Chapter 6

The ISO System of Limits and Fits - Tolerances and Deviations

SUMMARY*

The ISO System of Limits and Fits is a coordinated system of hole and shaft tolerances for engineering and manufacturing used for cutting tools, material stock, gages, etc. If held to these tolerances, cutting tools, material stock, and gages are available throughout the world.

The hole basis fits have four preferred hole tolerances (H11, H9, H8, and H7); the shaft basis fits have four preferred shaft tolerances (h11, h9, h7, and h6) as shown in Table 6-1. The above shaft tolerances are now covered in the new ANSI B32.100-2005 standard.

Select the basic size from Table 4-1 and one of the ten fits from Table 6-1 and read or cut and paste limit dimensions and clearances (interferences) from Tables 6-2 through 6-6 or CD's.

Tolerance Zones for holes are shown in Fig. 6-1 and for shafts in Fig. 6-2.

NOTE *The complete ISO System of Limits and Fits is stored on the CD, ISOTOL™ Computer Tolerance Software. The CD is available from ANSI or GO metric USA™.org, Inc. The on-line version has been available free of charge on the Home Page for two years, and will soon become available again for a fee.

TABLE 6-1 DESCRIPTION OF PREFERRED FITS (ANSI B4.2)

	ISO SYMBOL		DESCRIPTION	
	Hole Basis	Shaft Basis		
Clearance Fits	H11/c11	C11/h11	Loose running fit for wide commercial tolerances or allowances on external members.	More Clearance
	H9/d9	D9/h9	Free running fit not for use where accuracy is essential, but good for large temperature variations, high running speeds, or heavy journal pressures.	
	H8/f7	F8/h7	Close running fit for running on accurate machines and for accurate location at moderate speeds and journal pressures.	
	H7/g6	G7/h6	Sliding fit not intended to run freely, but to move and turn freely and locate accurately.	
	H7/h6	H7/h6	Locational clearance fit provides snug fit for locating stationary parts; but can be freely assembled and disassembled.	
Transition Fits	H7/k6	K7/h6	Locational transition fit for accurate location, a compromise between clearance and interference.	
	H7/n6	N7/h6	Locational transition fit for more accurate location where greater interference is permissible.	
Interference Fits	H7/p6[1]	P7/h6	Locational interference fit for parts requiring rigidity and alignment with prime accuracy of location but without special bore pressure requirements.	
	H7/s6	S7/h6	Medium drive fit for ordinary steel parts or shrink fits on light sections, the tightest fit usable with cast iron.	More Interference
	H7/u6	U7/h6	Force fit suitable for parts which can be highly stressed or for shrink fits where the heavy pressing forces required are impractical.	

[1]Transition fit for basic sizes in range from 0 through 3 mm.

TABLE 6-2 PREFERRED HOLE BASIS CLEARANCE FITS (ANSI B4.2)

mm

BASIC SIZE		LOOSE RUNNING			FREE RUNNING			CLOSE RUNNING			SLIDING			LOCATIONAL CLEARANCE		
		HOLE H11	SHAFT c11	DIFF	HOLE H9	SHAFT d9	DIFF	HOLE H8	SHAFT f7	DIFF	HOLE H7	SHAFT g6	DIFF	HOLE H7	SHAFT h6	DIFF
S7	**MAX**	7.090	6.920	0.260	7.036	6.960	0.112	7.022	6.987	0.050	7.015	6.995	0.029	7.015	7.000	0.024
	MIN	7.000	6.830	0.080	7.000	6.924	0.040	7.000	6.972	0.013	7.000	6.986	0.005	7.000	6.991	0.000
F8	**MAX**	8.090	7.920	0.260	8.036	7.960	0.112	8.022	7.987	0.050	8.015	7.995	0.029	8.015	8.000	0.024
	MIN	8.000	7.830	0.080	8.000	7.924	0.040	8.000	7.972	0.013	8.000	7.986	0.005	8.000	7.991	0.000
S9	**MAX**	9.090	8.920	0.260	9.036	8.960	0.112	9.022	8.987	0.050	9.015	8.995	0.029	9.015	9.000	0.024
	MIN	9.000	8.830	0.080	9.000	8.924	0.040	9.000	8.972	0.013	9.000	8.986	0.005	9.000	8.991	0.000
F10	**MAX**	10.090	9.920	0.260	10.036	9.960	0.112	10.022	9.987	0.050	10.015	9.995	0.029	10.015	10.000	0.024
	MIN	10.000	9.830	0.080	10.000	9.924	0.040	10.000	9.972	0.013	10.000	9.986	0.005	10.000	9.991	0.000
S11	**MAX**	11.110	10.905	0.315	11.043	10.950	0.136	11.027	10.984	0.061	11.018	10.994	0.035	11.018	11.000	0.029
	MIN	11.000	10.795	0.095	11.000	10.907	0.050	11.000	10.966	0.016	11.000	10.983	0.006	11.000	10.989	0.000
F12	**MAX**	12.110	11.905	0.315	12.043	11.950	0.136	12.027	11.984	0.061	12.018	11.994	0.035	12.018	12.000	0.029
	MIN	12.000	11.795	0.095	12.000	11.907	0.050	12.000	11.966	0.016	12.000	11.983	0.006	12.000	11.989	0.000
T13	**MAX**	13.110	12.905	0.315	13.043	12.950	0.136	13.027	12.984	0.061	13.018	12.994	0.035	13.018	13.000	0.029
	MIN	13.000	12.795	0.095	13.000	12.907	0.050	13.000	12.966	0.016	13.000	12.983	0.006	13.000	12.989	0.000
S14	**MAX**	14.110	13.905	0.315	14.043	13.950	0.136	14.027	13.984	0.061	14.018	13.994	0.035	14.018	14.000	0.029
	MIN	14.000	13.795	0.095	14.000	13.907	0.050	14.000	13.966	0.016	14.000	13.983	0.006	14.000	13-989	0.000
T15	**MAX**	15.110	14.905	0.315	15.043	14.950	0.136	15.027	14.984	0.061	15.018	14.994	0.035	15.018	15.000	0.029
	MIN	15.000	14.795	0.095	15.000	14.907	0.050	15.000	14.966	0.016	15.000	14.983	0.006	15.000	14.989	0.000
F16	**MAX**	16.110	15.905	0.315	16.043	15.950	0.136	16.027	15.984	0.061	16.018	15.994	0.035	16.018	16.000	0.029
	MIN	16.000	15.795	0.095	16.000	15.907	0.050	16.000	15.966	0.016	16.000	15.983	0.006	16.000	15.989	0.000
T17	**MAX**	17.110	16.905	0.315	17.043	16.950	0.136	17.027	16.984	0.061	17.018	16.994	0.035	17.018	17.000	0.029
	MIN	17.000	16.795	0.095	17.000	16.907	0.050	17.000	16.966	0.016	17.000	16.983	0.006	17.000	16.989	0.000
S18	**MAX**	18.110	17.905	0.315	18.043	17.950	0.136	18.027	17.984	0.061	18.018	17.994	0.035	18.018	18.000	0.029
	MIN	18.000	17.795	0.095	18.000	17.907	0.050	18.000	17.966	0.016	18.000	17.983	0.006	18.000	17.989	0.000
T19	**MAX**	19.130	18.890	0.370	19.052	18.935	0.169	19.033	18.980	0.074	19.021	18.993	0.041	19.021	19.000	0.034
	MIN	19.000	18.760	0.110	19.000	18.883	0.065	19.000	18.959	0.020	19.000	18.980	0.007	19.000	18.987	0.000
F20	**MAX**	20.130	19.890	0.370	20.052	19.935	0.169	20.033	19.980	0.074	20.021	19.993	0.041	20.021	20.000	0.034
	MIN	20.000	19.760	0.110	20.000	19.883	0.065	20.000	19.959	0.020	20.000	19.980	0.007	20.000	19.987	0.000
T21	**MAX**	21.130	20.890	0.370	21.052	20.935	0.169	21.033	20.980	0.074	21.021	20.993	0.041	21.021	21.000	0.034
	MIN	21.000	20.760	0.110	21.000	20.883	0.065	21.000	20.959	0.020	21.000	20.980	0.007	21.000	20.987	0.000
S22	**MAX**	22.130	21.890	0.370	22.052	21.935	0.169	22.033	21.980	0.074	22.021	21.993	0.041	22.021	22.000	0.034
	MIN	22.000	21.760	0.110	22.000	21.883	0.065	22.000	21.959	0.020	22.000	21.980	0.007	22.000	21.987	0.000
T23	**MAX**	23.130	22.890	0.370	23.052	22.935	0.169	23.033	22.980	0.074	23.021	22.993	0.041	23.021	23.000	0.034
	MIN	23.000	22.760	0.110	23.000	22.883	0.065	23.000	22.959	0.020	23.000	22.980	0.007	23.000	22.987	0.000
T24	**MAX**	24.130	23.890	0.370	24.052	23.935	0.169	24.033	23.980	0.074	24.021	23.993	0.041	24.021	24.000	0.034
	MIN	24.000	23.760	0.110	24.000	23.883	0.065	24.000	23.959	0.020	24.000	23.980	0.007	24.000	23.987	0.000

NOTES: 1. Select nominal sizes to preference rating as follows: F = First Choice, S = Second Choice, T = Third Choice.
2. ANSI B4.2 lists limit dimensions for nominal sizes marked "F" (First Choice) only. A cost penalty for material stock, tooling and gages is anticipated for sizes marked with "S" (Second Choice) and "T" (Third Choice).

TABLE 6-3 PREFERRED HOLE BASIS TRANSITION AND INTERFERENCE FITS (ANSI B4.2)

mm

BASIC SIZE		LOCATIONAL TRANSN HOLE H7	LOCATIONAL TRANSN SHAFT k6	LOCATIONAL TRANSN DIFF	LOCATIONAL TRANSN HOLE H7	LOCATIONAL TRANSN SHAFT n6	LOCATIONAL TRANSN DIFF	LOCATIONAL INTERF HOLE H7	LOCATIONAL INTERF SHAFT p6	LOCATIONAL INTERF DIFF	MEDIUM DRIVE HOLE H7	MEDIUM DRIVE SHAFT s6	MEDIUM DRIVE DIFF	FORCE HOLE H7	FORCE SHAFT u6	FORCE DIFF
S7	**MAX**	7.015	7.010	0.014	7.015	7.019	0.005	7.015	7.024	0.000	7.015	7.032	-0.008	7.015	7.037	-0.013
	MIN	7.000	7.001	-0.010	7.000	7.010	-0.019	7.000	7.015	-0.024	7.000	7.023	-0.032	7.000	7.028	-0.037
F8	**MAX**	8.015	8.010	0.014	8.015	8.019	0.005	8.015	8.024	0.000	8.015	8.032	-0.008	8.015	8.037	-0.013
	MIN	8.000	8.001	-0.010	8.000	8.010	-0.019	8.000	8.015	-0.024	8.000	8.023	-0.032	8.000	8.028	-0.037
S9	**MAX**	5.015	9.010	0.014	9.015	9.019	0.005	9.015	9.024	0.000	9.015	9.032	-0.008	9.015	9.037	-0.013
	MIN	9.000	9.001	-0.010	9.000	9.010	-0.019	9.000	9.015	-0.024	9.000	9.023	-0.032	9.000	9.028	-0.037
F10	**MAX**	10.015	10.010	0.014	10.015	10.019	0.005	10.015	10.024	0.000	10.015	10.032	-0.008	10.015	10.037	-0.013
	MIN	10.000	10.001	-0.010	10.000	10.010	-0.019	10.000	10.015	-0.024	10.000	10.023	-0.032	10.000	10.028	-0.037
S11	**MAX**	11.018	11.012	0.017	11.018	11.023	0.006	11.018	11.029	0.000	11.018	11.039	-0.010	11.018	11.044	-0.015
	MIN	11.000	11.001	-0.012	11.000	11.012	-0.023	11.000	11.018	-0.029	11.000	11.028	-0.039	11.000	11.033	-0.044
F12	**MAX**	12.018	12.012	0.017	12.018	12.023	0.006	12.018	12.029	0.000	12.018	12.039	-0.010	12.018	12.044	-0.015
	MIN	12.000	12.001	-0.012	12.000	12.012	-0.023	12.000	12.018	-0.029	12.000	12.028	-0.039	12.000	12.033	-0.044
T13	**MAX**	13.018	13.012	0.017	13.018	13.023	0.006	13.018	13.029	0.000	13.018	13.039	-0.010	13.018	13.044	-0.015
	MIN	13.000	13.001	-0.012	13.000	13.012	-0.023	13.000	13.018	-0.029	13.000	13.028	-0.039	13.000	13.033	-0.044
S14	**MAX**	14.018	14.012	0.017	14.018	14.023	0.006	14.018	14.029	0.000	14.018	14.039	-0.010	14.018	14.044	-0.015
	MIN	14.000	14.001	-0.012	14.000	14.012	-0.023	14.000	14.018	-0.029	14.000	14.028	-0.039	14.000	14.033	-0.044
T15	**MAX**	15.018	15.012	0.017	15.018	15.023	0.006	15.018	15.029	0.000	15.018	15.039	-0.010	15.018	15.044	-0.015
	MIN	15.000	15.001	-0.012	15.000	15.012	-0.023	15.000	15.018	-0.029	15.000	15.028	-0.039	15.000	15.033	-0.044
F16	**MAX**	16.018	16.012	0.017	16.018	16.029	0.006	16.018	16.029	0.000	16.018	16.039	-0.010	16.018	16.044	-0.015
	MIN	16.000	16.001	-0.012	16.000	16.012	-0.023	16.000	16.018	-0.029	16.000	16.028	-0.039	16.000	16.033	-0.044
T17	**MAX**	17.018	17.012	0.017	17.018	17.023	0.006	17.018	17.029	0.000	17.018	17.039	-0.010	17.018	17.044	-0.015
	MIN	17.000	17.001	-0.012	17.000	17.012	-0.023	17.000	17.018	-0.029	17.000	17.028	-0.039	17.000	17.033	-0.044
S18	**MAX**	18.018	18.012	0.017	18.018	18.023	0.006	18.018	18.029	0.000	18.018	18.039	-0.010	18.018	18.044	-0.015
	MIN	18.000	18.001	-0.012	18.000	18.012	-0.023	18.000	18.018	-0.029	18.000	18.028	-0.039	18.000	18.033	-0.044
T19	**MAX**	19.021	19.015	0.019	19.021	19.028	0.006	19.021	19.035	-0.001	19.021	19.048	0.014	19.021	19.054	-0.020
	MIN	19.000	19.002	-0.015	19.000	19.015	-0.028	19.000	19.022	-0.035	19.000	19.035	-0.048	19.000	19.041	-0.054
F20	**MAX**	20.021	20.015	0.019	20.021	20.028	0.006	20.021	20.035	-0.001	20.021	20.048	0.014	20.021	20.054	-0.020
	MIN	20.000	20.002	-0.015	20.000	20.015	-0.028	20.000	20.022	-0.035	20.000	20.035	-0.048	20.000	20.041	-0.054
T21	**MAX**	21.021	21.015	0.019	21.021	21.028	0.006	21.021	21.035	-0.001	21.021	21.048	0.014	21.021	21.054	-0.020
	MIN	21.000	21.002	-0.015	21.000	21.015	-0.028	21.000	21.022	-0.035	21.000	21.035	-0.048	21.000	21.041	-0.054
S22	**MAX**	22.021	22.015	0.019	22.021	22.028	0.006	22.021	22.035	-0.001	22.021	22.048	0.014	22.021	22.054	-0.020
	MIN	22.000	22.002	-0.015	22.000	22.015	-0.028	22.000	22.022	-0.035	22.000	22.035	-0.048	22.000	22.041	-0.054
T23	**MAX**	23.021	23.015	0.019	23.021	23.028	0.006	23.021	23.035	-0.001	23.021	23.048	0.014	23.021	23.054	-0.020
	MIN	23.000	23.002	-0.015	23.000	23.015	-0.028	23.000	23.022	-0.035	23.000	23.035	-0.048	23.000	23.041	-0.054
T24	**MAX**	24.021	24.015	0.019	24.021	24.028	0.006	24.021	24.035	-0.001	24.021	24.048	0.014	24.021	24.054	-0.020
	MIN	24.000	24.002	-0.015	24.000	24.015	-0.028	24.000	24.022	-0.035	24.000	24.035	-0.048	24.000	24.041	-0.054

NOTES: 1. Select nominal sizes to preference rating as follows: F = First Choice, S = Second Choice, T = Third Choice.
2. ANSI B4.2 lists limit dimensions for nominal sizes marked "F" (First Choice) only. A cost penalty for material stock, tooling and gages is anticipated for sizes marked with "S" (Second Choice) and "T" (Third Choice).

TABLE 6-4 PREFERRED SHAFT BASIS CLEARANCE FITS (ANSI B4.2)

mm

BASIC SIZE		LOOSE RUNNING			FREE RUNNING			CLOSE RUNNING			SLIDING			LOC CLEARANCE		
		HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF
		C11	h11		D9	h9		F8	h7		G7	h6		H7	h6	
S7	MAX	7.170	7.000	0.260	7.076	7.000	0.112	7.035	7.000	0.050	7.020	7.000	0.029	7.015	7.000	0.024
	MIN	7.080	6.910	0.080	7.040	6.964	0.040	7.013	6.985	0.013	7.005	6.991	0.005	7.000	6.991	0.000
F8	MAX	8.170	8.000	0.260	8.076	8.000	0.112	8.035	8.000	0.050	8.020	8.000	0.029	8.015	8.000	0.024
	MIN	8.080	7.910	0.080	8.040	7.964	0.040	8.013	7.985	0.013	8.005	7.991	0.005	8.000	7.991	0.000
S9	MAX	9.170	9.000	0.260	9.076	9.000	0.112	9.035	9.000	0.050	9.020	9.000	0.029	9.015	9.000	0.024
	MIN	9.080	8.910	0.080	9.040	8.964	0.040	9.013	8.985	0.013	9.005	8.991	0.005	9.000	8.991	0.000
F10	MAX	10.170	10.000	0.260	10.076	10.000	0.112	10.035	10.000	0.050	10.020	10.000	0.029	10.015	10.000	0.024
	MIN	10.080	9.910	0.080	10.040	9.964	0.040	10.013	9.985	0.013	10.005	9.991	0.005	10.000	9.991	0.000
S11	MAX	11.205	11.000	0.315	11.093	11.000	0.136	11.043	11.000	0.061	11.024	11.000	0.035	11.018	11.000	0.029
	MIN	11.095	10.890	0.095	11.050	10.957	0.050	11.016	10.982	0.016	11.006	10.989	0.006	11.000	10.989	0.000
F12	MAX	12.205	12.000	0.315	12.093	12.000	0.136	12.043	12.000	0.061	12.024	12.000	0.035	12.018	12.000	0.029
	MIN	12.095	11.890	0.095	12.050	11.957	0.050	12.016	11.982	0.016	12.006	11.989	0.006	12.000	11.989	0.000
T13	MAX	13.205	13.000	0.315	13.093	13.000	0.136	13.043	13.000	0.061	13.024	13.000	0.035	13.018	13.000	0.029
	MIN	13.095	12.890	0.095	13.050	12.957	0.050	13.016	12.982	0.016	13.006	12.989	0.006	13.000	12.989	0.000
S14	MAX	14.205	14.000	0.315	14.093	14.000	0.136	14.043	14.000	0.061	14.024	14.000	0.035	14.018	14.000	0.029
	MIN	14.095	13.890	0.095	14.050	13.957	0.050	14.016	13.982	0.016	14.006	13.989	0.006	14.000	13.989	0.000
T15	MAX	15.205	15.000	0.315	15.093	15.000	0.136	15.043	15.000	0.061	15.024	15.000	0.035	15.018	15.000	0.029
	MIN	15.095	14.890	0.095	15.050	14.957	0.050	15.016	14.982	0.016	15.006	14.989	0.006	15.000	14.989	0.000
F16	MAX	16.205	16.000	0.315	16.093	16.000	0.136	16.043	16.000	0.061	16.024	16.000	0.035	16.018	16.000	0.029
	MIN	16.095	15.890	0.095	16.050	15.957	0.050	16.016	15.982	0.016	16.006	15.989	0.006	16.000	15.989	0.000
T17	MAX	17.205	17.000	0.315	17.093	17.000	0.136	17.043	17.000	0.061	17.024	17.000	0.035	17.018	17.000	0.029
	MIN	17.095	16.890	0.095	17.050	16.957	0.050	17.016	16.982	0.016	17.006	16.989	0.006	17.000	16.989	0.000
S18	MAX	18.205	18.000	0.315	18.093	18.000	0.136	18.043	18.000	0.061	18.024	18.000	0.035	18.018	18.000	0.029
	MIN	18.095	17.890	0.095	18.050	17.957	0.050	18.016	17.982	0.016	18.006	17.989	0.006	18.000	17.989	0.000
T19	MAX	19.240	19.000	0.370	19.117	19.000	0.169	19.053	19.000	0.074	19.028	19.000	0.041	19.021	19.000	0.034
	MIN	19.110	18.870	0.110	19.065	18.948	0.065	19.020	18.979	0.020	19.007	18.987	0.007	19.000	18.987	0.000
F20	MAX	20.240	20.000	0.370	20.117	20.000	0.169	20.053	20.000	0.074	20.028	20.000	0.041	20.021	20.000	0.034
	MIN	20.110	19.870	0.110	20.065	19.948	0.065	20.020	19.979	0.020	20.007	19.987	0.007	20.000	19.987	0.000
T21	MAX	21.240	21.000	0.370	21.117	21.000	0.169	21.053	21.000	0.074	21.028	21.000	0.041	21.021	21.000	0.034
	MIN	21.110	20.870	0.110	21.065	20.948	0.065	21.020	20.979	0.020	21.007	20.987	0.007	21.000	20.987	0.000
S22	MAX	22.240	22.000	0.370	22.117	22.000	0.169	22.053	22.000	0.074	22.028	22.000	0.041	22.021	22.000	0.034
	MIN	22.110	21.870	0.110	22.065	21.948	0.065	22.020	21.979	0.020	22.007	21.987	0.007	22.000	21.987	0.000
T23	MAX	23.240	23.000	0.370	23.117	23.000	0.169	23.053	23.000	0.074	23.028	23.000	0.041	23.021	23.000	0.034
	MIN	23.110	22.870	0.110	23.065	22:948	0.065	23.020	22.979	0.020	23.007	22.987	0.007	23.000	22.987	0.000
T24	MAX	24.240	24.000	0.370	24.117	24.000	0.169	24.053	24.000	0.074	24.028	24.000	0.041	24.021	24.000	0.034
	MIN	24.110	23.870	0.110	24.065	23.948	0.065	24.020	23.979	0.020	24.007	23.987	0.007	24.000	23.987	0.000

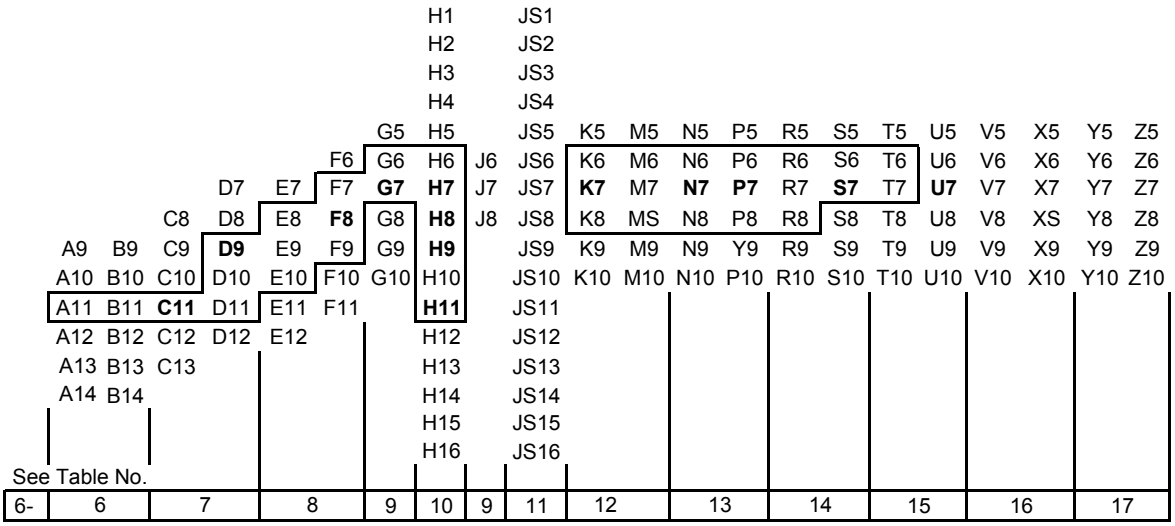
NOTES: 1. Select nominal sizes to preference rating as follows: F = First Choice, S = Second Choice, T = Third Choice.
2. ANSI B4.2 lists limit dimensions for nominal sizes marked "F" (First Choice) only. A cost penalty for material stock, tooling and gages is anticipated for sizes marked with "S" (Second Choice) and "T" (Third Choice).

TABLE 6-5 PREFERRED SHAFT BASIS TRANSITION AND INTERFERENCE FITS (ANSI B4.2)

mm

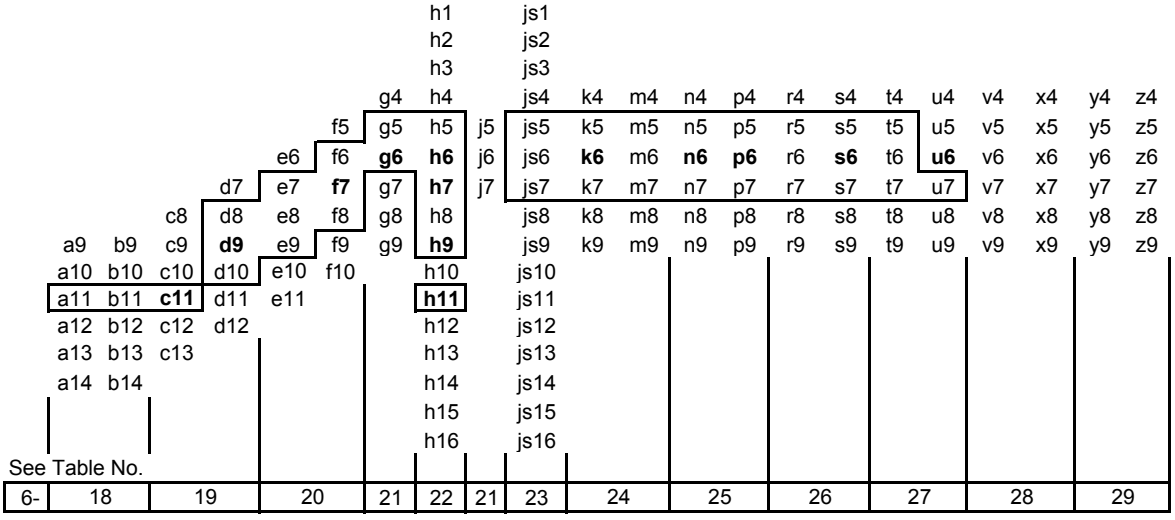
BASIC SIZE		LOCATIONAL TRANSN			LOCATIONAL TRANSN			LOCATIONAL INTERF			MEDIUM DRIVE			FORCE		
		HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF	HOLE	SHAFT	DIFF
		K7	h6		N7	h6		P7	h6		S7	h6		U7	h6	
S7	MAX	7.005	7.000	0.014	6.996	7.000	0.005	6.991	7.000	0.000	6.983	7.000	-0.008	6.978	7.000	-0.013
	MIN	6.990	6.991	-0.010	6.981	6.991	-0.019	6.976	6.991	-0.024	6.968	6.991	-0.032	6.963	6.991	-0.037
F8	MAX	8.005	8.000	0.014	7.996	8.000	0.005	7.991	8.000	0.000	7.983	8.000	-0.008	7.978	8.000	-0.013
	MIN	7.990	7.991	-0.010	7.981	7.991	-0.019	7.976	7.991	-0.024	7.968	7.991	-0.032	7.963	7.991	-0.037
S9	MAX	9.005	9.000	0.014	8.996	9.000	0.005	8.991	9.000	0.000	8.983	9.000	-0.008	8.978	9.000	-0.013
	MIN	8.990	8.991	-0.010	8.981	8.991	-0.019	8.976	8.991	-0.024	8.968	8.991	-0.032	8.963	8.991	-0.037
F10	MAX	10.005	10.000	0.014	9.996	10.000	0.005	9.991	10.000	0.000	9.983	10.000	-0.008	9.978	10.000	-0.013
	MIN	9.990	9.991	-0.010	9.981	9.991	-0.019	9.976	9.991	-0.024	9.968	9.991	-0.032	9.963	9.991	-0.037
S11	MAX	11.006	11.000	0.017	10.995	11.000	0.006	10.989	11.000	0.000	10.979	11.000	-0.010	10.974	11.000	-0.015
	MIN	10.988	10.989	-0.012	10.977	10.989	-0.023	10.971	10.989	-0.029	10.961	10.989	-0.039	10.956	10.989	-0.044
F12	MAX	12.006	12.000	0.017	11.995	12.000	0.006	11.989	12.000	0.000	11.979	12.000	-0.010	11.974	12.000	-0.015
	MIN	11.988	11.989	-0.012	11.977	11.989	-0.023	11.971	11.989	-0.029	11.961	11.989	-0.039	11.956	11.989	-0.044
T13	MAX	13.006	13.000	0.017	12.995	13.000	0.006	12.989	13.000	0.000	12.979	13.000	-0.010	12.974	13.000	-0.015
	MIN	12.988	12.989	-0.012	12.977	12.989	-0.023	12.971	12.989	-0.029	12.961	12.989	-0.039	12.956	12.989	-0.044
S14	MAX	14.006	14.000	0.017	13.995	14.000	0.006	13.989	14.000	0.000	13.979	14.000	-0.010	13.974	14.000	0.015
	MIN	13.988	13.989	-0.012	13.977	13.989	-0.023	13.971	13.989	-0.029	13.961	13.989	-0.039	13.956	13.989	-0.044
T15	MAX	15.006	15.000	0.017	14.995	15.000	0.006	14.989	15.000	0.000	14.979	15.000	-0.010	14.974	15.000	-0.015
	MIN	14.988	14.989	-0.012	14.977	14.989	-0.023	14.971	14.989	-0.029	14.961	14.989	-0.039	14.956	14.989	-0.044
F16	MAX	16.006	16.000	0.017	15.995	16.000	0.006	15.989	16.000	0.000	15.979	16.000	-0.010	15.974	16.000	-0.015
	MIN	15.988	15.989	-0.012	15.977	15.989	-0.023	15.971	15.989	-0.029	15.961	15.989	-0.039	15.956	15.989	-0.044
T17	MAX	17.006	17.000	0.017	16.995	17.000	0.006	16.989	17.000	0.000	16.979	17.000	-0.010	16.974	17.000	-0.015
	MIN	16.988	16.989	-0.012	16.977	16.989	-0.023	16.971	16.989	-0.029	16.961	16.989	-0.039	16.956	16.989	-0.044
S18	MAX	18.006	18.000	0.017	17.995	18.000	0.006	17.989	18.000	0.000	17.979	18.000	-0.010	17.974	18.000	-0.015
	MIN	17.988	17.989	-0.012	17.977	17.989	-0.023	17.971	17.989	-0.029	17.961	17.989	-0.039	17.956	17.989	-0.044
T19	MAX	19.006	19.000	0.019	18.993	19.000	0.006	18.986	19.000	-0.001	18.973	19.000	-0.014	18.967	19.000	-0.020
	MIN	18.985	18.987	-0.015	18.972	18.987	-0.028	18.965	18.987	-0.035	18.952	18.987	-0.048	18.946	18.987	-0.054
F20	MAX	20.006	20.000	0.019	19.993	20.000	0.006	19.986	20.000	-0.001	19.973	20.000	-0.014	19.967	20.000	-0.020
	MIN	19.985	19.987	-0.015	19.972	19.987	-0.028	19.965	19.987	-0.035	19.952	19.987	-0.048	19.946	19.987	-0.054
T21	MAX	21.006	21.000	0.019	20.993	21.000	0.006	20.986	21.000	-0.001	20.973	21.000	-0.014	20.967	21.000	-0.020
	MIN	20.985	20.987	-0.015	20.972	20.987	-0.028	20.965	20.987	-0.035	20.952	20.987	-0.048	20.946	20.987	-0.054
S22	MAX	22.006	22.000	0.019	21.993	22.000	0.006	21.986	22.000	-0.001	21.973	22.000	-0.014	21.967	22.000	-0.020
	MIN	21.985	21.987	-0.015	21.972	21.987	-0.028	21.965	21.987	-0.035	21.952	21.987	-0.048	21.946	21.987	-0.054
T23	MAX	23.006	23.000	0.019	22.993	23.000	0.006	22.986	23.000	-0.001	22.973	23.000	-0.014	22.967	23.000	-0.020
	MIN	22.985	22.987	-0.015	22.972	22.987	-0.028	22.965	22.987	-0.035	22.952	22.987	-0.048	22.946	22.987	-0.054
T24	MAX	24.006	24.000	0.019	23.993	24.000	0.006	23.986	24.000	-0.001	23.973	24.000	-0.014	23.967	24.000	-0.020
	MIN	23.985	23.987	-0.015	23.972	23.987	-0.028	23.965	23.987	-0.035	23.952	23.987	-0.048	23.946	23.987	-0.054

NOTES: 1. Select nominal sizes to preference rating as follows: F = First Choice, S = Second Choice, T = Third Choice.
2. ANSI B4.2 lists limit dimensions for nominal sizes marked "F" (First Choice) only. A cost penalty for material stock, tooling and gages is anticipated for sizes marked with "S" (Second Choice) and "T" (Third Choice).



