

Rotary core drilling equipment —

Part 4: Specification for System A — Inch units

Committees responsible for this British Standard

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- British Coal Corporation
- Drilling and Prospecting International Limited
- English Drilling Equipment Co. Limited
- Institution of Civil Engineers
- Institution of Mining and Metallurgy
- Natural Environment Research Council (Institute of Geological Science)

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Contents

	Page
Committees responsible	Inside front cover
National foreword	iv
1 Scope	1
2 Normative references	1
3 Designation	1
4 Materials	1
5 Dimensions and tolerances	1
Figure 1 — System of dimensional identification letters	3
Figure 2 — Drill rod and coupling	7
Figure 3 — “W” design drill rod — Drill rod tube	8
Figure 4 — “W” design drill rod — Drill rod coupling	9
Figure 5 — General relation of casing to core bit	10
Figure 6 — Casing	10
Figure 7 — Nesting of casing	11
Figure 8 — “W” design flush-jointed casing — Casing	12
Figure 9 — “W” design flush-jointed casing — Casing drive shoe	14
Figure 10 — “W” design flush-jointed casing — Casing shoe	15
Figure 11 — “W” design flush-jointed casing — Casing bit	16
Figure 12 — “W” design flush-jointed casing — Casing reaming shell	17
Figure 13 — “X” design flush-coupled casing — Casing tube	19
Figure 14 — “X” design flush-coupled casing — Casing shoe	20
Figure 15 — “X” design flush-coupled casing — Casing bit	21
Figure 16 — “X” design flush-coupled casing — Reaming shell	22
Figure 17 — “X” design flush-coupled casing — Casing coupling	24
Figure 18 — “WF” design double-tube core barrel — Swivel type — Assembly for sizes HWF, PWF, SWF, UWF and ZWF	25
Figure 19 — “WF” design double-tube core barrel — Short core bit	26
Figure 20 — “WF” design double-tube core barrel — Long core bit	28
Figure 21 — “WF” design double-tube core barrel — Core-lifter case	30
Figure 22 — “WF” design double-tube core barrel — Core lifter	31
Figure 23 — “WF” design double-tube core barrel — Reaming shell	32
Figure 24 — “WF” design double-tube core barrel — Outer tube	34
Figure 25 — “WF” design double-tube core barrel — Inner tube	36
Figure 26 — “WF” design double-tube core barrel — Head	37
Figure 27 — “WG” design single-tube core barrel — Assembly	39
Figure 28 — “WG” design core barrel — Single- and double-tube type — Bevel wall core bit	40
Figure 29 — “WG” design core barrel — Single- and double-tube type — Core lifter	41
Figure 30 — “WG” design single-tube core barrel — Reaming shell	42
Figure 31 — “WG” design single-tube core barrel — Tube	44
Figure 32 — “WG” design double-tube core barrel — Assembly — Rigid and swivel types	45
Figure 33 — “WG” design double-tube core barrel — Reaming shell	45
Figure 34 — “WG” design double-tube core barrel — Outer tube	48
Figure 35 — “WG” design double-tube core barrel — Inner tube	50
Figure 36 — “WG” design double-tube core barrel — Head	52

	Page
Figure 37 — “WM” design double-tube core barrel — Assembly — Swivel type	54
Figure 38 — “WM” design double-tube core barrel — Core bit	55
Figure 39 — “WM” design double-tube core barrel — Core-lifter case	57
Figure 40 — “WM” design double-tube core barrel — Core lifter	59
Figure 41 — “WM” design double-tube core barrel — Reaming shell	60
Figure 42 — “WM” design double-tube core barrel — Outer tube	61
Figure 43 — “WM” design double-tube core barrel — Inner tube	62
Figure 44 — “WM” design double-tube core barrel — Head	64
Figure 45 — “WT” design single-tube core barrel — Assembly — Sizes BWT, NWT and HWT	66
Figure 46 — “WT” design single-tube core barrel — Reaming shell	67
Figure 47 — “WT” design single-tube core barrel — Tube	69
Figure 48 — “WT” design double-tube core barrel — Assembly — Rigid and swivel types BWT, NWT and HWT	71
Figure 49 — “WT” design core barrel — Single and double type — Bevel wall core bit	72
Figure 50 — “WT” design core barrel — Single and double type — Core lifter	74
Figure 51 — “WT” design double-tube core barrel — Reaming shell	75
Figure 52 — “WT” design double-tube core barrel — Outer tube	77
Figure 53 — “WT” design double-tube core barrel — Inner tube	79
Figure 54 — “WT” design double-tube core barrel — Head	81
Figure 55 — “WT” design double-tube core barrel — Assembly — Rigid type RWT, EWT and AWT	83
Figure 56 — “WT” design double-tube core barrel — Bevel wall core bit	84
Figure 57 — “WT” design double-tube core barrel — Straight wall core bit	85
Figure 58 — “WT” design double-tube core barrel — Core lifter	86
Figure 59 — “WT” design double-tube core barrel — Reaming shell	87
Figure 60 — “WT” design double-tube core barrel — Outer tube	89
Figure 61 — “WT” design double-tube core barrel — Inner tube	91
Figure 62 — “WT” design double-tube core barrel — Head — Sizes RWT, EWT and AWT	92
Table 1 — Identification symbols	2
Table 2 — Mechanical properties	2
Table 3 — System of dimensional identification letters	4
Table 4 — Nomenclature and basic dimensions for drill rods and casings and their related diamond set items	5
Table 5 — Nomenclature and basic dimensions for core barrels and their related diamond set items	6
Table 6 — “W” design drill rod and coupling	7
Table 7 — “W” design drill rod and coupling	8
Table 8 — “W” design drill rod and coupling	9
Table 9 — Casing and casing coupling (where used) — Main dimensions	11
Table 10 — “W” design flush-jointed casing	13
Table 11 — “W” design flush-jointed casing	14
Table 12 — “W” design flush-jointed casing	15

	Page
Table 13 — “W” design flush-jointed casing	16
Table 14 — “W” design flush-jointed casing	18
Table 15 — “X” design flush-coupled casing	19
Table 16 — “X” design flush-coupled casing	20
Table 17 — “X” design flush-coupled casing	21
Table 18 — “X” design flush-coupled casing	23
Table 19 — “X” design flush-coupled casing	24
Table 20 — “WF” design double-tube core barrel	27
Table 21 — “WF” design double-tube core barrel	29
Table 22 — “WF” design double-tube core barrel	30
Table 23 — “WF” design double-tube core barrel	31
Table 24 — “WF” design double-tube core barrel	33
Table 25 — “WF” design double-tube core barrel	35
Table 26 — “WF” design double-tube core barrel	36
Table 27 — “WF” design double-tube core barrel	38
Table 28 — “WG” design single-tube core barrel	40
Table 29 — “WG” design single-tube core barrel	41
Table 30 — “WG” design single-tube core barrel	43
Table 31 — “WG” design single-tube core barrel	44
Table 32 — “WG” design double-tube core barrel	47
Table 33 — “WG” design double-tube core barrel	49
Table 34 — “WG” design double-tube core barrel	51
Table 35 — “WG” design double-tube core barrel	53
Table 36 — “WM” design double-tube core barrel	56
Table 37 — “WM” design double-tube core barrel	58
Table 38 — “WM” design double-tube core barrel	59
Table 39 — “WM” design double-tube core barrel	60
Table 40 — “WM” design double-tube core barrel	61
Table 41 — “WM” design double-tube core barrel	63
Table 42 — “WM” design double-tube core barrel	65
Table 43 — “WT” design single-tube core barrel (BWT, NWT, HWT)	68
Table 44 — “WT” design single-tube core barrel (BWT, NWT, HWT)	70
Table 45 — “WT” design single- and double-tube core barrel (BWT, NWT, HWT)	73
Table 46 — “WT” design single- and double-tube core barrel (BWT, NWT, HWT)	74
Table 47 — “WT” design double-tube core barrel (BWT, NWT, HWT)	76
Table 48 — “WT” design double-tube core barrel (BWT, NWT, HWT)	78
Table 49 — “WT” design double-tube core barrel (BWT, NWT, HWT)	80
Table 50 — “WT” design double-tube core barrel (BWT, NWT, HWT)	82
Table 51 — “WT” design double-tube core barrel (RWT, EWT, AWT)	84
Table 52 — “WT” design double-tube core barrel (RWT, EWT, AWT)	85
Table 53 — “WT” design double-tube core barrel (RWT, EWT, AWT)	86
Table 54 — “WT” design double-tube core barrel (RWT, EWT, AWT)	88
Table 55 — “WT” design double-tube core barrel (RWT, EWT, AWT)	90
Table 56 — “WT” design double-tube core barrel (RWT, EWT, AWT)	91
Table 57 — “WT” design double-tube core barrel (RWT, EWT, AWT)	93
List of references	Inside back cover

National foreword

This Part of BS 4019 has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee. It is identical with ISO 3551-2:1192 *Rotary core diamond drilling equipment — System A — Part 2: Inch units*, which was prepared by Technical Committee ISO/TC82/SC6 Diamond core drilling equipment, of the International Organization for Standardization (ISO) and in the development of which the United Kingdom played an active part.

To a large extent this Part of BS 4019 has been based on BS 4019-1:1974, which first was issued in 1966 and subsequently revised and converted into SI units by the UK in 1974 in cooperation with Canada and the USA and supported by Australia and South Africa and based on a proposal to ISO for an International Standard. This Part of BS 4019, together with BS 4019-3:1993, supersedes BS 4019-1:1974 which is withdrawn.

In this Part of BS 4019 all dimensions are in inch units and the purpose of this Part is to provide, on an international basis, the dimensional interchangeability in essential rotary core drilling fittings. These fittings are designed specifically for drilling with water as the circulating medium and are not necessarily suitable for use with air or mud as the circulating media. It is proposed to produce other Parts of this standard to cover equipment for use with air flush and wire-line, but it is not intended to publish British Standards on System B or System C.

BS 4019 comprises the following Parts:

- *Part 3: Specification for system A. Metric units;*
- *Part 4: Specification for system A. Inch units.*

NOTE The title of the ISO standard is *Rotary core diamond drilling equipment*. However, the use of other cutting materials is permitted (see note to clause 1).

Cross-references

International standard	Corresponding British Standard
ISO 263:1973	BS 1580 <i>Specification for unified screw threads</i> Parts 1 and Part 2:1962 <i>Diameters $\frac{1}{4}$ in and larger</i> (Technically equivalent)

The Technical Committee has reviewed the provisions of ISO 5864 and API 7, to which normative reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 94, 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 ISO 3551 establishes the nomenclature and lays down the leading dimensions to ensure interchangeability within the limits of System A of the following equipment:

- a) drill rods and couplings;
- b) casings, casing couplings, casing bits, casing shoes, drive shoes and casing reaming shells;
- c) core barrels, core bits, core lifters and reaming shells.

