Categorical Index

Numerical Index

Loxcreen's Finishes

Loxcreen's finishes include anodized finishes, electrolytic coloring (2-step), chemical finishes, mechanical finishes and liquid paint.

Loxcreen uses a sulfuric anodizing process. This is the most common process and it produces thin films suitable as pretreatment for organic and inorganic coatings.

Electrolytic coloring or 2-step anodizing is a two-step process. In the first step, the extrusion is clear anodized using conventional sulfuric anodizing. In the second step, the color is electrolytically deposited into the anodic pores. Colors range from champagne to black. 2-Step finish is much more resistant to fading than conventional color anodizing; however some variation in color is unavoidable because of process variables.

Our chemical finishes yield a matte or satin surface appearance (etched).

Loxcreen's standard liquid coating is an acrylic paint. The aluminum extrusion is cleaned and treated with a conversion coating. The paint is then electrostactically applied and cured in a high temp oven. It is typically applied in a single coat and has excellent application and mar-resistant properties. Polycron, which is a polyester coating, is also available. Polyester coatings are high solid, meaning they typically contain 55 to 70 percent solids. Acrylic solids ratio is 40 percent. Both coatings have a dry film thickness of 0.8 to 1.2 mils.

Loxcreen's Anodic Coating Designations:

Designation	Min. Film Thickness
200	.15 mils
201	.20 mils
202	.30 mils
Class II	.40 mils
Class I	.70 mils

Note: Class I and Class II are compliant to AAMA Specification 611.98

Loxcreen's Liquid Acrylic Coating:

Specification	Dry Film Thickness
AAMA2603-02	.80 mils minimum

Loxcreen Tempers

T-1: Cooled from an elevated temperature and naturally aged to a substantially stable condition. Applies to products for which the rate of cooling from an elevated temperature, such as casting or extrusion, is such that their strength is increased by room temperature aging.

T-4: Solution heat-treated and naturally aged to a substantially stable condition. Applies to products that are not cold worked after solution heat-treatment, or in which the effect of cold work in flattening or straightening may not be recognized in mechanical property limits.

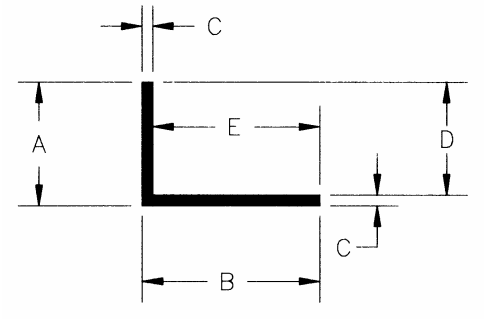
T-5: Cooled from an elevated temperature and then artificially aged. Applies to products that are cooled from an elevated temperature, such as casting or extrusion, and then artificially aged to improve mechanical properties or dimensional stability or both.

T-6: Solution heat-treated and then artificially aged. Applies to products that are not cold worked after solution heat- treatment, or in which the effect of cold work in flattening or straightening may not be recognized in mechanical property limits.

T-52: Cooled from an elevated temperature and artificially aged at an elevated temperature to produce a controlled temper range, typically used in bending or forming operations

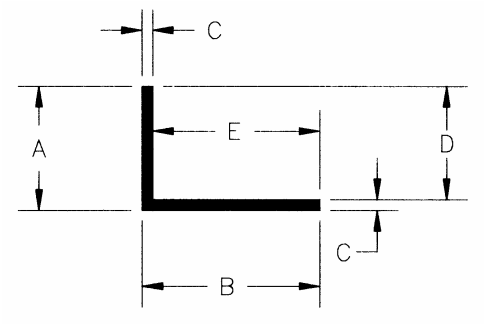
Note: Color variation is inherent in the anodizing process. Some finishes are not colorfast. Consider end use (inside or outside) when selecting a finish.

ANGLES - UNEQUAL LEGS



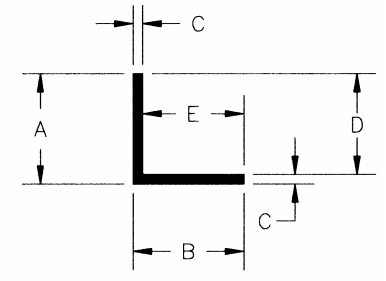
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA006842	.375	.500	.062	.313	.438	.060	1.750	29
AA000689	.375	.750	.062	.313	.688	.079	2.250	28
AA001652	.375	.750	.125	.250	.652	.150	2.250	15
AA003612	.375	1.000	.062	.313	.938	.097	2.710	28
AA005855	.500	.750	.062	.438	.688	.089	2.500	28
AA000682	.500	1.000	.062	.438	.938	.107	3.000	28
AA002209	.500	1.250	.125	.375	1.125	.244	3.500	14
AA011667	.625	1.000	.062	.938	.938	.116	3.210	28
AA002246	.625	1.562	.050	.575	1.512	.128	4.374	34
AA002120	.750	1.000	.125	.625	.875	.244	3.500	14
AA000490	.750	1.250	.062	.688	1.188	.144	4.000	28
AA000497	.750	1.500	.062	.688	1.438	.163	4.500	28

ANGLES - UNEQUAL LEGS



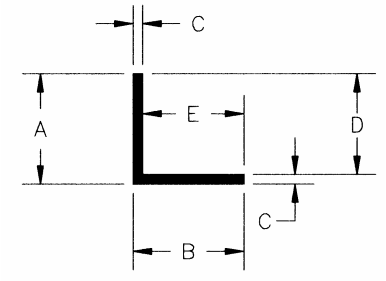
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA001509	1.000	1.250	.062	.938	1.188	.163	4.500	28
AA001529	1.000	1.500	.050	.950	1.450	.148	5.000	34
AA004631	1.000	1.500	.078	.922	1.422	.227	5.000	22
AA001595	1.000	1.500	.094	.906	1.406	.271	5.000	18
AA001365	1.000	1.500	.125	.875	1.375	.356	5.000	14
AA000171	1.000	2.000	.094	.906	1.906	.328	6.000	18
AA008149	1.000	2.000	.125	.875	1.875	.431	6.000	14
AA008196	1.000	2.000	.188	.812	1.812	.635	6.000	9
AA003605	1.000	2.500	.125	.875	2.375	.506	7.000	14
AA001557	1.000	3.000	.094	.906	2.906	.440	8.000	18
AA001933	1.000	3.750	.125	.875	3.625	.694	9.500	14
AA002249	1.500	2.000	.062	1.438	1.938	.256	7.000	27
AA002250	1.500	2.000	.093	1.407	1.907	.380	7.000	18
AA018521	1.750	2.500	.125	1.625	2.375	.618	8.460	14
AA020353	2.000	2.500	.188	1.812	2.312	.973	8.980	9
AA020500	2.000	3.000	.062	1.938	2.938	.367	9.970	27
AA020924	2.000	3.000	.125	1.875	2.875	.731	9.960	14
AA012473	2.000	3.000	.250	1.750	2.750	1.426	10.000	7
AA007454	2.000	4.000	.125	1.875	3.875	.881	12.000	14
AA017651	2.500	3.000	.125	2.375	2.875	.806	11.000	14
AA020655	3.000	2.000	.093	2.907	1.907	.547	9.970	18

ANGLES - EQUAL LEGS



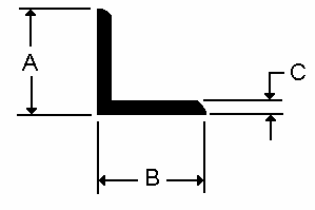
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA000796	.500	.500	.050	.450	.450	.058	2.000	34
AA000069	.500	.500	.055	.445	.445	.062	2.000	32
AA002224	.500	.500	.125	.375	.375	.131	2.000	15
AA012133	.750	.750	.040	.710	.710	.070	3.000	43
AA000089	.750	.750	.062	.688	.688	.107	3.000	28
AA000494	1.000	1.000	.045	.955	.955	.106	4.000	38
AA000199	1.000	1.000	.062	.938	.938	.144	4.000	28
AA001594	1.000	1.000	.094	.906	.906	.215	4.000	19
AA000382	1.000	1.000	.125	.875	.875	.281	4.000	14
AA000191	1.250	1.250	.064	1.186	1.186	.187	5.000	27
AA018310	1.250	1.250	.100	1.150	1.150	.288	5.000	17
AA000637	1.250	1.250	.125	1.125	1.125	.356	5.000	14
AA008236	1.250	1.250	.187	1.063	1.063	.520	5.000	10
AA001912	1.500	1.500	.062	1.438	1.438	.218	6.000	28
AA000421	1.500	1.500	.125	1.375	1.375	.431	6.000	14
AA008843	1.500	1.500	.188	1.312	1.312	.635	6.000	9
AA008221	1.750	1.750	.125	1.625	1.625	.506	7.000	14
AA002215	2.000	2.000	.062	1.938	1.938	.293	8.000	27
AA020654	2.000	2.000	.093	1.907	1.907	.436	7.970	18

ANGLES - EQUAL LEGS



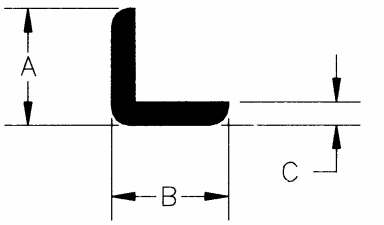
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA001260	2.000	2.000	.125	1.875	1.875	.581	8.000	14
AA008112	2.000	2.000	.187	1.813	1.813	.856	8.000	9
AA001447	2.000	2.000	.250	1.750	1.750	1.126	8.000	7
AA010552	2.500	2.500	.250	2.250	2.250	1.426	10.000	7
AA010029	3.000	3.000	.125	2.875	2.875	.881	12.000	14
AA012472	3.000	3.000	.250	2.750	2.750	1.726	12.000	7
AA002509	3.188	3.188	.094	3.094	3.094	.709	12.750	18

ANGLES - RADIUS INSIDE CORNERS



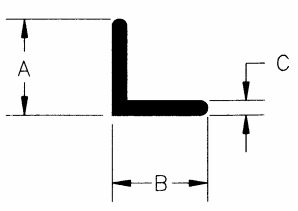
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA010773	2.000	2.000	.125	.574	7.890	14

ANGLES - RADIUS OUTSIDE CORNERS



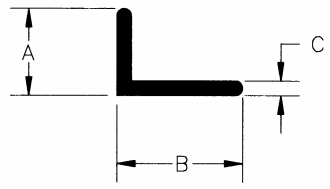
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA001896	1.310	2.060	.060	.234	6.630	28

EQUAL ANGLES - RADIUS ENDS



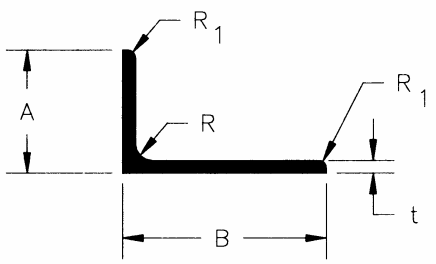
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA016092	2.000	2.000	.250	1.109	7.790	7

UNEQUAL ANGLES - RADIUS ENDS



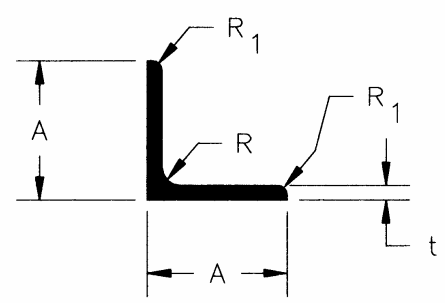
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA008278	1.125	1.375	.090	.244	4.940	20

STANDARD STRUCTURAL SHAPES
UNEQUAL ANGLES



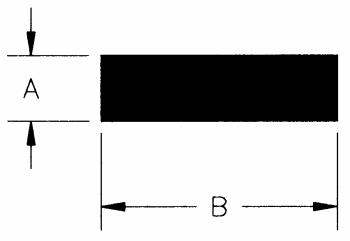
DIE NO.	A	B	t	R	R_1	AREA SQUARE INCHES	WEIGHT PER FOOT POUNDS
AA020633	1	1-1/2	1/4	3/16	1/8	.563	.676
AA008125	2	3	3/16	3/16	3/16	.893	1.072
AA008179	2	3	1/4	5/16	3/16	1.193	1.432
AA014655	2	4	3/16	5/16	3/16	1.098	1.318

