BENCO / MACHINES

ELECTRIC MOTORS, GEARBOXES, PUMPS & MIXING EQUIPMENT

Welding Procedure Specification WPS GMAW 01

Manufacturer	Benco Machines	WPS No	GMAW 01
Project Name	General Shop Use	PQR No	Pre qualified
Reference No		Drawing No	Structural Steelwork
Code / Standard	AWS D1.1	Date	20 August 2014

Base Metals

Material 1	EN 10025-2 S355JR÷AR	Material 2	EN 10025-2 S355JR÷AR
Thickness	3 – 65mm	Thickness	3 – 65mm
Combined thickness	6 – 150mm		

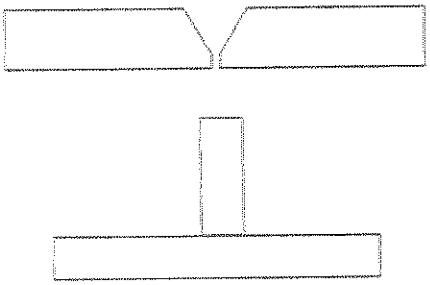
Welding Consumables

Welding process	GMAW	Process type	Semi-automatic
Filler specification	AWS A5.18 E70S6 1.2mm	Gas	Ar - $3O_2$ – $13CO_2$ typ
Typical trade name	Lincoln Fusion S6	Flow rate	16 – 22 l/min
Typ trade name gas	Coogar 84		

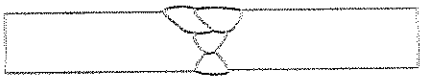
Preheat Temperature

Preheat temperature	For plate/section up to 20mm=0°C For plate/section 20 to 38mm=10°C For plate/section 38 to 65mm=65 °C	Inter-pass temperature	275 °C max
Heating method	Gas burners	Heated area	General heating

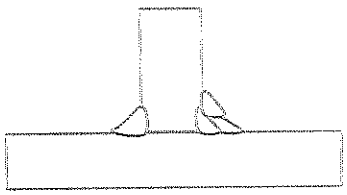
Joint Design to AWS designation



Root gouge for CJP welds



Max single pass fillet weld is 8mm



See pre-qualified joint details typically B-U2-GF, B-U3-GF, BP-3-GF, BC-P2-GF

All fillet welds in all plate thicknesses
Note max root fit-up of 3mm gap

Joint type	Butt and T-butt, PJP÷CJP	Gouging	Air carbon arc
Preparation method	Flame cut, guillotine, saw	Inter-pass cleaning	Chip & brush
Cleaning	Grinding	Backing	NA

Pass no	Welding Process	Filler size	Welding position	Current A DC÷	Volts V	Travel Speed mm/sec	Heat Input kJ/mm
All	GMAW	1.2mm	1G, 1F, 2F, flat	250-285	27-32	manual	NA
All	GMAW	1.2mm	2G, 2F, hor	235-275	24-28	manual	NA

Additional information

Stringer/weave	Stringer	Post weld heat treatment	none
Wire type	Solid	Inspection	100% Visual Inspection
Electrical stick-out	25mm max	Acceptance	AWS D1.1 Table 6.1

Manufacturer's representative_____
Designation Owner/Director

Welding Engineer
Designation

G B Murray_____
International Welding Engineer
ZA IWE 00016

For queries on use and interpretation, contact Weldex International at andrew@weldexinternational.co.za cel 083 600 4018

Procedure Qualification Record PQR

Manufacturer	Benco Machines	PQR no	PQR-002	Rev 00
Location	South Africa	WPS no	WPS-002	
Reference No		Standard	ASME IX 2010	
Welding Process	FCAW semi-automatic	Date	13 February 2013	

Base Materials QW-403

Material 1	BSEN 10025-2 S255JR+AR	Thickness	10mm	P no	Unassigned
Material 2	BSEN 10025-2 S255JR+AR	Thickness	10mm	P no	Unassigned
Outside diameter	NA				

Filler Metals QW-404

SFA specification	A5.20 E71T-1	Size of filler metal	1.2mm
AWS Filler Spec	E71T-1	Filler metal F no	F6
Thickness	t = 11mm	Weld metal A no	A1

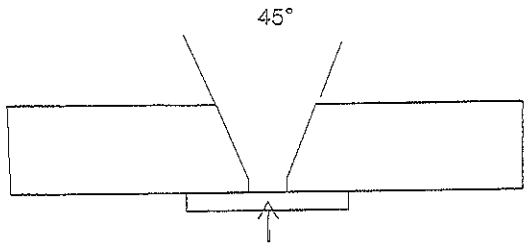
Position QW-405

Position of groove	Flat 1G	Weld progression	NA

Preheat & Interpass Temperature QW-406

Preheat temperature	15°C ambient	Interpass temperature	275°C nominal

Joint design QW-402



6mm root opening on backing bar

Back gouge for CJP

Post Weld Heat Treatment QW-407

Temperature	NA	Time	NA

Gas QW-408

Shielding + purge	CO_2 gas	Composition	99.9%CO_2
Flow rate	18 to 25 l/min	Nozzle size	20mm