It specifies the characteristics of a range of equipment for drilling holes having diameters from 1.18 in to 7.88 in and yielding cores having diameters from 0.73 in to 6.5 in.

NOTE The title of this part of ISO 3551 specifies diamond core drilling, but it is also possible to use other cutting materials.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3551. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 3551 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 263:1973, *ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range 0.06 to 6 in.*

ISO 5864:1978, *ISO inch screw threads — Allowances and tolerances.*

BS 1580:1962, *Specification for Unified screw threads — Parts 1 and 2: Diameters 1/4 in and larger.*

API 7, *Rotary shouldered connection, internal flush type (IF).*

3 Designation

Items manufactured in accordance with this part of ISO 3551 shall be designated by its number followed by the symbols as listed in Table 1.

4 Materials

Materials used in the manufacture of the equipment specified in this part of ISO 3551 shall have the mechanical properties specified in Table 2, though for special purposes other materials may be used by agreement between manufacturer and purchaser.

The method by which the mechanical properties of tubes are obtained is left to the manufacturer.

5 Dimensions and tolerances

5.1 Dimensions

All dimensions and tolerances shall be in accordance with Table 4 to Table 57. All dimensions given in this part of ISO 3551, unless otherwise stated, are in inches (see Introduction).

NOTE 1 In System A, maximum and minimum values are included for all dimensions.

NOTE 2 All these items have a right-hand thread. Where a left-hand thread is necessary, it is stipulated for each individual case in the footnotes to the figure or to the corresponding table.

NOTE 3 The radius (or chamfer) of the thread crest and the radius in thread root corners are left to the manufacturers (determined by national standards of manufacturers' countries).

5.2 Conformity

When drilling in conformity with American Diamond Core Drill Manufacturers Association (DCDMA) and Canadian Diamond Drilling Association (CDDA) standards, the lengths of rods and casings shall be 120 in, 60 in or 30 in, but in those industries where drilling depths are measured in metres, the rod and casing lengths may be 3 m, 1,5 m or 0,75 m.

5.3 Eccentricity

The eccentricity is defined as the distance between the centres of the outside and inside diameters and shall not exceed 10 % of the nominal wall thickness Q . The eccentricity is calculated according to the formula

$$\frac{Q_{\max} - Q_{\min}}{2 Q_{\text{nom}}} \times 100$$

where $Q_{\max}$ and $Q_{\min}$ are values of the wall thickness measured in the same section.

5.4 Straightness

When measured over the whole length of the tube by rolling against a straightedge, the maximum deviation shall not be greater than 1 in 1 200.

Table 1 — Identification symbols

Drill rods (see Table 4, Table 6, Table 7 and Table 8)	RW	EW	AW	BW	NW	HW	—	—	—	—
Casing — flush coupled (see Table 4, Table 9 and Table 15 to Table 19)	RX	EX	AX	BX	NX	HX	PX	SX	UX	ZX
Casing — flush jointed (see Table 4 and Table 9 to Table 14)	RW	EW	AW	BW	NW	HW	PW	SW	UW	ZW
“WF” design, face discharge core barrel (see Figure 6)	—	—	—	—	—	HWF	PWF	SWF	UWF	ZWF
“WG” design, internal discharge core barrel (see Figure 7 and Figure 8)	—	EWG	AWG	BWG	NWG	HWG	—	—	—	—
“WM” design, internal discharge core barrel ^a (see Figure 9)	—	EWM	AWM	BWM	NWM	—	—	—	—	—
“WT” design, thin wall, internal discharge core barrel (see Figure 10, Figure 11 and Figure 12)	RWT	EWT	AWT	BWT	NWT	HWT	—	—	—	—

^a These may be used with face discharge bits.

Table 2 — Mechanical properties

Component	Tensile strength, R_m , min. lbf/in ²	Yield stress, R_e , min. lbf/in ²	Percent elongation after fracture A_2 in, min. %
Parallel wall rods	90 000	76 000	15
Upset or forged end of rod	72 000	45 000	18
Casing and casing coupling sizes R to H	90 000	76 000	15
Casing and casing coupling sizes P to Z	72 000	45 000	18
Drill-rod coupling and adaptors	101 500	72 000	15
All other components	Not specified		

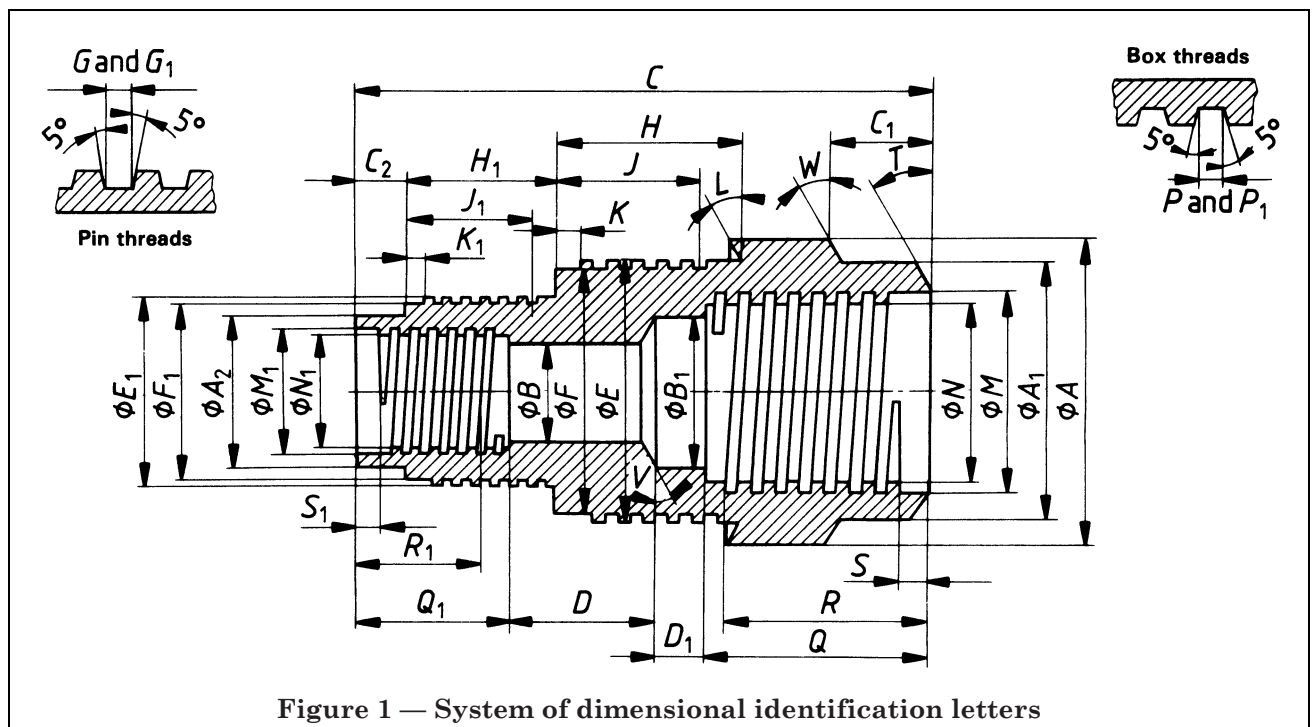


Table 3 — System of dimensional identification letters

<i>A, A₁, etc.</i>	Outside diameters — <i>A</i> being largest; <i>A₁, A₂, etc.</i> progressively smaller
<i>B, B₁, etc.</i>	Inside diameters — <i>B</i> being smallest; <i>B₁, B₂, etc.</i> progressively larger
<i>C, C₁, etc.</i>	External lengths — <i>C</i> being longest; <i>C₁, C₂, etc.</i> progressively shorter
<i>D, D₁, etc.</i>	Internal lengths — <i>D</i> being longest; <i>D₁, D₂, etc.</i> progressively shorter
<i>E, E₁, etc.</i>	Major diameter of pin threads — <i>E</i> being largest; <i>E₁, E₂, etc.</i> smaller
<i>F, F₁, etc.</i>	Minor diameter of pin threads <i>F</i> being largest; <i>F₁, F₂, etc.</i> smaller
Thread pitch (Threads per inch)	Pin threads
<i>G, G₁, etc.</i>	Width at root of pin thread
<i>H, H₁, etc.</i>	Length of outside diameter machined for external threading
<i>J, J₁, etc.</i>	Minimum length for full depth of pin threads
<i>K, K₁, etc.</i>	Length of relief at the starting-point of pin threads
<i>L, L₁, etc.</i>	Angle of bevel for pin thread shoulder
<i>M, M₁, etc.</i>	Major diameter of box threads — <i>M</i> being largest; <i>M₁, M₂, etc.</i> smaller
<i>N, N₁, etc.</i>	Minor diameter of box threads — <i>N</i> being largest; <i>N₁, N₂, etc.</i> smaller
Thread pitch (Threads per inch)	Box threads
<i>P, P₁, etc.</i>	Width at root of box threads
<i>Q, Q₁, etc.</i>	Length of inside diameter machined for internal threading
<i>R, R₁, etc.</i>	Minimum length for full depth of box threads
<i>S, S₁, etc.</i>	Length of counterbore at the starting-point of box threads
<i>T, T₁, etc.</i>	Angle of bevel for box thread shoulder
<i>U, U₁, etc.</i>	Included angles — internal and external
<i>V, V₁, etc.</i>	Internal angles — not pertaining to threaded connections
<i>W, W₁, etc.</i>	External angles — not pertaining to threaded connections
<i>X</i>	Diamond set dimensions — external diameter
<i>Y</i>	Diamond set dimensions — internal diameter
NOTE The following common abbreviations are sometimes used in tables in the English version for the sake of simplicity: O.D. = outside diameter I.D. = inside diameter.	