STANDARD STRUCTURAL SHAPES
EQUAL ANGLES



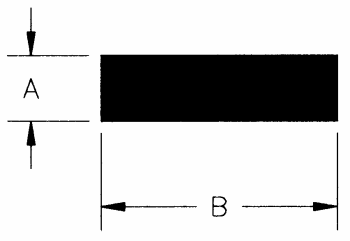
DIE NO.	A	t	R	R_1	AREA SQUARE INCHES	WEIGHT PER FOOT POUNDS
AA014566	1	1/8	3/16	1/8	.235	.282
AA000380	1	1/8	1/8	1/8	.231	.277
AA008231	1-1/2	1/8	1/8	1/8	.356	.427
AA000093	1-1/2	1/8	3/16	1/8	.360	.432
AA008103	1-1/2	3/16	3/16	3/16	.519	.623
AA008245	1-1/2	1/4	3/16	1/8	.688	.826
AA020288	2	3/16	1/8	3/16	.701	.841
AA008124	2	3/16	3/16	3/16	.706	.847
AA008102	2	1/4	1/4	1/4	.925	1.110
AA008138	3	1/4	5/16	1/4	1.432	1.718

BAR STOCK - RECTANGULAR



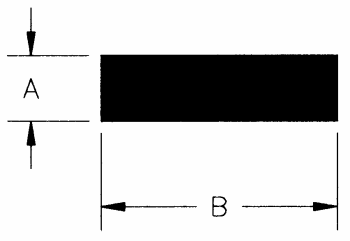
DIE NO.	A-INCH	B-INCH	WT./FT.	PER.	FACTOR
AA000113	.062	.750	.056	1.624	29
AA000114	.062	1.000	.074	2.120	29
AA003549	.062	1.250	.094	2.625	28
AA000115	.062	1.500	.112	3.124	28
AA003531	.062	2.000	.149	4.124	28
AA010837	.065	3.000	.234	6.130	26
AA008155	.100	.480	.058	1.130	19
AA008247	.125	.375	.056	1.000	18
AA011207	.125	.500	.074	1.220	16
AA000614	.125	.750	.113	1.750	15
AA000219	.125	1.000	.150	2.250	15
AA000390	.125	1.500	.226	3.250	14
AA000218	.125	2.000	.300	4.250	14
AA010028	.125	2.500	.376	5.250	14
AA002514	.125	3.000	.450	6.250	14

BAR STOCK - RECTANGULAR



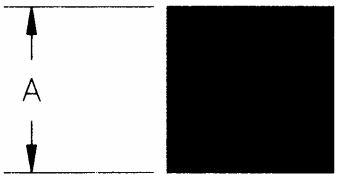
DIE NO.	A-INCH	B-INCH	WT./FT.	PER.	FACTOR
AA008242	.125	4.000	.600	8.250	14
AA000228	.187	1.000	.224	2.375	11
AA008101	.187	1.250	.281	2.875	10
AA008239	.187	2.000	.449	4.375	10
AA000615	.188	.750	.169	1.850	11
AA000837	.188	1.500	.338	3.376	10
AA010595	.188	3.000	.677	6.380	9
AA004179	.190	1.500	.342	3.380	10
AA001467	.250	.625	.187	1.750	9
AA000117	.250	1.000	.300	2.470	8
AA001364	.250	1.250	.376	3.000	8
AA001223	.250	1.500	.450	3.500	8
AA001257	.250	2.000	.600	4.500	8
AA001246	.250	2.500	.750	5.500	7
AA000386	.250	3.000	.900	6.500	7
AA001957	.250	4.000	1.200	8.470	7

BAR STOCK - RECTANGULAR



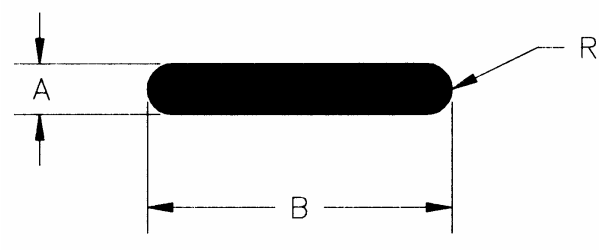
DIE NO.	A-INCH	B-INCH	WT./FT.	PER.	FACTOR
AA012571	.250	5.000	1.500	10.500	7
AA003394	.250	6.000	1.800	12.500	7
AA018679	.375	.625	.281	1.980	7
AA016335	.375	1.000	.450	2.750	6
AA008158	.375	1.500	.674	3.700	5
AA008169	.375	2.000	.900	4.720	5
AA001505	.375	2.500	1.125	5.750	5
AA001258	.375	3.000	1.350	6.750	5
AA007100	.375	4.000	1.800	8.720	5
AA016017	.415	1.100	.548	3.030	6
AA008146	.500	1.500	.899	3.950	4
AA001245	.500	2.000	1.200	5.000	4
AA008172	.500	3.000	1.800	7.000	4
AA001402	.500	4.000	2.400	9.000	4
AA008197	1.000	2.000	2.400	5.970	2
AA006132	1.000	4.000	4.800	10.000	2
AA007062	1.563	3.125	5.861	9.380	2

SQUARE BAR



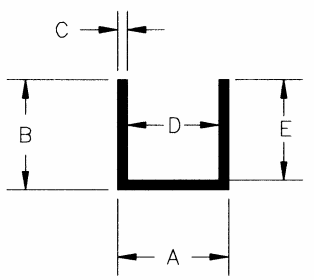
DIE NO.	A-INCH	WT./FT.	PER.	FACTOR
AA000375	.375	.169	1.500	16
AA000001	.500	.300	2.000	7
AA000162	.750	.676	3.000	4
AA008265	1.000	1.200	4.000	3
AA008130	1.500	2.696	5.890	2

RECTANGULAR BAR - ROUNDED CORNERS



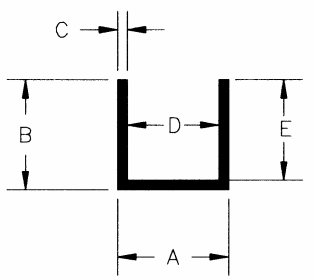
DIE NO.	A-INCH	B-INCH	R	WT./FT.	PER.	FACTOR
AA012132	.045	.875	.0225	.047	1.800	38
AA011090	.125	.500	.0620	.071	1.140	16
AA006293	.125	.750	.0625	.108	1.640	15
AA005535	.184	1.683	.0920	.362	3.580	10
AA000311	.187	1.500	.0935	.328	3.210	10
AA007381	.187	3.250	.0935	.720	6.710	9
AA019708	.188	1.000	.0940	.216	2.210	10
AA015217	.250	2.000	.1250	.584	4.290	7
AA002399	.500	1.500	.2500	.835	3.570	4
AA002691	.500	2.000	.2500	1.135	4.571	4

CHANNELS



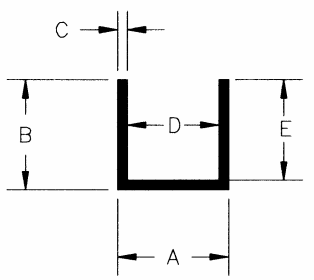
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA000085	.374	.375	.062	.250	.313	.074	2.120	29
AA000243	.375	.500	.068	.239	.432	.101	2.610	26
AA002397	.379	.937	.062	.255	.875	.158	4.380	28
AA002908	.430	1.000	.060	.310	.940	.167	4.740	28
AA000287	.500	.500	.046	.408	.454	.078	2.860	37
AA002440	.500	.500	.062	.376	.438	.102	2.876	28
AA006867	.500	.500	.125	.250	.375	.187	2.700	14
AA005421	.625	.625	.062	.501	.563	.131	3.630	28
AA004180	.639	.562	.062	.514	.500	.122	3.400	28
AA007446	.690	.750	.055	.580	.695	.137	4.220	31
AA010110	.750	.312	.062	.626	.250	.094	2.620	28
AA000495	.750	.500	.125	.500	.375	.226	3.250	14
AA005860	.750	.750	.062	.626	.688	.158	4.380	28
AA008227	.750	.750	.125	.500	.625	.300	4.250	14
AA011037	.874	.562	.062	.750	.500	.139	3.870	28

CHANNELS



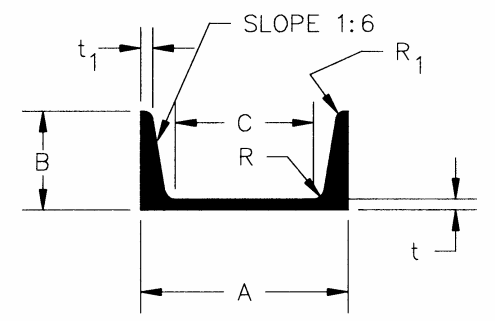
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA002415	.937	.812	.062	.813	.750	.181	5.000	28
AA000083	.975	.375	.050	.875	.325	.097	3.350	35
AA000288	1.000	.500	.125	.750	.375	.263	3.750	14
AA002809	1.000	.625	.062	.876	.563	.158	4.380	28
AA008215	1.000	.750	.125	.750	.625	.337	4.750	14
AA000238	1.000	1.000	.125	.750	.875	.413	5.750	14
AA000387	1.125	.875	.062	1.000	.813	.206	5.630	27
AA013534	1.156	.875	.062	1.032	.813	.206	5.690	28
AA001922	1.250	1.250	.125	1.000	1.125	.526	7.250	14
AA008228	1.250	1.250	.187	.876	1.063	.757	7.130	9
AA019770	1.375	1.375	.055	1.265	1.320	.265	8.090	31
AA002946	1.500	.750	.062	1.376	.688	.214	5.820	27
AA008121	1.500	1.000	.125	1.250	.875	.487	6.750	14
AA002850	1.500	1.500	.125	1.250	1.375	.637	8.750	14
AA017354	1.750	1.000	.093	1.564	.907	.397	7.290	18
AA016662	1.750	1.750	.093	1.564	1.657	.564	10.230	18
AA004872	1.875	1.250	.125	1.625	1.125	.619	8.500	14

CHANNELS



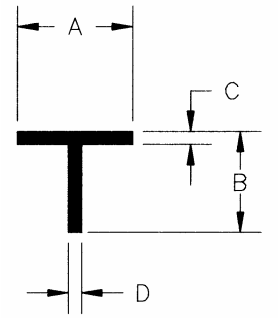
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	E-INCH	WT./FT.	PER.	FACTOR
AA011968	2.000	.750	.093	1.814	.625	.370	6.810	18
AA000164	2.000	1.000	.125	1.750	.875	.563	7.750	14
AA015163	2.000	2.000	.188	1.624	1.812	1.268	11.620	9
AA005345	2.375	1.250	.250	1.875	1.000	1.313	9.250	7
AA017166	2.500	1.000	.125	2.250	.875	.637	8.750	14
AA008181	2.500	1.500	.125	2.250	1.375	.787	10.750	14
AA005549	2.500	2.500	.125	2.250	2.375	1.087	14.750	14
AA003550	3.000	1.000	.125	2.750	.875	.713	9.750	14
AA008133	3.000	2.000	.250	2.500	1.750	1.950	13.500	7
AA010592	3.250	1.125	.125	3.000	1.000	.787	10.750	14
AA000456	4.000	1.000	.078	3.844	.922	.547	11.844	22
AA006542	4.000	1.750	.102	3.796	1.648	.893	14.800	17
AA008277	4.500	1.625	.125	4.250	1.500	1.126	15.250	14
AA002767	5.250	1.500	.125	5.000	1.375	1.200	16.200	14

CHANNELS - AMERICAN STANDARD



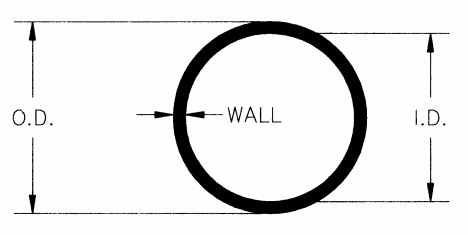
DIE NO.	A	B	C	t	t_1	R	R_1	AREA SQUARE INCHES	WEIGHT PER FOOT POUNDS
AA008191	3.000	1.498	1-3/4	.258	.170	.270	.100	1.470	1.764
AA008162	5.000	1.750	3-3/4	.190	.190	.290	.110	1.969	2.363

TEE SECTIONS



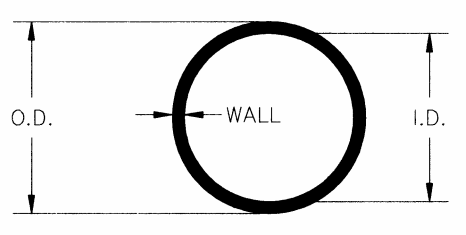
DIE NO.	A-INCH	B-INCH	C-INCH	D-INCH	WT./FT.	PER.	FACTOR
AA011177	1.250	.750	.062	.062	.144	4.000	28
AA013305	2.000	.750	.125	.125	.394	5.500	14

