

COMPUTER SOFTWARE
Well casing potential profile (WCPP)

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Well Casing Potential Profile (WCPP)

Electrical potential is the most important factor in cathodic protection in determining the degree of protection required by a buried or submerged metal structure. The necessary degree of protection is indicated by the potential difference measured against a reference electrode placed in the surrounding medium.

The most commonly used reference electrode is the saturated copper/copper sulphate (Cu/CuSO₄) electrode. Potential differences of at least -0.85 V / Cu/CuSO₄ are widely accepted as standard for the protection of steel in soil or water. The potential difference should be measured with the reference electrode placed as near as possible to the structure to minimise voltage drop (IR) errors caused by cathodic protection current flowing through the medium.

A well casing is physically and electrically similar to a vertically installed pipeline. The decrease of current and voltage with distance from the drain point of the cathodic protection station is like that along bare pipeline.

However, the cathodic protection test methods applicable to pipelines are not suitable to well casings. Whereas test leads can be installed at any point on most pipelines to measure potentials and currents, such measurements on well casings can only be carried out at the well head.

We have developed WCPP, a specialist software package for well casing potential profile calculation.

The software factors in the physical data of the well casings and electrical measurement of potentials and currents at the well head, allows calculation of potentials and currents at other points along the depth of the casing.

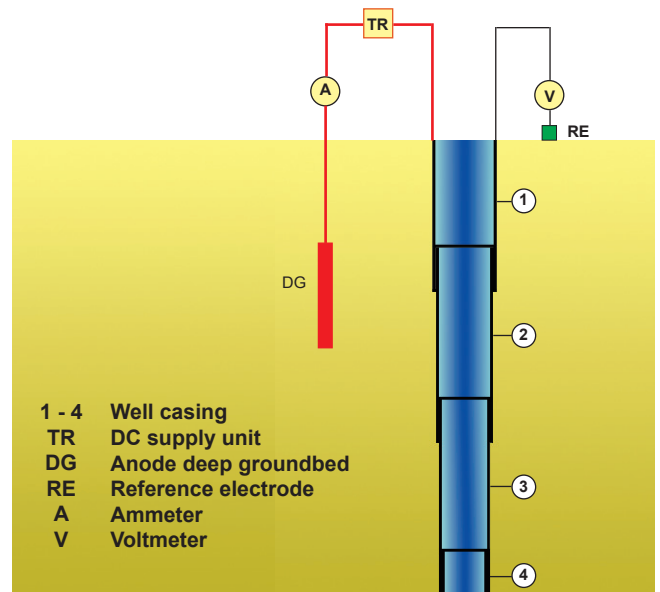
Variables which can be used are as follows:

Physical

- number of casings : n
- length of casings : L
- diameters of casings : D
- specific weight of casings : W

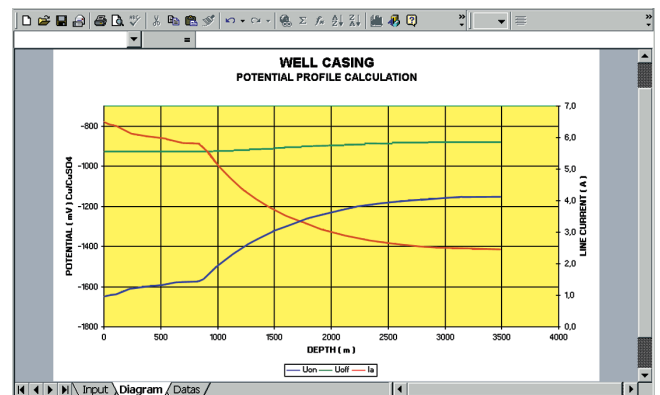
Electrical variables measured at the wellhead

- natural potential : E_n
- ON potential : E_{on}
- OFF potential : E_{off}
- drain current : I_d



| WELL CASINGS | | | | | | | |
|--------------------------------------|------------------|------------------|--|--------------------------|--------------|----------------|--|
| POTENTIAL PROFILE CALCULATION | | | | | | | |
| PHYSICAL DATA | | | | | | | |
| CUSTOMER | AGCOO | | | | | | |
| PROJECT No. | CT 24-00-1E | | | | | | |
| SITE | NAFOORA | | | | | | |
| LOCATION | GOSP 3 | | | | | | |
| DATE | 12.03.1992 | | | | | | |
| WELL-No. | C 116 | | | | | | |
| DATA TAKEN BY | Taofeg | | | | | | |
| PHYSICAL DATA | | | | | | | |
| TYPE OF CASING | CASING No. | LENGTH OF CASING | INNER DIAMETER OF CASING | WALL THICKNESS OF CASING | rho | rs | |
| Inner Casing | 1 | 3500 m | 150 mm | 9.00 mm | 0.2573 Ohm*m | 5.72E-05 Ohm/m | |
| Outer Casing | 2 | 850 m | 250 mm | 8.00 mm | 0.1992 Ohm*m | 3.07E-05 Ohm/m | |
| Outer Casing | 3 | 500 m | 300 mm | 7.00 mm | 0.2000 Ohm*m | 2.95E-05 Ohm/m | |
| Outer Casing | 4 | 100 m | 320 mm | 6.00 mm | 0.2000 Ohm*m | 3.25E-05 Ohm/m | |
| ELECTRICAL DATA (taken at well head) | | | | | | | |
| NATURAL POTENTIAL | U _n | -620 mV | against Cu/CuSO ₄ electrode | | | | |
| ON-POTENTIAL | U _{on} | -1650 mV | against Cu/CuSO ₄ electrode | | | | |
| OFF-POTENTIAL | U _{off} | -928 mV | against Cu/CuSO ₄ electrode | | | | |
| DRAIN CURRENT | I _d | 6.5 A | against Cu/CuSO ₄ electrode | | | | |

Input Menu



Potential Profile Diagram

Potential Output Data can be printed or displayed on screen.