

Evaluation Report

Build-In Hand Dryer based on art. 142



Name of client: DAN DRYER A/S
File no.: FUV0079-002 Rev.: 003
Date: 2021-10-25
Pages: 4 Encl.: 14
Ref: KTO / LIA

Client information

Client: DAN DRYER A/S
Address: Alsikevej 8
DK-8920 Randers NV
Denmark

The results relate only to the items tested. The test report should only be reproduced in extenso - in extracts only with a written agreement with this institute.

1. Product

Build-In Hand Dryer.

Trade name

Build-In Hand Dryers based on art. 142.

2. Manufacturer

The client is the manufacturer.

3. Purpose of test

By request of the client, the product has been subjected to an evaluation according to EN 45545-2, HL3 and EN 45545-5.

Revision 3: The client has requested to have the evaluation updated towards EN45545-2:2020 edition. The client has declared no changes of the product, see enclosure 13.

4. Sample

DBI-Danish Institute of Fire and Security Technology received the following sample:

One hand dryer assembled and one hand dryer dis-assembled in the different parts.

DBI also received documents showing compliance of EN 45545-2 requirements for some of the sub-parts.

All documentation has been filed by DBI under the file number above.

Further details were stated by the client, see enclosure 1-9.

5. Standards for evaluation

The evaluation was performed in accordance with:

EN 45545-2:2020	Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behaviour of materials and components.
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EN 45545-5:2013+A1:2015	Railway applications – Fire protection on railway vehicles – Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guide buses and magnetic levitation vehicles.
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6. Result of evaluation

6.1 EN 45545-2

All the components for the hand dryer were divided into three groups.

1. Parts who were documented tested with a result according to relevant EN 45545-2 requirements or better. See enclosure 1-4.
2. Parts were no requirements apply since their masses were below 10 g and they were not touching any unclassified material according to EN 45545-2 part 4.3.1. See enclosure 5-7.
3. Parts not belonging to either of the two groups above. See enclosure 7-9.

According to EN 45545-2 part 4.3.2 rule 1, the total combustible mass of all parts in group 3 was measured to 71.4 g. Since the total combustible mass is under 100 g no requirements apply to the parts in the group.

6.2 EN 45545-5

The evaluation according to EN 45545-5 has been conducted by Electrical Engineer, Dennis Aaberg from DBI's department for fire investigation. See enclosure 10-12.

7. Conclusion

The investigated sample of Build-In Hand Dryers based on art. 142 and its components fulfil the criteria listed in EN 45545-2:2020 for HL3 and EN 45545-5:2013+A1:2015.

8. Statement

This evaluation relates only to the product as received and the associated documentation.



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Combustible products with documentation acc. to EN 45545-2:2013 of DAN DRYER Build-In Hand Dryers based on art. 142

Item no.	Part no.	Description 1	Description 2	Description 3	Material application	Part/Sub part manufacturer	Article no.	Commercial material trade name	Material base type			Compliance acc. EN 45545-2:2013 Tables 2 and 5		Appendix A - Components
										Test/ Standard	Result/level	Requirement set	Compliance	
2	21230	Cable harness, Power		Radox 3 GKW Single core cable	Wiring	Huber & Suhner	0,5 mm ² : 12 548 125 1,0 mm ² : 12 551 402 1,5 mm ² : 12 545 286	-	-	R15 acc. EN 45545:2013	All criteria for R15 are met	R15	Yes - HL3	Radox Cable 165 – 219
4	21230	Cable harness, Power		WAGO connector X-COM 6-pole	Power supply connection	WAGO Kontakttechnik GmbH & Co. KG	769-606/002-000	CP-Polymer-Technik, Wellamid 6600-PA66-HWV0CP	PA66	IEC 60695-11-10/UL94	V0	R26	Yes - HL3	WAGO 432-593
5	21230	Cable harness, Power		WAGO connector plug X-COM 6-pole	Power supply connection	WAGO Kontakttechnik GmbH & Co. KG	769-106/021-000	CP-Polymer-Technik, Wellamid 6600-PA66-HWV0CP	PA66	IEC 60695-11-10/UL94	V0	R26	Yes - HL3	WAGO 432-593
9	21235	Cable assembly, Signal		Radox 3 GKW Single core cable	Wiring	Huber & Suhner	0,5 mm ² : 12 548 125 1,0 mm ² : 12 551 402 1,5 mm ² : 12 545 286	-	-	R15 acc. EN 45545-2:2013	All criteria for R15 are met	R15	Yes - HL3	Radox Cable 165 – 219
10	21235	Cable assembly, Signal		WAGO connector plug/receptacle, Signal	Insulating material for electrical connector	WAGO Kontakttechnik GmbH & Co. KG	734-304/019-000	CP-Polymer-Technik, Wellamid 6600-PA66-HWV0CP	PA66	IEC 60695-11-10/UL94	V0	R26	Yes - HL3	WAGO 432-593
12	40054	Motor capacitor 4μF, 400 V, 50/60 Hz	Hydra, mab mkp 4/400 I	Casing material for motor capacitor	Casing material for capacitor	HYDRA a.s.	MAB MKP 4 /400I	Hostacom N4 M01	PP	-	V0	R26	Yes - HL3	Capasitors 2-19
13	40054	Motor capacitor 4μF, 400 V, 50/60 Hz	Hydra, mab mkp 4/400 I	Filler resin material for motor capacitor	Filler resin material for motor capacitor	HYDRA a.s.	MAB MKP 4 /400I	Stobicast L780.99	PU	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Capasitors 2-19



