

# DIN EN 13381-8:2013-08 (E)

## Test methods for determining the contribution to the fire resistance of structural members - Part 8: Applied reactive protection to steel members

---

<b>Contents</b>		<b>Page</b>
Foreword .....		4
<b>1</b>	<b>Scope .....</b>	<b>6</b>
<b>2</b>	<b>Normative references .....</b>	<b>6</b>
<b>3</b>	<b>Terms and definitions, symbols and units .....</b>	<b>7</b>
<b>3.1</b>	<b>Terms and definitions .....</b>	<b>7</b>
<b>3.2</b>	<b>Symbols and units .....</b>	<b>9</b>
<b>4</b>	<b>Test equipment .....</b>	<b>11</b>
<b>4.1</b>	<b>General .....</b>	<b>11</b>
<b>4.2</b>	<b>Furnace .....</b>	<b>11</b>
<b>4.3</b>	<b>Loading equipment .....</b>	<b>11</b>
<b>5</b>	<b>Test conditions .....</b>	<b>11</b>
<b>5.1</b>	<b>General .....</b>	<b>11</b>
<b>5.2</b>	<b>Support and loading conditions .....</b>	<b>11</b>
<b>5.3</b>	<b>Loading .....</b>	<b>12</b>
<b>6</b>	<b>Test specimens .....</b>	<b>12</b>
<b>6.1</b>	<b>General .....</b>	<b>12</b>
<b>6.2</b>	<b>Size of test specimens .....</b>	<b>13</b>
<b>6.3</b>	<b>Construction of steel test specimens .....</b>	<b>14</b>
<b>6.4</b>	<b>Composition of steel sections .....</b>	<b>15</b>
<b>6.5</b>	<b>Properties of fire protection materials .....</b>	<b>15</b>
<b>6.6</b>	<b>Selection of test specimens .....</b>	<b>16</b>
<b>7</b>	<b>Installation of the test specimens .....</b>	<b>21</b>
<b>7.1</b>	<b>Loaded beam .....</b>	<b>21</b>
<b>7.2</b>	<b>Unloaded beams .....</b>	<b>22</b>
<b>7.3</b>	<b>Loaded columns .....</b>	<b>22</b>
<b>7.4</b>	<b>Unloaded columns .....</b>	<b>22</b>
<b>7.5</b>	<b>Test specimen installation patterns .....</b>	<b>22</b>
<b>7.6</b>	<b>Furnace load .....</b>	<b>23</b>
<b>8</b>	<b>Conditioning of the test specimens .....</b>	<b>23</b>
<b>9</b>	<b>Application of instrumentation .....</b>	<b>23</b>
<b>9.1</b>	<b>General .....</b>	<b>23</b>
<b>9.2</b>	<b>Instrumentation for measurement and control of furnace temperature .....</b>	<b>23</b>
<b>9.3</b>	<b>Instrumentation for measurement of steel temperatures .....</b>	<b>24</b>
<b>9.4</b>	<b>Instrumentation for the measurement of pressure .....</b>	<b>25</b>
<b>9.5</b>	<b>Instrumentation for the measurement of deformation .....</b>	<b>25</b>
<b>9.6</b>	<b>Instrumentation for the measurement of load .....</b>	<b>25</b>
<b>10</b>	<b>Test procedure .....</b>	<b>26</b>
<b>10.1</b>	<b>General .....</b>	<b>26</b>
<b>10.2</b>	<b>Furnace temperature and pressure .....</b>	<b>26</b>
<b>10.3</b>	<b>Application and control of load .....</b>	<b>26</b>
<b>10.4</b>	<b>Temperature of steelwork .....</b>	<b>26</b>

10.5	Deflection .....	27
10.6	Observations .....	27
10.7	Termination of test .....	27
11	Test results .....	27
11.1	Acceptability of test results .....	27
11.2	Presentation of test results .....	28
12	Test report .....	29
13	Assessment .....	29
13.1	General .....	29
13.2	Temperature data .....	30
13.3	Correction for discrepancy in stickability and insulation performance over the thickness range tested .....	30
13.4	Assessment procedures for thermal performance .....	30
13.5	Acceptability of the assessment method used and the resulting analysis - criteria for acceptability .....	30
14	Report of the assessment .....	31
15	Limits of the applicability of the results of the assessment .....	32
Annex A (normative) Test method to the smouldering fire (slow heating curve) .....		49
A.1	Introduction .....	49
A.2	Test equipment .....	49
A.3	Test specimens .....	49
A.4	Termination of test .....	50
A.5	Evaluation of the results .....	50
Annex B (normative) Measurement of properties of fire protection materials .....		51
B.1	Introduction .....	51
B.2	Thickness of fire protection materials .....	51
B.3	Identification .....	52
Annex C (normative) Fixing of thermocouples to steel work and routing of cables .....		53
C.1	Introduction .....	53
C.2	Types of thermocouples .....	53
C.3	Fixing of thermocouples .....	53
C.4	Routing of thermocouple wires .....	53
C.5	Connection of thermocouples .....	54
C.6	Thermocouple failures .....	54
Annex D (normative) Correction of data/Nominal thickness .....		55
D.1	Correction of data .....	55
D.2	Nominal thickness - Graphical method .....	58
Annex E (normative) Methods of assessment of fire protection system performance .....		59
E.1	General .....	59
E.2	Graphical Approach .....	59
E.3	Differential formula analysis (variable approach) methodology .....	65
E.4	Differential formula analysis (constant approach) methodology .....	70
E.5	Numerical regression analysis .....	71
Annex F (normative) Tables of section sizes .....		74
Bibliography .....		76