Certification Test Report

Morsø Jernstøberi A/S

Freestanding Wood Stove

Model: 7900 Series

Prepared for:	Morsø Jernstøberi A/S Furvej 6 7900 Nykøbing Mors Denmark
Prepared by:	OMNI-Test Laboratories, Inc. 13327 NE Airport Way Portland, OR 97230 (503) 643-3788
Test Period:	March 18-25, 2013
Report Date:	April 19, 2013
Report Number:	192-S-23-8.3

AUTHORIZED SIGNATORIES

This report has been reviewed and approved by the following authorized signatories:

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OMNI-Test Laboratories, Inc.

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OMNI-Test Laboratories, Inc.

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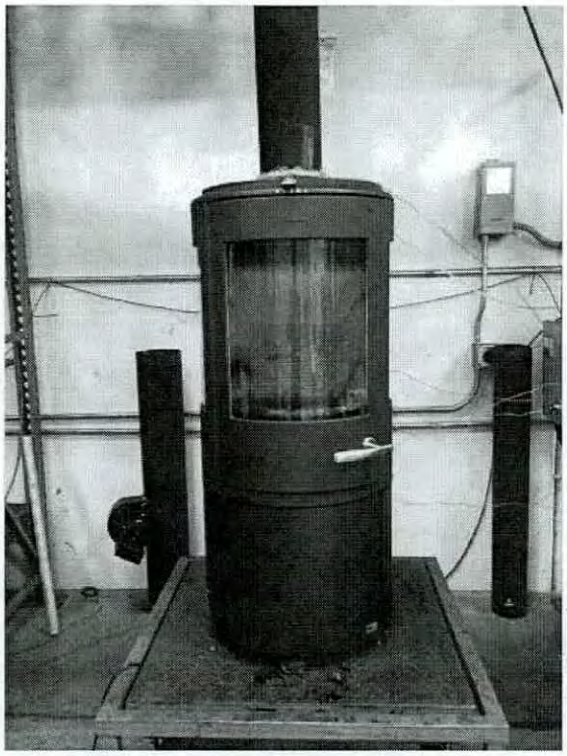
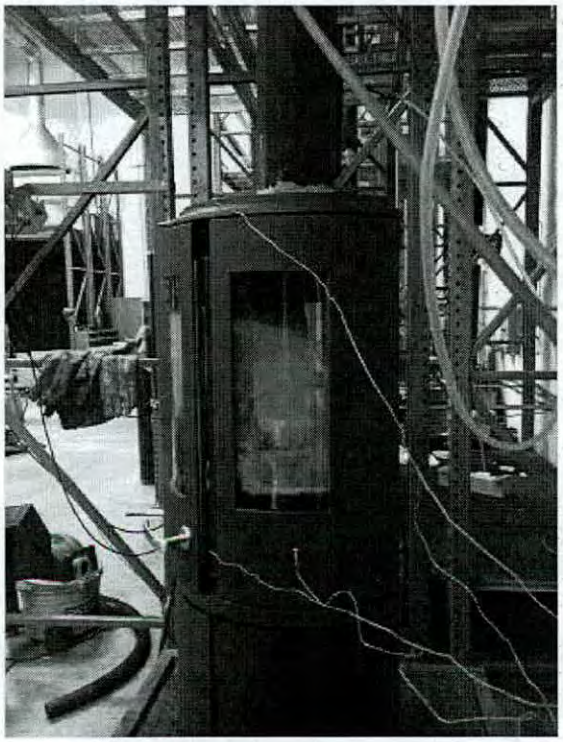
Morsø Jernstøberi A/S
Furvej 6
7900 Nykøbing Mors
Denmark

Morsø Jernstøberi A/S

7900 Series

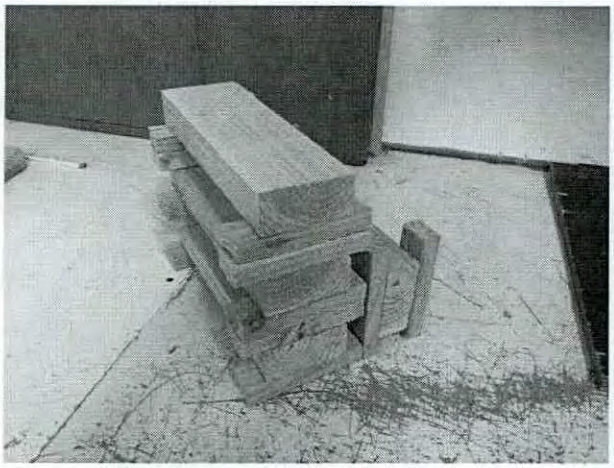
Test Dates: March 18-25, 2013



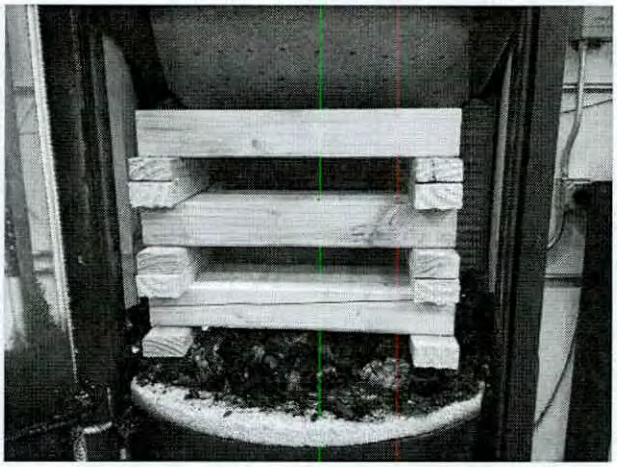


Morsø Jernstøberi A/S
7900 Series

Run 1 – Fuel

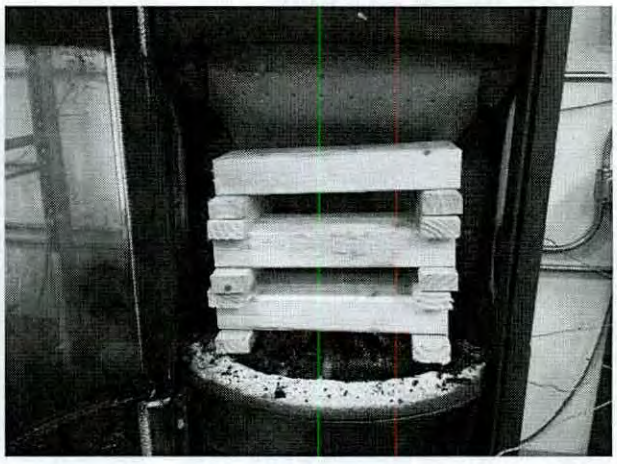


Run 1 – Newly Loaded Stove



Run 2 – Fuel

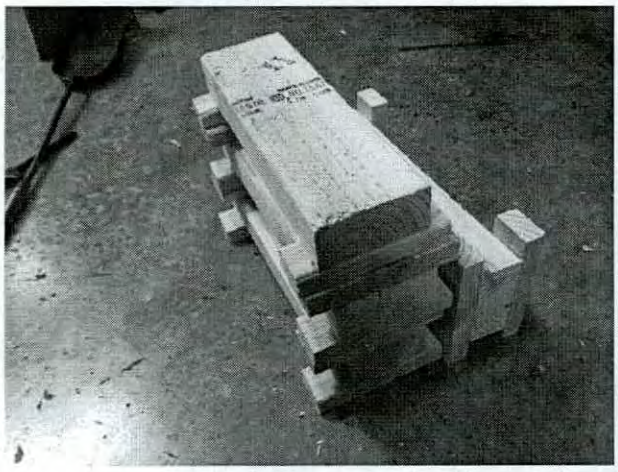
Run 2 – Newly Loaded Stove



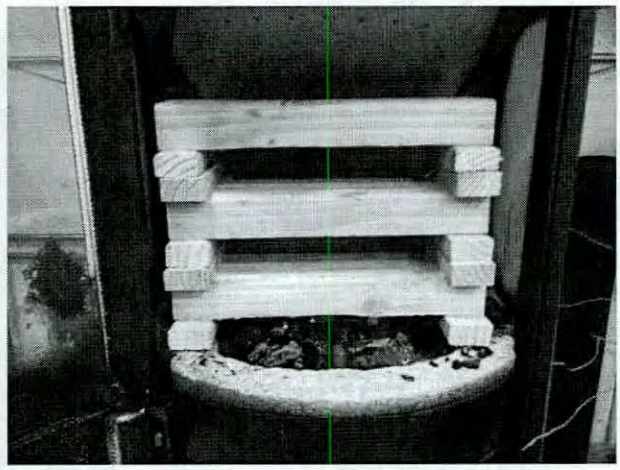
Morsø Jernstøberi A/S

7900 Series

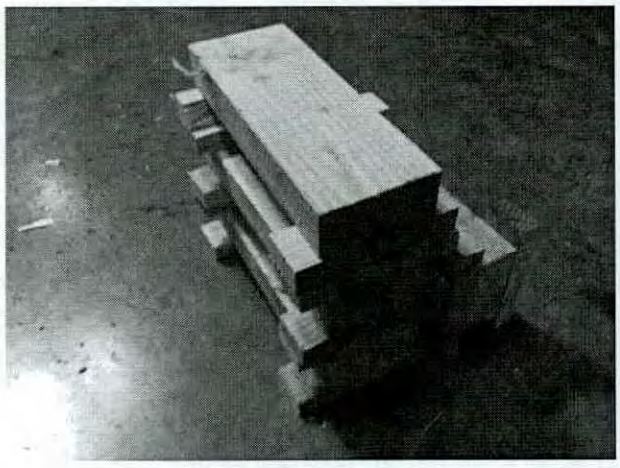
Run 3 – Fuel



Run 3 – Newly Loaded Stove



Run 4 – Fuel



Run 4 – Newly Loaded Stove

WOOD HEATER DESCRIPTION

Appliance Manufacturer: Morsø Jernstøberi A/S

Wood Stove Model: 7900 Series

Type: Freestanding, radiant-type room heater

WOOD HEATER INFORMATION

Materials of Construction: The unit is constructed primarily of cast iron. The firebox is lined with vermiculite. The door features a curved panel of 5mm borosilicate glass measuring 17" x 14". Two additional glass panels, each measuring 17" x 7", are mounted in the sides of the unit. The door and glass panels are all sealed with fiberglass rope gasketing.

Air Introduction System: Air enters the firebox through an opening located at the bottom of the appliance. Secondary air enters the appliance through the back and is channeled internally to a hollow, sloped baffle with four rows of holes.

Combustion Control Mechanisms: The combustion air inlet is controlled by a handle located above the fuel-loading door in the center of the appliance.

Combustor: N/A.

Internal Baffles: A hollow, sloped baffle is mounted in the upper portion of the firebox. The flame path is forced to the front of the firebox where it travels up through the opening between the baffle and primary air manifold.

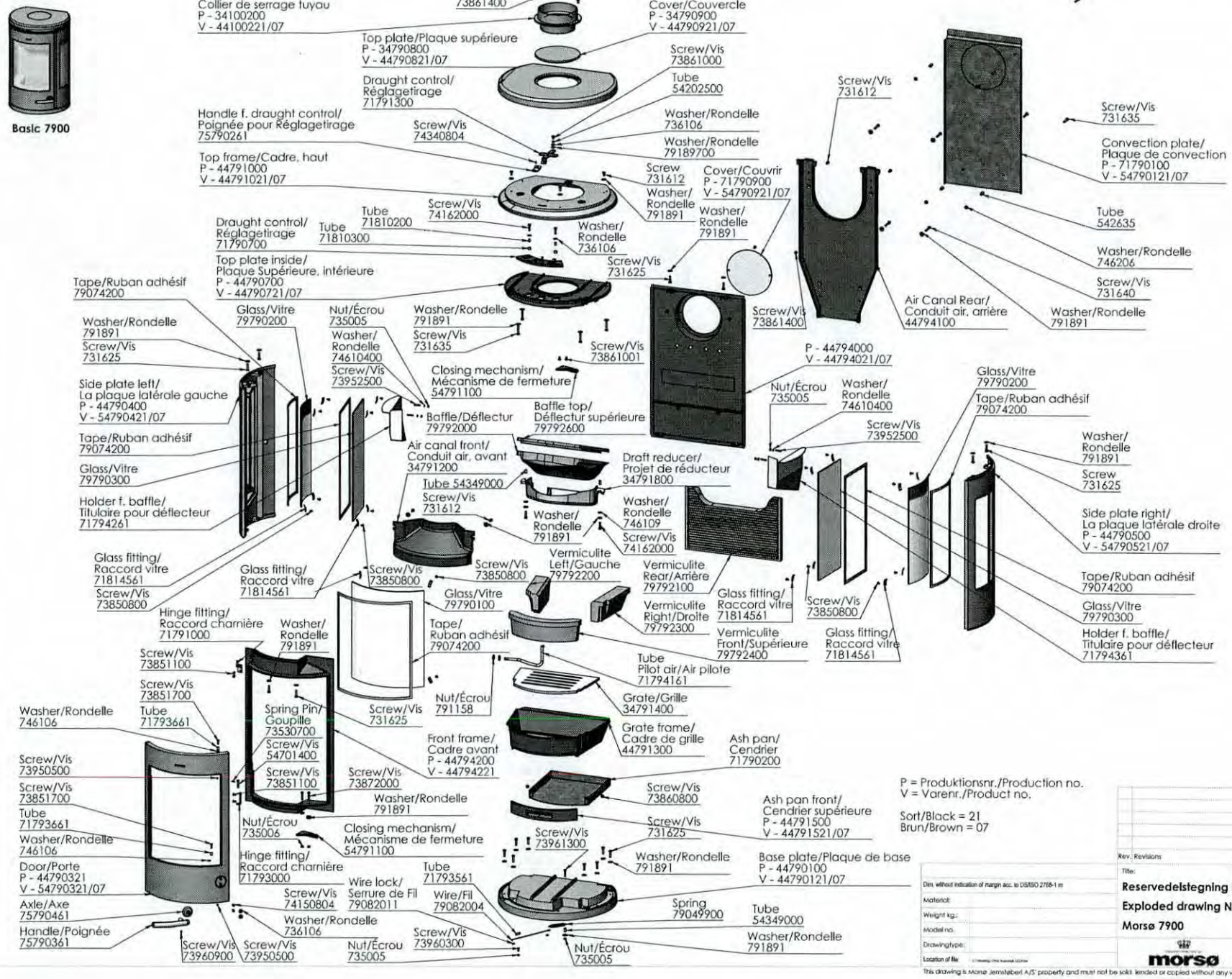
Other Features: None

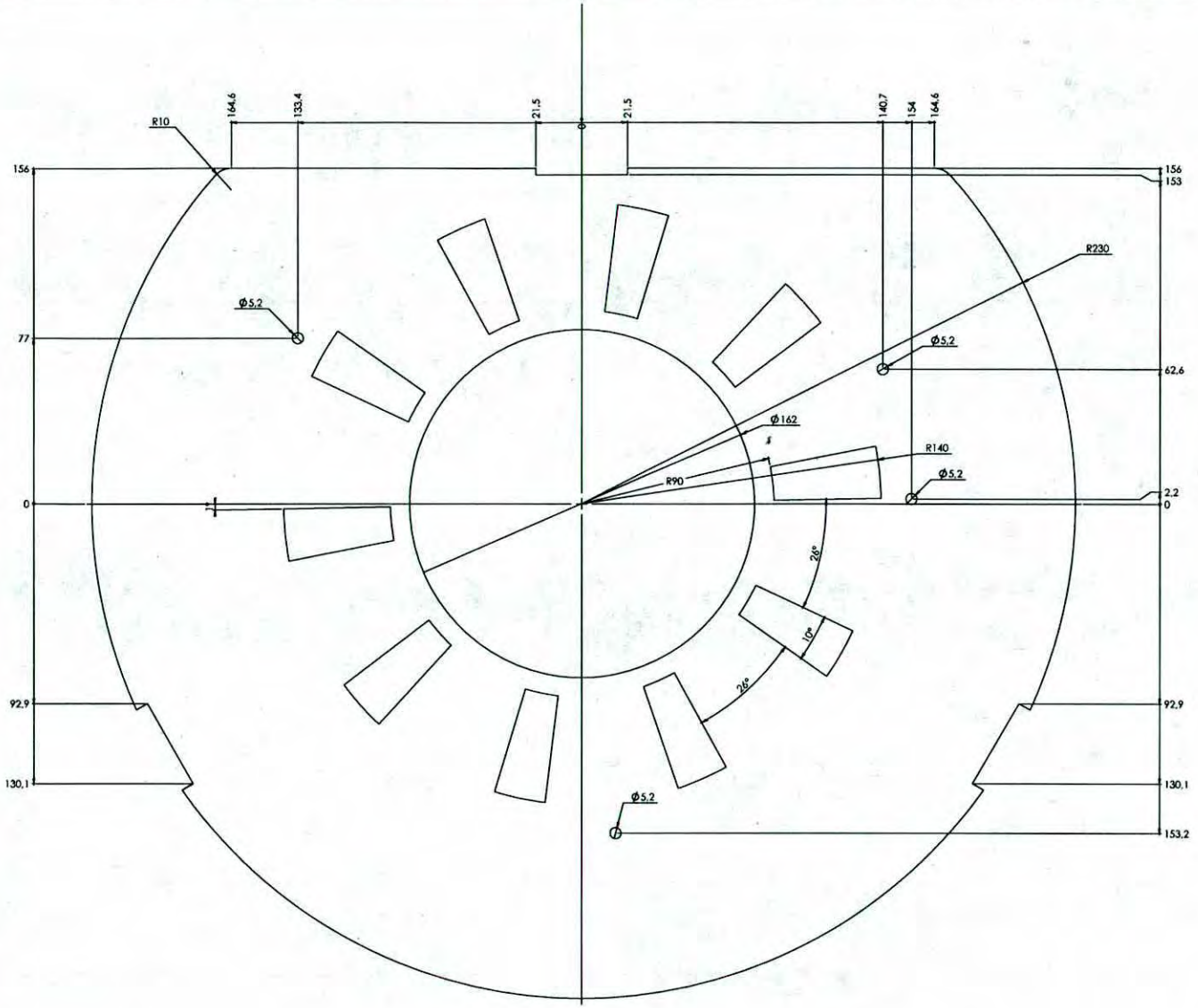
Flue Outlet: The 6-inch diameter flue outlet is located in the top of the unit.

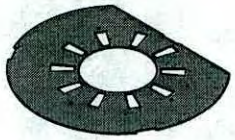
WOOD HEATER OPERATING INSTRUCTIONS

Specific Written Instructions: See Section 3 of this report. All markings and instruction materials were reviewed for content prior to printing.

Engineering Drawings/Blueprints (K List)

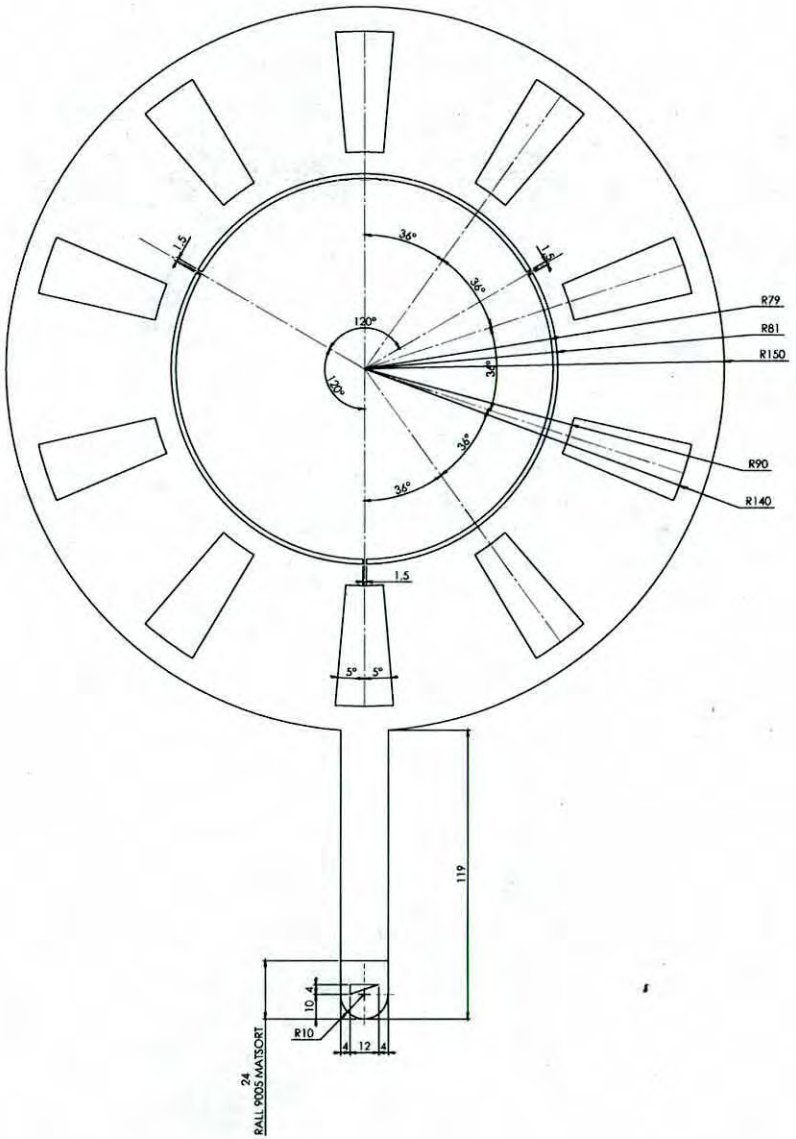

Basic 7900
Flue Collar/
Collier de serrage tuyau
P - 34100200
V - 44100221/07
Screw/Vis
73861400
Cover/Couvercle
P - 34790900
V - 44790921/07
Top plate/Plaque supérieure
P - 34790800
V - 44790821/07
Screw/Vis
73861000
Tube
54202500
Draught control/
Réglagetirage
71791300
Handle f. draught control/
Poignée pour Réglagetirage
75790261
Screw/Vis
74340804
Washer/Rondelle
736106
Washer/Rondelle
79189700
Top frame/Cadre, haut
P - 44791000
V - 44791021/07
Screw
731612
Washer/
Rondelle
791891
Cover/Couvrir
P - 71790900
V - 54790921/07
Screw/Vis
74162000
Tube
71810200
Tube
71810300
Draught control/
Réglagetirage
71790700
Washer/
Rondelle
736106
Washer/
Rondelle
791891
Top plate inside/
Plaque Supérieure, intérieure
P - 44790700
V - 44790721/07
Screw/Vis
731625
Screw/Vis
731612
Screw/Vis
731635
Convection plate/
Plaque de convection
P - 71790100
V - 54790121/07
Tube
542635
Washer/Rondelle
746206
Screw/Vis
731640
Washer/Rondelle
791891
Air Canal Rear/
Conduit air, arrière
44794100
Screw/Vis
73861400
Tape/Ruban adhésif
79074200
Glass/Vitre
79790200
Nut/Écrou
735005
Washer/Rondelle
791891
Screw/Vis
731635
Washer/Rondelle
791891
Screw/Vis
731625
Washer/
Rondelle
74610400
Screw/Vis
73952500
Screw/Vis
73861001
Closing mechanism/
Mécanisme de fermeture
54791100
P - 44794000
V - 44794021/07
Nut/Écrou
735005
Washer/
Rondelle
74610400
Screw/Vis
73952500
Glass/Vitre
79790200
Tape/Ruban adhésif
79074200
Side plate left/
La plaque latérale gauche
P - 44790400
V - 54790421/07
Baffle/Déflectur
79792000
Baffle top/
Déflectur supérieure
79792600
Air canal front/
Conduit air, avant
34791200
Draft reducer/
Projet de réducteur
34791800
Tape/Ruban adhésif
79074200
Glass/Vitre
79790300
Tube 54349000
Screw/Vis
731612
Washer/
Rondelle
791891
Washer/
Rondelle
746109
Screw/Vis
74162000
Holder f. baffle/
Titulaire pour déflecteur
71794261
Glass fitting/
Raccord vitre
71814561
Screw/Vis
73850800
Glass fitting/
Raccord vitre
71814561
Screw/Vis
73850800
Vermiculite
Left/Gauche
79792200
Vermiculite
Rear/Arrière
79792100
Glass/Vitre
79790100
Vermiculite
Right/Droite
79792300
Glass fitting/
Raccord vitre
71814561
Screw/Vis
73850800
Hinge fitting/
Raccord charnière
71791000
Washer/
Rondelle
791891
Tape/
Ruban adhésif
79074200
Vermiculite
Front/Supérieure
79792400
Glass fitting/
Raccord vitre
71814561
Screw/Vis
73851100
Screw/Vis
73851700
Tube
Pilot air/Air pilote
71794161
Grate/Grille
34791400
Washer/Rondelle
746106
Tube
71793661
Spring Pin/
Goupille
73530700
Screw/Vis
54701400
Screw/Vis
73851100
Nut/Écrou
791158
Screw/Vis
731625
Grate frame/
Cadre de grille
44791300
Ash pan/
Cendrier
71790200
Front frame/
Cadre avant
P - 44794200
V - 44794221
Screw/Vis
73872000
Screw/Vis
73860800
Screw/Vis
73950500
Screw/Vis
73851700
Tube
71793661
Washer/Rondelle
746106
Door/Porte
P - 44790321
V - 54790321/07
Axle/Axe
75790461
Handle/Poignée
75790361
Washer/Rondelle
791891
Nut/Écrou
735006
Closing mechanism/
Mécanisme de fermeture
54791100
Hinge fitting/
Raccord charnière
71793000
Screw/Vis
74150804
Washer/Rondelle
736106
Wire lock/
Serrure de Fil
79082011
Tube
71793561
Wire/Fil
79082004
Screw/Vis
73960900
Screw/Vis
73950500
Nut/Écrou
735005
Screw/Vis
73960300
Screw/Vis
73961300
Ash pan front/
Cendrier supérieure
P - 44791500
V - 44791521/07
Screw/Vis
731625
Washer/Rondelle
791891
Base plate/Plaque de base
P - 44790100
V - 44790121/07
Spring
79049900
Tube
54349000
Washer/Rondelle
791891
Nut/Écrou
735005
Glass/Vitre
79790200
Tape/Ruban adhésif
79074200
Washer/
Rondelle
791891
Screw
731625
Side plate right/
La plaque latérale droite
P - 44790500
V - 54790521/07
Tape/Ruban adhésif
79074200
Glass/Vitre
79790300
Holder f. baffle/
Titulaire pour déflecteur
71794361
P = Produktionsnr./Production no.
V = Varenr./Product no.
Sort/Black = 21
Brun/Brown = 07
Rev. Revisions
Sign.:
Date:
Title:
Reservedelstegning NA
Exploded drawing NA
Morsø 7900
Construction: RSV 23.04.2013
Released:
Format: A2
Scale: 1:10
Itemno.:
Drawing no.: 7900-501 a
Dim. without indication of margin acc. to DS/ISO 2768-1 m
Material:
Weight kg.:
Model no.
Drawingtype:
Location of file
morsø
This drawing is Morsø Jernstøberi A/S' property and must not be sold, lended or copied without any written authorization from the company.

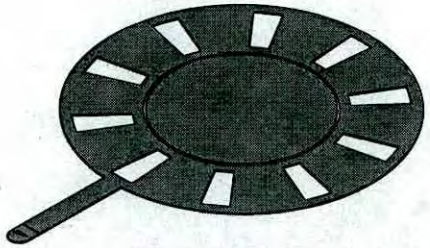




Rev.	Revisions	Sign:	Date:

Ingen grater på kanterne	Title:	Construction:	25-11-2011
Dim. without indication of marge acc. to DS/ISO 2768-1 m	Luftreg.dækplade for varmeakk.	Released:	10.08.2012
material: EPD - DC01AM/EN10130	Almeg.cover plate f. heat acc.	Format:	A1
Weight kg.: 0.904	Morsø 7900	Scale:	1:1
model no.		Item no.:	71792800
Drawingtype: Product Drawing		Drawing no.:	7900-74 a
Location of file:			





Rev.	Revisions	Sign.	Date:
Ingen grater på kanterne/Rough edges must be removed	Mo: Luftreg. plade varmeakk. Almeg. plate heat acc. Morsø 7900	Construction: LAH	25-11-2011
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Released: RSV	10.08.2012
Material: SPD - DC01AM/EN10130		Format:	A1
Weight kg.: 0.48		Scale:	1:2
Model no.: -		Items:	71792900
Drawingtype: Product Drawing		Drawing no.:	7900-75 a
Location of file:	morsø		

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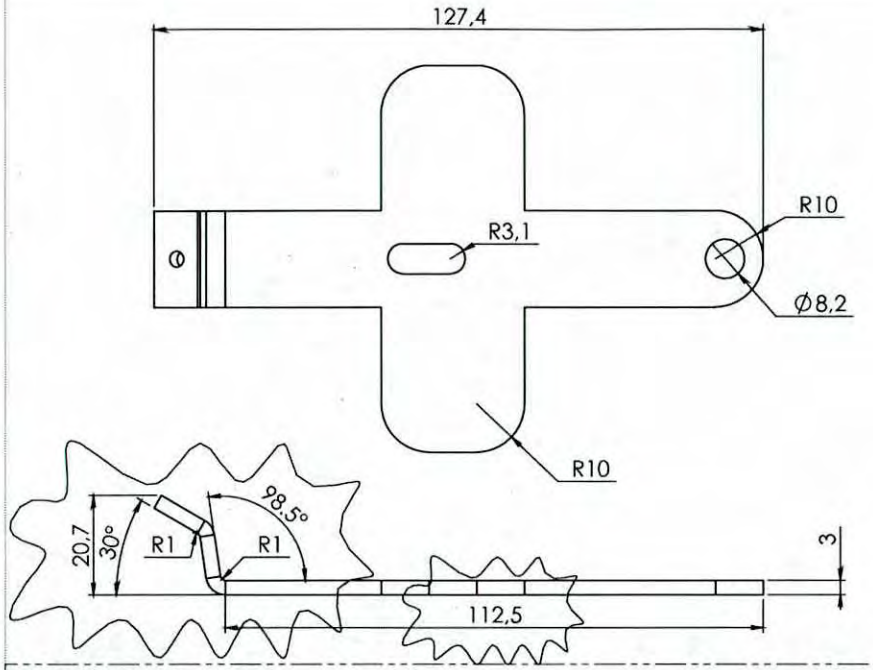

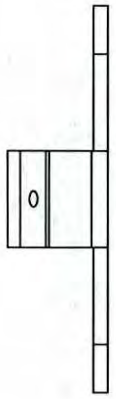

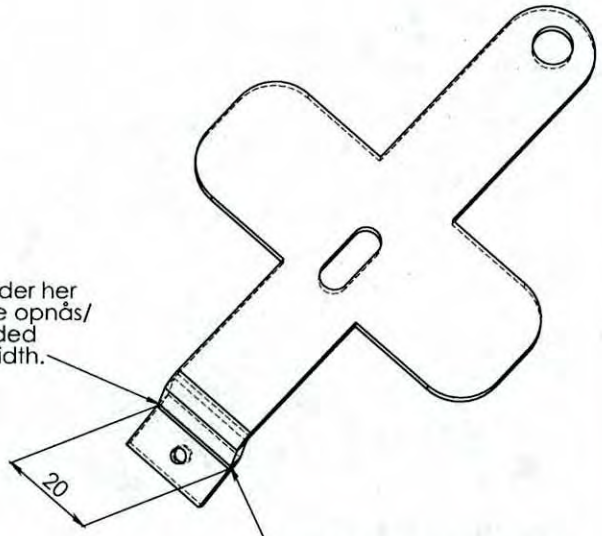

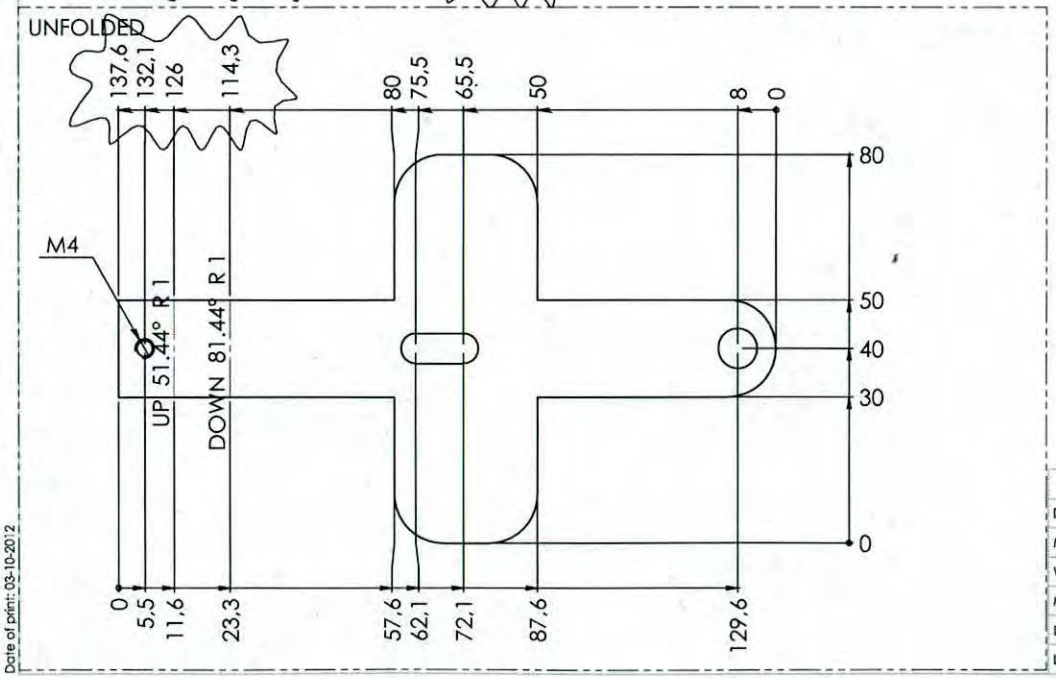

Rev.	Revisions		Sign.:	Date:
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	Title:	Construction:	LAH	02.02.12
	Luftregulerings håndtag pladedel	Released:	RSV	02.05.2012
	Airregulation handle Platepart	Format:	**A3**	
		Scale:	**1:1**	
	Morsø 7900	Itemno.:	**71791300**	
		Drawing no.:	**7900-79 c**	

Dim. without indication of margin acc. to DS/ISO 2768-1 m	
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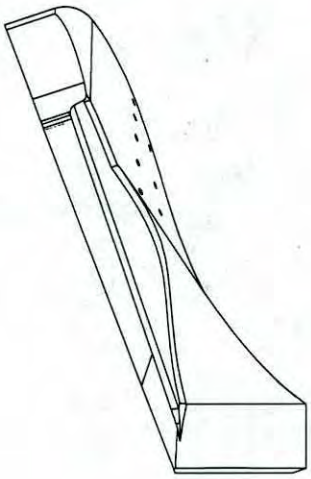
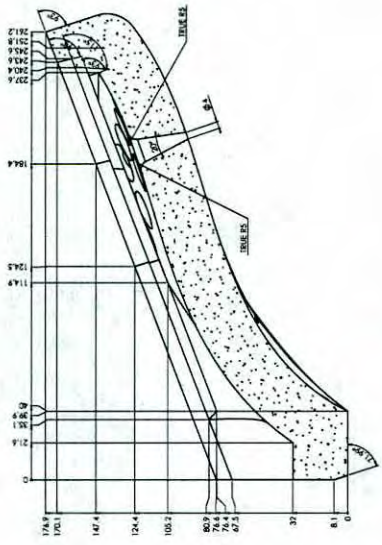
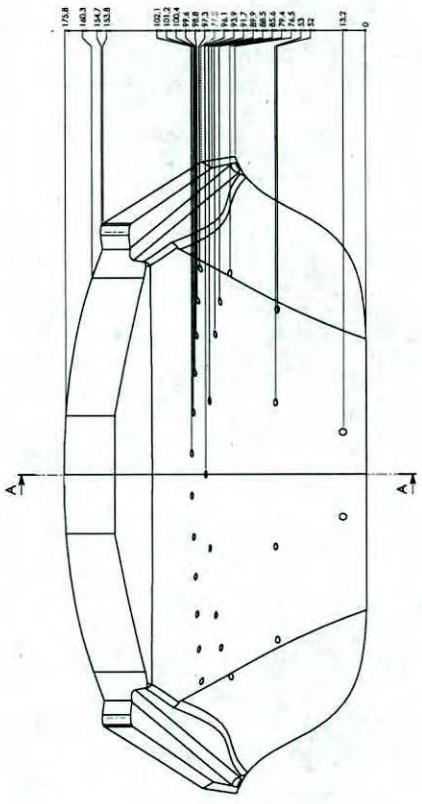
Model no.	
Drawingtype:	Product drawing
Location of file:	