Table 4 — Nomenclature and basic dimensions for drill rods and casings and their related diamond set items

Drill rod	Rod tube	Rod coupling	Casing flush coupling	Casing tube	Casing coupling	Casing flush jointed	Casing		Casing reaming shell	Casing bit		Casing shoe	
	O.D.	I.D.		O.D.	I.D.		O.D.	I.D.	Set O.D.	Set O.D.	Set I.D.	Set O.D.	Set I.D.
RW	1.098	0.416	RX	1.442	1.20	RW	1.442	1.20	not required	1.49	1.005	1.49	1.188
	1.093	0.401		1.437	1.19		1.437	1.19		1.48	0.995	1.48	1.183
EW	1.380	0.447	EX	1.822	1.51	EW	1.822	1.51	1.895	1.88	1.41	1.88	1.497
	1.375	0.432		1.812	1.50		1.812	1.50		1.87	1.40	1.87	1.492
AW	1.728	0.635	AX	2.26	1.916	AW	2.26	1.916	2.365	2.35	1.785	2.35	1.902
	1.718	0.620		2.25	1.906		2.25	1.906		2.34	1.775	2.34	1.897
BW	2.135	0.760	BX	2.885	2.385	BW	2.885	2.385	2.985	2.97	2.22	2.97	2.372
	2.125	0.745		2.875	2.375		2.875	2.375		2.96	2.21	2.96	2.367
NW	2.635	1.385	NX	3.515	3.015	NW	3.515	3.015	3.635	3.62	2.845	3.62	2.997
	2.625	1.370		3.500	3.000		3.500	3.000		3.61	2.835	3.61	2.987
HW	3.515	2.390	HX	4.515	3.952	HW	4.515	4.000	not required	4.632	3.782	4.632	3.93
	3.500	2.375		4.500	3.937		4.500	3.985		4.617	3.772	4.617	3.92
			PX	5.541	5.015	PW	5.541	5.015	not required	5.66	4.640	5.66	4.860
				5.459	4.865		5.459	4.865		5.64	4.625	5.64	4.845
			SX	6.675	6.002	SW	6.675	6.124	not required	6.80	5.640	6.80	5.785
				6.575	5.815		6.575	5.953		6.78	5.625	6.78	5.770
			UX	7.682	7.055	UW	7.682	7.108	not required	7.815	6.765	7.815	6.915
				7.568	6.937		7.568	6.921		7.785	6.745	7.785	6.895
			ZX	8.69	8.108	ZW	8.69	8.207	not required	8.825	7.765	8.825	7.915
				8.56	7.937		8.56	7.992		8.795	7.745	8.795	7.895

Table 5 — Nomenclature and basic dimensions for core barrels and their related diamond set items

Core barrel designs				Coring bits		Reaming shells	Kerf width in	Kerf area in ²	Core area in ²	Hole area in ²	Core-to-hole ratio %	Nominal core size ^a	Nominal hole size ^a
WF	WG	WM	WT	Set I.D.	Set O.D.	Set O.D.							
			RWT	0.74 0.73	1.165 1.155	1.18 1.17	0.22	0.658	0.424	1.083	39.1	0.73	1.18
	EWG	EWM		0.85 0.84	1.475 1.465	1.49 1.48	0.32	1.17	0.561	1.732	32.4	0.84	1.5
			EWT	0.91 0.90	1.475 1.465	1.49 1.48	0.29	1.089	0.643	1.732	37.1	0.9	1.5
	AWG	AWM		1.19 1.18	1.88 1.87	1.895 1.885	0.352	1.703	1.103	2.805	39.3	1.18	1.9
			AWT	1.286 1.276	1.88 1.87	1.895 1.885	0.304	1.517	1.289	2.805	45.9	1.27	1.9
	BWG	BWM		1.66 1.65	2.35 2.34	2.365 2.355	0.352	2.222	2.151	4.374	49.1	1.65	2.37
			BWT	1.755 1.745	2.35 2.34	2.365 2.355	0.305	1.968	2.405	4.374	55	1.75	2.37
	NWG	NWM		2.16 2.15	2.97 2.96	2.985 2.975	0.412	3.326	3.647	6.973	52.2	2.15	3
			NWT	2.318 2.308	2.97 2.96	2.985 2.975	0.333	2.771	4.202	6.973	60	2.3	3
HWF	HWG			3.005 2.995	3.897 3.882	3.912 3.902	0.453	4.919	7.069	11.987	59	3	3.92
			HWT	3.192 3.182	3.897 3.882	3.912 3.902	0.36	4.011	7.976	11.987	66.5	3.18	3.92
PWF				3.635 3.620	4.735 4.715	4.755 4.740	0.56	7.367	10.335	17.702	58.4	3.62	4.75
SWF				4.447 4.432	5.735 5.715	5.755 5.740	0.654	10.465	15.478	25.945	59.7	4.43	5.75
UWF				5.515 5.495	6.855 6.825	6.88 6.86	0.682	13.266	23.801	37.068	64.2	5.5	6.88
ZWF				6.515 6.495	7.855 7.825	7.88 7.86	0.682	15.411	33.233	48.645	68.3	6.5	7.88

^a Nominal core and hole sizes are rounded inch units and are not directly convertible into the metric values.

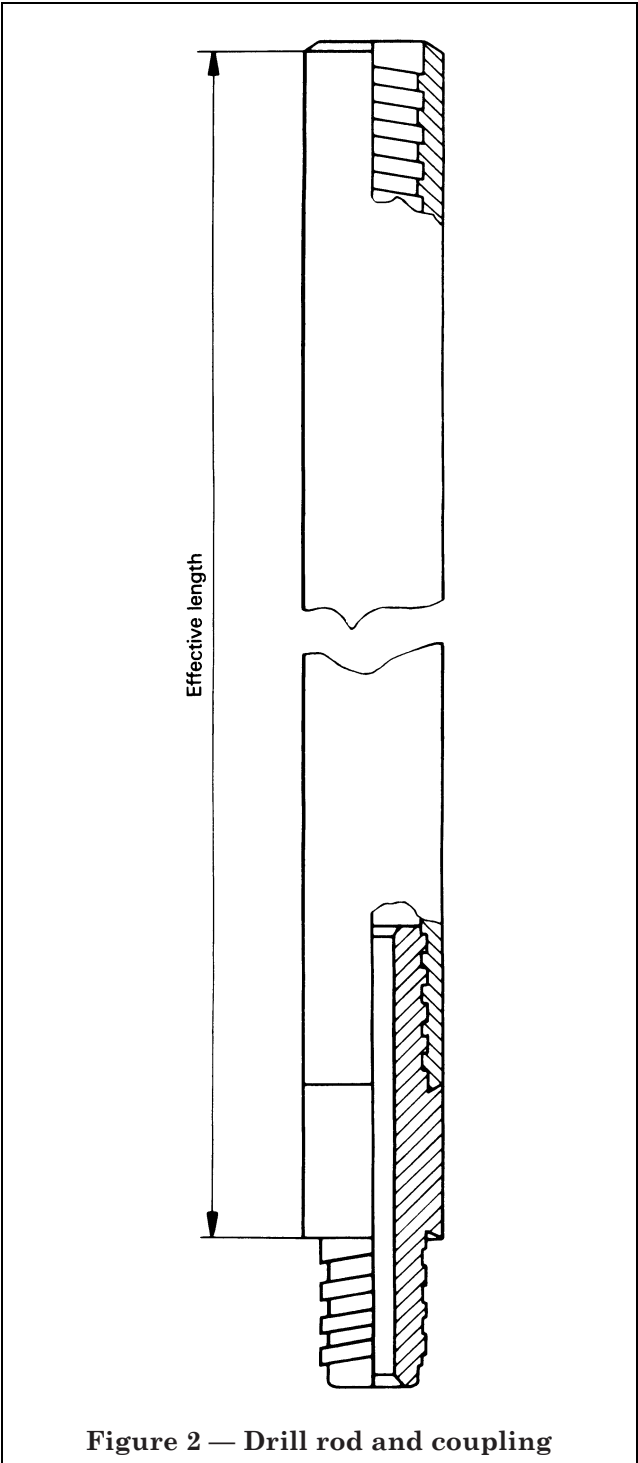
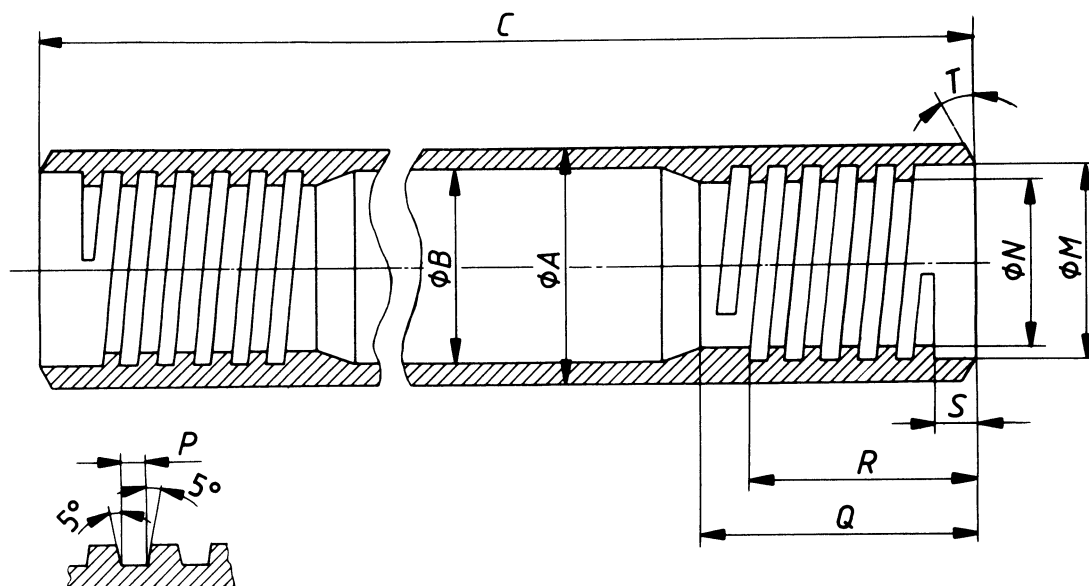


Table 6 — Drill rod and coupling — Main dimensions

Identification symbol	Rod O.D.	Coupling I.D.	Effective lengths (see Figure 2)
RW	1.093	0.406	120, 60 or 30
EW	1.375	0.437	
AW	1.718	0.625	
BW	2.125	0.75	
NW	2.625	1.375	
HW	3.5	2.375	
NOTE 1 Thread may be left-hand if required.			
NOTE 2 For detailed dimensions, see Table 7 and Table 8.			



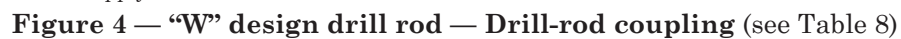
NOTE Dimensions shown apply to both ends. Not complete without coupling — see Figure 2 and Figure 4.

Figure 3 — “W” design drill rod — Drill rod tube (see Table 7)

Table 7 — “W” design drill rod — Drill rod tube

Dimension		RW	EW	AW	BW	NW	HW
A	max.	1.098	1.380	1.728	2.135	2.635	3.515
	min.	1.093	1.375	1.718	2.125	2.625	3.500
B ^a	max.	0.719	1	1.344	1.75	2.25	3.062
C	max.	118.92	118.71	118.745	118.285	118.265	117.78
	min.	118.86	118.65	118.685	118.225	118.205	117.72
M	max.	0.853	1.068	1.380	1.690	2.224	3.034
	min.	0.851	1.066	1.378	1.688	2.222	3.032
N	max.	0.746	0.943	1.255	1.533	2.036	2.844
	min.	0.744	0.941	1.253	1.531	2.034	2.842
Thread pitch (Threads per inch)		0.25 (4)	0.333 (3)	0.333 (3)	0.333 (3)	0.333 (3)	0.333 (3)
P	max.	0.125	0.166	0.166	0.166	0.166	0.166
	min.	0.122	0.162	0.162	0.162	0.162	0.162
Q	min.	1.562	1.75	2.125	2.50	3	3.562
R	min.	1.437	1.562	1.875	2.25	2.75	3.25
S	max.	0.26	0.322	0.385	0.385	0.385	0.385
	min.	0.24	0.302	0.365	0.365	0.365	0.365
T		30°	30°	30°	30°	30°	30°

^a The dimension B is a maximum and can apply either to upset end rods or parallel wall rods for the RW size only. For all other sizes, this dimension refers to upset end rods only.



