

Report

Octo+

NS-EN 16510-1:2023 Residential solid fuel burning appliances- Part 1: General requirements and test methods. NS-EN 16510-2-1:2023 Roomheaters

Author(s):

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VERSION

1

DATE

2026-01-19

AUTHOR(S)

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CLIENT(S)

Norsk Kleber AS

CLIENT'S REF.

Frode Eggan

PROJECT NO.

20012-128

NO. PAGES INCL. APPENDICES:

29

TEST OBJECT

Octo+

TEST OBJECT RECEIVED

2015-11-11

TEST PROGRAMME

NS-EN 16510-1:2023 Residential
solid fuel burning appliances- Part 1:
General requirements and test
methods. NS-EN 16510-2-1:2023
Roomheaters

TEST LOCATION

RISE Fire Research

DATE OF TEST

2018-11-02

SUMMARY:

Octo+ fulfils the requirements in NS-EN 16510-1:2023 and NS-EN 16510-2-1:2023.

Carbon monoxide (CO) at 13 % O₂:500 mg/Nm³Organic gaseous compound (OGC) at 13 % O₂ :11,7 mg/Nm³

Flue gas mass flow:

8.6 g/s

Efficiency at nominal heat output, 8.1 kW:

86 %

NO_x at 13 % O₂:77 mg/Nm³

Dust:

15 mg/Nm³

For safety distances, see page 11 and Appendix A.

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CLASSIFICATION THIS PAGE

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History

VERSION	DATE	VERSION DESCRIPTION
1	2025-05-15	First version.
2	2025-05-27	A new stove, Athene+, with identical burning chamber, is added.
3	2025-10-14	Athene+ have changed name to Roma.
4	2026-01-19	An additional safety report is referred to for rear distance without heat shield.

1 Product description

Product name:	Octo+
Manufacturer:	Norsk Kleber AS
Place of production:	Otta, Norway
Variants:	See below
Sampling:	The tested fireplace was selected by the client.

Octo+ is a free standing stove made of soap stone with glass in the door against the burning chamber. The burning chamber is made of Vermiculite and supplied with preheated air. The stove has a handle for control of primary/secondary air on the bottom of the door.

Babina+, Merethe+, Kristin+ and Roma have identical burning chamber and air system as Octo+.

2 Test performance

The nominal heat output test performed in accordance with NS-EN 16510-1.

Operator:	Birger Rønning
Conditioning of the test material:	NA
Number of single tests:	3

3 Remarks/deviations

- Environmental sustainability according to 16510-2-1 paragraph 4.9 is not performed.
- The result for nominal heat output is based on historical data from SINTEF NBL report 102044.11 and RISE Fire Research report 20012-75B, with 2 successive batches at nominal heat output.
- The safety distances are based on RISE Fire Research report 20012-123 dated 2024-09-06, and report 102044.53 dated 2014-05-20 from SP Fire Research.

4 Test results

4.1 Performance test at nominal heat output

Table 1: Test fuel specifications - Nominal heat output

Test fuel specifications - Nominal heat output	
Fuel type	Birch
Moister content	16%
Ash content	- %
Volatile matter	80 %
Hydrogen (H)	5,5 % (weight)
Carbon (C)	40 % (weight)
Sulphur (S)	0,05 % (weight)
Lower calorific value ($H_{i,f}$)	16 636 kJ/kg
Size, length	Wood log, 300 mm

EN 16510-1: A.4.2.2 Calculation of test fuel

$$M_a = 360\,000 \times P \times t / (H_{i,f} \times \eta) = 360\,000 \times 7.0 \times 0.75 / (16\,636 \times 73) = 2.02 \text{ kg}$$

EN 16510-1: A.4.7 Performance test at nominal heat output

The results are based on the average of three test periods. Two of the tests where consecutive.

Table 2: Test result from: Leakage test

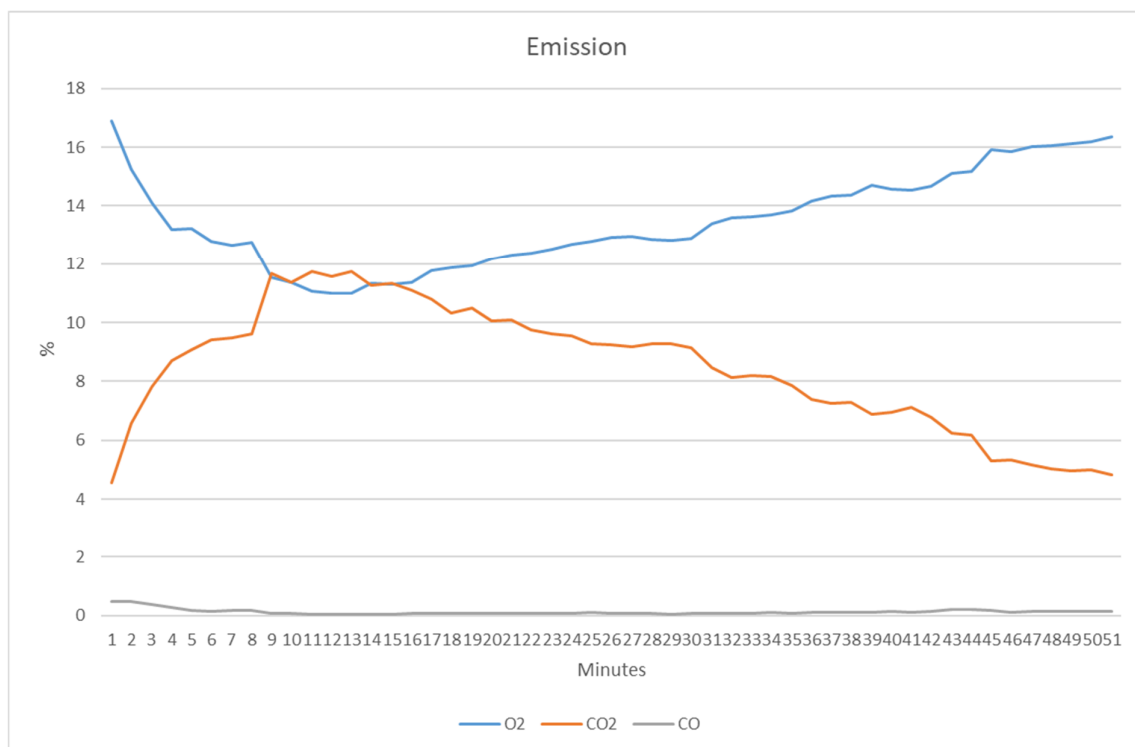
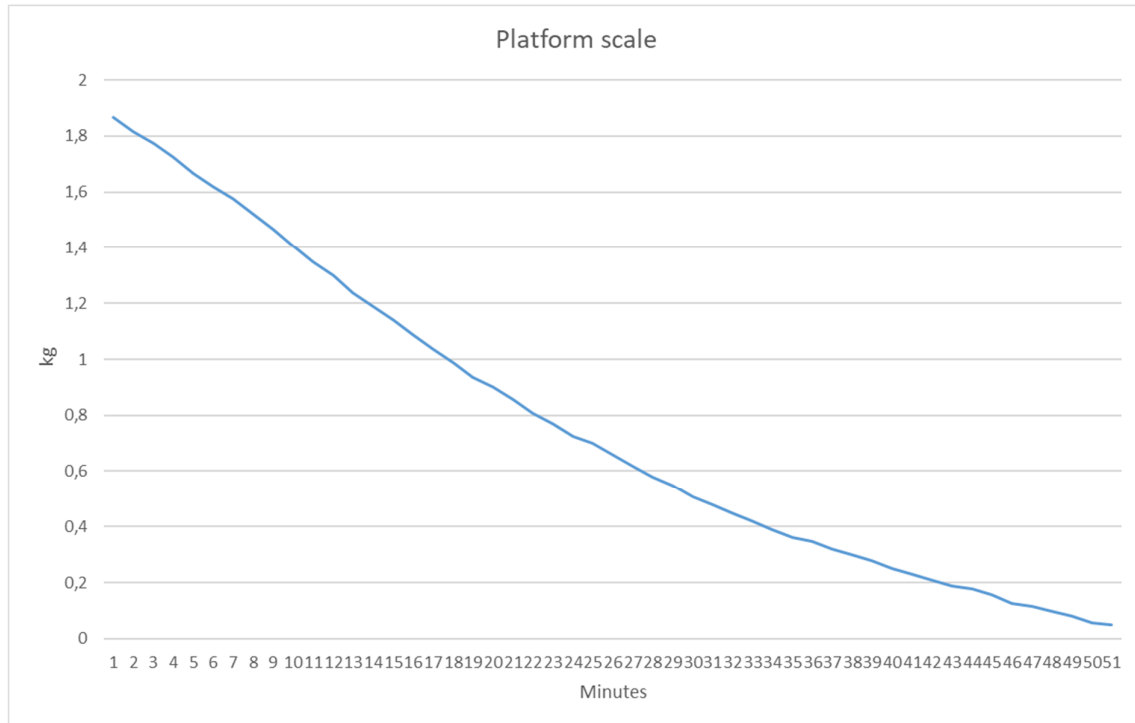
Before testing			After testing		
5 Pa:	5.0	m ³ /h	5 Pa:	5.0	m ³ /h
10 Pa:	9.7	m ³ /h	10 Pa:	9.7	m ³ /h
15 Pa:	12.5	m ³ /h	15 Pa:	12.5	m ³ /h