ROUND TUBES



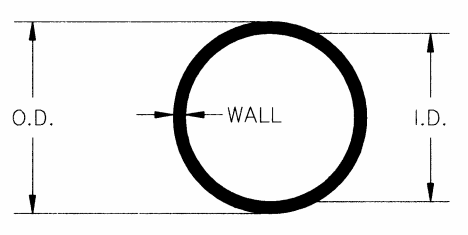
DIE NO.	O.D.	I.D.	WALL	WT./FT.	PER.	FACTOR
AA012520	.375	.275	.050	.061	2.040	33
AA004059	.375	.170	.102	.106	1.712	16
AA013109	.500	.324	.088	.137	2.590	19
AA005431	.606	.512	.047	.100	3.510	35
AA006284	.625	.505	.060	.128	3.550	28
AA008235	.625	.527	.049	.107	3.620	34
AA013360	.625	.445	.090	.181	3.360	19
AA002058	.745	.621	.062	.160	4.300	27
AA004015	.750	.650	.050	.132	4.400	33
AA008894	.750	.670	.040	.107	4.460	42
AA005836	.859	.761	.049	.150	5.090	34
AA001968	.875	.751	.062	.190	5.110	27
AA004182	.875	.777	.049	.152	5.190	34
AA008144	1.000	.750	.125	.413	5.500	13
AA004184	1.000	.870	.065	.229	5.870	26
AA008677	1.000	.876	.062	.218	5.890	27
AA002079	1.000	.900	.050	.179	5.970	33
AA004442	1.125	1.031	.047	.191	6.770	35
AA008128	1.250	1.000	.125	.530	7.070	13
AA019342	1.250	1.073	.177	.716	6.740	9
AA008136	1.250	1.150	.050	.226	7.540	33

ROUND TUBES



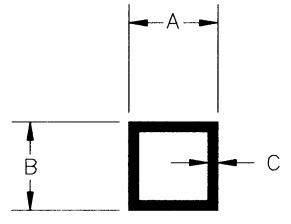
DIE NO.	O.D.	I.D.	WALL	WT./FT.	PER.	FACTOR
AA014744	1.325	1.075	.125	.565	7.540	13
AA008152	1.500	1.250	.125	.648	8.640	13
AA008253	1.500	1.280	.110	.576	8.730	15
AA002947	1.500	1.370	.065	.352	9.020	26
AA007451	1.500	1.400	.050	.274	9.110	33
AA008171	2.000	1.500	.250	1.649	11.000	7
AA018378	2.000	1.860	.140	.982	11.680	12
AA012012	2.000	1.750	.125	.884	11.780	13
AA008165	2.000	1.870	.065	.474	12.150	26
AA013892	2.000	1.902	.049	.361	12.260	34
AA002948	2.250	2.090	.080	.654	13.630	21
AA015369	2.300	2.050	.125	1.025	13.670	13
AA018490	2.500	2.310	.095	.862	15.110	18
AA008208	3.500	3.250	.125	1.590	21.210	13
AA008229	4.000	3.500	.250	3.534	23.560	7
AA008207	4.000	3.750	.125	1.826	24.350	13

EXTRUDED ALUMINUM PIPE



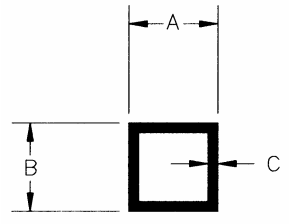
DIE NO.	Nom. Pipe Size (Inches)	O.D. (Inches)	Sched. No.	I. D. (Inches)	Wall Thick (Inches)	Nom. Wgt. Per Linear Foot	Perimeter
AA002198	1/2	.840	40	.622	.109	.300	4.593
AA008105	3/4	1.050	40	.824	.113	.400	5.891
AA008116	1	1.315	40	1.049	.133	.593	7.430
AA008243	1-1/4	1.660	10	1.442	.109	.637	9.750
AA008107	1-1/4	1.660	40	1.380	.140	.803	9.550
AA014429	1-1/2	1.900	10	1.682	.109	.736	11.250
AA008108	1-1/2	1.900	40	1.610	.145	.960	11.030
AA008109	2	2.375	40	2.067	.154	1.290	13.950
AA008170	2-1/2	2.875	40	2.469	.203	2.045	16.790
AA008118	3	3.500	40	3.068	.216	2.674	20.640

SQUARE TUBE



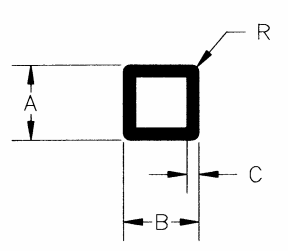
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA005748	.490	.490	.050	.106	3.530	33
AA005777	.625	.625	.050	.138	4.600	33
AA003419	.750	.750	.062	.205	5.500	27
AA018889	.750	.750	.125	.374	4.960	13
AA008148	1.000	1.000	.062	.280	7.450	27
AA020800	1.000	1.000	.100	.432	7.160	17
AA000860	1.000	1.000	.125	.526	7.000	13
AA010067	1.234	1.234	.050	.284	9.420	33
AA003872	1.250	1.250	.062	.354	9.500	27
AA013329	1.250	1.250	.097	.536	9.220	17
AA008223	1.250	1.250	.125	.676	9.000	13
AA011508	1.500	1.500	.062	.428	11.500	27
AA013328	1.500	1.500	.072	.493	11.420	23
AA018546	1.500	1.500	.095	.641	11.240	18
AA008222	1.500	1.500	.125	.826	11.000	13
AA015509	1.750	1.750	.090	.718	13.280	18
AA008167	1.750	1.750	.125	.976	13.000	13
AA011498	2.000	2.000	.060	.559	15.465	28
AA018649	2.000	2.000	.093	.851	15.260	18
AA008123	2.000	2.000	.125	1.126	15.000	13

SQUARE TUBE



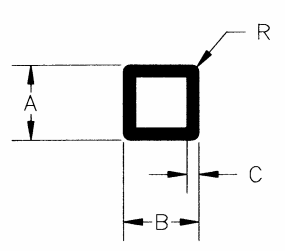
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA008264	2.000	2.000	.187	1.627	14.500	9
AA010910	2.000	2.000	.250	2.100	13.950	7
AA018822	2.500	2.500	.075	.874	9.970	22
AA019090	2.500	2.500	.125	1.426	18.960	13
AA004871	2.625	2.625	.125	1.500	20.000	13
AA008785	3.000	3.000	.092	1.284	24.550	19
AA006167	3.000	3.000	.125	1.726	23.000	13
AA020741	3.000	3.000	.250	3.300	21.950	7

SQUARE TUBE WITH RADIUS



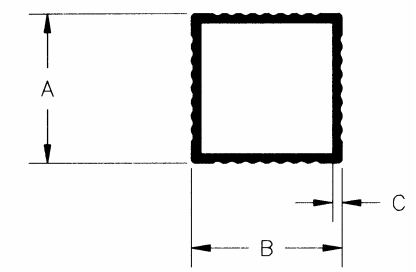
DIE NO.	A-INCH	B-INCH	C-INCH	R	WT./FT.	PER.	FACTOR
AA019982	.500	.500	.063	.012	.131	3.460	26
AA008097	.500	.500	.080	.047	.158	3.280	21
AA020078	.620	.620	.045	.063	.121	4.440	37
AA018650	.625	.625	.045	.015	.125	4.590	37
AA012484	.625	.625	.062	.062	.163	4.400	27
AA020079	.745	.745	.055	.094	.174	5.310	31
AA018695	.750	.750	.055	.031	.184	5.450	30
AA018802	.750	.750	.055	.062	.180	5.420	30
AA008771	.750	.750	.062	.093	.193	5.290	27
AA018643	.750	.750	.062	.188	.185	4.970	27
AA012485	.750	.750	.065	.062	.210	5.370	26
AA019008	.750	.750	.090	.020	.284	5.220	18
AA014880	.760	.760	.100	.031	.316	5.230	17
AA003938	.812	.812	.049	.078	.174	5.920	34
AA014879	.836	.836	.062	.031	.229	6.140	27
AA005350	.937	.937	.041	.119	.168	6.830	41
AA015771	.986	.986	.055	.086	.239	7.250	30
AA005273	1.000	1.000	.041	.119	.180	7.340	41
AA004274	1.000	1.000	.045	.123	.197	7.290	37
AA000855	1.000	1.000	.050	.031	.227	7.550	33
AA007993	1.000	1.000	.055	.031	.248	7.510	30
AA013883	1.000	1.000	.057	.125	.247	7.220	29
AA009215	1.000	1.000	.062	.093	.271	7.290	27

SQUARE TUBE WITH RADIUS



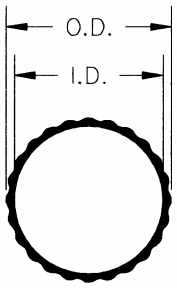
DIE NO.	A-INCH	B-INCH	C-INCH	R	WT./FT.	PER.	FACTOR
AA010292	1.000	1.000	.075	.093	.324	7.210	22
AA016908	1.000	1.000	.090	.093	.384	7.120	19
AA011154	1.000	1.000	.100	.093	.424	7.010	17
AA006947	1.000	1.000	.125	.125	.509	6.790	13
AA019062	1.020	1.020	.120	.180	.490	6.790	14
AA012543	1.125	1.125	.065	.156	.314	8.060	26
AA013910	1.250	1.250	.065	.140	.355	9.110	26
AA010032	1.250	1.250	.090	.125	.486	9.000	19
AA000856	1.500	1.500	.050	.031	.347	11.550	33
AA008969	1.500	1.500	.062	.093	.420	11.290	27
AA021029	1.500	1.500	.068	.125	.451	11.150	25
AA013337	1.500	1.500	.090	.032	.610	11.170	18
AA015079	1.500	1.500	.125	.093	.816	10.840	13
AA019063	1.520	1.520	.120	.180	.778	10.790	14
AA001837	1.650	1.650	.125	.031	.914	12.150	13
AA016136	2.000	2.000	.125	.125	1.110	14.730	13
AA019782	2.000	2.000	.250	.250	2.100	13.140	6
AA020423	2.250	2.250	.125	.031	1.276	16.890	13
AA016135	3.000	3.000	.125	.125	1.710	22.730	13
AA018450	4.000	4.000	.125	.078	2.318	30.850	13
AA015227	4.000	4.000	.250	.125	4.484	29.790	7

FLUTED SQUARE TUBE



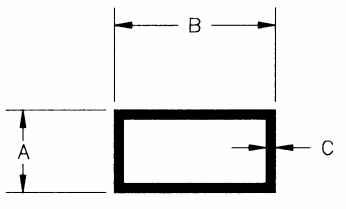
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA006946	.975	.975	.040	.196	8.060	41
AA003947	1.000	1.000	.053	.227	7.680	34

FLUTED ROUND TUBE



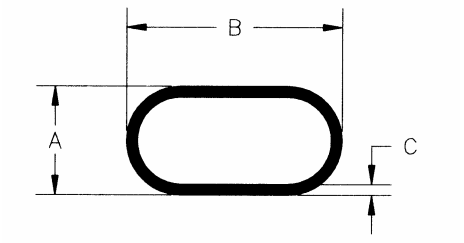
DIE NO.	O.D.	I.D.	WT./FT.	PER.	FACTOR
AA019709	.750	.700	.106	4.46	42
AA007346	.860	.760	.122	5.18	42
AA005170	1.000	. 900	.148	6.07	41
AA003747	1.750	1.350	.323	10.68	33

