BRITISH STANDARD

BS 7670-1: 1993

Incorporating Amendment No. 1

Steel nuts and bolts for resistance projection welding —

Part 1: Specification for dimensions and properties

UDC 621.882:669.14.018:621.791.76

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Mechanical Engineering Standards Policy Committee (GME/-) to Technical Committee GME/9, upon which the following bodies were represented:

BEAMA Ltd.
British Constructional Steelwork Association Ltd.
British Industrial Fasteners Federation
British Railways Board
British Steel Industry
British Steel Industry (Wire Section)
Gauge and Tool Makers' Association
Society of Motor Manufacturers and Traders Ltd.
Washer Manufacturers' Association of Great Britain

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Defence Manufacturers' Association
General Municipal Boilermaker and Allied Trades Union
Screw Thread Tool Manufacturers' Association
Society of British Aerospace Companies Ltd.

This British Standard, having been prepared under the direction of the General Mechanical Engineering Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 September 1993

The following BSI references relate to the work on this standard:
Committee reference GME/9
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Amendments issued since publication

Amd. No.	Date	Comments
8215	July 1994	Indicated by a sideline in the margin

Contents

Foreword

This Part of BS 7670 has been prepared under the authority of the General Mechanical Engineering Standards Policy Committee. It is one Part of a standard for steel nuts and bolts for resistance projection welding.

BS 7670-2 provides a specification for the welding processes and conditions applicable to weld bolts and nuts for resistance projection welding.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 6, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 7670 specifies the general dimensions, tolerances, materials and mechanical properties both for imperial weld nuts threaded 7/16–20UNF–2B and metric weld nuts and weld bolts with nominal thread diameters from M3 to M12 inclusive. The weld bolts have circular heads with three projections and the nuts are square with four projections or hexagonal with three projections for projection welding.

2 References

2.1 Normative references

This Part of BS 7670 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 7670 only when incorporated in it by updating or revision.

2.2 Informative references

This Part of BS 7670 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this Part of BS 7670, the definitions given in BS 499-1:1991 apply.

4 Weld bolts

4.1 Dimensions

The dimensions of weld bolts shall be as given in Figure 1 and Table 1.

The electrode contact area d_f min. shall be flat, smooth and free from surface projections.

4.2 Characteristics

The materials, tolerances and mechanical properties shall be as given in Table 2.

4.3 Designation

When designating weld bolts for the purpose of an enquiry or order, the following information shall be given:

a) general product description, i.e. weld bolt;

b) the number of this British Standard, i.e. BS 7670-1;

c) the letter M indicating that the product is ISO metric;

d) the nominal size (thread diameter) of the product in millimetres (d in Figure 1);

e) the nominal length in millimetres (l in Figure 1);

f) the property class;

g) details of the coating (if required) and the relevant British Standard where applicable.

Example. The designation of a weld bolt, with a thread diameter of 8 mm, and a nominal length of 25 mm, conforming to class 4.8, is as follows:

Weld bolt BS 7670-1, M8 × 25 – 4.8

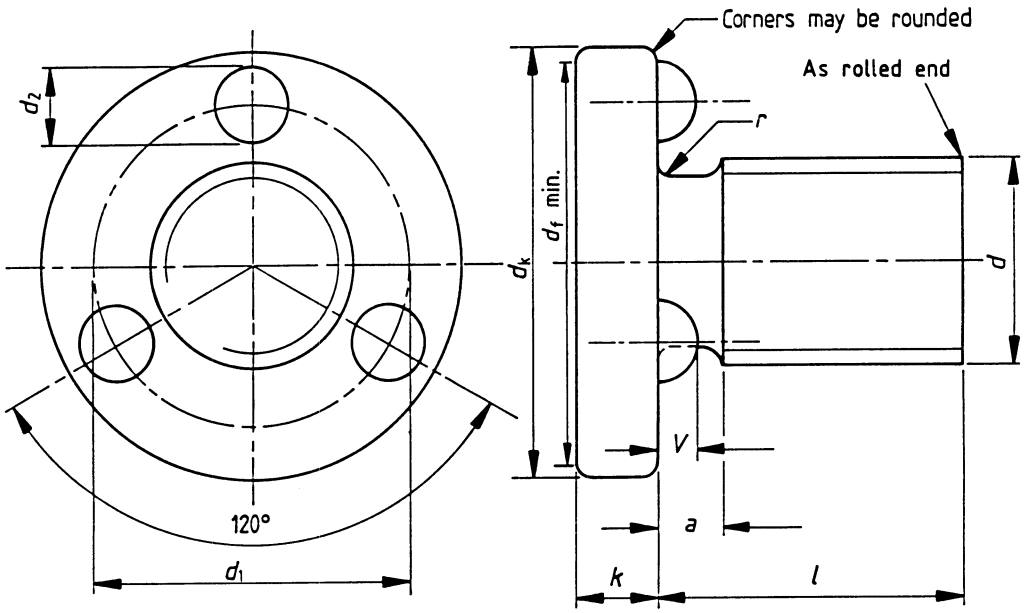
5 Weld nuts

5.1 Dimensions

The dimensions of square weld nuts shall be as given in Figure 2 and Table 3. The dimensions of hexagonal weld nuts shall be as given in Figure 3 and Table 4.

5.2 Characteristics

The materials, tolerances and mechanical properties shall be as given in Table 5.



NOTE Dimension *l* is the designated nominal length (see **4.3**).

Figure 1 — Dimensions of weld bolts

Table 1 — Dimensions of weld bolts

Dimensions in millimetres

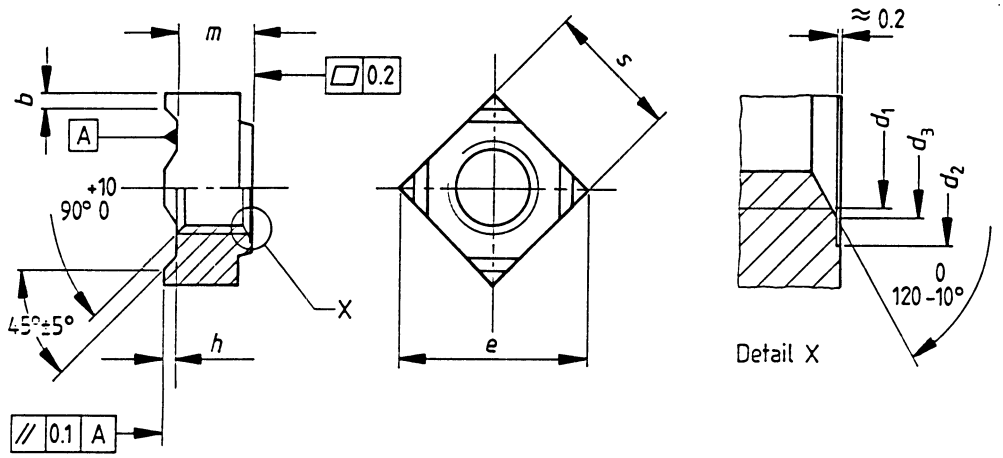
Thread size, d		**M3**	**M4**	**M5**	**M6**	**M8**	**M10**	**M12**
Thread pitch		0.5	0.7	0.8	1.0	1.25	1.5	1.75
a	max.	1.25	1.75	2.0	2.5	3.13	3.75	4.38
d_k	max.	6.37	8.45	10.45	12.55	16.55	20.65	24.65
	min.	5.63	7.55	9.55	11.45	15.45	19.35	23.35
d_f	min.	5.13	7.05	9.05	10.95	14.95	18.85	22.85
d_1	max.	4.98	6.48	8.08	9.58	12.70	15.70	18.70
	min.	4.50	6.00	7.50	9.00	12.00	15.00	18.00
d_2	max.	1.15	1.45	1.75	2.05	2.65	3.25	3.90
	min.	0.90	1.20	1.50	1.80	2.40	3.00	3.60
V	max.	0.55	0.70	0.85	1.00	1.30	1.60	1.90
	min.	0.35	0.50	0.65	0.80	1.10	1.40	1.70
k	max.	1.32	1.72	2.12	2.52	3.35	4.15	4.95
	min.	1.07	1.47	1.87	2.27	3.05	3.85	4.65
r	max.	0.40	0.40	0.50	0.60	0.80	0.80	0.80

NOTE Tolerances conform to BS 6322-1:1982.

