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OMAN Land Wellhead Project & Product Overview

Procedure: 9-5/8" x 13-3/8" Hanger Void repair using MS Sealant 02/04

Revision History

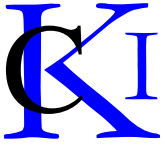
Rev	Date	Description	Author	Checked	Project
01	28/06/2014	Issued for HADCO review	TB		

KCI Reference: OM014SR/PROC01

Rev. No 01

June 2014

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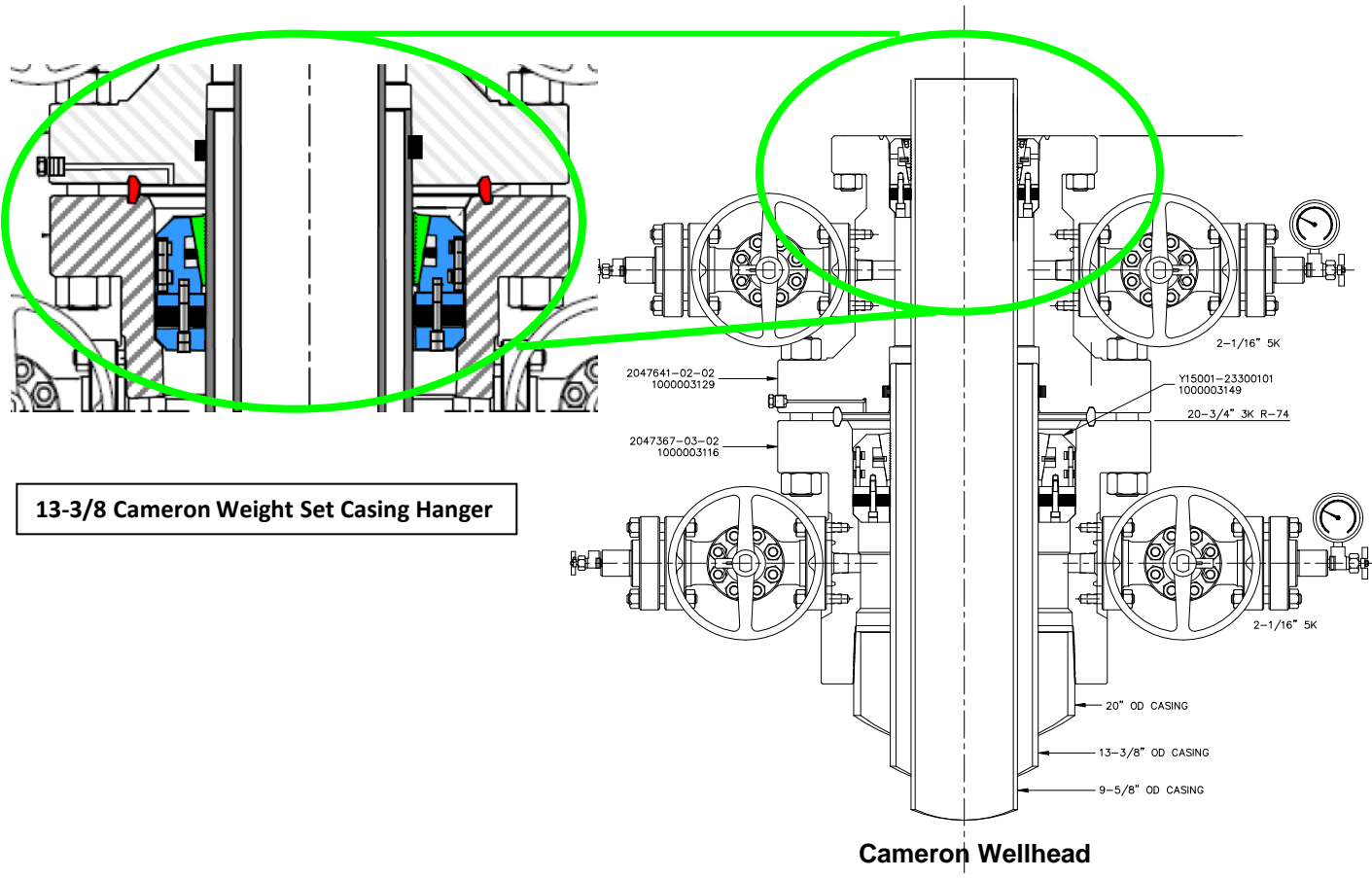
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Y-56 9-5/8" x 13-3/8" B-Annulus CHS void repair

History:

Evaluation report dated 16/04/2014 indicates a failure at the 'B'-Annulus CHS void. There was an initial 1200kPa found in the void when accessed. This was bled off and PBU was monitored for 10mins. The pressure rose to 500kPa over the 10 minutes. Test failed. (In flow tested against 4200kPa in A annulus and 3100 in B).