RECTANGULAR TUBE



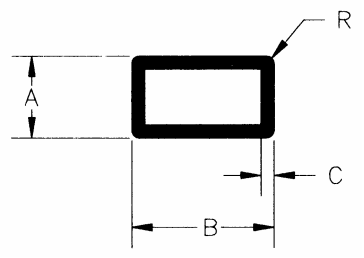
DIE NO.	A-INCH	B-INCH	C-INCH	WT./FT.	PER.	FACTOR
AA009556	.500	1.000	.062	.205	5.500	27
AA007743	.625	1.250	.062	.261	7.000	27
AA008127	1.000	1.500	.125	.674	9.000	13
AA003759	1.000	2.000	.060	.415	11.520	28
AA002894	1.000	2.000	.078	.533	11.380	21
AA008168	1.000	2.000	.125	.826	10.940	13
AA020623	1.000	3.000	.090	.826	15.230	18
AA016860	1.000	3.000	.125	1.124	14.950	13
AA008660	1.000	4.000	.125	1.426	19.000	13
AA020625	1.000	5.000	.090	1.258	23.230	18
AA009846	1.180	1.750	.055	.372	11.230	30
AA017361	1.375	3.000	.125	1.237	16.450	13
AA012097	1.500	2.000	.125	.974	13.000	13
AA014309	1.500	2.500	.125	1.126	15.000	13
AA013763	1.500	3.000	.125	1.276	17.000	13
AA018890	1.500	4.000	.125	1.576	20.960	13
AA005462	1.500	4.000	.180	2.220	20.470	9
AA002895	1.750	3.000	.125	1.350	18.020	13
AA008110	1.750	4.000	.125	1.650	21.950	13
AA014446	1.750	5.000	.125	1.950	26.000	13
AA019912	2.000	3.000	.060	.703	19.480	28
AA016657	2.000	3.000	.125	1.426	19.000	13
AA020624	2.000	4.000	.090	1.258	23.230	18
AA020166	2.000	5.000	.125	2.026	27.000	13

OVAL TUBE



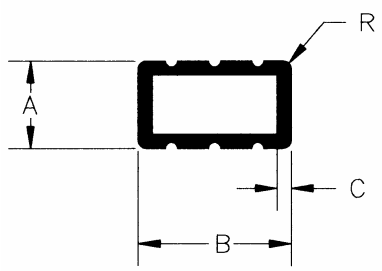
DIE NO.	A	B	C	WT./FT.	PER.	FACTOR
AA014558	1.000	1.875	.125	.674	9.00	13
AA014470	1.250	4.000	.135	1.458	18.01	12
AA014556	1.260	3.000	.135	1.136	14.03	12

RECTANGULAR TUBE WITH RADIUS



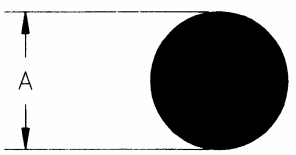
DIE NO.	A-INCH	B-INCH	C-INCH	R	WT./FT.	PER.	FACTOR
AA018373	1.000	1.500	.062	.093	.346	9.290	27
AA013336	1.000	1.500	.090	.032	.502	9.170	18
AA004210	1.000	2.000	.047	.125	.318	11.280	35
AA009349	1.000	2.000	.083	.098	.554	11.140	20
AA005384	1.000	3.000	.125	.062	1.121	14.890	13
AA012488	1.265	2.500	.125	.375	.974	12.990	13
AA015213	1.500	2.000	.125	.095	.966	12.840	13
AA020582	1.500	2.750	.070	.156	.673	16.020	24
AA013338	1.500	3.000	.125	.032	1.276	16.890	13
AA015078	1.500	4.000	.125	.095	1.566	20.840	13
AA019406	2.000	4.000	.125	.250	1.676	22.360	13

FLUTED RECTANGULAR TUBE WITH RADIUS



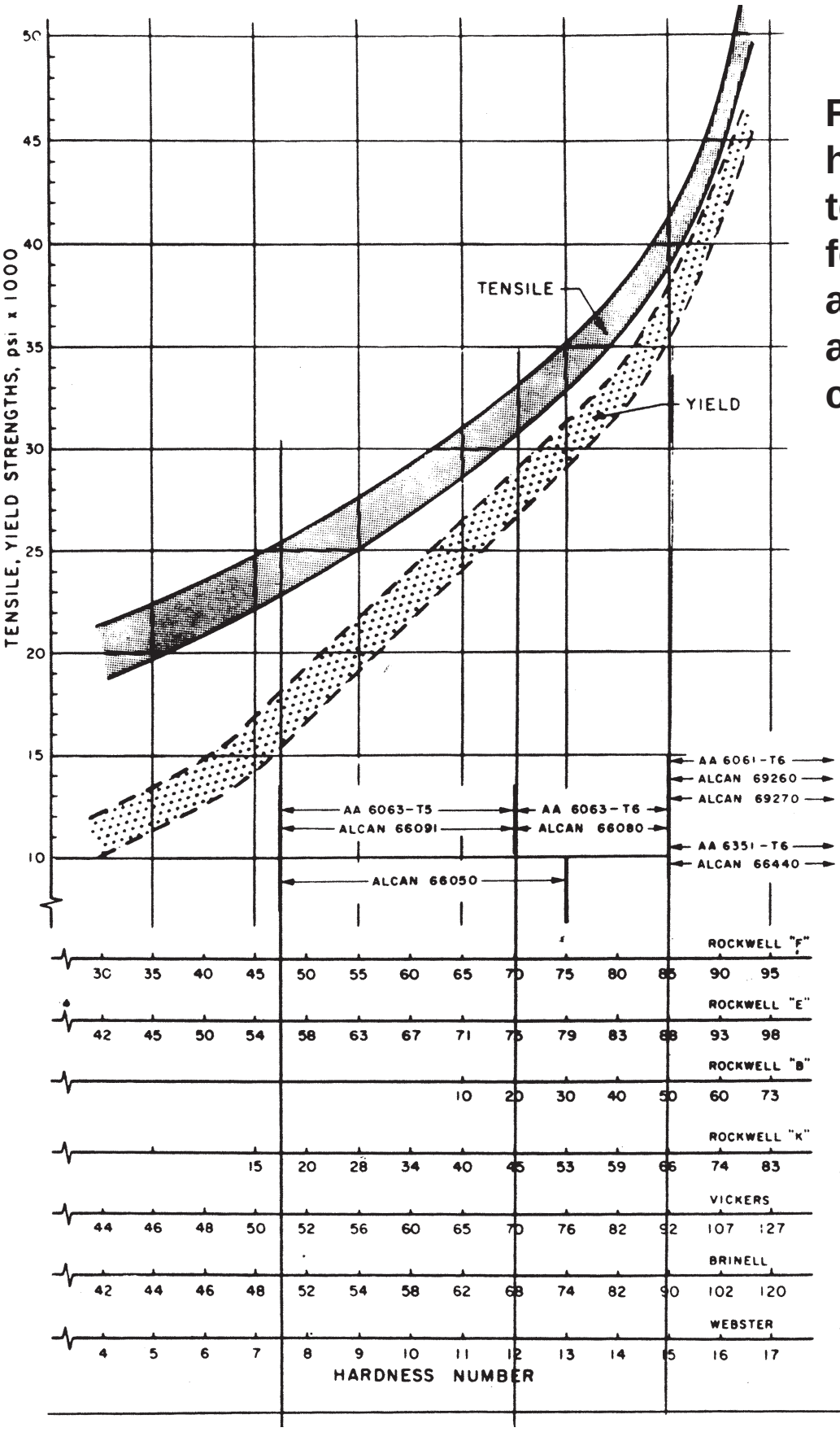
DIE NO.	A-INCH	B-INCH	C-INCH	R	WT./FT.	PER.	FACTOR
AA001780	.750	1.000	.062	.031	.226	6.937	31

ROUND RODS



DIE NO.	A-INCH	WT./FT.	PER.	FACTOR
AA008137	.250	.059	.785	13
AA008233	.375	.133	1.180	9
AA007684	.438	.180	1.370	8
AA008156	.500	.235	1.571	7
AA008153	.625	.368	1.964	5
AA001287	.750	.530	2.360	4
AA008234	1.000	.942	3.142	3
AA014870	1.375	1.782	4.320	2
AA014871	2.000	3.770	6.280	2

HARDNESS vs. MECHANICAL PROPERTIES



Relationship between hardness number and tensile, yield strengths for magnesium-silicide alloy extrusions in the artificially aged condition

HARDNESS TESTER SETTINGS

ROCKWELL “F”
1/16” Steel Ball Penetrator -- 60 KG. Load

ROCKWELL “E”
1/8” Steel Ball Penetrator -- 100 KG. Load

ROCKWELL “B”
1/16” Steel Ball Penetrator --100 KG. Load

ROCKWELL “K”
1/8” Steel Ball Penetrator-- 150 KG. Load

VICKERS
Diamond Penetrator --Various Loadings

BRINELL
10mm. Steel Ball Penetrator -- 500 KG. Load

WEBSTER
Model “B”

Step-by-Step Illustration of Standard Tolerancing

Just to show how the tables are used, a step-by-step example of standard tolerancing is spelled out on the following pages, applied to the "Model Extrusion" that appears at the top of Table 8-1

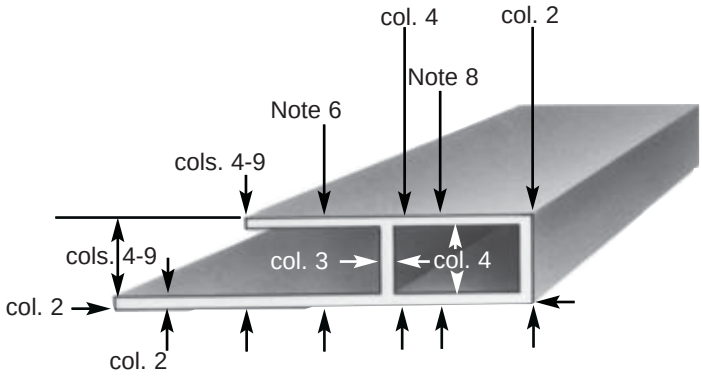


Table 8-1 Standard Cross-Sectional Dimension Tolerances (Except for T3510, T4510, T6510, T73510, T76510, and T8510 Tempers) [7]

SPECIFIED DIMENSION inches	TOLERANCE ② ③ — INCHES PLUS AND MINUS															
	METAL DIMENSIONS				SPACE DIMENSIONS											
	ALLOWABLE DEVIATION FROM SPECIFIED DIMENSION WHERE 75 PERCENT OR MORE OF THE DIMENSION IS METAL ⑨ ⑨				ALLOWABLE DEVIATION FROM SPECIFIED DIMENSION WHERE MORE THAN 25 PERCENT OF THE DIMENSION IS SPACE ⑥ ⑧											
	All Except Those Covered by Column 3		Wall Thickness ④ Completely ⑤ Enclosing Space 0.11 sq. in. and Over (Eccentricity)		At Dimensioned Points 0.250-0.624 inches from Base of Leg		At Dimensioned Points 0.625-1.249 inches from Base of Leg		At Dimensioned Points 1.250-2.499 inches from Base of Leg		At Dimensioned Points 2.500-3.999 inches from Base of Leg		At Dimensioned Points 4.000-5.999 inches from Base of Leg		At Dimensioned Points 6.000-8.000 inches from Base of Leg	
Col. 1	Col. 2		Col. 3		Col. 4		Col. 5		Col. 6		Col. 7		Col. 8		Col. 9	
	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys	Alloys 5083 5086 5454	Other Alloys
CIRCUMSCRIBING CIRCLE SIZES LESS THAN 10 INCHES IN DIAMETER																
Up thru 0.124	.009	.006	±15% of specified dimension; ±.090 max. ±.015 min.	±10% of specified dimension; ±.060 max. ±.010 min.	.013	.010	.015	.012	..	..	..	..	..	..	..	..
0.125-0.249	.011	.007			.016	.012	.018	.014	.020	.016	..	..	..	..	..	..
0.250-0.499	.012	.008			.018	.014	.020	.016	.022	.018	.024	.020	..	..	..	..
0.500-0.749	.014	.009			.021	.016	.023	.018	.025	.020	.027	.022	..	..	..	..
0.750-0.999	.015	.010			.023	.018	.025	.020	.027	.022	.030	.025	.030	.035	..	..
1.000-1.499	.018	.012			.027	.021	.029	.023	.032	.026	.036	.030	.041	.035	..	..
1.500-1.999	.021	.014			.031	.024	.033	.026	.038	.031	.043	.036	.049	.042	.057	.050
2.000 3.999	.036	.024			.046	.034	.050	.038	.060	.048	.069	.057	.080	.068	.092	.080
4.000 5.999	.051	.034			.061	.044	.067	.050	.081	.064	.095	.078	.111	.094	.127	.110
6.000 7.999	.066	.044			.076	.054	.084	.062	.104	.082	.121	.099	.142	.120	.162	.140
8 000-9.999	.081	.054			.091	.064	.101	.074	.127	.100	.147	.120	.182	.145	.197	.170
CIRCUMSCRIBING CIRCLE SIZES 10 INCHES IN DIAMETER AND OVER																
Up thru 0.124	.021	.014	±15% of specified dimension; ±.090 max. ±.025 min.	±15% of specified dimension; ±.090 max. ±.015 min.	.025	.018	.027	.020	..	..	..	..	..	..	..	..
0.125-0.249	.022	.015			.026	.019	.029	.022	.035	.028	..	..	..	..	..	..
0.250-0.499	.024	.016			.028	.020	.032	.024	.038	.030	.058	.050	..	..	..	..
0.500-0.749	.025	.017			.030	.022	.035	.027	.049	.040	.068	.060	..	..	..	..
0.750-0.999	.027	.018			.031	.023	.039	.030	.057	.050	.079	.070	.099	.090	..	..
1.000-1.499	.028	.019			.033	.024	.043	.034	.069	.060	.089	.080	.109	.100	..	..
1.500-1.999	.036	.024			.046	.034	.056	.044	.082	.070	.102	.090	.122	.110	.182	.170
2.000-3.999	.051	.034			.061	.044	.071	.054	.097	.080	.117	.100	.137	.120	.197	.180
4.000-5.999	.066	.044			.076	.054	.086	.064	.112	.090	.132	.110	.152	.130	.212	.190
6.000-7.999	.081	.054			.091	.064	.101	.074	.127	.100	.147	.120	.167	.140	.227	.200
8.000-9.999	.096	.064			.106	.074	.116	.084	.142	.110	.162	.130	.182	.150	.242	.210
10.000-11.999	.111	.074			.121	.084	.131	.094	.157	.120	.177	.140	.197	.160	.257	.220
12.000-13.999	.126	.084			.136	.094	.146	.104	.172	.130	.192	.150	.212	.170	.272	.230
14.000-15.999	.141	.094			.151	.104	.161	.114	.187	.140	.207	.160	.227	.180	.287	.240
16.000-17.999	.156	.104			.166	.114	.176	.124	.202	.150	.222	.170	.242	.190	.302	.250
18.000-19.999	.171	.114			.181	.124	.191	.134	.217	.160	.237	.180	.257	.200	.317	.260
20.000-21.999	.186	.124			.196	.134	.206	.144	.232	.170	.252	.190	.272	.210	.332	.270
22.000-24.000	.201	.134			.211	.144	.221	.154	.247	.180	.267	.200	.287	.220	.347	.280