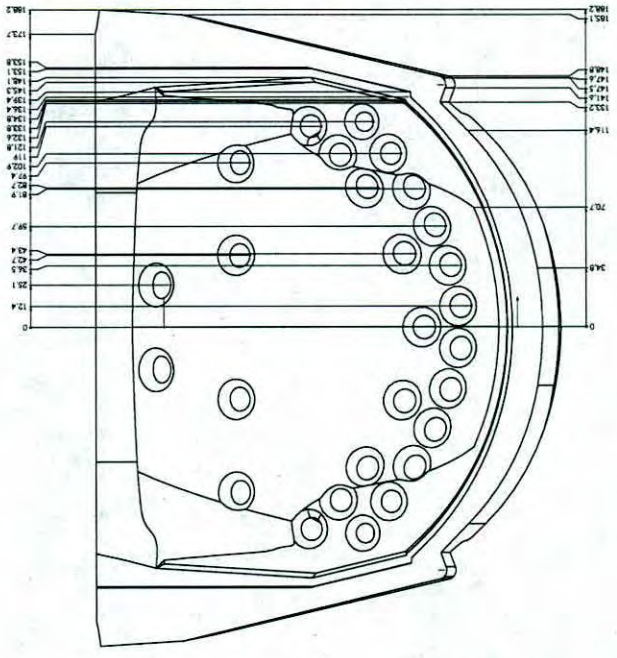
morsø

Date of print: 03-10-2012

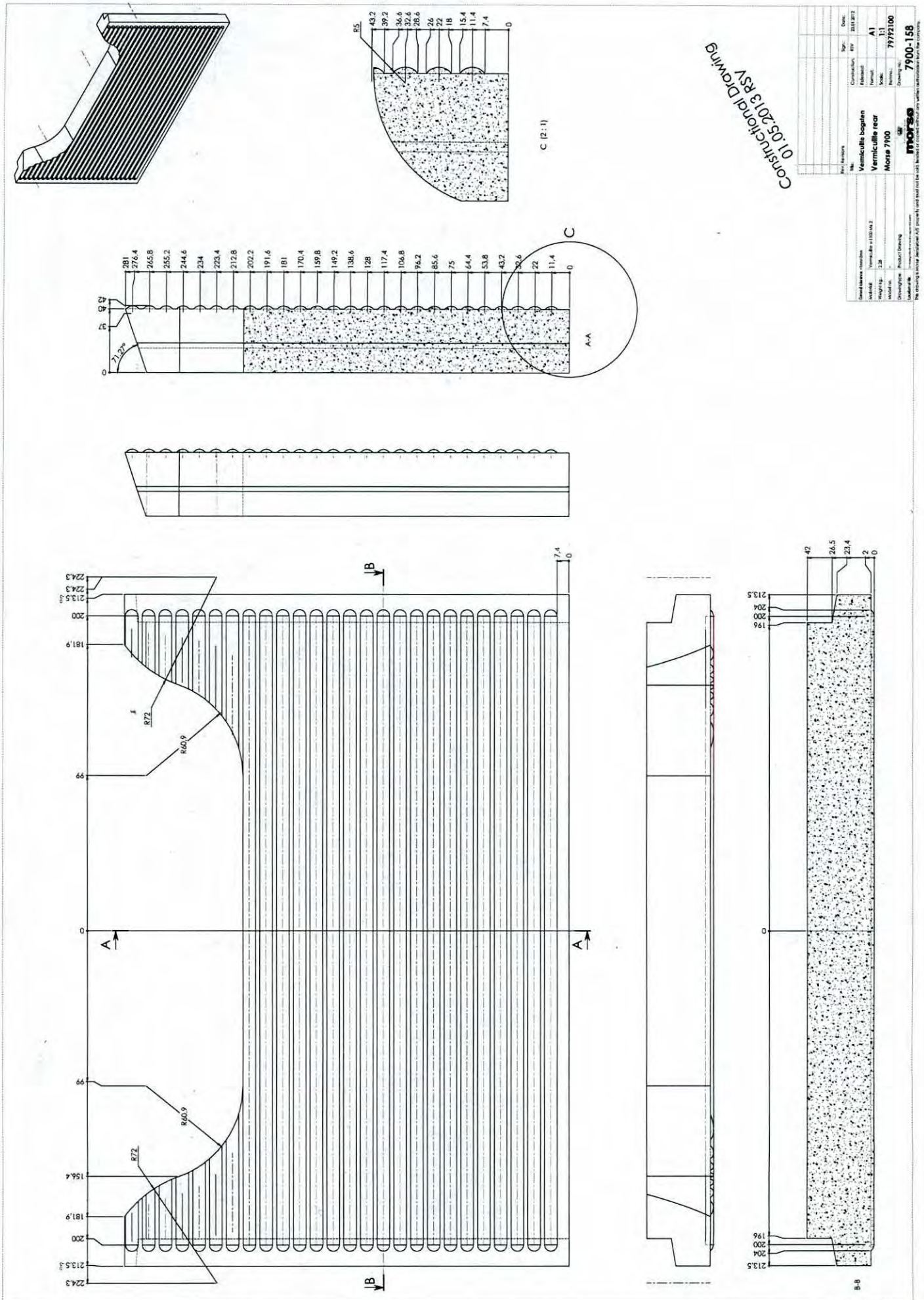


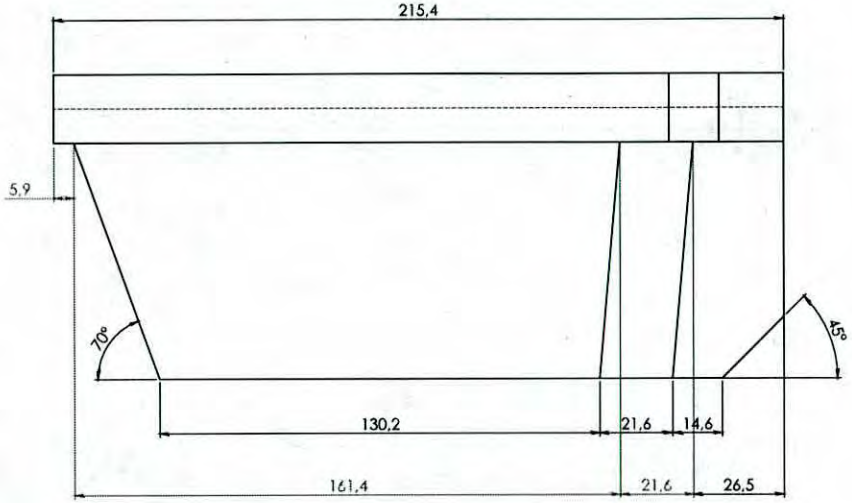


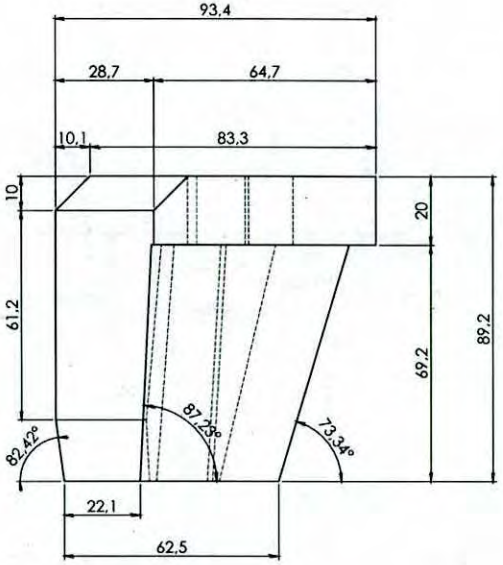


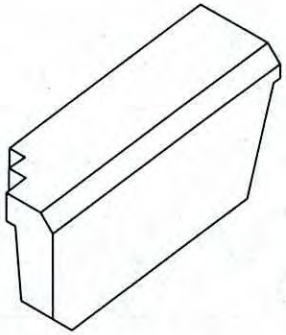


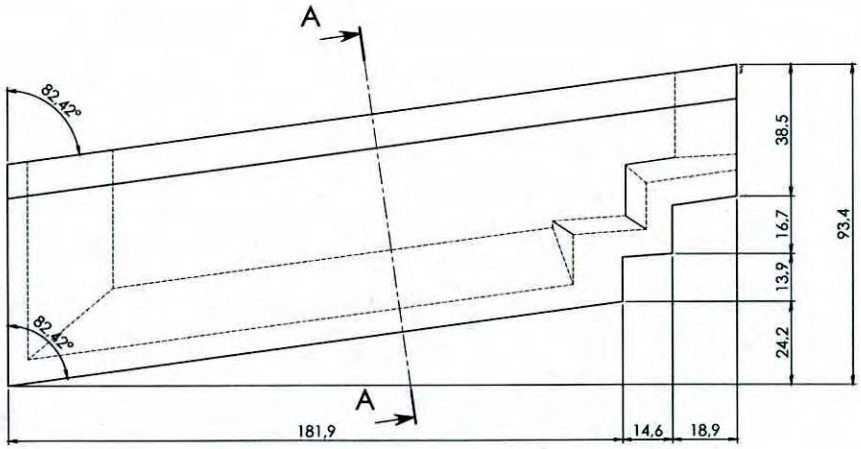
Constructional Drawing
01.05.2013 RSV

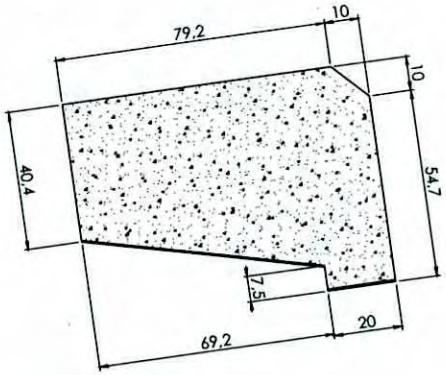

Constructional Drawing
01.05.2013 RSV
Vermiculite bagten
Vermiculite rear
Morse 7900
7900-158
A1
1:1
C (2:1)
A-A
B-B
R72
R60.9









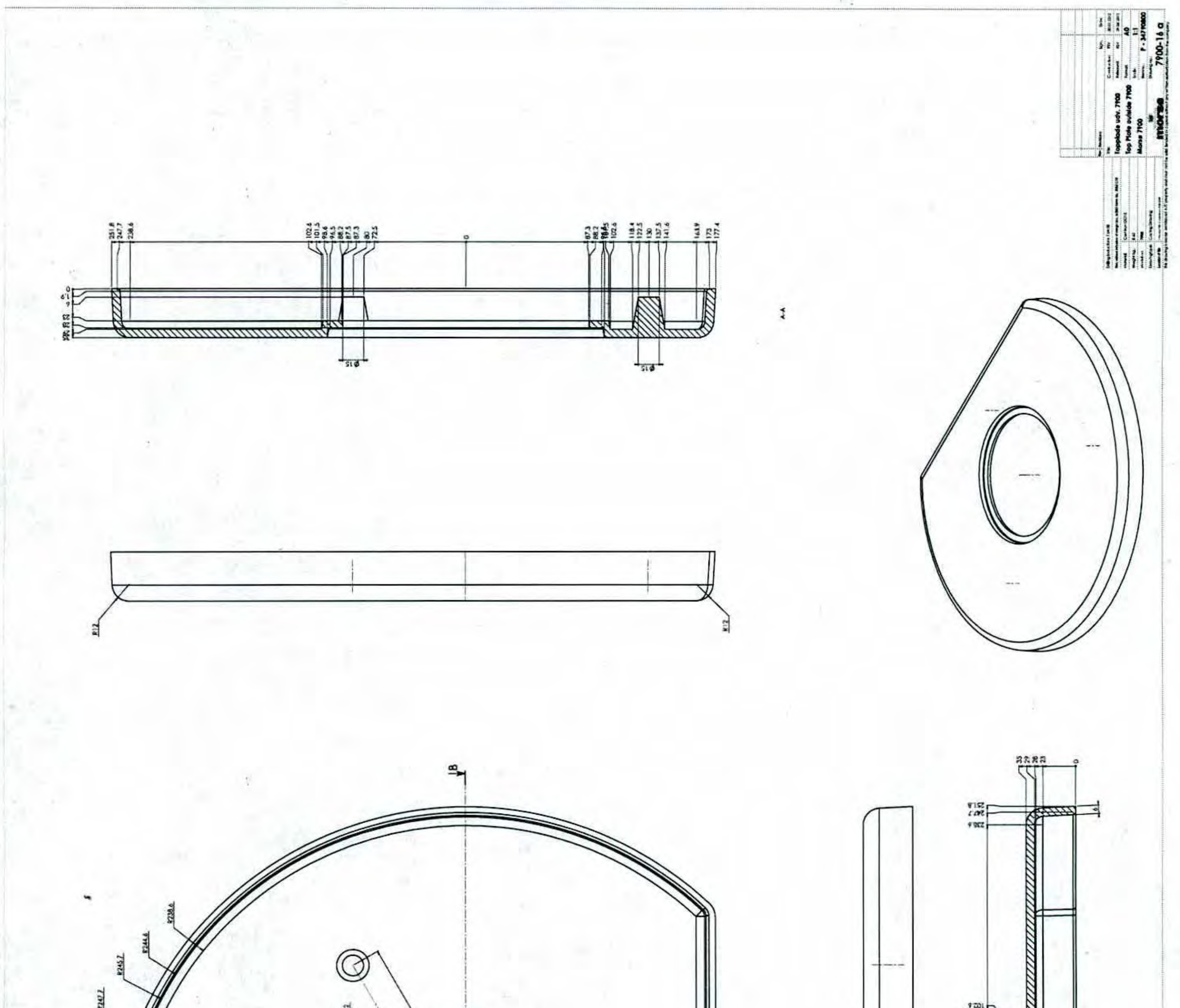


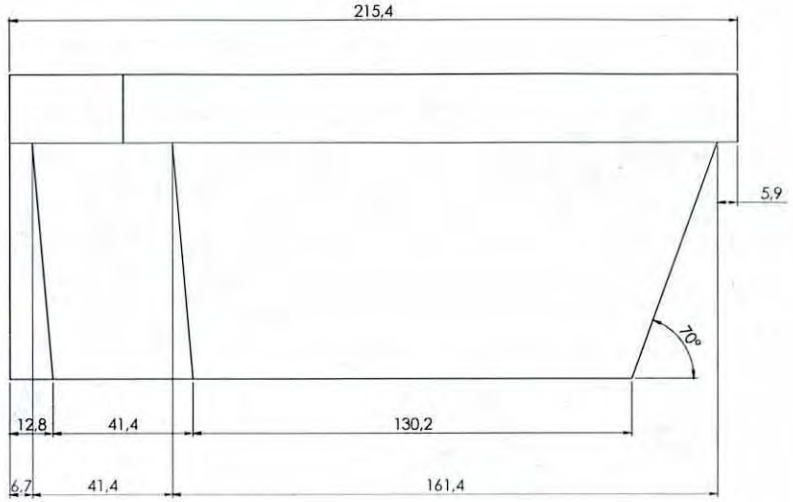
A-A

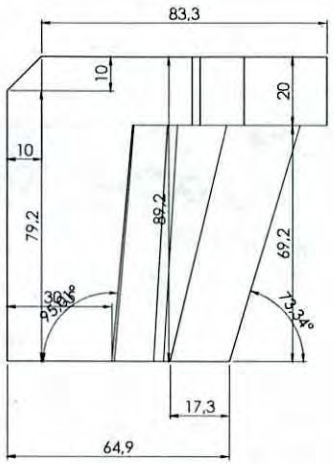
Constructional Drawing
01.05.2013 RSV

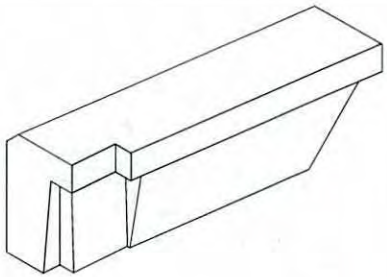
Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	RSV	25.04.2013
	Vermiculite bundsten venstre	Released:		
	Vermiculite bottom stone left	Format:		**A2**
	Morsø 7900	Scale:		**1:1**
		Itemno.:		**79792200**
		Drawing no.:		**7900-159**

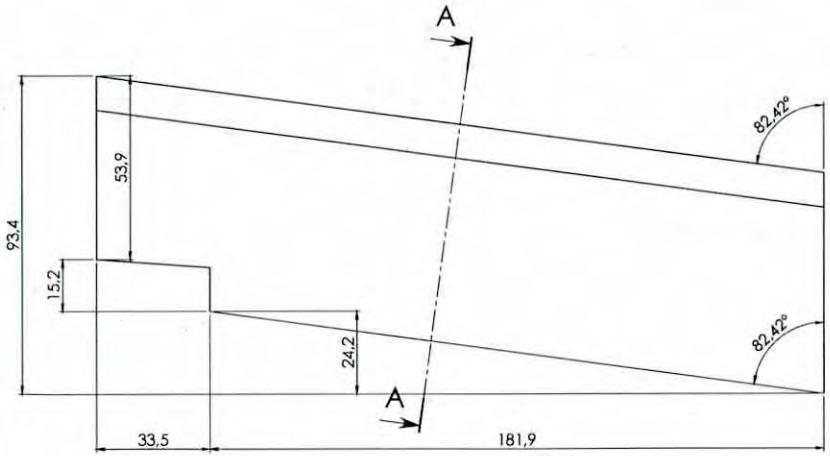
General tolerance:	+1mm/-2mm
Material:	Vermiculite v-1100-600
Weight kg.:	0.52
Model no.	
Drawingtype:	Product drawing
Location of file:	

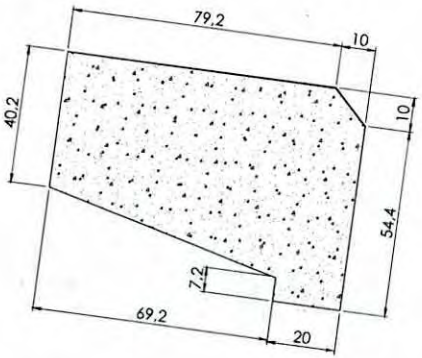

Model no. placed here on this side
A-A
B-B
Topplade udv. 7100
Top Plate outside 7100
Morse 7100
A0
1:1











A-A

Constructional Drawing
01.05.2013 RSV

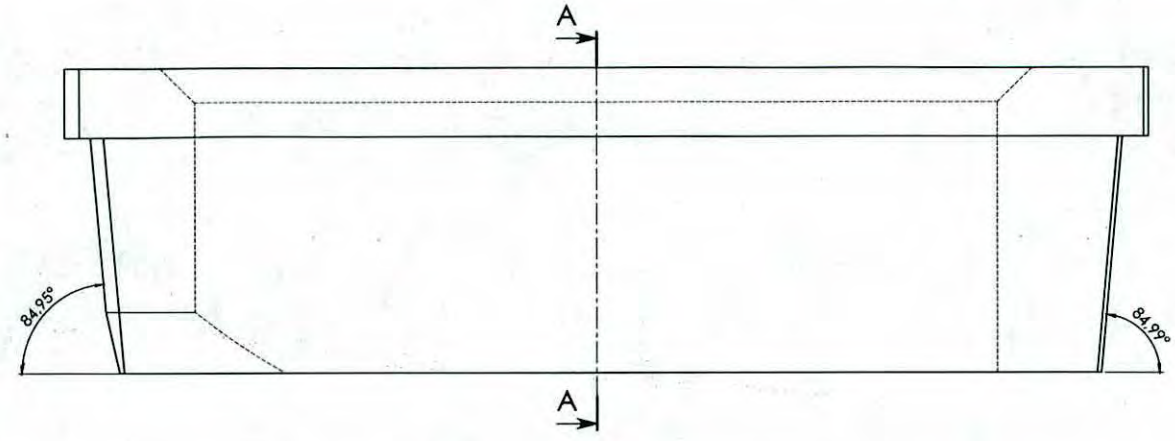
Rev.	Revisions		Sign.:	Date:
		Construction:	RSV	01.05.2013
		Released:		
		Format:		A2
		Scale:		1:1
		Itemno.:		79792300
		Drawing no.:		7900-160

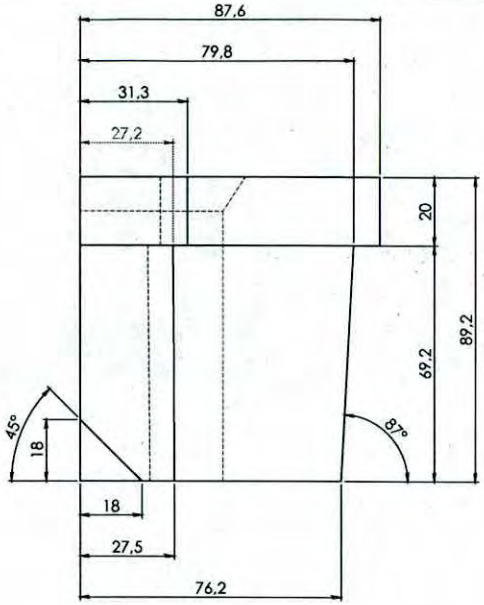
General tolerance:	+1mm/-2mm
Material:	Vermiculite v-1100-600
Weight kg.:	0.54
Model no.:	
Drawingtype:	Product drawing
Location of file:	

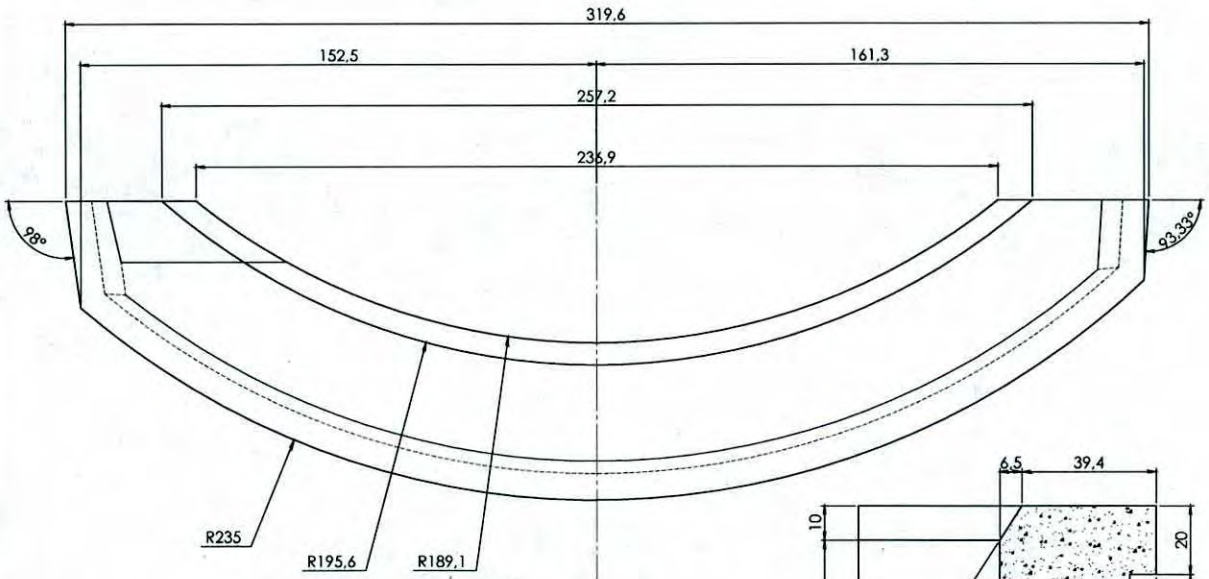
Title:
Vermiculite bundsten højre
Vermiculite bottom stone right
Morsø 7900

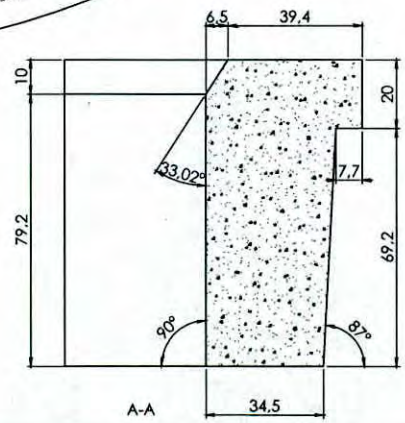
morsø

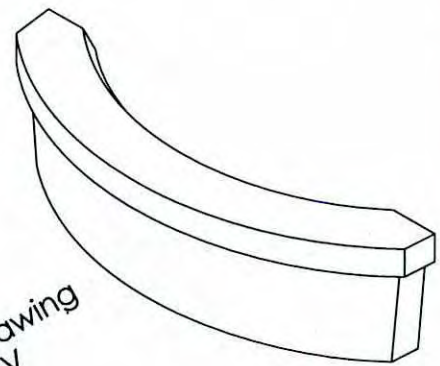
I-15 of I-126
Date of print: 08.05.2013







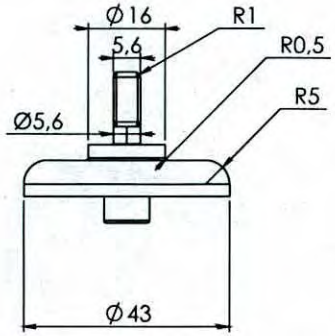


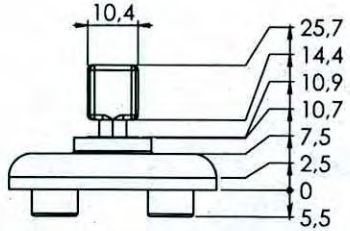


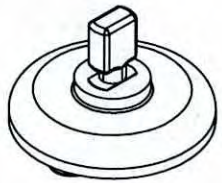
Constructional Drawing
01.05.2013 RSV

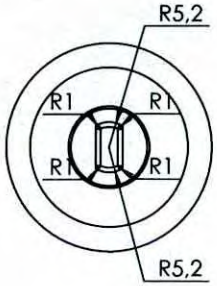
Rev.	Revisions	Sign.:	Date:

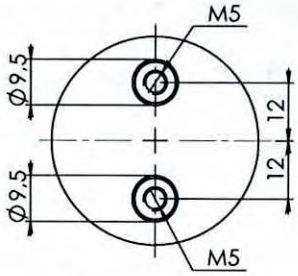
General tolerance: +1mm/-2mm	Title:	Construction:	RSV 25.04.2013
Material: Vermiculite v-1100-600	Vermiculite bundsten front	Released:	
Weight kg.: 0.63	Vermiculite bottom stone front	Format:	A2
Model no.	Morsø 7900	Scale:	1:1
Drawingtype: Product drawing		Itemno.:	79792400
Location of file:	morsø	Drawing no.:	7900-161







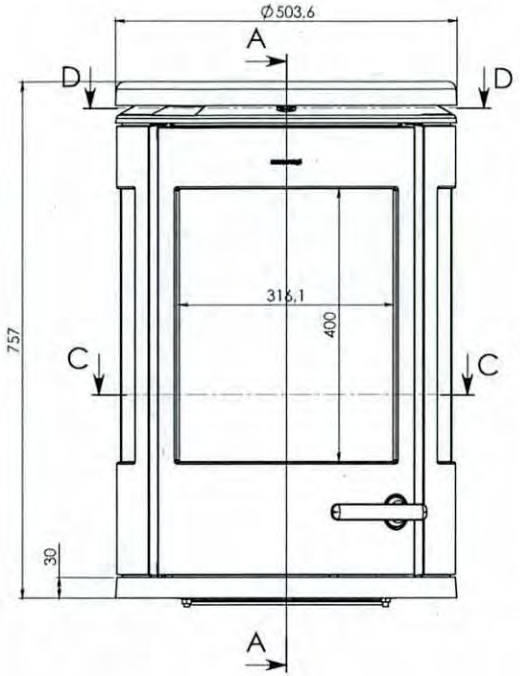


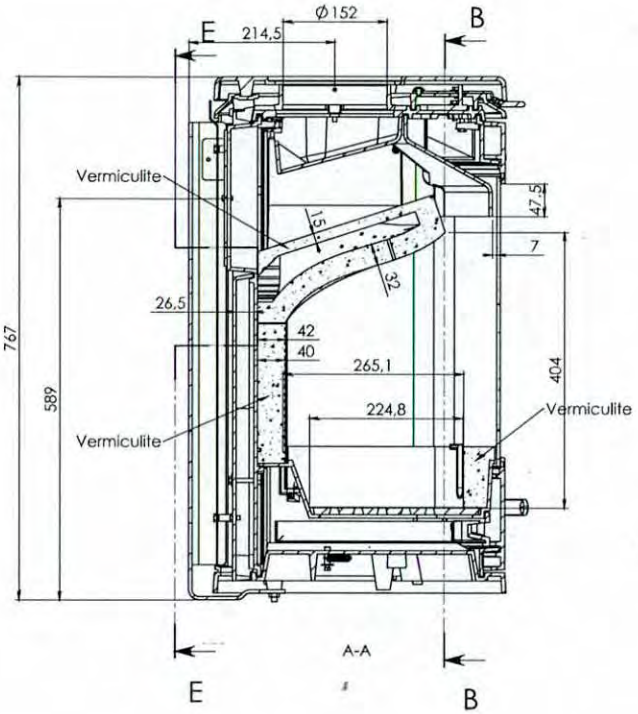


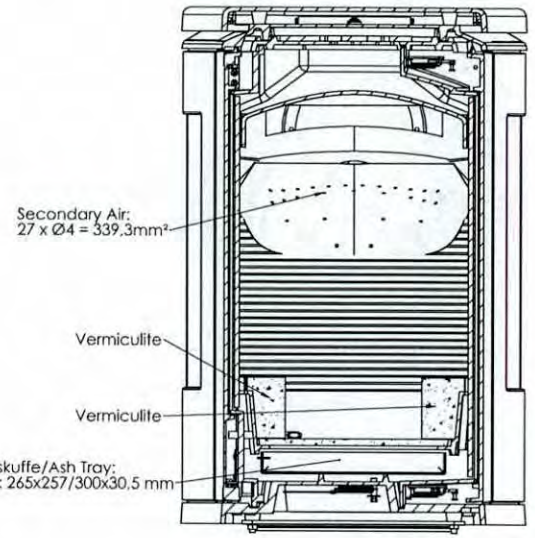
Constructional Drawing

Rev.	Revisions	Sign.:	Date:

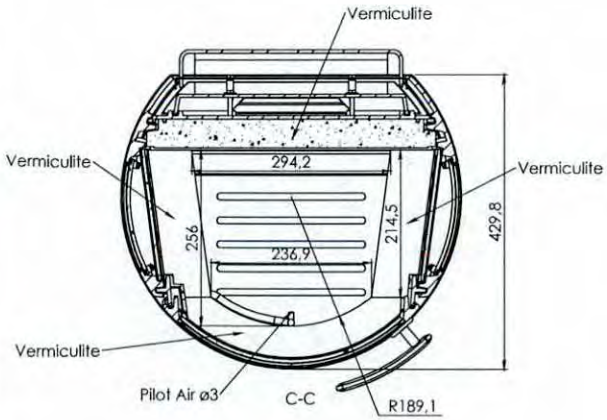
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Fod håndtag NA / Feed handle NA / Morsø 7900	Construction:	LAH 15.12.11
Material: Rustfri stål - Aisi 304		Released:	
Weight kg: 0.1		Format:	A3
Model no.		Scale:	1:1
Drawingtype:		Itemno.:	
Location of file:	morsø	Drawing no.:	7900-163

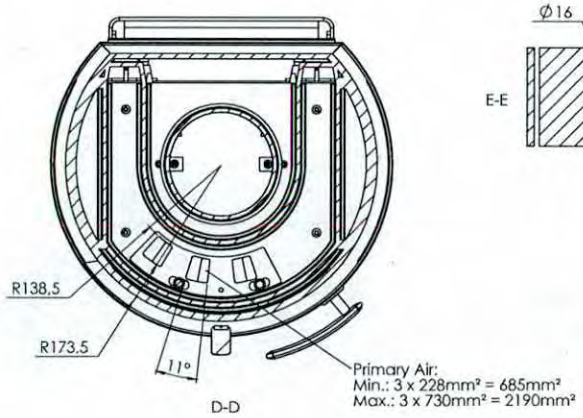


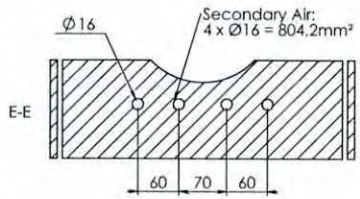




7970

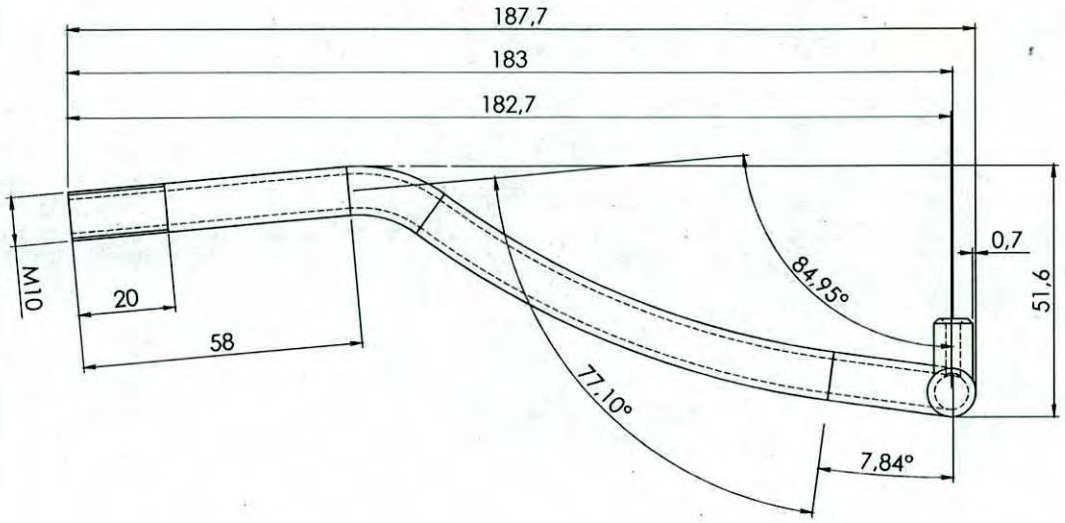


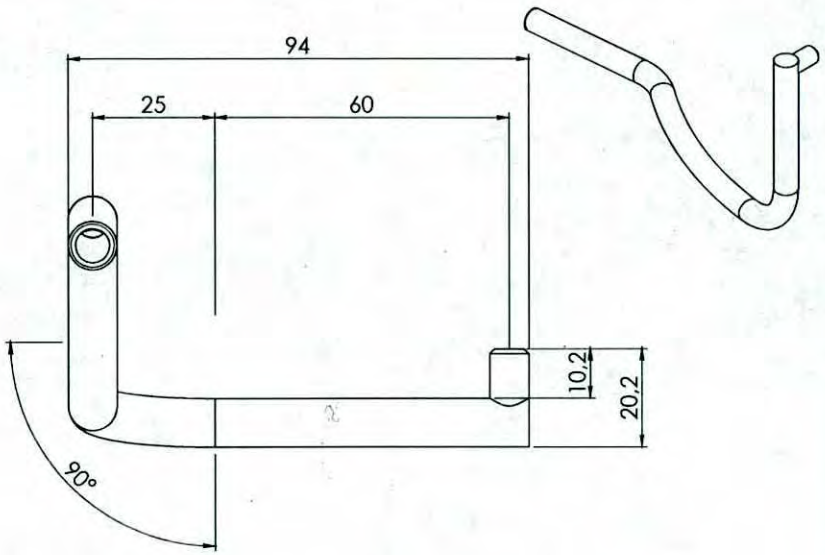


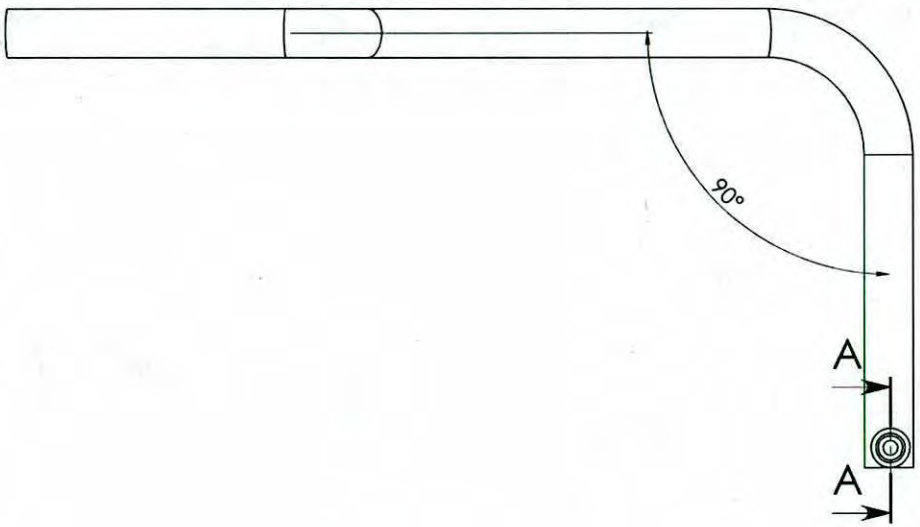


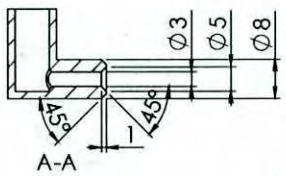
Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Godk. tegn. 7970 NA	Construction: RSV	03.04.2013
Material:	App. Drawing 7970 NA	Released:	
Weight kg.:	Morsø 7900	Format:	A2
Model no.:		Scale:	1:5
Drawingtype:		Item no.:	
Location of file:	morsø	Drawing no.:	7900-155 a