Legend: See Note to FIG. 6-2 below

FIG. 6-1 TOLERANCE ZONES FOR INTERNAL DIMENSIONS (HOLES) (ANSI B4.2)



Legend: First choice tolerance zones are printed in **bold** (ANSI B4.2 preferred)
Second choice tolerance zones framed (ISO 1829 selected)
Third choice tolerance zones open

FIG. 6-2 TOLERANCE ZONES FOR EXTERNAL DIMENSIONS (SHAFTS) (ANSI B4.2)

TABLE 6-6 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (A14 ... A9, B14 ...B9) (ANSI B4.2)

mm

SIZE		A14	A13	A12	A11	A10	A9	B14	B13	B12	B11	B10	B9
OVER	0	+0.520	+0.410	+0.370	+0.330	+0.310	+0.295	+0.390	+0.280	0.240	+0.200	+0.180	0.165
TO	3	+0.270	+0.270	+0.270	+0.270	+0.270	+0.270	+0.140	+0.140	+0.140	+0.140	+0.140	+0.140
OVER	3	+0.570	+0.450	+0.390	+0.345	+0.318	+0.300	+0.440	+0.320	+0.260	+0.215	+0.188	+0.170
TO	6	+0.270	+0.270	+0.270	+0.270	+0.270	+0.270	+0.140	+0.140	+0.140	+0.140	+0.140	+0.140
OVER	6	+0.640	+0.500	+0.430	+0.370	+0.338	+0.316	+0.510	+0.370	+0.300	+0.240	+0.208	+0.186
TO	10	+0.280	+0.280	+0.280	+0.280	+0.280	+0.280	+0.150	+0.150	+0.150	+0.150	+0.150	+0.150
OVER	10	+0.720	+0.560	+0.470	+0.400	+0.360	+0.338	+0.580	+0.420	+0.330	+0.260	+0.220	+0.193
TO	14	+0.290	+0.290	+0.290	+0.290	+0.290	+0.290	+0.150	+0.150	+0.150	+0.150	+0.150	+0.150
OVER	14	+0.720	+0.560	+0.470	+0.400	+0.360	+0.333	+0.580	+0.420	+0.330	+0.260	0.220	+0.193
TO	18	+0.290	+0.290	+0.290	+0.290	+0.290	+0.290	+0.150	+0.150	+0.150	+0.150	+0.150	+0.150
OVER	18	+0.820	+0.630	+0.510	+0.430	+0.384	+0.352	+0.680	+0.490	+0.370	+0.290	+0.244	+0.212
TO	24	+0.300	+0.300	+0.300	+0.300	+0.300	+0.300	+0.160	+0.160	+0.160	+0.160	+0.160	+0.160
OVER	24	+0.820	+0.630	+0.510	+0.430	+0.384	+0.352	+0.680	+0.490	+0.370	+0.290	+0.244	+0.212
TO	30	+0.300	+0.300	+0.300	+0.300	+0.300	+0.300	+0.160	+0.160	+0.160	+0.160	+0.160	+0.160
OVER	30	+0.930	+0.700	+0.560	+0.470	+0.410	+0.372	+0.790	+0.560	+0.420	+0.330	+0.270	+0.232
TO	40	+0.310	+0.310	+0.310	+0.310	+0.310	+0.310	+0.170	+0.170	+0.170	+0.170	+0.170	+0.170
OVER	40	+0.940	+0.710	+0.570	+0.480	+0.420	+0.382	+0.800	+0.570	+0.430	+0.340	+0.280	+0.242
TO	50	+0.320	+0.320	+0.320	+0.320	+0.320	+0.320	+0.180	+0.180	+0.180	+0.180	+0.180	+0.180
OVER	50	+1.080	+0.800	+0.640	+0.530	+0.460	+0.414	+0.930	+0.650	+0.490	+0.380	+0.310	+0.264
TO	65	+0.340	+0.340	+0.340	+0.340	+0.340	+0.340	+0.190	+0.190	+0.190	+0.190	+0.190	+0.190
OVER	65	+1.100	+0.820	+0.660	+0.550	+0.480	+0.434	+0.940	+0.660	+0.500	+0.390	+0.320	+0.274
TO	80	+0.360	+0.360	+0.360	+0.360	+0.360	+0.360	+0.200	+0.200	+0.200	+0.200	+0.200	+0.200
OVER	80	+1.250	+0.920	+0.730	+0.600	+0.520	+0.467	+1.090	+0.760	+0.570	+0.440	+0.360	+0.307
TO	100	+0.380	+0.380	+0.380	+0.380	+0.380	+0.380	+0.220	+0.220	+0.220	+0.220	+0.220	+0.220
OVER	100	1.280	+0.950	+0.760	+0.630	+0.550	+0.497	+1.110	+0.780	+0.590	+0.460	+0.380	+0.327
TO	120	+0.410	+0.410	+0.410	+0.410	+0.410	+0.410	+0.240	+0.240	+0.240	+0.240	+0.240	+0.240
OVER	120	+1.460	+1.090	+0.860	+0.710	+0.620	+0.560	+1.260	+0.890	+0.660	+0.510	+0.420	+0.360
TO	140	+0.460	+0.460	+0.460	+0.460	+0.460	+0.460	+0.260	+0.260	+0.260	+0.260	+0.260	+0.260
OVER	140	+1.520	+1.150	+0.920	+0.770	+0.680	+0.620	+1.280	+0.910	+0.680	+0.530	+0.440	+0.380
TO	160	+0.520	+0.520	+0.520	+0.520	+0.520	+0.520	+0.280	+0.280	+0.280	+0.280	+0.280	+0.280
OVER	160	+1.580	+1.210	+0.980	+0.830	+0.740	+0.680	+1.310	+0.940	+0.710	+0.560	+0.470	+0.410
TO	180	+0.580	+0.580	+0.580	+0.580	+0.580	+0.580	+0.310	+0.310	+0.310	+0.310	+0.310	+0.310
OVER	180	+1.810	+1.380	+1.120	+0.950	+0.845	+0.775	+1.490	+1.060	+0.800	+0.630	+0.525	+0.455
TO	200	+0.660	+0.660	+0.660	+0.660	+0.660	+0.660	+0.340	+0.340	+0.340	+0.340	+0.340	+0.340
OVER	200	+1.890	+1.460	+1.200	+1.030	+0.925	+0.855	+1.530	+1.100	+0.840	+0.670	+0.565	+0.495
TO	225	+0.740	+0.740	+0.740	+0.740	+0.740	+0.740	+0.380	+0.380	+0.380	+0.380	+0.380	+0.380
OVER	225	+1.970	+1.540	+1.280	+1.110	+1.005	+0.935	+1.570	+1.140	+0.880	+0.710	+0.605	+0.535
TO	250	+0.820	+0.820	+0.820	+0.820	+0.820	+0.820	+0.420	+0.420	+0.420	+0.420	+0.420	+0.420
OVER	250	+2.220	+1.730	+1.440	+1.240	+1.130	+1.050	+1.780	+1.290	+1.000	+0.800	+0.690	+0.610
TO	280	+0.920	+0.920	+0.920	+0.920	+0.920	+0.920	+0.480	+0.480	+0.480	+0.480	+0.480	+0.480
OVER	280	+2.350	+1.860	+1.570	+1.370	+1.260	+1.180	+1.840	+1.350	+1.060	+0.860	+0.750	+0.670
TO	315	+1.050	+1.050	+1.050	+1.050	+1.050	+1.050	+0.540	+0.540	+0.540	+0.540	+0.540	+0.540
OVER	315	+2.600	+2.090	+1.770	+1.560	+1.430	+1.340	+2.000	+1.490	+1.170	+0.960	+0.830	+0.740
TO	355	+1.200	+1.200	+1.200	+1.200	+1.200	+1.200	+0.600	+0.600	+0.600	+0.600	+0.600	+0.600
OVER	355	+2.750	+2.240	+1.920	+1.710	+1.580	+1.490	+2.080	+1.570	+1.250	+1.040	+0.910	+0.820
TO	400	+1.350	+1.350	+1.350	+1.350	+1.350	+1.350	+0.680	+0.680	+0.680	+0.680	+0.680	+0.680
OVER	400	+3.050	+2.470	+2.130	+1.900	+1.750	+1.655	+2.310	+1.730	+1.390	+1.160	+1.010	+0.915
TO	450	+1.500	+1.500	+1.500	+1.500	+1.500	+1.500	+0.760	+0.760	+0.760	+0.760	+0.760	+0.760
OVER	450	+3.200	+2.620	+2.280	+2.050	+1.900	+1.805	+2.390	+1.810	+1.470	+1.240	+1.090	+0.995
TO	500	+1.650	+1.650	+1.650	+1.650	+1.650	+1.650	+0.840	+0.840	+0.840	+0.840	+0.840	+0.840

TABLE 6-7 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (C13... C8, D12 ... D7) (ANSI B4.2)

mm

SIZE		C13	C12	C11	C10	C9	C8	D12	D11	D10	D9	D8	D7
OVER	0	0.200	0.160	0.120	0.100	0.085	0.074	0.120	0.080	0.060	0.045	0.034	0.030
TO	3	0.060	0.060	0.060	0.060	0.060	0.060	0.020	0.020	0.020	0.020	0.020	0.020
OVER	3	+0.250	+0.190	+0.145	0.118	0.100	0.088	0.150	0.105	0.078	+0.060	+0.048	+0.042
TO	6	+0.070	+0.070	+0.070	+0.070	+0.070	+0.070	+0.030	+0.030	+0.030	+0.030	+0.030	+0.030
OVER	6	+0.300	+0.230	0.170	+0.138	+0.116	0.102	+0.190	+0.130	+0.098	+0.076	+0.062	+0.055
TO	10	+0.080	+0.080	+0.080	+0.080	+0.080	+0.080	+0.040	+0.040	+0.040	+0.040	+0.040	+0.040
OVER	10	+0.365	+0.275	+0.205	+0.165	0.138	0.122	0.230	0.160	0.120	0.093	+0.077	+0.068
TO	14	+0.095	+0.095	+0.095	+0.095	+0.095	+0.095	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050
OVER	14	+0.365	+0.275	+0.205	+0.165	0.138	0.122	0.230	0.160	0.120	0.093	+0.077	+0.068
TO	18	+0.095	+0.095	+0.095	+0.095	+0.095	+0.095	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050
OVER	18	+0.440	0.320	+0.240	+0.194	+0.162	+0.143	0.275	+0.195	0.149	+0.117	+0.098	+0.086
TO	24	+0.110	+0.110	+0.110	+0.110	+0.110	+0.110	+0.065	+0.065	+0.065	+0.065	+0.065	+0.065
OVER	24	+0.440	0.320	+0.240	+0.194	+0.162	+0.143	0.275	+0.195	0.149	+0.117	+0.098	+0.086
TO	30	+0.110	+0.110	+0.110	+0.110	+0.110	+0.110	+0.065	+0.065	+0.065	+0.065	+0.065	+0.065
OVER	30	+0.510	+0.370	+0.280	0.220	0.182	0.159	+0.330	0.240	+0.180	+0.142	+0.119	+0.105
TO	40	+0.120	+0.120	+0.120	+0.120	+0.120	+0.120	+0.080	+0.080	+0.080	+0.080	+0.080	+0.080
OVER	40	+0.520	+0.380	+0.290	0.230	+0.192	0.169	+0.330	0.240	+0.180	+0.142	+0.119	+0.105
TO	50	+0.130	+0.130	+0.130	+0.130	+0.130	+0.130	+0.080	+0.080	+0.080	+0.080	+0.080	+0.080
OVER	50	+0.600	+0.440	+0.330	0.260	+0.214	0.186	+0.400	+0.290	+0.220	+0.174	0.146	+0.130
TO	65	+0.140	+0.140	+0.140	+0.140	+0.140	+0.140	+0.100	+0.100	+0.100	+0.100	+0.100	+0.100
OVER	65	+0.610	0.450	+0.340	0.270	+0.224	0.196	+0.400	+0.290	+0.220	+0.174	0.146	+0.130
TO	80	+0.150	+0.150	+0.150	+0.150	+0.150	+0.150	+0.100	+0.100	+0.100	+0.100	+0.100	+0.100
OVER	80	0.710	0.520	+0.390	+0.310	+0.257	0.224	0.470	+0.340	+0.260	+0.207	+0.174	+0.155
TO	100	+0.170	+0.170	+0.170	+0.170	+0.170	+0.170	+0.120	+0.120	+0.120	+0.120	+0.120	+0.120
OVER	100	+0.720	+0.530	+0.400	0.320	0.267	0.234	0.470	+0.340	+0.260	+0.207	+0.174	+0.155
TO	120	+0.180	+0.180	+0.180	+0.180	+0.180	+0.180	+0.120	+0.120	+0.120	+0.120	+0.120	+0.120
OVER	120	0.830	+0.600	+0.450	0.360	+0.300	0.263	+0.545	0.395	+0.305	+0.245	+0.208	+0.185
TO	140	+0.200	+0.200	+0.200	+0.200	+0.200	+0.200	+0.145	+0.145	+0.145	+0.145	+0.145	+0.145
OVER	140	+0.840	+0.610	0.460	+0.370	+0.310	0.273	+0.545	0.395	+0.305	+0.245	+0.208	+0.185
TO	160	+0.210	+0.210	+0.210	+0.210	+0.210	+0.210	+0.145	+0.145	+0.145	+0.145	+0.145	+0.145
OVER	160	+0.860	+0.630	+0.480	+0.390	+0.330	+0.293	+0.545	+0.395	+0.305	+0.245	+0.208	+0.185
TO	180	+0.230	+0.230	+0.230	+0.230	+0.230	+0.230	+0.145	+0.145	+0.145	+0.145	+0.145	+0.145
OVER	180	+0.960	+0.700	+0.530	+0.425	+0.355	+0.312	+0.630	+0.460	+0.355	+0.285	+0.242	+0.216
TO	200	+0.240	+0.240	+0.240	+0.240	+0.240	+0.240	+0.170	+0.170	+0.170	+0.170	+0.170	+0.170
OVER	200	+0.980	+0.720	+0.550	+0.445	+0.375	+0.332	+0.630	+0.460	+0.355	+0.285	+0.242	+0.216
TO	225	+0.260	+0.260	+0.260	+0.260	+0.260	+0.260	+0.170	+0.170	+0.170	+0.170	+0.170	+0.170
OVER	225	+1.000	+0.740	+0.570	+0.465	+0.395	+0.352	+0.630	+0.460	+0.355	+0.285	+0.242	+0.216
TO	250	+0.280	+0.280	+0.280	+0.280	+0.280	+0.280	+0.170	+0.170	+0.170	+0.170	+0.170	+0.170
OVER	250	+1.110	+0.820	+0.620	+0.510	+0.430	+0.381	0.710	+0.510	+0.400	+0.320	+0.271	+0.242
TO	280	+0.300	+0.300	+0.300	+0.300	+0.300	+0.300	+0.190	+0.190	+0.190	+0.190	+0.190	+0.190
OVER	280	+1.140	+0.850	+0.650	+0.540	+0.460	+0.411	+0.710	+0.510	+0.400	+0.320	+0.271	+0.242
TO	315	+0.330	+0.330	+0.330	+0.330	+0.330	+0.330	+0.190	+0.190	+0.190	+0.190	+0.190	+0.190
OVER	315	+1.250	+0.930	+0.720	+0.590	+0.500	+0.449	+0.780	+0.570	+0.440	+0.350	+0.299	+0.267
TO	355	+0.360	+0.360	+0.360	+0.360	+0.360	+0.360	+0.210	+0.210	+0.210	+0.210	+0.210	+0.210
OVER	355	+1.290	+0.970	+0.760	+0.630	+0.540	+0.489	+0.780	+0.570	+0.440	+0.350	+0.299	+0.267
TO	400	+0.400	+0.400	+0.400	+0.400	+0.400	+0.400	+0.210	+0.210	+0.210	+0.210	+0.210	+0.210
OVER	400	+1.410	+1.070	+0.840	+0.690	+0.595	+0.537	+0.860	+0.630	+0.480	+0.385	+0.327	+0.293
TO	450	+0.440	+0.440	+0.440	+0.440	+0.440	+0.440	+0.230	+0.230	+0.230	+0.230	+0.230	+0.230
OVER	450	+1.450	+1.110	+0.880	+0.730	+0.635	+0.577	+0.860	+0.630	+0.480	+0.385	+0.327	+0.293
TO	500	+0.480	+0.480	+0.480	+0.480	+0.480	+0.480	+0.230	+0.230	+0.230	+0.230	+0.230	+0.230

TABLE 6-8 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (E12 ... E7, F11 ... F6) (ANSI B4.2)

mm

SIZE		E12	E11	E10	E9	E8	E7	F11	F10	F9	F8	F7	F6
OVER	0	+0.114	0.074	0.054	0.039	0.028	0.024	0.066	0.046	0.031	0.020	0.016	+0.012
TO	3	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014	+0.006	+0.006	+0.006	+0.006	+0.006	+0.006
OVER	3	0.140	+0.095	+0.068	+0.050	0.038	0.032	0.085	+0.058	0.040	+0.028	0.022	+0.018
TO	6	+0.020	+0.020	+0.020	+0.020	+0.020	+0.020	+0.010	+0.010	+0.010	+0.010	+0.010	+0.010
OVER	6	+0.175	0.115	0.083	0.061	0.047	+0.040	0.103	0.071	0.049	0.035	0.028	+0.022
TO	10	0.025	0.025	0.025	0.025	0.025	0.025	+0.013	+0.013	+0.013	+0.013	+0.013	+0.013
OVER	10	0.212	0.142	0.102	0.075	0.059	+0.050	0.126	+0.086	0.059	+0.043	0.034	+0.027
TO	14	+0.032	+0.032	+0.032	+0.032	+0.032	+0.032	+0.016	+0.016	+0.016	+0.016	+0.016	+0.016
OVER	14	+0.212	+0.142	0.102	+0.075	+0.059	+0.050	0.126	+0.086	0.059	+0.043	0.034	+0.027
TO	18	+0.032	+0.032	+0.032	+0.032	+0.032	+0.032	+0.016	+0.016	+0.016	+0.016	+0.016	+0.016
OVER	18	0.250	+0.170	+0.124	+0.092	+0.073	.061	0.150	+0.104	0.072	+0.053	0.041	0.033
TO	24	+0.040	+0.040	+0.040	+0.040	+0.040	+0.040	+0.020	+0.020	+0.020	+0.020	+0.020	+0.020
OVER	24	0.250	+0.170	+0.124	+0.092	+0.073	.061	0.150	+0.104	0.072	+0.053	0.041	0.033
TO	30	+0.040	+0.040	+0.040	+0.040	+0.040	+0.040	+0.020	+0.020	+0.020	+0.020	+0.020	+0.020
OVER	30	+0.300	+0.210	0.150	0.112	+0.089	+0.075	0.185	0.125	+0.087	+0.064	0.050	+0.041
TO	40	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050	+0.025	+0.025	+0.025	+0.025	+0.025	+0.025
OVER	40	+0.300	+0.210	0.150	0.112	+0.089	+0.075	0.185	0.125	+0.087	+0.064	0.050	+0.041
TO	50	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050	+0.025	+0.025	+0.025	+0.025	+0.025	+0.025
OVER	50	+0.360	+0.250	+0.180	0.134	0.106	0.090	0.220	+0.150	0.104	+0.076	0.060	+0.049
TO	65	+0.060	+0.060	+0.060	+0.060	+0.060	+0.060	+0.030	+0.030	+0.030	+0.030	+0.030	+0.030
OVER	65	+0.360	+0.250	+0.180	0.134	0.106	0.090	0.220	+0.150	0.104	+0.076	0.060	+0.049
TO	80	+0.060	+0.060	+0.060	+0.060	+0.060	+0.060	+0.030	+0.030	+0.030	+0.030	+0.030	+0.030
OVER	80	+0.422	+0.292	+0.212	+0.159	+0.126	+0.107	0.256	+0.176	0.123	+0.090	0.071	0.058
TO	100	+0.072	+0.072	+0.072	+0.072	+0.072	+0.072	+0.036	+0.036	+0.036	+0.036	+0.036	+0.036
OVER	100	+0.422	+0.292	+0.212	+0.159	+0.126	+0.107	0.256	+0.176	0.123	+0.090	0.071	+0.058
TO	120	+0.072	+0.072	+0.072	+0.072	+0.072	+0.072	+0.036	+0.036	+0.036	+0.036	+0.036	+0.036
OVER	120	+0.485	+0.335	0.245	0.185	0.148	+0.125	0.293	0.203	+0.143	0.106	+0.083	+0.068
TO	140	+0.085	+0.085	+0.085	+0.085	+0.085	+0.085	+0.043	+0.043	+0.043	+0.043	+0.043	+0.043
OVER	140	+0.485	+0.335	0.245	0.185	0.148	+0.125	0.293	0.203	+0.143	0.106	+0.083	+0.068
TO	160	+0.085	+0.085	+0.085	+0.085	+0.085	+0.085	+0.043	+0.043	+0.043	+0.043	+0.043	+0.043
OVER	160	+0.485	+0.335	0.245	0.185	0.148	+0.125	0.293	0.203	+0.143	0.106	+0.083	+0.068
TO	180	+0.085	+0.085	+0.085	+0.085	+0.085	+0.085	+0.043	+0.043	+0.043	+0.043	+0.043	+0.043
OVER	180	0.560	0.390	+0.285	+0.215	+0.172	+0.146	0.340	+0.235	0.165	+0.122	0.096	+0.079
TO	200	+0.100	+0.100	+0.100	+0.100	+0.100	+0.100	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050
OVER	200	0.560	0.390	+0.285	+0.215	+0.172	+0.146	0.340	+0.235	0.165	+0.122	0.096	+0.079
TO	225	+0.100	+0.100	+0.100	+0.100	+0.100	+0.100	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050
OVER	225	0.560	0.390	+0.285	+0.215	+0.172	+0.146	0.340	+0.235	0.165	+0.122	0.096	+0.079
TO	250	+0.100	+0.100	+0.100	+0.100	+0.100	+0.100	+0.050	+0.050	+0.050	+0.050	+0.050	+0.050
OVER	250	+0.630	0.430	+0.320	+0.240	+0.191	+0.162	0.376	0.266	0.186	+0.137	0.108	+0.088
TO	280	+0.110	+0.110	+0.110	+0.110	+0.110	+0.110	+0.056	+0.056	+0.056	+0.056	+0.056	+0.056
OVER	280	+0.630	0.430	+0.320	+0.240	+0.191	+0.162	0.376	0.266	0.186	+0.137	+0.108	+0.088
TO	315	+0.110	+0.110	+0.110	+0.110	+0.110	+0.110	+0.056	+0.056	+0.056	+0.056	+0.056	+0.056
OVER	315	+0.695	+0.485	+0.355	0.265	0.214	0.182	0.422	+0.292	0.202	+0.151	+0.119	+0.098
TO	355	+0.125	+0.125	+0.125	+0.125	+0.125	+0.125	+0.062	+0.062	+0.062	+0.062	+0.062	+0.062
OVER	355	+0.695	+0.485	+0.355	0.265	0.214	0.182	0.422	+0.292	0.202	+0.151	+0.119	+0.098
TO	400	+0.125	+0.125	+0.125	+0.125	+0.125	+0.125	+0.062	+0.062	+0.062	+0.062	+0.062	+0.062
OVER	400	+0.765	+0.535	0.385	0.290	0.232	+0.198	+0.468	+0.318	0.223	+0.165	+0.131	+0.108
TO	450	+0.135	+0.135	+0.135	+0.135	+0.135	+0.135	+0.068	+0.068	+0.068	+0.068	+0.068	+0.068
OVER	450	+0.765	+0.535	0.385	0.290	0.232	+0.198	+0.468	+0.318	0.223	+0.165	+0.131	+0.108
TO	500	+0.135	+0.135	+0.135	+0.135	+0.135	+0.135	+0.068	+0.068	+0.068	+0.068	+0.068	+0.068