L-570 is a gas lift well.





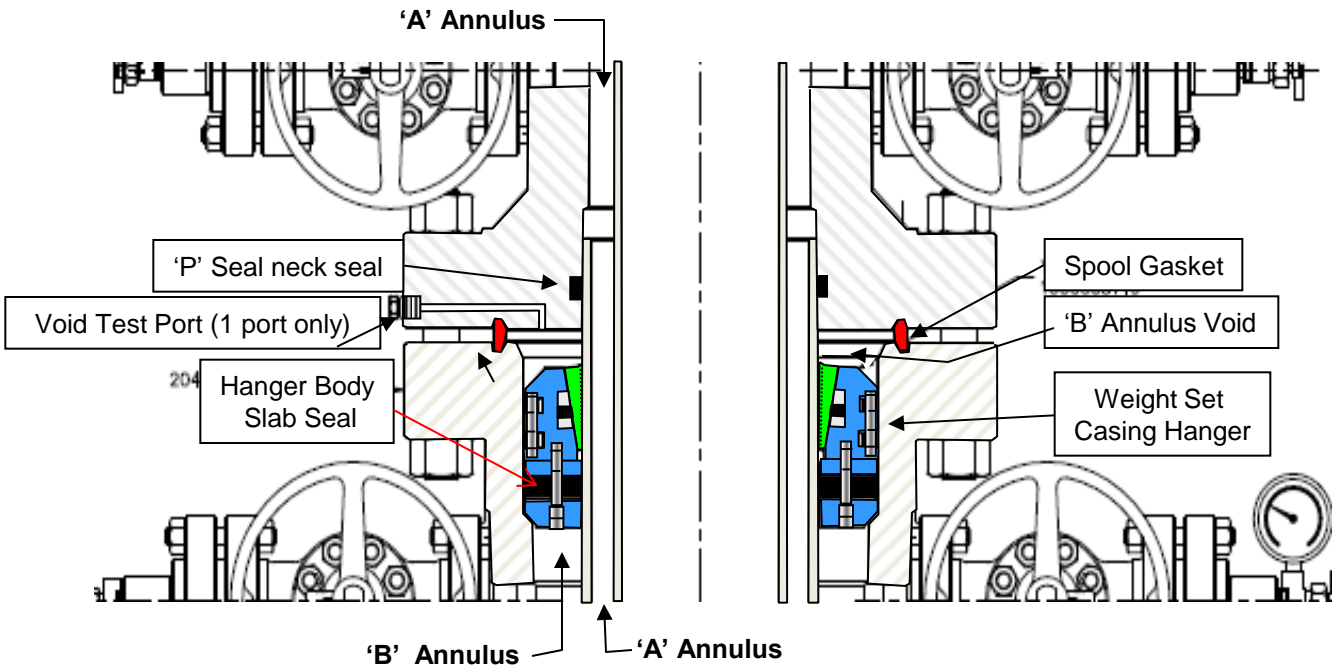
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Objectives:

The casing hanger is weight set supporting the 13-3/8" casing. The void volume is estimated to be 5-7 Litres. Access to the void is through a 1/2" NPT fitting.

The neck seal is a 'P' seal design with plastic packing available.

NOTE: Once sealant has been injected. Inflow testing only.





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Objective:

Retest and evaluate possible leak path.

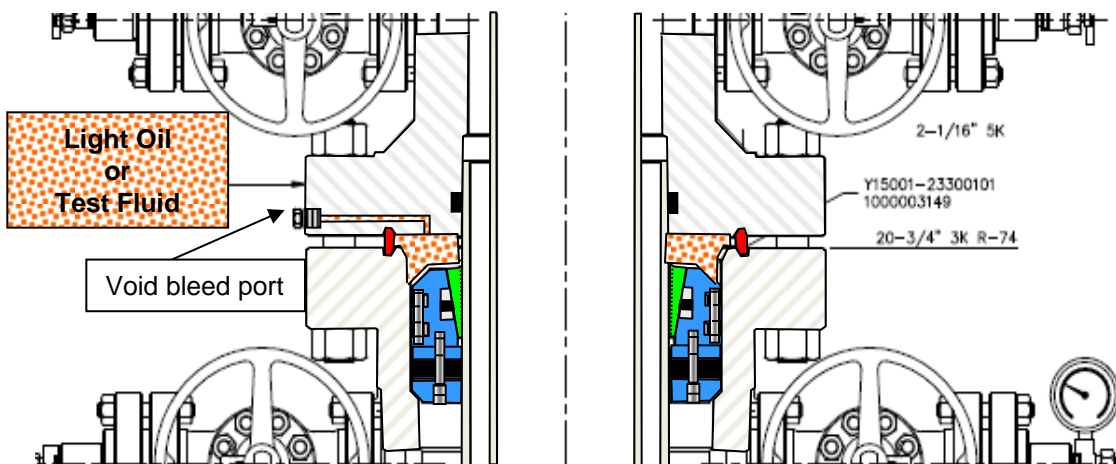
Inject a set volume of MS-Sealant 02/04 into the void to fully fill and ensure the integrity of the hanger slab seal. This will re-instate the void in maintaining standard procedures in support of annual testing.