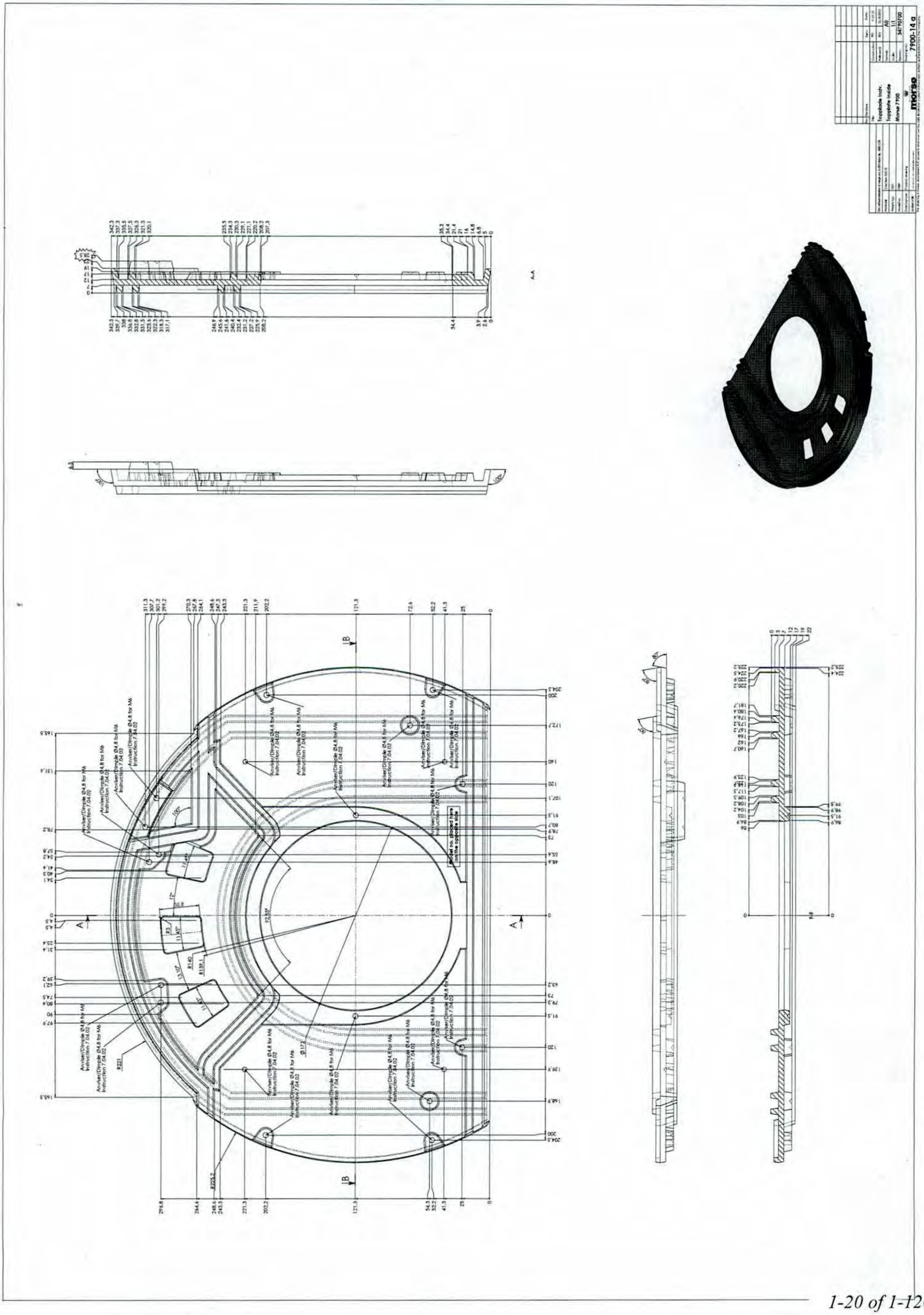


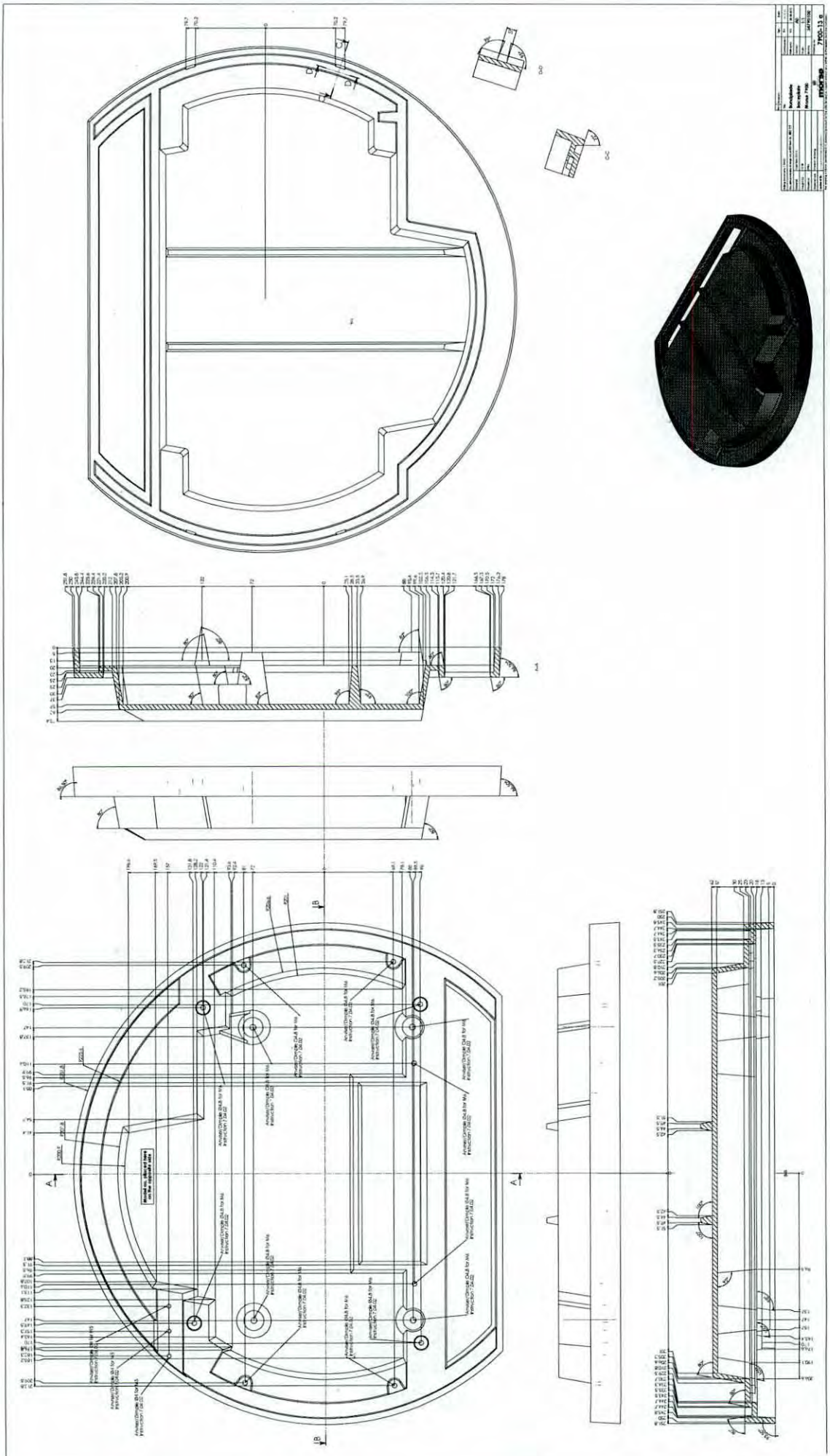
Constructional Drawing
10.04.2013

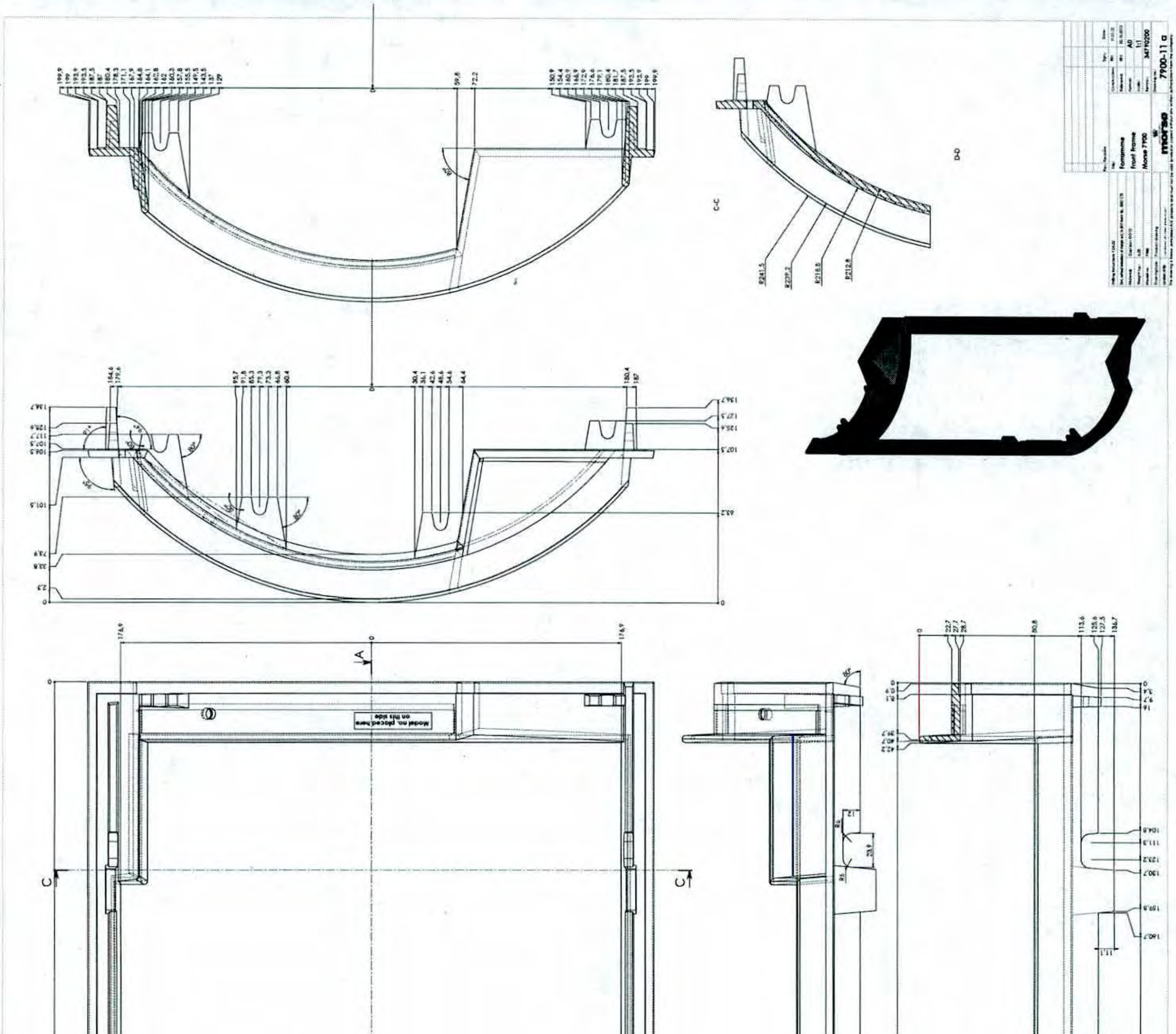
Rev.	Revisions	Sign.:	Date:

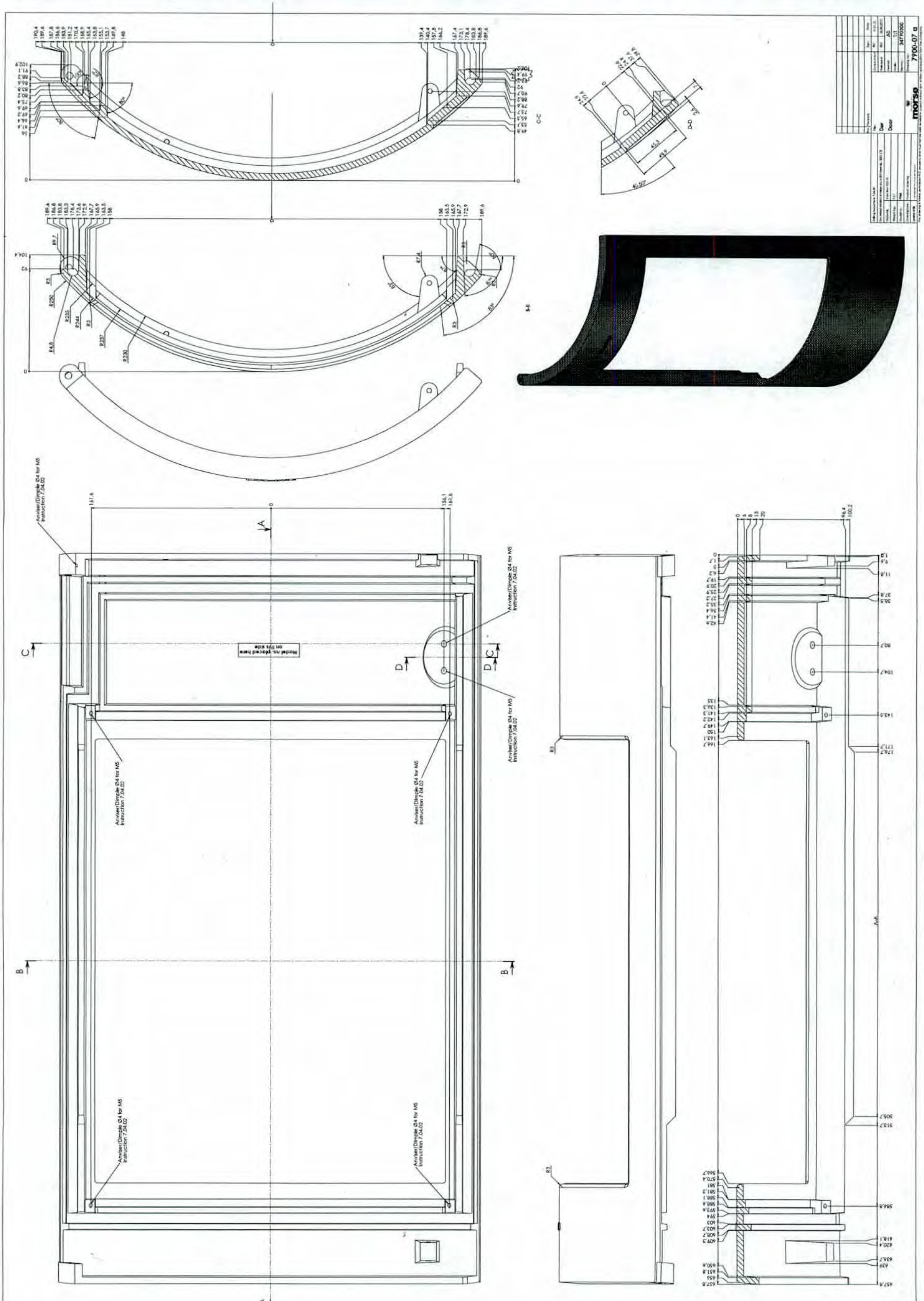
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: Pilotluftsrør NA Pilot Air Tube NA Morsø 7900	Construction:	RSV	10.04.2013
			Released:		
Material:	Material <not specified>		Format:	A3	
Weight kg:	0.089		Scale:	1:1	
Model no.			Itemno.:	71794100	
Drawingtype:	Product drawing	morsø	Drawing no.:	7900-146	
Location of file:	C:\Working\7900-146 Pilotluftrør 7900 NA.SLDPRT				

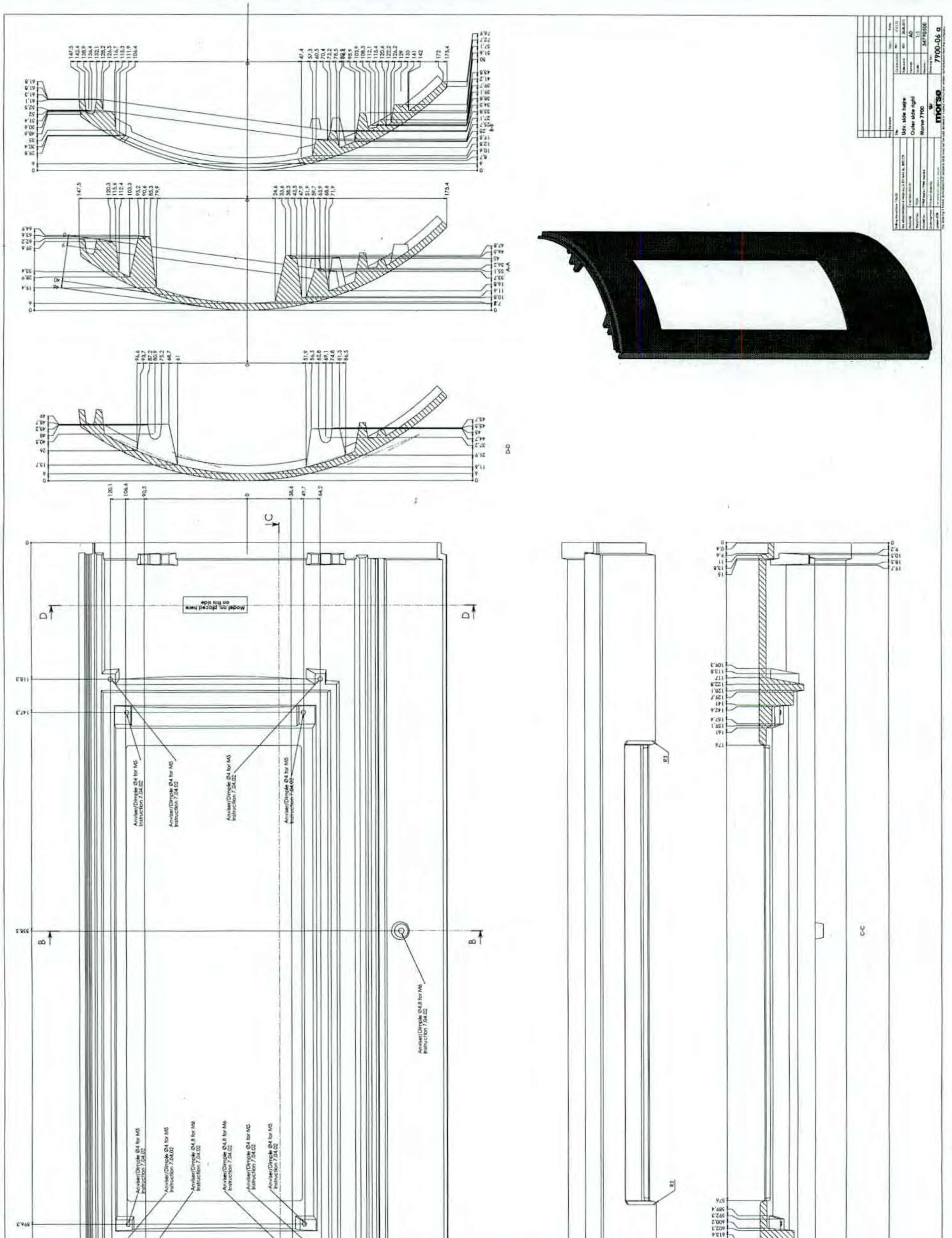
Date of print: 10-04-2013

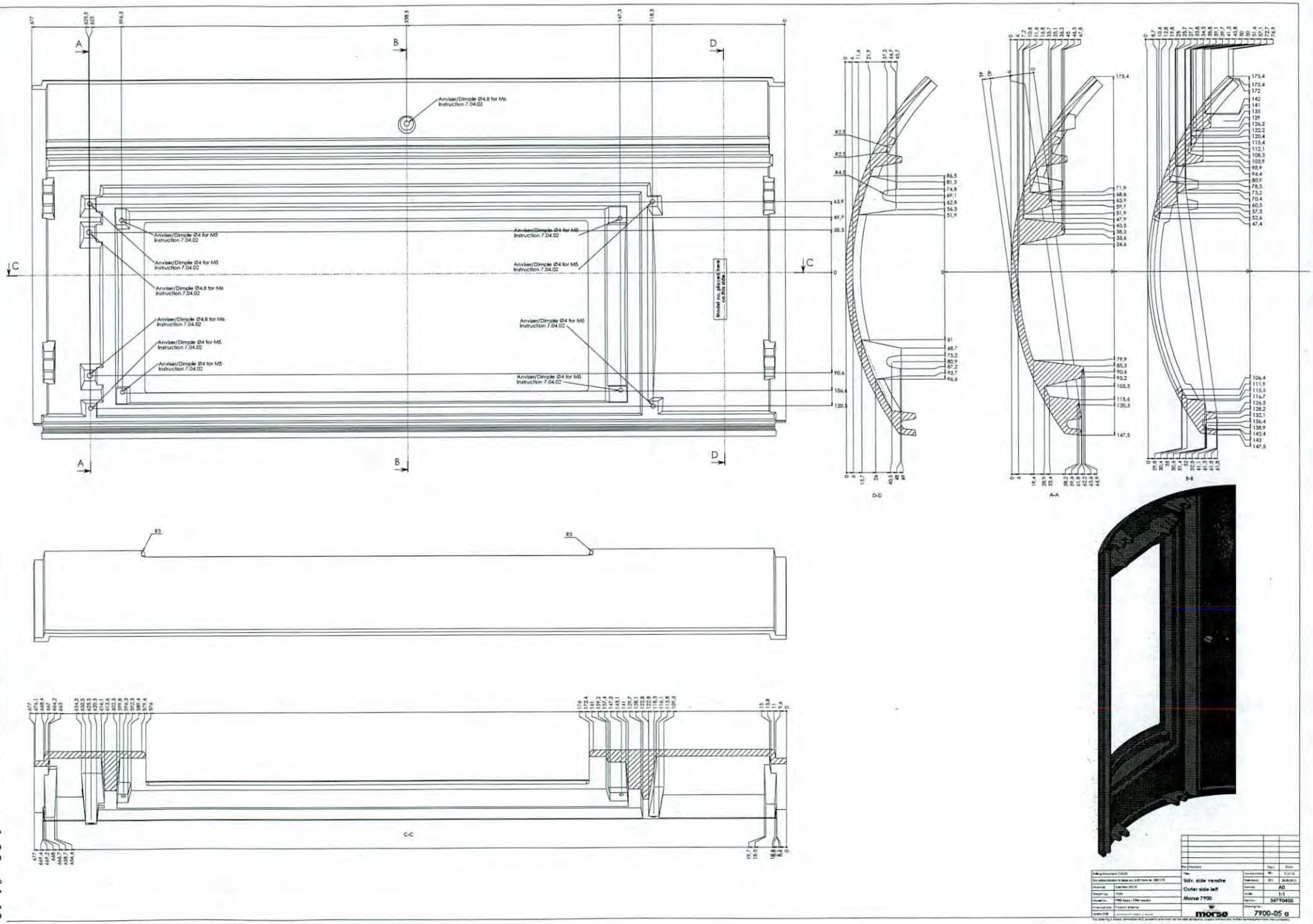


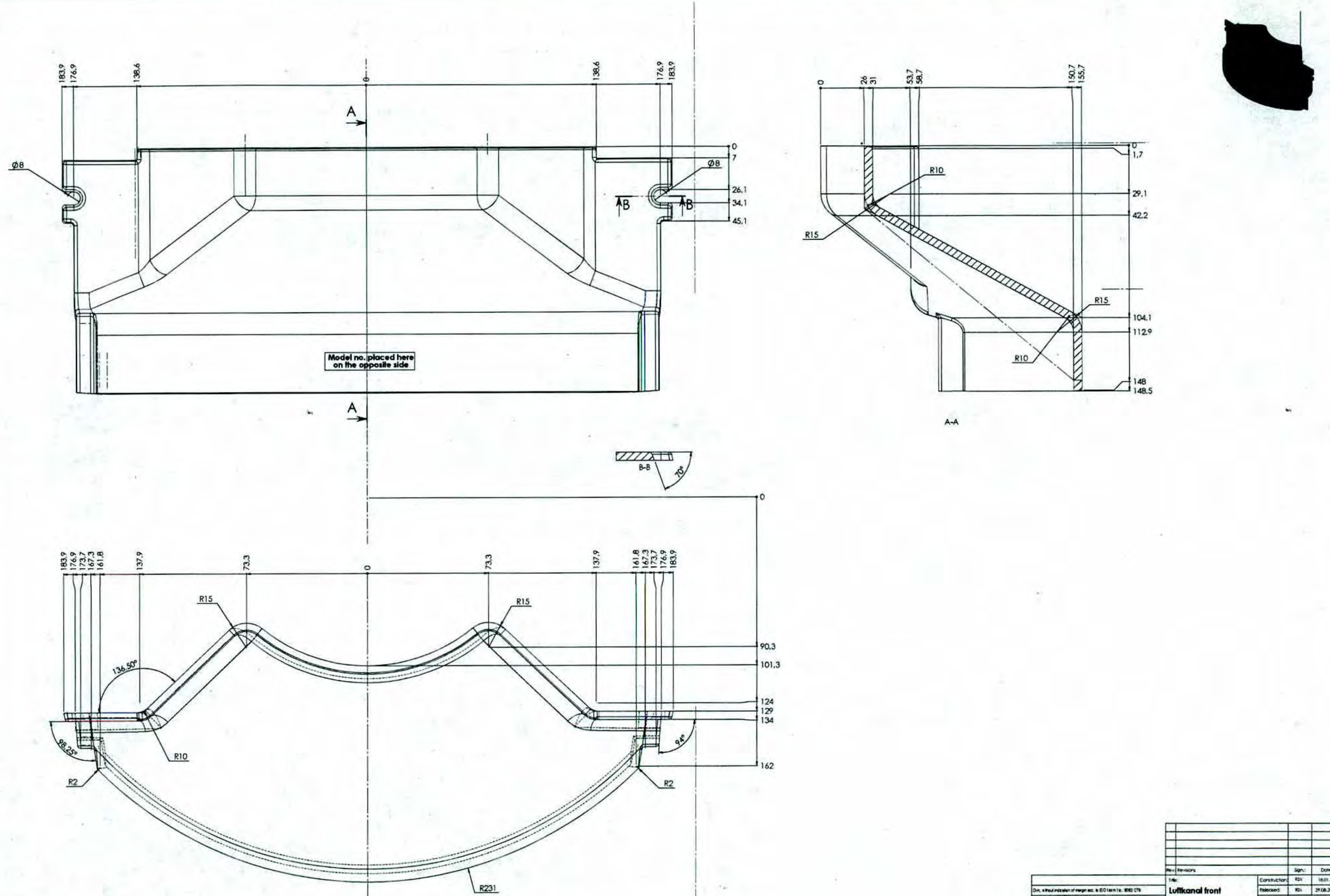






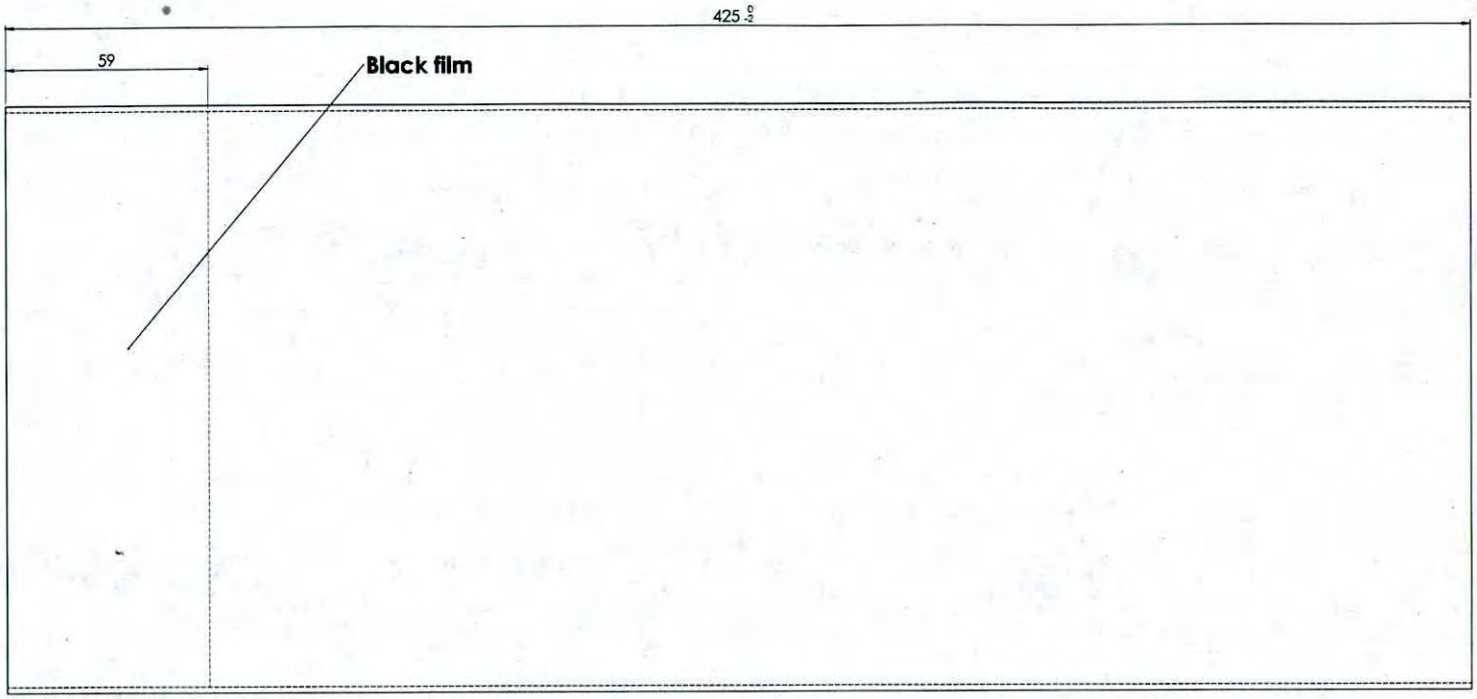


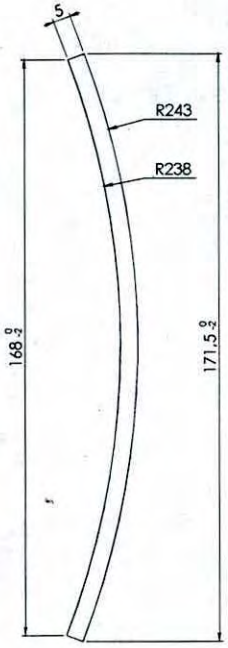

A
B
C
D
Anviser/Dimple Ø4.8 for M6
Instruction 7.04.02
Anviser/Dimple Ø4 for M5
Instruction 7.04.02
Model no. stamped here
on this side
D-D
A-A
B-B
C-C
R3
Udv. side venstre
Outer side left
Morse 7900
A0
1:1
34TF0400
7900-05 a

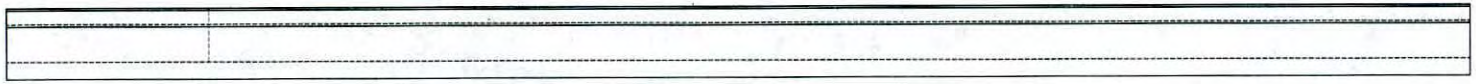


Dim. without indication of margin etc. is ISO form [illegible]		Title:	Construction:	RSV	18.01.12
Material:	Cast Iron GG15	Luftkanal front	Released:	RSV	29.08.2012
Weight kg.:	2,80	Air Canal front	Format:	A1	
Model no.:	7918	Morsø 7900	Scale:	1:1	
Drawingtype:	Casting Drawing		Item no.:	34791200	
Location of file:	[illegible]	morsø	Drawing no.:	7900-03 a	

This drawing is Morsø Jernstøberi A/S property and must not be sold, lended or copied without any written authorization from the company.

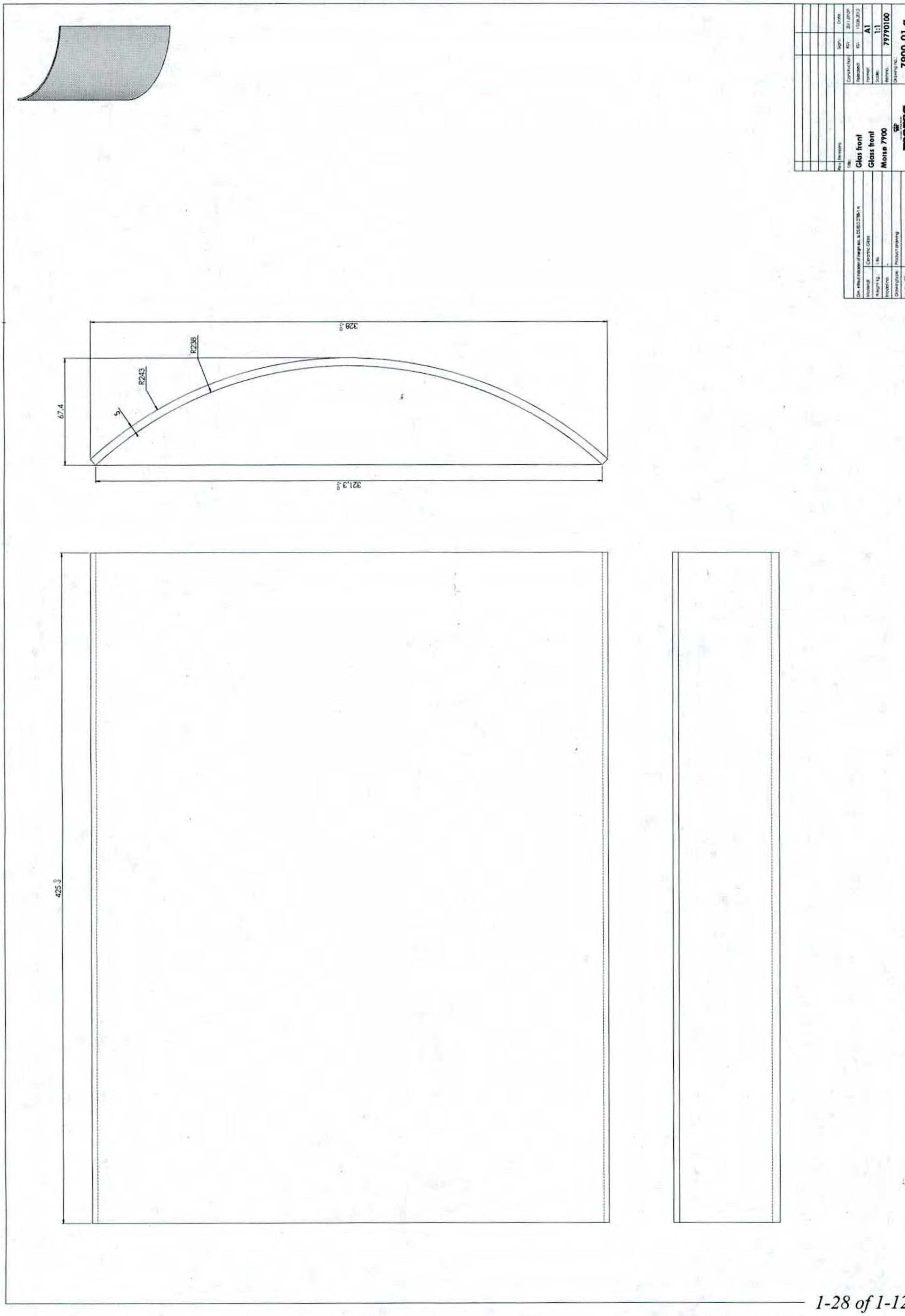




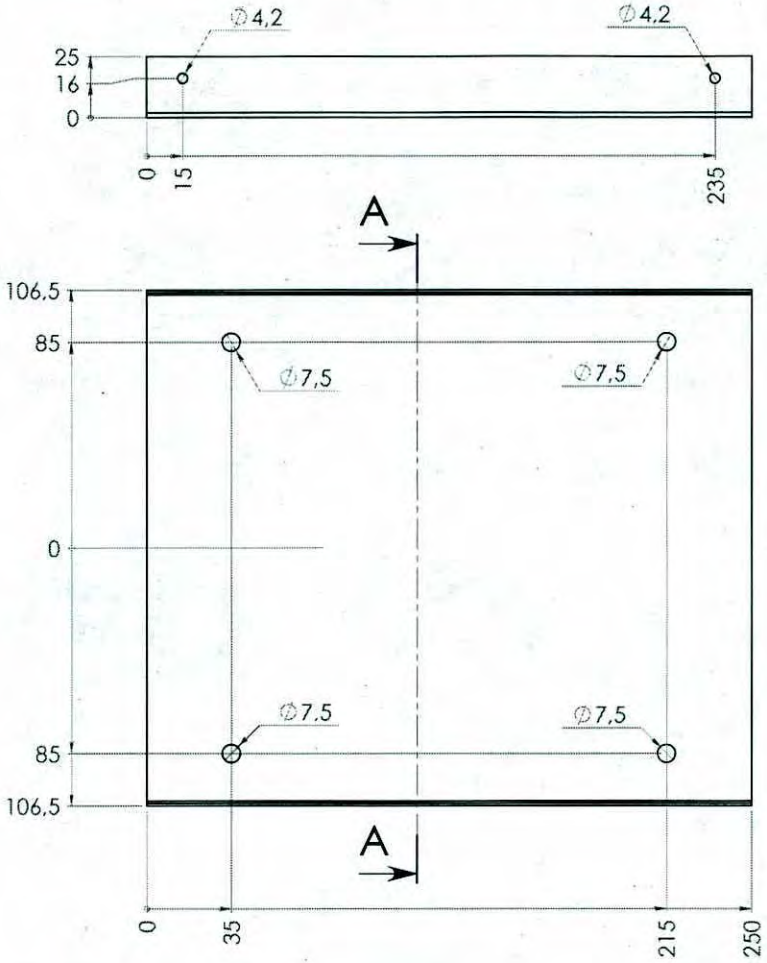


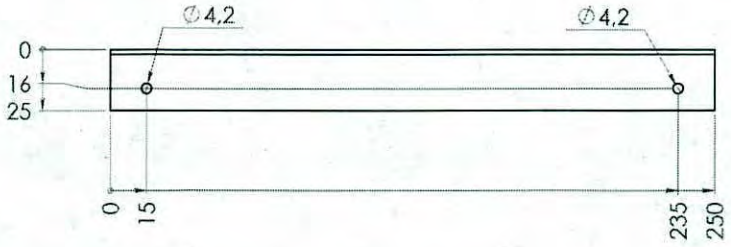
Rev.	Revisions	Sign.:	Date:

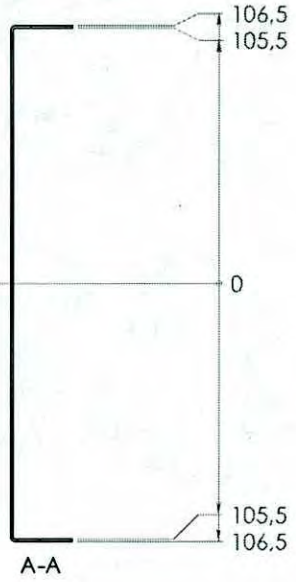
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Glas udv. side / Glass outer side / Morsø 7900	Construction:	RSV 2011.09.09
		Released:	RSV 15.08.2012
Material: Ceramic Glass		Format:	A2
Weight kg.: 0.906		Scale:	1:1
Model no.: -		Itemno.:	79790200
Drawingtype: Product drawing	morsø	Drawing no.:	7900-02 a
Location of file:			

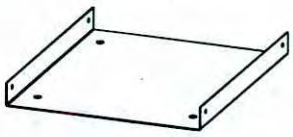


Glas front
Glass front
Morsø 7900
morsø
Material: Ceramic Glass
Drawing type: Product drawing
Construction
Released
Format: A1
Scale: 1:1
Item no.: 79790100
Drawing no.: 7900-01 a
328
R238
R243
67,4
5
321,3
425

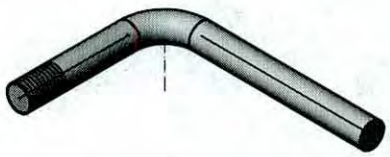


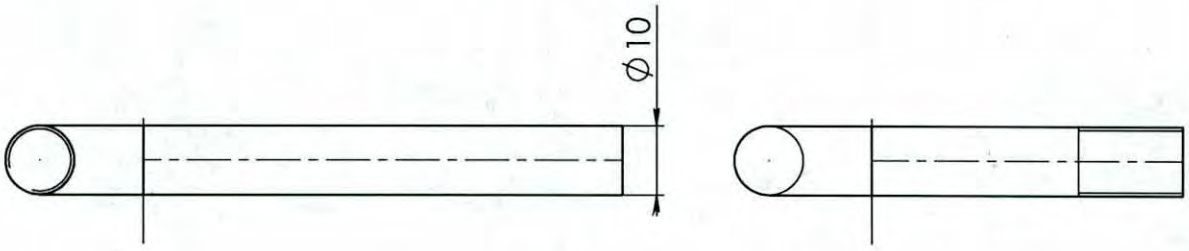


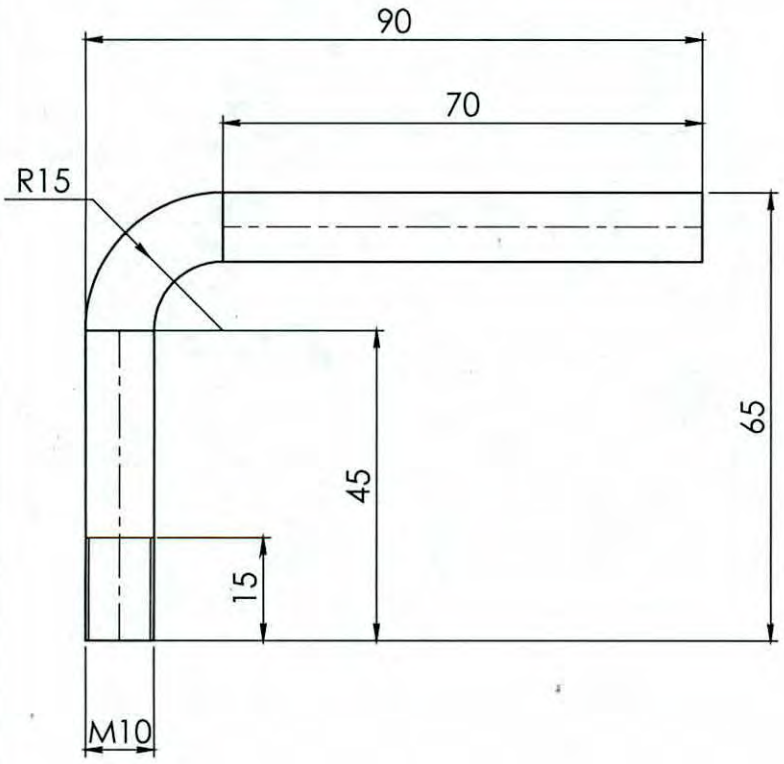




		Rev.	Revisions	Sign.:	Date:
		Title:	Mont.plade f. skuffesektion 7600	Construction: KDU	06.03.08
Mål uden toleranceangivelse i.h.t. DS/ISO 2768-1 m				Released: KDU	07.07.08
Material:	SPD Plade			Format:	A3
Weight:	0,5 kg			Scale:	1:2
Model no.	-		Morsø 7600	Itemno.:	71760900
Drawingtype:	Emnetegning			Drawing no.:	7600-62 a
Location of file:	C:\uDV\tegninger\7600\7600-62 Mont.plade f. skuffesektion 7600.SLDPRT		morsø		