TABLE 6-9 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (G10 ... G5, J8 . . . J6) (ANSI B4.2)

mm

SIZE		G10	G9	G8	G7	G6	G5	J8	J7	J6
OVER	0	0.042	0.027	+0.016	+0.012	+0.008	+0.006	+0.006	+0.004	+0.002
TO	3	+0.002	+0.002	+0.002	+0.002	+0.002	+0.002	-0.008	-0.006	-0.004
OVER	3	+0.052	+0.034	+0.022	+0.016	+0.012	+0.009	0.010	+0.006	+0.005
TO	6	+0.004	+0.004	+0.004	+0.004	+0.004	+0.004	-0.008	-0.006	-0.003
OVER	6	+0.063	+0.041	+0.027	+0.020	+0.014	+0.011	+0.012	+0.008	+0.005
TO	10	+0.005	+0.005	+0.005	+0.005	+0.005	+0.005	-0.010	-0.007	-0.004
OVER	10	+0.076	+0.049	+0.033	+0.024	0.017	+0.014	0.015	0.010	+0.006
TO	14	+0.006	+0.006	+0.006	+0.006	+0.006	+0.006	-0.012	-0.008	-0.005
OVER	14	+0.076	+0.049	+0.033	+0.024	0.017	+0.014	0.015	0.010	+0.006
TO	18	+0.006	+0.006	+0.006	+0.006	+0.006	+0.006	-0.012	-0.008	-0.005
OVER	18	+0.091	+0.059	+0.040	+0.028	+0.020	+0.016	+0.020	+0.012	+0.008
TO	24	+0.007	+0.007	+0.007	+0.007	+0.007	+0.007	-0.013	-0.009	-0.005
OVER	24	+0.091	+0.059	+0.040	+0.028	+0.020	+0.016	+0.020	+0.012	+0.008
TO	30	+0.007	+0.007	+0.007	+0.007	+0.007	+0.007	-0.013	-0.009	-0.005
OVER	30	+0.109	+0.071	+0.048	+0.034	+0.025	+0.020	0.024	0.014	0.010
TO	40	+0.009	+0.009	+0.009	+0.009	+0.009	+0.009	-0.015	-0.011	-0.006
OVER	40	+0.109	+0.071	+0.048	+0.034	+0.025	+0.020	0.024	0.014	0.010
TO	50	+0.009	+0.009	+0.009	+0.009	+0.009	+0.009	-0.015	-0.011	-0.006
OVER	50	+0.130	+0.084	+0.056	+0.040	0.029	+0.023	+0.028	0.018	0.013
TO	65	+0.010	+0.010	+0.010	+0.010	+0.010	+0.010	-0.018	-0.012	-0.006
OVER	65	+0.130	+0.084	+0.056	+0.040	+0.029	+0.023	+0.028	0.018	0.013
TO	80	+0.010	+0.010	+0.010	+0.010	+0.010	+0.010	-0.018	-0.012	-0.006
OVER	80	+0.152	+0.099	+0.066	+0.047	+0.034	+0.027	0.034	0.022	0.016
TO	100	+0.012	+0.012	+0.012	+0.012	+0.012	+0.012	-0.020	-0.013	-0.006
OVER	100	+0.152	+0.099	+0.066	+0.047	+0.034	+0.027	0.034	0.022	0.016
TO	120	+0.012	+0.012	+0.012	+0.012	+0.012	+0.012	-0.020	-0.013	-0.006
OVER	120	+0.174	+0.114	+0.077	+0.054	+0.039	+0.032	0.041	0.026	+0.018
TO	140	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014	-0.022	-0.014	-0.007
OVER	140	+0.174	+0.114	+0.077	+0.054	+0.039	+0.032	0.041	0.026	+0.018
TO	160	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014	-0.022	-0.014	-0.007
OVER	160	+0.174	+0.114	+0.077	+0.054	+0.039	+0.032	0.041	0.026	+0.018
TO	180	+0.014	+0.014	+0.014	+0.014	+0.014	+0.014	-0.022	-0.014	-0.007
OVER	180	+0.200	+0.130	+0.087	+0.061	+0.044	+0.035	0.047	0.030	+0.022
TO	200	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	-0.025	-0.016	-0.007
OVER	200	+0.200	+0.130	+0.087	+0.061	+0.044	+0.035	0.047	0.030	+0.022
TO	225	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	-0.025	-0.016	-0.007
OVER	225	+0.200	+0.130	+0.087	+0.061	+0.044	+0.035	0.047	0.030	+0.022
TO	250	+0.015	+0.015	+0.015	+0.015	+0.015	+0.015	-0.025	-0.016	-0.007
OVER	250	+0.227	+0.147	+0.098	+0.069	+0.049	+0.040	0.055	+0.036	0.025
TO	280	+0.017	+0.017	+0.017	+0.017	+0.017	+0.017	-0.026	-0.016	-0.007
OVER	280	+0.227	+0.147	+0.098	+0.069	+0.049	+0.040	0.055	+0.036	0.025
TO	315	+0.017	+0.017	+0.017	+0.017	+0.017	+0.017	-0.026	-0.016	-0.007
OVER	315	+0.248	+0.158	+0.107	+0.075	+0.054	+0.043	0.060	0.039	0.029
TO	355	+0.018	+0.018	+0.018	+0.018	+0.018	+0.018	-0.029	-0.018	-0.007
OVER	355	+0.248	+0.158	+0.107	+0.075	+0.054	+0.043	0.060	0.039	0.029
TO	400	+0.018	+0.018	+0.018	+0.018	+0.018	+0.018	-0.029	-0.018	-0.007
OVER	400	+0.270	+0.175	+0.117	+0.083	+0.060	+0.047	0.066	+0.043	+0.033
TO	450	+0.020	+0.020	+0.020	+0.020	+0.020	+0.020	-0.031	-0.020	-0.007
OVER	450	+0.270	+0.175	+0.117	+0.083	+0.060	+0.047	0.066	+0.043	+0.033
TO	500	+0.020	+0.020	+0.020	+0.020	+0.020	+0.020	-0.031	-0.020	-0.007

TABLE 6-10 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (H16 ... H1) (ANSI B4.2)

mm

SIZE		H16	H15	H14	H13	H12	H11	H10	H9	H8	H7	H6	H5	H4	H3	H2	H1
OVER	0	0.600	0.400	0.250	0.140	0.100	0.060	0.040	0.025	0.014	0.010	0.006	0.004	0.003	0.002	0.001	0.0008
TO	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	3	0.750	0.480	0.300	0.180	0.120	0.075	0.048	0.030	0.018	0.012	0.008	0.005	0.004	0.003	0.002	0.0010
TO	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	6	0.900	0.580	0.360	0.220	0.150	0.090	0.058	0.036	0.022	0.015	0.009	0.006	0.004	0.003	0.002	0.0010
TO	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	10	1.100	0.700	0.430	0.270	0.180	0.110	0.070	0.043	0.027	0.018	0.011	0.008	0.005	0.003	0.002	0.0012
TO	14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	14	1.100	0.700	0.430	0.270	0.180	0.110	0.070	0.043	0.027	0.018	0.011	0.008	0.005	0.003	0.002	0.0012
TO	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	18	1.300	0.840	0.520	0.330	0.210	0.130	0.084	0.052	0.033	0.021	0.013	0.009	0.006	0.004	0.003	0.0015
TO	24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	24	1.300	0.840	0.520	0.330	0.210	0.130	0.084	0.052	0.033	0.021	0.013	0.009	0.006	0.004	0.003	0.0015
TO	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	30	1.600	1.000	0.620	0.390	0.250	0.160	0.100	0.062	0.039	0.025	0.016	0.011	0.007	0.004	0.003	0.0015
TO	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	40	1.600	1.000	0.620	0.390	0.250	0.160	0.100	0.062	0.039	0.025	0.016	0.011	0.007	0.004	0.003	0.0015
TO	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	50	1.900	1.200	0.740	0.460	0.300	0.190	0.120	0.074	0.046	0.030	0.019	0.013	0.008	0.005	0.003	0.0020
TO	65	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	65	1.900	1.200	0.740	0.460	0.300	0.190	0.120	0.074	0.046	0.030	0.019	0.013	0.008	0.005	0.003	0.0020
TO	80	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	80	2.200	1.400	0.870	0.540	0.350	0.220	0.140	0.087	0.054	0.035	0.022	0.015	0.010	0.006	0.004	0.0025
TO	100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	100	2.200	1.400	0.870	0.540	0.350	0.220	0.140	0.087	0.054	0.035	0.022	0.015	0.010	0.006	0.004	0.0025
TO	120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	120	2.500	1.600	1.000	0.630	0.400	0.250	0.160	0.100	0.063	0.040	0.025	0.018	0.012	0.008	0.005	0.0035
TO	140	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	140	2.500	1.600	1.000	0.630	0.400	0.250	0.160	0.100	0.063	0.040	0.025	0.018	0.012	0.008	0.005	0.0035
TO	160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	160	2.500	1.600	1.000	0.630	0.400	0.250	0.160	0.100	0.063	0.040	0.025	0.018	0.012	0.008	0.005	0.0035
TO	180	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	180	2.900	1.850	1.150	0.720	0.460	0.290	0.185	0.115	0.072	0.046	0.029	0.020	0.014	0.010	0.007	0.0045
TO	200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	200	2.900	1.850	1.150	0.720	0.460	0.290	0.185	0.115	0.072	0.046	0.029	0.020	0.014	0.010	0.007	0.0045
TO	225	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	225	2.900	1.850	1.150	0.720	0.460	0.290	0.185	0.115	0.072	0.046	0.029	0.020	0.014	0.010	0.007	0.0045
TO	250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
OVER	250	3.200	2.100	1.300	0.810	0.520	0.320	0.210	0.130	0.081	0.052	0.032	0.023	0.016	0.012	0.008	0.006
TO	280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OVER	280	3.200	2.100	1.300	0.810	0.520	0.320	0.210	0.130	0.081	0.052	0.032	0.023	0.016	0.012	0.008	0.006
TO	315	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OVER	315	3.600	2.300	1.400	0.890	0.570	0.360	0.230	0.140	0.089	0.057	0.036	0.025	0.018	0.013	0.009	0.007
TO	355	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OVER	355	3.600	2.300	1.400	0.890	0.570	0.360	0.230	0.140	0.089	0.057	0.036	0.025	0.018	0.013	0.009	0.007
TO	400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OVER	400	4.000	2.500	1.550	0.970	0.630	0.400	0.250	0.155	0.097	0.063	0.040	0.027	0.020	0.015	0.010	0.008
TO	450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
OVER	450	4.000	2.500	1.550	0.970	0.630	0.400	0.250	0.155	0.097	0.063	0.040	0.027	0.020	0.015	0.010	0.008
TO	500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE 6-11 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (JS16...JS1) (ANSI B4.2)

mm

SIZE		JS16	JS15	JS14	JS13	JS12	JS11	JS10	JS9	JS8	JS7	JS6	JS5	JS4	JS3	JS2	JS1
OVER	0	0.300	0.200	0.125	0.070	0.050	0.030	0.020	0.013	0.007	0.0050	0.0030	0.0020	0.0015	0.0010	0.00060	0.00040
TO	3	-0.300	-0.200	-0.125	-0.070	-0.050	-0.030	-0.020	-0.013	-0.007	-0.0050	-0.0030	-0.0020	-0.0015	-0.0010	-0.00060	-0.00040
OVER	3	0.375	0.240	0.150	0.090	0.060	0.038	0.024	0.015	0.009	0.0060	0.0040	0.0025	0.0020	0.0013	0.00075	0.00050
TO	6	-0.375	-0.240	-0.150	-0.090	-0.060	-0.038	-0.024	-0.015	-0.009	-0.0060	-0.0040	-0.0025	-0.0020	-0.0013	-0.00075	-0.00050
OVER	6	0.450	0.290	0.180	0.110	0.075	0.045	0.029	0.018	0.011	0.0075	0.0045	0.0030	0.0020	0.0013	0.00075	0.00050
TO	10	-0.450	-0.290	-0.180	-0.110	-0.075	-0.045	-0.029	-0.018	-0.011	-0.0075	-0.0045	-0.0030	-0.0020	-0.0013	-0.00075	-0.00050
OVER	10	0.550	0.350	0.215	0.135	0.090	0.055	0.035	0.022	0.014	0.0090	0.0055	0.0040	0.0025	0.0015	0.00100	0.00060
TO	14	-0.550	-0.350	-0.215	-0.135	-0.090	-0.055	-0.035	-0.022	-0.014	-0.0090	-0.0055	-0.0040	-0.0025	-0.0015	-0.00100	-0.00060
OVER	14	0.550	0.350	0.215	0.135	0.090	0.055	0.035	0.022	0.014	0.0090	0.0055	0.0040	0.0025	0.0015	0.00100	0.00060
TO	18	-0.550	-0.350	-0.215	-0.135	-0.090	-0.055	-0.035	-0.022	-0.014	-0.0090	-0.0055	-0.0040	-0.0025	-0.0015	-0.00100	-0.00060
OVER	18	0.650	0.420	0.260	0.165	0.105	0.065	0.042	0.026	0.017	0.0105	0.0065	0.0045	0.0030	0.0020	0.00125	0.00075
TO	24	-0.650	-0.420	-0.260	-0.165	-0.105	-0.065	-0.042	-0.026	-0.017	-0.0105	-0.0065	-0.0045	-0.0030	-0.0020	-0.00125	-0.00075
OVER	24	0.650	0.420	0.260	0.165	0.105	0.065	0.042	0.026	0.017	0.0105	0.0065	0.0045	0.0030	0.0020	0.00125	0.00075
TO	30	-0.650	-0.420	-0.260	-0.165	-0.105	-0.065	-0.042	-0.026	-0.017	-0.0105	-0.0065	-0.0045	-0.0030	-0.0020	-0.00125	-0.00075
OVER	30	0.800	0.500	0.310	0.195	0.125	0.080	0.050	0.031	0.020	0.0125	0.0080	0.0055	0.0035	0.0020	0.00125	0.00075
TO	40	-0.800	-0.500	-0.310	-0.195	-0.125	-0.080	-0.050	-0.031	-0.020	-0.0125	-0.0080	-0.0055	-0.0035	-0.0020	-0.00125	-0.00075
OVER	40	0.800	0.500	0.310	0.195	0.125	0.080	0.050	0.031	0.020	0.0125	0.0080	0.0055	0.0035	0.0020	0.00125	0.00075
TO	50	-0.800	-0.500	-0.310	-0.195	-0.125	-0.080	-0.050	-0.031	-0.020	-0.0125	-0.0080	-0.0055	-0.0035	-0.0020	-0.00125	-0.00075
OVER	50	0.950	0.600	0.370	0.230	0.150	0.095	0.060	0.037	0.023	0.0150	0.0095	0.0065	0.0040	0.0025	0.00150	0.00100
TO	65	-0.950	-0.600	-0.370	-0.230	-0.150	-0.095	-0.060	-0.037	-0.023	-0.0150	-0.0095	-0.0065	-0.0040	-0.0025	-0.00150	-0.00100
OVER	65	0.950	0.600	0.370	0.230	0.150	0.095	0.060	0.037	0.023	0.0150	0.0095	0.0065	0.0040	0.0025	0.00150	0.00100
TO	80	-0.950	-0.600	-0.370	-0.230	-0.150	-0.095	-0.060	-0.037	-0.023	-0.0150	-0.0095	-0.0065	-0.0040	-0.0025	-0.00150	-0.00100
OVER	80	1.100	0.700	0.435	0.270	0.175	0.110	0.070	0.044	0.027	0.0175	0.0110	0.0075	0.0050	0.0030	0.00200	0.00125
TO	100	-1.100	-0.700	-0.435	-0.270	-0.175	-0.110	-0.070	-0.044	-0.027	-0.0175	-0.0110	-0.0075	-0.0050	-0.0030	-0.00200	-0.00125
OVER	100	1.100	0.700	0.435	0.270	0.175	0.110	0.070	0.044	0.027	0.0175	0.0110	0.0075	0.0050	0.0030	0.00200	0.00125
TO	120	-1.100	-0.700	-0.435	-0.270	-0.175	-0.110	-0.070	-0.044	-0.027	-0.0175	-0.0110	-0.0075	-0.0050	-0.0030	-0.00200	-0.00125
OVER	120	1.250	0.800	0.500	0.315	0.200	0.125	0.080	0.050	0.032	0.0200	0.0125	0.0090	0.0060	0.0040	0.00250	0.00175
TO	140	-1.250	-0.800	-0.500	-0.315	-0.200	-0.125	-0.080	-0.050	-0.032	-0.0200	-0.0125	-0.0090	-0.0060	-0.0040	-0.00250	-0.00175
OVER	140	1.250	0.800	0.500	0.315	0.200	0.125	0.080	0.050	0.032	0.0200	0.0125	0.0090	0.0060	0.0040	0.00250	0.00175
TO	160	-1.250	-0.800	-0.500	-0.315	-0.200	-0.125	-0.080	-0.050	-0.032	-0.0200	-0.0125	-0.0090	-0.0060	-0.0040	-0.00250	-0.00175
OVER	160	1.250	0.800	0.500	0.315	0.200	0.125	0.080	0.050	0.032	0.0200	0.0125	0.0090	0.0060	0.0040	0.00250	0.00175
TO	180	-1.250	-0.800	-0.500	-0.315	-0.200	-0.125	-0.080	-0.050	-0.032	-0.0200	-0.0125	-0.0090	-0.0060	-0.0040	-0.00250	-0.00175
OVER	180	1.450	0.925	0.575	0.360	0.230	0.145	0.093	0.058	0.036	0.0230	0.0145	0.0100	0.0070	0.0050	0.00350	0.00225
TO	200	-1.450	-0.925	-0.575	-0.360	-0.230	-0.145	-0.093	-0.058	-0.036	-0.0230	-0.0145	-0.0100	-0.0070	-0.0050	-0.00350	-0.00225
OVER	200	1.450	0.925	0.575	0.360	0.230	0.145	0.093	0.058	0.036	0.0230	0.0145	0.0100	0.0070	0.0050	0.00350	0.00225
TO	225	-1.450	-0.925	-0.575	-0.360	-0.230	-0.145	-0.093	-0.058	-0.036	-0.0230	-0.0145	-0.0100	-0.0070	-0.0050	-0.00350	-0.00225
OVER	225	1.450	0.925	0.575	0.360	0.230	0.145	0.093	0.058	0.036	0.0230	0.0145	0.0100	0.0070	0.0050	0.00350	0.00225
TO	250	-1.450	-0.925	-0.575	-0.360	-0.230	-0.145	-0.093	-0.058	-0.036	-0.0230	-0.0145	-0.0100	-0.0070	-0.0050	-0.00350	-0.00225
OVER	250	1.600	1.050	0.650	0.405	0.260	0.160	0.105	0.065	0.041	0.0260	0.0160	0.0115	0.0080	0.0060	0.0040	0.0030
TO	280	-1.600	-1.050	-0.650	-0.405	-0.260	-0.160	-0.105	-0.065	-0.041	-0.0260	-0.0160	-0.0115	-0.0080	-0.0060	-0.0040	-0.0030
OVER	280	1.600	1.050	0.650	0.405	0.260	0.160	0.105	0.065	0.041	0.0260	0.0160	0.0115	0.0080	0.0060	0.0040	0.0030
TO	315	-1.600	-1.050	-0.650	-0.405	-0.260	-0.160	-0.105	-0.065	-0.041	-0.0260	-0.0160	-0.0115	-0.0080	-0.0060	-0.0040	-0.0030
OVER	315	1.800	1.150	0.700	0.445	0.285	0.180	0.115	0.070	0.045	0.0285	0.0180	0.0125	0.0090	0.0065	0.0045	0.0035
TO	355	-1.800	-1.150	-0.700	-0.445	-0.285	-0.180	-0.115	-0.070	-0.045	-0.0285	-0.0180	-0.0125	-0.0090	-0.0065	-0.0045	-0.0035
OVER	355	1.800	1.150	0.700	0.445	0.285	0.180	0.115	0.070	0.045	0.0285	0.0180	0.0125	0.0090	0.0065	0.0045	0.0035
TO	400	-1.800	-1.150	-0.700	-0.445	-0.285	-0.180	-0.115	-0.070	-0.045	-0.0285	-0.0180	-0.0125	-0.0090	-0.0065	-0.0045	-0.0035
OVER	400	2.000	1.250	0.775	0.485	0.315	0.200	0.125	0.078	0.049	0.0315	0.0200	0.0135	0.0100	0.0075	0.0050	0.0040
TO	450	-2.000	-1.250	-0.775	-0.485	-0.315	-0.200	-0.125	-0.078	-0.049	-0.0315	-0.0200	-0.0135	-0.0100	-0.0075	-0.0050	-0.0040
OVER	450	2.000	1.250	0.775	0.485	0.315	0.200	0.125	0.078	0.049	0.0315	0.0200	0.0135	0.0100	0.0075	0.0050	0.0040
TO	500	-2.000	-1.250	-0.775	-0.485	-0.315	-0.200	-0.125	-0.078	-0.049	-0.0315	-0.0200	-0.0135	-0.0100	-0.0075	-0.0050	-0.0040

NOTE: Some js deviations in the grades 7 to 11 have been rounded off to 1/2(IT - 0.001) when IT values is odd.

TABLE 6-12 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (K10 ... K5, M10 ... M5) (ANSI B4.2)

mm

SIZE		K10	K9	K8	K7	K6	K5	M10	M9	M8	M7	M6	M5
OVER	0	0.000	0.000	0.000	0.000	0.000	0.000	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
TO	3	-0.040	-0.025	-0.014	-0.010	-0.006	-0.004	-0.042	-0.027	-0.016	-0.012	-0.008	-0.006
OVER	3			+0.005	+0.003	+0.002	0.000	-0.004	-0.004	+0.002	0.000	-0.001	-0.003
TO	6			-0.013	-0.009	-0.006	-0.005	-0.052	-0.034	-0.016	-0.012	-0.009	-0.008
OVER	6			+0.006	+0.005	+0.002	+0.001	-0.006	-0.006	+0.001	0.000	-0.003	-0.004
TO	10			-0.016	-0.010	-0.007	-0.005	-0.064	-0.042	-0.021	-0.015	-0.012	-0.010
OVER	10			+0.008	+0.006	+0.002	+0.002	-0.007	-0.007	+0.002	0.000	-0.004	-0.004
TO	14			-0.019	-0.012	-0.009	-0.006	-0.077	-0.050	-0.025	-0.018	-0.015	-0.012
OVER	14			+0.008	+0.006	+0.002	+0.002	-0.007	-0.007	+0.002	0.000	-0.004	-0.004
TO	18			-0.019	-0.012	-0.009	-0.006	-0.077	-0.050	-0.025	-0.018	-0.015	-0.012
OVER	18			+0.010	+0.006	+0.002	+0.001	-0.008	-0.008	+0.004	0.000	-0.004	-0.005
TO	24	NUMERICAL		-0.023	-0.015	-0.011	-0.008	-0.092	-0.060	-0.029	-0.021	-0.017	-0.014
OVER	24	VALUES FOR		+0.010	+0.006	+0.002	+0.001	-0.008	-0.008	+0.004	0.000	-0.004	-0.005
TO	30	TOLERANCE		-0.023	-0.015	-0.011	-0.008	-0.092	-0.060	-0.029	-0.021	-0.017	-0.014
OVER	30	ZONES IN THIS		+0.012	+0.007	+0.003	+0.002	-0.009	-0.009	+0.005	0.000	-0.004	-0.005
TO	40	AREA NOT		-0.027	-0.018	-0.013	-0.009	-0.109	-0.071	-0.034	-0.025	-0.020	-0.016
OVER	40	DEFINED		+0.012	+0.007	+0.003	+0.002	-0.009	-0.009	+0.005	0.000	-0.004	-0.005
TO	50			-0.027	-0.018	-0.013	-0.009	-0.109	-0.071	-0.034	-0.025	-0.020	-0.016
OVER	50			+0.014	+0.009	+0.004	+0.003	-0.011	-0.011	+0.005	0.000	-0.005	-0.006
TO	65			-0.032	-0.021	-0.015	-0.010	-0.131	-0.085	-0.041	-0.030	-0.024	-0.019
OVER	65			+0.014	+0.009	+0.004	+0.003	-0.011	-0.011	+0.005	0.000	-0.005	-0.006
TO	80			-0.032	-0.021	-0.015	-0.010	-0.131	-0.085	-0.041	-0.030	-0.024	-0.019
OVER	80			+0.016	+0.010	+0.004	+0.002	-0.013	-0.013	+0.006	0.000	-0.006	-0.008
TO	100			-0.038	-0.025	-0.018	-0.013	-0.153	-0.100	-0.048	-0.035	-0.028	-0.023
OVER	100			+0.016	+0.010	+0.004	+0.002	-0.013	-0.013	+0.006	0.000	-0.006	-0.008
TO	120			-0.038	-0.025	-0.018	-0.013	-0.153	-0.100	-0.048	-0.035	-0.028	-0.023
OVER	120			+0.020	+0.012	+0.004	+0.003	-0.015	-0.015	+0.008	0.000	-0.008	-0.009
TO	140			-0.043	-0.028	-0.021	-0.015	-0.175	-0.115	-0.055	-0.040	-0.033	-0.027
OVER	140			+0.020	+0.012	+0.004	+0.003	-0.015	-0.015	+0.008	0.000	-0.008	-0.009
TO	160			-0.043	-0.028	-0.021	-0.015	-0.175	-0.115	-0.055	-0.040	-0.033	-0.027
OVER	160			+0.020	+0.012	+0.004	+0.003	-0.015	-0.015	+0.008	0.000	-0.008	-0.009
TO	180			-0.043	-0.028	-0.021	-0.015	-0.175	-0.115	-0.055	-0.040	-0.033	-0.027
OVER	180			+0.022	+0.013	+0.005	+0.002	-0.017	-0.017	+0.009	0.000	-0.008	-0.011
TO	200			-0.050	-0.033	-0.024	-0.018	-0.202	-0.132	-0.063	-0.046	-0.037	-0.031
OVER	200			+0.022	+0.013	+0.005	+0.002	-0.017	-0.017	+0.009	0.000	-0.008	-0.011
TO	225			-0.050	-0.033	-0.024	-0.018	-0.202	-0.132	-0.063	-0.046	-0.037	-0.031
OVER	225			+0.022	+0.013	+0.005	+0.002	-0.017	-0.017	+0.009	0.000	-0.008	-0.011
TO	250			-0.050	-0.033	-0.024	-0.018	-0.202	-0.132	-0.063	-0.046	-0.037	-0.031
OVER	250			+0.025	+0.016	+0.005	+0.003	-0.020	-0.020	+0.009	0.000	-0.009	-0.013
TO	280			-0.056	-0.036	-0.027	-0.020	-0.230	-0.150	-0.072	-0.052	-0.041	-0.036
OVER	280			+0.025	+0.016	+0.005	+0.003	-0.020	-0.020	+0.009	0.000	-0.009	-0.013
TO	315			-0.056	-0.036	-0.027	-0.020	-0.230	-0.150	-0.072	-0.052	-0.041	-0.036
OVER	315			+0.028	+0.017	+0.007	+0.003	-0.021	-0.021	+0.011	0.000	-0.010	-0.014
TO	355			-0.061	-0.040	-0.029	-0.022	-0.251	-0.161	-0.078	-0.057	-0.046	-0.039
OVER	355			+0.028	+0.017	+0.007	+0.003	-0.021	-0.021	+0.011	0.000	-0.010	-0.014
TO	400			-0.061	-0.040	-0.029	-0.022	-0.251	-0.161	-0.078	-0.057	-0.046	-0.039
OVER	400			+0.029	+0.018	+0.008	+0.002	-0.023	-0.023	+0.011	0.000	-0.010	-0.016
TO	450			-0.068	-0.045	-0.032	-0.025	-0.273	-0.178	-0.086	-0.063	-0.050	-0.043
OVER	450			+0.029	+0.018	+0.008	+0.002	-0.023	-0.023	+0.011	0.000	-0.010	-0.016
TO	500			-0.068	-0.045	-0.032	-0.025	-0.273	-0.178	-0.086	-0.063	-0.050	-0.043

