

DIN EN 15080-8:2010-02 (E)

Extended application of results from fire resistance tests - Part 8: Beams

Contents		Page
Foreword		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Basis and methodology of establishing the extended application	6
4.1	General	6
4.2	Basic principles	7
4.2.1	General	7
4.2.2	Basis of the extended application	7
4.2.3	Mode of failure	7
4.2.4	Methods of analysis	7
4.3	Basic thermal analysis	8
4.4	Basic structural analysis	8
4.4.1	General	8
4.4.2	Modelling factor	8
4.4.3	Material properties	9
4.5	Analysis of other features	10
5	Critical parameters	10
5.1	General	10
5.2	Common thermal parameters	10
5.3	Common mechanical parameters	11
5.4	Common constructional parameters	11
5.5	Specific constructional parameters for beams without applied fire protection	11
5.5.1	Concrete beams	11
5.5.2	Steel beams	12
5.5.3	Composite steel-concrete beams	12
5.5.4	Timber beams	12
5.5.5	Mechanically jointed beams	13
5.6	Specific constructional parameters for beams with applied fire protection	13
6	Report of the extended application analysis	14
Annex A (informative)	Guidelines for making assessments	15
A.1	Mode of failure	15
A.1.1	General	15
A.1.2	Failure of protection system	15
A.1.3	Change of structural mode of failure from bending to shear	15
A.1.4	Change of structure mode of failure from bending to connection failure	16
A.2	Effect of material strength	16
A.3	Extrapolation of fire resistance	17
A.4	Accuracy of predictions	17
A.5	Prediction based on material laws	18
A.6	Modifying predicted temperatures	18
A.7	Deflection limits	19
Annex B (informative)	The Extended Application Of Steel Beams	20

B.1	Introduction	20
B.2	Analysis of reference tests	20
B.2.1	Thermal performance	20
B.2.2	Mechanical performance	21
B.2.3	Other features	22
B.3	Model for extended application	22
Annex C (informative) The Extended Application Of Timber Beams		24
C.1	Introduction	24
C.2	Extended application in the load domain (increase of load-bearing capacity)	24
C.2.1	Increasing of load-bearing capacity by higher strength class	24
C.2.2	Increasing of load-bearing capacity by increasing beam dimensions (braced beams) ²⁵	25
C.2.3	Increasing of load-bearing capacity by decreasing the fire resistance	26
C.3	Extended application in the time domain: Increasing fire resistance by applied fire protection	30
Annex D (informative) The Extended Application of a Composite Steel Concrete Beam		32
D.1	Introduction	32
D.1.1	General	32
D.1.2	Reference test 1	33
D.1.3	Reference test 2	33
D.2	Analysis of reference tests	34
D.2.1	Thermal performance	34
D.2.2	Reference test 1	34
D.2.3	Reference test 2	35
D.2.4	Structural performance	36
D.2.5	Bending resistance	36
D.2.6	Assessment of reference test 1	36
D.2.7	Assessment of reference test 2	37
D.2.8	Conclusions of structural performance	38
D.2.9	Model for extended application	38
D.2.10	Extended application	38
Annex E (informative) The extended application of concrete beams		41
E.1	Introduction	41
E.2	Failure modes	41
E.3	Examples	41
E.3.1	Possible change of failure mode	41
E.3.2	Change of cross section	42
E.3.3	Change of material strength	42
E.3.4	Axial and rotational restraint	43
Bibliography		44