

## RAPPORTO DI PROVA NO. 609.1CI0165/20

Test Report no.

**METODO DI PROVA / Test method :** CEI EN 60754-1:2015, EN 60754-1:2014-04

**DENOMINAZIONE DELLA PROVA:** Prova su gas emessi durante la combustione di materiali prelevati dai cavi  
*Description of the standard* - Parte 1: Determinazione del contenuto di gas acido alogenidrico.  
*Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content.*

**METODO DI PROVA / Test method :** CEI EN 60754-2:2015, EN 60754-2:2014-04

**DENOMINAZIONE DELLA PROVA:** Prova su gas emessi durante la combustione di materiali prelevati dai cavi  
*Description of the standard* - Parte 2: Determinazione dell'acidità (mediante la misura del pH) e della conduttività.  
*Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measuring) and conductivity.*

**METODO DI PROVA / Test method :** CEI EN 50305:2003, EN 50305:2002, BS EN 50305:2002 paragrafo 9.2

**DENOMINAZIONE DELLA PROVA:** Cavi aventi speciali requisiti in condizioni d'incendio - Metodi di prova.  
*Description of the standard* *Cables having special fire performance. Test methods.*

**METODO DI PROVA / Test method :** CEI EN 60684-2:2012 limitatamente al punto 45.2 metodo A

**DENOMINAZIONE DELLA PROVA:** Determinazione dei bassi livelli di fluoro  
*Description of the standard* *Determination of low levels of fluoride*

**RICHIEDENTE:** HUBER+SUHNER AG  
*Sponsor* Tumbelenstrasse 20  
CH-8330 Pfäffikon ZH (Switzerland)

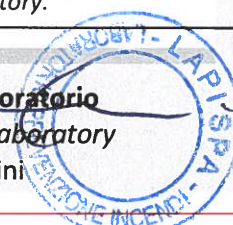
**DENOMINAZIONE DEL MATERIALE:** RADOX 125 REC part no. 1004531  
*Denomination of the material* (Nom. Dens.: 1.47 g/cm<sup>3</sup>)

**DATA RICEVIMENTO DEI CAMPIONI:** 24/03/2020  
*Date of the samples receipt*

- Il presente Rapporto di Prova è costituito da / *This Test Report consists of:*
- no. 5 pagine (compresa questa prima pagina) / *no. 5 pages (including this one).*
  - no. 2 allegati / *no. 2 annexes.*
- I risultati riportati in questo Rapporto si riferiscono esclusivamente al materiale sottoposto a prova fornito dal Richiedente (rif. codice Laboratorio no. 609/20). Un campione del materiale è stato conservato dal Laboratorio.  
*The results reported in this Report refer exclusively to the material submitted to test sent by the Sponsor (ref. lab. code no. 609/20). A sample of the material has been retained by the Laboratory.*

Prato, 07/04/2020

**Il Direttore del Laboratorio**  
*The Director of the Laboratory*  
Dr. Luca Ermini



## DESCRIZIONE DEL MATERIALE

### Description of the material

Aspetto: isolamento cavo di colore nero.

Appearance: cable insulation of black colour.

Composizione (\*): RADOX 125 REC (composto cavo di proprietà (2-Strati)).

Composition (\*): RADOX 125 REC (proprietary cable compound (2-Layer)).

Densità nominale / Nominal density (\*): 1.47 g/cm<sup>3</sup>.

Materiale isotropo / Isotropic material (\*).

Impiego / End use (\*): isolante cavo / cable insulation.

(\* ) - Informazioni fornite dal Richiedente / Information supplied by the Sponsor.

**Nota:** il Laboratorio LAPI non ha ricevuto informazioni dettagliate riguardanti la composizione chimica dei componenti utilizzati per fare il prodotto finale. LAPI non è responsabile di qualsiasi corrispondenza tra la produzione e l'attuale prototipo sottoposto alle prove. Il Produttore è l'unico responsabile della garanzia di tracciabilità dei prodotti ed è altresì l'unico responsabile in caso di controversia.

**Note:** Laboratory LAPI has not received detailed information regarding the chemical compositions of the components used to make the final product. LAPI is not responsible at all of any correspondence between current production and prototype submitted to the tests. The producer is the only responsible to cover a traceability of the products and in any case give response in case of complain.

## DESCRIZIONE DELLA PROCEDURA DI CAMPIONAMENTO

### Description of the sampling procedure

Il campionamento del prodotto "RADOX 125 REC part no. 1004531" e inviato per il test è stato effettuato a cura del Richiedente dal cavo RADOX 3GKW 600V 5X16 XM part no. 84126032 lotto di produzione no. 2241840 c/o lo stabilimento di HUBER+SUHNER AG sito in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), nel mese di Marzo 2020 (vedi dichiarazione allegata).

Il Laboratorio non è stato coinvolto in alcuna operazione di campionamento della produzione.

The sampling of the product "RADOX 125 REC part no. 1004531" and sent to be tested has been effected by the Sponsor from the cable RADOX 3GKW 600V 5X16 XM part no. 84126032 production batch no. 2241840 c/o the factory of HUBER+SUHNER AG located in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), on month of March 2020 (see declaration annexed).

The Laboratory has not been involved in any sampling procedure of the material from the production.

**CEI EN 60754-1**

## PREPARAZIONE E CONDIZIONAMENTO

### Preparation and conditioning

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

Preparation and conditioning of the specimens have been effected according to the standard in object.

## PROCEDIMENTO DI PROVA

### Test procedure

La prova è stata eseguita in conformità allo standard citato.

Temperatura di prova: 800°C, previo gradiente costante di innalzamento della temperatura (40±5) minuti.

Durata della prova: 20 minuti a 800°C.

Metodo analitico impiegato: conforme alle richieste del metodo.

The test has been effected according to the cited standard.

Test temperature: 800°C, constant rate of temperature rise in (40±5) minutes.

Test duration: 20 minutes at 800°C.

Analytical method used: complying with the prescription of the standard.

**LUOGO E DATA PROVA:** Prato, 02/04/2020

Place and test date

Operatore / Operator  
Dr. Valentina Melani



## RISULTATI / RESULTS

Componente <i>Component</i>	Quantità di acido alogenidrico gassoso <i>Halogen acid gas content</i>
Isolante / <i>Insulation</i>	<0.1%

**Nota:** come specificato in IEC 60754-1 paragrafo 1, il metodo in oggetto ha per scopo la determinazione della quantità di acidi alogenidrici gassosi, con esclusione dell'acido fluoridrico, che pertanto non fa parte del campo di applicazione di tale norma. Inoltre, in vista della quantità totale di acido alogenidrico gassoso inferiore allo 0.1%, cioè inferiore a 1 mg per grammo di campione, il dato riportato nel presente Rapporto di Prova viene integrato dai risultati della IEC 60754-2.

**Note:** as specified in IEC 60754-1 paragraph 1, the method in object has the scope of determining the quantity of halogen acid gas, with exclusion of hydrofluoric acid, that therefore does not make part of the field of application of this standard. Moreover, considering the total quantity of halogen acid gas found, less than 0.1%, that is less than 1 mg for gram of sample, the data reported are integrated with the results of IEC 60754-2.

### CEI EN 60754-2

#### PREPARAZIONE E CONDIZIONAMENTO

*Preparation and conditioning*

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

*Preparation and conditioning of the specimens have been effected according to the standard in object.*

#### PROCEDIMENTO DI PROVA

*Test procedure*

La prova è stata eseguita in conformità allo standard citato.

*The test has been effected according to the cited standard.*

## RISULTATI / RESULTS

Componente <i>Component</i> Isolante / <i>Insulation</i>	U.M. <i>M.U.</i>	Prova / Test 1	Prova / Test 2	Prova / Test 3	Media <i>Average</i>	Dev.st	CV (%)
pH	N/A	5.48	5.56	5.51	5.52	0.04	0.73
Conducibilità <i>Conducibility</i>	μS/mm	1.19	1.21	1.18	1.19	0.02	1.28

Media ponderata del pH, pH' / <i>Weighted average of pH, pH'</i>	5.52
Media ponderata della conducibilità / <i>Weighted average of conducibility</i>	1.19 (μS/mm)

**LUOGO E DATA PROVA:** Prato, 02/04/2020

*Place and test date*

**Operatore / Operator**

Dr. Valentina Melani

### CEI EN 50305

#### PROCEDIMENTO DI PROVA

##### Test procedure

La prova è stata eseguita in conformità allo standard citato. In particolare:

- Temperatura ambiente al momento della prova: 20°C
- Condizionamento del materiale: 48 h alla temperatura di (23 ± 2)°C e umidità relativa di (50±5)%
- L'apparecchiatura utilizzata è conforme a quanto riportato nella norma EN 50267-1
- L'alimentazione dell'aria è realizzata tramite aspirazione (Metodo 3 para. 4.6 della EN 50267-1)
- La combustione è effettuata alla temperatura di 800°C per 20 minuti (para.9.2.2.4 della EN 50305)
- La determinazione dell'indice di tossicità è effettuata in conformità alla EN 50305 dopo aver valutato la presenza di azoto e/o zolfo.
- Il metodo di analisi adottato è l'analisi in discontinuo (metodo E.2 para. 9.2.2.5 della EN 50305)
- Il calcolo dell'indice di tossicità è effettuato secondo le modalità riportate in para. 9.2.3 della EN 50305

*The test has been effected according to the cited standard. In particular:*

- *Temperature in the test facility during the test: 20 °C*
- *Conditioning of the specimen: 48 h at temperature of (23 ± 2)°C and (50±5)% relative humidity*
- *Test apparatus complying with EN 50267-1*
- *Air supply by suction (Method 3 para. 4.6 of EN 50267-1)*
- *Combustion at 800°C for 20 minutes (para. 9.2.2.4 of EN 50305)*
- *Determination of toxicity index according to EN 50305 after evaluating the presence of nitrogen and/or sulphur.*
- *Analytical methods: discontinuous (method E.2 para. 9.2.2.5 of EN 50305)*
- *Toxicity index calculation according to para. 9.2.3 of EN 50305.*

#### RISULTATI / RESULTS

Descrizione del componente <i>Component description</i>	Azoto <i>Nitrogen</i>	Zolfo <i>Sulphur</i>	Gas trovati (mg/g) <i>Gases found</i>		ITC (*)
Isolamento <i>Insulation</i>	Assente <i>Absent</i>	Assente <i>Absent</i>	1	CO <sub>2</sub> = 493 - CO= 44	3.1
			2	CO <sub>2</sub> = 470 - CO= 41	2.9
			3	CO <sub>2</sub> = 498 - CO= 44	3.1
			<b>Media / Average</b>	CO <sub>2</sub> = 487 - CO= 43	<b>3.0</b>

(\*) - Indice di tossicità calcolato secondo la norma in oggetto.

*Toxicity Index calculated referring test method in object.*

### CEI EN 60684-2

#### PROCEDIMENTO DI PROVA

##### Test procedure

La prova è stata eseguita in conformità allo standard citato.

Metodo analitico impiegato: metodo A secondo EN 60684-2 paragrafo 45.2.