TABLE 6-13 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (N10 ... N5, P10 ... P5) (ANSI B4.2)

mm

SIZE		N10	N9	N8	N7	N6	N5	P10	P9	P8	P7	P6	P5
OVER	0	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
TO	3	-0.044	-0.029	-0.018	-0.014	-0.010	-0.008	-0.046	-0.031	-0.020	-0.016	-0.012	-0.010
OVER	3	0.000	0.000	-0.002	-0.004	-0.005	-0.007	-0.012	-0.012	-0.012	-0.008	-0.009	-0.011
TO	6	-0.048	-0.030	-0.020	-0.016	-0.013	-0.012	-0.060	-0.042	-0.030	-0.020	-0.017	-0.016
OVER	6	0.000	0.000	-0.003	-0.004	-0.007	-0.008	-0.015	-0.015	-0.015	-0.009	-0.012	-0.013
TO	10	-0.058	-0.036	-0.025	-0.019	-0.016	-0.014	-0.073	-0.051	-0.037	-0.024	-0.021	-0.019
OVER	10	0.000	0.000	-0.003	-0.005	-0.009	-0.009	-0.018	-0.018	-0.018	-0.011	-0.015	-0.015
TO	14	-0.070	-0.043	-0.030	-0.023	-0.020	-0.017	-0.088	-0.061	-0.045	-0.029	-0.026	-0.023
OVER	14	0.000	0.000	-0.003	-0.005	-0.009	-0.009	-0.018	-0.018	-0.018	-0.011	-0.015	-0.015
TO	18	-0.070	-0.043	-0.030	-0.023	-0.020	-0.017	-0.088	-0.061	-0.045	-0.029	-0.026	-0.023
OVER	18	0.000	0.000	-0.003	-0.007	-0.011	-0.012	-0.022	-0.022	-0.022	-0.014	-0.018	-0.019
TO	24	-0.084	-0.052	-0.036	-0.028	-0.024	-0.021	-0.106	-0.074	-0.055	-0.035	-0.031	-0.028
OVER	24	0.000	0.000	-0.003	-0.007	-0.011	-0.012	-0.022	-0.022	-0.022	-0.014	-0.018	-0.019
TO	30	-0.084	-0.052	-0.036	-0.028	-0.024	-0.021	-0.106	-0.074	-0.055	-0.035	-0.031	-0.028
OVER	30	0.000	0.000	-0.003	-0.008	-0.012	-0.013	-0.026	-0.026	-0.026	-0.017	-0.021	-0.022
TO	40	-0.100	-0.062	-0.042	-0.033	-0.028	-0.024	-0.126	-0.088	-0.065	-0.042	-0.037	-0.033
OVER	10	0.000	0.000	-0.003	-0.008	-0.012	-0.013	-0.026	-0.026	-0.026	-0.017	-0.021	-0.022
TO	50	-0.100	-0.062	-0.042	-0.033	-0.028	-0.024	-0.126	-0.088	-0.065	-0.042	-0.037	-0.033
OVER	50	0.000	0.000	-0.004	-0.009	-0.014	-0.015	-0.032	-0.032	-0.032	-0.021	-0.026	-0.027
TO	65	-0.120	-0.074	-0.050	-0.039	-0.033	-0.028	-0.152	-0.106	-0.078	-0.051	-0.045	-0.040
OVER	65	0.000	0.000	-0.004	-0.009	-0.014	-0.015	-0.032	-0.032	-0.032	-0.021	-0.026	-0.027
TO	80	-0.120	-0.074	-0.050	-0.039	-0.033	-0.028	-0.152	-0.106	-0.078	-0.051	-0.045	-0.040
OVER	80	0.000	0.000	-0.004	-0.010	-0.016	-0.018	-0.037	-0.037	-0.037	-0.024	-0.030	-0.032
TO	100	-0.140	-0.087	-0.058	-0.045	-0.038	-0.033	-0.177	-0.124	-0.091	-0.059	-0.052	-0.047
OVER	100	0.000	0.000	-0.004	-0.010	-0.016	-0.018	-0.037	-0.037	-0.037	-0.024	-0.030	-0.032
TO	120	-0.140	-0.087	-0.058	-0.045	-0.038	-0.033	-0.177	-0.124	-0.091	-0.059	-0.052	-0.047
OVER	120	0.000	0.000	-0.004	-0.012	-0.020	-0.021	-0.043	-0.043	-0.043	-0.028	-0.036	-0.037
TO	140	-0.160	-0.100	-0.067	-0.052	-0.045	-0.039	-0.203	-0.143	-0.106	-0.068	-0.061	-0.055
OVER	140	0.000	0.000	-0.004	-0.012	-0.020	-0.021	-0.043	-0.043	-0.043	-0.028	-0.036	-0.037
TO	160	-0.160	-0.100	-0.067	-0.052	-0.045	-0.039	-0.203	-0.143	-0.106	-0.068	-0.061	-0.055
OVER	160	0.000	0.000	-0.004	-0.012	-0.020	-0.021	-0.043	-0.043	-0.043	-0.028	-0.036	-0.037
TO	180	-0.160	-0.100	-0.067	-0.052	-0.045	-0.039	-0.203	-0.143	-0.106	-0.068	-0.061	-0.055
OVER	180	0.000	0.000	-0.005	-0.014	-0.022	-0.025	-0.050	-0.050	-0.050	-0.033	-0.041	-0.044
TO	200	-0.185	-0.115	-0.077	-0.060	-0.051	-0.045	-0.235	-0.165	-0.122	-0.079	-0.070	-0.064
OVER	200	0.000	0.000	-0.005	-0.014	-0.022	-0.025	-0.050	-0.050	-0.050	-0.033	-0.041	-0.044
TO	225	-0.185	-0.115	-0.077	-0.060	-0.051	-0.045	-0.235	-0.165	-0.122	-0.079	-0.070	-0.064
OVER	225	0.000	0.000	-0.005	-0.014	-0.022	-0.025	-0.050	-0.050	-0.050	-0.033	-0.041	-0.044
TO	250	-0.185	-0.115	-0.077	-0.060	-0.051	-0.045	-0.235	-0.165	-0.122	-0.079	-0.070	-0.064
OVER	250	0.000	0.000	-0.005	-0.014	-0.025	-0.027	-0.056	-0.056	-0.056	-0.036	-0.047	-0.049
TO	280	-0.210	-0.130	-0.086	-0.066	-0.057	-0.050	-0.266	-0.186	-0.137	-0.088	-0.079	-0.072
OVER	280	0.000	0.000	-0.005	-0.014	-0.025	-0.027	-0.056	-0.056	-0.056	-0.036	-0.047	-0.049
TO	315	-0.210	-0.130	-0.086	-0.066	-0.057	-0.050	-0.266	-0.186	-0.137	-0.088	-0.079	-0.072
OVER	315	0.000	0.000	-0.005	-0.016	-0.026	-0.030	-0.062	-0.062	-0.062	-0.041	-0.051	-0.055
TO	355	-0.230	-0.140	-0.094	-0.073	-0.062	-0.055	-0.292	-0.202	-0.151	-0.098	-0.087	-0.080
OVER	355	0.000	0.000	-0.005	-0.016	-0.026	-0.030	-0.062	-0.062	-0.062	-0.041	-0.051	-0.055
TO	400	-0.230	-0.140	-0.094	-0.073	-0.062	-0.055	-0.292	-0.202	-0.151	-0.098	-0.087	-0.080
OVER	400	0.000	0.000	-0.006	-0.017	-0.027	-0.033	-0.068	-0.068	-0.068	-0.045	-0.055	-0.061
TO	450	-0.250	-0.155	-0.103	-0.080	-0.067	-0.060	-0.318	-0.223	-0.165	-0.108	-0.095	-0.088
OVER	450	0.000	0.000	-0.006	-0.017	-0.027	-0.033	-0.068	-0.068	-0.068	-0.045	-0.055	-0.061
TO	500	-0.250	-0.155	-0.103	-0.080	-0.067	-0.060	-0.318	-0.223	-0.165	-0.108	-0.095	-0.088

TABLE 6-14 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (R10 ... R5, S10 ... S5) (ANSI B4.2)

mm

SIZE		R10	R9	R8	R7	R6	R5	S10	S9	S8	S7	S6	S5
OVER	0	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010	-0.014	-0.014	-0.014	-0.014	-0.014	-0.014
TO	3	-0.050	-0.035	-0.024	-0.020	-0.016	-0.014	-0.054	-0.039	-0.028	-0.024	-0.020	-0.018
OVER	3	-0.015	-0.015	-0.015	-0.011	-0.012	-0.014	-0.019	-0.019	-0.019	-0.015	-0.016	-0.018
TO	6	-0.063	-0.045	-0.033	-0.023	-0.020	-0.019	-0.067	-0.049	-0.037	-0.027	-0.024	-0.023
OVER	6	-0.019	-0.019	-0.019	-0.013	-0.016	-0.017	-0.023	-0.023	-0.023	-0.017	-0.020	-0.021
TO	10	-0.077	-0.055	-0.041	-0.028	-0.025	-0.023	-0.081	-0.059	-0.045	-0.032	-0.029	-0.027
OVER	10	-0.023	-0.023	-0.023	-0.016	-0.020	-0.020	-0.028	-0.028	-0.028	-0.021	-0.025	-0.025
TO	14	-0.093	-0.066	-0.050	-0.034	-0.031	-0.028	-0.098	-0.071	-0.055	-0.039	-0.036	-0.033
OVER	14	-0.023	-0.023	-0.023	-0.016	-0.020	-0.020	-0.028	-0.028	-0.028	-0.021	-0.025	-0.025
TO	18	-0.093	-0.066	-0.050	-0.034	-0.031	-0.028	-0.098	-0.071	-0.055	-0.039	-0.036	-0.033
OVER	18	-0.028	-0.028	-0.028	-0.020	-0.024	-0.025	-0.035	-0.035	-0.035	-0.027	-0.031	-0.032
TO	24	-0.112	-0.080	-0.061	-0.041	-0.037	-0.034	-0.119	-0.087	-0.068	-0.048	-0.044	-0.041
OVER	24	-0.028	-0.028	-0.028	-0.020	-0.024	-0.025	-0.035	-0.035	-0.035	-0.027	-0.031	-0.032
TO	30	-0.112	-0.080	-0.061	-0.041	-0.037	-0.034	-0.119	-0.087	-0.068	-0.048	-0.044	-0.041
OVER	30	-0.034	-0.034	-0.034	-0.025	-0.029	-0.030	-0.043	-0.043	-0.043	-0.034	-0.038	-0.039
TO	40	-0.134	-0.096	-0.073	-0.050	-0.045	-0.041	-0.143	-0.105	-0.082	-0.059	-0.054	-0.050
OVER	40	-0.034	-0.034	-0.034	-0.025	-0.029	-0.030	-0.043	-0.043	-0.043	-0.034	-0.038	-0.039
TO	50	-0.134	-0.096	-0.073	-0.050	-0.045	-0.041	-0.143	-0.105	-0.082	-0.059	-0.054	-0.050
OVER	50	-0.041	-0.041	-0.041	-0.030	-0.035	-0.036	-0.053	-0.053	-0.053	-0.042	-0.047	-0.048
TO	65	-0.161	-0.115	-0.087	-0.060	-0.054	-0.049	-0.173	-0.127	-0.099	-0.072	-0.066	-0.061
OVER	65	-0.043	-0.043	-0.043	-0.032	-0.037	-0.038	-0.059	-0.059	-0.059	-0.048	-0.053	-0.054
TO	80	-0.163	-0.117	-0.089	-0.062	-0.056	-0.051	-0.179	-0.133	-0.105	-0.078	-0.072	-0.067
OVER	80	-0.051	-0.051	-0.051	-0.038	-0.044	-0.046	-0.071	-0.071	-0.071	-0.058	-0.064	-0.066
TO	100	-0.191	-0.138	-0.105	-0.073	-0.066	-0.061	-0.211	-0.158	-0.125	-0.093	-0.086	-0.081
OVER	100	-0.054	-0.054	-0.054	-0.041	-0.047	-0.049	-0.079	-0.079	-0.079	-0.066	-0.072	-0.074
TO	120	-0.194	-0.141	-0.108	-0.076	-0.069	-0.064	-0.219	-0.166	-0.133	-0.101	-0.094	-0.089
OVER	120	-0.063	-0.063	-0.063	-0.048	-0.056	-0.057	-0.092	-0.092	-0.092	-0.077	-0.085	-0.086
TO	140	-0.223	-0.163	-0.126	-0.088	-0.081	-0.075	-0.252	-0.192	-0.155	-0.117	-0.110	-0.104
OVER	140	-0.065	-0.065	-0.065	-0.050	-0.058	-0.059	-0.100	-0.100	-0.100	-0.085	-0.093	-0.094
TO	160	-0.225	-0.165	-0.128	-0.090	-0.083	-0.077	-0.260	-0.200	-0.163	-0.125	-0.118	-0.112
OVER	160	-0.068	-0.068	-0.068	-0.053	-0.061	-0.062	-0.108	-0.108	-0.108	-0.093	-0.101	-0.102
TO	180	-0.228	-0.168	-0.131	-0.093	-0.086	-0.080	-0.268	-0.208	-0.171	-0.133	-0.126	-0.120
OVER	180	-0.077	-0.077	-0.077	-0.060	-0.068	-0.071	-0.122	-0.122	-0.122	-0.105	-0.113	-0.116
TO	200	-0.262	-0.192	-0.149	-0.106	-0.097	-0.091	-0.307	-0.237	-0.194	-0.151	-0.142	-0.136
OVER	200	-0.080	-0.080	-0.080	-0.063	-0.071	-0.074	-0.130	-0.130	-0.130	-0.113	-0.121	-0.124
TO	225	-0.265	-0.195	-0.152	-0.109	-0.100	-0.094	-0.315	-0.245	-0.202	-0.159	-0.150	-0.144
OVER	225	-0.084	-0.084	-0.084	-0.067	-0.075	-0.078	-0.140	-0.140	-0.140	-0.123	-0.131	-0.134
TO	250	-0.269	-0.199	-0.156	-0.113	-0.104	-0.098	-0.325	-0.255	-0.212	-0.169	-0.160	-0.154
OVER	250	-0.094	-0.094	-0.094	-0.074	-0.085	-0.087	-0.158	-0.158	-0.158	-0.138	-0.149	-0.151
TO	280	-0.304	-0.224	-0.175	-0.126	-0.117	-0.110	-0.368	-0.288	-0.239	-0.190	-0.181	-0.174
OVER	280	-0.098	-0.098	-0.098	-0.078	-0.089	-0.091	-0.170	-0.170	-0.170	-0.150	-0.161	-0.163
TO	315	-0.308	-0.228	-0.179	-0.130	-0.121	-0.114	-0.380	-0.300	-0.251	-0.202	-0.193	-0.186
OVER	315	-0.108	-0.108	-0.108	-0.087	-0.097	-0.101	-0.190	-0.190	-0.190	-0.169	-0.179	-0.183
TO	355	-0.338	-0.248	-0.197	-0.144	-0.133	-0.126	-0.420	-0.330	-0.279	-0.226	-0.215	-0.208
OVER	355	-0.114	-0.114	-0.114	-0.093	-0.103	-0.107	-0.208	-0.208	-0.208	-0.187	-0.197	-0.201
TO	400	-0.344	-0.254	-0.203	-0.150	-0.139	-0.132	-0.438	-0.348	-0.297	-0.244	-0.233	-0.226
OVER	400	-0.126	-0.126	-0.126	-0.103	-0.113	-0.119	-0.232	-0.232	-0.232	-0.209	-0.219	-0.225
TO	450	-0.376	-0.281	-0.223	-0.166	-0.153	-0.146	-0.482	-0.387	-0.329	-0.272	-0.259	-0.252
OVER	450	-0.132	-0.132	-0.132	-0.109	-0.119	-0.125	-0.252	-0.252	-0.252	-0.229	-0.239	-0.245
TO	500	-0.382	-0.287	-0.229	-0.172	-0.159	-0.152	-0.502	-0.407	-0.349	-0.292	-0.279	-0.272

TABLE 6-15 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (T10 ... T5, U10... U5) (ANSI B4.2)

mm

SIZE		T10	T9	T8	T7	T6	T5	U10	U9	U8	U7	U6	U5
OVER	0							-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
TO	3							-0.058	-0.043	-0.032	-0.028	-0.024	-0.022
OVER	3							-0.023	-0.023	-0.023	-0.019	-0.020	-0.022
TO	6							-0.071	-0.053	-0.041	-0.031	-0.028	-0.027
OVER	6				NUMERICAL VALUES FOR			-0.028	-0.028	-0.028	-0.022	-0.025	-0.026
TO	10				TOLERANCE ZONES IN			-0.086	-0.064	-0.050	-0.037	-0.034	-0.032
OVER	10				THIS AREA NOT DEFINED			-0.033	-0.033	-0.033	-0.026	-0.030	-0.030
TO	14							-0.103	-0.076	-0.060	-0.044	-0.041	-0.038
OVER	14							-0.033	-0.033	-0.033	-0.026	-0.030	-0.030
TO	18							-0.103	-0.076	-0.060	-0.044	-0.041	-0.038
OVER	18							-0.041	-0.041	-0.041	-0.033	-0.037	-0.038
TO	24							-0.125	-0.093	-0.074	-0.054	0.050	-0.047
OVER	24	-0.041	-0.041	-0.041	-0.033	-0.037	-0.038	-0.048	-0.048	-0.048	-0.040	-0.044	-0.045
TO	30	-0.125	-0.093	-0.074	-0.054	-0.050	-0.047	-0.132	-0.100	-0.081	-0.061	-0.057	-0.054
OVER	30	-0.048	-0.048	-0.048	-0.039	-0.043	-0.044	-0.060	-0.060	-0.060	-0.051	-0.055	-0.056
TO	40	-0.148	-0.110	-0.087	-0.064	-0.059	-0.055	-0.160	-0.122	-0.099	-0.076	-0.071	-0.067
OVER	40	-0.054	-0.054	-0.054	-0.045	-0.049	-0.050	-0.070	-0.070	-0.070	-0.061	-0.065	-0.066
TO	50	-0.154	-0.116	-0.093	-0.070	-0.065	-0.061	-0.170	-0.132	-0.109	-0.086	-0.081	-0.077
OVER	50	-0.066	-0.066	-0.066	-0.055	-0.060	-0.061	-0.087	-0.087	-0.087	-0.076	-0.081	-0.082
TO	65	-0.186	-0.140	-0.112	-0.085	-0.079	-0.074	-0.207	-0.161	-0.133	-0.106	-0.100	-0.095
OVER	65	-0.075	-0.075	-0.075	-0.064	-0.069	-0.070	-0.102	-0.102	-0.102	-0.091	-0.096	-0.097
TO	80	-0.195	-0.149	-0.121	-0.094	-0.088	-0.088	-0.222	-0.176	-0.148	-0.121	-0.115	-0.110
OVER	80	-0.091	-0.091	-0.091	-0.078	-0.084	-0.086	-0.124	-0.124	-0.124	-0.111	-0.117	-0.119
TO	100	-0.231	-0.178	-0.145	-0.113	-0.106	-0.101	-0.264	-0.211	-0.178	-0.146	-0.139	-0.134
OVER	100	-0.104	-0.104	-0.104	-0.091	-0.097	-0.099	-0.144	-0.144	-0.144	-0.131	-0.137	-0.139
TO	120	-0.244	-0.191	-0.158	-0.126	-0.119	-0.114	-0.284	-0.231	-0.198	-0.166	-0.159	-0.154
OVER	120	-0.122	-0.122	-0.122	-0.107	-0.115	-0.116	-0.170	-0.170	-0.170	-0.155	-0.163	-0.164
TO	140	-0.282	-0.222	-0.185	-0.147	-0.140	-0.134	-0.330	-0.270	-0.233	-0.195	-0.188	-0.182
OVER	140	-0.134	-0.134	-0.134	-0.119	-0.127	-0.128	-0.190	-0.190	-0.190	-0.175	-0.183	-0.184
TO	160	-0.294	-0.234	-0.197	-0.159	-0.152	-0.146	-0.350	-0.290	-0.253	-0.215	-0.208	-0.202
OVER	160	-0.146	-0.146	-0.146	-0.131	-0.139	-0.140	-0.210	-0.210	-0.210	-0.195	-0.203	-0.204
TO	180	-0.306	-0.246	-0.209	-0.171	-0.164	-0.158	-0.370	-0.310	-0.273	-0.235	-0.228	-0.222
OVER	180	-0.166	-0.166	-0.166	-0.149	-0.157	-0.160	-0.236	-0.236	-0.236	-0.219	-0.227	-0.230
TO	200	-0.351	-0.281	-0.238	-0.195	-0.186	-0.180	-0.421	-0.351	-0.308	-0.265	-0.256	-0.250
OVER	200	-0.180	-0.180	-0.180	-0.163	-0.171	-0.174	-0.258	-0.258	-0.258	-0.241	-0.249	-0.252
TO	225	-0.365	-0.295	-0.252	-0.209	-0.200	-0.194	-0.443	-0.373	-0.330	-0.287	-0.278	-0.272
OVER	225	-0.196	-0.196	-0.196	-0.179	-0.187	-0.190	-0.284	-0.284	-0.284	-0.267	-0.275	-0.278
TO	250	-0.381	-0.311	-0.268	-0.225	-0.216	-0.210	-0.469	-0.399	-0.356	-0.313	-0.304	-0.298
OVER	250	-0.218	-0.218	-0.218	-0.198	-0.209	-0.211	-0.315	-0.315	-0.315	-0.295	-0.306	-0.308
TO	280	-0.428	-0.348	-0.299	-0.250	-0.241	-0.234	-0.525	-0.445	-0.396	-0.347	-0.338	-0.331
OVER	280	-0.240	-0.240	-0.240	-0.220	-0.231	-0.233	-0.350	-0.350	-0.350	-0.330	-0.341	-0.343
TO	315	-0.450	-0.370	-0.321	-0.272	-0.263	-0.256	-0.560	-0.480	-0.431	-0.382	-0.373	-0.366
OVER	315	-0.268	-0.268	-0.268	-0.247	-0.257	-0.261	-0.390	-0.390	-0.390	-0.369	-0.379	-0.383
TO	355	-0.498	-0.408	-0.357	-0.304	-0.293	-0.286	-0.620	-0.530	-0.479	-0.426	-0.415	-0.408
OVER	355	-0.294	-0.294	-0.294	-0.273	-0.283	-0.287	-0.435	-0.435	-0.435	-0.414	-0.424	-0.428
TO	400	-0.524	-0.434	-0.383	-0.330	-0.319	-0.312	-0.665	-0.575	-0.524	-0.471	-0.460	-0.453
OVER	400	-0.330	-0.330	-0.330	-0.307	-0.317	-0.323	-0.490	-0.490	-0.490	-0.467	-0.477	-0.483
TO	450	-0.580	-0.485	-0.427	-0.370	-0.357	-0.350	-0.740	-0.645	-0.587	-0.530	-0.517	-0.510
OVER	450	-0.360	-0.360	-0.360	-0.337	-0.347	-0.353	-0.540	-0.540	-0.540	-0.517	-0.527	-0.533
TO	500	-0.610	-0.515	-0.457	-0.400	-0.387	-0.380	-0.790	-0.695	-0.637	-0.580	-0.567	-0.560

TABLE 6-16 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (V10 ... V5, X10 ... X5) (ANSI B4.2)

mm

SIZE		V10	V9	V8	V7	V6	V5	X10	X9	X8	X7	X6	X5
OVER	0							-0.020	-0.020	-0.020	-0.020	-0.020	-0.020
TO	3							-0.060	-0.045	-0.034	-0.030	-0.026	-0.024
OVER	3							-0.028	-0.028	-0.028	-0.024	-0.025	-0.027
TO	6				NUMERICAL VALUES FOR			-0.076	-0.058	-0.046	-0.036	-0.033	-0.032
OVER	6				TOLERANCE ZONES IN			-0.034	-0.034	-0.034	-0.028	-0.031	-0.032
TO	10				THIS AREA NOT DEFINED.			-0.092	-0.070	-0.056	-0.043	-0.040	-0.038
OVER	10							-0.040	-0.040	-0.040	-0.033	-0.037	-0.037
TO	14							-0.110	-0.083	-0.067	-0.051	-0.048	-0.045
OVER	14	-0.039	-0.039	-0.039	-0.032	-0.036	-0.036	-0.045	-0.045	-0.045	-0.038	-0.042	-0.042
TO	18	-0.109	-0.082	-0.066	-0.050	-0.047	-0.044	-0.115	-0.088	-0.072	-0.056	-0.053	-0.050
OVER	18	-0.047	-0.047	-0.047	-0.039	-0.043	-0.044	-0.054	-0.054	-0.054	-0.046	-0.050	-0.051
TO	24	-0.131	-0.099	-0.080	-0.060	-0.056	-0.053	-0.138	-0.106	-0.087	-0.067	-0.063	-0.060
OVER	24	-0.055	-0.055	-0.055	-0.047	-0.051	-0.052	-0.064	-0.064	-0.064	-0.056	-0.060	-0.061
TO	30	-0.139	-0.107	-0.088	-0.068	-0.064	-0.061	-0.148	-0.116	-0.097	-0.077	-0.073	-0.070
OVER	30	-0.068	-0.068	-0.068	-0.059	-0.063	-0.064	-0.080	-0.080	-0.080	-0.071	-0.075	-0.076
TO	40	-0.168	-0.130	-0.107	-0.084	-0.079	-0.075	-0.180	-0.142	-0.119	-0.096	-0.091	-0.087
OVER	40	-0.081	-0.081	-0.081	-0.072	-0.076	-0.077	-0.097	-0.097	-0.097	-0.088	-0.092	-0.093
TO	50	-0.181	-0.143	-0.120	-0.097	-0.092	-0.088	-0.197	-0.159	-0.136	-0.113	-0.108	-0.104
OVER	50	-0.102	-0.102	-0.102	-0.091	-0.096	-0.097	-0.122	-0.122	-0.122	-0.111	-0.116	-0.117
TO	65	-0.222	-0.176	-0.148	-0.121	-0.115	-0.110	-0.242	-0.196	-0.168	-0.141	-0.135	-0.130
OVER	65	-0.120	-0.120	-0.120	-0.109	-0.114	-0.115	-0.146	-0.146	-0.146	-0.135	-0.140	-0.141
TO	80	-0.240	-0.194	-0.166	-0.139	-0.133	-0.128	-0.266	-0.220	-0.192	-0.165	-0.159	-0.154
OVER	80	-0.146	-0.146	-0.146	-0.133	-0.139	-0.141	-0.178	-0.178	-0.178	-0.165	-0.171	-0.173
TO	100	-0.286	-0.233	-0.200	-0.168	-0.161	-0.156	-0.318	-0.265	-0.232	-0.200	-0.193	-0.188
OVER	100	-0.172	-0.172	-0.172	-0.159	-0.165	-0.167	-0.210	-0.210	-0.210	-0.197	-0.203	-0.205
TO	120	-0.312	-0.259	-0.226	-0.194	-0.187	-0.182	-0.350	-0.297	-0.264	-0.232	-0.225	-0.220
OVER	120	-0.202	-0.202	-0.202	-0.187	-0.195	-0.196	-0.248	-0.248	-0.248	-0.233	-0.241	-0.242
TO	140	-0.362	-0.302	-0.265	-0.227	-0.220	-0.214	-0.408	-0.348	-0.311	-0.273	-0.266	-0.260
OVER	140	-0.228	-0.228	-0.228	-0.213	-0.221	-0.222	-0.280	-0.280	-0.280	-0.265	-0.273	-0.274
TO	160	-0.388	-0.328	-0.291	-0.253	-0.246	-0.240	-0.440	-0.380	-0.343	-0.305	-0.298	-0.292
OVER	160	-0.252	-0.252	-0.252	-0.237	-0.245	-0.246	-0.310	-0.310	-0.310	-0.295	-0.303	-0.304
TO	180	-0.412	-0.352	-0.315	-0.277	-0.270	-0.264	-0.470	-0.410	-0.373	-0.335	-0.328	-0.322
OVER	180	-0.284	-0.284	-0.284	-0.267	-0.275	-0.278	-0.350	-0.350	-0.350	-0.333	-0.341	-0.344
TO	200	-0.469	-0.399	-0.356	-0.313	-0.304	-0.298	-0.535	-0.465	-0.422	-0.379	-0.370	-0.364
OVER	200	-0.310	-0.310	-0.310	-0.293	-0.301	-0.304	-0.385	-0.385	-0.385	-0.368	-0.376	-0.379
TO	225	-0.495	-0.425	-0.382	-0.339	-0.330	-0.324	-0.570	-0.500	-0.457	-0.414	-0.405	-0.399
OVER	225	-0.340	-0.340	-0.340	-0.323	-0.331	-0.334	-0.425	-0.425	-0.425	-0.408	-0.416	-0.419
TO	250	-0.525	-0.455	-0.412	-0.369	-0.360	-0.354	-0.610	-0.540	-0.497	-0.454	-0.445	-0.439
OVER	250	-0.385	-0.385	-0.385	-0.365	-0.376	-0.378	-0.475	-0.475	-0.475	-0.455	-0.466	-0.468
TO	280	-0.595	-0.515	-0.466	-0.417	-0.408	-0.401	-0.685	-0.605	-0.556	-0.507	-0.498	-0.491
OVER	280	-0.425	-0.425	-0.425	-0.405	-0.416	-0.418	-0.525	-0.525	-0.525	-0.505	-0.516	-0.518
TO	315	-0.635	-0.555	-0.506	-0.457	-0.448	-0.441	-0.735	-0.655	-0.606	-0.557	-0.548	-0.541
OVER	315	-0.475	-0.475	-0.475	-0.454	-0.464	-0.468	-0.590	-0.590	-0.590	-0.569	-0.579	-0.583
TO	355	-0.705	-0.615	-0.564	-0.511	-0.500	-0.493	-0.820	-0.730	-0.679	-0.626	-0.615	-0.608
OVER	355	-0.530	-0.530	-0.530	-0.509	-0.519	-0.523	-0.660	-0.660	-0.660	-0.639	-0.649	-0.653
TO	400	-0.760	-0.670	-0.619	-0.566	-0.555	-0.548	-0.890	-0.800	-0.749	-0.696	-0.685	-0.678
OVER	400	-0.595	-0.595	-0.595	-0.572	-0.582	-0.588	-0.740	-0.740	-0.740	-0.717	-0.727	-0.733
TO	450	-0.845	-0.750	-0.692	-0.635	-0.622	-0.615	-0.990	-0.895	-0.837	-0.780	-0.767	-0.760
OVER	450	-0.660	-0.660	-0.660	-0.637	-0.647	-0.653	-0.820	-0.820	-0.820	-0.797	-0.807	-0.813
TO	500	-0.910	-0.815	-0.757	-0.700	-0.687	-0.680	-1.070	-0.975	-0.917	-0.860	-0.847	-0.840

