Permanent Gauge Installation SOP	***SOP RM01***
Scope of Work	The following Standard Operating Procedure specifically applies to: Installation of Permanent Downhole Gauge
QHSE References *(Applicable SOP's, Management Plans, Systems & Client / Industry Information)*	▪ Huracan Pre Job Safety Meeting & Induction Record ▪ Permanent Gauge Installation-HSE-LP-JSA ▪ HSE-LP-HSMP ▪ HSE-LP-EnvMP ▪ Current version of Wellsite Permit to Work System
Last Updated	09/16; 03/17, 03/19.
Responsibilities	Wellsite crew to abide be SOP at all times
Specialist Equipment	Pneumatic Installation Unit, Handheld Pneumatic Banding Machine
Associated & Additional Controls Required	▪ *All employees have the right and the responsibility to stop a job if they feel that the job is unsafe or if there is a danger to themselves or any other fellow worker / contractor from the activity or if there is the potential of damage or failure of any equipment or damage to the environment.* ▪ *If an operating company procedure and Service Company procedure do not correspond, then a procedural review shall be undertaken and endorsed by the relevant Supervisor to determine the acceptable way forward. In the absence of the review / endorsement process as above, the operating company procedure shall prevail.* ▪ *All employees, contractors and others engaged to work for or on behalf of Huracan Pty Ltd are responsible for taking 'all practicable steps' to protect their own health and safety and the health and safety of others by complying with the WHS Act 2011 and by adhering to all relevant legislation, company and client/customer safety requirements.*

Any statement in *Bold and Italics* is a critical step and must be carried out as it is written.	
Icon	**Description**
NOTE	*Information to assist in the safe completion of this procedure*
CAUTION	***Insert Cautions points between steps as required.***
HOLD	***Insert hold points between steps as required.***
DANGEROUS GOODS	***Insert Dangerous Goods points where Hazardous Chemicals / Dangerous Goods use occurs***
	Insert Manual Handling points where manual handling is required

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Step No.	**Task Description**	**Photo**
HOLD	**A spotter must be used to direct Huracan Vehicles when interaction between Mobile Plant and Plant & Equipment is 3 metres or less e.g. Rigging Up & Down Operations. The Spotter shall be a suitably competent Huracan worker as designated by the Huracan Crew and will have control of the site / area whilst interaction between plant occurs. The form of communication between all applicable parties shall be established & confirmed by the spotter prior to commencing.**	

1	**Before departing for location:**
	• Confirm tubing install depth then check there is the required meterage on the spool.
	• Check TEC Cable insulation and continuity.
	• Check gauge is as requested by client. Perform function test on gauge and compare to calibrated crystal gauge pressure.
	• Check sufficient cross coupling protectors and bands for installation
	• Check suitable wellhead outlet for rod lock / wellhead.
	• Cable splice
	• You will need an assortment of Swagelok fittings / Fittings for the job (Job Specific):
	  • 1/8” NPTM male to ¼” tubing
	  • 1/4” NPTM male to ¼” tubing
	  • 3/8” NPTM male to ¼” tubing
	  • 1/2” NPTM male to ¼” tubing
	  • 3/4” NPTM male to ¼” tubing
	  • 1” NPTM male to ¼” tubing
	  • ½” NPTM to 1” NPTF Bushes
	  • ½” NPTM to 1” NPTF Bushes
	• Job Specific Tools include:
	  • Shifters, spanners to suit all sizes of pipework
	  • Thread tape
	  • Torque wrench
	  • Pipe bender
	  • Pipe cutter
	  • Crystal gauge
	  • Allen Keys
	  • Pressure test pump and oil	

2	• Report to Client OCR and confirm scope of work has not changed and set depth; • Report to Rig Manager and complete any third-party checklists and inductions • Huracan SSM to provide a copy of relevant documentation (HSEMP, ERP, Inductions as required) as required	
3	Hold toolbox meeting with all applicable parties & discuss job scope including any exclusion zones i.e. from spooling unit to rig floor.	

