may still be used until the publication of all the revised editions of the other Parts of DIN 488.

See Explanatory notes for the connection with EURONORM 80 published by the European Coal and Steel Community.

See Explanatory notes for the connection with a standard in preparation by the International Organization for Standardization (ISO).

The DIN 488 series includes:

DIN 488 Part 2	(at present at the stage of draft)	Reinforcing steel; reinforcing steel bars; dimensions and masses
DIN 488 Part 3	(at present at the stage of draft)	Reinforcing steel; reinforcing steel bars; testing
DIN 488 Part 4	(at present at the stage of draft)	Reinforcing steel; reinforcing steel fabrics and reinforcing wire; construction, dimensions and masses
DIN 488 Part 5	(at present at the stage of draft)	Reinforcing steel; reinforcing steel fabrics and reinforcing wire; testing
DIN 488 Part 6	(at present at the stage of draft)	Reinforcing steel; inspection
DIN 488 Part 7	(at present at the stage of draft)	Reinforcing steel; verification of weldability of reinforcing steel bars; test procedure and evaluation

1 Scope

1.1 This standard applies to the weldable steel grades described in clause 3 and table 1 used for the reinforcement of concrete.

This standard does not apply to prestressing steel for the reinforcement of prestressed concrete as specified in DIN 4227 Part 1.

1.2 According to the *Laender* building regulations, the use of reinforcing steels not complying with this standard requires the agreement of the *Laender* building inspectorates or of the authority appointed by it in each case, unless a general building inspectorate approval has been granted.

2 Concepts

2.1 Reinforcing steel

2.1.1 Reinforcing steel is a steel with a practically circular cross section used for reinforcing concrete.

2.1.2 Reinforcing steel is supplied in the form of reinforcing steel bars (S), reinforcing steel fabric (M) or reinforcing wire.

2.2 Reinforcing steel bars

Reinforcing steel bars are a reinforcing steel supplied in technically straight bars for single bar reinforcement.

2.3 Reinforcing steel fabric

A reinforcing steel fabric is a reinforcement prefabricated in a workshop from bars assembled in a cross-wise fashion, joined together at the crossover points by means of resistance spot welding to give resistance to shear.

2.4 Reinforcing wire

Reinforcing wire is a smooth or profiled reinforcing steel produced in the form of a coil and fabricated into reinforcements in a workshop (see subclause 3.3 and clause 8).

3 Classification into grades

3.1 Reinforcing steel grades BSt 420 S and BSt 500 S as specified in table 1 shall be supplied in the form of ribbed reinforcing steel bars (see subclause 2.2).

3.2 Reinforcing steel grade BSt 500 M as specified in table 1 shall be supplied in the form of a welded steel reinforcing fabric (see subclause 2.3) made from ribbed bars.

3.3 Reinforcing steel grades BSt 500 G and BSt 500 P as specified in clause 8 shall be supplied in the form of smooth and profiled reinforcing wire (see subclause 2.4).

Continued on pages 2 to 8

Table 1. **Classification into grades and properties of reinforcing steels**

	1		2	3	4	5
Reinforcing steel grade	Abbreviation		BSt 420 S	BSt 500 S	BSt 500 M [2]	Value p % [3]
	Symbol [1]		III S	IV S	IV N	
	Material number		1.0428	1.0438	1.0466	
	Product form		Reinforcing steel bar	Reinforcing steel bar	Reinforcing steel fabric [2]	
1	Nominal diameter d_s	mm	6 to 28	6 to 28	4 to 12 [4]	–
2	Yield strength R_e (β_s) [5] or 0,2% proof stress $R_{p\,0,2}$ ($\beta_{0,2}$) [5]	N/mm²	420	500	500	5,0
3	Tensile strength R_m (β_Z) [5]	N/mm²	500 [6]	550 [6]	550 [6]	5,0
4	Elongation after fracture A_{10} (δ_{10}) [5]	%	10	10	8	5,0
5	Fatigue strength of straight bars [7]	N/mm² Amplitude $2\sigma_A$ ($2 \cdot 10^6$)	215	215	–	10,0
6	bent bars	$2\sigma_A$ ($2 \cdot 10^6$)	170	170	–	10,0
7	straight bars taken from a fabric, with weld point	$2\sigma_A$ ($2 \cdot 10^6$)	–	–	100	10,0
8		$2\sigma_A$ ($2 \cdot 10^5$)	–	–	200	10,0
9	Bend mandrel diameter, in mm, in rebend test for nominal diameter d_s, in mm	6 to 12	5 d_s	5 d_s	–	1,0
10		14 and 16	6 d_s	6 d_s	–	1,0
11		20 to 28	8 d_s	8 d_s	–	1,0
12	Bend mandrel diameter, in mm, in bend test at the weld point		–	–	6 d_s	5,0
13	Shear force of the joint S	N	–	–	$0,3 \cdot A_s \cdot R_s$	5,0
14	Permissible minus deviation from the nominal cross section A_s [8]	%	4	4	4	5,0
15	Relative rib area f_R		See DIN 488 Part 2	See DIN 488 Part 2	See DIN 488 Part 4	0
16	Chemical composition in the cast analysis and product analysis [9], % by mass, maximum	C	0,22 (0,24)	0,22 (0,24)	0,15 (0,17)	–
17		P	0,050 (0,055)	0,050 (0,055)	0,050 (0,055)	–
18		S	0,050 (0,055)	0,050 (0,055)	0,050 (0,055)	–
19		N [10]	0,012 (0,013)	0,012 (0,013)	0,012 (0,013)	–
20	Suitability for welding by processes [11]		E, MAG, GP, RA, RP	E, MAG, GP, RA, RP	E [12], MAG [12], RP	–

