

I. FUNDAMENTAL PRINCIPLES

A. The primary object of this standard is to provide efficient, durable and easily fabricated splines applicable to very nearly all conditions with a minimum of restrictions and limitations. In order to meet special requirements, a deviation from this standard may be necessary.

B. This is a shallow depth side bearing spline featuring a 30° pressure angle and a full radius at the root of the teeth to decrease the stress concentration at the root to a minimum.

C. This standard incorporates a stubbed tooth form. The numerator or basic pitches are 10 in number ranging from 6 to 48. The depth or denominator pitch being twice the basic pitch, ranges from 12 to 96. The table of basic tooth proportions covers from 12 to an indefinite number of teeth for pitches $6/12$, $8/16$, $10/20$, $12/24$, $16/32$, $20/40$ and $24/48$ and from 8 to an indefinite number of teeth for pitches $32/64$, $40/80$ and $48/96$. The tables of dimensions cover from 8 to 50 teeth with pitch diameters from .1667 to 8.333. To use a spline with less than 12 teeth for pitches $24/48$ and larger teeth, it is suggested that the tooth form be laid out to check for possible tool interferences or interferences with the mating member, and perhaps modifying the tooth to suit. For splines of more than 50 teeth use the same tooth proportions as for 50 teeth or as specified in Table I, Basic Tooth Dimensions.

II. SPLINE TOOTH NOMENCLATURE

Figure 1 shows a tooth diagram of splines in mesh. The various elements of the tooth are illustrated and defined.

III. METHOD OF DIMENSIONING SPLINES

A. Figure 2 contains the required data to be incorporated on the engineering drawing with an illustration to clarify the dimensions. The dimensions and tolerances may be taken from the tables entitled "Dimensions for Splines." The method of calculating the basic chordal space and basic chordal tooth thickness is indicated on Page 2.

B. This information given on the drawing will enable the tool and production engineers to design tools, gages and other equipment necessary for the manufacture of these splines.

IV. BASIC TOOTH PROPORTION

C. Table I is a table of basic tooth proportions. It is to be noted that the amount of land clearance of the teeth is considerably greater than on a gear of corresponding pitch, this being necessary to accommodate a full radius at the root of the teeth. The internal member does not require as much clearance as the external member; however, when the number of teeth of the internal becomes large enough to incorporate the same generating cutting tool as the external member, the depth of the internal tooth has been increased to equal that of the external, thereby eliminating one cutting tool. (See NOTE on P. 5)

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IV. BASIC TOOTH PROPORTION
(Continued)

B. The true involute form diameter for the external spline is given in the table as the maximum diameter and is the same as the basic I. D. of the internal spline. This diameter may be decreased to obtain the involute clearance desired. This also applies to the true involute form diameter for the internal spline which is given in the tables as the minimum diameter and is the O.D. of the external spline. In this case the diameter may be increased to give clearance if an exceptionally loose fit is used.

C. The fillet generated by a full radius tip tool is a curve related to a cycloid for both the internal and the external splines, but for practical purposes an approximate radius tangent to adjacent involutes and root diameter may be specified.

V. DIMENSIONS FOR SPLINES

Tables II to XI inclusive show spline dimensions with tolerances as calculated from the basic tooth dimensions, Table I.

VI. FORMULAEEXTERNAL & INTERNAL SPLINES

CIRCULAR PITCH = $3.1416 / \text{DIAMETRAL PITCH}^*$
 ADDENDUM = $1 / \text{DIAMETRAL PITCH}^{**}$
 DEDENDUM = ADDENDUM + CLEARANCE
 CLEARANCE = DETERMINED BY LAYOUT
 WORKING DEPTH = $2 \times \text{ADDENDUM}$
 WHOLE DEPTH = ADDENDUM + DEDENDUM
 INVOLUTE CLEARANCE & FULL RADIUS IS DETERMINED BY LAYOUT
 BASIC ARC SPACE & TOOTH THICKNESS = $1.5708 / \text{DIAMETRAL PITCH}^*$
 $\left. \begin{array}{l} \text{BASIC CH.T.T.} \\ \text{BASIC CH.S.} \end{array} \right\} = \text{P.D.} \times \sin \frac{90^\circ}{N}$
 PITCH DIAMETER = $\text{NO. OF TEETH} / \text{DIAMETRAL PITCH}^*$