*The test has been effected according to the standard cited.*

*Analytical method used: method A according to EN 60684-2 paragraph 45.2.*

#### RISULTATI / RESULTS

#### CALCOLO DELLA QUANTITÀ DI FLUORO

##### Fluorine quantitative determination

Descrizione componente / <i>Component description</i>	Contenuto di fluoro / <i>Content of fluorine</i>
Isolante / <i>Insulation</i>	< 0.02%

**LUOGO E DATA PROVA:** Prato, 02/04/2020

*Place and test date*

**Operatore / Operator**  
Dr. Valentina Melani



Foto / Photos

CEI IEC 60754-1 - CEI IEC 60754-2

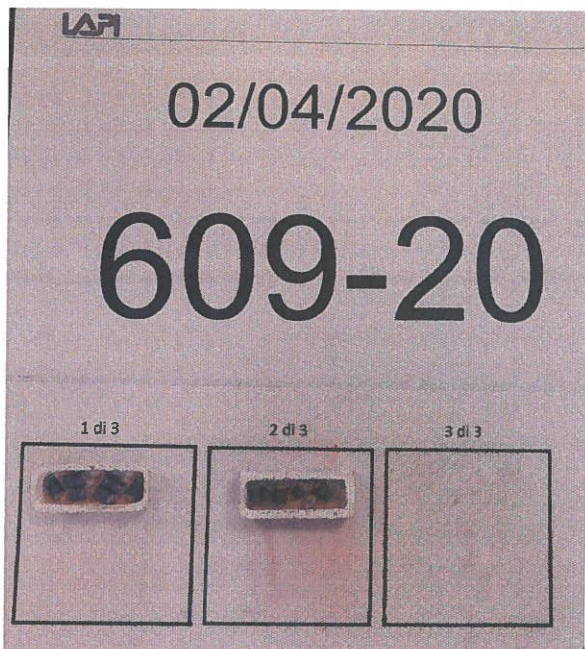


Foto 1: prima della prova / Picture 1: before testing

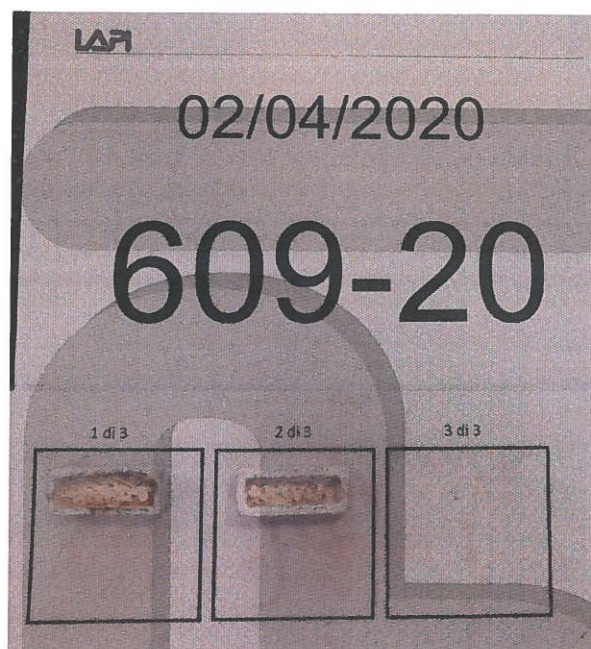


Foto 2: dopo la prova / Picture 2: after testing

CEI EN 50305 - CEI EN 60684-2

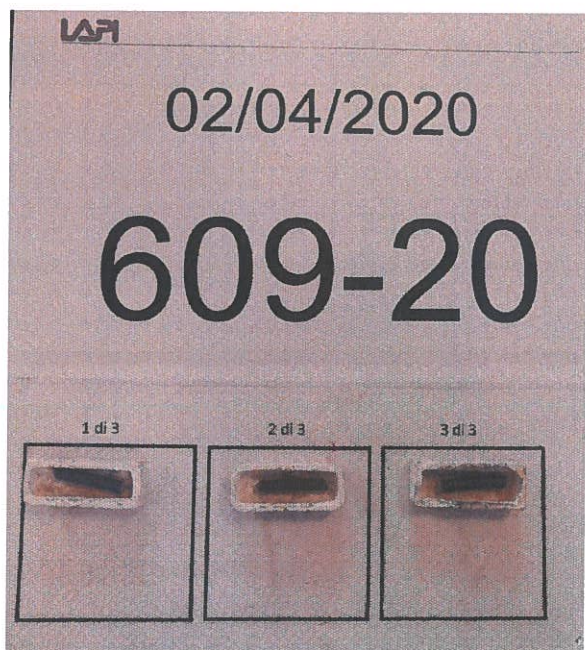


Foto 1: prima della prova / Picture 1: before testing

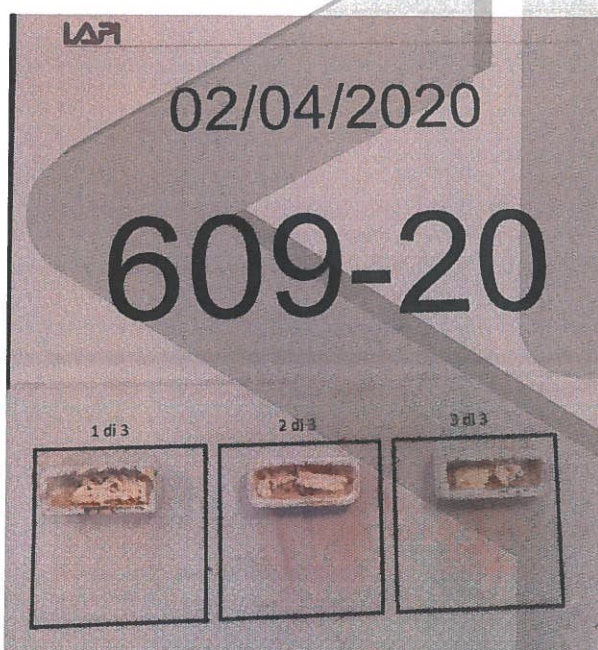


Foto 2: dopo la prova / Picture 2: after testing

**LUOGO E DATA PROVA:** Prato, 02/04/2020  
Place and test date

**Operatore / Operator**  
Dr. Valentina Melani



## RAPPORTO DI PROVA NO. 411.1CI0110/22

Test Report no.

**METODO DI PROVA:**

Test method

CEI EN 50305:2020, EN 50305:2020, BS EN 50305:2020

**DENOMINAZIONE DELLA PROVA:**

Description of the standard

Cavi aventi speciali requisiti in condizioni d'incendio - Indice tossicità.  
Cables having special fire performance - Toxicity index.

**RICHIEDENTE:**

Sponsor

HUBER+SUHNER AG

Tumbelenstrasse 20  
CH-8330 Pfäffikon ZH (Switzerland)

**DENOMINAZIONE DEL MATERIALE:**

Denomination of the material

RADOX EI109 / EM104 part no. 93004040  
(Nom. Dens.: 160 kg/m<sup>3</sup>)

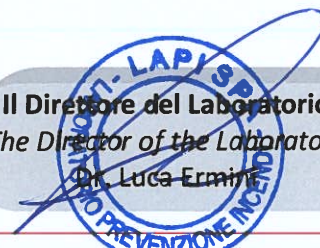
**DATA RICEVIMENTO DEI CAMPIONI:** 02/03/2022

Date of the samples receipt

- Il presente Rapporto di Prova è costituito da / This Test Report consists of:
- no. 3 pagine (compresa questa prima pagina) / no. 3 pages (including this one).
  - no. 2 allegati / no. 2 annexes.
- I risultati riportati in questo Rapporto si riferiscono esclusivamente al materiale sottoposto a prova fornito dal Richiedente (rif. codice Laboratorio no. 411/22). Un campione del materiale è stato conservato dal Laboratorio.
- The results reported in this Report refer exclusively to the material submitted to test sent by the Sponsor (ref. Laboratory code no. 411/22). A sample of the material has been retained by the Laboratory.*

Prato, 15/03/2022

Il Direttore del Laboratorio  
The Director of the Laboratory  
Dr. Luca Ermirio



## DESCRIZIONE DEL MATERIALE

### Description of the material

Aspetto: isolamento di colore naturale (nero) per cavo.

Appearance: insulation for cable of nature (black) colour.

Composizione (\*): RADOX EI109 / EM104 (composto per cavi reticolato di proprietà).

Composition (\*): RADOX EI109 / EM104 (proprietary crosslinked cable compound).

Densità nominale / Nominal density (\*): 160 kg/m<sup>3</sup>.

Lato esposto (\*): indifferente, materiale a facce uguali.

Side exposed (\*): either, the material has two identical sides.

Impiego / End use (\*): isolante cavo / cable insulation.

(\*) - Informazioni fornite dal Richiedente / Information supplied by the Sponsor.

**Nota:** il Laboratorio LAPI non ha ricevuto informazioni dettagliate riguardanti la composizione chimica dei componenti utilizzati per stratificare il prodotto finale. LAPI non è responsabile di qualsiasi corrispondenza tra la produzione e l'attuale prototipo sottoposto alle prove. Il Produttore è l'unico responsabile della garanzia di tracciabilità dei prodotti ed è altresì l'unico responsabile in caso di controversia.

**Note:** Laboratory LAPI has not received detailed information regarding the chemical compositions of the components used to stratify the final product. LAPI is not responsible at all of any correspondence between current production and prototype submitted to the tests. The producer is the only responsible to cover a traceability of the products and in any case give response in case of complain.

## DESCRIZIONE DELLA PROCEDURA DI CAMPIONAMENTO

### Description of the sampling procedure

Il campionamento del prodotto "RADOX EI109 / EM104 part no. 93004040" e inviato per il test è stato effettuato a cura del Richiedente dalla guaina del cavo RADOX EN50264-3-1 600V 1X400 M part no. 85146304 lotto di produzione no. 1004740193 c/o lo stabilimento di HUBER+SUHNER AG sito in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), in Febbraio 2022 (vedi dichiarazione allegata).

Il Laboratorio non è stato coinvolto in alcuna operazione di campionamento della produzione.

The sampling of the product "RADOX EI109 / EM104 part no. 93004040" and sent to be tested has been effected by the Sponsor from the sheath of the cable RADOX EN50264-3-1 600V 1X400 M part no. 85146304 production batch no. 1004740193 c/o the factory of HUBER+SUHNER AG located in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), on February 2022 (see declaration annexed).

The Laboratory has not been involved in any sampling procedure of the material from the production.

## PROCEDIMENTO DI PROVA

### Test procedure

La prova è stata eseguita in conformità allo standard citato. In particolare:

- Temperatura ambiente al momento della prova: 20°C
- Condizionamento del materiale: 48 h alla temperatura di (23 ± 2)°C e umidità relativa di (50±5)%
- L'apparecchiatura utilizzata è conforme a quanto riportato nella norma EN 50267-1
- L'alimentazione dell'aria è realizzata tramite aspirazione (Metodo 3 para. 4.6 della EN 50267-1)
- La combustione è effettuata alla temperatura di 800°C per 20 minuti (para.9.2.2.4 della EN 50305)
- La determinazione dell'indice di tossicità è effettuata in conformità alla EN 50305 dopo aver valutato la presenza di azoto e/o zolfo.
- Il metodo di analisi adottato è l'analisi in discontinuo (metodo E.2 para. 9.2.2.5 della EN 50305)
- Il calcolo dell'indice di tossicità è effettuato secondo le modalità riportate in para. 9.2.3 della EN 50305

**LUOGO E DATA PROVA:** Prato, 14/03/2022

Place and test date

Operatore / Operator  
Dr. Valentina Meloni



The test has been effected according to the cited standard. In particular:

- Temperature in the test facility during the test: 20 °C
- Conditioning of the specimen: 48 h at temperature of (23 ± 2)°C and (50±5)% relative humidity
- Test apparatus complying with EN 50267-1
- Air supply by suction (Method 3 para. 4.6 of EN 50267-1)
- Combustion at 800°C for 20 minutes (para. 9.2.2.4 of EN 50305)
- Determination of toxicity index according to EN 50305 after evaluating the presence of nitrogen and/or sulphur.
- Analytical methods: discontinuous (method E.2 para. 9.2.2.5 of EN 50305)
- Toxicity index calculation according to para. 9.2.3 of EN 50305.

