

General Description

ALLGAL® coated structural quality steel coil is produced by Orrcon Steel by a unique electrogalvanizing technology using BlueScope supplied hot rolled coil. The electrogalvanized coated steel is then cold-formed into ALLGAL® Tube and Pipe using the ERW (Electric Resistance Weld) process, where the external weld upset is removed and the ALLGAL® coating at the weld zone is restored with a thermal spray applied zinc alloy. ALLGAL® coated Tube and Pipe is available in a range of shapes, thicknesses and strength grades. SHS, RHS, yard rail, silo sections and CHS products all manufactured to comply with the requirements of AS/NZS 1163 – Structural Steel Hollow Sections. CHS pipe is also available to AS 1074 – Steel tubes and tubulars for ordinary service; for use in fire-sprinkler, hydrant and general low pressure gas and fluid applications.

Certification

ALLGAL® Tube and Pipe is manufactured to comply with all requirements of AS/NZS 1163 and/or AS 1074 and produced from quality steel supplied by BlueScope Steel Australia. Orrcon Manufacturing is an ISO9001 accredited business and has been third party certified by ACRS to comply to AS/NZS 1163. Mechanical test facilities are accredited by NATA to comply to ISO17025 and material test certificates are available on request.

Coating

ALLGAL® complies with the coating weight requirements of AS 4750 Electro-galvanized (zinc) Coatings on Ferrous Hollow and Open Sections, class ZE50/50. The minimum average zinc coating weight is 50 grams per square metre on the inside and outside surface of the tube.

Orrcon Steel applies a clear water-based polymer coating called Clear-Tec to the external surface of ALLGAL® which provides additional shelf life protection. The total coating thickness of ALLGAL® plus Clear-Tec is a minimum of 11 microns.

ALLGAL® has a matte, spangle-free surface appearance and has a consistent and uniform thickness. External surfaces further protected with a Clear-Tec coating. Coating performance is guaranteed to maintain adhesion at a minimum 1t bend radius (180° bend along L-axis).

ALLGAL® PCQ for Powder Coat Quality critical applications can be requested, which provides for no tube-mark, increased attention to surface aesthetics and a light oil for ease of cleaning, pre-treatment and improved powder coat finish appearance.

The smooth surface finish of ALLGAL® is highly suited to organic paint and duplex coating systems generally, for extended durability when exposed in more aggressive corrosive environments.

ALLGAL® coating:

- ▶ Hot rolled strip is acid pickled to the equivalent of Class 3 surface finish.
- ▶ The strip passes through plating tanks to apply minimum 7 micron of zinc on top and bottom surface (ZE50/50 coating class AS4750 - 50g/m² per side).
- ▶ A surface passivation layer is applied at a level of 20-50mg/m².
- ▶ A Clear-Tec coating is applied to a thickness of 4 – 6 microns to the outside of the finished tube.
- ▶ Clear-Tec is a water based polyester resin with acrylic modification which is hard and tough, offers UV protection and enhanced adherence for acrylic and polyester top coats.

Available Product Range

Sizes available
SHS 20x20mm to 125x125mm RHS 38x25mm to 150x100mm Thickness available in 1.6, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0mm
YARD RAIL 52x25mm to 115x42mm Thickness available in 1.6, 2.0, 2.5, 3.0, 4.0mm
SILO SECTIONS 75x64mm Thickness available in 2.5, 3.0mm
CHS (C350L0) 25.4mm OD to 165.1mm OD Thickness available in 2.0, 2.3, 2.6, 2.9, 3.0, 3.2, 3.5, 3.6, 5.4, 6.0mm
PIPE (C250L0) 20NB to 150NB Thickness available in 2.6, 3.2, 3.6, 4.0, 4.5, 5.0, 5.4mm

MOQ's apply unless within the defined stock range of your local steel supplier. Standard pack and MiniPak configurations available for most RHS, SHS, CHS and Pipe. Standard pack configuration only for Yard Rail and Silo Sections.



Typical Applications

Orrcon Steel's ALLGAL® is suitable for a wide range of applications that require a consistent high quality manufacturing, protection and smooth surface finish. These may include;

- ▶ Structural applications
- ▶ Mechanical applications
- ▶ General purpose applications

ALLGAL® PCQ is great for powder-coating

Mechanical Properties

Orrcon Steel's ALLGAL® steel hollow sections are manufactured to comply with the mechanical property requirements of: AS/NZS 1163 Cold-Formed Structural Steel Hollow Sections in grades C250L0, C350L0, C450L0 and the minimum properties of AS 1074 Steel Tubes and Tubulars for Ordinary Service.