Note: This will protect the 'B' void seal structure from 'A' annulus fluid/ gas pressure effecting a 2 barrier requirement. Areas to be protected: spool gasket, bleed fittings.

Evaluation:

- Vent and bleed down both 'A, 'B' annuli(If possible)
- Open and vent the void bleed port.
- Inject light oil or test fluid through the void bleed port.
- Apply test pressure through the void bleed port.
- Obtain a PBU (Pressure Build Up) if possible.
- Report findings

Evaluation





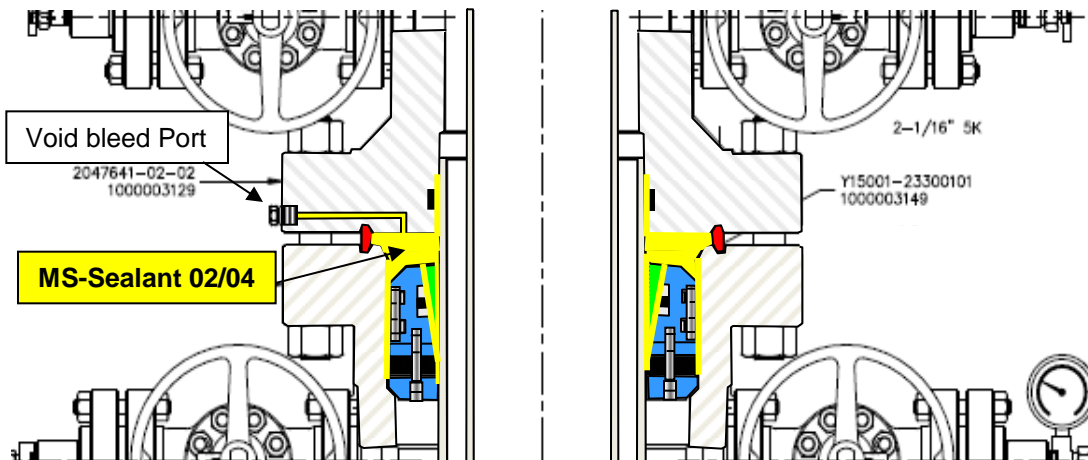
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MS-Sealant Deployment:

- Vent and bleed down both 'A' and 'B' Annulus (If possible)
- Open and vent the void bleed port.
- Mix and Inject 2 Litre of MS-Sealant 02/04 through the void bleed port.
- Continue to inject the MS-Sealant 02/04 until a PBU is present or the whole volume of between 3-5 litres has been injected.
- If a PBU is achieved then allow the sealant to cure under pressure.
- If no PBU can be achieved then remove the injection manifold and allow to cure under no pressure.

Allow 12-24 hours to cure. Leave a sample of the mixed sealant at the wellhead to confirm its condition before testing the hanger void. Test pressure to be confirmed by client.

MS-Sealant 02/04 Deployment





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KCI MS-Sealant - Viscosity
Mixing and Characteristics 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 will come in 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.

Standard setting time is 6-8 hours, however this is subject to temperature and can be as long as 12-24 hours in some cases.

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

Review the information label attached to both compound and activator.

Mixing:

With the leak rate determined the required activator volume can be added. It should be used and mixed in a well ventilated area. KCI will provide a large enough container to support mixing and deploying the sealant.

The activator should be dispensed into the same container as the MS-Sealant O2 compound and continue to stir for approximately 5 minutes to gain a uniformed substance.