Table 2 — Characteristics of weld bolts

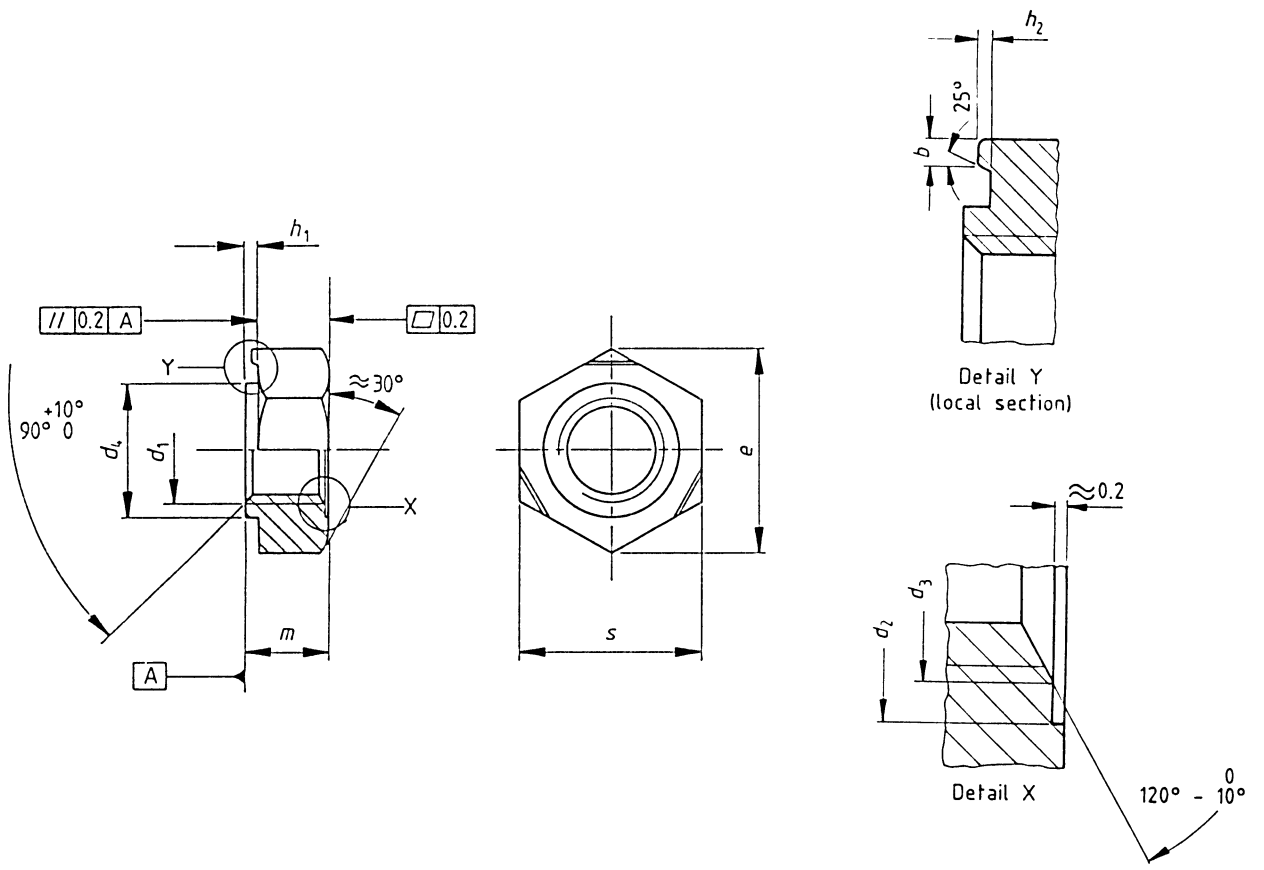
Characteristic	Requirement
Material	Steel with a carbon content not greater than 0.23 %
Thread tolerance	Conforming to class 6g of BS 3643-1:1981 and BS 3643-2:1981
Mechanical properties[a]	Conforming to material property class 4.8, 5.8 or 8.8 of BS EN 20898-1:1992, test programme B[b]
Permissible dimensional deviations and deviations of form	Conforming to product grade A of BS 6322-1:1982
Finish	As processed, with a lubricant, but free from scale and excessive oxide, as rolled, unless otherwise agreed between the purchaser and supplier[c]
Acceptability	In accordance with BS 6587:1985

