

## ToughMet® 3 TS Alloy Rod, Tube & Wire Data Sheet

Materion's ToughMet 3 TS alloy is a cold worked, spinodally hardened alloy designed to provide high strength for the most demanding static structural loads and pressures. It provides high toughness combined with high strength to resist dynamic impact loading. ToughMet 3 TS alloy provides galling resistance, high bearing performance and compatibility with many sour environments or salt water. It is non-magnetic and very easy to machine into complex components.

### CHEMICAL COMPOSITION (WEIGHT PERCENT)

| Alloy  | Nickel | Tin | Copper  |
|--------|--------|-----|---------|
| C72900 | 15     | 8   | Balance |

### PHYSICAL PROPERTIES

| Elastic Modulus                        | Poisson's Ratio | Electrical Conductivity | Thermal Conductivity         | Coefficient of Thermal Expansion                                  | Density  | Magnetic Permeability |
|--|-----------------|-------------------------|------------------------------|---|--|-----------------------|
| 21 x 106 psi<br>144 kN/mm <sup>2</sup> | 0.33            | < 7% IACS<br>< 4 MS/m   | 22 Btu/ft/hr/°F<br>38 W/m/°C | 9.1 x 10 <sup>-6</sup> in/in/°F<br>16.4 x 10 <sup>-6</sup> m/m/°C | 0.325 lb/in <sup>3</sup><br>9.00 g/cm <sup>3</sup> | <1 .001               |

### MINIMUM MECHANICAL PROPERTIES

| Temper      |                                | Diameter                         |                             | 0.2% Offset Yield Strength |                   | Ultimate Tensile Strength |                   | Elongation | Hardness | Average CVN Impact Toughness |      |
|-------------|--------------------------------|----------------------------------|-----------------------------|----------------------------|-------------------|---------------------------|-------------------|------------|----------|------------------------------|------|
|             |                                | inch                             | mm                          | ksi                        | N/mm <sup>2</sup> | ksi                       | N/mm <sup>2</sup> | % (in 4D)  | HRC      | ft-lbs                       | J    |
| Rod         | TS 95                          | 0.75 - 3.25                      | 19 - 82                     | 95                         | 655               | 106                       | 730               | 18         | 93 HRB   | 30*                          | 40*  |
|             |                                | 3.26 - 6.00                      | 83 - 152.4                  | 95                         | 655               | 105                       | 725               | 18         | 93 HRB   | 30*                          | 40*  |
|             | TS 120U                        | 0.75 - 6.00                      | 19 - 40.9                   | 110                        | 755               | 120                       | 825               | 15         | 24       | 15                           | 20   |
|             |                                | 1.6 - 3.25                       | 41 - 82                     | 110                        | 755               | 120                       | 825               | 15         | 24       | 12                           | 16   |
|             | TS130                          | 3.26 - 6.00                      | 83 - 152.4                  | 110                        | 755               | 120                       | 825               | 15         | 22       | 11**                         | 14** |
|             |                                | 0.75 - 6.00                      | 19 - 152.4                  | 130                        | 895               | 140                       | 965               | 10         | 24       |                              |      |
|             | TS160U                         | 0.25                             | < 6.35                      | 150                        | 1035              | 160                       | 1100              | 5          | 32       |                              |      |
|             |                                | 0.26 - 0.4                       | 6.35 - 10                   | 150                        | 1035              | 160                       | 1100              | 7          | 32       |                              |      |
|             |                                | 0.41 - 0.75                      | 10.1 - 19                   | 150                        | 1035              | 165                       | 1140              | 7          | 36       |                              |      |
|             |                                | 0.76 - 1.6                       | 19.1 - 41                   | 150                        | 1035              | 165                       | 1140              | 5          | 34       |                              |      |
| 1.61 - 3.25 |                                | 41.1 - 82                        | 150                         | 1035                       | 160               | 1105                      | 3                 | 34         |          |                              |      |
| Wire        | TS160U                         | 3.26 - 6.00                      | 83 - 152.4                  | 148                        | 1020              | 160                       | 1100              | 3          | 32       |                              |      |
|             |                                | < 0.25                           | < 6.35                      | 150                        | 1035              | 160                       | 1105              | 5          | 32       |                              |      |
| Tube        | TS 105                         | 0.26 - 0.4                       | 6.35 - 10                   | 150                        | 1035              | 160                       | 1105              | 7          | 32       |                              |      |
|             |                                | 1.50 - 3.05.(O.D.)<br>< 0.4 wall | 38 - 77 (O.D.)<br>< 10 wall | 105                        | 725               | 120                       | 830               | 15         | 22       |                              |      |
|             | 1.50-3.05.(O.D.)<br>> 0.4 wall | 38- 77 (O.D.)<br>> 10 wall       | 105                         | 725                        | 120               | 830                       | 16                | 22         | 14***    | 19***                        |      |
| TS 150      | 1.30 - 3.00.(O.D.)             | 33 - 76.(O.D.)                   | 150                         | 1035                       | 158               | 1090                      | 5                 | 36         |          |                              |      |

