

# TECHNICAL REPORT

HORIZONTAL PUBLICATION

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**Fire hazard testing -  
Part 2-22: Glowing/hot-wire based test methods - Results of the round robin  
tests for the development of IEC TS 60695-2-21:2023**

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## CONTENTS

FOREWORD.....	9
INTRODUCTION.....	11
1 Scope.....	12
2 Normative references .....	12
3 Terms, definitions, and abbreviated terms .....	12
3.1 Terms and definitions.....	12
3.2 Abbreviated terms.....	13
4 General information .....	13
4.1 Information on round robin tests .....	13
4.2 Information on participants.....	13
5 First round robin test .....	14
5.1 First round robin test objectives .....	14
5.2 First round robin test equipment.....	15
5.3 First round robin test participants.....	15
5.4 First round robin test summary of tests .....	15
5.5 First round robin test summary of activities setup.....	16
5.6 First round robin test results .....	17
5.6.1 First RRT apparatus and test conditions .....	17
5.6.2 First RRT NiCr wire cuts resistance verification .....	18
5.6.3 First RRT Verification of achieved ignitions.....	19
5.6.4 First RRT Verification of connectors time to ignition.....	29
5.6.5 First RRT Verification of connectors flame duration .....	37
5.6.6 First RRT Verification of connector flame heights .....	46
5.6.7 First RRT NiCr wire cuts burnouts during tests .....	50
5.7 First round robin test outcome .....	56
5.7.1 Connectors ignition and NiCr wire application method .....	56
5.7.2 Enclosures testing repeatability .....	56
5.7.3 Conclusions.....	56
6 Second round robin test.....	57
6.1 Second round robin test objectives .....	57
6.2 Second round robin test equipment.....	57
6.3 Second round robin test participants .....	58
6.4 Second round robin test summary of tests .....	58
6.5 Second round robin test summary of activities setup.....	58
6.6 Second round robin test results.....	59
6.6.1 Second RRT apparatus and test conditions .....	59
6.6.2 Second RRT NiCr wire cuts resistance verification .....	60
6.6.3 Second RRT verification of achieved ignitions .....	62
6.6.4 Second RRT Verification of connector time to ignition.....	69
6.6.5 Second RRT Verification of connector flame duration .....	71
6.6.6 Second RRT verification of connector flame height.....	73
6.7 Second round robin test outcome.....	74
6.7.1 NiCr wire cuts resistance comparison .....	74
6.7.2 Connectors testing results comparison .....	75
6.7.3 Finished units testing results comparison .....	76
6.7.4 Conclusions.....	77

7	Third round robin test .....	77
7.1	Third round robin test objectives .....	77
7.2	Third round robin test equipment .....	78
7.3	Third round robin test participants.....	78
7.4	Third round robin test summary of tests .....	79
7.5	Third round robin test summary of activities setup .....	79
7.6	Third round robin test results .....	81
7.6.1	Third RRT Verification of achieved ignitions .....	81
7.6.2	Third RRT Verification of time to ignition.....	87
7.6.3	Third RRT Verification of connectors flame duration .....	98
7.7	Third round robin test outcome .....	102
7.7.1	External NiCr wire application method and NiCr wire length over 100 mm ...	102
7.7.2	Uninsulated connectors testing effectiveness.....	104
8	Round robin test results analysis .....	104
8.1	General.....	104
8.2	Plastic insulating connectors achieved ignitions .....	105
8.3	Plastic insulating connectors time to ignitions .....	105
8.4	Plastic insulating connectors flame durations .....	106
8.5	Finished unit enclosures achieved ignitions .....	107
9	Document conclusion .....	108
Annex A (informative) Examples of the round robin tests .....		109
A.1	First RRT tests examples .....	109
A.2	Second RRT examples .....	110
A.3	Third RRT examples .....	113
Bibliography.....		115
Figure 1 – First RRT - NiCr wire resistance measurements .....		
		19
Figure 2 – First RRT - Bench test V2 connector with internal NiCr wire - Time to ignition.....		
		30
Figure 3 – First RRT - Bench test V0 connector with internal NiCr wire - Time to ignition.....		
		31
Figure 4 – First RRT - Enclosure test V2 connector with internal NiCr wire - Time to ignition.....		
		34
Figure 5 – First RRT - Enclosure test V2 connector with external NiCr wire - Time to ignition.....		
		35
Figure 6 – First RRT - Enclosure test V0 connector with internal NiCr wire - Time to ignition.....		
		36
Figure 7 – First RRT - Bench test V2 connector with internal NiCr wire - Flame duration.....		
		38
Figure 8 – First RRT - Bench test V0 connector with internal NiCr wire - Flame duration.....		
		40
Figure 9 – First RRT - Enclosure test V2 connector with internal NiCr wire - Flame duration .....		
		42
Figure 10 – First RRT - Enclosure test V2 connector with external NiCr wire - Flame duration .....		
		43
Figure 11 – First RRT - Enclosure test V0 connector with internal NiCr wire - Flame duration .....		
		44
Figure 12 – First RRT - Bench test V2 connector with internal NiCr wire - Flame height.....		
		47
Figure 13 – First RRT - Bench test of V0 connector with internal NiCr wire - Flame height .....		
		48

