

This Standard is obsolescent.
See the BSI Catalogue for details.

BRITISH STANDARD 3550 : 1963

UDC 621.824-45

SPECIFICATION FOR INVOLUTE SPLINES

SPECIFICATION FOR INVOLUTE SPLINES

B.S. 3550 : 1963

Incorporating amendments issued May 1976 (AMD 1985)
and September 1983 (AMD 4371)

BRITISH STANDARDS INSTITUTION
Incorporated by Royal Charter

THIS BRITISH STANDARD, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 30th January, 1963.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 9000, fully indexed and with a note of the contents of each, will be found in the BSI Catalogue. The BSI Catalogue may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

B.S. 1044. Recommended designs for plug, ring and gap gauges.

B.S. 2059. Straight-sided splines and serrations.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

CO-OPERATING ORGANIZATIONS

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared consists of representatives from the following Government departments and scientific and industrial organizations:

*Admiralty
Air Ministry
Associated Offices' Technical Committee
Association of Mining Electrical and Mechanical Engineers
Association of Consulting Engineers (Incorporated)
British Chemical Plant Manufacturers' Association
British Compressed Air Society
*British Electrical and Allied Manufacturers' Association
*British Engineers' Association
*British Gear Manufacturers' Association
British Internal Combustion Engine Manufacturers' Association
*British Iron and Steel Federation
British Railways, The British Transport Commission
Crown Agents for Oversea Governments and Administrations
*D.S.I.R.—National Engineering Laboratory
Electricity Council, The Generating Board and the Area Boards in England and Wales
Engineering Equipment Users' Association
Gas Council

*High Commission of India
Institute of Marine Engineers
Institute of Petroleum
Institution of Civil Engineers
Institution of Gas Engineers
Institution of Heating and Ventilating Engineers
*Institution of Mechanical Engineers
*Institution of Mechanical Engineers (Automobile Division)
*Institution of Production Engineers
*Locomotive and Allied Manufacturers' Association of Great Britain
Machine Tool Trades Association
Ministry of Labour (Factory Inspectorate)
Ministry of Power
Ministry of Public Building and Works
Ministry of Transport
National Coal Board
National Physical Laboratory (D.S.I.R.)
Radio Industry Council
*War Office

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of this standard:

Association of Crane Makers
Association of Hydraulic Equipment Manufacturers
Bright Steel Bar Association
British Cycle and Motor Cycle Industries Association Ltd.
British Internal Combustion Engine Research Association
British Ship Research Association
Gauge and Toolmakers' Association

Institution of Engineers and Shipbuilders in Scotland
Milling Cutter and Reamer Association
Ministry of Aviation
North East Coast Institution of Engineers and Shipbuilders
Society of British Aircraft Constructors Ltd.
Steel Works Plant Association
Taper Pin Manufacturers' Association

The following B.S.I. references relate to the work on this standard:
Committee references MEE/4, MEE/4/3 Drafts for comment A(MEE)8557, AA(MEE)2785

CONTENTS

Part 1. Dimensions

	Page		Page
Co-operating organizations	2	6. 3/6 pitch-flat root side fit	19
Foreword	5	7. 4/8 pitch-flat root side fit	20
SPECIFICATION		8. 5/10 pitch-flat root side fit	21
1. Scope	5	9. 6/12 pitch-flat root side fit	22
2. Terms, definitions and symbols	5	10. 8/16 pitch-flat root side fit	23
3. Types of fit	8	11. 10/20 pitch-flat root side fit	24
4. Formulae for basic dimensions	8	12. 12/24 pitch-flat root side fit	25
5. Fillets and chamfers	10	13. 16/32 pitch-flat root side fit	26
6. Classes of fit	10	14. 20/40 pitch-flat root side fit	27
7. Spline errors	10	15. 24/48 pitch-flat root side fit	28
8. Effect of spline errors	11	16. 32/64 pitch-flat root side fit	29
9. Effective and actual dimensions	11	17. 3/6 pitch-flat root major diameter fit	30
10. Use of effective and actual dimensions	13	18. 4/8 pitch-flat root major diameter fit	31
11. Spline tables	13	19. 5/10 pitch-flat root major diameter fit	32
12. Drawing data	13	20. 6/12 pitch-flat root major diameter fit	33
13. Calculation of fillets	54	21. 8/16 pitch-flat root major diameter fit	34
14. Modifications for low numbers of splines	54	22. 10/20 pitch-flat root major diameter fit	35
FIGURES		23. 12/24 pitch-flat root major diameter fit	36
1. Terms and symbols	7	24. 16/32 pitch-flat root major diameter fit	37
2. Profile errors	11	25. 2.5/5 pitch-fillet root side fit	38
3. Effect of splined hole errors	12	26. 3/6 pitch-fillet root side fit	39
4. Effect of splined shaft errors	12	27. 4/8 pitch-fillet root side fit	40
5. Spline fit control	13	28. 5/10 pitch-fillet root side fit	41
6-12. Drawing data	14-17	29. 6/12 pitch-fillet root side fit	42
13. Fillet for fillet root, internal	54	30. 8/16 pitch-fillet root side fit	43
14. Fillet for fillet root, external	54	31. 10/20 pitch-fillet root side fit	44
TABLES		32. 12/24 pitch-fillet root side fit	45
1. Formulae for basic dimensions	8	33. 16/32 pitch-fillet root side fit	46
2. Basic dimensions	9	34. 20/40 pitch-fillet root side fit	47
3. Internal (hole) and external (shaft) spline tolerances	10	35. 24/48 pitch-fillet root side fit	48
4. Effective clearance	12	36. 32/64 pitch-fillet root side fit	49
5. 2.5/5 pitch-flat root side fit	18	37. 40/80 pitch-fillet root side fit	50
		38. 48/96 pitch-fillet root side fit	51
		39. Machining tolerances	52
		40. Formulae for dimensions and tolerances in tables 5 to 38 inclusive	53
		41. One/Two pitch basic dimensions	55
		42. Basic spline data	56

CONTENTS (continued)

Part 2. Gauging and Inspection

	Page		Page
Foreword	57	28. Measurement with three pins	69
SPECIFICATION		29. Cumulative pitch error chart	70
15. Scope	57	30. Pitch readings due to eccentricity	70
16. Inspection methods	57	31. Typical chart record	70
17. Inspection with gauges	57	32. Measurement change factor K_i	71
18. Gauges for splined holes	59	33. Measurement change factor K_e	71
19. Gauges for splined shafts	61	TABLES	
20. Gauge tolerances	64	43. Relationship between work and gauge tolerances	63
21. Relationship between gauge and work	65	44. Allowable errors for gauges	64
22. Measurement with pins	68	45. Tolerances for actual space width and spline thickness of gauges	64
23. Analytical inspection	69	46. Tolerances over measuring pins: plug gauges	64
24. Change factor	71	47. Tolerances between measuring pins: ring gauges	65
FIGURES		48. Tolerances for major and minor diameters of gauges	65
15. Space width and spline thickness inspection	57	49. Measurements between pins for maximum actual space width, splined hole	72
16. GO full form plug gauge for side fit and NOT GO composite plug gauge for side fit and major diameter fit	58	50. Measurements over pins for minimum actual spline thickness, splined shaft, Class 1 fit	73
17. GO full form major diameter fit plug gauge	59	51. Measurements over pins for minimum actual spline thickness, splined shaft, Class 2 fit	74
18. NOT GO sector plug gauge	60	52. Measurements between pins for basic space width, splined hole	75
19. NOT GO major diameter fit sector plug gauge	60	53. Measurements over pins, for basic spline thickness, splined shaft	76
20. Ring gauge: GO full form side fit, NOT GO composite side fit and major diameter fit	61	APPENDIX	
21. GO full form major diameter fit ring gauge	62	54. Sevolutes of angles	77
22. NOT GO sector ring gauge	62	INDEX	
23. Relationship between full form and composite ring gauges and splined shafts	66	Index	79
24. Relationship between full form and composite ring gauges and splined holes	67		
25. Measurement between pins	68		
26. Measurement over pins	68		
27. Six spline, internal	69		

BRITISH STANDARD SPECIFICATION FOR INVOLUTE SPLINES

Part 1. Dimensions

FOREWORD

This British Standard has been prepared under the direction of the Mechanical Engineering Industry Standards Committee, and is complementary to B.S. 2059, 'Straight sided splines and serrations'.

After the publication of B.S. 2059 in 1953 preliminary work on a standard for involute splines was commenced. It became apparent that the A.S.A. B5 Standard was in use to some extent and that interchangeability of parts made to British and American Standards would be most desirable. It was decided to publish a British Standard for Involute splines omitting reference to the serrations which appear in A.S.A. Standard B5 as the Committee considered that a satisfactory choice of serrations was available from B.S. 2059 : Part 2.

The basic dimension of all sizes of splines covered are the same as those given in the American Standard A.S.A. B5-15: 1960 for

- a. major diameter fit
- b. side fit

The Committee considered the terms defined in B.S. 2517, 'Definitions for use in mechanical engineering' and the terms and notation defined in B.S. 2519, 'Glossary of terms and notation for toothed gearing' but decided to adhere to those given in the A.S.A. standard. Definitions of the terms used are included in this standard.

Details of gauges and inspection are given in Part 2.

Obsolescent (by Amendment No. 2)

The need for the equipment covered by this British Standard has been reviewed and it has been decided that, in the interests of rationalization, it should be regarded as obsolescent and not therefore used for new designs. The standard will be withdrawn in due course.

NOTE. Reference should now be made to BS 6186 'Specification for involute splines; metric module' Part 1 'Dimensions and tolerances.'

SPECIFICATION

1. SCOPE

This British Standard provides data and guidance for the design of straight involute splines of 30° pressure angle, tabulates limiting dimensions and deals with manufacturing errors and their effect on the fit between mating spline elements.

The range of splines covered is:

Side fit,	}	2.5/5 to 32/64 pitch,
flat root		6 to 60 splines inclusive
Major diameter fit,	}	3/6 to 16/32 pitch,
flat root		6 to 60 splines inclusive
Side fit,	}	2.5/5 to 48/96 pitch,
fillet root		6 to 60 splines inclusive
(see figure 1)		

2. TERMS, DEFINITIONS AND SYMBOLS

For the purposes of this standard the following terms and definitions apply.

2.1 An *involute spline* is a spline having involute profiles.

2.2 *Pitch circle* is the reference circle from which all transverse spline dimensions are derived and is the circle on which the pressure angle of the involute has the specified standard value.

2.3 *Pitch diameter* (D) is the diameter of the pitch circle.

2.4 *Pitch* is a combination number; the upper or first number is the diametral pitch, the lower or second number is the stub pitch.

2.5 *Diametral pitch* (P) is the number of splines per inch of pitch diameter.

2.6 *Stub pitch* (P_s) is a number used to compute addendum and dedendum; 1 inch divided by the stub pitch is the basic addendum.

2.7 *Circular pitch* (p) is the distance between corresponding points of adjacent splines along the pitch circle.

2.8 *Pitch point* is the intersection of the spline profile with the pitch circle.

2.9 *Pressure angle* is the acute angle between a line tangent to an involute and a radial line through the point of tangency. Unless otherwise specified, it is the main pressure angle.

2.10 *Main pressure angle* (ϕ) is the pressure angle at the pitch point.

2.11 *Base circle* is the circle from which involute spline profiles are constructed.

2.12 *Base diameter* (D_b) is the diameter of the base circle.

2.13 *Major diameter* is the diameter of the outermost surface of the spline (major circle). It is the outside diameter (D_o) of the splined shaft or the root diameter (D_i) of the splined hole.

2.14 Minor diameter is the diameter of the innermost surface of the spline (minor circle). It is the inside diameter (D_i) of the splined hole or the root diameter (D_{re}) of the splined shaft.

2.15 Addendum (a) is the radial distance from the pitch circle to the minor circle of the splined hole and from the pitch circle to the major circle of the splined shaft.

2.16 Dedendum (b) is the radial distance from the pitch circle to the major circle of the splined hole and from the pitch circle to the minor circle of the splined shaft.

2.17 Depth of engagement is the sum of the addenda of internal (hole) and external (shaft) splines, less the height of any chamfer.

2.18 Form clearance (c_F) is the radial depth of involute profile beyond the depth of engagement with the mating part.

2.19 Form diameter (D_F) is the diameter at the deepest point of desired true involute form (TIF).

2.20 Fillet is the concave portion of the spline profile which joins the sides to the bottom of the space.

2.21 Fillet root splines are those in which a single fillet in the general form of an arc joins the sides of adjacent splines.

2.22 Flat root splines are those in which fillets join the arcs of major or minor circles to the spline sides.

2.23 Effective space width of a splined hole is equal to the circular spline thickness on the pitch circle of an imaginary perfect splined shaft which would fit the splined hole without looseness or interference.

2.24 Effective spline thickness of a splined shaft is equal to the circular space width on the pitch circle of an imaginary perfect splined hole which would fit the splined shaft without looseness or interference.

2.25 Actual space width (s) is the length of arc on the pitch circle of any single space.

2.26 Actual spline thickness (t) is the length of arc on the pitch circle of any single spline.

2.27 Cumulative pitch error is the value obtained by subtracting the design length from the actual length between corresponding profiles of splines not adjacent to each other.

2.28 Profile error is the deviation from the specified spline profile (see Fig. 2).

2.29 Alignment error (twist) is the deviation of the splines from parallelism with the axis of the splined shaft or splined hole.

2.30 Effective error is the accumulated effect of the spline errors on the fit with the mating part.

2.31 Error allowance (e) is the permissible effective error.

2.32 Machining tolerance (m) is the permissible variation in actual space width or actual spline thickness.

2.33 Total tolerance ($m \pm e$) is the machining tolerance plus the error allowance.

2.34 Effective clearance (c_v) is the effective space width of the splined hole minus the effective spline thickness of the mating splined shaft.

2.35 Length of engagement (L_a) is the axial length of contact between mating splines.

2.36 Active spline length (L_s) is the length of spline which contacts the mating spline. On sliding splines it exceeds the length of engagement.

