



Mactech Europe

Method Statement



MAROKO Weldless Mechanical Connector

Example - BP Exploration Limited

PROCEDURE Reference. 101116 Rev 1

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1.Document Scope

This method statement covers the installation and pipe preparation requirements for a 'Typical' MAROKO Weldless Mechanical Connector.

A 8" ANSI 900lb connector to suit schedule 80 Grade B pipe is used as an example.

The statement specifically covers: -

- The specification of the pipe preparation required to allow the MAROKO Connector to be correctly installed.
- Information covering the installation and removal of the MAROKO Connector.

The required pipe preparation is under taken on site by the use of a MACTECH Europe split frame cold cutting machine, which has the capability to both cut and prepare the pipe.

It is recommended that the MAROKO connectors bolts are correctly tightened by the use of calibrated torque wrenches / tensioning equipment, which will be supplied by MACTECH Europe Ltd.

2.Safety

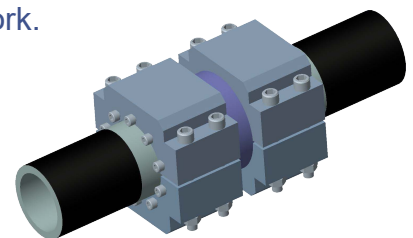
The connector must be installed and the pipes prepared by competent personnel who are trained in the safe use of installation equipment and who are capable of working in a safe and proper manner.

Certificates of competency are available for all Mactech service engineers upon request.

Risk Assessment

A risk assessment of the coupling installation / pipe machining must be undertaken by a competent person prior to undertaking any work and risks identified mitigated.

A work permit must be obtained before commencing work.



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3.Handling

The MAROKO Connector can weigh more than the recommended maximum weight permitted to be manually lifted. Therefore, always use appropriate lifting equipment and certified slings when handling the connector. An eye bolt hole is located within the unit which can be used by screwing in the correct rating of eye bolt.

Ensure that all industry regulations and practices are adhered to and ensure no one is allowed to work beneath suspended loads

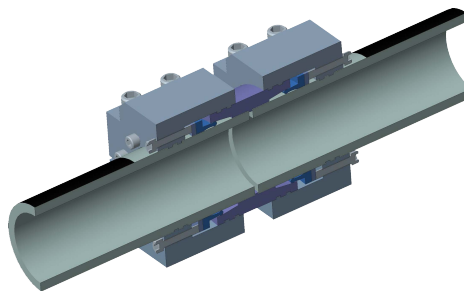
4.Connector Description

The connector comprises 3 key elements

- A centre sleeve that spans the pipes being connected.
- 2 half shell clamps that lock the connector to the pipes and the centre sleeve.
- A unique and patented 'Radial Wedge Seal' that provides a metal seal between the pipe and the centre sleeve
- The half clamps grip the connecting pipes by means of grooves machined into the pipes periphery.
- The clamps are closed by tensioning through bolts.
- The seals are energised by cap head bolts.

Please refer to appendix 4 – Coupling general arrangement drawings.

The connector is classified as a groove type connector and one that is considered to be a permanent connection method for metallic piping systems. It is possible to remove the connector and reuse once the seal rings have been changed.



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5. Coupling Specification

The intended application should be checked with the specification sheet contained in Appendix I. If the pipe is outside the limits specified, then the connector must not be fitted and Mactech Europe Limited contacted immediately.

The name plate on the connector should be checked to ensure the coupling has been supplied as specified.

The connector must not be installed on any application where it will see pressures / temperatures above those specified in these procedures / stamped on the body of the connector.

6. Pipe Specification – Preparation.

The pipe should be checked for both diametrical and ovality tolerance to ensure that it is within the API 5LL specification. The maximum / minimum diameters are given in Appendix 2.

The coupling is supplied with a go – no go gauge which can be used to check the pipe diameter is within specification.

The pipes outer surfaces should be machined in accordance with the pipe preparation specification contained in Appendix 3.

The pipe ends need to be square cut within +/- 1 Degree across their face.

In the event that the pipes surface, once cleaned falls below the minimum specified pipe diameter then the coupling should not be fitted.

