



Kinetics Controls & Innovation Ltd

**Kenya  
Project, Product & Deployment Overview  
Kenya Well No. (TBC)**

**Procedure:** 20-3/4" to 13-3/8 hanger void isolation using MS-Sealant 04

**REVISION HISTORY**

<b>Rev</b>	<b>Date</b>	<b>Description</b>	<b>Author</b>	<b>Checked</b>	<b>Project</b>
01	09/12/13	Issued for internal Review	GO	SR	GO
02	11/12/13	Issued to customer	GO	RM	GO
03	29/12/13	Issued to Customer	RM		KH

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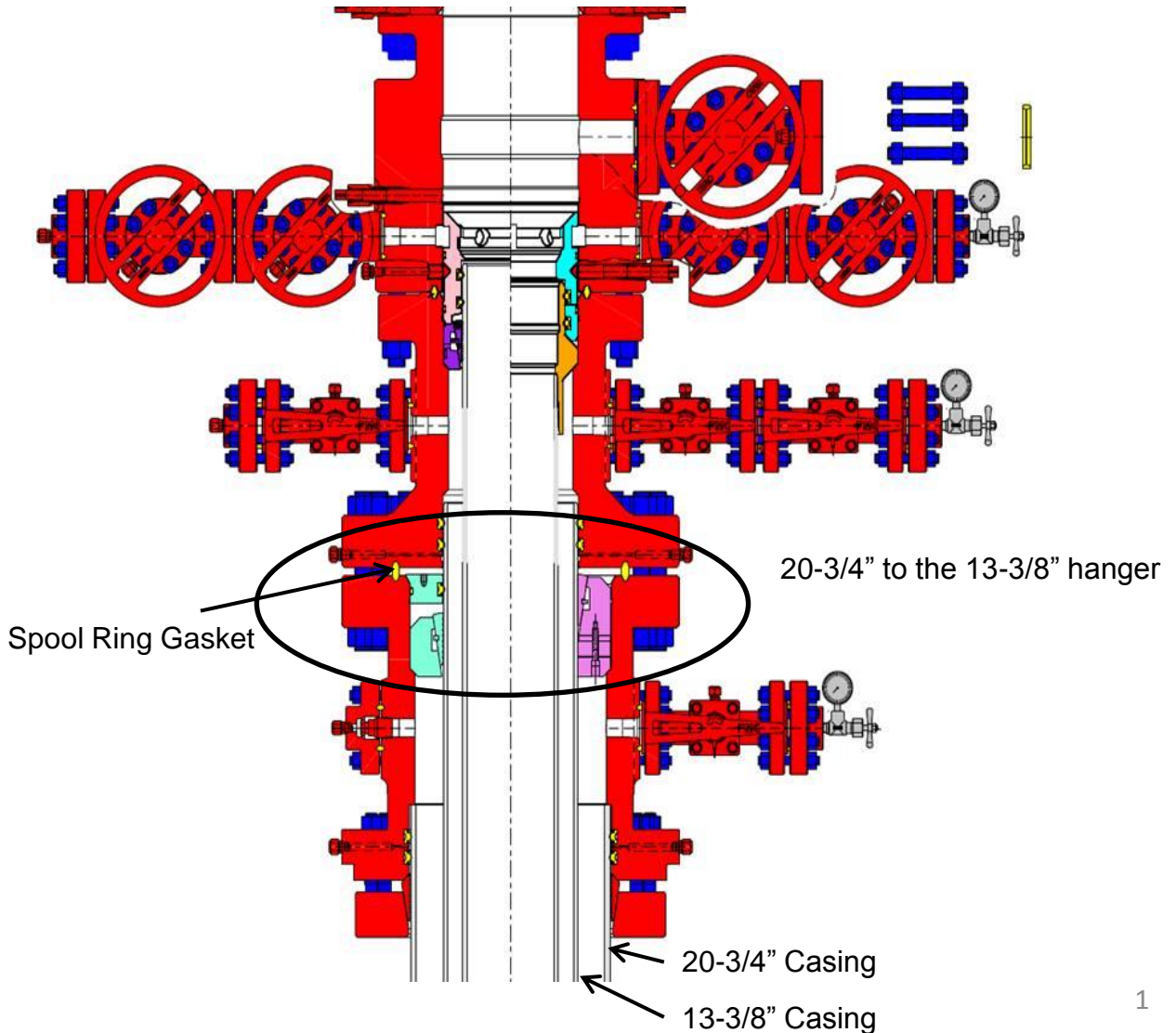
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## History