2.37 Symbols

a	addendum
b	dedendum
c_v	effective clearance
c_F	form clearance
D	pitch diameter
D_b	base diameter
D_{ci}	pin contact diameter, internal spline
D_{ce}	pin contact diameter, external spline
D_F	form diameter
D_{Fi}	form diameter, internal spline
D_{Fe}	form diameter, external spline
D_i	minor diameter, internal
D_o	major diameter, external
D_{re}	minor diameter, external
D_{ri}	major diameter, internal
d_c	diameter of measuring pin for external spline
d_i	diameter of measuring pin for internal spline
e	error allowance
K_e	change factor for external spline
K_i	change factor for internal spline
L	spline length
L_a	active spline length
L_s	length of engagement
m	machining tolerance
M_e	measurement over pins
M_i	measurement between pins
N	number of splines
P	diametral pitch
P_s	stub pitch
p	circular pitch
r_f	fillet radius
s	actual space width, circular
s_v	effective space width, circular
t	actual spline thickness, circular
t_v	effective spline thickness, circular
ϕ	main pressure angle
ϕ_{ci}	pressure angle at contact diameter, internal
ϕ_{ce}	pressure angle at contact diameter, external
ϕ_i	pressure angle at pin centre, internal
ϕ_e	pressure angle at pin centre, external
ϕ_F	pressure angle at form diameter

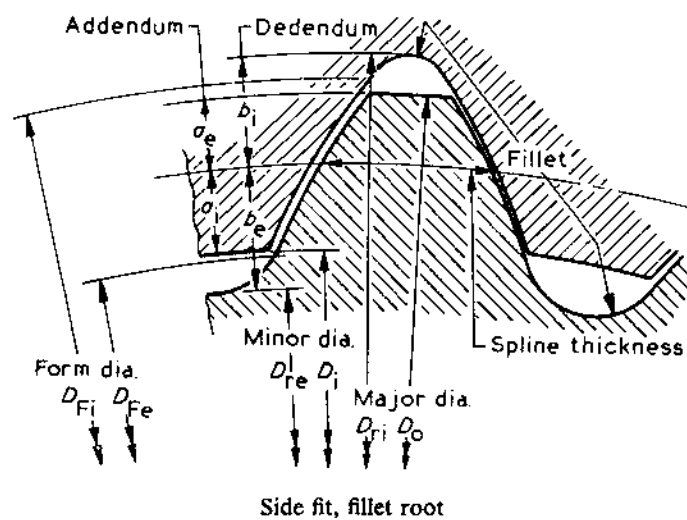
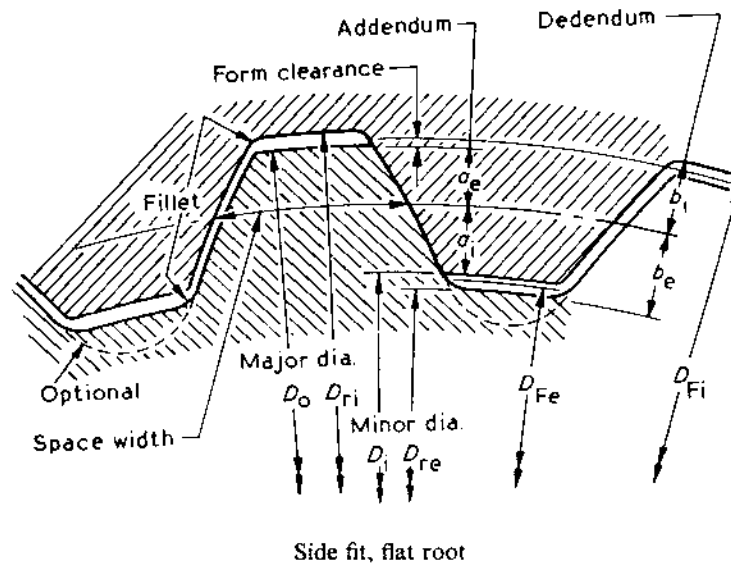
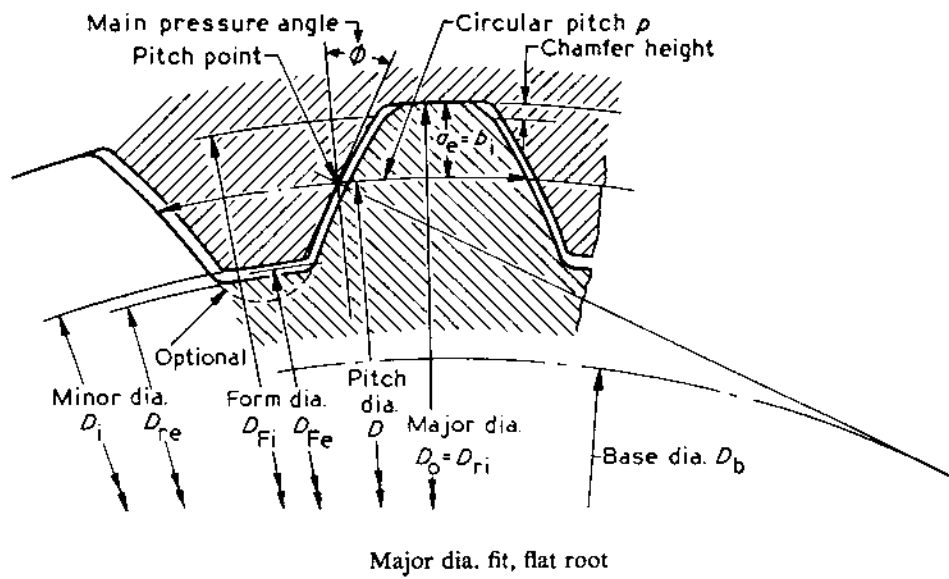


Fig. 1. Terms and symbols

3. TYPES OF FIT

(see Fig. 1)

3.1 Major diameter fit. In this type the members fit on the major diameter, the sides of the splines act as drivers and the minor diameters are clearance dimensions. The roots of the spline spaces of the splined hole are flat and those of the splined shaft are flat or approximately semi-circular.

3.2 Side fit. In this type the splined hole and splined shaft members fit on the sides of the splines only. The major and minor diameters are clearance dimensions and the roots of the splines of each member may be flat or approximately semi-circular.

4. FORMULAE FOR BASIC DIMENSIONS

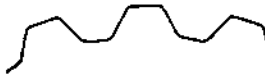
The formulae for the basic dimensions are given in Table 1.

TABLE 1.

	Symbol	Flat root side fit 2.5/5 to 32/64 pitch inc.	Flat root major dia. fit 3/6 to 16/32 pitch inc.	Fillet root side fit 2.5/5 to 48/96 pitch inc.
Stub pitch	P_s	$2P$	$2P$	$2P$
Pitch diameter	D	N/P	N/P	N/P
Base diameter	D_b	$D \cos \phi$	$D \cos \phi$	$D \cos \phi$
Circular pitch	p	π/P	π/P	π/P
Minimum effective space width	$s_{\min}$	$\pi/2P$	$\pi/2P$	$\pi/2P$
Addendum, internal	a_i	$1/P_s^*$	$1/P_s^*$	$1/P_s^*$
Addendum, external	a_e	$0.8/P_s - 0.002$	$1/P_s$	$1/P_s$
Dedendum, internal	b_i	$1/P_s$	$1/P_s$	$1.8/P_s$
Dedendum, external 2.5/5 to 12/24 inc.	b_e	$1.2/P_s + 0.002$	$1.2/P_s + 0.002$	$1.8/P_s$
Dedendum, external 16/32 to 48/96 inc.	b_e	$1.2/P_s + 0.002$	$1.2/P_s + 0.002$	$2.0/P_s$
Form clearance	c_F	0.001 D max. 0.010 min. 0.002		

* Not correct for low numbers of splines. (See modified form diameter, Clause 14). For formulae for dimensions and tolerances see Table 40.

TABLE 2. BASIC DIMENSIONS (INCHES)

Relative size	Pitch	Circular pitch	Minimum effective space width
$N = 15$ 	2.5/5	1.2566	0.6283
$N = 15$ 	3/6	1.0472	0.5236
$N = 15$ 	4/8	0.7854	0.3927
$N = 20$ 	5/10	0.6283	0.3142
$N = 20$ 	6/12	0.5236	0.2618
$N = 20$ 	8/16	0.3927	0.1963
$N = 40$ 	10/20	0.3142	0.1571
$N = 40$ 	12/24	0.2618	0.1309
$N = 40$ 	16/32	0.1963	0.0982
$N = 40$ 	20/40	0.1571	0.0785
$N = 40$ 	24/48	0.1309	0.0654
$N = 40$ 	32/64	0.0982	0.0491
$N = 40$ 	40/80	0.0785	0.0393
$N = 40$ 	48/96	0.0654	0.0327

5. FILLETS AND CHAMFERS

5.1 Fillets for flat root splines. The fillet is controlled by the form diameter, and the maximum radius at maximum material conditions is given in the tables. If the fillet is produced by a generating process it will have a varying radius of curvature.

Specification of the fillet is not usually necessary. Where it is necessary to reduce stress concentrations to the minimum a minimum radius may be specified.

Flat root splines are suitable for most applications.

5.2 Fillets for fillet root splines. The tables give full tangent radii for maximum depth with a minimum value of 0.004 inch. These values are intended as a guide for the specification of approximate radii for highly stressed parts.

The curvature along any generated fillet varies and cannot be properly specified by a radius of any given value.

Fillet root splines are recommended for heavy loads because larger fillets reduce stress concentrations.

5.3 Chamfers for external (shaft) splines. These are required for major diameter fits to provide clearance for the fillet of the internal (hole) spline.

Where the same tooling is used for producing major diameter and side fit external (shaft) splines, a chamfer (which is usually permissible) may be generated on the side fit spline.

5.3.1 Standard internal (hole) splines have no chamfer at the minor diameter. Where the design requirements demand a chamfer, special tooling or a further operation will be required.

6. CLASSES OF FIT

6.1 Basis of system. The dimensions and resultant fits given in the tables are based on the basic hole system. In this system the design size of the splined hole is the basis, and variations in fit are obtained by varying the allowance on the splined shaft.

6.2 Major diameter fit is a close fit on the major diameter. The space width and spline thickness are the same as for the Class 1 (free) side fit.

6.3 Side fit. The members fit on the sides of the splines only. Two classes of fit are provided viz Class 2 (close) where the backlash is a minimum and Class 1 (free) where greater backlash is allowed. The same tolerances are used for both fits.

7. SPLINE ERRORS

The permissible tolerances for pitch, profile, alignment etc. as well as for machining are given in Table 3.

TABLE 3. INTERNAL (HOLE) AND EXTERNAL (SHAFT) SPLINE TOLERANCES
(In 0.0001 inch units)

Pitch	2.5/5 3/6	4/8 5/10	6/12 8/16	10/20 12/24	16/32 20/40	24/48 48/96					
N	*Machining tolerance (Summary of Table 39)										
10	16	15	13	12	12	12					
20	18	16	14	13	12	12					
30	19	18	16	14	13	13					
40	21	19	17	15	14	14					
50	23	21	19	16	15	15					
60	25	22	20	17	15	15					
*Error allowance											
10	23	20	17	16	14	12					
20	27	23	19	17	15	13					
30	30	25	21	19	16	15					
40	34	27	23	21	18	16					
50	37	30	25	22	19	17					
60	41	32	27	24	20	18					
†Maximum cumulative pitch error											
10	20	17	15	15	14	12					
20	24	20	18	17	15	13					
30	28	22	20	19	16	15					
40	32	25	22	20	18	16					
50	36	27	25	22	19	17					
60	40	30	27	24	20	18					
Profile error											
	+7 -10	+6 -8	+5 -7	+4 -6	+3 -5	+2 -4					
Alignment error											
Lg. In.	0.5	1	2	3	4	5	6	7	8	9	10
Error	3	4	5	6	7	8	9	10	11	12	13

* For basis of calculation see formulae in Table 40.

† For numbers of splines not given, proportionate values shall be taken.

7.1 Positive and negative profile errors are illustrated in Fig. 2. The reference profile, from which deviations occur, passes through the pitch point which is used to determine the actual space width or spline thickness. Profile error is positive in the direction of the space, and negative in the direction of the spline.

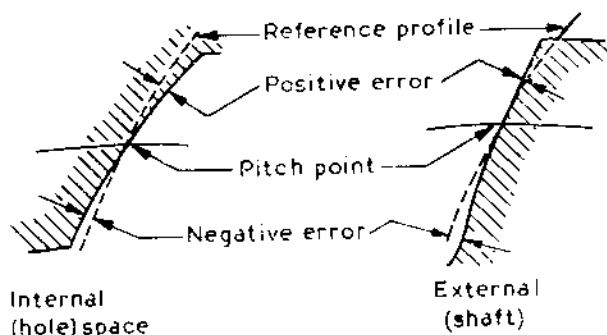


Fig. 2. Profile errors

7.2 Alignment

7.2.1 Tolerances for alignment error include the effect of taper.

7.2.2 The alignment tolerance applies to the total spline length or any portion thereof, unless otherwise specified.

7.3 Out of roundness may appear merely as a result of pitch and profile errors given in Table 3 and requires no further allowance. However, heat treatment and deflection of thin sections may cause out of roundness, which increases pitch and profile errors. Allowance for this will depend upon circumstances and is, therefore, not tabulated.

7.4 Eccentricity

7.4.1 Eccentricity of major diameters in relation to the pitch diameters of major diameter fit splines should be absorbed within the maximum material limits established by the tolerances on major diameters and effective space width or effective spline thickness.

7.4.2 Eccentricity of major and minor diameters, in relation to the pitch diameters of side fit splines must be controlled within the form diameters of the mating splines, even under conditions of maximum effective clearance. This standard does not establish specific tolerances.

NOTE. *Spline errors due to eccentricity.* This standard does not include corrections to take account of the eccentricity of locating surfaces.

If the alignment of mating splines is affected by the eccentricity of locating surfaces (e.g. bearing surfaces) relative to each other and/or to the splines, it may be necessary to decrease the effective and actual spline thickness of the external member in order to maintain the desired fit condition.

8. EFFECT OF SPLINE ERRORS

8.1 Pitch errors cause the clearance to vary between mating splines. Any pitch error reduces the clearance.

8.2 Profile errors. Positive profile errors affect the fit by reducing the clearance; negative profile errors do not affect the fit.

8.3 Alignment errors cause clearance variations and therefore usually reduce the clearance.

8.4 Error allowance. The effect of individual spline errors on the effective fit is less than their total, because areas of more than minimum clearance can be altered without changing the fit. The error allowance is 60 per cent of the sum of twice the positive profile error the maximum cumulative pitch error (see Fig. 29 of Part 2), and the alignment error for the length of engagement. The error allowances in Table 3 are based on an alignment error for an assumed length of engagement equal to one-half the pitch diameter. Adjustment may be required for a greater length of engagement.

9. EFFECTIVE AND ACTUAL DIMENSIONS

9.1 Effective and actual space width. Fig. 3, view A, illustrates a splined hole with errors of pitch and profile. View B shows that a perfect splined shaft contour (without errors) does not fit, even though each spline has the same width as the mating space. To allow the perfect splined shaft to fit in any position, all spaces of the splined hole must be widened by the amount of interference. This width as shown in view C, is the actual space width of the splined hole. The effective space width is the spline thickness of the perfect mating spline.

9.2 Effective and actual spline thickness. The same reasoning applied to the splined shaft leads to the concept of effective spline thickness which exceeds the actual spline thickness by the effective error. See Fig. 4.

9.3 Effective clearance. The effective space width of the splined hole minus the effective spline thickness of the splined shaft is the effective clearance, which defines the fit mating parts (this is strictly true only if high points of mating parts come into contact). Values are given in Table 4, which are summarized from Tables 5 to 38 inc.

9.4 Space width and spline thickness limits. The variation of actual space width and actual spline thickness within the machining tolerance causes corresponding variations of effective dimensions, so that there are four limit dimensions for each component part, as illustrated in the bar chart, Fig. 5.

9.4.1 The minimum effective space width is always basic, and is half the circular pitch; the maximum effective spline thickness is determined by the desired minimum effective clearance. The permissible variation of the effective clearance is then distributed between the internal (hole) and external (shaft) splines to arrive at the maximum effective space width and the minimum effective spline thickness. Limits of the actual space width and actual spline thickness are constructed from suitable error allowances.

