

SHOCKWAVE METALWORKING TECHNOLOGIES BV

Shipbuilding Application

Aluminium / Steel Transition Joint:



For Welding Aluminium to Steel

General:

The vacuum-explosion welded transition joint, called **Triplate[®]** is a high quality material for welding aluminium to steel.

Shockwave, the producer and supplier of **Triplate[®]** is specialized in the manufacture of this "high-tech" transition joint.

Approval of manufacturer:

Shockwave is approved as a manufacturer of Aluminium/Steel transition joints by Lloyd's Register of Shipping and Det Norske Veritas. RINA, Germanische Lloyd's, Veritas and ABS.

Applications:

Triplate[®] is most often used in shipbuilding, as a transition joint for welding an aluminium superstructure to a steel hull, for example.

The products:

Triplate[®] is constructed in three layers: steel, pure aluminium and sea water corrosion resistant aluminium. These three layers are homogeneously bonded together in a vacuum, with the aid of explosives (explosion cladded, welded or plated).

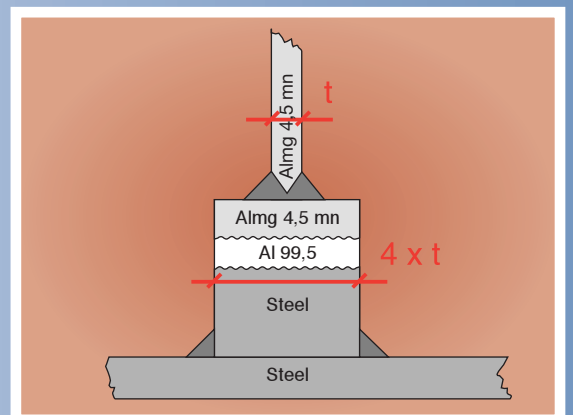


Base Material:	Steel:	LRA Shipplate Gr. A	or St 52-3N
Interlayer:	Pure Aluminium:	Al 99,5	(Alloy 1050A)
Superlayer:	Corrosion-resistant Al:	AlMg4,5Mn	(Alloy 5083)

Dimensions:

Standard dimensions are available from stock; custom-made sections can also be supplied quickly (including water-jet cutting). The recommended stripwidth is 4 x thickness of the Aluminium plate.

Standard Strip Width:	Variable
Standard Strip Length:	max. 3800 mm
Standard Strip Thickness:	28 mm or 34 mm



Processing:

Triplate[®] is easy to process and replaces the conventional nut-and-bolt, or rivet joint.

It is important that the temperature of TRIPLATE remains below the critical limit of 315° C during welding!

With reference to bending, use a standard minimum radius of 10 times the strip width or strip thickness.

Minimum mechanical values:

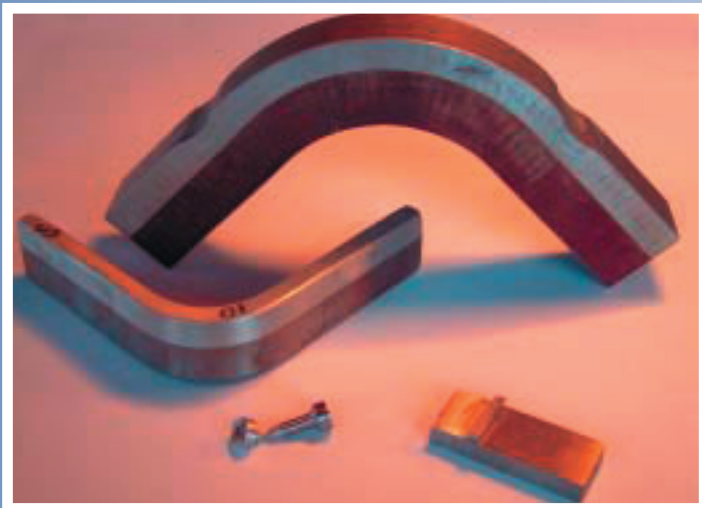
Shearstrength Basematerial - Interlayer:	> 55 N/mm ²
Bendtest Basematerial in Compression:	acceptable
Bendtest Basematerial in Tension:	acceptable
Sidebend test:	acceptable
Tensile Strength (through thickness):	> 75 N/mm ²
Processing Temperature:	max. 315° C



Through thickness tensile test of Triplate

Testing:

Triplate[®] meets the requirements of all the international standards, including the MIL-J-24445A, for Military applications.



Bendtests, sheartest and tensile test of Triplate

Possible inspection authorities:

- Lloyd's Register of Shipping
- Det Norske Veritas
- Germanischer Lloyd
- Bureau Veritas
- American Bureau of Shipping
- RINA
- etc.

Welding:

The following factors are influencing the welding process:

Welding speed, dimensions of the transition joint, position of the weld, dissipation of the heat into the structure.

Most important is that the temperature of **Triplate®** remains below the critical limit of 315° C during welding!

Preferred welding process:

The recommended welding methods are similar to those, used for the parent metals.

Aluminium: GTAW or GMAW, TIG and MIG welding are acceptable, Synergic pulse Mig welding is also being used.

Small diameter wires are recommended. (1.2 mm is preferable).

Argon shielding gas is recommended.

The aluminium oxide film must be wire brushed away before welding and degreased with a solvent.

Steel: Coated electrode, GMAW, SMAW or FCAW

Small diameters electrodes are recommended (e.g. 2.5 mm).

DO NOT PRE HEAT THE TRANSITION JOINT!

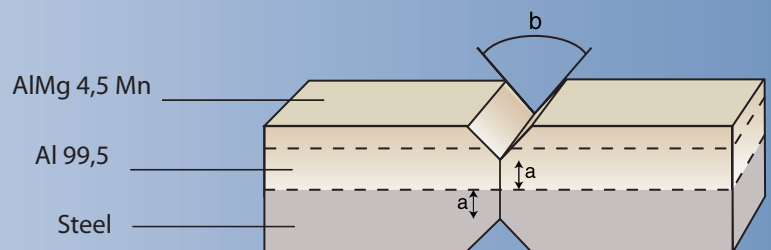
If possible, the aluminium weld should be made first, in order to minimise temperature rise of the transition joint.

It is recommended to use heat sensitive paint on the transition joint in order to monitor the interface temperature.

Butt welds:

The strip ends should be chamfered and the butted strips clamped (see drawing).

An area of 3 mm above and below the Aluminium/Steel interface should not be welded. This unwelded area should be hammered watertight or drilled and injected with epoxy or sealant.



a= 3 mm.
b = 60 - 75°

Bending:

Triplate® can be bent in three directions:

- Sidebend: $R = 10 \times \text{stripwidth}$
- Aluminium in tension: $R = 300 \text{ mm}$
- Aluminium in compression: $R = 300 \text{ mm}$



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