

# ISO 7240-31:2022-09 (E)

## Fire detection and alarm systems - Part 31: Resettable line-type heat detectors

<b>Contents</b>		<b>Page</b>
<b>Foreword</b>		<b>viii</b>
<b>Introduction</b>		<b>ix</b>
<b>1</b>	<b>Scope</b>	<b>1</b>
<b>2</b>	<b>Normative references</b>	<b>1</b>
<b>3</b>	<b>Terms and definitions</b>	<b>1</b>
<b>4</b>	<b>Requirements</b>	<b>3</b>
4.1	General	3
4.1.1	Conformance	3
4.1.2	Heat response classes	3
4.2	Individual alarm indication	5
4.3	Signalling	5
4.4	Repeatability	6
4.5	Reproducibility	6
4.6	Connection of ancillary devices	6
4.7	Manufacturer's adjustments	6
4.8	Software	6
4.8.1	General	6
4.8.2	Software design	6
4.8.3	The storage of programs and data	6
4.9	Sensing element fault	7
4.10	On-site adjustment of response behaviour	7
4.11	Maximum ambient temperature test (sensing element)	7
4.12	Variation in supply parameters	7
4.13	Low voltage fault	7
4.14	Fire sensitivity for Class A and ror-only RLTHD	7
4.15	Static response temperature test	7
4.16	Response times from typical application temperature for ror-only RLTHD	8
4.17	Dry heat (operational) sensor control unit	8
4.18	Dry heat (endurance) for sensor control unit and sensing element	8
4.19	Cold (operational) for sensing element	8
4.20	Cold (operational) for sensor control unit	8
4.21	Damp heat, steady-state (endurance) for sensor control unit and sensing element	8
4.22	Damp heat, cyclic (operational) for sensing element	8
4.23	Damp heat, cyclic (operational) for sensor control unit	8
4.24	Damp heat, steady-state (operational) for sensor control unit	8
4.25	Damp heat, cyclic (endurance) for sensor control unit and sensing element	8
4.26	Shock (operational) for sensor control unit	8
4.27	Impact (operational) for sensor control unit	9
4.28	Impact (operational) for sensing element	9
4.29	Vibration, sinusoidal (operational) for sensor control unit	9
4.30	Vibration, sinusoidal (operational) for sensing element	9
4.31	Vibration, sinusoidal (endurance) for sensor control unit	9
4.32	Vibration, sinusoidal (endurance) for sensing element	9
4.33	Sulfur dioxide (SO <sub>2</sub> ) corrosion (endurance) for sensing element	9
4.34	Sulfur dioxide (SO <sub>2</sub> ) corrosion (endurance) for sensor control unit	9
4.35	Electromagnetic immunity	9
<b>5</b>	<b>Test methods</b>	<b>9</b>
5.1	General	9
5.1.1	Atmospheric conditions for tests	9
5.1.2	Operating conditions for tests	10
5.1.3	Mounting arrangements	10
5.1.4	Tolerances	10

5.1.5	Procedure for measurement of response time.....	10
5.1.6	Provision for tests.....	11
5.1.7	Test schedule.....	12
5.2	Individual alarm indication.....	14
5.3	Signalling.....	14
5.4	Repeatability.....	14
5.4.1	Object of the test.....	14
5.4.2	Test procedure.....	14
5.4.3	Requirements.....	15
5.5	Reproducibility.....	15
5.5.1	Object of the test.....	15
5.5.2	Test procedure.....	15
5.5.3	Requirements.....	15
5.6	Connection of ancillary devices.....	15
5.7	Manufacturer's adjustments.....	15
5.8	Requirements for software-controlled detectors.....	15
5.9	Sensing element fault.....	15
5.9.1	Object of the test.....	15
5.9.2	Sensing element operational continuity.....	16
5.9.3	Requirements.....	16
5.10	On-site adjustment of response behaviour.....	16
5.11	Maximum ambient temperature test (sensing element).....	16
5.11.1	Object of the test.....	16
5.11.2	Mounting of the sensing element.....	16
5.11.3	Test procedure.....	16
5.11.4	Requirements.....	16
5.12	Variation in supply parameters.....	16
5.12.1	Object of the test.....	16
5.12.2	Test procedure.....	17
5.12.3	Requirements.....	17
5.13	Low voltage fault.....	17
5.13.1	Object of the test.....	17
5.13.2	Test procedure.....	17
5.13.3	Requirements.....	17
5.14	Fire sensitivity for Class A and ror-only RLTHD.....	17
5.14.1	Object of the test.....	17
5.14.2	Principle.....	17
5.14.3	Fire test room.....	17
5.14.4	Test fires.....	18
5.14.5	Mounting of the specimens.....	18
5.14.6	Initial conditions.....	18
5.14.7	Recording of the fire parameters and response times.....	19
5.14.8	Requirements.....	19
5.15	Static response temperature test.....	19
5.15.1	Object of the test.....	19
5.15.2	Test procedure for non-integrating linear and multipoint RLTHD.....	19
5.15.3	Test procedure for integrating linear RLTHD.....	21
5.15.4	Requirements.....	22
5.16	Response times from typical application temperature for ror-only RLTHD.....	22
5.16.1	Object of the test.....	22
5.16.2	Test procedure.....	22
5.16.3	Requirements.....	22
5.17	Dry heat (operational) test for sensor control unit.....	22
5.17.1	Object of the test.....	22
5.17.2	Reference.....	22
5.17.3	State of the specimen during conditioning.....	22
5.17.4	Conditioning.....	23
5.17.5	Measurements during conditioning.....	23