TABLE 4. EFFECTIVE CLEARANCE
(In 0.0001 inch units)

Class 1 fit							Class 2 fit						
Pitch	2.5/5 3/6	4/8 5/10	6/12 8/16	10/20 12/24	16/32 20/40	24/48 48/96	Pitch	2.5/5 3/6	4/8 5/10	6/12 8/16	10/20 12/24	16/32 20/40	24/48 48/96
<i>N</i>	Minimum and maximum						<i>N</i>	Minimum and maximum					
10	20-52	17-47	15-41	15-39	15-39	15-39	10	0-32	0-30	0-26	0-24	0-24	0-24
20	22-58	18-50	16-44	15-41	15-39	15-39	20	0-36	0-32	0-28	0-26	0-24	0-24
30	24-62	20-56	17-49	16-44	15-41	15-41	30	0-38	0-36	0-32	0-28	0-26	0-26
40	26-68	22-60	18-52	17-47	15-43	15-43	40	0-42	0-38	0-34	0-30	0-28	0-28
50	28-74	23-65	19-57	17-49	15-45	15-45	50	0-46	0-42	0-38	0-32	0-30	0-30
60	30-80	25-69	20-60	18-52	15-45	15-45	60	0-50	0-44	0-40	0-34	0-30	0-30

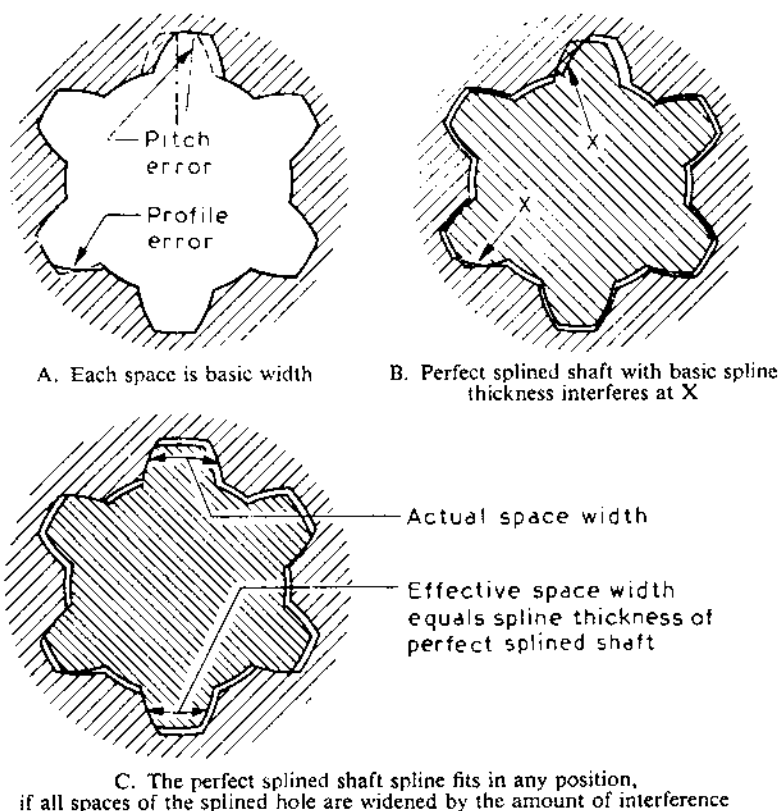
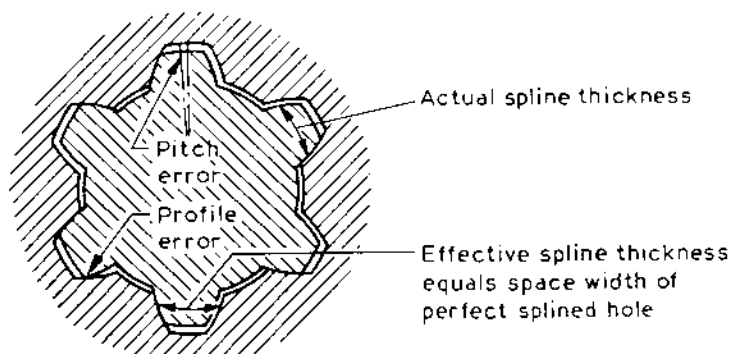


Fig. 3. Effect of splined hole errors



The perfect splined hole fits in any position,
if all shaft splines are narrowed by the amount of interference

Fig. 4. Effect of splined shaft errors

10. USE OF EFFECTIVE AND ACTUAL DIMENSIONS

Dimension	Effective	Actual	Dimensioning		
			Standard	Alternatives	
				A	B
				see Cl.10.4.1	see Cl.10.4.2
Space width of internal (hole)	$s_v \text{ max.}$	$s \text{ max.}$	Required	Required	(AUX.)
	$s_v \text{ min.}$	$s \text{ min.}$	(AUX.)	(AUX.)	(AUX.)
	$t_v \text{ max.}$	$t \text{ max.}$	(AUX.)	Required	Required
Spline thickness of external (shaft)	$t_v \text{ min.}$	$t \text{ min.}$	Required	Required	Required
	$c_v \text{ min.}$	$c \text{ min.}$	Required	Required	Required
	$c_v \text{ max.}$	$c \text{ max.}$	(AUX.)	Required	Required
				(AUX.)	(AUX.)
				(AUX.)	(AUX.)
				Required	(AUX.)

 c_v = Effective clearance e = Error allowance m = Machining tolerance (see Tables 39 and 40).

Fig. 5. Spline fit control

Fig. 5 presents four dimensions for space width and for spline thickness. Each of these has a definite function.

10.1 Minimum effective space width ($s_v \text{ min.}$) and maximum effective spline thickness ($t_v \text{ max.}$) These dimensions control the minimum effective clearance, and must always be specified.

10.2 Minimum actual space width ($s \text{ min.}$) and maximum actual spline thickness ($t \text{ max.}$) These dimensions cannot be used for acceptance or rejection of parts. If the actual space width is less than the minimum without causing the effective space width to be undersize, or if the actual spline thickness is more than the maximum without causing the effective spline thickness to be oversize, the effective error is less than anticipated; such parts are acceptable and not defective. The specification of these actual dimensions as processing auxiliary dimensions is recommended. They are used to analyse undersize effective space width or oversize effective spline thickness conditions to determine whether or not they are caused by excessive effective error.

10.3 Maximum actual space width ($s \text{ max.}$) and minimum actual spline thickness ($t \text{ min.}$) These dimensions define the machining tolerances and control the effective error. The difference between these dimensions reduced by the effective error of the internal (hole) and external (shaft) spline, is the maximum effective clearance. Where the effective error obtained in machining is appreciably less than the error allowance, these dimensions must be adjusted in order to maintain the desired fit.

10.4 Maximum effective space width ($s_v \text{ max.}$) and minimum effective spline thickness ($t_v \text{ min.}$) These dimensions define the maximum effective clearance, but they do not control the effective error.

10.4.1 They may be used, in addition to the limits in Clause 10.3 in order to prevent the increase of maximum effective clearance, due to reduction of effective errors. See Fig. 5, alternative A.

10.4.2 Where the actual size ($s \text{ max.}$ or $t \text{ min.}$) needs no control or is controlled by independent and separate

metrological inspection, dimensions $s_v \text{ max.}$ or $t_v \text{ min.}$ may be substituted for those given in Clause 10.3. See Fig. 5, alternative B.

11. SPLINE TABLES

Tables 5 to 38 inclusive give the dimensions for splines of the side fit—flat root type, major diameter fit—flat root type, and side fit—fillet root type. Dimensions for the one/two pitch splines Table 41, are given for reference because spline dimensions in other tables are inversely proportioned to the one/two pitch spline dimensions.

NOTE. Adjustments may be required to allow for heat treatment distortions, thin sections, very long splines, precision requirements and so forth.

11.1 Formulae for dimensions and tolerances listed in Tables 5 to 38 are shown in Table 40. Some dimensions are modified as explained in clause 14. Space width and spline thickness tolerances are based on the sum of the machining tolerance and error allowance given in Table 3.

12. DRAWING DATA

It is important that uniform methods of presentation be used to show complete information on detail drawings. Much misunderstanding will be avoided by following the suggested arrangement of dimensions and data, as shown in Figs. 6 to 12. The X's indicate where the dimensions are to be placed, and the number of X's indicate the number of decimal places normally used.

NOTE. Details of pin diameters and dimensions over pins are given in Part 2 of this standard.

12.1 Spline data and auxiliary dimensions. Spline data are used for design and manufacturing purposes. Auxiliary dimensions are dimensions without tolerances used as the basis of calculation only and do not govern manufacturing or inspection operations in any way.

12.2 Where a fillet root external spline is used for a major diameter fit the drawing should conform with Fig. 12. The minor diameters and fillet radii are obtained from tables 25—38 inclusive columns 18.3 and 19 respectively and other dimensions from tables 17—24 inclusive.