TABLE 6-17 TOLERANCE ZONES - INTERNAL DIMENSIONS (HOLES) (Y10 ... Y5, Z10 ... Z5) (ANSI B4.2)

mm

SIZE		Y10	Y9	Y8	Y7	Y6	Y5	Z10	Z9	Z8	Z7	Z6	Z5
OVER	0							-0.026	-0.026	-0.026	-0.026	-0.026	-0.026
TO	3							-0.066	-0.051	-0.040	-0.036	-0.032	-0.030
OVER	3				NUMERICAL VALUES FOR			-0.035	-0.035	-0.035	-0.031	-0.032	-0.034
TO	6							-0.083	-0.065	-0.053	-0.043	-0.040	-0.039
OVER	6				TOLERANCE ZONES IN			-0.042	-0.042	-0.042	-0.036	-0.039	-0.040
TO	10							-0.100	-0.078	-0.064	-0.051	-0.048	-0.046
OVER	10				THIS AREA NOT DEFINED.			-0.050	-0.050	-0.050	-0.043	-0.047	-0.047
TO	14							-0.120	-0.093	-0.077	-0.061	-0.058	-0.055
OVER	14							-0.060	-0.060	-0.060	-0.053	-0.057	-0.057
TO	18							-0.130	-0.103	-0.087	-0.071	-0.068	-0.065
OVER	18	-0.063	-0.063	-0.063	-0.055	-0.059	-0.060	-0.073	-0.073	-0.073	-0.065	-0.069	-0.070
TO	24	-0.147	-0.115	-0.096	-0.076	-0.072	-0.069	-0.157	-0.125	-0.106	-0.086	-0.082	-0.079
OVER	24	-0.075	-0.075	-0.075	-0.067	-0.071	-0.072	-0.088	-0.088	-0.088	-0.080	-0.084	-0.085
TO	30	-0.159	-0.127	-0.108	-0.088	-0.084	-0.081	-0.172	-0.140	-0.121	-0.101	-0.097	-0.094
OVER	30	-0.094	-0.094	-0.094	-0.085	-0.089	-0.090	-0.112	-0.112	-0.112	-0.103	-0.107	-0.108
TO	40	-0.194	-0.156	-0.133	-0.110	-0.105	-0.101	-0.212	-0.174	-0.151	-0.128	-0.123	-0.119
OVER	40	-0.114	-0.114	-0.114	-0.105	-0.109	-0.110	-0.136	-0.136	-0.136	-0.127	-0.131	-0.132
TO	50	-0.214	-0.176	-0.153	-0.130	-0.125	-0.121	-0.236	-0.198	-0.175	-0.152	-0.147	-0.143
OVER	50	-0.144	-0.144	-0.144	-0.133	-0.138	-0.139	-0.172	-0.172	-0.172	-0.161	-0.166	-0.167
TO	65	-0.264	-0.218	-0.190	-0.163	-0.157	-0.152	-0.292	-0.246	-0.218	-0.191	-0.185	-0.180
OVER	65	-0.174	-0.174	-0.174	-0.163	-0.168	-0.169	-0.210	-0.210	-0.210	-0.199	-0.204	-0.205
TO	80	-0.294	-0.248	-0.220	-0.193	-0.187	-0.182	-0.330	-0.284	-0.256	-0.229	-0.223	-0.218
OVER	80	-0.214	-0.214	-0.214	-0.201	-0.207	-0.209	-0.258	-0.258	-0.258	-0.245	-0.251	-0.253
TO	100	-0.354	-0.301	-0.268	-0.236	-0.229	-0.224	-0.398	-0.345	-0.312	-0.280	-0.273	-0.268
OVER	100	-0.254	-0.254	-0.254	-0.241	-0.247	-0.249	-0.310	-0.310	-0.310	-0.297	-0.303	-0.305
TO	120	-0.394	-0.341	-0.308	-0.276	-0.269	-0.264	-0.450	-0.397	-0.364	-0.332	-0.325	-0.320
OVER	120	-0.300	-0.300	-0.300	-0.285	-0.293	-0.294	-0.365	-0.365	-0.365	-0.350	-0.358	-0.359
TO	140	-0.460	-0.400	-0.363	-0.325	-0.318	-0.312	-0.525	-0.465	-0.428	-0.390	-0.383	-0.377
OVER	140	-0.340	-0.340	-0.340	-0.325	-0.333	-0.334	-0.415	-0.415	-0.415	-0.400	-0.408	-0.409
TO	160	-0.500	-0.440	-0.403	-0.365	-0.358	-0.352	-0.575	-0.515	-0.478	-0.440	-0.433	-0.427
OVER	160	-0.380	-0.380	-0.380	-0.365	-0.373	-0.374	-0.465	-0.465	-0.465	-0.450	-0.458	-0.459
TO	180	-0.540	-0.480	-0.443	-0.405	-0.398	-0.392	-0.625	-0.565	-0.528	-0.490	-0.483	-0.477
OVER	180	-0.425	-0.425	-0.425	-0.408	-0.416	-0.419	-0.520	-0.520	-0.520	-0.503	-0.511	-0.514
TO	200	-0.610	-0.540	-0.497	-0.454	-0.445	-0.439	-0.705	-0.635	-0.592	-0.549	-0.540	-0.534
OVER	200	-0.470	-0.470	-0.470	-0.453	-0.461	-0.464	-0.575	-0.575	-0.575	-0.558	-0.566	-0.569
TO	225	-0.655	-0.585	-0.542	-0.499	-0.490	-0.484	-0.760	-0.690	-0.647	-0.604	-0.595	-0.589
OVER	225	-0.520	-0.520	-0.520	-0.503	-0.511	-0.514	-0.640	-0.640	-0.640	-0.623	-0.631	-0.634
TO	250	-0.705	-0.635	-0.592	-0.549	-0.540	-0.534	-0.825	-0.755	-0.712	-0.669	-0.660	-0.654
OVER	250	-0.580	-0.580	-0.580	-0.560	-0.571	-0.573	-0.710	-0.710	-0.710	-0.690	-0.701	-0.703
TO	280	-0.790	-0.710	-0.661	-0.612	-0.603	-0.596	-0.920	-0.840	-0.791	-0.742	-0.733	-0.726
OVER	280	-0.650	-0.650	-0.650	-0.630	-0.641	-0.643	-0.790	-0.790	-0.790	-0.770	-0.781	-0.783
TO	315	-0.860	-0.780	-0.731	-0.682	-0.673	-0.666	-1.000	-0.920	-0.871	-0.822	-0.813	-0.806
OVER	315	-0.730	-0.730	-0.730	-0.709	-0.719	-0.723	-0.900	-0.900	-0.900	-0.879	-0.889	-0.893
TO	355	-0.960	-0.870	-0.819	-0.766	-0.755	-0.748	-1.130	-1.040	-0.989	-0.936	-0.925	-0.918
OVER	355	-0.820	-0.820	-0.820	-0.799	-0.809	-0.813	-1.000	-1.000	-1.000	-0.979	-0.989	-0.993
TO	400	-1.050	-0.960	-0.909	-0.856	-0.845	-0.838	-1.230	-1.140	-1.089	-1.036	-1.025	-1.018
OVER	400	-0.920	-0.920	-0.920	-0.897	-0.907	-0.913	-1.100	-1.100	-1.100	-1.077	-1.087	-1.093
TO	450	-1.170	-1.075	-1.017	-0.960	-0.947	-0.940	-1.350	-1.255	-1.197	-1.140	-1.127	-1.120
OVER	450	-1.000	-1.000	-1.000	-0.977	-0.987	-0.993	-1.250	-1.250	-1.250	-1.227	-1.237	-1.243
TO	500	-1.250	-1.155	-1.097	-1.040	-1.027	-1.020	-1.500	-1.405	-1.347	-1.290	-1.277	-1.270

TABLE 6-18 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (a14 ... a9, b14 ... b9) (ANSI B4.2)

mm

SIZE		a14	a13	a12	a11	a10	a9	b14	b13	b12	b11	b10	b9
OVER	0	-0.270	-0.270	-0.270	-0.270	-0.270	-0.270	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140
TO	3	-0.520	-0.410	-0.370	-0.330	-0.310	-0.295	-0.390	-0.280	-0.240	-0.200	-0.180	-0.165
OVER	3	-0.270	-0.270	-0.270	-0.270	-0.270	-0.270	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140
TO	6	-0.570	-0.450	-0.390	-0.345	-0.318	-0.300	-0.440	-0.320	-0.260	-0.215	-0.188	-0.170
OVER	6	-0.280	-0.280	-0.280	-0.280	-0.280	-0.280	-0.150	-0.150	-0.150	-0.150	-0.150	-0.150
TO	10	-0.640	-0.500	-0.430	-0.370	-0.338	-0.316	-0.510	-0.370	-0.300	-0.240	-0.208	-0.186
OVER	10	-0.290	-0.290	-0.290	-0.290	-0.290	-0.290	-0.150	-0.150	-0.150	-0.150	-0.150	-0.150
TO	14	-0.720	-0.560	-0.470	-0.400	-0.360	-0.333	-0.580	-0.420	-0.330	-0.260	-0.220	-0.193
OVER	14	-0.290	-0.290	-0.290	-0.290	-0.290	-0.290	-0.150	-0.150	-0.150	-0.150	-0.150	-0.150
TO	18	-0.720	-0.560	-0.470	-0.400	-0.360	-0.333	-0.580	-0.420	-0.330	-0.260	-0.220	-0.193
OVER	18	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.160	-0.160	-0.160	-0.160	-0.160	-0.160
TO	24	-0.820	-0.630	-0.510	-0.430	-0.384	-0.352	-0.680	-0.490	-0.370	-0.290	-0.244	-0.212
OVER	24	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.160	-0.160	-0.160	-0.160	-0.160	-0.160
TO	30	-0.820	-0.630	-0.510	-0.430	-0.384	-0.352	-0.680	-0.490	-0.370	-0.290	-0.244	-0.212
OVER	30	-0.310	-0.310	-0.310	-0.310	-0.310	-0.310	-0.170	-0.170	-0.170	-0.170	-0.170	-0.170
TO	40	-0.930	-0.700	-0.560	-0.470	-0.410	-0.372	-0.790	-0.560	-0.420	-0.330	-0.270	-0.232
OVER	40	-0.320	-0.320	-0.320	-0.320	-0.320	-0.320	-0.180	-0.180	-0.180	-0.180	-0.180	-0.180
TO	50	-0.940	-0.710	-0.570	-0.480	-0.420	-0.382	-0.800	-0.570	-0.430	-0.340	-0.280	-0.242
OVER	50	-0.340	-0.340	-0.340	-0.340	-0.340	-0.340	-0.190	-0.190	-0.190	-0.190	-0.190	-0.190
TO	65	-1.080	-0.800	-0.640	-0.530	-0.460	-0.414	-0.930	-0.650	-0.490	-0.380	-0.310	-0.264
OVER	65	-0.360	-0.360	-0.360	-0.360	-0.360	-0.360	-0.200	-0.200	-0.200	-0.200	-0.200	-0.200
TO	80	-1.100	-0.820	-0.660	-0.550	-0.480	-0.434	-0.940	-0.660	-0.500	-0.390	-0.320	-0.274
OVER	80	-0.380	-0.380	-0.380	-0.380	-0.380	-0.380	-0.220	-0.220	-0.220	-0.220	-0.220	-0.220
TO	100	-1.250	-0.920	-0.730	-0.600	-0.520	-0.467	-1.090	-0.760	-0.570	-0.440	-0.360	-0.307
OVER	100	-0.410	-0.410	-0.410	-0.410	-0.410	-0.410	-0.240	-0.240	-0.240	-0.240	-0.240	-0.240
TO	120	-1.280	-0.950	-0.760	-0.630	-0.550	-0.497	-1.110	-0.780	-0.590	-0.460	-0.380	-0.327
OVER	120	-0.460	-0.460	-0.460	-0.460	-0.460	-0.460	-0.260	-0.260	-0.260	-0.260	-0.260	-0.260
TO	140	-1.460	-1.090	-0.860	-0.710	-0.620	-0.560	-1.260	-0.890	-0.660	-0.510	-0.420	-0.360
OVER	140	-0.520	-0.520	-0.520	-0.520	-0.520	-0.520	-0.280	-0.280	-0.280	-0.280	-0.280	-0.280
TO	160	-1.520	-1.150	-0.920	-0.770	-0.680	-0.620	-1.280	-0.910	-0.680	-0.530	-0.440	-0.380
OVER	160	-0.580	-0.580	-0.580	-0.580	-0.580	-0.580	-0.310	-0.310	-0.310	-0.310	-0.310	-0.310
TO	180	-1.580	-1.210	-0.980	-0.830	-0.740	-0.680	-1.310	-0.940	-0.710	-0.560	-0.470	-0.410
OVER	180	-0.660	-0.660	-0.660	-0.660	-0.660	-0.660	-0.340	-0.340	-0.340	-0.340	-0.340	-0.340
TO	200	-1.810	-1.380	-1.120	-0.950	-0.845	-0.775	-1.490	-1.060	-0.800	-0.630	-0.525	-0.455
OVER	200	-0.740	-0.740	-0.740	-0.740	-0.740	-0.740	-0.380	-0.380	-0.380	-0.380	-0.380	-0.380
TO	225	-1.890	-1.460	-1.200	-1.030	-0.925	-0.855	-1.530	-1.100	-0.840	-0.670	-0.565	-0.495
OVER	225	-0.820	-0.820	-0.820	-0.820	-0.820	-0.820	-0.420	-0.420	-0.420	-0.420	-0.420	-0.420
TO	250	-1.970	-1.540	-1.280	-1.110	-1.005	-0.935	-1.570	-1.140	-0.880	-0.710	-0.605	-0.535
OVER	250	-0.920	-0.920	-0.920	-0.920	-0.920	-0.920	-0.480	-0.480	-0.480	-0.480	-0.480	-0.480
TO	280	-2.220	-1.730	-1.440	-1.240	-1.130	-1.050	-1.780	-1.290	-1.000	-0.800	-0.690	-0.610
OVER	280	-1.050	-1.050	-1.050	-1.050	-1.050	-1.050	-0.540	-0.540	-0.540	-0.540	-0.540	-0.540
TO	315	-2.350	-1.860	-1.570	-1.370	-1.260	-1.180	-1.840	-1.350	-1.060	-0.860	-0.750	-0.670
OVER	315	-1.200	-1.200	-1.200	-1.200	-1.200	-1.200	-0.600	-0.600	-0.600	-0.600	-0.600	-0.600
TO	355	-2.600	-2.090	-1.770	-1.560	-1.430	-1.340	-2.000	-1.490	-1.170	-0.960	-0.830	-0.740
OVER	355	-1.350	-1.350	-1.350	-1.350	-1.350	-1.350	-0.680	-0.680	-0.680	-0.680	-0.680	-0.680
TO	400	-2.750	-2.240	-1.920	-1.710	-1.580	-1.490	-2.080	-1.570	-1.250	-1.040	-0.910	-0.820
OVER	400	-1.500	-1.500	-1.500	-1.500	-1.500	-1.500	-0.760	-0.760	-0.760	-0.760	-0.760	-0.760
TO	450	-3.050	-2.470	-2.130	-1.900	-1.750	-1.655	-2.310	-1.730	-1.390	-1.160	-1.010	-0.915
OVER	450	-1.650	-1.650	-1.650	-1.650	-1.650	-1.650	-0.840	-0.840	-0.840	-0.840	-0.840	-0.840
TO	500	-3.200	-2.620	-2.280	-2.050	-1.900	-1.805	-2.390	-1.810	-1.470	-1.240	-1.090	-0.995

TABLE 6-19 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (c13 ... c8, d12 ... d7) (ANSI B4.2)

mm

SIZE		c13	c12	c11	c10	c9	c8	d12	d11	d10	d9	d8	d7
OVER	0	-0.060	-0.060	-0.060	-0.060	-0.060	-0.060	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020
TO	3	-0.200	-0.160	-0.120	-0.100	-0.085	-0.074	-0.120	-0.080	-0.060	-0.045	-0.034	-0.030
OVER	3	-0.070	-0.070	-0.070	-0.070	-0.070	-0.070	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030
TO	6	-0.250	-0.190	-0.145	-0.118	-0.100	-0.088	-0.150	-0.105	-0.078	-0.060	-0.048	-0.042
OVER	6	-0.080	-0.080	-0.080	-0.080	-0.080	-0.080	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040
TO	10	-0.300	-0.230	-0.170	-0.138	-0.116	-0.102	-0.190	-0.130	-0.098	-0.076	-0.062	-0.055
OVER	10	-0.095	-0.095	-0.095	-0.095	-0.095	-0.095	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
TO	14	-0.365	-0.275	-0.205	-0.165	-0.138	-0.122	-0.230	-0.160	-0.120	-0.093	-0.077	-0.068
OVER	14	-0.095	-0.095	-0.095	-0.095	-0.095	-0.095	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
TO	18	-0.365	-0.275	-0.205	-0.165	-0.138	-0.122	-0.230	-0.160	-0.120	-0.093	-0.077	-0.068
OVER	18	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	-0.065	-0.065	-0.065	-0.065	-0.065	-0.065
TO	24	-0.440	-0.320	-0.240	-0.194	-0.162	-0.143	-0.275	-0.195	-0.149	-0.117	-0.098	-0.086
OVER	24	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	-0.065	-0.065	-0.065	-0.065	-0.065	-0.065
TO	30	-0.440	-0.320	-0.240	-0.194	-0.162	-0.143	-0.275	-0.195	-0.149	-0.117	-0.098	-0.086
OVER	30	-0.120	-0.120	-0.120	-0.120	-0.120	-0.120	-0.080	-0.080	-0.080	-0.080	-0.080	-0.080
TO	40	-0.510	-0.370	-0.280	-0.220	-0.182	-0.159	-0.330	-0.240	-0.180	-0.142	-0.119	-0.105
OVER	40	-0.130	-0.130	-0.130	-0.130	-0.130	-0.130	-0.080	-0.080	-0.080	-0.080	-0.080	-0.080
TO	50	-0.520	-0.380	-0.290	-0.230	-0.192	-0.169	-0.330	-0.240	-0.180	-0.142	-0.119	-0.105
OVER	50	-0.140	-0.140	-0.140	-0.140	-0.140	-0.140	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
TO	65	-0.600	-0.440	-0.330	-0.260	-0.214	-0.186	-0.400	-0.290	-0.220	-0.174	-0.146	-0.130
OVER	65	-0.150	-0.150	-0.150	-0.150	-0.150	-0.150	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100
TO	80	-0.610	-0.450	-0.340	-0.270	-0.224	-0.196	-0.400	-0.290	-0.220	-0.174	-0.146	-0.130
OVER	80	-0.170	-0.170	-0.170	-0.170	-0.170	-0.170	-0.120	-0.120	-0.120	-0.120	-0.120	-0.120
TO	100	-0.710	-0.520	-0.390	-0.310	-0.257	-0.224	-0.470	-0.340	-0.260	-0.207	-0.174	-0.155
OVER	100	-0.180	-0.180	-0.180	-0.180	-0.180	-0.180	-0.120	-0.120	-0.120	-0.120	-0.120	-0.120
TO	120	-0.720	-0.530	-0.400	-0.320	-0.267	-0.234	-0.470	-0.340	-0.260	-0.207	-0.174	-0.155
OVER	120	-0.200	-0.200	-0.200	-0.200	-0.200	-0.200	-0.145	-0.145	-0.145	-0.145	-0.145	-0.145
TO	140	-0.830	-0.600	-0.450	-0.360	-0.300	-0.263	-0.545	-0.395	-0.305	-0.245	-0.208	-0.185
OVER	140	-0.210	-0.210	-0.210	-0.210	-0.210	-0.210	-0.145	-0.145	-0.145	-0.145	-0.145	-0.145
TO	160	-0.840	-0.610	-0.460	-0.370	-0.310	-0.273	-0.545	-0.395	-0.305	-0.245	-0.208	-0.185
OVER	160	-0.230	-0.230	-0.230	-0.230	-0.230	-0.230	-0.145	-0.145	-0.145	-0.145	-0.145	-0.145
TO	180	-0.860	-0.630	-0.480	-0.390	-0.330	-0.293	-0.545	-0.395	-0.305	-0.245	-0.208	-0.185
OVER	180	-0.240	-0.240	-0.240	-0.240	-0.240	-0.240	-0.170	-0.170	-0.170	-0.170	-0.170	-0.170
TO	200	-0.960	-0.700	-0.530	-0.425	-0.355	-0.312	-0.630	-0.460	-0.355	-0.285	-0.242	-0.216
OVER	200	-0.260	-0.260	-0.260	-0.260	-0.260	-0.260	-0.170	-0.170	-0.170	-0.170	-0.170	-0.170
TO	225	-0.980	-0.720	-0.550	-0.445	-0.375	-0.332	-0.630	-0.460	-0.355	-0.285	-0.242	-0.216
OVER	225	-0.280	-0.280	-0.280	-0.280	-0.280	-0.280	-0.170	-0.170	-0.170	-0.170	-0.170	-0.170
TO	250	-1.000	-0.740	-0.570	-0.465	-0.395	-0.352	-0.630	-0.460	-0.355	-0.285	-0.242	-0.216
OVER	250	-0.300	-0.300	-0.300	-0.300	-0.300	-0.300	-0.190	-0.190	-0.190	-0.190	-0.190	-0.190
TO	280	-1.110	-0.820	-0.620	-0.510	-0.430	-0.381	-0.710	-0.510	-0.400	-0.320	-0.271	-0.242
OVER	280	-0.330	-0.330	-0.330	-0.330	-0.330	-0.330	-0.190	-0.190	-0.190	-0.190	-0.190	-0.190
TO	315	-1.140	-0.850	-0.650	-0.540	-0.460	-0.411	-0.710	-0.510	-0.400	-0.320	-0.271	-0.242
OVER	315	-0.360	-0.360	-0.360	-0.360	-0.360	-0.360	-0.210	-0.210	-0.210	-0.210	-0.210	-0.210
TO	355	-1.250	-0.930	-0.720	-0.590	-0.500	-0.449	-0.780	-0.570	-0.440	-0.350	-0.299	-0.267
OVER	355	-0.400	-0.400	-0.400	-0.400	-0.400	-0.400	-0.210	-0.210	-0.210	-0.210	-0.210	-0.210
TO	400	-1.290	-0.970	-0.760	-0.630	-0.540	-0.489	-0.780	-0.570	-0.440	-0.350	-0.299	-0.267
OVER	400	-0.440	-0.440	-0.440	-0.440	-0.440	-0.440	-0.230	-0.230	-0.230	-0.230	-0.230	-0.230
TO	450	-1.410	-1.070	-0.840	-0.690	-0.595	-0.537	-0.860	-0.630	-0.480	-0.385	-0.327	-0.293
OVER	450	-0.480	-0.480	-0.480	-0.480	-0.480	-0.480	-0.230	-0.230	-0.230	-0.230	-0.230	-0.230
TO	500	-1.450	-1.110	-0.880	-0.730	-0.635	-0.577	-0.860	-0.630	-0.480	-0.385	-0.327	-0.293

TABLE 6-20 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (e11 ... e6, f10 ... f5) (ANSI B4.2)

mm

SIZE		e11	e10	e9	e8	e7	e6	f10	f9	f8	f7	f6	f5
OVER	0	-0.014	-0.014	-0.014	-0.014	-0.014	-0.014	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
TO	3	-0.074	-0.054	-0.039	-0.028	-0.024	-0.020	-0.046	-0.031	-0.020	-0.016	-0.012	-0.010
OVER	3	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010
TO	6	-0.095	-0.068	-0.050	-0.038	-0.032	-0.028	-0.058	-0.040	-0.028	-0.022	-0.018	-0.015
OVER	6	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.013	-0.013	-0.013	-0.013	-0.013	-0.013
TO	10	-0.115	-0.083	-0.061	-0.047	-0.040	-0.034	-0.071	-0.049	-0.035	-0.028	-0.022	-0.019
OVER	10	-0.032	-0.032	-0.032	-0.032	-0.032	-0.032	-0.016	-0.016	-0.016	-0.016	-0.016	-0.016
TO	14	-0.142	-0.102	-0.075	-0.059	-0.050	-0.043	-0.086	-0.059	-0.043	-0.034	-0.027	-0.024
OVER	14	-0.032	-0.032	-0.032	-0.032	-0.032	-0.032	-0.016	-0.016	-0.016	-0.016	-0.016	-0.016
TO	18	-0.142	-0.102	-0.075	-0.059	-0.050	-0.043	-0.086	-0.059	-0.043	-0.034	-0.027	-0.024
OVER	18	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020
TO	24	-0.170	-0.124	-0.092	-0.073	-0.061	-0.053	-0.104	-0.072	-0.053	-0.041	-0.033	-0.029
OVER	24	-0.040	-0.040	-0.040	-0.040	-0.040	-0.040	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020
TO	30	-0.170	-0.124	-0.092	-0.073	-0.061	-0.053	-0.104	-0.072	-0.053	-0.041	-0.033	-0.029
OVER	30	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025
TO	40	-0.210	-0.150	-0.112	-0.089	-0.075	-0.066	-0.125	-0.087	-0.064	-0.050	-0.041	-0.036
OVER	40	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025
TO	50	-0.210	-0.150	-0.112	-0.089	-0.075	-0.066	-0.125	-0.087	-0.064	-0.050	-0.041	-0.036
OVER	50	-0.060	-0.060	-0.060	-0.060	-0.060	-0.060	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030
TO	65	-0.250	-0.180	-0.134	-0.106	-0.090	-0.079	-0.150	-0.104	-0.076	-0.060	-0.049	-0.043
OVER	65	-0.060	-0.060	-0.060	-0.060	-0.060	-0.060	-0.030	-0.030	-0.030	-0.030	-0.030	-0.030
TO	80	-0.250	-0.180	-0.134	-0.106	-0.090	-0.079	-0.150	-0.104	-0.076	-0.060	-0.049	-0.043
OVER	80	-0.072	-0.072	-0.072	-0.072	-0.072	-0.072	-0.036	-0.036	-0.036	-0.036	-0.036	-0.036
TO	100	-0.292	-0.212	-0.159	-0.126	-0.107	-0.094	-0.176	-0.123	-0.090	-0.071	-0.058	-0.051
OVER	100	-0.072	-0.072	-0.072	-0.072	-0.072	-0.072	-0.036	-0.036	-0.036	-0.036	-0.036	-0.036
TO	120	-0.292	-0.212	-0.159	-0.126	-0.107	-0.094	-0.176	-0.123	-0.090	-0.071	-0.058	-0.051
OVER	120	-0.085	-0.085	-0.085	-0.085	-0.085	-0.085	-0.043	-0.043	-0.043	-0.043	-0.043	-0.043
TO	140	-0.335	-0.245	-0.185	-0.148	-0.125	-0.110	-0.203	-0.143	-0.106	-0.083	-0.068	-0.061
OVER	140	-0.085	-0.085	-0.085	-0.085	-0.085	-0.085	-0.043	-0.043	-0.043	-0.043	-0.043	-0.043
TO	160	-0.335	-0.245	-0.185	-0.148	-0.125	-0.110	-0.203	-0.143	-0.106	-0.083	-0.068	-0.061
OVER	160	-0.085	-0.085	-0.085	-0.085	-0.085	-0.085	-0.043	-0.043	-0.043	-0.043	-0.043	-0.043
TO	180	-0.335	-0.245	-0.185	-0.148	-0.125	-0.110	-0.203	-0.143	-0.106	-0.083	-0.068	-0.061
OVER	180	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
TO	200	-0.390	-0.285	-0.215	-0.172	-0.146	-0.129	-0.235	-0.165	-0.122	-0.096	-0.079	-0.070
OVER	200	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
TO	225	-0.390	-0.285	-0.215	-0.172	-0.146	-0.129	-0.235	-0.165	-0.122	-0.096	-0.079	-0.070
OVER	225	-0.100	-0.100	-0.100	-0.100	-0.100	-0.100	-0.050	-0.050	-0.050	-0.050	-0.050	-0.050
TO	250	-0.390	-0.285	-0.215	-0.172	-0.146	-0.129	-0.235	-0.165	-0.122	-0.096	-0.079	-0.070
OVER	250	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056
TO	280	-0.430	-0.320	-0.240	-0.191	-0.162	-0.142	-0.266	-0.186	-0.137	-0.108	-0.088	-0.079
OVER	280	-0.110	-0.110	-0.110	-0.110	-0.110	-0.110	-0.056	-0.056	-0.056	-0.056	-0.056	-0.056
TO	315	-0.430	-0.320	-0.240	-0.191	-0.162	-0.142	-0.266	-0.186	-0.137	-0.108	-0.088	-0.079
OVER	315	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062
TO	355	-0.485	-0.355	-0.265	-0.214	-0.182	-0.161	-0.292	-0.202	-0.151	-0.119	-0.098	-0.087
OVER	355	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062
TO	400	-0.485	-0.355	-0.265	-0.214	-0.182	-0.161	-0.292	-0.202	-0.151	-0.119	-0.098	-0.087
OVER	400	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.068	-0.068	-0.068	-0.068	-0.068	-0.068
TO	450	-0.535	-0.385	-0.290	-0.232	-0.198	-0.175	-0.318	-0.223	-0.165	-0.131	-0.108	-0.095
OVER	450	-0.135	-0.135	-0.135	-0.135	-0.135	-0.135	-0.068	-0.068	-0.068	-0.068	-0.068	-0.068
TO	500	-0.535	-0.385	-0.290	-0.232	-0.198	-0.175	-0.318	-0.223	-0.165	-0.131	-0.108	-0.095