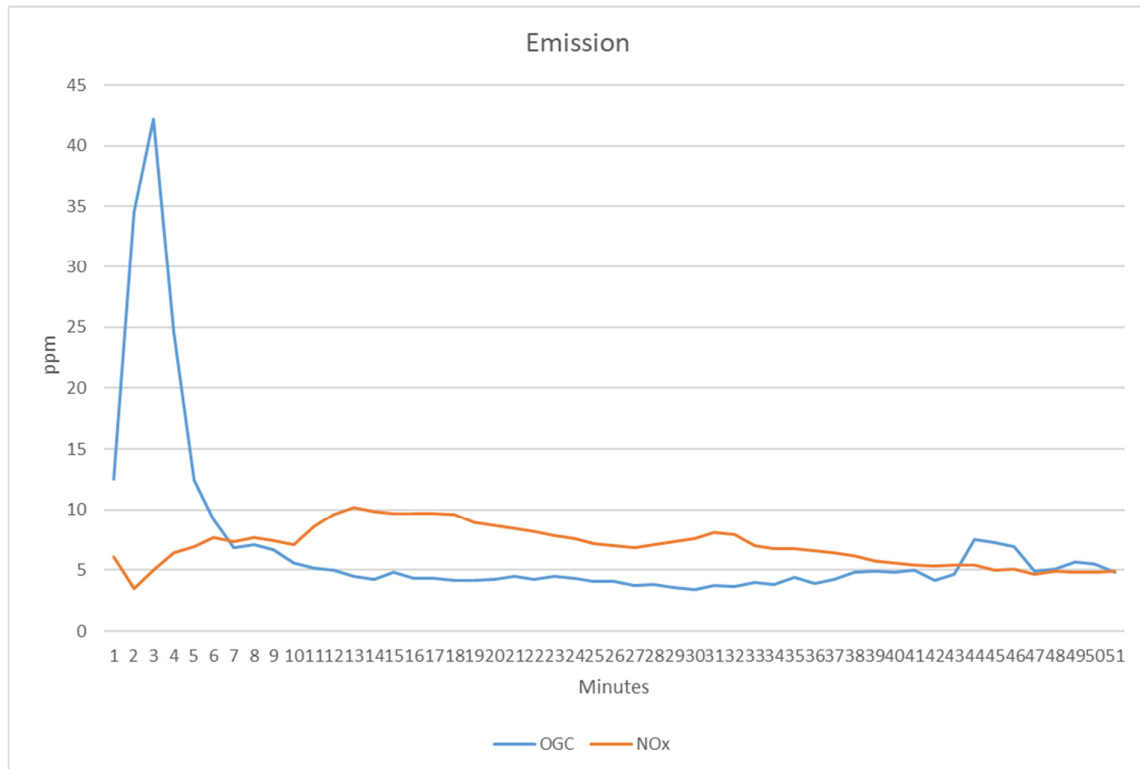
Table 3: Values measured and calculated after performance testing according to EN 16510-1.

Parameter	Charge 1	Charge 2	Charge 3	Requirements
Basic firebed, kg	0.33	0.31	0.33	
Valve setting, mm open	40	41	40	
Duration, h	0.77	0.76	0.76	≥ 0.67
Pieces of test fuel, pcs	2	2	3	-
Weight of test fuel, kg	1.70	1.82	1.94	-
Draught in chimney, Pa	11.8	12.2	11.3	12 ± 2
CO ₂ -content, mean value, %	6.8	8.0	8.0	-
CO- content, mean value, %	0.04	0.06	0.05	-
Flue gas temperature, T _{fg} , mean value, °C	156	178	186	-
Flue gas outlet temperature, T _s = T _{fg} + 0.2 * T _{fg} , °C	187	214	232	-
Ambient temperature, mean value, °C	21	21	22	-
THC, ppm	7	7	10	-
NO _x , ppm	39	43	37	-
Average of test 1, 2 and 3				
Flue gas temperature, mean value, °C	171			-
Ambient temperature, mean value, °C	22			-
CO ₂ -content, mean value, %	7.4			-
CO, % at 13 % O ₂	0.05			≤ 0.12
OGC, mg/Nm ³ at 13 % O ₂	11,7			≤ 120
NO _x , mg/Nm ³ at 13 % O ₂	77			≤ 200
Dust, mg/Nm ³	15			≤ 40
Efficiency, %	85,9			≥ 65
Total heat output, average, kW	9.6			-
Flue gas mass flow, average, g/s	8.6			-