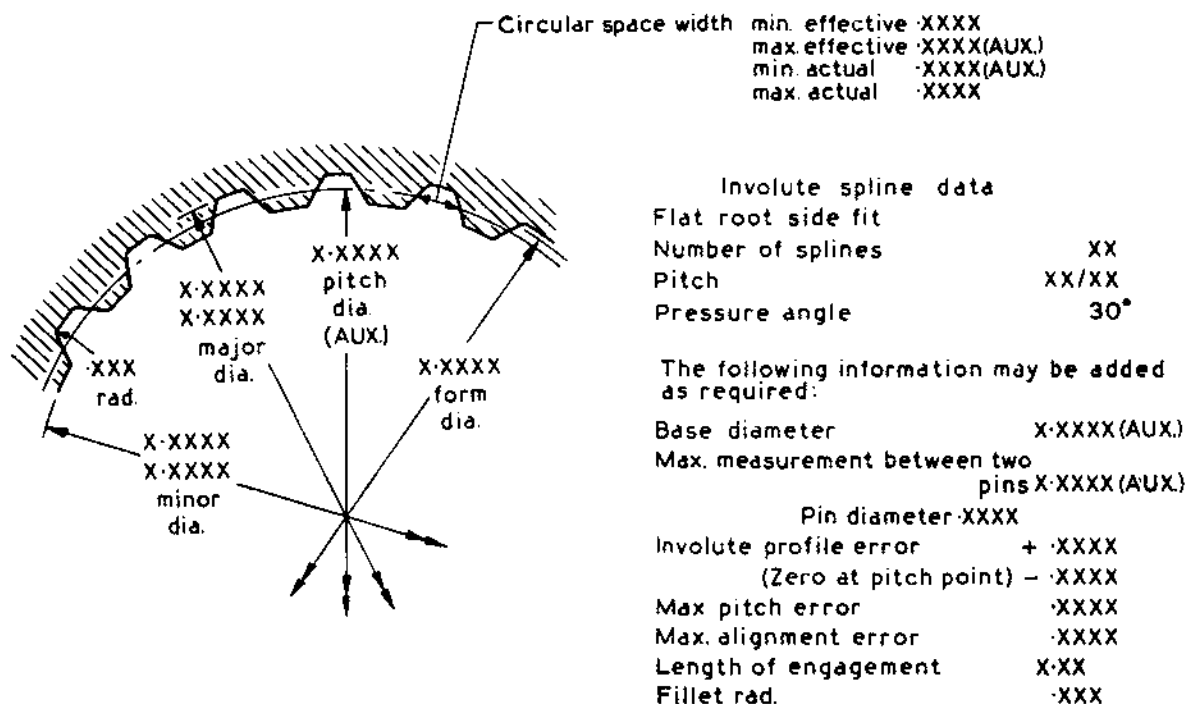


Fig. 6. Drawing data : Splined hole, side fit, flat root type

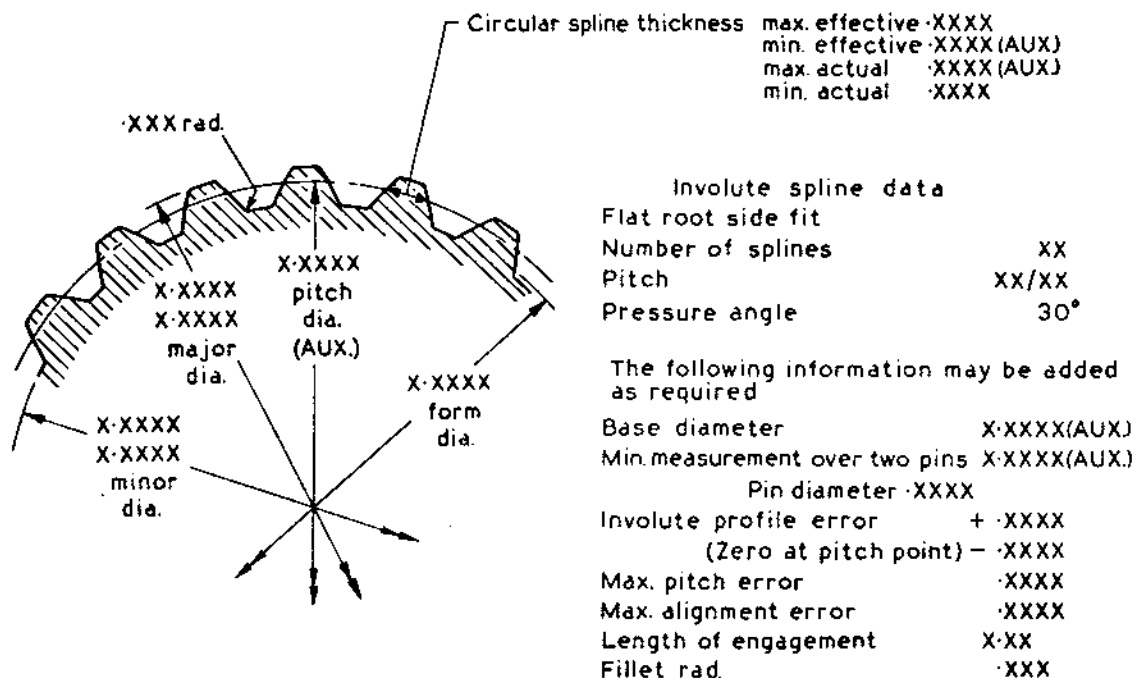


Fig. 7. Drawing data : Splined shaft, side fit, flat root type

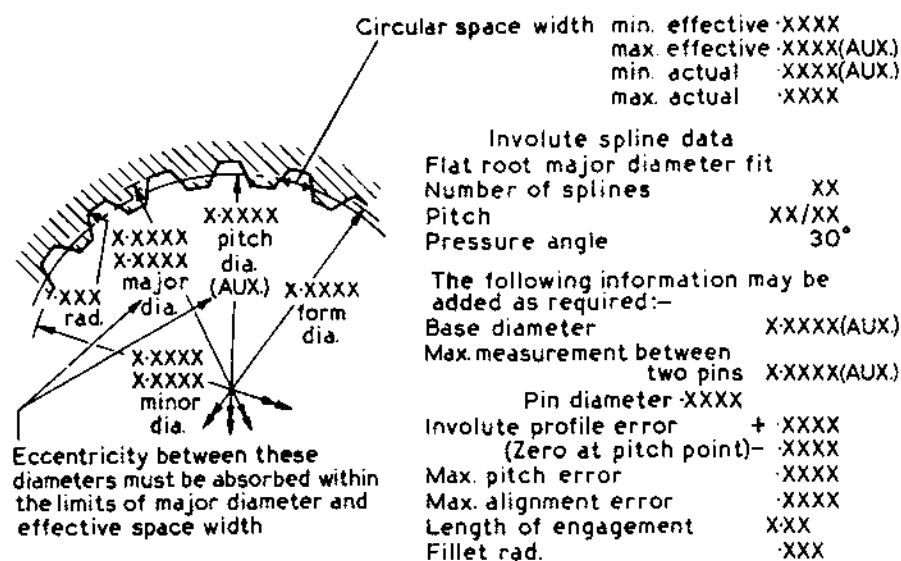


Fig. 8. Drawing data : Splined hole, major diameter fit, flat root type

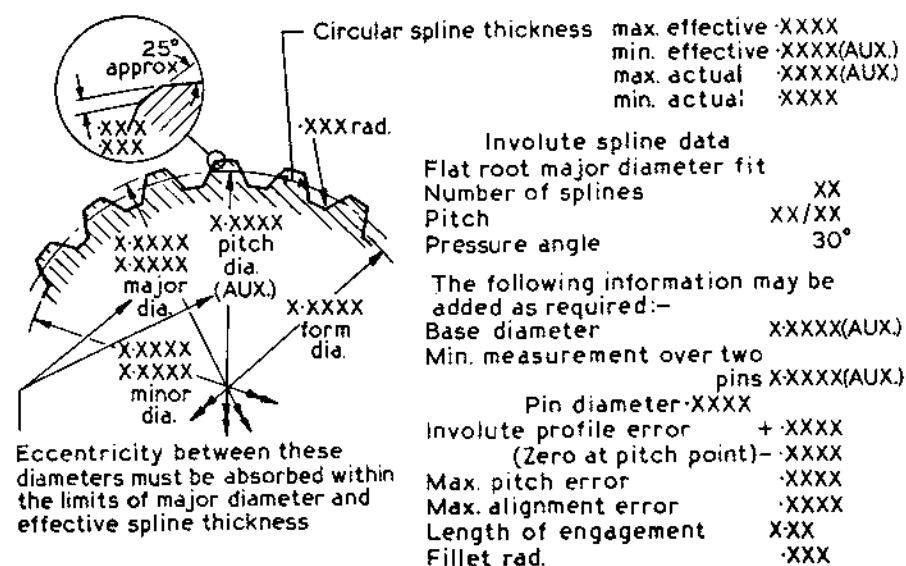


Fig. 9. Drawing data : Splined shaft, major diameter fit, flat root type

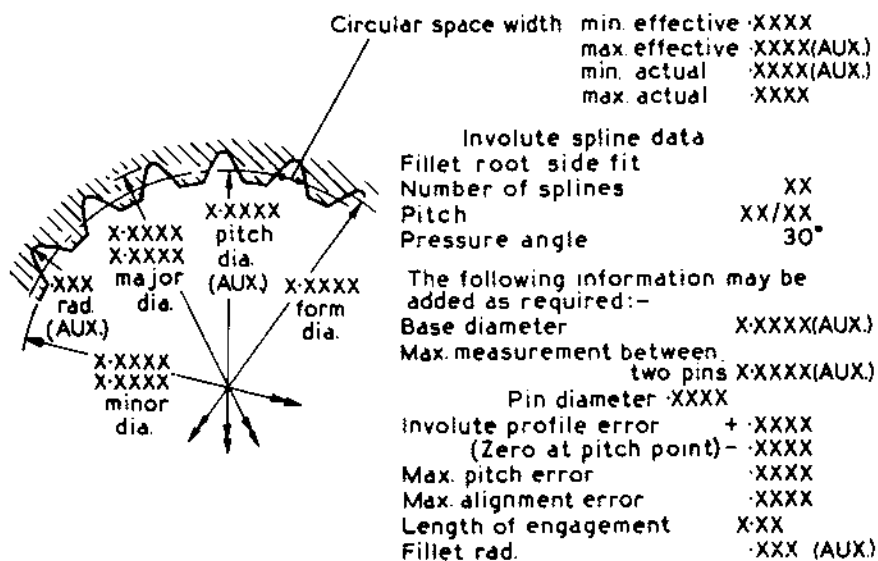


Fig. 10. Drawing data : Splined hole, side fit, fillet root type

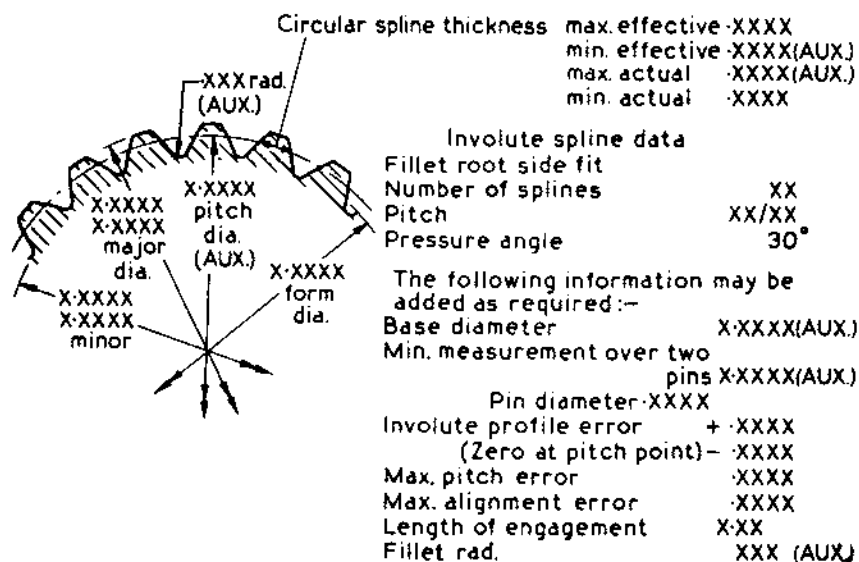


Fig. 11. Drawing data : Splined shaft, side fit, fillet root type

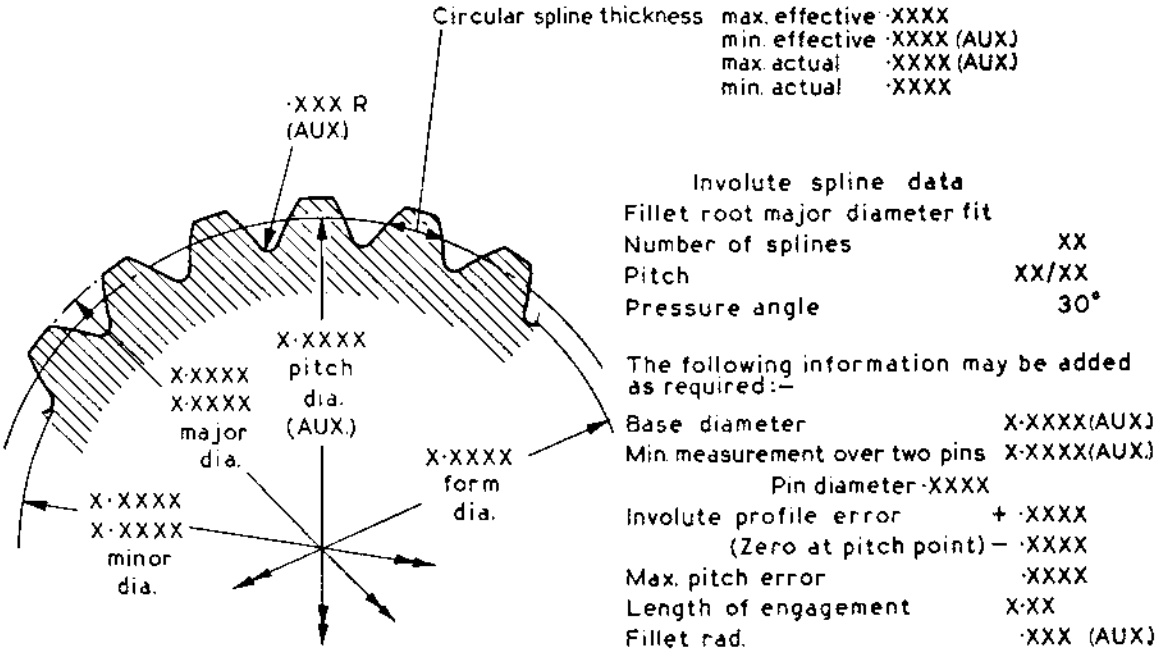


Fig. 12. Drawing data : Splined shaft, fillet root major diameter fit

TABLE 5. 2.5/5 PITCH, FLAT ROOT SIDE FIT

INCHES

INTERNAL AND EXTERNAL			INTERNAL (See Fig. 6 for drawing data)							EXTERNAL (See Fig. 7 for drawing data)							
No. of splines <i>N</i>	Pitch dia. <i>D</i>	Base dia. <i>D_b</i>	Major dia. <i>D_{ti}</i>	Form dia. <i>D_{Fi}</i>	(d) Minor dia. <i>D_i</i>	Fillet rad. <i>r_i</i>	Space width(*)		Spline thickness(*)				Major dia. <i>D_o</i>	(d) Form dia. <i>D_{Fe}</i>	Minor dia. <i>D_{re}</i>	Fillet rad. <i>r_e</i>	
							(b) Max. actual <i>s</i>	(c) Min. eff. <i>s_e</i>	Class 1 fit		Class 2 fit						
									(c) Max. eff. <i>t_e</i>	(b) Min. actual <i>t</i>	(c) Max. eff. <i>t_e</i>	(b) Min. actual <i>t</i>					
1	2	3	4-1	5-1	6-1	7	8	9	10	11	12	13	14-1	17-1	18-1	19	
Tolerance in 0.0001 inch units			+450 -0	—	+200 -0	—	—	—	—	—	—	—	+0 -200	—	+0 -450	—	
6	2.4000	2.0785	2.8000	2.7208	2.1037	0.105	0.6320	0.6283	0.6264	0.6227	0.6283	0.6246	2.7160	2.0989	1.9160	0.113	
7	2.8000	2.4249	3.2000	3.1216	2.4799	0.100	0.6321	0.6283	0.6264	0.6226	0.6283	0.6245	3.1160	2.4743	2.3160	0.104	
8	3.2000	2.7713	3.6000	3.5224	2.8628	0.097	0.6321	0.6283	0.6263	0.6225	0.6283	0.6245	3.5160	2.8564	2.7160	0.097	
9	3.6000	3.1177	4.0000	3.9232	3.2500	0.094	0.6322	0.6283	0.6263	0.6224	0.6283	0.6244	3.9160	3.2428	3.1160	0.091	
10	4.0000	3.4641	4.4000	4.3240	3.6401	0.091	0.6322	0.6283	0.6263	0.6224	0.6283	0.6244	4.3160	3.6321	3.5160	0.086	
11	4.4000	3.8105	4.8000	4.7248	4.0324	0.089	0.6323	0.6283	0.6263	0.6223	0.6283	0.6243	4.7160	4.0236	3.9160	0.081	
12	4.8000	4.1569	5.2000	5.1256	4.4262	0.087	0.6323	0.6283	0.6263	0.6222	0.6283	0.6243	5.1160	4.4166	4.3160	0.078	
13	5.2000	4.5033	5.6000	5.5264	4.8211	0.085	0.6324	0.6283	0.6262	0.6222	0.6283	0.6242	5.5160	4.8107	4.7160	0.074	
14	5.6000	4.8497	6.0000	5.9272	5.2169	0.084	0.6324	0.6283	0.6262	0.6221	0.6283	0.6242	5.9160	5.2057	5.1160	0.072	
15	6.0000	5.1962	6.4000	6.3280	5.6135	0.082	0.6325	0.6283	0.6262	0.6220	0.6283	0.6241	6.3160	5.6015	5.5160	0.069	
16	6.4000	5.5426	6.8000	6.7288	6.0106	0.081	0.6325	0.6283	0.6262	0.6219	0.6283	0.6241	6.7160	5.9978	5.9160	0.067	
17	6.8000	5.8890	7.2000	7.1296	6.4081	0.079	0.6326	0.6283	0.6262	0.6219	0.6283	0.6240	7.1160	6.3945	6.3160	0.065	
18	7.2000	6.2354	7.6000	7.5304	6.8061	0.078	0.6327	0.6283	0.6261	0.6218	0.6283	0.6239	7.5160	6.7917	6.7160	0.063	
19	7.6000	6.5818	8.0000	7.9312	7.2043	0.077	0.6327	0.6283	0.6261	0.6217	0.6283	0.6239	7.9160	7.1891	7.1160	0.062	
20	8.0000	6.9282	8.4000	8.3320	7.6029	0.076	0.6328	0.6283	0.6261	0.6216	0.6283	0.6238	8.3160	7.5869	7.5160	0.060	
21	8.4000	7.2746	8.8000	8.7328	8.0016	0.074	0.6328	0.6283	0.6261	0.6216	0.6283	0.6238	8.7160	7.9848	7.9160	0.060	
22	8.8000	7.6210	9.2000	9.1336	8.4006	0.073	0.6329	0.6283	0.6261	0.6215	0.6283	0.6237	9.1160	8.3830	8.3160	0.060	
23	9.2000	7.9674	9.6000	9.5344	8.8000	0.072	0.6329	0.6283	0.6260	0.6214	0.6283	0.6237	9.5160	8.7816	8.7160	0.060	
24	9.6000	8.3138	10.0000	9.9352	9.2000	0.071	0.6330	0.6283	0.6260	0.6214	0.6283	0.6236	9.9160	9.1808	9.1160	0.060	
25	10.0000	8.6602	10.4000	10.3360	9.6000	0.070	0.6330	0.6283	0.6260	0.6213	0.6283	0.6236	10.3160	9.5800	9.5160	0.060	
26	10.4000	9.0067	10.8000	10.7360	10.0000	0.069	0.6331	0.6283	0.6260	0.6212	0.6283	0.6235	10.7160	9.9800	9.9160	0.060	
27	10.8000	9.3531	11.2000	11.1360	10.4000	0.069	0.6331	0.6283	0.6260	0.6211	0.6283	0.6235	11.1160	10.3800	10.3160	0.060	
28	11.2000	9.6995	11.6000	11.5360	10.8000	0.069	0.6332	0.6283	0.6259	0.6211	0.6283	0.6234	11.5160	10.7800	10.7160	0.060	
29	11.6000	10.0459	12.0000	11.9360	11.2000	0.069	0.6332	0.6283	0.6259	0.6210	0.6283	0.6234	11.9160	11.1800	11.1160	0.060	
30	12.0000	10.3923	12.4000	12.3360	11.6000	0.069	0.6333	0.6283	0.6259	0.6209	0.6283	0.6233	12.3160	11.5800	11.5160	0.060	
31	12.4000	10.7387	12.8000	12.7360	12.0000	0.069	0.6333	0.6283	0.6259	0.6208	0.6283	0.6233	12.7160	11.9800	11.9160	0.060	
32	12.8000	11.0851	13.2000	13.1360	12.4000	0.068	0.6334	0.6283	0.6259	0.6208	0.6283	0.6232	13.1160	12.3800	12.3160	0.060	
33	13.2000	11.4315	13.6000	13.5360	12.8000	0.068	0.6334	0.6283	0.6258	0.6207	0.6283	0.6232	13.5160	12.7800	12.7160	0.060	
34	13.6000	11.7779	14.0000	13.9360	13.2000	0.068	0.6335	0.6283	0.6258	0.6206	0.6283	0.6231	13.9160	13.1800	13.1160	0.060	
35	14.0000	12.1244	14.4000	14.3360	13.6000	0.068	0.6336	0.6283	0.6258	0.6205	0.6283	0.6230	14.3160	13.5800	13.5160	0.060	
36	14.4000	12.4708	14.8000	14.7360	14.0000	0.068	0.6336	0.6283	0.6258	0.6205	0.6283	0.6230	14.7160	13.9800	13.9160	0.060	
37	14.8000	12.8172	15.2000	15.1360	14.4000	0.068	0.6337	0.6283	0.6258	0.6204	0.6283	0.6229	15.1160	14.3800	14.3160	0.060	
38	15.2000	13.1636	15.6000	15.5360	14.8000	0.068	0.6337	0.6283	0.6257	0.6203	0.6283	0.6229	15.5160	14.7800	14.7160	0.060	
39	15.6000	13.5100	16.0000	15.9360	15.2000	0.068	0.6338	0.6283	0.6257	0.6203	0.6283	0.6228	15.9160	15.1800	15.1160	0.060	
40	16.0000	13.8564	16.4000	16.3360	15.6000	0.068	0.6338	0.6283	0.6257	0.6202	0.6283	0.6228	16.3160	15.5800	15.5160	0.060	
41	16.4000	14.2028	16.8000	16.7360	16.0000	0.067	0.6339	0.6283	0.6257	0.6201	0.6283	0.6227	16.7160	15.9800	15.9160	0.060	
42	16.8000	14.5492	17.2000	17.1360	16.4000	0.067	0.6339	0.6283	0.6257	0.6200	0.6283	0.6227	17.1160	16.3800	16.3160	0.060	
43	17.2000	14.8956	17.6000	17.5360	16.8000	0.067	0.6340	0.6283	0.6256	0.6200	0.6283	0.6226	17.5160	16.7800	16.7160	0.060	
44	17.6000	15.2420	18.0000	17.9360	17.2000	0.067	0.6340	0.6283	0.6256	0.6199	0.6283	0.6226	17.9160	17.1800	17.1160	0.060	
45	18.0000	15.5884	18.4000	18.3360	17.6000	0.067	0.6341	0.6283	0.6256	0.6198	0.6283	0.6225	18.3160	17.5800	17.5160	0.060	
46	18.4000	15.9349	18.8000	18.7360	18.0000	0.067	0.6341	0.6283	0.6256	0.6197	0.6283	0.6225	18.7160	17.9800	17.9160	0.060	
47	18.8000	16.2813	19.2000	19.1360	18.4000	0.067	0.6342	0.6283	0.6256	0.6197	0.6283	0.6224	19.1160	18.3800	18.3160	0.060	
48	19.2000	16.6277	19.6000	19.5360	18.8000	0.067	0.6342	0.6283	0.6255	0.6196	0.6283	0.6224	19.5160	18.7800	18.7160	0.060	
49	19.6000	16.9741	20.0000	19.9360	19.2000	0.067	0.6343	0.6283	0.6255	0.6195	0.6283	0.6223	19.9160	19.1800	19.1160	0.060	
50	20.0000	17.3205	20.4000	20.3360	19.6000	0.067	0.6344	0.6283	0.6255	0.6194	0.6283	0.6222	20.3160	19.5800	19.5160	0.060	
51	20.4000	17.6669	20.8000	20.7360	20.0000	0.067	0.6344	0.6283	0.6255	0.6194	0.6283	0.6222	20.7160	19.9800	19.9160	0.060	
52	20.8000	18.0133	21.2000	21.1360	20.4000	0.067	0.6345	0.6283	0.6255	0.6193	0.6283	0.6221	21.1160	20.3800	20.3160	0.060	
53	21.2000	18.3597	21.6000	21.5360	20.8000	0.067	0.6345	0.6283	0.6254	0.6192	0.6283	0.6221	21.5160	20.7800	20.7160	0.060	
54	21.6000	18.7061	22.0000	21.9360	21.2000	0.067	0.6346	0.6283	0.6254	0.6192	0.6283	0.6220	21.9160	21.1800	21.1160	0.060	
55	22.0000	19.0526	22.4000	22.3360	21.6000	0.067	0.6346	0.6283	0.6254	0.6191	0.6283	0.6220	22.3160	21.5800	21.5160	0.060	
56	22.4000	19.3990	22.8000	22.7360	22.0000	0.066	0.6347	0.6283	0.6254	0.6190	0.6283	0.6219	22.7160	21.9800	21.9160	0.060	
57	22.8000	19.7454	23.2000	23.1360	22.4000	0.066	0.6347	0.6283	0.6254	0.6189	0.6283	0.6219	23.1160	22.3800	22.3160	0.060	
58	23.2000	20.0918	23.6000	23.5360	22.8000.												