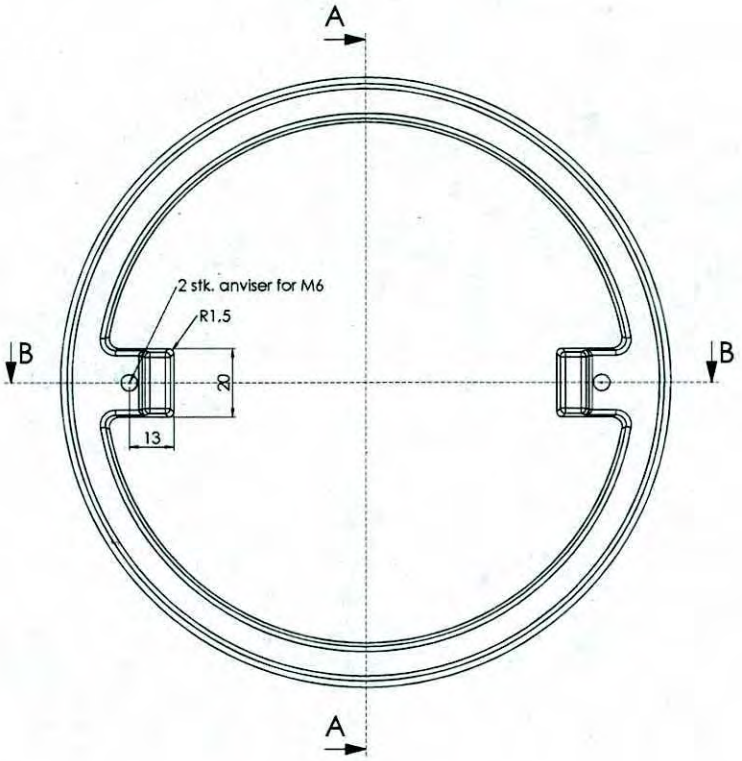


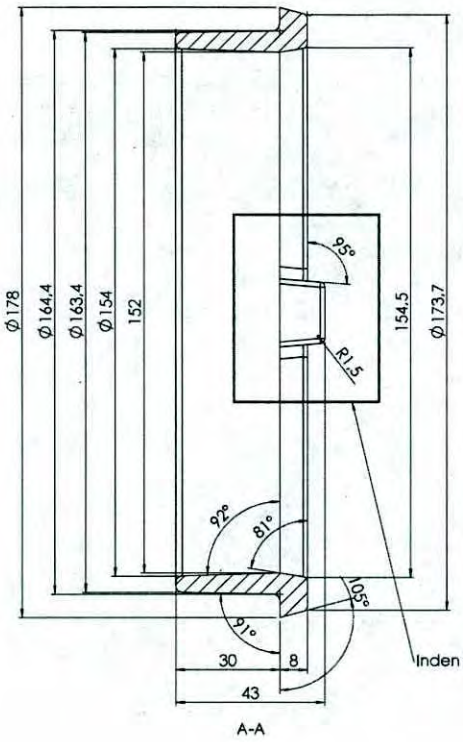


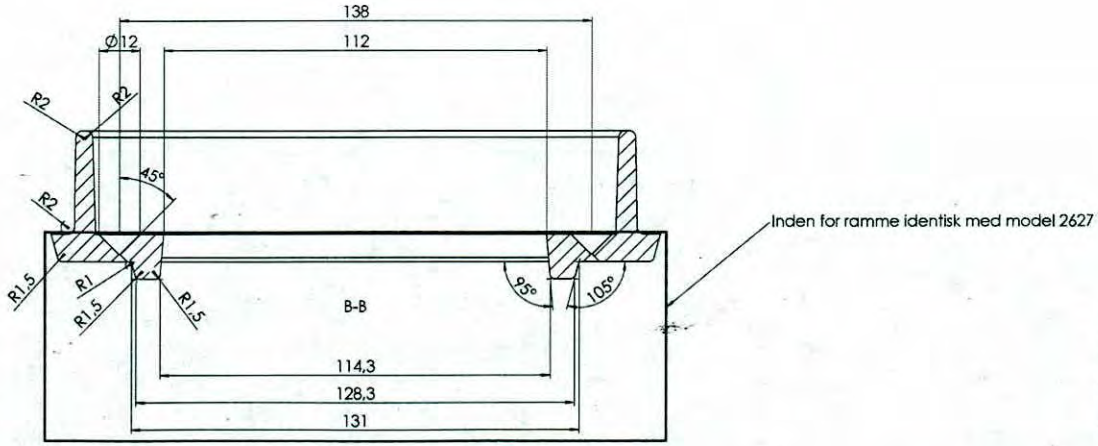


			Rev.	Revisions		Sign.:	Date:
				Title:	Construction:	RSV	17.01.11
Dim. without indication of margin acc. to DS/ISO 2768-1 m				**Varmeakk. håndtag**	Released:	RSV	2011.02.11
Material:	DIN 931			**Heat acc. handle**	Format:	A4	
Weight kg.:	0.086				Scale:	1:1	
Model no.				**Morsø 6100**	Itemno.:	79612400	
Drawingtype:	Product Drawing				Drawing no.:		
Location of file:	U:\udv\Tegninger\6100\6100-167 Varmeakk. håndtag.SLDPRT			morsø		6100-167 a	

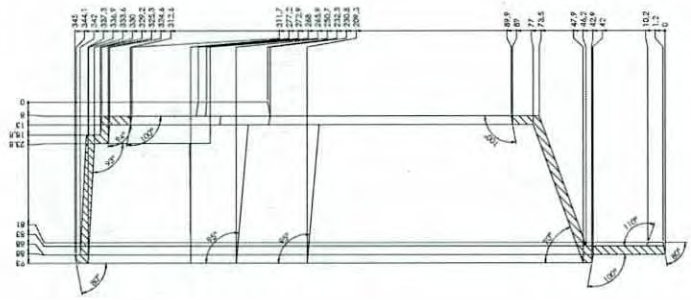
Date of print: 14-02-2011

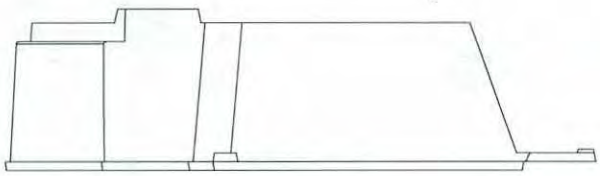


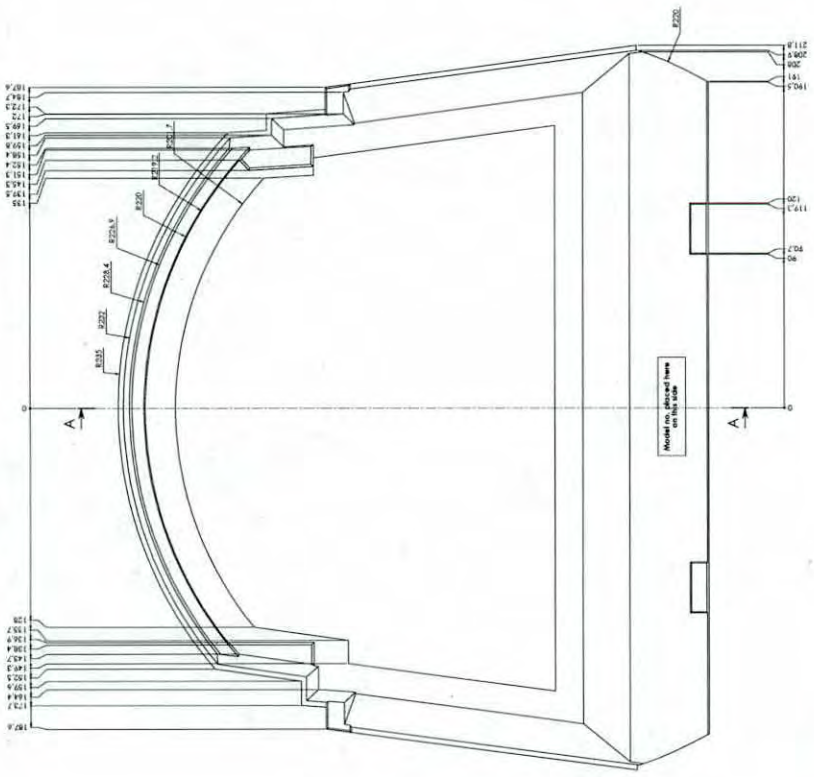


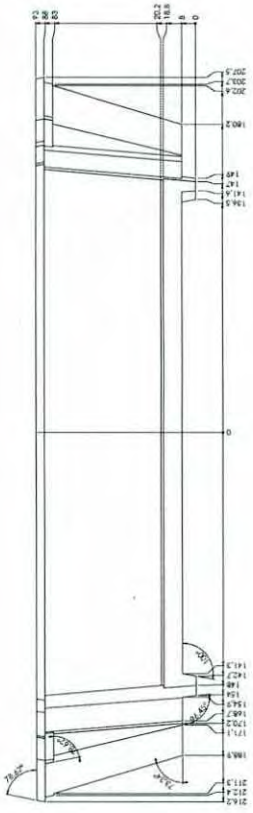


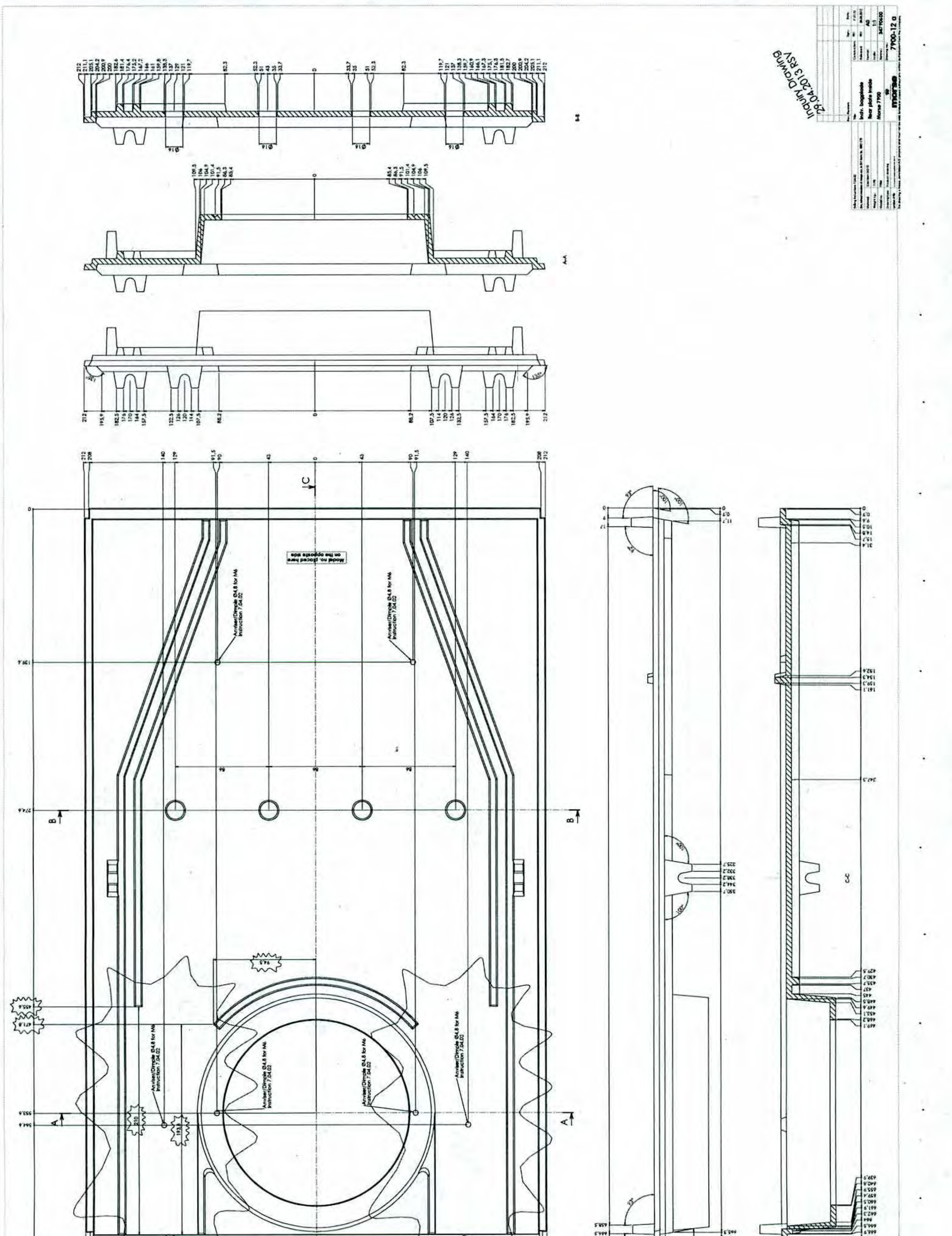
				Rev.	Revisionstekst:	Sign.:	Dato:
Materiale:	GG15			Titel:		Konstr.:	RSV 13.12.2000
Vægt:	0,978 kg	Bearbejdes:			**Røgtud USA**	Frigivet:	RSV 21.08.2001
Overfladebeh.:			m²			Tegn.format:	A2
Måltolerance:	Mål uden toleranceangivelse ISO-norm nr. 8062 CT8					Målforhold:	1:1
Ruhedstolerance:					**Morsø 3400**	Varenr.:	34344100
Værktøjsnr.:	Modelnr.: 3441				morsø	Tegningsnr.:	**3400-97 a**
Tegningstype:	Slebetegning						

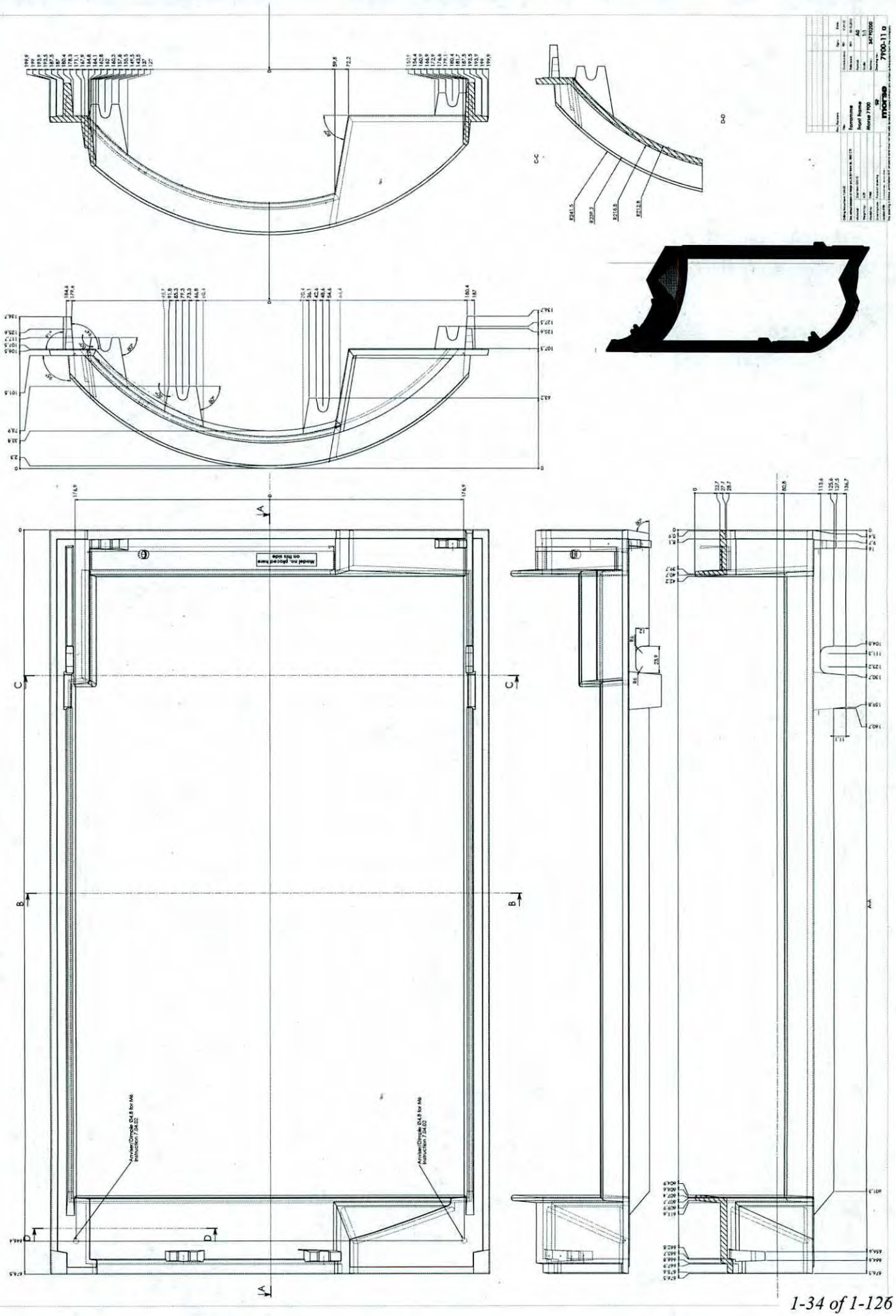


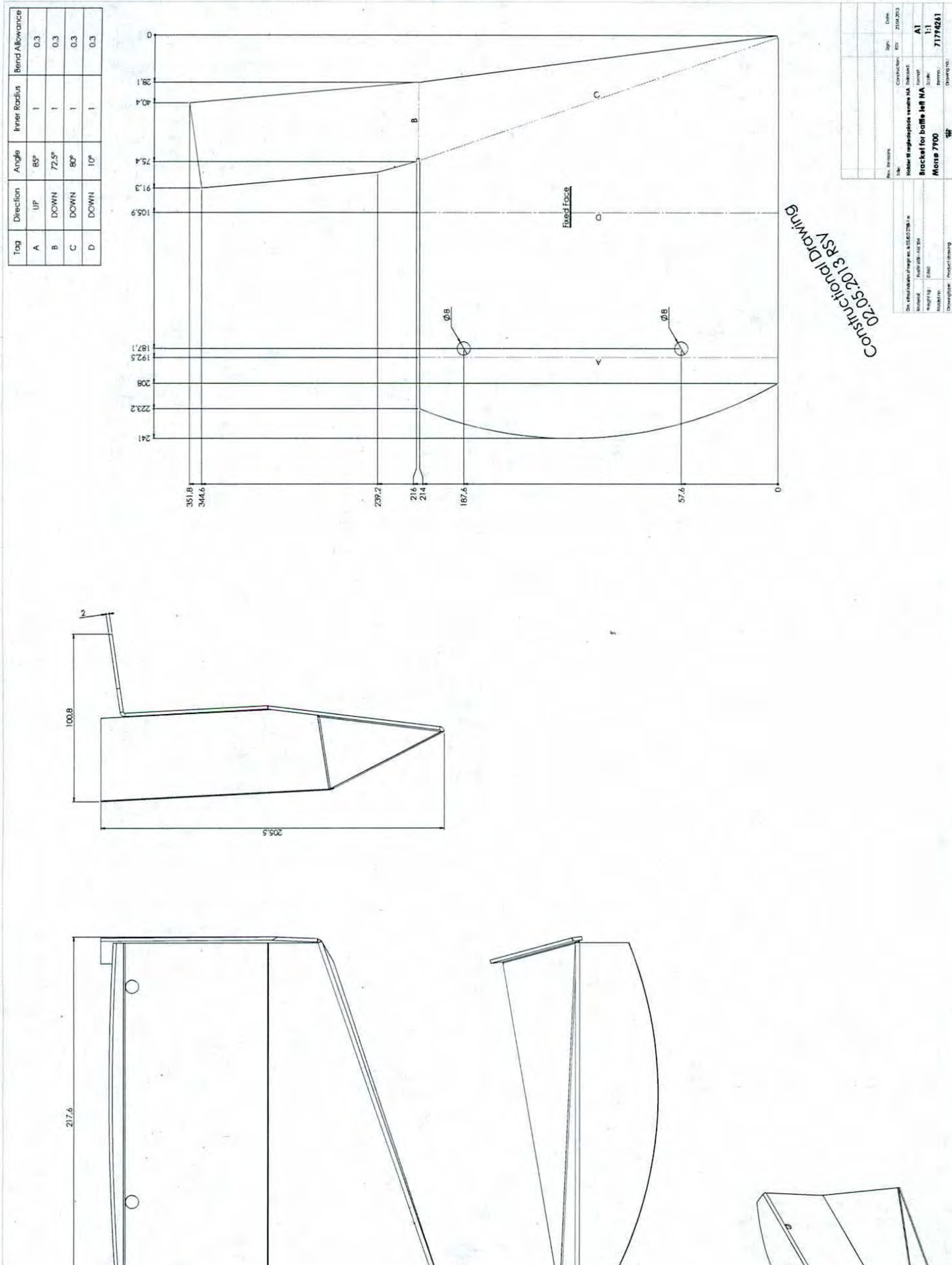



Model no. placed here on this side



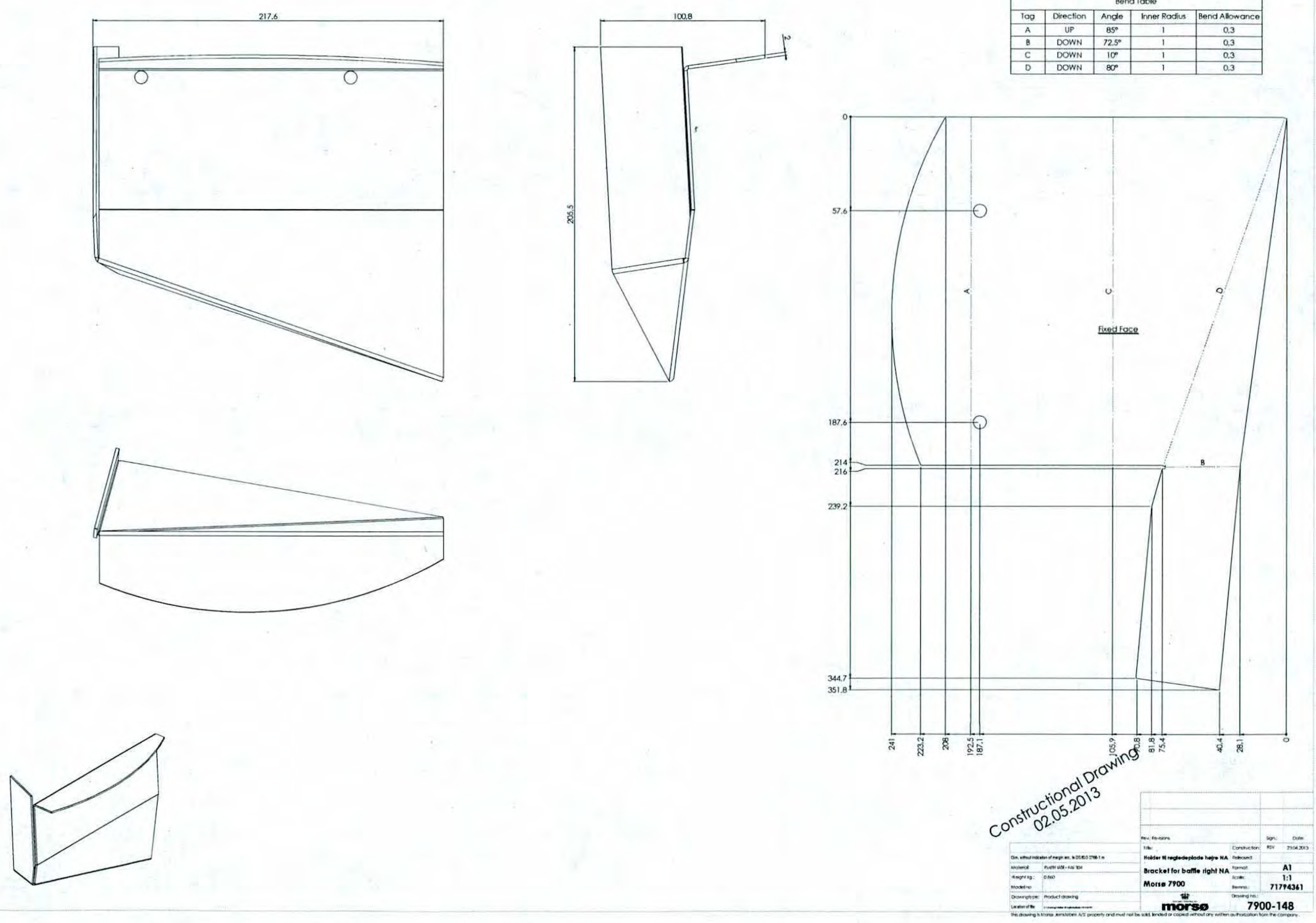

Inquiry Drawing
29.04.2013 RSV
7900-12 a
Model no. placed here on the opposite side

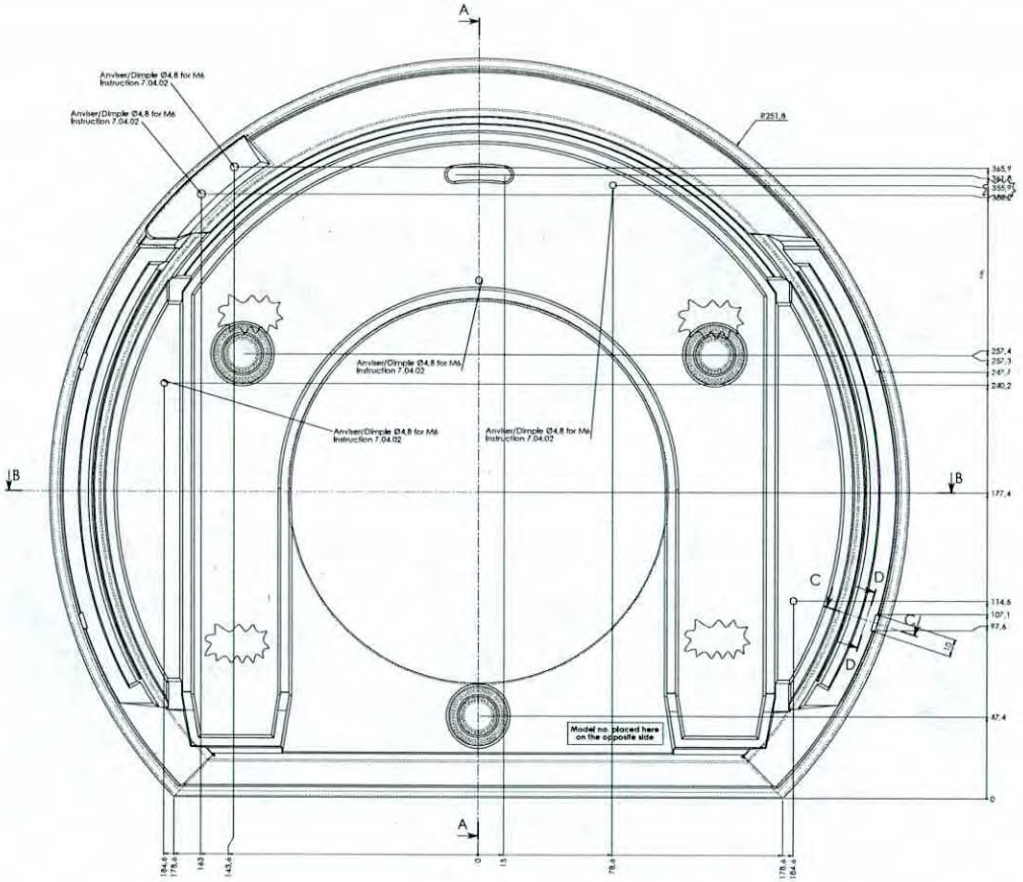

Model no. placed here on this side
Anvisir/Dimple Ø4.8 for Mi Instruction / 34.02
Anvisir/Dimple Ø4.8 for Mi Instruction / 34.02
7700-11 a
Front frame
Monse 7700

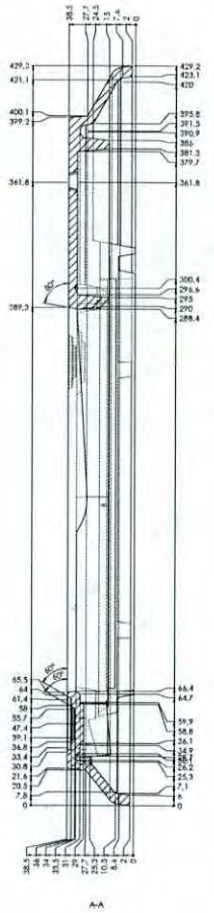


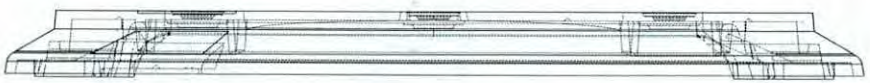
Tag	Direction	Angle	Inner Radius	Bend Allowance
A	UP	85°	1	0.3
B	DOWN	72.5°	1	0.3
C	DOWN	80°	1	0.3
D	DOWN	10°	1	0.3

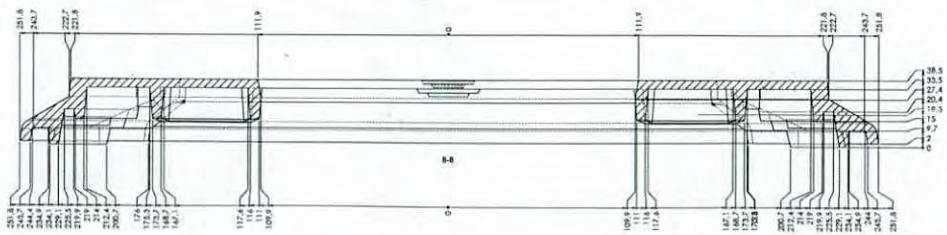
Bend Table				
Tag	Direction	Angle	Inner Radius	Bend Allowance
A	UP	85°	1	0,3
B	DOWN	72,5°	1	0,3
C	DOWN	10°	1	0,3
D	DOWN	80°	1	0,3





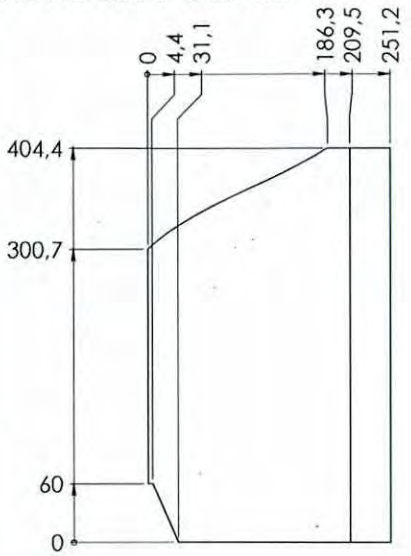


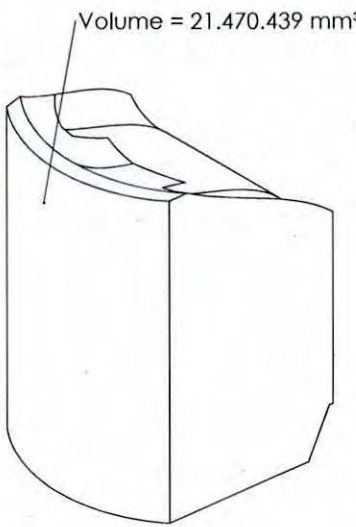


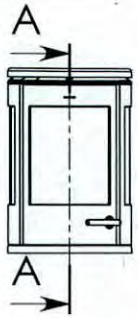


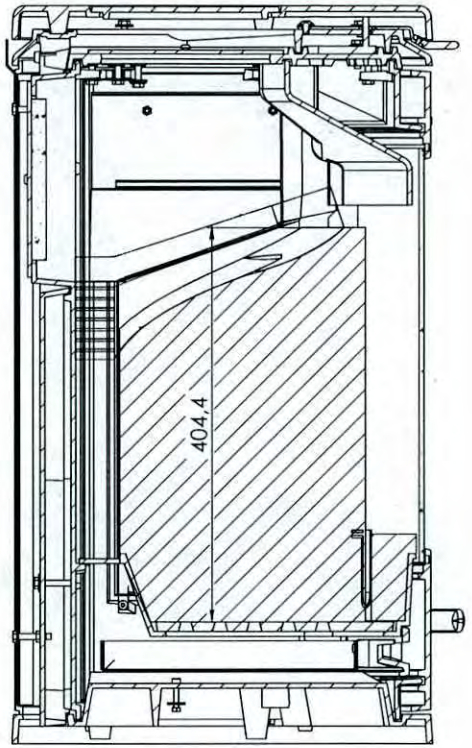
Title:	Topramme		
	Top frame	Format:	A0
	Morse 7900	Scale:	1:1
		Item no.:	34791000
	morse	Drawing no.:	7900-15 b

FIRE BOX VOLUME

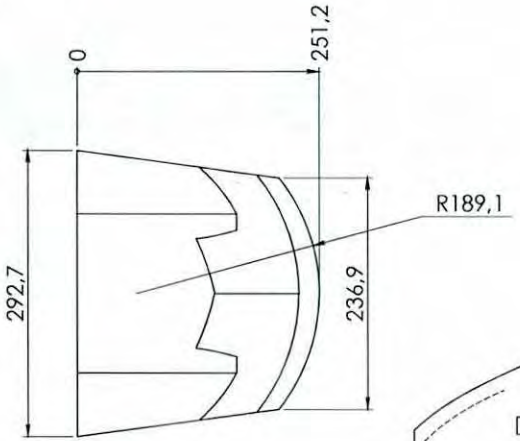








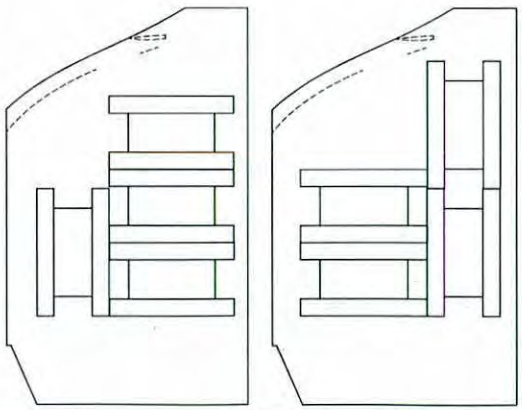
A-A



V = 21 470 439 mm³
= 0.758221 ft³

=> fuel load = 4.78 lb - 5.84 lb.

=> 4 pieces @ 8.5"



Rev.	Revisions	Sign.	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Brændkammervolume NA	Construction: RSV	04.02.2013
Material:	Fire Box Volume NA	Released:	
Weight kg:	Morsø 7900	Format:	A3
Model no.		Scale:	1:5
Drawingtype: Dimension drawing		Itemno.:	
Location of file:	morsø	Drawing no.:	7900-145 a

SKAMOL V-1100 (600) vermiculite insulating board

for back-up insulation up to 1100°C (2012°F)

skamol

Skamol A/S
Østergade 58-60
DK-7900 Nykøbing Mors
Denmark
Tel: +45 9772 1533
Fax: +45 9772 4975
insulation@skamol.dk

www.skamol.com

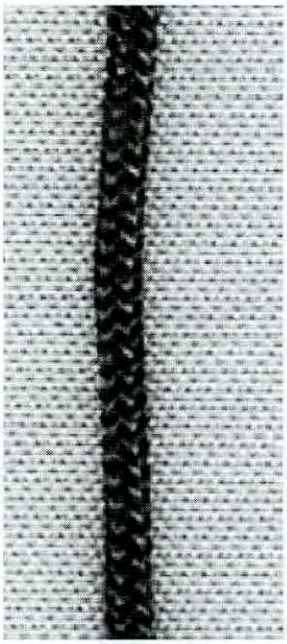
Grade		V-1100 (600)
Maximum service temperature		
	°C	1100
	°F	2012
Bulk density, dry (EN 1094-4)		
	kg/m^3	600
	lbs/cu.ft.	37.5
Compressive strength (EN 1094-5: 1995)		
@ room temperature	MPa	4.2
	lbs/sq.in.	609
Modulus of rupture (EN 993-6: 1995)		
	MPa	1.6
	lbs/sq.in.	232
Total porosity (EN 1094-4:1995)		
	%	76
Specific heat		
	kJ/(kg×K)	0.94
	BTU/(lb×°F)	0.224
Coefficient of reversible thermal expansion (BS 1902: section 5.3: 1990)		
@ 20°C-750°C (68°F-1382°F)	K^{-1}	$11x10^{-6}$
	$°F^{-1}$	$6.1x10^{-6}$
Resistance to thermal shock (EN 993-11: 1998)		
heating to 950°C (1742°F)	cycles	>30
Linear reheat shrinkage (EN 1094-6: 1999)		
12 h at 1000°C (1832°F)	%	1.0
12 h at 1100°C (2012°F)		-
Pyrometric cone equivalent (ASTM C24-89 ORTON cones)		
	°C	1300
	°F	2372
Thermal conductivity (ASTM C-182)		
mean temp. @ 200°C	W/(m×K)	0.16
@ 400°C		0.18
@ 600°C		0.20
@ 800°C		0.22
@ 392°F	BTU/(sq.ft.×h×°F/in)	1.11
@ 752°F		1.25
@ 1112°F		1.39
@ 1472°F		1.53
Chemical analysis, typical	%	
Silica	SiO_2	46
Titanium dioxide	TiO_2	0.7
Ferric oxide	Fe_2O_3	5.5
Alumina	Al_2O_3	7.0
Magnesium oxide	MgO	19
Calcium oxide	CaO	3.5
Sodium oxide	Na_2O	0.2
Potassium oxide	K_2O	10
Loss on ignition 1025°C (1877°F)	LOI	7.0
Colour		SAND
HS Tariff number		
(Harmonized Commodity Description and Coding System)		6806.90.00

Data are average results of tests conducted under standard procedures and are subject to variation. Data contained in this data sheet are supplied in good faith as a technical service and are subject to change without notice. Misprint and errors excepted.

October 2012

STEFFCA®
- vi vil kendes på den gode service

4108 - Ø 8mm Dark grey / Round



The basic material of 4108 consists of 6-9 microns texturised E-glass fibre yarns. The product is inorganic, sterile, incombustible, totally asbestos-free, and contains no toxins or heavy metals. 4108 is a knitted glass fibre packing without core, made of E-glass. It is a very stable packing because it is relatively heavy, and is therefore suited as stove door packing and suitable for fire tube sealing purposes.

Product info

Dimension	Ø 8mm
Length	100m
Material	E-Glass
Temperature	550°C
Colour	Coke
Application	Packing/ Sealing
Combustibility	Incombustible

STEFFCA A/S • Romsøvej 24 • DK-5800 Nyborg • A/S Reg-nr. 24 44 93 • CVR-nr. DK 20 76 85 09
Telefon +45 6531 3102 • Telefax +45 6531 8502
info@steffca.dk • www.steffca.dk • www.isocare.dk

STEFFCA®
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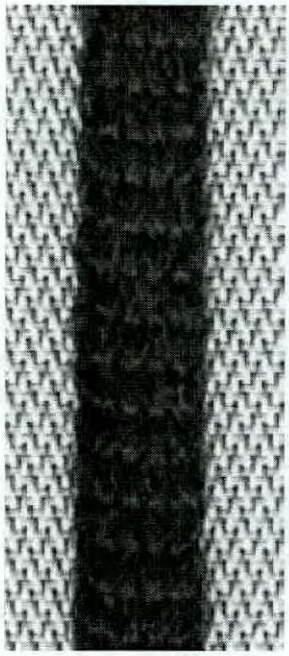
2608 - 8x3mm. Self-adhesive glass fibre tape



The basic material of 2608 consists of 6-9 micron texturised E-glass fibre yarns. The product is inorganic, sterile, incombustible, totally asbestos-free, and contains no toxins or heavy metals. 2608 is a knitted glass fibre tape. It has a big packing surface and minimum packing thickness which makes it ideal for packing of glass in ovens with limited space for round packings. The packing has double-sided adhesive for easy assembling.

Product info

Dimension	8x3mm
Length	100m
Material	E-Glass
Temperature	550°C
Colour	Black
Application	Packing/ Sealing
Combustibility	Incombustible

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STEFFCA®
- vi vil kendes på den gode service

5005 - Heat-stable silicone - red

5005 is an acetic thixotropic silicone that cures at contact with the humidity of air. This silicone is particularly developed to withstand temperatures up to 350°C.

