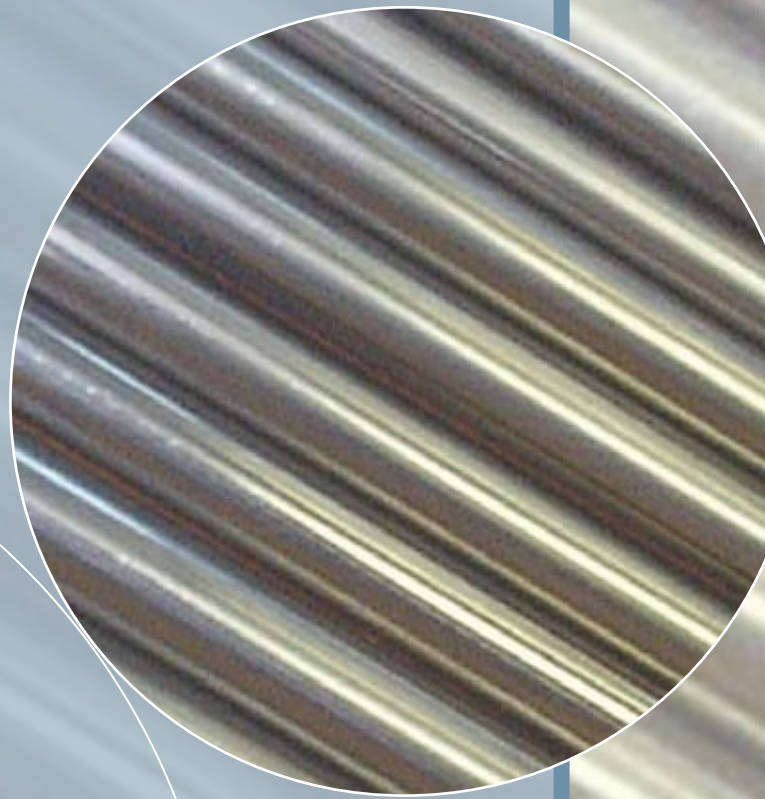




## TECHNICAL SPECIFICATION - TS40

LOW CARBON ERW PRECISION TUBE READITUBE® STEEL TUBING FOR  
GENERAL APPLICATIONS



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## 1.0 Scope

This specification covers the technical requirements for the production and supply of low carbon ERW (electric resistance welded) steel tubing supplied in the As Formed condition with a galvanised surface finish and with the internal weld upset (fin) not removed.

- Note:
1. The ERW tube is manufactured from pre-galvanised strip which is zinc coated on both surfaces with a total zinc coating greater than Z100 for general applications. In the ERW process the zinc coating is burnt off in the weld area. (The outside area is re-coated after the weld bead has been removed.)
  2. The performance of ReadITube is influenced by micro-environments which vary from site to site. In corrosive environments it is recommended that a suitable barrier coating (eg paint or powder coating) be applied over the galvanised surface and that the application of such coating be fully in accordance with the supplier's recommendations with regard to surface pre-treatment, application, curing, and maintenance of the coating - refer to AS 2312 "Guide to the Protection of Structural Steel against Atmospheric Corrosion by the use of Protective Coatings".

ATM ReadITube® is a registered trademark of OneSteel Trading Pty Limited.

## 2.0 References

ATM Precision Tube Customer Information Handbook - Standard Terminology

AS 2312 "Guide to the Protection of Structural Steel against Atmospheric Corrosion by the use of Protective Coatings".

AS 1397 "Steel sheet and strip - Hot-dip zinc-coated or aluminium/zinc coated".

## 3.0 Definitions

Terms used in this specification are defined in the ATM Precision Tube Customer Information Handbook Standard Terminology.

## 4.0 Designation

Tubing ordered to this specification shall be designated as ReadITube.

## 5.0 Information to be Supplied by the Purchaser:

The purchaser should supply the following information at the time of an enquiry and/or order.

