

TEST REPORT

Report no.:
300-ELAB-2313-EN-nom



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TECHNOLOGICAL
INSTITUTE**

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Page 1 of 12
Init.: REHV/MXB
Order no.: 787856
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Product: Solid fuel stove Type: Cosmo 1147 steel, ver. 2

Sample: Receipt at DTI, Aarhus: 05.12.2017, sampled by Jydepejsen Denmark

Test period: Date of testing: 05.12.2017 - 06.12.2017

Procedure Testing of a solid fuel stove in accordance with DS/EN 13240:2003 and DS/EN 13240/A2:2004. Emission measurements are in accordance with DS/CEN/TS 15883 and FprEN 16510-1 See paragraph 5. The uncertainty of the measurements meets the requirements of DS/EN 13240 paragraph A3, and relevant parts of DS/CEN/TS 15883 and FprEN 16510-1.

Result: The stove meets the requirements of EN 13240 with regards to nominal testing. Safety test is not accomplished.

Remarks: See paragraph 2 - Remarks.

Terms: Accredited testing was carried out in compliance with the current guidelines laid down by DANAK (The Danish Accreditation), cf. www.danak.dk, and the general terms and conditions of The Danish Technological Institute. The test results apply to the tested products only. This test report may be reproduced in extract only if the laboratory has approved the extract in writing. Danish Technological Institute is Notified Body with identification number 1235 and DIN Certco test laboratory, PL 168.

Issued: Date 19.12.2017, Danish Technological Institute, Aarhus, Energy Laboratory

Signature: René Lyngsø Hvidberg
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Test reg. no. 300



1. Documentation material

- Installation manual and user's instruction
- Drawings
- CE-label

The documentation material is enclosed as a digitally signed PDF file.

2. Remarks

This report only includes results regarding nominal testing for an improved previously tested model. Safety testing for this new model is not covered in this report.

The documentation material is only controlled for its combustion properties.

3. The basis of the test

This report concerns testing of a free-standing stove, Cosmo 1147 steel, ver. 2, with production number 1132534. The stove has been subject to random sampling and is representative for appliances from the production. The manufacturer must be in possession of a written declaration of the above-mentioned.

Testing was carried out by Danish Technological Institute, Kongsvang Allé 29, DK-8000 Aarhus C, Denmark.

The thermal loss in the flue gas was calculated according to a corrected formula. In formula 4 in the standard the factor 1.92 was corrected to 1.244 during the calculation.

4. Product description

4.1. Test specimen

The stove weighs 140kg.

The solid fuel appliance is not equipped with a catalyst.

The dimensions of the bottom in the firebox are:

Breadth: 360 mm
Depth: 325 mm

The flue spigot has a diameter of 150 mm. The flue spigot can optional be attached on the top or at the back of the stove.

Accessories:

- Assembly manual and user's instructions
- Glove

Cosmo 1147 steel, ver. 2 is a wood burning stove with convection and fuel storage container. The stove is equipped with a vibration grate, an ash pan and a fire door with a glass pane. The top of the stop and the door is made from cast iron.

The inner sides of the firebox are lined with vermiculite. Combustion air is supplied as primary air (as kindling air), secondary air and tertiary air.



Secondary air is supplied via a crevice above the fire door (air wash), and tertiary air is supplied via holes in the back side of the firebox. Furthermore, the stove has a kindling device which supplies air through the vibration grate as primary air.

The amount and the distribution of the combustion air are controlled by a single operating handle at the front of the stove divided into 3 "clicks". For 100% secondary and kindling air, the handle must be placed furthest to the right. Kindling air must only be just for kindling and re-stoking the stove. For closing of the kindling air, the handle has to be set at the first "click" from the right. At the 3rd "click" from the right, the combustion air is fully closed.

The stove was tested with intermittent operation.

4.2. Variants

Danish Technological Institute has assessed the following variants.

The variants are designed with the same type of fire box and air system as the tested stove or with a fire box that is insignificantly different from the tested. The variants are only assessed for its combustion properties, not assessed for its safety properties.