Product info

Quantity	300ml
Material	Silicone
Temperature	270°C. - temporary 300°C
Colour	Red
Application	Sealing/Glueing
Combustibility	Incombustible

STEFFCA A/S • Romsøvej 24 • DK-5800 Nyborg • A/S Reg-nr. 24 44 93 • CVR-nr. DK 20 76 85 09
Telefon +45 6531 3102 • Telefax +45 6531 8502
info@steffca.dk • www.steffca.dk • www.isocare.dk

SKAMOL VIP-12

for back-up insulation up to 1100 °C (2012 °F)

skamol

Skamol A/S
Østergade 58-60
DK-7900 Nykøbing Mors
Denmark
Tel: +45 9772 1533
Fax: +45 9772 4975
insulation@skamol.dk

www.skamol.com

Maximum service temperature (PrEN 14306:2002)		
	°C	1100
	°F	2012
Bulk density, dry (EN 1094-4)		
	kg/m^3	1200
	lbs/cu.ft.	75
Compressive strength (EN 1094-5: 1995)		
@ room temperature	MPa	9.5
	lbs/sq.in.	1378
Modulus of rupture (EN 993-7:1998)		
	MPa	2.5
	lbs/sq.in.	363
Total porosity (EN 1094-4: 1995)		
	%	56
Specific heat		
	kJ/(kg×K)	1.0
	BTU/(lb×°F)	0.24
Coefficient of reversible thermal expansion (BS 1902: section 5.3: 1990)		
@ 20°C-750°C (68°F-1382°F)	K^{-1}	$10x10^{-6}$
	$°F^{-1}$	$5.6x10^{-6}$
Linear reheat shrinkage (EN 1094-6: 1999)		
12 h at 1000°C (1832°F)	%	1.0
Pyrometric cone equivalent (ASTM C24-89 ORTON cones)		
	°C	1330
	°F	2426
Thermal conductivity (ASTM C-182)		
mean temp. @ 200°C	W/(m×K)	0.25
@ 400°C		0.27
@ 600°C		0.29
@ 800°C		0.30
@ 392°F	BTU/(sq.ft.×h×°F/in)	1.73
@ 752°F		1.87
@ 1112°F		2.01
@ 1472°F		2.08
Chemical analysis, typical	%	
Silica	SiO_2	52
Titanium dioxide	TiO_2	1.6
Ferric oxide	Fe_2O_3	3.8
Alumina	Al_2O_3	23
Magnesium oxide	MgO	8.9
Calcium oxide	CaO	1.5
Sodium oxide	Na_2O	0.2
Potassium oxide	K_2O	5.6
Loss on ignition 1025°C (1877°F)	LOI	3.0
Colour		SAND
HS Tariff number		
(Harmonized Commodity Description and Coding System)		6806.90.00

Data are average results of tests conducted under standard procedures and are subject to variation. Data contained in this data sheet are supplied in good faith as a technical service and are subject to change without notice. Misprint and errors excepted.

October 2012

2. Technical Features

2.1 General Remarks

All data stated in this technical delivery specification are to be seen as guideline values.

Those values, for which no generally valid measuring method exist or which are not generally defined (e.g. by a technical standard), are specified and explained.

2.2 Appearance

- Transparent, slightly coloured due to the material composition and production process
- Surface appearance: plane, slightly textured due to the production process

2.3 Mechanical Characteristics

2.3.1 Density

ρ	approx. 2.6 g / cm^3

2.3.2 Modulus of Elasticity

E	approx. 93 × 10^3 MPa

2.3.3 Poisson's Ratio

μ	approx. 0.25

2.3.4 Bending Strength

The bending strength testing is to be accomplished according to DIN EN 1288 part 5 (R45).

$\overline{\sigma}_{bB}$	approx. 35 MPa

2.3.5 Impact Resistance

The impact resistance of ROBAX® depends on the kind of installation, the size and thickness of the panel, the kind of impact, the geometry of the panel and especially here on the drilled holes and their position on the ROBAX® panel.

Therefore information regarding the impact resistance can only be given with knowledge of the respective application (especially in combination with the technical standards regarding impact resistance that have to be met for single applications). Corresponding guideline values on request.

2.4 Thermal Characteristics

2.4.1 Coefficient of Mean Linear Expansion

$\alpha_{(20-700°C)}$ $(0 \pm 0.5) \times 10^{-6}$ /K

2.4.2 Mean Specific Thermal Capacity

$c_{p(20-100°C)}$ approx. 0.8×10^{3} J / (kg · K)

2.4.3 Thermal Conductivity

$\lambda_{(90°C)}$ approx. 1.6 W / (m · K)

2.4.4 Resistance to Temperature Differences (RTD)

Resistance of the panel to temperature differences between heated zone and cold panel edge (room temperature).

No cracking due to thermal stress at $T_{es,\,max}$ [1)] ≤ 700°C

2.4.5 Thermal Shock Resistance

Resistance of the panel to thermal shock when the hot panel is quenched with cold water (room temperature).

No cracking due to thermal stress at $T_{es,\,max}$ [1)] ≤ 700°C

2.4.6 Temperature / Time Load Capacity (under consideration of items 2.4.4 and 2.4.5)

The temperature / time load capacity specifies the maximum permissible temperature for given load times for the fireplace panels, below which no cracking due to thermal stress occurs.

The value pairs specified in the following table 2.1 are relevant to the practical use of the glass ceramic material as fireplace panel. The temperature values refer to the hottest point on the exterior side of the panel ($T_{es,\,max}$) because this temperature can be measured more easily and more reliably.

[1)] $T_{es,\,max}$: Maximum temperature on the exterior side of the panel, that means the reverse side of the heat source, at the hottest point

SCHOTT
glass made of ideas

Load temperature $T_{es, max}$ [1)]	Load time
560°C (1040°F)	5000 hr
610°C (1130°F)	1000 hr
660°C (1220°F)	100 hr
710°C (1310°F)	10 hr
760°C (1400°F)	5 hr

Table 2.1: Temperature / time load capacity for ROBAX® panels

Note:

For ROBAX® fireplace panels the temperature / time load capacity specified in table 2.1 must be maintained. It must be ensured that this temperature / time load capacity is not exceeded during use, to prevent cracking due to thermal stress.

The temperature / time load data for even temperature distributions within an entire glass ceramic panel (e.g. homogeneous heating conditions in a testing furnace) are given in table 2.2. This data is to be seen purely as characteristic data for the glass ceramic material itself. It is not typical for use of the glass ceramic material as fireplace panels, which have a temperature distribution totally different from evenness. The temperatures refer to the homogeneous heating of the ROBAX® panel (T_{hom}).

Load temperature T_{hom} [2)]	Load time
700°C (1292°F)	6000 hr
750°C (1382°F)	750 hr
775°C (1427°F)	275 hr
800°C (1472°F)	100 hr
825°C (1517°F)	35 hr

Table 2.2: Temperature / time load capacity for uniformly heated ROBAX® panels

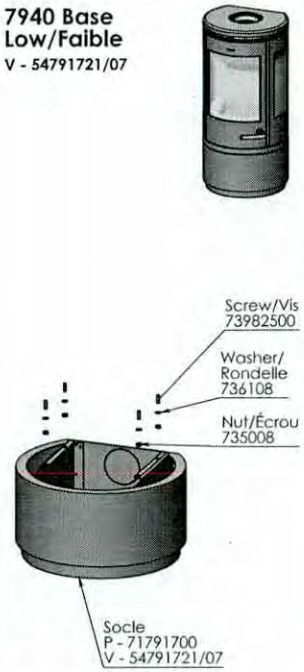
[1)] $T_{es, max}$: Maximum temperature on the exterior side of the panel, that means the reverse side of the heat source, at the hottest point

[2)] T_{hom}: Homogenous temperature, i.e. material temperature under homogeneous heating conditions

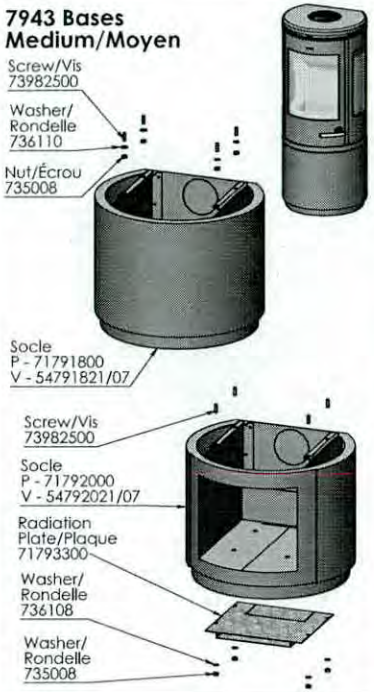
Engineering Drawings/Blueprints (Remainder)

7940 Base
Low/Faible

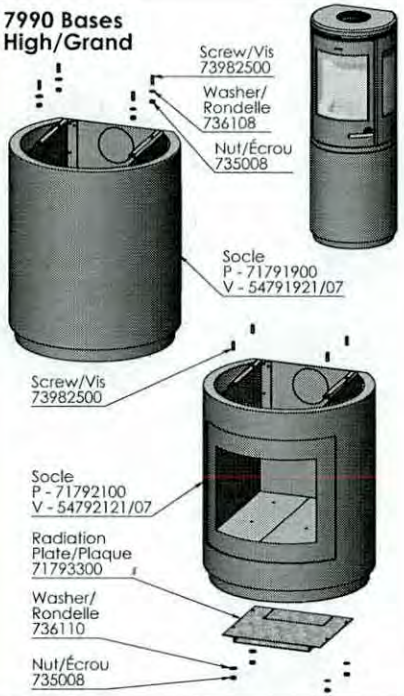
V - 54791721/07



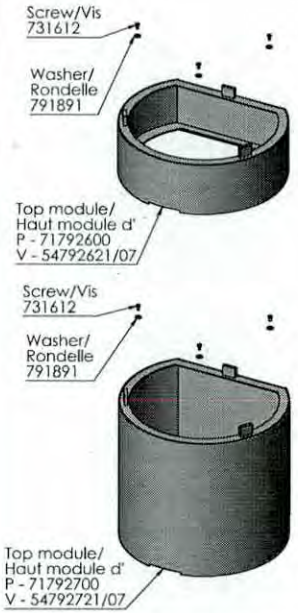
7943 Bases
Medium/Moyen



7990 Bases
High/Grand

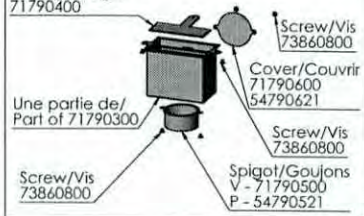


Option:
Top Modules



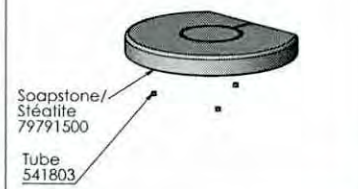
Option:
Box
Fresh Air/Air frais

V - 54793321/07



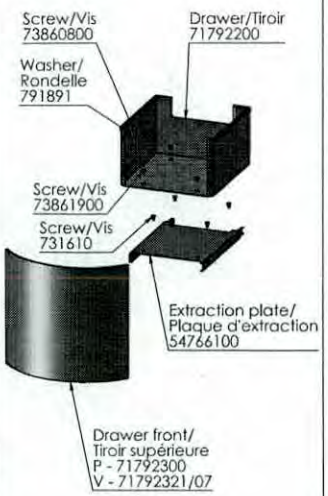
Option:
Soapstone/Stéatite

V - 79790600



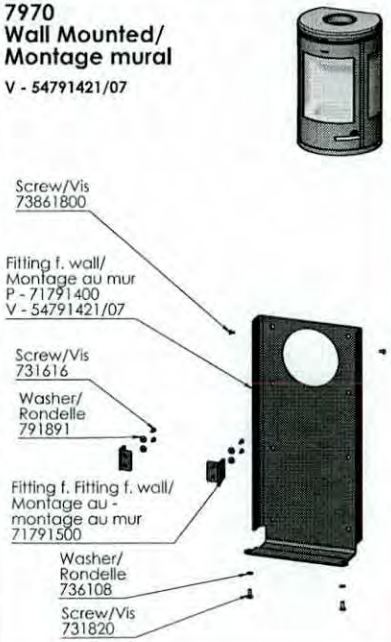
Option:
Drawer/Tiroir

V - 54792321/07



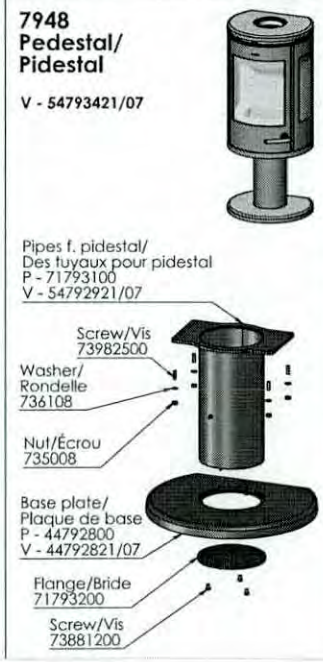
7970
Wall Mounted/
Montage mural

V - 54791421/07

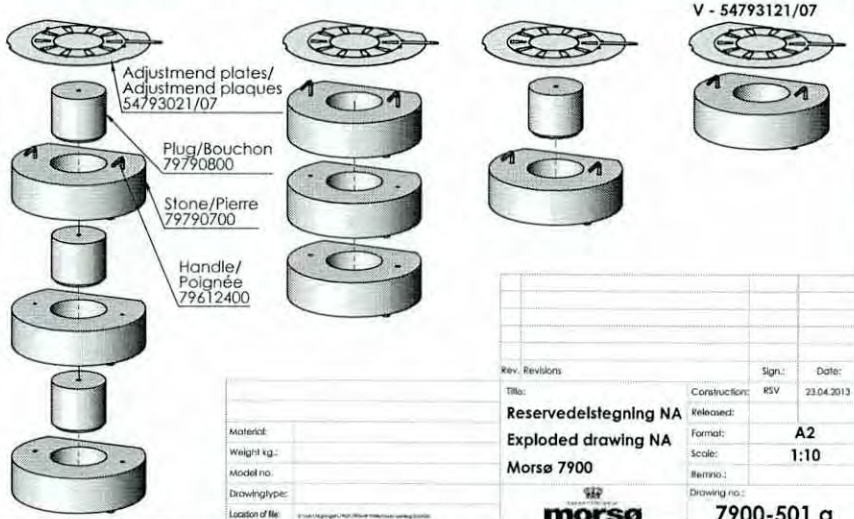


7948
Pedestal/
Pidestal

V - 54793421/07



Option:
Heat Storage/Accumulateur de chaleur



Rev. Revisions		Sign.:	Date:
Title:	Construction:	RSV	23.04.2013
Reservedelstegning NA	Released:		
Exploded drawing NA	Format:	**A2**	
Morsø 7900	Scale:	**1:10**	
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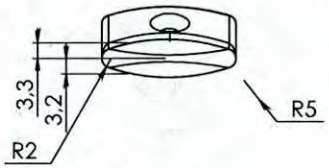
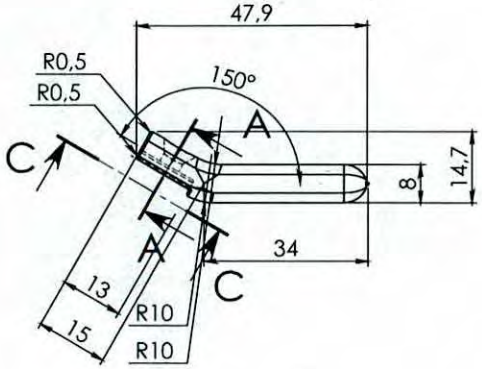
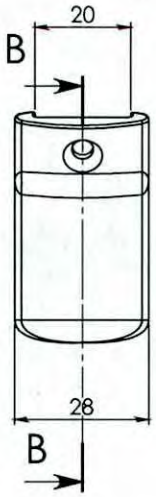
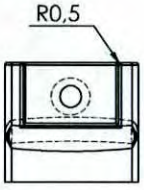
Material:	Drawing no.:		
Weight kg.:	**7900-501 a**		
Model no.:			
Drawingtype:			
Location of file:			

morsø

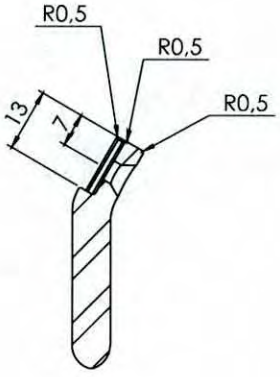




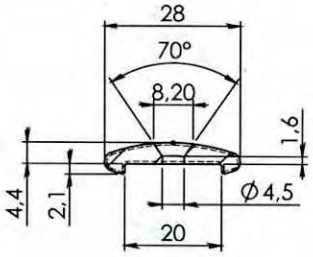




C-C



B-B

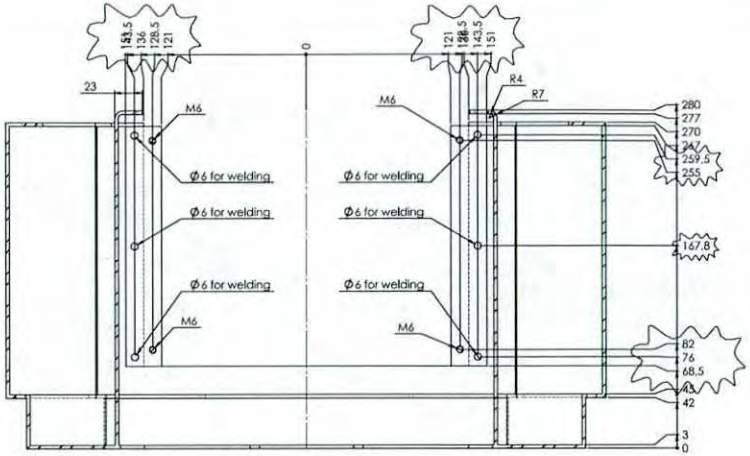


A-A

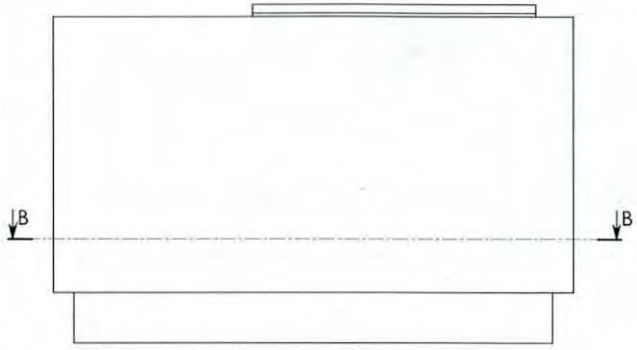
Rev.	Revisions	Sign.:	Date:

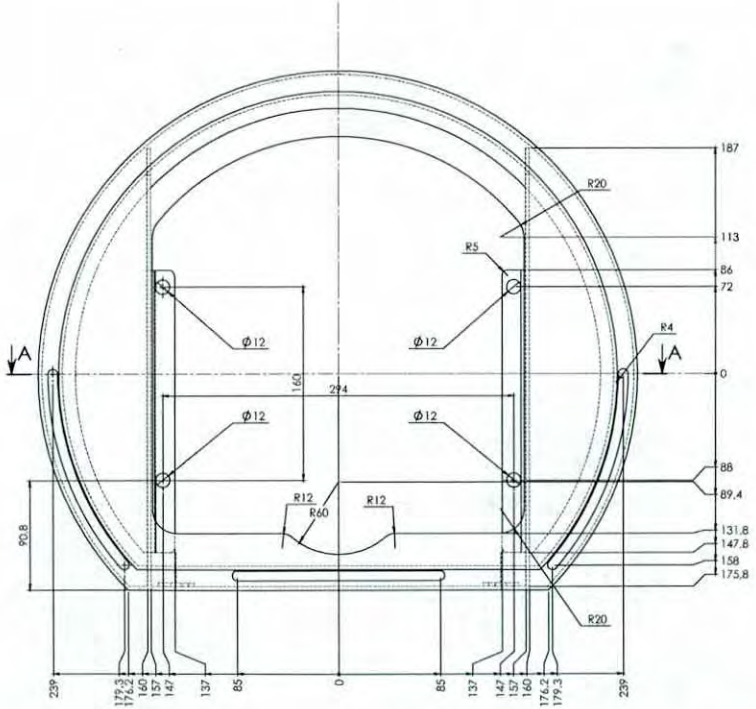
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: Reguleringshåndtag / Regulationhandle / Morsø 7900	Construction:	LAH 18.01.12
Material:	Rustfri stål - Aisi 304		Released:	RSV 15.08.2012
Weight kg:	0.06		Format:	A3
Model no.			Scale:	1:1
Drawingtype:	Product drawing		Itemno.:	75790261
Location of file:		morsø	Drawing no.:	7900-51 a

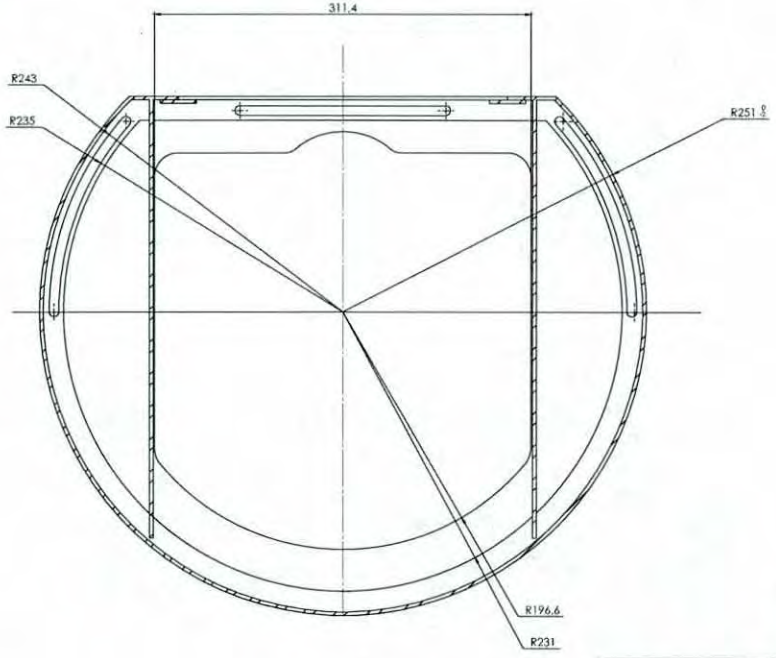
Date of print: 15-08-2012



A-A





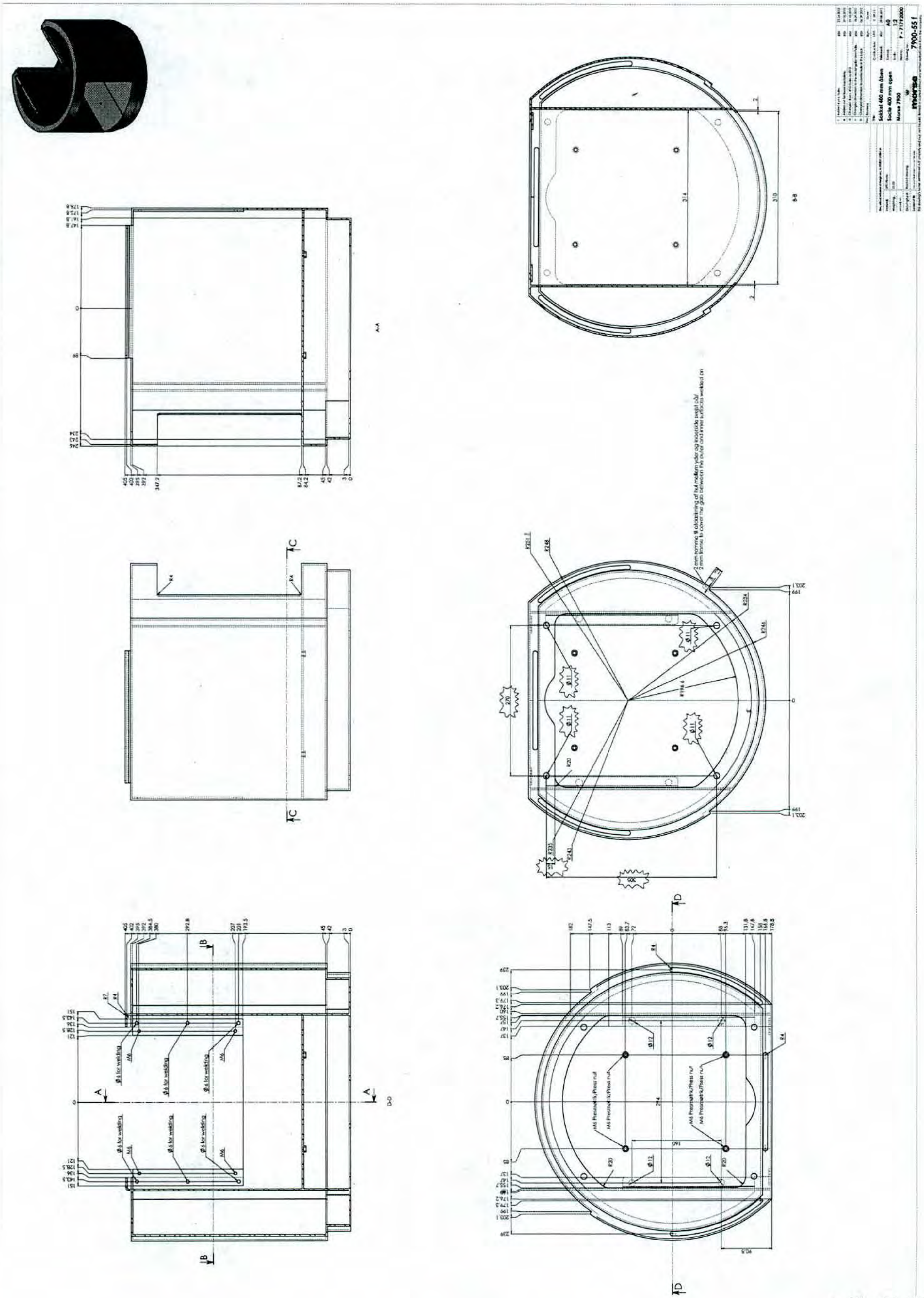


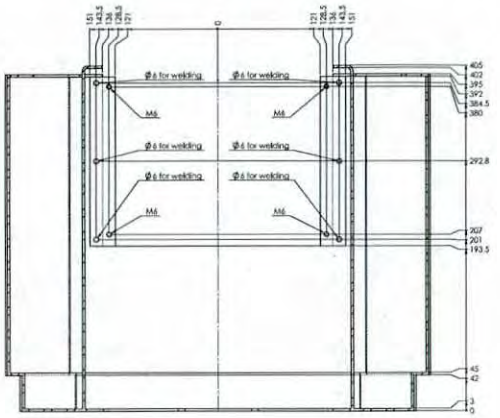
B-B

c	Added cut for the bone backplate.		RSV	27.02.2013
b	Changed the dimension to create hole in the back.		RSV	06.09.2012
Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	LAH	21.09.11
	Sokkel 275 mm	Released:	RSV	29.08.2012
	Socle 275 mm	Format:	A1	
	Morsø 7900	Scale:	1:2	
		Item no.:	P - 71791700	
	morsø	Drawing no.:	7900-54 c	

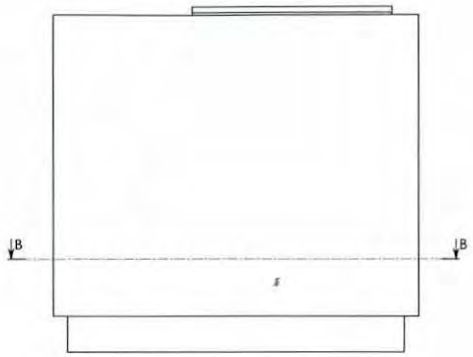
Det, without indication of merge acc. to DS/ISO 2768-1 m

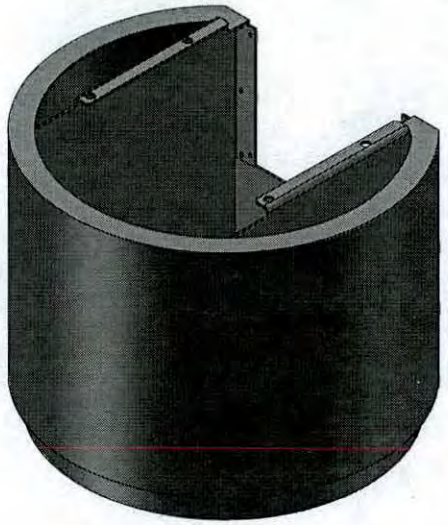
Material:	SPD Plate
Weight kg.:	15.60
Model no:	
Drawingtype:	Product drawing
Location of file:	

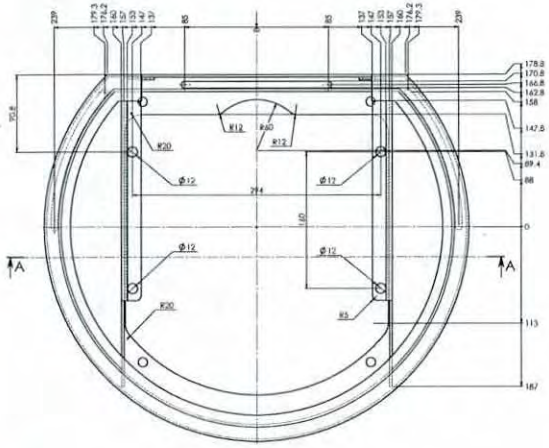


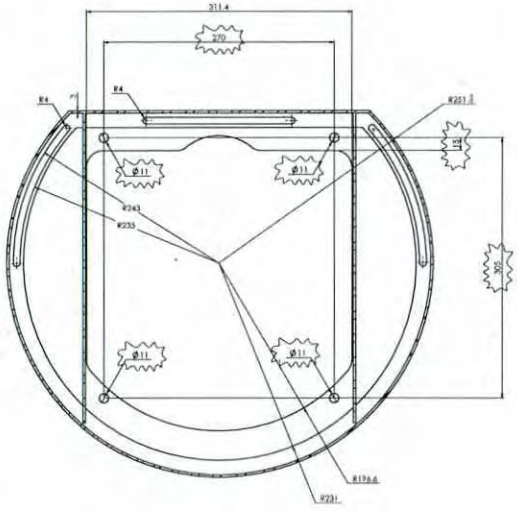


A-A



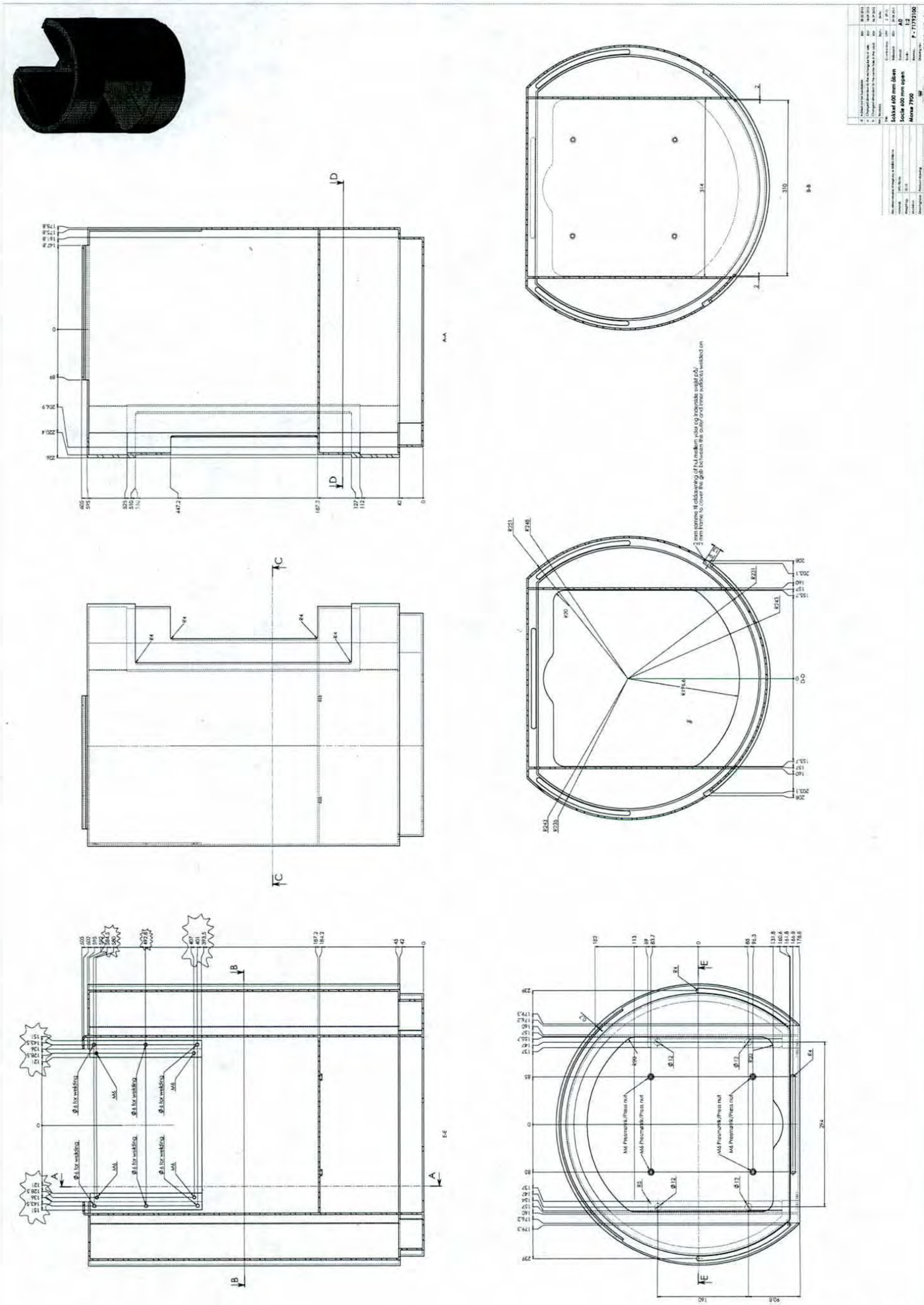


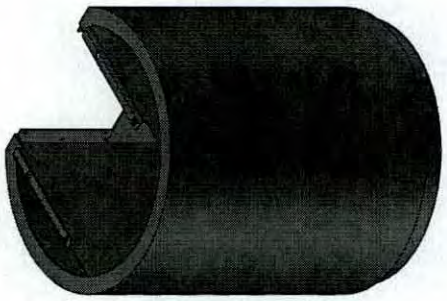


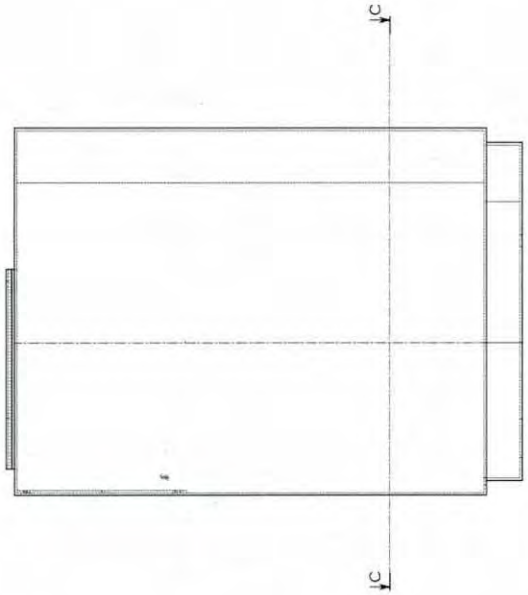


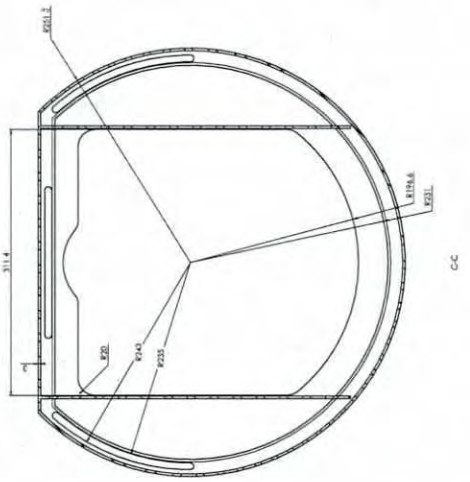
B-B

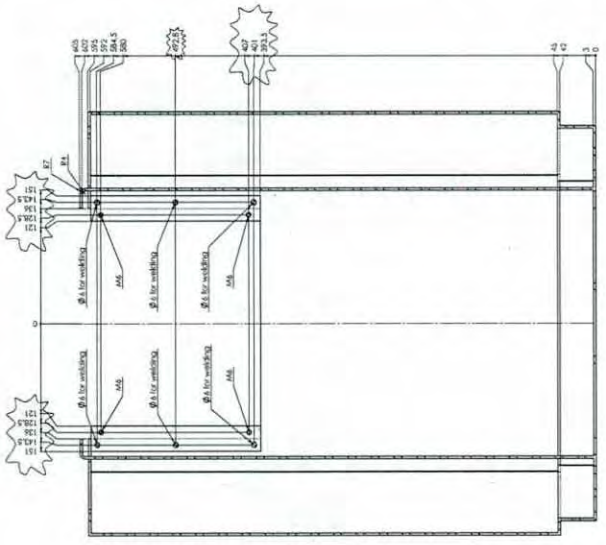
Sokkel 400 mm			
Socle 400 mm		A0	
Morse 7900		1:2	
morse		7900-56 d	

