

# OIL STATES INDUSTRIES (UK) LTD.

## Mudline Make-up & Release (MMR) Tie-back Connector Description and Preliminary Running Procedure.



1	26.05.10	Issued for information	TA	JG	AG
Rev	Date	Description	Originated By	Checked By	Approved By




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**M005708**

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	Project	No.	Rev.
	<b>MMR Connector Development</b>	<b>M005708</b>	<b>1</b>
	Title	Date	
	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	<b>26th May 2010</b>	

**Table of contents**

**1.0 General description .....1**

**1.1 MMR connector box .....1**

**1.2 MMR connector installation pin .....1**

**1.3 MMR tie-back stabbing pin .....1**

**1.4 Lock ring .....1**

**2.0 Make-up I: MMR connector make-up .....3**

**2.1 Visual indication of make-up I .....3**

**2.2 Break out I: MMR connector break out .....4**

**3.0 Make-up II: MMR tie-back connector make-up .....7**

**3.1 Visual indication of make-up II .....7**

**3.2 Break out II: MMR tie-back connector break out .....9**

**4.0 Driveability .....12**

**5.0 Material .....12**

**List of figures**

**Figure 1 – General arrangement of MMR connector .....2**

**Figure 2 – General arrangement of MMR connector .....2**

**Figure 3 – General arrangement of MMR tie-back connector .....3**


**Figure 4 – MMR connector make-up process .....5**

**Figure 5 – MMR connector break-out process .....6**

**Figure 6 – MMR tie-back connector make-up process .....8**


**Figure 7 – MMR tie-back connector break-out process .....10**

**Figure 8 – MMR tie-back connector break-out process continued .....11**

	Project	No.	Rev.
	MMR Connector Development	M005708	1
	Title	Date	
	MMR Connector Description & Preliminary Running Procedure.	26th May 2010	

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	<b>MMR Connector Development</b>	<b>M005708</b>	<b>1</b>
	Title	Date	
	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	<b>26th May 2010</b>	

### 1.1 General description

The Mudline Make-up & Release (MMR) is a threaded conductor connector system with the rapid make-up desired for offshore operations. It comprises of

- a) MMR connector box
- b) MMR connector installation pin
- c) MMR tie-back stabbing pin
- d) Lock ring

### 1.2 MMR connector box

The MRM box is contoured to ensure easy stab-in characteristics. As shown in figures 1 and 2, the lower part of the box internal diameter is unthreaded for easy alignment and stab-in while the top part of the internal diameter is grooved for the MMR connector pin to lock during make up. The box also has an external groove round its circumference for lock ring attachment as shown in figure 3. It also has 3 off shear pins designed to break during break-out.

### 1.3 MMR connector installation pin

This is a threaded pin which has 3 off 60<sup>0</sup> tooth sections equispaced around the top half of its circumference as shown in figures 1 and 2. The lower half of the pin is an unthreaded stabbing guide which helps the pin to self align and stab easily into the box.

### 1.4 MMR tie-back stabbing pin

This is an unthreaded stabbing guide pin which has a groove for lock ring attachment as shown in figure 3. It is usually pre-assembled to the lock ring and it is designed to have easy stab-in characteristics into the box in the sea bed.

### 1.5 Lock ring

The lockring is an externally split ring shown in figure 3 below which is attached to the MMR stabbing pin. It moves outwards radially from the



Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		

stabbing pin groove under load and snaps back into the pin and box groove to make up the joint.

