

Test reports

Sigma Duplex

1. Prøvnings- / Skorstensfejerattest DK s. 1
2. Test report for NO..... s. 2
3. Test report for DE/UK s. 3



**Europæisk Prøvningsinstitut
Organisation 1015
Hudcova 424/56b, 621 00 Brno**

Erklæring til afprøvningsnr.: 30-12835

udstedt Testing Laboratory nej. 1.045.1, akkrediteret af CAI ops, nr. 447/2015 akkrediteringscertifikat

Produkt:

Pejseindsats træ model Sigma Duplex

Producent:

Jydepejsen A/S
Ahornsvinget 3-7 - Nr.Felding
DK7500 Holstebro

Procedure:

X	Prøvning efter DS/EN13240/A2:2004
	Prøvning efter NS3058-1 & -2 (partikelmåling)
X	Emissionsmåling efter CEN/TS 15883 (støv og OGC)

Prøvningsresultater

Akkrediteret prøvning af brændeovn iht. EN 13240 er foretaget med brænde der påfyres manuelt, og følgende resultater blev opnået:

Nominel ydelse:	8,5 kW
CO-emission:	0,0653 % - henført til 13 % O ₂
Virkningsgrad:	80,9 %
Røggastemperatur:	250 °C
Afstand til bagvæg:	400 mm.
Afstand til sidevæg:	400 mm.

Emissioner iht. NS 3058 og/eller CEN/TS 15883:

Partikler efter NS 3058:	g/kg (tørstof) middelværdi (krav 2015:5 / 2017:4)
Partikler efter NS 3058:	g/kg (tørstof) maksimalt (krav 2015:10 / 2017:8)
OGC efter CEN/TS 15883:	38 mgC/Nm ³ ved 13% O ₂ (krav 2015:150 / 2017:120)
Støv efter CEN/TS 15883:	39 mg/Nm ³ ved 13% O ₂ (krav 2015:40/ 2017:30)

Bemærk venligst, at de oplyste værdier er et uddrag af prøvningsrapporten. For yderligere oplysninger henvises til prøvningsrapporten, se nummer ovenfor.

STROJIRENSKÝ ZKUŠEBNÍ ÚSTAV, s.p.

HUDCOVA 56b

621 00 BRNO



Milan Holomek
Leder af tjenesten
Brno, 2015-10-06

Skorstensfejerpåtegning

På baggrund af ovennævnte emissioner attesteres det hermed, at fyringsanlægget opfylder emissionskravene i bilag 1 til Bekendtgørelse nr. 46 af 22/01 – 2015 om regulering af luftforurening fra fyringsanlæg til fast brændsel under 1 MV, for så vidt:

Krav fra 2015 til januar 2017 opfyldt	x	Krav efter januar 2017 opfyldt	
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PRØVNINGSATTEST

Utdrag av rapport nr. 102044.42B

Rekvirent og produsent:

Jydepejsen A/S
Ahornsvinget 3-7 – Nr.Felding
DK-7500 Holstebro

Ovn type: Sigma Duplex

Testmetode: Emisjon i henhold til NS 3058

Prøvningsresultater

Veiet partikkelemisjon etter NS 3058: 3,0 g/kg (maks 10 g/kg)

Maksimalt utslipp i en enkelt prøving: 3,4 g/kg (maks 20 g/kg)

Utdrag af rapport nr. 102044.42A

Nominel effekt: 8,3 kW

Brændsel: Brænde

Bemerk vennligst, at de opplyste verdier er utdrag fra prøvningsrapporten.
SINTEF NBL as er notifisert prøvningsorgan med **ID-nr. 1084**

Trondheim, 2013-12-06	Skorsteinsfeiers påtegning
	
Asbjørn Østnor, fagansvarlig	Dato, underskrift

Det attesteres hermed at ovenfor nevnte fyringsanlegg oppfyller emisjonskravene i:

Bilag 1 til bekendtgørelse nr. 1432 af 11 december 2007 vedr. regulering af luftforurening fra brændeovne og brænde kedler samt visse andre anlæg til energiproduktion.



