BASF – Fire Safety Technology

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Test Report No.: 11504 / 40047 Date: 06.03.2015

BASF SE
Brandschutztechnik
G-PMF/A - A521
D-67056 Ludwigshafen

Test according to

ISO 4589 Part 2 : 2006-06

Plastics - Determination of burning behaviour by oxygen index Part 2: Ambient-temperature test

Client:

NORRES-Schlauchtechnik GmbH & Co. KG

Am Stadthafen 12-18

45881 Gelsenkirchen

The results refer exclusively to the tested samples.

As an accredited Test Laboratory, the BASF SE Fire Safety Technology Test Centre is authorized to conduct fire tests in accordance with DIN EN ISO/IEC 17025 : 2005.
DAkkS-Register-No.: D-PL-14121-07-00

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-14121-07-00

Test according to ISO 4589 Part 2 : 2006-06
Plastics - Determination of burning behaviour by oxygen index
Part 2: Ambient-temperature test

Test report No.: 11504 / 40047

Receipt of order: 14.11.2014
Receipt of samples: 01.12.2014
Date of test: 09.12.2014

1. Material: (information supplied by client)

AIRDUC PUR 352 SE RAILWAY
AIRDUC PUR 352 SE RAILWAY PLUS

Colour:

End use application:

2. Summary of results and classification:

Limiting Oxygen Index (LOI)	[%]	29,4
Classification according to DIN EN 45545-2:2013-08, R22, R23, R24, with respect to test acc. to EN ISO 4589-2		**HL 1+2**

Remarks:
Report dtd. 09.12.2014 changed upon customer's request. Developmental product was renamed to brand name.
For a final classification, additional tests are required.

Any conclusions we draw about the fire safety of the materials we test are based exclusively on the results of the test under the conditions described.
The extent to which such conclusions can be applied to non-tested material under non-standard conditions is the sole responsibility of the customer and is done so at his own risk.

BASF Fire Safety Technology

Dr Henn
Head of Laboratory

Ludwigshafen, 06.03.2015

Kaiser
Technician

Test report No.: 11504 / 40047

3. Material:

Information supplied by client

AIRDUC PUR 352 SE RAILWAY
AIRDUC PUR 352 SE RAILWAY PLUS
Construction: Polyurethane TPU flame retardant, reinforced with steel wire, glass aluminium laminated

Additional details from test laboratory

Colour: black

4. Samples:

Sample size (determined by BASF test laboratory):

Length:	146,30	[mm]	Weight:	13,13	[g]
Width:	53,40	[mm]	Weigt per unit area:	0,83	[kg/m²]
Thickness:		[mm]	Density:		[kg/m³]
Outer diameter:		[mm]			
Inner diameter:		[mm]	Remarks:		

Pre-conditioning:

	Conditions	Duration days
Client: (information supplied by client)		
Test laboratory:	Standard 23/50 ISO 554	8

Sample preparation:

Exposed surface: Waved surface

Test gas temperature: 22°C
(start of test)

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5. Test results:

Sample type: V - For flexible film or sheet

Procedure (Ignition method): B - Propagating ignition

5.1 Preliminary determination of Oxygen concentration (Increment d = 1 Vol. %)

Oxygen [Vol.%]	28,0	32,0	31,1	29,0	30,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Duration of burning [s]	20	69	93	34	157							
Burning distance [mm]	8	80	80	10	80							
Event (X or O)	O	X	X	O	X							

5.2 Determination of Oxygen concentration (Increment d = 0,2 Vol. %)

N_T-Series												
N_L-Series (8.6.1 – 8.6.2)								(8.6.3)				c_f
Oxygen [Vol.%]	29,00	29,20	29,40					29,60	29,40	29,20	29,40	29,60
Duration of burning [s]	40	19	61					81	125	54	35	28
Burning distance [mm]	11	5	20					80	80	25	10	5
Event (X or O)	O	O	O					X	X	O	O	X
(Table 4): k-Factor with corrected sign:					-0,75							
Oxygen Index:				[%]	**29,4**							
Standard deviation σ :				[%]	0,152							

The following requirement by ISO 4589-2 section 8.6.4 was fulfilled:

$$\frac{2\hat{\sigma}}{3} < d < 1{,}5\,\hat{\sigma} \qquad 2/3 \text{ s} < 0{,}2 < 0{,}228$$

According to aforementioned requirements, determination of limiting Oxygen concentration did not have to be repeated.