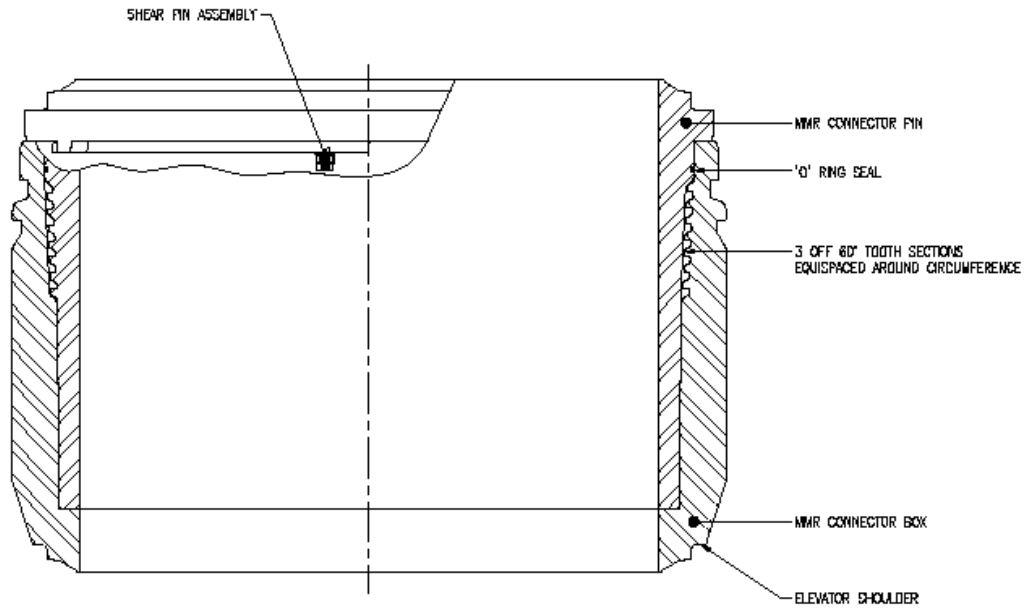


Fig 1 – General arrangement of MMR connector (unlocked)

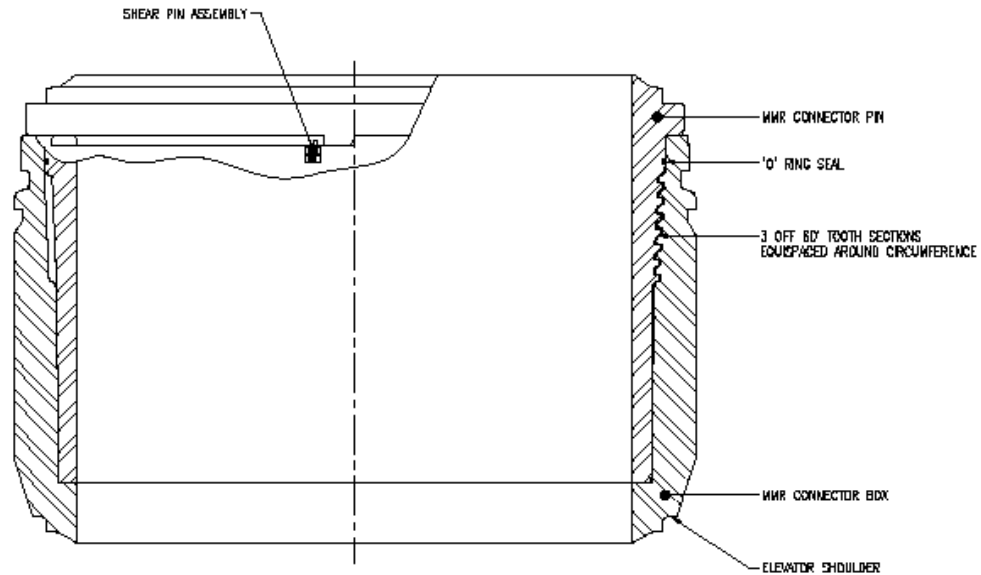


Fig 2 – General arrangement of MMR connector (locked)



Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		

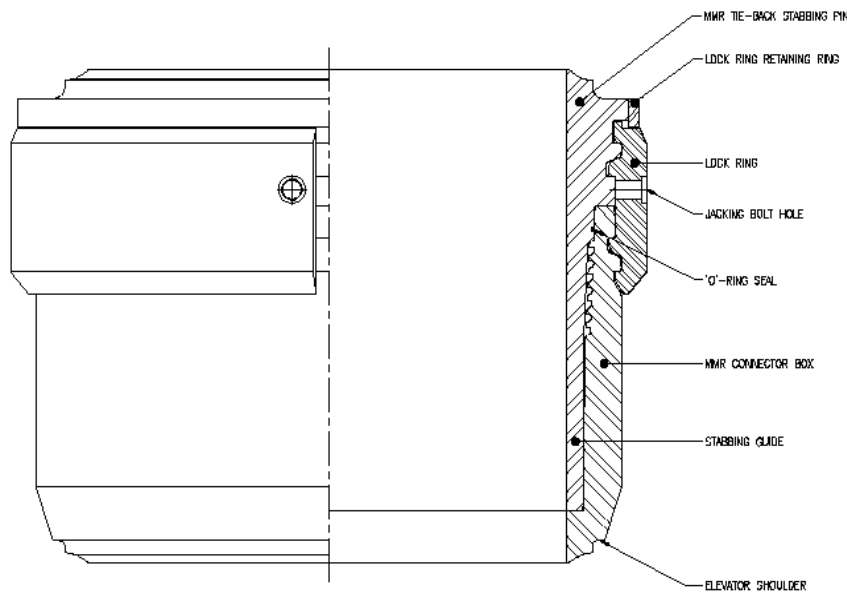



Fig 3 – General arrangement of MMR tie-back connector.

