

DIN EN 13381-9:2015-09 (E)

Test methods for determining the contribution to the fire resistance of structural members - Part 9: Applied fire protection systems to steel beams with web openings

Contents		Page
Foreword		4
Introduction		5
1	Scope	6
2	Normative references	7
3	Terms and definitions, symbols and units	7
3.1	Terms and definitions	7
3.2	Symbols and units	9
4	Test equipment	9
4.1	General	9
4.2	Furnace	9
4.3	Test conditions	9
5	Test specimens	10
5.1	General	10
5.2	Precautions against erroneous results	10
5.3	Construction of steel test specimens	10
5.3.1	Cellular beam test sections	10
5.3.2	Application of the fire protection material to the test sections	10
5.4	Composition of test specimen component materials	10
5.4.1	Steel sections	10
5.4.2	Fire protection materials	11
5.4.3	Fire protection thickness requirements for sprayed materials	11
5.4.4	Selection of test specimens	11
6	Installation of the test specimens	13
6.1	Fixing	13
6.2	Installation pattern	13
6.3	Furnace Load	13
6.4	Conditioning of the test specimens	14
7	Application of instrumentation	14
7.1	General	14
7.2	Instrumentation for measurement of furnace temperature	14
7.2.1	General	14
7.2.2	Furnace temperature in the region of test specimens	14
7.3	Instrumentation for measurement and determination of steel temperatures	14
7.3.1	General	14
7.3.2	Location of thermocouples attached to the Beams	14
7.3.3	Location of web reference thermocouples	14
7.4	Instrumentation for measurement of pressure	14
8	Test procedure	15
8.1	General	15
8.2	Furnace temperature and pressure	15
8.3	Temperature of steelwork	15
8.4	Observations	15

8.5	Termination of test	15
9	Test results	15
9.1	Acceptability of test results	15
9.2	Test report and presentation of test results	16
10	Assessment	16
10.1	General	16
10.2	Determination of mean web post and web reference temperatures	17
10.3	Determination of web post lines	17
10.4	Additional thermal modification factors	18
10.5	Determination of limiting temperature	18
10.6	Determination of EMTA	18
11	Report of the assessment	19
12	Limits of the applicability of the results of the assessment	19
Annex A (informative) Determination of Product Thickness on Beams with Web Openings		30
A.1	Purpose	30
A.2	Background	30
A.3	Overview of structural geometry	30
A.4	Interaction with EN 13381-4 and EN 13381-8	32
A.5	Steel temperature distribution	32
A.6	Structural analysis of the beam design	32
A.7	Determination of fire protection thickness	37
A.7.1	Product specific analysis on the basis of a specified critical temperature	37
A.7.2	Iterative protection thickness analysis	37
A.7.3	Iterative steel temperature analysis	37
A.8	Structural models	37
Annex B (informative) The logic for determining the web post average temperature		38
Bibliography		40