DIN EN 16704-2-1:2017-03 (E)

Railway applications - Track - Safety protection on the track during work - Part 2-1 : Common solutions and technologies - Technical requirements for Track Warning Systems (TWS)

Contents

Page

European foreword 4

Introduction 5

1 Scope 6

2 Normative references 6

3 Terms and definitions 7

4 Functional requirements 11
4.1 Types of TWS 11
4.2 General functional requirements 11
4.2.1 System definition 11
4.3 LOWS 13
4.3.1 Lookout Operated Warning System (LOWS) 13
4.3.2 Lookout Operated Warning System with Influence Function (LOWS-I) 14
4.4 ATWS 15
4.4.1 Automatic Track Warning System ATWS 15
4.4.2 Automatic Track Warning System with Influence Function (ATWS-I) 16
4.5 SCWS 16
4.5.1 Signal Controlled Warning System (SCWS) 16
4.5.2 Signal Controlled Warning System with Influence Function (SCWS-I) 17

5 Non-functional requirements 17
5.1 Communication 17
5.2 Reliability 17
5.3 Availability 17
5.4 Maintainability 17
5.5 Functional Safety 17
5.6 Service Life 17
5.7 Safety for the user 18
5.8 Environment 18
5.8.1 General 18
5.8.2 Protection against dust and water (IP-Codes) 18
5.8.3 Pollution 18
5.8.4 Compatibility with Electromagnetic Current (EMC compatibility) 18
5.8.5 Power Supply 18
5.8.6 External connectors and cables 18
5.8.7 Altitude 18
5.8.8 Pulse Pressure 19
5.8.9 Temperature 19
5.8.10 Humidity 19
5.8.11 Wind 19
5.8.12 Snow and hail 19
5.8.13 Ice 19
5.8.14 Solar radiation 19
5.8.15 Lightning protection 19
5.8.16 Fire protection 19

5.9 Vibration and Shock 20
5.9.1 General 20
5.9.2 Vibration 20
5.9.3 Shock 20
5.10 Dimension, mass, handling 20
5.11 Control elements of the TWS 20
5.12 Indication on the TWS 21
5.13 Technical processing time 21
5.14 TWS power supply and power consumption 22
5.15 Warning in case of a safety critical failure 22
5.16 Technical detection 22
5.17 Speed Range for detection components 22
5.18 TWS-Signal 22
5.18.1 Acoustic TWS-Signal 22
5.18.2 Optical TWS-Signals 23
5.19 Information by Human-Machine-Interface (HMI) 23
5.19.1 During operation 23
5.19.2 Priority of information on the HMI 23
5.19.3 Developing HMI 23
5.20 Data logging 23
5.21 User manual 24
5.22 Marking 24
5.23 Colour 25

Annex A (normative) Specification of acoustic warning signals 26

A.1 General 26
A.2 Sound criteria for acoustic TWS-Signals 26
A.3 Time criteria for acoustic TWS-Signals 27

Annex B (normative) Specification of optical TWS signals 28

B.1 General 28

Bibliography 29