Dimension		RW	EW	AW	BW	NW	HW
<i>A</i>	max.	1.098	1.380	1.728	2.135	2.635	3.515
	min.	1.090	1.372	1.714	2.121	2.620	3.495
<i>B</i>	max.	0.416	0.447	0.635	0.760	1.385	2.390
	min.	0.401	0.432	0.620	0.745	1.370	2.375
<i>C</i>	ref.	3.75	4.625	5.25	6.5	7.5	9
<i>C</i> ₁	max.	1.12	1.33	1.295	1.755	1.775	2.26
	min.	1.10	1.31	1.275	1.735	1.755	2.24
<i>E</i>	max.	0.849	1.062	1.374	1.684	2.218	3.028
	min.	0.847	1.060	1.372	1.682	2.216	3.026
<i>F</i>	max.	0.742	0.937	1.249	1.527	2.030	2.838
	min.	0.737	0.932	1.244	1.522	2.025	2.833
Thread pitch (Threads per inch)		0.25 (4)	0.333 (3)	0.333 (3)	0.333 (3)	0.333 (3)	0.333 (3)
<i>G</i>	max.	0.125	0.166	0.166	0.166	0.166	0.166
	min.	0.122	0.162	0.162	0.162	0.162	0.162
<i>H</i>	max.	1.33	1.662	1.994	2.387	2.877	3.324
	min.	1.31	1.642	1.974	2.367	2.857	3.304
<i>J</i>	min.	1.125	1.437	1.75	2.125	2.625	3.125
<i>K</i>	max.	0.072	0.197	0.26	0.322	0.385	0.385
	min.	0.052	0.177	0.24	0.302	0.365	0.365
<i>L</i>		30°	30°	30°	30°	30°	30°

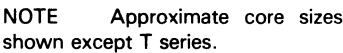


Figure 5 — General relation of casing to core bit



Figure 6 — Casing (see Table 9)

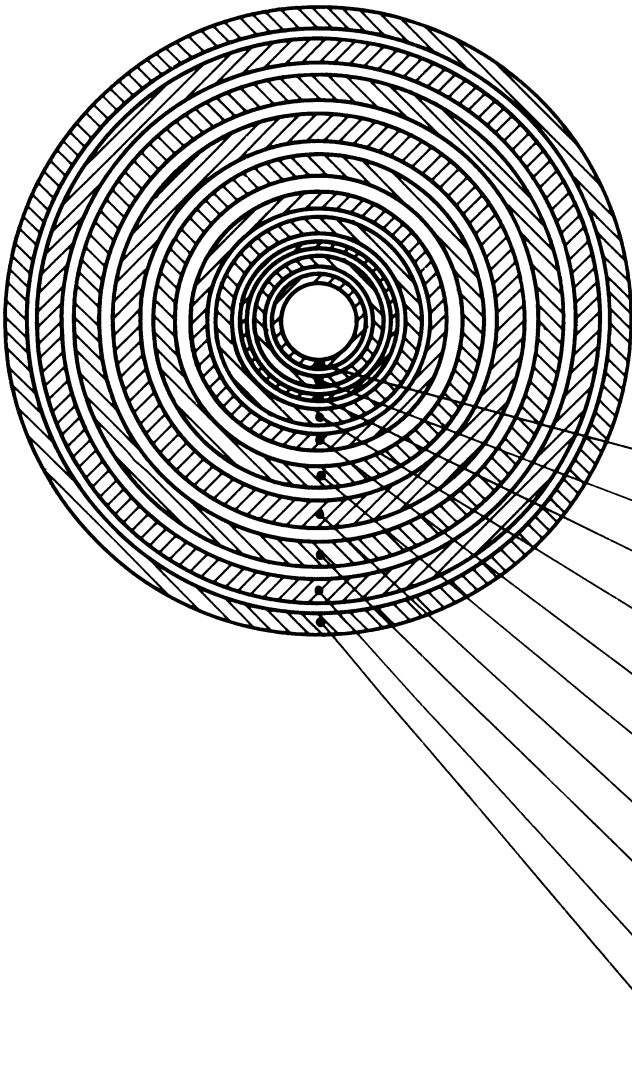


Table 9 — Casing and casing coupling (where used) — Main dimensions

Identification symbol	Outside diameter max.	Inside diameter min.	Effective lengths (see Figure 6)
RX RW	1.442	1.19	120, 60 or 30
EX EW	1.822	1.5	
AX AW	2.26	1.906	
BX BW	2.885	2.375	
NX NW	3.515	3	
HX HW	4.515	3.937	
PX PW	5.541	4.865	
SX SW	6.675	5.815	
UX UW	7.682	6.937	
ZX ZW	8.69	7.937	

Figure 7 — Nesting of casing (see Table 9)

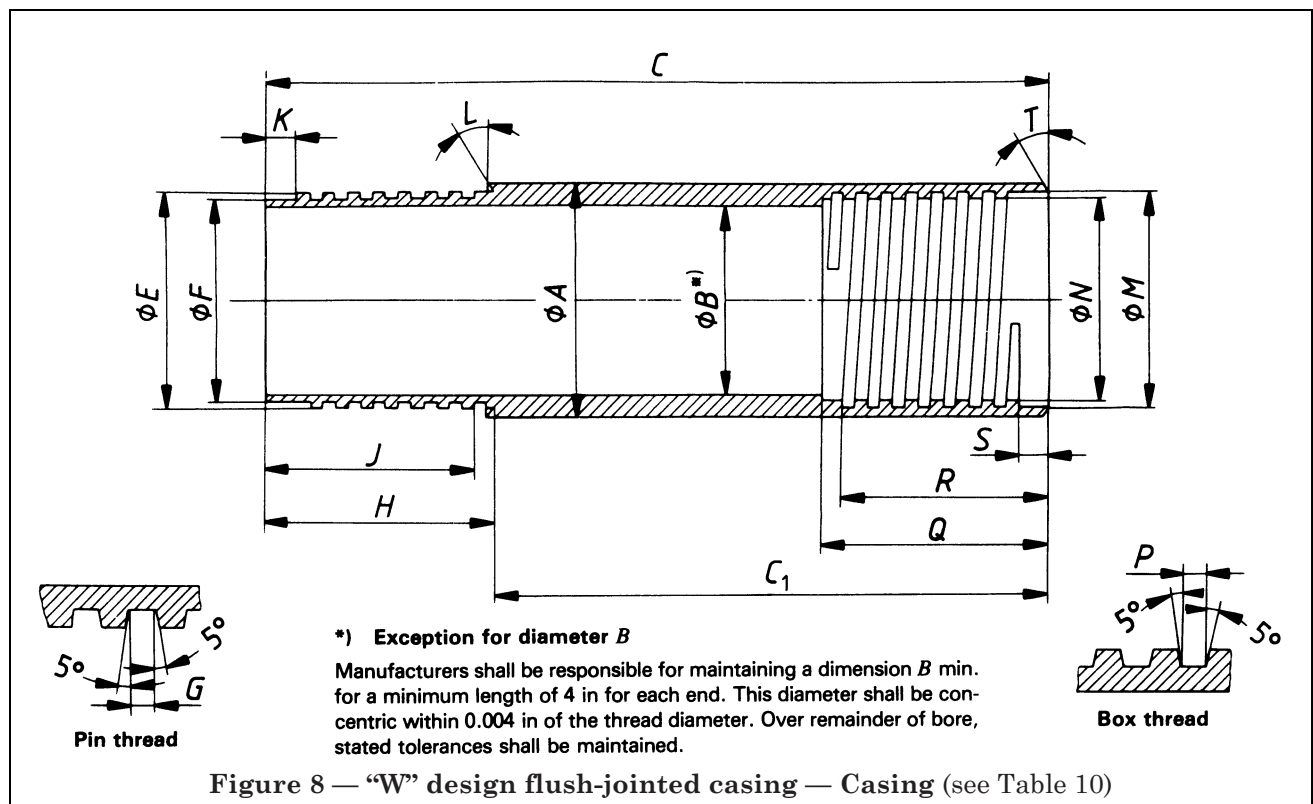


Figure 8 — "W" design flush-jointed casing — Casing (see Table 10)

Table 10 — “W” design flush-jointed casing — Casing

Dimension		RW	EW	AW	BW	NW	HW	PW	SW	UW	ZW
<i>A</i>	max.	1.442	1.822	2.26	2.885	3.515	4.515	5.541	6.675	7.682	8.69
	min.	1.437	1.812	2.25	2.875	3.500	4.500	5.459	6.575	7.568	8.56
<i>B^a</i>	max.	1.20	1.51	1.916	2.385	3.015	4.000	5.015	6.124	7.108	8.207
	min.	1.19	1.50	1.906	2.375	3.000	3.985	4.865	5.953	6.921	7.992
<i>C</i>	max. (ref.)	121.792	122.042	122.292	122.542	122.792	123.042	123.292	123.542	123.792	124.042
	min. (ref.)	121.702	121.952	122.202	122.452	122.702	122.952	123.202	123.452	123.702	123.952
<i>C₁</i>	max.	120.047	120.047	120.047	120.047	120.047	120.047	120.047	120.047	120.047	120.047
	min.	119.952	119.952	119.952	119.952	119.952	119.952	119.952	119.952	119.952	119.952
<i>E</i>	max.	1.346	1.708	2.130	2.677	3.307	4.297	5.299	6.411	7.412	8.457
	min.	1.343	1.705	2.126	2.673	3.303	4.292	5.294	6.406	7.406	8.451
<i>F</i>	max.	1.284	1.617	2.039	2.586	3.216	4.207	5.179	6.291	7.261	8.306
	min.	1.282	1.615	2.036	2.583	3.213	4.203	5.175	6.287	7.256	8.301
Thread pitch (Threads per inch)		0.2 (5)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.333 (3)	0.333 (3)	0.5 (2)	0.5 (2)
<i>G</i>	max.	0.104	0.128	0.128	0.128	0.128	0.128	0.169	0.169	0.252	0.252
	min.	0.100	0.124	0.124	0.124	0.124	0.124	0.165	0.165	0.248	0.248
<i>H</i>	max.	1.750	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
	min.	1.745	1.995	2.245	2.495	2.745	2.995	3.245	3.495	3.745	3.995
<i>J</i>	min.	1.625	1.875	2.125	2.375	2.625	2.875	3.125	3.375	3.625	3.875
<i>K</i>	max.	0.26	0.30	0.30	0.30	0.30	0.30	0.36	0.36	0.44	0.44
	min.	0.24	0.28	0.28	0.28	0.28	0.28	0.34	0.34	0.42	0.42
<i>L</i>		15°	15°	15°	15°	15°	15°	15°	15°	15°	15°
<i>M</i>	max.	1.352	1.714	2.138	2.685	3.315	4.308	5.310	6.422	7.426	8.471
	min.	1.349	1.711	2.134	2.681	3.311	4.303	5.305	6.417	7.420	8.465
<i>N</i>	max.	1.288	1.621	2.045	2.592	3.222	4.215	5.187	6.299	7.271	8.316
	min.	1.286	1.619	2.042	2.589	3.219	4.211	5.183	6.295	7.266	8.311
Thread pitch (Threads per inch)		0.2 (5)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.333 (3)	0.333 (3)	0.5 (2)	0.5 (2)
<i>P</i>	max.	0.104	0.128	0.128	0.128	0.128	0.128	0.169	0.169	0.252	0.252
	min.	0.100	0.124	0.124	0.124	0.124	0.124	0.165	0.165	0.248	0.248
<i>Q</i>	max.	1.755	2.005	2.255	2.505	2.755	3.005	3.255	3.505	3.755	4.005
	min.	1.750	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
<i>R</i>	min.	1.625	1.875	2.125	2.375	2.625	2.875	3.125	3.375	3.625	3.875
<i>S</i>	max.	0.26	0.30	0.30	0.30	0.30	0.30	0.36	0.36	0.44	0.44
	min.	0.24	0.28	0.28	0.28	0.28	0.28	0.34	0.34	0.42	0.42
<i>T</i>		15°	15°	15°	15°	15°	15°	15°	15°	15°	15°