Australian Standard	Grade	Minimum Strength (MPa)		Minimum Strength (%)					
		Yield	Tensile	CHS do/t			RHS/SHS b/t, d/t		
				≤15	>15 ≤15	>30	≤15	>15 ≤15	>30
AS/NZS 1163	250	≥250	≥320	18	20	22	14	16	18
	350	≥350	≥430	16	18	20	12	14	16
	450	≥450	≥500	12	14	16	10	12	14
AS 1074	250	≥195	≥320	20					

ALLGAL tubular steel sections meet the Charpy V Notch impact requirements within AS/NZS 1163 for L0 specification.

Chemistry

Grade C250L0

Element	C	Si	Mn	P	S	Cr	Mo	Al	Ti	CE _{IIW}
Specification (max %)	0.12	0.05	0.50	0.03	0.03	0.15	0.10	0.10	0.04	0.25

Grade C350L0

Element	C	Si	Mn	P	S	Cr	Mo	Al	Ti	CE _{IIW}
Specification (max %)	0.20	0.25	1.60	0.03	0.03	0.30	0.10	0.10	0.04	0.43

Grade C450L0

Element	C	Si	Mn	P	S	Cr	Mo	Al	Ti	CE _{IIW}
Specification (max %)	0.20	0.25	1.70	0.03	0.03	0.30	0.35	0.10	0.04	0.43

Boron limits are less than 0.0005%. The following elements may be present to the limits stated: Cu (0.25% and Ni (0.25%). Other limits as per AS/NZS 1163 apply.

Dimensional Tolerances

Dimensional tolerances are specified to meet the minimum requirements of AS/NZS 1163 and/or AS 1074.

Dimensional tolerances	AS/NZS 1163		AS 1074	
Thickness	± 10%		Light	-8%, +Unlimited
			Medium/Heavy	-10%, +Unlimited
Outer Dimensions	± 1%, with a minimum of ± 0.5mm		± 1%	
Corner Radius (Where t = nominal material thickness)	≤ 50x50	1.5t to 3.0t		N/A
	> 50x50	1.8t to 3.0t		
Concavity / Convexity	SHS/RHS	Max 0.8% or 0.5mm, whichever is greater		
Squareness	Adjacent sides 90 ± 1° maximum			
Out-of-roundness	2% for CHS with D/T less than 100			
Twist	2.0mm + 0.5mm/m length			
Straightness	CHS ≤ 0.20%, SHS/RHS ≤ 0.15% of total length		0.2% of total length	
Linear Mass	≥ 0.96 x Specified nominal mass		≥ 0.96 x Specified nominal mass	
Length	-0mm, +100mm		-0mm, +8mm	

Storage and Handling of ALLGAL® in Packs

To avoid white-rust corrosion (storage stain) during handling and storage it is essential that galvanized pipe and tube, including ALLGAL®, be kept dry when in pack form. The easiest way to keep packs of ALLGAL® from corroding is to keep packs out of the weather.

Moisture is needed for white rust to proceed, so condensation on packs from high humidity should be avoided by ensuring there is sufficient airflow while in storage. Airflow helps reduce stagnant cool air surrounding the surface, raises the surface temperature and replaces humid air with drier air under appropriate conditions. When condensation can't be prevented elevated airflow can dry the water that forms on surfaces.

If a pack gets wet then capillary action will wick water between the lengths and inside the pack. The outside surface may be dry, but water inside the pack cannot dry until each length and layers is separated. Pack cutting on band-saws using water-based flood coolant has also been known to contribute to white rust, for this reason oil mist coolant is recommended.

If packs are exposed to moisture then it is essential they are broken open and each length and layer is separated so air-flow can dry the surface. If the climate is one where condensation occurs then forced air is recommended to avoid the steel surface getting colder than the air temperature. The stack should be on a slight incline so water can more easily run-off the tube surface.

Workability and Serviceability

ALLGAL® is Electrogalvanized steel Tube and Pipe with the external surface being top coated with a specially formulated polymer coating called Clear-Tec. Electrogalvanizing is a special form of electroplating. It is usually used in high performance applications requiring coatings that are easy to weld, topcoat and that provide good resistance to corrosion. This method is used because the coating provides a smooth finish that is easy to weld and paint.

Weldability

The smooth and uniform ALLGAL® coating has a beneficial effect on welding. ALLGAL® can be welded at high speeds, it is easy to strike an arc and weld fumes are minimal.

The procedure for welding is to simply make the weld, remove any slag, wipe the area and spray the bare steel in the weld zone with a zinc rich paint.

The fumes that are generated have been measured by Orrcon Steel to be below TWA and STEL limits. Weld fumes are low due to the water based Clear-Tec coating and the controlled and uniform thickness.

BlueScope steel coil to AS1397 confers guaranteed zinc-coating performance and steel weldability to group number 5, as per AS/NZS 1554.1.

