REYNOLDS LIFT TECHNOLOGIES

PMM Safety Information Card

CASE #1: BACKSPIN / VSD SERVICE

HAZARDS:

- Fluid column above pump must drain after shutdown causing pump to spin in reverse
- Spinning a PMM generates potentially dangerous voltage

SAFE BACKSPIN PROCEDURE:

1. Stop pump from the VSD; Lock out the VSD following standard Company LO/TO procedure
2. WAIT ADDITIONAL FULL 15 MINUTES for well to drain
3. Don high voltage PPE including: a) 10kV min rated "hot gloves"; and b) CAT II rated arc flash face shield and hood
4. Open junction box and measure phase current with Amp Clamp
5. Once current reads <0.2 Arms, verify by reading voltage
6. Perform "Safe shorting procedure" per Reynolds operations manual and short all 3 phases together with jumper cable

CASE #2: RUN IN HOLE

HAZARDS:

- Sudden movement in derrick may cause pump to spin
- Spinning a PMM generates potentially dangerous voltage

SAFE RUN IN PROCEDURE:

1. Short up-hole end of all 3 phases together inside spooling unit
2. Open motor shipping cap and remove plastic shorting block
3. Technician performing tape-in shall personally verify no hazards exist to cause pump rotation during splice (i.e. no fluid in pump that could drain)
4. Perform standard MLE tape-in splice
5. When necessary to check pump rotation, remove shorting block from spooling unit while wearing 10kV rated "hot gloves" PPE
6. Reinstall shorting block and keep in place during trip in hole

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CASE #3: PULL OUT OF HOLE

HAZARDS:

- Lifting wet string may cause pump rotation when fluid has to drain
- Spinning a PMM generates potentially dangerous voltage

SAFE PULL OUT PROCEDURE:

1. Perform CASE #1 BACKSPIN procedure
2. Once all phases are shorted, attach copper split lug to 4th cable on shorting jumpers
3. Remove Phase "A" from J-Box and insert into split lug position #1
4. Remove Phase "B" from J-Box and insert into split lug position #2
5. Once 2 phases are shorted together system is safe and jumper cables can be removed
6. With split-lug still installed, pull downhole cable out of J-Box and feed into spooling unit
7. Keep phases shorted during entire trip out of hole

CASE #4: CABLE CUT DOWNHOLE

HAZARDS:

- Cable/armor may become compromised on old installation due to corrosion or while fishing a stuck pump
- Shorting cables on surface may not work if cable is cut
- Fluid draining while pulling out may cause pump rotation and potentially dangerous high voltage

SAFE PULL OUT PROCEDURE:

1. Perform CASE #3 POOH procedure and keep surface cable shorted while pulling cable out of the hole
2. Fill well with brine/saltwater well above height of cable cut
3. Saltwater ensures PMM will be shorted at any location with exposed conductors

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