



Steel Square Tubing Reference Guide



Prepared by

Advanced CAD Modeling Solutions

Valrico, Florida

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American Steel Square Tubing Manufacturers



U.S. Square Tube Mill Capability Matrix (Max Size HSS)

Manufacturer	Max Square Tube Size (OD)	Wall Thickness Range	ASTM Grades	Notes
Atlas Tube	Up to 22" x 22"	~0.188" to 1.00"+	A500, A1085	One of the largest HSS producers in North America; heavy structural capability for columns & infrastructure
Steel Tube Inc	Up to 12" x 12"	~0.083" to 0.500"	A500, A513	Strong in light-to-medium structural and mechanical tubing; coil-fed mills
Sterling Pipe & Tube	Up to 12" x 12"	~0.083" to 0.500"	A500, A513	Similar range to Steel Tube Inc; strong mid-market structural supply
Alliance Tubular Products	Up to 8" x 8"	~0.083" to 0.375"	A500 Grade B/C	Focused on standard structural HSS sizes for construction and fabrication markets
American Tubular Products (ATP)	Up to 8" x 8"	~0.083" to 0.375"	A500	Regional manufacturer; lighter structural and general fabrication supply

American Steel Square Tubing Distributors

MAJOR STEEL SQUARE TUBE DISTRIBUTORS



UNITED STATES



Metals USA



Kloekner Metals Corporation



Totten Tubes



US Wholesale Pipe & Tube



MBI MB Metals



Brown Strauss



SPS Companies
(Steel and Pipe Supply)



Reliance Steel &
Aluminum Co.

A500 vs A513 vs A1085 Comparison

Overview		
Spec	Primary Category	Core Purpose
ASTM A500	Structural HSS (Hot/Cold formed ERW or seamless)	Load-bearing structural frames (buildings, bridges, equipment)
ASTM A513	Mechanical tubing (ERW / DOM)	Precision mechanical parts requiring tight tolerances
ASTM A1085	Premium structural HSS	High-strength structural tubing with tighter tolerances + better consistency



Mechanical Properties			
Property	A500 (Grade B/C typical)	A513 (DOM / mechanical tubing)	A1085
Yield Strength	~46–50 ksi (Grade B/C)	~35–75 ksi (varies widely by type)	50 ksi minimum (guaranteed)
Tensile Strength	~58–65 ksi	~60–90+ ksi (DOM can be higher)	~65 ksi minimum
Ductility	Good	Moderate to high (depends on DOM)	High + consistent
Consistency	Medium	Variable (process-dependent)	High consistency across sections



Dimensional Tolerances & Geometry Control			
OD/Wall Tolerance	Moderate	Tight (best of three in many cases)	Tight (structural-grade controlled)
Corner Radius Control	Loose to moderate	Moderate	Tighter + more consistent HSS geometry
Straightness	Good	Very good	Very good
Surface Finish	Mill finish (rougher)	Smooth (DOM = very smooth)	Smooth structural finish

Structural Design Behavior			
Code Design Basis	AISC 360 standard	Not structural code basis	AISC structural accepted
Load Path Reliability	High	Not intended for structural design	Very high
Buckling Behavior Consistency	Moderate	Variable	Improved predictability
Welded Frame Suitability	Excellent	Limited (depends on application)	Excellent



ASTM A500 limitations

Less precise dimensional control
Corners vary between mills
Not ideal for tight-fit assemblies without machining
Surface finish is not precision-grade

Use A500 when:

You are designing **frames, supports, or general structural**
Cost efficiency matters
You are working within standard fabrication supply chains

ASTM A513 limitations

Not a structural specification (critical distinction)
Strength varies significantly by DOM vs ERW type
Weld quality not standardized for load-bearing design
Not ideal for code-driven structural systems
Can be overestimated due to high tensile numbers

Use A513 when:

You need **precision fit-up, telescoping tubes, or machining**
The tube is part of a **mechanical system, not a structural frame**
Tight tolerance outweighs structural code classification

ASTM A1085 limitations

Higher cost
Limited availability (not all mills produce it)
Overkill for light structural work
May require procurement lead time planning