KCI has been requested to provide an isolation within the 20-3/4" to the 13-3/8" hanger void. The customer installed the 13-3/8" hanger in the 20-3/4" and noticed there was gas migrating through it into the void. The client has bled off the well from the side outlet and installed a pressure gauge. The customer has installed the Unihead above the void.

KCI recommend a full fill of the 20-3/8" void using MS-Sealant 04 to provide a barrier within the void . The intension is to fill the void to protect the Spool Ring Gasket from annulus gas or fluid pressure.

Void volume estimated to be 2 to 4 Litres.





## 20-3/8" Evaluation



## Evaluation

1. Vent and bleed down annulus pressure from above and below the casing hanger
2. Sting and vent any residual pressure from 20-3/8" test ports.
3. Attach KCI deployment manifold to test port 1, sting test port 2.
4. Pump light oil through test port 1 until oil returns are seen at test port 2.
5. Once returns are seen through test port 2, close stinger and pressure up the 20-3/8" void to (TBC)psi for 15 minutes. Record findings and leak rate.



## 20-3/8" Repair



## Repair

1. Vent and bleed down the annulus pressure above and below the casing hanger
2. Stinger and vent test ports 1 & 2
3. Attach KCI deployment manifold to test port 1, while having a stinger on test port 2.
4. Mix 2 litres of MS-Sealant 04 with 200ml activator and decant into deployment cylinder.
5. Begin sealant injection until sealant returns are seen at test port 2. If no sealant returns are seen at test port 2, mix a further 2 litres and repeat process.
6. When returns are seen at test port 2, close stinger and pressure up to (TBC)psi. Allow to cure and leave sample at well to gauge the cured state of the sealant.

**Note: Do not pressure test through test ports 1 or 2 once sealant has cured as this may disturb the seal structure. Inflow test only.**



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## **KCI MS-Sealant - Viscosity 01 to 06** **Mixing and Deployment Review Sheet**

The KCI MS-Sealant is a compound deployed in a fluid state against pressure (if required). The MS-Sealant is designed to flow around existing materials and annulus areas as a filler and will establish a pressure energised seal.

The product is provided in two parts,  
1/ Compound,  
2/ Activator,

Both products combined provide a package to meet a specified setting time.

Note: The activator measure is subject to curing time requirements and can not be adjusted please contact the above office for advise if required.

Standard setting time is 2 to 24 hours subject to temperature

Deployment time is 1 to 1-1/2 hours subject to temperature.

Review information label attached to both compound and activator.

### **Mixing:**

Use in well ventilated area.

KCI provide a large container to support mixing and a hand air drive stirrer

Empty compound into container provided and stir gently.

Empty activator into same container and continue to stir approximately 5 minutes.

### **Deployment: Subject to viscosity**

**Deployment Tool:** Cylinder complete with interface fitting, manifold, feed hose etc.

Place the pump into the container.