Observations:

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6. Test equipment:

Test apparatus	PK	0007
Caliper gauge	MB	0029
Balance	MW	0007
Analyzer	MA	0002
Stop watch	MU	0045

7. Requirements:

Standard ISO 4589 Part 2 does not define any requirements.

Requirements by other standards:

Standard	Criteria		Requirements
DIN EN 45545-2:2013-08*	Set of requirements R22, R23, R24	HL 1 and 2	LOI ≥ 28%
		HL 3	LOI ≥ 32%
DIN CEN/TS 45545-2:2009-07	Set of requirements R23, R24, R25	HL 1 and 2	LOI ≥ 28%
		HL 3	LOI ≥ 32%
DIN 5510 – 2:2009-05, section 5.2.2.4	Small electrical parts with a combustible material mass of 50 or 300 g (accessible / not accessible by passengers), which are arranged with a spacing of ≤ 20 cm behind, next to or above one another		LOI ≥ 28%
	Materials used in electrical equipment that is not accessible to passengers		LOI ≥ 30%
NF F 16-101, section 6.1.3	„ I " classification (in conjunction with test acc. to IEC 60695-2-10)	I 0	LOI ≥ 70%
		I 1	LOI ≥ 45%
		I 2	LOI ≥ 32%
		I 3	LOI ≥ 28%
		I 4	LOI ≥ 20%
BS 6853	Tables 7 + 8	Vehicle category Ia and Ib	LOI ≥ 34 %
		Vehicle category II	LOI ≥ 28 %
TSI Freight waggon (2006)**	Section 4.2.7.2.2.4. Material requirement		LOI ≥ 26 %

* = EN 45545-2 (2013/03) **from edition 2013-04, no more requirements regarding LOI

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Test Report No.: 11504 / 40049 Date: 09.02.2015

BASF SE
Brandschutztechnik
G-PMF/A - A521
D-67056 Ludwigshafen

Test according to

DIN EN ISO 5659 Part 2 : 2013-03

Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test

Client:

NORRES-Schlauchtechnik GmbH & Co. KG

Am Stadthafen 12-18

45881 Gelsenkirchen

The results refer exclusively to the tested samples.

As an accredited Test Laboratory, the BASF SE Fire Safety Technology Test Centre is authorized to conduct fire tests in accordance with DIN EN ISO/IEC 17025 : 2005.
DAkkS-Register-No.: D-PL-14121-07-00

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-14121-07-00

BASF – Fire Safety Technology

Test according to DIN EN ISO 5659 Part 2 : 2013-03
Plastics - Smoke generation - Part 2: Determination of optical density by a single-chamber test

Test Report No.: 11504 / 40049

Receipt of order: 14.11.2014
Receipt of samples: 01.12.2014
Date of test: 17.12.2014

1. Material: (information supplied by client)

AIRDUC PUR 352 SE RAILWAY PLUS

Colour:

End use application:

2. Summary of results and classification:

Mean value of specific optical density at 4 min	**D_s (4)**	**0,4**
Cumulative value of spec. optical dens. in the first 4 min.	**VOF4**	**1,0**
Mean value of maximum specific optical density	**D_s (max)**	**0,8**
Classification according to DIN EN 45545-2:2013-08, set of requirements R22/R23, with respect to test method ISO 5659-2, at 25 kW/m2, with pilot flame		**HL3**

Remarks: Report dtd.17.12.2014 changed upon customer's request. Developmental product was renamed to brand name.
For a final classification, additional tests are required.

Any conclusions we draw about the fire safety of the materials we test are based exclusively on the results of the test under the conditions described.
The extent to which such conclusions can be applied to non-tested material under non-standard conditions is the sole responsibility of the customer and is done so at his own risk.