5.17.6	Final measurements.....	23
5.17.7	Requirements.....	23
5.18	Dry heat (endurance) for sensor control unit and sensing element.....	23
5.18.1	Object of the test.....	23
5.18.2	Principle.....	23
5.18.3	Reference.....	24
5.18.4	State of the specimen during conditioning.....	24
5.18.5	Conditioning.....	24
5.18.6	Final measurements.....	24
5.18.7	Requirements.....	25
5.19	Cold (operational) for sensing element.....	25
5.19.1	Object of the test.....	25
5.19.2	Reference.....	25
5.19.3	State of the specimen during conditioning.....	25
5.19.4	Conditioning.....	25
5.19.5	Measurements during conditioning.....	25
5.19.6	Final measurements.....	25
5.19.7	Requirements.....	26
5.20	Cold (operational) for sensor control unit.....	26
5.20.1	Object of the test.....	26
5.20.2	Reference.....	26
5.20.3	State of the specimen during conditioning.....	26
5.20.4	Conditioning.....	26
5.20.5	Measurements during conditioning.....	26
5.20.6	Final measurements.....	26
5.20.7	Requirements.....	27
5.21	Damp heat, steady-state (endurance) for sensor control unit and sensing element.....	27
5.21.1	Object of the test.....	27
5.21.2	Reference.....	27
5.21.3	State of the specimen during conditioning.....	27
5.21.4	Conditioning.....	27
5.21.5	Final measurements.....	27
5.21.6	Requirements.....	27
5.22	Damp heat, cyclic (operational) for sensing element.....	28
5.22.1	Object of the test.....	28
5.22.2	Principle.....	28
5.22.3	Reference.....	28
5.22.4	State of the specimen during conditioning.....	28
5.22.5	Conditioning.....	28
5.22.6	Measurements during conditioning.....	29
5.22.7	Final measurements.....	29
5.22.8	Requirements.....	29
5.23	Damp heat, cyclic (operational) for sensor control unit.....	29
5.23.1	Object of the test.....	29
5.23.2	Principle.....	29
5.23.3	Reference.....	29
5.23.4	State of the specimen during conditioning.....	29
5.23.5	Conditioning.....	29
5.23.6	Measurements during conditioning.....	30
5.23.7	Final measurements.....	30
5.23.8	Requirements.....	30
5.24	Damp heat, steady-state (operational) for sensor control unit.....	30
5.24.1	Object of the test.....	30
5.24.2	Principle.....	30
5.24.3	Reference.....	30
5.24.4	State of the specimen during conditioning.....	31
5.24.5	Conditioning.....	31
5.24.6	Measurements during conditioning.....	31

