



# The TEST HOUSE

## Certificate of Test



**Client:** VR Access Solutions Limited, 1A Swan Courtyard, Charles Edward Road, Birmingham, B26 1BU

**Date of receipt:** 13 June 2016 **Date of Summary:** 18 July 2016

**Reference No.:** T60843A **MI No.:** 4050

**Order No.:** 10103 **Specification:** EN10219-1 Grade S460MH

**Description:** 1 off Scaffold Tube with welded fittings (1000mm length)

**Identity:** 'Turnlok 1m Standard', 'EUT01A 11/15 X'

**Test methods:** **Procedure:** N/A

**Inspection Authority:** N/A

### SUMMARY

The product had been manufactured using tubing that met the S460MH tensile test, dimensional requirements and complied with the chemical analysis composition. It was noted however, that the carbon content (C) was above the maximum level stipulated, but was within the permitted tolerance. The parent steel cast had been aluminium killed (deoxidation method GF).

The tensile test proof stress to UTS ratio confirmed that the tube had been produced by a cold forming route.

The product's welding consistently met the stringent (Level B) of BSEN ISO 5817:2014 in respect of visual inspection, Magnetic Particle Inspection (MPI) and macrographic examination.


The Vickers hardness survey of the fabrication weld examined metallographically yielded satisfactory values and served to confirm that the weld metal and HAZ regions were both free from unacceptably hard crack sensitive welding related transformation products.

We conclude that the product had been manufactured from parent steel tubing that was fully compliant with the S460MH specified requirements. The product's fabrication welding overall was acceptable to Level B of BSEN ISO 5817:2014.

**UKAS DISCLAIMER:** This project includes tests and examinations, which were completed against UKAS accredited procedures. The scope of laboratory accreditation does not, however, include the analysis of test data or the offering of professional opinions.

**- End of Summary -**

Note - The test results detailed above apply only to the sample(s) of material submitted to the laboratory.

<b>Summary prepared by:</b> N Green	<b>Witnessed by:</b>
<b>Certificate Approved by:</b> N Green, Section Leader	
<b>Signed:</b>  <b>Date:</b> 18-7-16	



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**Client:** VR Access Solutions Limited, 1A Swan Courtyard, Charles Edward Road, Birmingham, B26 1BU

**Date of receipt:** 13 June 2016 **Date of test:** 1 July 2016

**Reference No.:** T60843A **MI No.:** 4050

**Order No.:** 10103 **Specification:** EN10219-1 Grade S460MH

**Description:** 1 off Scaffold Tube with welded fittings (1000mm length)

**Identity:** 'Turnlok 1m Standard', 'EUT01A 11/15 X'


**Test methods:** Procedure: TP27, BSEN ISO 17638: 2009

**Visual Inspection: ACCEPT**

MAGNETIC PARTICLE INSPECTION REPORT	
INSPECTION DETAILS	
Description of equipment: Magnaflux Y6 Yoke Identification number: M27	Viewing equipment: Halogen Arc Lamp Identification number: N/A
Method of flux generation: Magnetic flow	Viewing conditions: White Light measured at: 1600 LUX UVA Light measured at: N/A
Distance between contact areas (mm): Various	
Material surface condition: Galvanised	Detection medium and background: Magnaflux 7HF Black ink, Batch: 140504 Magnaflux WCP-2 Contrast paint, Batch: 140904
Current (Amps): Magnetic flow: N/A Current Flow: N/A	
AC/DC/Half wave/Full wave rectified: AC	Field strength measurement: Berthold Gauge Position 3 + Lift test

RESULTS	Assessment criteria: As required by the test standard, assessment has been conducted in line with BSEN ISO 5817:2014 Level B (Level C for weld profile)		
Surface	Acceptance level B	Indications	Comments
Weld 1	Accept	Nil	No significant indications

**- End of Test Results -**

<b>Tests Performed by:</b> P R Robinson	<b>Witnessed by:</b>
<b>Certificate Approved by:</b> N Green, Section Leader	
<b>Signed:</b>  <b>Date:</b> 18-7-16	





# The TEST HOUSE

## Certificate of Test



**Client:** VR Access Solutions Limited, 1A Swan Courtyard, Charles Edward Road, Birmingham, B26 1BU  
**Date of receipt:** 13 June 2016 **Date of test:** 8 July 2016  
**Reference No.:** T60843A **MI No.:** 4050  
**Order No.:** 10103 **Specification:** EN10219-1 Grade S460MH