BASF Fire Safety Technology **Ludwigshafen, 09.02.2015**

Dr. Henn
Head of Laboratory

Spielmann
Technician

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Test report according to DIN EN ISO/IEC 17025 : 2005

Test Report No.: 11504 / 40049

3. Material:

Information supplied by client

AIRDUC PUR 352 SE RAILWAY PLUS
Construction: Polyurethane TPU flame retardant, reinforced with steel wire, glass aluminium laminated

Additional details from testing laboratory

4. Samples:

Sample size (determined by BASF test laboratory):

Length:	76,40	[mm]	Weight:	20,94	[g]
Width:	77,40	[mm]	Weigt per unit area:	3,54	[kg/m²]
Thickness:	4,40	[mm]	Density:		[kg/m³]
Outer diameter:		[mm]	Remarks: Thickness measured with wire inlet		
Inner diameter:		[mm]			

Pre-conditioning:

	Conditions	Duration days
Client: (information supplied by client)		
Test Laboratory:	Standard 23/50 ISO 554	17

Sample preparation:

Exposed surface : Waved, glass aluminium laminated surface

5. Test equipment:

Test apparatus	PK	0018
Sliding gauge	MB	0029
Balance	MW	0007
Stop-watch	MU	0039

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6. Test results:

Irradiance	[kW/m²]	25		
Flame mode		Flamming		
Test duration	[min]	10		
Sample		1	2	3
Wire grid used	yes/no	no	no	no
Thickness	[mm]	4,4	4,5	4,5
C_f				
Clear beam correction factor	Dc	0,38	0,16	0,58
Specific optical density at 4 min	Ds4	0	0	0
Mean value of specific optical density at 4 min	Ds4	0,4		
Specific optical density at 10 min	Ds10	1	0	1
Mean value of specific optical density at 10 min	Ds10	0,6		
Specific optical density (maximum)	$Ds_{(max)}$	1	1	1
Mean value of specific optical density (maximum)	$Ds_{(max)}$	0,8		
Obscuration value in 4 min	VOF4	2	1	1
Mean obscuration value in 4 min	VOF4	1		

Observations:
No ignition of sample

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7. Requirements:

DIN EN 45545-2:2013-08

Set of requiremt.	Reference	kW/m²	Parameter	HL1	HL2	HL3
R1, R2, R6, R11, R12	T10.01	50 w/o fl.	$D_s(4)$	600	300	150
	T10.02		VOF4	1200	600	300
	T11.01		CIT_G *	1,2	0,9	0,75
R3	T10.01	50 w/o fl.	$D_s(4)$	---	480	240
	T10.02		VOF4	---	960	480
	T11.01		CIT_G *	1,2	0,9	0,75
R5	T10.03	25 w. fl.	D_s(max)	300	250	200
	T11.02		CIT_G *	1,2	0,9	0,75
R7	T10.04	50 w/o fl.	D_s(max)	---	600	300
	T11.01		CIT_G *	---	1,8	1,5
R8, R9	T10.03	25 w. fl.	D_s(max)	---	600	300
	T11.02		CIT_G *	---	1,8	1,5
R10	T10.03	25 w. fl.	D_s(max)	600	300	150
	T11.02		CIT_G *	1,2	0,9	0,75
R17	T10.04	50 w/o fl.	D_s(max)	---	600	300
	T11.01		CIT_G *	---	1,8	1,5
R20	T10.03	25 w. fl.	D_s(max)	200	200	200
	T11.02		CIT_G *	0,75	0,75	0,75
R21	T10.03	25 w. fl.	D_s(max)	300	300	200
	T11.02		CIT_G *	1,2	0,9	0,75
R22	T10.03	25 w. fl.	D_s(max)	600	300	150
	T12 **	*600°C*	*$CIT_{(NLP)}$*	*1,2*	*0,9*	*0,75*
R23	T10.03	25 w. fl.	D_s(max)	---	600	300
	T12 **	*600°C*	*$CIT_{(NLP)}$*	---	*1,8*	*1,5*