Strojírenský zkušební ústav, s.p.
(Engineering Test Institute, Public Enterprise)
Testing Laboratory 1045.1, Workplace 1
Accredited by the Czech Accreditation Institute
Hudcova 424/56b, 621 00 Brno, Czech Republic

Page 1 of 10



TEST REPORT

30-12835-T

Product: Fireplace insert for wood (birch)

Type designation: Sigma Duplex

Customer: Jydepejsen A/S
Ahornsvinget 3-7 - Nr. Felding
DK-7500 Holstebro
Denmark

Manufacturer: Jydepejsen A/S
Ahornsvinget 3-7 - Nr. Felding
DK-7500 Holstebro
Denmark

Employee responsible: Ing. Stanislav Buchta

Report issue date: 2015-08-18

Distribution list: 1 copy to the Customer
1 copy to the Engineering Test Institute

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Partial copies are subject to approval.

The results of tests and verifications relate only to the products tested.

v_4.0 Brno 2012



The Engineering Test Institute, Public Enterprise, (hereinafter referred to as SZU in Brno) performed the activity based on these documents:

- Order B-52353/1 of 2015-06-09 (received on 2015-06-09)
- Contract B-52353/1/30
- Change of implementation date 0211-Dv/5115 of 2015-08-18

I. Product description

The fireplace insert, type designation Sigma Duplex, is inset appliance operated with firedoors closed, and is intended for occasional heating and supplemental heating of dwelling rooms and other indoor spaces. The fireplace insert for wood are made of steel segments. Combustion chamber is lined with removable chamot boards. The combustion chamber of Sigma Duplex fireplace insert is firmly closed-up with two doors. The doors are glazed with special heat-resistant glass. Flue spigot is at the top. Supply of primary and secondary combustion air is separate. Primary air is brought directly to the fire bed. Secondary air is brought into the space above the fire bed. These fireplace inserts are intended for intermittent operation.

Basic technical data of fireplace inserts

(Table 1)

Type	Main dimensions (mm)			Weight (kg)	Nominal output (kW)	Fuel consumption (kg/h)	Flue gas connector diameter (mm)	Operating draught (Pa)
	Height	Width	Depth					
Sigma Duplex (birch)	1127.5	816	466	139	8.5	2.4	150	12

According to ČSN EN 13229/A2 Table 1 – Categorisation of appliances, the product is of category 1b.

II. Sample tested

Visual inspection and tests were carried out on the samples indicated in the following table:

(Table 2)

Type	Date	Sample Reg. No.
Sigma Duplex	2015-05-04	0211.15.16231.002

The visual inspection and all the tests were carried out by Ing. Marek Skřivan, Test Engineer, in the period from 05/2015, at the Boilers and Industrial Heat Equipment Test Station of SZU in Brno.



III. Methods, test results and verifications

Measuring and test equipment

(Table 3)

No.	Description	Inventory number	Calibration valid until:	Accuracy
1.	Barometer	112541	01.2019	See Calibration Sheet 6013-KL-K001-14
2.	Thermometer (Testo 608-H1)	117044	02.2018	See Calibration Sheet 1072F/13
3.	Hygrometer (Testo 608-H1)	117044	02.2018	See Calibration Sheet 1072F/13
4.	Draught gauge	117274	03.2017	See Calibration Sheet 1760F/15
5.	Scale, HP-30 K	022333	10.2015	See Calibration Sheet 6051-KL-HO172-13
6.	Stop watch	990806	10.2017	See Calibration Sheet 2953E-12
7.	THERM 5500-3	021990	02.2016	See Calibration Sheet 130015
8.	THERM 2285-2	021763	10.2015	See Calibration Sheet 120166
9.	SARTORIUS analytical scale	021458	07.2015	See 6051-KL-H0410-11
10.	Calliper	115884	09.2015	See Calibration Sheet KL-D-1617/05/11
11.	HORIBA ENDA – 680P combustion product analyser	022305	x	+
12.	PE 2400 CHNS elemental analyser	022107		
13.	Gravimat SHC 5 - TU	920002		