EXTERNAL SPLINES

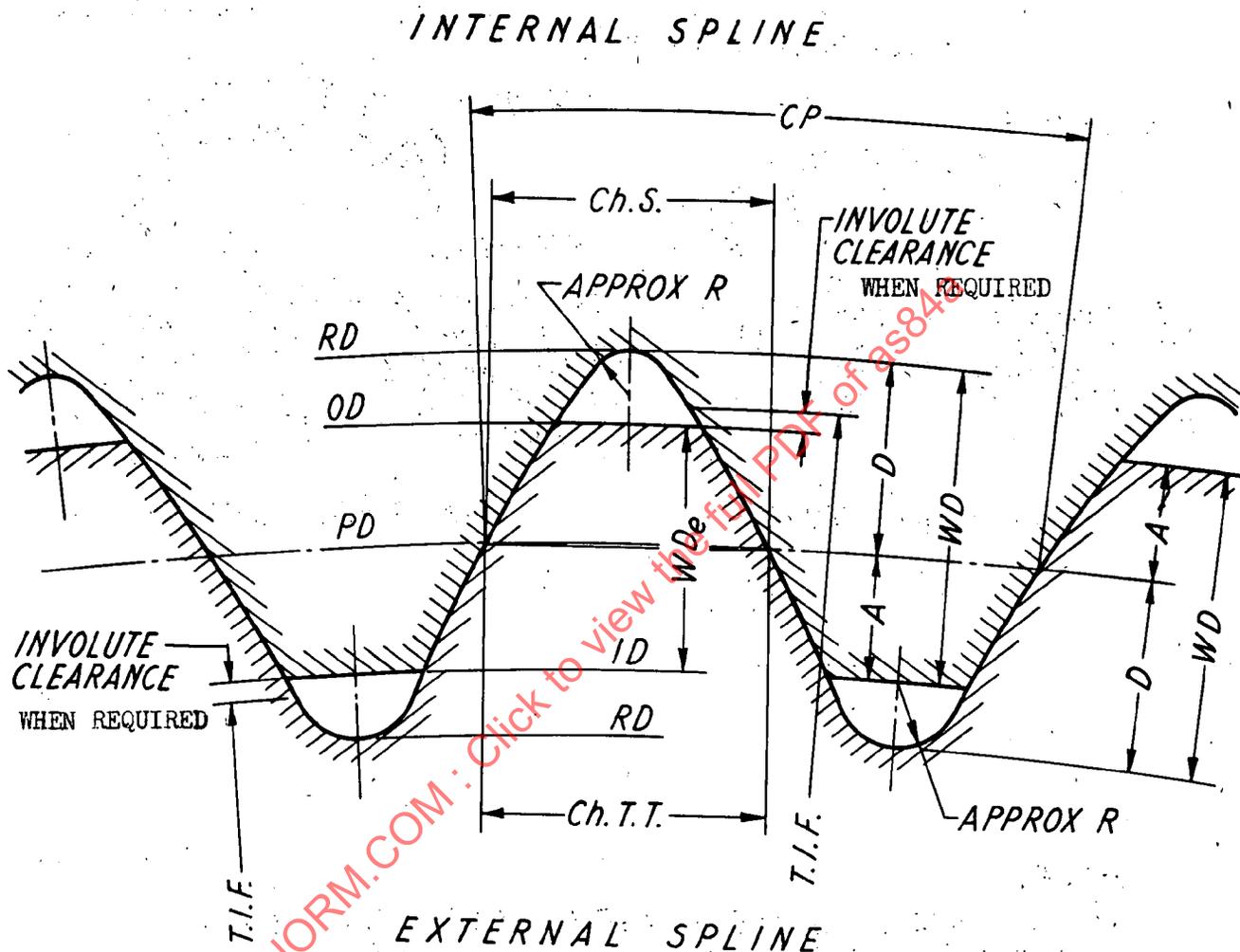
OUTSIDE DIAMETER = $\text{PITCH DIAMETER} + (2 \times \text{ADDENDUM})$
 ROOT DIAMETER = $\text{OUTSIDE DIAMETER} - (2 \times \text{WHOLE DEPTH})$
 TRUE INVOLUTE FORM DIAMETER = $\text{INTERNAL INSIDE DIAMETER} - (2 \times \text{INVOLUTE CLEARANCE, WHEN REQUIRED})$

INTERNAL SPLINES

INSIDE DIAMETER = $\text{PITCH DIAMETER} - (2 \times \text{ADDENDUM})$
 ROOT DIAMETER = $\text{INSIDE DIAMETER} + (2 \times \text{WHOLE DEPTH})$
 TRUE INVOLUTE FORM DIAMETER = $\text{OUTSIDE DIAMETER} + (2 \times \text{INVOLUTE CLEARANCE, WHEN REQUIRED})$

