

953

FAQs: Updated:31 October 2005.



Reynolds 953

Thank you for enquiring about Reynolds 953 butted tube sets.

Because it is a new metal for use in the bike industry, we are working to ensure 953 allows for frame-builder processes but will expect there will be detailed questions that may require an periodic update. A separate file can be sent to you, indicating possible methods of frame-building with 953.

To cover questions that have been raised so far

- Material – maraging stainless steel, specially manufactured for Reynolds by Carpenter SpecialtyAlloys, USA. This material undergoes a double vacuum remelt process to get achieve the necessary properties and purity. It has a very low carbon content, which has an advantage that machinability compared to e.g. AerMet 100 which is improved due to low carbide content.
- Made from welded, cold-drawn tube with a highly homogenous welds to avoid a potential weak point (specialist aerospace weld mill). Although a departure from Reynolds' preference of using seamless materials for high-end tubing, the cost factor would make seamless material very expensive for a steel frame although this remains a future option. 953 passes 3 tests after ageing at 950F a) 50% flatten from e.g. 28.6mm OD to 14mm width without any cracking along the weld seam b) drilling into the weld seam area does not cause any seam cracking c) no visible seam line on the finished tube after polishing.
- Ultimate tensile strength – 1750 to 2050MPa depending on process used (853 airhardening steel are 1200-1400 MPa). Density is 7.79 gm/cc. Poissons ratio is 0.30.
- Yield strength 1500-1900 MPa depending on the combination of cold-working, butting, and ageing temperature. (1500 MPa is approx. twice the yield strength of Cold-worked, Stress relieved 3-2.5 titanium). At 950 F ageing temperature, yield strength should be in the 1650-1730 MPa range based on internal tests. Elongation can be increased by changing the ageing temperature.
- Stiffness Modulus (E) is 200 GPa, similar to other steel alloys. Although Reynolds do not have frame design expertise, we assume that if higher stiffness is required when lighter tubes are used, advantage can be taken of the higher strength by using slightly oversize but thin wall tubes with a lower overall weight.
- Can be TIG welded with AWS ER630 wire or silver brazed using recommended filler wires. NB Silver brazing trials indicate this is workable, but an outstanding question is corrosion resistance on the braze area. There may be brazing materials with similar melting points but with the corrosion resistance of a stainless steel.
- High tensile / impact strength and fracture toughness. Workability before ageing.
- Corrosion resistance superior to type 410 stainless steels. Note that under some conditions e.g. sulphuric acid, prolonged submersion in sea water 953 will show signs of pitting and corrosion. We assume these are not normal conditions for a bike frame.
- Cold worked butted wall profiles from 0.65mm down to 0.3mm (e.g. .65/0.4/0.65, 0.5/0.30/0.50mm) depending on diameter
- Full range of stainless steel fittings / BB shell / head tube will be available in compatible alloys including 953 BB shell, 953 lightweight rear drop-outs.
- Tube diameters 28.6, 31.75, 34.9 & 36.4 mm.

- Variety of butt profiles to suit frame sizing and lugged construction if needed.
- Supplies of tube and fittings will be available to frame builders world wide from early February 2006
- Full specification and pricing will be available end October 2005 .
- Tubes can be supplied ready aged, so frame builders can just fabricate the frames, but assume mitre and cutting could be slow. Or Reynolds can supply without age, so frame building will be similar to standard CrMo steels, for the builder to age the whole frame. Full heat treatment details will be provided. Ageing will leave a superficial tint, which can be removed by light polishing, shot blasting or pickling.
- Purging whilst welding the frame is recommended, but not essential. Purging would reduce possible contamination on the inner surface of the weld joints, improving corrosion resistance
- Frame alignment should be carried out before ageing but we do not expect jigs to be needed when ageing as this is a relatively low temperature for steel heat-treatment.

Contact for specification and prices :-



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