Note:

x ... Verified with use of calibration standards prior to measurement

+ ... ± 5 % of measured values

Measurement uncertainty

(Table 4)

Parameter measured	Uncertainty of measurement
Gas analysis CO CO ₂	$\leq 6\%$ of the measured value $\leq 2\%$ of the measured value
Temperature Flue gas Ambient room Surface Touchable areas	≤ 5 K ≤ 1.5 K ≤ 2 K ≤ 2 K
Mass Fuel consumption Residue Fuel load ≤ 7.5 kg > 7.5 kg	± 20 g ± 5 g ± 5 g ± 10 g

"The stated extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, $k=2$, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4/02."



Test title: Structural safety

Requirement specification: ČSN EN 13229/A2:2005 Art. 4.3, 4.5, 4.14

Sample tested: Fireplace insert for wood (birch), type designation Sigma Duplex

Measuring equipment: No. 10, see Table 3

Required product properties	Requirement specification	Test result	Note
ČSN EN 13229/A2:2005 Art.:			
Flue spigot or socket The flue spigot or socket where required for installation purposes shall be designed to enable a suitable gastight connection to be made between the flue gas connector and the appliance. The spigot or socket shall provide a good fit for the size of pipe recommended by the manufacturer. Where the flue gas connector fits over an outlet spigot the overlap shall be a length of at least 25 mm for a pipe diameter of 160 mm or less, and at least 40 mm for a pipe diameter greater than 160 mm. Where the flue gas connector fits into a socket, the insertion depth shall be a minimum of 25 mm. <i>NOTE It is recommended that provision is made for sealing internal connections with heat resistant sealing compound and/or sealing rope if required.</i>	4.3	+	150 mm diameter, upwards
Flueways It shall be possible to clean the flueways of the appliance completely using commercially available tools or brushes, unless special cleaning tools or brushes are provided by the manufacturer. The size of the flueway in its minimum dimension shall be not less than 30 mm except that where fuels other than bituminous coal are burned it shall be permissible to reduce it to not less than 15 mm provided an access door(s) is provided for cleaning the flueway.	4.5	+	> 30 mm
Control of flue gas If a flue damper is fitted, it shall be a type which does not block the flue totally by accumulation of combustion residue. The damper shall be easy to operate and incorporate an aperture within the blade which, in a continuous area, occupies at least 20 cm ² or 3 % of the cross-sectional area of the blade if this is greater. The position of the damper shall be recognisable to the user from the setting of the device. If a draught regulator is fitted, the minimum cross sectional area requirement shall not be applicable but the device shall be easily accessible for cleaning.	4.14	0	

*) Test result:

+.... Requirement fulfilled

0.... Requirement does not apply to the product in question

Tested by: Ing. Marek Skřivan

Date: 2015-05-18

Signed:

Reviewed by: Ing. Stanislav Buchta

Date: 2015-08-18

Signed:



Accredited test number: 1029 **Test title:** Heat output and calorific efficiency test
1032 **Combustion efficiency test**
Test method: ČSN EN 13229:2002 Art. A. 4.4., A. 4.5, A.4.6, A.4.7
Sample tested: Fireplace insert for wood (birch), type designation Sigma Duplex
Measuring equipment: Nos. 1 + 13, see Table – Measuring and test equipment

Test results:

Fireplace insert for wood (birch), type designation Sigma Duplex

Date of testing:	2015-05-15	$t_{ok} = 24$	$^{\circ}\text{C}$	r.v. = 31	%	$p_a = 98.3$	kPa
Place of testing:	At SZU	Yes	At the Manufacturer's premises	-	At the Customer's premises	Other:	
Measured and calculated values: Nominal output	Unit	1	2	Average	Limit acc. to:		
					EN 13229	15a B-VG	I.BImSchV Stufe 2
Fuel used: Birch wood	mm	330					
Setting of combustion air – Primary/Secondary	%	3/4					
Mass of the test fuel fired hourly	kg/h	2,480	2,493	2,487			
Input achieved	kW	10,99	11,05	11,02			
Combustion air temperature	$^{\circ}\text{C}$	23	25	24			
Flue draught	Pa	11	12	11			
Average flue gas temperature	$^{\circ}\text{C}$	233	247	240			
CO ₂	%	8,96	8,87	8,91			
CO – measured	%	0,0773	0,0790	0,0781			
CO – at O ₂ = 13%	%	0,0645	0,0660	0,0653	≤ 1.0		
CO – at O ₂ = 13%	mg/Nm ³	807	824	816		≤ 1500	≤ 1250
CO – at O ₂ = 0%	mg/MJ	557	569	563		≤ 1100	
NO _x – measured	ppm	66	66	66			
NO _x – at O ₂ = 13%	mg/Nm ³	113	112	113		≤ 200	
NO _x – at O ₂ = 0%	mg/MJ	78	77	78		≤ 150	
OGC – measured	ppm	21	35	28			
OGC (TOC) – at O ₂ = 13%	mg/Nm ³	28	48	38		≤ 120	
OGC (TOC) – at O ₂ = 0%	mg/MJ	19	33	26		≤ 50	
Dust - measured	mg/Nm ³	48	46	47			
Dust (TZL) – at O ₂ = 13%	mg/Nm ³	40	38	39		≤ 75	≤ 40
Dust (TZL) – at O ₂ = 0%	mg/MJ	28	27	28		≤ 35	
Chimney loss	%	17,74	19,00	18,37			
Proportion of losses through latent heat in flue gases	%	0,55	0,57	0,56			
Proportion of heat losses through combustible constituents in residues	%	0,18	0,18	0,18			
Efficiency	%	81,53	80,25	80,89	≥ 30	≥ 80	≥ 75
Water heat output	kW	-	-	-			
Total heat output achieved	kW	8,96	8,87	8,92			
Heat output - uncertainty	kW	0,33	0,33	0,33			
Nominal heat output	kW	8.5					
Dry flue gases mass flow	g/s	8,3	8,4	8,4			



Fuel analysis

Type of fuel	Birch wood			
Analytical indicator	Symbol	Unit	Value	Uncertainty
Net calorific value	Q_d	[MJ/kg]	15,960	0.14
Total water in original state	W_t	[% of mass]	11,19	0.02
Ash	A	[% of mass]	0,69	0.02
Carbon	C	[% of mass]	43,88	0.25
Hydrogen	H	[% of mass]	6,19	0.10

Note: Sample in original condition

Tested by: Ing. Marek Skřivan

Date: 2015-05-18

Signed:

Reviewed by: Ing. Stanislav Buchta

Date: 2015-08-18

Signed:



Accredited test number: 1031 **Test title:** Adjustability test

Test method: ČSN EN 13229/A2:2005 Art. A 4.8

Sample tested: Fireplace insert for wood (birch), type designation Sigma Duplex

Measuring equipment: Nos. 1 + 8, see Table – Measuring and test equipment

Test results:

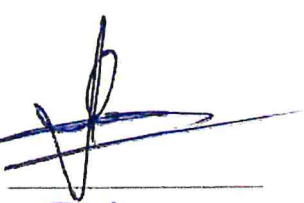
Fireplace insert for wood (birch), type designation Sigma Duplex

Date of testing:	2015-05-15		$t_{ok} = 24$	$^{\circ}\text{C}$	r.v. = 31	%	$p_a = 98.3$	kPa
Place of testing:	At SZU	Yes	At the Manufacturer's premises	-	At the Customer's premises	Other:		
Variables measured and calculated			Unit	Value	Limit	Note		
Fuel used: Birch wood			mm	330				
Fuel consumption			kg/h	0,82				
Heat input achieved			kW	3,65				
Ambient room temperature and combustion air temperature			$^{\circ}\text{C}$	24				
Flue draught			Pa	6	$\pm 1 \text{ Pa}$			
Average flue gas temperature			$^{\circ}\text{C}$	205				
Combustion period			min	53				
Recovery capability, after time			min	2				

Note: The appliance input is adjustable within the range of 33-100 % by a gradual adjustment of combustion air supply.