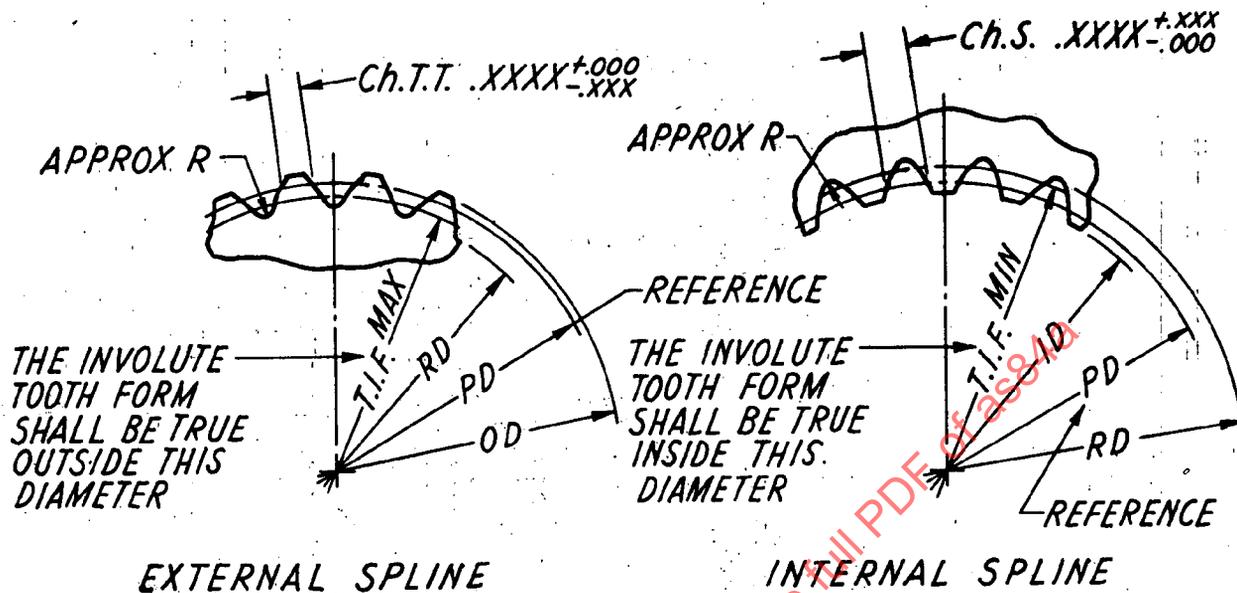
* Use numerator of the diametral pitch

** Use denominator of the diametral pitch



- | | |
|--|--------------------------------------|
| A = ADDENDUM | PD = PITCH DIAMETER |
| D = DEDENDUM | OD = OUTSIDE DIAMETER |
| WD _e = WORKING DEPTH | RD = ROOT DIAMETER |
| WD = WHOLE DEPTH | ID = INSIDE DIAMETER |
| R = FILLET RADIUS | T.I.F. = TRUE INVOLUTE FORM DIAMETER |
| CP = CIRCULAR PITCH | |
| Ch.T.T. = CHORDAL TOOTH THICKNESS (EXTERNAL) | |
| Ch.S. = CHORDAL SPACE (INTERNAL) | |

TOOTH NOMENCLATURE
FIG. 1



NOTES:

- (1) THE CHORDAL SPACE OF THE INTERNAL SPLINE (SEE TABLES) IS BASIC WITH A PLUS TOLERANCE
- (2) THE CHORDAL TOOTH THICKNESS AND TOLERANCE OF THE EXTERNAL SPLINE SHOULD BE SELECTED TO OBTAIN THE DESIRED FIT
- (3) SPLINE DATA:
30° STUB TOOTH FORM
XX TEETH XX/XX PITCH

METHOD OF DIMENSIONING
FIG. 2

TABLE I
BASIC TOOTH DIMENSIONS

DIA. PITCH	CIR. PITCH	TYPE	NO. OF TEETH	ADD.	DED.	WORKING DEPTH	WHOLE DEPTH	APPROX. FILLET RADIUS
6/12	.5236	EXT.	12 to Rack	.0833	.1506	.1666	.2339	.080
		INT.	12 to 29	.0833	.1370	.1666	.2203	.080
*8/16	.3927	EXT.	12 to 16	.0625	.1127	.1250	.1752	.060
		INT.	12 to 36	.0625	.1050	.1250	.1675	.060
10/20	.3142	EXT.	12 to 19	.0500	.0901	.1000	.1401	.050
		INT.	12 to 41	.0500	.0850	.1000	.1350	.045
12/24	.2618	EXT.	12 to 20	.0417	.0749	.0834	.1166	.040
		INT.	12 to 47	.0417	.0725	.0834	.1142	.035
*16/32	.1964	EXT.	12 to Rack	.0313	.0625	.0626	.0938	.020
		INT.	12 to 59	.0313	.0555	.0626	.0868	.020
20/40	.1571	EXT.	12 to Rack	.0250	.0500	.0500	.0750	.018
		INT.	12 to 71	.0250	.0425	.0500	.0675	.018
24/48	.1309	EXT.	12 to Rack	.0208	.0417	.0416	.0625	.015
		INT.	12 to 83	.0208	.0355	.0416	.0563	.015
*32/64	.0982	EXT.	8 to Rack	.0156	.0313	.0312	.0469	.010
		INT.	8 to 111	.0156	.0275	.0312	.0431	.010
40/80	.0785	EXT.	8 to Rack	.0125	.0225	.0250	.0350	.009
		INT.	8 to Rack	.0125	.0225	.0250	.0350	.009
48/96	.0655	EXT.	8 to Rack	.0104	.0184	.0208	.0288	.008
		INT.	8 to Rack	.0104	.0184	.0208	.0288	.008

*Preferred

NOTE: The shallow depth given for the smaller internal splines may be used for the full range of the number of teeth, depending on the size of the cutter.