- (a) Dimensions of cross section (diameter/non circular size and wall thickness).
- (b) Length required (in mm) and type (ML, NSML) - refer to clause 6.7.
- (c) Designation eg TS40 ReadiTube - refer to clause 4.0.
- (d) Quantity and delivery instructions

## 6.0 Requirements

### 6.1 Tube Condition

Tubing shall be supplied in the As Formed condition i.e. as produced ex the weldmill.

### 6.2 Chemical Composition

The cast analysis of the steel used shall conform to the following:

TABLE 1 : TS40 STANDARD CHEMISTRY		
	Guaranteed Maximum (%)	Typical (%)
Carbon (C)	0.10	0.04-0.07
Phosphorous (P)	0.030	0.01-0.02
Manganese (Mn)	0.45	0.20-0.30
Sulphur (S)	0.03	0.01-0.02
Silicon (Si)	-	0.01-0.02
Alumium (Al)	-	0.03-0.05
Nitrogen (Ni)	-	0.001-0.004

### 6.3 Zinc Coating

The tube shall be produced from G2 Z100 strip, or equivalent, to comply with specification AS 1397 "Steel sheet and strip - Hot-dip zinc-coated or aluminium/zinc coated". Coating Class Z100 has a minimum total coating mass of 100g/m<sup>2</sup> measured by the triple spot test as detailed in AS 1397. The thickness in the vicinity of the weldline will generally be less due to the recoating process used.

## 6.4 Mechanical Properties

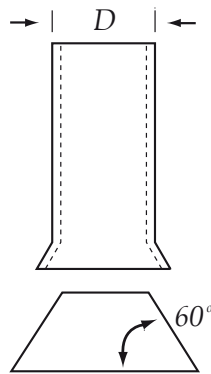
### 6.4.1 Tensile Test

Tubing in the As-Formed condition shall conform to the following tensile properties:

**TABLE 2 : MECHANICAL PROPERTIES**

Yield Strength MPa (min)	300
Tensile Strength MPa (min)	350
Elongation % (min) on a gauge length $5.65 \sqrt{S_0}$	15

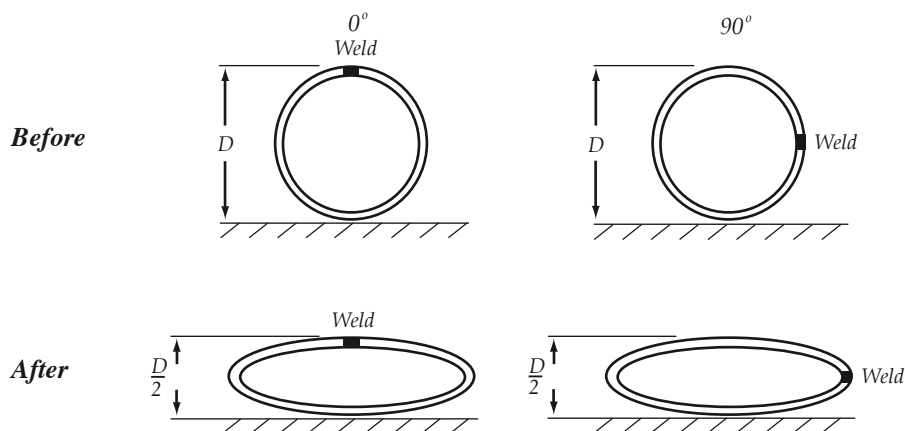
### 6.4.2 Flare Test



Both circular and non-circular tube shall be capable, with suitable end preparation, of being expanded over a cone or pyramid shaped drift expander until metal failure with no evidence of radial fracture of the weld zone, ie fracture of the weld zone along a radial line from the tube centre to the outside surface is not acceptable. A ductile/shear ( $45^\circ$ ) fracture of the weld zone or fracture of the parent metal is acceptable.