Use A1085 when:

You need **high-performance structural steel**
Seismic, fatigue, or high-load reliability is required
You want tighter tolerances than A500 without moving into mechanical tubing

Common ASTM Sizes

Tube Size (in)	Wall (in)	Outside Width (in)	Inside Width (in)	Inside Radius (in)	Outside Radius (in)	Notes
0.5	0.049	0.5	0.402	0.098	0.147	Typical ASTM A500 design radius
0.5	0.065	0.5	0.37	0.13	0.195	Typical ASTM A500 design radius
0.5	0.083	0.5	0.334	0.166	0.249	Typical ASTM A500 design radius
0.5	0.095	0.5	0.31	0.19	0.285	Typical ASTM A500 design radius
0.5	0.12	0.5	0.26	0.24	0.36	Typical ASTM A500 design radius
0.5	0.134	0.5	0.232	0.335	0.469	Typical ASTM A500 design radius
0.5	0.188	0.5	0.124	0.47	0.658	Typical ASTM A500 design radius
0.625	0.049	0.625	0.527	0.098	0.147	Typical ASTM A500 design radius
0.625	0.065	0.625	0.495	0.13	0.195	Typical ASTM A500 design radius
0.625	0.083	0.625	0.459	0.166	0.249	Typical ASTM A500 design radius
0.625	0.095	0.625	0.435	0.19	0.285	Typical ASTM A500 design radius
0.625	0.12	0.625	0.385	0.24	0.36	Typical ASTM A500 design radius
0.625	0.134	0.625	0.357	0.335	0.469	Typical ASTM A500 design radius
0.625	0.188	0.625	0.249	0.47	0.658	Typical ASTM A500 design radius
0.625	0.25	0.625	0.125	0.625	0.875	Typical ASTM A500 design radius
0.75	0.049	0.75	0.652	0.098	0.147	Typical ASTM A500 design radius
0.75	0.065	0.75	0.62	0.13	0.195	Typical ASTM A500 design radius
0.75	0.083	0.75	0.584	0.166	0.249	Typical ASTM A500 design radius
0.75	0.095	0.75	0.56	0.19	0.285	Typical ASTM A500 design radius
0.75	0.12	0.75	0.51	0.24	0.36	Typical ASTM A500 design radius
0.75	0.134	0.75	0.482	0.335	0.469	Typical ASTM A500 design radius
0.75	0.188	0.75	0.374	0.47	0.658	Typical ASTM A500 design radius
0.75	0.25	0.75	0.25	0.625	0.875	Typical ASTM A500 design radius
0.75	0.313	0.75	0.124	0.939	1.252	Typical ASTM A500 design radius
0.875	0.049	0.875	0.777	0.098	0.147	Typical ASTM A500 design radius
0.875	0.065	0.875	0.745	0.13	0.195	Typical ASTM A500 design radius
0.875	0.083	0.875	0.709	0.166	0.249	Typical ASTM A500 design radius
0.875	0.095	0.875	0.685	0.19	0.285	Typical ASTM A500 design radius
0.875	0.12	0.875	0.635	0.24	0.36	Typical ASTM A500 design radius
0.875	0.134	0.875	0.607	0.335	0.469	Typical ASTM A500 design radius
0.875	0.188	0.875	0.499	0.47	0.658	Typical ASTM A500 design radius
0.875	0.25	0.875	0.375	0.625	0.875	Typical ASTM A500 design radius