**Description:** 1 off Scaffold Tube with welded fittings (1000mm length)  
**Identity:** 'Turnlok 1m Standard', 'EUT01A 11/15 X'  
**Test methods:** Procedure: TP13, BSEN ISO 17639:2013  
**Inspection Authority:** N/A

**DIMENSIONAL MEASUREMENTS:**

Tube outside diameter (after stripping of galvanising) (Average of 4 readings) (mm): 48.46  
 Tube wall thickness (after stripping of galvanising) (Average of 5 readings) (mm): 3.07  
 Parent tube outside diameter to wall thickness (D/T) ratio = 15.79  
 BSEN 10219-2:2006 tolerances, outside diameter  $\pm 0.48\text{mm}$  for a nominal outside diameter of 48.3mm and  $\pm 0.32\text{mm}$  for a nominal wall thickness of 3.2mm.

MACROEXAMINATION		Assessment criteria: As required by the test standard, assessment has been conducted in line with BSEN ISO 5817:2014 Level B (Level C for weld profile)	
Test Specification: BSEN ISO 17639:2013			Accepted
Position/Preparation	Mark	Comments	Yes/No
Weld cross section including both parent materials. Specimen prepared to a 1200 Grit finish and examined immersion etched in Nital.	1	Weld 1: The weld exhibits adequate fusion and penetration in the designated weld area. Unfused weld root bead roll through noted.	Yes

**- End of Test Results -**

Note - The test results detailed above apply only to the sample(s) of material submitted to the laboratory.

<b>Tests Performed by:</b> A Mughal/N Green	<b>Witnessed by:</b>
<b>Certificate Approved by:</b> N Green, Section Leader	
<b>Signed</b> ..... <i>N Green</i> ..... <b>Date</b> 18-7-16	





# The TEST HOUSE

## Certificate of Test



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**Client:** VR Access Solutions Limited, 1A Swan Courtyard, Charles Edward Road, Birmingham, B26 1BU  
**Date of receipt:** 13 June 2016 **Date of test:** 12 July 2016  
**Reference No.:** T60843A **MI No.:** 4050  
**Order No.:** 10103 **Specification:** EN10219-1 Grade S460MH

**Description:** 1 off Scaffold Tube with welded fittings (1000mm length)  
**Identity:** 'Turnlok 1m Standard', 'EUT01A 11/15 X'  
**Test methods:** Procedure: TP01c-1, BSEN ISO 6892-1: 2009 A, EMT, OES MAX 1 & Fusion  
**Inspection Authority:** N/A

TENSILE TEST(S)		Test machine calibrated to class 1.0 requirements of BS EN ISO 7500-1:2004								
Identity/Position	Mark	Dimensions			Proof Stress Rp 0.2%		Max Stress		EI %	RA %
		Size	CSA	GL	Load	Stress	Load	Stress		
		mm	mm <sup>2</sup>	mm	kN	N/mm <sup>2</sup>	kN	N/mm <sup>2</sup>		
Longitudinal tensile from Steel tube	2	12.11 x 3.29	39.84	5.65 √So	19.93	500	21.82	548	21.5	-
Fracture Description: Clean fracture					-	460 min	-	530 - 720	17 min	-

Comments: Extensometer number E95063, calibrated to BS EN ISO 9513:2012 class 0.5, was used for these tests.  
 For Mark No:2, the reported proof stress will potentially over report the true value, due to the data coming from a stress engineering strain diagram in which the modulus gradient was erroneously low.  
 Note: The thickness measurement for Mk 2 includes the galvanised coating.

CHEMICAL ANALYSIS								
Identity	Element (%)							
	C	Si	Mn	P	S	Cr	Mo	Ni
Parent Material	0.17	0.26	1.18	0.029	0.008	0.02	<0.01	0.02
	Al	As	B	Co	Cu	Nb	Pb	Sn
	0.026	-	-	-	-	<0.01	-	-
	Ti	V	W	Zr	Ca	Ce	Sb	N
	<0.01	<0.01	-	-	-	-	-	0.0035

Comments: Chemical analysis carried out under the cover of UKAS Testing No.0136.

- End of Test Results -

Note - The test results detailed above apply only to the sample(s) of material submitted to the laboratory.