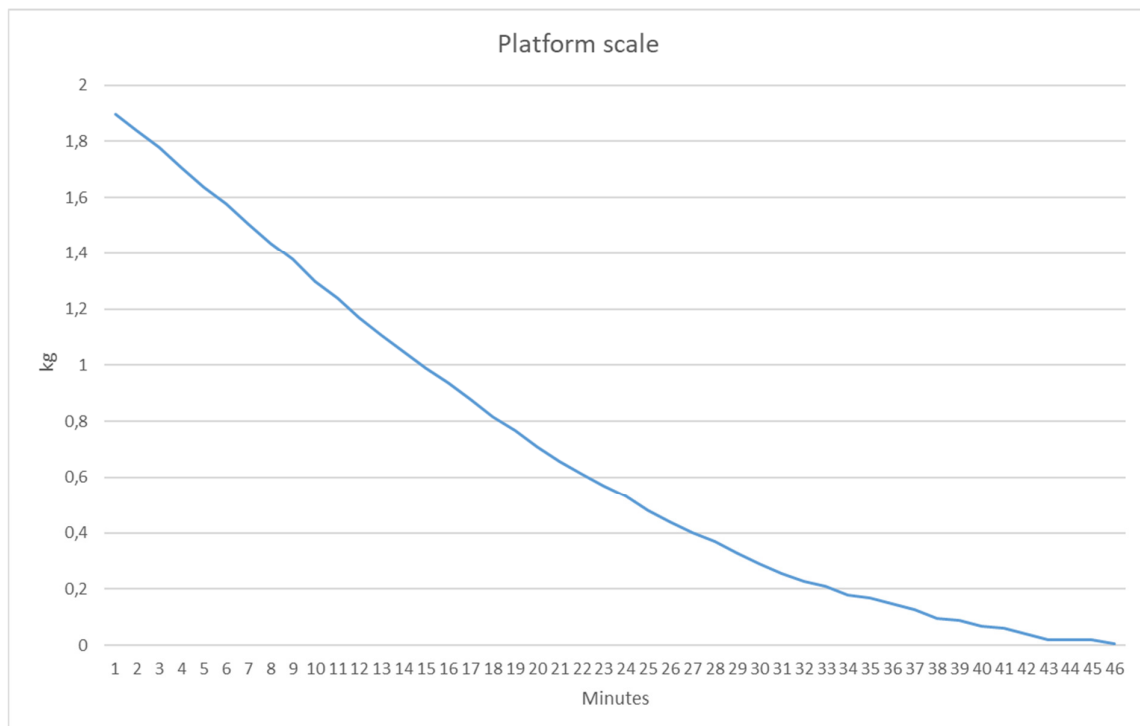
4.2 Graphs at nominal heat output

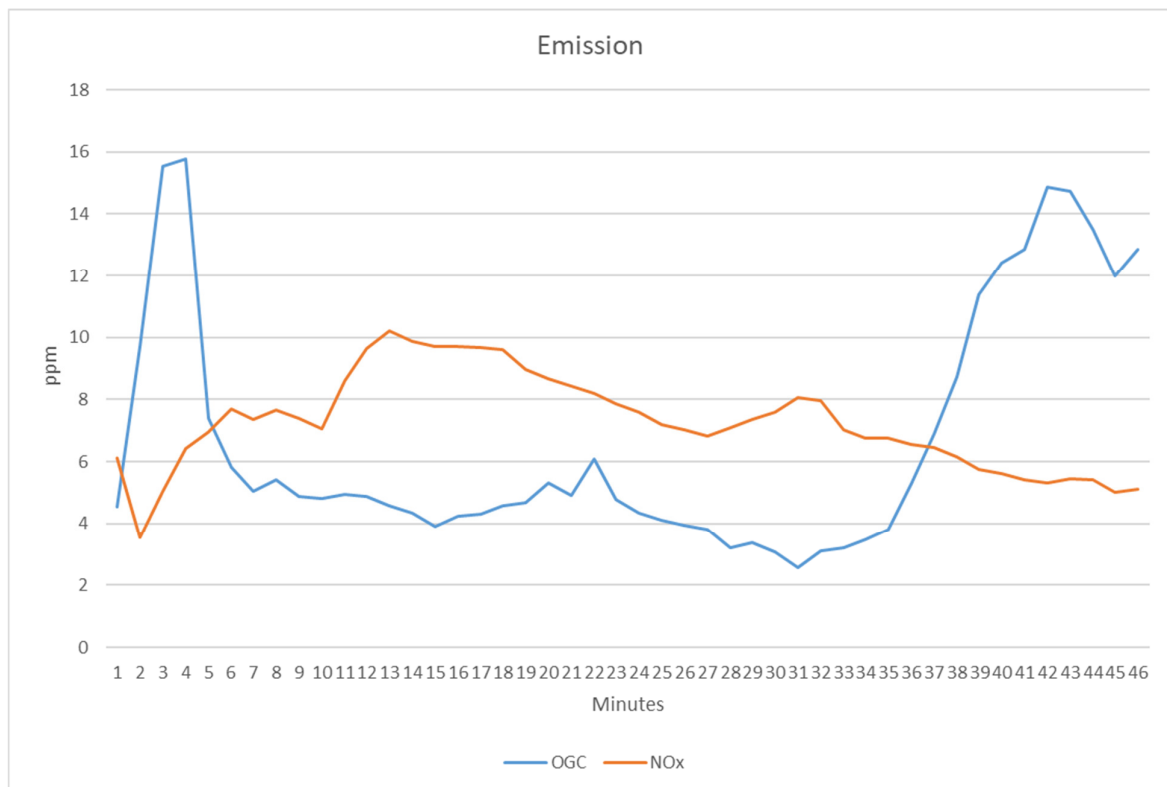
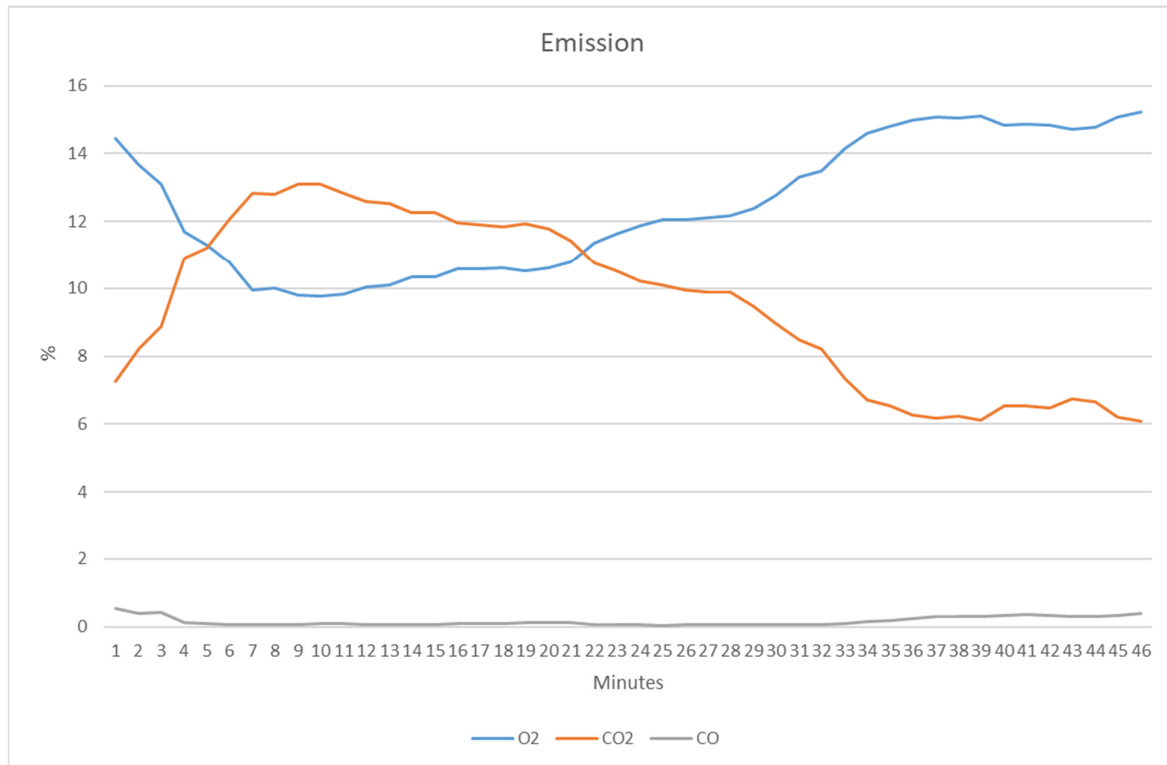
4.2.1 Charge 1



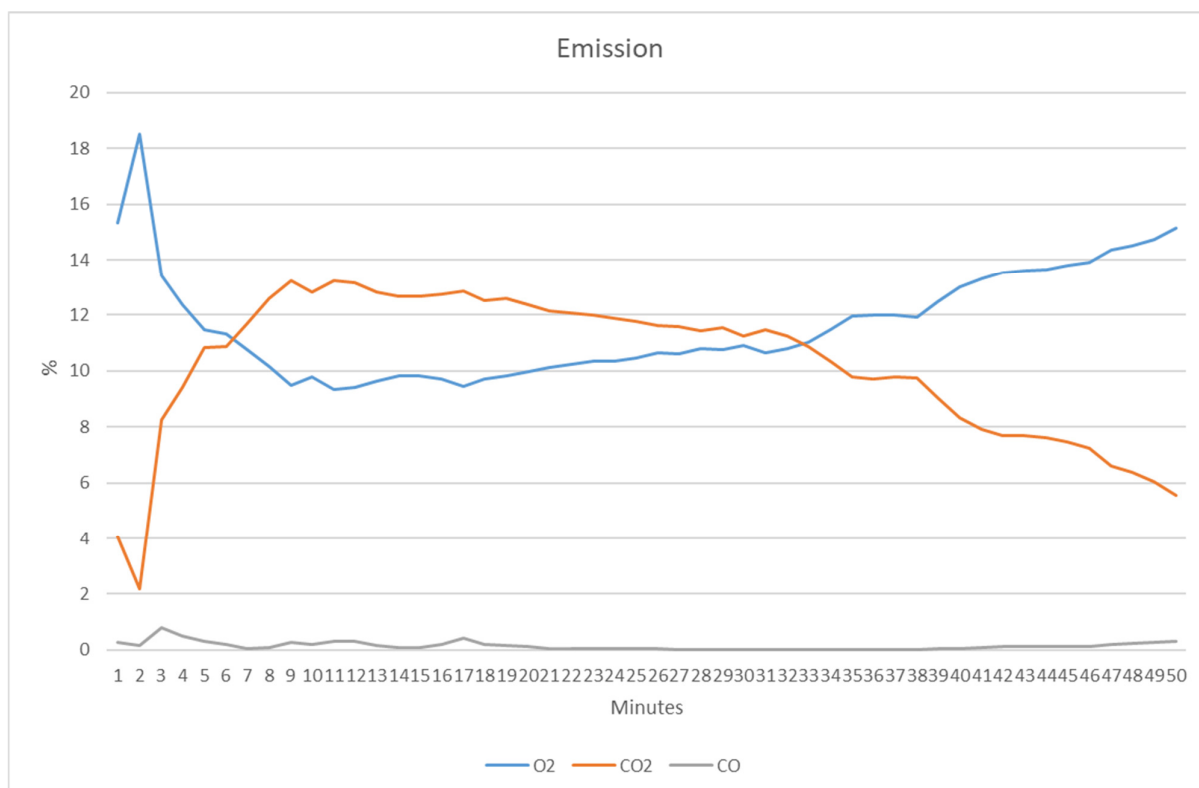
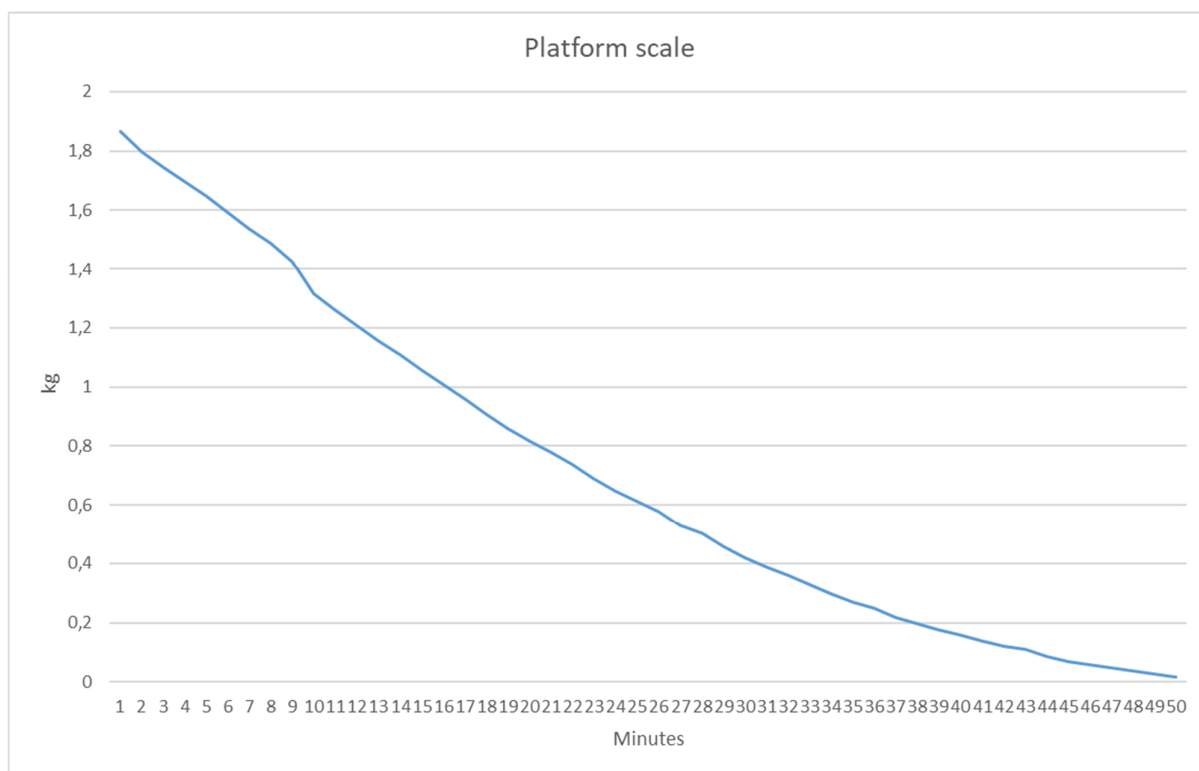