TABLE II
DIMENSIONS FOR SPLINES
6/12 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.020	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.020 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	2.0000	2.167	1.699	1.833		.080	1.833	2.274	2.167	.2611	.080
13	2.1667	2.333	1.866	2.000		"	2.000	2.441	2.333	.2612	"
14	2.3333	2.500	2.032	2.167		"	2.167	2.607	2.500	.2613	"
15	2.5000	2.667	2.199	2.333		"	2.333	2.774	2.667	"	"
16	2.6667	2.833	2.366	2.500		"	2.500	2.941	2.833	.2614	"
17	2.8333	3.000	2.532	2.667		"	2.667	3.107	3.000	"	"
18	3.0000	3.167	2.699	2.833		"	2.833	3.274	3.167	.2615	"
19	3.1667	3.333	2.866	3.000		"	3.000	3.441	3.333	"	"
20	3.3333	3.500	3.032	3.167		"	3.167	3.607	3.500	"	"
21	3.5000	3.667	3.199	3.333		.080	3.333	3.774	3.667	.2616	.080
22	3.6667	3.833	3.366	3.500		"	3.500	3.941	3.833	"	"
23	3.8333	4.000	3.532	3.667		"	3.667	4.107	4.000	"	"
24	4.0000	4.167	3.699	3.833		"	3.833	4.274	4.167	"	"
25	4.1667	4.333	3.866	4.000		"	4.000	4.441	4.333	"	"
26	4.3333	4.500	4.032	4.167		"	4.167	4.607	4.500	.2617	"
27	4.5000	4.667	4.199	4.333		"	4.333	4.774	4.667	"	"
28	4.6667	4.833	4.366	4.500		"	4.500	4.941	4.833	"	"
29	4.8333	5.000	4.532	4.667		"	4.667	5.107	5.000	"	"
30	5.0000	5.167	4.699	4.833		"	4.833	5.301	5.167	"	.070
31	5.1667	5.333	4.866	5.000		.080	5.000	5.468	5.333	.2617	.070
32	5.3333	5.500	5.032	5.167		"	5.167	5.635	5.500	"	"
33	5.5000	5.667	5.199	5.333		"	5.333	5.801	5.667	"	"
34	5.6667	5.833	5.366	5.500		"	5.500	5.968	5.833	"	"
35	5.8333	6.000	5.532	5.667		"	5.667	6.135	6.000	"	"
36	6.0000	6.167	5.699	5.833		"	5.833	6.301	6.167	"	"
37	6.1667	6.333	5.866	6.000		"	6.000	6.468	6.333	"	"
38	6.3333	6.500	6.032	6.167		"	6.167	6.635	6.500	"	"
39	6.5000	6.667	6.199	6.333		"	6.333	6.801	6.667	"	"
40	6.6667	6.833	6.366	6.500		"	6.500	6.968	6.833	"	"
41	6.8333	7.000	6.532	6.667		.080	6.667	7.135	7.000	.2617	.070
42	7.0000	7.167	6.699	6.833		"	6.833	7.301	7.167	"	"
43	7.1667	7.333	6.866	7.000		"	7.000	7.468	7.333	"	"
44	7.3333	7.500	7.032	7.167		"	7.167	7.635	7.500	"	"
45	7.5000	7.667	7.199	7.333		"	7.333	7.801	7.667	"	"
46	7.6667	7.833	7.366	7.500		"	7.500	7.968	7.833	"	"
47	7.8333	8.000	7.532	7.667		"	7.667	8.135	8.000	"	"
48	8.0000	8.167	7.699	7.833		"	7.833	8.301	8.167	"	"
49	8.1667	8.333	7.866	8.000		"	8.000	8.468	8.333	"	"
50	8.3333	8.500	8.032	8.167		"	8.167	8.635	8.500	"	"

SEE NOTE - Fig. 2

TABLE III
DIMENSIONS FOR SPLINES
8/16 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.020	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.020 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	1.5000	1.625	1.275	1.375		.060	1.375	1.710	1.625	.1958	.060
13	1.6250	1.750	1.400	1.500		"	1.500	1.835	1.750	.1959	"
14	1.7500	1.875	1.525	1.625		"	1.625	1.960	1.875	"	"
15	1.8750	2.000	1.650	1.750		"	1.750	2.085	2.000	.1960	"
16	2.0000	2.125	1.775	1.875		"	1.875	2.210	2.125	"	"
17	2.1250	2.250	1.900	2.000		"	2.000	2.335	2.250	.1961	"
18	2.2500	2.375	2.025	2.125		"	2.125	2.460	2.375	"	"
19	2.3750	2.500	2.150	2.250		"	2.250	2.585	2.500	"	"
20	2.5000	2.625	2.275	2.375		"	2.375	2.710	2.625	"	"
21	2.6250	2.750	2.400	2.500		.060	2.500	2.835	2.750	.1962	.060
22	2.7500	2.875	2.525	2.625		"	2.625	2.960	2.875	"	"
23	2.8750	3.000	2.650	2.750		"	2.750	3.085	3.000	"	"
24	3.0000	3.125	2.775	2.875		"	2.875	3.210	3.125	"	"
25	3.1250	3.250	2.900	3.000		"	3.000	3.335	3.250	"	"
26	3.2500	3.375	3.025	3.125		"	3.125	3.460	3.375	"	"
27	3.3750	3.500	3.150	3.250		"	3.250	3.585	3.500	"	"
28	3.5000	3.625	3.275	3.375		"	3.375	3.710	3.625	"	"
29	3.6250	3.750	3.400	3.500		"	3.500	3.835	3.750	"	"
30	3.7500	3.875	3.525	3.625		"	3.625	3.960	3.875	.1963	"
31	3.8750	4.000	3.650	3.750		.060	3.750	4.085	4.000	.1963	.060
32	4.0000	4.125	3.775	3.875		"	3.875	4.210	4.125	"	"
33	4.1250	4.250	3.900	4.000		"	4.000	4.335	4.250	"	"
34	4.2500	4.375	4.025	4.125		"	4.125	4.460	4.375	"	"
35	4.3750	4.500	4.150	4.250		"	4.250	4.585	4.500	"	"
36	4.5000	4.625	4.275	4.375		"	4.375	4.710	4.625	"	"
37	4.6250	4.750	4.400	4.500		"	4.500	4.850	4.750	"	.055
38	4.7500	4.875	4.525	4.625		"	4.625	4.975	4.875	"	"
39	4.8750	5.000	4.650	4.750		"	4.750	5.100	5.000	"	"
40	5.0000	5.125	4.775	4.875		"	4.875	5.225	5.125	"	"
41	5.1250	5.250	4.900	5.000		.060	5.000	5.350	5.250	.1963	.055
42	5.2500	5.375	5.025	5.125		"	5.125	5.475	5.375	"	"
43	5.3750	5.500	5.150	5.250		"	5.250	5.600	5.500	"	"
44	5.5000	5.625	5.275	5.375		"	5.375	5.725	5.625	"	"
45	5.6250	5.750	5.400	5.500		"	5.500	5.850	5.750	"	"
46	5.7500	5.875	5.525	5.625		"	5.625	5.975	5.875	"	"
47	5.8750	6.000	5.650	5.750		"	5.750	6.100	6.000	"	"
48	6.0000	6.125	5.775	5.875		"	5.875	6.225	6.125	"	"
49	6.1250	6.250	5.900	6.000		"	6.000	6.350	6.250	"	"
50	6.2500	6.375	6.025	6.125		"	6.125	6.475	6.375	"	"