Deployment: Subject to viscosity

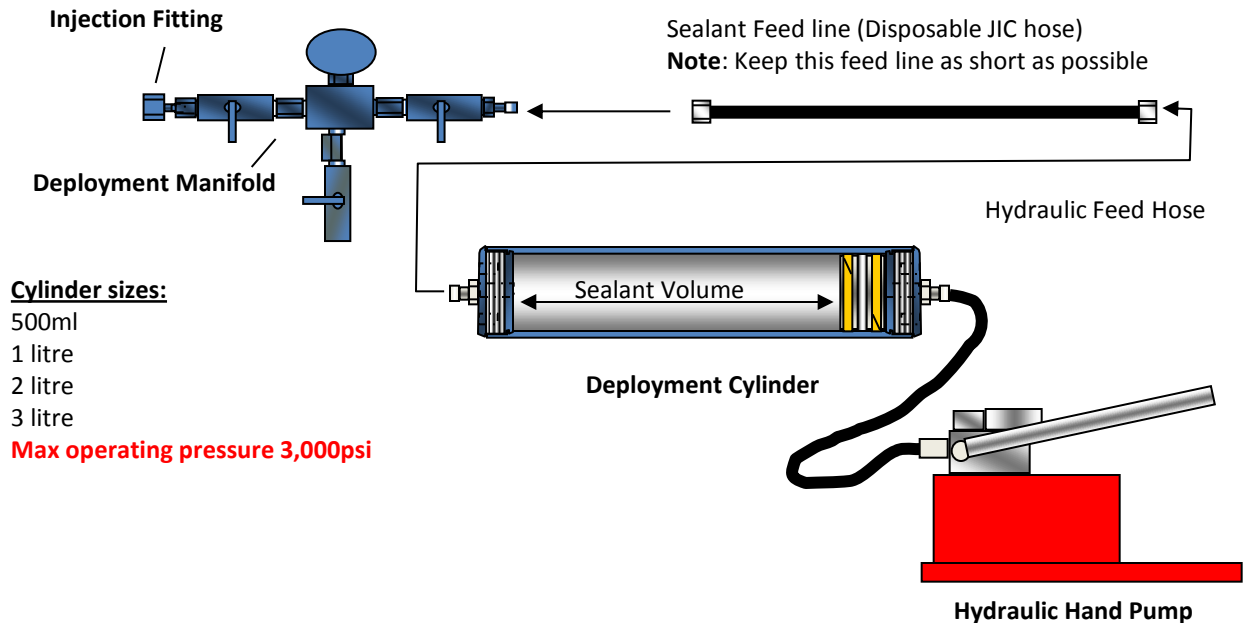
500ml,1,2,3 litre Deployment Cylinder complete with interface fitting, manifold and deployment hose.

Pump the MS-Sealant fluid to displace, purge any air or grease within the feed line and the manifold assembly prior to deployment.



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KCI Mac-Seal and MS-Sealant Deployment Tools



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 and 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 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 activator 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.

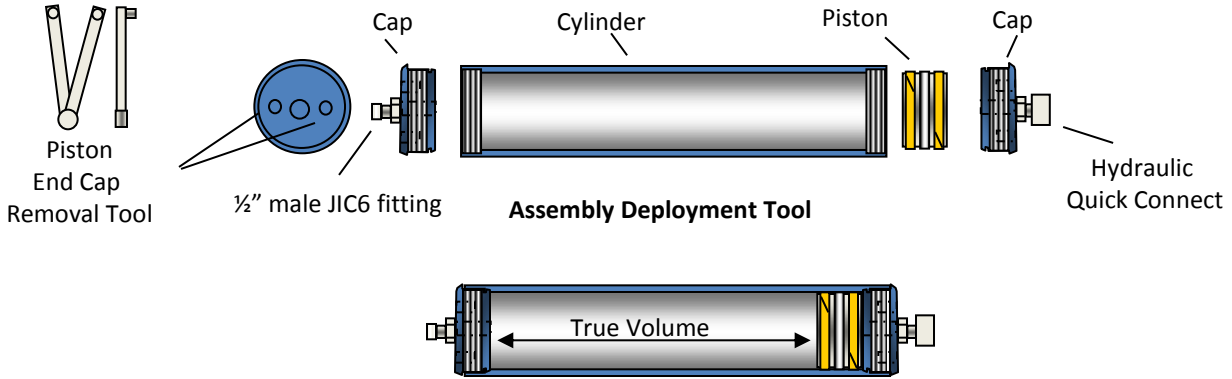
Connect the tool package to the injection port and deploy the sealant in accordance with the application and KCI method procedure..

If any on-going deployment is a part or full cylinder fill, displace any air prior to connecting the cylinder to the feed line.

