



REYNOLDS 953 MAR-AGING STAINLESS STEEL

Reynolds latest innovation takes steel alloys into a new league. By utilising a specially developed "martensitic-aging" stainless steel alloy that can achieve tensile strength in excess of 2000MPa, this has a strength-to-weight ratio that can take on the best in the world. This material combines the resilient ride of steel, very high impact strength (similar to armour plating) and corrosion resistance in an extraordinary material that can now be used for bike tubing.

We developed this alloy in conjunction with Carpenter Specialty Alloys, USA to provide a product which combines high impact strength, corrosion resistance, optimum cold-working and good fatigue life.

Reynolds will work with fabricators to provide recommended production techniques, so that the challenges inherent in using an extremely hard metal can be overcome.

Benefits for the customer: Ultra strong steel, with the advantage of a stainless finish for maximum weight reduction from very thin walls. **And the legendary ride of steel.**

As frame properties will depend on the production sequence at the framebuilder, we summarise the two main alternatives proposed:

1 - Optimum Strength Process

Cold Worked, Butted tubing sent by Reynolds, Welded & Aged by frame manufacturer :

- Carpenter produces input material at the optimised specification
- Reynolds cold-works, butts tubes and shapes tube sets
- Frame Manufacturer welds tube sets including fittings in 953 or compatible stainless alloys
 - Uses AWS ER630 weld rod (Custom 630)
 - No preheat necessary, but aligning recommended prior to Age
- Frame Aged at 950F (510 C) for 4 hours at temperature, air cooled.

Final Properties of Frame:

- Welds will have aged properties (over 1350 MPA Tensile Strength with AWS ER630 wire)
- Cold worked tube areas will have cold worked plus age properties - 1750-2050 MPA Tensile Strength depending on cold-work/age/thickness.

2 - Aged Tubing Process

Cold Worked, Butted and Aged Tubing by Reynolds, then Welded by frame manufacturer :

- Carpenter produces input material at the optimised specification
- Reynolds cold-works, butts tubes and shapes tube sets, then ages tubing to delivered specification
- Frame manufacturer welds tube sets
 - Uses AWS ER630 weld rod
 - No preheat necessary, and no ageing process is carried out on the finished frame
 - Process should allow for cutting/mitring of high-strength steel

Final Properties of Frame:

- Welds and Heat Affected Zones will have as-welded properties (over 1100 MPA Tensile Strength with AWS ER630 wire)
- Cold worked tubes will have cold worked plus age properties (around 1800-1950 MPA Tensile).

Final properties of each frame will depend on the tubes used, the wall thickness chosen and the welding method employed. Where lower strength/fatigue is acceptable for the frame design/fittings, 953 can be welded to lower strength 304 or 316L type stainless steel parts using suitable weld rods.

Please contact Reynolds if you have any questions.

KTN 8/24/05