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Hydraulic Installation Guidelines
Appendix G
ISO System of Limits and Fits

Orttech recommends that the ISO system of limits and fits (ISO R286) be used for tolerancing of bore and shaft machining, and for tolerancing of mounting surfaces and features for mounting Ortlinghaus clutch/brakes, clutches, and brakes. This is the system that the tolerances listed in the Installation Guidelines are based on.

This system of limits and fits uses a designation consisting of a letter followed by a number, which calls out a specific tolerance based on the nominal dimension of a detail. A lower case letter is used to designate a tolerance for shafts and externally dimensioned details while an upper case letter is used to designate a tolerance for holes and internally dimensioned details. The number designates the tolerance grade, lower numbers being finer tolerances. Typically used designations are H7, H10, JS10, h6, and g6.

More information on this system is available from sources such as the most recent edition of the "Machinery's Handbook". The standard itself is available from ANSI.

The following tables tabulate several tolerance grades that are commonly used. Table G1 is for metric dimensions up to 3150 mm and Table G2 is for inch dimensions up to 124 inches.

Table G1
Tolerances per ISO R286 in mm

Size Range	g6	g7	h6	h8	k6
> 3 to 6	-.004 / -.012	-.004 / -.016	+0 / -.008	+0 / -.018	+.001 / +.009
> 6 to 10	-.005 / -.014	-.005 / -.020	+0 / -.009	+0 / -.022	+.001 / +.010
> 10 to 18	-.006 / -.017	-.006 / -.024	+0 / -.011	+0 / -.027	+.001 / +.012
> 18 to 30	-.007 / -.020	-.007 / -.028	+0 / -.013	+0 / -.033	+.002 / +.015
> 30 to 50	-.009 / -.025	-.009 / -.034	+0 / -.016	+0 / -.039	+.002 / +.018
> 50 to 80	-.010 / -.029	-.010 / -.040	+0 / -.019	+0 / -.046	+.002 / +.021
> 80 to 120	-.012 / -.034	-.012 / -.047	+0 / -.022	+0 / -.054	+.003 / +.025
> 120 to 180	-.014 / -.039	-.014 / -.054	+0 / -.025	+0 / -.063	+.003 / +.028
> 180 to 250	-.015 / -.044	-.015 / -.061	+0 / -.029	+0 / -.072	+.004 / +.033
> 250 to 315	-.017 / -.049	-.017 / -.069	+0 / -.032	+0 / -.081	+.004 / +.036
> 315 to 400	-.018 / -.054	-.018 / -.075	+0 / -.036	+0 / -.089	+.004 / +.040
> 400 to 500	-.020 / -.060	-.020 / -.083	+0 / -.040	+0 / -.097	+.005 / +.045
> 500 to 630	-.022 / -.066	-.022 / -.092	+0 / -.044	+0 / -.110	
> 630 to 800	-.024 / -.074	-.024 / -.104	+0 / -.050	+0 / -.125	
> 800 to 1000	-.026 / -.082	-.026 / -.116	+0 / -.056	+0 / -.140	
> 1000 to 1250	-.028 / -.094	-.028 / -.133	+0 / -.066	+0 / -.165	
> 1250 to 1600	-.030 / -.108	-.030 / -.155	+0 / -.078	+0 / -.195	
> 1600 to 2000	-.032 / -.124	-.032 / -.182	+0 / -.092	+0 / -.230	
> 2000 to 2500	-.034 / -.144	-.034 / -.209	+0 / -.110	+0 / -.280	
> 2500 to 3150	-.038 / -.173	-.038 / -.248	+0 / -.135	+0 / .330	

Size Range	H7	H10	N7	P9	JS 10
> 3 to 6	-0 / +.012	-0 / +.048	-.004 / -.016	-.012 / -.042	+.024 / -.024
> 6 to 10	-0 / +.015	-0 / +.058	-.004 / -.019	-.015 / -.051	+.029 / -.029
> 10 to 18	-0 / +.018	-0 / +.070	-.005 / -.023	-.018 / -.061	+.035 / -.035
> 18 to 30	-0 / +.021	-0 / +.084	-.007 / -.028	-.022 / -.074	+.042 / -.042
> 30 to 50	-0 / +.025	-0 / +.100	-.008 / -.033	-.026 / -.088	+.050 / -.050
> 50 to 80	-0 / +.030	-0 / +.120	-.009 / -.039	-.032 / -.106	+.060 / -.060
> 80 to 120	-0 / +.035	-0 / +.140	-.010 / -.045	-.037 / -.124	+.070 / -.070
> 120 to 180	-0 / +.040	-0 / +.160	-.012 / -.052	-.043 / -.143	+.080 / -.080
> 180 to 250	-0 / +.046	-0 / +.185	-.014 / -.060	-.050 / -.165	+.0925 / -.0925
> 250 to 315	-0 / +.052	-0 / +.210	-.014 / -.066	-.056 / -.186	+.105 / -.105
> 315 to 400	-0 / +.057	-0 / +.230	-.016 / -.073	-.062 / -.202	+.115 / -.115
> 400 to 500	-0 / +.063	-0 / +.250	-.017 / -.080	-.068 / -.223	+.125 / -.125
> 500 to 630	-0 / +.070	-0 / +.280			+.140 / -.140
> 630 to 800	-0 / +.080	-0 / +.320			+.160 / -.160
> 800 to 1000	-0 / +.090	-0 / +.360			+.180 / -.180
> 1000 to 1250	-0 / +.105	-0 / +.420			+.210 / -.210
> 1250 to 1600	-0 / +.125	-0 / +.500			+.250 / -.250
> 1600 to 2000	-0 / +.150	-0 / +.600			+.300 / -.300
> 2000 to 2500	-0 / +.175	-0 / +.700			+.350 / -.350
> 2500 to 3150	-0 / +.210	-0 / +.860			+.430 / -.430