14	40054	Motor capacitor 4μF, 400 V, 50/60 Hz	Hydra, mab mkp 4/400 I	Core of winding for motor capacitor	Core of winding for motor capacitor	HYDRA a.s.	MAB MKP 4 /400I	-	Polyamid PA6 GF35	-	V0	R26	Yes - HL3	Capasitors 2-19
15	40054	Motor capacitor 4μF, 400 V, 50/60 Hz	Hydra, mab mkp 4/400 I	Dielectric film for motor capacitor	Dielectric film for motor capacitor	HYDRA a.s.	MAB MKP 4 /400I	-	PP	-	V0	R26	Yes - HL3	Capasitors 2-19
16	40054	Motor capacitor 4μF, 400 V, 50/60 Hz	Hydra, mab mkp 4/400 I	Cover film for motor capacitor	Cover film for motor capacitor	HYDRA a.s.	MAB MKP 4 /400I	-	PP	-	V0	R26	Yes - HL3	Capasitors 2-19
17	40054	Motor capacitor 4μF, 400 V, 50/60 Hz	Hydra, mab mkp 4/400 I	Contact holder for motor capacitor	Contact holder for motor capacitor	HYDRA a.s.	MAB MKP 4 /400I	-	PA 6	-	V0	R26	Yes - HL3	Capasitors 2-19
20	40176	Heating element, 1500 W, 230 Vac	w/thermostat and fuse TCO	Micanite support structure	Support and electrical insulation	Lund & Sørensen A/S	for heating filament	Cogebi, Cogemicanite 505.3	Muscovite Mica + resin	IEC 60695- 11-10 / UL94	V0	R26	Yes - HL3	Heating element 46-89
24	40030	Heating element holder, grey	Lexan 3412R	-	Holder/funnel for heating element assembly	DAN DRYER		Lexan 3412R by SABIC	PC	IEC 60695- 11-10 / UL94	V0	R26	Yes - HL3	Heating element 46-89
26	40260	Blower motor	EBM-papst R2E 146 BC 2812	Bobbin	Bobbin	ebmpapst	-	Ultramid A3X2G5 by BASF or Latamid 66H2G 25/VOKB by LATI or Technyl A20V25 by Rhodia	All: PA66	All: IEC 60695-11- 10/UL94	V0	R26	Yes - HL3	Blower Motor 94-164
28	40260	Blower motor	EBM-papst R2E 146 BC 2812	Winding retainer	Winding retainer	ebmpapst	-	Ultramid A3X2G5 by BASF or Latamid 66H2G 25/VOKB by LATI or Technyl A20V25 by Rhodia	All: PA66	All: IEC 60695-11- 10/UL94	V0	R26	Yes - HL3	Blower Motor 94-164