TABLE 6-21 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (g9 ... g4, j7 ... j5) (ANSI B4.2)

mm

SIZE		g9	g8	g7	g6	g5	g4	j7	j6	j5
OVER	0	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	0.006	0.004	0.002
TO	3	-0.027	-0.016	-0.012	-0.008	-0.006	-0.005	-0.004	-0.002	-0.002
OVER	3	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	0.008	0.006	0.003
TO	6	-0.034	-0.022	-0.016	-0.012	-0.009	-0.008	-0.004	-0.002	-0.002
OVER	6	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	0.010	0.007	0.004
TO	10	-0.041	-0.027	-0.020	-0.014	-0.011	-0.009	-0.005	-0.002	-0.002
OVER	10	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	0.012	0.008	0.005
TO	14	-0.049	-0.033	-0.024	-0.017	-0.014	-0.011	-0.006	-0.003	-0.003
OVER	14	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	0.012	0.008	0.005
TO	18	-0.049	-0.033	-0.024	-0.017	-0.014	-0.011	-0.006	-0.003	-0.003
OVER	18	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	0.013	0.009	0.005
TO	24	-0.059	-0.040	-0.028	-0.020	-0.016	-0.013	-0.008	-0.004	-0.004
OVER	24	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	0.013	0.009	0.005
TO	30	-0.059	-0.040	-0.028	-0.020	-0.016	-0.013	-0.008	-0.004	-0.004
OVER	30	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	0.015	0.011	0.006
TO	40	-0.071	-0.048	-0.034	-0.025	-0.020	-0.016	-0.010	-0.005	-0.005
OVER	40	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	0.015	0.011	0.006
TO	50	-0.071	-0.048	-0.034	-0.025	-0.020	-0.016	-0.010	-0.005	-0.005
OVER	50	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010	0.018	0.012	0.006
TO	65	-0.084	-0.056	-0.040	-0.029	-0.023	-0.018	-0.012	-0.007	-0.007
OVER	65	-0.010	-0.010	-0.010	-0.010	-0.010	-0.010	0.018	0.012	0.006
TO	80	-0.084	-0.056	-0.040	-0.029	-0.023	-0.018	-0.012	-0.007	-0.007
OVER	80	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	0.020	0.013	0.006
TO	100	-0.099	-0.066	-0.047	-0.034	-0.027	-0.022	-0.015	-0.009	-0.009
OVER	100	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	0.020	0.013	0.006
TO	120	-0.099	-0.066	-0.047	-0.034	-0.027	-0.022	-0.015	-0.009	-0.009
OVER	120	-0.014	-0.014	-0.014	-0.014	-0.014	-0.014	0.022	0.014	0.007
TO	140	-0.114	-0.077	-0.054	-0.039	-0.032	-0.026	-0.018	-0.011	-0.011
OVER	140	-0.014	-0.014	-0.014	-0.014	-0.014	-0.014	0.022	0.014	0.007
TO	160	-0.114	-0.077	-0.054	-0.039	-0.032	-0.026	-0.018	-0.011	-0.011
OVER	160	-0.014	-0.014	-0.014	-0.014	-0.014	-0.014	0.022	0.014	0.007
TO	180	-0.114	-0.077	-0.054	-0.039	-0.032	-0.026	-0.018	-0.011	-0.011
OVER	180	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	0.025	0.016	0.007
TO	200	-0.130	-0.087	-0.061	-0.044	-0.035	-0.029	-0.021	-0.013	-0.013
OVER	200	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	0.025	0.016	0.007
TO	225	-0.130	-0.087	-0.061	-0.044	-0.035	-0.029	-0.021	-0.013	-0.013
OVER	225	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	0.025	0.016	0.007
TO	250	-0.130	-0.087	-0.061	-0.044	-0.035	-0.029	-0.021	-0.013	-0.013
OVER	250	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017	0.026	0.016	0.007
TO	280	-0.147	-0.098	-0.069	-0.049	-0.040	-0.033	-0.026	-0.016	-0.016
OVER	280	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017	0.026	0.016	0.007
TO	315	-0.147	-0.098	-0.069	-0.049	-0.040	-0.033	-0.026	-0.016	-0.016
OVER	315	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	0.029	0.018	0.007
TO	355	-0.158	-0.107	-0.075	-0.054	-0.043	-0.036	-0.028	-0.018	-0.018
OVER	355	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	0.029	0.018	0.007
TO	400	-0.158	-0.107	-0.075	-0.054	-0.043	-0.036	-0.028	-0.018	-0.018
OVER	400	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	0.031	0.020	0.007
TO	450	-0.175	-0.117	-0.083	-0.060	-0.047	-0.040	-0.032	-0.020	-0.020
OVER	450	-0.020	-0.020	-0.020	-0.020	-0.020	-0.020	0.031	0.020	0.007
TO	500	-0.175	-0.117	-0.083	-0.060	-0.047	-0.040	-0.032	-0.020	-0.020

TABLE 6-22 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (h16 ... h1) (ANSI B4.2)

mm

SIZE		h16	h15	h14	h13	h12	h11	h10	h9	h8	h7	h6	h5	h4	h3	h2	h1
OVER	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	3	-0.600	-0.400	-0.250	-0.140	-0.100	-0.060	-0.040	-0.025	-0.014	-0.010	-0.006	-0.004	-0.003	-0.002	-0.0012	-0.0008
OVER	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	6	-0.750	-0.480	-0.300	-0.180	-0.120	-0.075	-0.048	-0.030	-0.018	-0.012	-0.008	-0.005	-0.004	-0.003	-0.0015	-0.0010
OVER	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	10	-0.900	-0.580	-0.360	-0.220	-0.150	-0.090	-0.058	-0.036	-0.022	-0.015	-0.009	-0.006	-0.004	-0.003	-0.0015	-0.0010
OVER	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	14	-1.100	-0.700	-0.430	-0.270	-0.180	-0.110	-0.070	-0.043	-0.027	-0.018	-0.011	-0.008	-0.005	-0.003	-0.0020	-0.0012
OVER	14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	18	-1.100	-0.700	-0.430	-0.270	-0.180	-0.110	-0.070	-0.043	-0.027	-0.018	-0.011	-0.008	-0.005	-0.003	-0.0020	-0.0012
OVER	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	24	-1.300	-0.840	-0.520	-0.330	-0.210	-0.130	-0.084	-0.052	-0.033	-0.021	-0.013	-0.009	-0.006	-0.004	-0.0025	-0.0015
OVER	24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	30	-1.300	-0.840	-0.520	-0.330	-0.210	-0.130	-0.084	-0.052	-0.033	-0.021	-0.013	-0.009	-0.006	-0.004	-0.0025	-0.0015
OVER	30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	40	-1.600	-1.000	-0.620	-0.390	-0.250	-0.160	-0.100	-0.062	-0.039	-0.025	-0.016	-0.011	-0.007	-0.004	-0.0025	-0.0015
OVER	40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	50	-1.600	-1.000	-0.620	-0.390	-0.250	-0.160	-0.100	-0.062	-0.039	-0.025	-0.016	-0.011	-0.007	-0.004	-0.0025	-0.0015
OVER	50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	65	-1.900	-1.200	-0.740	-0.460	-0.300	-0.190	-0.120	-0.074	-0.046	-0.030	-0.019	-0.013	-0.008	-0.005	-0.0030	-0.0020
OVER	65	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	80	-1.900	-1.200	-0.740	-0.460	-0.300	-0.190	-0.120	-0.074	-0.046	-0.030	-0.019	-0.013	-0.008	-0.005	-0.0030	-0.0020
OVER	80	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	100	-2.200	-1.400	-0.870	-0.540	-0.350	-0.220	-0.140	-0.087	-0.054	-0.035	-0.022	-0.015	-0.010	-0.006	-0.0040	-0.0025
OVER	100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	120	-2.200	-1.400	-0.870	-0.540	-0.350	-0.220	-0.140	-0.087	-0.054	-0.035	-0.022	-0.015	-0.010	-0.006	-0.0040	-0.0025
OVER	120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	140	-2.500	-1.600	-1.000	-0.630	-0.400	-0.250	-0.160	-0.100	-0.063	-0.040	-0.025	-0.018	-0.012	-0.008	-0.0050	-0.0035
OVER	140	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	160	-2.500	-1.600	-1.000	-0.630	-0.400	-0.250	-0.160	-0.100	-0.063	-0.040	-0.025	-0.018	-0.012	-0.008	-0.0050	-0.0035
OVER	160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	180	-2.500	-1.600	-1.000	-0.630	-0.400	-0.250	-0.160	-0.100	-0.063	-0.040	-0.025	-0.018	-0.012	-0.008	-0.0050	-0.0035
OVER	180	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	200	-2.900	-1.850	-1.150	-0.720	-0.460	-0.290	-0.185	-0.115	-0.072	-0.046	-0.029	-0.020	-0.014	-0.010	-0.0070	-0.0045
OVER	200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	225	-2.900	-1.850	-1.150	-0.720	-0.460	-0.290	-0.185	-0.115	-0.072	-0.046	-0.029	-0.020	-0.014	-0.010	-0.0070	-0.0045
OVER	225	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	250	-2.900	-1.850	-1.150	-0.720	-0.460	-0.290	-0.185	-0.115	-0.072	-0.046	-0.029	-0.020	-0.014	-0.010	-0.0070	-0.0045
OVER	250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	280	-3.200	-2.100	-1.300	-0.810	-0.520	-0.320	-0.210	-0.130	-0.081	-0.052	-0.032	-0.023	-0.016	-0.012	-0.0080	-0.0060
OVER	280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	315	-3.200	-2.100	-1.300	-0.810	-0.520	-0.320	-0.210	-0.130	-0.081	-0.052	-0.032	-0.023	-0.016	-0.012	-0.0080	-0.0060
OVER	315	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	355	-3.600	-2.300	-1.400	-0.890	-0.570	-0.360	-0.230	-0.140	-0.089	-0.057	-0.036	-0.025	-0.018	-0.013	-0.0090	-0.0070
OVER	355	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	400	-3.600	-2.300	-1.400	-0.890	-0.570	-0.360	-0.230	-0.140	-0.089	-0.057	-0.036	-0.025	-0.018	-0.013	-0.0090	-0.0070
OVER	400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	450	-4.000	-2.500	-1.550	-0.970	-0.630	-0.400	-0.250	-0.155	-0.097	-0.063	-0.040	-0.027	-0.020	-0.015	-0.0100	-0.0080
OVER	450	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000
TO	500	-4.000	-2.500	-1.550	-0.970	-0.630	-0.400	-0.250	-0.155	-0.097	-0.063	-0.040	-0.027	-0.020	-0.015	-0.0100	-0.0080

TABLE 6-23 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (js16 ... js1) (ANSI B4.2)

mm

SIZE		js16	js15	js14	js13	js12	js11	js10	js9	js8	js7	js6	js5	js4	js3	js2	js1
OVER	0	0.300	0.200	0.125	0.070	0.050	0.030	0.0200	0.0125	0.0070	0.0050	0.0030	0.0020	0.0015	0.00100	0.00060	0.00040
TO	3	-0.300	-0.200	-0.125	-0.070	-0.050	-0.030	-0.0200	-0.0125	-0.0070	-0.0050	-0.0030	-0.0020	-0.0015	-0.00100	-0.00060	-0.00040
OVER	3	0.375	0.240	0.150	0.090	0.060	0.0375	0.0240	0.0150	0.0090	0.0060	0.0040	0.0025	0.0020	0.00125	0.00075	0.00050
TO	6	-0.375	-0.240	-0.150	-0.090	-0.060	-0.0375	-0.0240	-0.0150	-0.0090	-0.0060	-0.0040	-0.0025	-0.0020	-0.00125	-0.00075	-0.00050
OVER	6	0.450	0.290	0.180	0.110	0.075	0.045	0.0290	0.0180	0.0110	0.0075	0.0045	0.0030	0.0020	0.00125	0.00075	0.00050
TO	10	-0.450	-0.290	-0.180	-0.110	-0.075	-0.045	-0.0290	-0.0180	-0.0110	-0.0075	-0.0045	-0.0030	-0.0020	-0.00125	-0.00075	-0.00050
OVER	10	0.550	0.350	0.215	0.135	0.090	0.055	0.0350	0.0215	0.0135	0.0090	0.0055	0.0040	0.0025	0.00150	0.00100	0.00060
TO	14	-0.550	-0.350	-0.215	-0.135	-0.090	-0.055	-0.0350	-0.0215	-0.0135	-0.0090	-0.0055	-0.0040	-0.0025	-0.00150	-0.00100	-0.00060
OVER	14	0.550	0.350	0.215	0.135	0.090	0.055	0.0350	0.0215	0.0135	0.0090	0.0055	0.0040	0.0025	0.00150	0.00100	0.00060
TO	18	-0.550	-0.350	-0.215	-0.135	-0.090	-0.055	-0.0350	-0.0215	-0.0135	-0.0090	-0.0055	-0.0040	-0.0025	-0.00150	-0.00100	-0.00060
OVER	18	0.650	0.420	0.260	0.165	0.105	0.065	0.0420	0.0260	0.0165	0.0105	0.0065	0.0045	0.0030	0.00200	0.00125	0.00075
TO	24	-0.650	-0.420	-0.260	-0.165	-0.105	-0.065	-0.0420	-0.0260	-0.0165	-0.0105	-0.0065	-0.0045	-0.0030	-0.00200	-0.00125	-0.00075
OVER	24	0.650	0.420	0.260	0.165	0.105	0.065	0.0420	0.0260	0.0165	0.0105	0.0065	0.0045	0.0030	0.00200	0.00125	0.00075
TO	30	-0.650	-0.420	-0.260	-0.165	-0.105	-0.065	-0.0420	-0.0260	-0.0165	-0.0105	-0.0065	-0.0045	-0.0030	-0.00200	-0.00125	-0.00075
OVER	30	0.800	0.500	0.310	0.195	0.125	0.080	0.0500	0.0310	0.0195	0.0125	0.0080	0.0055	0.0035	0.00200	0.00125	0.00075
TO	40	-0.800	-0.500	-0.310	-0.195	-0.125	-0.080	-0.0500	-0.0310	-0.0195	-0.0125	-0.0080	-0.0055	-0.0035	-0.00200	-0.00125	-0.00075
OVER	40	0.800	0.500	0.310	0.195	0.125	0.080	0.0500	0.0310	0.0195	0.0125	0.0080	0.0055	0.0035	0.00200	0.00125	0.00075
TO	50	-0.800	-0.500	-0.310	-0.195	-0.125	-0.080	-0.0500	-0.0310	-0.0195	-0.0125	-0.0080	-0.0055	-0.0035	-0.00200	-0.00125	-0.00075
OVER	50	0.950	0.600	0.370	0.230	0.150	0.095	0.0600	0.0370	0.0230	0.0150	0.0095	0.0065	0.0040	0.00250	0.00150	0.00100
TO	65	-0.950	-0.600	-0.370	-0.230	-0.150	-0.095	-0.0600	-0.0370	-0.0230	-0.0150	-0.0095	-0.0065	-0.0040	-0.00250	-0.00150	-0.00100
OVER	65	0.950	0.600	0.370	0.230	0.150	0.095	0.0600	0.0370	0.0230	0.0150	0.0095	0.0065	0.0040	0.00250	0.00150	0.00100
TO	80	-0.950	-0.600	-0.370	-0.230	-0.150	-0.095	-0.0600	-0.0370	-0.0230	-0.0150	-0.0095	-0.0065	-0.0040	-0.00250	-0.00150	-0.00100
OVER	80	1.100	0.700	0.435	0.270	0.175	0.110	0.0700	0.0435	0.0270	0.0175	0.0110	0.0075	0.0050	0.00300	0.00200	0.00125
TO	100	-1.100	-0.700	-0.435	-0.270	-0.175	-0.110	-0.0700	-0.0435	-0.0270	-0.0175	-0.0110	-0.0075	-0.0050	-0.00300	-0.00200	-0.00125
OVER	100	1.100	0.700	0.435	0.270	0.175	0.110	0.0700	0.0435	0.0270	0.0175	0.0110	0.0075	0.0050	0.00300	0.00200	0.00125
TO	120	-1.100	-0.700	-0.435	-0.270	-0.175	-0.110	-0.0700	-0.0435	-0.0270	-0.0175	-0.0110	-0.0075	-0.0050	-0.00300	-0.00200	-0.00125
OVER	120	1.250	0.800	0.500	0.315	0.200	0.125	0.0800	0.0500	0.0315	0.0200	0.0125	0.0090	0.0060	0.00400	0.00250	0.00175
TO	140	-1.250	-0.800	-0.500	-0.315	-0.200	-0.125	-0.0800	-0.0500	-0.0315	-0.0200	-0.0125	-0.0090	-0.0060	-0.00400	-0.00250	-0.00175
OVER	140	1.250	0.800	0.500	0.315	0.200	0.125	0.0800	0.0500	0.0315	0.0200	0.0125	0.0090	0.0060	0.00400	0.00250	0.00175
TO	160	-1.250	-0.800	-0.500	-0.315	-0.200	-0.125	-0.0800	-0.0500	-0.0315	-0.0200	-0.0125	-0.0090	-0.0060	-0.00400	-0.00250	-0.00175
OVER	160	1.250	0.800	0.500	0.315	0.200	0.125	0.0800	0.0500	0.0315	0.0200	0.0125	0.0090	0.0060	0.00400	0.00250	0.00175
TO	180	-1.250	-0.800	-0.500	-0.315	-0.200	-0.125	-0.0800	-0.0500	-0.0315	-0.0200	-0.0125	-0.0090	-0.0060	-0.00400	-0.00250	-0.00175
OVER	180	1.450	0.925	0.575	0.360	0.230	0.145	0.0925	0.0575	0.0360	0.0230	0.0145	0.0100	0.0070	0.00500	0.00350	0.00225
TO	200	-1.450	-0.925	-0.575	-0.360	-0.230	-0.145	-0.0925	-0.0575	-0.0360	-0.0230	-0.0145	-0.0100	-0.0070	-0.00500	-0.00350	-0.00225
OVER	200	1.450	0.925	0.575	0.360	0.230	0.145	0.0925	0.0575	0.0360	0.0230	0.0145	0.0100	0.0070	0.00500	0.00350	0.00225
TO	225	-1.450	-0.925	-0.575	-0.360	-0.230	-0.145	-0.0925	-0.0575	-0.0360	-0.0230	-0.0145	-0.0100	-0.0070	-0.00500	-0.00350	-0.00225
OVER	225	1.450	0.925	0.575	0.360	0.230	0.145	0.0925	0.0575	0.0360	0.0230	0.0145	0.0100	0.0070	0.00500	0.00350	0.00225
TO	250	-1.450	-0.925	-0.575	-0.360	-0.230	-0.145	-0.0925	-0.0575	-0.0360	-0.0230	-0.0145	-0.0100	-0.0070	-0.00500	-0.00350	-0.00225
OVER	250	1.600	1.050	0.650	0.405	0.260	0.160	0.1050	0.0650	0.0405	0.0260	0.0160	0.0115	0.0080	0.00600	0.00400	0.00300
TO	280	-1.600	-1.050	-0.650	-0.405	-0.260	-0.160	-0.1050	-0.0650	-0.0405	-0.0260	-0.0160	-0.0115	-0.0080	-0.00600	-0.00400	-0.00300
OVER	280	1.600	1.050	0.650	0.405	0.260	0.160	0.1050	0.0650	0.0405	0.0260	0.0160	0.0115	0.0080	0.00600	0.00400	0.00300
TO	315	-1.600	-1.050	-0.650	-0.405	-0.260	-0.160	-0.1050	-0.0650	-0.0405	-0.0260	-0.0160	-0.0115	-0.0080	-0.00600	-0.00400	-0.00300
OVER	315	1.800	1.150	0.700	0.445	0.285	0.180	0.1150	0.0700	0.0445	0.0285	0.0180	0.0125	0.0090	0.00650	0.00450	0.00350
TO	355	-1.800	-1.150	-0.700	-0.445	-0.285	-0.180	-0.1150	-0.0700	-0.0445	-0.0285	-0.0180	-0.0125	-0.0090	-0.00650	-0.00450	-0.00350
OVER	355	1.800	1.150	0.700	0.445	0.285	0.180	0.1150	0.0700	0.0445	0.0285	0.0180	0.0125	0.0090	0.00650	0.00450	0.00350
TO	400	-1.800	-1.150	-0.700	-0.445	-0.285	-0.180	-0.1150	-0.0700	-0.0445	-0.0285	-0.0180	-0.0125	-0.0090	-0.00650	-0.00450	-0.00350
OVER	400	2.000	1.250	0.775	0.485	0.315	0.200	0.1250	0.0775	0.0485	0.0315	0.0200	0.0135	0.0100	0.00750	0.00500	0.00400
TO	450	-2.000	-1.250	-0.775	-0.485	-0.315	-0.200	-0.1250	-0.0775	-0.0485	-0.0315	-0.0200	-0.0135	-0.0100	-0.00750	-0.00500	-0.00400
OVER	450	2.000	1.250	0.775	0.485	0.315	0.200	0.1250	0.0775	0.0485	0.0315	0.0200	0.0135	0.0100	0.00750	0.00500	0.00400
TO	500	-2.000	-1.250	-0.775	-0.485	-0.315	-0.200	-0.1250	-0.0775	-0.0485	-0.0315	-0.0200	-0.0135	-0.0100	-0.00750	-0.00500	-0.00400

NOTE: Some js deviations in the grades 7 to 11 have been rounded off to 1/2(IT - 0.001) when IT values is odd.

TABLE 6-24 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (k9 ... k4, m9 ... m4) (ANSI B4.2)

mm

SIZE		k9	k8	k7	k6	k5	k4	m9	m8	m7	m6	m5	m4
OVER	0	0.025	0.014	0.010	0.006	0.004	0.003	0.027	0.016	0.012	0.008	0.006	0.005
TO	3	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.002	0.002	0.002
OVER	3	0.030	0.018	0.013	0.009	0.006	0.005	0.034	0.022	0.016	0.012	0.009	0.008
TO	6	0.000	0.000	0.001	0.001	0.001	0.001	0.004	0.004	0.004	0.004	0.004	0.004
OVER	6	0.036	0.022	0.016	0.010	0.007	0.005	0.042	0.028	0.021	0.015	0.012	0.010
TO	10	0.000	0.000	0.001	0.001	0.001	0.001	0.006	0.006	0.006	0.006	0.006	0.006
OVER	10	0.043	0.027	0.019	0.012	0.009	0.006	0.050	0.034	0.025	0.018	0.015	0.012
TO	14	0.000	0.000	0.001	0.001	0.001	0.001	0.007	0.007	0.007	0.007	0.007	0.007
OVER	14	0.043	0.027	0.019	0.012	0.009	0.006	0.050	0.034	0.025	0.018	0.015	0.012
TO	18	0.000	0.000	0.001	0.001	0.001	0.001	0.007	0.007	0.007	0.007	0.007	0.007
OVER	18	0.052	0.033	0.023	0.015	0.011	0.008	0.060	0.041	0.029	0.021	0.017	0.014
TO	24	0.000	0.000	0.002	0.002	0.002	0.002	0.008	0.008	0.008	0.008	0.008	0.008
OVER	24	0.052	0.033	0.023	0.015	0.011	0.008	0.060	0.041	0.029	0.021	0.017	0.014
TO	30	0.000	0.000	0.002	0.002	0.002	0.002	0.008	0.008	0.008	0.008	0.008	0.008
OVER	30	0.062	0.039	0.027	0.018	0.013	0.009	0.071	0.048	0.034	0.025	0.020	0.016
TO	40	0.000	0.000	0.002	0.002	0.002	0.002	0.009	0.009	0.009	0.009	0.009	0.009
OVER	40	0.062	0.039	0.027	0.018	0.013	0.009	0.071	0.048	0.034	0.025	0.020	0.016
TO	50	0.000	0.000	0.002	0.002	0.002	0.002	0.009	0.009	0.009	0.009	0.009	0.009
OVER	50	0.074	0.046	0.032	0.021	0.015	0.010	0.085	0.057	0.041	0.030	0.024	0.019
TO	65	0.000	0.000	0.002	0.002	0.002	0.002	0.011	0.011	0.011	0.011	0.011	0.011
OVER	65	0.074	0.046	0.032	0.021	0.015	0.010	0.085	0.057	0.041	0.030	0.024	0.019
TO	80	0.000	0.000	0.002	0.002	0.002	0.002	0.011	0.011	0.011	0.011	0.011	0.011
OVER	80	0.087	0.054	0.038	0.025	0.018	0.013	0.100	0.067	0.048	0.035	0.028	0.023
TO	100	0.000	0.000	0.003	0.003	0.003	0.003	0.013	0.013	0.013	0.013	0.013	0.013
OVER	100	0.087	0.054	0.038	0.025	0.018	0.013	0.100	0.067	0.048	0.035	0.028	0.023
TO	120	0.000	0.000	0.003	0.003	0.003	0.003	0.013	0.013	0.013	0.013	0.013	0.013
OVER	120	0.100	0.063	0.043	0.028	0.021	0.015	0.115	0.078	0.055	0.040	0.033	0.027
TO	140	0.000	0.000	0.003	0.003	0.003	0.003	0.015	0.015	0.015	0.015	0.015	0.015
OVER	140	0.100	0.063	0.043	0.028	0.021	0.015	0.115	0.078	0.055	0.040	0.033	0.027
TO	160	0.000	0.000	0.003	0.003	0.003	0.003	0.015	0.015	0.015	0.015	0.015	0.015
OVER	160	0.100	0.063	0.043	0.028	0.021	0.015	0.115	0.078	0.055	0.040	0.033	0.027
TO	180	0.000	0.000	0.003	0.003	0.003	0.003	0.015	0.015	0.015	0.015	0.015	0.015
OVER	180	0.115	0.072	0.050	0.033	0.024	0.018	0.132	0.089	0.063	0.046	0.037	0.031
TO	200	0.000	0.000	0.004	0.004	0.004	0.004	0.017	0.017	0.017	0.017	0.017	0.017
OVER	200	0.115	0.072	0.050	0.033	0.024	0.018	0.132	0.089	0.063	0.046	0.037	0.031
TO	225	0.000	0.000	0.004	0.004	0.004	0.004	0.017	0.017	0.017	0.017	0.017	0.017
OVER	225	0.115	0.072	0.050	0.033	0.024	0.018	0.132	0.089	0.063	0.046	0.037	0.031
TO	250	0.000	0.000	0.004	0.004	0.004	0.004	0.017	0.017	0.017	0.017	0.017	0.017
OVER	250	0.130	0.081	0.056	0.036	0.027	0.020	0.150	0.101	0.072	0.052	0.043	0.036
TO	280	0.000	0.000	0.004	0.004	0.004	0.004	0.020	0.020	0.020	0.020	0.020	0.020
OVER	280	0.130	0.081	0.056	0.036	0.027	0.020	0.150	0.101	0.072	0.052	0.043	0.036
TO	315	0.000	0.000	0.004	0.004	0.004	0.004	0.020	0.020	0.020	0.020	0.020	0.020
OVER	315	0.140	0.089	0.061	0.040	0.029	0.022	0.161	0.110	0.078	0.057	0.046	0.039
TO	355	0.000	0.000	0.004	0.004	0.004	0.004	0.021	0.021	0.021	0.021	0.021	0.021
OVER	355	0.140	0.089	0.061	0.040	0.029	0.022	0.161	0.110	0.078	0.057	0.046	0.039
TO	400	0.000	0.000	0.004	0.004	0.004	0.004	0.021	0.021	0.021	0.021	0.021	0.021
OVER	400	0.155	0.097	0.068	0.045	0.032	0.025	0.178	0.120	0.086	0.063	0.050	0.043
TO	450	0.000	0.000	0.005	0.005	0.005	0.005	0.023	0.023	0.023	0.023	0.023	0.023
OVER	450	0.155	0.097	0.068	0.045	0.032	0.025	0.178	0.120	0.086	0.063	0.050	0.043
TO	500	0.000	0.000	0.005	0.005	0.005	0.005	0.023	0.023	0.023	0.023	0.023	0.023

TABLE 6-25 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (n9 ... n4, p9 ... p4) (ANSI B4.2)

mm

SIZE		n9	n8	n7	n6	n5	n4	p9	p8	p7	p6	p5	p4
OVER	0	0.029	0.018	0.014	0.010	0.008	0.007	0.031	0.020	0.016	0.012	0.010	0.009
TO	3	0.004	0.004	0.004	0.004	0.004	0.004	0.006	0.006	0.006	0.006	0.006	0.006
OVER	3	0.038	0.026	0.020	0.016	0.013	0.012	0.042	0.030	0.024	0.020	0.017	0.016
TO	6	0.008	0.008	0.008	0.008	0.008	0.008	0.012	0.012	0.012	0.012	0.012	0.012
OVER	6	0.046	0.032	0.025	0.019	0.016	0.014	0.051	0.037	0.030	0.024	0.021	0.019
TO	10	0.010	0.010	0.010	0.010	0.010	0.010	0.015	0.015	0.015	0.015	0.015	0.015
OVER	10	0.055	0.039	0.030	0.023	0.020	0.017	0.061	0.045	0.036	0.029	0.026	0.023
TO	14	0.012	0.012	0.012	0.012	0.012	0.012	0.018	0.018	0.018	0.018	0.018	0.018
OVER	14	0.055	0.039	0.030	0.023	0.020	0.017	0.061	0.045	0.036	0.029	0.026	0.023
TO	18	0.012	0.012	0.012	0.012	0.012	0.012	0.018	0.018	0.018	0.018	0.018	0.018
OVER	18	0.067	0.048	0.036	0.028	0.024	0.021	0.074	0.055	0.043	0.035	0.031	0.028
TO	24	0.015	0.015	0.015	0.015	0.015	0.015	0.022	0.022	0.022	0.022	0.022	0.022
OVER	24	0.067	0.048	0.036	0.028	0.024	0.021	0.074	0.055	0.043	0.035	0.031	0.028
TO	30	0.015	0.015	0.015	0.015	0.015	0.015	0.022	0.022	0.022	0.022	0.022	0.022
OVER	30	0.079	0.056	0.042	0.033	0.028	0.024	0.088	0.065	0.051	0.042	0.037	0.033
TO	40	0.017	0.017	0.017	0.017	0.017	0.017	0.026	0.026	0.026	0.026	0.026	0.026
OVER	40	0.079	0.056	0.042	0.033	0.028	0.024	0.088	0.065	0.051	0.042	0.037	0.033
TO	50	0.017	0.017	0.017	0.017	0.017	0.017	0.026	0.026	0.026	0.026	0.026	0.026
OVER	50	0.094	0.066	0.050	0.039	0.033	0.028	0.106	0.078	0.062	0.051	0.045	0.040
TO	65	0.020	0.020	0.020	0.020	0.020	0.020	0.032	0.032	0.032	0.032	0.032	0.032
OVER	65	0.094	0.066	0.050	0.039	0.033	0.028	0.106	0.078	0.062	0.051	0.045	0.040
TO	80	0.020	0.020	0.020	0.020	0.020	0.020	0.032	0.032	0.032	0.032	0.032	0.032
OVER	80	0.110	0.077	0.058	0.045	0.038	0.033	0.124	0.091	0.072	0.059	0.052	0.047
TO	100	0.023	0.023	0.023	0.023	0.023	0.023	0.037	0.037	0.037	0.037	0.037	0.037
OVER	100	0.110	0.077	0.058	0.045	0.038	0.033	0.124	0.091	0.072	0.059	0.052	0.047
TO	120	0.023	0.023	0.023	0.023	0.023	0.023	0.037	0.037	0.037	0.037	0.037	0.037
OVER	120	0.127	0.090	0.067	0.052	0.045	0.039	0.143	0.106	0.083	0.068	0.061	0.055
TO	140	0.027	0.027	0.027	0.027	0.027	0.027	0.043	0.043	0.043	0.043	0.043	0.043
OVER	140	0.127	0.090	0.067	0.052	0.045	0.039	0.143	0.106	0.083	0.068	0.061	0.055
TO	160	0.027	0.027	0.027	0.027	0.027	0.027	0.043	0.043	0.043	0.043	0.043	0.043
OVER	160	0.127	0.090	0.067	0.052	0.045	0.039	0.143	0.106	0.083	0.068	0.061	0.055
TO	180	0.027	0.027	0.027	0.027	0.027	0.027	0.043	0.043	0.043	0.043	0.043	0.043
OVER	180	0.146	0.103	0.077	0.060	0.051	0.045	0.165	0.122	0.096	0.079	0.070	0.064
TO	200	0.031	0.031	0.031	0.031	0.031	0.031	0.050	0.050	0.050	0.050	0.050	0.050
OVER	200	0.146	0.103	0.077	0.060	0.051	0.045	0.165	0.122	0.096	0.079	0.070	0.064
TO	225	0.031	0.031	0.031	0.031	0.031	0.031	0.050	0.050	0.050	0.050	0.050	0.050
OVER	225	0.146	0.103	0.077	0.060	0.051	0.045	0.165	0.122	0.096	0.079	0.070	0.064
TO	250	0.031	0.031	0.031	0.031	0.031	0.031	0.050	0.050	0.050	0.050	0.050	0.050
OVER	250	0.164	0.115	0.086	0.066	0.057	0.050	0.186	0.137	0.108	0.088	0.079	0.072
TO	280	0.034	0.034	0.034	0.034	0.034	0.034	0.056	0.056	0.056	0.056	0.056	0.056
OVER	280	0.164	0.115	0.086	0.066	0.057	0.050	0.186	0.137	0.108	0.088	0.079	0.072
TO	315	0.034	0.034	0.034	0.034	0.034	0.034	0.056	0.056	0.056	0.056	0.056	0.056
OVER	315	0.177	0.126	0.094	0.073	0.062	0.055	0.202	0.151	0.119	0.098	0.087	0.080
TO	355	0.037	0.037	0.037	0.037	0.037	0.037	0.062	0.062	0.062	0.062	0.062	0.062
OVER	355	0.177	0.126	0.094	0.073	0.062	0.055	0.202	0.151	0.119	0.098	0.087	0.080
TO	400	0.037	0.037	0.037	0.037	0.037	0.037	0.062	0.062	0.062	0.062	0.062	0.062
OVER	400	0.195	0.137	0.103	0.080	0.067	0.060	0.223	0.165	0.131	0.108	0.095	0.088
TO	450	0.040	0.040	0.040	0.040	0.040	0.040	0.068	0.068	0.068	0.068	0.068	0.068
OVER	450	0.195	0.137	0.103	0.080	0.067	0.060	0.223	0.165	0.131	0.108	0.095	0.088
TO	500	0.040	0.040	0.040	0.040	0.040	0.040	0.068	0.068	0.068	0.068	0.068	0.068