KCI Mac-Seal and MS-Sealant Deployment Tools

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

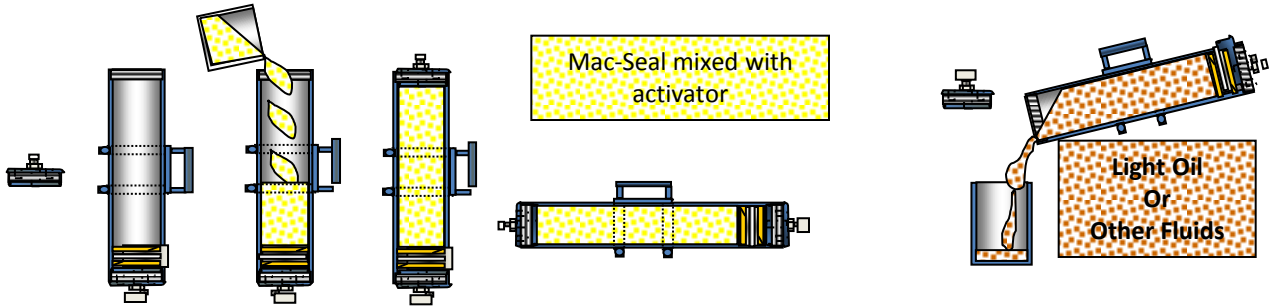
The cylinders have been designed to operate with seawater and range from 250mls, 1,3,and 5 litre deployment volumes. Operating pressure ranges from 3,000 psi and 10,000psi dependant on application.



Mixing Instructions

The Mac-Seal and MS-Sealant are supplied as a two part product containing a compound and a catalyst. The product has been provided with set volumes from 250mls through to 1,3 & 5 litre packs of compound (white) and activator.

Pour the set volume of activator into the compound tub and mix until the sealant is mixed thoroughly. Pour the mixed compound and activator into the cylinder and attach the feed line.



Note:

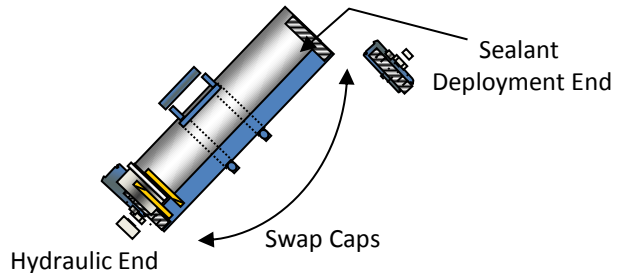
Prepare all cylinders to receive the sealant prior to mixing.

Sealant curing time:

6-8 hours, however this can be as long as 12-24 hours subject to the temperature.

Sealant deployment time:

1/1.5 hours after mixing.



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.

Method Statement

Pre job

Step	Description	Resp	Initials
1.1	Liaise with HADCO, conduct toolbox talk with all parties on work scope requirements. Review KCI Risk Assessment. Travel to Work site.	HAD/KCI	
1.2	KCI personnel to ensure tooling and product is prepared and tested for operations on arrival. Any anomalies to be recorded.	KCI	
1.3	Confirm with HADCO to identify Well and locate porting.	HADCO	

Evaluation

Step	Description	Resp	Initials
2.1	Vent and bleed down both A and B annuli (If possible)	HADCO	
2.2	Open and vent the void bleed port.	HADCO	
2.3	Inject light oil or test fluid through the void bleed port until a PBU (Pressure Build Up) is acquired (If possible).	KCI/HAD	
2.4	Apply test pressure (TBC). Attempt to recreate the test failure.	KCI/HAD	
2.5	Record findings and bleed down pressure.	KCI	



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Repair / Sealant deployment

Step	Repair	Resp	Initials
3.1	Mix 2 Litres of MS-Sealant 02/04 and empty into KCI deployment cylinder.	KCI	
3.2	KCI personnel to rig up sealant deployment tools and attach KCI deployment	KCI	
3.3	<p>Inject MS-Sealant 02/04 into B annulus void until cylinder is empty. Once empty, re-fill the cylinder and commence injection again.</p> <p>Repeat until a PBU is achieved or the approximate void volume of 3-5 litres has been injected.</p> <p>If no PBU can be achieved then remove the injection manifold and allow to cure with no pressure.</p> <p>If a PBU is achieved then allow the sealant to cure under pressure.</p>	KCI	
3.4	<p>Allow 12-24 hours to cure. Leave a sample of the mixed sealant at the wellhead to confirm its condition before testing the B-Annulus hanger void.</p> <p>Test pressure to be confirmed by client. Final tests will be completed after 2 days. NOTE: Once sealant has been injected. Inflow testing only.</p>	KCI/HAD	
3.5	Always leave worksite in a clean and tidy state.	KCI/HAD	