(a) Measurements with pins cannot be used to determine effective space width and spline thickness. Measurements with pins for actual space width and spline thickness are in Tables 49, 50 and 51 in Part 2.

(b) For (AUX.) minimum actual space width, and (AUX.) maximum actual spline thickness, see Table 39.

(c) For (AUX.) maximum effective space width, and (AUX.) minimum effective spline thickness, see Table 39.

(d) Figures in bold type are modified values

TABLE 6. 3/6 PITCH, FLAT ROOT SIDE FIT

INCHES

INTERNAL AND EXTERNAL			INTERNAL (See Fig. 6 for drawing data)						EXTERNAL (See Fig. 7 for drawing data)								
No. of splines <i>N</i>	Pitch dia. <i>D</i>	Base dia. <i>D_b</i>	Major dia. <i>D_{F1}</i>	Form dia. <i>D_{F1}</i>	Minor dia. <i>D₁</i>	Fillet rad. <i>r_f</i>	Space width(^a)		Spline thickness(^a)				Major dia. <i>D_o</i>	(d) Form dia. <i>D_{Fo}</i>	Minor dia. <i>D_{ro}</i>	Fillet rad. <i>r_f</i>	
							(b) Max. actual <i>s</i>	(c) Min. eff. <i>s_v</i>	Class 1 fit		Class 2 fit						
									(c) Max. eff. <i>t_v</i>	(b) Min. actual <i>t</i>	(c) Max. eff. <i>t_v</i>	(b) Min. actual <i>t</i>					
1	2	3	4-1	5-1	6-1	7	8	9	10	11	12	13	14-1	17-1	18-1	19	
Tolerance in 0.0001 inch units			+380 -0	—	+150 -0	—	—	—	—	—	—	—	+0 -150	—	+0 -380	—	
6	2.0000	1.7321	2.3333	2.2667	1.7529	0.088	0.5273	0.5236	0.5217	0.5180	0.5236	0.5199	2.2627	1.7489	1.5960	0.094	
7	2.3333	2.0207	2.6667	2.6007	2.0663	0.084	0.5274	0.5236	0.5217	0.5179	0.5236	0.5198	2.5960	2.0616	1.9293	0.087	
8	2.6667	2.3094	3.0000	2.9346	2.3853	0.081	0.5274	0.5236	0.5216	0.5178	0.5236	0.5198	2.9293	2.3800	2.2627	0.081	
9	3.0000	2.5981	3.3333	3.2687	2.7080	0.079	0.5275	0.5236	0.5216	0.5177	0.5236	0.5197	3.2627	2.7020	2.5960	0.076	
10	3.3333	2.8868	3.6667	3.6027	3.0331	0.077	0.5275	0.5236	0.5216	0.5177	0.5236	0.5197	3.5960	3.0264	2.9293	0.071	
11	3.6667	3.1754	4.0000	3.9366	3.3599	0.075	0.5276	0.5236	0.5216	0.5176	0.5236	0.5196	3.9293	3.3526	3.2627	0.068	
12	4.0000	3.4641	4.3333	4.2707	3.6880	0.073	0.5276	0.5236	0.5216	0.5175	0.5236	0.5196	4.2627	3.6800	3.5960	0.065	
13	4.3333	3.7528	4.6667	4.6047	4.0172	0.072	0.5277	0.5236	0.5215	0.5174	0.5236	0.5195	4.5960	4.0085	3.9293	0.062	
14	4.6667	4.0415	5.0000	4.9386	4.3469	0.070	0.5277	0.5236	0.5215	0.5174	0.5236	0.5195	4.9293	4.3376	4.2627	0.060	
15	5.0000	4.3301	5.3333	5.2727	4.6774	0.069	0.5278	0.5236	0.5215	0.5173	0.5236	0.5194	5.2627	4.6674	4.5960	0.058	
16	5.3333	4.6188	5.6667	5.6067	5.0083	0.068	0.5278	0.5236	0.5215	0.5172	0.5236	0.5194	5.5960	4.9976	4.9293	0.056	
17	5.6667	4.9075	6.0000	5.9406	5.3396	0.067	0.5279	0.5236	0.5215	0.5172	0.5236	0.5193	5.9293	5.3283	5.2627	0.054	
18	6.0000	5.1962	6.3333	6.2747	5.6712	0.066	0.5280	0.5236	0.5214	0.5171	0.5236	0.5192	6.2627	5.6592	5.5960	0.053	
19	6.3333	5.4848	6.6667	6.6087	6.0031	0.064	0.5280	0.5236	0.5214	0.5170	0.5236	0.5192	6.5960	5.9904	5.9293	0.052	
20	6.6667	5.7735	7.0000	6.9426	6.3351	0.064	0.5281	0.5236	0.5214	0.5169	0.5236	0.5191	6.9293	6.3218	6.2627	0.050	
21	7.0000	6.0622	7.3333	7.2767	6.6675	0.062	0.5281	0.5236	0.5214	0.5169	0.5236	0.5191	7.2627	6.6535	6.5960	0.049	
22	7.3333	6.3509	7.6667	7.6107	7.0000	0.061	0.5282	0.5236	0.5214	0.5168	0.5236	0.5190	7.5960	6.9853	6.9293	0.048	
23	7.6667	6.6395	8.0000	7.9446	7.3333	0.061	0.5282	0.5236	0.5213	0.5167	0.5236	0.5190	7.9293	7.3180	7.2627	0.048	
24	8.0000	6.9282	8.3333	8.2787	7.6667	0.060	0.5283	0.5236	0.5213	0.5166	0.5236	0.5189	8.2627	7.6507	7.5960	0.048	
25	8.3333	7.2169	8.6667	8.6127	8.0000	0.059	0.5283	0.5236	0.5213	0.5166	0.5236	0.5189	8.5960	7.9833	7.9293	0.048	
26	8.6667	7.5056	9.0000	8.9466	8.3333	0.058	0.5284	0.5236	0.5213	0.5165	0.5236	0.5188	8.9293	8.3160	8.2627	0.047	
27	9.0000	7.7942	9.3333	9.2807	8.6667	0.057	0.5284	0.5236	0.5213	0.5164	0.5236	0.5188	9.2627	8.6487	8.5960	0.047	
28	9.3333	8.0829	9.6667	9.6147	9.0000	0.056	0.5285	0.5236	0.5212	0.5164	0.5236	0.5187	9.5960	8.9813	8.9293	0.047	
29	9.6667	8.3716	10.0000	9.9486	9.3333	0.056	0.5285	0.5236	0.5212	0.5163	0.5236	0.5187	9.9293	9.3140	9.2627	0.046	
30	10.0000	8.6603	10.3333	10.2827	9.6667	0.054	0.5286	0.5236	0.5212	0.5162	0.5236	0.5186	10.2627	9.6467	9.5960	0.046	
31	10.3333	8.9489	10.6667	10.6160	10.0000	0.054	0.5286	0.5236	0.5212	0.5161	0.5236	0.5186	10.5960	9.9800	9.9293	0.046	
32	10.6667	9.2376	11.0000	10.9493	10.3333	0.054	0.5287	0.5236	0.5212	0.5161	0.5236	0.5185	10.9293	10.3133	10.2627	0.046	
33	11.0000	9.5263	11.3333	11.2827	10.6667	0.054	0.5287	0.5236	0.5211	0.5160	0.5236	0.5185	11.2627	10.6467	10.5960	0.046	
34	11.3333	9.8150	11.6667	11.6160	11.0000	0.054	0.5288	0.5236	0.5211	0.5159	0.5236	0.5184	11.5960	10.9800	10.9293	0.046	
35	11.6667	10.1036	12.0000	11.9493	11.3333	0.054	0.5289	0.5236	0.5211	0.5158	0.5236	0.5183	11.9293	11.3133	11.2627	0.046	
36	12.0000	10.3923	12.3333	12.2827	11.6667	0.054	0.5289	0.5236	0.5211	0.5158	0.5236	0.5183	12.2627	11.6467	11.5960	0.046	
37	12.3333	10.6810	12.6667	12.6160	12.0000	0.054	0.5290	0.5236	0.5211	0.5157	0.5236	0.5182	12.5960	11.9800	11.9293	0.047	
38	12.6667	10.9697	13.0000	12.9493	12.3333	0.054	0.5290	0.5236	0.5210	0.5156	0.5236	0.5182	12.9293	12.3133	12.2627	0.047	
39	13.0000	11.2583	13.3333	13.2827	12.6667	0.054	0.5291	0.5236	0.5210	0.5156	0.5236	0.5181	13.2627	12.6467	12.5960	0.047	
40	13.3333	11.5470	13.6667	13.6160	13.0000	0.054	0.5291	0.5236	0.5210	0.5155	0.5236	0.5181	13.5960	12.9800	12.9293	0.047	
41	13.6667	11.8357	14.0000	13.9493	13.3333	0.053	0.5292	0.5236	0.5210	0.5154	0.5236	0.5180	13.9293	13.3133	13.2627	0.047	
42	14.0000	12.1244	14.3333	14.2827	13.6667	0.053	0.5292	0.5236	0.5210	0.5153	0.5236	0.5180	14.2627	13.6467	13.5960	0.047	
43	14.3333	12.4130	14.6667	14.6160	14.0000	0.053	0.5293	0.5236	0.5209	0.5153	0.5236	0.5179	14.5960	13.9800	13.9293	0.047	
44	14.6667	12.7017	15.0000	14.9493	14.3333	0.053	0.5293	0.5236	0.5209	0.5152	0.5236	0.5179	14.9293	14.3133	14.2627	0.047	
45	15.0000	12.9904	15.3333	15.2827	14.6667	0.053	0.5294	0.5236	0.5209	0.5151	0.5236	0.5178	15.2627	14.6467	14.5960	0.047	
46	15.3333	13.2791	15.6667	15.6160	15.0000	0.053	0.5294	0.5236	0.5209	0.5150	0.5236	0.5178	15.5960	14.9800	14.9293	0.047	
47	15.6667	13.5677	16.0000	15.9493	15.3333	0.053	0.5295	0.5236	0.5209	0.5150	0.5236	0.5177	15.9293	15.3133	15.2627	0.047	
48	16.0000	13.8564	16.3333	16.2827	15.6667	0.053	0.5295	0.5236	0.5208	0.5149	0.5236	0.5177	16.2627	15.6467	15.5960	0.047	
49	16.3333	14.1451	16.6667	16.6160	16.0000	0.053	0.5296	0.5236	0.5208	0.5148	0.5236	0.5176	16.5960	15.9800	15.9293	0.047	
50	16.6667	14.4338	17.0000	16.9493	16.3333	0.053	0.5296	0.5236	0.5208	0.5147	0.5236	0.5175	16.9293	16.3133	16.2627	0.047	
51	17.0000	14.7224	17.3333	17.2827	16.6667	0.053	0.5297	0.5236	0.5208	0.5147	0.5236	0.5175	17.2627	16.6467	16.5960	0.048	
52	17.3333	15.0111	17.6667	17.6160	17.0000	0.053	0.5298	0.5236	0.5208	0.5146	0.5236	0.5174	17.5960	16.9800	16.9293	0.048	
53	17.6667	15.2998	18.0000	17.9493	17.3333	0.053	0.5298	0.5236	0.5207	0.5145	0.5236	0.5174	17.9293	17.3133	17.2627	0.048	
54	18.0000	15.5885	18.3333	18.2827	17.6667	0.053	0.5299	0.5236	0.5207	0.5145	0.5236	0.5173	18.2627	17.6467	17.5960	0.048	
55	18.3333	15.8771	18.6667	18.6160	18.0000	0.053	0.5299	0.5236	0.5207	0.5144	0.5236	0.5173	18.5960	17.9800	17.9293	0.048	
56	18.6667	16.1658	19.0000	18.9493	18.3333	0.053	0.5300	0.5236	0.5207	0.5143	0.5236	0.5172	18.9293	18.3133	18.2627	0.048	
57	19.0000	16.4545	19.3333	19.2827	18.6667	0.053	0.5300	0.5236	0.5207	0.5142	0.5236	0.5172	19.2627	18.6467	18.5960	0.048	
58	19.3333	16.7432	19.6667	19.6160	19.0000	0.053	0.5301	0.5236	0.5206	0.5142	0.5236	0.5171	19.5960	18.9800	18.9293	0.048	
59	19.6667	17.0318	20.0000	19.9493	19.3333	0.053	0.5301	0.5236	0.5206	0.5141	0.5236	0.5171	19.9293	19.3133	19.2		

(a) Measurements with pins cannot be used to determine effective space width and spline thickness. Measurements with pins for actual space width and spline thickness are in Tables 49, 50 and 51 in Part 2.

(b) For (AUX.) minimum actual space width, and (AUX.) maximum actual spline thickness, see Table 39.

(c) For (AUX.) maximum effective space width, and (AUX.) minimum effective spline thickness, see Table 39.

(d) Figures in bold type are modified values, see Clause 14.