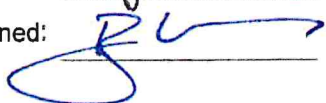
Tested by: Ing. Marek Skřivan

Date: 2015-05-18

Signed: 

Reviewed by: Ing. Stanislav Buchta

Date: 2015-08-18

Signed: 



Accredited test number: 1028 **Test title:** Flue gas temperature and surface temperature test

Test method: ČSN EN 13229/A2:2005 Art. A.4.7. A.4.9

Sample tested: Fireplace insert for wood (birch), type designation Sigma Duplex

Measuring equipment: Nos. 1 ÷ 3, 8, 11, see Table – Measuring and test equipment

Test results:

Fireplace insert for wood (birch), type designation Sigma Duplex

Date of testing:	2015-05-15	$t_{ok} = 24$	°C	r.v. = 31	%	$p_a = 98.3$	kPa
Place of testing:	At SZU	Yes	At the Manufacturer's premises	-	At the Customer's premises	Other:	

Measured point	Material	Temperature rise (K)	
		Measured	Limit acc. to ČSN EN
Primary and secondary air controls	Metal	79*)	35
Door handle	Metal	34	35

Average flue gas temperature after spigot	°C	250	-
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***) Note:**

It is necessary to use the supplied protective glove when manipulating with the primary and secondary air controls.
The tables show the highest temperatures.

Tested by: Ing. Marek Skřivan

Date: 2015-05-18

Signed:

Reviewed by: Ing. Stanislav Buchta

Date: 2015-08-18

Signed:



Accredited test number: 1035 **Test title:** Temperature safety test– Temperature rise of the surrounding flammable materials

Test method: ČSN EN 13229/A2 Art. A.4.7 and A 4.9

Sample tested: Fireplace insert for wood (birch), type designation Sigma Duplex

Measuring equipment : Nos. 1 ÷ 3, 8, 11, see Table – Measuring and test equipment

Test results:

Fireplace insert for wood (birch), type designation Sigma Duplex

Date of testing:	2015-05-15 and 18	$t_{ok} = 24$	$^{\circ}\text{C}$	r.v. = 31	%	$p_a = 98.3$	kPa
Place of testing:	At SZU	Yes	At the Manufacturer's premises	-	At the Customer's premises	Other:	

During test of nominal output (A.4.9.1)

Test	Ambient temperature	Flue draught	Maximum temperature rise						Quantity of fuel
			Trihedron – distance				Floor protector	Limit	
			mm						
			400	400	800	800			
-	°C	Pa	K						kg/h
1	24	12	61	60	55	45	26	65	2.49

During thermal overload test (A.4.9.2)

Test	Ambient temperature	Flue draught	Maximum temperature rise						Quantity of fuel
			Trihedron – distance *)				Floor protector	Limit	
			mm						
			400	400	800	800			
-	°C	Pa	K						kg
1	26	15	63	62	58	49	29	65	2.96

NOTE: Trihedron placed 400 mm from the rear wall of the appliance.
Trihedron placed 400 mm from the side wall of the appliance.
Trihedron placed 800 mm from the front wall of the appliance.
Trihedron placed 800 mm above the appliance.

The tables show the highest measured values.

Tested by: Ing. Marek Skřivan

Date: 2015-05-18

Signed:

Reviewed by: Ing. Stanislav Buchta

Date: 2015-08-18

Signed:



IV. List of referenced documentation

- Order B-52353/1 of 2015-06-09 (received on 2015-06-09)
- Contract B-52353/1/30
- Change of implementation date 0211-Dv/5115 of 2015-08-18
- Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
- ČSN EN 13229:2002/A2:2005 – Inset appliances including open fires fired by solid fuels – Requirements and test methods
- A list of technical documentation:
 - Instructions for assembly, installation and operation of Sigma Duplex fireplace insert
 - Assembly drawing – Sigma Duplex, Dwg. No. 14700000

Report compiled by: Ing. Jiří Dvořák

Person responsible for correctness of the Report:

Milan Holomek
Head of Heat and Environment-Friendly Equipment
Test Station