Cosmo series, ver. 2

- Cosmo on foot, ver. 2 (drawing 13700500)
Identical fire box. The storage compartment is removed and a base/plinth is fitted below the stove.
- Cosmo 1147 Soapstone, ver. 2 (drawing 13721000)
Identical with the tested stove except that the sides are fitted with soapstone.
- Cosmo 1147 soapstone high, ver. 2 (drawing 13702250)
Identical fire box. The height of the storage compartment is slightly increased. The stove is fitted with soapstone and the top above the combustion chamber is increased with room for accumulating stones.
- Cosmo 1147 Ceramic, ver. 2 (drawing 13703500)
Identical fire box. The stove is fitted with ceramic stones.
- Cosmo 971 steel, ver. 2 (drawing 13700000)
Identical fire box. The height of the storage compartment is reduced.
- Cosmo 971 Soapstone, ver. 2 (drawing 13720000)
Identical fire box. The height of the storage compartment is reduced. The stove is fitted with soapstone.
- Cosmo Classic, ver. 2 (drawing 13703000)
Identical fire box. The height of the storage compartment is increased. The stove is fitted with soapstone with a classic look.
- Cosmo High Soapstone, 1 piece, ver. 2 (drawing 13722000)
Identical fire box. The height of the storage compartment is reduced. The stove is fitted with soapstone (1 piece) and the top above the combustion chamber is increased with room for accumulating stones.
- Cosmo 1500, ver. 2 (drawing 13750000)
Identical fire box. The height of the stove is increased above the combustion chamber, and there is room for accumulating stones.
- Cosmo 1500 Soapstone, ver. 2 (drawing 13755000)



Identical fire box as the Cosmo 1500 but fitted with soapstone.

Cubic series, ver. 2

- Cubic wall, ver. 2 (drawing 13100000)
A stove for wall mounting. The depth of the fire box is reduced by 9 mm otherwise the fire box is identical with the tested stove. The front door is straight and not slightly arched like the Cosmo model, but the total area of glass is comparable to the tested stove. The stove has no storage compartment, and therefore the stove is lower than the tested stove.
- Cubic W200, ver. 2 (drawing 13104000)
A stove for wall mounting as Cubic Wall. The stove has a steel box added to the Cubic wall model for one of the sides. The depth of the fire box is reduced by 9 mm otherwise the fire box is identical with the tested stove. The front door is straight and not slightly arched like the Cosmo model, but the total area of glass is comparable to the tested stove. The stove has no storage compartment, and therefore the stove is lower than the tested stove.
- Cubic 109, ver. 2 (drawing 13101000)
The depth of the fire box is reduced by 9 mm otherwise the fire box is identical with the tested stove. The front door is straight and not slightly arched like the Cosmo model, but the total area of glass is comparable to the tested stove. The storage compartment is lower, and therefore the stove is lower than the tested stove.
- Cubic 166, ver. 2 (drawing 13102000)
The depth of the fire box is reduced by 9 mm otherwise the fire box is identical with the tested stove. The front door is straight and not slightly arched like the Cosmo model, but the total area of glass is comparable to the tested stove. The storage compartment lower, but the top above the combustion chamber is increased with room for accumulating stones.
- Cubic 215, ver. 2 (drawing 13103000)
The depth of the fire box is reduced by 9 mm otherwise the fire box is identical with the tested stove. The front door is straight and not slightly arched like the Cosmo model, but the total area of glass is comparable to the tested stove. The storage compartment lower, but the top above the combustion chamber is further increased (than the Cubic 166) with more room for accumulating stones.
- Cubic Corner, ver. 2 (drawing 13106000)
A stove for installation in a corner. The depth of the fire box is reduced by 9 mm otherwise the fire box is identical with the tested stove. The front door is straight and not slightly arched like the Cosmo model, but the total area of glass is comparable to the tested stove. The stove has no storage compartment, and therefore the stove is lower than the tested stove.

Mido series, ver. 2

- Mido, ver. 2 (drawing 14201000)
Identical fire box. The total area of glass is comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and therefore the stove is lower than the tested stove. Furthermore, the stove is fitted with another type of topplate.
- Mido Soapstone, ver. 2 (drawing 14205000)
Identical fire box. The stove is identical with the Mido, ver. 2 but fitted with soapstone.

Avanti

- Avanti, ver. 2 (drawing 119-00001-00)
Identical fire box. The storage compartment is slightly lower and the stove is fitted with another type of topplate.