^a See note in Figure 8.

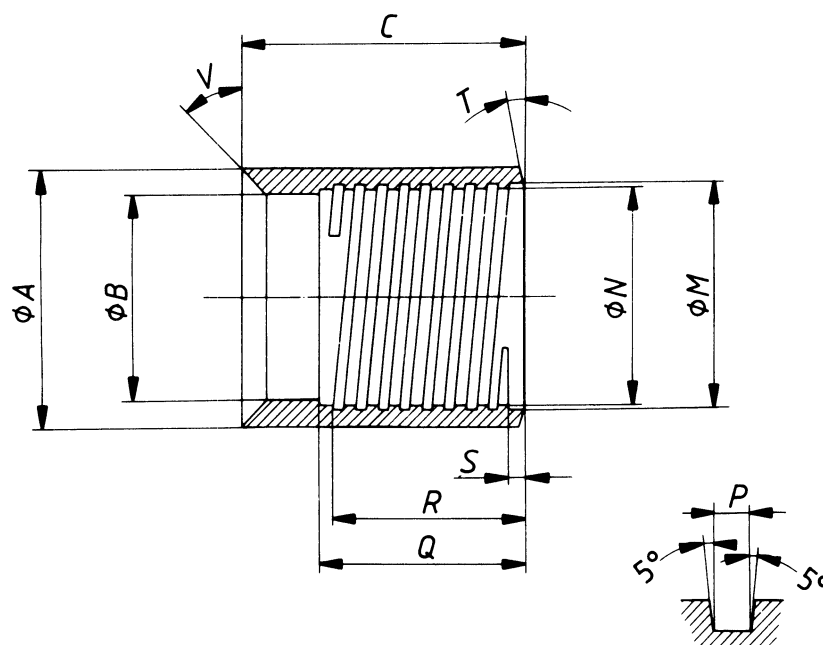


Figure 9 — “W” design flush-jointed casing — Casing drive shoe (see Table 11)

Table 11 — “W” design flush-jointed casing — Casing drive shoe

Dimension		RW	EW	AW	BW	NW	HW	PW	SW	UW	ZW
A	max.	1.475	1.88	2.345	2.965	3.648	4.648	5.67	6.795	7.795	8.785
	min.	1.465	1.87	2.312	2.938	3.618	4.618	5.61	6.735	7.735	8.715
B	max.	1.190	1.500	1.905	2.375	3.00	3.985	4.865	5.953	6.921	7.992
	min.	1.185	1.495	1.900	2.370	2.99	3.970	4.845	5.923	6.891	7.962
C	min.	3.75	4	4.25	4.5	4.75	6.5	6.75	7	7.25	7.5
M	max.	1.352	1.714	2.138	2.685	3.315	4.308	5.310	6.422	7.426	8.471
	min.	1.349	1.711	2.134	2.681	3.311	4.303	5.305	6.417	7.420	8.465
N	max.	1.288	1.621	2.045	2.592	3.222	4.215	5.187	6.299	7.271	8.316
	min.	1.286	1.619	2.042	2.589	3.219	4.211	5.183	6.295	7.266	8.311
Thread pitch (Threads per inch)		0.2 (5)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.333 (3)	0.333 (3)	0.5 (2)	0.5 (2)
P	max.	0.104	0.128	0.128	0.128	0.128	0.128	0.169	0.169	0.252	0.252
	min.	0.100	0.124	0.124	0.124	0.124	0.124	0.165	0.165	0.248	0.248
Q	max.	1.755	2.005	2.255	2.505	2.755	3.005	3.255	3.505	3.755	4.005
	min.	1.750	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
R	min.	1.625	1.875	2.125	2.375	2.625	2.875	3.125	3.375	3.625	3.875
S	max.	0.26	0.30	0.30	0.30	0.30	0.32	0.36	0.36	0.44	0.44
	min.	0.24	0.28	0.28	0.28	0.28	0.30	0.34	0.34	0.42	0.42
T		15°	15°	15°	15°	15°	15°	15°	15°	15°	15°
V		Optional									

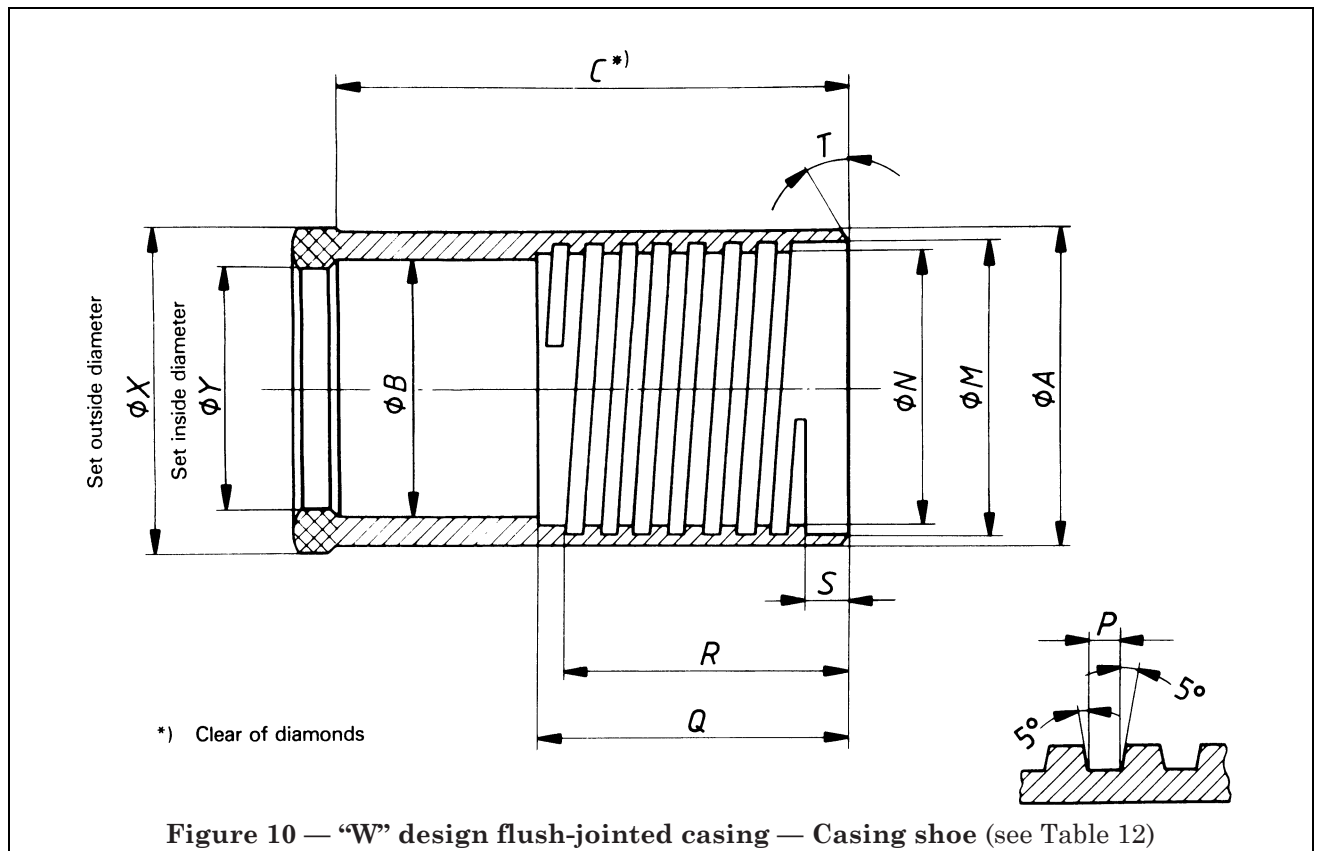


Table 12 — “W” design flush-jointed casing — Casing shoe

Dimension		RW	EW	AW	BW	NW	HW	PW	SW	UW	ZW
A	max.	1.456	1.832	2.297	2.912	3.562	4.564	5.564	6.689	7.689	8.689
	min.	1.452	1.828	2.293	2.908	3.558	4.560	5.558	6.683	7.680	8.680
B	max.	1.21	1.52	1.926	2.395	3.03	3.97	4.885	5.837	6.977	7.977
	min.	1.19	1.50	1.906	2.375	3.00	3.94	4.865	5.807	6.937	7.937
C	min.	3.25	3.5	3.75	4.25	4.5	5	5.25	5.75	6	6.25
M	max.	1.352	1.714	2.138	2.685	3.315	4.308	5.310	6.422	7.426	8.471
	min.	1.349	1.711	2.134	2.681	3.311	4.303	5.305	6.417	7.420	8.465
N	max.	1.288	1.621	2.045	2.592	3.222	4.215	5.187	6.299	7.271	8.316
	min.	1.286	1.619	2.042	2.589	3.219	4.211	5.183	6.295	7.266	8.311
Thread pitch (Threads per inch)		0.2 (5)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.333 (3)	0.333 (3)	0.5 (2)	0.5 (2)
P	max.	1.104	0.128	0.128	0.128	0.128	0.128	0.169	0.169	0.252	0.252
	min.	0.100	0.124	0.124	0.124	0.124	0.124	0.165	0.165	0.248	0.248
Q	max.	1.755	2.005	2.255	2.505	2.755	3.005	3.255	3.505	3.755	4.005
	min.	1.750	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
R	min.	1.625	1.875	2.125	2.375	2.625	2.875	3.125	3.375	3.625	3.875
S	max.	0.26	0.30	0.30	0.30	0.30	0.30	0.36	0.36	0.44	0.44
	min.	0.24	0.28	0.28	0.28	0.28	0.28	0.34	0.34	0.42	0.42
T		15°	15°	15°	15°	15°	15°	15°	15°	15°	15°
X	max.	1.49	1.88	2.35	2.97	3.62	4.632	5.66	6.80	7.815	8.825
	min.	1.48	1.87	2.34	2.96	3.61	4.617	5.64	6.78	7.785	8.795
Y	max.	1.188	1.497	1.902	2.372	2.997	3.93	4.860	5.785	6.915	7.915
	min.	1.183	1.492	1.897	2.367	2.987	3.92	4.845	5.770	6.895	7.895