The depth of the grooves is critical to the correct performance of the coupling and must be machined accurately by the use of a form tool. The depth of groove must be checked post machining by the use of a dial gauge indicator. If the maximum depth of groove has been exceeded then the coupling should not be fitted. The area of machined groove must be cut out and the work re started.

The two grooves are machined simultaneously with the distance between them set by the use of a tool box spacer.

Particular attention must be paid to the pipes surface area in the region of the seal contact point. This area must be free from any defects / tool marks / dents etc. and be of clean metal. i.e. with no paint / surface coatings.



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The two pipes being connected must be capable of being aligned within the same plane and the pipe ends must be allowed to come into contact if they were aligned prior to coupling installation. The connector will pull in a misalignment but it is recommended that initial axial misalignment be kept below 2 degrees.

- Always ensure that a new seal is used. Do not re-use old seals.

All surfaces of the coupling and pipe ends must be clean and free from debris.

7.Connector Installation.

1. Ensure that the coupling is free from defects
2. The two pipes should be set a distance apart slightly greater than the length of the couplings centre sleeve, which will facilitate coupling installation.
3. Slide a seal support ring followed by a radial wedge seal onto each end of the pipes being connected with the taper facing towards the pipes end.
4. Position the seal support rings and seals so that they are in contact with each other and the outer edge of the support ring is within 5mm from the innermost groove.
5. Slide the centre sleeve over one of the pipe ends until it comes into contact with the tapered seal.
6. Position one half of the split clamp beneath the pipe and engage the grooves into the pipe and centre sleeve. Support into position.
7. Lower the 2nd clamp half on top of the 1st and ensure the grooves are aligned.
8. Insert the clamp bolts (4 or 6 depending upon size)). Torque the bolts in a sequential pattern to 20%, 50%, 80% and then final load. Refer to the bolt load table for loadings.
9. Insert the seal energisation bolts into the end of the clamp shells.

Torque the bolts in a sequential pattern to 20%, 50%, 80% and then final load. Refer to the bolt load table for loadings.

Align the 2nd pipe into the centre sleeve until it comes into contact with the tapered wedge seal

Repeat the steps 6 to 9 for the second clamp set.



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Connector Torque Figures

Coupling	Clamp Bolts	End Bolts
2	80 ft lbs	20 ft lbs
4	180 ft lbs	50 ft lbs
8	220 ft lbs	70 ft lbs

If the coupling is fitted with grease nipples, then at this stage the corrosion inhibitor can be injected between the coupling / pipe annulus.

If the MAROKO connector has been supplied with an external test facility, then a hand pump filled with hydraulic oil should be fitted to the lower of the 2 180-degree opposed test ports. Once the test cavity has been filled and bleed a suitable pressure gauge should be fitted to the upper port and the cavity pressurised to the test pressure.

Upon completion of the test the pressure should be vented and 1/44in BSP blanking plugs inserted to seal the ports.

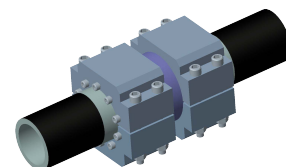
8. Coupling Removal

Prior to removing the connector, a permit to work must be obtained stating that the line is safe to work on. Please verify that the line is depressurised and vented.

Suitable rigging / lifting equipment should be used if the connectors weight is about that which can be safely manually handled. Attached the rigging equipment to the eye bolt hole located in the coupling

9. Documentation

Upon completion of the installation, a connector installation report must be completed.





Appendix 1 – Coupling Specification Sheet

Mactech Reference #:	Example
Customer:	BP Exploration
Contact person:	Kevin Halstead
Telephone:	
Email:	
Date:	10th November 2016
Project name/ location:	Example

Application Details	
Piping specification:	API 5L
Nominal pipe size: (nominal bore N.B)	8"
Pipe outside diameter (OD):	8.625"
Pipe material specification:	API 5L Grade B
Wall thickness/Schedule:	Schedule 80 0.5"
Temperature:	Minimum: -20 Deg C Maximum: 100 Deg C
Line operating / Design pressure:	2144 psi
Line pressure rating:	ANSI Class 900 lb
Line hydrotest pressure:	3171 psi
Corrosion allowance:	N / A
Seam welded or seamless pipe?	Seamless
Line contents:	Test - Water
Sour service:	No
Topside/ Onshore /Subsea:	Topside
Pipe design life:	25 Years
Coating required:	Epoxy coating
Coupling external test facility:	No
Connector configuration:	(Pipe / Pipe) (Blind) (Flange Termination) (Other)
(If other please specify)	2
Quantity required:	API 5L

