

DIN EN 15152:2024-02 (E)

Railway applications - Windscreens for trains (includes Amendment :2023)

Contents		Page
European foreword		4
1	Scope	7
2	Normative references	7
3	Terms and definitions	8
4	Functional requirements	12
4.1	General	12
4.1.1	Windscreen classification	12
4.1.2	Driver's windscreens	13
4.1.3	Passenger windscreens and vehicle end windows	14
4.2	Optical areas	14
4.3	Windscreen test requirements	16
4.3.1	Type tests	16
4.3.2	Routine tests	17
4.4	Marking	17
4.5	Service requirements	17
4.6	Storage and handling of finished windscreens	18
5	Visual and optical requirements	18
5.1	Appearance defects	18
5.1.1	General	18
5.1.2	Visual inspection procedure for appearance defects	18
5.1.3	Definition and classification of defects	21
5.1.4	Defect acceptance criteria	23
5.2	Optical characteristics	23
5.2.1	Secondary image separation	23
5.2.2	Optical distortion	24
5.2.3	Haze	25
5.2.4	Light transmittance	25
5.2.5	Chromaticity	27
6	Mechanical characteristics	30
6.1	Impact resistance	30
6.1.1	Impact test requirements	30
6.1.2	Spalling assessment	32
6.1.3	Impact test projectile velocity	32
6.1.4	Impact test procedure	34
6.1.5	Impact test acceptance criteria	35
6.2	Residual visibility	35
6.2.1	Test samples	35
6.2.2	Test method	36
6.2.3	Acceptance criteria	36
6.3	Resistance against abrasion	36
6.4	Resistance to repeated impact from small particles (gravelling)	36
6.4.1	General	36
6.4.2	Test samples	36
6.4.3	Test method	37
6.5	Bullet resistance	37

7	Performance in service	38
7.1	Heating system	38
7.1.1	General	38
7.1.2	Heating uniformity	38
7.1.3	Coating based heating systems	39
7.1.4	Wire based heating systems	39
7.1.5	Resistance measurement	39
7.1.6	Voltage withstand test	39
7.2	Resistance against ageing	39
7.2.1	General	39
7.2.2	Accelerated weathering test	40
7.2.3	Thermal cycling	40
7.2.4	Humidity test	41
7.2.5	Windscreen heating test	42
Annex A (normative) Determination of windscreen angles		43
A.1	Determination of windscreen plan view angle	43
A.2	Determination of the rake angle	46
Annex B (normative) Transmittance calculation for inclined windscreen		47
Annex C (normative) Windscreen test sample mounting		50
Annex D (normative) Impact test projectile		52
Annex E (normative) Gravelling test projectile		54
Annex F (informative) Test samples		55
F.1	Test sample properties	55
F.2	Test sample for optical tests	55
F.3	"Test sample for mechanical tests"	55
F.4	Test sample for ageing tests	55
Annex G (normative) Summary of testing requirements		56
Annex H (informative) Alternative method for testing resistance to Ultra Violet radiation		57
H.1	General	57
H.2	Test method	57
H.3	Interpretation of results	57
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC aimed to be covered		58
Bibliography		59