* after 4 or 8 minutes, whichever is higher
** NF X 70-100-1 &-2

Test Report No.: 11504 / 40049

DIN CEN/TS 45545-2:2009-07

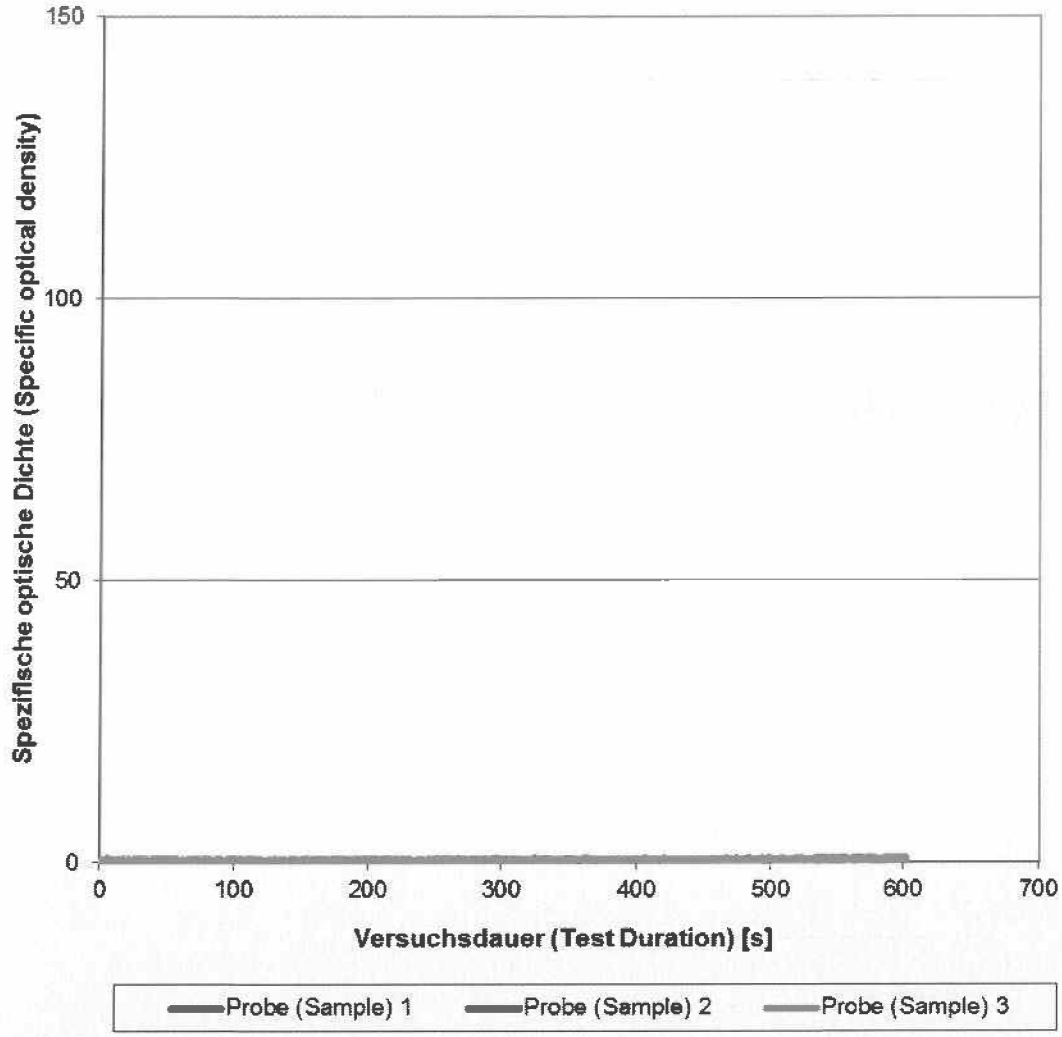
Set of requiremt.	Reference	kW/m²	Parameter	HL1	HL2	HL3
R1, R2, R5, R10, R11	T10.01	50 w/o.fl.	$D_s(4)$	600	300	150
	T10.02		VOF4	1200	600	300
	T11.01		CIT_G *	1,2	0,9	0,75
R3	T10.01	50 w/o.fl.	$D_s(4)$	600	480	240
	T10.02		VOF4	1200	960	480
	T11.01		CIT_G *	1,2	0,9	0,75
R4	T10.03	25 w.fl.	D_s(max)	300	250	200
	T11.02		CIT_G *	1,2	0,9	0,75
R6, R8	T10.04	50 w/o.fl.	D_s(max)	---	600	300
	T11.01		CIT_G *	---	1,8	1,5
R7	T10.03	25	D_s(max)	---	600	300
	T11.02		CIT_G *	---	1,8	1,5
R9	T10.03	25 w.fl.	D_s(max)	600	300	150
	T11.02		CIT_G *	1,2	0,9	0,75
R16	T10.04	50 w/o.fl.	D_s(max)	---	600	300
	T11.01		CIT_G *	---	1,8	1,5
R19	T10.03	25 w.fl.	D_s(max)	200	200	200
	T11.02		CIT_G *	0,75	0,75	0,75
R20, R22	T10.03	25 w.fl.	D_s(max)	300	300	200
	T11.02		CIT_G *	1,2	0,9	0,75
R23	T10.03	25 w.fl.	D_s(max)	600	300	150
	T12 **	*600°C*	$CIT_{(NLP)}$	*1,2*	*0,9*	*0,75*
R24	T10.03	25 w.fl.	D_s(max)	---	600	300
	T12 **	*600°C*	$CIT_{(NLP)}$	---	*1,8*	*1,5*