1 These Standard Tolerances are applicable to the average profile (shape); wider tolerances may be required for some profiles (shapes) and closer tolerances may be possible for others.

2 The tolerance applicable to a dimension composed of two or more component dimensions is the sum of the tolerances of the component dimensions if all of the component dimensions are indicated.

3 When a dimension tolerance is specified other than as an equal bilateral tolerance, the value of the standard tolerance is that which applies to the mean of the maximum and minimum dimensions permissible under the tolerance for the dimension under consideration.

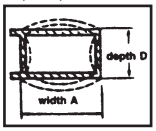
4 Where dimensions specified are outside and inside, rather than wall thickness itself, the allowable deviation (eccentricity) given in Column 3 applies to mean wall thickness. (Mean will thickness is the average of two wall thickness measurements taken at opposite sides of the void).

5 In the case of Class 1 Hollow Profiles the standard wall thickness tolerance for extruded round tube is applicable. (A Class 1 Hollow Profile is one whose void is round and one inch or more in diameter and whose weight is equally distributed on opposite sides of two or more equally spaced axes.)

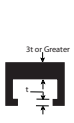
6 At points less than 0.250 inch from base of leg the tolerances in Col. 2 are applicable.

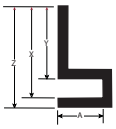
7 Tolerances for extruded profiles in T3510, T4510, T6510, T73510, T76510, and T8510 tempers shall be as agreed upon between purchaser and vendor at the time the contract or order is entered.

8 The following tolerances apply where the space is completely enclosed (hollow profiles): For the width (A), the balance is the value shown in Col. 4 for the depth dimension (D). For the depth (D), the tolerance is the value shown in Col. 4 for the width dimension (A). In no case is the tolerance for either width or depth less than the metal dimensions (Col. 2) at the corners. Example—Alloy 6061 hollow profile having 1 X 3 rectangular outside dimensions; width tolerance is ±0.021 inch and depth tolerance ±.034 inch. (Tolerances at corners, Col. 2, metal dimensions, are ±0.024 inch for the width and ±0.012 inch for the depth.) Note that the Col. 4 tolerance of 0.021 inch must be adjusted to 0.024 inch so that it is not less than the Col. 2 tolerance.



9 These tolerances do not apply to space dimensions such as dimensions "X" and "Z" of the example (below), even when "Y" is 75 percent or more of "X." For the tolerance applicable to dimensions "X" and "Z" use Col. 4, 5, 6, 7, 8, or 9, dependent on distance "A."





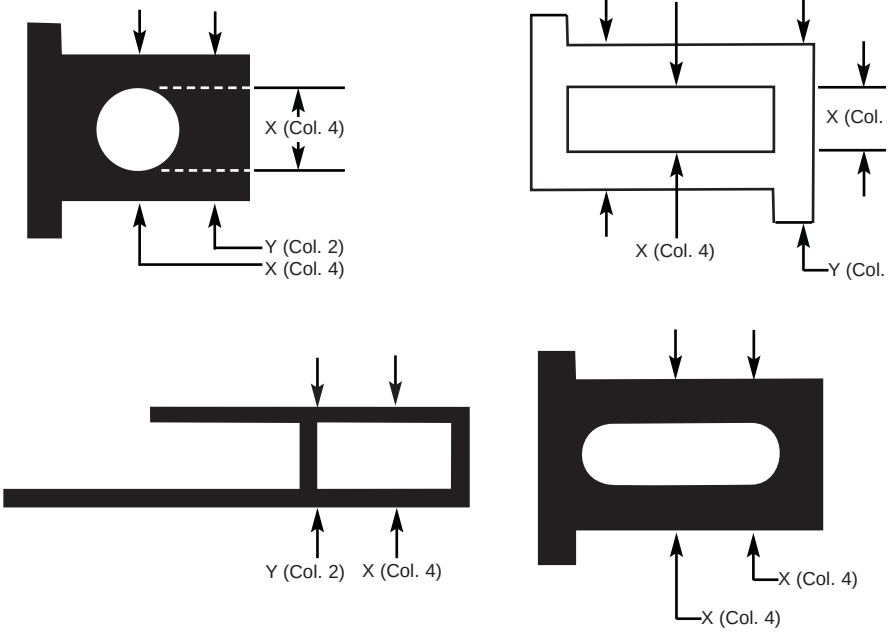
10 The wall thickness tolerance for hollow or semihollow profiles shall be as agreed upon between purchaser and vendor at the time the contract or order is entered when the nominal thickness of one wall is three times or greater than that of the opposite wall.

Examples Illustrating Use of the Standard Tolerance Table

Closed-Space Dimensions

All dimensions designated “Y” are classed as “metal dimensions” and tolerances are determined from column 2.

Dimensions designated “X” are classed as “space dimensions through an enclosed void” and the tolerances applicable are determined from column 4 unless 75 percent of the dimension is metal, in which case column 2 applies.



Open-Space Dimensions

Tolerances applicable to dimensions “X” are determined as follows:

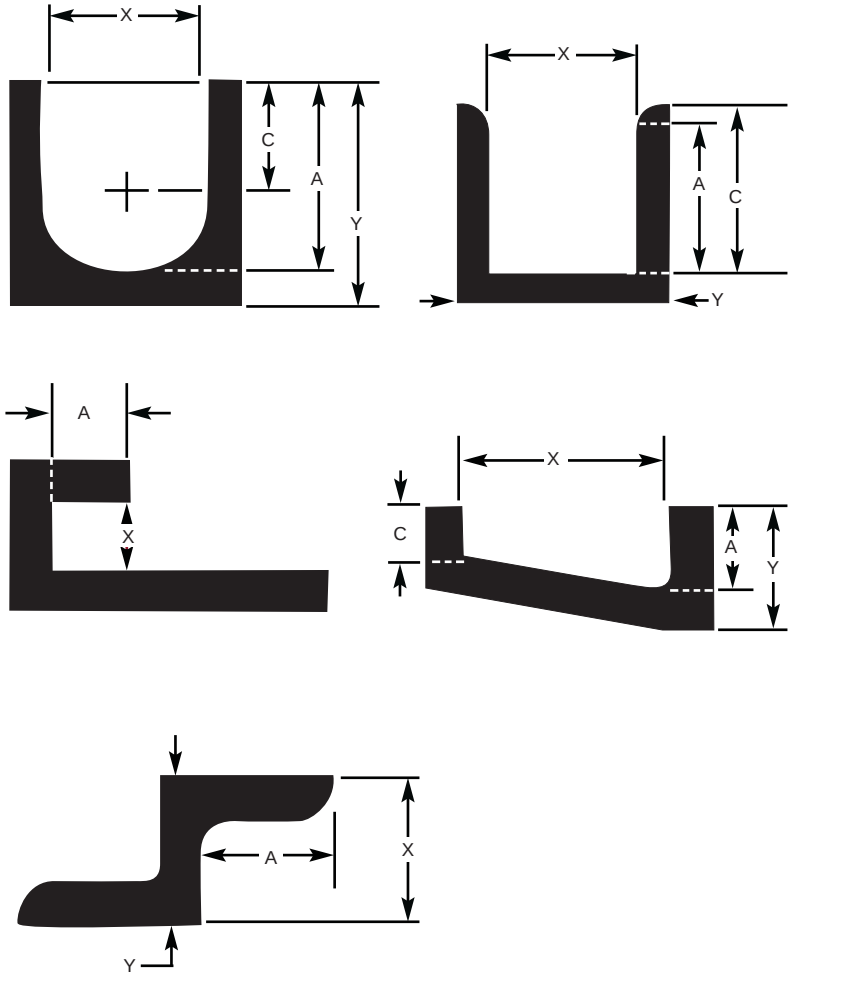
1. Locate dimension “X” in column 1.

2. Determine which of columns 4 through 9 is applicable, dependent on distance “A.”

3. Locate proper tolerance in column 4, 5, 6, 7, 8 or 9 in the same line as dimension “X.”

Dimensions “Y” are “metal dimensions”; tolerances are determined from column 2.

Distances “C” are shown merely to indicate incorrect values for determining which of columns 4 through 9 apply.



Two Special Cases

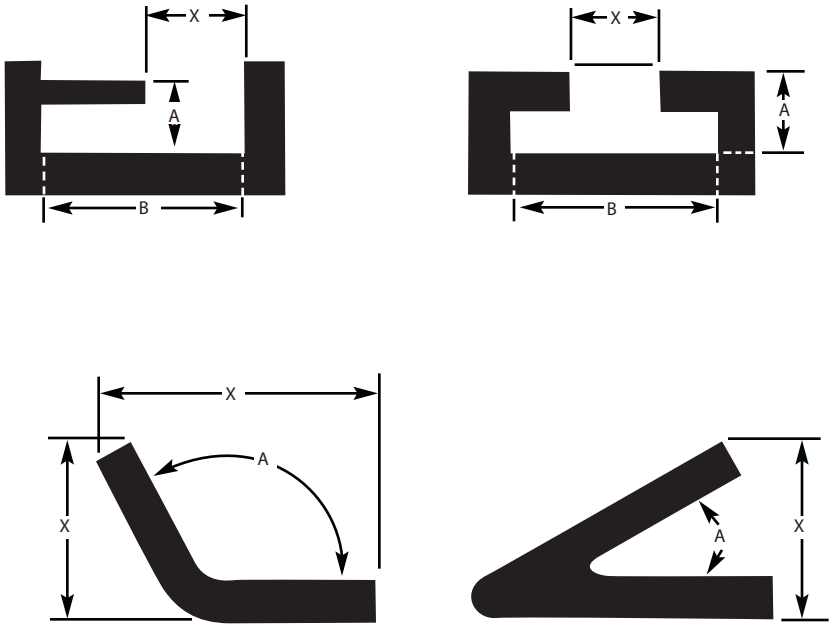
I. Tolerances applicable to dimensions “X” are determined as follows:

1. Locate distance “B” in column 1.

2. Determine which of columns 4-9 is applicable, dependent on distance “A.”

3. Locate proper tolerance in column 4, 5, 6, 7, 8, or 9 in same line as value chosen in column 1.

II. Tolerances applicable to dimensions “X” are not determined from the Standard Tolerance Table; tolerances are determined by standard tolerances applicable to angles “A.”