SEE NOTE - Fig. 2

TABLE IV
DIMENSIONS FOR SPLINES
10/20 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.020	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.020 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	1.2000	1.300	1.020	1.100		.050	1.100	1.370	1.300	.1566	.045
13	1.3000	1.400	1.120	1.200		"	1.200	1.470	1.400	.1567	"
14	1.4000	1.500	1.220	1.300		"	1.300	1.570	1.500	.1568	"
15	1.5000	1.600	1.320	1.400		"	1.400	1.670	1.600	"	"
16	1.6000	1.700	1.420	1.500		"	1.500	1.770	1.700	"	"
17	1.7000	1.800	1.520	1.600		"	1.600	1.870	1.800	.1569	"
18	1.8000	1.900	1.620	1.700		"	1.700	1.970	1.900	"	"
19	1.9000	2.000	1.720	1.800		"	1.800	2.070	2.000	"	"
20	2.0000	2.100	1.820	1.900		.045	1.900	2.170	2.100	"	"
21	2.1000	2.200	1.920	2.000		.045	2.000	2.270	2.200	.1569	.045
22	2.2000	2.300	2.020	2.100		"	2.100	2.370	2.300	"	"
23	2.3000	2.400	2.120	2.200		"	2.200	2.470	2.400	.1570	"
24	2.4000	2.500	2.220	2.300		"	2.300	2.570	2.500	"	"
25	2.5000	2.600	2.320	2.400		"	2.400	2.670	2.600	"	"
26	2.6000	2.700	2.420	2.500		"	2.500	2.770	2.700	"	"
27	2.7000	2.800	2.520	2.600		"	2.600	2.870	2.800	"	"
28	2.8000	2.900	2.620	2.700		"	2.700	2.970	2.900	"	"
29	2.9000	3.000	2.720	2.800		"	2.800	3.070	3.000	"	"
30	3.0000	3.100	2.820	2.900		"	2.900	3.170	3.100	"	"
31	3.1000	3.200	2.920	3.000		.045	3.000	3.270	3.200	.1570	.045
32	3.2000	3.300	3.020	3.100		"	3.100	3.370	3.300	"	"
33	3.3000	3.400	3.120	3.200		"	3.200	3.470	3.400	"	"
34	3.4000	3.500	3.220	3.300		"	3.300	3.570	3.500	"	"
35	3.5000	3.600	3.320	3.400		"	3.400	3.670	3.600	"	"
36	3.6000	3.700	3.420	3.500		"	3.500	3.770	3.700	"	"
37	3.7000	3.800	3.520	3.600		"	3.600	3.870	3.800	"	"
38	3.8000	3.900	3.620	3.700		"	3.700	3.970	3.900	"	"
39	3.9000	4.000	3.720	3.800		"	3.800	4.070	4.000	"	"
40	4.0000	4.100	3.820	3.900		"	3.900	4.170	4.100	"	"
41	4.1000	4.200	3.920	4.000		.045	4.000	4.270	4.200	.1570	.045
42	4.2000	4.300	4.020	4.100		"	4.100	4.380	4.300	"	.040
43	4.3000	4.400	4.120	4.200		"	4.200	4.480	4.400	"	"
44	4.4000	4.500	4.220	4.300		"	4.300	4.580	4.500	"	"
45	4.5000	4.600	4.320	4.400		"	4.400	4.680	4.600	"	"
46	4.6000	4.700	4.420	4.500		"	4.500	4.780	4.700	"	"
47	4.7000	4.800	4.520	4.600		"	4.600	4.880	4.800	"	"
48	4.8000	4.900	4.620	4.700		"	4.700	4.980	4.900	"	"
49	4.9000	5.000	4.720	4.800		"	4.800	5.080	5.000	"	"
50	5.0000	5.100	4.820	4.900		"	4.900	5.180	5.100	"	"