* after 4 or 8 minutes whichever is higher
** NF X 70-100-1 &-2

Test Report No.: 11504 / 40049

8. Charts:

Spezifische optische Dichte (Specific optical density)



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Test Report No.: 11504 / 40054 Date: 09.02.2015

BASF SE
Brandschutztechnik
G-PMF/A - A521
D-67056 Ludwigshafen

Test according to

NF X 70-100 Partie 1+2 : 2006-04

Fire tests - Analysis of gaseous effluents - Part 1 : methods for analysing gases stemming from thermal degradation Calculation of CIT-NLP according to DIN EN 45545 Part 2 (2013-08)

Client:

NORRES-Schlauchtechnik GmbH & Co. KG

Am Stadthafen 12-18

45881 Gelsenkirchen

The results refer exclusively to the tested samples.

As an accredited Test Laboratory, the BASF SE Fire Safety Technology Test Centre is authorized to conduct fire tests in accordance with DIN EN ISO/IEC 17025 : 2005.
DAkkS-Register-No.: D-PL-14121-07-00

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-14121-07-00

Test according to NF X 70-100 Partie 1+2 : 2006-04
Fire tests - Analysis of gaseous effluents - Part 1 : methods for analysing gases stemming from thermal degradation
Calculation of CIT-NLP according to DIN EN 45545 Part 2 (2013-08)

Test report No.: 11504 / 40054

Receipt of order: 14.11.2014
Receipt of samples: 01.12.2014
Date of test: 05.01.2015

1. Material: (information supplied by client)

AIRDUC PUR 352 SE RAILWAY PLUS

Colour:

End use application: Hose

2. Summary of results and classification:

Conventional Index of Toxicity	CIT_{NLP}	0,06
Classification with respect to Smoke Gas Toxicity determination according to DIN EN 45545-2:2013-08, requirement table	R22 / R23	HL3

Remarks:
Report dtd. 17.12.2014 changed upon customer's request. Developmental product was renamed to brand name.
For a final classification, additional tests are required.
CIT_NLP related only to combustible components: 0,11, corresponding to HL3.

Any conclusions we draw about the fire safety of the materials we test are based exclusively on the results of the test under the conditions described.
The extent to which such conclusions can be applied to non-tested material under non-standard conditions is the sole responsibility of the customer and is done so at his own risk.

BASF Fire Safety Technology

Dr. Henn
Head of Laboratory

Ludwigshafen, 09.02.2015

Kaiser
Technician

Test report No.: 11504 / 40054

3. Material:

Information supplied by client

AIRDUC PUR 352 SE RAILWAY PLUS
Construction: Polyurethane TPU flame retardant, reinforced with steel wire, glass aluminium laminated

Additional description by laboratory

Colour TPU: black

4. Samples:

Dimensions (determined by BASF test laboratory):

Length:	[mm]	Weight:	2,00	[g]
Width:	[mm]	Weight per unit area:		[kg/m²]
Thickness:	[mm]	Density:		[kg/m³]
Outer diameter:	[mm]	Remarks:		
Inner diameter:	[mm]			

Pre-conditioning:

	Conditions	Duration days
Client: (information supplied by client)		
Laboratory:	Standard 23/50 ISO 554	35

Sample preparation:

Remarks:

Test report No.: 11504 / 40054

5. Test results:

Test of smoke gas toxicity at a temperature of 600 °C

$$CIT_{NLP} = \frac{450\,g}{150\,m^3 \times N} \times \sum_{i=1}^{i=8} \frac{c_i\,mg\,g^{-1}}{C_i\,mg\,m^{-3}}$$ With N* = 3: $$CIT_{NLP} = \sum_{i=1}^{i=8} \frac{c_i}{C_i}$$ (*correction factor)