Allow the MS-Sealant fluid to displace any grease within the feed line prior to connecting to the manifold assembly

**Note: if the sealant is being deployed through an existing grease / injection fitting. Remove the manifold and inject a small amount of grease to flush the check valve only.**

### **Cleaning the tool and accessories:**

Return to KCI for redress

**Note: This product is required to be deployed by KCI trained and registered personnel or sub-contractors.**

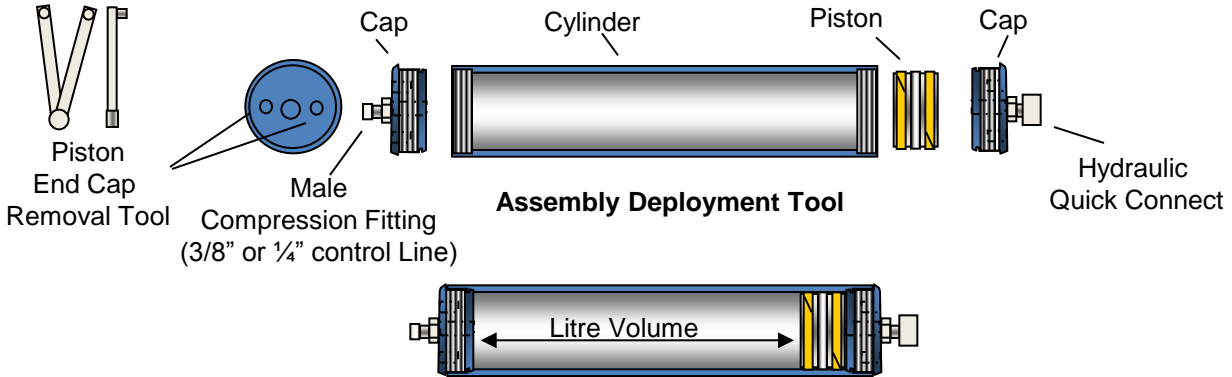


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## Deployment Tools

Cylinders are provided as the preferred method of deploying the sealant. These are designed as a simple process for preparation / handling, deployment (diver assist) and refurbishment.

The cylinders have been designed to operate with seawater and range from 250mls, 1,3,& 5litre deployment volumes. Operating pressure 3,500psi and 10,000psi.



## Mixing Instructions

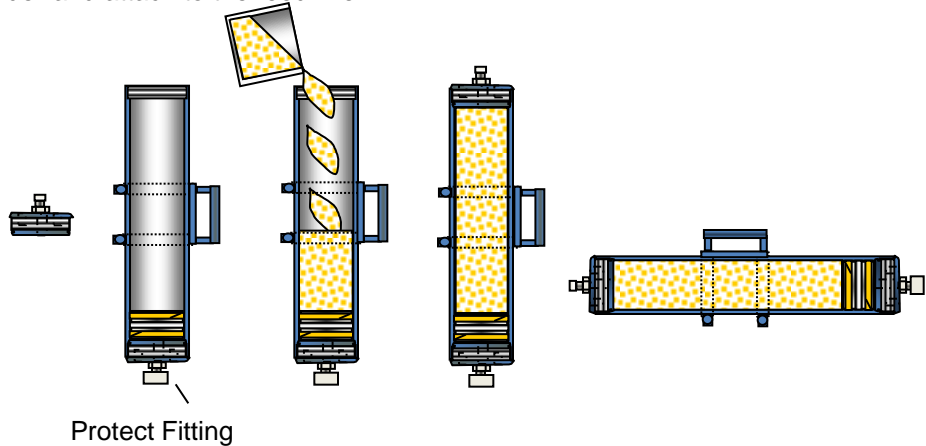
The IBS / Mac-Seal / MS-Sealant is a two-part product i.e. compound and hardener. The product has been provided with set volumes i.e. 250mls , 1,3 & 5 Litre packs of compound (white) and hardener. Pour the set volume of hardener into the compound tub and mix until the sealant is mixed throughout. Pour the mixed compound and hardener into the cylinder and attach to the feed line.