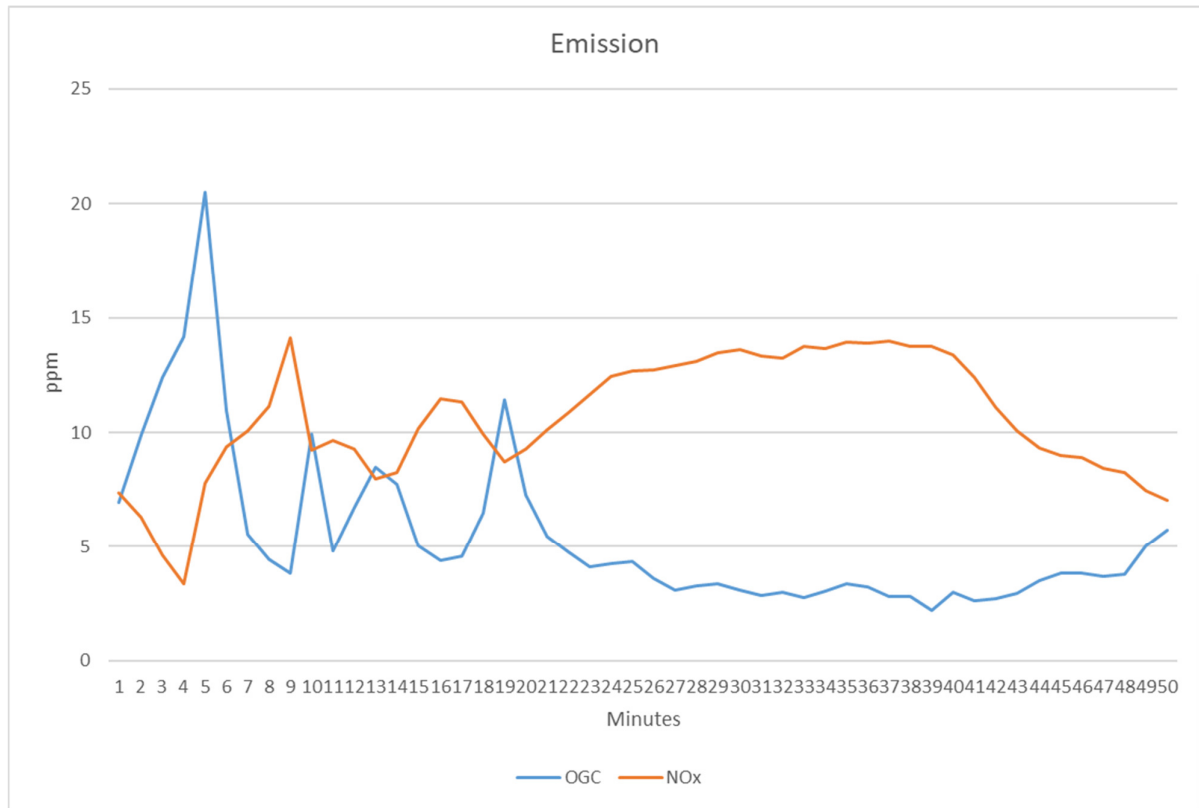
4.2.2 Charge 2





4.2.3 Charge 3





5 Safety test

Table 4: Test fuel specifications - Safety

Test fuel specifications - Safety	
Fuel type	Fir timber
Moister content	16%
Lower calorific value ($H_{i,t}$)	16.15 MJ/kg
Size, length	2" x 2", 250 mm
Bottom of burning chamber, S_c (m x m)	0.27 x 0.33
Calculated test load	1.86 kg

Table 5: Results from safety test of Octo+ with insulated flue pipe.

	UNIT	RESULT
Duration	h	6.5
Weight of test fuel	kg	24.57
Moisture content in test fuel	%	13
Combustion velocity	kg/h	3.78
Lower calorific value	MJ/kg	17.230
Draught in chimney	Pa	16
Flue gas temperature, average	°C	263
Flue gas temperature, maximum	°C	306
Ambient temperature	°C	28
Back wall (100 mm distance)	K	63
Side wall (400 mm distance)	K	65
Floor	K	20
Ceiling, 2,2 m height	K	43
Door handle, operating devices ²⁾	K	> 35 K

¹⁾ The stove has to be delivered with glove.

EN 16510-1: 4.6 Load bearing capacity

The stoves has a spigot with thickness > 3 mm and can carry the load of 120 kg.

6 Evaluation of the construction according to NS-EN 16510-1 chapter 4

Table 6: Construction requirements

	Fulfil NS-EN 16510-1	Other requirements
4.4.2.1 Integral boiler	NA	
4.4.2.4.3 Boiler waterways	NA	
4.4.3 Cleaning of heating surfaces	yes	
4.4.4 Flue gas outlet	yes	
4.4.5 Flueways	yes	
4.4.7 Ashpan and ash removal	yes	
4.4.8 Bottomgrate	yes	
4.4.9.1 Primary air inlet control	yes	
4.4.9.2 Secondary air inlet control	yes	
4.4.10 Damper	NA	
4.4.11 Charging doors and ash-pit doors	yes	
4.4.12 Flue bypass device	NA	
4.4.14 Front firebars	yes	
4.4.15 Fossil solid fuel and peat briquettes burning appliances	NA	
4.4.16 Draught regulator	NA	

7 Measuring equipment

Table 7: Measurement uncertainty

Parameter	Identification	Type	Range	Uncertainty
OGC	NBL-2587	J.U.M. (FID)	0-1000 ppm	± 1 %
NO _x	NBL-1509	ABB	0-300 ppm	± 5 ppm
CO ₂	NBL-1509	ABB	0-20 %	± 0.3 %
CO	NBL-1509	ABB	0-1 %	± 0.015 %
Draught, in chimney	NBL-1227	Setra	0-50 Pa	± 1 Pa
Temperature, flue gas	NBL 1377	Type K	0-950 °C	± 4 °C
Temperature, ambient and test heart	NBL 1377	Type K	0-50 °C	± 1 °C
Flow	NBL-1319	Control Unit CU6	0-20 l/min	± 1.3 %
Weight of test PM	NBL-122	Metler AE50	0-1 g	± 0.0001 g
Weight of test fuel	NBL-2759	Metler KCC600	0-600 000 g	± 20 g

The uncertainty of measurement is stated as expanded uncertainty of measurement with the coverage factor $k=2$, corresponding to a coverage probability of approx. 95% for normal distribution.