Figure 14 – Second RRT - NiCr wire resistance measurements .....	61
Figure 15 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector time to ignition .....	70
Figure 16 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector flame duration .....	72
Figure 17 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector flame height .....	74
Figure 18 – Third RRT - V2 Connectors time to ignition .....	88
Figure 19 – Third RRT - V0 Connectors time to ignition .....	89
Figure 20 – Third RRT - Top specified layer time to ignition - V2 Connectors with top plastic sheet HB results .....	90
Figure 21 – Third RRT - Top specified layer time to ignition - V0 Connectors with top plastic sheet HB results .....	91
Figure 22 – Third RRT - Top specified layer time to ignition -Uninsulated connectors with top plastic sheet HB results .....	92
Figure 23 – Third RRT - Top specified layer time to ignition -Uninsulated connectors with top plastic sheet V0 results .....	93
Figure 24 – Third RRT - Lower specified layer time to ignition - V2 Connectors results .....	95
Figure 25 – Third RRT - Top specified layer time to ignition -Uninsulated connectors with top plastic sheet HB results .....	96
Figure 26 – Third RRT - Top specified layer time to ignition - V2 connectors with top plastic sheet HB results .....	97
Figure 27 – Third RRT - Top specified layer time to ignition - V0 connectors with top plastic sheet HB results .....	98
Figure 28 – Third RRT – V2 Connectors flame duration .....	99
Figure 29 – Third RRT - V0 Connectors flame duration .....	100
Figure 30 – Third RRT - Flame duration - Finished units test of V2 Connectors with top plastic sheet HB .....	101
Figure 31 – Third RRT - Flame duration - Finished units test of V0 Connectors with top plastic sheet HB .....	102
Figure A.1 – First RRT - Example of plastic insulating connector with internal NiCr wire coil - bench test .....	109
Figure A.2 – Example of plastic insulating connector with internal NiCr wire coil - Finished unit test .....	110
Figure A.3 – Second RRT - Example of plastic insulating connector with internal NiCr wire coil - bench test .....	111
Figure A.4 – Second RRT - Example of plastic insulating connector with internal NiCr wire coil - Finished unit 1 test .....	112
Figure A.5 – Second RRT - Example of plastic insulating connector with internal NiCr wire coil - Finished unit 2 test .....	113
Figure A.6 – Third RRT - Example of plastic insulating connector with external NiCr wire coil - bench test .....	113
Figure A.7 – Third RRT - Example of simulated finished unit test by uninsulated connector with external NiCr wire coil .....	114
Figure A.8 – Third RRT - Example of simulated finished unit test by plastic insulated connector with external NiCr wire coil .....	114
Table 1 – Summary of round robin test participants .....	14
Table 2 – First RRT - Objectives and verification methods .....	14

