

COMPUTER SOFTWARE

Well casing potential profile (WCPP)

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German Cathodic Protection



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/CuSO_4) electrode. Potential differences of at least $-0.85 \text{ V} / \text{Cu}/\text{CuSO}_4$ 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.

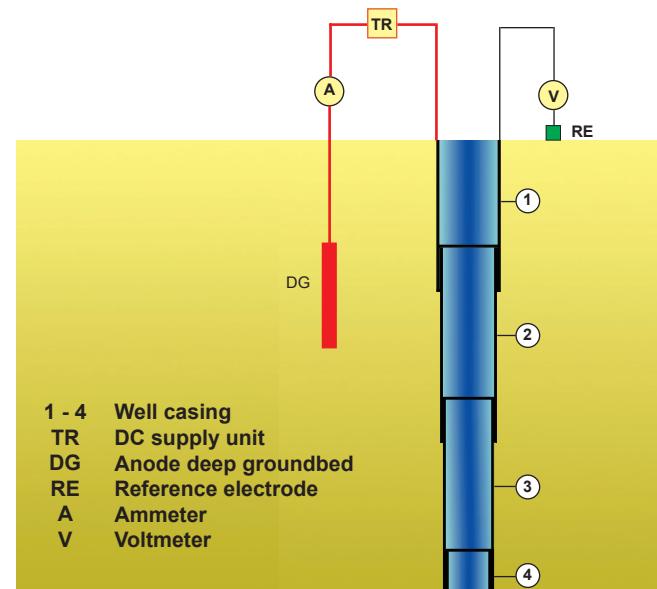
Variables which can be used are as follows:

Physical

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

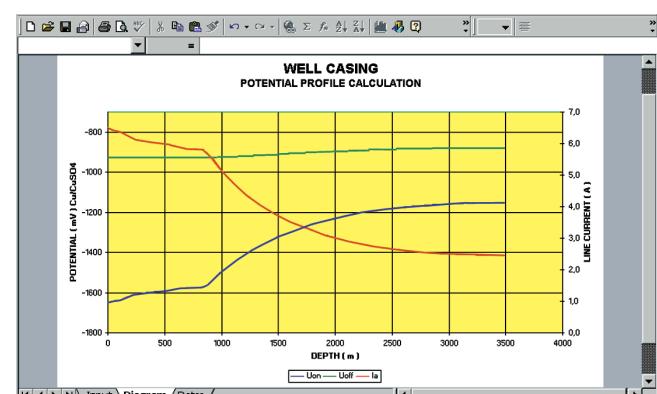
Electrical variables measured at the wellhead

natural potential	: E nat
ON potential	: E on
OFF potential	: E off
drain current	: I



WELL CASINGS							
POTENTIAL PROFILE CALCULATION							
PHYSICAL DATA							
6 CUSTOMER	AGOOCO						
7 PROJECT No.	CT 24-00-1						
8 SITE	NAFOORA						
9 LOCATION	GOSP 3						
10							
11 DATE	12.03.1992						
12 WELL-No.	C 116						
13 DATA TAKEN BY	TaoFeg						
14							
16							
PHYSICAL DATA							
17 TYPE OF CASING	CASING No.	LENGTH OF CASING	INNER DIAMETER OF CASING	WALL THICKNESS OF CASING	ρ	r_s	
18 Inner Casing	1	3500 m	150 mm	9.00 mm	0.2573 Ohm·m	5.72E-05 Ohmmf	
19 Outer Casing	2	850 m	250 mm	8.00 mm	0.1992 Ohm·m	3.07E-05 Ohmmf	
20 Outer Casing	3	500 m	300 mm	7.00 mm	0.2000 Ohm·m	2.96E-05 Ohmmf	
21 Outer Casing	4	100 m	320 mm	6.00 mm	0.2000 Ohm·m	3.25E-05 Ohmmf	
22							
23							
24							
ELECTRICAL DATA (taken at well head)							
26 NATURAL POTENTIAL	U _{ln}	-820 mV	against Cu/CuSO ₄ electrode				
27 ON-POTENTIAL	U _{on}	-1650 mV	against Cu/CuSO ₄ electrode				
28 OFF-POTENTIAL	U _{off}	-928 mV	against Cu/CuSO ₄ electrode				
30 DRAIN CURRENT	I _d	6.5 A					
31							

Input Menu



Potential Profile Diagram

Potential Output Data

can be printed or displayed on screen.