## 2.1 MMR connector make-up

The make-up of the connector is achieved by stabbing the threaded pin in to the box until the abutment face of the pin touches that of the box. The pin can then be turned through 6<sup>th</sup> of a turn in the anti-clockwise direction to attain full lock as shown in steps 1 to 3 of figure 4. A series of shear pins engage at this point to prevent accidental back-off from occurring.

## 2.2 Visual indication of MMR connector make-up

Full make-up can be confirmed after turn by visually inspecting the pin and box shoulders to see that they are properly aligned as shown in step 3 of figure 4. If partially made up, the pin and box shoulders will not align for the full circumference. The shear pins will also be engaged at proper make-up. When it has been ascertained that the MMR connector has been properly made up, then the joint can be lowered to the sea bed.

	Project	No.	Rev.
	<b>MMR Connector Development</b>	<b>M005708</b>	<b>1</b>
	Title	Date	
	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	<b>26th May 2010</b>	

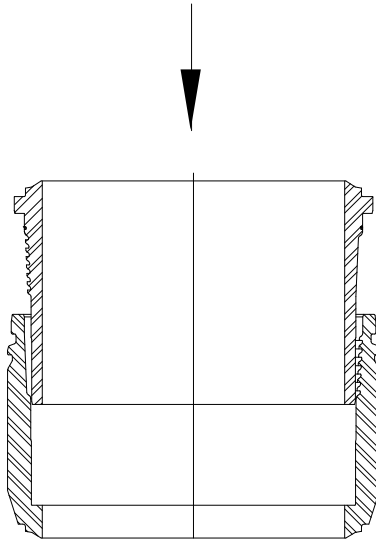
## 2.2 MMR connector break-out

To break out the joint, the pin is then turned back in the clockwise direction through 6<sup>th</sup> of a turn at a torque of approximately 50,000 ft-lb for a 30" connection and the shear pins break. The joint is then separated by lifting the MMR connector pin joint from the MMR box on to the drill floor as shown in steps 1 to 3 of figure 5.



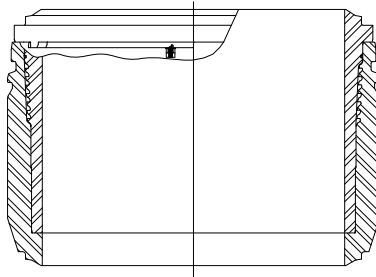
Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		

STEP 1



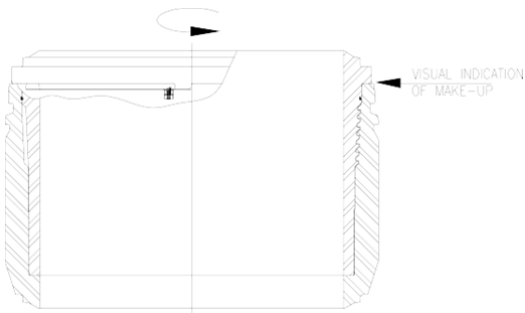
STABBING PROCESS

STEP 2



MMR PIN CONNECTOR FULLY STABBED

STEP 3



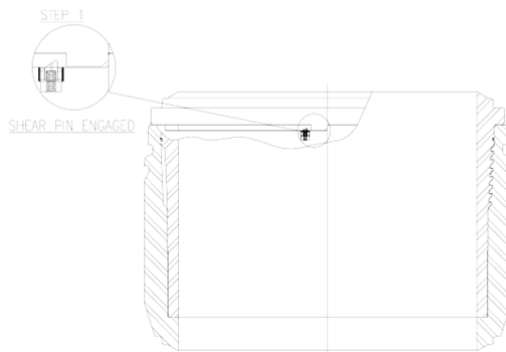
6th OF A TURN TO LOCK MMR PIN CONNECTOR  
SHEAR PINS ENGAGED

Figure 4 – MMR connector make-up process.