### 6.4.3 Flattening Tests

Circular tube shall be capable of being flattened without cracking between two parallel plane surfaces with the weld located at  $90^\circ$  and  $0^\circ$  to the direction of weld flattening until the distance between the surfaces is half the nominal outside diameter of the tube.



Note: These tests are not applicable to non-circular tube.

## 6.5 Surface Finish

- Tube shall be supplied with a commercial quality surface finish with zinc coating equal to or greater than Z100.
- Coil break up to 0.15mm deep shall not be cause for rejection.
- Isolated pits not exceeding 0.15mm deep shall not be cause for rejection.
- The external weld flash shall be removed.
- Tool chatter marks up to 0.15mm deep shall not be cause for rejection.
- Other surface marking up to 0.15mm deep shall not be cause for rejection.

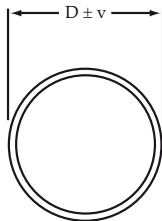
Note: Other surface marking includes longitudinal roll marks, chop marks (quarter moon shaped roll marks), indentations due to metal pick up on weldmill tooling, scratches, reeler straightening marks, handling marks and weld burn (low frequency welding only).

## 6.6 Tube Dimensions & Wall Thickness

### 6.6.1 Outside Diameter - Circular Tube

Circular tube shall be supplied to the following dimensional tolerances:

TABLE 3 : OD TOLERANCES	
Outside Diameter, D (mm)	Maximum Permissible Variation in Outside Diameter, v (mm)
$16 < D \leq 25$	$\pm 0.20$
$25 < D \leq 50$	$\pm 0.25$

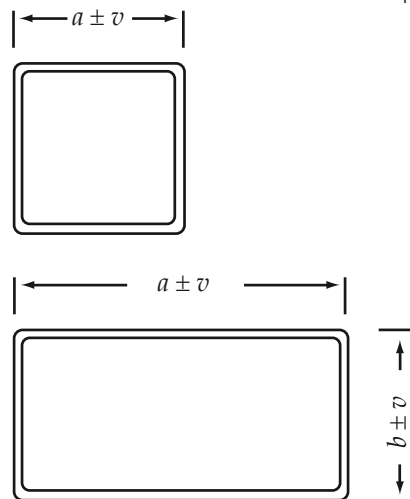


- Note:
1. If the wall thickness is less than 2.5% of the diameter, the above extreme tolerances shall be increased to 1.5 times the values shown.
  2. Due to the possible distortion of the tube on cutting, the outside diameter tolerance does not apply for a distance of 25 mm from the end of mill lengths (MLs) or non standard mill lengths (NSMLs) ie. on tube cut to length on the weldmill - refer to clause 6.9.
  3. As Formed ERW tube may change shape near the end of the tube due to the effects of welding and cutting when the tube is cut to the final required length.

### 6.6.2 Outside Dimensions - Non-Circular Tube

Non-Circular tube shall be supplied to the following dimensional tolerances:

Dimension, a (mm)	Maximum Permissible Variation in Diameter, v (mm)			
	Squares	Rectangles Long Side	Other Shapes	
			Long Side	Short Side
$20 < a \leq 40$	$\pm 0.25$	$\pm 0.25$	$\pm 0.25$	$\pm 0.45$
$40 < a \leq 60$	$\pm 0.30$	$\pm 0.30$	$\pm 0.30$	$\pm 0.55$
$60 < a \leq 80$	$\pm 0.35$	$\pm 0.35$	$\pm 0.35$	$\pm 0.65$
$80 < a \leq 100$	$\pm 0.40$	$\pm 0.40$	$\pm 0.40$	$\pm 0.75$
$100 < a \leq 120$	$\pm 0.45$	$\pm 0.45$	$\pm 0.45$	$\pm 0.85$

