

Field Installation of RFID Tags is possible!



Field Installation of RFID tag for Petrobras in 1998

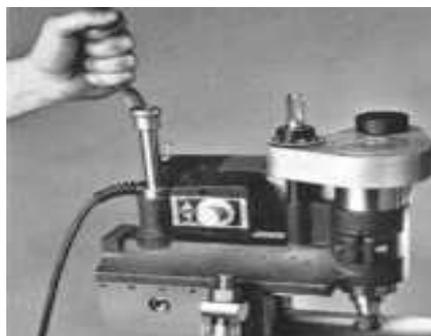
DEN-CON ELECTRONICS “PRINT SYSTEM”

TYPICAL RFID TAG FIELD INSTALLATION PROCEDURES

Preparation prior to the installation of RFID tags into tubular goods is critical to the success of the installation and the performance of the system overall. Make sure that all cutting tools are sharp and free from defects; also, make certain that there is an ample supply of cutting tool cooling fluid prior to beginning the installation process. Compressed air to clean out the newly bored hole will make final installation of the RFID tag/cup and retainer assembly much easier.

In order to install the RFID tag/cup and retainer assembly correctly, the diameter dimension of the hole is critical. If a portable type machine is being used to install the RFID assembly, test holes may be required to assure proper fit. The diameter of the installation hole must fall between .994 and .998. Bit adjustment (grinding of the diameter) may be required. If this dimension is missed, the retainer ring will not be able to retain the RFID tag assembly resulting in possible “lost” tags.

A compact, portable boring mill, available from Den-Con Electronics, works well for field installation of the RFID tag assemblies. Bit adjustments must be calculated for these machines to take into consideration the shaft “run-out”. Generally, a center cut end-mill ground to .900 works well however, as the mill wears, additional adjustments to the bit may be required to achieve an installation hole within the designed specifications. Generally, a fixed mill, in good condition, should not have significant amounts of “run out” on the cutting head and standard bits may be used in order to achieve the specified diameter installation hole. However, it is our suggestion that test holes be bored to check the tolerances of the mounting hole whichever machine is used. The following instructions are primarily for use with a field/portable mill installation.



Portable Mill

Install the .900” fluted center cutting tool into the portable mill collet. Make sure that the cutting tool is inserted far enough into the collet so that the locking screw is

tightened on the milled flat spot on the cutting tool. Tighten the hex slotted set-screw with the provided hex wrench. Be certain that the locking screw is tight.

Place the milling tool on the tool joint or drill collar and connect the attaching chain to the proper connector on the mill base. Leaving enough slack in the mounting chain so the mill can be adjusted to the proper area for milling the installation hole. With the mill sitting on the tubular, move the mill within 1" to 2" of the area to be milled.

Normal installation area on an 18 degree shouldered connection is approximately 1" below the pin connection upset, on drill collars or non-shouldered tubulars, approximately 18" below the pin connection face. This will place the tag below the tong space. Some adjustment may be necessary on collars that have been shortened by repairs or that have been manufactured with zip grooves.

Tighten the nut on the make-up section of the attaching chain vice to secure the mill in the proper position. Care must be taken at this point to ensure that the chain is tightly secured around the tubular. Make sure that all **kinks** in the chain are removed. **Failure to insure that the chain is tight will produce unwanted results and possibly damage to the tubular.** The mill may be adjusted horizontally for precise positioning of the hole to be milled. Once the mill is positioned properly, lock the 4 hex screws on the horizontal traverse plate on the mill base to make the mill more stable during the milling operation.

Prior to turning the power switch on the mill to "ON", make sure that there is an ample amount of milling tool-cooling fluid available. **Failure to cool the milling tool will result in abnormal wear of the tool and shorten its life considerably.** Den-Con recommends recirculated water based cutting oil for this purpose.

With the mill secured "TIGHTLY" to the tubular, start the mill by turning the mill "ON/OFF" switch to the "ON" position. **Do not use the variable speed option on the mill.** Allow the mill to run momentarily. Adjust the vertical feed adjustment until the cutting tool "LIGHTLY" comes into contact with the tubular. When the bit just touches the tubular, adjust the vernier scale knob for vertical measurement to "0". The "0" should point to the arrow on the gear housing when the bit just touches the metal. This vernier scale is calibrated in thousandths of an inch. Therefore, one full turn of the dial will equal .100 of an inch, (onehundred thousandths). In order to drill a hole .625 deep, the dial must return to "0" 6 and 1/4 times. **Do not loose track of the depth of the milling tool during the milling process.** Over drilling the installation hole depth can result in poor RFID tag reads. A visual or mechanical stop on the mill may be incorporated if desired. Hole depths will vary depending on the outside diameter and the maximum wear diameter of the tubular being tagged. **Always position the RFID tag just below the maximum wear diameter of the tubular.**

While boring the hole for the RFID tag, care must be taken not to overload the mill by attempting to remove too much material at once. Mill damage can result if it is

consistently overloaded. Attempting to bore mounting holes too quickly will damage the cutting tool making it less effective by causing premature wear during the drilling process.