A.6.2.1.5 Seasonal space heating energy efficiency

η	F(2)	F(3)	F(4)
%	-	-	-
87	1	0	0
$\eta_s = \eta - 10 \% + F(2) + F(3) + F(4)$			
$\eta_s = 87 - 10 \% + 1 + 0 + 0$			
$\eta_s = 78 \geq 65 \%$			
Requirement met			

A.6.2.1.6 Energy efficiency index (EEI)

η	BLF	F(2)	F(3)	F(4)
%	-	-	-	-
87	1.45	1	0	0
$EEI = (\eta \cdot 1.45) - 10 \% + F(2) + F(3) + F(4)$				
$EEI = (87 \cdot 1.45) - 10 + 1 + 0 + 0$				
EEI = 117				

Energy efficiency class								
G	F	E	D	C	B	A	A+	A++
EEI<42	42≤EEI<62	62≤EEI<72	72≤EEI<77	77≤EEI<82	82≤EEI<88	88≤EEI<107	107≤EEI<130	EEI≥130
Achieved class: A+								

Appendices

A Evaluation of safety distances

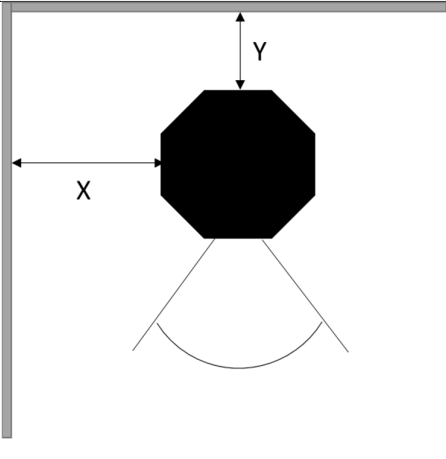
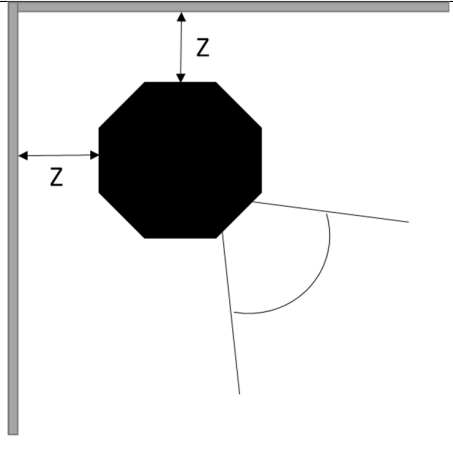
B Pictures

C Description of test item

Appendix A – Evaluation of safety distances

In addition to the minimum safety distances obtained by testing, RISE Fire Research has assessed minimum safety distances for alternative set-ups. The evaluated minimum safety distances for Octo+ are declared in Table 9.

Table 8: Declared minimum safety distances assessed by RISE Fire Research based on performed safety test of Octo+.

RISE evaluation of safety distances			
			
Octo+	Combustible wall		Combustible wall
	x [mm]	y [mm]	z (mm)
Minimum distances (with side glass)	650	350	600
Minimum distances without side glass and with insulated flue pipe. Heat shield ¹⁾ is mounted on the back of the stove.	400	350 100 ¹⁾	350

Furniture distance: 900 mm

Appendix B – Pictures

Safety test



Picture 1: Octo+, front with fuel charge

Safety test Octo+

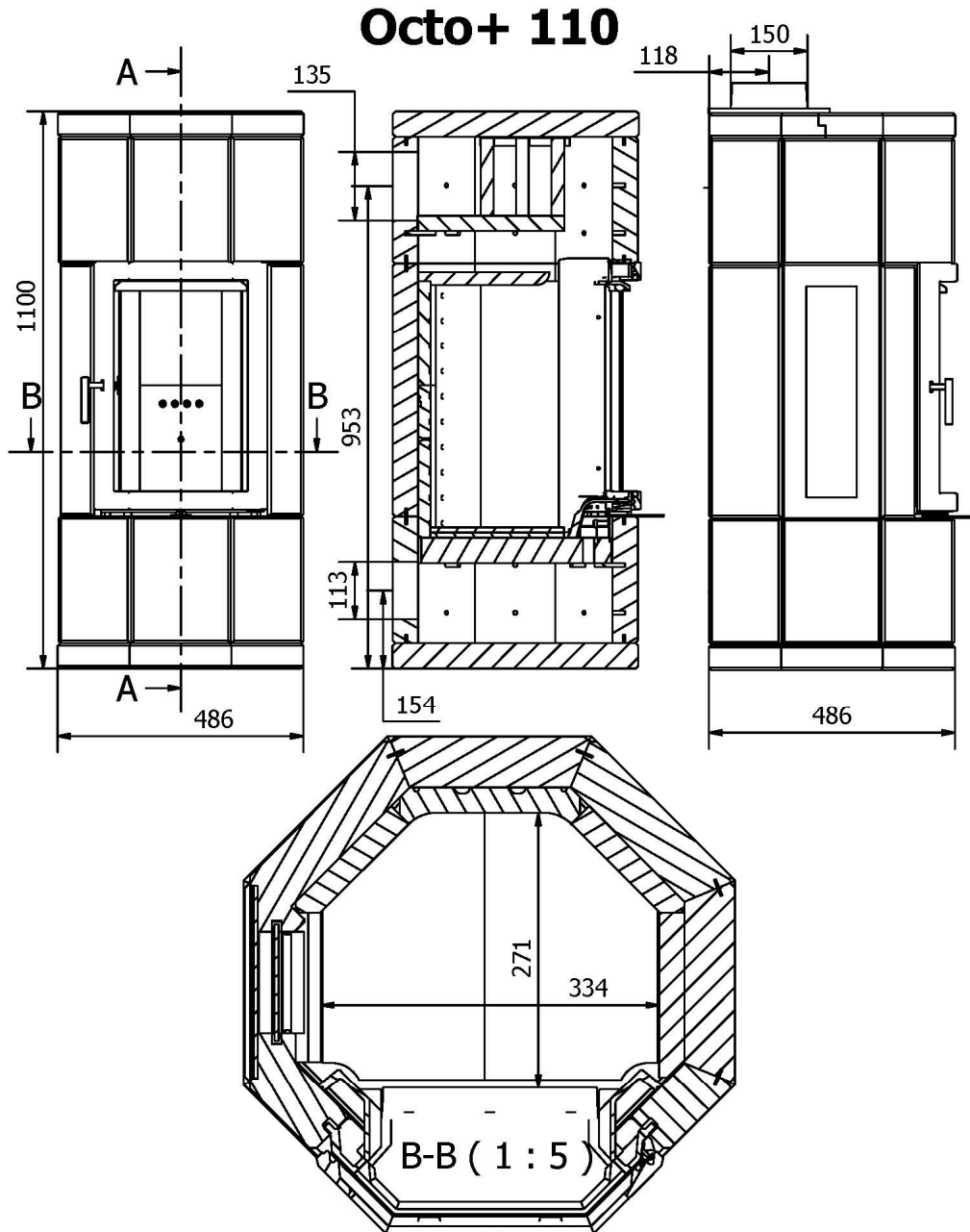


Picture 2: Octo+, Heat shield on the back



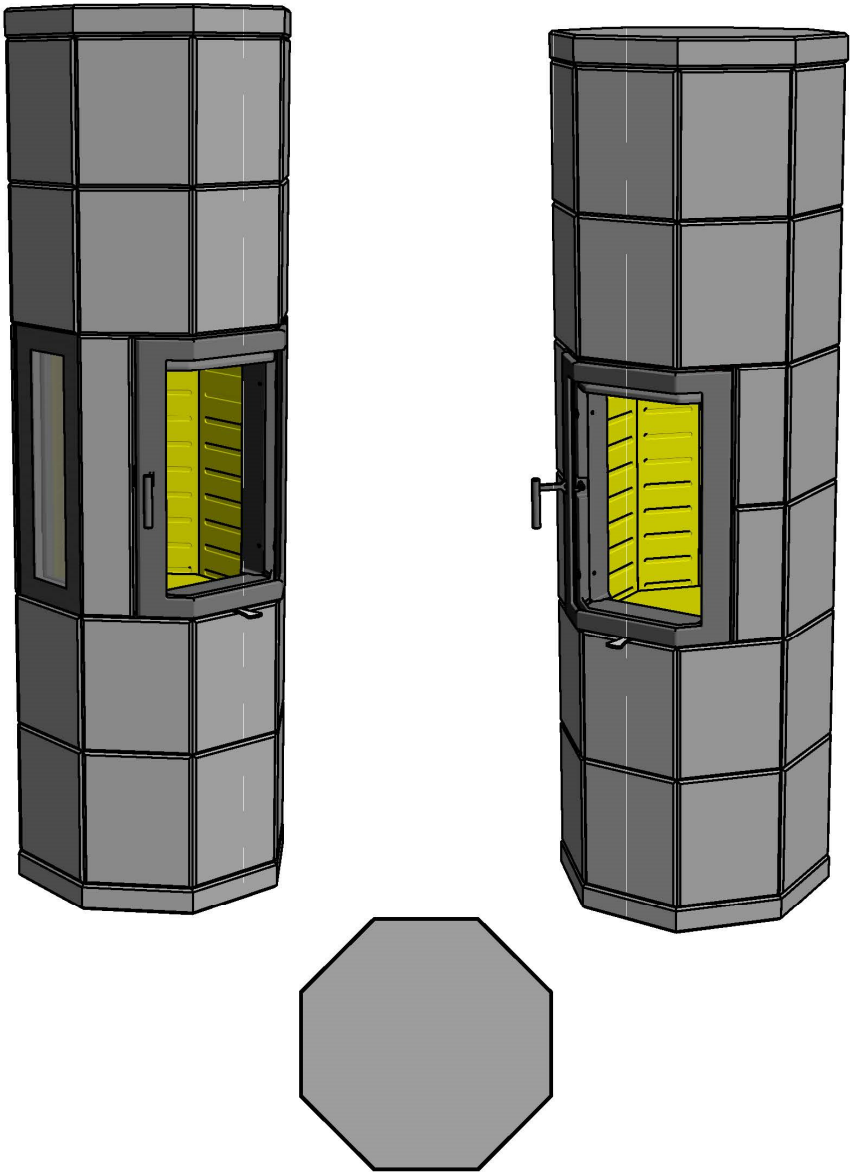
Picture 3: Octo+, side (glass only on the right side of the stove).