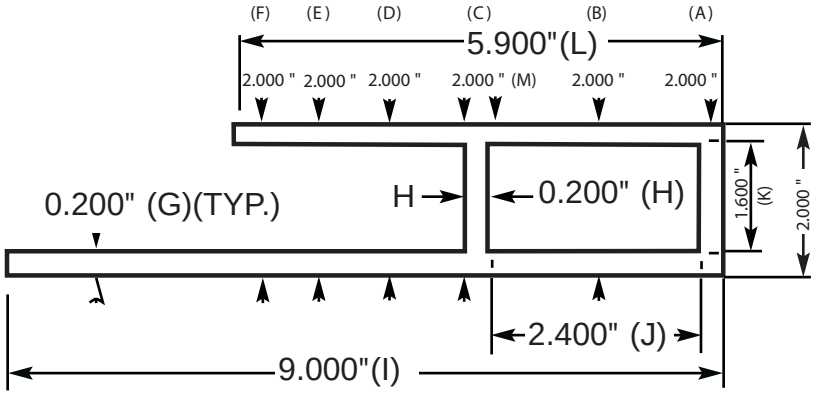
THE EXAMPLE

This example supposes that the “model extrusion” profile is to be produced with the nominal dimensions specified on the drawing

- A lower horizontal leg 9" long.
- An upper horizontal leg 5.9" long.
- A vertical connecting leg at one end.
- A vertical connecting leg whose inner surface is located 2.4 inches from the inside of the end leg.
- A uniform outside depth of 2"

  A uniform metal thickness of 0.200
- The alloy is assumed to be one of
- the many choices included on the" tolerance table as “Other Alloys.”

Because this profile seems simple--consisting only of parallel surfaces, right angles, and uniform thicknesses--it shows all the more clearly how commercial standard tolerances can vary from point to point over “open” and “closed” sections.



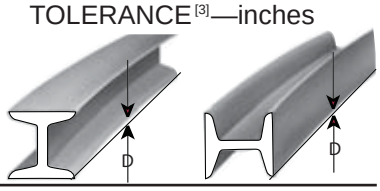
The standard tolerancing for this profile might be worked out, step-by-step, this way:

STANDARD TOLERANCES FOR EXTRUDED WIRE, ROD, BAR AND PROFILES

Table 8-2 **Length[1]—Wire, Rod, Bar and Profiles (Shapes)**

SPECIFIED DIAMETER (WIRE AND ROD): SPECIFIED WIDTH (BAR): CIRCUMSCRIBING CIRCLE DIAMETER[4] (PROFILES): inches	TOLERANCE—inches plus ALLOWABLE DEVIATION FROM SPECIFIED LENGTH SPECIFIED LENGTH—feet			
	Up through 12	Over 12 through 30	Over 30 through 50	Over 50
Up through 2.999	1/8	1/4	3/8	1
3.000-7.999	3/16	5/16	7/16	1
8.000 and over	1/4	3/8	1/4	1

Table 8-3 **Straightness[1]—Rod, Bar and Profiles (Shapes)**

PRODUCT	TEMPER	SPECIFIED DIAMETER (ROD): SPECIFIED WIDTH (BAR): CIRCUMSCRIBING CIRCLE DIAMETER[4] (PROFILES): (inches)	SPECIFIED THICKNESS (RECTANGLES): MINIMUM THICKNESS (PROFILES): (inches)	TOLERANCE[3]—inches  IN TOTAL LENGTH OR IN ANY MEASURED SEGMENT OF ONE FOOT OR MORE OF TOTAL LENGTH
Rod and Square, Hexagonal and Octagonal Bar	All except O TX510[2] TX511[2]	All	..	.0125 x Measured length, ft.
	O	0.500 and over	..	.050 x Measured length, ft.
	TX510[2]	0.500 and over	..	.050 x Measured length, ft.
	TX511[2]	0.500 and over	..	.0125 x Measured length, ft.
Rectangular Bar	All except O TX510[2]	Up through 1.499	Up through 0.094[7]	.050 x Measured length, ft.
			0.095 and over	.0125 x Measured length, ft.
	TX511[2]	1.500 and over	All	.0125 x Measured length, ft.
	O	Over 0.500	0.500 and over	.050 x Measured length, ft.
	TX510[2]	Over 0.500	0.500 and over	.050 x Measured length, ft.
	TX511[2]	Over 0.500	0.500 and over	.0125 x Measured length, ft.
Profiles (Shapes)	All except O TX510[2][5]	Up through 1.499	Up through 0.094[7]	.050 x Measured length, ft.
			0.095 and over	.0125 x Measured length, ft.
	TX511[2]	1.500 and over	All	.0125 x Measured length, ft.
	O	0.500 and over	Up through 0.094[7]	.200 x Measured length, ft.
			0.095	.050 x Measured length, ft.
	TX511[2]	0.500 and over	Up through 0.094[7]	.050 x Measured length, ft.
			0.095 and over	.0125 x Measured length, ft.

Footnotes for Tables 8-2 through 8-5

[1] These Standard Tolerances are applied to the average profile (shape); wider tolerances may be required for some profiles, and closer tolerances may be possible for others.

[2] TX510 and TX511 are general designations for the following stress-relieved tempers: T3510, T4510, T61510, T6510, T8510, T73510, T76510, and T3511, T4511, T61511, T6511, T8511, T73511, T76511, respectively.

[3] When weight of piece on the flat surface minimizes deviation.

[4] The circumscribing circle diameter is the diameter of the smallest circle that will completely enclose the cross-section of the extruded product.

[5] Tolerances for T3510, T4510, T6510, T73510, T76510, and T8510 tempers shall be as agreed upon between purchaser and vendor at the time the contract or order is entered.

[6] See ASD, Standards Section (6), for Application of Twist Limits; for additional information, see Aluminum Association publication “Understanding Aluminum Extrusion Tolerances.”

[7] Applies only if the thickness along at least one-third of the total perimeter is 0.094 or less. Otherwise use the tolerance shown for 0.095 and over.

[8] Tolerance for “O” temper material is four times the standard tolerances shown.

Excerpted from Aluminum Standards and Data (ASD), 1997, Tables 11.5 and 11.6.

Table 8-4 **Twist [1] [6]—Bar and Profiles (Shapes)**

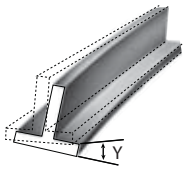
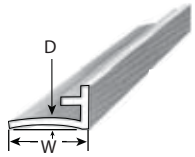
PRODUCT	TEMPER	SPECIFIED WIDTH (BAR): CIRCUMSCRIBING CIRCLE DIAMETER [4] (PROFILES): (inches)	SPECIFIED THICKNESS (RECTANGLES): MINIMUM THICKNESS (PROFILES): (inches)	TOLERANCE [3]— degrees 	
				IN TOTAL LENGTH OR IN ANY MEASURED SEGMENT OF ONE FOOT OR MORE OF TOTAL LENGTH	MAXIMUM FOR TOTAL LENGTH
Bar	All except O	Up through 1.499	All	1 x Measured length, ft.	7
	TX510 [2]	1.500-2.999	All	1/2 x Measured length, ft.	5
	TX511 [2]	3.000 and over	All	1/4 x Measured length, ft.	3
	O	0.500-1.499	0.500 and over	3 x Measured length, ft.	21
		1.500-2.999	0.500 and over	1 1/2 x Measured length, ft.	15
		3.000 and over	0.500 and over	3/4 x Measured length, ft.	9
	TX510 [2]	0.500-2.999	0.500 and over	1 1/2 x Measured length, ft.	7
		3.000 and over	0.500 and over	1/2 x Measured length, ft.	5
	TX511[2]	0.500-1.499	0.500 and over	1 x Measured length, ft.	7
		1.500-2.999	0.500 and over	1/2 x Measured length, ft.	5
		3.000 and over	0.500 and over	1/4 x Measured length, ft.	3
Profiles (Shapes)	All except O	Up through 1.499	All	1 x Measured length, ft.	7
	TX510 [2] [5]	1.500-2.999	All	1/2 x Measured length, ft.	5
	TX511 [2]	3.000 and over	All	1/4 x Measured length, ft.	3
	O	0.500 and over	Up through 0.094 [7]	3 x Measured length, ft.	21
		0.500-1.499	0.095 and over	3 x Measured length, ft.	21
		1.500-2.999	0.095 and over	1 1/2 x Measured length, ft.	15
		3.000 and over	0.095 and over	1/4 x Measured length, ft.	9
	TX511 [2]	0.500 and over	Up through 0.094 [7]	1 x Measured length, ft.	7
		0.500-1.499	0.095 and over	1 x Measured length, ft.	7
		1.500-2.999	0.095 and over	1/2 x Measured length, ft.	5
		3.000 and over	0.095 and over	1/4 x Measured length, ft.	3

Table 8-5 **Flatness (Flat Surfaces)[1]—Bar, Solid Profiles & Semihollow Profiles (Shapes)**
EXCEPT FOR PROFILES IN O[8] T3510, T4510, T6510, T73510, T76510 and T8510 TEMPERS[4]



SURFACE WIDTHS UP THROUGH 1INCH OR ANY 1-INCH INCREMENT OF WIDER SURFACES
Maximum Allowable Deviation D = TOLERANCE (inches)

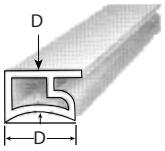
WIDTHS OVER 1-INCH
Maximum Allowable Deviation D = TOLERANCE x W (inches)

MINIMUM THICKNESS OF METAL FORMING THE SURFACE (inches)	SURFACE WIDTH—inches										
	UP TO 5.999	6.000 TO 7.999	8.000 TO 9.999	10.000 TO 11.999	12.000 TO 13.999	14.000 TO 15.999	16.000 TO 17.999	18.000 TO 19.999	20.000 TO 21.999	22.000 TO 23.999	24.000 AND UP
	TOLERANCE										
Up through .0124	.004	.006	.010	.014	..	..	..	..	..	..	..
0.125-0.187	.004	.006	.008	.012	.014	.014	.014	..	..	..	..
0.188-0.249	.004	.006	.008	.010	.012	.012	.012	.014	.014	..	..
0.250-0.374	.004	.006	.006	.008	.010	.010	.012	.012	.012	.014	..
0.375-0.499	.004	.004	.006	.008	.008	.008	.010	.010	.010	.012	.014
0.500-0.749	.004	.004	.006	.006	.008	.008	.008	.008	.010	.010	.012
0.750-0.999	.004	.004	.006	.006	.008	.008	.008	.008	.008	.008	.010
1.000-1.499	.004	.004	.004	.006	.006	.008	.008	.008	.008	.008	.008
1.500-1.999	.004	.004	.004	.004	.006	.006	.006	.008	.008	.008	.008
2.000 and up	.004	.004	.004	.004	.004	.006	.006	.006	.008	.008	.008

Excerpted from Aluminum Standards and Data (ASD), 1997, Tables 11.7 and 11.8

Table 8-6 **Flatness (Flat Surfaces)[1] HOLLOW PROFILES (SHAPES)**

EXCEPT FOR PROFILES IN O[10], T3510, T4510, T6510, T73510, T76510 and T8510 TEMPERS[4]



SURFACE WIDTHS UP THROUGH 1 INCH OR ANY 1-INCH INCREMENT OF WIDER SURFACES
Maximum Allowable Deviation D = TOLERANCE (inches)

WIDTHS OVER 1 INCH
Maximum Allowable Deviation D = TOLERANCE x W (inches)

MINIMUM THICKNESS OF METAL FORMING THE SURFACE (inches)	SURFACE WIDTH—inches										
	UP TO 5.999	6.000 TO 7.999	8.000 TO 9.999	10.000 TO 11.999	12.000 TO 13.999	14.000 TO 15.999	16.000 TO 17.999	18.000 TO 19.999	20.000 TO 21.999	22.000 TO 23.999	24.000 AND UP
	TOLERANCE										
Up through 0.124	.006	.008	.012	.016	..	..	..	..	..	..	..
0.125-0.187	.006	.008	.010	.014	.016	..	..	..	..	..	..
0.188-0.249	.004	.006	.010	.012	.014	.014	.014	.016	..	..	..
0.250-0.374	.004	.006	.008	.010	.012	.012	.012	.014	.014	.016	..
0.375-0.499	.004	.006	.008	.010	.010	.010	.012	.012	.012	.014	.016
0.500-0.749	.004	.004	.006	.008	.008	.008	.010	.010	.012	.012	.014
0.750-0.999	.004	.004	.006	.006	.008	.008	.008	.008	.010	.010	.012
1.000 and up	.004	.004	.004	.006	.006	.008	.008	.008	.008	.008	.008

Table 8-7 **Surface Roughness[1] Wire Rod, Bar & Profiles (Shapes)**

SPECIFIED SECTION THICKNESS (inches)	ALLOWABLE DEPTH OF CONDITIONS[2] (inches, max)
Up through 0.063	.0015
0.064-0.125	.002
0.126-0.188	.0025
0.189-0.250	.003
0.251-0.500	.004
0.501-and over	.008

Table 8-8 **Contour (Curved Surfaces)** [1] [3] **— Profiles (Shapes)**

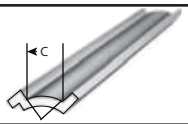
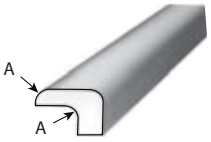
Temper	
All except O, TX510[4]	Allowable deviation from specified contour: 0.005 inch per inch of chord length; 0.005 inch minimum. Not applicable to contours with chord length 6 inches and over.
O	Allowable deviation from specified contour: 0.015 inch per inch of chord length; 0.015 inch minimum. Not applicable to contours with chord length 6 inches and over.