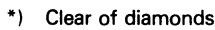


Table 13 — “W” design flush-jointed casing — Casing bit

Dimension		RW	EW	AW	BW	NW	HW	PW	SW	UW	ZW
A	max.	1.456	1.832	2.297	2.912	3.562	4.564	5.564	6.689	7.689	8.689
	min.	1.452	1.828	2.293	2.908	3.558	4.560	5.558	6.683	7.680	8.680
B	max.	1.045	1.465	1.84	2.278	2.903	3.872	4.75	5.75	6.895	7.895
	min.	1.025	1.435	1.81	2.248	2.873	3.832	4.70	5.70	6.835	7.835
C	min.	3.25	3.5	3.75	4.25	4.5	5	5.25	5.75	6	6.25
M	max.	1.352	1.714	2.138	2.685	3.315	4.308	5.310	6.422	7.426	8.471
	min.	1.349	1.711	2.134	2.681	3.311	4.303	5.305	6.417	7.420	8.465
N	max.	1.288	1.621	2.045	2.592	3.222	4.215	5.187	6.299	7.271	8.316
	min.	1.286	1.619	2.042	2.589	3.219	4.211	5.183	6.295	7.266	8.311
Thread pitch (Threads per inch)		0.2 (5)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)	0.333 (3)	0.333 (3)	0.5 (2)	0.5 (2)
P	max.	0.104	0.128	0.128	0.128	0.128	0.128	0.169	0.169	0.252	0.252
	min.	0.100	0.124	0.124	0.124	0.124	0.124	0.165	0.165	0.248	0.248
Q	max.	1.755	2.005	2.255	2.505	2.755	3.005	3.255	3.505	3.755	4.005
	min.	1.750	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
R	min.	1.625	1.875	2.125	2.375	2.625	2.875	3.125	3.375	3.625	3.875
S	max.	0.26	0.30	0.30	0.30	0.30	0.30	0.36	0.36	0.44	0.44
	min.	0.24	0.28	0.28	0.28	0.28	0.28	0.34	0.34	0.42	0.42
T		15°	15°	15°	15°	15°	15°	15°	15°	15°	15°
X	max.	1.49	1.88	2.35	2.97	3.62	4.632	5.66	6.80	7.815	8.825
	min.	1.48	1.87	2.34	2.96	3.61	4.617	5.64	6.78	7.785	8.795
Y	max.	1.005	1.41	1.785	2.22	2.845	3.782	4.640	5.640	6.765	7.765
	min.	0.995	1.40	1.775	2.21	2.835	3.772	4.625	5.625	6.745	7.745

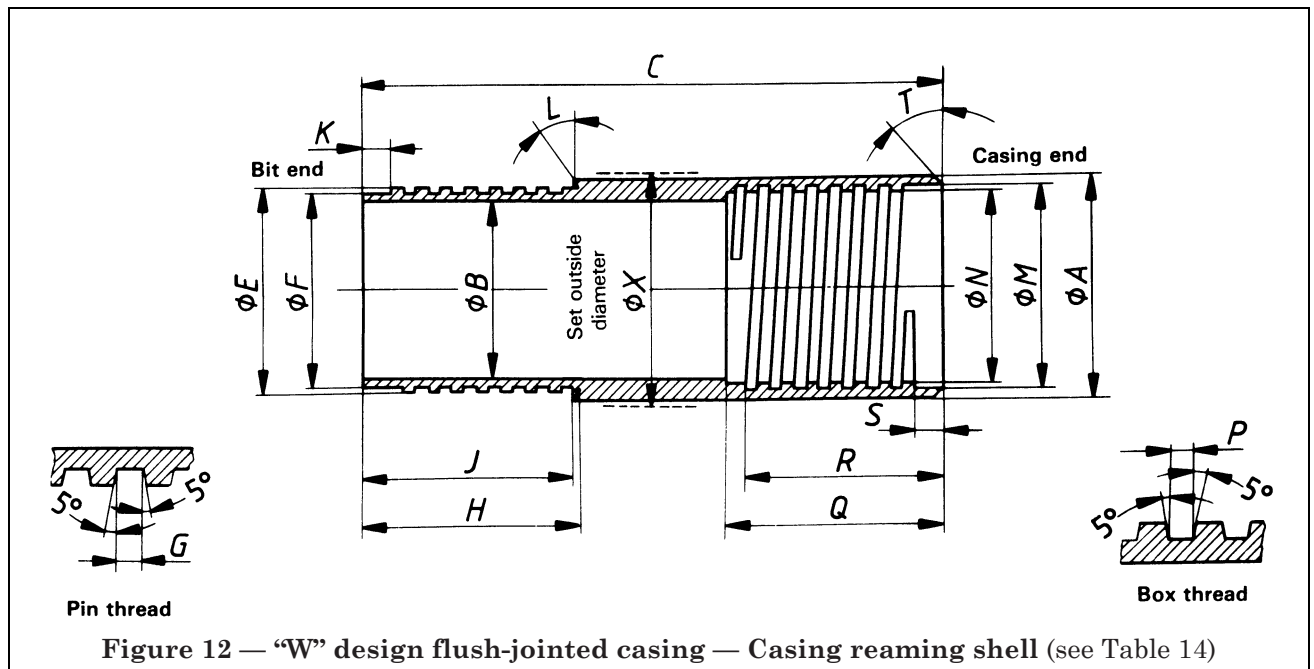
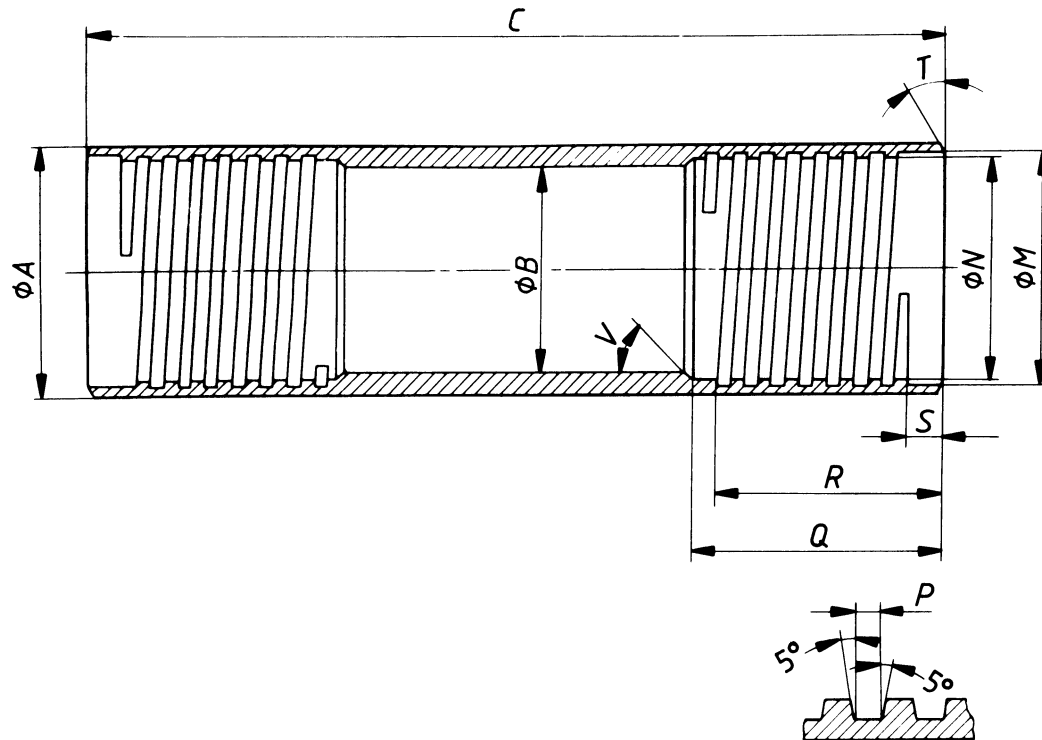


Table 14 — “W” design flush-jointed casing — Casing reaming shell

Dimension		EW	AW	BW	NW
<i>A</i>	max.	1.832	2.297	2.912	3.562
	min.	1.828	2.293	2.908	3.558
<i>B</i>	max.	1.51	1.916	2.385	3.015
	min.	1.50	1.906	2.375	3.000
<i>C</i>	min.	5.5	6	6.75	7.25
<i>E</i>	max.	1.708	2.130	2.677	3.307
	min.	1.705	2.126	2.673	3.303
<i>F</i>	max.	1.617	2.039	2.586	3.216
	min.	1.615	2.036	2.583	3.213
Thread pitch (Threads per inch)		0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)
<i>G</i>	max.	0.128	0.128	0.128	0.128
	min.	0.124	0.124	0.124	0.124
<i>H</i>	max.	2.000	2.250	2.500	2.750
	min.	1.995	2.245	2.495	2.745
<i>J</i>	min.	1.875	2.125	2.375	2.625
<i>K</i>	max.	0.30	0.30	0.30	0.30
	min.	0.28	0.28	0.28	0.28
<i>L</i>		15°	15°	15°	15°
<i>M</i>	max.	1.714	2.138	2.685	3.315
	min.	1.711	2.134	2.681	3.311
<i>N</i>	max.	1.621	2.045	2.592	3.222
	min.	1.619	2.042	2.589	3.219
Thread pitch (Threads per inch)		0.25 (4)	0.25 (4)	0.25 (4)	0.25 (4)
<i>P</i>	max.	0.128	0.128	0.128	0.128
	min.	0.124	0.124	0.124	0.124
<i>Q</i>	max.	2.005	2.255	2.505	2.755
	min.	2.000	2.250	2.500	2.750
<i>R</i>	min.	1.875	2.125	2.375	2.625
<i>S</i>	max.	0.30	0.30	0.30	0.30
	min.	0.28	0.28	0.28	0.28
<i>T</i>		15°	15°	15°	15°
<i>X</i>	max.	1.895	2.365	2.985	3.635
	min.	1.885	2.355	2.975	3.625



NOTE Dimensions shown apply to both ends.