Appendix C - Description of test item



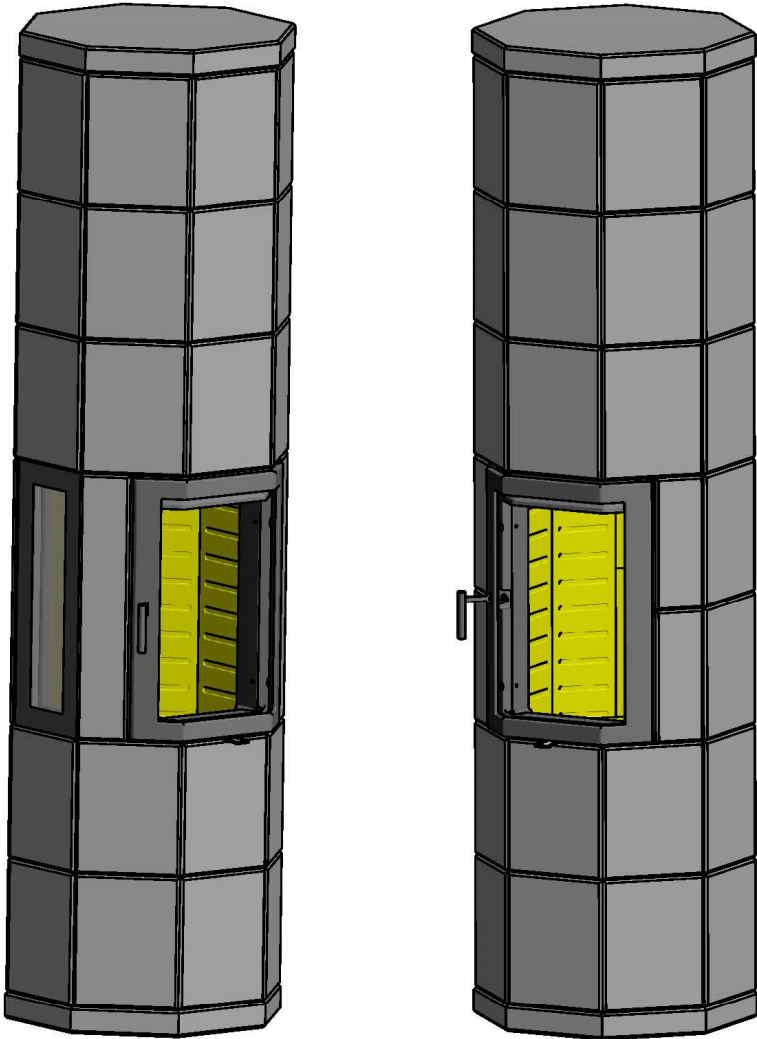
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Octo+ 160



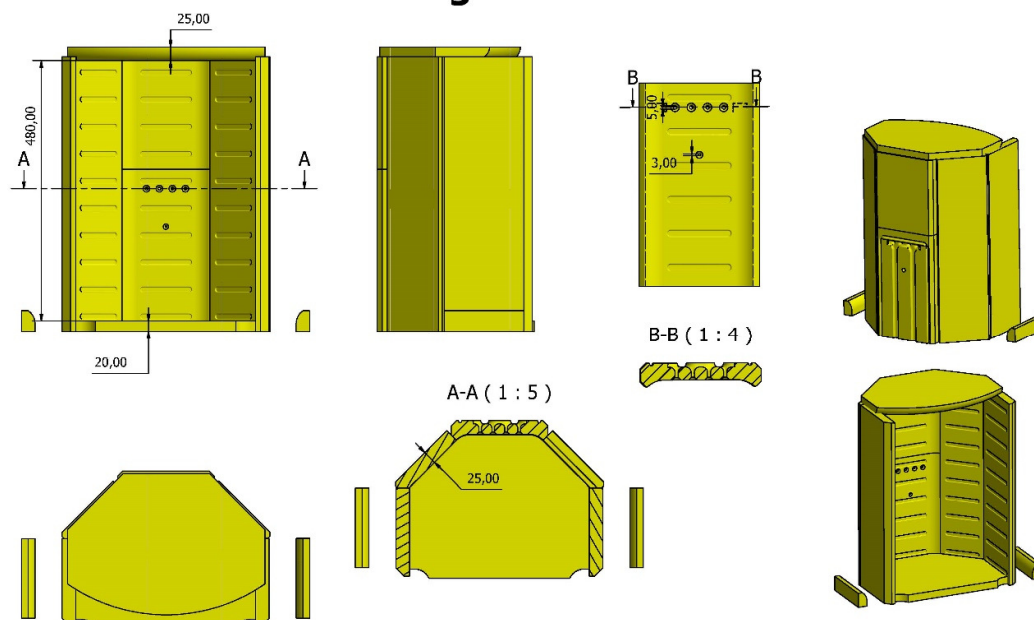
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Octo+ 185



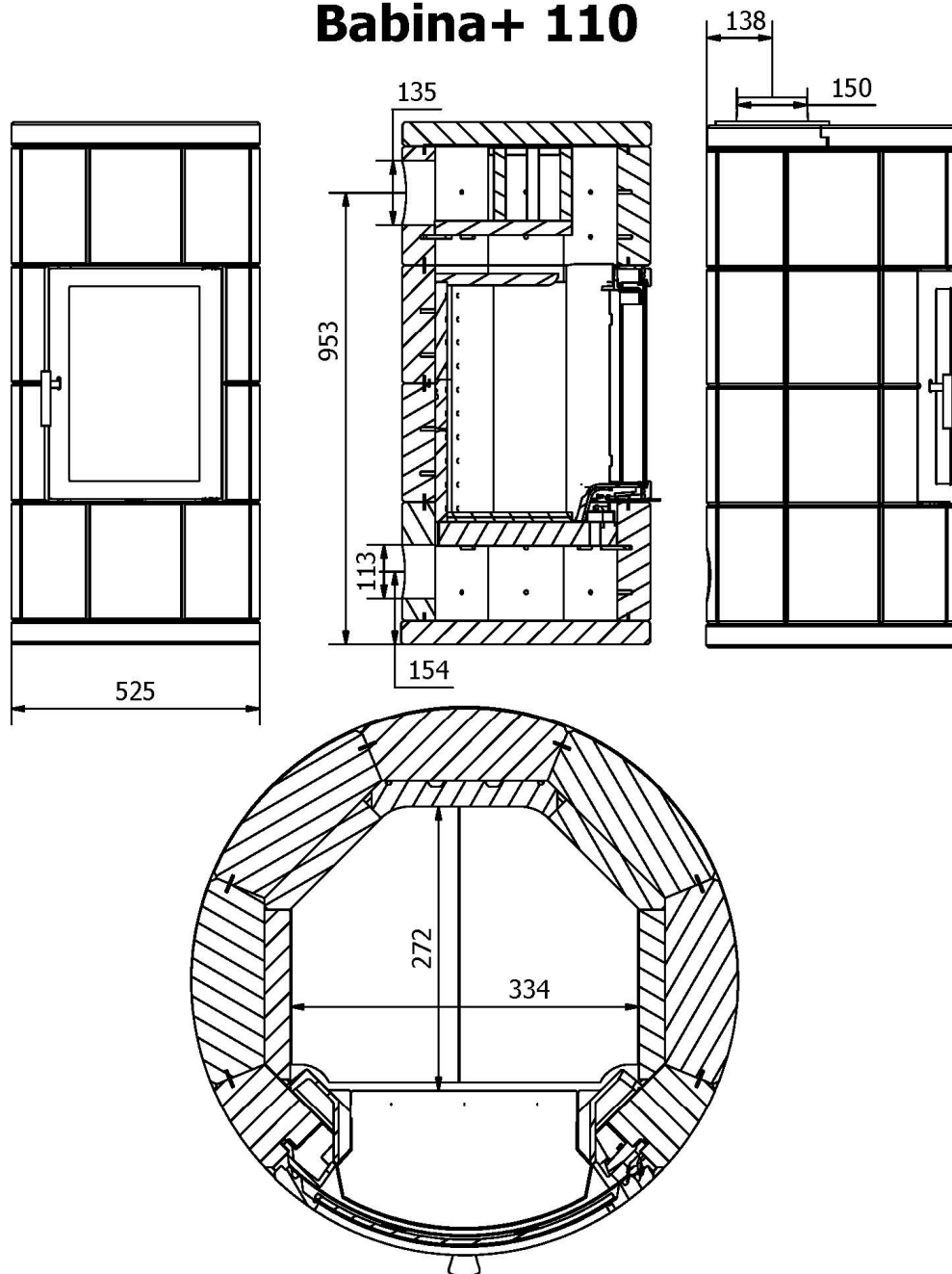
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Skamol foringer for +Modeller