Trend line series, ver. 2



- Trend Line 1, ver. 2 (drawing 013-00001-00)
Identical fire box. The stove is a plate iron stove. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and therefore the stove is lower than the tested stove.
- Trend Line 1 full soapstone, ver. 2 (drawing 013-00005-00)
Identical fire box. The stove is a Trend Line 1, ver. 2 fitted with soapstone. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different.
- Trend Line 2, ver. 2 (drawing 013-00002-00)
Identical fire box. The stove is a plate iron stove and has a plinth instead of a base with a storage room. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different.
- Trend Line 3, ver. 2 (drawing 013-00003-00)
Identical fire box. The stove is a plate iron stove. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different.
- Trend Line 3 full soapstone, ver. 2 (drawing 013-00004-00)
Identical fire box. The stove is a Trend Line 3, ver. 2 fitted with soapstone. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different.

Fine line series, ver. 2

- Fine Line 1, ver. 2 (drawing 010-000002-00)
Identical fire box. The stove is a plate iron stove. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and therefore the stove is lower than the tested stove.
- Fine Line 1 full soapstone, ver. 2 (drawing 010-00001-00)
Identical fire box. The stove has a classic look fitted with soapstone. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and therefore the stove is lower than the tested stove.
- Fine Line 2 full soapstone, ver. 2 (drawing 010-00005-00)
Identical fire box. The stove has a classic look fitted with soapstone. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and the stove has a higher top above the combustion chamber with a little shelf in the front.

Soft line series, ver. 2

- Soft-Line wall steel top, ver. 2 (drawing 012-00001-00)
Identical fire box. The stove is a plate iron stove. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and the stove has a higher top above the combustion chamber with a little shelf in the front.
- Soft-Line full soapstone, ver. 2 (drawing 012-00002-00)
Identical fire box. The stove identical with Soft-line wall steel top but fitted with soapstone. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and the stove has a higher top above the combustion chamber with a little shelf in the front.
- Soft-Line full ceramic, ver. 2 (drawing 012-00003-00)
Identical fire box. The stove identical with Soft-line wall steel top but fitted with ceramics. The total area of glass is slightly smaller but comparable to the tested stove even though the shape is slightly different. The storage compartment is lower, and the stove has a higher top above the combustion chamber with a little shelf in the front.



Danish Technological Institute assesses that all the above-mentioned appliances have identical or better combustion properties than the tested stove.

Please find the documentation of the variants in a separate digitally signed file; "Documentations set".

4.3. Boiler

The stove is not equipped with a boiler.



5. Arrangement and premises for test

The solid fuel stove was installed in accordance with clause A.4.1.

Test of nominal output in accordance with clause A.4.7 was carried out with birch wood, and the test load applied was 1.42 kg according to clause A.4.2 based on the manufacturer's information.

For nominal testing the door was closed immediately after refuelling. Kindling air was applied for 2:00 minutes, and the secondary air supply was slowly set for approx. 50% (in the middle of click 1 and 2 from the right) 3:00 minutes after refuelling time until the end of the burn cycle.

The manufacturer quotes that the refuelling interval at nominal output is 48 minutes.

Safety test was not accomplished. See remarks.

The stove was tested with intermittent operation.

Emission of NO_x was determined in accordance with DS/CEN/TS 15883:2009, paragraph 5.

Emission of OGC was determined in accordance with DS/CEN/TS 15883:2009, paragraph 4.

The dust emission was determined in accordance with FprEN 16510-1:2016 paragraph F.2 Heated filter.

The fuel moisture of the firewood was determined according to the weigh/dry method.



6. Test results

6.1. Nominal test in accordance with EN 13240 A.4.7 with birch wood as test fuel

Parameter	Value			Requirement	Unit
	1 st charge	2 nd charge	3 rd charge		
No. of wood logs per charge	2	2	2	-	pcs
Weight per charge	1.42	1.43	1.42	-	kg
Fuel moisture	14	14	14	16 ± 4	%
Lower calorific value	15.4	15.4	15.4	-	MJ/kg
Test duration	0.83	0.79	0.73	Min. 0.75h (in one charge)	h
Fuel consumption per hour	1.72	1.82	1.95	-	kg/h
Mean ambient temperature	27	27	26	-	°C
Flue gas temp. at 20 °C ambient temp.	285	286	287	-	°C
CO ₂ , mean value	10.5	10.7	10.6	-	%
CO, mean value	0.07	0.10	0.06	-	%
THC, mean value	60	75	59	-	ppmC
NO _x , mean value	56	54	58	-	ppm
Dust at actual O ₂	12	9	10	-	mg/m ³ _n
Flue draught, mean value	12	12	12	12 ± 2	Pa
Heat conduction system					
Water flow	-	-	-	-	m ³ /h
Water temperature – inlet	-	-	-	-	°C
Water temperature – outlet	-	-	-	-	°C

