Keyhole Technology

Cathodic Protection Maintenance

Installation of anodes and test station wires

PROCESS DESIGN

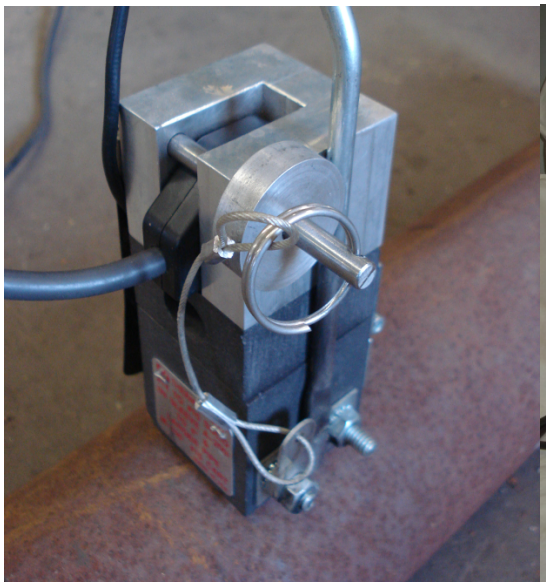
All Tellus procedures and tooling have been designed and developed to employ innovative methods and specialized equipment for the performance of standard maintenance processes through core cut openings (18" diameter) in the road surface or pavement.

PROCESS INTEGRITY

A high level of process integrity can only be achieved through analysis and understanding the failure modes and hazards that may exist. Tellus Underground Technology works closely with the LDC's and their contractors to develop standard operating procedures and tool sets that are designed to address and resolve those unexpected situations in which events do not progress as expected.

OPERATING COST SAVINGS

When the costs of "Keyhole" procedures are compared to conventional methods operating costs are significantly reduced. The elimination of street restoration costs along with labor cost savings have resulted in operating cost reductions of as much as 50%.



The attachment of cathodic protection anodes and test station wires is performed using a brazing process known as thermo-welding. The tooling package for this procedure includes a graphite furnace that is used to fire or heat the braze material into a molten mass then allow it to flow down through the mold and onto the gas main while encapsulating the anode wire or test station wire in the same molten mass. As one may expect, a thorough cleaning of the area where the wire is to be attached is critical to the success of this procedure.

The procedure begins by preparing the main using a pneumatic extension angle grinder fitted with a "Scotch-brite" or wire wheel to remove rust scale or the corrosion protection material that covers the area where the wire is to be attached. Selection of the appropriate wheel to prepare the main for attachment of the wire is extremely important to the success of this procedure. Selection of a wheel that is too aggressive will lead to gouging the main, resulting in permanent damage while ineffective cleaning of the main will result in a lack adhesion of the braze material.

After the anode wire or test wire have been successfully attached to the main a corrosion patch must be installed over the newly exposed section of the main to protect it from future corrosion. The tooling provided for this step of the procedure must give the gas mechanic the ability to achieve a complete seal over the previously prepared area especially in the area around where the anode wire exits the patch. When installing an anode the operator completes this procedure by placing the anode at a point that is off to the side and below the level on the main.

Tooling Description and

TECHNICAL SUPPORT

We work with your operating crews and contractors to insure that they fully understand every detail of the keyhole process. We also work with your technicians and procurement staff to insure that all of your operating standards are fully satisfied.

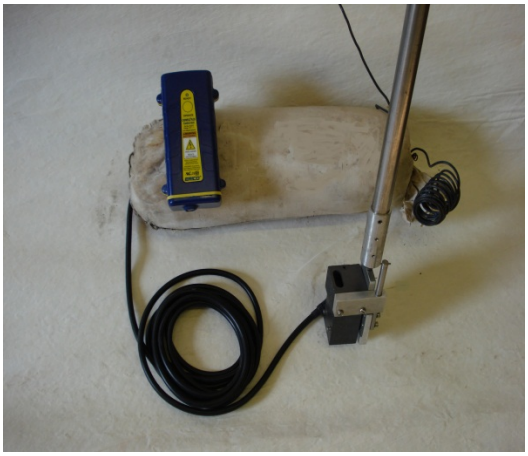
SUPERIOR QUALITY

Tellus tools are professional quality tools designed for use by utility professionals. These tools are designed to exceed all of the demands of the underground gas distribution industry.

STATE OF THE ART TECHNOLOGY

The Tellus organization is constantly and consistently engaged in R&D and product development efforts. We are also in constant contact with gas utility industry equipment and hardware suppliers to insure that the latest developments will be applied to all new procedures and keyhole devices.

For more information on any of our products or services please visit us on the Web at: www.tellusunderground.com



The keyhole tooling utilized to attach anodes and test wires to the gas main include a pneumatic grinder and a furnace/firing controller device that provides placement of the anode wire or test wire in the braze material.

There are two suppliers of brazing controller/furnace systems each of which utilize their own unique controller and furnace. There are also a number of corrosion protection patching materials and methods available. The Tellus staff will offer assistance in selecting the brazing and corrosion protection system that best suits the customer's specific criteria.

The pneumatic grinder/sander can be fitted with an abrasive type or wire brush type of surface preparation wheel. Selection assistance is also available for the customer's pipe coating or surface finish.

All Tellus processes are supported by a flow chart and a step by step operating procedure. Just as in any scientific or medical procedure each step must be performed exactly as designed and in the prescribed sequence to achieve repeatable and successful results. When well-designed tools are utilized in a thoughtfully-designed procedure the operating gas mechanics can always expect professional results.

Tool Requirements

Tool Description	Tellus P/N
Pneumatic extension sander/grinder	CPS-1410
¼" Hex drive	HEX-1011
Cadweld process:	
Cadweld furnace holder, ¼" Hex drive	CPS-1411
Cadweld control unit w/15 ft. lead	CPS-1416
Cadweld furnace/furnace assembly Cadweld)	CPS-1412
Thermoweld process:	
Thermoweld battery pack	CPS-1407
Thermoweld furnace holder	CPS-1405
Patch installation tools:	
Roylson patch installation tool	CPS-1418
Patch installation tool, ¼" Hex drive	CPS-1408
Patch smoothing bar, ¼" Hex drive	CPS-1409

SERVICES AVAILABLE

Technical Support
Setup and Training
Tool Maintenance Support
Procedure Mapping
Special Application Design

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