TABLE 6-26 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (r9 ... r4, s9 ... s4) (ANSI B4.2)

mm

SIZE		r9	r8	r7	r6	r5	r4	s9	s8	s7	s6	s5	s4
OVER	0	0.035	0.024	0.020	0.016	0.014	0.013	0.039	0.028	0.024	0.020	0.018	0.017
TO	3	0.010	0.010	0.010	0.010	0.010	0.010	0.014	0.014	0.014	0.014	0.014	0.014
OVER	3	0.045	0.033	0.027	0.023	0.020	0.019	0.049	0.037	0.031	0.027	0.024	0.023
TO	6	0.015	0.015	0.015	0.015	0.015	0.015	0.019	0.019	0.019	0.019	0.019	0.019
OVER	6	0.055	0.041	0.034	0.028	0.025	0.023	0.059	0.045	0.038	0.032	0.029	0.027
TO	10	0.019	0.019	0.019	0.019	0.019	0.019	0.023	0.023	0.023	0.023	0.023	0.023
OVER	10	0.066	0.050	0.041	0.034	0.031	0.028	0.071	0.055	0.046	0.039	0.036	0.033
TO	14	0.023	0.023	0.023	0.023	0.023	0.023	0.028	0.028	0.028	0.028	0.028	0.028
OVER	14	0.066	0.050	0.041	0.034	0.031	0.028	0.071	0.055	0.046	0.039	0.036	0.033
TO	18	0.023	0.023	0.023	0.023	0.023	0.023	0.028	0.028	0.028	0.028	0.028	0.028
OVER	18	0.080	0.061	0.049	0.041	0.037	0.034	0.087	0.068	0.056	0.048	0.044	0.041
TO	24	0.028	0.028	0.028	0.028	0.028	0.028	0.035	0.035	0.035	0.035	0.035	0.035
OVER	24	0.080	0.061	0.049	0.041	0.037	0.034	0.087	0.068	0.056	0.048	0.044	0.041
TO	30	0.028	0.028	0.028	0.028	0.028	0.028	0.035	0.035	0.035	0.035	0.035	0.035
OVER	30	0.096	0.073	0.059	0.050	0.045	0.041	0.105	0.082	0.068	0.059	0.540	0.050
TO	40	0.034	0.034	0.034	0.034	0.034	0.034	0.043	0.043	0.043	0.043	0.043	0.043
OVER	40	0.096	0.073	0.059	0.050	0.045	0.041	0.105	0.082	0.068	0.059	0.540	0.050
TO	50	0.034	0.034	0.034	0.034	0.034	0.034	0.043	0.043	0.043	0.043	0.043	0.043
OVER	50	0.115	0.087	0.071	0.060	0.054	0.049	0.127	0.099	0.083	0.072	0.066	0.061
TO	65	0.041	0.041	0.041	0.041	0.041	0.041	0.053	0.053	0.053	0.053	0.053	0.053
OVER	65	0.117	0.089	0.073	0.062	0.056	0.051	0.133	0.105	0.089	0.078	0.072	0.067
TO	80	0.043	0.043	0.043	0.043	0.043	0.043	0.059	0.059	0.059	0.059	0.059	0.059
OVER	80	0.138	0.105	0.086	0.073	0.066	0.061	0.158	0.125	0.106	0.093	0.086	0.081
TO	100	0.051	0.051	0.051	0.051	0.051	0.051	0.071	0.071	0.071	0.071	0.071	0.071
OVER	100	0.141	0.108	0.089	0.076	0.069	0.064	0.166	0.133	0.114	0.101	0.094	0.089
TO	120	0.054	0.054	0.054	0.054	0.054	0.054	0.079	0.079	0.079	0.079	0.079	0.079
OVER	120	0.163	0.126	0.103	0.088	0.081	0.075	0.192	0.155	0.132	0.117	0.110	0.104
TO	140	0.063	0.063	0.063	0.063	0.063	0.063	0.092	0.092	0.092	0.092	0.092	0.092
OVER	140	0.165	0.128	0.105	0.090	0.083	0.077	0.200	0.163	0.140	0.125	0.118	0.112
TO	160	0.065	0.065	0.065	0.065	0.065	0.065	0.100	0.100	0.100	0.100	0.100	0.100
OVER	160	0.168	0.131	0.108	0.093	0.086	0.080	0.208	0.171	0.148	0.133	0.126	0.120
TO	180	0.068	0.068	0.068	0.068	0.068	0.068	0.108	0.108	0.108	0.108	0.108	0.108
OVER	180	0.192	0.149	0.123	0.106	0.097	0.091	0.237	0.194	0.168	0.151	0.142	0.136
TO	200	0.077	0.077	0.077	0.077	0.077	0.077	0.122	0.122	0.122	0.122	0.122	0.122
OVER	200	0.195	0.152	0.126	0.109	0.100	0.094	0.245	0.202	0.176	0.159	0.150	0.144
TO	225	0.080	0.080	0.080	0.080	0.080	0.080	0.130	0.130	0.130	0.130	0.130	0.130
OVER	225	0.199	0.156	0.130	0.113	0.104	0.098	0.255	0.212	0.186	0.169	0.160	0.154
TO	250	0.084	0.084	0.084	0.084	0.084	0.084	0.140	0.140	0.140	0.140	0.140	0.140
OVER	250	0.224	0.175	0.146	0.126	0.117	0.110	0.288	0.239	0.210	0.190	0.181	0.174
TO	280	0.094	0.094	0.094	0.094	0.094	0.094	0.158	0.158	0.158	0.158	0.158	0.158
OVER	280	0.228	0.179	0.150	0.130	0.121	0.114	0.300	0.251	0.222	0.202	0.193	0.186
TO	315	0.098	0.098	0.098	0.098	0.098	0.098	0.170	0.170	0.170	0.170	0.170	0.170
OVER	315	0.248	0.197	0.165	0.144	0.133	0.126	0.330	0.279	0.247	0.226	0.215	0.208
TO	355	0.108	0.108	0.108	0.108	0.108	0.108	0.190	0.190	0.190	0.190	0.190	0.190
OVER	355	0.254	0.203	0.171	0.150	0.139	0.132	0.348	0.297	0.265	0.244	0.233	0.226
TO	400	0.114	0.114	0.114	0.114	0.114	0.114	0.208	0.208	0.208	0.208	0.208	0.208
OVER	400	0.281	0.223	0.189	0.166	0.153	0.146	0.387	0.329	0.295	0.272	0.259	0.252
TO	450	0.126	0.126	0.126	0.126	0.126	0.126	0.232	0.232	0.232	0.232	0.232	0.232
OVER	450	0.287	0.229	0.195	0.172	0.159	0.152	0.407	0.349	0.315	0.292	0.279	0.272
TO	500	0.132	0.132	0.132	0.132	0.132	0.132	0.252	0.252	0.252	0.252	0.252	0.252

TABLE 6-27 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (t9 ... t4, u9 ... u4) (ANSI B4.2)

mm

SIZE		t9	t8	t7	t6	t5	t4	u9	u8	u7	u6	u5	u4
OVER	0							0.043	0.032	0.028	0.024	0.022	0.021
TO	3							0.018	0.018	0.018	0.018	0.018	0.018
OVER	3							0.053	0.041	0.035	0.031	0.028	0.027
TO	6				NUMERICAL VALUES FOR			0.023	0.023	0.023	0.023	0.023	0.023
OVER	6							0.064	0.050	0.043	0.037	0.034	0.032
TO	10				TOLERANCE ZONES IN			0.028	0.028	0.028	0.028	0.028	0.028
OVER	10							0.076	0.060	0.051	0.044	0.041	0.038
TO	14				THIS AREA NOT DEFINED.			0.033	0.033	0.033	0.033	0.033	0.033
OVER	14							0.076	0.060	0.051	0.044	0.041	0.038
TO	18							0.033	0.033	0.033	0.033	0.033	0.033
OVER	18							0.093	0.074	0.062	0.054	0.050	0.047
TO	24							0.041	0.041	0.041	0.041	0.041	0.041
OVER	24	0.093	0.074	0.062	0.054	0.050	0.047	0.100	0.081	0.069	0.061	0.057	0.054
TO	30	0.041	0.041	0.041	0.041	0.041	0.041	0.048	0.048	0.048	0.048	0.048	0.048
OVER	30	0.110	0.087	0.073	0.064	0.059	0.055	0.122	0.099	0.085	0.076	0.071	0.067
TO	40	0.048	0.048	0.048	0.048	0.048	0.048	0.060	0.060	0.060	0.060	0.060	0.060
OVER	40	0.116	0.093	0.079	0.070	0.065	0.061	0.132	0.109	0.095	0.086	0.081	0.077
TO	50	0.054	0.054	0.054	0.054	0.054	0.054	0.070	0.070	0.070	0.070	0.070	0.070
OVER	50	0.140	0.112	0.096	0.085	0.079	0.074	0.161	0.133	0.117	0.106	0.100	0.095
TO	65	0.066	0.066	0.066	0.066	0.066	0.066	0.087	0.087	0.087	0.087	0.087	0.087
OVER	65	0.149	0.121	0.105	0.094	0.088	0.083	0.176	0.148	0.132	0.121	0.115	0.110
TO	80	0.075	0.075	0.075	0.075	0.075	0.075	0.102	0.102	0.102	0.102	0.102	0.102
OVER	80	0.178	0.145	0.126	0.113	0.106	0.101	0.211	0.178	0.159	0.146	0.139	0.134
TO	100	0.091	0.091	0.091	0.091	0.091	0.091	0.124	0.124	0.124	0.124	0.124	0.124
OVER	100	0.191	0.158	0.139	0.126	0.119	0.114	0.231	0.198	0.179	0.166	0.159	0.154
TO	120	0.104	0.104	0.104	0.104	0.104	0.104	0.144	0.144	0.144	0.144	0.144	0.144
OVER	120	0.222	0.185	0.162	0.147	0.140	0.134	0.270	0.233	0.210	0.195	0.188	0.182
TO	140	0.122	0.122	0.122	0.122	0.122	0.122	0.170	0.170	0.170	0.170	0.170	0.170
OVER	140	0.234	0.197	0.174	0.159	0.152	0.146	0.290	0.253	0.230	0.215	0.208	0.202
TO	160	0.134	0.134	0.134	0.134	0.134	0.134	0.190	0.190	0.190	0.190	0.190	0.190
OVER	160	0.246	0.209	0.186	0.171	0.164	0.158	0.310	0.273	0.250	0.235	0.228	0.222
TO	180	0.146	0.146	0.146	0.146	0.146	0.146	0.210	0.210	0.210	0.210	0.210	0.210
OVER	180	0.281	0.238	0.212	0.195	0.186	0.180	0.351	0.308	0.282	0.265	0.256	0.250
TO	200	0.166	0.166	0.166	0.166	0.166	0.166	0.236	0.236	0.236	0.236	0.236	0.236
OVER	200	0.295	0.252	0.226	0.209	0.200	0.194	0.373	0.330	0.304	0.287	0.278	0.272
TO	225	0.180	0.180	0.180	0.180	0.180	0.180	0.258	0.258	0.258	0.258	0.258	0.258
OVER	225	0.311	0.268	0.242	0.225	0.216	0.210	0.399	0.356	0.330	0.313	0.304	0.298
TO	250	0.196	0.196	0.196	0.196	0.196	0.196	0.284	0.284	0.284	0.284	0.284	0.284
OVER	250	0.348	0.299	0.270	0.250	0.241	0.234	0.445	0.396	0.367	0.347	0.338	0.331
TO	280	0.218	0.218	0.218	0.218	0.218	0.218	0.315	0.315	0.315	0.315	0.315	0.315
OVER	280	0.370	0.321	0.292	0.272	0.263	0.256	0.480	0.431	0.402	0.382	0.373	0.366
TO	315	0.240	0.240	0.240	0.240	0.240	0.240	0.350	0.350	0.350	0.350	0.350	0.350
OVER	315	0.408	0.357	0.325	0.304	0.293	0.286	0.530	0.479	0.447	0.426	0.415	0.408
TO	355	0.268	0.268	0.268	0.268	0.268	0.268	0.390	0.390	0.390	0.390	0.390	0.390
OVER	355	0.434	0.383	0.351	0.330	0.319	0.312	0.575	0.524	0.492	0.471	0.460	0.453
TO	400	0.294	0.294	0.294	0.294	0.294	0.294	0.435	0.435	0.435	0.435	0.435	0.435
OVER	400	0.485	0.427	0.393	0.370	0.357	0.350	0.645	0.587	0.553	0.530	0.517	0.510
TO	450	0.330	0.330	0.330	0.330	0.330	0.330	0.490	0.490	0.490	0.490	0.490	0.490
OVER	450	0.515	0.457	0.423	0.400	0.387	0.380	0.695	0.637	0.603	0.580	0.567	0.560
TO	500	0.360	0.360	0.360	0.360	0.360	0.360	0.540	0.540	0.540	0.540	0.540	0.540

TABLE 6-28 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (v9 ... v4, x9 ... x4) (ANSI B4.2)

mm

SIZE		v9	v8	v7	v6	v5	v4	x9	x8	x7	x6	x5	x4
OVER	0							0.045	0.034	0.030	0.026	0.024	0.023
TO	3							0.020	0.020	0.020	0.020	0.020	0.020
OVER	3				NUMERICAL VALUES FOR			0.058	0.046	0.040	0.036	0.033	0.032
TO	6				TOLERANCE ZONES IN			0.028	0.028	0.028	0.028	0.028	0.028
OVER	6				THIS AREA NOT DEFINED.			0.070	0.056	0.049	0.043	0.040	0.038
TO	10							0.034	0.034	0.034	0.034	0.034	0.034
OVER	10							0.083	0.067	0.058	0.051	0.048	0.045
TO	14							0.040	0.040	0.040	0.040	0.040	0.040
OVER	14	0.082	0.066	0.057	0.050	0.047	0.044	0.088	0.072	0.063	0.056	0.053	0.050
TO	18	0.039	0.039	0.039	0.039	0.039	0.039	0.045	0.045	0.045	0.045	0.045	0.045
OVER	18	0.099	0.080	0.068	0.060	0.056	0.053	0.106	0.087	0.075	0.067	0.063	0.060
TO	24	0.047	0.047	0.047	0.047	0.047	0.047	0.054	0.054	0.054	0.054	0.054	0.054
OVER	24	0.107	0.088	0.076	0.068	0.064	0.061	0.116	0.097	0.085	0.077	0.073	0.070
TO	30	0.055	0.055	0.055	0.055	0.055	0.055	0.064	0.064	0.064	0.064	0.064	0.064
OVER	30	0.130	0.107	0.093	0.084	0.079	0.075	0.142	0.119	0.105	0.096	0.091	0.087
TO	40	0.068	0.068	0.068	0.068	0.068	0.068	0.080	0.080	0.080	0.080	0.080	0.080
OVER	40	0.143	0.120	0.106	0.097	0.092	0.088	0.159	0.136	0.122	0.113	0.108	0.104
TO	50	0.081	0.081	0.081	0.081	0.081	0.081	0.097	0.097	0.097	0.097	0.097	0.097
OVER	50	0.176	0.148	0.132	0.121	0.115	0.110	0.196	0.168	0.152	0.141	0.135	0.130
TO	65	0.102	0.102	0.102	0.102	0.102	0.102	0.122	0.122	0.122	0.122	0.122	0.122
OVER	65	0.194	0.166	0.150	0.139	0.133	0.128	0.220	0.192	0.176	0.165	0.159	0.154
TO	80	0.120	0.120	0.120	0.120	0.120	0.120	0.146	0.146	0.146	0.146	0.146	0.146
OVER	80	0.233	0.200	0.181	0.168	0.161	0.156	0.265	0.232	0.213	0.200	0.193	0.188
TO	100	0.146	0.146	0.146	0.146	0.146	0.146	0.178	0.178	0.178	0.178	0.178	0.178
OVER	100	0.259	0.226	0.207	0.194	0.187	0.182	0.297	0.264	0.245	0.232	0.225	0.220
TO	120	0.172	0.172	0.172	0.172	0.172	0.172	0.210	0.210	0.210	0.210	0.210	0.210
OVER	120	0.302	0.265	0.242	0.227	0.220	0.214	0.348	0.311	0.288	0.273	0.266	0.260
TO	140	0.202	0.202	0.202	0.202	0.202	0.202	0.248	0.248	0.248	0.248	0.248	0.248
OVER	140	0.328	0.291	0.268	0.253	0.246	0.240	0.380	0.343	0.320	0.305	0.298	0.292
TO	160	0.228	0.228	0.228	0.228	0.228	0.228	0.280	0.280	0.280	0.280	0.280	0.280
OVER	160	0.352	0.315	0.292	0.277	0.270	0.264	0.410	0.373	0.350	0.335	0.328	0.322
TO	180	0.252	0.252	0.252	0.252	0.252	0.252	0.310	0.310	0.310	0.310	0.310	0.310
OVER	180	0.399	0.356	0.330	0.313	0.304	0.298	0.465	0.422	0.396	0.379	0.370	0.364
TO	200	0.284	0.284	0.284	0.284	0.284	0.284	0.350	0.350	0.350	0.350	0.350	0.350
OVER	200	0.425	0.382	0.356	0.339	0.330	0.324	0.500	0.457	0.431	0.414	0.405	0.399
TO	225	0.310	0.310	0.310	0.310	0.310	0.310	0.385	0.385	0.385	0.385	0.385	0.385
OVER	225	0.455	0.412	0.386	0.369	0.360	0.354	0.540	0.497	0.471	0.454	0.445	0.439
TO	250	0.340	0.340	0.340	0.340	0.340	0.340	0.425	0.425	0.425	0.425	0.425	0.425
OVER	250	0.515	0.466	0.437	0.417	0.408	0.401	0.605	0.556	0.527	0.507	0.498	0.491
TO	280	0.385	0.385	0.385	0.385	0.385	0.385	0.475	0.475	0.475	0.475	0.475	0.475
OVER	280	0.555	0.506	0.477	0.457	0.448	0.441	0.655	0.606	0.577	0.557	0.548	0.541
TO	315	0.425	0.425	0.425	0.425	0.425	0.425	0.525	0.525	0.525	0.525	0.525	0.525
OVER	315	0.615	0.564	0.532	0.511	0.500	0.493	0.730	0.679	0.647	0.626	0.615	0.608
TO	355	0.475	0.475	0.475	0.475	0.475	0.475	0.590	0.590	0.590	0.590	0.590	0.590
OVER	355	0.670	0.619	0.587	0.566	0.555	0.548	0.800	0.749	0.717	0.696	0.685	0.678
TO	400	0.530	0.530	0.530	0.530	0.530	0.530	0.660	0.660	0.660	0.660	0.660	0.660
OVER	400	0.750	0.692	0.658	0.635	0.622	0.615	0.895	0.837	0.803	0.780	0.767	0.760
TO	450	0.595	0.595	0.595	0.595	0.595	0.595	0.740	0.740	0.740	0.740	0.740	0.740
OVER	450	0.815	0.757	0.723	0.700	0.687	0.680	0.975	0.917	0.883	0.860	0.847	0.840
TO	500	0.660	0.660	0.660	0.660	0.660	0.660	0.820	0.820	0.820	0.820	0.820	0.820

TABLE 6-29 TOLERANCE ZONES - EXTERNAL DIMENSIONS (SHAFTS) (y9 ... y4, z9 ... z4) (ANSI B4.2)

mm

SIZE		y9	y8	y7	y6	y5	y4	z9	z8	z7	z6	z5	z4
OVER	0							0.051	0.040	0.036	0.032	0.030	0.029
TO	3							0.026	0.026	0.026	0.026	0.026	0.026
OVER	3							0.065	0.053	0.047	0.043	0.040	0.039
TO	6			NUMERICAL VALUES FOR				0.035	0.035	0.035	0.035	0.035	0.035
OVER	6							0.078	0.064	0.057	0.051	0.048	0.046
TO	10			TOLERANCE ZONES IN				0.042	0.042	0.042	0.042	0.042	0.042
OVER	10							0.093	0.077	0.068	0.061	0.058	0.055
TO	14			THIS AREA NOT DEFINED.				0.050	0.050	0.050	0.050	0.050	0.050
OVER	14							0.103	0.087	0.078	0.071	0.068	0.065
TO	18							0.060	0.060	0.060	0.060	0.060	0.060
OVER	18	0.115	0.096	0.084	0.076	0.072	0.069	0.125	0.106	0.094	0.086	0.082	0.079
TO	24	0.063	0.063	0.063	0.063	0.063	0.063	0.073	0.073	0.073	0.073	0.073	0.073
OVER	24	0.127	0.108	0.096	0.088	0.084	0.081	0.140	0.121	0.109	0.101	0.097	0.094
TO	30	0.075	0.075	0.075	0.075	0.075	0.075	0.088	0.088	0.088	0.088	0.088	0.088
OVER	30	0.156	0.133	0.119	0.110	0.105	0.101	0.174	0.151	0.137	0.128	0.123	0.119
TO	40	0.094	0.094	0.094	0.094	0.094	0.094	0.112	0.112	0.112	0.112	0.112	0.112
OVER	40	0.176	0.153	0.139	0.130	0.125	0.121	0.198	0.175	0.161	0.152	0.147	0.143
TO	50	0.114	0.114	0.114	0.114	0.114	0.114	0.136	0.136	0.136	0.136	0.136	0.136
OVER	50	0.218	0.190	0.174	0.163	0.157	0.152	0.246	0.218	0.202	0.191	0.185	0.180
TO	65	0.144	0.144	0.144	0.144	0.144	0.144	0.172	0.172	0.172	0.172	0.172	0.172
OVER	65	0.248	0.220	0.204	0.193	0.187	0.182	0.284	0.256	0.240	0.229	0.223	0.218
TO	80	0.174	0.174	0.174	0.174	0.174	0.174	0.210	0.210	0.210	0.210	0.210	0.210
OVER	80	0.301	0.268	0.249	0.236	0.229	0.224	0.345	0.312	0.293	0.280	0.273	0.268
TO	100	0.214	0.214	0.214	0.214	0.214	0.214	0.258	0.258	0.258	0.258	0.258	0.258
OVER	100	0.341	0.308	0.289	0.276	0.269	0.264	0.397	0.364	0.345	0.332	0.325	0.320
TO	120	0.254	0.254	0.254	0.254	0.254	0.254	0.310	0.310	0.310	0.310	0.310	0.310
OVER	120	0.400	0.363	0.340	0.325	0.318	0.312	0.465	0.428	0.405	0.390	0.383	0.377
TO	140	0.300	0.300	0.300	0.300	0.300	0.300	0.365	0.365	0.365	0.365	0.365	0.365
OVER	140	0.440	0.403	0.380	0.365	0.358	0.352	0.515	0.478	0.455	0.440	0.433	0.427
TO	160	0.340	0.340	0.340	0.340	0.340	0.340	0.415	0.415	0.415	0.415	0.415	0.415
OVER	160	0.480	0.443	0.420	0.405	0.398	0.392	0.565	0.528	0.505	0.490	0.483	0.477
TO	180	0.380	0.380	0.380	0.380	0.380	0.380	0.465	0.465	0.465	0.465	0.465	0.465
OVER	180	0.540	0.497	0.471	0.454	0.445	0.439	0.635	0.592	0.566	0.549	0.540	0.534
TO	200	0.425	0.425	0.425	0.425	0.425	0.425	0.520	0.520	0.520	0.520	0.520	0.520
OVER	200	0.585	0.542	0.516	0.499	0.490	0.484	0.690	0.647	0.621	0.604	0.595	0.589
TO	225	0.470	0.470	0.470	0.470	0.470	0.470	0.575	0.575	0.575	0.575	0.575	0.575
OVER	225	0.635	0.592	0.566	0.549	0.540	0.534	0.755	0.712	0.686	0.669	0.660	0.654
TO	250	0.520	0.520	0.520	0.520	0.520	0.520	0.640	0.640	0.640	0.640	0.640	0.640
OVER	250	0.710	0.661	0.632	0.612	0.603	0.596	0.840	0.791	0.762	0.742	0.733	0.726
TO	280	0.580	0.580	0.580	0.580	0.580	0.580	0.710	0.710	0.710	0.710	0.710	0.710
OVER	280	0.780	0.731	0.702	0.682	0.673	0.666	0.920	0.871	0.842	0.822	0.813	0.806
TO	315	0.650	0.650	0.650	0.650	0.650	0.650	0.790	0.790	0.790	0.790	0.790	0.790
OVER	315	0.870	0.819	0.787	0.766	0.755	0.748	1.040	0.989	0.957	0.936	0.925	0.918
TO	355	0.730	0.730	0.730	0.730	0.730	0.730	0.900	0.900	0.900	0.900	0.900	0.900
OVER	355	0.960	0.909	0.877	0.856	0.845	0.838	1.140	1.089	1.057	1.036	1.025	1.018
TO	400	0.820	0.820	0.820	0.820	0.820	0.820	1.000	1.000	1.000	1.000	1.000	1.000
OVER	400	1.075	1.017	0.983	0.960	0.947	0.940	1.255	1.197	1.163	1.140	1.127	1.120
TO	450	0.920	0.920	0.920	0.920	0.920	0.920	1.100	1.100	1.100	1.100	1.100	1.100
OVER	456	1.155	1.097	1.063	1.040	1.027	1.020	1.405	1.347	1.313	1.290	1.277	1.270
TO	500	1.000	1.000	1.000	1.000	1.000	1.000	1.250	1.250	1.250	1.250	1.250	1.250

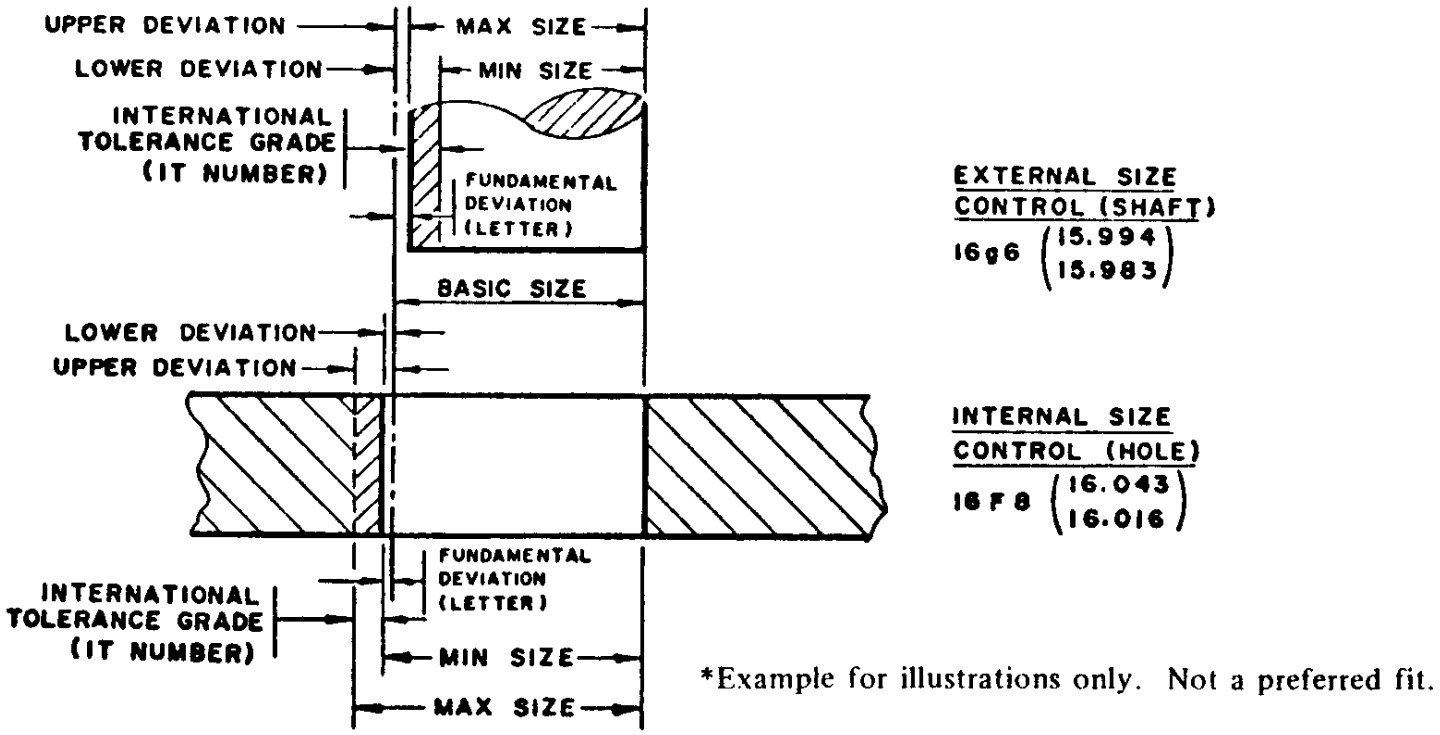


FIG. 6-3 ILLUSTRATIONS OF DEFINITIONS

INTRODUCTION

The ISO System of Limits and Fits (referred to as the ISO system) is covered in national standards throughout the world, as shown by the following list:

Global	ISO 286
USA	ANSI B4.2
Japan	JIS B0401
Germany	DIN 7160//61
France	NF E 02-100-122
UK	BSI 4500
Italy	UNI 6388
Australia	AS 1654

HISTORY OF THE ISO SYSTEM

The present ISO system is based on the ISA System of Limits and Fits published in ISA Bulletin 25 (1940), and on comments included in the Draft Final Report of ISA Committee 3, December 1935. The unification of the various national systems of limits and fits was one of the essential tasks discussed at the initial conference of the ISA in New York, in April, 1926. The same year the Secretariat of ISA Committee 3, Limits and Fits, was entrusted to the Germany Standardizing Association, and needless to say, the system was all metric from the start.