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4	**Spotting Spooling Unit and Rig Up:** • Huracan spotter to assist driver to reverse any truck into position; • Move TEC cable spooling unit to agreed location on site. • Install bunting / barricading to prevent un-authorised access to rear of spooling unit • Attach sheave to tugger line from rig • Place banding gun, banding material and clips in suitable area on rig floor (be aware of introducing trip hazards) and hook to air supply.	
HOLD	***Install barricading - run barrier tape from the spooling unit to the wellhead to stop unauthorised access.***	
5	**Connect gauge carrier pup joint to completion string** • Drift gauge pup joint with suitable drift • Place pup joint into elevators and stab onto completion • Torque gauge pup joint to completion string	
6	**Installation of the gauge into the gauge carrier** • Lift top sheave with tugger line • Ensure tape around TEC Cable spool so when tension is release it does not back spool • Place TEC cable through sheave • Lift sheave up and out of the way holding TEC cable • Install cablehead onto TEC Cable • Install TEC cable into Gauge, check gauge reading • Install cablehead onto Gauge as per manufacturers instructions • Install next tubing joint onto completion	
7	**RIH with TEC Cable** • Ensure that there is sufficient room between the slips so that TEC cable is not damaged while running in hole. • The first four joints after the gauge must be without back tension on the spooling unit; • After the forth cross coupling protector has been installed then increase air pressure until sufficient back tension is on the TEC cable (equivalent to two people holding back the real)	
HOLD	***Whenever the is preparing to make the next connection by closing the slips to hold the production tubing – it is essential that you hold the TEC Cable in a location that it will not be crushed by the slips as this would render the TEC cable inoperable and requiring total removal and recommencement of installation.***	
8a	**RIH with Banded Cross Coupling Protectors** • Place mat around tubing to protect against drop opbjects into the well • Install cross coupling protectors on each coupling or as per clients specific recommendation by lifting tong out of the way; rig personnel to pull TEC cable against tubing using open hand and pulling it tight against tubing • Huracan personnel to install cross coupling protector and tighten using pneumatic banding machine	
CAUTION	***The FROMM Pneumatic banding machine has the potential to crush fingers so ensure rig personnel are aware that hands are clear of the bands while banding and only open hands and palms are used to pull the TEC cable against the tubing***	

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8b	**RIH with Cannon Cross Coupling Protectors** • Place mat around tubing to protect against drop opbjects into the well • Install cross coupling protectors on each coupling or as per clients specific recommendation by lifting tong out of the way; rig personnel to pull TEC cable against tubing using open hand and pulling it tight against tubing • Use manual clossing tool to close it sufficient to be able to install wedge • Install wedge and secure using pneumatic hammer	
8c	**RIH with Forged Cross Coupling Protectors** • Install cross coupling protectors on each coupling or as per clients specific recommendation by lifting tong out of the way; rig personnel to pull TEC cable against tubing using open hand and pulling it tight against tubing • Huracan personnel to install cross coupling protector and tichten using pneumatic ratchet • Check torque with torque wrench as per manufacturers recommendation	
9	**Installing TEC cable through hanger assembly, landing and installing Rodlock:** • With the production tubing nearing the measured set depth set slips with approx. 5ft of production tubing protruding above rig floor; • Screw hanger onto production tubing; • Confirm all is as it should be and how much extra cap string they would like protruding from the rod-lock when installed (more is better to an extent as it can be cut to suit) • Tape TEC cable on the real to ensure TEC cable does not bird nest • Cut the TEC cable with pipe cutter, • Lower sheave • Take the cut end of the cap-string to the rig floor being cautious thus not to bend or kink the tubing; • Install pass-thru ¼" NPT male to ¼" tubing Swagelok fitting on underside of hanger after removing Allen key, repeat for top side of hanger; • Pass the TEC cable through the hanger from the bottom side up gently, you will need help in doing this as to not excessively kink/bend • Once it's completely fed through the hanger and persons are happy, lock of first the bottom • If there is an access port, install a pressure test fitting and pump fluid until it is seen coming from the top fitting, bleed off and do up the top Swagelok pressure test between the two-compression fittings to client's specifications; • Hanger landing tool to be installed being cautious of the TEC cable • Rig to land hanger and rotate to activate torque anchor in place; • Check gauge is still operational; • Rod-lock to be lifted over in place, while its suspended feed cap-string through side port (1/2" to ¼" bush, ¼" male NPT to ¼" pass-through fitting • Lower rod-lock into place whilst holding TEC cable, once rod-lock is landed on flange tighten up	

