



Corrosion Rings and Coupons

180 Series

Instruction Manual

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Ver. 5

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Introduction

The placement of corrosion test rings in the drill string is routinely used to evaluate the corrosiveness of the drilling fluid environment on the drill string and other steel parts. Removal and examination of these rings after a period of exposure can be highly informative as to the corrosiveness of the drilling fluid and the type of corrosion encountered. A close examination of the scales and pits on the exposed rings will aid in choosing the proper remedial action.

In a laboratory setting, corrosion coupons are more common. These are placed into special corrosion test cells and pressurized and/or heated while aging. Instructions for installing corrosion coupons will be included with the corrosion cell. The procedure for calculating corrosion rate is the same for rings and coupons.

Corrosion rings are made from AISI 4130 cold drawn seamless mechanical tubing similar to drill pipe. Coupons are made from cold rolled steel.

Components

Corrosion Coupons:

- #180-08 Rod Coupon; 4½" × ¼" Diameter
- #180-10 Scale Coupon; 1" × 3" × ⅛" (with Holes)
- #180-12 Corrosion Coupon; 1" × 3" × ⅛"
- #180-34 Corrosion Coupon; ¾" × 3" × ⅛"

Holders:

- #180-00 Coupon Holder for Flat Coupon; 1" NPT
- #180-02 Coupon Holder for Flat Coupon; 2" NPT
- #180-04 Nylon Grommet; Package of 10
- #180-06 Coupon Holder for Rod Coupon; 2" NPT

Part #	Drill Pipe Size and Type	K-Factor	Ring Dimensions
#180-14	2.875" Internal Flush and 3.500" Slim Hole	394	2.425" OD; 2.125" ID
#180-16	3.500" Extra Hole and 3.500" Full Hole	357	2.685" OD; 2.405" ID
#180-18	3.500" Internal Flush and 3.500" Full Hole	337	2.965" OD; 2.435" ID
#180-19	2 3/8" PAC	1150	1.575" OD; 1.387" ID
#180-20	4.000" Full Hole	256	3.156" OD; 2.82" ID
#180-22	4.000" Internal Flush and 4.500" Extra Hole	250	3.703" OD; 3.227" ID
#180-24	4.500" Full Hole and 4.500" Extra Hole and 4.000" Internal Flush	207	3.500" OD; 3.00" ID
#180-26	4.500" Internal Flush and 5" Extra Hole	253	4.185" OD; 3.749" ID
#180-28	5.563", 5.500" API Regular or Full Hole and 6.625" API Regular	134	4.590" OD; 4.004" ID
#180-30	4.500" Extra Hole	184	3.805" OD; 3.399" ID
#180-32	5" Extra Hole Tool Joint	179.12	4.185" OD; 3.745" ID

Procedure



1. Place the corrosion ring into the tool joint in the drill string. Allow the ring to be exposed to the drilling fluid for at least 40 hours. A typical test time is 100 hours.

For corrosion coupons, refer to the instruction manual provided with the aging cell being used.

Always wear clean, dry gloves when handling corrosion rings or coupons. Do not remove them from the protective packing until you are ready to begin the test.



2. Carefully remove the ring from the tool joint. Immediately wipe the ring with a clean cloth to remove any drilling fluid residue.
3. Carefully examine the ring. Note any severe corrosion or mechanical damage on the mailing envelope.

Severe mechanical damage will invalidate the test. Cuts or dents on the outer surface indicates considerable movement within the toolbox recess and should be noted in the report.



If severe corrosion is evident, the cause of the corrosion should be determined promptly and remedial action taken immediately.

4. Thoroughly dry the ring and place it in the corrosion-inhibiting wrapper and then in the original shipping envelope. Each envelope and ring are marked by a corresponding serial number.
5. The ring should be thoroughly cleaned and weighed to the nearest milligram as soon as possible to avoid further corrosion.

If the ring is not reweighed on-site, ship the envelope via overnight or second day air to OFITE. Be sure all the requested information on the envelope is filled in along with a contact name and phone number and ship it to:

OFI Testing Equipment
11302 Steeplecrest Dr.
Houston, Texas 77065 (USA)
Attn: Repair Department

OFITE will clean and weigh the ring to determine the weight loss. The corrosion weight is then calculated in pounds per square foot per year, kilograms per square meter per year, or in mils per year (metal loss in thousandths of an inch per year). A nominal fee is charged for this service.



