DIN EN 12954:2020-02 (E)

General principles of cathodic protect ion of buried or immersed onshore metallic structures

Contents

Page

European foreword 4

Introduction 5

1 Scope 6

2 Normative references 6

3 Terms and definitions 7

4 Abbreviations and symbols 13

5 Cathodic protection personnel competence 13

6 Principles and criteria of cathodic protection 14
6.1 Principles of cathodic protection 14
6.2 Cathodic protection criteria 14

Table 1 -- Free corrosion potentials, protection potentials and limiting critical potentials of common metallic materials in soils and waters (except seawater and brackish water) measured against CSE 15
6.3 Alternative method 16
6.3.1 100 mV cathodic potential shift 16
6.3.2 Other methods 17
6.4 Criteria in presence of a.c 17

7 Prerequisites for application of cathodic protection 17
7.1 General 17
7.2 Electrical continuity 17
7.3 Electrical isolation 17
7.4 External coating 18

8 Useful data and design considerations 18
8.1 General 18
8.2 Structure details 19
8.3 Service conditions 19

9 Design 20
9.1 General 20
9.2 Design lifetime 20
9.3 Adjacent structures and external electrical sources 20
9.4 Electrical continuity/discontinuity 20
9.5 Protective coatings 21
9.6 Current demand 21
9.7 Galvanic anode systems 22
9.7.1 General considerations 22
9.7.2 Utilization of galvanic anode systems 22
9.7.3 Design of a galvanic anode system 22
9.7.4 Technical considerations and data for the design of a galvanic protection system 23

Table 2 -- Typical chemical compositions of the alloys used for zinc anodes 24

Table 3 -- Typical electrochemical parameters for zinc anodes used in soils 25

Table 4 -- Typical chemical compositions of the alloys used for magnesium anodes 25

Table 5 -- Typical electrochemical parameters for magnesium anodes used in soils 26

Figure 1 -- Current capacity of magnesium alloy versus current density [9] 27
9.8 A.C. and/or d.c. decoupling devices 28
9.9 Impressed current cathodic protection (ICCP) system 28
9.10 Monitoring 29
9.11 Cable 29
9.12 Impressed current groundbeds 30

10 Installation of cathodic protection systems 31

11 Commissioning 31
11.1 General 31
11.2 Preliminary checking 31
11.3 Start-up 32
11.4 Assessment of the cathodic protection effectiveness 32
11.5 Documentations 33

12 Monitoring, inspection and maintenance 33
12.1 General 33
12.2 Monitoring 34
12.3 Inspection 35
12.4 Maintenance 35

Annex A (informative) Corrosion likelihood in soils 36

Annex B (informative) Reduction of the corrosion rate by using a 100 mV cathodic polarization -- 100 mV cathodic potential shift 38

B.1 Measurement method during polarization 38

Figure B.1 -- Polarization formation method 38
B.2 Measurement method during depolarization 39

Figure B.2 -- Polarization decay method 39

Bibliography 40