1) For drawings and static calculations.

2) The requirements specified in this column shall also apply for reinforcing wire with the restrictions specified in subclause 8.3.

3) p value for a statistical probability $W = 1 - a = 0,90$ (one-sided) (see also subclause 5.2.2).

4) The limiting conditions specified in the application standards shall apply for reinforcing steel fabrics with nominal diameters of 4,0 and 4,5 mm; it is not necessary to verify the fatigue strength.

5) Symbols used in the past.

6) The actual values of R_m in the tensile test shall be not less than $1,05 \cdot R_e$ (or $R_{p\,0,2}$), and not less than $1,03 \cdot R_e$ (or $R_{p\,0,2}$) in the case of reinforcing steel BSt 500 M with yield strength values exceeding 550 N/mm².

7) The fatigue strength required of straight bars shall be considered given if the values in line 6 are achieved.

8) Production shall be set up such that the average cross-section corresponds at least to the nominal cross-section.

9) The values in brackets shall apply for the product analysis.

10) The values shall apply for the total nitrogen content. Higher values are only permitted if sufficient quantities of nitrogen fixing elements are present.

11) The code letters signify: E = metal manual arc welding; MAG = metal active gas welding; GP = gas pressure welding; RA = flash butt welding; RP = resistance spot welding.

12) The nominal diameter of the bars in the fabric shall be not less than 6 mm for the MAG process and not less than 8 mm for the E process, if bars from fabrics are to be welded together or welded to steel bars of not more than 14 mm nominal diameter.

4 Designation

4.1 The standard designation of products complying with the standards in the DIN 488 series shall be formed as follows in the sequence stated:

- term (reinforcing steel bar, reinforcing steel fabric, or reinforcing wire);
- number of this DIN Standard (DIN 488);
- abbreviation or material number of the reinforcing steel grade (see table 1);
- nominal diameter of reinforcing steel bars and reinforcing wire or characterizing nominal dimensions in the case of reinforcing steel fabrics.

4.2 Examples of the standard designation

(see also DIN 488 Part 2 and DIN 488 Part 4):

a) Designation of ribbed reinforcing steel bars made from grade BSt 500 S, with a nominal diameter of d_s = 20 mm:

Reinforcing steel bar
DIN 488 – BSt 500 S – 20

or

Reinforcing steel bar
DIN 488 – 1.0438 – 20

b) Designation of smooth reinforcing wire made from grade BSt 500 G, with a nominal diameter of d_s = 6 mm:

Reinforcing wire DIN 488 – BSt 500 G – 6

or

Reinforcing wire DIN 488 – 1.0464 – 6

c) See DIN 488 Part 4 for the designation of reinforcing steel fabrics.

5 Requirements

5.1 Manufacturing process

5.1.1 Reinforcing steel bars complying with this standard shall be produced as follows:

- hot rolled, without subsequent treatment, or
- hot rolled and heat treated with the heat of rolling, or
- cold formed (by twisting or drawing the hot rolled original products).

5.1.2 The bars for reinforcing steel fabrics complying with the standard shall be produced by cold forming (i.e. by drawing and/or cold rolling the hot rolled original products).