### RISULTATI / RESULTS

Descrizione del componente <i>Component description</i>	Azoto <i>Nitrogen</i>	Zolfo <i>Sulphur</i>	Gas trovati (mg/g) <i>Gases found</i>		ITC (*)
			1	2	
Guaina / Sheath	Assente <i>Absent</i>	Assente <i>Absent</i>	1	CO <sub>2</sub> = 578 - CO= 41	3.0
			2	CO <sub>2</sub> = 555 - CO= 40	2.9
			3	CO <sub>2</sub> = 563 - CO= 40	2.9
			<b>Media / Average</b>	CO <sub>2</sub> = 565 - CO= 40	<b>2.9</b>

(\*) - Indice di tossicità calcolato secondo la norma in oggetto.  
*Toxicity Index calculated referring test method in object.*

### Foto / Photos



Foto 1: prima della prova / Picture 1: before testing



Foto 2: dopo la prova / Picture 2: after testing

**LUOGO E DATA PROVA:** Prato, 14/03/2022  
*Place and test date*

**Operatore / Operator**  
Dr. Valentina Melani





## RAPPORTO DI PROVA NO. 411.1CI0158/22

Test Report no.

**METODO DI PROVA:**

Test method

CEI EN 60754-1/A1:2020, EN 60754-1/A1:2020

**DENOMINAZIONE DELLA PROVA:**

Description of the standard

Prova su gas emessi durante la combustione di materiali prelevati dai cavi  
- Parte 1: Determinazione del contenuto di gas acido alogenidrico.  
Test on gases evolved during combustion of materials from cables -  
Part 1: Determination of the halogen acid gas content.

**RICHIEDENTE:**

Sponsor

HUBER+SUHNER AG

Tumbelenstrasse 20  
CH-8330 Pfäffikon ZH (Switzerland)

**DENOMINAZIONE DEL MATERIALE:**

Denomination of the material

RADOX EI109 / EM104 part no. 93004040  
(Nom. Dens.: 160 kg/m<sup>3</sup>)

**DATA RICEVIMENTO DEI CAMPIONI:** 02/03/2022

Date of the samples receipt

- Il presente Rapporto di Prova è costituito da / *This Test Report consists of:*
- no. 3 pagine (compresa questa prima pagina) / *no. 3 pages (including this one).*
  - no. 2 allegati / *no. 2 annexes.*
- I risultati riportati in questo Rapporto si riferiscono esclusivamente al materiale sottoposto a prova fornito dal Richiedente (rif. codice Laboratorio no. 411/22). Un campione del materiale è stato conservato dal Laboratorio.  
*The results reported in this Report refer exclusively to the material submitted to test sent by the Sponsor (ref. Laboratory code no. 411/22). A sample of the material has been retained by the Laboratory.*

Prato, 15/03/2022

Il Direttore del Laboratorio  
The Director of the Laboratory  
Dr. Luca Ermini

## DESCRIZIONE DEL MATERIALE

### Description of the material

Aspetto: isolamento di colore naturale (nero) per cavo.

*Appearance: insulation for cable of nature (black) colour.*

Composizione (\*): RADOX EI109 / EM104 (composto per cavi reticolato di proprietà).

*Composition (\*): RADOX EI109 / EM104 (proprietary crosslinked cable compound).*

Densità nominale / Nominal density (\*): 160 kg/m<sup>3</sup>.

Lato esposto (\*): indifferente, materiale a facce uguali.

*Side exposed (\*): either, the material has two identical sides.*

Impiego / End use (\*): isolante cavo / cable insulation.

(\* ) - Informazioni fornite dal Richiedente / Information supplied by the Sponsor.

**Nota:** il Laboratorio LAPI non ha ricevuto informazioni dettagliate riguardanti la composizione chimica dei componenti utilizzati per stratificare il prodotto finale. LAPI non è responsabile di qualsiasi corrispondenza tra la produzione e l'attuale prototipo sottoposto alle prove. Il Produttore è l'unico responsabile della garanzia di tracciabilità dei prodotti ed è altresì l'unico responsabile in caso di controversia.

**Note:** Laboratory LAPI has not received detailed information regarding the chemical compositions of the components used to stratify the final product. LAPI is not responsible at all of any correspondence between current production and prototype submitted to the tests. The producer is the only responsible to cover a traceability of the products and in any case give response in case of complain.

## DESCRIZIONE DELLA PROCEDURA DI CAMPIONAMENTO

### Description of the sampling procedure

Il campionamento del prodotto "RADOX EI109 / EM104 part no. 93004040" e inviato per il test è stato effettuato a cura del Richiedente dalla guaina del cavo RADOX EN50264-3-1 600V 1X400 M part no. 85146304 lotto di produzione no. 1004740193 c/o lo stabilimento di HUBER+SUHNER AG sito in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), in Febbraio 2022 (vedi dichiarazione allegata).

Il Laboratorio non è stato coinvolto in alcuna operazione di campionamento della produzione.

*The sampling of the product "RADOX EI109 / EM104 part no. 93004040" and sent to be tested has been effected by the Sponsor from the sheath of the cable RADOX EN50264-3-1 600V 1X400 M part no. 85146304 production batch no. 1004740193 c/o the factory of HUBER+SUHNER AG located in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), on February 2022 (see declaration annexed).*

*The Laboratory has not been involved in any sampling procedure of the material from the production.*

## PREPARAZIONE E CONDIZIONAMENTO

### Preparation and conditioning

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

*Preparation and conditioning of the specimens have been effected according to the standard in object.*

## PROCEDIMENTO DI PROVA

### Test procedure

La prova è stata eseguita in conformità allo standard citato.

Temperatura di prova: 800°C, previo gradiente costante di innalzamento della temperatura (40±5) minuti.

Durata della prova: 20 minuti a 800°C. Metodo analitico impiegato: conforme alle richieste del metodo.

*The test has been effected according to the cited standard.*

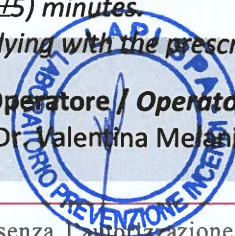
*Test temperature: 800°C, constant rate of temperature rise in (40±5) minutes.*

*Test duration: 20 minutes at 800°C. Analytical method used: complying with the prescription of the standard.*

**LUOGO E DATA PROVA:** Prato, 14/03/2022

*Place and test date*

Operatore / Operator  
Dr. Valentina Meloni



**RISULTATO / RESULT**

Componente <i>Component</i>	Quantità di acido alogenidrico gassoso <i>Halogen acid gas content</i>
Guaina / <i>Sheath</i>	<0.1%

**Nota:** come specificato in IEC 60754-1 paragrafo 1, il metodo in oggetto ha per scopo la determinazione della quantità di acidi alogenidrici gassosi, con esclusione dell'acido fluoridrico, che pertanto non fa parte del campo di applicazione di tale norma. Inoltre, in vista della quantità totale di acido alogenidrico gassoso inferiore allo 0.1%, cioè inferiore a 1 mg per grammo di campione, il dato riportato nel presente Rapporto di Prova viene integrato dai risultati della IEC 60754-2.

**Note:** as specified in IEC 60754-1 paragraph 1, the method in object has the scope of determining the quantity of halogen acid gas, with exclusion of hydrofluoric acid, that therefore does not make part of the field of application of this standard. Moreover, considering the total quantity of halogen acid gas found, less than 0.1%, that is less than 1 mg for gram of sample, the data reported are integrated with the results of IEC 60754-2.

**Foto / Photos**

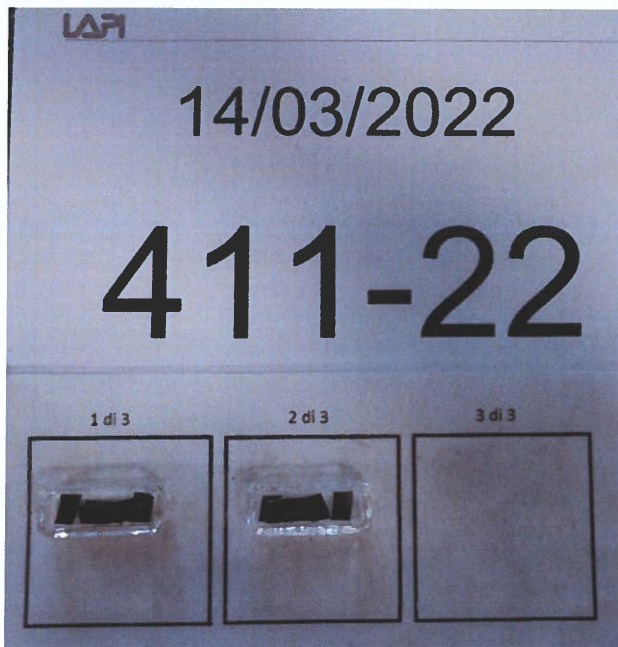


Foto 1: prima della prova / Picture 1: before testing



Foto 2: dopo la prova / Picture 2: after testing

**LUOGO E DATA PROVA:** Prato, 14/03/2022  
*Place and test date*

**Operatore / Operator**  
Dr. Valentina Melani



## RAPPORTO DI PROVA NO. 411.1CI0160/22

Test Report no.

**METODO DI PROVA:**

Test method

CEI EN 60754-2/A1:2020, EN 60754-2/A1:2020

**DENOMINAZIONE DELLA PROVA:**

Description of the standard

Prova su gas emessi durante la combustione di materiali prelevati dai cavi  
- Parte 2: Determinazione dell'acidità (mediante la misura del pH) e della conduttività.

Test on gases evolved during combustion of materials from cables -  
Part 2: Determination of acidity (by pH measuring) and conductivity.

**RICHIEDENTE:**

Sponsor

HUBER+SUHNER AG

Tumbelenstrasse 20  
CH-8330 Pfäffikon ZH (Switzerland)

**DENOMINAZIONE DEL MATERIALE:**

Denomination of the material

RADOX EI109 / EM104 part no. 93004040  
(Nom. Dens.: 160 kg/m<sup>3</sup>)

**DATA RICEVIMENTO DEI CAMPIONI:** 02/03/2022

Date of the samples receipt

- Il presente Rapporto di Prova è costituito da / *This Test Report consists of:*
  - no. 3 pagine (compresa questa prima pagina) / *no. 3 pages (including this one).*
  - no. 2 allegati / *no. 2 annexes.*
- I risultati riportati in questo Rapporto si riferiscono esclusivamente al materiale sottoposto a prova fornito dal Richiedente (rif. codice Laboratorio no. 411/22). Un campione del materiale è stato conservato dal Laboratorio.  
*The results reported in this Report refer exclusively to the material submitted to test sent by the Sponsor (ref. Laboratory code no. 411/22). A sample of the material has been retained by the Laboratory.*

Prato, 15/03/2022

Il Direttore del Laboratorio  
The Director of the Laboratory

Dr. Luca Ermola

## DESCRIZIONE DEL MATERIALE

### Description of the material

Aspetto: isolamento di colore naturale (nero) per cavo.

Appearance: insulation for cable of nature (black) colour.

Composizione (\*): RADOX EI109 / EM104 (composto per cavi reticolato di proprietà).

Composition (\*): RADOX EI109 / EM104 (proprietary crosslinked cable compound).

