

## *Gatorshield Steel Tubing vs. Aluminum*



*The Engineered Choice for Outdoor Structures*

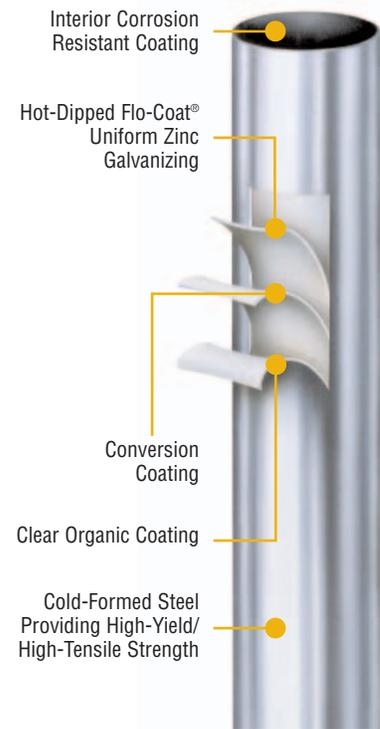
# Gatorshield Advantages

## ...ARE MORE THAN SKIN DEEP

Gatorshield® coating is Allied's superior, triple-layer rust and corrosion resistant product protection. Gatorshield coated steel tubing has been the standard of excellence and the product of choice for outdoor structures for over 20 years. Gatorshield tubing is given superior corrosion resistance by our patented, in-line Flo-Coat® process. A 99.99% pure zinc coating is applied, then a conversion coating. A clear organic topcoat seals the surface. The result is unmatched, long-lasting rust and corrosion protection. Gatorshield tubing's bright, smooth and uniform surface retains its attractive appearance for an extended period. Aluminum turns a dull, dark gray as it ages.

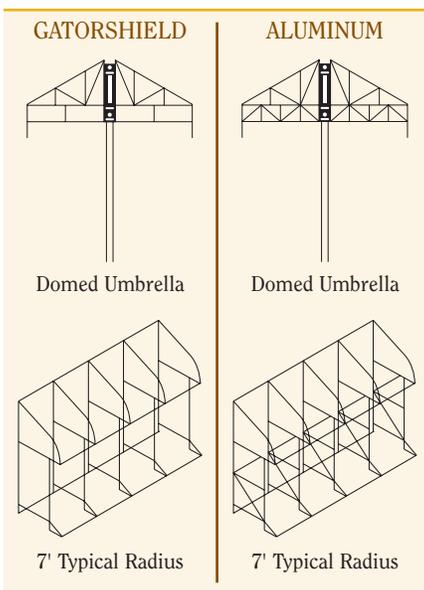
## ...CAN MAKE STRUCTURES LESS COSTLY

Gatorshield tubing's advantages over aluminum add up. Lower material cost, less material required per structure, and less fabrication expense add up to a compelling cost argument in favor of Gatorshield tubing as the material of choice for outdoor structures. And the much reduced risk of post-installation failure due to welding and wind, snow or ice loading is an "insurance policy" against expensive repair or replacement in the future. Also, the use of steel reduces theft and vandalism of structures...the scrap value of aluminum is more than 10 times that of steel. Satisfied users agree on Gatorshield tubing's cost-effectiveness – and on its superiority.



## GATORSHIELD ADVANTAGE...GREATER STRENGTH

The superior strength of Gatorshield steel tubing is the key to its advantage over aluminum, yielding greater structural integrity and requiring fewer linear feet of material per structure. In turn, these advantages translate into longer life and lower costs for outdoor structures.



PROPERTY	50/55 W/GATORSHIELD	ALUMINUM
Yield Strength	50,000 PSI Min.	25,000 PSI
Tensile Strength	55,000 PSI Min.	30,000 PSI
% Elongation	25% Min.	15% Min.
Modulus of Elasticity	30 x 10 <sup>6</sup> PSI	10 x 10 <sup>6</sup> PSI
Typical Surface Hardness—Rockwell B	75	35-40

## YOU'LL NEED LESS MATERIAL

Gatorshield tubing's higher strength permits the use of less linear footage, smaller sizes and/or lighter wall thickness to achieve the desired design performance. The design comparison below demonstrates that less Gatorshield tubing is required than aluminum for any given outdoor structure. Less material and Gatorshield's lower material cost (approximately 50% savings vs. aluminum) give Gatorshield a compelling advantage over aluminum.

### MATERIAL NEEDED – LINEAR FEET

SUBJECT	GATORSHIELD	ALUMINUM
Domed Umbrella	768	1328
7' Typical Radius	71.5	103.5

### SECTION PROPERTIES – ALLIED'S GATORSHIELD

EQUIVALENT PIPE SIZE	SIZE	A	I	SM	R	LBS/FT
1/2"	.815 x .072	0.168	0.0117	0.0287	0.263	0.571
3/4"	1.050 x .083	0.252	0.0296	0.0565	0.343	0.857
1"	1.315 x .083	0.321	0.0612	0.0931	0.436	1.092
1 1/4"	1.660 x .083	0.411	0.1281	0.1544	0.558	1.397
1 1/2"	1.900 x .095	0.538	0.2199	0.2315	0.639	1.831
2"	2.375 x .095	0.680	0.4429	0.3729	0.806	2.313

- A = Cross-sectional Area (inches<sup>2</sup>). Assists in determining size, once load demand is known.
- I = Moment of Inertia (inches<sup>4</sup>). Measure of a tube's resistance to deflection under load.
- SM = Section Modulus (inches<sup>3</sup>). The key ingredient to determining load-carrying capabilities.
- R = Radius of Gyration (inches). The critical factor for determining buckling loads of a column.

## COMPARABLE STRENGTH

Gatorshield permits substitution of lighter gauge, less costly steel in place of heavier gauge aluminum with no loss in strength.