29	40260	Blower motor	EBM-papst R2E 146 BC 2812	End cap insulation	End cap insulation	ebmpapst	-	Ultramid A3X2G5 by BASF or Latamid 66H2G 25/VOKB by LATI or Technyl A20V25 by Rhodia	All: PA66	All: IEC 60695-11-10/UL94	V0	R26	Yes - HL3	Blower Motor 94-164
30	40260	Blower motor	EBM-papst R2E 146 BC 2812	Slot wedge	Slot wedge	ebmpapst	-	SABIC, VALOX 357	PBT+PC	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Blower Motor 94-164
31	40260	Blower motor	EBM-papst R2E 146 BC 2812	Covering cap	Covering cap	ebmpapst	-	LATI, Latamid 66 H2G 25/V0CT1	PA66	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Blower Motor 94-164
32	40260	Blower motor	EBM-papst R2E 146 BC 2812	Plastic wiring board	Plastic wiring board	ebmpapst	-	Ultramid A3X2G5 by BASF or Latamid 66H2G 25/VOKB by LATI or Technyl A20V25 by Rhodia	All: PA66	All: IEC 60695-11-10/UL94	V0	R26	Yes - HL3	Blower Motor 94-164
37	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	Timer casing, plastic, Lexan	Housing and insulation material	DAN DRYER	45470	Lexan 3412R by SABIC	PC	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Timer Unit 350 - 431
38	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	Lid for timer casing, plastic,	Housing and insulation material	DAN DRYER	45472	Lexan 3412R by SABIC	PC	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Timer Unit 350 - 431
39	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	Timer unit PCB without attached technical equipment	Printed circuit board	KingBoard Laminates	KB 6160 (ANSI FR4)		Epoxy/Glass fibre	IEC 60695-11-10 / UL94	V0	R24 or R25	Yes - HL3	Timer Unit 350 - 431
41	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	Transformer unit, ta40/B, Pri:230V 50/60 Hz, Sec: 6V, 1,8VA	Potting compound	Dantrafo A/S, Denmark	DT 1010050 ta40/B	Araldite CW5730 N/Hardener HY5731 by Huntsman Advanced Materials (Switzerland) GmbH or RAKU-PUR 21-2350 by RAMPF GIESSHARZE GmbH & Co. KG	Epoxy or PU	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Timer Unit 350 - 431
47	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Sensor housing partition	Sensor housing material	DAN DRYER	-	NORYL V0150B(f1)(IT) Black -by SABIC	PPO/PS	IEC 60695-11-10 / UL94	V0	R26	Yes - HL3	Sensor Unit 224-343



49	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Sensor PCB	Printed circuit board	KingBoard Laminates	KB 6160 (ANSI FR4)		Epoxy/Glass fibre	IEC 60695-11-10 / UL94	V0	R24 or R25	Yes - HL3	Sensor Unit 224-343
51	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Sensor cable	Signal cable	Huber & Suhner	Radox GKW/LW S EMC -12 555 595	-	-	R15 acc. EN 45545:2013	All criteria for R15 are met	R15	Yes - HL3	Sensor Unit 224-343
52	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	WAGO connector plug/receptacle, Signal	Insulating material for electrical connector	WAGO Kontakttechnik GmbH & Co. KG	734-104/037-000	CP-Polymer-Technik, Wellamid 6600-PA66-HWV0CP	PA66	IEC 60695-11-10/UL94	V0	R26	Yes - HL3	Sensor Unit 224-343

Note: According to EN 45545-2:2013: All products < 10 g or in touching contact with another product < 10 g with approved documentation.



Sheet of Combustible Products not grouped acc. Rule 1 EN 45545-2:2013 of DAN DRYER Build-In Hand Dryers based on art. 142