Densità nominale / Nominal density (\*): 160 kg/m<sup>3</sup>.

Lato esposto (\*): indifferente, materiale a facce uguali.

Side exposed (\*): either, the material has two identical sides.

Impiego / End use (\*): isolante cavo / cable insulation.

(\* ) - Informazioni fornite dal Richiedente / Information supplied by the Sponsor.

**Nota:** il Laboratorio LAPI non ha ricevuto informazioni dettagliate riguardanti la composizione chimica dei componenti utilizzati per stratificare il prodotto finale. LAPI non è responsabile di qualsiasi corrispondenza tra la produzione e l'attuale prototipo sottoposto alle prove. Il Produttore è l'unico responsabile della garanzia di tracciabilità dei prodotti ed è altresì l'unico responsabile in caso di controversia.

**Note:** Laboratory LAPI has not received detailed information regarding the chemical compositions of the components used to stratify the final product. LAPI is not responsible at all of any correspondence between current production and prototype submitted to the tests. The producer is the only responsible to cover a traceability of the products and in any case give response in case of complain.

## DESCRIZIONE DELLA PROCEDURA DI CAMPIONAMENTO

### Description of the sampling procedure

Il campionamento del prodotto "RADOX EI109 / EM104 part no. 93004040" e inviato per il test è stato effettuato a cura del Richiedente dalla guaina del cavo RADOX EN50264-3-1 600V 1X400 M part no. 85146304 lotto di produzione no. 1004740193 c/o lo stabilimento di HUBER+SUHNER AG sito in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), in Febbraio 2022 (vedi dichiarazione allegata).

Il Laboratorio non è stato coinvolto in alcuna operazione di campionamento della produzione.

The sampling of the product "RADOX EI109 / EM104 part no. 93004040" and sent to be tested has been effected by the Sponsor from the sheath of the cable RADOX EN50264-3-1 600V 1X400 M part no. 85146304 production batch no. 1004740193 c/o the factory of HUBER+SUHNER AG located in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), on February 2022 (see declaration annexed).

The Laboratory has not been involved in any sampling procedure of the material from the production.

## PREPARAZIONE E CONDIZIONAMENTO

### Preparation and conditioning

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

Preparation and conditioning of the specimens have been effected according to the standard in object.

## PROCEDIMENTO DI PROVA

### Test procedure

La prova è stata eseguita in conformità allo standard citato.

The test has been effected according to the cited standard.

**LUOGO E DATA PROVA:** Prato, 14/03/2022

Place and test date

Operatore / Operator  
Dr. Valentina Melani



**RISULTATI / RESULTS**

Componente Component Guaina / Sheath	U.M. M.U.	Prova / Test 1	Prova / Test 2	Prova / Test 3	Media Average	Dev.st	CV (%)
pH	N/A	5.68	5.62	5.65	<b>5.65</b>	0.03	0.53
Conducibilità Conductivity	μS/mm	1.03	0.99	1.00	<b>1.01</b>	0.02	1.91

Media ponderata del pH, pH' / Weighted average of pH, pH'	<b>5.65</b>
Media ponderata della conducibilità / Weighted average of conductivity	<b>1.01 (μS/mm)</b>

**Foto / Photos**



Foto 1: prima della prova / Picture 1: before testing



Foto 2: dopo la prova / Picture 2: after testing

**LUOGO E DATA PROVA:** Prato, 14/03/2022  
Place and test date

**Operatore / Operator**  
Dr. Valentina Melani



## RAPPORTO DI PROVA NO. 411.1CI0145/22

Test Report no.

**METODO DI PROVA:**

Test method

CEI EN 60684-2:2012 limitatamente al punto 45.2 metodo A

**DENOMINAZIONE DELLA PROVA:**

Description of the standard

Determinazione dei bassi livelli di fluoro

Determination of low levels of fluoride

**RICHIEDENTE:**

Sponsor

HUBER+SUHNER AG

Tumbelenstrasse 20

CH-8330 Pfäffikon ZH (Switzerland)

**DENOMINAZIONE DEL MATERIALE:**

Denomination of the material

RADOX EI109 / EM104 part no. 93004040

(Nom. Dens.: 160 kg/m<sup>3</sup>)

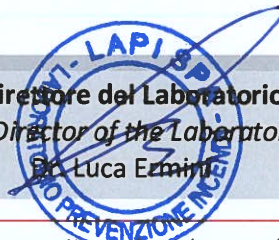
**DATA RICEVIMENTO DEI CAMPIONI:** 02/03/2022

Date of the samples receipt

- 
- Il presente Rapporto di Prova è costituito da / *This Test Report consists of:*
- no. 3 pagine (compresa questa prima pagina) / *no. 3 pages (including this one).*
  - no. 2 allegati / *no. 2 annexes.*
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- The results reported in this Report refer exclusively to the material submitted to test sent by the Sponsor (ref. Laboratory code no. 411/22). A sample of the material has been retained by the Laboratory.*
- 

Prato, 15/03/2022

Il Direttore del Laboratorio  
The Director of the Laboratory  
Dr. Luca Ermirli



## DESCRIZIONE DEL MATERIALE

### *Description of the material*

Aspetto: isolamento di colore naturale (nero) per cavo.

*Appearance: insulation for cable of nature (black) colour.*

Composizione (\*): RADOX EI109 / EM104 (composto per cavi reticolato di proprietà).

*Composition (\*): RADOX EI109 / EM104 (proprietary crosslinked cable compound).*

Densità nominale / *Nominal density* (\*): 160 kg/m<sup>3</sup>.

Lato esposto (\*): indifferente, materiale a facce uguali.

*Side exposed (\*): either, the material has two identical sides.*

Impiego / *End use* (\*): isolante cavo / *cable insulation.*

(\* ) - Informazioni fornite dal Richiedente / *Information supplied by the Sponsor.*

**Nota:** il Laboratorio LAPI non ha ricevuto informazioni dettagliate riguardanti la composizione chimica dei componenti utilizzati per stratificare il prodotto finale. LAPI non è responsabile di qualsiasi corrispondenza tra la produzione e l'attuale prototipo sottoposto alle prove. Il Produttore è l'unico responsabile della garanzia di tracciabilità dei prodotti ed è altresì l'unico responsabile in caso di controversia.

**Note:** Laboratory LAPI has not received detailed information regarding the chemical compositions of the components used to stratify the final product. LAPI is not responsible at all of any correspondence between current production and prototype submitted to the tests. The producer is the only responsible to cover a traceability of the products and in any case give response in case of complain.

## DESCRIZIONE DELLA PROCEDURA DI CAMPIONAMENTO

### *Description of the sampling procedure*

Il campionamento del prodotto "RADOX EI109 / EM104 part no. 93004040" e inviato per il test è stato effettuato a cura del Richiedente dalla guaina del cavo RADOX EN50264-3-1 600V 1X400 M part no. 85146304 lotto di produzione no. 1004740193 c/o lo stabilimento di HUBER+SUHNER AG sito in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), in Febbraio 2022 (vedi dichiarazione allegata).

Il Laboratorio non è stato coinvolto in alcuna operazione di campionamento della produzione.

*The sampling of the product "RADOX EI109 / EM104 part no. 93004040" and sent to be tested has been effected by the Sponsor from the sheath of the cable RADOX EN50264-3-1 600V 1X400 M part no. 85146304 production batch no. 1004740193 c/o the factory of HUBER+SUHNER AG located in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), on February 2022 (see declaration annexed).*

*The Laboratory has not been involved in any sampling procedure of the material from the production.*

## PREPARAZIONE E CONDIZIONAMENTO

### *Preparation and conditioning*

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

*Preparation and conditioning of the specimens have been effected according to the standard in object.*

**LUOGO E DATA PROVA:** Prato, 14/03/2022

*Place and test date*

Operatore / *Operator*  
Dr. Valentin Meloni





### PROCEDIMENTO DI PROVA

#### Test procedure

La prova è stata eseguita in conformità allo standard citato.

Metodo analitico impiegato: metodo A secondo EN 60684-2 paragrafo 45.2.

*The test has been effected according to the standard cited.*

*Analytical method used: method A according to EN 60684-2 paragraph 45.2.*

### RISULTATO / RESULT

#### CALCOLO DELLA QUANTITÀ DI FLUORO

##### Fluorine quantitative determination

Descrizione componente / Component description	Contenuto di fluoro / Content of fluorine
Guaina / Sheath	< 0.02%

#### Foto / Photos



Foto 1: prima della prova / Picture 1: before testing



Foto 2: dopo la prova / Picture 2: after testing

**LUOGO E DATA PROVA:** Prato, 14/03/2022

*Place and test date*

**Operatore / Operator**

Dr. Valentina Melani



## RAPPORTO DI PROVA NO. 1510.1CI0165/20

Test Report no.

**METODO DI PROVA / Test method:** CEI EN 60754-1:2015, EN 60754-1:2014-04

**DENOMINAZIONE DELLA PROVA:**  
Description of the standard

Prova su gas emessi durante la combustione di materiali prelevati dai cavi  
- Parte 1: Determinazione del contenuto di gas acido alogenidrico.  
Test on gases evolved during combustion of materials from cables -  
Part 1: Determination of the halogen acid gas content.

**METODO DI PROVA / Test method:** CEI EN 60754-2:2015, EN 60754-2:2014-04

**DENOMINAZIONE DELLA PROVA:**  
Description of the standard

Prova su gas emessi durante la combustione di materiali prelevati dai cavi  
- Parte 2: Determinazione dell'acidità (mediante la misura del pH) e della  
conduttività.  
Test on gases evolved during combustion of materials from cables -  
Part 2: Determination of acidity (by pH measuring) and conductivity.

**METODO DI PROVA / Test method:** CEI EN 50305:2003, EN 50305:2002, BS EN 50305:2002 paragrafo 9.2

**DENOMINAZIONE DELLA PROVA:**  
Description of the standard

Cavi aventi speciali requisiti in condizioni d'incendio - Metodi di prova.  
Cables having special fire performance. Test methods.

**METODO DI PROVA / Test method:** CEI EN 60684-2:2012 limitatamente al punto 45.2 metodo A

**DENOMINAZIONE DELLA PROVA:**  
Description of the standard

Determinazione dei bassi livelli di fluoro  
Determination of low levels of fluoride

**RICHIEDENTE:**  
Sponsor

HUBER+SUHNER AG  
Tumbelenstrasse 20  
CH-8330 Pfäffikon ZH (Switzerland)

**DENOMINAZIONE DEL MATERIALE:**  
Denomination of the material

RADOX EI 303 part no. 93031580  
(Nom. Dens.: 1.42 g/cm<sup>3</sup>)

**DATA RICEVIMENTO DEI CAMPIONI:** 15/09/2020  
Date of the samples receipt

- Il presente Rapporto di Prova è costituito da / This Test Report consists of:
- no. 5 pagine (compresa questa prima pagina) / no. 5 pages (including this one).
  - no. 2 allegati / no. 2 annexes.
- I risultati riportati in questo Rapporto si riferiscono esclusivamente al materiale sottoposto a prova fornito dal Richiedente (rif. codice Laboratorio no. 1510/20). Un campione del materiale è stato conservato dal Laboratorio.
- The results reported in this Report refer exclusively to the material submitted to test sent by the Sponsor (ref. lab. code no. 1510/20). A sample of the material has been retained by the Laboratory.*

Prato, 29/09/2020

Il Direttore del Laboratorio  
The Director of the Laboratory  
Dr. Luca Ermini

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## DESCRIZIONE DEL MATERIALE

### Description of the material

Aspetto: isolamento cavo di colore naturale (biancastro).