[a] Both before and after welding.
[b] The material property class shall be marked on the bolts by the indented method only.
[c] Alternative surface finishes (e.g. electroplating) may be applied, if agreed between the purchaser and supplier. Some surface finishes are unsuitable for welding.



NOTE The internal form of the weld projections may be radiused at the discretion of the supplier.

Figure 2 — Dimensions of square weld nuts



NOTE The internal form of the weld projections may be radiused at the discretion of the supplier.

Figure 3 — Dimensions of hexagonal weld nuts

Table 3 — Dimensions of square weld nuts

Dimensions in millimetres

Thread size, d_1		**M4**	**M5**	**M6**	**M8**	**M10**	$\frac{7}{16}$**–20UNF–2B**	**M12**
Thread pitch		0.7	0.8	1.0	1.25	1.5	—	1.75
b	max.	0.95	1.15	1.35	1.65	2.0	2.2	2.2
	min.	0.65	0.85	1.05	1.35	1.6	1.8	1.8
d_2	max.	5.18	6.18	7.72	10.22	12.77	13.77	13.77
	min.	5	6	7.5	10	12.5	13.5	13.5
d_3	max.	4.2	5.25	6.3	8.4	10.5	11.7	12.6
e	min.	9	12	13	18	22	25	25
h	max.	0.7	0.9	0.9	1.1	1.3	1.5	1.5
	min.	0.5	0.7	0.7	0.9	1.1	1.3	1.3
m	max.	3.5	4.2	5	6.5	8	9	9.5
	min.	3.2	3.9	4.7	6.14	7.64	8.64	9.14
s	max.	7	9	10	14	17	19	19
	min.	6.64	8.64	9.64	13.57	16.57	18.48	18.48

Table 4 — Dimensions of hexagonal weld nuts

Dimensions in millimetres

Thread size, d_1		M3	M4	M5	M6	M8	M10	$\frac{7}{16}$ –20 UNF–2B	M12
Thread pitch		0.5	0.7	0.8	1.0	1.25	1.5	—	1.75
b	max.	1.0	1.0	1.0	1.12	1.25	1.55	1.55	1.55
	min.	0.6	0.6	0.6	0.68	0.75	0.95	0.95	0.95
d_2	max	4.68	6.18	7.22	8.22	10.77	12.77	13.77	15.07
	min.	4.5	6	7	8	10.5	12.5	13.5	14.8
d_3	max.	3.15	4.2	5.25	6.3	8.4	10.5	11.7	12.6
d_4	max.	4.47	5.97	6.96	7.96	10.45	12.45	13.45	14.75
	min.	4.395	5.895	6.87	7.87	10.34	12.34	13.34	14.64
e	min.	8.15	9.83	10.95	12.02	15.38	18.74	20.91	20.91
h_1	max.	0.55	0.65	0.7	0.75	0.9	1.15	1.4	1.4
	min.	0.45	0.55	0.6	0.6	0.75	1	1.2	1.2
h_2	max.	0.25	0.35	0.4	0.4	0.5	0.65	0.8	0.8
	min.	0.15	0.25	0.3	0.3	0.35	0.5	0.6	0.6
m	max.	3	3.5	4	5	6.5	8	10	10
	min.	2.75	3.2	3.7	4.7	6.14	7.64	9.64	9.64
s	max.	7.5	9	10	11	14	17	19	19
	min.	7.28	8.78	9.78	10.73	13.73	16.73	18.67	18.67