SEE NOTE - FIG. 2

TABLE V
DIMENSIONS FOR SPLINES
12/24 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.020	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.020 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	1.0000	1.083	.850	.917		.040	.917	1.145	1.083	.1305	.035
13	1.0833	1.167	.934	1.000		"	1.000	1.228	1.167	.1306	"
14	1.1667	1.250	1.017	1.083		"	1.083	1.312	1.250	"	"
15	1.2500	1.333	1.100	1.167		"	1.167	1.395	1.333	.1307	"
16	1.3333	1.417	1.184	1.250		"	1.250	1.478	1.417	"	"
17	1.4167	1.500	1.267	1.333		"	1.333	1.562	1.500	"	"
18	1.5000	1.583	1.350	1.417		"	1.417	1.645	1.583	"	"
19	1.5833	1.667	1.434	1.500		"	1.500	1.728	1.667	.1308	"
20	1.6667	1.750	1.517	1.583		"	1.583	1.812	1.750	"	"
21	1.7500	1.833	1.600	1.667		.035	1.667	1.895	1.833	.1308	.035
22	1.8333	1.917	1.684	1.750		"	1.750	1.978	1.917	"	"
23	1.9167	2.000	1.767	1.833		"	1.833	2.062	2.000	"	"
24	2.0000	2.083	1.850	1.917		"	1.917	2.145	2.083	"	"
25	2.0833	2.167	1.934	2.000		"	2.000	2.228	2.167	"	"
26	2.1667	2.250	2.017	2.083		"	2.083	2.312	2.250	"	"
27	2.2500	2.333	2.100	2.167		"	2.167	2.395	2.333	"	"
28	2.3333	2.417	2.184	2.250		"	2.250	2.478	2.417	"	"
29	2.4167	2.500	2.267	2.333		"	2.333	2.562	2.500	"	"
30	2.5000	2.583	2.350	2.417		"	2.417	2.645	2.583	"	"
31	2.5833	2.667	2.434	2.500		.035	2.500	2.728	2.667	.1308	.035
32	2.6667	2.750	2.517	2.583		"	2.583	2.812	2.750	"	"
33	2.7500	2.833	2.600	2.667		"	2.667	2.895	2.833	"	"
34	2.8333	2.917	2.684	2.750		"	2.750	2.978	2.917	"	"
35	2.9167	3.000	2.767	2.833		"	2.833	3.062	3.000	.1309	"
36	3.0000	3.083	2.850	2.917		"	2.917	3.145	3.083	"	"
37	3.0833	3.167	2.934	3.000		"	3.000	3.228	3.167	"	"
38	3.1667	3.250	3.017	3.083		"	3.083	3.312	3.250	"	"
39	3.2500	3.333	3.100	3.167		"	3.167	3.395	3.333	"	"
40	3.3333	3.417	3.184	3.250		"	3.250	3.478	3.417	"	"
41	3.4167	3.500	3.267	3.333		.035	3.333	3.562	3.500	.1309	.035
42	3.5000	3.583	3.350	3.417		"	3.417	3.645	3.583	"	"
43	3.5833	3.667	3.434	3.500		"	3.500	3.728	3.667	"	"
44	3.6667	3.750	3.517	3.583		"	3.583	3.812	3.750	"	"
45	3.7500	3.833	3.600	3.667		"	3.667	3.895	3.833	"	"
46	3.8333	3.917	3.684	3.750		"	3.750	3.978	3.917	"	"
47	3.9167	4.000	3.767	3.833		"	3.833	4.062	4.000	"	"
48	4.0000	4.083	3.850	3.917		"	3.917	4.150	4.083	"	.030
49	4.0833	4.167	3.934	4.000		"	4.000	4.233	4.167	"	"
50	4.1667	4.250	4.017	4.083		"	4.083	4.317	4.250	"	"