Figure 13 — “X” design flush-coupled casing — Casing tube (see Table 15)

Table 15 — “X” design flush-coupled casing — Casing tube

Dimension		RX	EX	AX	BX	NX	HX	PX	SX	UX	ZX
A	max.	1.442	1.822	2.26	2.885	3.515	4.515	5.541	6.675	7.682	8.69
	min.	1.437	1.812	2.25	2.875	3.500	4.500	5.459	6.575	7.568	8.56
B	max.	1.20	1.625	2.00	2.562	3.187	4.125	5.138	6.252	7.244	8.228
	min.	1.19	1.615	1.99	2.552	3.172	4.110	4.933	5.953	6.921	7.992
C	max.	117.904	118.59	117.108	116.646	116.646	116.17	116.10	115.598	115.10	114.586
	min.	117.844	118.53	117.048	116.586	116.586	116.11	116.04	115.538	115.04	114.526
M	max.	1.351	1.721	2.128	2.690	3.315	4.271	5.262	6.379	7.392	8.376
	min.	1.349	1.719	2.126	2.688	3.313	4.267	5.257	6.372	7.385	8.369
N	max.	1.291	1.659	2.065	2.596	3.221	4.175	5.167	6.282	7.276	8.260
	min.	1.289	1.657	2.063	2.594	3.219	4.172	5.163	6.278	7.271	8.255
Thread pitch (Threads per inch)		0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.2 (5)	0.2 (5)	0.2 (5)	0.25 (4)	0.25 (4)
P	max.	0.064	0.064	0.064	0.063	0.063	0.102	0.101	0.101	0.125	0.125
	min.	0.061	0.061	0.061	0.060	0.060	0.099	0.097	0.097	0.121	0.121
Q	min.	1	2	2.25	2.375	2.625	2.5	2.75	3	3.25	3.5
R	min.	0.937	1.875	2.125	2.25	2.5	2.25	2.625	2.875	3.125	3.375
S	max.	0.135	0.26	0.26	0.26	0.26	0.32	0.385	0.385	0.385	0.385
	min.	0.116	0.24	0.24	0.24	0.24	0.30	0.365	0.365	0.365	0.365
T		0°	30°	30°	30°	30°	30°	15°	15°	15°	15°
V		—	—	does not apply		—	—	30°	30°	30°	30°

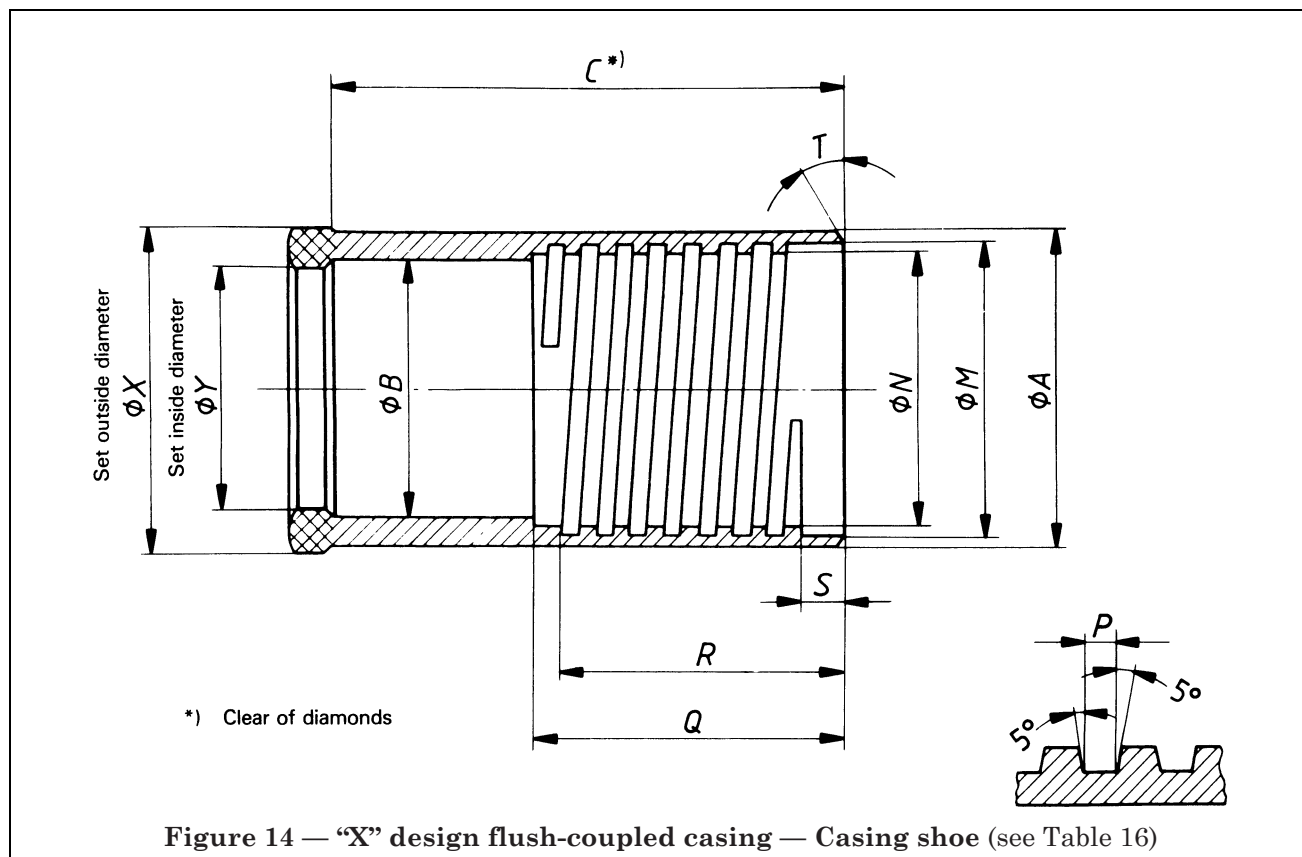


Table 16 — “X” design flush-coupled casing — Casing shoe

Dimension		RX	EX	AX	BX	NX	HX	PX	SX	UX	ZX
A	max.	1.456	1.832	2.297	2.912	3.562	4.564	5.564	6.689	7.689	8.689
	min.	1.452	1.828	2.293	2.908	3.558	4.560	5.558	6.683	7.680	8.680
B	max.	1.21	1.52	1.926	2.395	3.03	3.97	4.885	5.837	6.977	7.977
	min.	1.19	1.50	1.906	2.375	3.00	3.94	4.865	5.807	6.937	7.937
C	min.	2.5	3.5	3.75	4.125	4.375	4.5	5.25	5.75	6	6.25
M	max.	1.351	1.721	2.128	2.690	3.315	4.271	5.262	6.379	7.392	8.376
	min.	1.349	1.719	2.126	2.688	3.313	4.267	5.257	6.372	7.385	8.369
N	max.	1.291	1.659	2.065	2.596	3.221	4.175	5.167	6.282	7.276	8.260
	min.	1.289	1.657	2.063	2.594	3.219	4.172	5.163	6.278	7.271	8.255
Thread pitch (Threads per inch)		0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.2 (5)	0.2 (5)	0.2 (5)	0.25 (4)	0.25 (4)
P	max.	0.064	0.064	0.064	0.063	0.063	0.102	0.101	0.101	0.125	0.125
	min.	0.061	0.061	0.061	0.060	0.060	0.099	0.097	0.097	0.121	0.121
Q	min.	1	2	2.25	2.375	2.625	2.5	2.75	3	3.25	3.5
R	min.	0.937	1.875	2.125	2.25	2.5	2.25	2.625	2.875	3.125	3.375
S	max.	0.135	0.26	0.26	0.26	0.26	0.32	0.385	0.385	0.385	0.385
	min.	0.116	0.24	0.24	0.24	0.24	0.30	0.365	0.365	0.365	0.365
T		0°	30°	30°	30°	30°	30°	15°	15°	15°	15°
X	max.	1.49	1.88	2.35	2.97	3.62	4.632	5.66	6.80	7.815	8.825
	min.	1.48	1.87	2.34	2.96	3.61	4.617	5.64	6.78	7.785	8.795
Y	max.	1.188	1.497	1.902	2.372	2.997	3.93	4.860	5.785	6.915	7.915
	min.	1.183	1.492	1.897	2.367	2.987	3.92	4.845	5.770	6.895	7.895



Table 17 — “X” design flush-coupled casing — Casing bit

Dimension		RX	EX	AX	BX	NX	HX	PX	SX	UX	ZX
A	max.	1.456	1.832	2.297	2.912	3.562	4.564	5.564	6.689	7.689	8.689
	min.	1.452	1.828	2.293	2.908	3.558	4.560	5.558	6.683	7.680	8.680
B	max.	1.045	1.465	1.84	2.278	2.903	3.872	4.75	5.75	6.895	7.895
	min.	1.025	1.435	1.81	2.248	2.873	3.832	4.70	5.70	6.835	7.835
C	min.	2.5	3.5	3.75	4.125	4.375	4.5	5.25	5.75	6	6.25
M	max.	1.351	1.721	2.128	2.690	3.315	4.271	5.262	6.379	7.392	8.376
	min.	1.349	1.719	2.126	2.688	3.313	4.267	5.257	6.372	7.385	8.369
N	max.	1.291	1.659	2.065	2.596	3.221	4.175	5.167	6.282	7.276	8.260
	min.	1.289	1.657	2.063	2.594	3.219	4.172	5.163	6.278	7.271	8.255
Thread pitch (Threads per inch)		0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.2 (5)	0.2 (5)	0.2 (5)	0.25 (4)	0.25 (4)
P	max.	0.064	0.064	0.064	0.063	0.063	0.102	0.101	0.101	0.125	0.125
	min.	0.061	0.061	0.061	0.060	0.060	0.099	0.097	0.097	0.121	0.121
Q	min.	1	2	2.25	2.375	2.625	2.5	2.75	3	3.25	3.5
R	min.	0.937	1.875	2.125	2.25	2.5	2.25	2.625	2.875	3.125	3.375
S	max.	0.135	0.26	0.26	0.26	0.26	0.32	0.385	0.385	0.385	0.385
	min.	0.116	0.24	0.24	0.24	0.24	0.30	0.365	0.365	0.365	0.365
T		0°	30°	30°	30°	30°	30°	15°	15°	15°	15°
X	max.	1.49	1.88	2.35	2.97	3.62	4.632	5.66	6.80	7.815	8.825
	min.	1.48	1.87	2.34	2.96	3.61	4.617	5.64	6.78	7.785	8.795
Y	max.	1.005	1.41	1.785	2.22	2.845	3.782	4.640	5.640	6.765	7.765
	min.	0.995	1.40	1.775	2.21	2.835	3.772	4.625	5.625	6.745	7.745