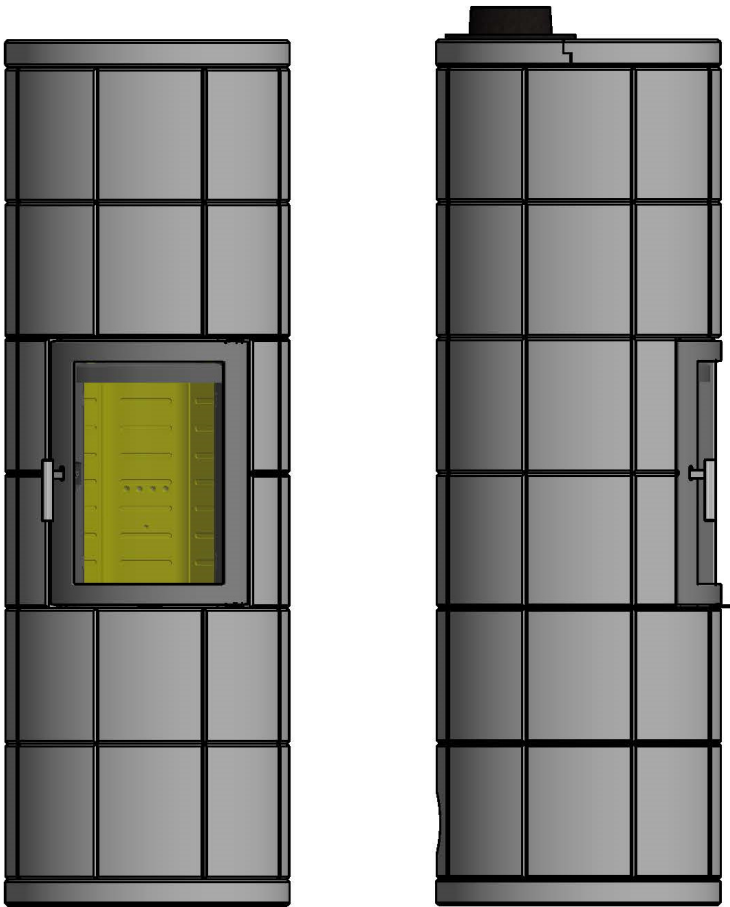
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Babina+ 110



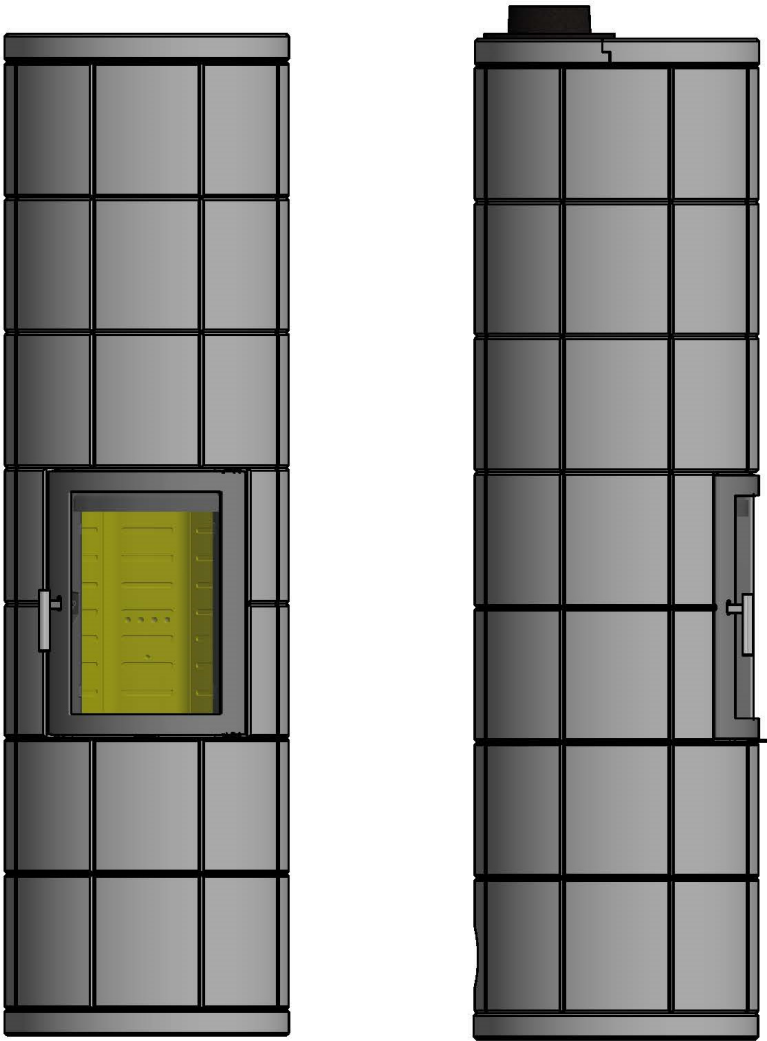
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Babina+ 160



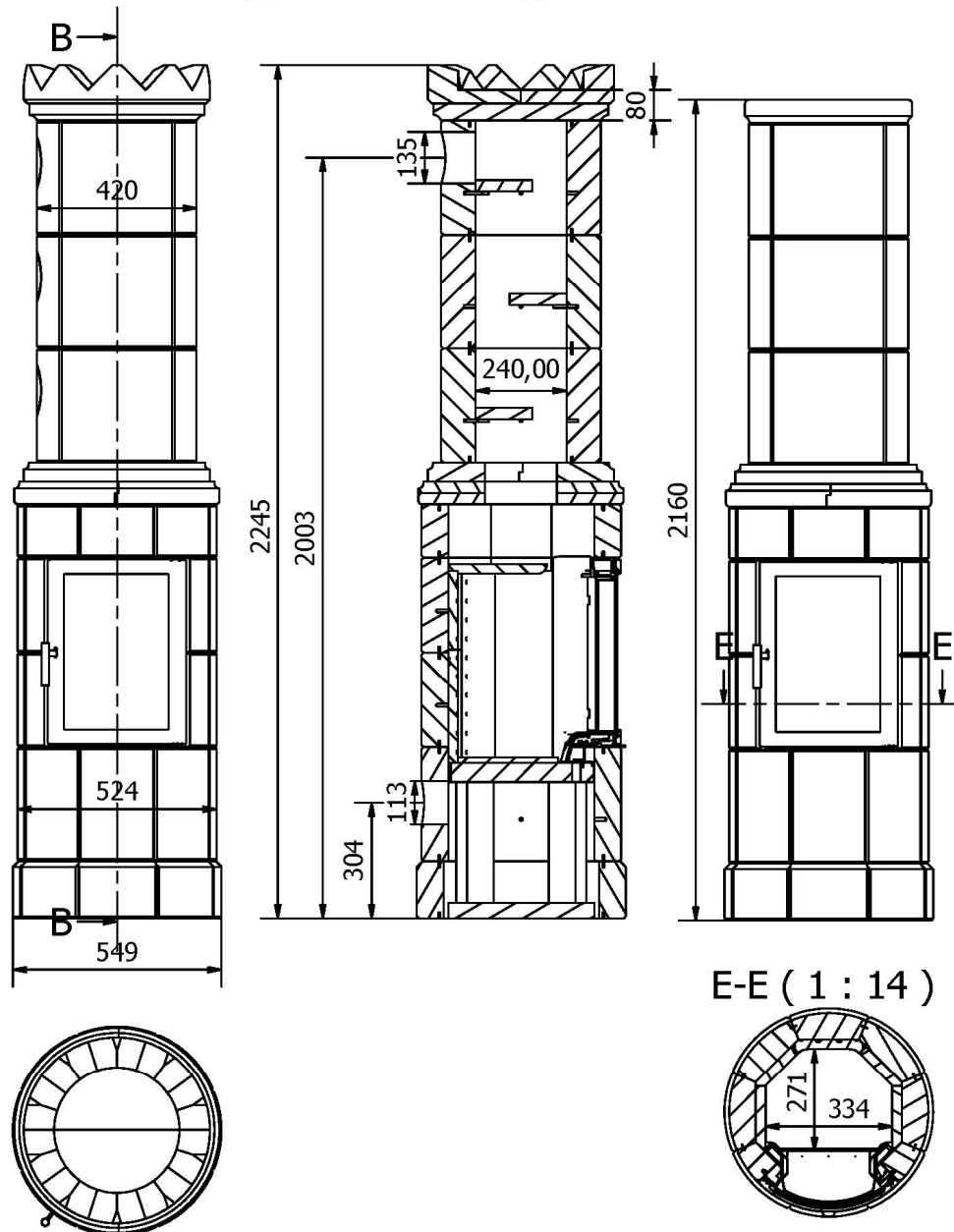
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Babina+ 185