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10	**Install Wellhead Outlet:** • Fill void between tubing hanger with fluid • Check gauge is still operational • Install lower section of wellhead outlet by passing TEC cable through and tightening up connection • Pump to fill void and install Swagelok onto TEC cable and tighten • Pressure test as per client recommendation • Compete termination as per Wellhead outlet specific instructions	

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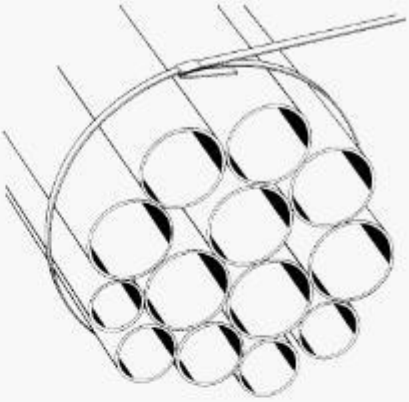
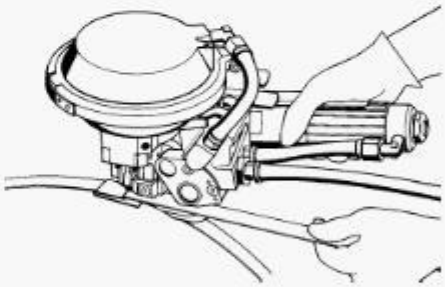
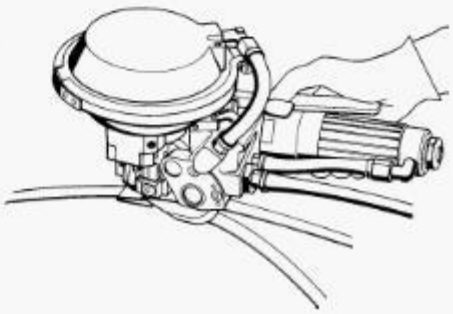
Step No.	**Task Description**	**Photo**
NOTE	FROMM **10 OPERATION** **10.1 Feeding the strap** The strap is fed through the seal, around the package to be strapped and again through the seal. The strap end is then bent. The operator then tensions the loose loop manually making sure that the bent strap end is adjacent to the object to be strapped.  Always wear safety glasses with side shields which conform to ANSI Standard Z87.1.  When handling strap, always wear protective gloves.	
	10.2 Introducing the tool The upper strap is held with the left hand; the right hand lifts the air motor and introduces the tool from the right to the left and from the rear to the front. The air motor is then released.	
	10.3 Tensioning the strap The tension valve lever A48.1232 is pressed down. The lever is caught completely and the strap is tensioned until the air motor stalls. If the cycle has to be interrupted the catch A48.1234 has to be pressed to the left.	

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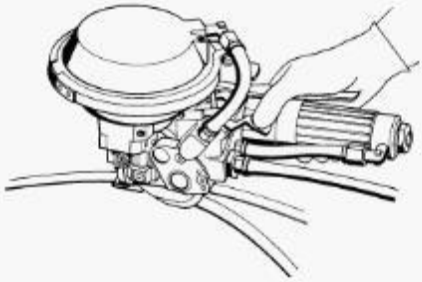
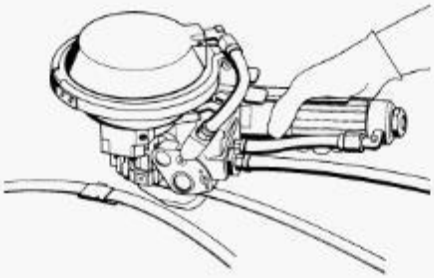
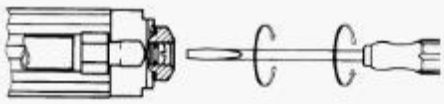
NOTE	**FROMM** **10.4 Sealing the strap** The sealing valve lever A48.1233 is pressed down until the seal is notched and the upper strap sheared; the tensioning process is interrupted automatically. **10.5 Releasing the tool** The tool can be released from the strapping without any further action after completing the strapping cycle. By lifting the air motor the strap end is removed from the tool. **10.6 Tension regulation** The tension is regulated by the continuous adjustment of the throttle screw L2.1412. The air supply is reduced by turning the screw clockwise. The throttle screw is located at the rear end of the air motor.	  

Standard Operating Procedure – *Preparation, Review and Approval*

	Title	Name	Signature	Date
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