Mean values calculated based on the 2nd and the 3rd charges.			
Flue gas temperature at 20 °C ambient temp.	286	-	°C
Flue gas mass flow	5.2	-	g/sec
Efficiency	80	≥50	%
Nominal heat output, total (measured)	6.4	-	kW
Nominal heat output, ambient (measured)	6.4	-	kW
Nominal heat output, water (measured)	-	-	kW
CO ₂ , mean value	10.7	-	%
CO at 13 % O ₂	0.056	≤1.0	%
CO at 13 % O ₂	706	≤12500	mg/m ³ _n
OGC at 13 % O ₂ (carbon equivalents)	29	-	mg/m ³ _n
NO _x at 13 % O ₂ (NO ₂ equivalents)	84	-	mg/m ³ _n
Dust at 13 % O ₂	6	-	mg/m ³ _n



Declared by the manufacturer			
Nominal output stated	6.0	5.6 – 6.4 ¹⁾	kW
Refuelling interval p. charge at the rated output	48	Min. 45	minutes

¹⁾ The heat output quoted must be minor than or equal to the measured output - however maximum 15 % below the measured output.



6.2. Safety test in accordance with A.4.9.2.2

Safety test not accomplished.

6.3. Further non accredited test ¹⁾

Not accomplished.

7. Other measurements

Subject	Measured	Unit
Leakage before testing, all valves on air inlets closed ¹⁾	7.3	m ³ /h
Leakage after testing, all valves on air inlets closed ¹⁾	7.5	m ³ /h

¹⁾ Leakage was measured at a test pressure of 25 Pa.

²⁾ All valves closed and intended air inlets without valves also closed.

8. Control and assessment before and after testing

Paragraph in the standard	Subject	Remarks	Requirement met
4	Requirements on materials, design and construction	None	Yes
6	Requirements on output, CO emission	None	Yes
6	Requirements on efficiency	None	Yes
7*	Requirements on installation and operating instructions	None	Yes
8*	Requirements on marking	None	Yes

*) Only regarding nominal test results.



9. Test equipment

Testing was carried out at test rig D.

Instrument	Trace-ability	Instrument number		
		Test rig B	Test rig C	Test rig D
Data logger, HP 34970A	DANAK 200	270-A-2498	270-A-1630	270-A-1581
DOP version II	-	-	-	-
CO/CO ₂ analyser, ABB IR	ELAB	270-A-2423	270-A-2276	Id no. 108176
Spangas CO/CO ₂ , AGA (High CO and CO ₂)	Swedac	Id no. 135573		
Spangas CO/CO ₂ , AGA (Low CO)	Swedac	Id no. 135574		
NOx analyser, Eco Physics CLD	ELAB	Id no. 106124	Id no. 106124	270-A-2420
Spangas NO, AGA	Swedac	Id no. 135576		
FID meter M & A Thermo- / AAL FIDs	ELAB	270-A-1611	270-A-2497	270-A-1611
Spangas C ₃ H ₈ (Propane)	Swedac	Id no. 135580	Id no. 135581	Id no. 135582
Surface temperature, walls Thermo couples, type T	ELAB	Id no. 134392	Id no. 134395	Id no. 134397
Thermo couples, others, type T and type K	ELAB	Id no. 134394	Id no. 134396	Id no. 134398
Surface temperature, Technoterm 5500	DANAK 200	270-A-0976	270-A-0976	270-A-0976
Surface temperature, Dan 1200	DANAK 200	270-A-0876	270-A-0876	270-A-0876
Surface temperature, Ametek	DANAK 200	270-A-1649	270-A-1649	270-A-1649
Pressure gauge, Autotran 700 (flue draught)	ELAB	270-A-1166	270-A-1632	Id no. 81592
Calibrator, Jofra 650 SE	DANAK 200	270-A-0912	270-A-0912	270-A-0912
Scale, Mettler Toledo (15kg/1g)	ELAB	Id no. 5822		
Scale, Mettler Toledo XS4002S (4,1kg/10mg)	ELAB	Id no. 135794		
Scale, Mettler Toledo XS 204 (220g/0,1mg)	ELAB	Id no. 7084		
Scale, Mettler, 600 kg, KC 600	ELAB	270-A-1790	270-A-1638	ID no. 81593
Disa Dantec flow analyser (air velocity)	DANAK 200	270-A-0486	270-A-0486	270-A-0486
Dantec Flowmaster	DANAK 200	270-A-0750	270-A-0750	270-A-0750
Hygrometer (air humidity) Thermoguard	DANAK 200	Id no. 142357		
Barometric reading (atmospheric pressure) Thermoguard/(Ahlborn)	DANAK 200	Id no. 7102		
Dust measuring equipment (Wöhler SM 96)	ELAB	ID no. 7205	ID no. 7205	ID no. 81603
Flow meter	ELAB	270-A-1793	270-A-1636	ID no. 81604
PST leakage meter (Brooks glass tube)	ELAB	Id no. 83013		
Thermo sensor Pt 100 (inlet) ¹⁾	DANAK 200	270-A-1262-1	-	-
Thermo sensor Pt 100 (return) ¹⁾	DANAK 200	270-A-1262-2	-	-
Water flow ¹⁾	DANAK 200	270-A-1507	-	-