TABLE 7. 4/8 PITCH, FLAT ROOT SIDE FIT

INCHES

INTERNAL AND EXTERNAL			INTERNAL (See Fig. 6 for drawing data)						EXTERNAL (See Fig. 7 for drawing data)							
No. of splines <i>N</i>	Pitch dia. <i>D</i>	Base dia. <i>D_b</i>	Major dia. <i>D_H</i>	Form dia. <i>D_{F1}</i>	(d) Minor dia. <i>D₁</i>	Fillet rad. <i>r_f</i>	Space width(*)		Spline thickness(*)				Major dia. <i>D_o</i>	(d) Form dia. <i>D_{F2}</i>	Minor dia. <i>D_{re}</i>	Fillet rad. <i>r_f</i>
							(b) Max. actual <i>s</i>	(c) Min. eff. <i>s_v</i>	Class 1 fit		Class 2 fit					
1	2	3	4-1	5-1	6-1	7	8	9	10	11	12	13	14-1	17-1	18-1	19
Tolerance in 0.0001 inch units			+300 -0	—	+100 -0	—	—	—	—	—	—	—	+0 -100	—	+0 -300	—
6	1.5000	1.2990	1.7500	1.6990	1.3114	0.067	0.3960	0.3927	0.3910	0.3877	0.3927	0.3894	1.6960	1.3114	1.1960	0.071
7	1.7500	1.5165	2.0000	1.9495	1.5498	0.064	0.3961	0.3927	0.3910	0.3876	0.3927	0.3893	1.9460	1.5458	1.4460	0.065
8	2.0000	1.7321	2.2500	2.2000	1.7885	0.062	0.3961	0.3927	0.3910	0.3876	0.3927	0.3893	2.1960	1.7845	1.6960	0.061
9	2.2500	1.9486	2.5000	2.4505	2.0304	0.060	0.3961	0.3927	0.3910	0.3875	0.3927	0.3893	2.4460	2.0259	1.9460	0.057
10	2.5000	2.1651	2.7500	2.7010	2.2742	0.059	0.3962	0.3927	0.3909	0.3875	0.3927	0.3892	2.6960	2.2692	2.1960	0.054
11	2.7500	2.3816	3.0000	2.9515	2.5193	0.057	0.3962	0.3927	0.3909	0.3874	0.3927	0.3892	2.9460	2.5138	2.4460	0.051
12	3.0000	2.5981	3.2500	3.2020	2.7653	0.056	0.3963	0.3927	0.3909	0.3874	0.3927	0.3891	3.1960	2.7593	2.6960	0.049
13	3.2500	2.8146	3.5000	3.4525	3.0121	0.055	0.3963	0.3927	0.3909	0.3873	0.3927	0.3891	3.4460	3.0056	2.9460	0.047
14	3.5000	3.0311	3.7500	3.7030	3.2595	0.054	0.3963	0.3927	0.3909	0.3873	0.3927	0.3891	3.6960	3.2525	3.1960	0.045
15	3.7500	3.2476	4.0000	3.9535	3.5073	0.053	0.3964	0.3927	0.3909	0.3872	0.3927	0.3890	3.9460	3.4998	3.4460	0.044
16	4.0000	3.4641	4.2500	4.2040	3.7555	0.052	0.3964	0.3927	0.3909	0.3872	0.3927	0.3890	4.1960	3.7475	3.6960	0.042
17	4.2500	3.6806	4.5000	4.4545	4.0039	0.051	0.3964	0.3927	0.3908	0.3871	0.3927	0.3890	4.4460	3.9954	3.9460	0.041
18	4.5000	3.8971	4.7500	4.7050	4.2526	0.050	0.3965	0.3927	0.3908	0.3870	0.3927	0.3889	4.6960	4.2436	4.1960	0.040
19	4.7500	4.1136	5.0000	4.9555	4.5015	0.049	0.3965	0.3927	0.3908	0.3870	0.3927	0.3889	4.9460	4.4920	4.4460	0.039
20	5.0000	4.3301	5.2500	5.2060	4.7506	0.049	0.3966	0.3927	0.3908	0.3869	0.3927	0.3888	5.1960	4.7406	4.6960	0.038
21	5.2500	4.5466	5.5000	5.4565	5.0000	0.048	0.3966	0.3927	0.3908	0.3869	0.3927	0.3888	5.4460	4.9895	4.9460	0.037
22	5.5000	4.7631	5.7500	5.7070	5.2500	0.047	0.3966	0.3927	0.3908	0.3868	0.3927	0.3888	5.6960	5.2390	5.1960	0.037
23	5.7500	4.9796	6.0000	5.9575	5.5000	0.046	0.3967	0.3927	0.3908	0.3868	0.3927	0.3887	5.9460	5.4885	5.4460	0.037
24	6.0000	5.1962	6.2500	6.2080	5.7500	0.046	0.3967	0.3927	0.3907	0.3867	0.3927	0.3887	6.1960	5.7380	5.6960	0.037
25	6.2500	5.4127	6.5000	6.4585	6.0000	0.045	0.3968	0.3927	0.3907	0.3867	0.3927	0.3886	6.4460	5.9875	5.9460	0.037
26	6.5000	5.6292	6.7500	6.7090	6.2500	0.044	0.3968	0.3927	0.3907	0.3866	0.3927	0.3886	6.6960	6.2370	6.1960	0.036
27	6.7500	5.8457	7.0000	6.9595	6.5000	0.044	0.3968	0.3927	0.3907	0.3866	0.3927	0.3886	6.9460	6.4865	6.4460	0.036
28	7.0000	6.0622	7.2500	7.2100	6.7500	0.043	0.3969	0.3927	0.3907	0.3865	0.3927	0.3885	7.1960	6.7360	6.6960	0.036
29	7.2500	6.2787	7.5000	7.4605	7.0000	0.043	0.3969	0.3927	0.3907	0.3865	0.3927	0.3885	7.4460	6.9855	6.9460	0.035
30	7.5000	6.4952	7.7500	7.7110	7.2500	0.042	0.3969	0.3927	0.3906	0.3864	0.3927	0.3885	7.6960	7.2350	7.1960	0.035
31	7.7500	6.7117	8.0000	7.9615	7.5000	0.041	0.3970	0.3927	0.3906	0.3864	0.3927	0.3884	7.9460	7.4845	7.4460	0.035
32	8.0000	6.9282	8.2500	8.2120	7.7500	0.041	0.3970	0.3927	0.3906	0.3863	0.3927	0.3884	8.1960	7.7340	7.6960	0.034
33	8.2500	7.1447	8.5000	8.4625	8.0000	0.040	0.3971	0.3927	0.3906	0.3863	0.3927	0.3883	8.4460	7.9835	7.9460	0.034
34	8.5000	7.3612	8.7500	8.7130	8.2500	0.039	0.3971	0.3927	0.3906	0.3862	0.3927	0.3883	8.6960	8.2330	8.1960	0.034
35	8.7500	7.5777	9.0000	8.9635	8.5000	0.039	0.3971	0.3927	0.3906	0.3861	0.3927	0.3883	8.9460	8.4825	8.4460	0.033
36	9.0000	7.7942	9.2500	9.2140	8.7500	0.038	0.3972	0.3927	0.3906	0.3861	0.3927	0.3882	9.1960	8.7320	8.6960	0.033
37	9.2500	8.0107	9.5000	9.4645	9.0000	0.038	0.3972	0.3927	0.3905	0.3860	0.3927	0.3882	9.4460	8.9815	8.9460	0.033
38	9.5000	8.2272	9.7500	9.7150	9.2500	0.037	0.3972	0.3927	0.3905	0.3860	0.3927	0.3882	9.6960	9.2310	9.1960	0.032
39	9.7500	8.4437	10.0000	9.9655	9.5000	0.037	0.3973	0.3927	0.3905	0.3859	0.3927	0.3881	9.9460	9.4805	9.4460	0.032
40	10.0000	8.6603	10.2500	10.2160	9.7500	0.036	0.3973	0.3927	0.3905	0.3859	0.3927	0.3881	10.1960	9.7300	9.6960	0.031
41	10.2500	8.8768	10.5000	10.4660	10.0000	0.036	0.3974	0.3927	0.3905	0.3858	0.3927	0.3880	10.4460	9.9800	9.9460	0.031
42	10.5000	9.0933	10.7500	10.7160	10.2500	0.036	0.3974	0.3927	0.3905	0.3858	0.3927	0.3880	10.6960	10.2300	10.1960	0.031
43	10.7500	9.3098	11.0000	10.9660	10.5000	0.036	0.3974	0.3927	0.3905	0.3857	0.3927	0.3880	10.9460	10.4800	10.4460	0.032
44	11.0000	9.5263	11.2500	11.2160	10.7500	0.036	0.3975	0.3927	0.3904	0.3857	0.3927	0.3879	11.1960	10.7300	10.6960	0.032
45	11.2500	9.7428	11.5000	11.4660	11.0000	0.036	0.3975	0.3927	0.3904	0.3856	0.3927	0.3879	11.4460	10.9800	10.9460	0.032
46	11.5000	9.9593	11.7500	11.7160	11.2500	0.036	0.3975	0.3927	0.3904	0.3856	0.3927	0.3879	11.6960	11.2300	11.1960	0.032
47	11.7500	10.1758	12.0000	11.9660	11.5000	0.036	0.3976	0.3927	0.3904	0.3855	0.3927	0.3878	11.9460	11.4800	11.4460	0.032
48	12.0000	10.3923	12.2500	12.2160	11.7500	0.036	0.3976	0.3927	0.3904	0.3855	0.3927	0.3878	12.1960	11.7300	11.6960	0.032
49	12.2500	10.6088	12.5000	12.4660	12.0000	0.036	0.3977	0.3927	0.3904	0.3854	0.3927	0.3877	12.4460	11.9800	11.9460	0.032
50	12.5000	10.8253	12.7500	12.7160	12.2500	0.036	0.3977	0.3927	0.3903	0.3853	0.3927	0.3877	12.6960	12.2300	12.1960	0.032
51	12.7500	11.0418	13.0000	12.9660	12.5000	0.036	0.3977	0.3927	0.3903	0.3853	0.3927	0.3877	12.9460	12.4800	12.4460	0.032
52	13.0000	11.2583	13.2500	13.2160	12.7500	0.036	0.3978	0.3927	0.3903	0.3852	0.3927	0.3876	13.1960	12.7300	12.6960	0.032
53	13.2500	11.4748	13.5000	13.4660	13.0000	0.036	0.3978	0.3927	0.3903	0.3852	0.3927	0.3876	13.4460	12.9800	12.9460	0.032
54	13.5000	11.6913	13.7500	13.7160	13.2500	0.036	0.3979	0.3927	0.3903	0.3851	0.3927	0.3875	13.6960	13.2300	13.1960	0.032
55	13.7500	11.9078	14.0000	13.9660	13.5000	0.036	0.3979	0.3927	0.3903	0.3851	0.3927	0.3875	13.9460	13.4800	13.4460	0.032
56	14.0000	12.1244	14.2500	14.2160	13.7500	0.035	0.3979	0.3927	0.3903	0.3850	0.3927	0.3875	14.1960	13.7300	13.6960	0.032
57	14.2500	12.3409	14.5000	14.4660	14.0000	0.035	0.3980	0.3927	0.3902	0.3850	0.3927	0.3874	14.4460	13.9800	13.9460	0.032
58	14.5000	12.5574	14.7500	14.7160	14.2500	0.035	0.3980	0.3927	0.3902	0.3849	0.3927	0.3874	14.6960	14.2300	14.1960	0.032
59	14.7500	12.7739	15.0000	14.9660	14.5000	0.035	0.3980	0.3927	0.3902	0.3849	0.3927	0.3874	14.9460	14.4800	14.4460	0.032
60	15.0000	12.9904	15.2500	15.2160	14.7500	0.035	0.3981	0.3927	0.3902	0.3848	0.3927	0.3873	15.1960	14.1		

(*) Measurements with pins cannot be used to determine effective space width and spline thickness. Measurements with pins for actual space width and spline thickness are in Tables 49, 50 and 51 in Part 2.

(b) For (AUX.) minimum actual space width, and (AUX.) maximum actual spline thickness, see Table 39.

(c) For (AUX.) maximum effective space width, and (AUX.) minimum effective spline thickness, see Table 39.

(d) Figures in bold type are modified values, see Clause 14.