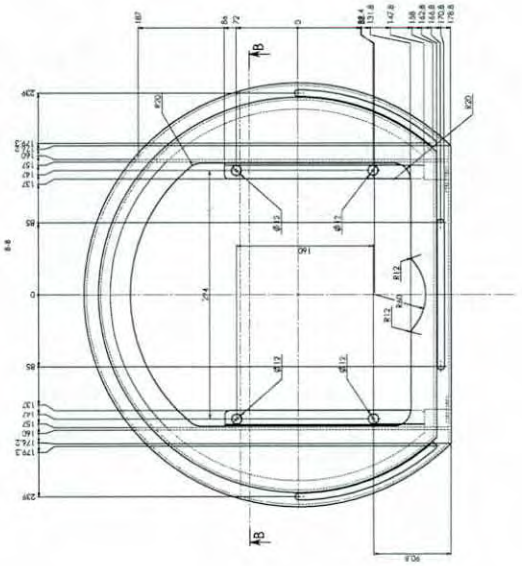

Sokkel 600 mm åben
Socle 600 mm open
Morsø 7900
7900-57 d

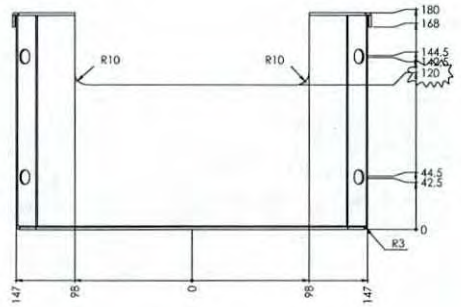


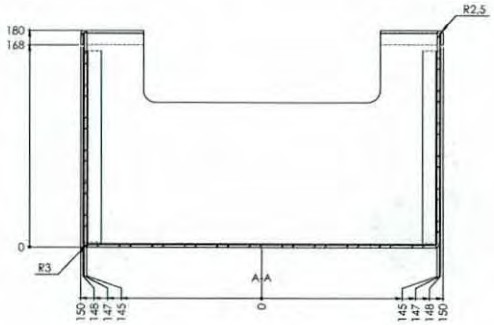


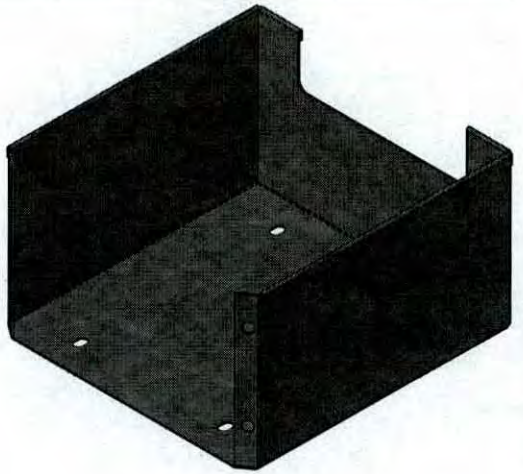


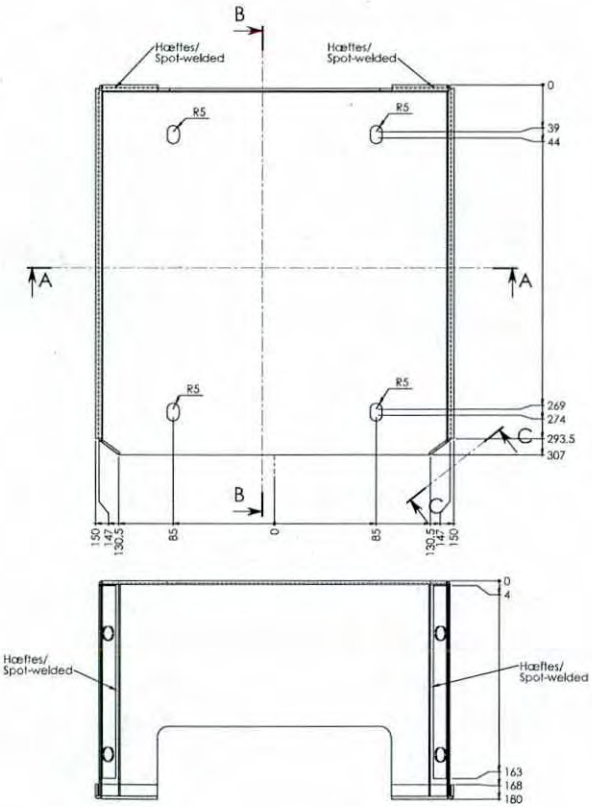


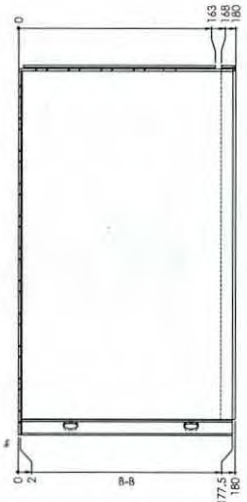


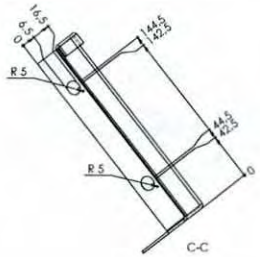












A	Modified cutout in the back.	PSV	06.09.2012
B	Added spot-welding.	PSV	14.08.2012
C	Modified width	PSV	13.06.2012
D	modified oval holes of the # 3, 5 to K9.	PSV	13.06.2012
Rev.	Revisions	Sign.	Date

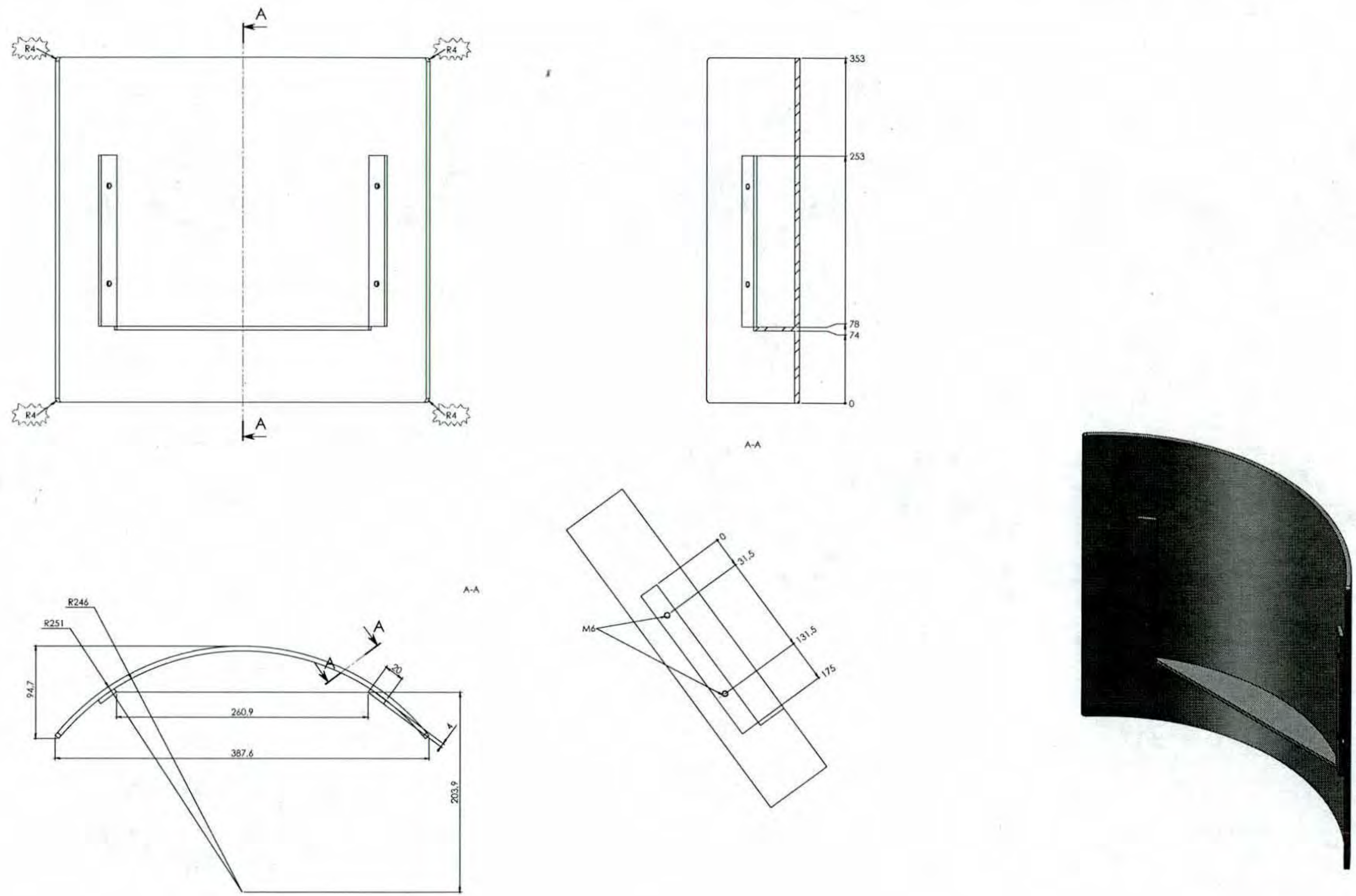
Size without indication of margin acc. to DS/ISO 7518-1 e

Material:	Galvanized plate
Weight kg:	3.94
Model no.:	-
Drawing type:	Product Drawing
Location of file:	

Title:	Skuffekasse sokler
	Drawbox socle
	Morsø 7900
Construction:	LAR 21-09.2011
Released:	PSV 06.06.2012
Format:	A1
Scale:	1:2
Item no.:	71792200
Drawing no.:	7900-59 e

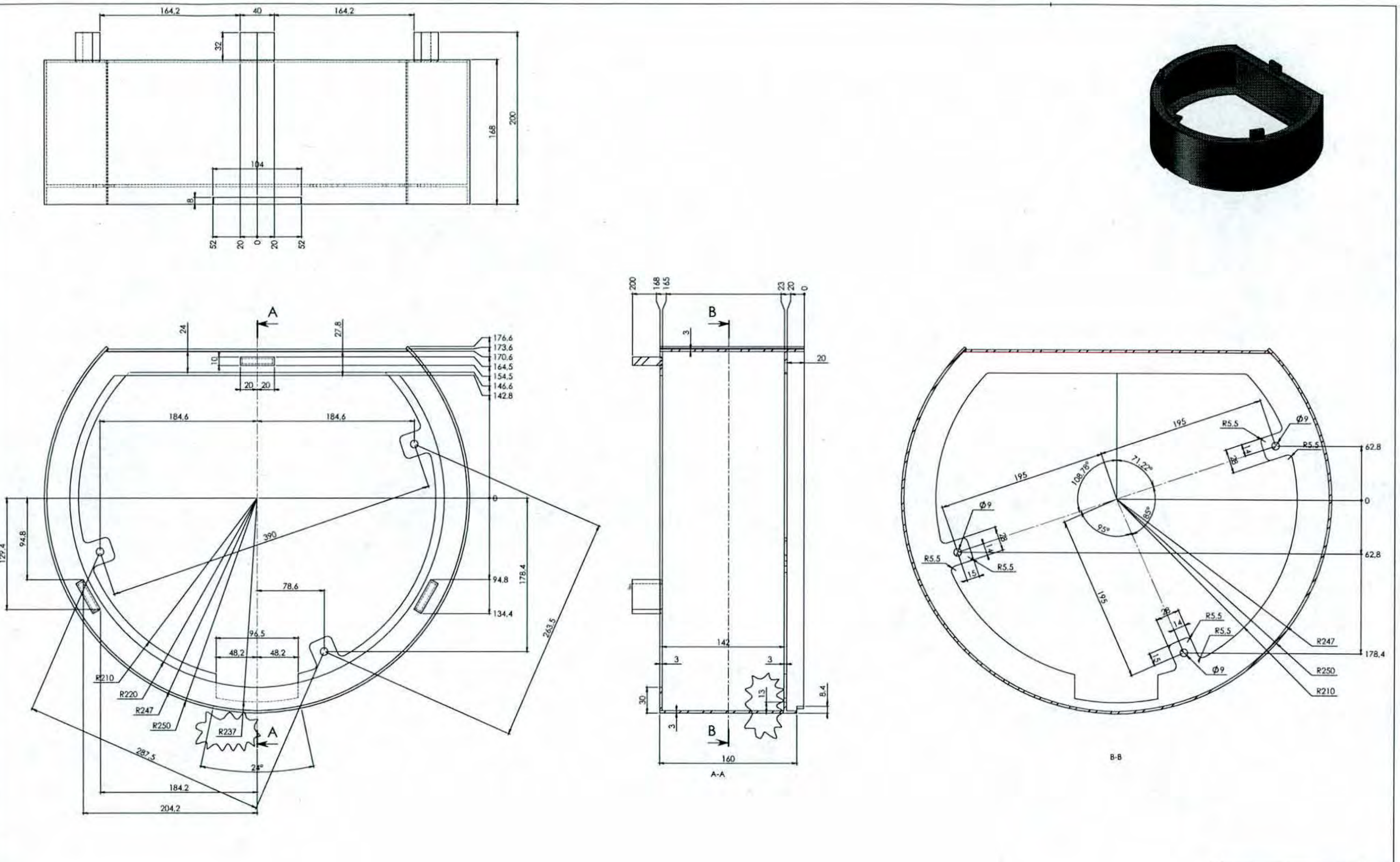
morsø

The drawing is Morsø Jernstøberi A/S' property and must not be sold, lended or copied without any written authorization from the company.

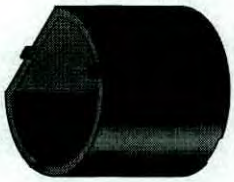


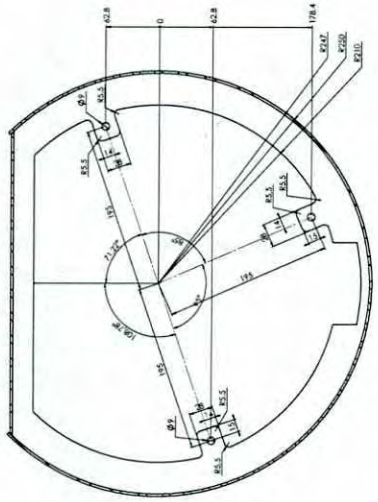
B	Changed corners to R4	RSV	08.06.2012
Rev.	Revisions	Sign.:	Date:
Title:	Construction:	LAH	25.11.11
Skuffe front	Released:	RSV	08.06.2012
Draw front	Format:	A1	
Morsø 7900	Scale:	1:2	
	Bomno.:	71792300	
morsø	Drawing no.:	7900-60 b	

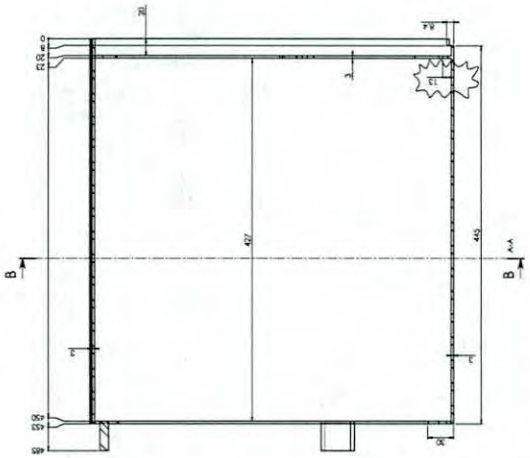
Dim. without indication of margin acc. to DS/ISO 2768-1 m	
Material:	SPD Plade
Weight kg.:	6.43
Model no.:	
Drawingtype:	Product drawing

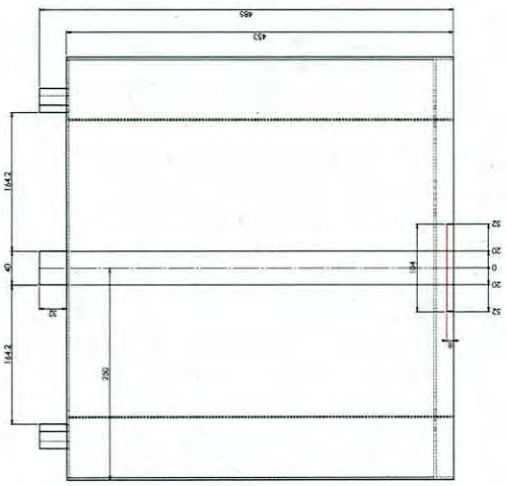


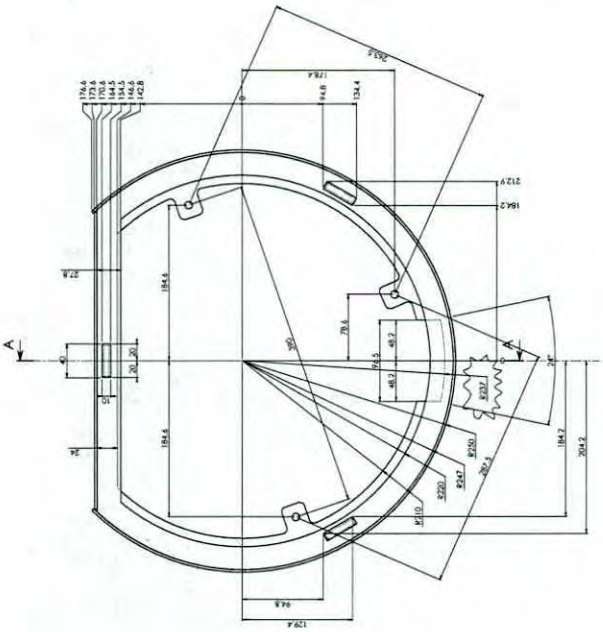
		Rev.	Revisions		Sign.:	Date:
		Title:		Construction:	LAH	25-11-2011
Material:	SPD Plade	Topmodul 190 mm glat		Released:	RSV	10.08.2012
Weight kg.:	8,16	Top module 190 mm straight		Format:	A1	
Model no.:	1406	Morsø 7900		Scale:	1:2	
Drawingtype:	Product drawing			Item no.:	71792600	
Location of file:		morsø		Drawing no.:	7900-63 a	

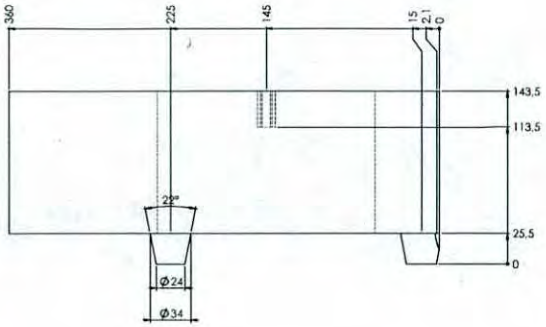


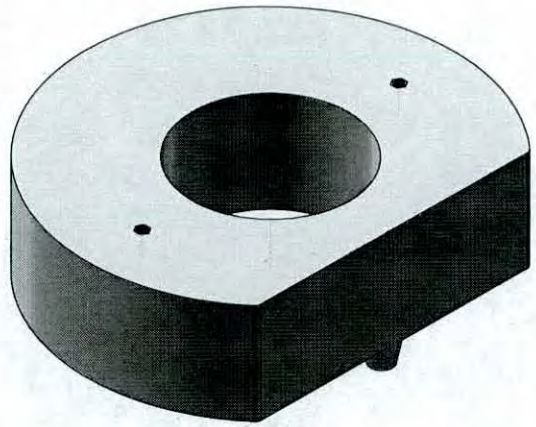


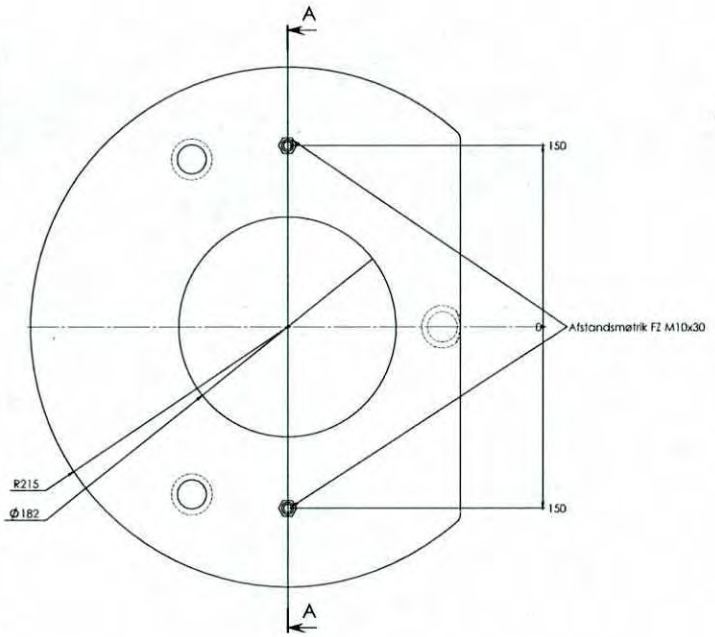


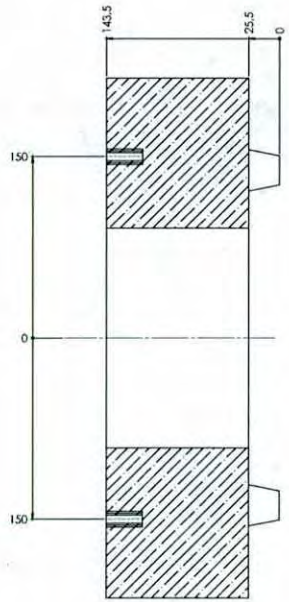








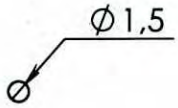


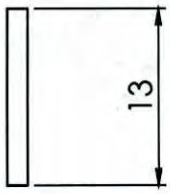


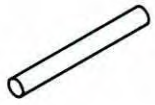
A-A

				Rev. Revisions	Sign.: Date:
				Title: Varmeakk. sten Heat acc. stone Morsø 7900	Construction: LAP 04.10.11 Released: RSV 09.08.2012 Format: A1 Scale: 1:2 Forms: 79790700
Material:	Beton/Concrete				
Weight kg.:	28.34 After drying: 27.5				
Model no.				morsø	Drawing no.: 7900-70 a
Drawingtype:	Product drawing				
Location of file:					

This drawing is Morsø Jernstøberi A/S' property and must not be sold, lended or copied without any written authorization from the company.







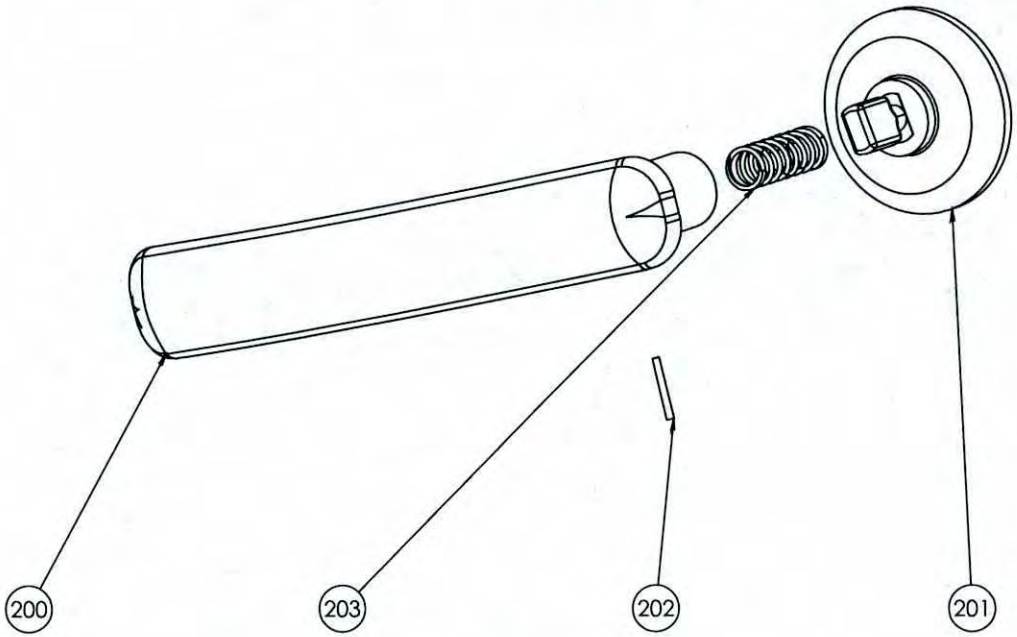
Constructional Drawing

Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: **Pin håndtag NA** **Pin handle NA** **Morsø 7900**	Construction:	LAH 10.04.2013
			Released:	
Material:	Material <not specified>		Format:	A4
Weight kg.:	0.02		Scale:	2:1
Model no.			Itemno.:	
Drawingtype:		morsø	Drawing no.:	7900-164
Location of file:	C:\Working\7900-164 Pin f. håndtag fyrdør 7900 NA.SLDPRT			

Date of print: 15-04-2013

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
200	7900-162 Håndtag fyrdør 7900 NA	Håndtag fyrdør NA	1
201	7900-163 Bøsn. f. håndtag 7900 NA	Fod håndtag NA	1
202	7900-164 Pin f. håndtag fyrdør 7900 NA	Pin håndtag NA	1
203	C03600381000S-Sodemann	Compression-Spring	1

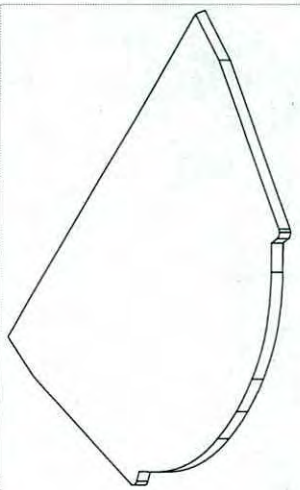


Constructional Drawing

Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Håndtag fyrdør NA Handle firedoor NA Morsø 7400	Construction:	LAH 10.04.2013
		Released:	
Material: ERROR!:materiale		Format:	A3
Weight kg: 403.98		Scale:	1:1
Model no.		Itemno.:	
Drawingtype:	morsø	Drawing no.:	7900-166
Location of file:			

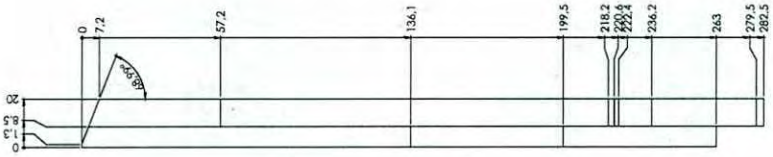
Date of print: 10-04-2013

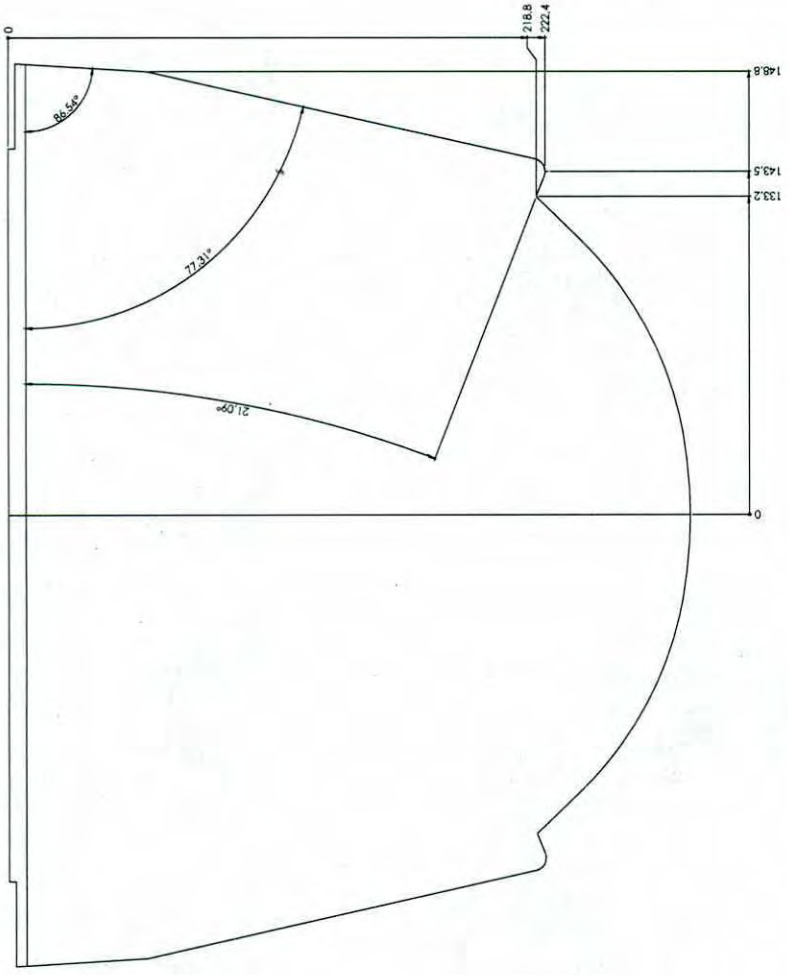


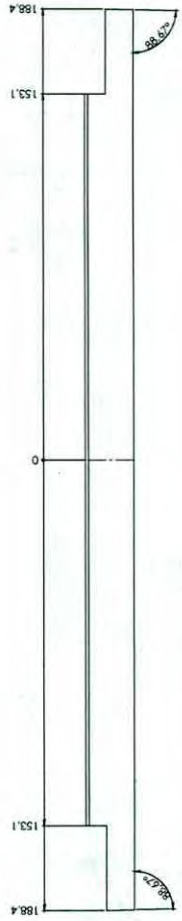
Constructional Drawing
02.05.2013

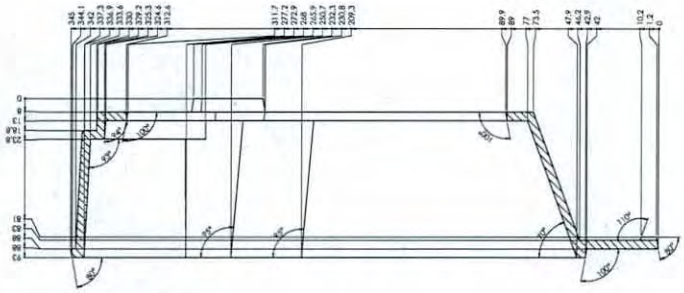
Rev	Revisions	Sign	Date
		EKV	02.05.2013

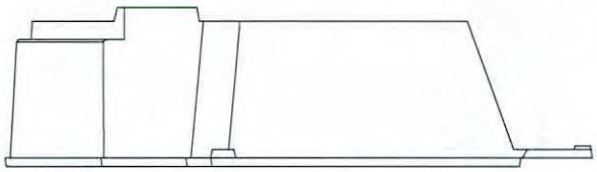
Title:	Vermiculite top til regle-dspl. NA
Construction:	Vermiculite top for bottle NA
Assembl:	
format:	A1
scale:	1:1
Morse 7900	
Morse no.:	79792400
Drawing no.:	7900-169

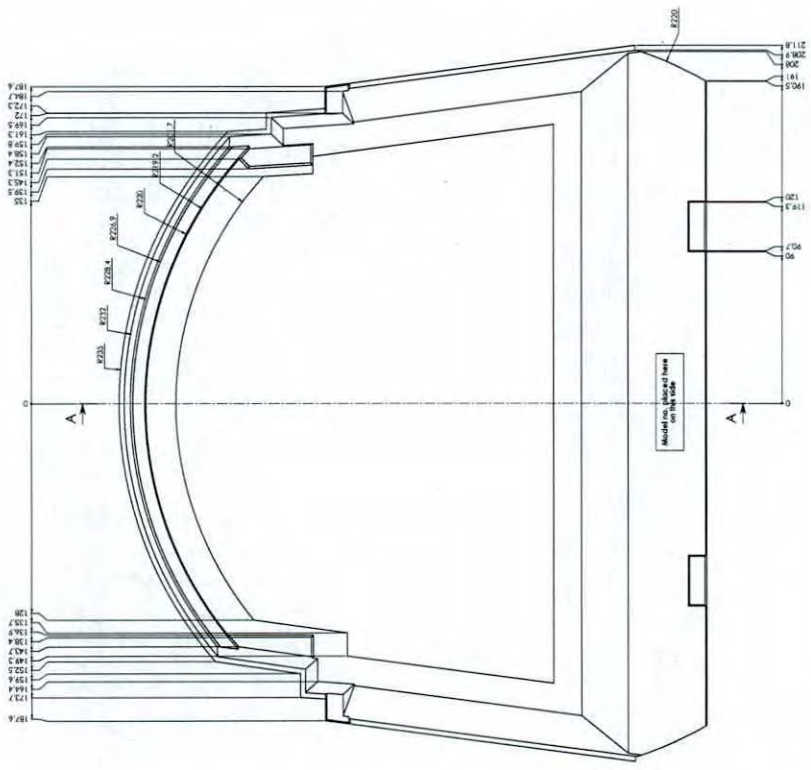


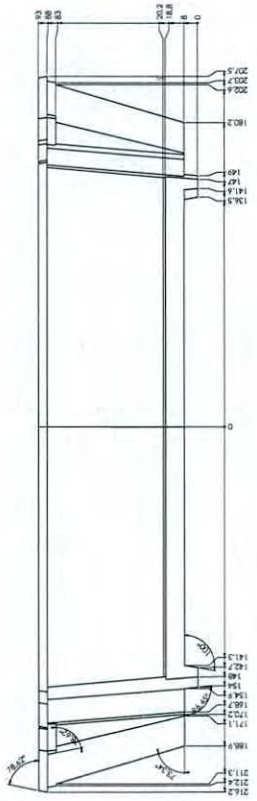


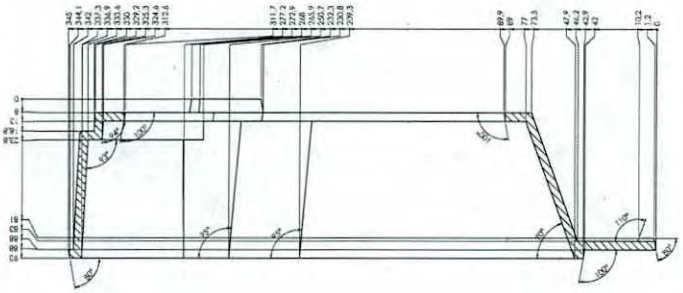


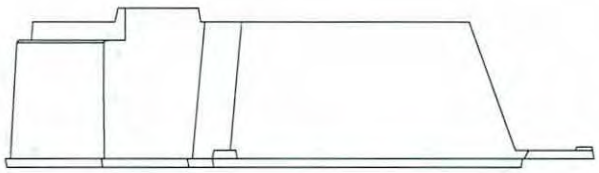


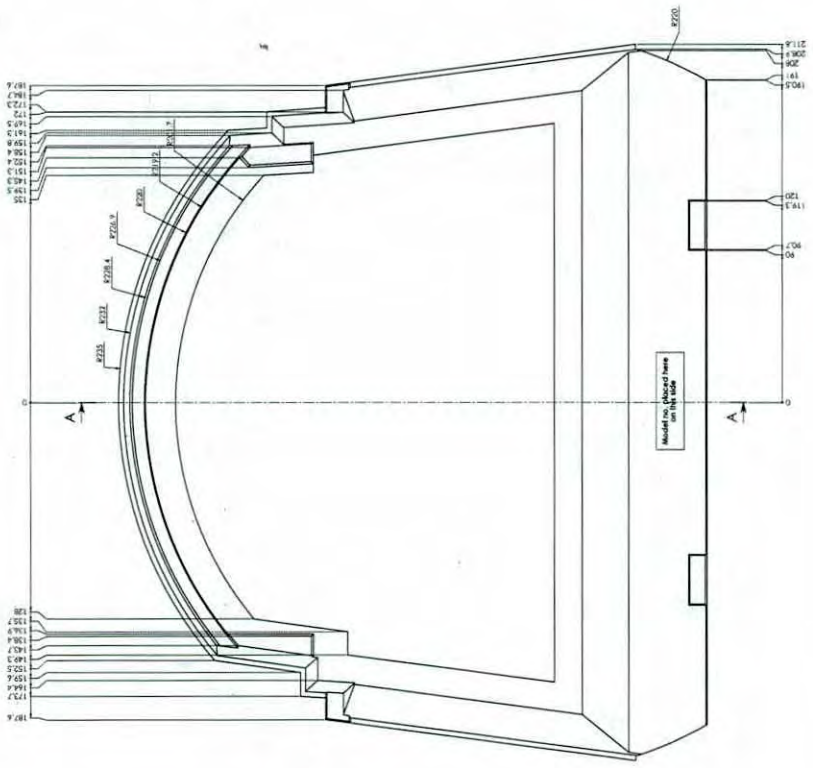


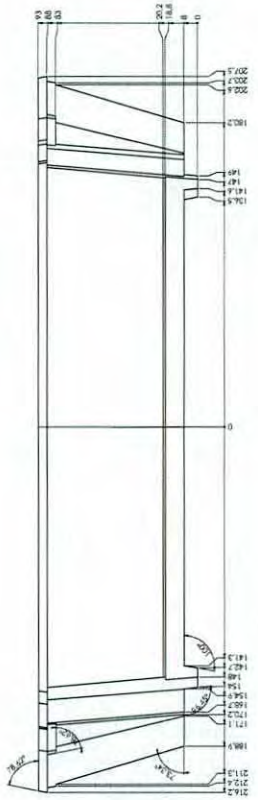

Model no. placed here on the side

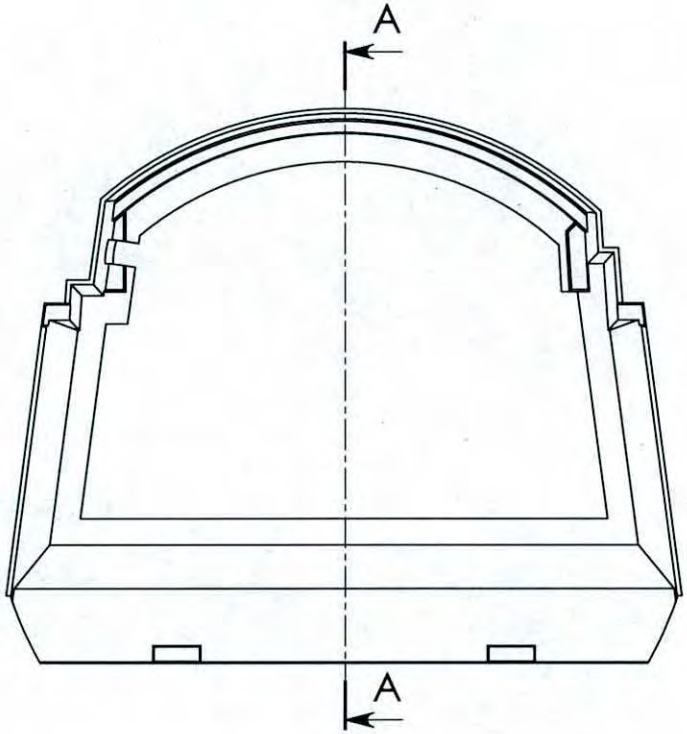


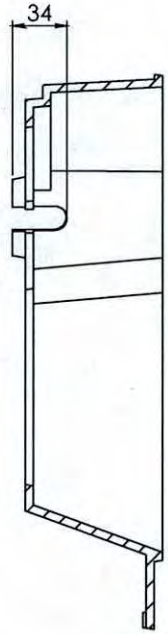




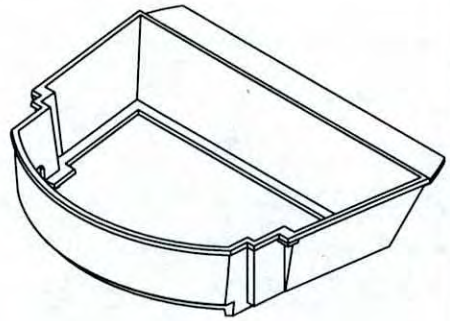

Model no. placed here on this side

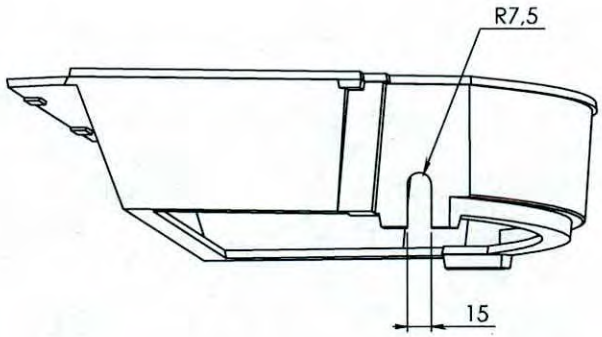






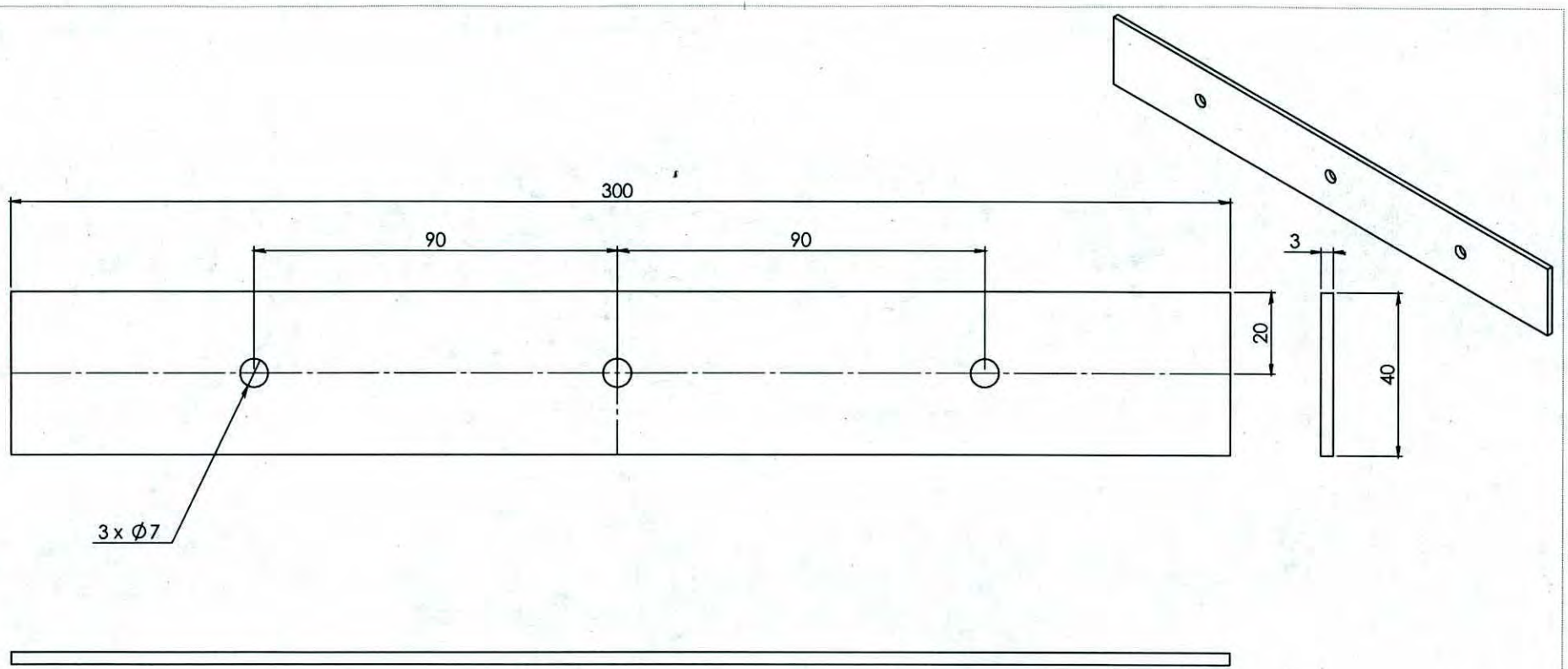
A-A





Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	RSV	06.05.2013
Dim. without indication of margin acc. to DS/ISO 2768-1 m	**Risteramme**	Released:		
Material: Cast Iron GG15	**Grate frame**	Format:	**A3**	
Weight kg: 5.09	**Morsø 7900**	Scale:	**1:3**	
Model no. **7913**		Itemno.:	**44791300**	
Drawingtype: Work up drawing	morsø	Drawing no.:	**13-44791300 a**	
Location of file: C:\Working\7900-17 Risteramme 7900.SLDPRT				