¹⁾ Only used for testing of solid fuel stove/inset appliance with boiler.



10. Appendices

Appendix 1: Conversion EN including two selected charges

(1 page)

Construction Product Regulation:

The Danish Technological Institute guarantees that employees carrying out tests to be used together with harmonized standards under notification no. 1235 according to EU regulation 305/2011, article 43, satisfy all the requirements made for capability, integrity and impartiality. You find the CPR here:

http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=uriserv:OJ.C_.2017.267.01.0016.01.ENG

September 2017

Conversion of measurements for 2 selected charges

Appendix 1

General information only for EN-test	Test:	Nominel
Manufacturer: Jydepejsen		
Type: Cosmo 1147, ver. 2		
ELAB no. 2313		
Test date 2017-12-06		

Below you find different re-calculations or specifications of measuring units given in the report

Parameter	Value	Unit	Reference unit
CO ₂	10,7	Vol %	-
CO ₂	106720	ppm	-
CO ₂	210	g/m ³ _n	Current % O ₂
CO ₂	100	g/MJ	-
O ₂	10,0	Vol %	-
O ₂	100447	ppm	-
Lambda	1,89	Air excess	-
CO	0,06	Vol %	13 % O ₂
CO	564	ppm	13 % O ₂
CO	1482	ppm	Lambda 1 (0 % O ₂)
CO	706	mg/m ³ _n	13 % O ₂
CO	966	mg/m ³ _n	Current CO ₂ /O ₂
CO	463	mg/MJ	-
OGC (as carbon)	29	mg/m ³ _n (Carbon equi.)	13 % O ₂
OGC	54	ppm (Carbon equi.)	13 % O ₂
OGC	18	ppm (Propan equi.)	13 % O ₂
OGC (as carbon)	76	mg/m ³ _n (Carbon equi.)	Lambda 1 (0 % O ₂)
OGC (as carbon)	40	mg/m ³ _n (Carbon equi.)	Current CO ₂ /O ₂
OGC (as carbon)	19	mg/MJ (Carbon equi.)	-
NO _x (as NO ₂)	41	ppm	13 % O ₂
NO _x (as NO ₂)	0,0041	Vol %	13 % O ₂
NO _x (as NO ₂)	107	ppm	Lambda 1 (0 % O ₂)
NO _x (as NO ₂)	84	mg/nm ³	13 % O ₂
NO _x (as NO ₂)	116	mg/nm ³	Current CO ₂ /O ₂
NO _x (as NO ₂)	55	mg/MJ	-
Dust	6	mg/m ³ _n	13 % O ₂
Dust	16	mg/m ³ _n	Lambda 1 (0 % O ₂)
Dust	9	mg/m ³ _n	Current CO ₂ /O ₂
Dust	4	mg/MJ	-
Dust	0,12	g/h	-
Air consumption	8,2	m ³ /kg	At t_amb
Air consumption	4,3	liter/sec (Nom. output)	At t_amb
Flue gas volume	7,4	m ³ _n /kg	Dry
Flue gas volume	17,0	m ³ /kg	At t_flue gas
Ambient temperature	27	°C	-
Flue gas temperature	286	°C	At 20°C t_amb

All values are given at dry flue gas and listed where relevant for the two selected charges