Table G2
Tolerances per ISO R286 in inches

Size Range	g6	g7	h6	h8	k6
> .12 to .24	-.00015 / -.00045	-.00015 / -.00065	+0 / -.0003	+0 / -.0007	+.0001 / +.0004
> .24 to .40	-.0002 / -.0006	-.0002 / -.0008	+0 / -.0004	+0 / -.0009	+.0001 / +.0005
> .40 to .71	-.00025 / -.00065	-.00025 / -.00095	+0 / -.0004	+0 / -.0010	+.0001 / +.0005
> .71 to 1.09	-.0003 / -.0008	-.0003 / -.0011	+0 / -.0005	+0 / -.0012	+.0001 / +.0006
> 1.19 to 1.97	-.0004 / -.0010	-.0004 / -.0014	+0 / -.0006	+0 / -.0016	+.0001 / +.0007
> 1.97 to 3.15	-.0004 / -.0011	-.0004 / -.0016	+0 / -.0007	+0 / -.0018	+.0001 / +.0008
> 3.15 to 4.73	-.0005 / -.0014	-.0005 / -.0019	+0 / -.0009	+0 / -.0022	+.0001 / +.0010
> 4.73 to 7.09	-.0006 / -.0016	-.0006 / -.0022	+0 / -.0010	+0 / -.0025	+.0001 / +.0011
> 7.09 to 9.85	-.0006 / -.0018	-.0006 / -.0024	+0 / -.0012	+0 / -.0028	+.0002 / +.0014
> 9.85 to 12.41	-.0007 / -.0019	-.0007 / -.0027	+0 / -.0012	+0 / -.0030	+.0002 / +.0014
> 12.41 to 15.75	-.0007 / -.0021	-.0007 / -.0029	+0 / -.0014	+0 / -.0035	+.0002 / +.0016
> 15.75 to 19.69	-.0008 / -.0024	-.0008 / -.0033	+0 / -.0016	+0 / -.0040	+.0002 / +.0018
>19.69 to 24.81	-.0009 / -.0027	-.0009 / -.0037	+0 / -.0018	+0 / -.0045	
> 24.81 to 31.50	-.0009 / -.0029	-.0009 / -.0039	+0 / -.0020	+0 / -.0050	
> 31.50 to 39.38	-.0010 / -.0032	-.0010 / -.0045	+0 / -.0022	+0 / -.0060	
> 39.38 to 49.22	-.0010 / -.0035	-.0010 / -.0050	+0 / -.0025	+0 / -.0070	
> 49.22 to 63.00	-.0012 / -.0042	-.0012 / -.0062	+0 / -.0030	+0 / -.0080	
> 63.00 to 78.75	-.0012 / -.0047	-.0012 / -.0072	+0 / -.0035	+0 / -.0090	
> 78.75 to 98.43	-.0014 / -.0054	-.0014 / -.0084	+0 / -.0040	+0 / -.0100	
> 98.43 to 124.02	-.0014 / -.0064	-.0014 / -.0094	+0 / -.0050	+0 / -.0120	

Size Range	H7	H10	N7	P9	JS 10
> .12 to .24	0005	-0 / +.0018	-.0001 / -.0006	-.0005 / -.0017	+.024 / -.024
> .24 to .40	-0 / +.0006	-0 / +.0022	-.0002 / -.0008	-.0006 / -.0020	+.029 / -.029
> .40 to .71	-0 / +.0007	-0 / +.0028	-.0002 / -.0009	-.0007 / -.0023	+.035 / -.035
> .71 to 1.09	-0 / +.0008	-0 / +.0035	-.0003 / -.0011	-.0008 / -.0028	+.042 / -.042
> 1.19 to 1.97	-0 / +.0010	-0 / +.0040	-.0003 / -.0013	-.0010 / -.0035	+.050 / -.050
> 1.97 to 3.15	-0 / +.0012	-0 / +.0045	-.0003 / -.0015	-.0014 / -.0044	+.060 / -.060
> 3.15 to 4.73	-0 / +.0014	-0 / +.0050	-.0005 / -.0019	-.0016 / -.0051	+.070 / -.070
> 4.73 to 7.09	-0 / +.0016	-0 / +.0060	-.0006 / -.0022	-.0018 / -.0058	+.080 / -.080
> 7.09 to 9.85	-0 / +.0018	-0 / +.0070	-.0008 / -.0026	-.0020 / -.0065	+.0925 / -.0925
> 9.85 to 12.41	-0 / +.0020	-0 / +.0080	-.0008 / -.0026	-.0022 / -.0072	+.105 / -.105
> 12.41 to 15.75	-0 / +.0022	-0 / +.0090	-.0008 / -.0030	-.0025 / -.0085	+.115 / -.115
> 15.75 to 19.69	-0 / +.0025	-0 / +.0100	-.0009 / -.0034	-.0028 / -.0088	+.125 / -.125
>19.69 to 24.81	-0 / +.0028	-0 / +.0120			+.140 / -.140
> 24.81 to 31.50	-0 / +.0030	-0 / +.0120			+.160 / -.160
> 31.50 to 39.38	-0 / +.0035	-0 / +.0140			+.180 / -.180
> 39.38 to 49.22	-0 / +.0040	-0 / +.0160			+.210 / -.210
> 49.22 to 63.00	-0 / +.0050	-0 / +.0200			+.250 / -.250
> 63.00 to 78.75	-0 / +.0060	-0 / +.0250			+.300 / -.300
> 78.75 to 98.43	-0 / +.0070	-0 / +.0280			+.350 / -.350
> 98.43 to 124.02	-0 / +.0080	-0 / +.0350			+.430 / -.430