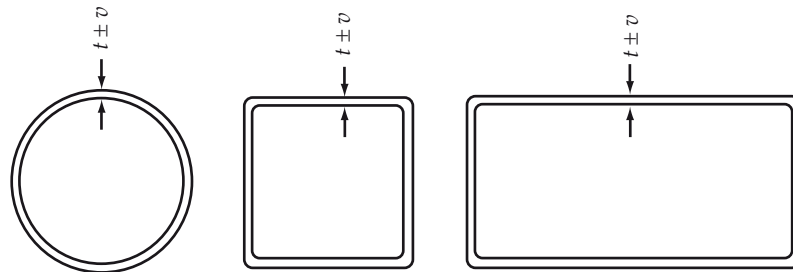


- Note:
1. In the case of rectangles the tolerance shown for the long side shall also be applied to the short side (eg. the tolerances for 5025 rectangular tube shall be  $50.0 \pm 0.25\text{mm} \times 25.0 \pm 0.25\text{mm}$ ).
  2. Due to the possible distortion of the tube on cutting, the tolerance shown does not apply for a distance of 25mm from the end of mill lengths (MLs) or non standard mill lengths (NSMLs) ie. on tube cut to length on the weldmill - refer to clause 6.9.
  3. As Formed ERW tube may change shape near the end of the tube due to the effects of welding and cutting when the tube is cut to the final required length.

### 6.6.3 Wall Thickness

Tubing shall be supplied to the wall thickness tolerances as set out below

Wall Thickness, t (mm)	Maximum Permissible Variation in Wall Thickness, v (mm)
$t \leq 1.0$	$\pm 0.15$
$1.0 < t \leq 1.6$	$\pm 0.20$
$1.6 < t \leq 2.0$	$\pm 0.25$
$2.0 < t \leq 3.0$	$\pm 0.30$



Note: As localised thickening may occur, the above plus variations do not apply to the weld area as indicated by the width of the heat affected zone.

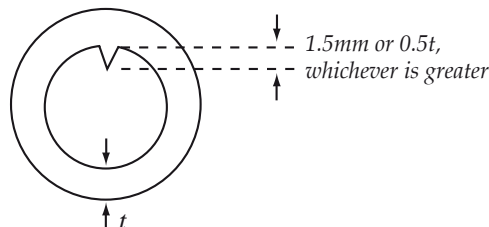
## 6.7 Length

### 6.7.1 Mill Lengths

Unless otherwise specified on the order, tubing shall be supplied in mill lengths (ML) of 6.100 metres or 7.320 metres. Tubing can be supplied ex the weldmill as a non-standard mill length (NSML) within the length range 4000 to 8000mm eg. 5850mm NSML, if requested. In both cases, a length tolerance of plus 50mm minus Nil shall apply.

## 6.8 Height of Weld Upset

The external weld upset shall be removed ie. flush with the outside surface of the tube. The internal weld upset or fin is not removed and the height may measure up to 1.5mm or 50% of the nominal wall thickness whichever is greater.



## 6.9 End Condition

### 6.9.1 Mill Lengths

Tube shall be supplied with shear or saw cut mill ends that may have a small shear dimple or burrs.

## 6.10 End Welds

Tubes containing the cross welds used to join the end of one coil of strip to the next coil shall not be included in the consignment.

## 6.11 Straightness

For mill lengths straightness tolerance shall be 4mm per 1000mm which assumes the tube to be bent in a constant radius, measured against a straight edge.

## 6.12 Non-Circular Tube - Other Features

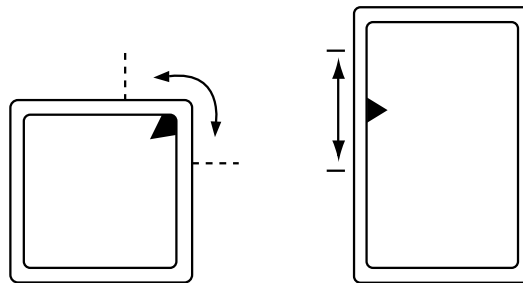
### 6.12.1 Corner Radii

Corner radii differ for each size and wall thickness combination. Typical corner radii information can be supplied on request.