USAGE

The ISO System of Limits and Fits is now in extensive use in Europe.

An increasing number of drawings issued throughout the world specify the tolerances with the ISO symbols only. The ISO system for tolerances and gages is fully covered in ANSI B4.2 and B4.4M.

Cutting tools, material stock, and gages held to ISO tolerances are available in many major industrial countries. It is recommended that a similar specification in USA standards be provided if the worldwide manufacture of products is a defined goal.

BASES

Temperature. The standard reference temperature for industrial length measurement is 20^0C (68^0F).

DEFINITIONS

The most important terms relating to limits and fits are as shown in Fig. 6-3. The terms are defined below.

basic size — the size to which limits or deviations are assigned. The basic size is the same for both members of a fit. It is designated by the number 40 in 40H7.

deviation — the algebraic difference between a size and the corresponding basic size

upper deviation — the algebraical difference between the maximum limit of size and the corresponding basic size

lower deviation — the algebraic difference between the minimum limit of size and the corresponding basic size

fundamental deviation — the one of the two deviations closest to the basic size. It is designated by the letter H in 40H7

tolerance — the difference between the maximum and minimum size limits on a part

tolerance zone — a zone representing the tolerance and its position in relation to the basic size

international tolerance grade (IT) — a group of tolerances which vary depending on the basic size, but which provide the same relative level of accuracy within a given grade. It is designated by the number 7 in 40H7 (IT7).

hole basis — the system of fits where the minimum hole size is basic. The fundamental deviation for a hole basis system is "H".

shaft basis — the system of fits where the maximum shaft size is basic. The fundamental deviation for a shaft basis system is "h".

clearance fit — the relationship between assembled parts when clearance occurs under all tolerance conditions

interference fit — the relationship between assembled parts when interference occurs under all tolerance conditions

transition — the relationship between assembled parts when either a clearance or interference fit can result depending on the tolerance conditions of the mating parts

DESCRIPTION OF TOLERANCE DESIGNATION

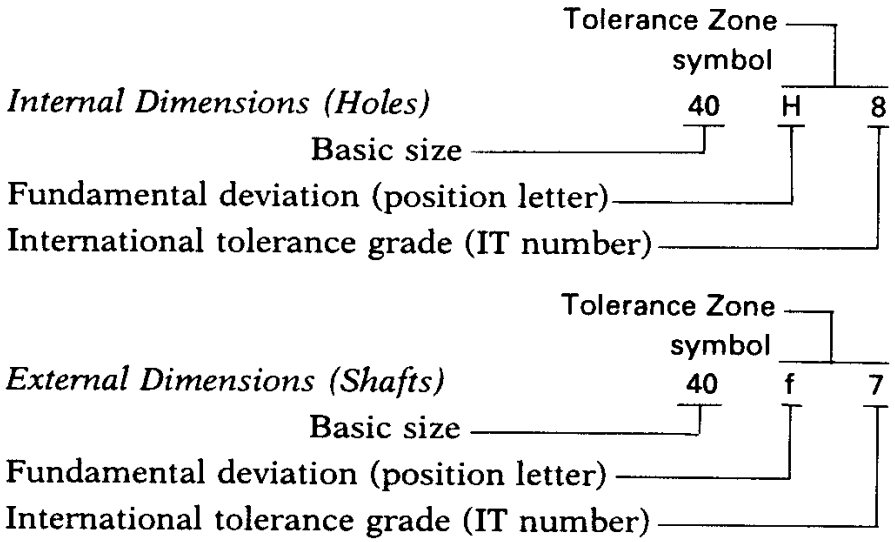
An "International Tolerance grade" establishes the magnitude of the tolerance zone or the amount of part size variation allowed for internal and external dimensions alike (see Fig. 6-3). Tolerances are expressed in "grade number," which are consistent with International Tolerance grades identified by the prefix IT, i.e., "IT6," "IT11," etc. A smaller grade number provides a smaller tolerance zone.

A fundamental deviation establishes the position of the tolerance zone with respect to the basic size (see Fig. 6-3). Fundamental deviations are expressed by "tolerance position letters." Capital letters are used for internal dimensions, and lower case or small letters are used for external dimensions.

Symbols

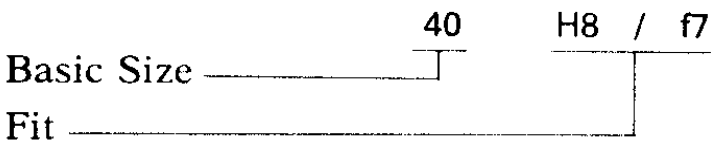
By combining the IT grade number and the tolerance position letter, the tolerance symbol is established which identifies the actual maximum and minimum limits of the part. The toleranced sizes are thus defined by the basic size of the part followed by a symbol composed of a letter and a number.

Example:



A fit is indicated by the basic size common to both components, followed by a symbol corresponding to each component, the internal part symbol preceding the external part symbol.

Example:



Some methods of designating tolerances on drawings gages, etc. are shown in the following three examples.
(a) 40H8 (b) 40H8(40.039/40.000) (c) 40.039/40.000(40H8)

NOTE: Values in parentheses indicate reference only.

BILATERAL TOLERANCE SYSTEM

The ISO system of limits and fits has a full range of bilateral (two-sided) tolerances designated js and JS. The two symmetrical deviations are ± IT/2 (one half of the International Tolerances grade).

UNILATERAL TOLERANCE SYSTEM

The ISO system of limits and fits, with all its possible combinations, includes two unilateral (one-sided) tolerancing methods that are in common use. One tolerancing practice is based on a nominal hole (H, hole basis), the other on a nominal shaft (h, shaft basis). The ISO system has been in use in Germany for over 60 years, and standards for selected fits have influenced the European market for metric standard material sizes, measuring tools, couplings, collars, bearings, etc.

HOLE-BASIS OR SHAFT-BASIS FITS

The nominal H, hole-basis fit and h, shaft-basis fit tolerancing systems are both used, depending on each specific application. The hole-basis system is used with stepped shaft designs. Standard gages for checking the hole-basis fits cost less than those required for checking shaft-basis fits. In designs where a uniform-diameter shaft is used it is advantageous to employ the shaft-basis system. For example, in the case of driving shafts, a single shaft may have to accommodate a variety of accessories — such as couplings, bearings, collars, etc. Steel products toleranced to the shaft-basis system are supplied in a number of steel grades and finishes throughout Europe. Both types of fits might be used on the same design.

PREFERRED FITS

ANSI B4.2 specifies the ten hole and shaft basis fits as shown in Table 6-1 and as illustrated in Fig. 6-4. Each of the ten hole basis fits corresponds to a shaft basis fit with equal clearances for the same nominal size.

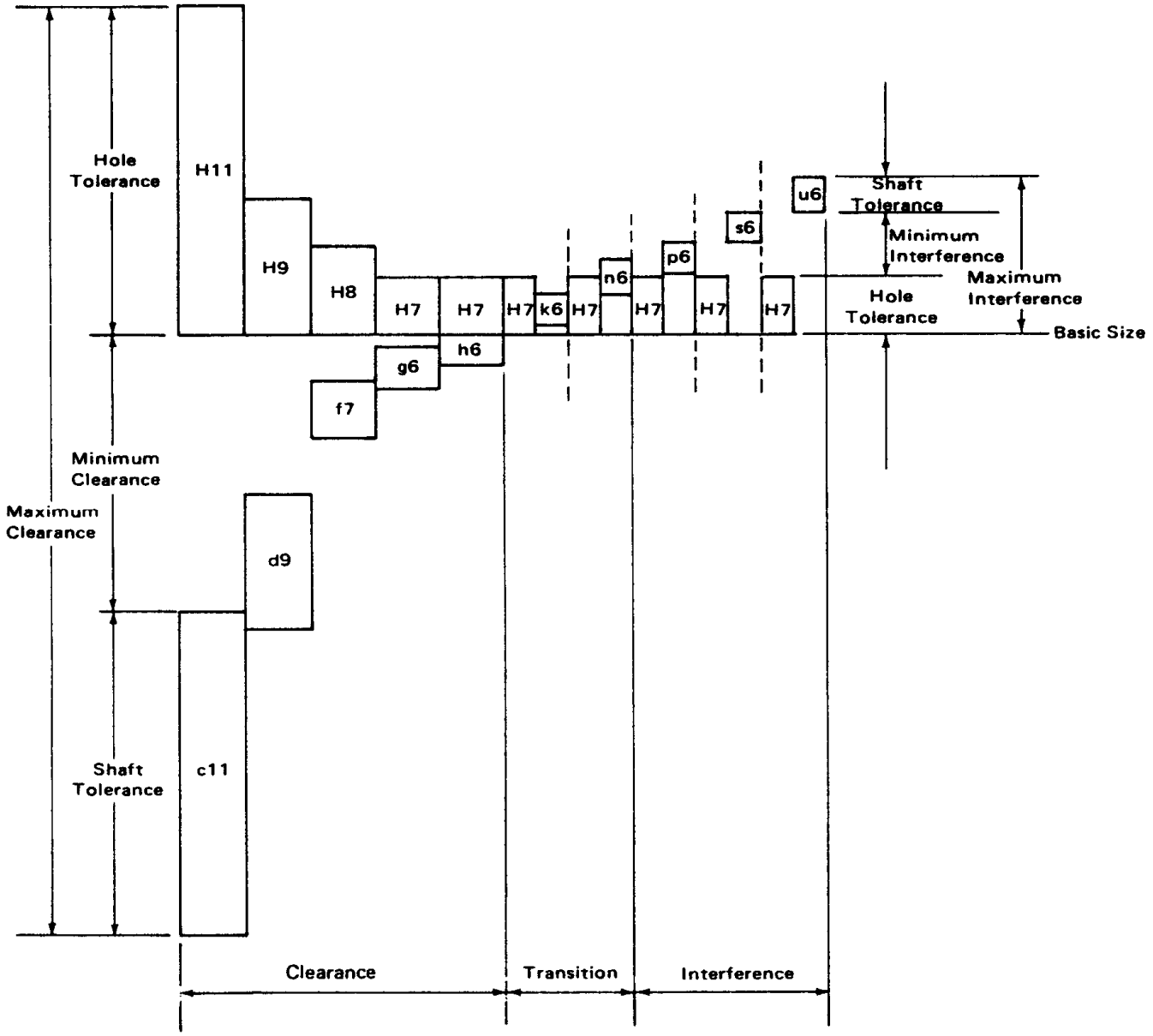


FIG. 6-4 PREFERRED HOLE BASIS FITS (ANSI B4.2)

The ten hole-basis preferred fits use the following tolerances:

Hole: H7, H8, H9, H11
Shaft: c11, d9, f7, g6, h6, k6, n6, p6, s6, u6

It might be desirable for a user to standardize on three, or even two, of the above hole tolerances. The shaft tolerances might also be reduced to fit the requirements of certain types of products.

The ten shaft-basis preferred fits use the following tolerances:

Hole: C11, D9, F8, G7, H7, K7, N7, P7, S7, U7
Shaft: h6, h7, h9, h11

Note that many steel products shown in Chapter 10 are produced worldwide to the shaft tolerances shown above. The new ANSI B32.100 standard specifies the above four shaft tolerances. An illustration of the ten shaft fits is shown in Fig. 6-5.

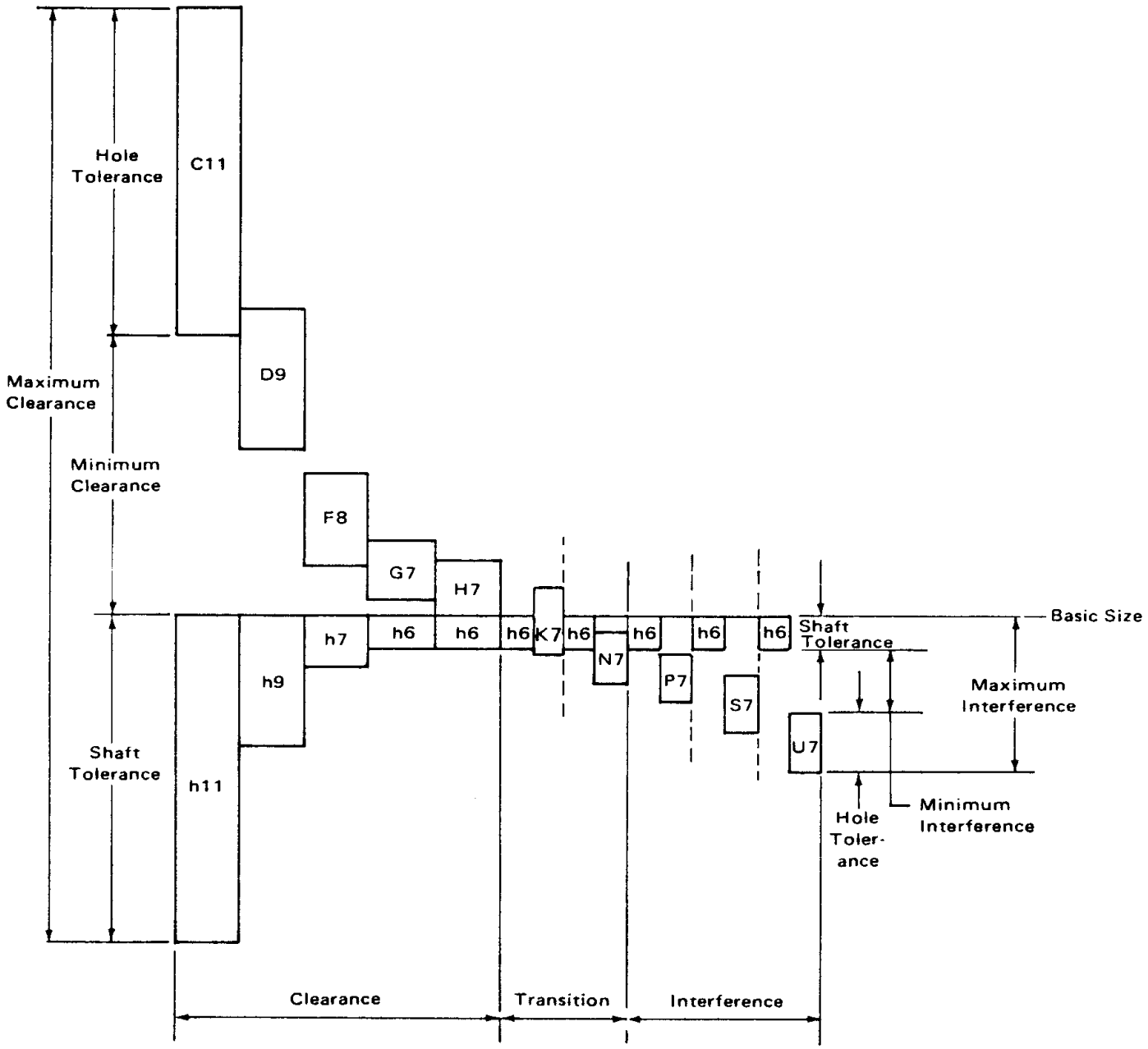


FIG. 6-5 PREFERRED SHAFT BASIS FITS (ANSI B4.2)

PRACTICAL USE OF IT GRADES

The machining process shown in Fig. 6-6 can, under normal conditions, produce the IT grades indicated. Practical usage of the various IT tolerance grades is shown in Fig. 6-7. Numerical values for IT grades from IT1 through IT18 for basic series up to 3150 mm are shown in Table 6-30.

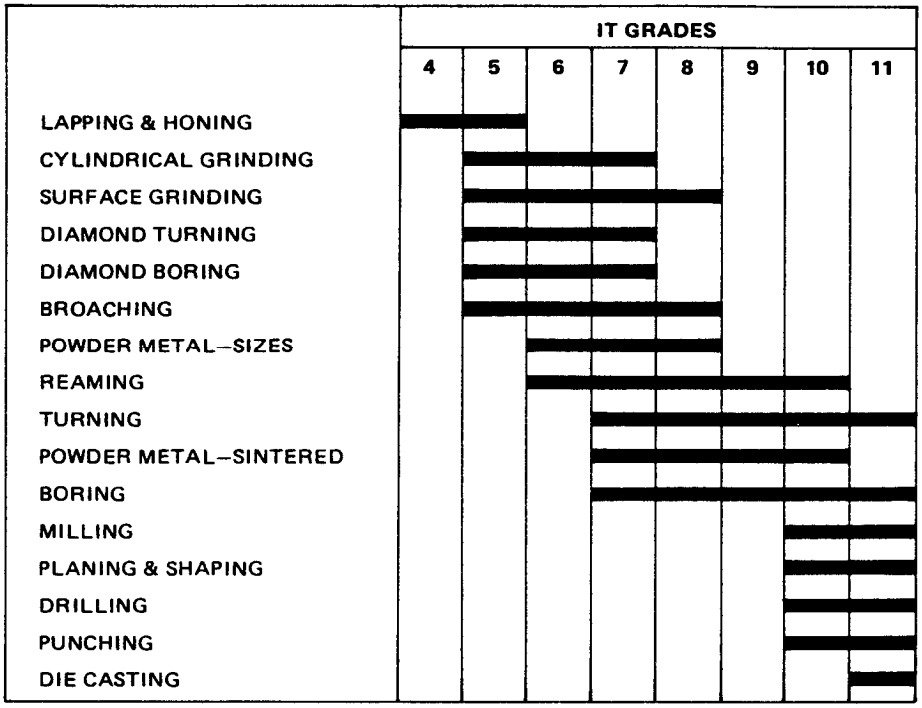


FIG. 6-6 MACHINING PROCESSES (ANSI B4.2)

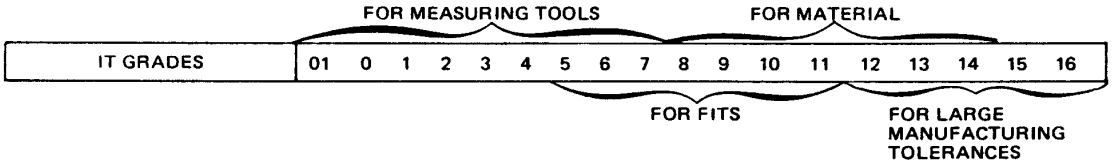


FIG. 6-7 PRACTICAL USE OF INTERNATIONAL TOLERANCE GRADES (ANSI B4.2)

NON-TOLERANCED DIMENSIONS

The ISO system of limits and fits can be used on a great number of applications from the finest tolerances to the coarsest. The tolerances are increasing with the nominal size in the ISO system. It is common practice in those countries that have used the ISO system to apply a somewhat related system
to the non-toleranced dimensions on a drawing. It is now part of ISO 2768-1. The tolerances are dependent on the nominal sizes and are shown in the following table.

TABLE 6-30 INTERNATIONAL TOLERANCE GRADES FOR BASIS SIZES UP TO 3150 mm AND IT GRADES FROM IT1 THROUGH IT18 (ISO 286)

Basic size mm		International tolerance (IT) grades																
		IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14	IT15	IT16	IT17	IT18
Above	Up to and in-cluding	Tolerances																	
		micrometers											millimeters						
-	3	0.8	1.2	2	3	4	6	10	14	25	40	60	0.1	0.14	0.25	0.4	0.6	1	1.4
3	6	1	1.5	2.5	4	5	8	12	18	30	48	75	0.12	0.18	0.3	0.48	0.75	1.2	1.8
6	10	1	1.5	2.5	4	6	9	15	22	36	58	90	0.15	0.22	0.36	0.58	0.9	1.5	2.2
10	18	1.2	2	3	5	8	11	18	27	43	70	110	0.18	0.27	0.43	0.7	1.1	1.8	2.7
18	30	1.5	2.5	4	6	9	13	21	33	52	84	130	0.21	0.33	0.52	0.84	1.3	2.1	3.3
30	50	1.5	2.5	4	7	11	16	25	39	62	100	160	0.25	0.39	0.62	1	1.6	2.5	3.9
50	80	2	3	5	8	13	19	30	46	74	120	190	0.3	0.46	0.74	1.2	1.9	3	4.6
80	120	2.5	4	6	10	15	22	35	54	87	140	220	0.35	0.54	0.87	1.4	2.2	3.5	5.4
120	180	3.5	5	8	12	18	25	40	63	100	160	250	0.4	0.63	1	1.6	2.5	14	6.3
180	250	4.5	7	10	14	20	29	46	72	115	185	290	0.46	0.72	1.15	1.85	2.9	4.6	7.2
250	315	6	8	12	16	23	32	52	81	130	210	320	0.52	0.81	1.3	2.1	3.2	5.2	8.1
315	400	7	9	13	18	25	36	57	89	140	230	360	0.57	0.89	1.4	2.3	3.6	5.7	8.9
400	500	8	10	15	20	27	40	63	97	155	250	400	0.63	0.97	1.55	2.5	4	6.3	9.7
500	630	9	11	16	22	32	44	70	110	175	280	440	0.7	1.1	1.75	2.8	4.4	7	11
630	800	10	13	18	25	36	50	80	125	200	320	500	0.8	1.25	2	3.2	5	8	12.5
B00	1000	11	15	21	28	40	56	90	140	230	360	560	0.9	1.4	2.3	3.6	5.6	9	14
1000	1250	13	18	24	33	47	66	105	165	260	420	660	1.05	1.65	2.6	4.2	6.6	10.5	16.5
1250	1600	15	21	29	39	55	78	125	195	310	500	780	1.25	1.95	3.1	5	7.8	12.5	19.5
1600	2000	18	25	35	46	65	92	150	230	370	600	920	1.5	2.3	3.7	6	9.2	15	23
2000	2500	22	30	41	55	78	110	175	280	440	700	1100	1.75	2.8	4.4	7	11	17.5	28
2500	3150	26	36	50	68	96	135	210	330	540	860	1350	2.1	3.3	5.4	8.6	13.5	21	33

NOTES:
1. Values for international tolerance grades IT01 and IT0 for basic sizes less than or equal to 500 mm are given in ISO 286-1, annex A, table 5.
2. Values for international tolerance grades IT1 to IT5 (incl) for basic sizes over 500 mm are included for experimental use.
3. International tolerance grades IT14 to IT18 (incl) shall not be used for basic sizes less than or equal to 1 mm.

TABLE 6-31 GENERAL TOLERANCE - LINEAR DIMENSIONS (ISO 2768-1)

mm

Tolerance class		Permissible deviations for basic size range							
Designation	Description	0.5[1] up to 3	over 3 up to 6	over 6 up to 30	over 30 up to 120	over 120 up to 400	over 400 up to 1000	over 1000 up to 2000	over 2000 up to 4000
f	fine	± 0.05	± 0.05	± 0.1	± 0.15	± 0.2	± 0.3	± 0.5	-
m	medium	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2
c	coarse	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2	± 3	± 4
v	very coarse	-	± 0.5	± 1	± 1.5	± 2.5	± 4	± 6	± 8

1. For nominal sizes below 0,5 mm, the deviations shall be indicated adjacent to the relevant nominal size(s).

TOLERANCES ON ANGLES

The nominal size for an angle is the length (in mm) of the short leg.

Tolerances shown in Table 6-31 apply to the fine, medium, and coarse, and very coarse series specified in ISO 2768-1. Radii and chamfer tolerances are shown in Table 6-32 and angular tolerances are given in Table 6-33.

TABLE 6-32 GENERAL TOLERANCE - RADII AND CHAMFERS (ISO 2768-1)

mm

Tolerance class		Permissible deviations for basic size range		
Description	**Designation**	**0.5[1] up to 3**	**over 3 up to 6**	**over 6**
f	**fine**	**± 0.2**	**± 0.5**	**± 1**
m	**medium**			
c	**coarse**	**± 0.4**	**± 1**	**± 2**
v	**very coarse**			

NOTE: 1. For nominal sizes below 0.5 mm, the deviations shall be indicated adjacent to the relevant nominal size(s).

TABLE 6-33 GENERAL TOLERANCE - ANGLES (ISO 2768-1)

Tolerance class		Permissible deviations for ranges of lengths, in millimeters, of the shorter side of the angle concerned				
Description	**Designation**	**up to 10**	**over 10 up to 50**	**over 50 up to 120**	**over 120 up to 400**	**over 400**
f	**fine**	± 1°	± 0°30'	± 0°20'	± 0°10'	± 0°5'
m	**medium**					
c	**coarse**	± 1°30'	± 1°	± 0°30'	± 0°15'	± 0°10'
v	**very coarse**	± 3°	± 2°	± 1 °	± 0°30'	± 0°20'

RELATED ISO STANDARDS

17.040.10 Limits and fits

ISO 286-1: 2010 Geometrical product specifications (GPS) -- ISO code system for tolerances on linear sizes -- Part 1: Basis of tolerances, deviations and fits
ISO 286-2: 2010 Geometrical product specifications (GPS) -- ISO code system for tolerances on linear sizes -- Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts
ISO 1101:2004 Geometrical Product Specifications (GPS) -- Geometrical tolerancing -- Tolerances of form, orientation, location and run-out
ISO 1101 (Draft) Geometrical product specifications (GPS) -- Geometrical tolerancing -- Tolerances of form, orientation, location and run-out
ISO 1938-1: 2012 Geometrical product specifications (GPS) - Dimensional measuring equipment -- Part 1: Plain limit gauges of linear size
ISO 2768-1:1989 General tolerances -- Part 1: Tolerances for linear and angular dimensions without individual tolerance indications
ISO 2768-2:1989 General tolerances -- Part 2: Geometrical tolerances for features without individual tolerance indications
ISO 5458:1998 Geometrical Product Specifications (GPS) -- Geometrical tolerancing -- Positional tolerancing
ISO 5459: 2011 Geometrical product specifications (GPS) -- Geometrical tolerancing -- Datums and datum systems
ISO 8062:1994 Castings -- System of dimensional tolerances and machining allowances
ISO 8062-1:2007 Geometrical product specifications (GPS) -- Dimensional and geometrical tolerances for moulded parts -- Part 1: Vocabulary
ISO/PRF TS 8062-2 Geometrical product specifications (GPS) -- Dimensional and geometrical tolerances for moulded parts -- Part 2: Rules
ISO 8062-3:2007 Geometrical product specifications (GPS) -- Dimensional and geometrical tolerances for moulded parts -- Part 3: General dimensional and geometrical tolerances and machining allowances for castings. ISO 8062-3:2007/Cor 1:2009
ISO 13920:1996 Welding -- General tolerances for welded constructions -- Dimensions for lengths and angles -- Shape and position
ISO 14405-1:2010 Geometrical product specifications (GPS) -- Dimensional tolerancing -- Part 1: Linear sizes
ISO 14405-2:2011 Geometrical product specifications (GPS) -- Dimensional tolerancing -- Part 2: Dimensions other than linear sizes

ISO HANDBOOKS

ISO Standards Handbook - Limits, fits and surface properties

This handbook contains a comprehensive collection of ISO standards for: general limits and fits; limits and fits for screw threads; limits and fits for gears and involute splines; properties of surfaces. Standards on relevant terminology complete the collection. Year of publication:1999 2nd Edition. ISBN 92-67-10293-1. This book is also shown after Chapter 5.