Table 3 – First RRT - Participants .....	15
Table 4 – First RRT - Investigation points and related subclause references .....	15
Table 5 – First RRT - Tests list .....	16
Table 6 – First RRT - Participants' apparatus and test conditions .....	17
Table 7 – First RRT - NiCr wire cuts resistance measurements .....	18
Table 8 – First RRT - Bench test of V2 connectors with internal NiCr wire - Connector ignition verification results .....	20
Table 9 – First RRT - Bench test of V2 connectors with external NiCr wire - Connector ignition verification results .....	20
Table 10 – First RRT - Bench test of V0 Connectors with internal NiCr wire - Connector ignition verification results .....	21
Table 11 – First RRT - Bench test of V0 connectors with external NiCr wire - Connector ignition verification results .....	21
Table 12 – First RRT - Summary of bench tests - Connectors achieved ignitions results .....	22
Table 13 – First RRT - Enclosure test of V2 connectors with internal NiCr wire - Connector ignition verification results .....	23
Table 14 – First RRT - Enclosure test of V2 connectors with external NiCr wire - Connector ignition verification results .....	23
Table 15 – First RRT - Enclosure test of V0 connectors with internal NiCr wire - Connector ignition verification results .....	24
Table 16 – First RRT - Enclosure test of V0 connectors with external NiCr wire - Connector ignition verification results .....	24
Table 17 – First RRT - Summary of enclosure test - Connectors achieved ignitions results .....	25
Table 18 – First RRT - Enclosure test by V2 connectors with internal NiCr wire - Enclosure ignition verification results .....	26
Table 19 – First RRT - Enclosure test by V2 connectors with external NiCr wire - Enclosure ignition verification results .....	27
Table 20 – First RRT - Enclosure test by V0 connectors with internal NiCr wire - Enclosure ignition verification results .....	27
Table 21 – First RRT - Enclosure test by V0 connectors with external NiCr wire - Enclosure ignition verification results .....	28
Table 22 – First round robin results - Summary of enclosure tests - Enclosure achieved ignitions results .....	29
Table 23 – First RRT - Bench test of V2 connectors with internal NiCr wire - Connector time to ignition verification results .....	29
Table 24 – First RRT - Bench test of V2 connectors with external NiCr wire - Connector time to ignition verification results .....	30
Table 25 – First RRT - Bench test of V0 connectors with internal NiCr wire - Connector time to ignition verification results .....	31
Table 26 – First RRT - Bench test of V0 connectors with external NiCr wire - Connector time to ignition verification results .....	32
Table 27 – First RRT - Summary of bench tests - Connectors time to ignitions results .....	32
Table 28 – First RRT - Enclosure test of V2 connectors with internal NiCr wire - Connector time to ignition verification results .....	33
Table 29 – First RRT - Enclosure test of V2 connectors with external NiCr wire - Connector time to ignition verification results .....	34
Table 30 – First RRT - Enclosure test of V0 connectors with internal NiCr wire - Connector time to ignition verification results .....	35

Table 31 – First RRT - Enclosure test of V0 connectors with external NiCr wire - Connector time to ignition verification results .....	36
Table 32 – First round robin results - Summary of enclosure tests - Connectors time to ignitions results.....	37
Table 33 – First RRT - Bench test of V2 connectors with internal NiCr wire - Connector flame duration verification results .....	38
Table 34 – First RRT - Bench test of V2 connectors with external NiCr wire - Connector flame duration verification.....	39
Table 35 – First RRT - Bench test of V0 connectors with internal NiCr wire - Connector flame duration verification.....	39
Table 36 – First RRT - Bench test of V0 connectors with external NiCr wire - Connector flame duration verification.....	40
Table 37 – First RRT - Summary of bench test - Connector flame duration .....	41
Table 38 – First RRT - Enclosure test of V2 connectors with internal NiCr wire - Connector flame duration verification.....	41
Table 39 – First RRT - Enclosure test of V2 connectors with external NiCr wire - Connector flame duration verification.....	42
Table 40 – First RRT - Enclosure test of V0 connectors with internal NiCr wire - Connector flame duration verification.....	43
Table 41 – First RRT - Enclosure test of V0 connectors with external NiCr wire - Connector flame duration verification.....	44
Table 42 – First RRT - Summary of enclosure test - Connector flame duration.....	45
Table 43 – First RRT - Bench test of V2 connectors with internal NiCr wire - Connector flame height verification.....	46
Table 44 – First RRT - Bench test of V2 connectors with internal NiCr wire - Connector flame height verification.....	47
Table 45 – First RRT - Bench test of V0 connectors with internal NiCr wire - Connector flame height verification.....	48
Table 46 – First RRT - Bench test of V0 connectors with external NiCr wire - Connector flame height verification.....	49
Table 47 – First Round Robin Results - Summary of bench test - Connector flame height .....	49
Table 48 – First RRT - Bench test of V2 connectors with internal NiCr wire - NiCr wire burnouts .....	50
Table 49 – First RRT - Bench test of V2 connectors with external NiCr wire - NiCr wire burnouts .....	51
Table 50 – First RRT - Bench test of V0 connectors with internal NiCr wire - NiCr wire burnouts .....	51
Table 51 – First RRT - Summary of the NiCr wire burnouts verifications during plastic insulating connector bench tests.....	52
Table 52 – First RRT - Summary of NiCr wire burnout verifications during plastic insulating connector bench tests.....	52
Table 53 – First RRT - Enclosure test of V2 Connectors with internal NiCr wire - NiCr wire burnouts.....	53
Table 54 – First RRT - Enclosure test of V2 Connectors with external NiCr wire - NiCr wire burnouts.....	53
Table 55 – First RRT - Enclosure test of V0 Connectors with internal NiCr wire - NiCr wire burnouts.....	54
Table 56 – First RRT - Enclosure test of V0 Connectors with external NiCr wire - NiCr wire burnouts.....	55