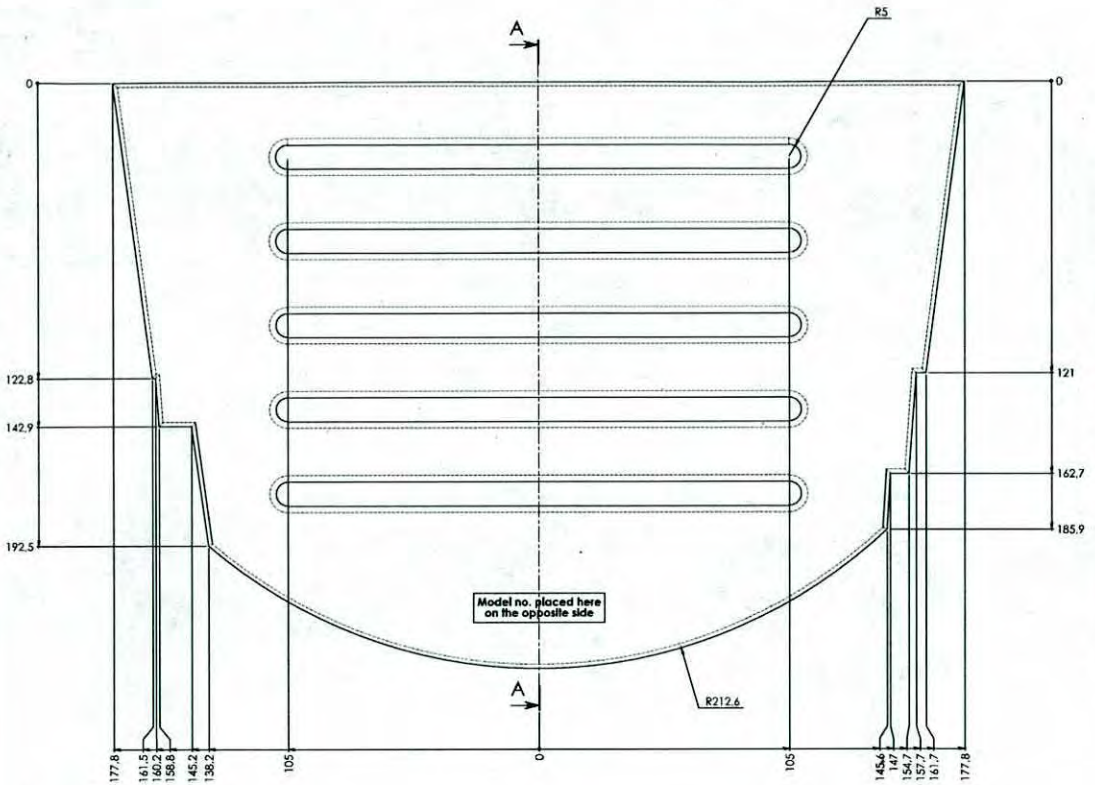
Date of print: 06-05-2013

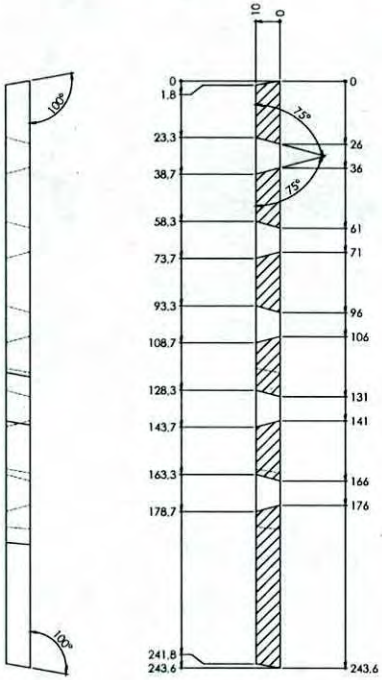


Rev.	Revisions	Sign.:	Date:

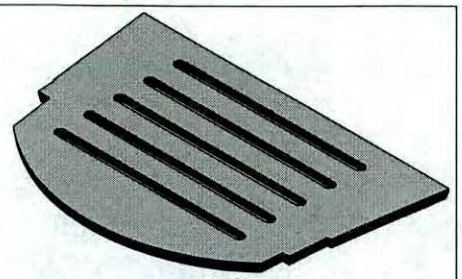
No sharp edges		Title:	Construction:	RSV 15.05.2013
Dim. without indication of margin acc. to DS/ISO 2768-1 m		**Afdækningsplade NA**	Released:	
Material:	SPD - DC01AM/EN10130	**Cover plate NA**	Format:	**A3**
Weight kg:	0.275	**Morsø 7900**	Scale:	**1:1**
Model no.			Itemno.:	**71794400**
Drawingtype:	Product drawing	morsø	Drawing no.:	**7900-170 a**
Location of file:	C:\Working\7900-170 Afdækningsplade 7900 NA.SLDPRT			

Date of print: 15-05-2013





A-A



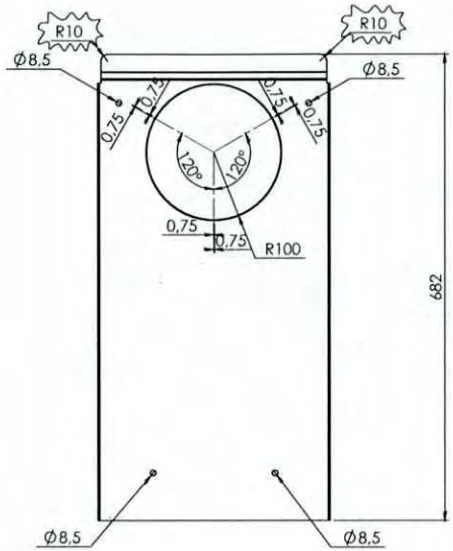
Material: GG15 Crome

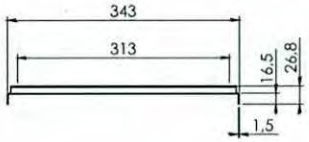
Rev	Revisions	Sign:	Date:

Title:		Construction:	RSV 17.01.12
Rist		Released:	RSV 29.08.2012
Grate		Format:	A1
Morso 7900		Scale:	1:1
		Item no.:	34791400
	morso	Drawing no.:	7900-18 a

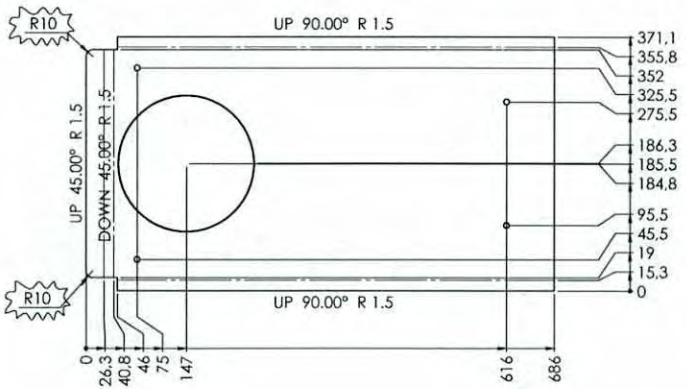
Dim. without indication of merge acc. to ISO Norm No. 8062 CT8

material:	Cast Iron GG15 Crome
Weight kg:	4.15
model no.	7914
Drawing type:	Product drawing
Location of file:	





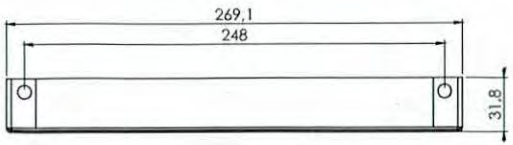
UNFOLDED

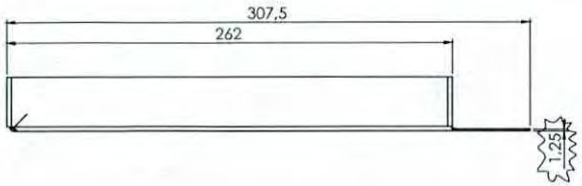


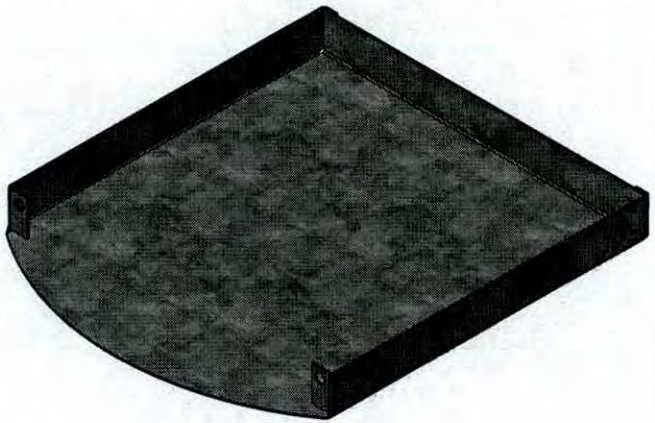
Rev.	Revisions	Sign.:	Date:
c	Added R10 at top corners.	RSV	10.07.2012
b	Added 45° bend.	RSV	03.06.2012

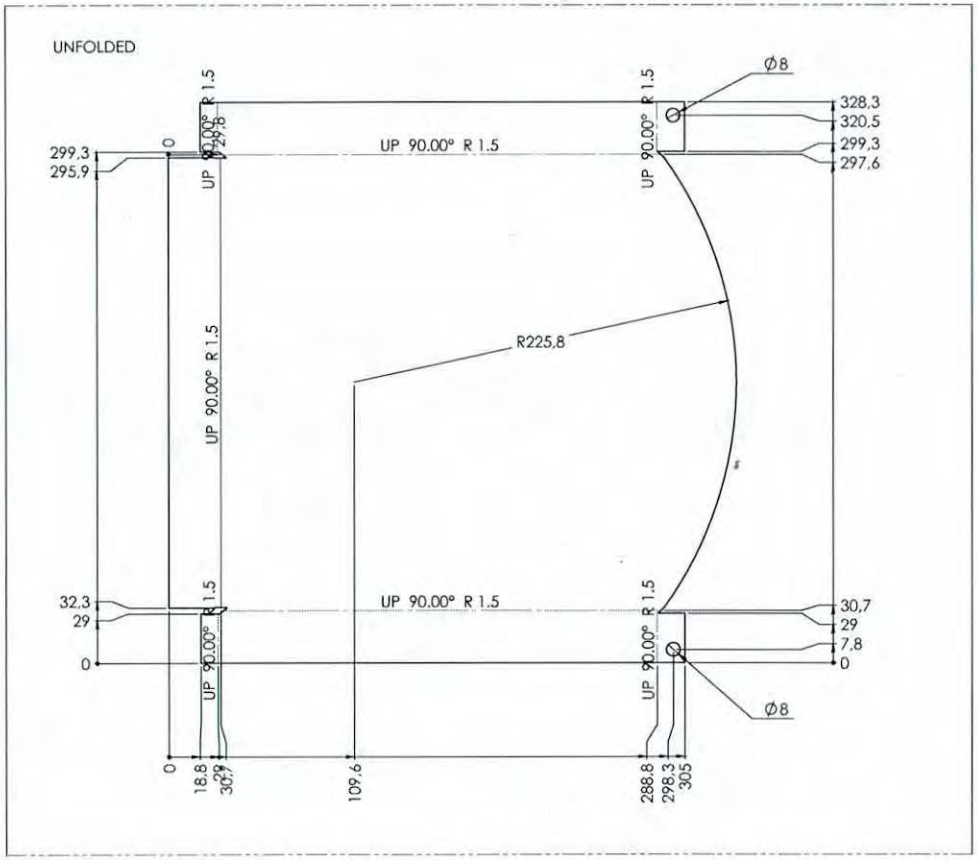
Title:		Construction:	LAH 02.02.12
Konvektionsplade		Released:	RSV 30.04.2012
Convection plate		Format:	**A2**
Morsø 7900		Scale:	**1:5**
		Item no.:	**71790100**
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Drawing no.:	**7900-19 c**
Material:	Galvanized plate		
Weight kg.:	2.97		
Model no.			
Drawingtype:	Product drawing		
Location of file:			

morsø



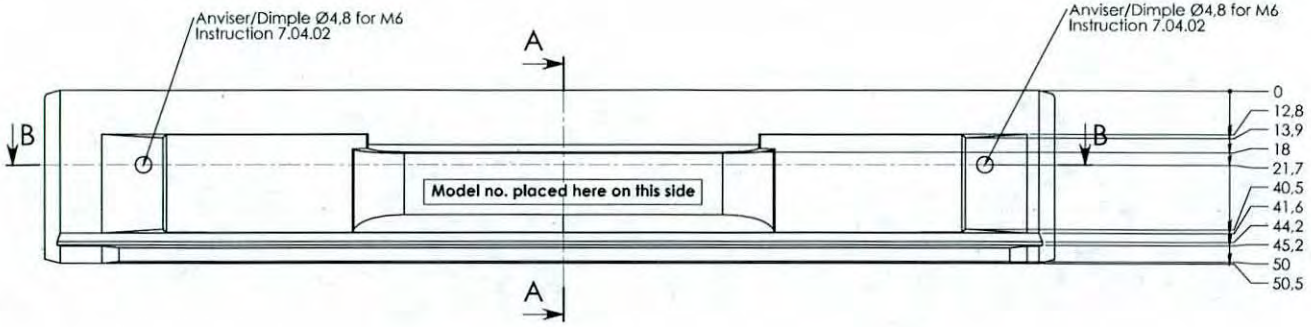


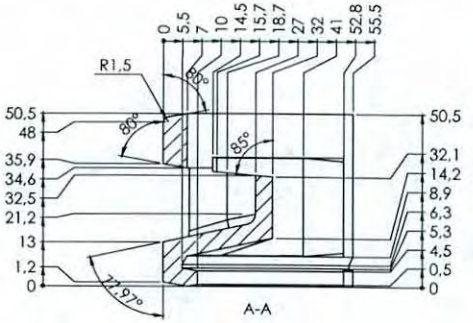


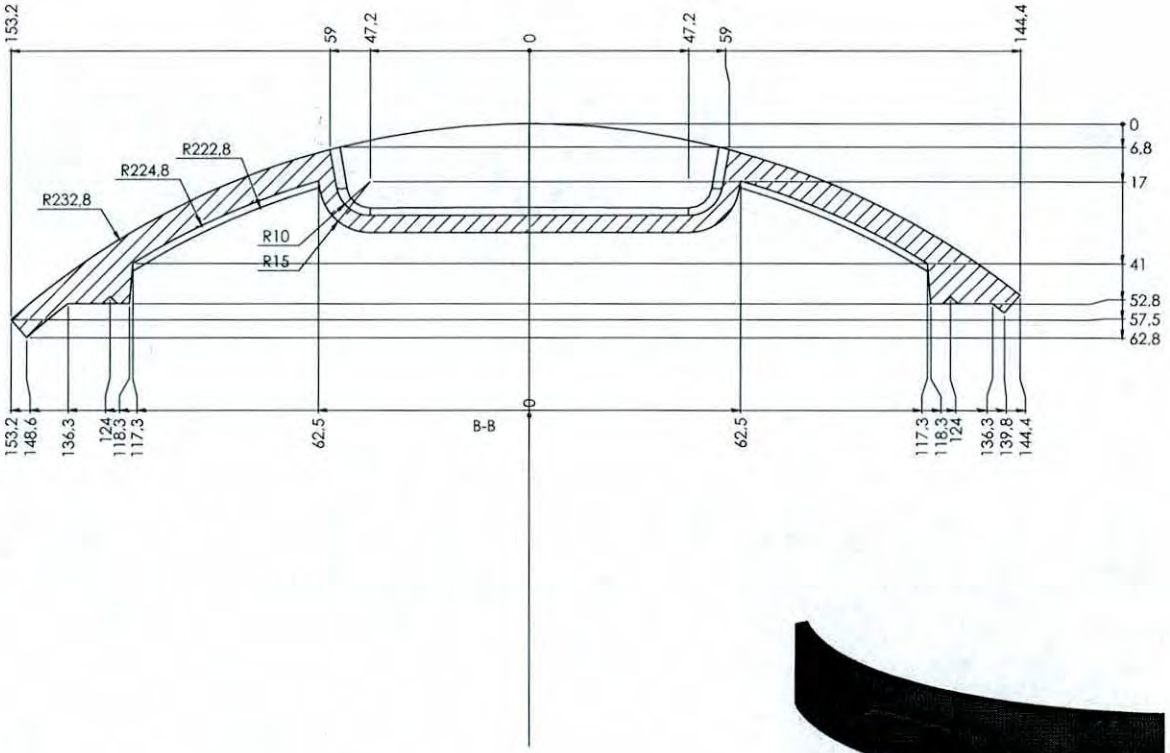


Rev.	Revisions	Sign.:	Date:
d	Changed thickness from 1.5 to 1.25 mm	RSV	14.02.2013
c	Changed Ø7 to Ø8.	RSV	27.09.2012
b	Changed center dimensions for Ø7 holes.	RSV	16.08.2012

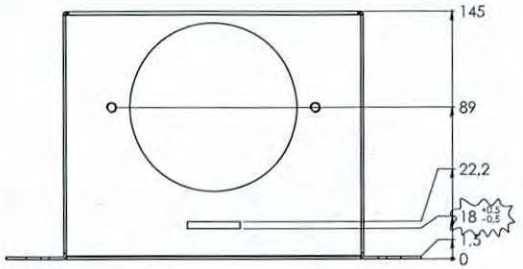
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: Askeskuffe / Ash tray / Morsø 7900	Construction: LAH 02.02.12
Material:	Galvanized plate		Released: RSV 02.05.2012
Weight kg.:	1.01		Format: A2
Model no.			Scale: 1:2
Drawingtype:	Product drawing		Itemno.: 71790200
Location of file:		morsø	Drawing no.: 7900-20 d Rev.: D

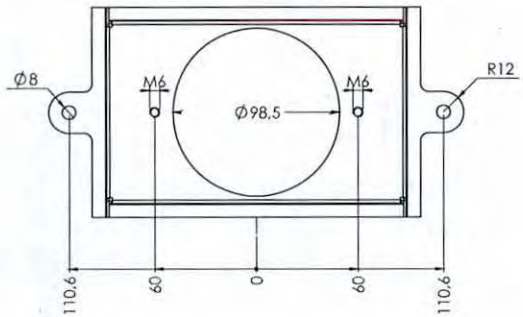


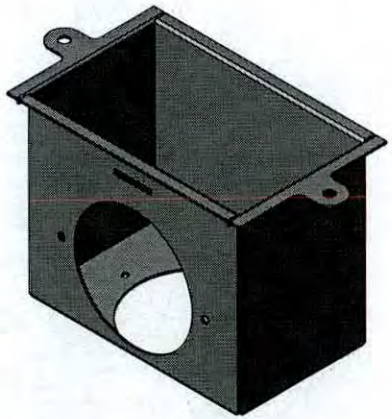


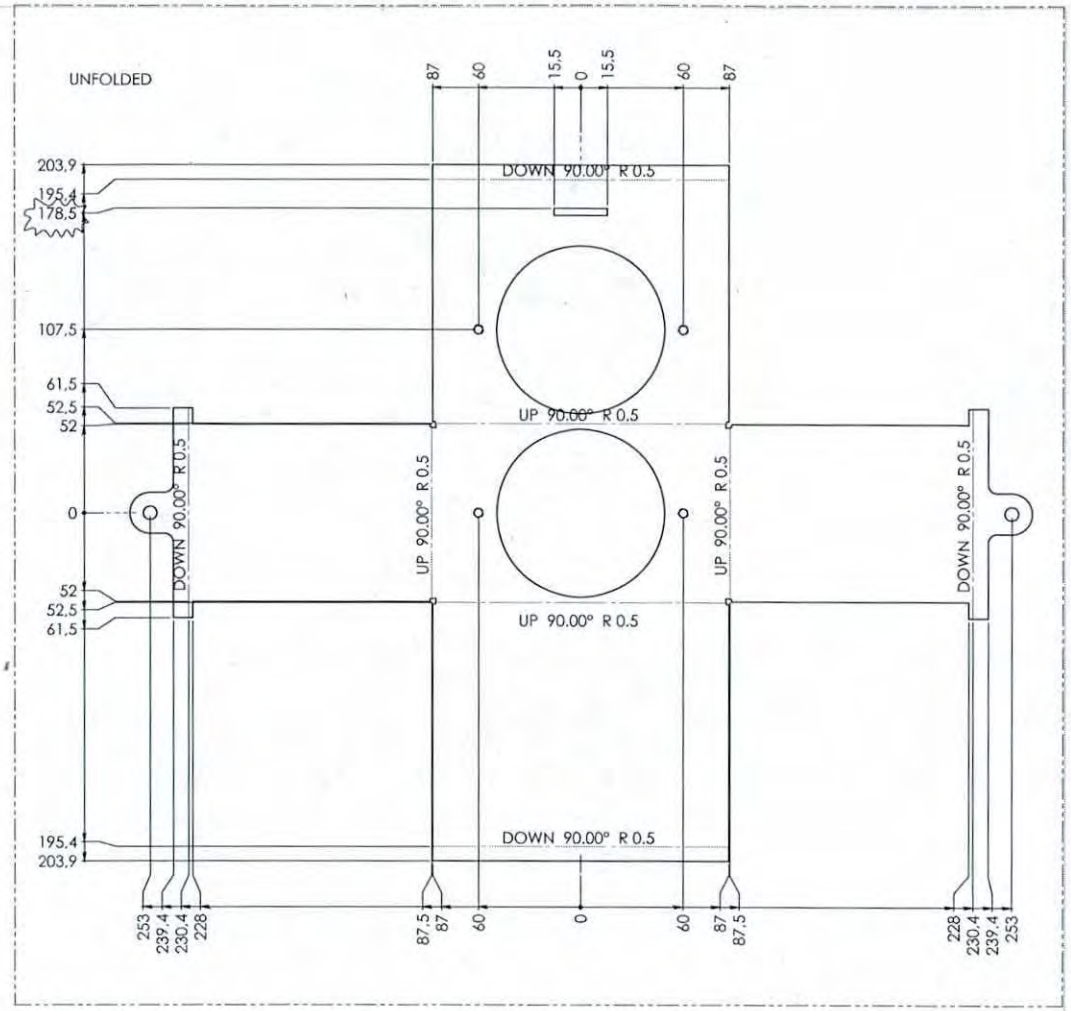


Rev.	Revisions		Sign.:	Date:
Drilling Instructions 7.04.02		Title:	Construction:	RSV 08.02.12
Dim. without indication of margin acc. to ISO Norm No.: 8062 CT9		Askeskuffe front Ashtray front Morsø 7900	Released:	RSV 29.08.2012
Material:	Cast Iron GG15		Format:	A2
Weight kg.:	0.94		Scale:	1:1
Model no.	7618		Itemno.:	34791500
Drawingtype:	Casting Drawing	morsø	Drawing no.:	7900-21 a
Location of file:				

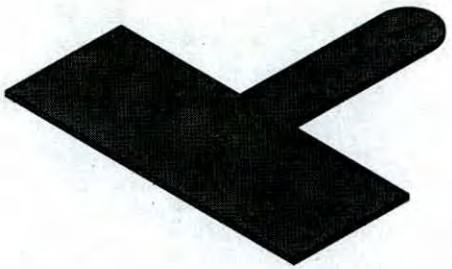


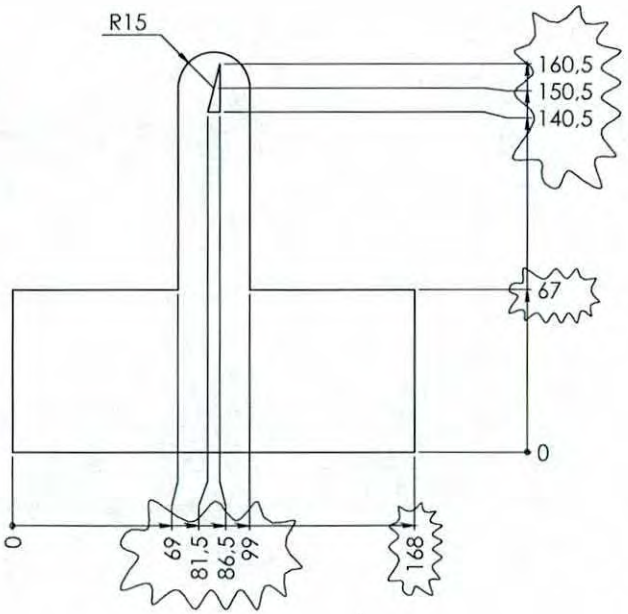




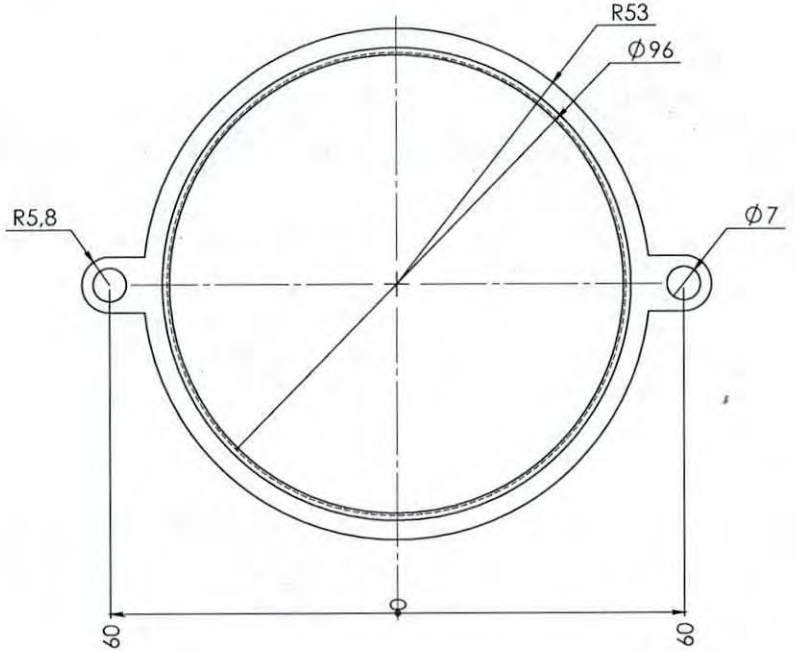


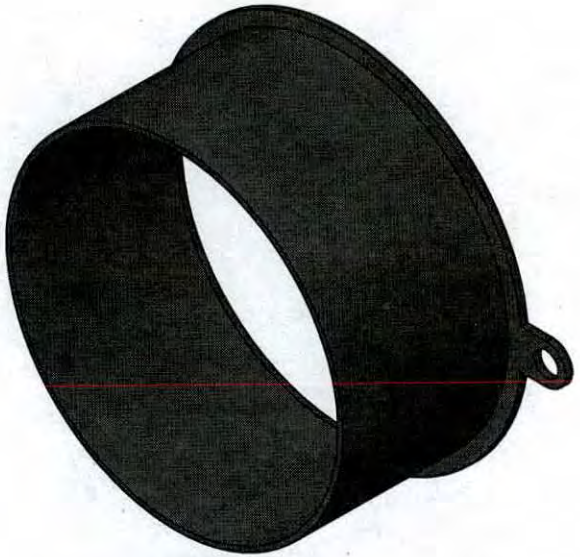
e	Changed dimension to rektangulary hole.		RSV	03.10.2012
d	Filled the corners.		RSV	17.09.2012
c	Changed dimensions at rekt. hole. Right and the big hole on the side.		RSV	06.09.2012
b	Changed dimensions at rektangulary hole.		RSV	25.05.2012
Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	LAH	11.10.11
Dim. without indication of margin acc. to DS/ISO 2768-1 m	**Airtight boks 7900**	Released:	RSV	30.04.2012
Material: SPD Plade	**Airtight Box 7900**	Format:	**A2**	
Weight kg.: 1.02	**Morsø 7900**	Scale:	**1:2**	
Model no.		Itemno.:	**Part of 71790300**	
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-22 e**	
Location of file:				

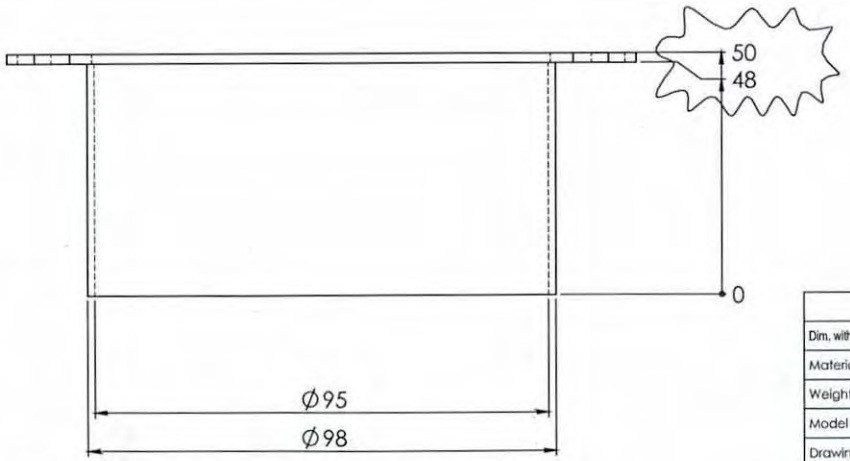




b	+1mm i begge sider, +2mm bagpå, fjernet ovale huller.		RSV	20.09.2012
Rev.	Revisions		Sign.:	Date:
		Title:	Construction:	LAH 10.10.11
Dim. without indication of margin acc. to DS/ISO 2768-1 m		**Luftspjæld Airtightboks**	Released:	RSV 02.05.2012
Material:	SPD Plade	**Closingplate Airtight Box**	Format:	**A3**
Weight kg:	0.32	**Morsø 7900**	Scale:	**1:2**
Model no.			Itemno.:	**71790400**
Drawingtype:	Product drawing	morsø	Drawing no.:	**7900-23 b**
Location of file:				



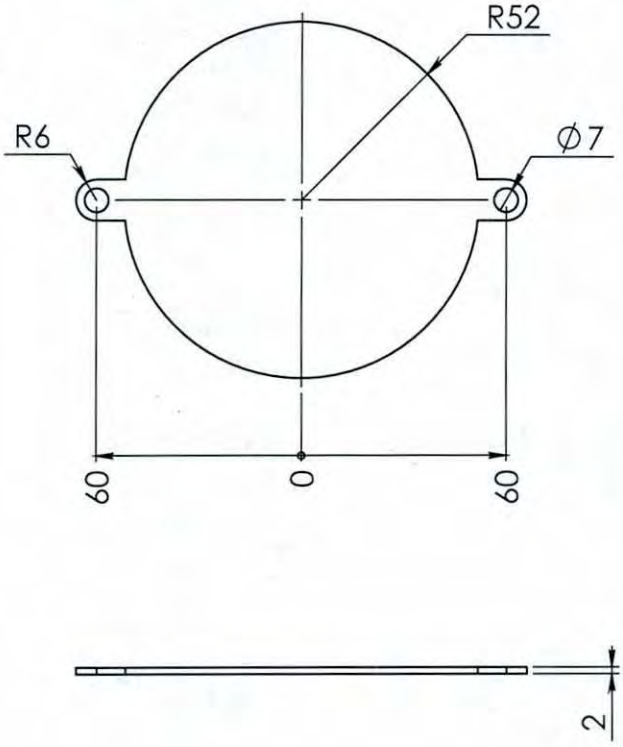




Rev.	Revisions	Sign.:	Date:
b	Changed dimension.	RSV	18.12.2012

Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: Rørstuts friskluftboks Pipe Airtight Box Morsø 7900	Construction: LAH 11.10.11
Material:	SPD - DC01AM/EN10130		Released: RSV 02.05.2012
Weight kg:	0.20		Format: A3
Model no.			Scale: 1:1
Drawingtype:	Product drawing		Itemno.: 71790500
Location of file:		morsø	Drawing no.: 7900-24 b

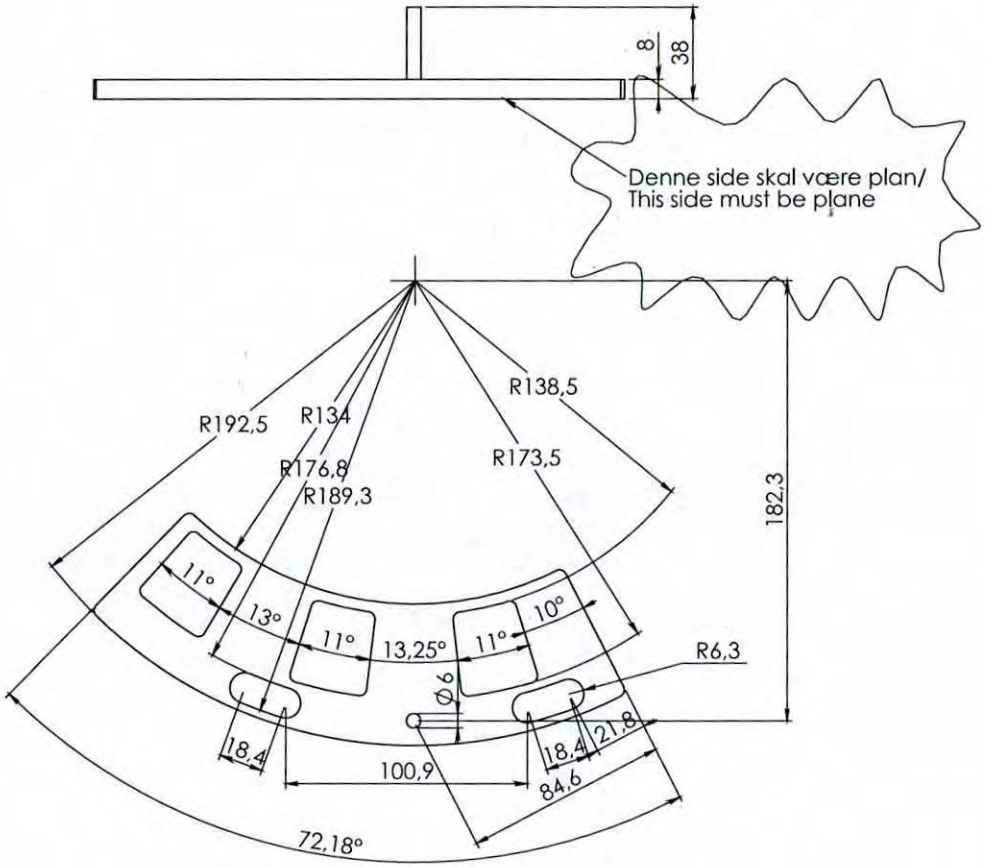
Date of print: 18-12-2012



Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: **Prop airtight boks** **Stopper airtight Box** **Morsø 7900**	Construction:	LAH	11.10.11
		Released:	RSV	02.05.2012
Material: SPD Plade		Format:	A4	
Weight kg.: 0.13		Scale:	1:2	
Model no.		Itemno.:	71790600	
Drawingtype: Product drawing	morsø	Drawing no.:	7900-25 a	
Location of file: U:\udv\Tegninger\7900\7900-25 Prop frisluftboks.SLDPRT				

Date of print: 23-05-2012

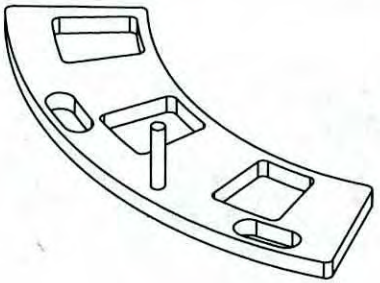


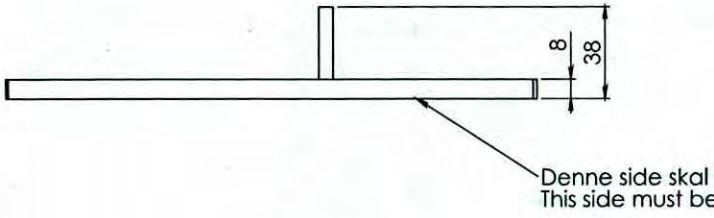
Rev.	Revisions	Sign.:	Date:
c	Added note: This side must be plane	RSV	25.10.2012
b	Changed dimension to tap.	RSV	08.10.2012

Title:		Construction:	LAH 02.02.12
Luftregulerindsplade		Released:	RSV 14.08.2012
Airregulation plate		Format:	**A3**
Morsø 7900		Scale:	**1:2**
		Itemno.:	**71790700**
morsø		Drawing no.:	**7900-26 c**