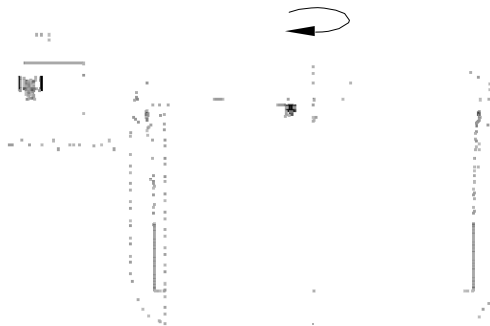




Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		

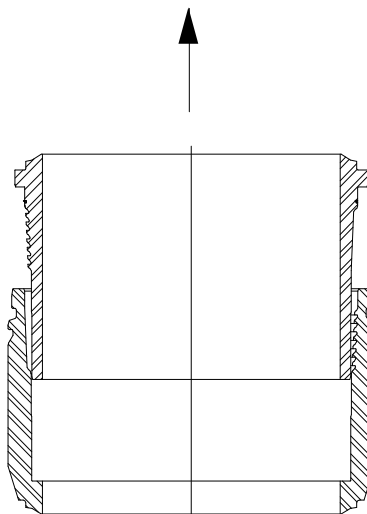


MMR PIN CONNECTOR LOCKED  
SHEAR PINS ENGAGED




6th OF A TURN TO UNLOCK MMR PIN CONNECTOR  
SHEAR PINS BREAK-OUT

STEP 3



MMR PIN CONNECTOR DISENGAGED AND REMOVED

Figure 5 – MMR connector break-out process.

	Project	No.	Rev.
	<b>MMR Connector Development</b>	<b>M005708</b>	<b>1</b>
	Title	Date	
	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	<b>26th May 2010</b>	

### 3.1 MMR tie-back connector make-up

The second make up is achieved via the lock ring which is attached to the MMR tie-back stabbing pin member. The MMR tie-back stabbing pin/lock ring is stabbed over the box. Weight of top joint expands lock ring while pin and box abutment faces come together and lock ring snaps closed as shown in steps 1 to 3 of figure 6.

### 3.2 Visual Indication of MMR tie-back connector Make-up

At correct make-up, the lock ring gap will return to its original value of 0.75”.



Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		

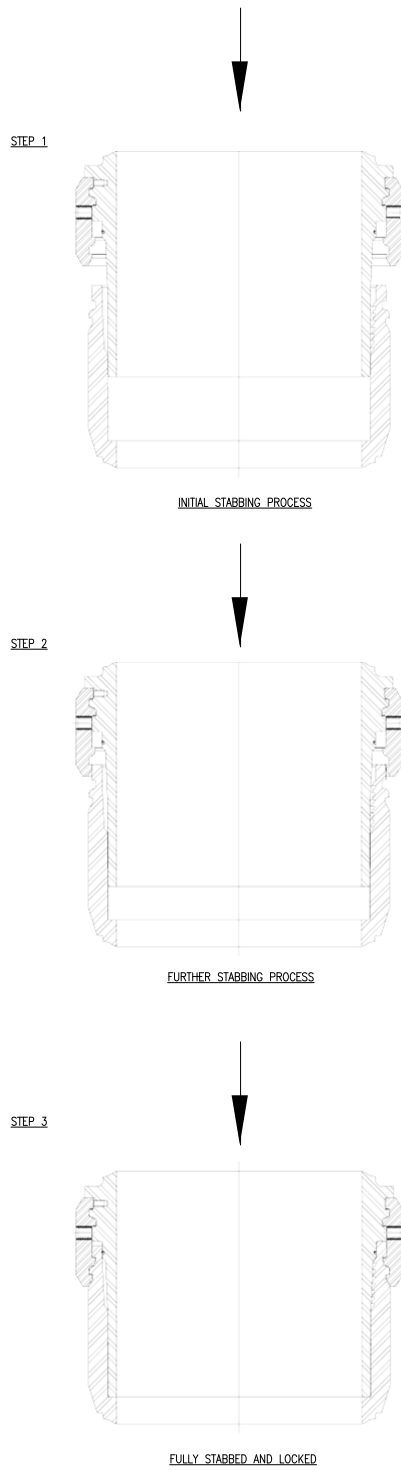



Figure 6 – MMR tie-back connector make-up process

	Project	No.	Rev.
	<b>MMR Connector Development</b>	<b>M005708</b>	<b>1</b>
	Title	Date	
	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	<b>26th May 2010</b>	

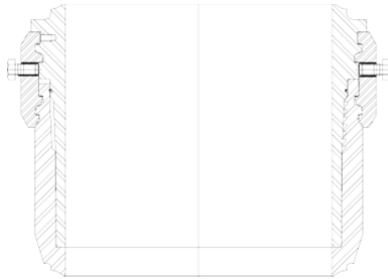
### 3.2 MMR tie-back connector break-out

To break out the MMR tie-back connector joint, the lockring is jacked out using seven jacking bolts positioned circumferentially around the lock ring as shown in steps 1 to 3 of figure 7. The joint is then separated by lifting the pin with the lock ring from the box joint as shown in steps 4 and 5 of figure 7. A remote hydraulic option is also offered where the bolts are replaced by hydraulic cylinders.



