

DIN EN 15528:2016-01 (E)

Railway applications - Line categories for managing the interface between load limits of vehicles and infrastructure

Contents	Page
European foreword.....	6
Introduction	7
1 Scope.....	8
2 Normative references.....	9
3 Terms, definitions, symbols and abbreviated terms.....	9
3.1 Terms and definitions	9
3.2 Symbols and abbreviated terms	12
4 Classification system.....	14
4.1 Definition of line categories	14
4.2 Correlation to types of vehicles.....	14
4.3 Correlation between line category and speed.....	15
4.3.1 Introduction	15
4.3.2 Freight traffic.....	15
4.3.3 Mixed traffic and passenger traffic.....	15
5 Classification of infrastructure	16
5.1 Civil engineering structures.....	16
5.1.1 Classification.....	16
5.1.2 Dynamic checks	16
5.2 Track construction, track substructure and earthworks.....	17
5.3 Infrastructures classification results.....	18
6 Categorization of railway vehicles.....	18
6.1 General rules.....	18
6.2 Freight wagons.....	21
6.2.1 Specific rules for freight wagons	21
6.2.2 Resulting load limits for freight wagons.....	21
6.3 Locomotives	21
6.3.1 General.....	21
6.3.2 4-axle locomotives	21
6.3.3 6-axle locomotives	22
6.4 Passenger carriages	22
6.5 Multiple units.....	23
6.6 Special vehicles	23
6.7 Vehicle categorization results	24
7 Compatibility of the interface between vehicle and infrastructure	24
Annex A (normative) Reference wagons and load models representing the line categories.....	26
Annex B (informative) Flow chart: Classification of infrastructure and categorization of vehicles	31
Annex C (informative) MU-Groups and MU-Classes.....	32
C.1 Definition	32
C.2 MU-Group CB.....	34
C.2.1 General.....	34

C.2.2	Train parameters of MU-Class CB_1	34
C.2.3	Train parameters of MU-Class CB_2	34
C.3	MU-Group AB.....	34
C.3.1	General	34
C.3.2	Train parameters of MU-Class AB_1.....	35
C.3.3	Train parameters of MU-Class AB_2.....	35
C.3.4	Train parameters of MU-Class AB_3.....	35
C.3.5	Train parameters of MU-Class AB_4.....	36
C.4	MU-Group SA	36
C.4.1	General	36
C.4.2	Train parameters of MU-Class SA_1	36
C.4.3	Train parameters of MU-Class SA_2	36
C.5	Example: Correspondence check of a real MU-train to MU-classes.....	37
C.5.1	General	37
C.5.2	General description of the real MU-train to be checked.....	37
C.5.3	MU-group identification.....	37
C.5.4	MU-class identification	37
C.5.5	Results	38
C.5.6	Example of infrastructure compatibility check.....	38
Annex D (normative)	Mass definitions for line category and dynamic compatibility check for passenger carriages and multiple units	39
Annex E (informative)	Load models corresponding to MU-classes.....	40
E.1	General	40
E.2	Geometric axle configuration.....	40
E.2.1	General	40
E.2.2	Axle spacing pattern of MU-Class CB_1	41
E.2.3	Axle spacing pattern of MU-Class CB_2	42
E.2.4	Axle spacing pattern of MU-Class AB_1	43
E.2.5	Axle spacing pattern of MU-Class AB_2	44
E.2.6	Axle spacing pattern of MU-Class AB_3	45
E.2.7	Axle spacing pattern of MU-Class AB_4	46
E.2.8	Axle spacing pattern of MU-Class SA_1.....	47
E.2.9	Axle spacing pattern of MU-Class SA_2.....	48
E.3	Axle load P_{MUclass}	48
E.4	Results and basic information	49
Annex F (informative)	Speeds which do not require dynamic compatibility checks	50

Annex G (informative) Methods used to determine the load carrying capacity of existing structures.....	52
Annex H (informative) Line classification result.....	53
H.1 General.....	53
H.2 Example 1.....	53
H.3 Example 2.....	53
H.4 Example 3.....	54
Annex I (informative) Example of calculation methodology.....	55
I.1 General.....	55
I.2 Tables of calculation results for example in Annex I	57
I.3 Diagram of calculation results for example in Annex I	59
Annex J (informative) Maximum permissible axle load P – Wagons with two 2-axles bogies	61
Annex K (informative) Maximum permissible axle load P – Wagons with two 3-axles bogies.....	64
Annex L (informative) Line categories of 6-axle locomotives.....	67
Annex M (informative) L4 locomotive classes (4-axle locomotives).....	68
Annex N (informative) L6 locomotive classes (6-axle locomotives).....	69
Annex O (informative) Example of correspondence between a national track classification system and line categories.....	71
Annex P (informative) Parametric studies for dynamic analysis.....	74
P.1 Nature and objective	74
P.2 Parameters to consider.....	74
P.3 Methods and assumptions	74
P.4 Results.....	75
P.5 Example	75
Annex Q (informative) Comparison of RA-classification with line categories	83
Annex R (informative) Weight note for locomotives.....	84
R.1 General.....	84
R.2 Example of a weight note for a series A locomotive	85
R.3 Example of a weight note for a series B locomotive	86
Annex S (informative) Examples of axle spacings for locomotives and for a standard passenger carriage	87
S.1 Introduction	87
S.2 Typical axle spacing patterns of locomotives with 22,5 t axle load.....	87
S.3 Axle spacing pattern and axle load of a 26,4 m carriage.....	88
Annex T (informative) Categorization of MU's by parameter check.....	91
T.1 General.....	91
T.2 MU-Group CB.....	91

T.3	MU-Group AB	92
T.4	MU-group SA.....	92
T.5	Identification of line category by axle load	93
Annex U (informative) Guidance for categorizing light rail MU's into line category a10, a12 or a14		94
U.1	General	94
U.2	4 axle light rail MU with 2 bogies	94
U.3	4 axle light rail MU with 4 single axles.....	95
U.4	6 axle light rail MU with 3 bogies	96
U.5	6 axles light rail MUs with 6 single axles.....	98
U.6	6 axles light rail MUs with 2 bogies and 2 single axles.....	99
U.7	8 axles light rail MUs or more axles	101
Annex ZA (informative) Relationship between this European standard and the Essential Requirements of EU Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast)		102
Bibliography		106