It should be noted that the loss of metal is due to both corrosive and erosive effects of the drilling fluid, since the bore of the ring is exposed to the fluid pumped down the drill string. Loss from erosion may be substantial when the drilling fluid contains a high concentration of sand or abrasive material.

Calculations

The difference between the initial and final weight of the corrosion ring or coupon is attributed to corrosion. The corrosion rate is calculated and reported as lb/ft²/year or mils per year (mpy). The term “mils per year” refers to the loss of metal in thousandths of an inch per year.

Corrosion rings and coupons are supplied with a corresponding K factor. The K factor is a constant that takes into account the exposed surface area and density of the ring. It is provided to make calculations easier.

$$\text{Corrosion Rate (lb/ft}^2\text{/year)} = \frac{\text{Weight Loss (g)}}{\text{Exposure Time (hours)}} \times K$$

$$\text{Corrosion Rate (mpy)} = \text{lb/ft}^2\text{/year} \times 24.62$$

A corrosion rate of 2 lb/ft²/year or 50 mpy or less is usually considered acceptable. However, this may vary with individual conditions.

Warranty and Return Policy

Warranty:

OFI Testing Equipment, Inc. (OFITE) warrants that the products shall be free from liens and defects in title, and shall conform in all respects to the terms of the sales order and the specifications applicable to the products. All products shall be furnished subject to OFITE's standard manufacturing variations and practices. Unless the warranty period is otherwise extended in writing, the following warranty shall apply: if, at any time prior to twelve (12) months from the date of invoice, the products, or any part thereof, do not conform to these warranties or to the specifications applicable thereto, and OFITE is so notified in writing upon discovery, OFITE shall promptly repair or replace the defective products. Notwithstanding the foregoing, OFITE's warranty obligations shall not extend to any use by the buyer of the products in conditions more severe than OFITE's recommendations, nor to any defects which were visually observable by the buyer but which are not promptly brought to OFITE's attention.

In the event that the buyer has purchased installation and commissioning services on applicable products, the above warranty shall extend for an additional period of twelve (12) months from the date of the original warranty expiration for such products.

In the event that OFITE is requested to provide customized research and development for the buyer, OFITE shall use its best efforts but makes no guarantees to the buyer that any products will be provided.

OFITE makes no other warranties or guarantees to the buyer, either express or implied, and the warranties provided in this clause shall be exclusive of any other warranties including ANY IMPLIED OR STATUTORY WARRANTIES OF FITNESS FOR PURPOSE, MERCHANTABILITY, AND OTHER STATUTORY REMEDIES WHICH ARE WAIVED.

This limited warranty does not cover any losses or damages that occur as a result of:

- Improper installation or maintenance of the products
- Misuse
- Neglect
- Adjustment by non-authorized sources
- Improper environment
- Excessive or inadequate heating or air conditioning or electrical power failures, surges, or other irregularities
- Equipment, products, or material not manufactured by OFITE
- Firmware or hardware that have been modified or altered by a third party
- Consumable parts (bearings, accessories, etc.)

Returns and Repairs:

Items being returned must be carefully packaged to prevent damage in shipment and insured against possible damage or loss. OFITE will not be responsible for equipment damaged due to insufficient packaging.

Any non-defective items returned to OFITE within ninety (90) days of invoice are subject to a 15% restocking fee. Items returned must be received by OFITE in original condition for it to be accepted. Reagents and special order items will not be accepted for return or refund.

OFITE employs experienced personnel to service and repair equipment manufactured by us, as well as other companies. To help expedite the repair process, please include a repair form with all equipment sent to OFITE for repair. Be sure to include your name, company name, phone number, email address, detailed description of work to be done, purchase order number, and a shipping address for returning the equipment. All repairs performed as "repair as needed" are subject to the ninety (90) day limited warranty. All "Certified Repairs" are subject to the twelve (12) month limited warranty.

Returns and potential warranty repairs require a Return Material Authorization (RMA) number. An RMA form is available from your sales or service representative.

Please ship all equipment (with the RMA number for returns or warranty repairs) to the following address:

OFI Testing Equipment, Inc.
Attn: Repair Department
11302 Steeplecrest Dr.
Houston, TX 77065
USA

OFITE also offers competitive service contracts for repairing and/or maintaining your lab equipment, including equipment from other manufacturers. For more information about our technical support and repair services, please contact techservice@ofite.com.