



**DRIVEN.**  
TO MAKE IT SAFER.

**DOCOL®**  
THE AUTOMOTIVE STEEL

**a.e.d.**  
MOTORSPORT PRODUCTS



## DOCOL TUBE FACTS

Docol Tube – Advanced High Strength Steel - Dual Phase Steel - This steel undergoes special heat treatment in a continuous annealing line, producing a two-phase structure. Ferrite that imparts unique forming properties represents one phase, and martensite that accounts for the strength represents the other phase. Docol is not a standard high strength steel. Therefore during application design stages it is imperative to contact A.E.D. for specific technical properties.

Docol was engineered to provide a stronger, safer, more consistent alternative to 4130 CD seamless tube. What have we learned? Faster more consistent, longer lasting racecars that better utilize tuning components.

**Suitable applications:** roll cages, chassis, suspension, wheelie bars, motorcycles, aerotube suspension and wing struts, drive shafts, nerf bars and bumpers, aircraft structures, and off road powersports equipment.

Since A.E.D. introduced Docol in 2013, hundreds of cars are now competing. This includes drag cars, late models, sprint/midgets, sports cars, go karts, land speed cars World Rally Cars, motorcycles, BMX bikes, snowmobiles, and even a few sport aircraft applications. Dirt oval chassis builders have been the largest users of this material.

**Common production applications:** door crash bars, roof bows, A&B pillars, bumpers, foot boxes and seats, Docol has been used in production cars for more than 30 years.

## KEY ADVANTAGES OF DOCOL

- Stronger than 4130 by 10 to 15 percent.
- Heat Affected Zone (HAZ) in Docol is much smaller in area, less brittle and retains better elongation than 4130 typically does.
- Docol is much more tolerant to heavy fabrication. It does not warp and distort like 4130 and stays more relaxed in tooling and fixtures during fabrication.
- Greater resistance to fatigue.
- Docol absorbs energy and presents a more consistent and controlled failure mode.
- Clean mill finish product – minimal, if any, surface prep required. Docol does not have an oxide or decarb layer and looks like a high quality electric welded tube.
- Accurate and consistent dimensional and mechanical properties because this material is a rolled and welded strip. See comparison sheet attached.
- Compatible with welding to 4130 and mild steel components.
- Suitable for TIG and MIG welding.
- Clean no scrap based material.

## CURRENTLY ACCEPTED BY:

NHRA – all classes, SFI, BMW Car Club, Pikes Peak Hill Climb, USAC, World Figure 8, POWRi, World of Outlaws (late model and sprint), Lucas Oil Late Model Series, SCCA, Can Am Midget Series and many more.



## TODAY'S AHSS

Advanced High-Strength Steels (AHSS) are complex, sophisticated materials, with carefully selected chemical compositions and multiphase microstructures resulting from precisely controlled heating and cooling processes. Various strengthening mechanisms are employed to achieve a range of strength, ductility, toughness, and fatigue properties. These steels aren't the mild steels of yesterday; rather they are uniquely light weight and engineered to meet the challenges of today's vehicles for stringent safety regulations, emissions reduction, solid performance, at affordable costs.

The AHSS family includes Dual Phase (DP), Complex-Phase (CP), Ferritic-Bainitic (FB), Martensitic (MS or MART), Transformation-Induced Plasticity (TRIP), Hot-Formed (HF), and Twinning-Induced Plasticity (TWIP). These 1st and 2nd Generation AHSS grades are uniquely qualified to meet the functional performance demands of certain parts. For example, DP and TRIP steels are excellent in the crash zones of the car for their high energy absorption.

Steels with yield strength levels in excess of 550 MPa (80 ksi) are generally referred to as AHSS. These steels are also sometimes called "ultrahigh-strength steels" for tensile strengths exceeding 780 MPa (113 ksi). comparable or improved capabilities at significantly lower cost.

The principal difference between conventional HSS and AHSS is their microstructure. Conventional HSS are single-phase ferritic steels with a potential for some pearlite in C-Mn steels. AHSS are primarily steels with a microstructure containing a phase other than ferrite, pearlite, or cementite - for example martensite, bainite, austenite, and/or retained austenite in quantities sufficient to produce unique mechanical properties. Some types of AHSS have a higher strain hardening capacity resulting in a strength-ductility balance superior to conventional steels. Other types have ultra-high yield and tensile strengths and show a bake hardening behavior.