Item no.	Part no.	Description 1	Description 2	Description 3	Material application	Part/Sub part manufacturer	Article no. / Commercial trade name	Material base type	Result/ level	Quantity	Unit	Total mass [g]	Apendix A - Components Chapter/Page
1	21002	Kabelklemme, H3P, Ø6,5mm, PA66	Fb.: Nat., UL94 V2, -40-105 Grad	-	Kabelklemme	Hellerman Tyton	211-60039	Polyamide 6,6 PA66	V2	2	Pcs.	2	Cable Clamps 20-21
3	21230	Cable harness, Power		Isolation for Faston 6,3 receptacle	Electrical isolation of Faston connectors	COLOMBO SERGIO & FIGLI SRL	CS 63N004 / Rhodia, Technyl A205F or Ascend, Vidyne 21SPC	PA66	V2	8	Pcs.	3.6	Connector housing 37-45
6	21230	Cable harness, Power		Phoenix power supply connector for timer unit	Insulating material for electrical connector	PHOENIX CONTACT	MSTB 2,5/ 3-ST-5,08	PA	V0	1	Pcs.	5	Timer unit/ Phoenix connector headers 336-371
8	21230	Cable harness, Power		Heat shrink tubing Ø9,5 LS0H	Cable bundling	DSG CANUSA or Hellermann Tyton	Deray HB by DSG CANUSA or TR27 by Hellermann Tyton	Polyolefin	-	38	cm	4.2	Shrink Tubing 318-323
11	21235	Cable assembly, Signal or similar		Phoenix 4-pole Signal connector plug for timer unit	Insulating material for electrical connector	PHOENIX CONTACT	MC 1,5/ 4-ST-3,5	PA	V0	1	Pcs.	2	Timer unit/Phoenix connector headers 362-397
21	40176	Heating element, 1500 W, 230 Vac	w/thermostat and fuse TCO	Insulated internal connection wire	Wire insulation	-	FP20USV# / Teflon	FEP	-	1	Pcs.	0.3	Heating element 46-89
22	40176	Heating element, 1500 W, 230 Vac	w/thermostat and fuse TCO	Bimetal thermostat thermal cut-out	Insulation and support material	Sensata	MA10 AA-056-2	-	-	1	Pcs.	0.5	Heating element 46-89
23	40176	Heating element, 1500 W, 230 Vac	w/thermostat and fuse TCO	Non-resetting thermal cut-out	Insulation and support material	Thermodisc	Microtemp G4A00 093C	-	-	1	Pcs.	0.3	Heating element 46-89



27	40260	Blower motor	EBM-papst R2E 146 BC 2812	Interwinding insulation	Interwinding insulation	ebmpapst	Radici, RADILON A USZ200 333 NER	PA66	HB	2	Pcs.	2.2	Blower Motir/ RADILON A USZ200 131-133 164
40	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	Transformer unit, ta40/B, Pri:230V 50/60 Hz, Sec: 6V, 1,8VA	Plastic casing	Dantrafo A/S, Denmark	DT 1010050 ta40/B / Durethan BG30X by Lanxess AG	PA6	HB	1	Pcs.	4	Timer unit/ Transformer Unit 384-405
42	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	Transformer unit, ta40/B, Pri:230V 50/60 Hz, Sec: 6V, 1,8VA	Bobbin	Dantrafo A/S, Denmark	DT 1010050 ta40/B / Durethan AKV30H by Lanxess AG or Durethan BKV30H by Lanxess AG	PA66 or PA6	HB	1	Pcs.	3	Timer unit/ Transformer Unit 410-431
43	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	4 -pole PCB connector header	Connector housing material	PHOENIX CONTACT	MC 1,5/ 4-G-3,5 - 1844236	PBT	V0	1	Pcs.	1	Timer unit/Phoenix connector headers 362- 397
44	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	2 -pole PCB connector header	Connector housing material	PHOENIX CONTACT	MC 1,5/ 2-G-3,5 - 1844210	PBT	V0	1	Pcs.	0.6	Timer unit/Phoenix connector headers 362- 397
45	45405	Timer unit, Type AE3, ext. IR	230V 50/60Hz	3 -pole PCB connector header	Connector housing material	PHOENIX CONTACT	MSTBA 2,5/ 3-G-5,08 - 1757255	PA	V0	1	Pcs.	1.1	Timer unit/Phoenix connector headers 362- 397
46	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Sensor housing	Sensor housing material	DAN DRYER	NORYL V0150B(f1)(IT) Black -by SABIC	PPO/PS	V0	1	Pcs.	8.9	Timer unit/ Sensor housing and housing partition 335-342
48	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Sensor cover glass	Cover glass for IR emitter and receiver	DAN DRYER	Diakon CMG302 by Lucite	PMMA	HB	2	Pcs.	1	Timer unit/ Sensor cover glass -PMMA 329-334



50	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Sensor housing Potting material	Potting compound	DAN DRYER	Voltatex 3100 + Voltatex 5131(hardener) by Axalta Coating Systems Germany GmbH	PU	-	1	Pcs.	3.0	Timer unit/ Sensor housing and housing partition 335-342
54	45426	Sensor, external, complete w/	70 cm cable, H&S, w/WAGO 734	Heat shrink tubing	Cable jacket termination	Raychem or DSG CANUSA or Hellermann Tyton	RNF-100 by Raychem or Deray HB by DSG CANUSA or TR27 by Hellermann Tyton	Polyolefin	-	1	Pcs.	0.1	Shrink Tubing 344-349

Note: No requirement apply to products with a combustible mass of < 10 g not in touching contact with another unclassified product, according to EN 45545-2:2013 part 4.3.1.