SEE NOTE - Fig. 2

TABLE VI
DIMENSIONS FOR SPLINES
16/32 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.020	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.020 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	.7500	.813	.625	.688		.020	.688	.861	.813	.0979	.020
13	.8125	.875	.687	.750		"	.750	.924	.875	"	"
14	.8750	.938	.750	.813		"	.813	.986	.938	.0980	"
15	.9375	1.000	.812	.875		"	.875	1.049	1.000	"	"
16	1.0000	1.063	.875	.938		"	.938	1.111	1.063	"	"
17	1.0625	1.125	.937	1.000		"	1.000	1.174	1.125	"	"
18	1.1250	1.188	1.000	1.063		"	1.063	1.236	1.188	.0981	"
19	1.1875	1.250	1.062	1.125		"	1.125	1.299	1.250	"	"
20	1.2500	1.313	1.125	1.188		"	1.188	1.361	1.313	"	"
21	1.3125	1.375	1.187	1.250		.020	1.250	1.424	1.375	.0981	.020
22	1.3750	1.438	1.250	1.313		"	1.313	1.486	1.438	"	"
23	1.4375	1.500	1.312	1.375		"	1.375	1.549	1.500	"	"
24	1.5000	1.563	1.375	1.438		"	1.438	1.611	1.563	"	"
25	1.5625	1.625	1.437	1.500		"	1.500	1.674	1.625	"	"
26	1.6250	1.688	1.500	1.563		"	1.563	1.736	1.688	"	"
27	1.6875	1.750	1.562	1.625		"	1.625	1.799	1.750	"	"
28	1.7500	1.813	1.625	1.688		"	1.688	1.861	1.813	"	"
29	1.8125	1.875	1.687	1.750		"	1.750	1.924	1.875	"	"
30	1.8750	1.938	1.750	1.813		"	1.813	1.986	1.938	"	"
31	1.9375	2.000	1.812	1.875		.020	1.875	2.049	2.000	.0981	.020
32	2.0000	2.063	1.875	1.938		"	1.938	2.111	2.063	"	"
33	2.0625	2.125	1.937	2.000		"	2.000	2.174	2.125	"	"
34	2.1250	2.188	2.000	2.063		"	2.063	2.236	2.188	"	"
35	2.1875	2.250	2.062	2.125		"	2.125	2.299	2.250	"	"
36	2.2500	2.313	2.125	2.188		"	2.188	2.361	2.313	"	"
37	2.3125	2.375	2.187	2.250		"	2.250	2.424	2.375	"	"
38	2.3750	2.438	2.250	2.313		"	2.313	2.486	2.438	"	"
39	2.4375	2.500	2.312	2.375		"	2.375	2.549	2.500	.0982	"
40	2.5000	2.563	2.375	2.438		"	2.438	2.611	2.563	"	"
41	2.5625	2.625	2.437	2.500		.020	2.500	2.674	2.625	.0982	.020
42	2.6250	2.688	2.500	2.563		"	2.563	2.736	2.688	"	"
43	2.6875	2.750	2.562	2.625		"	2.625	2.799	2.750	"	"
44	2.7500	2.813	2.625	2.688		"	2.688	2.861	2.813	"	"
45	2.8125	2.875	2.687	2.750		"	2.750	2.924	2.875	"	"
46	2.8750	2.938	2.750	2.813		"	2.813	2.986	2.938	"	"
47	2.9375	3.000	2.812	2.875		"	2.875	3.049	3.000	"	"
48	3.0000	3.063	2.875	2.938		"	2.938	3.111	3.063	"	"
49	3.0625	3.125	2.937	3.000		"	3.000	3.174	3.125	"	"
50	3.1250	3.188	3.000	3.063		"	3.063	3.236	3.188	"	"

SEE NOTE - FIG. 2

TABLE VII
DIMENSIONS FOR SPLINES
20/40 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.020	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.020 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	.6000	.650	.500	.550		.018	.550	.685	.650	.0785	.018
13	.6500	.700	.550	.600		"	.600	.735	.700	"	"
14	.7000	.750	.600	.650		"	.650	.785	.750	.0784	"
15	.7500	.800	.650	.700		"	.700	.835	.800	"	"
16	.8000	.850	.700	.750		"	.750	.885	.850	"	"
17	.8500	.900	.750	.800		"	.800	.935	.900	"	"
18	.9000	.950	.800	.850		"	.850	.985	.950	"	"
19	.9500	1.000	.850	.900		"	.900	1.035	1.000	.0785	"
20	1.0000	1.050	.900	.950		"	.950	1.085	1.050	"	"
21	1.0500	1.100	.950	1.000		.018	1.000	1.135	1.100	.0785	.018
22	1.1000	1.150	1.000	1.050		"	1.050	1.185	1.150	"	"
23	1.1500	1.200	1.050	1.100		"	1.100	1.235	1.200	"	"
24	1.2000	1.250	1.100	1.150		"	1.150	1.285	1.250	"	"
25	1.2500	1.300	1.150	1.200		"	1.200	1.335	1.300	"	"
26	1.3000	1.350	1.200	1.250		"	1.250	1.385	1.350	"	"
27	1.3500	1.400	1.250	1.300		"	1.300	1.435	1.400	"	"
28	1.4000	1.450	1.300	1.350		"	1.350	1.485	1.450	"	"
29	1.4500	1.500	1.350	1.400		"	1.400	1.535	1.500	"	"
30	1.5000	1.550	1.400	1.450		"	1.450	1.585	1.550	"	"
31	1.5500	1.600	1.450	1.500		.018	1.500	1.635	1.600	.0785	.018
32	1.6000	1.650	1.500	1.550		"	1.550	1.685	1.650	"	"
33	1.6500	1.700	1.550	1.600		"	1.600	1.735	1.700	"	"
34	1.7000	1.750	1.600	1.650		"	1.650	1.785	1.750	"	"
35	1.7500	1.800	1.650	1.700		"	1.700	1.835	1.800	"	"
36	1.8000	1.850	1.700	1.750		"	1.750	1.885	1.850	"	"
37	1.8500	1.900	1.750	1.800		"	1.800	1.935	1.900	"	"
38	1.9000	1.950	1.800	1.850		"	1.850	1.985	1.950	"	"
39	1.9500	2.000	1.850	1.900		"	1.900	2.035	2.000	"	"
40	2.0000	2.050	1.900	1.950		"	1.950	2.085	2.050	"	"
41	2.0500	2.100	1.950	2.000		.018	2.000	2.135	2.100	.0785	.018
42	2.1000	2.150	2.000	2.050		"	2.050	2.185	2.150	"	"
43	2.1500	2.200	2.050	2.100		"	2.100	2.235	2.200	"	"
44	2.2000	2.250	2.100	2.150		"	2.150	2.285	2.250	"	"
45	2.2500	2.300	2.150	2.200		"	2.200	2.335	2.300	"	"
46	2.3000	2.350	2.200	2.250		"	2.250	2.385	2.350	"	"
47	2.3500	2.400	2.250	2.300		"	2.300	2.435	2.400	"	"
48	2.4000	2.450	2.300	2.350		"	2.350	2.485	2.450	"	"
49	2.4500	2.500	2.350	2.400		"	2.400	2.535	2.500	"	"
50	2.5000	2.550	2.400	2.450		"	2.450	2.585	2.550	"	"