Table 57 – First RRT - Enclosure test of V0 Connectors with external NiCr wire - NiCr wire burnouts .....	55
Table 58 – First RRT - Summary of connector ignition results .....	56
Table 59 – Second round robin test - Objectives and verification methods .....	57
Table 60 – Second RRT - Participants .....	58
Table 61 – Second RRT - Investigation points and related subclause references .....	58
Table 62 – Second RRT - Tests list.....	59
Table 63 – Second RRT - Test equipment and environmental conditions .....	60
Table 64 – Second RRT - NiCr wire cuts resistance measurements .....	61
Table 65 – Second RRT - Summary of verification of achieved ignitions .....	62
Table 66 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector ignition verification results .....	63
Table 67 – Second RRT - Bench test of V0 Connectors with internal NiCr wire - Connector ignition verification results .....	63
Table 68 – Second RRT - Finished unit 1 test with V2 Connectors with internal NiCr wire - Finished unit enclosure ignition verification results .....	64
Table 69 – Second RRT - Finished unit 1 test with V0 Connectors with internal NiCr wire - Finished unit enclosure ignition verification results .....	65
Table 70 – Second RRT - Finished unit 2 test with V2 Connectors with internal NiCr wire - Finished unit enclosure ignition verification results .....	65
Table 71 – Second RRT - Finished unit 2 test with V0 Connectors with internal NiCr wire - Finished unit enclosure ignition verification results .....	66
Table 72 – Second RRT - Finished unit 1 test with V2 Connectors with internal NiCr wire - Specified layer ignition verification results .....	67
Table 73 – Second RRT - Finished unit 1 test with V0 Connectors with internal NiCr wire - Specified layer ignition verification results .....	67
Table 74 – Second RRT - Finished unit 2 test with V2 Connectors with internal NiCr wire - Specified layer ignition verification results .....	68
Table 75 – Second RRT - Finished unit 2 test with V0 Connectors with internal NiCr wire - Specified layer ignition verification results .....	69
Table 76 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector time to ignition verification results .....	69
Table 77 – Second RRT - Bench test of V0 Connectors with internal NiCr wire - Connector time to ignition verification results .....	71
Table 78 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector flame .....	71
Table 79 – Second RRT - Bench test of V0 Connectors with internal NiCr wire - Connector flame duration .....	72
Table 80 – Second RRT - Bench test of V2 Connectors with internal NiCr wire - Connector flame height .....	73
Table 81 – Second RRT - Bench test of V0 Connectors with internal NiCr wire - Connector flame height .....	74
Table 82 – Second RRT - Outcome of NiCr wire cuts resistance .....	75
Table 83 – Second RRT - Outcome of connectors achieved ignition .....	75
Table 84 – Second RRT - Outcome of connectors time to ignition .....	75
Table 85 – Second RRT - Outcome of connectors flame duration .....	76
Table 86 – Second RRT - Outcome of connectors flame height .....	76
Table 87 – Second RRT - Outcome of finished units ignition .....	76