5.1.3 The specifications in subclause 8.1 shall apply for the production of reinforcing wire.

5.1.4 The manufacturing process remains at the discretion of the producer within the framework specified in subclauses 5.1.1 to 5.1.3, as long as he has furnished the proofs specified in DIN 488 Part 6.

5.2 Properties

5.2.1 Reinforcing steel shall have the properties and meet the requirements specified in DIN 488 Part 1 to Part 7. Steels failing to fulfil these requirements shall not be designated reinforcing steel complying with DIN 488 Part 1 to Part 7.

The proper production of reinforcing steel complying with this standard and exhibiting the properties required shall be supervised in accordance with the specifications of DIN 488 Part 6. The methods of test for demonstrating the properties are specified in DIN 488 Part 3 and Part 5.

5.2.2 The data given in table 1 (pertaining to lines 2 to 15 in columns 2 to 4) are p-fractiles of the overall population. The overall population is the production of the works over the period specified in DIN 488 Part 6. The requirements shall be deemed to have been fulfilled if the p-fractiles specified in columns 2 to 4 are not achieved by a proportion of the overall population not exceeding the value of p specified in column 5.

5.2.3 The deformation properties including the suitability for bending under the conditions specified in DIN 1045 shall be considered given if the requirements on the rebend test or the bend test at the weld point as specified in table 1 (lines 9 to 12) are fulfilled.

5.2.4 The data given in table 1 (lines 16 to 19) shall apply for the chemical composition (cast analysis and product analysis) in conjunction with the specifications given in DIN 488 Part 7.

5.2.5 The reinforcing steel grades complying with this standard shall be suitable for welding by the processes listed in table 1 (line 20).

The specifications given in DIN 488 Part 7 shall apply for the verification of weldability of reinforcing steel grades BSt 420 S and BSt 500 S.

Proof of weldability shall be considered furnished for reinforcing steel grade BSt 500 M and for reinforcing wire if the values pertaining to the chemical composition specified in table 1 are maintained.

5.2.6 The requirements on the surface geometry, on the dimensions and permissible dimensional deviations are specified in DIN 488 Part 2 for reinforcing steel bars and in DIN 488 Part 4 for reinforcing steel fabrics and reinforcing wire.

6 Product labelling

6.1 Marking the steel grade

6.1.1 General

The different grades of reinforcing steel are distinguished by way of the surface geometry and/or the processing form of the product (see also DIN 488 Part 2 and Part 4).

6.1.2 Reinforcing steel bars

a) Grade BSt 420 S reinforcing steel bars shall be marked by means of two opposed rows of parallel oblique ribs. Except in the case of reinforcing steel bars made by cold twisting, the oblique ribs shall be at differing intervals on either half of the circumference (see figure 1).

b) Grade BSt 500 S reinforcing steel bars shall be marked by two rows of oblique ribs, one row consisting of parallel oblique ribs and the other of ribs with alternating angles of inclination towards the axis of the bar (see figure 2).

6.1.3 Reinforcing steel fabric

Grade BSt 500 M reinforcing steel fabrics can be identified by their form and the ribbing on their bars;

the bars in the reinforcing steel fabrics shall have three rows of oblique ribs, each over a portion of the circumference of approximately $d \cdot \pi/3$.

6.1.4 Reinforcing wire

See subclause 8.4.

6.2 Identification of the producer works

6.2.1 General

The reinforcing steels shall bear the producer's symbol specified for the relevant producer works [1].

6.2.2 Reinforcing steel bars

6.2.2.1 The country in which the steel was produced and the producer works shall each be identified by a specific number of normal oblique ribs between thickened oblique ribs in accordance with the system illustrated in figures 1 and 2.

6.2.2.2 The works symbol shall begin with two thickened oblique ribs. The field for identifying the country shall follow with a specified number of normal oblique ribs finishing with a thickened rib. The works number shall then follow giving a specified number of normal oblique ribs (see figures 1 and 2, example a); this field can also be divided into a tens and a units field by means of a thickened oblique rib (see figures 1 and 2, example b). Again, a thickened oblique rib shall be used to indicate the end of the marking.

6.2.2.3 The works symbol shall be repeated along the bar at intervals of approximately 1 m.

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1) The *Institut für Bautechnik*, Reichpietschufer 72–76, D-1000 Berlin 30 keeps an index of valid works symbols.