TABLE 8. 5/10 PITCH, FLAT ROOT SIDE FIT

INCHES

INTERNAL AND EXTERNAL			INTERNAL (See Fig. 6 for drawing data)							EXTERNAL (See Fig. 7 for drawing data)							
No. of splines <i>N</i>	Pitch dia. <i>D</i>	Base dia. <i>D_b</i>	Major dia. <i>D_{F1}</i>	Form dia. <i>D_{F1}</i>	(a) Minor dia. <i>D_i</i>	Fillet rad. <i>r_f</i>	Space width ^(a)		Spline thickness ^(a)				Major dia. <i>D_o</i>	(a) Form dia. <i>D_{Fo}</i>	Minor dia. <i>D_{ro}</i>	Fillet rad. <i>r_f</i>	
							(b) Max. actual <i>s</i>	(c) Min. eff. <i>s_v</i>	Class 1 fit		Class 2 fit						
									(c) Max. eff. <i>t_v</i>	(b) Min. actual <i>t</i>	(c) Max. eff. <i>t_v</i>	(b) Min. actual <i>t</i>					
1	2	3	4-1	5-1	6-1	7	8	9	10	11	12	13	14-1	17-1	18-1	19	
Tolerance in 0.0001 inch units			+1 250 —	—	+80 —0	—	—	—	—	—	—	—	+0 —80	—	+0 —250	—	
6	1.2000	1.0392	1.4000	1.3600	1.0532	0.053	0.3175	0.3142	0.3125	0.3092	0.3142	0.3109	1.3560	1.0492	0.9560	0.058	
7	1.4000	1.2124	1.6000	1.5600	1.2404	0.051	0.3176	0.3142	0.3125	0.3091	0.3142	0.3108	1.5560	1.2364	1.1560	0.053	
8	1.6000	1.3856	1.8000	1.7600	1.4312	0.050	0.3176	0.3142	0.3125	0.3091	0.3142	0.3108	1.7560	1.4272	1.3560	0.049	
9	1.8000	1.5588	2.0000	1.9600	1.6243	0.049	0.3176	0.3142	0.3125	0.3090	0.3142	0.3108	1.9560	1.6203	1.5560	0.046	
10	2.0000	1.7321	2.2000	2.1600	1.8189	0.048	0.3177	0.3142	0.3124	0.3090	0.3142	0.3107	2.1560	1.8149	1.7560	0.043	
11	2.2000	1.9053	2.4000	2.3604	2.0149	0.047	0.3177	0.3142	0.3124	0.3089	0.3142	0.3107	2.3560	2.0105	1.9560	0.041	
12	2.4000	2.0785	2.6000	2.5608	2.2117	0.046	0.3178	0.3142	0.3124	0.3089	0.3142	0.3106	2.5560	2.2069	2.1560	0.039	
13	2.6000	2.2517	2.8000	2.7612	2.4091	0.045	0.3178	0.3142	0.3124	0.3088	0.3142	0.3106	2.7560	2.4039	2.3560	0.038	
14	2.8000	2.4249	3.0000	2.9616	2.6070	0.044	0.3178	0.3142	0.3124	0.3088	0.3142	0.3106	2.9560	2.6014	2.5560	0.036	
15	3.0000	2.5981	3.2000	3.1620	2.8052	0.043	0.3179	0.3142	0.3124	0.3087	0.3142	0.3105	3.1560	2.7992	2.7560	0.035	
16	3.2000	2.7713	3.4000	3.3624	3.0038	0.042	0.3179	0.3142	0.3124	0.3087	0.3142	0.3105	3.3560	2.9974	2.9560	0.034	
17	3.4000	2.9445	3.6000	3.5628	3.2025	0.042	0.3179	0.3142	0.3123	0.3086	0.3142	0.3104	3.5560	3.1957	3.1560	0.033	
18	3.6000	3.1177	3.8000	3.7632	3.4015	0.041	0.3180	0.3142	0.3123	0.3085	0.3142	0.3104	3.7560	3.3943	3.3560	0.032	
19	3.8000	3.2909	4.0000	3.9636	3.6006	0.040	0.3180	0.3142	0.3123	0.3085	0.3142	0.3104	3.9560	3.5930	3.5560	0.031	
20	4.0000	3.4641	4.2000	4.1640	3.8000	0.040	0.3181	0.3142	0.3123	0.3084	0.3142	0.3103	4.1560	3.7920	3.7560	0.031	
21	4.2000	3.6373	4.4000	4.3644	4.0000	0.039	0.3181	0.3142	0.3123	0.3084	0.3142	0.3103	4.3560	3.9916	3.9560	0.030	
22	4.4000	3.8105	4.6000	4.5648	4.2000	0.039	0.3181	0.3142	0.3123	0.3083	0.3142	0.3103	4.5560	4.1912	4.1560	0.030	
23	4.6000	3.9837	4.8000	4.7652	4.4000	0.038	0.3182	0.3142	0.3123	0.3083	0.3142	0.3102	4.7560	4.3908	4.3560	0.030	
24	4.8000	4.1569	5.0000	4.9656	4.6000	0.037	0.3182	0.3142	0.3122	0.3082	0.3142	0.3102	4.9560	4.5904	4.5560	0.030	
25	5.0000	4.3301	5.2000	5.1660	4.8000	0.037	0.3183	0.3142	0.3122	0.3082	0.3142	0.3101	5.1560	4.7900	4.7560	0.030	
26	5.2000	4.5033	5.4000	5.3664	5.0000	0.036	0.3183	0.3142	0.3122	0.3081	0.3142	0.3101	5.3560	4.9896	4.9560	0.030	
27	5.4000	4.6765	5.6000	5.5668	5.2000	0.036	0.3183	0.3142	0.3122	0.3081	0.3142	0.3101	5.5560	5.1892	5.1560	0.029	
28	5.6000	4.8497	5.8000	5.7672	5.4000	0.035	0.3184	0.3142	0.3122	0.3080	0.3142	0.3100	5.7560	5.3888	5.3560	0.029	
29	5.8000	5.0229	6.0000	5.9676	5.6000	0.035	0.3184	0.3142	0.3122	0.3080	0.3142	0.3100	5.9560	5.5884	5.5560	0.029	
30	6.0000	5.1962	6.2000	6.1680	5.8000	0.034	0.3184	0.3142	0.3121	0.3079	0.3142	0.3100	6.1560	5.7880	5.7560	0.029	
31	6.2000	5.3694	6.4000	6.3684	6.0000	0.034	0.3185	0.3142	0.3121	0.3079	0.3142	0.3099	6.3560	5.9876	5.9560	0.029	
32	6.4000	5.5426	6.6000	6.5688	6.2000	0.033	0.3185	0.3142	0.3121	0.3078	0.3142	0.3099	6.5560	6.1872	6.1560	0.028	
33	6.6000	5.7158	6.8000	6.7692	6.4000	0.033	0.3186	0.3142	0.3121	0.3078	0.3142	0.3098	6.7560	6.3868	6.3560	0.028	
34	6.8000	5.8890	7.0000	6.9696	6.6000	0.032	0.3186	0.3142	0.3121	0.3077	0.3142	0.3098	6.9560	6.5864	6.5560	0.028	
35	7.0000	6.0622	7.2000	7.1700	6.8000	0.032	0.3186	0.3142	0.3121	0.3076	0.3142	0.3098	7.1560	6.7860	6.7560	0.027	
36	7.2000	6.2354	7.4000	7.3704	7.0000	0.031	0.3187	0.3142	0.3121	0.3076	0.3142	0.3097	7.3560	6.9856	6.9560	0.027	
37	7.4000	6.4086	7.6000	7.5708	7.2000	0.031	0.3187	0.3142	0.3120	0.3075	0.3142	0.3097	7.5560	7.1852	7.1560	0.027	
38	7.6000	6.5818	7.8000	7.7712	7.4000	0.031	0.3187	0.3142	0.3120	0.3075	0.3142	0.3097	7.7560	7.3848	7.3560	0.026	
39	7.8000	6.7550	8.0000	7.9716	7.6000	0.030	0.3188	0.3142	0.3120	0.3074	0.3142	0.3096	7.9560	7.5844	7.5560	0.026	
40	8.0000	6.9282	8.2000	8.1720	7.8000	0.030	0.3188	0.3142	0.3120	0.3074	0.3142	0.3096	8.1560	7.7840	7.7560	0.026	
41	8.2000	7.1014	8.4000	8.3724	8.0000	0.029	0.3189	0.3142	0.3120	0.3073	0.3142	0.3095	8.3560	7.9836	7.9560	0.025	
42	8.4000	7.2746	8.6000	8.5728	8.2000	0.029	0.3189	0.3142	0.3120	0.3073	0.3142	0.3095	8.5560	8.1832	8.1560	0.025	
43	8.6000	7.4478	8.8000	8.7732	8.4000	0.028	0.3189	0.3142	0.3120	0.3072	0.3142	0.3095	8.7560	8.3828	8.3560	0.025	
44	8.8000	7.6210	9.0000	8.9736	8.6000	0.028	0.3190	0.3142	0.3119	0.3072	0.3142	0.3094	8.9560	8.5824	8.5560	0.024	
45	9.0000	7.7942	9.2000	9.1740	8.8000	0.027	0.3190	0.3142	0.3119	0.3071	0.3142	0.3094	9.1560	8.7820	8.7560	0.024	
46	9.2000	7.9674	9.4000	9.3744	9.0000	0.027	0.3190	0.3142	0.3119	0.3071	0.3142	0.3094	9.3560	8.9816	8.9560	0.024	
47	9.4000	8.1406	9.6000	9.5748	9.2000	0.026	0.3191	0.3142	0.3119	0.3070	0.3142	0.3093	9.5560	9.1812	9.1560	0.023	
48	9.6000	8.3138	9.8000	9.7752	9.4000	0.026	0.3191	0.3142	0.3119	0.3070	0.3142	0.3093	9.7560	9.3808	9.3560	0.023	
49	9.8000	8.4870	10.0000	9.9756	9.6000	0.026	0.3192	0.3142	0.3119	0.3069	0.3142	0.3092	9.9560	9.5804	9.5560	0.023	
50	10.0000	8.6603	10.2000	10.1760	9.8000	0.025	0.3192	0.3142	0.3118	0.3068	0.3142	0.3092	10.1560	9.7800	9.7560	0.023	
51	10.2000	8.8335	10.4000	10.3760	10.0000	0.025	0.3192	0.3142	0.3118	0.3068	0.3142	0.3092	10.3560	9.9800	9.9560	0.023	
52	10.4000	9.0067	10.6000	10.5760	10.2000	0.025	0.3193	0.3142	0.3118	0.3067	0.3142	0.3091	10.5560	10.1800	10.1560	0.023	
53	10.6000	9.1799	10.8000	10.7760	10.4000	0.025	0.3193	0.3142	0.3118	0.3067	0.3142	0.3091	10.7560	10.3800	10.3560	0.023	
54	10.8000	9.3531	11.0000	10.9760	10.6000	0.025	0.3194	0.3142	0.3118	0.3066	0.3142	0.3090	10.9560	10.5800	10.5560	0.023	
55	11.0000	9.5263	11.2000	11.1760	10.8000	0.025	0.3194	0.3142	0.3118	0.3066	0.3142	0.3090	11.1560	10.7800	10.7560	0.023	
56	11.2000	9.6995	11.4000	11.3760	11.0000	0.025	0.3194	0.3142	0.3118	0.3065	0.3142	0.3090	11.3560	10.9800	10.9560	0.023	
57	11.4000	9.8727	11.6000	11.5760	11.2000	0.025	0.3195	0.3142	0.3117	0.3065	0.3142	0.3089	11.5560	11.1800	11.1560	0.023	
58	11.6000	10.0459	11.8000	11.7760	11.4000	0.025	0.3195	0.3142	0.3117	0.3064	0.3142	0.3089	11.7560	11.3800	11.3560	0.023	
59	11.8000	10.2191	12.0000	11.9760	11.6000	0.025	0.3195	0.3142	0.3117	0.3064	0.3142	0.3089	11.9560	11.5800	11.5560	0.023	
60	12.0000	10.3923	12.2000	12.1760	11.8000	0.025	0.3196	0.3142	0.3117	0.3063	0.3142	0.3088	12.1560	11.7800	11.7560	0.023	

(a) Measurements with pins cannot be used to determine effective space width and spline thickness. Measurements with pins for actual space width and spline thickness are in Tables 49, 50 and 51 in Part 2.

(b) For (AUX.) minimum actual space width, and (AUX.) maximum actual spline thickness, see Table 39.

(c) For (AUX.) maximum effective space width, and (AUX.) minimum effective spline thickness, see Table 39.

(d) Figures in bold type are modified values, see Clause 14.

TABLE 9. 6/12 PITCH, FLAT ROOT SIDE FIT

INCHES

INTERNAL AND EXTERNAL			INTERNAL (See Fig. 6 for drawing data)							EXTERNAL (See Fig. 7 for drawing data)							
No. of splines <i>N</i>	Pitch dia. <i>D</i>	Base dia. <i>D_b</i>	Major dia. <i>D_{ri}</i>	Form dia. <i>D_{Fi}</i>	(a) Minor dia. <i>D_i</i>	Fillet rad. <i>r_f</i>	Space width ^(a)		Spline thickness ^(a)				Major dia. <i>D_o</i>	(a) Form dia. <i>D_{Fe}</i>	Minor dia. <i>D_{re}</i>	Fillet rad. <i>r_f</i>	
							(b) Max. actual <i>s</i>	(c) Min. eff. <i>s_e</i>	Class 1 fit		Class 2 fit						
									(c) Max. eff. <i>t_e</i>	(b) Min. actual <i>t</i>	(c) Max. eff. <i>t_e</i>	(b) Min. actual <i>t</i>					
1	2	3	4-1	5-1	6-1	7	8	9	10	11	12	13	14-1	17-1	18-1	19	
Tolerance in 0.0001 inch units			+220 —	—	+50 —0	—	—	—	—	—	—	—	+0 —50	—	+0 —220	—	
6	1.0000	0.8660	1.1667	1.1333	0.8800	0.044	0.2646	0.2618	0.2603	0.2575	0.2618	0.2590	1.1293	0.8760	0.7960	0.050	
7	1.1667	1.0104	1.3333	1.3000	1.0340	0.042	0.2646	0.2618	0.2603	0.2575	0.2618	0.2590	1.2960	1.0300	0.9627	0.044	
8	1.3333	1.1547	1.5000	1.4667	1.1930	0.041	0.2647	0.2618	0.2603	0.2574	0.2618	0.2589	1.4627	1.1890	1.1293	0.041	
9	1.5000	1.2990	1.6667	1.6333	1.3539	0.041	0.2647	0.2618	0.2603	0.2574	0.2618	0.2589	1.6293	1.3499	1.2960	0.038	
10	1.6667	1.4434	1.8333	1.8000	1.5160	0.040	0.2647	0.2618	0.2603	0.2573	0.2618	0.2589	1.7960	1.5120	1.4627	0.036	
11	1.8333	1.5877	2.0000	1.9667	1.6790	0.039	0.2648	0.2618	0.2603	0.2573	0.2618	0.2588	1.9627	1.6750	1.6293	0.034	
12	2.0000	1.7321	2.1667	2.1333	1.8427	0.039	0.2648	0.2618	0.2603	0.2573	0.2618	0.2588	2.1293	1.8387	1.7960	0.033	
13	2.1667	1.8764	2.3333	2.3003	2.0071	0.038	0.2649	0.2618	0.2603	0.2572	0.2618	0.2587	2.2960	2.0028	1.9627	0.031	
14	2.3333	2.0207	2.5000	2.4674	2.1721	0.037	0.2649	0.2618	0.2603	0.2572	0.2618	0.2587	2.4627	2.1674	2.1293	0.030	
15	2.5000	2.1651	2.6667	2.6343	2.3372	0.037	0.2649	0.2618	0.2602	0.2571	0.2618	0.2587	2.6293	2.3322	2.2960	0.029	
16	2.6667	2.3094	2.8333	2.8013	2.5026	0.036	0.2650	0.2618	0.2602	0.2571	0.2618	0.2586	2.7960	2.4973	2.4627	0.028	
17	2.8333	2.4537	3.0000	2.9684	2.6683	0.035	0.2650	0.2618	0.2602	0.2570	0.2618	0.2586	2.9627	2.6626	2.6293	0.028	
18	3.0000	2.5981	3.1667	3.1353	2.8340	0.035	0.2650	0.2618	0.2602	0.2570	0.2618	0.2586	3.1293	2.8280	2.7960	0.027	
19	3.1667	2.7424	3.3333	3.3023	3.0000	0.034	0.2651	0.2618	0.2602	0.2569	0.2618	0.2585	3.2960	2.9937	2.9627	0.027	
20	3.3333	2.8868	3.5000	3.4694	3.1667	0.034	0.2651	0.2618	0.2602	0.2569	0.2618	0.2585	3.4627	3.1600	3.1293	0.026	
21	3.5000	3.0311	3.6667	3.6363	3.3333	0.033	0.2651	0.2618	0.2602	0.2569	0.2618	0.2585	3.6293	3.3263	3.2960	0.026	
22	3.6667	3.1754	3.8333	3.8033	3.5000	0.033	0.2652	0.2618	0.2602	0.2568	0.2618	0.2584	3.7960	3.4927	3.4627	0.026	
23	3.8333	3.3198	4.0000	3.9704	3.6667	0.032	0.2652	0.2618	0.2602	0.2568	0.2618	0.2584	3.9627	3.6590	3.6293	0.026	
24	4.0000	3.4641	4.1667	4.1373	3.8333	0.032	0.2652	0.2618	0.2602	0.2567	0.2618	0.2584	4.1293	3.8253	3.7960	0.026	
25	4.1667	3.6084	4.3333	4.3043	4.0000	0.031	0.2653	0.2618	0.2601	0.2567	0.2618	0.2583	4.2960	3.9917	3.9627	0.025	
26	4.3333	3.7528	4.5000	4.4714	4.1667	0.031	0.2653	0.2618	0.2601	0.2566	0.2618	0.2583	4.4627	4.1580	4.1293	0.025	
27	4.5000	3.8971	4.6667	4.6383	4.3333	0.031	0.2653	0.2618	0.2601	0.2566	0.2618	0.2583	4.6293	4.3243	4.2960	0.025	
28	4.6667	4.0415	4.8333	4.8053	4.5000	0.030	0.2654	0.2618	0.2601	0.2565	0.2618	0.2582	4.7960	4.4907	4.4627	0.025	
29	4.8333	4.1858	5.0000	4.9724	4.6667	0.030	0.2654	0.2618	0.2601	0.2565	0.2618	0.2582	4.9627	4.6570	4.6293	0.025	
30	5.0000	4.3301	5.1667	5.1393	4.8333	0.029	0.2654	0.2618	0.2601	0.2564	0.2618	0.2582	5.1293	4.8233	4.7960	0.025	
31	5.1667	4.4745	5.3333	5.3063	5.0000	0.029	0.2655	0.2618	0.2601	0.2564	0.2618	0.2581	5.2960	4.9897	4.9627	0.024	
32	5.3333	4.6188	5.5000	5.4734	5.1667	0.028	0.2655	0.2618	0.2601	0.2564	0.2618	0.2581	5.4627	5.1560	5.1293	0.024	
33	5.5000	4.7631	5.6667	5.6403	5.3333	0.028	0.2656	0.2618	0.2601	0.2563	0.2618	0.2580	5.6293	5.3223	5.2960	0.024	
34	5.6667	4.9075	5.8333	5.8073	5.5000	0.027	0.2656	0.2618	0.2601	0.2563	0.2618	0.2580	5.7960	5.4887	5.4627	0.024	
35	5.8333	5.0518	6.0000	5.9744	5.6667	0.027	0.2656	0.2618	0.2600	0.2562	0.2618	0.2580	5.9627	5.6550	5.6293	0.023	
36	6.0000	5.1962	6.1667	6.1413	5.8333	0.027	0.2657	0.2618	0.2600	0.2562	0.2618	0.2579	6.1293	5.8213	5.7960	0.023	
37	6.1667	5.3405	6.3333	6.3083	6.0000	0.027	0.2657	0.2618	0.2600	0.2561	0.2618	0.2579	6.2960	5.9877	5.9627	0.023	
38	6.3333	5.4848	6.5000	6.4754	6.1667	0.026	0.2657	0.2618	0.2600	0.2561	0.2618	0.2579	6.4627	6.1540	6.1293	0.023	
39	6.5000	5.6292	6.6667	6.6423	6.3333	0.026	0.2658	0.2618	0.2600	0.2560	0.2618	0.2578	6.6293	6.3203	6.2960	0.022	
40	6.6667	5.7735	6.8333	6.8093	6.5000	0.026	0.2658	0.2618	0.2600	0.2560	0.2618	0.2578	6.7960	6.4867	6.4627	0.022	
41	6.8333	5.9178	7.0000	6.9764	6.6667	0.025	0.2658	0.2618	0.2600	0.2560	0.2618	0.2578	6.9627	6.6530	6.6293	0.022	
42	7.0000	6.0622	7.1667	7.1433	6.8333	0.025	0.2659	0.2618	0.2600	0.2559	0.2618	0.2577	7.1293	6.8193	6.7960	0.022	
43	7.1667	6.2065	7.3333	7.3103	7.0000	0.025	0.2659	0.2618	0.2600	0.2559	0.2618	0.2577	7.2960	6.9857	6.9627	0.021	
44	7.3333	6.3509	7.5000	7.4774	7.1667	0.024	0.2659	0.2618	0.2600	0.2558	0.2618	0.2577	7.4627	7.1520	7.1293	0.021	
45	7.5000	6.4952	7.6667	7.6443	7.3333	0.024	0.2660	0.2618	0.2599	0.2558	0.2618	0.2576	7.6293	7.3183	7.2960	0.021	
46	7.6667	6.6395	7.8333	7.8113	7.5000	0.023	0.2660	0.2618	0.2599	0.2557	0.2618	0.2576	7.7960	7.4847	7.4627	0.021	
47	7.8333	6.7839	8.0000	7.9784	7.6667	0.023	0.2660	0.2618	0.2599	0.2557	0.2618	0.2576	7.9627	7.6510	7.6293	0.020	
48	8.0000	6.9282	8.1667	8.1453	7.8333	0.022	0.2661	0.2618	0.2599	0.2556	0.2618	0.2575	8.1293	7.8173	7.7960	0.020	
49	8.1667	7.0726	8.3333	8.3123	8.0000	0.022	0.2661	0.2618	0.2599	0.2556	0.2618	0.2575	8.2960	7.9837	7.9627	0.020	
50	8.3333	7.2169	8.5000	8.4794	8.1667	0.022	0.2661	0.2618	0.2599	0.2555	0.2618	0.2575	8.4627	8.1500	8.1293	0.019	
51	8.5000	7.3612	8.6667	8.6463	8.3333	0.021	0.2662	0.2618	0.2599	0.2555	0.2618	0.2574	8.6293	8.3163	8.2960	0.019	
52	8.6667	7.5056	8.8333	8.8133	8.5000	0.021	0.2662	0.2618	0.2599	0.2555	0.2618	0.2574	8.7960	8.4827	8.4627	0.019	
53	8.8333	7.6499	9.0000	8.9804	8.6667	0.021	0.2663	0.2618	0.2599	0.2554	0.2618	0.2573	8.9627	8.6490	8.6293	0.018	
54	9.0000	7.7942	9.1667	9.1473	8.8333	0.020	0.2663	0.2618	0.2599	0.2554	0.2618	0.2573	9.1293	8.8153	8.7960	0.018	
55	9.1667	7.9386	9.3333	9.3143	9.0000	0.020	0.2663	0.2618	0.2598	0.2553	0.2618	0.2573	9.2960	8.9816	8.9627	0.018	
56	9.3333	8.0829	9.5000	9.4814	9.1667	0.019	0.2664	0.2618	0.2598	0.2553	0.2618	0.2572	9.4627	9.1480	9.1293	0.018	
57	9.5000	8.2273	9.6667	9.6483	9.3333	0.019	0.2664	0.2618	0.2598	0.2552	0.2618	0.2572	9.6293	9.3143	9.2960	0.017	
58	9.6667	8.3716	9.8333	9.8153	9.5000	0.019	0.2664	0.2618	0.2598	0.2552	0.2618	0.2571	9.7960	9.4806	9.4627	0.017	
59	9.8333	8.5159	10.0000	9.9824	9.6667	0.018	0.2665	0.2618	0.2598	0.2551	0.2618	0.2571	9.9627	9.6470	9.6293	0.016	
60	10.0000	8.6603	10.1667	10.1493	9.8333	0.018	0.2665	0.2618	0.2598	0.2551	0.2618	0.2571	10.1293	9.8133	9.7960	0.016	