0.875	0.313	0.875	0.249	0.939	1.252	Typical ASTM A500 design radius
0.875	0.375	0.875	0.125	1.125	1.5	Typical ASTM A500 design radius
1	0.049	1	0.902	0.098	0.147	Typical ASTM A500 design radius
1	0.065	1	0.87	0.13	0.195	Typical ASTM A500 design radius
1	0.083	1	0.834	0.166	0.249	Typical ASTM A500 design radius
1	0.095	1	0.81	0.19	0.285	Typical ASTM A500 design radius
1	0.12	1	0.76	0.24	0.36	Typical ASTM A500 design radius
1	0.134	1	0.732	0.335	0.469	Typical ASTM A500 design radius
1	0.188	1	0.624	0.47	0.658	Typical ASTM A500 design radius
1	0.25	1	0.5	0.625	0.875	Typical ASTM A500 design radius
1	0.313	1	0.374	0.939	1.252	Typical ASTM A500 design radius
1	0.375	1	0.25	1.125	1.5	Typical ASTM A500 design radius
1.25	0.049	1.25	1.152	0.098	0.147	Typical ASTM A500 design radius
1.25	0.065	1.25	1.12	0.13	0.195	Typical ASTM A500 design radius
1.25	0.083	1.25	1.084	0.166	0.249	Typical ASTM A500 design radius
1.25	0.095	1.25	1.06	0.19	0.285	Typical ASTM A500 design radius
1.25	0.12	1.25	1.01	0.24	0.36	Typical ASTM A500 design radius
1.25	0.134	1.25	0.982	0.335	0.469	Typical ASTM A500 design radius
1.25	0.188	1.25	0.874	0.47	0.658	Typical ASTM A500 design radius
1.25	0.25	1.25	0.75	0.625	0.875	Typical ASTM A500 design radius
1.25	0.313	1.25	0.624	0.939	1.252	Typical ASTM A500 design radius
1.25	0.375	1.25	0.5	1.125	1.5	Typical ASTM A500 design radius
1.25	0.5	1.25	0.25	1.5	2	Typical ASTM A500 design radius
1.5	0.049	1.5	1.402	0.098	0.147	Typical ASTM A500 design radius
1.5	0.065	1.5	1.37	0.13	0.195	Typical ASTM A500 design radius
1.5	0.083	1.5	1.334	0.166	0.249	Typical ASTM A500 design radius
1.5	0.095	1.5	1.31	0.19	0.285	Typical ASTM A500 design radius
1.5	0.12	1.5	1.26	0.24	0.36	Typical ASTM A500 design radius
1.5	0.134	1.5	1.232	0.335	0.469	Typical ASTM A500 design radius
1.5	0.188	1.5	1.124	0.47	0.658	Typical ASTM A500 design radius
1.5	0.25	1.5	1	0.625	0.875	Typical ASTM A500 design radius
1.5	0.313	1.5	0.874	0.939	1.252	Typical ASTM A500 design radius
1.5	0.375	1.5	0.75	1.125	1.5	Typical ASTM A500 design radius
1.5	0.5	1.5	0.5	1.5	2	Typical ASTM A500 design radius
2	0.049	2	1.902	0.098	0.147	Typical ASTM A500 design radius
2	0.065	2	1.87	0.13	0.195	Typical ASTM A500 design radius
2	0.083	2	1.834	0.166	0.249	Typical ASTM A500 design radius
2	0.095	2	1.81	0.19	0.285	Typical ASTM A500 design radius
2	0.12	2	1.76	0.24	0.36	Typical ASTM A500 design radius