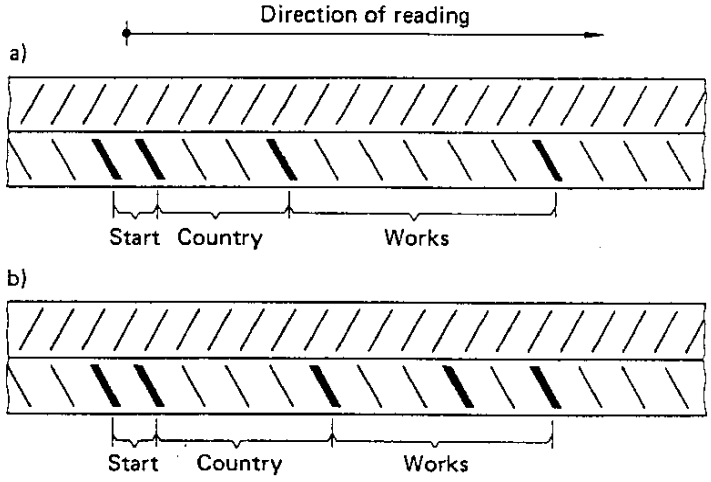

Figure 1. Labelling of reinforcing steel bar grade BSt 420 S
Example a): country No. 2, works No. 5.
Example b): country No. 3, works No. 21.

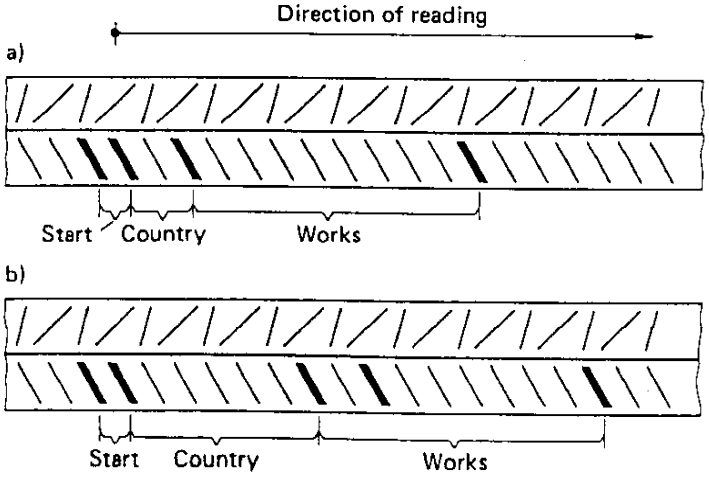

Figure 2. Labelling of reinforcing steel bar grade BSt 500 S
Example a): country No. 1, works No. 8.
Example b): country No. 5, works No. 16.

6.2.3 Reinforcing steel fabrics

6.2.3.1 Reinforcing steel fabrics shall be provided with a weather-resistant label showing the producer works number and the fabric designation.

6.2.3.2 In addition, one of the three rows of ribs on the bars shall be marked in accordance with the system illustrated in figure 3.

6.2.3.3 The works symbol is determined by the number of oblique ribs lying between shorter or point-form additional ribs (see figure 3, example a). Labelling may also be effected by means of increased distances between the ribs (omission of a rib, see figure 3, example b) instead of these shorter ribs or points.

7 Delivery certificate

7.1 Reinforcing steel produced in accordance with this standard shall be supplied with a numbered delivery certificate providing the following information:

a) producer and works;
b) works symbol or works number;
c) inspection mark;
d) full designation of the reinforcing steel;
e) quantity supplied;
f) delivery date;
g) recipient.

7.2 Where reinforcing steel is supplied by a stockist or from a bending mill, the supplier shall confirm in the delivery certificate that he only obtains reinforcing steel from producer works which are subject to inspection in accordance with DIN 488 Part 6.

8 Reinforcing wire

8.1 Classification into grades, manufacturing process, form of wire on delivery

Reinforcing wire shall be produced by cold forming in the steel grades listed in subclause 3.3 and normally supplied in the form of wire (in coils).

The products shall have a smooth surface (grade BSt 500 G, material number 1.0464, symbol IV G), or a profiled surface (grade BSt 500 P, material number 1.0465, symbol IV P) (see also DIN 488 Part 4).

8.2 Delivery and application

8.2.1 Reinforcing wire shall only be supplied by works producing welded reinforcing steel fabrics. It shall be supplied to the processor directly from the producer works.