Appearance: cable insulation of natural (whitish) colour.

Composizione (\*): RADOX EI 303 (composto cavo di proprietà).

Composition (\*): RADOX EI 303 (proprietary cable compound).

Densità nominale / Nominal density (\*): 1.42 g/cm<sup>3</sup>.

Materiale isotropo / Isotropic material (\*).

Impiego / End use (\*): isolante cavo / cable insulation.

(\*) - Informazioni fornite dal Richiedente / Information supplied by the Sponsor.

**Nota:** il Laboratorio LAPI non ha ricevuto informazioni dettagliate riguardanti la composizione chimica dei componenti utilizzati per fare il prodotto finale. LAPI non è responsabile di qualsiasi corrispondenza tra la produzione e l'attuale prototipo sottoposto alle prove. Il Produttore è l'unico responsabile della garanzia di tracciabilità dei prodotti ed è altresì l'unico responsabile in caso di controversia.

**Note:** Laboratory LAPI has not received detailed information regarding the chemical compositions of the components used to make the final product. LAPI is not responsible at all of any correspondence between current production and prototype submitted to the tests. The producer is the only responsible to cover a traceability of the products and in any case give response in case of complain.

## DESCRIZIONE DELLA PROCEDURA DI CAMPIONAMENTO

### Description of the sampling procedure

Il campionamento del prodotto "RADOX EI 303 part no. 93031580" e inviato per il test è stato effettuato a cura del Richiedente dal cavo RADOX TENUIS-TW 600V 1X4 M WH part no. 12581455 ordine no. 232914 (08-2020) c/o lo stabilimento di HUBER+SUHNER AG sito in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), in data 02 Settembre 2020 (vedi dichiarazione allegata).

Il Laboratorio non è stato coinvolto in alcuna operazione di campionamento della produzione.

The sampling of the product "RADOX EI 303 part no. 93031580" and sent to be tested has been effected by the Sponsor from the cable RADOX TENUIS-TW 600V 1X4 M WH part no. 12581455 order no. 232914 (08-2020) c/o the factory of HUBER+SUHNER AG located in Tumbelenstrasse 20 - CH-8330 Pfäffikon ZH (Switzerland), on 02<sup>nd</sup> September 2020 (see declaration annexed).

The Laboratory has not been involved in any sampling procedure of the material from the production.

## CEI EN 60754-1

## PREPARAZIONE E CONDIZIONAMENTO

### Preparation and conditioning

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

Preparation and conditioning of the specimens have been effected according to the standard in object.

## PROCEDIMENTO DI PROVA

### Test procedure

La prova è stata eseguita in conformità allo standard citato.

Temperatura di prova: 800°C, previo gradiente costante di innalzamento della temperatura (40±5) minuti.

Durata della prova: 20 minuti a 800°C.

Metodo analitico impiegato: conforme alle richieste del metodo.

The test has been effected according to the cited standard.

Test temperature: 800°C, constant rate of temperature rise in (40±5) minutes.

Test duration: 20 minutes at 800°C.

Analytical method used: complying with the prescription of the standard.

**LUOGO E DATA PROVA:** Prato, 25/09/2020

Place and test date

LAPI SP...  
LABORATORIO  
OPERATORE  
Dr. Valentina Melani

### RISULTATI / RESULTS

Componente <i>Component</i>	Quantità di acido alogenidrico gassoso <i>Halogen acid gas content</i>
Isolante / <i>Insulation</i>	<0.1%

**Nota:** come specificato in IEC 60754-1 paragrafo 1, il metodo in oggetto ha per scopo la determinazione della quantità di acidi alogenidrici gassosi, con esclusione dell'acido fluoridrico, che pertanto non fa parte del campo di applicazione di tale norma. Inoltre, in vista della quantità totale di acido alogenidrico gassoso inferiore allo 0.1%, cioè inferiore a 1 mg per grammo di campione, il dato riportato nel presente Rapporto di Prova viene integrato dai risultati della IEC 60754-2.

**Note:** as specified in IEC 60754-1 paragraph 1, the method in object has the scope of determining the quantity of halogen acid gas, with exclusion of hydrofluoric acid, that therefore does not make part of the field of application of this standard. Moreover, considering the total quantity of halogen acid gas found, less than 0.1%, that is less than 1 mg for gram of sample, the data reported are integrated with the results of IEC 60754-2.

### CEI EN 60754-2

#### PREPARAZIONE E CONDIZIONAMENTO

*Preparation and conditioning*

Preparazione e condizionamento dei provini sono stati eseguiti in conformità allo standard in oggetto.

*Preparation and conditioning of the specimens have been effected according to the standard in object.*

#### PROCEDIMENTO DI PROVA

*Test procedure*

La prova è stata eseguita in conformità allo standard citato.

*The test has been effected according to the cited standard.*

### RISULTATI / RESULTS

Componente <i>Component</i>	U.M. <i>M.U.</i>	Prova / Test 1	Prova / Test 2	Prova / Test 3	Media <i>Average</i>	Dev.st	CV (%)
Isolante / <i>Insulation</i>							
pH	N/A	5.67	5.63	5.61	5.64	0.03	0.54
Conducibilità <i>Conducibility</i>	μS/mm	1.07	1.06	1.04	1.06	0.02	1.45

Media ponderata del pH, pH' / <i>Weighted average of pH, pH'</i>	5.64
Media ponderata della conducibilità / <i>Weighted average of conducibility</i>	1.06 (μS/mm)

LUOGO E DATA PROVA: Prato, 25/09/2020

*Place and test date*

Operatore / *Operator*  
Dr. Valentina Melani



**CEI EN 50305**

**PROCEDIMENTO DI PROVA**

*Test procedure*

La prova è stata eseguita in conformità allo standard citato. In particolare:

- Temperatura ambiente al momento della prova: 20°C
- Condizionamento del materiale: 48 h alla temperatura di (23 ± 2)°C e umidità relativa di (50±5)%
- L'apparecchiatura utilizzata è conforme a quanto riportato nella norma EN 50267-1
- L'alimentazione dell'aria è realizzata tramite aspirazione (Metodo 3 para. 4.6 della EN 50267-1)
- La combustione è effettuata alla temperatura di 800°C per 20 minuti (para.9.2.2.4 della EN 50305)
- La determinazione dell'indice di tossicità è effettuata in conformità alla EN 50305 dopo aver valutato la presenza di azoto e/o zolfo.
- Il metodo di analisi adottato è l'analisi in discontinuo (metodo E.2 para. 9.2.2.5 della EN 50305)
- Il calcolo dell'indice di tossicità è effettuato secondo le modalità riportate in para. 9.2.3 della EN 50305

*The test has been effected according to the cited standard. In particular:*

- *Temperature in the test facility during the test: 20 °C*
- *Conditioning of the specimen: 48 h at temperature of (23 ± 2)°C and (50±5)% relative humidity*
- *Test apparatus complying with EN 50267-1*
- *Air supply by suction (Method 3 para. 4.6 of EN 50267-1)*
- *Combustion at 800°C for 20 minutes (para. 9.2.2.4 of EN 50305)*
- *Determination of toxicity index according to EN 50305 after evaluating the presence of nitrogen and/or sulphur.*
- *Analytical methods: discontinuous (method E.2 para. 9.2.2.5 of EN 50305)*
- *Toxicity index calculation according to para. 9.2.3 of EN 50305.*

**RISULTATI / RESULTS**

Descrizione del componente <i>Component description</i>	Azoto <i>Nitrogen</i>	Zolfo <i>Sulphur</i>	Gas trovati (mg/g) <i>Gases found</i>		ITC (*)
			1	2	
Isolamento <i>Insulation</i>	Assente <i>Absent</i>	Assente <i>Absent</i>	1	CO <sub>2</sub> = 459 - CO= 28	2.1
			2	CO <sub>2</sub> = 483 - CO= 29	2.2
			3	CO <sub>2</sub> = 472 - CO= 27	2.1
			<b>Media / Average</b>	CO <sub>2</sub> = 471 - CO= 28	2.1

(\*) - Indice di tossicità calcolato secondo la norma in oggetto.

*Toxicity Index calculated referring test method in object.*

**CEI EN 60684-2**

**PROCEDIMENTO DI PROVA**

*Test procedure*

La prova è stata eseguita in conformità allo standard citato.

Metodo analitico impiegato: metodo A secondo EN 60684-2 paragrafo 45.2.

*The test has been effected according to the standard cited.*

*Analytical method used: method A according to EN 60684-2 paragraph 45.2.*

**RISULTATI / RESULTS**

**CALCOLO DELLA QUANTITÀ DI FLUORO**

*Fluorine quantitative determination*

Descrizione componente / <i>Component description</i>	Contenuto di fluoro / <i>Content of fluorine</i>
Isolante / <i>Insulation</i>	< 0.02%

**LUOGO E DATA PROVA:** Prato, 25/09/2020

*Place and test date*

**Operatore / Operator**  
Dr. Valentina Melani

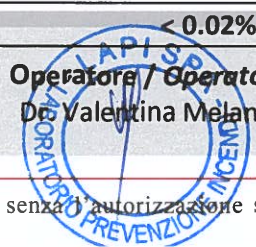


Foto / Photos

CEI IEC 60754-1 - CEI IEC 60754-2



Foto 1: prima della prova / Picture 1: before testing

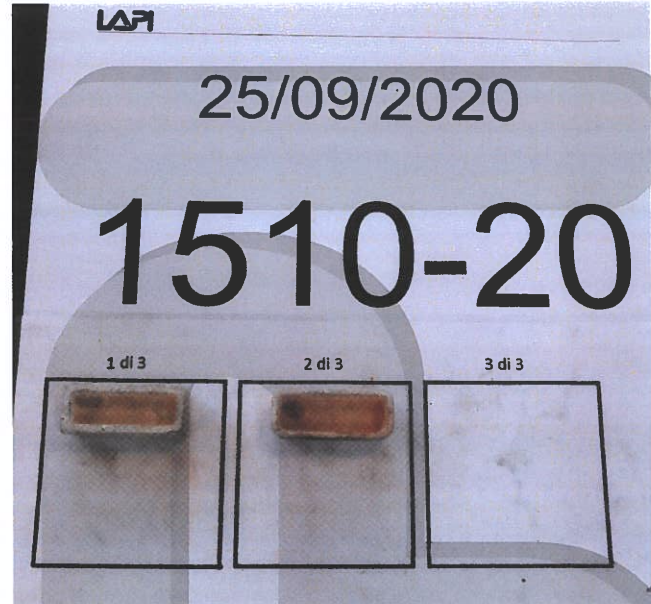


Foto 2: dopo la prova / Picture 2: after testing

CEI EN 50305 - CEI EN 60684-2



Foto 1: prima della prova / Picture 1: before testing

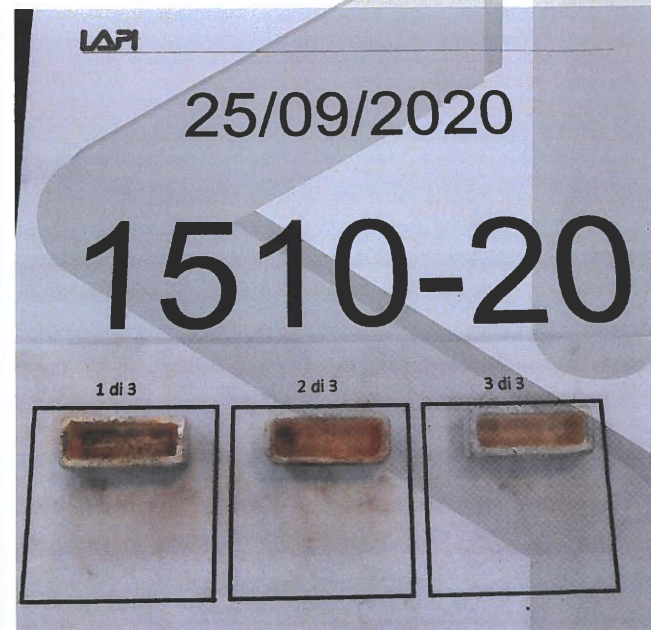


Foto 2: dopo la prova / Picture 2: after testing

**LUOGO E DATA PROVA:** Prato, 25/09/2020  
Place and test date

**Operatore / Operator**  
Dr. Valentina Melani



HUBER+SUHNER AG  
Low Frequency Division  
Tumbelenstrasse 20  
CH-8330 PFAEFFIKON ZH  
Switzerland

## Test for vertical flame propagation for a single insulated wire or cable according to EN 60332-1-2

(2 appendices)

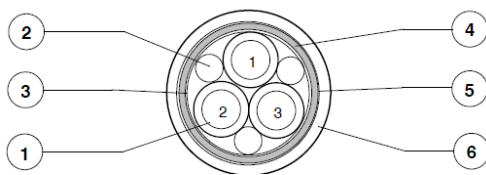
### Introduction

RISE Safety has by request of HUBER+SUHNER AG performed a fire test according to EN 45545-2 which refer to EN 60332-1-2. The purpose of the tests is to form a basis for technical fire classification.