Additional care is warranted when welding pre-galvanized zinc coatings to manage fume exposure and weld quality. Refer Weld Australia (formerly WTIA) Technical Notes: TN 07 Health and Safety in Welding and TGN-BC-03 Welding of Mill Applied Galvanized Steel Sections.

Factors influencing durability

- ▶ Environmental corrosivity
- ▶ Local variations in environment
- ▶ Design of the structure
- ▶ Surface cleaning prior to coating
- ▶ Oil, grease, dirt, chlorides
- ▶ Surface pretreatment
- ▶ Coating system application process
- ▶ Coating types – sacrificial, barrier
- ▶ Maintenance of and alterations to the structure

Micro-environments

Local environmental effects that can result in a significant acceleration of the corrosion rate:

Exposure to contaminants:

- ▶ Local industry or animal farms
- ▶ Agricultural fertilizers/insecticides
- ▶ Alkali/acidic fallout
- ▶ Wind borne salts

Local weather conditions:

- ▶ Damp locations not dried by direct exposure to the sun
- ▶ Sea breezes
- ▶ Prevailing wind direction
- ▶ Surfaces not freely drained

Design & installed structure:

- ▶ Hot or cold surfaces
- ▶ Abrasion or impact
- ▶ Animal enclosures
- ▶ Unwashed surfaces
- ▶ North/west facing & non-vertical

Corrosion & Durability of ALLGAL® Coating

ALLGAL® is a passivated electroplated coating suitable for mild and moderate arid/urban inland regions to achieve a medium term durability of 5 to 10 years.

The durability of steel structures can be determined based on the coating system and the environment. To achieve medium to long term durability in coastal regions all zinc tubular coated steels require additional protection against corrosion.

Durability of Zinc Coatings

ALLGAL® coating protects steel because it corrodes between 10 to 40 times slower than the steel surface. In the same environment and conditions zinc coatings of the same coating mass achieve the same durability regardless of the application process.

- ▶ ALLGAL® offers good corrosion protection in corrosivity categories C1 and C2 as per AS4312 (A & B as per AS2312).
- ▶ In dry internal environments (<60% humidity) & external environments in arid and urban inland locations and can be expected to achieve a medium term durability of 5 to 10 years.
- ▶ ALLGAL® is not recommended in categories C3-C5 as per AS4312 (C, D, E or F as per AS2312) unless a suitable top coat protection system in accordance with AS/NZS 2312 is utilised.

To achieve long term durability in category C3, ALLGAL® requires top coat protection in accordance with AS/NZS 2312.

The following standards have been utilised to develop these guidelines:

- ▶ AS2312 Guide to protection of structural steel against corrosion.
- ▶ Appendix E of AS4750 Electrogalvanized coatings on ferrous hollow and open sections.
- ▶ ISO9223 Corrosion of metals and alloys: Corrosivity of atmospheres – Classification.
- ▶ AS4312 Atmospheric corrosivity zones in Australia.

Corrosion Protection

Research has shown that the corrosion protection offered by zinc is a function of the coating weight, and doesn't vary with the method of application. ALLGAL® products because they have a duplex coating of zinc and Clear-Tec have the following advantages;

- ▶ Rate of zinc depletion is reduced, adding to the life of the coating.
- ▶ The Clear-Tec acts as a primer, making it easier to apply further coats of paint.
- ▶ The product will stay shiny longer than bare galvanized products, which can quickly become dull in appearance.

Painting ALLGAL®

The zinc coating is sealed with Clear-Tec polymer and therefore easy to topcoat. First wipe the material down with a light solvent such as Prepsol. This must be done until the product is visibly clean. Prepsol is an alcohol that doesn't affect the Clear-Tec coating. Clear-Tec is also designed to be removed by methylated spirits and caustic cleaners.

Clear-Tec is compatible with many painting systems including Enamels, Acrylics, polyurethanes and PVA emulsions. If unsure, test the paint on a small area first, or seek further advice from your paint supplier.

Powder Coating ALLGAL®

For powder coating it is important that white rust has not formed on the surface of the product. If this is the case then the white rust needs to be removed and the surface passivated (e.g. zinc phosphate) before it can be powder coated.

Depending on the powder coating operation, you may wish to order ALLGAL® PCQ. ALLGAL® PCQ is the same as ALLGAL®, except the zinc is coated with oil rather than Clear-Tec. In this way, standard degreasing stations can remove the oil prior to powder coating.

If you powder coat and do not have a degreasing process, then use ALLGAL®. The Clear-Tec coating can be wiped clean using a light solvent such as Prepsol. Clear-Tec has been designed to sustain the temperature of powder coating ovens (tested to 230°C).

Contact us for more about this product

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For ALLGAL® Tube and Pipe's availability please contact your Orrcon Steel representative.

Please note that not all products are available in all regions.

Please ensure you have the current data sheet for this product as displayed at orrconsteel.com.au/resources/technical-resources/