8.2.2 Processing of reinforcing wire shall be restricted to factory-made reinforcements, the fabrication, supervision and use of which is subject to technical building specifications (e.g. DIN 4035 or DIN 4223).

8.3 Requirements

The requirements specified in columns 4 and 5 of table 1 shall apply for reinforcing wire with the exception of the specifications given in lines 7, 8, 12, 13 and 15.

8.4 Labelling

8.4.1 The individual coils shall be provided with a weather-resistant label giving the producer works number and the nominal diameter of the product.

8.4.2 In addition to the requirements of subclause 8.4.1, grade BSt 500 P profiled reinforcing wire shall bear a works symbol in accordance with the system illustrated in figure 4. In that system, the works number is introduced either by an indented square, set perpendicular to the axis (figure 4, example a), or by two indented parallelepipeds (figure 4, example b), and is to be read by counting the raised spaces between the following indentations.

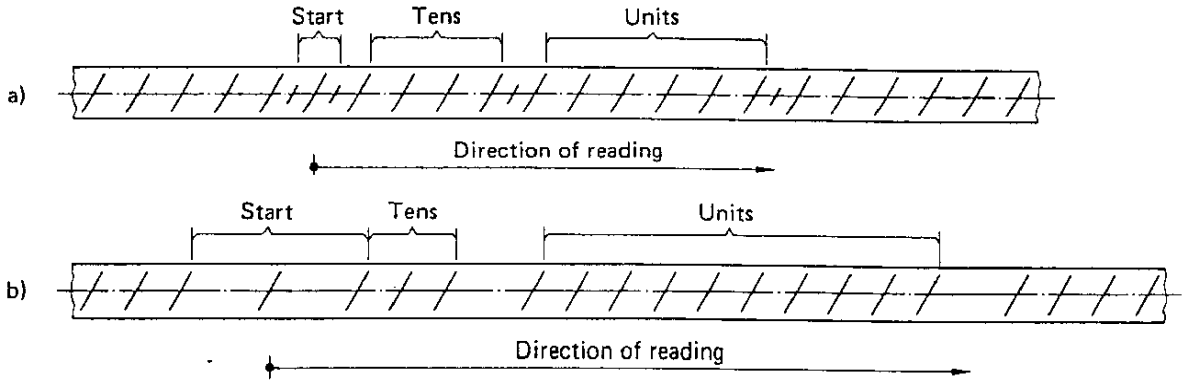

Figure 3. Works symbol for reinforcing steel fabrics
Example a): works No. 46.
Example b): works No. 40 (= 3 · 10 + 10).

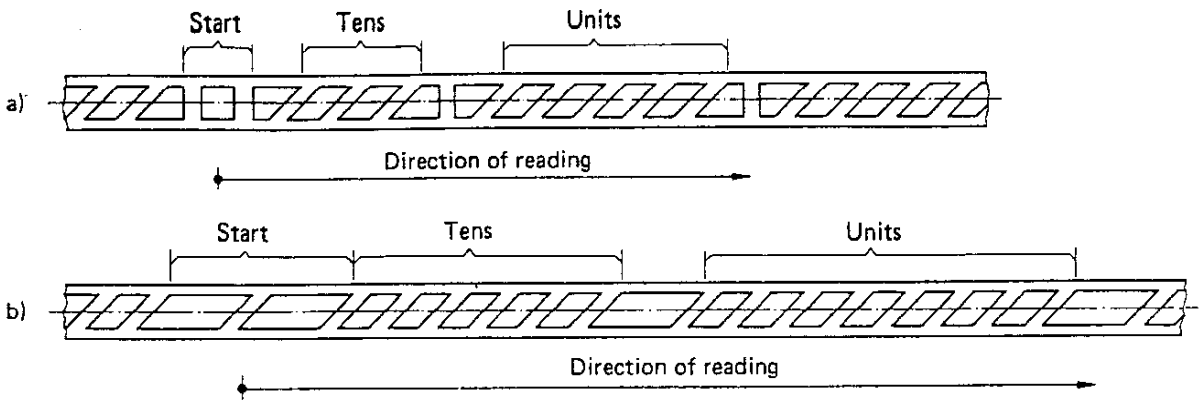

Figure 4. Works symbol for profiled reinforcing wire
Example a): works No. 35.
Example b): works No. 68.