### Product description

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 2X0.5 MM S
Article number:	12568117
Nominal diameter (mm):	4.8
Batch number:	2017107
Date of manufacture:	Week 40-2018



### Components:

- Stranded tin plated copper acc. to EN 50306-2
- Insulation RADOX EI 303
- Filler (optional): RADOX 125 REC
- Separator Tape (optional)
- Tin plated copper braid
- Separator Tape
- Sheath RADOX EM 104

*Notes by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENIUS-TW 600V 2X0.5 MM S 12568117-2017107 40-2018 CRCC10218P11529R1M".*

Photographs of a specimen of the tested product are shown in appendix 2.

According to the standard EN 45545-2, table 2, the product is defined as a "Listed Product" to which the following parameters apply:

### RISE Research Institutes of Sweden AB

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SE-501 15 BORÅS	SE-504 62 BORÅS	+46 33 13 55 02
Sweden		info@ri.se

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Product No: EL1A / EL1B  
 Location: Interior / Exterior  
 Description: Interiors / Exterior located  
 Product name: Cables for interior / Cables for exterior  
 Requirement Set: R15 / R16

**Manufacturer**

Huber+Suhner AG, Pfaeffikon ZH, Switzerland.

**Sampling**

The sample was selected by the client. It is not known to RISE Safety – Fire Research if the cable received is representative of the mean production characteristics.

The sample was received March 5, 2019 at RISE Safety – Fire Research.

**Test results**

A summary of the test results is shown in the table below. Detailed test results are given in appendix 1. Photographs of a specimen of the tested product are shown in appendix 2.

<b>Standard</b>	<b>Parameter</b>	<b>Test value</b>
EN 60332-1-2:2004+A1:2015	Unaffected length (unburned part) of cable measured from the lower edge of the top support (mm)	420
EN 60332-1-2:2004+A1:2015	Total damaged length (burned part) of cable (mm)	65

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.



**Note**

The accreditation referred to is valid for EN 60332-1-2:2004+A1:2015.

In order to achieve reaction to fire classification according to EN 45545-2, the product should be tested according to several test methods listed by requirement set No. R15/R16.

A reported result is compliant if it is equal to the requirement after rounding to the specified requirement level plus one digit.

**RISE Research Institutes of Sweden AB  
Safety - Fire Research Materials**

Performed by



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**Appendices**

1. Test results EN 60332-1-2:2004+A1:2015+A11:2016
2. Photographs EN 60332-1-2:2004+A1:2015+A11:2016

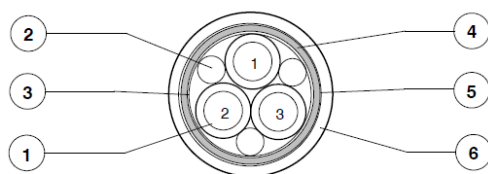
Appendix 1

**Test results EN 60332-1-2:2004+A1:2015+A11:2016**

**Product**

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 2X0.5 MM S
Article number:	12568117
Nominal diameter (mm):	4.8
Batch number:	2017107
Date of manufacture:	Week 40-2018



**Components:**

- Stranded tin plated copper acc. to EN 50306-2
- Insulation RADOX EI 303
- Filler (optional): RADOX 125 REC
- Separator Tape (optional)
- Tin plated copper braid
- Separator Tape
- Sheath RADOX EM 104

*Notes by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENUIS-TW 600V 2X0.5 MM S 12568117-2017107 40-2018 CRCC10218P11529R1M".*

**Test results**

Length of test sample: 600 mm.

**Observations during fire test**

The gas flame was applied, s	0
The gas flame was removed, s	60
After flame time, s	7

**Observations after fire test**

Unaffected length (unburned part) of cable measured from the lower edge of the top support, mm	420
Total damaged length (burned part) of cable, mm	65

**Measured data**

Diameter: 4.7 mm.  
Weight per 600 mm: 23.4 g.

## Appendix 1

### Conditioning

Temperature:  $(23 \pm 5)$  °C.

Relative humidity:  $(50 \pm 20)$  %.

### Date of test

March 29, 2019.

## Appendix 2

**Photographs EN 60332-1-2:2004+A1:2015+A11:2016**

*Photo 1. Prior to test, marking on the cable.*



*Photo 2. Prior to test, cross section.*

HUBER+SUHNER AG  
Low Frequency Division  
Tumbelenstrasse 20  
CH-8330 PFAEFFIKON ZH  
Switzerland

## Test on electric and optical fibre cables under fire conditions according to EN 60332-3-25

(2 appendices)

### Introduction

RISE Safety has by request of Huber+Suhner AG performed a fire test according to EN 60332-3-25. The purpose of the tests is to form a basis for technical fire classification.

### Product description

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 2X0.5 MM S
Article number:	12568117
Nominal diameter (mm):	4.8
Batch number:	2351324
Date of manufacture:	Week 19-2020

Detailed product description is held on file by RISE.

*Notes by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENUIS-TW 600V 2X0.5 MM S 12568117-2351324 19-2020 CRCC10218P11529R1M".*

Photographs of a specimen of the tested product are shown in appendix 2.

### Manufacturer

Huber+Suhner AG, Pfaeffikon ZH, Switzerland.

### Sampling

The sample was selected by the client. It is not known to RISE Safety – Fire Research if the cable received is representative of the mean production characteristics.

The sample was received March 28, 2020 at RISE Safety – Fire Research.

### RISE Research Institutes of Sweden AB

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Sweden		info@ri.se

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**Test results**

A summary of the test results is shown in the table below. Detailed test results are given in appendix 1. Photographs of a specimen of the tested product are shown in appendix 2.

Standard	Parameter	Test value
EN 60332-3-25:2009	Charred portion of the tested cable (m)	0.44

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

**Note**

The accreditation referred to is valid for EN 60332-3-25.

**RISE Research Institutes of Sweden AB  
Safety - Fire Research Materials**

Performed by

Examined by

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Daniel Schlosser

Per Thureson

**Appendices**

1. Test results EN 60332-3-25:2009
2. Photographs EN 60332-3-25:2009

Appendix 1

**Test results EN 60332-3-25:2009**

**Product**

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 2X0.5 MM S
Article number:	12568117
Nominal diameter (mm):	4.8
Batch number:	2351324
Date of manufacture:	Week 19-2020

Detailed product description is held on file by RISE.

*Notes by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENIUS-TW 600V 2X0.5 MM S 12568117-2351324 19-2020 CRCC10218P11529R1M".*

**Test specification**

---

Internal test specimen number	1224mA
Amount of non-metallic material, l/m:	0.5 l/m
Number of bundles based on nominal diameter:	3
Number of layers:	1
Number of test pieces in each layer:	12 x 3
Measured outer diameter, mm:	4.7
Mounting:	The cables were mounted on a cable ladder by RISE Safety. Mounting was done according to EN 60332-3-25 with deviations given in EN 50305. The spacing between the bundles was half the bundle diameter. See photographs in appendix 2.
Number of burners:	1
Application time of ignition burner, min:	20

---

**Test results**

---

Damaged length, m:	0.44
After flame time, min:s:	00:00

---

Appendix 1

**Observations**

No droplets. No other observations.

**Conditioning**

Temperature ( $23 \pm 5$ ) °C.

**Date of test**

June 17, 2020.



Appendix 2

Photographs EN 60332-3-25:2009



Photo 1. Prior to test, marking on the cable.

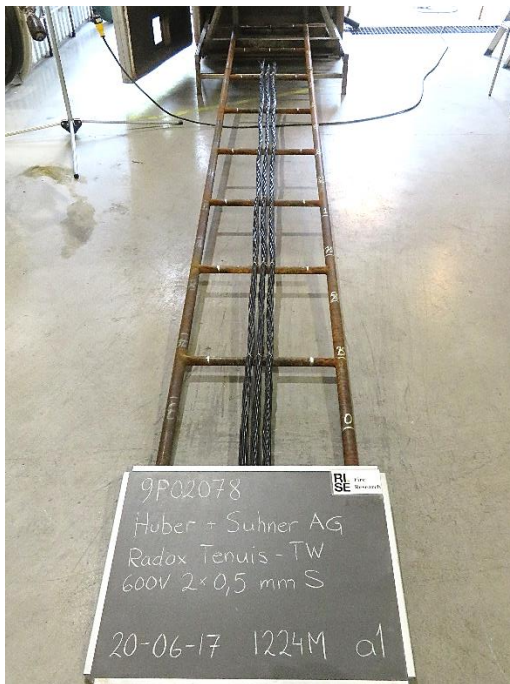


Photo 2. Prior to test, front side.

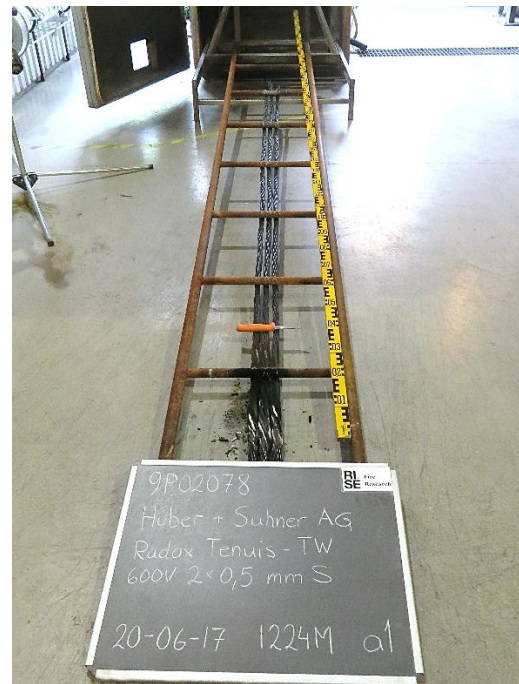


Photo 3. After test, rear side.



Photo 4. After test, rear side.