Electrical Characteristics QW-409

Current DC pos	245 to 265 Amps	Voltage	25 to 28 Volts
Polarity	DC pos	Electrode size	1.2 mm

Technique QW-410

Travel speed	3 to 6 mm/s	Single or multiple electrode	Single
String or weave	String	Multipass or single pass	multipass

Tensile Tests QW-150

Type & number	Area mm^2	Maximum load kN	UTS MPa	Fracture location
Requirement	To be indicated	To be indicated	470-630	To be indicated
Transverse 1	183.1	97.6	533	PM
Transverse 2	183.0	95.4	521	PM

Guided Bend Tests QW-160

Former diameter = 40mm	Qty tested	Bend Angle	Comment
Face bend test	2	180°	Acceptable
Root bend test	2	180°	Acceptable

Toughness Tests QW-170

Notch location	Temperature °C	Energy Value in Joule			
Direction		1	2	3	Ave
Requirement	NA	NA	NA	NA	NA
Parent metal					
Heat affected zone					
Weld metal					

Non-destructive Examination

Visual	Acceptable	Radiography	Acceptable
Magnetic Particle	Acceptable	Ultrasonic Testing	NA

Macro Examination

Qty tested	Magnification	Comment

Notes

1. See test certificate 2013-19508A for destructive testing and W3406-13 for NDT

The undersigned certify that the test welds were prepared, welded and tested satisfactorily in accordance with the code requirements of Section IX of the ASME Code. The examiner from Weldex International witnessed the weld.

Manufacturer	_____	Examiner	G B Murray
Signature	_____	Signature	_____
Designation	_____	Designation	International Welding Engineer Registration no ZA IWE 00016
Date	_____	Date	_____

INTERNATIONAL WELDING ZA IWE 00016 ENGINEER

BENCO / MACHINES

ELECTRIC MOTORS, GEARBOXES, PUMPS & MINING EQUIPMENT

Welding Procedure Specification WPS QW482

Manufacturer	Benco Machines	WPS no	WPS-FCAW-002	Rev 00
Location	South Africa	PQR no	PQR-FCAW-002	
Reference No	General Shop Work	Standard	ASME 2010	
Welding Process	FCAW semi-automatic	Date	13 February 2013	

Base Metal QW-403

Material 1	BSEN 10025-2 S355JR÷AR	Thickness	3mm to 20mm	P no	Unassigned
Material 2	BSEN 10025-2 S355JR÷AR	Thickness	3mm to 20mm	P no	Unassigned
Pipe diameter	NA	Combined thickness			

Filler Metals QW-404

Process	FCAW	F no	F 6
SFA Specification	A5.20	A no	A 1
AWS classification	E71T-1	Size of filler metal	1.2

Position QW -405

Position of groove	Flat	Weld progression	NA
Position of fillet	NA	Weld progression	NA

Preheat QW-406

Preheat temperature	0°C min ambient 20°C nominal ambient	Interpass temperature	275°C max

Post Weld Heat Treatment QW-407

Temperature range	NA	Time range	NA

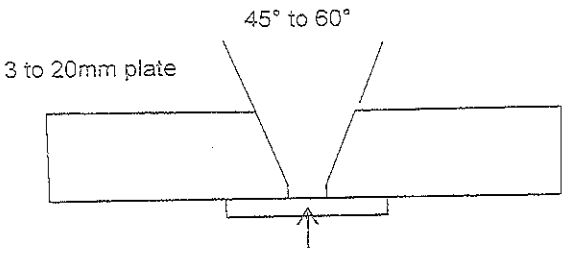
Gas QW-408

Shielding	Carbon dioxide	Composition	100% CO_2
Flow rate	18 to 25 l/min	Nozzle size	20mm

Electrical Characteristics QW-409

Electrode	E71T-1	Electrode type	Rutile flux cored
Current	235 to 285 Amps	Voltage	24 to 30 Volts
Polarity	DC pos	Electrode size	1.2mm
Metal transfer mode	Globular÷Spray	Wire feed speed range	As required

Joints QW-402



Back gouge for CJP

Welding technique QW-410

String or weave bead	String
Nozzle size	20mm diameter
initial & interpass cleaning	Light grind and brush
Method of back-gouging	Carbon arc air
Contact tube to work distance	About 20mm
Multiple or single pass per side	Multiple pass
Multiple or single electrodes	Single
Travel speed range	Manual between 3 and 6 mm/sec
Peening	Not permitted

Run no	Welding process	Filler size diameter	Filler class	Welding position	Amps	Volts	Speed mm/sec	Heat input kJ/mm
All	FCAW	1.2mm	E71T-1	Flat	235 - 285	24 - 30	4 – 6	0.85 to 1.9

Non-destructive Examination

Visual	100%	Radiography	See drawing
Magnetic Particle	See drawing	Ultrasonic Testing	See drawing
Penetrant Inspection	NA	Acceptance Standard	ASME

Manufacturer	_____	Examiner	G B Murray
Signature	_____	Signature	_____
Designation	_____	Designation	International Welding Engineer Registration no ZA IWE 00016
Date	_____	Date	_____

INTERNATIONAL WELDING ENGINEER ZA IWE 00016