QA	
Factory pressure test	Yes
Third party inspection	No



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Appendix 2 – API Tolerances

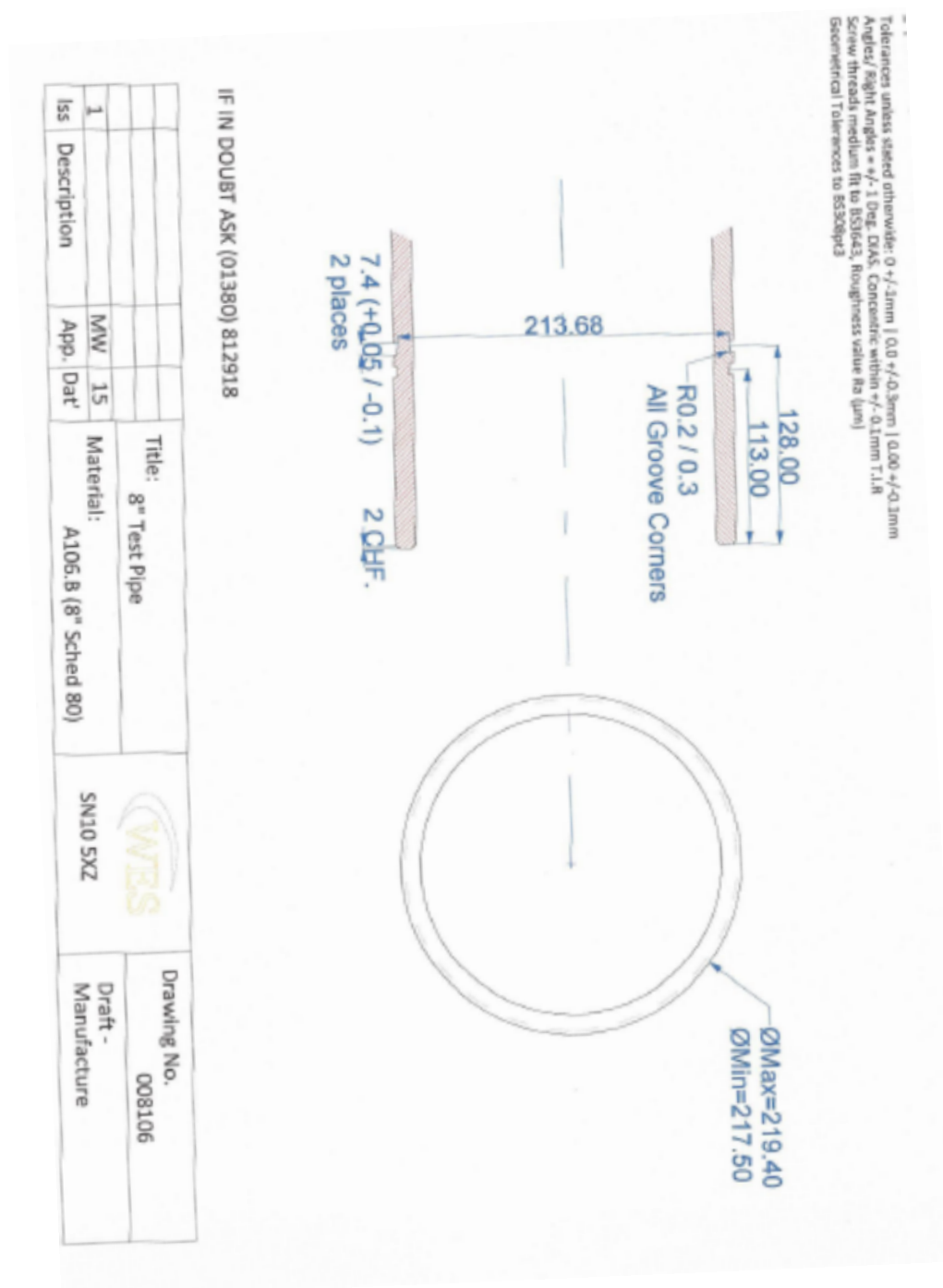
+ / - 0.75% of specified outside diameter.