HUBER+SUHNER AG  
 Low Frequency Division  
 Tumbelenstrasse 20  
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 Switzerland

## Measurement of smoke density of cables burning under defined conditions according to EN 61034-2

(2 appendices)

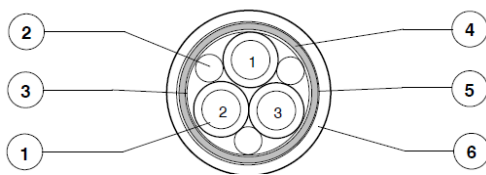
### Introduction

RISE Safety has by request of HUBER+SUHNER AG performed a fire test according to EN 45545-2 which refer to EN 61034-2. The purpose of the test is to form a basis for technical fire classification.

### Product description

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 2X0.5 MM S
Article number:	12568117
Nominal diameter (mm):	4.8
Batch number:	2017107
Date of manufacture:	Week 40-2018



### Components:

- Stranded tin plated copper acc. to EN 50306-2
- Insulation RADOX EI 303
- Filler (optional): RADOX 125 REC
- Separator Tape (optional)
- Tin plated copper braid
- Separator Tape
- Sheath RADOX EM 104

*Notes by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENUIS-TW 600V 2X0.5 MM S 12568117-2017107 40-2018 CRCC10218P11529R1M".*

Photographs of a specimen of the tested product are shown in appendix 2.

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According to the standard EN 45545-2, table 2, the product is defined as a “Listed Product” to which the following parameters apply:

Product No: EL1A / EL1B  
 Location: Interior / Exterior  
 Description: Interiors / Exterior located  
 Product name: Cables for interior / Cables for exterior  
 Requirement Set: R15 / R16

**Manufacturer**

Huber+Suhner AG, Pfaeffikon ZH, Switzerland.

**Sampling**

The sample was selected by the client. It is not known to RISE Safety – Fire Research if the cable received is representative of the mean production characteristics.

The sample was received March 5, 2019 at RISE Safety – Fire Research.

**Test results**

A summary of the test results is shown in the table below. Detailed test results are given in appendix 1. Photographs of a specimen of the tested product are shown in appendix 2.

<b>Standard</b>	<b>Parameter</b>	<b>Test value</b>
EN 61034-2	Transmission (%)	93

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

**Note**

The accreditation referred to is valid for EN 61034-2:2005+A1:2013.

In order to achieve reaction to fire classification according to EN 45545-2, the product should be tested according to several test methods listed by requirement set No. R15/R16.

A reported result is compliant if it is equal to the requirement after rounding to the specified requirement level plus one digit.

**RISE Research Institutes of Sweden AB  
Safety - Fire Research Materials**

Performed by



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**Appendices**

1. Test results EN 61034-2:2005+A1:2013
2. Photographs EN 61034-2:2005+A1:2013

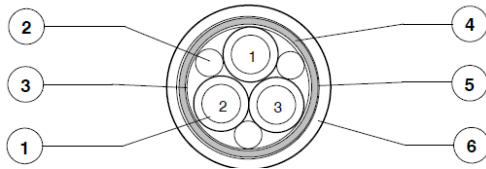
Appendix 1

**Test results EN 61034-2:2005+A1:2013**

**Product**

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 2X0.5 MM S
Article number:	12568117
Nominal diameter (mm):	4.8
Batch number:	2017107
Date of manufacture:	Week 40-2018



**Components:**

- Stranded tin plated copper acc. to EN 50306-2
- Insulation RADOX EI 303
- Filler (optional): RADOX 125 REC
- Separator Tape (optional)
- Tin plated copper braid
- Separator Tape
- Sheath RADOX EM 104

*Notes by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENUIS-TW 600V 2X0.5 MM S 12568117-2017107 40-2018 CRCC10218P11529R1M".*

**Test specification**

Mounting	Bundles
Number of cables lengths	7 x 3
Number of bundles	3
Ignition source	1 liter of alcohol
Alcohol ignited, min:s	00:00
Test duration, min:s	40:01

**Test results**

Minimum measured light transmittance	93.4 %
--------------------------------------	--------

## Appendix 1

## Light transmission

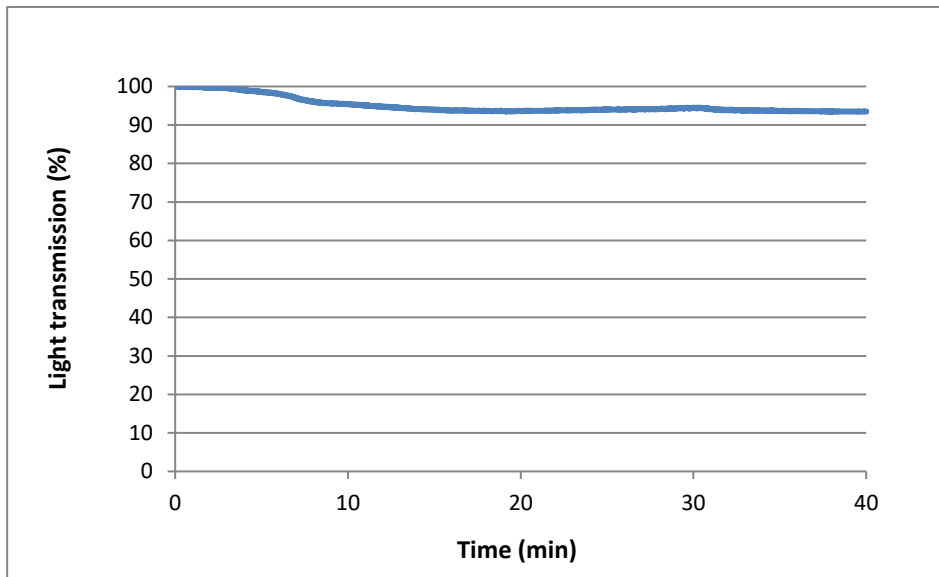


Figure 1. Measured light transmittance (%).

## Measured data

Diameter: 4.7 mm.

## Conditioning

Temperature:  $(23 \pm 5)$  °C.

## Date of test

March 25, 2019.

## Appendix 2

**Photographs EN 61034-2:2005+A1:2013**

*Photo 1. Prior to test, marking on the cable.*



*Photo 2. Prior to test, cross section.*

HUBER+SUHNER AG  
 Low Frequency Division  
 Tumbelenstrasse 20  
 CH-8330 PFAEFFIKON ZH  
 Switzerland

## Test for vertical flame propagation for a single insulated wire or cable according to EN 60332-1-2

(2 appendices)

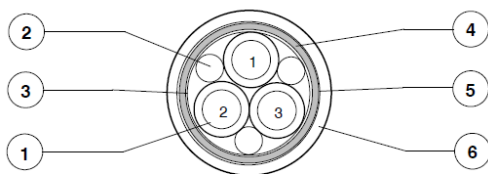
### Introduction

RISE Safety has by request of HUBER+SUHNER AG performed a fire test according to EN 45545-2 which refer to EN 60332-1-2. The purpose of the tests is to form a basis for technical fire classification.

### Product description

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 12X2X1.5 MM S
Article number:	85004430
Nominal diameter (mm):	20.6
Batch number:	1934634
Date of manufacture:	Week 19-2018



### Components:

- 4 Stranded tin plated copper acc. to EN 50306-2
- 5 Insulation RADOX EI 303
- 5 Filler (optional): RADOX 125 REC
- 6 Tin plated copper braid
- 6 Separator Tape
- 6 Sheath RADOX EM 104

*Note by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENUIS-TW 600V 12X2X1.5 MM S 85004430-1934634 19-2018".*

Photographs of a specimen of the tested product are shown in appendix 2.

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According to the standard EN 45545-2, table 2, the product is defined as a “Listed Product” to which the following parameters apply:

Product No: EL1A / EL1B  
 Location: Interior / Exterior  
 Description: Interiors / Exterior located  
 Product name: Cables for interior / Cables for exterior  
 Requirement Set: R15 / R16

**Manufacturer**

Huber+Suhner AG, Pfaeffikon ZH, Switzerland.

**Sampling**

The sample was selected by the client. It is not known to RISE Safety – Fire Research if the cable received is representative of the mean production characteristics.

The sample was received March 5, 2019 at RISE Safety – Fire Research.

**Test results**

A summary of the test results is shown in the table below. Detailed test results are given in appendix 1. Photographs of a specimen of the tested product are shown in appendix 2.

Standard	Parameter	Test value
EN 60332-1-2:2004+A1:2015	Unaffected length (unburned part) of cable measured from the lower edge of the top support (mm)	405
EN 60332-1-2:2004+A1:2015	Total damaged length (burned part) of cable (mm)	85

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

**Note**

The accreditation referred to is valid for EN 60332-1-2:2004+A1:2015.

In order to achieve reaction to fire classification according to EN 45545-2, the product should be tested according to several test methods listed by requirement set No. R15/R16.

A reported result is compliant if it is equal to the requirement after rounding to the specified requirement level plus one digit.

**RISE Research Institutes of Sweden AB  
Safety - Fire Research Materials**

Performed by



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**Appendices**

1. Test results EN 60332-1-2:2004+A1:2015
2. Photographs EN 60332-1-2:2004+A1:2015

Appendix 1

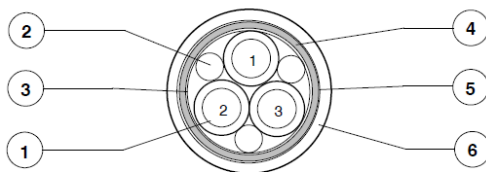
**Test results EN 60332-1-2:2004+A1:2015**

**Product**

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 12X2X1.5 MM S
Article number:	85004430
Nominal diameter (mm):	20.6
Batch number:	1934634
Date of manufacture:	Week 19-2018

**Components:**



Stranded tin plated copper acc. to EN 50306-2  
 Insulation RADOX EI 303  
 Filler (optional): RADOX 125 REC  
 Tin plated copper braid  
 Separator Tape  
 Sheath RADOX EM 104

*Note by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENUIS-TW 600V 12X2X1.5 MM S 85004430-1934634 19-2018".*

**Test results**

Length of test sample: 600 mm.

**Observations during fire test**

The gas flame was applied, s	0
The gas flame was removed, s	60
After flame time, s	2

**Observations after fire test**

Unaffected length (unburned part) of cable measured from the lower edge of the top support, mm	405
Total damaged length (burned part) of cable, mm	85

**Measured data**

Diameter: 20.1 mm.  
 Weight per 600 mm: 437 g.

## Appendix 1

### Conditioning

Temperature:  $(23 \pm 5)$  °C.

Relative humidity:  $(50 \pm 20)$  %.

### Date of test

March 29, 2019.

## Appendix 2

**Photographs EN 60332-1-2:2004+A1:2015**

*Photo 1. Prior to test, marking on the cable.*



*Photo 2. Prior to test, cross section.*

HUBER+SUHNER AG  
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## Test on electric and optical fibre cables under fire conditions according to EN 60332-3-24

(2 appendices)

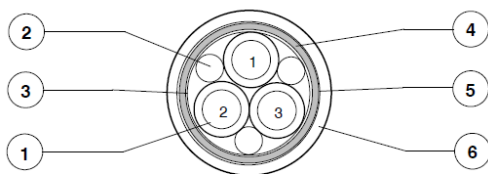
### Introduction

RISE Safety has by request of HUBER+SUHNER AG performed a fire test according to EN 45545-2 which refer to EN 60332-1-2. The purpose of the tests is to form a basis for technical fire classification.