Once the hole is plunged into the tubular, retract the cutting tool with the vertical feed screw. Counting the revolutions out of the hole is a good method of checking the total assembly hole depth. Once the mill is removed from the plunge position, it is virtually impossible to reattach the mill in the exact position to deepen a hole. **Be sure of your depth of cut prior to removing the mill.** When the bit is clear of the tubular, remove the mill so the hole can be cleaned with compressed air to remove all cuttings and fluid remaining in the hole. Place the tag into the cup with the beveled side up, then place the cup cover into the cup. Place the tag assembly into the hole. Make sure that the cup assembly is seated completely into the hole. The cup assembly should fit into the hole without having to apply force to it. Once the tag assembly is installed, place the stainless steel retainer, prongs up, into the hole and seat the retainer against the tag assembly. The retainer must be seated squarely on top of the tag assembly. A 1.00" dowel works well for this operation.

During a typical installation, approximately 25 - 30 joints of tubular can be drilled before the bit shows signs of wear. A worn bit, aside from not penetrating the metal easily, will squeak when it becomes dull. If a bit is not replaced when it becomes dull, the installation holes will be milled undersize and ragged causing possible poor fit of the tag/cup assembly and retaining ring, resulting in possible "lost" tags.

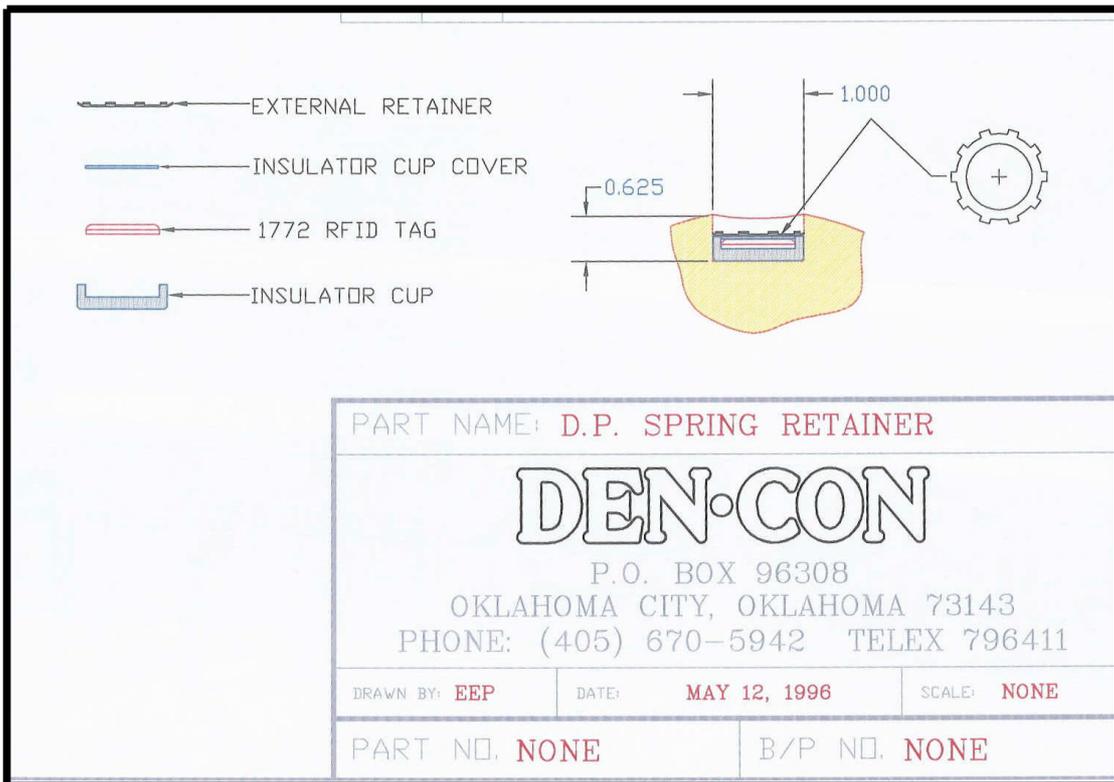
The average milling time per joint may vary. During past installations, a tubular has been totally machined, tags mounted and retainers installed in 3 - 4 minutes. Experience will increase the speed of installation.

Once all RFID installations have been completed, scan and record required data for each item and download the data into the database being used to begin the tracking/identification processes.



Tag Installation sequence

Installation Cup
 RFID Tag
 Installation Cup Cover
 Stainless Steel External Retaining Ring



If there are additional questions regarding the installation of our products, correspondence may be addressed to:

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