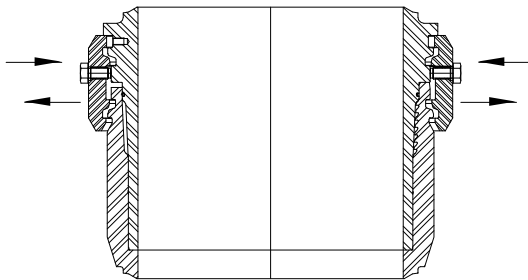
Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		

STEP 1



JACKING BOLTS INSERTED

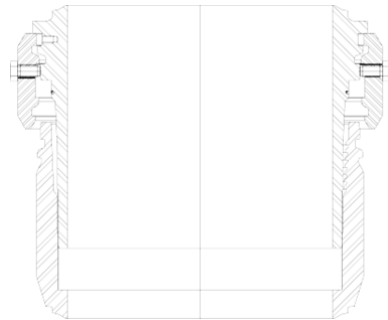
STEP 2



LOCKRING EXPANDED WITH JACKING BOLTS



STEP 3

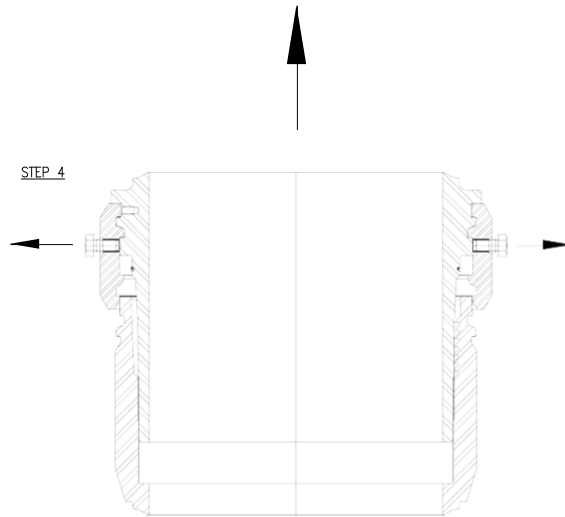


PIN AND LOCKRING REMOVED

Figure 7 – MMR tie-back connector break-out process

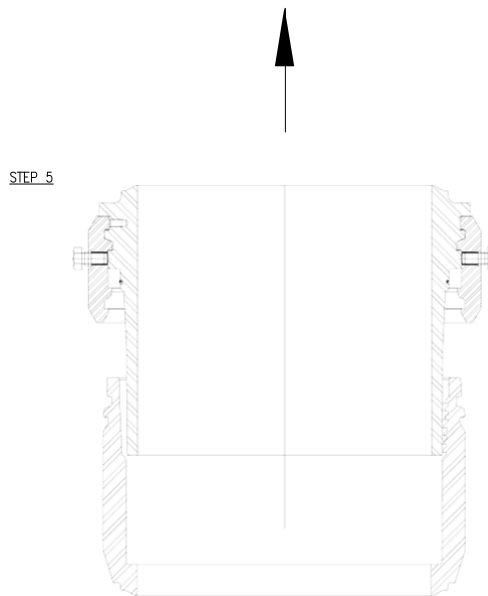


Project	<b>MMR Connector Development</b>	No.	<b>M005708</b>	Rev.	<b>1</b>
Title	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	Date	<b>26th May 2010</b>		



STEP 4


JACKING BOLTS SCREWED OUT  
LOCKRING LOCKED ONTO PIN



STEP 5

REMOVAL OF PIN AND LOCKRING

Figure 7 – MMR tie-back connector break-out process continued.

	Project	No.	Rev.
	<b>MMR Connector Development</b>	<b>M005708</b>	<b>1</b>
	Title	Date	
	<b>MMR Connector Description &amp; Preliminary Running Procedure.</b>	<b>26th May 2010</b>	

#### **4.0 Driveability**

The MMR connector is ideally suited for pile driving applications and is produced in a range of sizes from 20” through to 36”.

#### **5.0 Material**

The MMR connector are typically made from HIHOS, an Oil States developed high strength, micro-alloy steel (100,000 psi yield).