For more information about this unique family of advanced steels, visit the Advanced Strength Steels applications guidelines. [www.WorldAutoSteel.org](http://www.WorldAutoSteel.org).

## TECHNICAL INFORMATION:

Docol has passed all standard metallurgical tests and surpassed 4130 in all areas.

Docol is a Quenched and Tempered product versus an alloyed product such as 4130. Quenching & Tempering is the process of bringing the material down in temperature very rapidly to control the crystallization of the metal.

While elongation is typically an indicator of the ductility of most metals, including 4130, Docol's elongation value is much less critical due to its crystalline structure or Dual Phase and its cleanliness, as Docol is not a scrap based product.

Docol as a finished tube is NOT a heat treatable material. Any attempt to heat treat Docol may result in what is known as a "dead soft" material with minimal strength value.

As a seam welded product, for best forming results it is recommended to orient the seam in the neutral position. (Not on the ID or OD of the bend)

Welding recommendations: ER80SD2 filler material both MIG & TIG (if you want to get really technical)

Because of its reduction in prep time, many builders have switched from 4130 to exclusively using Docol.

## CURRENTLY 37 TUBE SIZES IN STOCK:

.625" x .035"  
 .625" x .049"  
 .625" x .058"  
 .750" x .049"  
 .750" x .058"  
 .750" x .065"  
 .875" x .058"  
 1.00" x .049"  
 1.00" x .058"  
 1.00" x .065"  
 1.00" x .083"  
 1.125" x .049"

1.125" x .058"  
 1.125" x .065"  
 1.125" x .083"  
 1.25" x .049"  
 1.25" x .058"  
 1.25" x .065"  
 1.25" x .083"  
 1.25" x .095"  
 1.375" x .049"  
 1.375" x .058"  
 1.375" x .065"  
 1.375" x .083"  
 1.375" x .095"

1.50" x .058"  
 1.50" x .065"  
 1.50" x .083"  
 1.50" x .095"  
 1.50" x .120"  
 1.625" x .065"  
 1.625" x .083"  
 1.75" x .065"  
 1.75" x .083"  
 1.75" x .095"  
 1.75" x .120"  
 2.00" x .120"

**Docol 800 Sht.**  
 1mm (.039")  
 1.5mm (.059")  
 2.0mm (.079")

**Domex 700 \*\* Sheets**  
 (.098") 2.5mm  
 (.118") 3.0mm  
 (.157") 4.0mm  
 (.197") 5.0mm  
 (.315") 8.0mm

## TUBE COMPARISONS

	DOCOL	4130	1020 DOM
<b>TENSILE min.</b>	116,000 psi	95,000 psi	80,000 psi
<b>YIELD min.</b>	100,000 psi	75,000 psi	70,000 psi
<b>ELONGATION min. % IN 2"</b>	13% FULL TUBE	12% FULL TUBE	15% FULL TUBE
	8% STRIP	7% STRIP	5% STRIP
<b>DIAMETER TOL.</b>	+/- .006"	+/- 10%	+/- 10%
<b>WALL THK. TOL.</b>	+/- .005"	+/- 10% of wall	+/- 10% of wall

### Docol/Strenx\*\* Sheet:

High strength steel sheets may cost less than 4130. High strength steel sheets can allow for some weight reduction.

Welds to 4130 and mild steel. Docol/Domex steel sheets are strong and formable, eliminating the need for annealed or normalized conditions.

## SHEET MATERIAL COMPARISONS

	DOCOL 800	Domex 700 **	4130N	4130A	A-90	MILD STEEL
<b>TENSILE psi.</b>	116,000 min	108,000 min	95,000 min	85,000 max	58,000 min	58,000 min
	137,000 max	137,000 max				
<b>YIELD psi.</b>	87,000 min	101,000 min	75,000 min		56,000 min	25,000 min
<b>ELONGATION min. % IN 2"</b>						35,000 max
	10%	10 -12%	8-12%		18% min	38 -42%

**Save weight – try dual phase high strength steels.**

\*\* Domex brand name is changing to Strenx



[www.aedmotorsport.com](http://www.aedmotorsport.com)

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