+/- 1.5% Ovality

Nominal Outside Diameter 8.625 in

Diameter Range 8.56 in to 8.69 in

Appendix 3 – Pipe End Machining Specification

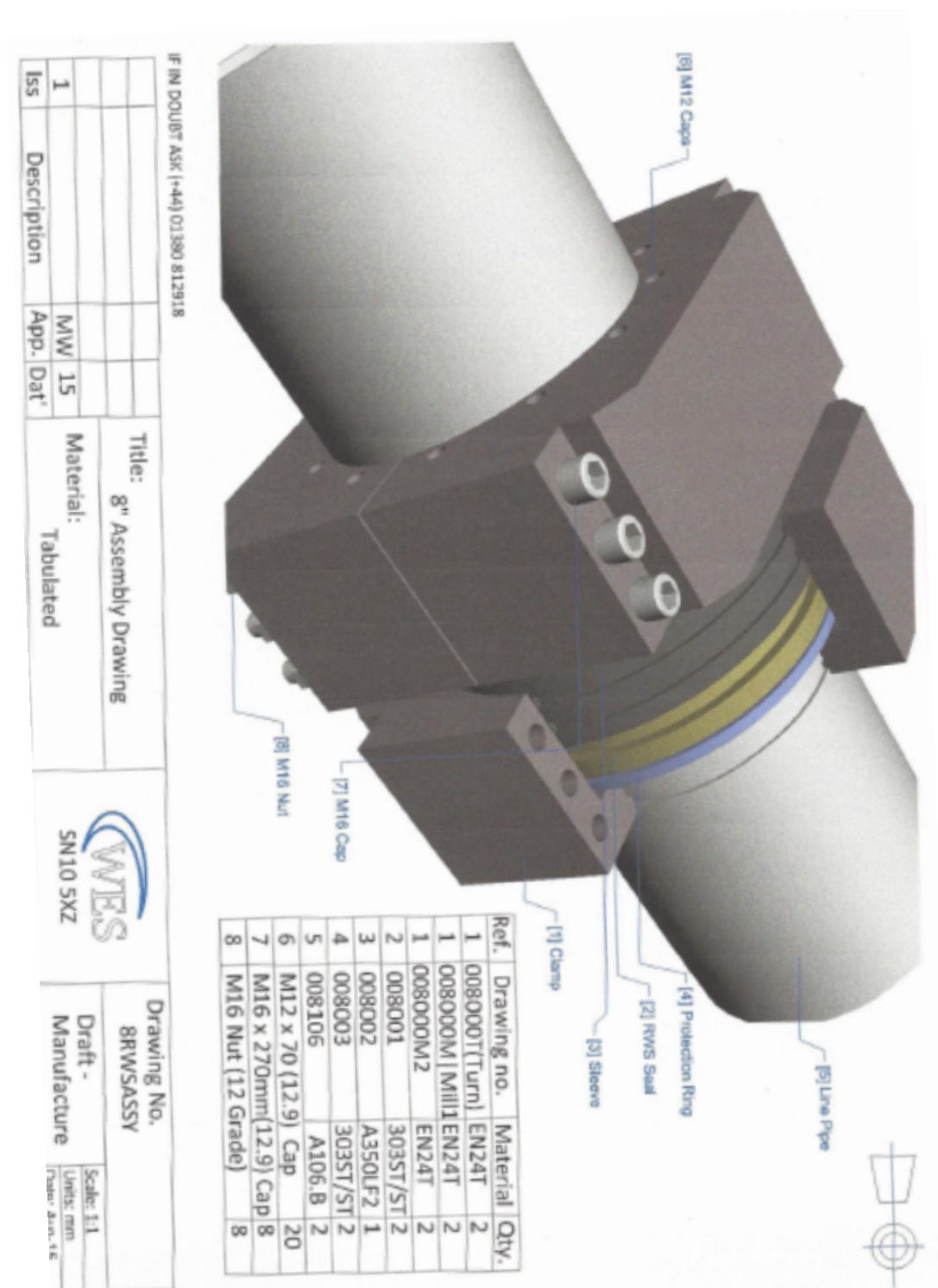


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Appendix 4 – Coupling General Arrangement



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