



WELDING PROCEDURE QUALIFICATION RECORD (WPQR)

N. 18.TQ.IT.022-YESS-WPQR-002

Manufacturer **Yess Yakma ve Enerji Sistemleri Sanayi ve Ticaret LTD.ŞTİ.**
WPQR No. **YES-WPQR-002** Dated **05/06/2018**
Manufacturer's welding procedure (WPS) No. **YESS-WPS-02** Dated **04/06/2018**

RANGE OF APPROVAL

Welding process **141** Type **Manual**
Joint type **BW**
Single/Multiple pass **Multiple , ssnb**
Parent material group(s) **1.1** **ISO/TR 15608**
Parent material thickness (mm) **Butt Joint = 3,6** 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) **48,3**
Filler metal type **TS EN ISO 21952-A:08, G/W MoSi**
Shielding gas (ISO 14175) **I1** **Backing gas** **None**
(ISO 14175)
Type of welding current **DCEN** Heat input Kj/cm **See table on page 2**
Welding position **HL-045**
Preheat min. (°C) **10** 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**

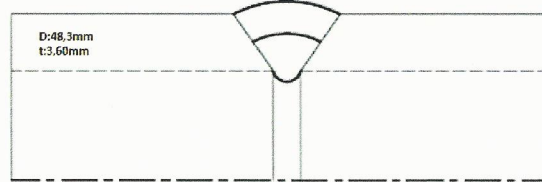
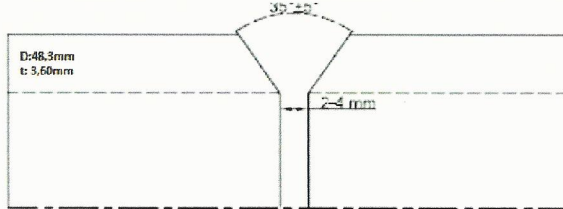
on **05/06/2018**



RINA
RINA Turkey
RINA - REGISTRO ITALIANO NAVALE
RINA DENİZCİLİK VE BELGELENDİRME LTD.ŞTİ.

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	G/W MoSi	90	23	7,6	1,63	DCEN
2	141	Φ 2,40	G/W MoSi	100	24	7,6	1,80	DCEN



PARENT MATERIAL

Material specification	EN 10216-2		
Type or grade	16 Mo 3 TC 2 / 15 Mo 3 (1.5415)		
Group(s)/Subgroup(s) No. (ISO/TR 15608)	1.1		
Thickness (mm)	3,6	Throat thickness (mm)	N/A
Diameter (mm)	48,3		
Branch connection angle	70		
Other	N/A		

WELDING CONSUMABLES

Process	141
Trade name(s)	GEKA SGMo
Specification	TS EN ISO 21952-A:08
Classification / designation	G/W MoSi
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	10
Trailing	NA	NA	NA
Backing	NA	NA	NA

POSITION

Welding position	HL-045
Other	N/A



PREHEAT		POSTWELD HEAT TREATMENT	
Preheat temperature	10	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	48,3	24,7	3,62	235	544	21	Broked from Material
2	48,3	24,7	3,64	235	538	17	Broked from Material

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



Certificate No. 18.TQ.IT.022-YESS-WPQR-002

IMPACT TEST				
Spec No.	Notch location	Notch type	Test Temp. (°C)	Impact values (J)
1	WELD	V (10 x 2,5)	+ 20	25-22-18
2	HAZ	V (10 x 2,5)	+ 20	20-27-18

HARDNESS TEST		
Location	Avarage value	Maximum value
Parent metal(s)	163	167
H.A.Z.(s)	181	192
Weld metal	216	224

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

Issued at: ISTANBUL - TURKEY

on 05/06/2018



RINA
RINA Turkey
RINA · REGISTRO ITALIANO NAVALE