Common ASTM Sizes

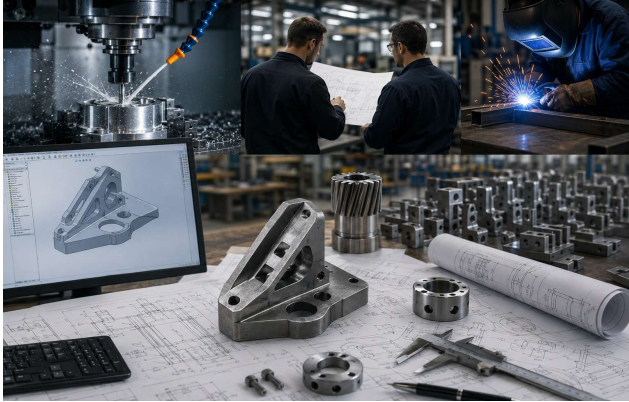
Tube Size (in)	Wall (in)	Outside Width (in)	Inside Width (in)	Inside Radius (in)	Outside Radius (in)	Notes
2	0.134	2	1.732	0.335	0.469	Typical ASTM A500 design radius
2	0.188	2	1.624	0.47	0.658	Typical ASTM A500 design radius
2	0.25	2	1.5	0.625	0.875	Typical ASTM A500 design radius
2	0.313	2	1.374	0.939	1.252	Typical ASTM A500 design radius
2	0.375	2	1.25	1.125	1.5	Typical ASTM A500 design radius
2	0.5	2	1	1.5	2	Typical ASTM A500 design radius
2.5	0.049	2.5	2.402	0.098	0.147	Typical ASTM A500 design radius
2.5	0.065	2.5	2.37	0.13	0.195	Typical ASTM A500 design radius
2.5	0.083	2.5	2.334	0.166	0.249	Typical ASTM A500 design radius
2.5	0.095	2.5	2.31	0.19	0.285	Typical ASTM A500 design radius
2.5	0.12	2.5	2.26	0.24	0.36	Typical ASTM A500 design radius
2.5	0.134	2.5	2.232	0.335	0.469	Typical ASTM A500 design radius
2.5	0.188	2.5	2.124	0.47	0.658	Typical ASTM A500 design radius
2.5	0.25	2.5	2	0.625	0.875	Typical ASTM A500 design radius
2.5	0.313	2.5	1.874	0.939	1.252	Typical ASTM A500 design radius
2.5	0.375	2.5	1.75	1.125	1.5	Typical ASTM A500 design radius
2.5	0.5	2.5	1.5	1.5	2	Typical ASTM A500 design radius
3	0.049	3	2.902	0.098	0.147	Typical ASTM A500 design radius
3	0.065	3	2.87	0.13	0.195	Typical ASTM A500 design radius
3	0.083	3	2.834	0.166	0.249	Typical ASTM A500 design radius
3	0.095	3	2.81	0.19	0.285	Typical ASTM A500 design radius
3	0.12	3	2.76	0.24	0.36	Typical ASTM A500 design radius
3	0.134	3	2.732	0.335	0.469	Typical ASTM A500 design radius
3	0.188	3	2.624	0.47	0.658	Typical ASTM A500 design radius
3	0.25	3	2.5	0.625	0.875	Typical ASTM A500 design radius
3	0.313	3	2.374	0.939	1.252	Typical ASTM A500 design radius
3	0.375	3	2.25	1.125	1.5	Typical ASTM A500 design radius
3	0.5	3	2	1.5	2	Typical ASTM A500 design radius
3.5	0.049	3.5	3.402	0.098	0.147	Typical ASTM A500 design radius
3.5	0.065	3.5	3.37	0.13	0.195	Typical ASTM A500 design radius
3.5	0.083	3.5	3.334	0.166	0.249	Typical ASTM A500 design radius
3.5	0.095	3.5	3.31	0.19	0.285	Typical ASTM A500 design radius
3.5	0.12	3.5	3.26	0.24	0.36	Typical ASTM A500 design radius
3.5	0.134	3.5	3.232	0.335	0.469	Typical ASTM A500 design radius