<b>Tests Performed by:</b>	<i>A Mughal / A Beadsley</i>	<b>Witnessed by:</b>
<b>Certificate Approved by:</b>	<i>N Green, Section Leader</i>	
<b>Signed</b> .....	<i>N Green</i>	<b>Date</b> <i>13-7-16</i>





# The TEST HOUSE

## Certificate of Test



**Client:** VR Access Solutions Limited, 1A Swan Courtyard, Charles Edward Road, Birmingham, B26 1BU  
**Date of receipt:** 13 June 2016 **Date of test:** 15 July 2016  
**Reference No.:** T60843A **MI No.:** 4050  
**Order No.:** 10103 **Specification:** EN10219-1 Grade S460MH

**Description:** 1 off Scaffold Tube with welded fittings (1000mm length)  
**Identity:** 'Turnlok 1m Standard', 'EUT01A 11/15 X'  
**Test methods:** Procedure: TP08, BSEN ISO 6507-1:2005  
**Inspection Authority:** N/A

HARDNESS TESTS	Method	Indentor			Load (kg)				
Mark No.: 1	Vickers	Diamond Pyramid			10				
Schematic: Transverse weld macro section of tube to fitting				Region	Indent	Hardness	Region	Indent	Hardness
				PM	1	179	-	16	-
				PM	2	179	-	17	-
				PM	3	179	-	18	-
				HAZ	4	174	-	19	-
				HAZ	5	194	-	20	-
				HAZ	6	231	-	21	-
				WM	7	194	-	22	-
				WM	8	191	-	23	-
				WM	9	196	-	24	-
				HAZ	10	176	-	25	-
				HAZ	11	165	-	26	-
				HAZ	12	181	-	27	-
				PM	13	184	-	28	-
				PM	14	190	-	29	-
				PM	15	192	-	30	-
				Maximum in HAZ: 231		Maximum in WM: 196			

**- End of Test Results -**

Note - The test results detailed above apply only to the sample(s) of material submitted to the laboratory.

<b>Tests Performed by:</b> G Bishop <b>Certificate Approved by:</b> N Green, Section Leader Signed ..... <i>N Green</i> ..... Date <i>18-7-16</i>	<b>Witnessed by:</b>
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Client: VR Access Solutions Limited, 1A Swan Courtyard, Charles Edward Road,  
Birmingham, B26 1BU  
Job reference: T60843A

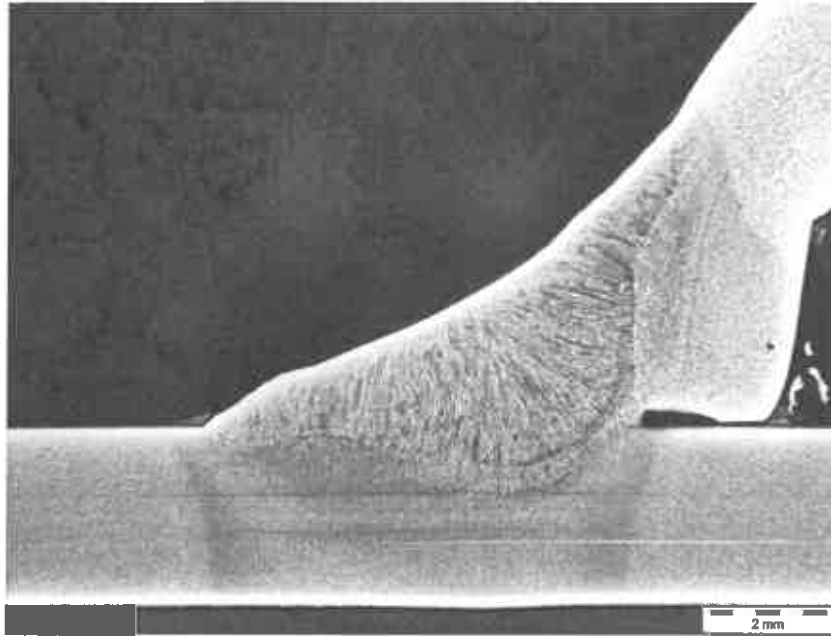


Figure 1 (S43704): Specimen Mk 1, weld cross section macrograph (original image captured at x12.5), specimen immersion etched in Nital (MI 4050).