### COMPARABLE STRENGTH

ALUMINUM SIZE	GATORSHIELD SIZE
1.00 sq. x .125 (11 ga.)	1.00 sq. x .035 (20 ga.)
1.00 x 2.00 x .125 (11 ga.)	1.00 x 2.00 x .035 to .065 (20 ga. to 16 ga.)

Gatorshield also allows up to 22% reduction in outside diameter when compared to same gauge aluminum without sacrificing strength.

### COMPARABLE STRENGTH

ALUMINUM SIZE	GATORSHIELD SIZE
1.315 x .083 (14 ga.)	1.050 x .083 (14 ga.)
1.660 x .083 (14 ga.)	1.315 x .083 (14 ga.)
1.900 x .095 (13 ga.)	1.660 x .095 (13 ga.)

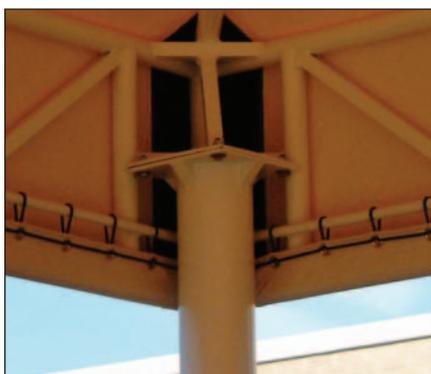
## GATORSHIELD ADVANTAGE...SUPERIOR FABRICATION

A comparison of the requirements for fabricating outdoor structures of Gatorshield and aluminum reveal major advantages for Gatorshield:

Gatorshield ductile steel tubing withstands the bending and forming required for custom awning designs, recreational equipment, etc. Common tempers of aluminum, however, continue to age-harden while in storage, and can break during any fabrication process, causing costly scrap losses.

Aluminum loses approximately 50% of its strength in the weld area, which could cause post-installation failure if welds are not located in low stress areas during its design. In addition, welding of aluminum, or using aluminum electrodes which contain magnesium, can result in unsightly black deposits.

Steel structures require significantly fewer welds as indicated in the comparison below. The result is lower welding labor costs for Gatorshield structures. Welding Gatorshield also requires less expensive equipment and materials. And, unlike aluminum, Gatorshield can be easily welded in the field.

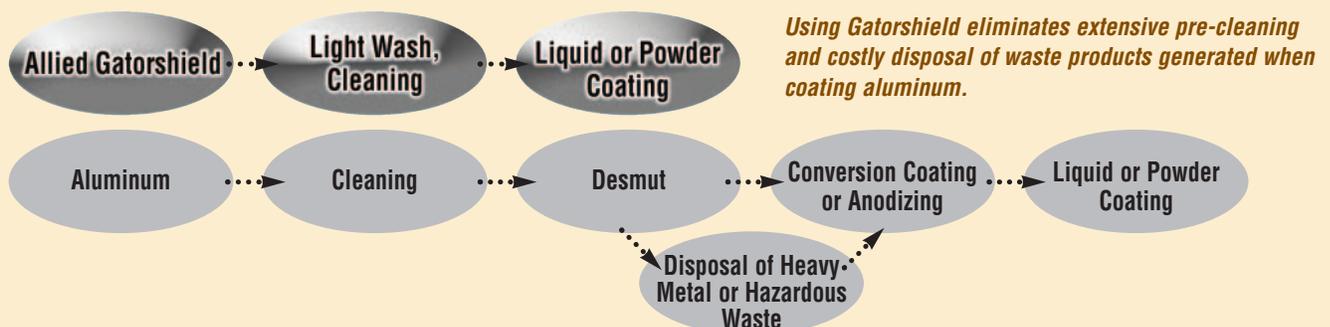


### WELDING REQUIREMENTS – TOTAL WELD COUNT

SUBJECT	GATORSHIELD	ALUMINUM
Domed Umbrella	112	395
7' Typical Radius	55	95

Gatorshield steel tubing is easily and less expensively painted or powder coated than aluminum, offering variety in color, texture and sheen to enhance design possibilities and aesthetic appeal. Because Gatorshield's third coat has the same paint chemistry and surface consistency as costly primers, finish adhesion is excellent, providing a long-lasting, attractive appearance.

## COATING PROCESS COMPARISON



## ADVANTAGE... UNMATCHED DURABILITY

The higher rigidity of Gatorshield structures means less bowing and deflection than aluminum structures under identical load conditions. This translates to a much more stable installation, with far less chance of damage to the fabric covers, graphics and backlit illumination equipment of custom awnings and the roofs of structures. Gatorshield's superior hardness makes framing and support structures much more resistant to everyday dings and dents. And its approximately 30% greater load carrying capacity than aluminum, size for size, was dramatically revealed in a wind-load test conducted by Construction Research Laboratory, Inc. of Miami, an independent testing laboratory.

## WIND LOAD COMPARISON

Both test awnings were 15'0" wide by 3'6" high by 8'0" deep and identically attached to a supporting back wall structure. One awning frame was fabricated of Gatorshield 1.050" OD by 14 gauge and 0.815" OD by 15 gauge welded steel tubing; the other from Schedule 40 1.050" OD by 12 gauge and 0.840" OD by 12 gauge 6061-T6 extruded aluminum pipe. Identical awning material was used for each, and each awning was subjected to wind speeds increased in 10 mph increments. At 60 mph, the aluminum awning frame collapsed within 4 seconds. The frame made from Gatorshield® steel tubing exhibited a slight downward bow at 80 mph, but did not fail.



## CONCLUSION

For durability and installation stability, Allied's Gatorshield® steel tubing is far superior to aluminum for all awning and canopy frame applications. Full test information, including a videotape of the wind load test, is available upon request.

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