Standards referred to

DIN 488 Part 2	(at present at the stage of draft) Reinforcing steel; reinforcing steel bars; dimensions and masses
DIN 488 Part 3	(at present at the stage of draft) Reinforcing steel; reinforcing steel bars; testing
DIN 488 Part 4	(at present at the stage of draft) Reinforcing steel; reinforcing steel fabrics and reinforcing wire; construction, dimensions and masses
DIN 488 Part 5	(at present at the stage of draft) Reinforcing steel; reinforcing steel fabrics and reinforcing wire; testing
DIN 488 Part 6	(at present at the stage of draft) Reinforcing steel; inspection
DIN 488 Part 7	(at present at the stage of draft) Reinforcing steel; verification of weldability of reinforcing steel bars; test procedure and evaluation
DIN 1045	Concrete and reinforced concrete; design and construction
DIN 4035	Reinforced concrete pipes, reinforced concrete pressure pipes and associated reinforced concrete fittings; dimensions, technical delivery conditions
DIN 4223	(at present at the stage of draft) Autoclaved aerated concrete; reinforced components
DIN 4227 Part 1	Prestressed concrete; partially or fully prestressed structural components made from normal concrete

Previous editions

DIN 488: 07.23, 05.32, 03.39; DIN 488 Part 1: 04.72

Amendments

The amendments made in comparison with the April 1972 edition relate to the following:

a) classification into steel grades;
b) weldability of the steels;
c) mechanical and technological properties;
d) see Explanatory notes for further amendments.

Explanatory notes

This revised edition of DIN 488 Part 1 was prepared in a joint committee of the *Normenausschuss Eisen und Stahl* (Iron and Steel Standards Committee) and the *Normenausschuss Bauwesen* (Building Standards Committee), in which the producers and users of reinforcing steel, the building authorities, test institutes and universities are represented. This joint committee is also dealing with the revision of the previous editions of DIN 488 Part 2 to Part 6 and the preparation of a new Part 7 with specifications relating to the verification of weldability of reinforcing steel. It also acts as the national committee reflecting the international standardization work on reinforcing steel. Discussions on the revision of EURONORM 80 (Reinforcing bars, not for prestressing) (present edition, March 1969) and on the preparation of a first edition of a corresponding ISO Standard (DP 6935/2, at present fifth proposal, September 1981, Document number ISO/TC 17/SC 16 N 211) are at present in progress and have been taken into consideration in the discussions dealing with the revision of the DIN 488 series of standards.

The main aims of the revision of the DIN Standard were to reduce the number of grades covered by the standards, to include weldable reinforcing steels only and to adopt the reinforcing steel bar BSt 500 S (IV S).

Classification into grades

a) The transverse ribbed reinforcing steel bar BSt 22/34 RU (IR) which has not been produced for some years has now been withdrawn from the standard.

b) The smooth reinforcing steel bar BSt 22/34 GU (IG) which is not systematically produced under continuous inspection has similarly been omitted. In future, its place can be taken by the weldable structural steel St 37-2 complying with DIN 17 100 (see DIN 1013 Part 1 and Part 2 for dimensions and permissible deviations).

c) The question of which reinforcing steel grades should be specified for single bar reinforcement was of particular importance. At first, a majority in the technical committee supported the proposal of specifying just one grade, having regard to the advantages for the simplification of production and stock-keeping, the harmonization of the conditions of processing and utilization and the avoidance of materials identity problems. This grade was to be grade BSt 500 (reinforcing steel bar IV) with a characteristic yield strength of 500 N/mm^2, which has been generally approved by the building inspectorates in Germany for about ten years, has been specified in EURONORM 80 since 1969 and is intended also to be included in the proposed ISO Standard. However, this proposal was rejected by the overwhelming majority of the users in their comments on the draft for DIN 488 Part 1 published in February 1983 on this basis. Most contractors, professional associations in the construction industry and engineering offices could see no substantial technical or economic advantages in the restriction to grade BSt 500; they requested, also having regard to harmonization with international delivery conditions and the simpler application of the DIN Standard when building abroad, the retention of a reinforcing steel with a characteristic yield strength of 420 N/mm^2 (BSt 420), for which at present there is the greatest demand.