Table 8-9 **Squareness of Cut Ends[1]**

Allowable deviation from square: 1 degree

Table 8-10 **Corner and Fillet Radii[1]— Bar & Profiles (Shapes)**

SPECIFIED RADIUS[9] (inches)	TOLERANCE—inches ALLOWABLE DEVIATION FROM SPECIFIED RADIUS  Difference between radius A and specified radius
Sharp corners	+1/64
0.016-0.187	±1/64
0.188 and over	±10%

Footnotes for Tables 8-6 through 8-11

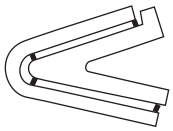
[1] These Standard Tolerances are applicable to the average profile (shape); wider tolerances may be required for some profiles, and closer tolerances may be possible for others.

[2] Conditions include die lines and handling marks.

[3] As measured with a contour gauge whose surface is limited to a maximum subtended angle of 90 degrees. Extruded curved surfaces comprising more than a 90 degree subtended angle are checked by sliding the gauge across the surface, thus checking two or more 90-degree portions of the surface. Extruded profile surfaces comprising arcs formed by two or more radii require the use of a separate contour gauge for each portion of the surface formed by an individual radius.

[4] Tolerances for T3510, T4510, T6510, T 73510, T76510, and T8510 tempers shall be as agreed upon between the purchaser and vendor and at the time the contract or order is entered.

[5] Angles are measured with protractors or with gauges. As illustrated, a four-point contact system is used, two contact points being as close to the angle vertex as practical, and the others near the ends of the respective surfaces forming the angle. Between these points of measurement, surface flatness is the controlling tolerance.



[6] When the area between the surface forming an angle is all metal, values in column 2 apply if the larger surface length to metal thickness ratio is 1 or less.

[7] When two legs are involved, the one having the larger ratio determines the applicable column.

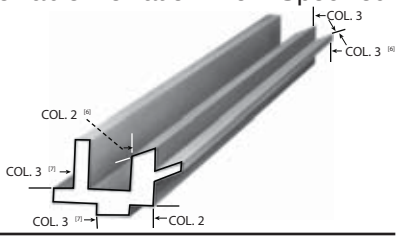
[8] Not applicable to 2219 alloy extrusions. Most profiles in 2219 alloy will have die lines about twice the depth shown in the table; however, for each profile the supplier should be contacted for the roughness value to apply.

[9] If unspecified, the radius shall be 1/32 inch maximum including tolerances.

[10] Tolerance for “O” temper material is four times the standard tolerance shown.

Excerpted from Aluminum Standards and Data (ASD), 1997, Tables 11.9, 11.10, 11.11, 11.12, 11.13, and 11.14.

Table 8-11 Angularity [1] [5]

TEMPER	MINIMUM SPECIFIED LEG THICKNESS (inches)	TOLERANCE Degrees plus and minus Allowable Deviation From Specified  RATIO: [6] [7] LEG OR SURFACE LENGTH TO LEG OR METAL THICKNESS	
		1 and less	Over 1 through 40
	Column 1	Column 2	Column 3
All except O, TX510[4]	Up through 0.187 0.188-0.749 0.750 and over	1 1 1	2 1 1/2 1
O	Up through 0.187 0.188-0.749 0.750 and over	3 3 3	6 4 1/2 3

STANDARD TOLERANCES FOR EXTRUDED TUBE

Table 8-12 Diameter—Round Tube

EXCEPT FOR T3510, T4510,T6510,T75310, AND T8510 TEMPERS[7]

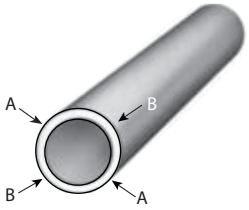
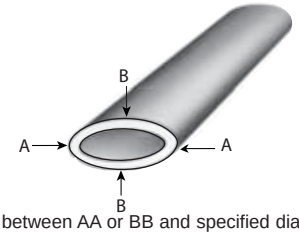
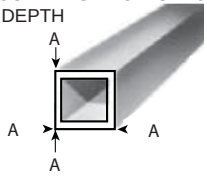
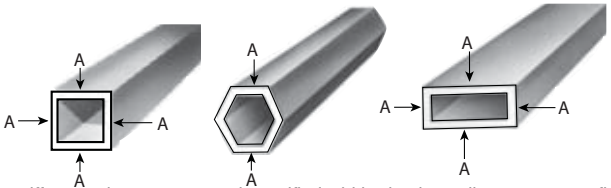
SPECIFIED DIAMETER [1] (inches)	TOLERANCE[2]-inches plus and minus			
	ALLOWABLE DEVIATION OF MEAN DIAMETER [3] FROM SPECIFIED DIAMETER (Size)  Difference between 1/2 (AA+BB) and specified diameter		ALLOWABLE DEVIATION OF DIAMETER AT ANY POINT FROM SPECIFIED DIAMETER [4]  Difference between AA or BB and specified diameter	
Column 1	Column 2		Column 3	
	Alloys 5083, 5086, 5454	Other Alloys [16]	Alloys 5083, 5086, 5454	Other Alloys [16]
0.500 - 0.999	.015	.010	.030	.020
1.000 - 1.999	.018	.012	.038	.025
2.000 - 3.999	.023	.015	.045	.030
4.000 - 5.999	.038	.025	.075	.050
6.000 - 7.999	.053	.035	.113	.075
8.000 - 9.999	.068	.045	.150	.100
10.000 -11.999	.083	.055	.188	.125
12.000 -13.999	.098	.065	.225	.150
14.000 -15.999	.113	.075	.263	.175
16.000 -17.999	.128	.085	.300	.200

Table 8-13 Width and Depth—Square, Rectangular, Hexagonal, and Octagonal Tube

EXCEPT FOR T3510,T4510, T6510, T73510, AND T8510 TEMPERS [7]

SPECIFIED WIDTH or DEPTH (inches)	TOLERANCE[2]-inches plus and minus				
	ALLOWABLE DEVIATION OF WIDTH OR DEPTH AT CORNERS FROM SPECIFIED WIDTH OR DEPTH  Difference between AA and specified width or depth		ALLOWABLE DEVIATION OF WIDTH OR DEPTH NOT AT CORNERS FROM SPECIFIED WIDTH OR DEPTH [4]  Difference between AA and specified width, depth, or distance across flats		
	SQUARE, RECTANGULAR		SQUARE, HEXAGONAL, OCTAGONAL		RECTANGULAR
Column 1	Column 2				Column 4
	Alloys 5083, 5086, 5454	Other Alloys [16]	Alloys 5083, 5086, 5454	Other Alloys [16]	All Alloys
0.500-0.749	.018	.012	.030	.020	The tolerance for the width is the value in the previous column for a dimension equal to the depth, and conversely, but in no case is the tolerance less than at the corners. Example: The width tolerance of a 1 X 3 inch alloy 6061 rectangular tube is ± 0.025 inch and the depth tolerance ±0.035 inch.
0.750-0.999	.021	.014	.030	.020	
1.000-1.999	.027	.018	.038	.025	
2.000-3.999	.038	.025	.053	.035	
4.000-4.999	.053	.035	.068	.045	
5.000-5.999	.068	.045	.083	.055	
6.000-6.999	.083	.055	.098	.065	
7.000-7.999	.098	.065	.108	.075	
8.000-8.999	.113	.075	.123	.085	
9.000-9.999	.128	.085	.143	.095	
10.000-10.999	.143	.095	.158	.105	
11.000-12.999	.158	.105	.173	.115	

Numbered footnotes follow Table 8-24. Excerpted from Aluminum Standards and Data (ASD), 1997, Tables 12.2 and 12.3.

Table 8-14 Wall Thickness—Round Extruded Tube

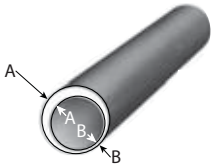
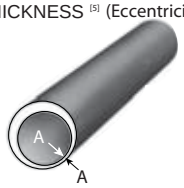
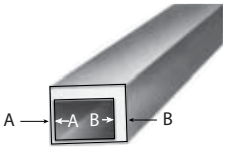
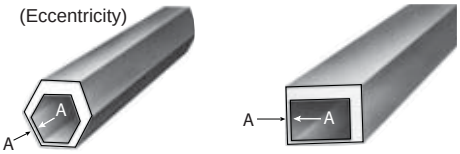
SPECIFIED WALL THICKNESS [6] (inches)	TOLERANCE[1] [2]-inches plus and minus								
	ALLOWABLE DEVIATION OF MEAN WALL THICKNESS [5] FROM SPECIFIED WALL THICKNESS  Difference between 1/2 (AA + BB) and specified wall thickness								ALLOWABLE DEVIATION OF WALL THICKNESS AT ANY POINT FROM MEAN WALL THICKNESS [5] (Eccentricity)  Difference between AA and mean wall thickness
	OUTSIDE DIAMETER-INCHES								
	Under 1.250		1.250-2.999		3.000-4.999		5.000 and over		
Column 1	Column 2		Column 3		Column 4		Column 5		Column 6
	Alloys 5083 5086 5454	**Other Alloys** [16]	**Alloys 5083 5086 5454**	**Other Alloys** [16]	**Alloys 5083 5086 5454**	**Other Alloys** [16]	**Alloys 5083 5086 5454**	**Other Alloys** [16]	**All Alloys**
Under 0.047	.090	.006	..	..	..	..	..	..	Plus and minus 10% of mean wall thickness max ± 0.060 min ± 0.010
0.047-0.061	.011	.007	.012	.008	.012	.008	.015	.010	
0.062-0.077	.012	.008	.012	.008	.014	.009	.018	.012	
0.078-0.124	.014	.009	.014	.009	.015	.010	.023	.015	
0.125-0.249	.014	.009	.014	.009	.020	.013	.030	.020	
0.250-0.374	.017	.011	.017	.011	.024	.016	.038	.025	
0.375-0.499	..	..	.023	.015	.032	.021	.053	.035	
0.500-0.749	..	..	.030	.020	.042	.028	.068	.045	
0.750-0.999	..	..	..	..	.053	.035	.083	.055	
1.000-1.499	..	..	..	..	.068	.045	.098	.065	
1.500-2.000	..	..	..	..	..	..	.113	.075	
2.001-2.499	..	..	..	..	..	..	.128	.085	± 0.120
2.500-2.999	..	..	..	..	..	..	.143	.095	
3.000-3.499	..	..	..	..	..	..	.158	.105	
3.500-4.000	..	..	..	..	..	..	.173	.115	

TABLE 8-15 Wall Thickness—Other-than-Round Extruded Tube

SPECIFIED WALL THICKNESS [6] (inches)	TOLERANCE[1] [2]-inches plus and minus					
	ALLOWABLE DEVIATION OF MEAN WALL THICKNESS[5] FROM SPECIFIED WALL THICKNESS  Difference between 1/2 (AA + BB) and specified wall thickness				ALLOWABLE DEVIATION OF WALL THICKNESS[5] (Eccentricity)  Difference between AA and mean wall thickness	
	CIRCUMSCRIBING CIRCLE DIAMETER[10]-inches					
	Under 5.000		5.000 and over		Under 5.000	5.000 and over
Column 1	Column 2		Column 3		Column 4	Column 5
	Alloys 5083 5086 5454	**Other Alloys** [16]	**Alloys 5083 5086 5454**	**Other Alloys** [16]	**All Alloys**	**All Alloys**
Under 0.047	.008	.005	.012	.008	.005	Plus and minus 10% of mean wall thickness max ± 0.060 min ± 0.010
0.047-0.061	.009	.006	.014	.009	.007	
0.062-0.124	.011	.007	.015	.010	.010	
0.125-0.249	.012	.008	.023	.015	.015	
0.250-0.374	.017	.011	.030	.020	.025	
0.375-0.499	.021	.014	.045	.030	.030	
0.500-0.749	.038	.025	.060	.040	.040	
0.750-0.999	.053	.035	.075	.050	.050	
1.000-1.499	.068	.045	.090	.060	.060	
1.500-2.000	..	..	.105	.070	..	