	Concentration, c_i [mg/g]				Reference value, c_i [mg/m³]	c_i / C_i
Sample No.	1	2	3	Avg.		
Init. weight [g]	2,01	2,01	1,99	2,00		
CO_2	361	363	432	385	72000	0,01
CO	34	34	35	34	1380	0,02
HF *)	nd	nd	nd	nd	25	nd
HCl *)	nd	nd	nd	nd	75	nd
HBr *)	nd	nd	nd	nd	99	nd
HCN *)	1,94	1,68	1,83	1,81	55	0,03
NO_x *)	nd	nd	nd	nd	38	nd
SO_2 *)	0,08	nd	nd	0,03	262	0,00
*) Wet analysis carried out by BASF Central Analytics, DAkkS accreditation No. D-PL-14121-02-00. nd = not detected					CIT_{NLP}: **0,06**	

Test report No.: 11504 / 40054

Observations:
2.00 g of the sample contained 0.86 g noncombustible components *.
Based on 1,14g combustible components, resulting CIT_NLP is 0.11.

* The sample was mechanically separated and the mass of combustible / non-combustible components determined.

6. Test equipment:

Test apparatus	PV	0006
Data acquisition	MC	0005
Analyzer	MA	0005
Balance	MW	0007

7. Requirements:

DIN EN 45545-2:2013-08

Method	Standard	Parameter	HL1	HL2	HL3
Requirement table: **R22**					
T12	NF X 70-100-1 & 2	CIT_{NLP} (Max.)	1,2	0,9	0,75
Requirement table **R23**					
T12	NF X 70-100-1 & 2	CIT_{NLP} (Max.)	---	1,8	1,5

DIN CEN/TS 45545-2:2009-07

Method	Standard	Parameter	HL1	HL2	HL3
Requirement table: **R23**					
T12	NF X 70-100-1 & 2	CIT_{NLP} (Max.)	1,2	0,9	0,75
Requirement table **R24**					
T12	NF X 70-100-1 & 2	CIT_{NLP} (Max.)	---	1,8	1,5

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Test Report No.: 11504 / 40047 Date: 09.02.2015

BASF SE
Brandschutztechnik
G-PMF/A - A521
D-67056 Ludwigshafen

Test according to

ISO 4589 Part 2 : 2006-06

Plastics - Determination of burning behaviour by oxygen index Part 2: Ambient-temperature test

Client:

NORRES-Schlauchtechnik GmbH & Co. KG

Am Stadthafen 12-18

45881 Gelsenkirchen

The results refer exclusively to the tested samples.

As an accredited Test Laboratory, the BASF SE Fire Safety Technology Test Centre is authorized to conduct fire tests in accordance with DIN EN ISO/IEC 17025 : 2005.
DAkkS-Register-No.: D-PL-14121-07-00

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-14121-07-00

Test according to ISO 4589 Part 2 : 2006-06
Plastics - Determination of burning behaviour by oxygen index
Part 2: Ambient-temperature test

Test report No.: 11504 / 40047

Receipt of order: 14.11.2014
Receipt of samples: 01.12.2014
Date of test: 09.12.2014

1. Material: (information supplied by client)

AIRDUC PUR 352 SE RAILWAY PLUS

Colour:

End use application:

2. Summary of results and classification:

Limiting Oxygen Index (LOI)	[%]	29,4
Classification according to DIN EN 45545-2:2013-08, R22, R23, R24, with respect to test acc. to EN ISO 4589-2		HL 1+2

Remarks:
Report dtd.17.12.2014 changed upon customer's request. Developmental product was renamed to brand name.
For a final classification, additional tests are required.

Any conclusions we draw about the fire safety of the materials we test are based exclusively on the results of the test under the conditions described.
The extent to which such conclusions can be applied to non-tested material under non-standard conditions is the sole responsibility of the customer and is done so at his own risk.