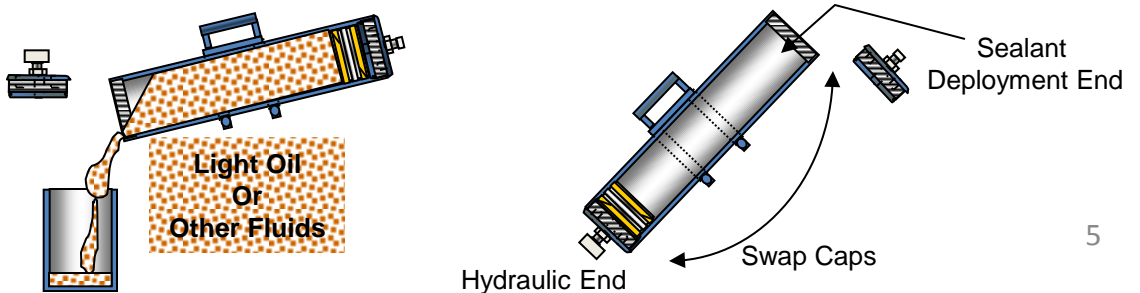
**Note:** Prepare all cylinders to receive the sealant prior to mixing

**Sealant curing time:**  
3 hours subject to temperature  
24 hours for IBS

**Sealant deployment time:**  
1 hours after mixing.

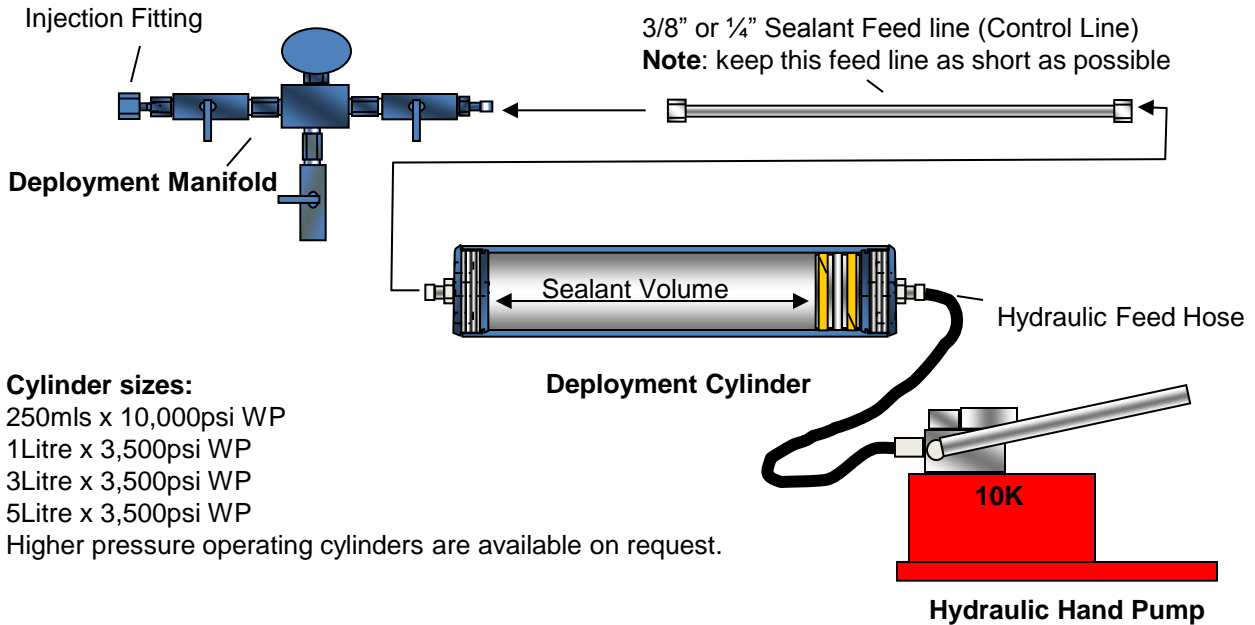


KCI provides the sealant as a fixed volume package i.e. compound & hardener. In the event that more than one package is required the cylinder can be re-used by emptying the hydraulic fluid and swapping the caps.