3.5	0.188	3.5	3.124	0.47	0.658	Typical ASTM A500 design radius
3.5	0.25	3.5	3	0.625	0.875	Typical ASTM A500 design radius
3.5	0.313	3.5	2.874	0.939	1.252	Typical ASTM A500 design radius
3.5	0.375	3.5	2.75	1.125	1.5	Typical ASTM A500 design radius
3.5	0.5	3.5	2.5	1.5	2	Typical ASTM A500 design radius
4	0.049	4	3.902	0.098	0.147	Typical ASTM A500 design radius
4	0.065	4	3.87	0.13	0.195	Typical ASTM A500 design radius
4	0.083	4	3.834	0.166	0.249	Typical ASTM A500 design radius
4	0.095	4	3.81	0.19	0.285	Typical ASTM A500 design radius
4	0.12	4	3.76	0.24	0.36	Typical ASTM A500 design radius
4	0.134	4	3.732	0.335	0.469	Typical ASTM A500 design radius
4	0.188	4	3.624	0.47	0.658	Typical ASTM A500 design radius
4	0.25	4	3.5	0.625	0.875	Typical ASTM A500 design radius
4	0.313	4	3.374	0.939	1.252	Typical ASTM A500 design radius
4	0.375	4	3.25	1.125	1.5	Typical ASTM A500 design radius
4	0.5	4	3	1.5	2	Typical ASTM A500 design radius
5	0.049	5	4.902	0.098	0.147	Typical ASTM A500 design radius
5	0.065	5	4.87	0.13	0.195	Typical ASTM A500 design radius
5	0.083	5	4.834	0.166	0.249	Typical ASTM A500 design radius
5	0.095	5	4.81	0.19	0.285	Typical ASTM A500 design radius
5	0.12	5	4.76	0.24	0.36	Typical ASTM A500 design radius
5	0.134	5	4.732	0.335	0.469	Typical ASTM A500 design radius
5	0.188	5	4.624	0.47	0.658	Typical ASTM A500 design radius
5	0.25	5	4.5	0.625	0.875	Typical ASTM A500 design radius
5	0.313	5	4.374	0.939	1.252	Typical ASTM A500 design radius
5	0.375	5	4.25	1.125	1.5	Typical ASTM A500 design radius
5	0.5	5	4	1.5	2	Typical ASTM A500 design radius
6	0.049	6	5.902	0.098	0.147	Typical ASTM A500 design radius
6	0.065	6	5.87	0.13	0.195	Typical ASTM A500 design radius
6	0.083	6	5.834	0.166	0.249	Typical ASTM A500 design radius
6	0.095	6	5.81	0.19	0.285	Typical ASTM A500 design radius
6	0.12	6	5.76	0.24	0.36	Typical ASTM A500 design radius
6	0.134	6	5.732	0.335	0.469	Typical ASTM A500 design radius
6	0.188	6	5.624	0.47	0.658	Typical ASTM A500 design radius
6	0.25	6	5.5	0.625	0.875	Typical ASTM A500 design radius
6	0.313	6	5.374	0.939	1.252	Typical ASTM A500 design radius
6	0.375	6	5.25	1.125	1.5	Typical ASTM A500 design radius