Following this request, it was decided in the concluding discussions to include both grades of reinforcing steel in the final version of the revised edition of DIN 488 Part 1. The relevant manufacturing processes are mentioned in subclause 5.1.1.

d) In accordance with today's demand, only the ribbed grade of welded reinforcing steel fabrics BSt 500 M (previously BSt 50/55 RK) has been standardized. Non-welded reinforcing steel fabrics have not been produced in Germany for many years.

e) The delivery and application conditions described in clause 8 specify steel grades BSt 500 G (smooth) and BSt 500 P (profiled) for reinforcing wire, which has been included for the first time.

f) The range of nominal diameters for reinforcing steel bars has remained unchanged at d_s = 6 to 28 mm. The same applies for the range of nominal diameters d_s = 4 to 12 mm for reinforcing steel fabrics; however, there are restricting conditions for the use of nominal diameters d_s = 4 and 4,5 mm (see footnote 4 to table 1).

g) Both EURONORM 80 (present draft for the revised edition, June 1983) and the proposed ISO Standard specify two grades with yield strength values of 400 and 500 N/mm^2 and nominal diameters up to d_s = 50 mm for single bar reinforcement. The ISO Standard is intended also to cover a hot rolled reinforcing steel bar with a nominal yield strength of 300 N/mm^2, for which there is no interest in Germany.

The grades for the reinforcing steel fabrics have not yet been standardized on the international level.

Properties of the steels

h) All grades of reinforcing steel specified in this standard are suitable for welding by the processes stated in table 1 (line 20) (see also subclause 5.2.5). The standard thereby takes account of the fact that the number of unplanned, uncontrolled and sometimes unavoidable welds on site has also increased for the grades which were not previously considered weldable in the DIN 488 series of standards. Furthermore, development in the techniques of reinforcement in Germany have led to reinforcement being predominantly supplied to the site ready bent and prefabricated into units by bending mills. Joints are increasingly made by welding (processes E and RP) in this process. The decision only to cover weldable steels in DIN 488 Part 1 is in line with the desire for improved safety and harmonization of processing conditions; at the same time, it permits a reduction in the previous multiplicity of grades. It should be noted that only weldable steels will be specified in the revised edition of EURONORM 80.

i) The new grade BSt 420 S (III S) also includes the previous grade BSt 42/50 RK (III K). It is essentially distinguished from grade BSt 42/50 RU (III U), previously standardized, as regards the chemical composition (see table 1, lines 16 to 19) which has been specified in order to ensure weldability. The nominal values of yield strength, tensile strength and elongation after fracture, basic for dimensioning in accordance with DIN 1045, have not been amended from those for grade III U.

j) The values of elongation after fracture in the international delivery conditions relate to proportional bars with a gauge length $L_0 = 5\,d_0$ (A_5). However, the standards in the DIN 488 series will continue to specify the long proportional bar ($L_0 = 10\,d_0$ or A_{10}). The view of the technical committee was that the short bar was less suitable for an assessment of the steels as the proportion of necking elongation would be more likely to conceal the uniform elongation in the measurements and, as a consequence of measuring errors, the standard deviations would be greater than those for long proportional bars.

k) No values have been specified for the uniform elongation of the steels. An international research programme is at present under way on the European level to establish the most suitable method of determining the uniform elongation and to collect the associated test values; the results of this programme are not yet available.

l) The specifications relating to the rebend test (table 1, lines 9 to 11) do not stand in a direct relationship to the minimum values specified in DIN 1045, December 1978 edition, table 18, for the bend mandrel diameter for brackets, loops and binders as well as for bent

beams. The rebend test is solely intended to test the deformability of the reinforcing steel. Suitability for bending under the conditions specified in DIN 1045 is considered assured if the requirements of table 1 are complied with.

It should be noted that the international standards specify greater bend mandrel diameters for the rebend test than does DIN 488 Part 1.

m) Experiments carried out under laboratory conditions on the bending behaviour of the reinforcing steels at temperatures of 250 °C to 1100 °C gave a very wide scatter of results, very dependent on the method by which the products were produced, as was also the case with property changes after cooling. Conclusions regarding the properties of the steel during and after high temperature bending under site conditions are only conditionally possible as the circumstances (heating, cooling) are not defined in such a case. It has, therefore, not been possible to define generally applicable specifications in this standard.

Labelling of the products

n) The specifications relating to the labelling of reinforcing steels BSt 420 S and BSt 500 S by means of a specific arrangement of the oblique ribs (see subclause 6.1.2) correspond to current practice in labelling weldable grades. Identical specifications are included in EURONORM 80.

The nature of the labelling of the producer works remains essentially the same except that the start of the symbol for reinforcing steel bars in the DIN 488 series of standards consists of two consecutive thickened oblique ribs.

International Patent Classification

E 04 C 5-01