Table 88 – Third RRT - Objectives and verification methods .....	77
Table 89 – Third RRT - Participants .....	79
Table 90 – Third RRT - Investigation points and related subclause references.....	79
Table 91 – Third RRT - Tests list .....	79
Table 92 – Third RRT - Bench test of V2 Connectors with external NiCr wire - Ignitions verification .....	81
Table 93 – Third RRT - Bench test of V0 Connectors with external NiCr wire - Ignitions verification .....	82
Table 94 – Third RRT - Uninsulated connector test of finished unit with V0 plastic sheet - Ignitions verification .....	83
Table 95 – Third RRT - Uninsulated connector test of finished unit with HB plastic sheet - Ignitions verification .....	84
Table 96 – Third RRT - Finished unit test of V2 Connectors with external NiCr wire - Ignitions verification .....	85
Table 97 – Third RRT - Finished unit test of V0 Connectors with external NiCr wire - Ignitions verification .....	86
Table 98 – Third RRT - V2 Connectors with external NiCr wire - Time to ignition .....	87
Table 99 – Third RRT - V0 Connectors with external NiCr wire - Time to ignition .....	88
Table 100 – Third RRT - Finished unit test of V2 Connectors with top plastic sheet HB - Top specified layer time to ignitions .....	90
Table 101 – Third RRT - Finished unit test of V0 Connectors with top plastic sheet HB - Top specified layer time to ignitions .....	91
Table 102 – Third RRT - Finished unit test of uninsulated connectors with top plastic sheet HB - Top specified layer time to ignitions.....	92
Table 103 – Third RRT - Finished unit test of uninsulated connectors with top plastic sheet V0 - Top specified layer time to ignitions .....	93
Table 104 – Third RRT - Bench test of V2 Connectors - Lower specified layer time to ignitions .....	94
Table 105 – Third RRT - Finished unit test of Uninsulated connectors with top plastic sheet HB - Lower specified layer time to ignitions .....	95
Table 106 – Third RRT - Finished unit test of V2 connectors with top plastic sheet HB - Lower specified layer time to ignitions.....	96
Table 107 – Third RRT - Finished unit test of V0 connectors with top plastic sheet HB - Lower specified layer time to ignitions.....	97
Table 108 – Third RRT - Bench test of V2 connectors - Flame duration .....	98
Table 109 – Third RRT - Bench test of V0 connectors - Flame duration .....	99
Table 110 – Third RRT - Finished unit test of V2 connectors - Flame duration .....	100
Table 111 – Third RRT - Finished unit test of V0 connectors - Flame duration .....	101
Table 112 – Third RRT - Plastic insulating connectors achieved ignitions outcome .....	102
Table 113 – Third RRT - Low specified layer achieved ignitions outcome.....	102
Table 114 – Third RRT - Top specified layer achieved ignitions outcome .....	103
Table 115 – Third RRT - Plastic insulating connector tests outcome .....	103
Table 116 – Third RRT - Finished unit tests outcome .....	103
Table 117 – Third RRT - Uninsulated connector tests outcome .....	104
Table 118 – Round robin test results - Plastic insulating connectors achieved ignitions analysis by round robin test .....	105
Table 119 – Round robin test results - Plastic insulating connectors achieved ignitions analysis .....	105

Table 120 – Round robin test results - Plastic insulating connectors time to ignitions analysis by round robin test .....	106
Table 121 – Round robin test results - Plastic insulating connectors time to ignitions analysis by NiCr wire application method .....	106
Table 122 – Round robin test results - Plastic insulating connectors flame durations analysis by round robin test .....	106
Table 123 – Round robin test results - Plastic insulating connectors flame durations analysis by NiCr wire application method .....	107
Table 124 – Round robin test results - Finished unit enclosures achieved ignitions analysis by round robin test .....	107
Table 125 – Round robin test results - Finished unit enclosures achieved ignitions analysis by NiCr wire application method .....	108

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**Fire hazard testing -  
Part 2-22: Glowing/hot-wire based test methods - Results of the round  
robin tests for the development of IEC TS 60695-2-21:2023**

FOREWORD

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IEC TR 60695-2-22 has been prepared by IEC technical committee 89: Fire hazard testing. It is a Technical Report.

It has the status of a basic safety publication in accordance with IEC Guide 104.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
89/1645/DTR	89/1655/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

A list of all parts in the IEC 60695 series, published under the general title *Fire hazard testing*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
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## INTRODUCTION

Fires may create hazards to life and property as a result of the generation of heat (emission of heat on fire hazard), and as a result of the production of toxic effluent, corrosive effluent, and smoke (fire effluents on the fire hazard). Fires start with ignition and then can grow, leading in some cases to flash-over and a fully developed fire. Resistance to ignition is therefore one of the most important parameters of a material to be considered in the assessment of a fire hazard.

Most current fire hazard assessment techniques evaluate the resistance to ignition characteristics of a single material or component. These assessment techniques are able to drive the preselection and validation of materials and components but are not able to evaluate the possible interaction of materials or components in a complex environment such as in a finished unit once a fire event is initiated.