(a) Measurements with pins cannot be used to determine effective space width and spline thickness. Measurements with pins for actual space width and spline thickness are in Tables 49, 50 and 51 in Part 2.

(b) For (AUX.) minimum actual space width, and (AUX.) maximum actual spline thickness, see Table 39.

(c) For (AUX.) maximum effective space width, and (AUX.) minimum effective spline thickness, see Table 39.

(d) Figures in bold type are modified values, see Clause 14.

TABLE 10. 8/16 PITCH, FLAT ROOT SIDE FIT

INCHES

INTERNAL AND EXTERNAL			INTERNAL (See Fig. 6 for drawing data)						EXTERNAL (See Fig. 7 for drawing data)								
No. of splines <i>N</i>	Pitch dia. <i>D</i>	Base dia. <i>D_b</i>	Major dia. <i>D_{F1}</i>	Form dia. <i>D_{F1}</i>	(d) Minor dia. <i>D₁</i>	Fillet rad. <i>r₁</i>	Space width ^(a)		Spline thickness ^(a)				Major dia. <i>D_o</i>	(d) Form dia. <i>D_{Fo}</i>	Minor dia. <i>D_{re}</i>	Fillet rad. <i>r₁</i>	
							(b) Max. actual <i>s</i>	(c) Min. eff. <i>s_r</i>	Class 1 fit		Class 2 fit						
									(c) Max. eff. <i>t_v</i>	(b) Min. actual <i>t</i>	(c) Max. eff. <i>t_v</i>	(b) Min. actual <i>t</i>					
1	2	3	4-1	5-1	6-1	7	8	9	10	11	12	13	14-1	17-1	18-1	19	
Tolerance in 0.0001 inch units			+180 -0	—	+50 -0	—	—	—	—	—	—	—	+0 -50	—	+0 -180	—	
6	0.7500	0.6495	0.8750	0.8500	0.6635	0.033	0.1991	0.1963	0.1949	0.1920	0.1963	0.1935	0.8460	0.6595	0.5960	0.041	
7	0.8750	0.7578	1.0000	0.9750	0.7761	0.032	0.1991	0.1963	0.1949	0.1920	0.1963	0.1935	0.9710	0.7721	0.7210	0.033	
8	1.0000	0.8660	1.1250	1.1000	0.8953	0.031	0.1992	0.1963	0.1949	0.1919	0.1963	0.1934	1.0960	0.8913	0.8460	0.031	
9	1.1250	0.9743	1.2500	1.2250	1.0159	0.030	0.1992	0.1963	0.1949	0.1919	0.1963	0.1934	1.2210	1.0119	0.9710	0.029	
10	1.2500	1.0825	1.3750	1.3500	1.1374	0.029	0.1993	0.1963	0.1948	0.1918	0.1963	0.1934	1.3460	1.1334	1.0960	0.027	
11	1.3750	1.1908	1.5000	1.4750	1.2596	0.029	0.1993	0.1963	0.1948	0.1918	0.1963	0.1933	0.4710	1.2556	1.2210	0.026	
12	1.5000	1.2990	1.6250	1.6000	1.3823	0.029	0.1993	0.1963	0.1948	0.1918	0.1963	0.1933	1.5960	1.3783	1.3460	0.025	
13	1.6250	1.4073	1.7500	1.7250	1.5054	0.029	0.1994	0.1963	0.1948	0.1918	0.1963	0.1932	1.7210	1.5014	1.4710	0.024	
14	1.7500	1.5155	1.8750	1.8500	1.6288	0.029	0.1994	0.1963	0.1948	0.1917	0.1963	0.1932	1.8460	1.6248	1.5960	0.023	
15	1.8750	1.6238	2.0000	1.9750	1.7524	0.028	0.1994	0.1963	0.1948	0.1916	0.1963	0.1932	1.9710	1.7484	1.7210	0.022	
16	2.0000	1.7321	2.1250	2.1000	1.8762	0.028	0.1995	0.1963	0.1948	0.1916	0.1963	0.1931	2.0960	1.8722	1.8460	0.021	
17	2.1250	1.8403	2.2500	2.2253	2.0004	0.028	0.1995	0.1963	0.1948	0.1915	0.1963	0.1931	2.2210	1.9962	1.9710	0.021	
18	2.2500	1.9486	2.3750	2.3505	2.1250	0.027	0.1995	0.1963	0.1948	0.1915	0.1963	0.1931	2.3460	2.1205	2.0960	0.020	
19	2.3750	2.0568	2.5000	2.4758	2.2500	0.027	0.1996	0.1963	0.1948	0.1914	0.1963	0.1930	2.4710	2.2452	2.2210	0.020	
20	2.5000	2.1651	2.6250	2.6010	2.3750	0.026	0.1996	0.1963	0.1947	0.1914	0.1963	0.1930	2.5960	2.3700	2.3460	0.020	
21	2.6250	2.2733	2.7500	2.7263	2.5000	0.026	0.1996	0.1963	0.1947	0.1913	0.1963	0.1930	2.7210	2.4948	2.4710	0.020	
22	2.7500	2.3816	2.8750	2.8515	2.6250	0.026	0.1997	0.1963	0.1947	0.1913	0.1963	0.1929	2.8460	2.6195	2.5960	0.020	
23	2.8750	2.4898	3.0000	2.9768	2.7500	0.025	0.1997	0.1963	0.1947	0.1913	0.1963	0.1929	2.9710	2.7442	2.7210	0.020	
24	3.0000	2.5981	3.1250	3.1020	2.8750	0.025	0.1997	0.1963	0.1947	0.1912	0.1963	0.1929	3.0960	2.8690	2.8460	0.020	
25	3.1250	2.7063	3.2500	3.2273	3.0000	0.025	0.1998	0.1963	0.1947	0.1912	0.1963	0.1928	3.2210	2.9938	2.9710	0.020	
26	3.2500	2.8146	3.3750	3.3525	3.1250	0.024	0.1998	0.1963	0.1947	0.1911	0.1963	0.1928	3.3460	3.1185	3.0960	0.020	
27	3.3750	2.9228	3.5000	3.4778	3.2500	0.024	0.1999	0.1963	0.1947	0.1911	0.1963	0.1928	3.4710	3.2432	3.2210	0.020	
28	3.5000	3.0311	3.6250	3.6030	3.3750	0.024	0.1999	0.1963	0.1947	0.1910	0.1963	0.1927	3.5960	3.3680	3.3460	0.020	
29	3.6250	3.1393	3.7500	3.7282	3.5000	0.023	0.1999	0.1963	0.1947	0.1910	0.1963	0.1927	3.7210	3.4928	3.4710	0.020	
30	3.7500	3.2476	3.8750	3.8535	3.6250	0.023	0.2000	0.1963	0.1946	0.1909	0.1963	0.1926	3.8460	3.6175	3.5960	0.019	
31	3.8750	3.3558	4.0000	3.9788	3.7500	0.023	0.2000	0.1963	0.1946	0.1909	0.1963	0.1926	3.9710	3.7422	3.7210	0.019	
32	4.0000	3.4641	4.1250	4.1040	3.8750	0.022	0.2000	0.1963	0.1946	0.1909	0.1963	0.1926	4.0960	3.8670	3.8460	0.019	
33	4.1250	3.5724	4.2500	4.2293	4.0000	0.022	0.2001	0.1963	0.1946	0.1908	0.1963	0.1925	4.2210	3.9918	3.9710	0.019	
34	4.2500	3.6806	4.3750	4.3545	4.1250	0.022	0.2001	0.1963	0.1946	0.1908	0.1963	0.1925	4.3460	4.1165	4.0960	0.019	
35	4.3750	3.7889	4.5000	4.4798	4.2500	0.021	0.2001	0.1963	0.1946	0.1907	0.1963	0.1925	4.4710	4.2412	4.2210	0.019	
36	4.5000	3.8971	4.6250	4.6050	4.3750	0.021	0.2002	0.1963	0.1946	0.1907	0.1963	0.1924	4.5960	4.3660	4.3460	0.018	
37	4.6250	4.0054	4.7500	4.7303	4.5000	0.021	0.2002	0.1963	0.1946	0.1906	0.1963	0.1924	4.7210	4.4908	4.4710	0.018	
38	4.7500	4.1136	4.8750	4.8555	4.6250	0.020	0.2002	0.1963	0.1946	0.1906	0.1963	0.1924	4.8460	4.6155	4.5960	0.018	
39	4.8750	4.2219	5.0000	4.9808	4.7500	0.020	0.2003	0.1963	0.1946	0.1905	0.1963	0.1923	4.9710	4.7402	4.7210	0.018	
40	5.0000	4.3301	5.1250	5.1060	4.8750	0.020	0.2003	0.1963	0.1945	0.1905	0.1963	0.1923	5.0960	4.8650	4.8460	0.018	
41	5.1250	4.4384	5.2500	5.2313	5.0000	0.019	0.2003	0.1963	0.1945	0.1905	0.1963	0.1923	5.2210	4.9898	4.9710	0.017	
42	5.2500	4.5466	5.3750	5.3365	5.1250	0.019	0.2004	0.1963	0.1945	0.1904	0.1963	0.1922	5.3460	5.1145	5.0960	0.017	
43	5.3750	4.6549	5.5000	5.4818	5.2500	0.019	0.2004	0.1963	0.1945	0.1904	0.1963	0.1922	5.4710	5.2392	5.2210	0.017	
44	5.5000	4.7631	5.6250	5.6070	5.3750	0.019	0.2004	0.1963	0.1945	0.1903	0.1963	0.1922	5.5960	5.3640	5.3460	0.017	
45	5.6250	4.8714	5.7500	5.7323	5.5000	0.019	0.2005	0.1963	0.1945	0.1903	0.1963	0.1921	5.7210	5.4888	5.4710	0.017	
46	5.7500	4.9796	5.8750	5.8575	5.6250	0.018	0.2005	0.1963	0.1945	0.1902	0.1963	0.1921	5.8460	5.6135	5.5960	0.016	
47	5.8750	5.0879	6.0000	5.9828	5.7500	0.018	0.2005	0.1963	0.1945	0.1902	0.1963	0.1921	5.9710	5.7382	5.7210	0.016	
48	6.0000	5.1962	6.1250	6.1080	5.8750	0.018	0.2006	0.1963	0.1945	0.1901	0.1963	0.1920	6.0960	5.8630	5.8460	0.016	
49	6.1250	5.3044	6.2500	6.2333	6.0000	0.017	0.2006	0.1963	0.1945	0.1901	0.1963	0.1920	6.2210	5.9878	5.9710	0.016	
50	6.2500	5.4127	6.3750	6.3585	6.1250	0.017	0.2007	0.1963	0.1944	0.1900	0.1963	0.1919	6.3460	6.1125	6.0960	0.015	
51	6.3750	5.5209	6.5000	6.4838	6.2500	0.017	0.2007	0.1963	0.1944	0.1900	0.1963	0.1919	6.4710	6.2372	6.2210	0.015	
52	6.5000	5.6292	6.6250	6.6090	6.3750	0.017	0.2007	0.1963	0.1944	0.1900	0.1963	0.1919	6.5960	6.3620	6.3460	0.015	
53	6.6250	5.7374	6.7500	6.7343	6.5000	0.017	0.2008	0.1963	0.1944	0.1899	0.1963	0.1918	6.7210	6.4868	6.4710	0.015	
54	6.7500	5.8457	6.8750	6.8595	6.6250	0.017	0.2008	0.1963	0.1944	0.1899	0.1963	0.1918	6.8460	6.6115	6.5960	0.014	
55	6.8750	5.9539	7.0000	6.9848	6.7500	0.017	0.2008	0.1963	0.1944	0.1898	0.1963	0.1918	6.9710	6.7362	6.7210	0.014	
56	7.0000	6.0622	7.1250	7.1100	6.8750	0.017	0.2009	0.1963	0.1944	0.1898	0.1963	0.1917	7.0960	6.8610	6.8460	0.014	
57	7.1250	6.1704	7.2500	7.2353	7.0000	0.016	0.2009	0.1963	0.1944	0.1897	0.1963	0.1917	7.2210	6.9858	6.9710	0.014	
58	7.2500	6.2787	7.3750	7.3605	7.1250	0.015	0.2009	0.1963	0.1944	0.1897	0.1963	0.1917	7.3460	7.1105	7.0960	0.014	
59	7.3750	6.3870	7.5000	7.4858	7.2500	0.015	0.2010	0.1963	0.1944	0.1896	0.1963	0.1916	7.4710	7.2352	7.2210	0.013	
60	7.5000	6.4952	7.6250	7.6110	7.3750	0.015	0.2010	0.1963	0.1943	0.1896	0.1963	0.1916	7.5960	7.3600	7.3460	0.013	

(a) Measurements with pins cannot be used to determine effective space width and spline thickness. Measurements with pins for actual space width and spline thickness are in Tables 49, 50 and 51 in Part 2.

(b) For (AUX.) minimum actual space width, and (AUX.) maximum actual spline thickness, see Table 39.

(c) For (AUX.) maximum effective space width, and (AUX.) minimum effective spline thickness, see Table 39.

(d) Figures in bold type are modified values, see Clause 14.