BASF Fire Safety Technology

Dr. Henn
Head of Laboratory

Ludwigshafen, 09.02.2015

M. Kaiser
Technician

Test report No.: 11504 / 40047

3. Material:

Information supplied by client

AIRDUC PUR 352 SE RAILWAY PLUS
Construction: Polyurethane TPU flame retardant, reinforced with steel wire, glass aluminium laminated

Additional details from test laboratory

Colour: black

4. Samples:

Sample size (determined by BASF test laboratory):

Length:	146,30	[mm]	Weight:	13,13	[g]
Width:	53,40	[mm]	Weigt per unit area:	0,83	[kg/m²]
Thickness:		[mm]	Density:	0,00	[kg/m³]
Outer diameter:		[mm]			
Inner diameter:		[mm]	Remarks:		

Pre-conditioning:

	Conditions	Duration days
Client: (information supplied by client)		
Test laboratory:	Standard 23/50 ISO 554	8

Sample preparation:

Exposed surface: Waved surface

Test gas temperature: 22°C
(start of test)

Test according to ISO 4589 Part 2 : 2006-06
Plastics - Determination of burning behaviour by oxygen index
Part 2: Ambient-temperature test

Test report No.: 11504 / 40047

5. Test results:

Sample type: V - For flexible film or sheet

Procedure (Ignition method): B - Propagating ignition

5.1 Preliminary determination of Oxygen concentration (Increment d = 1 Vol. %)

Oxygen [Vol.%]	28,0	32,0	31,1	29,0	30,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Duration of burning [s]	20	69	93	34	157							
Burning distance [mm]	8	80	80	10	80							
Event (X or O)	O	X	X	O	X							

5.2 Determination of Oxygen concentration (Increment d = 0,2 Vol. %)

N_T-Series												
N_L-Series (8.6.1 – 8.6.2)								(8.6.3)				c_r
Oxygen [Vol.%]	29,00	29,20	29,40					29,60	29,40	29,20	29,40	29,60
Duration of burning [s]	40	19	61					81	125	54	35	28
Burning distance [mm]	11	5	20					80	80	25	10	5
Event (X or O)	O	O	O					X	X	O	O	X
(Table 4): k-Factor with corrected sign:					-0,75							
Oxygen Index:				[%]	**29,4**							
Standard deviation σ :				[%]	0,152							

The following requirement by ISO 4589-2 section 8.6.4 was fulfilled:

$$\frac{2\hat{\sigma}}{3} < d < 1{,}5\,\hat{\sigma} \qquad 2/3\ s < 0{,}2 < 0{,}228$$

According to aforementioned requirements, determination of limiting Oxygen concentration did not have to be repeated.

Observations:

Test report No.: 11504 / 40047

6. Test equipment:

Test apparatus	PK	0007
Caliper gauge	MB	0029
Balance	MW	0007
Analyzer	MA	0002
Stop watch	MU	0045

7. Requirements:

Standard ISO 4589 Part 2 does not define any requirements.

Requirements by other standards:

Standard	Criteria		Requirements
DIN EN 45545-2:2013-08*	Set of requirements R22, R23, R24	HL 1 and 2	LOI ≥ 28%
		HL 3	LOI ≥ 32%
DIN CEN/TS 45545-2:2009-07	Set of requirements R23, R24, R25	HL 1 and 2	LOI ≥ 28%
		HL 3	LOI ≥ 32%
DIN 5510 – 2:2009-05, section 5.2.2.4	Small electrical parts with a combustible material mass of 50 or 300 g (accessible / not accessible by passengers), which are arranged with a spacing of ≤ 20 cm behind, next to or above one another		LOI ≥ 28%
	Materials used in electrical equipment that is not accessible to passengers		LOI ≥ 30%
NF F 16-101, section 6.1.3	„ I " classification (in conjunction with test acc. to IEC 60695-2-10)	I 0	LOI ≥ 70%
		I 1	LOI ≥ 45%
		I 2	LOI ≥ 32%
		I 3	LOI ≥ 28%
		I 4	LOI ≥ 20%
BS 6853	Tables 7 + 8	Vehicle category Ia and Ib	LOI ≥ 34 %
		Vehicle category II	LOI ≥ 28 %
TSI Freight waggon (2006)**	Section 4.2.7.2.2.4. Material requirement		LOI ≥ 26 %

* = EN 45545-2 (2013/03) **from edition 2013-04, no more requirements regarding LOI