### 6.12.2 Weldline Location

Due to the configuration of the weldmill rolls, the weldline will normally be equidistant from the opposite corners ie. the weldline will be on or adjacent to a corner in the case of squares and on the longer face in the case of rectangles.

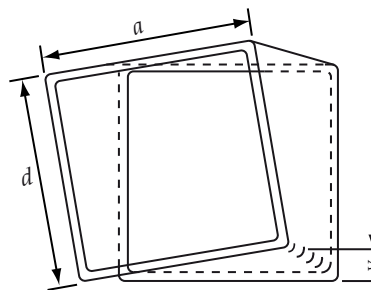
No action is normally taken to control the exact location of the weldline.



### 6.12.3 Twist

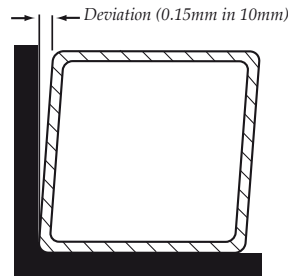
The tolerances for twist of non-circular tubing are shown in the table below:

TABLE 9 : TWIST TOLERANCE	
Largest Dimension, a (mm)	Twist Tolerance in 1 metre, v (mm)
$12.7 < a \leq 38.1$	2.0
$38.1 < a \leq 63.5$	2.5
$63.5 < a \leq 101.6$	3.0



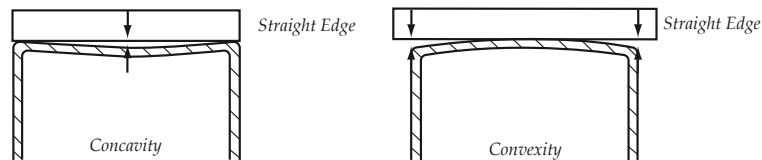
### 6.12.4 Squareness - Square & Rectangular Tube

Maximum out of square of adjacent sides shall be 0.15mm in 10mm face width.



### 6.12.5 Flatness - Square & Rectangular Tube

The actual dimensional variation across any face may exceed half of the total outside dimensional tolerance as set out in clause 6.6.



## 6.13 Rust Prevention

### 6.13.1 Standard Rust Prevention

The tube shall be coated with a light, readily removable, temporary rust preventative, designed to withstand corrosion when stored in normal conditions under cover for a maximum period of 3 months from time of delivery.

Note: Care must be taken in transit and in the storage of ReadiTube to keep the tube dry, as water can cause corrosion (white rust) where surfaces of the tubes are in contact. This is particularly important in the case of non-circular tube where the contact area is greater.

### 6.14 Packaging

Standard packaging for mill lengths is strapped, rectangular or hexagonal packs.

## 7.0 Control

This specification is not to be reproduced without the authority of the originator. Holders of this specification should determine its validity prior to use.

## Technical specifications are also available for the following Precision Tubing products:

- TS 11** EzyForm™ - Hot rolled, low carbon ERW steel tubing for general applications
- TS 21** EzyForm™ - Low carbon ERW steel tubing for general applications
- TS 22** Hi-Lite® - ERW steel tubing with specified mechanical properties
- TS 23** VHS - Mild carbon heat treated ultra high strength ERW steel tubing
- TS 28** Hi-Form® - Low carbon ERW Aluminised steel tubing for use in automotive exhaust systems
- TS 30** GALVATUBE™ - Premium low carbon ERW steel tubing for general applications
- TS 31** EzyForm™ - Low carbon ERW steel tubing with special requirements
- TS 40** ReadiTube® - Low carbon galvanised ERW steel tubing for general applications
- TS 41** EzyForm™ - Low carbon ERW steel tubing for fluid carrying applications
- TS 50** Tubecolor® - Premium powder coated ERW steel tubing
- TS 60** Painted RT™ - Powder coated ERW steel tubing

OneSteel has a range of other Technical Specifications for products and/or applications not listed above. Please contact OneSteel Direct for further Information or visit our website [www.onesteel.com](http://www.onesteel.com)



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