Sheet of Combustible Products grouped acc. Rule 1 EN 45545-2:2013 of DAN DRYER Build-In Hand Dryers based on art. 142

Item no.	Part no.	Description 1	Description 2	Material application	Part/Sub part manufacturer	Article no. / Commercial trade name	Material base type	Quantity	Unit	Total mass [g]	Appendix A - Components Chapter/Page
7	21230	Cable harness, Power	Molex 2x2 motor supply connector, receptacle	Crimp terminal housing	Molex	39-01-3043 or 46993-0411	Nylon	1	Pcs.	1.5	Molex 90-93
8	21230	Cable harness, Power	Heat shrink tubing Ø9,5 LS0H	Cable bundling	DSG CANUSA or Hellermann Tyton	Deray HB by DSG CANUSA or TR27 by Hellermann Tyton	Polyolefin	38	cm	4.2	Shrink tubing 344-349
18	40120	Power relay	Contact base (TE, RM505730)	Contact base material	Tyco Electronics	RM505730	Bakelite	1	Pcs.	20	Relay 220-223
19	40120	Power relay	Cover (TE, RM505730)	Cover material	Tyco Electronics	RM505730	PC	1	Pcs.	14	Relay 220-223
25	40260	Blower motor	Winding impregnation (EBM-papst R2E 146 BC 2812)	Winding impregnation	ebmpapst	Voltatex 4015	Unsat. Polyesterimide	1	Pcs.	28	Blower Motor 94-164
33	40260	Blower motor	Cable grommet (EBM-papst R2E 146 BC 2812)	Cable grommet	ebmpapst	Santoprene 101/73 by Exxon Mobil Chemical	TPE	1	Pcs.	0.5	Blower Motor 94-164
34	40260	Blower motor	Heat shrink tubing (EBM-papst R2E 146 BC 2812)	Heat shrink tubing	ebmpapst	Versafit RT-1136 by Raychem or Deray H or CFB by DSG-CanUSA or ACS-55(H-2(Z)) by Hongshang	Cross-linked Poly-olefin	1	Pcs.	1.1	Blower Motor 94-164
35	40260	Blower motor	Motor supply wiring -Single wire leads (EBM-papst R2E 146 BC 2812)	Wire insulation	Leoni Studer	190815; 190808; 190810; 190813 / Leoni Studer, Betatherm 145	Cross-linked Poly-olefin	100	cm	0.8	Blower Motor 94-164
36	40260	Blower motor	Molex 2x2 motor supply connector (EBM-papst R2E 146 BC 2812)	Crimp terminal housing	Molex	46992-0410	Nylon	1	Pcs.	1.1	Blower Motor 94-164



File: FUV0079-002 Date: 2021-10-25

53	45426	Sensor, external, complete w/	Isolated single wire ferrules (70 cm cable, H&S, w/WAGO 734)	Ferrule insulation collar material	Zoller & Fröhlich or Weidmüller	Z+F V30AE series or Z+F V30MA series or One or more of the types described in section 'J' of the 2015/2016 Weidmüller Tools catalog art. No. 2021630000	-	4	Pcs.	0.2	Sensor unit 224-343
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Total mass of group 71.4 g

Note: According to EN 45545-2:2013 part 4.3.2 Rule 1: All products < 10 g or in touching contact with another product < 10 g and without documentation must be grouped. If the total combustible mass of the products is < 100 g; no requirements apply to the products of this group.

Inspection of the electrical design Build-In Hand Dryers based on art. 142 according to the requirements of EN 45545-5:2013+A1:2015

Product overview

The electrical inspection of the product includes the electrical parts used in construction of the product.

Intern electrical wiring.