5.24.7	Final measurements.....	31
5.24.8	Requirements.....	31
5.25	Damp heat, cyclic (endurance) for sensor control unit and sensing element.....	31
5.25.1	Object of the test.....	31
5.25.2	Principle.....	32
5.25.3	Reference.....	32
5.25.4	State of the specimen during conditioning.....	32
5.25.5	Conditioning.....	32
5.25.6	Final measurements.....	32
5.25.7	Requirements.....	32
5.26	Shock (operational) for sensor control unit.....	33
5.26.1	Object of the test.....	33
5.26.2	Reference.....	33
5.26.3	State of the specimen during conditioning.....	33
5.26.4	Conditioning.....	33
5.26.5	Measurements during conditioning.....	33
5.26.6	Final measurements.....	33
5.26.7	Requirements.....	33
5.27	Impact (operational) for sensor control unit.....	34
5.27.1	Object of the test.....	34
5.27.2	Reference.....	34
5.27.3	State of the specimen during conditioning.....	34
5.27.4	Conditioning.....	34
5.27.5	Measurements during conditioning.....	34
5.27.6	Final measurements.....	34
5.27.7	Requirements.....	34
5.28	Impact (operational) for sensing element.....	35
5.28.1	Object of the test.....	35
5.28.2	Test apparatus.....	35
5.28.3	State of the specimen(s) during conditioning.....	35
5.28.4	Conditioning.....	35
5.28.5	Measurements during conditioning.....	35
5.28.6	Final measurements.....	35
5.28.7	Requirements.....	36
5.29	Vibration, sinusoidal (operational) for sensor control unit.....	36
5.29.1	Object of the test.....	36
5.29.2	Reference.....	36
5.29.3	State of the specimen during conditioning.....	36
5.29.4	Conditioning.....	36
5.29.5	Measurements during conditioning.....	36
5.29.6	Final measurements.....	36
5.29.7	Requirements.....	37
5.30	Vibration, sinusoidal (operational) for sensing element.....	37
5.30.1	Object of the test.....	37
5.30.2	Reference.....	37
5.30.3	State of the specimen during conditioning.....	37
5.30.4	Conditioning.....	37
5.30.5	Measurements during conditioning.....	37
5.30.6	Final measurements.....	37
5.30.7	Requirements.....	38
5.31	Vibration, sinusoidal (endurance) for sensor control unit.....	38
5.31.1	Object of the test.....	38
5.31.2	Reference.....	38
5.31.3	State of the specimen during conditioning.....	38
5.31.4	Conditioning.....	38
5.31.5	Final measurements.....	38
5.31.6	Requirements.....	38
5.32	Vibration, sinusoidal (endurance) for sensing element.....	39

5.32.1	Object of the test.....	39
5.32.2	Reference.....	39
5.32.3	State of the specimen during conditioning.....	39
5.32.4	Conditioning.....	39
5.32.5	Final measurements.....	39
5.32.6	Requirements.....	39
5.33	Sulfur dioxide (SO <sub>2</sub> ) corrosion (endurance) for sensing element.....	40
5.33.1	Object of the test.....	40
5.33.2	Reference.....	40
5.33.3	State of the specimen during conditioning.....	40
5.33.4	Conditioning.....	40
5.33.5	Final measurements.....	40
5.33.6	Requirements.....	40
5.34	Sulfur dioxide (SO <sub>2</sub> ) corrosion (endurance) for sensor control unit.....	41
5.34.1	Object of the test.....	41
5.34.2	Reference.....	41
5.34.3	State of the specimen during conditioning.....	41
5.34.4	Conditioning.....	41
5.34.5	Final measurements.....	41
5.34.6	Requirements.....	41
5.35	Electromagnetic compatibility (EMC), immunity tests (operational).....	42
5.35.1	General.....	42
5.35.2	State of the specimen during conditioning.....	42
5.35.3	Final measurements.....	42
5.35.4	Requirements.....	42
<b>6</b>	<b>Test report.....</b>	<b>42</b>
<b>7</b>	<b>Marking.....</b>	<b>43</b>
7.1	General.....	43
7.2	Marking of sensor control unit.....	43
7.3	Marking of sensing element.....	43
7.4	Marking of functional units.....	43
<b>8</b>	<b>Data.....</b>	<b>44</b>
8.1	Hardware documentation.....	44
8.2	Software documentation.....	44
	<b>Annex A (normative) Arrangement of the sensing element in the fire test room.....</b>	<b>46</b>
	<b>Annex B (normative) Flaming liquid test fires (TF6F, TF6 and TF6S).....</b>	<b>48</b>
	<b>Annex C (normative) Test arrangement for the sensing element of linear heat detectors in the heat tunnel.....</b>	<b>50</b>
	<b>Annex D (informative) Apparatus for mounting of the sensing element of linear heat detectors in the heat tunnel.....</b>	<b>51</b>
	<b>Annex E (normative) Mounting of the sensing element of multipoint RLTHD in the heat tunnel.....</b>	<b>52</b>
	<b>Annex F (normative) Heat tunnel for response time and response temperature measurements.....</b>	<b>54</b>
	<b>Annex G (informative) Construction of the heat tunnel.....</b>	<b>55</b>
	<b>Annex H (normative) Test arrangement for vibration tests for sensing element.....</b>	<b>57</b>
	<b>Annex I (normative) Test apparatus for impact test on the sensing element.....</b>	<b>58</b>