### Product description

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 12X2X1.5 MM S
Article number:	85004430
Nominal diameter (mm):	20.6
Batch number:	1934634
Date of manufacture:	Week 19-2018



### Components:

- 4 Stranded tin plated copper acc. to EN 50306-2
- 5 Insulation RADOX EI 303
- 5 Filler (optional): RADOX 125 REC
- 6 Tin plated copper braid
- 6 Separator Tape
- 6 Sheath RADOX EM 104

*Note by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENIUS-TW 600V 12X2X1.5 MM S 85004430-1934634 19-2018".*

Photographs of a specimen of the tested product are shown in appendix 2.

### RISE Research Institutes of Sweden AB

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According to the standard EN 45545-2, table 2, the product is defined as a “Listed Product” to which the following parameters apply:

Product No: EL1A / EL1B  
 Location: Interior / Exterior  
 Description: Interiors / Exterior located  
 Product name: Cables for interior / Cables for exterior  
 Requirement Set: R15 / R16

**Manufacturer**

Huber+Suhner AG, Pfaeffikon ZH, Switzerland.

**Sampling**

The sample was selected by the client. It is not known to RISE Safety – Fire Research if the cable received is representative of the mean production characteristics.

The sample was received March 5, 2019 at RISE Safety – Fire Research.

**Test results**

A summary of the test results is shown in the table below. Detailed test results are given in appendix 1. Photographs of a specimen of the tested product are shown in appendix 2.

<b>Standard</b>	<b>Parameter</b>	<b>Test value</b>
EN 60332-3-24:2009	Charred portion of the tested cable (m)	0.67

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

**Note**

The accreditation referred to is valid for EN 60332-3-24:2009.

In order to achieve reaction to fire classification according to EN 45545-2, the product should be tested according to several test methods listed by requirement set No. R15/R16.

A reported result is compliant if it is equal to the requirement after rounding to the specified requirement level plus one digit.

**RISE Research Institutes of Sweden AB  
Safety - Fire Research Materials**

Performed by



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**Appendices**

1. Test results EN 60332-3-24:2009
2. Photographs EN 60332-3-24:2009



Appendix 1

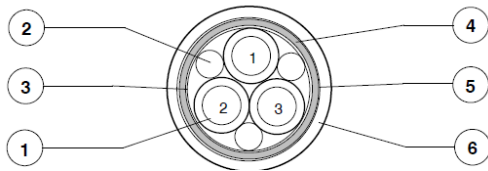
**Test results EN 60332-3-24:2009**

**Product**

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 12X2X1.5 MM S
Article number:	85004430
Nominal diameter (mm):	20.6
Batch number:	1934634
Date of manufacture:	Week 19-2018

**Components:**



- 4 Stranded tin plated copper acc. to EN 50306-2
- 5 Insulation RADOX EI 303
- 6 Filler (optional): RADOX 125 REC
- 1 Tin plated copper braid
- 2 Separator Tape
- 3 Sheath RADOX EM 104

*Note by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENIUS-TW 600V 12X2X1.5 MM S 85004430-1934634 19-2018".*

**Test specification**

---

Nominal total volume of non-metallic material on the test ladder, l/m:	1.5
Number of test pieces, based on nominal diameter:	8
Number of layers:	1
Number of test pieces in each layer	8
Measured outer diameter, mm:	20.2
Mounting:	The cables were mounted on a cable ladder by RISE Safety. Mounting was done according to EN 60332-3-24:2009. No spacing between the cables were used. See photographs in appendix 2.
Number of burners:	One
Application time of ignition burner, min:	20

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Appendix 1

**Test results**

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Damaged length, m: 0.67

After flame time, min:s: 00:33

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**Conditioning**

Temperature (23 ± 5) °C.

**Date of test**

March 21, 2019.

Appendix 2

Photographs EN 60332-3-24:2009



Photo 1. Prior to test, marking on the cable.



Photo 2. Prior to test, cross section.

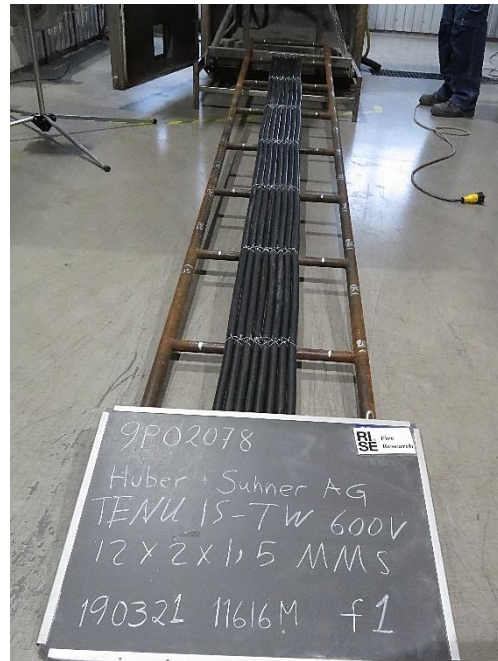


Photo 3. Prior to test, front side.



Photo 4. After test, front side.



Photo 5. After test, front side.

HUBER+SUHNER AG  
Low Frequency Division  
Tumbelenstrasse 20  
CH-8330 PFAEFFIKON ZH  
Switzerland

## Measurement of smoke density of cables burning under defined conditions according to EN 61034-2

(2 appendices)

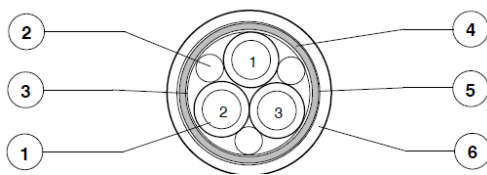
### Introduction

RISE Safety has by request of HUBER+SUHNER AG performed a fire test according to EN 45545-2 which refer to EN 61034-2. The purpose of the test is to form a basis for technical fire classification.

### Product description

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 12X2X1.5 MM S
Article number:	85004430
Nominal diameter (mm):	20.6
Batch number:	1934634
Date of manufacture:	Week 19-2018



#### Components:

- Stranded tin plated copper acc. to EN 50306-2
- Insulation RADOX EI 303
- Filler (optional): RADOX 125 REC
- Tin plated copper braid
- Separator Tape
- Sheath RADOX EM 104

*Note by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENIUS-TW 600V 12X2X1.5 MM S 85004430-1934634 19-2018".*

Photographs of a specimen of the tested product are shown in appendix 2.

### RISE Research Institutes of Sweden AB

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According to the standard EN 45545-2, table 2, the product is defined as a “Listed Product” to which the following parameters apply:

Product No: EL1A / EL1B  
 Location: Interior / Exterior  
 Description: Interiors / Exterior located  
 Product name: Cables for interior / Cables for exterior  
 Requirement Set: R15 / R16

**Manufacturer**

Huber+Suhner AG, Pfaeffikon ZH, Switzerland.

**Sampling**

The sample was selected by the client. It is not known to RISE Safety – Fire Research if the cable received is representative of the mean production characteristics.

The sample was received March 5, 2019 at RISE Safety – Fire Research.

**Test results**

A summary of the test results is shown in the table below. Detailed test results are given in appendix 1. Photographs of a specimen of the tested product are shown in appendix 2.

<b>Standard</b>	<b>Parameter</b>	<b>Test value</b>
EN 61034-2	Transmission (%)	96

The test results relate only to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

**Note**

The accreditation referred to is valid for EN 61034-2:2005+A1:2013.

In order to achieve reaction to fire classification according to EN 45545-2, the product should be tested according to several test methods listed by requirement set No. R15/R16.

A reported result is compliant if it is equal to the requirement after rounding to the specified requirement level plus one digit.

**RISE Research Institutes of Sweden AB  
Safety - Fire Research Materials**

Performed by



Signed by: Marina C Andersson  
Reason: I am the author of this document  
Date & Time: 2019-04-05 15:41:46 +02:00

Marina C Andersson

Examined by



Signed by: Per Thureson  
Reason: I have reviewed this document  
Date & Time: 2019-04-05 15:10:48 +02:00

Per Thureson

**Appendices**

1. Test results EN 61034-2:2005+A1:2013
2. Photographs EN 61034-2:2005+A1:2013

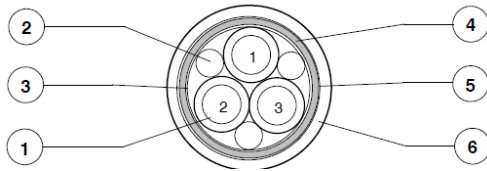
Appendix 1

**Test results EN 61034-2:2005+A1:2013**

**Product**

According to the client:

Type of Unit:	Traction cable
Family name:	RADOX TENUIS-TW 600V MM S
Cable name:	RADOX TENUIS-TW 600V 12X2X1.5 MM S
Article number:	85004430
Nominal diameter (mm):	20.6
Batch number:	1934634
Date of manufacture:	Week 19-2018



**Components:**

- Stranded tin plated copper acc. to EN 50306-2
- Insulation RADOX EI 303
- Filler (optional): RADOX 125 REC
- Tin plated copper braid
- Seperator Tape
- Sheath RADOX EM 104

*Note by RISE: The colour of the cable tested was black. The cable tested had the marking: "HUBER+SUHNER RADOX TENIUS-TW 600V 12X2X1.5 MM S 85004430-1934634 19-2018".*

**Test specification**

Mounting	Single cables
Number of cables lengths	2
Ignition source	1 liter of alcohol
Alcohol ignited, min:s	00:00
Test duration, min:s	40:01

**Test results**

Minimum measured light transmittance	96.3 %
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## Appendix 1

## Light transmission

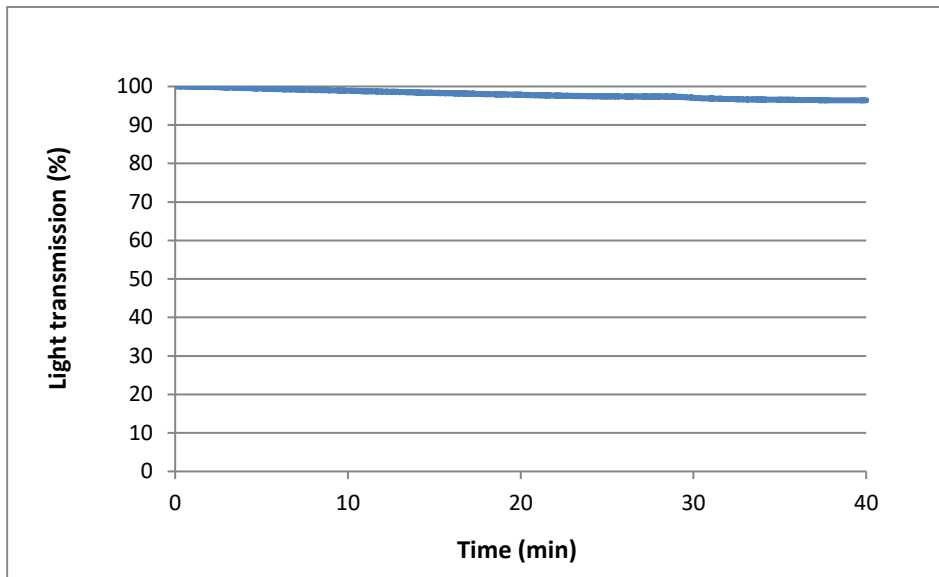


Figure 1. Measured light transmittance (%).

**Measured data**

Diameter: 20.7 mm.

**Conditioning**

Temperature:  $(23 \pm 5)$  °C.

**Date of test**

March 26, 2019.



## Appendix 2

**Photographs EN 61034-2:2005+A1:2013**

*Photo 1. Prior to test, marking on the cable.*



*Photo 2. Prior to test, cross section.*