

DIN EN 15280:2013-12 (E)

Evaluation of a.c. corrosion likelihood of buried pipelines applicable to cathodically protected pipelines

Contents		Page
Foreword		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Cathodic protection personnel competence	8
5	Assessment of the a.c. influence	9
5.1	General	9
5.2	Assessment of the level of interference	9
6	Evaluation of the likelihood of a.c. corrosion	10
6.1	Prerequisite	10
6.1.1	General	10
6.1.2	A.c. voltage on the structure	10
6.2	A.c. and d.c. current density	11
6.2.1	General	11
6.2.2	A.c. current density	11
6.2.3	High cathodic d.c. current density	11
6.2.4	Low cathodic d.c. current density	11
6.2.5	Current ratio "I _{a.c.} /I _{d.c.} "	12
6.2.6	Soil resistivity	12
6.3	Corrosion rate	12
6.4	Pipeline coatings	12
6.5	Evaluation of the metal loss	12
7	Acceptable interference levels	12
8	Measurement techniques	13
8.1	Measurements	13
8.1.1	General	13
8.1.2	Selection of test sites	13
8.1.3	Selection of measurement parameter	14
8.1.4	Sampling rate for the recording of interference levels	14
8.1.5	Accuracy of measuring equipment	14
8.1.6	Installation of coupons or probes to calculate current densities	14
8.2	D.c. potential measurements	14
8.3	A.c. voltage measurements	15
8.4	Measurements on coupons and probes	15
8.4.1	Installation of coupons or probes	15
8.4.2	Current measurements	15
8.4.3	Corrosion rate measurements	16
8.5	Pipeline metal loss techniques	17
9	Mitigation measures	17
9.1	General	17
9.2	Construction measures	17
9.2.1	Modification of bedding material	17

9.2.2	Installation of isolating joints	17
9.2.3	Installation of mitigation wires	17
9.2.4	Optimisation of pipeline and/or powerline route	18
9.2.5	Power line or pipeline construction	18
9.3	Operation measures	18
9.3.1	Earthing	18
9.3.2	Adjustment of cathodic protection level	19
9.3.3	Repair of coating defects	19
10	Commissioning	19
10.1	Commissioning	19
10.2	Preliminary checking	20
10.2.1	General	20
10.2.2	Start up	20
10.2.3	Verification of effectiveness	21
10.2.4	Installation and commissioning documents	21
11	Monitoring and maintenance	21
Annex A (informative) Simplified description of the a.c. corrosion phenomenon		23
A.1	Cathodically protected pipeline	23
A.2	Cathodically protected pipeline with a.c. voltage	23
A.2.1	Description of the phenomena	23
A.2.2	Reduction of the a.c. corrosion rate	24
Annex B (informative) Coupons and probes		25
B.1	Use and sizes of coupons and probes	25
B.1.1	Use of coupons or probes	25
B.1.2	Sizes of coupons or probes	25
B.2	Installation of buried coupons and probes	25
B.2.1	General	25
B.2.2	Before installing the coupon or probe	25
B.2.3	Installation of the buried coupon or probe	26
B.3	ER probes principles	27
B.3.1	Assessment of the corrosion using the electrical resistance (ER) probe technique	27
B.3.2	ER probe application in the field	29
B.4	Perforation probes	29
Annex C (informative) Coulometric oxidation		31
Annex D (informative) Influence of soil characteristics on the a.c. corrosion process		32
D.1	Influence of electrical parameters	32
D.2	Influence of the electrochemical process	32
D.3	Influence of alkaline ions and cations	32
Annex E (informative) Other criteria that have been used in the presence of a.c. influence		33
E.1	General	33
E.2	ON-potential approach	33
E.2.1	General	33
E.2.2	More negative (Eon) cathodic protection level	33
E.2.3	Less negative (Eon) cathodic protection level	33
E.2.4	Criteria	34
Annex F (informative) Parameters to take into account to choose a d.c. decoupling device		36
F.1	General aspects to be taken into account	36
F.2	Electrical parameters	36

Annex G (informative) Method to determine the reference electrode location to remote earth37
Bibliography38