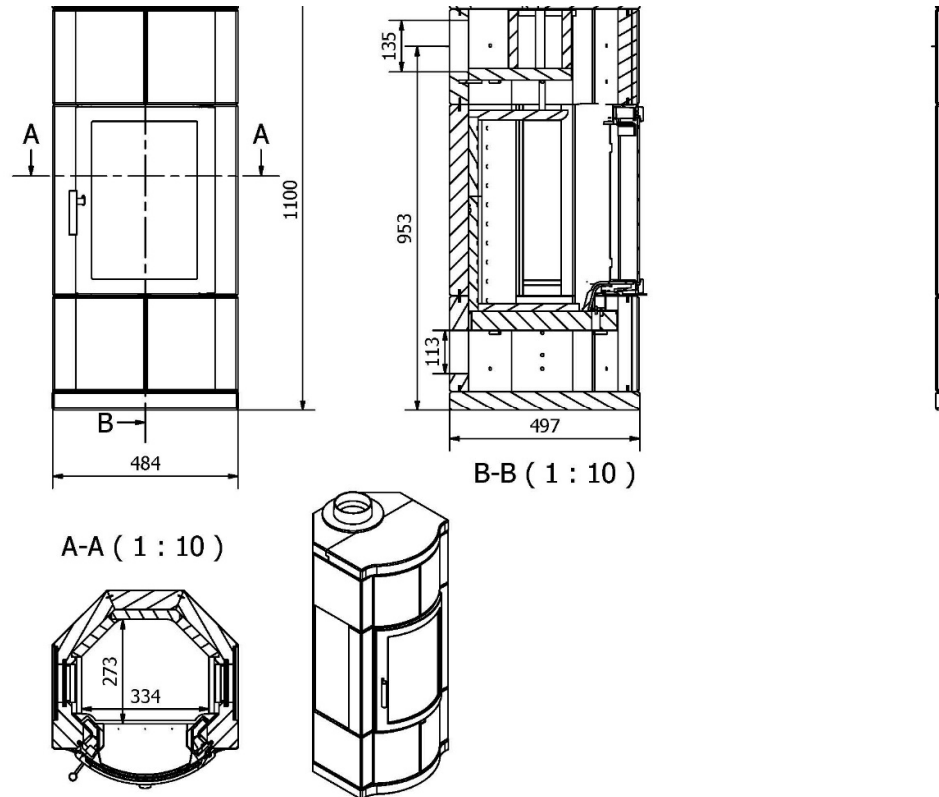
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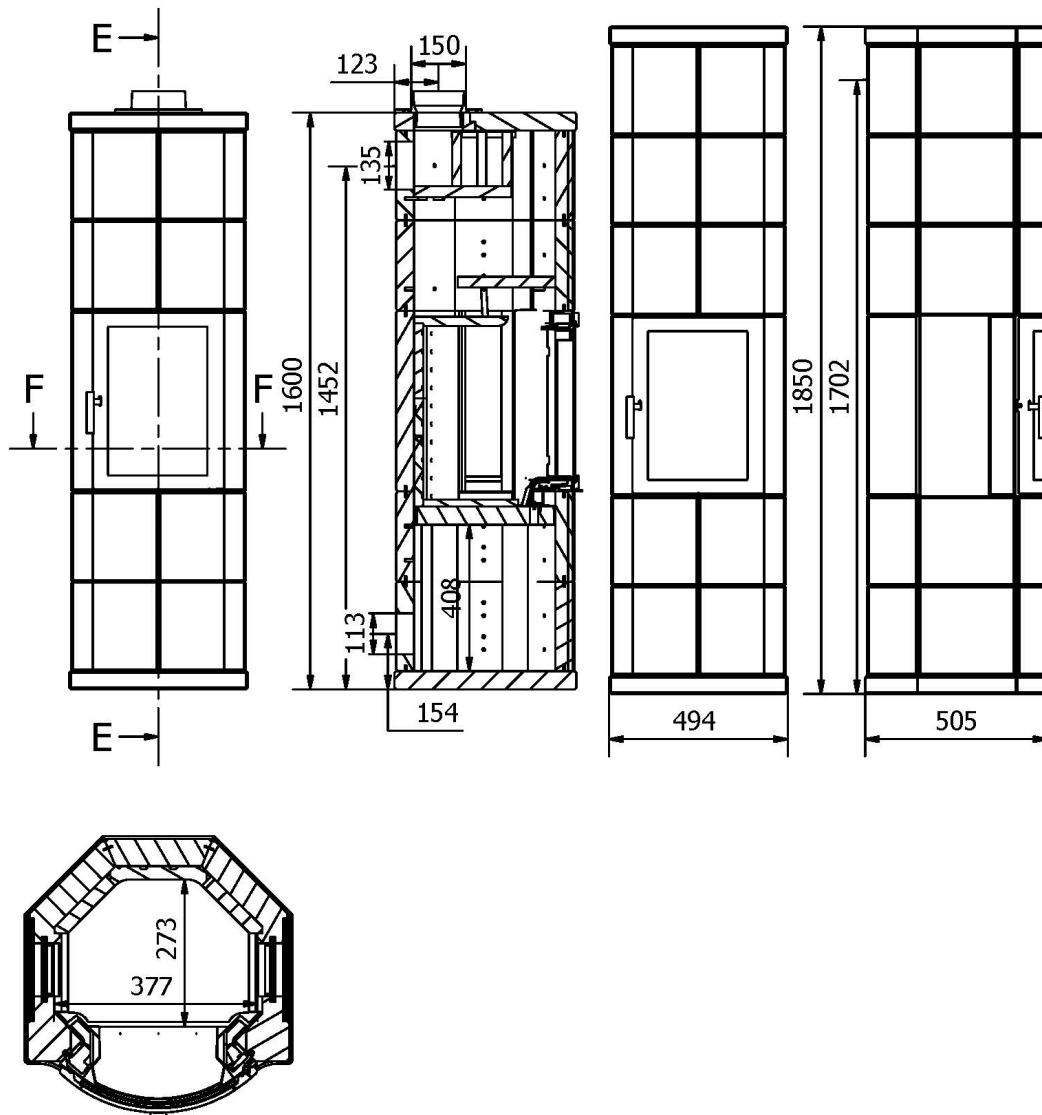


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Merete+ 110

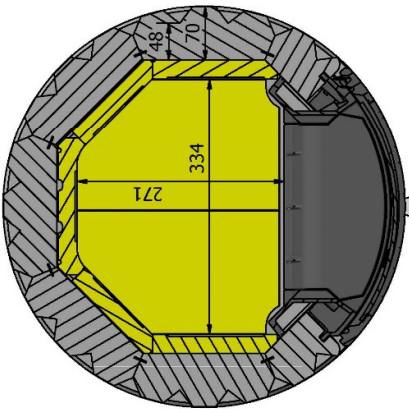
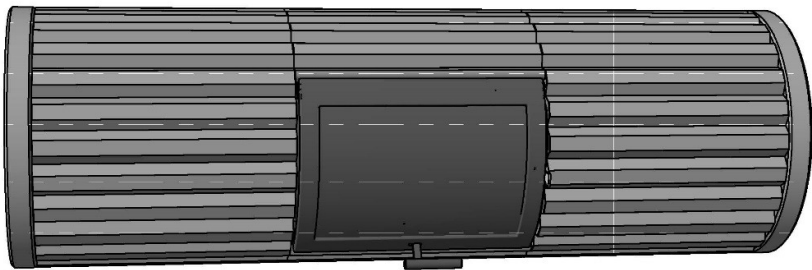


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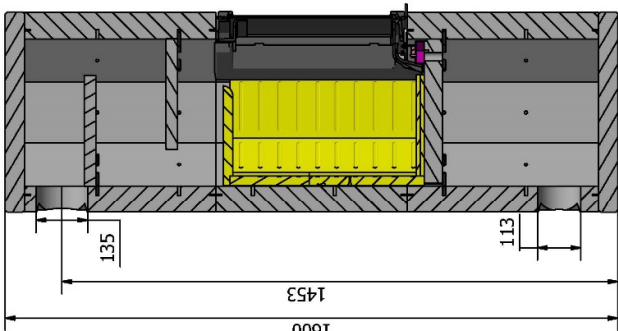


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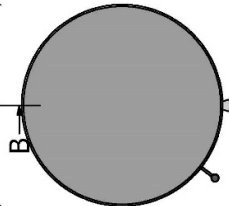
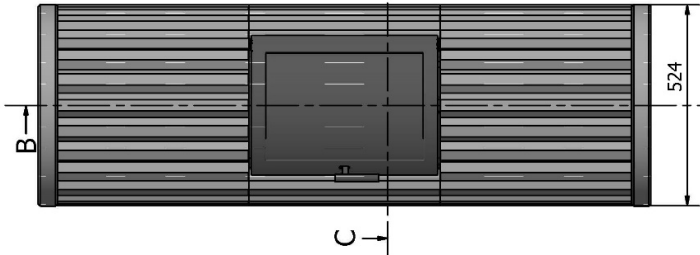
Roma



C-C (1 : 5)



B-B (1 : 10)



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