Table 5 — Characteristics of weld nuts

Characteristic		Requirement
Material		Steel with a carbon content not greater than 0.23 %
Thread tolerance	ISO metric	Conforming to class 6H of BS 3643-1:1981 and BS 3643-2:1981
	Unified	Conforming to class 2B of BS 1580-1:1962 & BS 1580-2:1962
Mechanical properties[a]		Conforming to material property class 4, 6 or 8 of BS EN 20898-2:1992[b]
Permissible dimensional deviations and deviations of form		Conforming to product grade A of BS 6322-1:1982
Finish		As processed, with a lubricant, but free from scale and excessive oxide, as rolled, unless otherwise agreed between the purchaser and supplier[c]
Acceptability		In accordance with BS 6587:1985

[a] Both before and after welding.

[b] The material property class shall be marked on the nuts by the indented method only, and shall be applied to the side or upper (unwelded) face only in such a way that it does not interfere with the quality of the surface.

[c] Alternative surface finishes (e.g. electroplating) may be applied, if agreed between the purchaser and supplier. Some finishes are unsuitable for welding.

5.3 Designation

5.3.1 *ISO metric weld nuts*

When designating ISO metric weld nuts for the purpose of an enquiry or order, the following information shall be given:

a) general product description, e.g. square weld nut;

b) the number of this British Standard, i.e. BS 7670-1;

c) the letter M indicating that the product is ISO metric;

d) the nominal size (thread diameter) of the product in millimetres;

e) the property class;

f) details of the coating (if required) and the relevant British Standard where applicable.

Example. The designation of a square weld nut with a thread diameter of 8 mm, conforming to property class 6, is as follows:

Square weld nut BS 7670-1, M8 – 6.

5.3.2 $\frac{7}{16}$ *– 20 UNF – 2B weld nuts*

When designating $\frac{7}{16}$ – 20 UNF – 2B weld nuts for the purpose of an enquiry or order, the following information shall be given:

a) general product description, e.g. hexagonal weld nut;

b) the number of this British Standard, i.e. BS 7670-1;

c) the thread size, i.e. $\frac{7}{16}$ – 20 UNF – 2B;

d) the property class;

e) details of the coating (if required) and the relevant British Standard where applicable.

Example. The designation of a hexagonal weld nut with a $\frac{7}{16}$ – 20 UNF – 2B thread, conforming to property class 4, is as follows:

Hexagonal weld nut
BS 7670-1, $\frac{7}{16}$ – 20 UNF – 2B – 4.

List of references (see clause 2)

Normative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 499, *Welding terms and symbols.*
BS 499-1:1991, *Glossary for welding, brazing and thermal cutting.*
BS 1580, *Specification for Unified screw threads.*
BS 1580-1:1962 & BS 1580-2:1962, *Diameters $\frac{1}{4}$ in and larger.*
BS 3643, *ISO metric screw threads.*
BS 3643-1:1981, *Principles and basic data.*
BS 3643-2:1981, *Specification for selected limits of size.*
BS 6322, *Tolerances for fasteners.*
BS 6322-1:1982, *Specification for tolerances of bolts, screws and nuts with thread diameters ≥ 1.6 mm and ≤ 150 mm and product grades A, B and C.*
BS 6587:1985, *Method of acceptance inspection for fasteners.*
BS EN 20898, *Mechanical properties of fasteners.*
BS EN 20898-1:1992, *Bolts, screws and studs.*
BS EN 20898-2:1992, *Nuts with specified proof load values.*

Informative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 7670, *Steel nuts and bolts for resistance projection welding.*
BS 7670-2, *Welding conditions*[1)2)].

[1)] In preparation.

[2)] Referred to in foreword only.

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