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ISRAC Israel Laboratory Accreditation Authority ISO/IEC 17025 No. 373

Date: 15.03.2021

# Metallabs Test Report No: 210122

Accreditation for ISO/IEC 17025-2017

| Company Name | Contact Name | Contact Details |
|---|---|---|
| T.S. Metal LTD | Talal Abo Kartome | talalabokartome@gmail.com |

| | | | |
|---|---|---|---|
| **Part Description** | Welded Pipe Ø6" SCH 120 | **Other** | |
| | | **WPS No.** | WPS 1003 |
| **Material** | A/SA-335 P22 Steel | **Welder Name** | Khaled Abu Shakra |
| | | **Welder ID** | 201166188 |
| | | **Welding Process** | GTAW+SMAW |
| **Dimensions** | Diameter: Ø6"<br>Wall Thickness: 14.27 mm | **Weld No.** | - |
| | | **Electrode** | - |
| | | **PWHT** | - |
| **Other Description** | According to ASME IX | | |

| Test No. | Tests Performed | Number of Specimens | Standard | Requirements | Comments |
|---|---|---|---|---|---|
| **1** | Tensile Test | 2 | ASTM E8-16a<br>ASME IX-2019 | ASME IX-2019 | - |
| **2** | Bending test | 4 | ASME IX-2019 | ASME IX-2019 | - |
| **3** | Hardness test | 1 | ASTM E92-17 | - | - |
| **4** | Macroscopic Examination | 1 | ASTM E3-17<br>ASTM E340-15 | - | - |

**The test conditions and results are detailed further**

| | |
|---|---|
| **Conclusions** | **1. The tensile test and the bending test results comply with ASME IX-2019 standard requirements.**<br>**2. No defects or irregularities were found in the macroscopic examination.** |

Prepared by: Peter Geltser
Laboratory Manager

All tests performed at Berl Katsanelson 13 St. Ashkelon, Israel at Room Temp.: 24±5ºC ; Humidity: 40±20%

Approved by: Zohar Natan
Quality Manager

# 1. Test Results

## 1.1. Tensile Test

The test was performed using Shimadzu tensile test machine, according to ASTM E8-16a standard.
The test was conducted on specimens that were prepared in according to ASME IX-2019 standard.
The tests were carried out under ISRAC's accreditation. The test results are detailed in Table 1:

**Table 1: Tensile Test Results**

| Specimen | Width [mm] | Thickness [mm] | Max Force [kN] | U.T.S [MPa] | Location of Break |
|---|---|---|---|---|---|
| **T1** | 19.03 | 12.43 | 121.745 | 515 | Base Metal |
| **T2** | 19.16 | 12.33 | 123.123 | 520 | Base Metal |
| **ASME IX-2019 Standard Req. for A/SA-335 P22 Steel, Min.** | - | - | - | 415 | - |

## 1.2. Bending Test

The bending test was performed on standard specimens in accordance with ASME IX-2019 standard.
The tests were carried out under ISRAC's accreditation.
The test details and results are shown in Table 2:

**Table 2: Bending Test Results**

| Specimen | Thickness of Specimens [mm] | Mandrel Diameter [mm] | Distance Between Rollers [mm] | Defect Size [mm] | Results |
|---|---|---|---|---|---|
| **Side Bend 1** | **10** | **40** | **63** | - | **Pass** |
| **Side Bend 2** | | | | - | **Pass** |
| **Side Bend 3** | | | | - | **Pass** |
| **Side Bend 4** | | | | - | **Pass** |

## 1.3. Hardness Test

The welding hardness distribution test was performed on an INNOVATEST MODEL NOVA 360 hardness tester, using Vickers method with 10Kg. load on polished specimen, according to ASTM E 92-17 standard. The test was carried out under ISRAC's accreditation. The test results and the locations are detailed in Table 3:

**Table 3: Hardness Test - Vickers Method**

| Location | Hardness | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Face | | | Avg. | Root | | | Avg. |
| **Base Metal 1** | 149 | 153 | 154 | 152 | 145 | 151 | 156 | 151 |
| **HAZ 1** | 211 | 209 | 214 | 211 | 192 | 189 | 211 | 197 |
| **Weld Metal** | 218 | 218 | 217 | 218 | 210 | 211 | 212 | 211 |
| **HAZ 2** | 218 | 213 | 214 | 215 | 179 | 179 | 179 | 179 |
| **Base Metal 2** | 154 | 148 | 152 | 151 | 144 | 146 | 141 | 144 |

## 1.4. Macroscopic Examination

The macroscopic examination was performed on polished and etched section in accordance with ASTM E3-17 and ASTM E340-15. Figure 1 shows the polished and etched macroscopic section through the welding. No defects or irregularities were found.

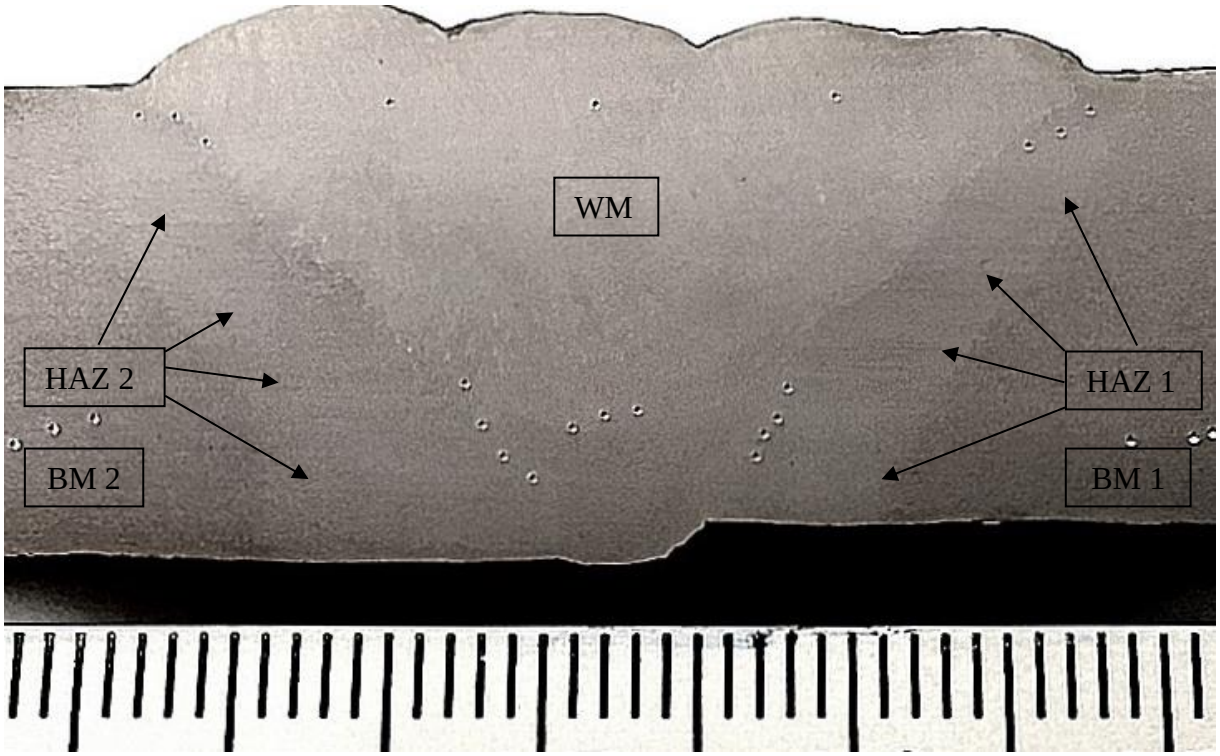


Figure 1

Macroscopic section through the welding, polished and etched with nital reagent

WM – Weld metal

HAZ – Heat affected zone

BM – Base metal

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