### KCI MS-Sealant Deployment Tools



**Note:** This product is required to be deployed by KCI trained and registered personnel or sub-contractors.

#### **Tooling review:**

The pump can be used directly for the evaluation of the leak path. With volumes over 3litres a pump will be provided with a high volume / low pressure and low volume / high pressure button.

The hydraulic feed hose is provided with quick connects.

The cylinder is designed to provide repeat applications.

The sealant feed line is recommended to be as short as possible.

The KCI manifold is designed to provide 2 barriers at all times (if required) with venting capabilities). **Note the gauge has a filled grease box to prevent the sealant from entering the gauge, ensure this is in place before deploying the sealant.**

#### **Deployment Review:**

Mix the compound and hardener as per mixing instructions.

Remove the cylinder cap and pour in the mixed sealant and replace the cap.

Connect the feed line and Manifold to the cylinder

Connect the hydraulic feed hose and pump to the cylinder and displace the sealant through to the injection interface fitting.

Leave a sample on the wellhead. This will confirm internal sealant structure i.e. cured condition.

Connect the tool package to the injection port and deploy the sealant in accordance with the application and KCI method procedure..

**Note:** If any ongoing deployment is a part or full cylinder fill, displace any air prior to connecting the cylinder to the feed line.





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### Method Statement for Tullow Oil

#### Pre job

Step	Description	Resp	Initials
1.1	Liaise with WSS to raise PTW and conduct toolbox talk with all parties on work scope requirements. Review KCI Risk Assessment.	TO / FMC	
1.2	KCI personnel to ensure tooling and product is prepared and tested for operations on arrival. Any anomalies to be recorded.	FMC	
1.3	Confirm with WSS to identify Well and porting.	TO / FMC	

#### Evaluation

Step	Description	Resp	Initials
2.1	Flatten or balance annulus above and below the void.	FMC / TO	
2.2	Sting test port 1 & 2 and vent any pressure at the void.	FMC	
2.3	Rig up test pump at test port 1 and inject with oil. With a stinger on test port 2 and vented monitor oil displacement from test port 2.	FMC	
2.4	Close test port 2 and try to obtain a PBU at test port 1.	FMC	
2.5	Bleed down pressure, Sting and vent test port 2, Rig down test equipment. Record findings and monitor.	FMC	
2.6	If no PBU has been obtained move onto step 3.1.	FMC	

## Repair / Sealant deployment

Step	Description	Resp	Initials
3.1	Vent a sting both test ports to ensure no pressure present, if pressure is present flatten or balance annulus above and below the void.	FMC	
3.2	Rig up sealant deployment tools and attach KCI deployment manifold to port 1.	FMC	
3.3	Mix two litres of sealant with full jar of hardener (200mls) and decant into deployment cylinder.	FMC	
3.4	Inject MS-Sealant 04 until returns are present through test port 2, take sample of sealant and leave on wellhead for assessment of sealant curing.	FMC	
3.5	Close test port 2 and continue to deploy the remaining two litres of sealant until PBU achieved or piston has dead ended in the deployment cylinder.	FMC	
3.6	Close valves on KCI deployment manifold and leave the sealant under pressure and bleed down deployment tooling before disconnecting.	FMC	
3.7	Allow MS-Sealant 04 to cure.	FMC	

## Testing

Step	Description	Resp	Initials
4.1	Ensure sealant has cured by assessing sample taken.	FMC	
4.2	Once sealant has cured remove the KCI deployment manifold from test port 1. Take care when removing KCI deployment manifold, not to disturb the seal and if sealant attached cut to break free the KCI deployment manifold.	FMC	
4.2	Conduct an inflow test, if annulus is flat, pressure up to look for differential pressures.	TO / FMC	

## **NOTE**

Only an inflow test can now be carried out to assess integrity. If tested through the test ports it could disrupt the seal structure.