



WELDING PROCEDURE QUALIFICATION RECORD (WPQR)

N. 18.TQ.IT.022-YESS-WPQR-004

Manufacturer **Yess Yakma ve Enerji Sistemleri Sanayi ve Ticaret LTD.ŞTİ.**
WPQR No. **YES-WPQR-004** Dated **05/06/2018**
Manufacturer's welding procedure (WPS) No. **YESS-WPS-04** Dated **04/06/2018**

RANGE OF APPROVAL

Welding process **141** Type **Manual**
Joint type **BW**
Single/Multiple pass **Multiple , ssnb**
Parent material group(s) **5.1** **ISO/TR 15608**
Parent material thickness (mm) **Butt Joint = 5,0** Fillet Joint $t_1 = \text{N/A}$ $t_2 = \text{N/A}$
Throat thickness (mm) **N/A**
Weld deposit thickness (mm) **N/A**
Outside diameter (mm) **38,0**
Filler metal type **EN ISO 21952-A , W CrMo1Si**
Shielding gas (ISO 14175) **I1** *Backing gas (ISO 14175)* **None**
Type of welding current **DCEN** Heat input Kj/cm **See table on page 2**
Welding position **HL-045**
Preheat min. (°C) **200** Interpass temp. Max. (°C) **Less than 350**
Post weld heat treatment / Ageing **No**
Other information **None**

Welders name **Bülent DÜNDAR** Stamp No. **W01**
Welding test conducted by **Ethem GUNGOR**
Mechanical test conducted by **Borusan Mannesmann A.S.** Laboratory test No. **N/A**
At presence of RINA Surveyor **Yes**

We certify that statements in this certificate are correct and that the test welds were prepared, welded and tested in accordance with the requirements of **UNI EN ISO 15614-1: 2017** Standard. Certified that all required activities were carried out above mentioned standards and codes

Issued at: **ISTANBUL - TURKEY**

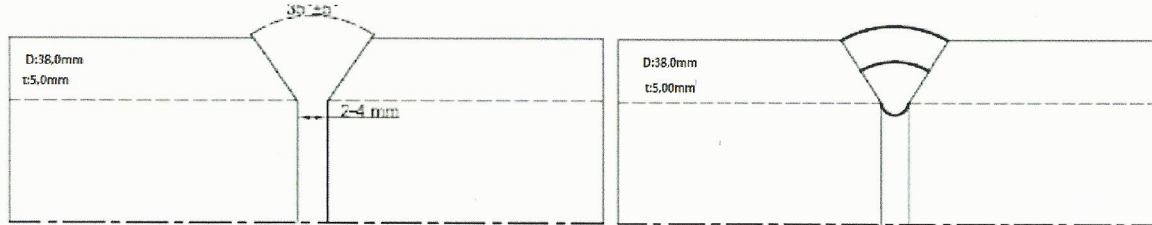
on **05/06/2018**



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JOINT DETAILS AND WELDING SEQUENCES

Pass No.	Process	Filler metal diam. (mm)	Filler metal classification	Amps	Volt	Travel speed (cm/min)	Heat input (kJ/mm)	Other
1	141	Φ 2,40	W CrMo2Si	85	9	4,0	1,35	DCEN
2	141	Φ 2,40	W CrMo2Si	105	11	4,0	1,82	DCEN



PARENT MATERIAL

Material specification **EN 10216-2**Type or grade **13CrMo4-5**Group(s)/Subgroup(s) No. (ISO/TR 15608) **5.1**Thickness (mm) **5,0**Throat thickness (mm) **N/A**Diameter (mm) **38,0**Branch connection angle **70**Other **N/A**

WELDING CONSUMABLES

Process **141**Trade name(s) **AS TIG CrMo1**Specification **EN ISO 21952-A**Classification / designation **W CrMo1Si**Size (mm) **2,40**Deposited metal thickness **-**Groove **-**Throat **-**Flux trade name **NA**Consumable insert **NA**Other **-**

GAS

	Gas	Mixture	Flow rate (l/min.)
Shielding	Argon	%99,99	9
Trailing	NA	NA	NA
Backing	NA	NA	NA

POSITION

Welding position **HL-045**Other **N/A**

PREHEAT		POSTWELD HEAT TREATMENT	
Preheat temperature	200	Temperature	NA
Interpass temperature	Less than 350	Time	NA
Other	-	Other	-

ELECTRICAL CHARACTERISTICS			
Current	DCEN		
Ampere (range)	See table on page 2	Volts (Range)	See table on page 2
Mode of metal transfer	Globular		
Tungsten electrode size and type	N/A		
Other	N/A		

TECHNIQUE			
Travel speed (range)	See table	--	
String or weave bead	String & Weave		
Oscillation (*)	--		
Method of groove/edge preparation	Grinding		
Interpass cleaning	Grinding/Brushing		
Method of back gouging	N/A		
Orifice or gas cup size	--		
Stand off distance (*)	--		
Multiple or single pass	Multiple Pass		
Multiple or single electrodes	Single		
Torch angle (*)	--		
Other	(*) for fully mechanized/robotic only		

TRANSVERSE TENSILE TEST						
Spec. (No.)	Width (mm)	Thickness (mm)	A (%)	Total load (N)	R _m (N/mm ²)	Fracture location
1	-	-	-	-	-	-
2	-	-	-	-	-	-

ALL-WELD METAL TENSILE TEST							
Spec. (No.)	Diameter (mm)	Area (mm)	L ₀ (mm)	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Note
1	38,0	24,8	5,08	-	521	23	Broked from Material
2	38,0	24,7	5,12	-	520	25	Broked from Material

BEND TEST		
Type	No.	Result
FACE TRANSVERSE	1-2	Satisfactory
ROOT TRANSVERSE	1-2	Satisfactory
SIDE TRANSVERSE	-	-



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IMPACT TEST				
Spec No.	Notch location	Notch type	Test Temp. (°C)	Impact values (J)
1	WELD	V (10 x 2,5)	+ 20	24-25-21
2	HAZ	V (10 x 2,5)	+ 20	25-25-26

HARDNESS TEST		
Location	Avarage value	Maximum value
Parent metal(s)	174	184
H.A.Z.(s)	195	215
Weld metal	220	244

OTHER TEST

MACROGRAPHIC EXAMINATION Acceptable

NON DESTRUCTIVE EXAMINATION

VISUAL EXAMINATION Acceptable
RADIOGRAPHIC EXAMINATION Acceptable
PENETRANT TEST Acceptable
MAGNETIC PARTICLE Not required
ULTRASONIC TEST Not required

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