SEE NOTE - FIG. 2

TABLE VIII
DIMENSIONS FOR SPLINES
24/48 DIAMETRAL PITCH - 30° PRESSURE ANGLE

No. Teeth	Pitch Dia.	External					Internal				
		O.D. +.000 -.005	R.D. +.000 -.015	T.I.F. Max.	Ch.T.T.	Approx. R	I.D. +.005 -.000	R.D. +.015 -.000	T.I.F. Min.	Ch.S. Min. (Basic)	Approx. R
12	.5000	.542	.417	.458		.015	.458	.571	.542	.0653	.015
13	.5417	.583	.458	.500		"	.500	.613	.583	"	"
14	.5833	.625	.500	.542		"	.542	.654	.625	"	"
15	.6250	.667	.542	.583		"	.583	.696	.667	"	"
16	.6667	.708	.583	.625		"	.625	.738	.708	"	"
17	.7083	.750	.625	.667		"	.667	.779	.750	.0654	"
18	.7500	.792	.667	.708		"	.708	.821	.792	"	"
19	.7917	.833	.708	.750		"	.750	.863	.833	"	"
20	.8333	.875	.750	.792		"	.792	.904	.875	"	"
21	.8750	.917	.792	.833		.015	.833	.946	.917	.0654	.015
22	.9167	.958	.833	.875		"	.875	.988	.958	"	"
23	.9583	1.000	.875	.917		"	.917	1.029	1.000	"	"
24	1.0000	1.042	.917	.958		"	.958	1.071	1.042	"	"
25	1.0417	1.083	.958	1.000		"	1.000	1.113	1.083	"	"
26	1.0833	1.125	1.000	1.042		"	1.042	1.154	1.125	"	"
27	1.1250	1.167	1.042	1.083		"	1.083	1.196	1.167	"	"
28	1.1667	1.208	1.083	1.125		"	1.125	1.238	1.208	"	"
29	1.2083	1.250	1.125	1.167		"	1.167	1.279	1.250	"	"
30	1.2500	1.292	1.167	1.208		"	1.208	1.321	1.292	"	"
31	1.2917	1.333	1.208	1.250		.015	1.250	1.363	1.333	.0654	.015
32	1.3333	1.375	1.250	1.292		"	1.292	1.404	1.375	"	"
33	1.3750	1.417	1.292	1.333		"	1.333	1.446	1.417	"	"
34	1.4167	1.458	1.333	1.375		"	1.375	1.468	1.458	"	"
35	1.4583	1.500	1.375	1.417		"	1.417	1.529	1.500	"	"
36	1.5000	1.542	1.417	1.458		"	1.458	1.571	1.542	"	"
37	1.5417	1.583	1.458	1.500		"	1.500	1.613	1.583	"	"
38	1.5833	1.625	1.500	1.542		"	1.542	1.654	1.625	"	"
39	1.6250	1.667	1.542	1.583		"	1.583	1.696	1.667	"	"
40	1.6667	1.708	1.583	1.625		"	1.625	1.738	1.708	"	"
41	1.7083	1.750	1.625	1.667		.015	1.667	1.779	1.750	.0654	.015
42	1.7500	1.792	1.667	1.708		"	1.708	1.821	1.792	"	"
43	1.7917	1.833	1.708	1.750		"	1.750	1.863	1.833	"	"
44	1.8333	1.875	1.750	1.792		"	1.792	1.904	1.875	"	"
45	1.8750	1.917	1.792	1.833		"	1.833	1.946	1.917	"	"
46	1.9167	1.958	1.833	1.875		"	1.875	1.988	1.958	"	"
47	1.9583	2.000	1.875	1.917		"	1.917	2.029	2.000	"	"
48	2.0000	2.042	1.917	1.958		"	1.958	2.071	2.042	"	"
49	2.0417	2.083	1.958	2.000		"	2.000	2.113	2.083	"	"
50	2.0833	2.125	2.000	2.042		"	2.042	2.154	2.125	"	"

SEE NOTE - FIG. 2