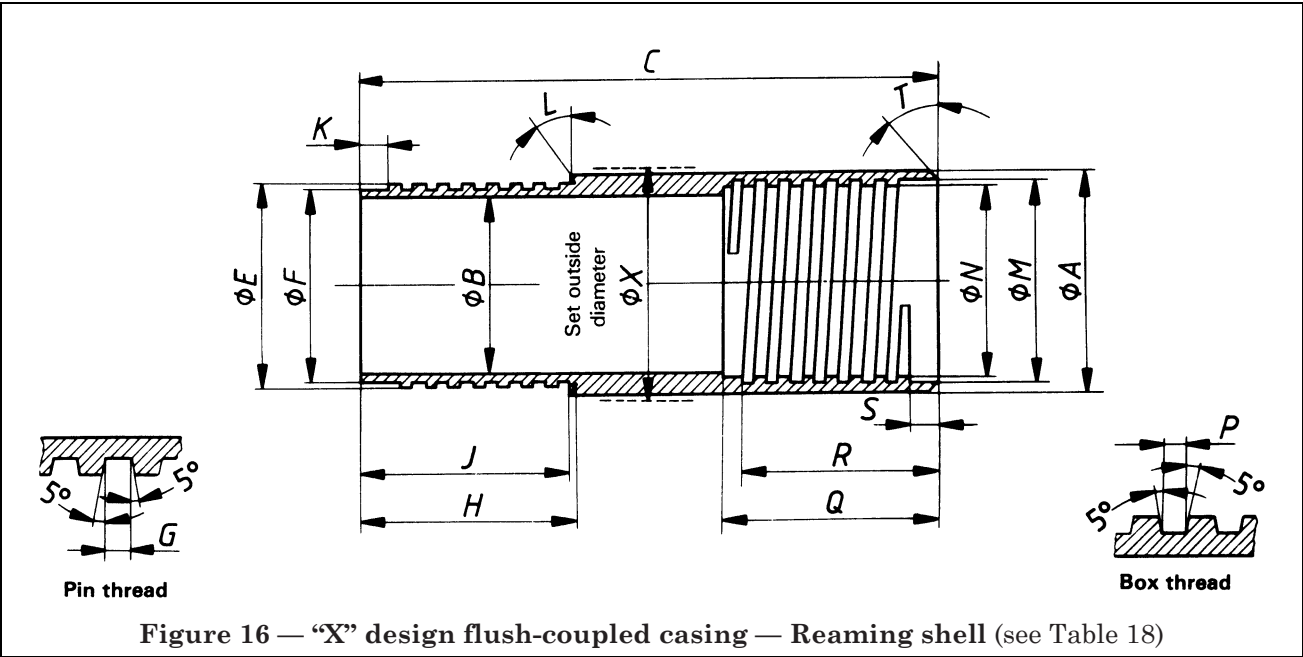


Figure 16 — “X” design flush-coupled casing — Reaming shell (see Table 18)

Table 18 — “X” design flush-coupled casing — Reaming shell

Dimension		EX	AX	BX	NX
<i>A</i>	max.	1.832	2.297	2.912	3.562
	min.	1.828	2.293	2.908	3.558
<i>B</i>	max.	1.51	1.916	2.385	3.015
	min.	1.50	1.906	2.375	3.000
<i>C</i>	min.	5.25	5.75	6.25	6.75
<i>E</i>	max.	1.717	2.124	2.686	3.311
	min.	1.715	2.122	2.684	3.309
<i>F</i>	max.	1.655	2.061	2.592	3.217
	min.	1.650	2.056	2.587	3.212
Thread pitch (Threads per inch)		0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)
<i>G</i>	max.	0.064	0.064	0.063	0.063
	min.	0.061	0.061	0.060	0.060
<i>H</i>	max.	1.79	2.05	2.195	2.44
	min.	1.77	2.03	2.175	2.42
<i>J</i>	min.	1.625	1.875	2	2.25
<i>K</i>	max.	0.198	0.198	0.198	0.198
	min.	0.178	0.178	0.178	0.178
<i>L</i>		30°	30°	30°	30°
<i>M</i>	max.	1.721	2.128	2.690	3.315
	min.	1.719	2.126	2.688	3.313
<i>N</i>	max.	1.659	2.065	2.596	3.221
	min.	1.657	2.063	2.594	3.219
Thread pitch (Threads per inch)		0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)
<i>P</i>	max.	0.064	0.064	0.063	0.063
	min.	0.061	0.061	0.060	0.060
<i>Q</i>	max.	2.03	2.28	2.405	2.655
	min.	2.00	2.25	2.375	2.625
<i>R</i>	min.	1.875	2.125	2.25	2.5
<i>S</i>	max.	0.26	0.26	0.26	0.26
	min.	0.24	0.24	0.24	0.24
<i>T</i>		30°	30°	30°	30°
<i>X</i>	max.	1.895	2.365	2.985	3.635
	min.	1.885	2.355	2.975	3.625

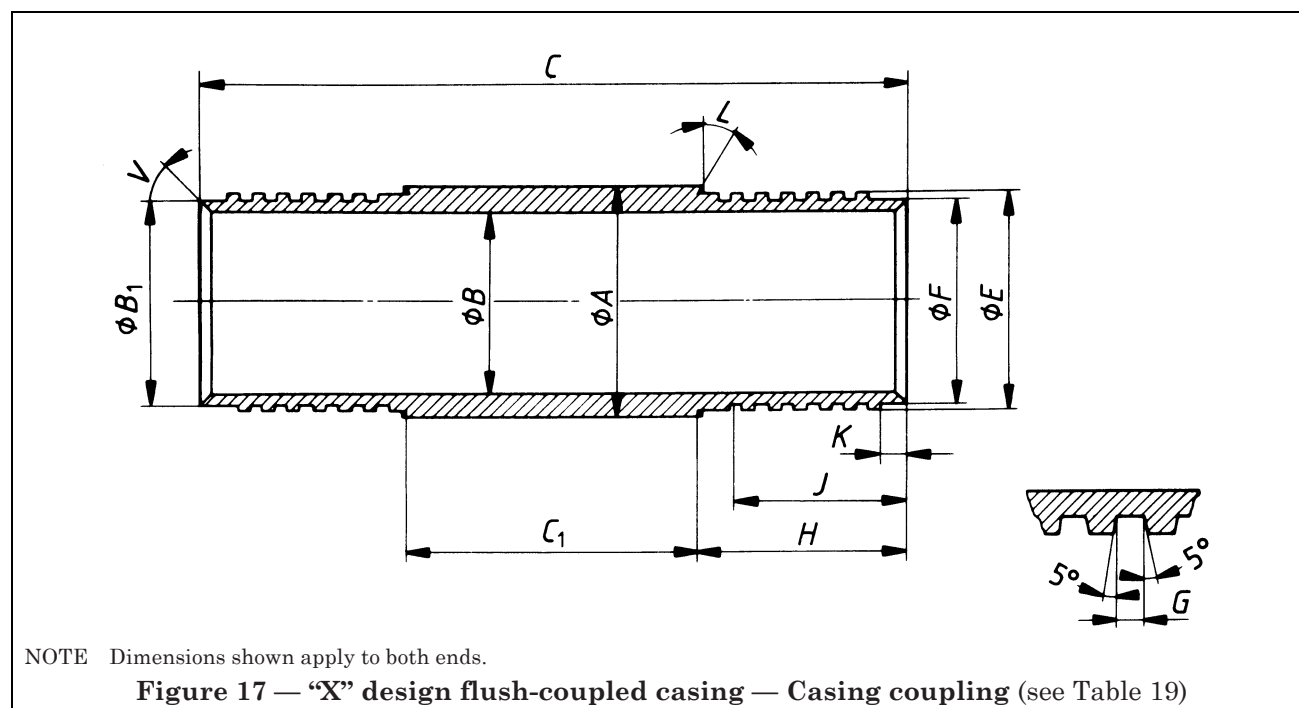


Table 19 — “X” design flush-coupled casing — Casing coupling

Dimension		RX	EX	AX	BX	NX	HX	PX	SX	UX	ZX
A	max.	1.442	1.822	2.26	2.885	3.515	4.515	5.541	6.675	7.682	8.69
	min.	1.437	1.812	2.25	2.875	3.500	4.500	5.459	6.575	7.568	8.56
B	max.	1.20	1.51	1.916	2.385	3.015	3.952	5.015	6.002	7.055	8.108
	min.	1.19	1.50	1.906	2.375	3.000	3.937	4.865	5.815	6.937	7.937
B ₁	max.	1.20	1.590	1.995	2.525	3.150	4.105	5.095	6.210	7.200	8.185
	min.	1.19	1.565	1.970	2.500	3.125	4.080	5.070	6.185	7.175	8.160
C	ref.	4	5	7	7.75	8.25	8.5	9	10	11	12
C ₁	max.	2.136	1.45	2.932	3.394	3.394	3.87	3.94	4.442	4.94	5.454
	min.	2.116	1.43	2.912	3.374	3.374	3.85	3.92	4.422	4.92	5.434
E	max.	1.347	1.717	2.124	2.686	3.311	4.264	5.254	6.368	7.380	8.364
	min.	1.345	1.715	2.122	2.684	3.309	4.261	5.251	6.363	7.375	8.359
F	max.	1.287	1.655	2.061	2.592	3.217	4.169	5.160	6.274	7.266	8.250
	min.	1.282	1.650	2.056	2.587	3.212	4.164	5.156	6.270	7.261	8.245
Thread pitch (Threads per inch)		0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.125 (8)	0.2 (5)	0.2 (5)	0.2 (5)	0.25 (4)	0.25 (4)
G	max.	0.064	0.064	0.064	0.063	0.063	0.102	0.101	0.101	0.125	0.125
	min.	0.061	0.061	0.061	0.060	0.060	0.099	0.097	0.097	0.121	0.121
H	max.	0.947	1.79	2.05	2.195	2.44	2.33	2.545	2.794	3.044	3.288
	min.	0.927	1.77	2.03	2.175	2.42	2.31	2.525	2.774	3.024	3.268
J	min.	0.875	1.625	1.875	2	2.25	2.125	2.375	2.625	2.875	3.125
K	max.	0.135	0.198	0.198	0.198	0.198	0.198	0.198	0.198	0.198	0.198
	min.	0.116	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
L		0°	30°	30°	30°	30°	30°	15°	15°	15°	15°
V		0°	30°	30°	30°	30°	30°	30°	30°	30°	30°