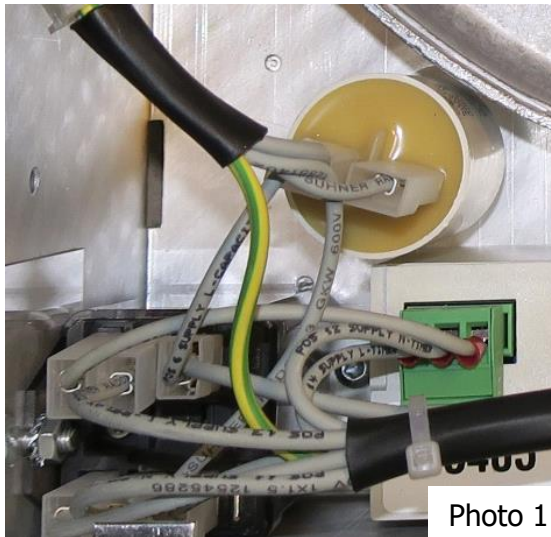


Photo 1

From inspection of the internal wiring the following manufacturer (HUBER+SUHNER-Type RADOX 3 GKW 600V) of the wiring that can be seen on photo 1 it can be confirmed that the wires meet the requirements in accordance with EN 45545-2. Pkt. 4.2 C. (EN 50306, EN 50264 and EN 50382)

Resistors and heating equipment



Photo 2

From inspection of the heating equipment that can be seen on photo 2, it can be confirmed that the equipment meets the requirements in accordance with EN 45545-5. Pkt. 5.10

Pkt. 5.10

Measures shall be taken to prevent the risk of fire in areas where resistors and heating equipment have a surface temperature of 200°C or more under normal or fault operating conditions:

- *The use of two separate levels of protective device, each capable of independently cutting off energy supply to the heating equipment or resistors:*

Intern electrical construction.

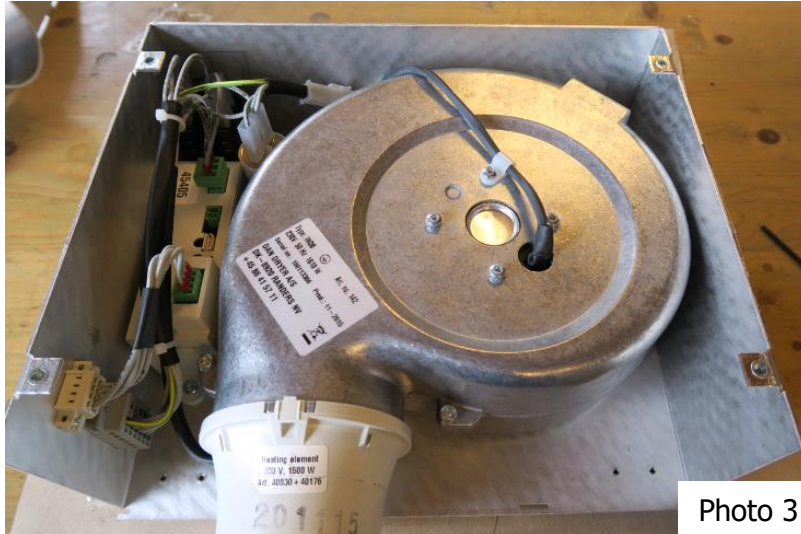
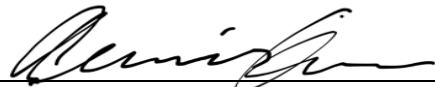


Photo 3

From inspection of the internal electrical construction that can be seen on photo 3, it can be confirmed that the equipment meets the requirements in accordance with EN 45545-5.

The inspection shows that the electrical construction within the product is done accordingly to the standard description in EN 45545-2 and EN 45545-5.



Dennis Aaberg
Fire Investigator



File: FUV0079-002

Date: 2021-10-25

DAN DRYER A/S



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Declaration

TO WHOM IT MAY CONCERN,

This Declaration is issued under the sole responsibility of the manufacturer.

Manufacturer: DAN DRYER A/S
Alsikevej 8
DK-8920 Randers NV
Denmark

The object of the declaration: Build-In Hand Dryer for rolling stock
item number 142

This declaration confirms that the product Hand Dryer art. 142 has not had any components or parts updated or changed since its last issued Evaluation Report FUV0079-002 by DBI 2019-11-19.

Signed for and on behalf of DAN DRYER A/S

Randers, 6/10 - 2021

Susanne Friis Eden,
Managing Director