\* no single value less than 24 ft-lbs (32 J) \*\*no single value less than 10 ft-lbs (13.5 J)

\*\*\*no single value less than 12 ft-lbs (16 J); (10mm width x 10mm thickness) CVN specimens only

## STANDARD TOLERANCES ROD/WIRE

| Temper                                | Form | Diameter    |            | Diameter Tolerance |             | Straightness Tolerance                   |                                     |
|---------------------------------------|------|-------------|------------|--------------------|-------------|--|-------------------------------------|
|                                       |      | inch        | mm         | inch               | mm          | inch                                     | mm                                  |
| TS160U                                | Rod  | 0.25 - 0.39 | 6.35 - 9.9 | +/- 0.002          | +/- 0.05    | < 0.25 inches deviation in 10 ft. length | < 6.35 mm deviation in 3048 length  |
|                                       |      | 0.4 - 0.74  | 10 - 18.9  | + 0.005/-0         | + 0.13/-0   |  |                                     |
| TS 95,<br>TS120U,<br>TS130,<br>TS160U | Rod  | 0.75 - 1.6  | 19 - 40.9  | + 0.02/+ 0.08      | + 0.5/+ 2.0 | < 0.5 inches deviation in 10 ft. length  | < 12 mm deviation in 3048 mm length |
|                                       |      | 1.61 - 2.75 | 41 - 70    | + 0.02/+ 0.10      | + 0.5/+2.5  |  |                                     |
|                                       |      | 2.76 - 3.25 | 70.1 - 82  | + 0.02/+ 0.145     | +0.5/+3.7   |  |                                     |
|                                       |      | 3.26 - 6.00 | 83 - 152.4 | + 0.02/+ 0.187     | + 0.5/+4.75 |  |                                     |
| TS160U                                | Wire | < 0.4       | < 10       | +/- 0.002          | +/- 0.05    |  |                                     |

## STANDARD TOLERANCES TUBE

| Temper | Outside Diameter |         | Inside Diameter              | Diameter Tolerance |          | Straightness Tolerance                   |                                     |
|--------|------------------|---------|------------------------------|--------------------|----------|--|-------------------------------------|
|        | inch             | mm      |                              | inch               | mm       | inch                                     | mm                                  |
| TS105  | 1.50 - 1.99      | 38 - 50 | Wall thickness 10-20% of OD* | +/- 0.010          | +/- 0.25 | < 0.5 inches deviation in 10 ft length** | < 12 mm deviation in 3048 mm length |
|        | 2.00 - 3.050     | 51 - 76 | Wall thickness 10-20% of OD* | +/- 0.012          | +/- 0.30 |  |                                     |
| TS150  | 1.30 - 1.99      | 33 - 52 | Wall thickness 8-20% of OD*  | +/- 0.008          | +/- 0.20 | < 0.5 inches deviation in 10 ft length** | < 12 mm deviation in                |
|        | 2.00 - 3.00      | 53 -79  | Wall thickness 6-10% of OD*  | +/- 0.010          | +/- 0.25 |  |                                     |

\* This is only a guideline. Check with mill with actual required dimensions

\*\*Tighter straightness tolerance may be available

## STANDARD AVAILABILITY

Rod: Nominal 6-12 ft (1829-3658 mm) random mill lengths

Wire: Coil size up to 300 lbs (136 kg)

Surface: Mill hardened finish

## INDUSTRY STANDARDS AND SPECIFICATIONS

UNS C72900, AMS 4597

### Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.