Numbered footnotes follow Table 8-24.

Excerpted from Aluminum Standards and Data (ASD), 1997, Tables 12.4 and 12.5.

TABLE 8-16 Length—Extruded Tube

SPECIFIED OUTSIDE DIAMETER OR WIDTH (inches)	TOLERANCE-inches plus excepted as noted							
	ALLOWABLE DEVIATION FROM SPECIFIED LENGTH							
	STRAIGHT				COILED			
	SPECIFIED LENGTH-feet							
	Up through 12	Over 12 through 30	Over 30 through 50	Over 50	Up through 100	Over 100 through 250	Over 250 through 500	Over 500
0.500-1.249	1/8	1/4	3/8	1	+5%, -0%	±10%	±15%	±20%
1.250-2.999	1/8	1/4	3/8	1	..	..	..	..
3.000-7.999	3/16	5/16	7/16	1	..	..	..	..
8.000 & over	1/4	3/8	1/2	1	..	..	..	..

TABLE 8-17 Twist [11]—Other-than-Round Tube

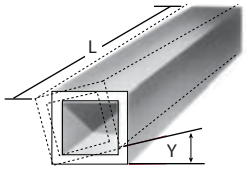
TEMPER	SPECIFIED WIDTH (inches)	SPECIFIED THICKNESS (inches)	TOLERANCE [9]-Degrees	
			ALLOWABLE DEVIATION FROM STRAIGHT  Y (max.) in degrees	
			IN TOTAL LENGTH OR IN ANY SEGMENT OF ONE FOOT OR MORE OF TOTAL LENGTH	MAXIMUM FOR TOTAL LENGTH
All except O, TX510, TX511	0.500-1.499	All	1 x Measured length, feet	
	1.500-2.999	All	1/2 x Measured length, feet	5
	3.000 and over	All	1/4 x Measured length,feet	3
TX510 [8]	0.500 and over	0.095 and over	[7]	[7]
TX511 [8]	0.500-1.499	0.095 and over	1 x Measured length, feet	7
	1.500-2.999	0.095 and over	1/2 x Measured length, feet	5
	3.000 and over	0.095 and over	1/4 x Measured length, feet	3

TABLE 8-18 Straightness—Tube in Straight Lengths

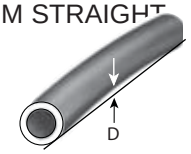
TEMPER	SPECIFIED WIDTH (inches)	TOLERANCE [9] [12] -inches
		ALLOWABLE DEVIATION (D) FROM STRAIGHT 
		IN TOTAL LENGTH OR IN ANY SEGMENT OF ONE FOOT OR MORE OF TOTAL LENGTH
All except O, TX510[8]	0.500-5.999	.010 x Measured length, feet
	6.000 and over	.020 x Measured length, feet
TX510[8]	0.500 and over	[7]

TABLE 8-19 Flatness (Flat Surfaces)

Except for 0, T3510, T4510, T6510, T73510, T76510, & T8510 Tempers[7]

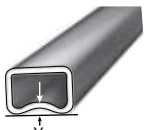
MINIMUM THICKNESS OF METAL FORMING THE SURFACE (inches)	TOLERANCE-inches  Maximum Allowable Deviation Y	
	WIDTHS UP THROUGH 1INCH OR ANY 1-INCH INCREMENT OF WIDER SURFACES	WIDTHS OVER 1INCH THROUGH 5.999 INCHES
Up through 0.187	0.006	0.006 x W (inches)
0.188 and over	0.004	0.004 x W (inches)

TABLE 8-20 Squareness of Cut Ends

Allowable deviation from square: 1 degree.

TABLE 8-21 Corner and Fillet Radii

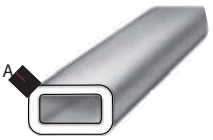
SPECIFIED RADIUS (inches)	TOLERANCE-inches ALLOWABLE DEVIATION FROM SPECIFIED RADIUS  Difference between radius A and specified radius
Sharp corners	+1/64
0.016-0.187	±1/64
0.188 and over	±10%

TABLE 8-22 Angularity

Allowable deviation from square: ± 2 degrees.

TABLE 8-23 Surface Roughness[14] [17]

Specified Outside Diameter (inches)	Specified Wall Thickness (inches)	Allowable Depth of Conditions [13] (inches, max.)
Up through 12.750	Up through 0.063	0.0025
	0.064-0.125	0.003
	0.126-0.188	0.0035
	0.189-0.250	0.004
	0.251-0.500	0.005
	0.501 and over	0.008
12.751-15.000	Up through 0.500	0.010
	0.501 and over	0.012
15.001-20.000	Up through 0.500	0.012
	0.501 and over	0.015
20.001 and over	Up through 0.500	0.015
	0.501 and over	0.020

TABLE 8-24 Dents[15]

Depth of dents shall not exceed twice the tolerances specified in Table 8-12 for diameter at any point from specified diameter, except for tube having a wall thickness less than 2 1/2 percent of the outside diameter, in which case the following multipliers apply:
2% to 2 1/2% exclusive-2.5 x tolerance (max.)
1 1/2% to 2% exclusive-3.0 x tolerance (max.)
1% to 1 1/2% exclusive-4.0 x tolerance (max.)

Footnotes for Tables 8-12 through 8-24

[1] When outside diameter, inside diameter, and wall thickness (or their equivalent dimensions in other-than-round tube) are all specified, standard tolerances are applicable to any two of these dimensions, but not to all three. When both outside and inside diameters or inside diameter and wall thickness are specified, the tolerance applicable to the specified or calculated O.D. dimension shall also apply to the I.D. dimension.

[2] When a dimension tolerance is specified other than as an equal bilateral tolerance, the value of the standard tolerance is that which applied to the mean of the maximum and minimum dimensions permissible under the tolerance for the dimension under consideration.

[3] Mean diameter is the average of two diameter measurements taken at right angles to each other at any point along the length.

[4] Not applicable in the annealed (O) temper or if wall thickness is less than 2 1/2 percent of outside diameter of a circle having a circumference equal to the perimeter of the tube.

[5] The mean wall thickness of round tube is the average of two measurements taken opposite each other. The mean wall thickness of other-than-round tube is the average of two measurements taken opposite each other at approximate center line of tube and perpendicular to the longitudinal axis of the cross-section.

[6] When dimensions specified are outside and inside, rather than wall thickness itself, allowable deviation at any point (eccentricity) applies to mean wall thickness.

[7] Tolerances for T3510, T4510, T6510, T73510, T76510, and T8510 tempers shall be as agreed upon between purchaser and vendor at the time the contract or order is entered.

[8] Tempers TX510 and TX511 are general designations for the following stress-relieved tempers: T3510, T4510, T6510, T8510, T73510, T76510; and T3511, T4511, T6511, T8511, T73511, T76511, respectively.

[9] When weight of piece on flat surface minimizes deviation.

[10] The circumscribing circle diameter is the diameter of the smallest circle that will completely enclose the cross-section of the extruded product.

[11] See ASD, Standards Section (6), for Application of Twist limits.

[12] Tolerances not applicable to TX510 or TX511 temper tube having a wall thickness less than 0.095 inches.

[13] Conditions include die lines, mandrel lines, and handling marks.

[14] For tube over 12.750 inches O.D. the 2xxx and 7xxx series alloys and 5xxx series alloys with nominal magnesium content of 3 percent or more are excluded.

[15] Not applicable to O temper tube.

[16] Limited to those alloys listed in ASD, Table 12.1.

[17] Not applicable to 2219 alloy tube. Most tubes in 2219 alloy will have die lines about twice the depth shown in the table; however, for each tube size the supplier should be contacted for the roughness value to apply.

[18] If unspecified, the radius shall be 1/32 inch maximum including tolerances.

Excerpted from Aluminum Standards and Data (ASD), 1997, Tables 12.10, 12.11, 12.12, 12.13, and 12.14.

Terms & Conditions

1. CONTRACT BETWEEN BUYER AND SELLER: A written order and acknowledgment shall constitute the contract between Buyer and Seller, and said Contract may not be amended or rescinded except by written agreement by both parties, referring expressly to this contract.

2. WARRANTY: Seller warrants that merchandise sold to Buyer shall be free from defects in material and workmanship and shall conform to specifications. **EXCEPT FOR SUCH WARRANTY, THE SELLER DISCLAIMS ANY AND ALL OTHER WARRANTIES OF ANY KIND WHATSOEVER, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE AND INCLUDING BUT NOT LIMITED TO ANY ORAL OR WRITTEN DESCRIPTION OF THE PRODUCTS, THEIR CHARACTERISTICS OR PROPERTIES OTHER THAN THAT SPECIFICALLY STATED IN THE FOREGOING LIMITED WARRANTY. SELLER SHALL HAVE NO LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES AS A RESULT OF THE SALE OF ITS MERCHANDISE.** In the event that its merchandise is not as warranted, Buyer's sole remedy will be, at Seller's election, replacement of the merchandise or return of the purchase price. Prior written approval from the Seller must be secured before returning any merchandise for credit.

3. TOLERANCES: Standard Commercial tolerances apply unless otherwise specified.

4. PRICE: Prices are based on existing conditions and are subject to change, at our discretion, at any time prior to order shipment. Unless otherwise specified, all prices are based on quantity shipped per release, with Buyer accepting over-run or under-run on each individual item based on standard shipping tolerances. Exact control of quantity shipped must be specified as a requirement of said contract.

5. CREDIT: All shipments shall be subject to the approval of Seller's Credit Department. If, in the sole judgment of the Seller, the financial responsibility of the Buyer is unsatisfactory, or becomes impaired, or if Buyer fails to make any payment in accordance with the terms of the contract, then Seller may defer or decline to make any shipments except upon receipt of satisfactory security or cash payments in advance, or Seller may terminate the contract.

6. TAXES: All prices are subject to the net additions of all Federal, State, or Municipal taxes or charges which may be established or levied upon or assessed against the merchandise under contract.

7. SHIPMENTS: Unless otherwise specified, title to all merchandise, and the risk of loss, shall pass to the Buyer upon delivery by the Seller to the transportation carrier at the shipping point or the actual transfer of possession to the Buyer, whichever is earlier.

8. DELAYS: Seller cannot be held liable for loss or damage arising from delay in fulfilling or failure to fulfill any accepted order in accordance with its terms where such delay or failure is caused by shortage of materials, delays of carriers, embargoes, fires, floods, strikes, riots, wars, acts of God, or other causes beyond our control.

9. RETURNED MATERIAL AUTHORIZATION: Seller must be notified within 10 days after delivery of Buyer's request to return merchandise. Upon receipt of Seller's authorization, merchandise must be returned within 30 days in accordance with Seller's shipping instructions. Merchandise must be returned in exactly the same condition as in which it was received by Buyer. Handling and restocking fees will be charged to Buyer's account.

10. CANCELLATION: Said contract is subject to cancellation only upon Seller's acceptance of such cancellation in writing and the effective date of cancellation shall be the date of such acceptance. Payment of cancellation charges shall be made by Buyer upon receipt of statement of same. Cancellation charges shall not exceed the purchase price of the canceled portion of the contract.

11. EQUIPMENT: Any equipment (including jigs, process dies and tools, etc.) which Seller constructs or acquires specifically for use on Buyer's order shall be the sole property of Seller, whether or not they are charged to Buyer's account. Die charges are for exclusive use of extrusion tooling and are not subject to refund. Dies which indicate no activity for two years or more will be scrapped without notice and replacement cost will be for Buyer's account.

12. PATENT PROTECTION: Seller agrees to indemnify Buyer against any claims or liabilities for or by reason of alleged patent infringement arising from the manufacture or sale of any merchandise furnished Buyer hereunder, except where the specifications, process, design or method of manufacture originated with Buyer, in which event Buyer agrees to indemnify Seller in like manner.

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