Common ASTM Sizes

Tube Size (in)	Wall (in)	Outside Width (in)	Inside Width (in)	Inside Radius (in)	Outside Radius (in)	Notes
6	0.5	6	5	1.5	2	Typical ASTM A500 design radius
7	0.049	7	6.902	0.098	0.147	Typical ASTM A500 design radius
7	0.065	7	6.87	0.13	0.195	Typical ASTM A500 design radius
7	0.083	7	6.834	0.166	0.249	Typical ASTM A500 design radius
7	0.095	7	6.81	0.19	0.285	Typical ASTM A500 design radius
7	0.12	7	6.76	0.24	0.36	Typical ASTM A500 design radius
7	0.134	7	6.732	0.335	0.469	Typical ASTM A500 design radius
7	0.188	7	6.624	0.47	0.658	Typical ASTM A500 design radius
7	0.25	7	6.5	0.625	0.875	Typical ASTM A500 design radius
7	0.313	7	6.374	0.939	1.252	Typical ASTM A500 design radius
7	0.375	7	6.25	1.125	1.5	Typical ASTM A500 design radius
7	0.5	7	6	1.5	2	Typical ASTM A500 design radius
8	0.049	8	7.902	0.098	0.147	Typical ASTM A500 design radius
8	0.065	8	7.87	0.13	0.195	Typical ASTM A500 design radius
8	0.083	8	7.834	0.166	0.249	Typical ASTM A500 design radius
8	0.095	8	7.81	0.19	0.285	Typical ASTM A500 design radius
8	0.12	8	7.76	0.24	0.36	Typical ASTM A500 design radius
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8	0.188	8	7.624	0.47	0.658	Typical ASTM A500 design radius
8	0.25	8	7.5	0.625	0.875	Typical ASTM A500 design radius
8	0.313	8	7.374	0.939	1.252	Typical ASTM A500 design radius
8	0.375	8	7.25	1.125	1.5	Typical ASTM A500 design radius
8	0.5	8	7	1.5	2	Typical ASTM A500 design radius
10	0.049	10	9.902	0.098	0.147	Typical ASTM A500 design radius
10	0.065	10	9.87	0.13	0.195	Typical ASTM A500 design radius
10	0.083	10	9.834	0.166	0.249	Typical ASTM A500 design radius
10	0.095	10	9.81	0.19	0.285	Typical ASTM A500 design radius
10	0.12	10	9.76	0.24	0.36	Typical ASTM A500 design radius
10	0.134	10	9.732	0.335	0.469	Typical ASTM A500 design radius
10	0.188	10	9.624	0.47	0.658	Typical ASTM A500 design radius
10	0.25	10	9.5	0.625	0.875	Typical ASTM A500 design radius
10	0.313	10	9.374	0.939	1.252	Typical ASTM A500 design radius
10	0.375	10	9.25	1.125	1.5	Typical ASTM A500 design radius
10	0.5	10	9	1.5	2	Typical ASTM A500 design radius
12	0.049	12	11.902	0.098	0.147	Typical ASTM A500 design radius
12	0.065	12	11.87	0.13	0.195	Typical ASTM A500 design radius
12	0.083	12	11.834	0.166	0.249	Typical ASTM A500 design radius
12	0.095	12	11.81	0.19	0.285	Typical ASTM A500 design radius
12	0.12	12	11.76	0.24	0.36	Typical ASTM A500 design radius
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12	0.25	12	11.5	0.625	0.875	Typical ASTM A500 design radius
12	0.313	12	11.374	0.939	1.252	Typical ASTM A500 design radius
12	0.375	12	11.25	1.125	1.5	Typical ASTM A500 design radius
12	0.5	12	11	1.5	2	Typical ASTM A500 design radius
14	0.049	14	13.902	0.098	0.147	Typical ASTM A500 design radius
14	0.065	14	13.87	0.13	0.195	Typical ASTM A500 design radius
14	0.083	14	13.834	0.166	0.249	Typical ASTM A500 design radius
14	0.095	14	13.81	0.19	0.285	Typical ASTM A500 design radius
14	0.12	14	13.76	0.24	0.36	Typical ASTM A500 design radius
14	0.134	14	13.732	0.335	0.469	Typical ASTM A500 design radius
14	0.188	14	13.624	0.47	0.658	Typical ASTM A500 design radius
14	0.25	14	13.5	0.625	0.875	Typical ASTM A500 design radius
14	0.313	14	13.374	0.939	1.252	Typical ASTM A500 design radius
14	0.375	14	13.25	1.125	1.5	Typical ASTM A500 design radius
14	0.5	14	13	1.5	2	Typical ASTM A500 design radius
16	0.049	16	15.902	0.098	0.147	Typical ASTM A500 design radius
16	0.065	16	15.87	0.13	0.195	Typical ASTM A500 design radius
16	0.083	16	15.834	0.166	0.249	Typical ASTM A500 design radius
16	0.095	16	15.81	0.19	0.285	Typical ASTM A500 design radius
16	0.12	16	15.76	0.24	0.36	Typical ASTM A500 design radius
16	0.134	16	15.732	0.335	0.469	Typical ASTM A500 design radius
16	0.188	16	15.624	0.47	0.658	Typical ASTM A500 design radius
16	0.25	16	15.5	0.625	0.875	Typical ASTM A500 design radius
16	0.313	16	15.374	0.939	1.252	Typical ASTM A500 design radius
16	0.375	16	15.25	1.125	1.5	Typical ASTM A500 design radius
16	0.5	16	15	1.5	2	Typical ASTM A500 design radius

Have engineering or manufacturing questions, or need support with product design, drafting, or lean manufacturing optimization? Schedule a complimentary 30-minute consultation with ACMS.

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It is not a substitute for:

- Engineering judgment
- Applicable building codes
- Manufacturer specifications
- Project-specific calculations
- Licensed Professional Engineer approval where required

Users should always verify:

- Material certifications
- Structural calculations
- Load requirements
- Local code compliance
- Customer specifications
- Manufacturing capabilities

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