In a fault condition, a finished unit may be subject to the overheating of electrical connections and contacts. Such overheating can be caused by corrosion, poor crimp connections, incorrect assembly, erosion of contact surfaces, or mechanical fatigue. Insulating materials that are overheated can ignite and cause fire.

It is difficult to simulate the actual conditions of potential faults in finished units; therefore, all possible fire hazards should be considered at the design stage and subsequently during the preselection of materials and components.

The fire containment test described in [IEC TS 60695-2-21:2023 \[1\]](#) has been developed to verify if a finished unit is able to contain an internal fire event, generated by combustible parts ignited by a simulated overheated electrical connection.

This Technical Report summarizes the investigation and verification activities done for the development of [IEC TS 60695-2-21:2023 \[1\]](#).

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## 1 Scope

This part of the IEC 60695 series, which is a Technical Report, summarizes the round robin tests performed by the IEC/TC 89/PT 60695-2-15, "Fire containment test on finished units" during the development of IEC TS 60695-2-21:2023 [1], *Fire containment test on finished units*.

This document aims to serve as knowledge retention, describing the methodologies, investigation, and verification techniques, as well as providing a compendium of the different verification results, of the development of IEC TS 60695-2-21:2023 [1] as new test method.

IEC/TC 89 and other IEC Technical Committees can benefit from this document, when developing new test methodologies or planning and executing round robin tests.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13943:2017, *Fire safety — Vocabulary*

## 3 Terms, definitions, and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943:2017 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1.1

##### **enclosure**

external casing protecting the electrical and mechanical parts of apparatus

Note 1 to entry: The term excludes cables.

Note 2 to entry: For this document, the term enclosure means the enclosure of a finished unit.

[SOURCE: ISO 13943:2017 [2], 3.93, Modified - The domain <electrotechnical> has been deleted and Note to entry 2 has been added.]

#### 3.1.2

##### **finished unit**

complete unit which is designed to stand alone, usable by an end-user and having a direct function for the end-user. It is intended to be placed on the market and/or taken into service as single unit

Note 1 to entry: Electrical installation products such as distribution boards, circuit protection devices, switchgear, control gear, cable management system and electrical accessories (wiring devices) are not considered to be finished units.

Note 2 to entry: For this document, the term enclosure and the term finished unit can be used interchangeably.

[SOURCE: [IEC TS 60695-2-21:2023 \[1\]](#), 3.5, Modified - Added Note 2 to entry.]

### 3.1.3

#### **flame, noun**

rapid, self-sustaining, sub-sonic propagation of combustion in a gaseous medium, usually with emission of light

[SOURCE: [ISO 13943:2017 \[2\]](#), 3.159]

### 3.1.4

#### **ignition**

DEPRECATED: sustained ignition  
initiation of sustained flame

[SOURCE: [ISO 13943:2017 \[2\]](#), 3.218]

## 3.2 Abbreviated terms

NiCr	Nickel-Chrome alloy wire
RRT	Round Robin Test

## 4 General information

### 4.1 Information on round robin tests

This Technical Report summarizes the main information and results of three RRTs that were organized and performed by the IEC/TC 89/Project Team 60695-2-15.

The first RRT was performed between November 2016 and September 2017; the participation was open to all the Project Team 60695-2-15 members. The summary and results of the first RRT are reported in [Clause 5](#).

The second RRT was performed between February 2018 and September 2018; the participation was open to all the members of IEC/TC 89 National Committees and Liaison Committees. The summary and results of the second RRT are reported in [Clause 6](#).

The third RRT was performed between March 2020 and August 2020; the participation was open to all the members of IEC/TC 89 National Committees and Liaison Committees. The summary and results of the third RRT are reported in [Clause 7](#).

The first and second round robin tests were performed during the project development and led to the publication of the New Work Item Proposal. The third round robin test was performed following the approval of the New Work Item Proposal and led to the publication of the first Committee Draft document.

Final conclusions about the three RRTs and their influence on the development of [IEC TS 60695-2-21:2023 \[1\]](#) are reported in [Clause 9](#).

Examples of the different round robin tests are reported in the informative [Annex A](#).

### 4.2 Information on participants

Some laboratories participated in one or more RRT, therefore for ease of understanding, starting from the first RRT, a sequential number has been assigned to the participating laboratories. This number has been kept fixed across the three RRTs. The summary of all the laboratories that participated in the three RRTs is shown in [Table 1](#).