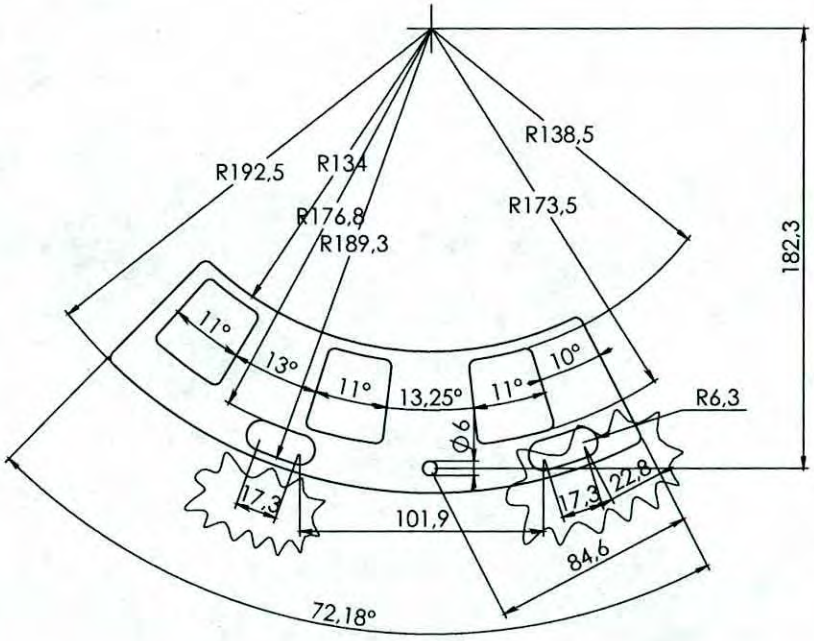
Dim. without indication of margin acc. to DS/ISO 2768-1 m	
Material:	SPD Plade
Weight kg:	0.51
Model no.	
Drawingtype:	Product drawing
Location of file:	

Date of print: 25-10-2012





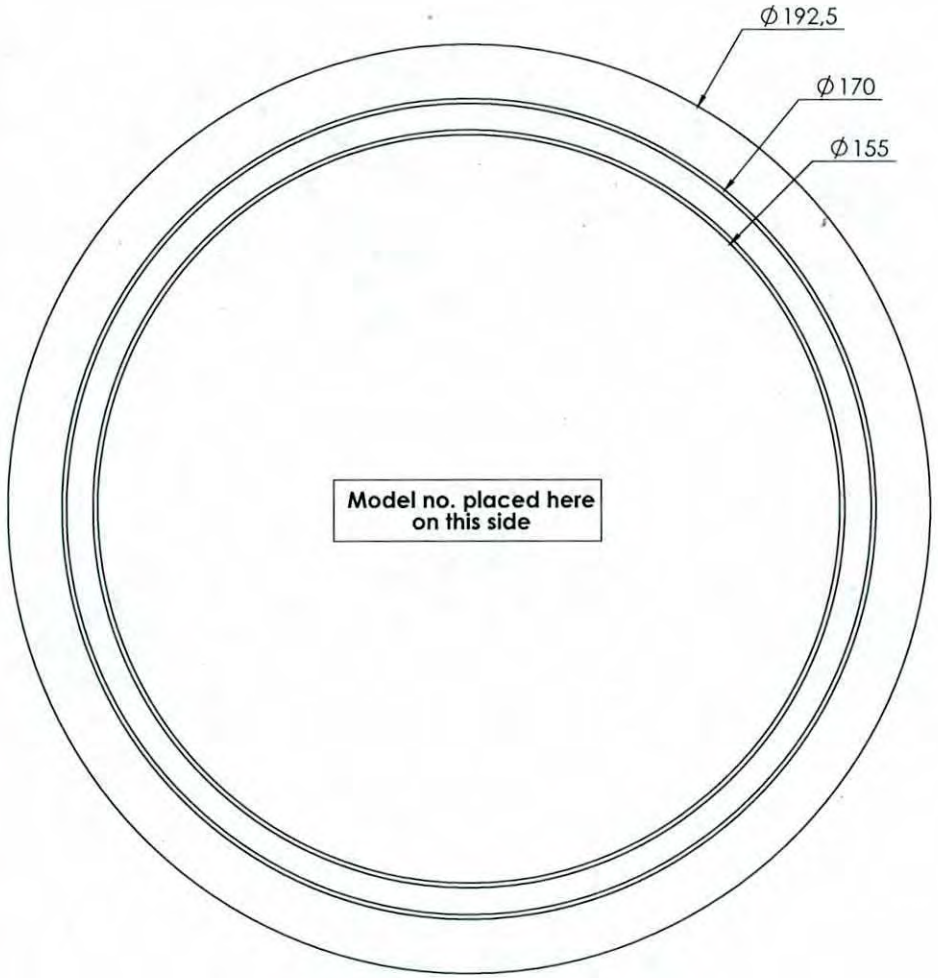
Denne side skal være plan/
This side must be plane

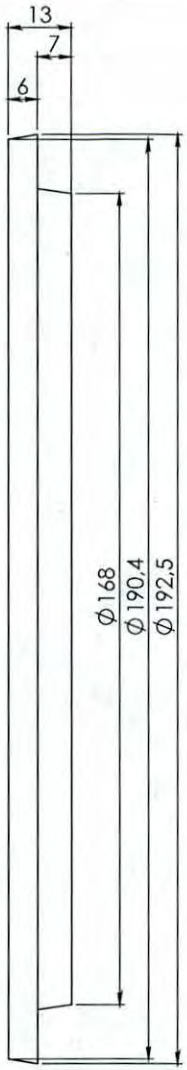


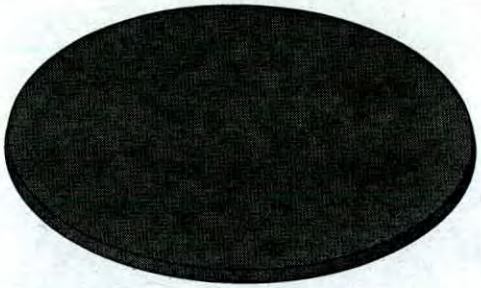
Rev.	Revisions	Sign.:	Date:
d	Changed the dimensions at the too oval holes.	RSV	06.05.2013
c	Added note: This side must be plane	RSV	25.10.2012
b	Changed dimension to tap.	RSV	08.10.2012

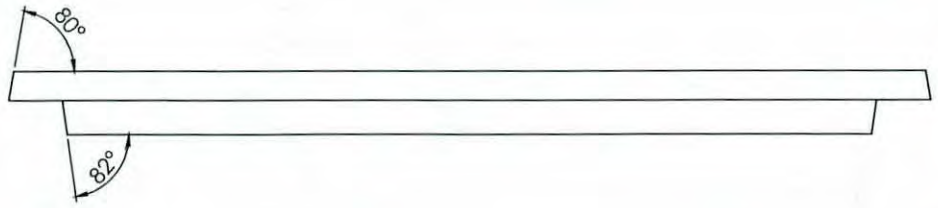
Dim. without indication of margin acc. to DS/ISO 2768-1 m			
Material:	SPD Plade		
Weight kg:	0.51		
Model no.			
Drawingtype:	Product drawing		
Location of file:	C:\Working\7900-26 Spjæld 7900.SLDPRT		

Title:		Construction:	LAH 02.02.12
Luftregulerindsplade		Released:	RSV 14.08.2012
Airregulation plate		Format:	**A3**
Morsø 7900		Scale:	**1:2**
		Itemno.:	**71790700**
morsø		Drawing no.:	**7900-26 d**



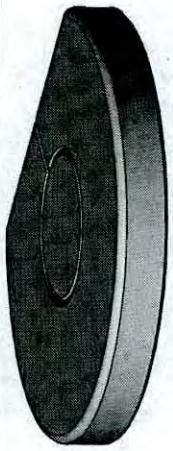


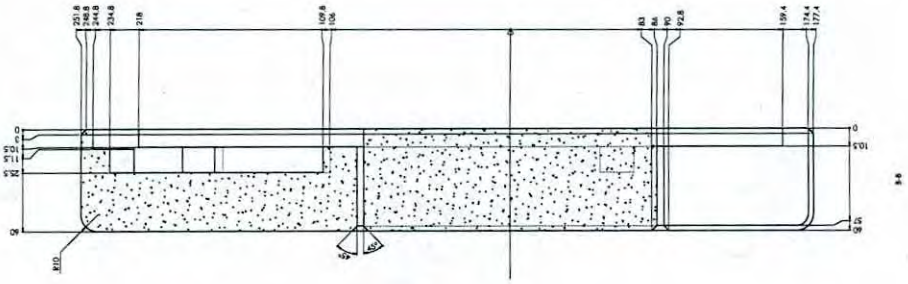


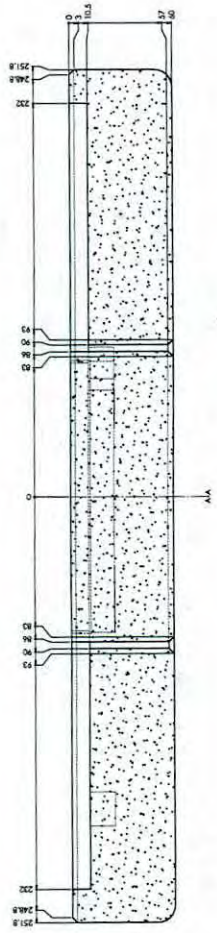


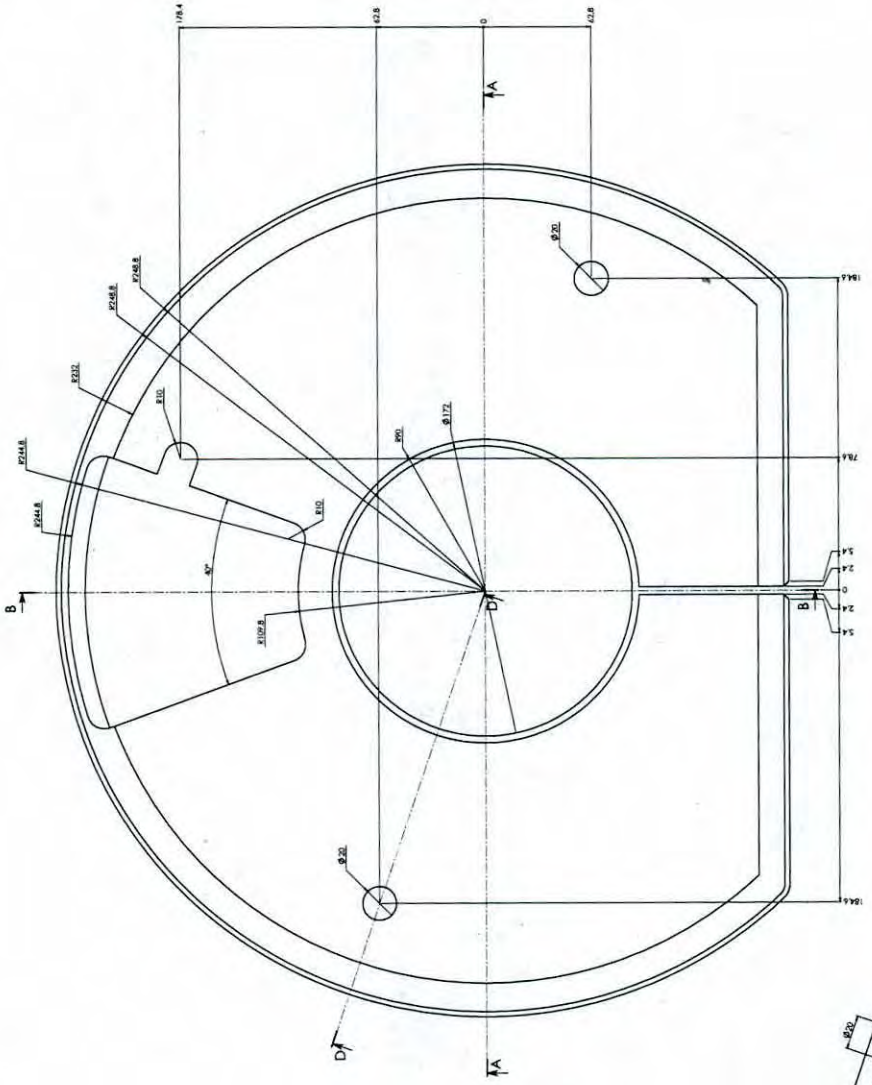
Rev.	Revisions	Sign.:	Date:

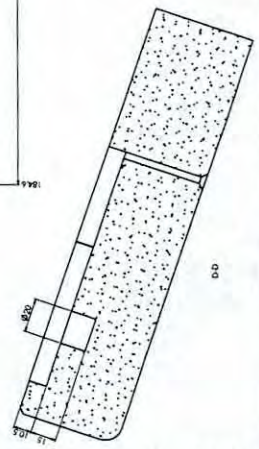
Anviser efter instruktion: 7.04.02 Boreanviser	Title:	Construction:	RSV 08.02.12
Dim. without indication of margin acc. to ISO Norm No.: 8062 CT9	**Top dæksel**	Released:	RSV 29.08.2012
Material: Cast Iron GG15	**Top cover**	Format:	**A3**
Weight kg: 1.42	**Morsø 7900**	Scale:	**1:1**
Model no. **7909**		Itemno.:	**P - 34790900**
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-28 a**
Location of file:			

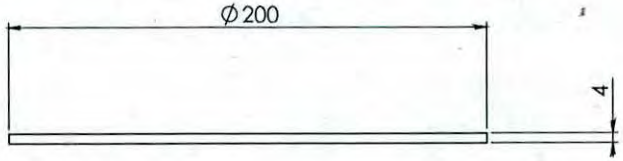


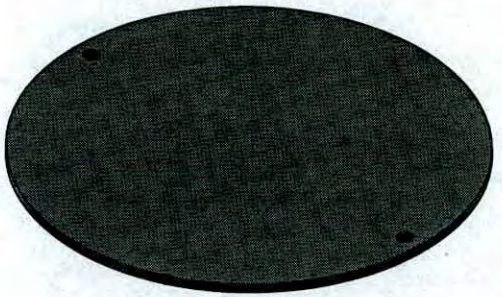


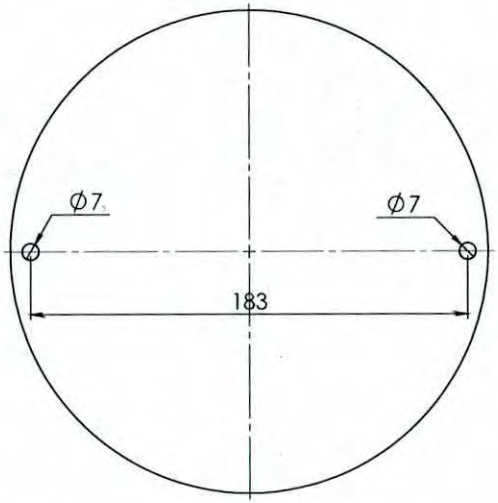








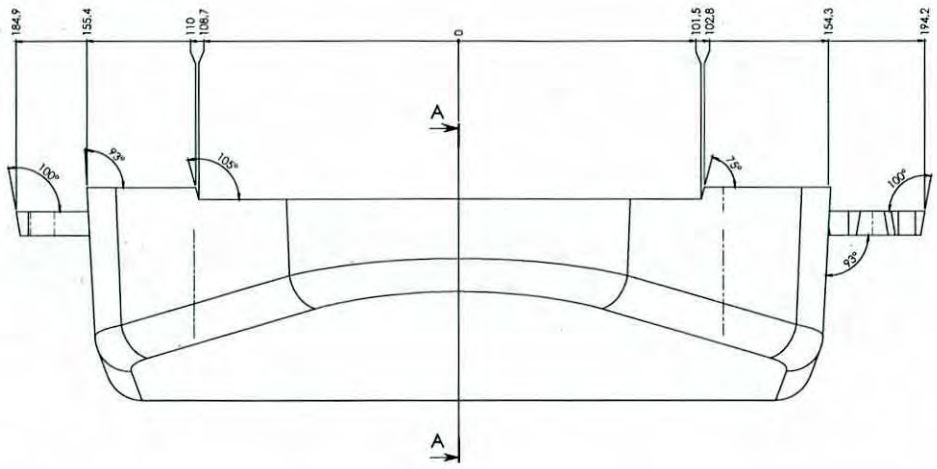


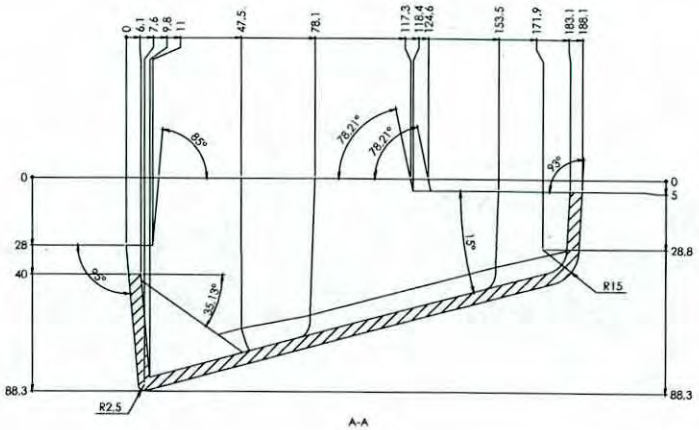


Rev.	Revisions	Sign.:	Date:

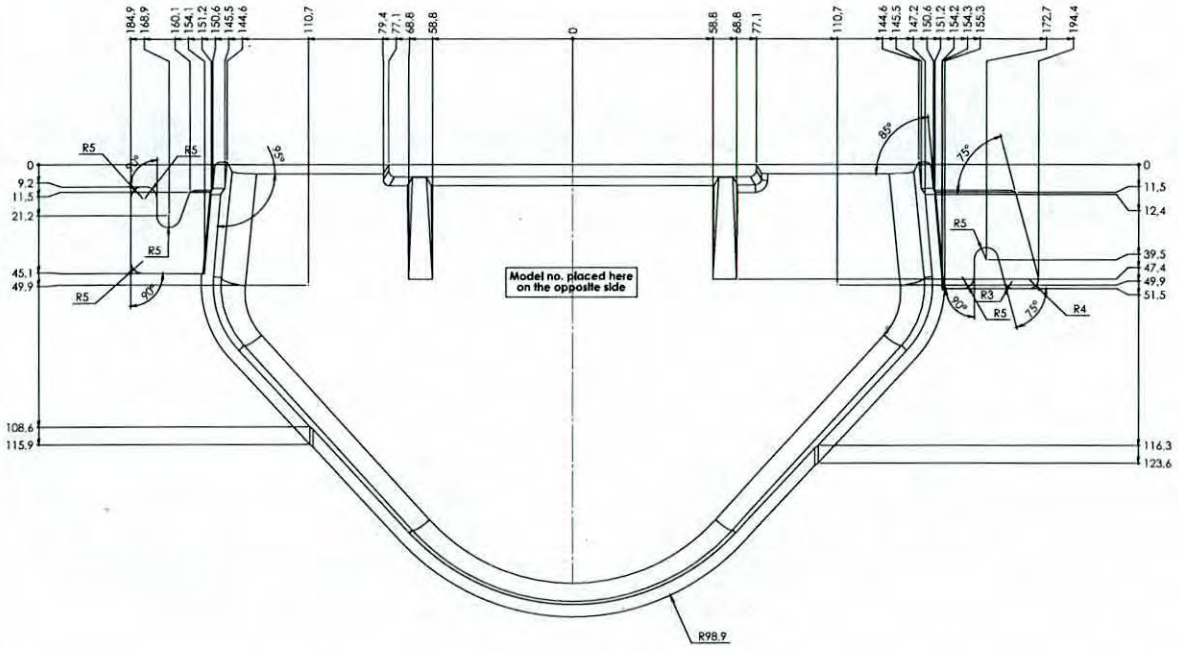
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title:	Construction:	LAH 02.02.12
Material:	SPD - DC01AM/EN10130	**Blindplade røgtud**	Released:	RSV 02.05.2012
Weight kg:	0.97	**Blind plate spigot**	Format:	**A3**
Model no.		**Morsø 7900**	Scale:	**1:2**
Drawingtype:	Product drawing		Itemno.:	**71790900**
Location of file:		morsø	Drawing no.:	**7900-39 a**

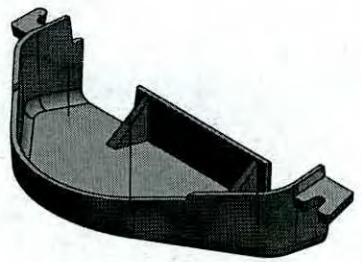
Date of print: 02-05-2012





A-A



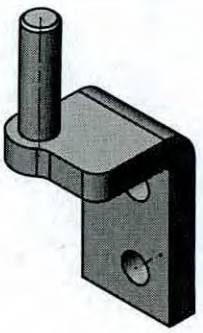


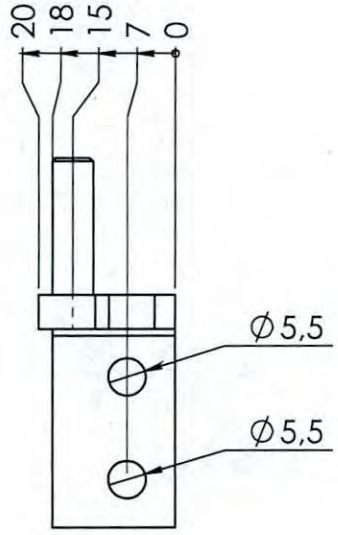
Material: GG15 Crome

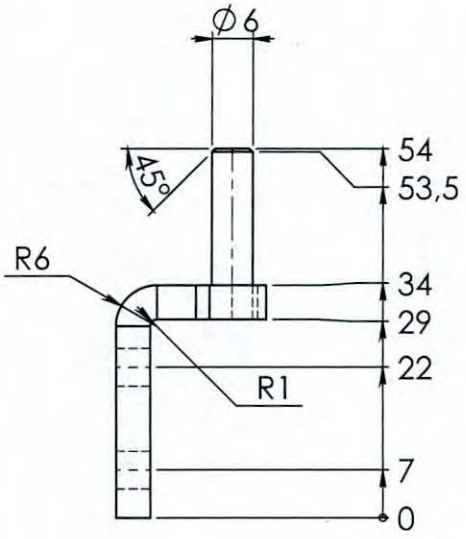
		Rev.	Revisions
			Sign.: Date:
Dim. without indication of margin acc. to ISO Norm No. 8062 CT8		Title:	Røgskål
Material:	Cast Iron GG15 Crome		Draft reducer
Weight kg.:	2.95		Morsø 7900
Model No.:	7918		
Drawing type:	Product drawing		
Location of file:			

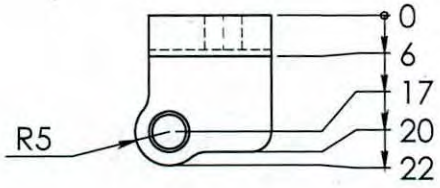
Construction:	RSV	14.02.12
Released:	RSV	29.08.2012
Format:		A1
Scale:		1:1
Item no.:		34791800
Drawing no.:		7900-42 a

morsø





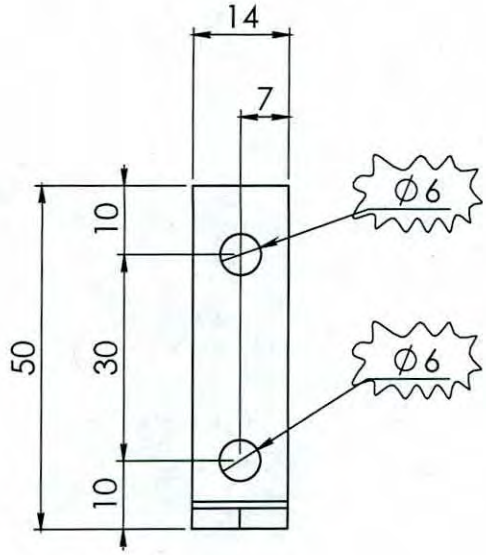


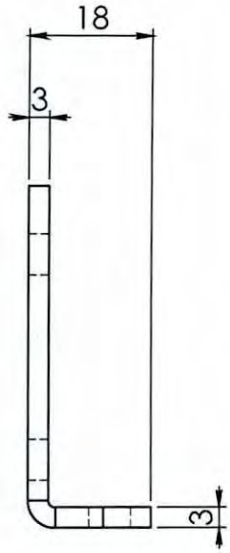


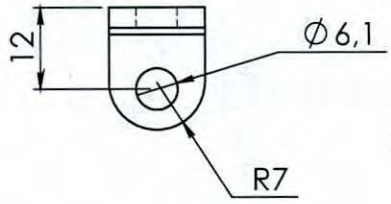
Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: **Hængsel i top** **Top Hinge** **Morsø 7900**	Construction:	LAH	02-02-2012
		Released:	RSV	16.08.2012
Material: SPD Plade		Format:	A4	
Weight kg.: 0.036		Scale:	1:1	
Model no.		Itemno.:	71791000	
Drawingtype: Product Drawing	morsø	Drawing no.:	7900-43 a	
Location of file: U:\udv\Tegninger\7900\7900-43 Dørbeslag top.SLDPRT				

Date of print: 16-08-2012



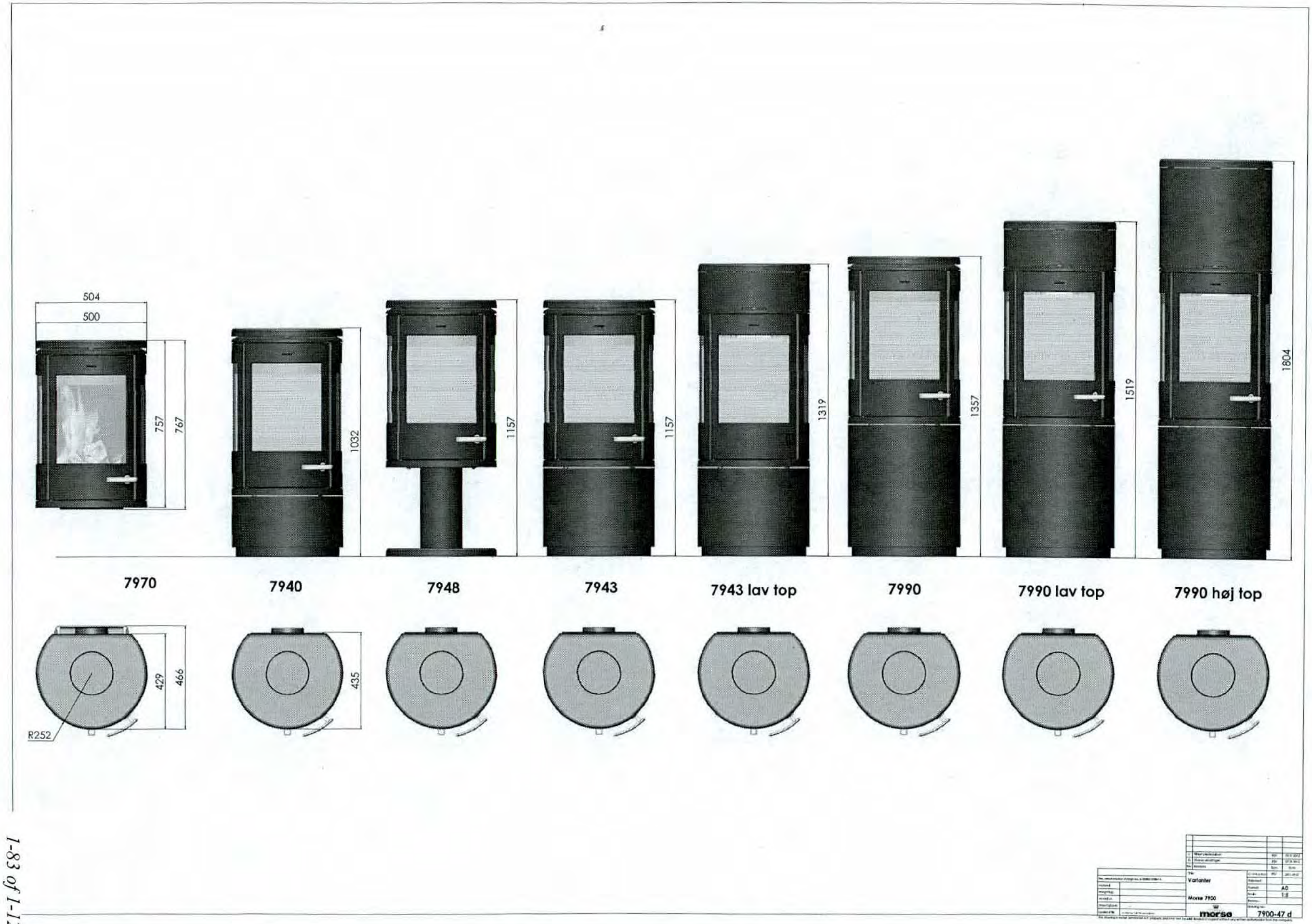




Rev.	Revisions	Sign.:	Date:
b	Changed 2 holes Ø5.5 to Ø6.	RSV	13.08.2012

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Hængsel i bund / Bottom Hinge / Morsø 7900	Construction:	RSV	02-07-2012
		Released:	RSV	09.08.2012
Material: SPD Plade		Format:	A4	
Weight kg.: 0.018		Scale:	1:1	
Model no.		Itemno.:	71793000	
Drawingtype: Product Drawing	morsø	Drawing no.:	7900-44 b	
Location of file: U:\udv\Tegninger\7900\7900-44 Dørsbeslag bund.SLDPRT				

Date of print: 13-08-2012

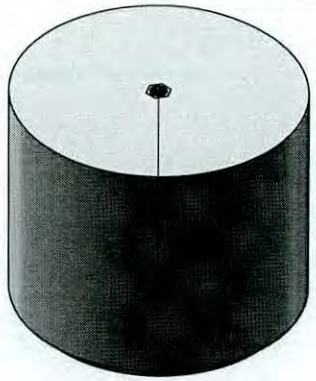

504
500
757
767
1032
1157
1157
1319
1357
1519
1804
7970
7940
7948
7943
7943 lav top
7990
7990 lav top
7990 høj top
429
466
435
R252
Varianter
Morsø 7900
morsø
A0
1:5
7900-47 d

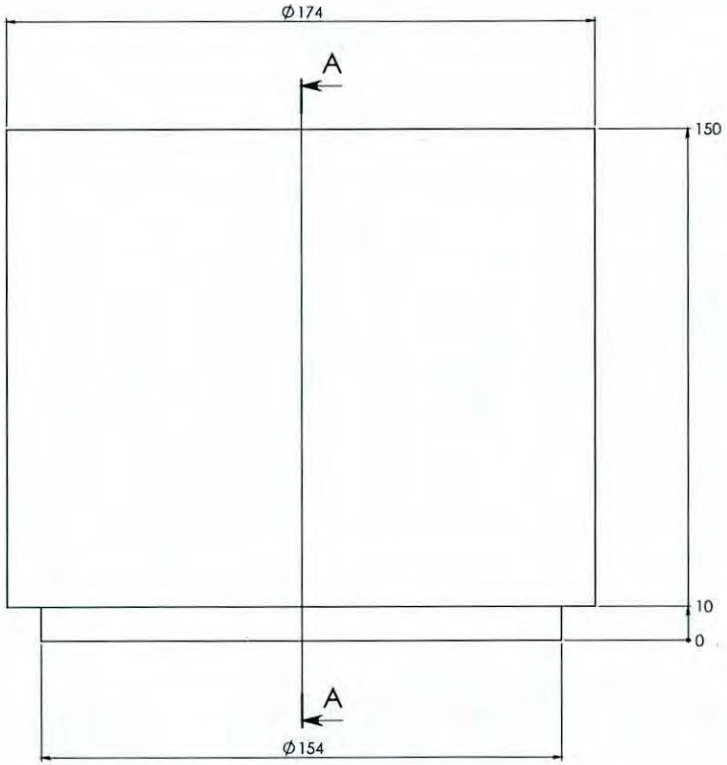
7940	7948	7943	7943	7943	7970	7990	7990	7990
		 with plain base	 with log storage	 with drawer		 with plain base	 with log storage	 with drawer
54790021  A +  B 54791721	54790021  A +  C 54793421	54790021  A +  D 54791821	54790021  A +  E 54792021	54790021  A +  E 54792021 +  K 54792321	54790021  A +  F 54791421	54790021  A +  G 54791921	54790021  A +  H 54792121	54790021  A +  H 54792121 +  K 54792321

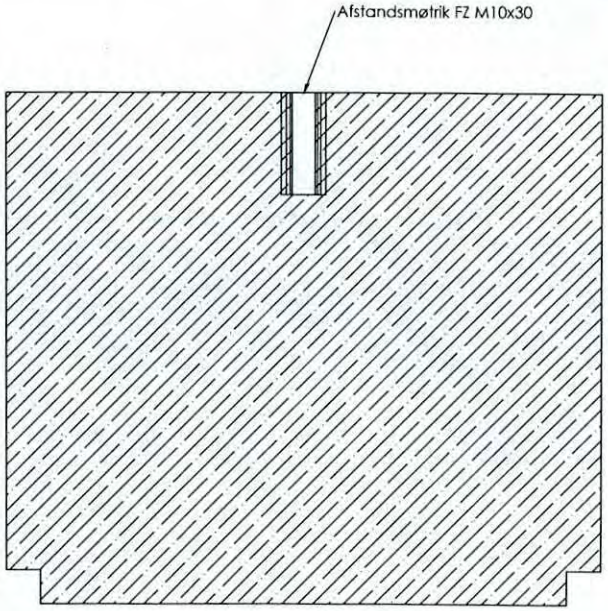
Note:
For brown version replace 21 in the end with 07.

TOP MODULES

LOW TOP	HIGH TOP	AIR TIGHT BOX	SOAP STONE	HEAT STORAGE	HEAT STORAGE PLUG	HEAT STORAGE BRICK
 54792621	 54792721	 54793321	 79790600	 54793121	 79790800	 79790700



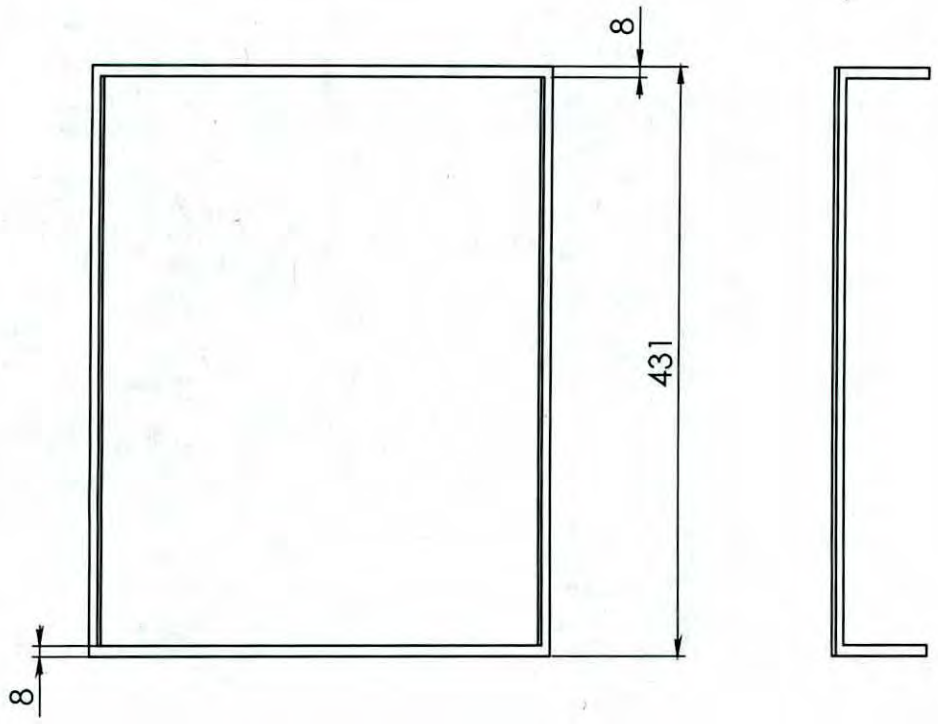


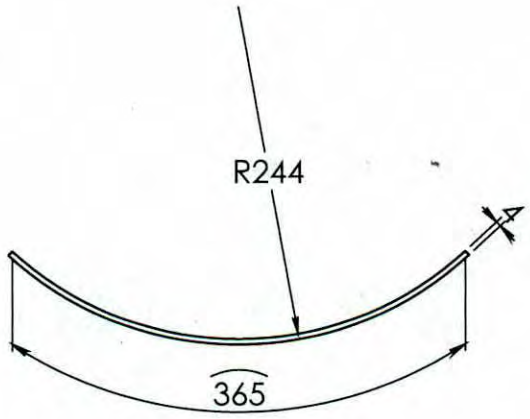


A-A (1 : 1)

Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	LAH	04-10-11
	Prop varmeakk.	Released:	RSV	09.08.2012
	Plug heat acc.	Format:		**A2**
	Morsø 7900	Scale:		**1:2**
		Itemno.:		**79790800**
	morsø	Drawing no.:		**7900-71 a**

Dim. without indication of margin acc. to DS/ISO 2768-1 m	
Material:	Beton/Concrete
Weight kg.:	8.09
Model no.:	
Drawingtype:	Product Drawing
Location of file:	

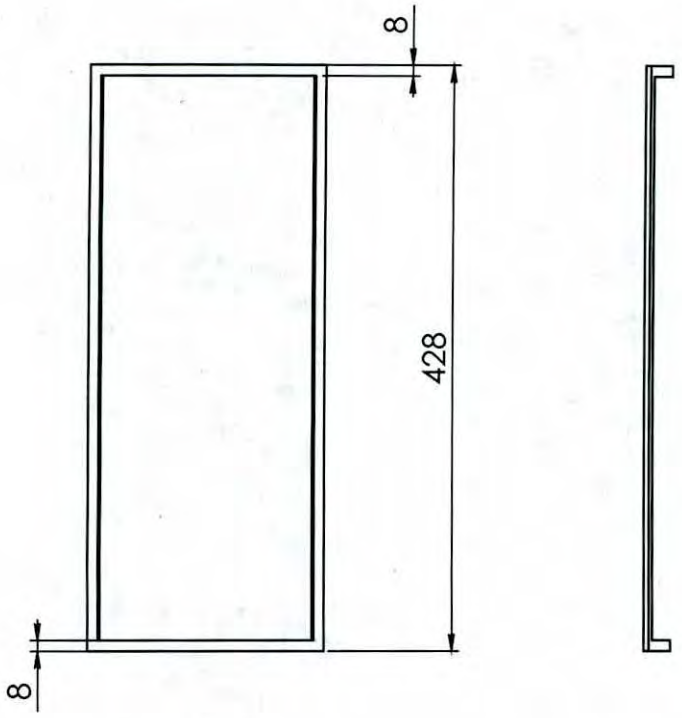


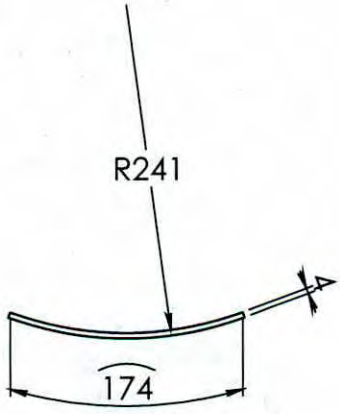


Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: **Glasbånd m. tape** **Glass gasket tape** **Morsø 7900**	Construction:	RSV	02.03.2012
		Released:		
Material: Material <not specified>		Format:	A4	
Weight kg.: 0.39		Scale:	1:5	
Model no. -		Itemno.:	79074200	
Drawingtype: Product drawing	morsø	Drawing no.:	7900-72 a	
Location of file: U:\wdv\Tegninger\7900\7900-72 Glasbånd front.SLDPRT				

Date of print: 24-04-2013

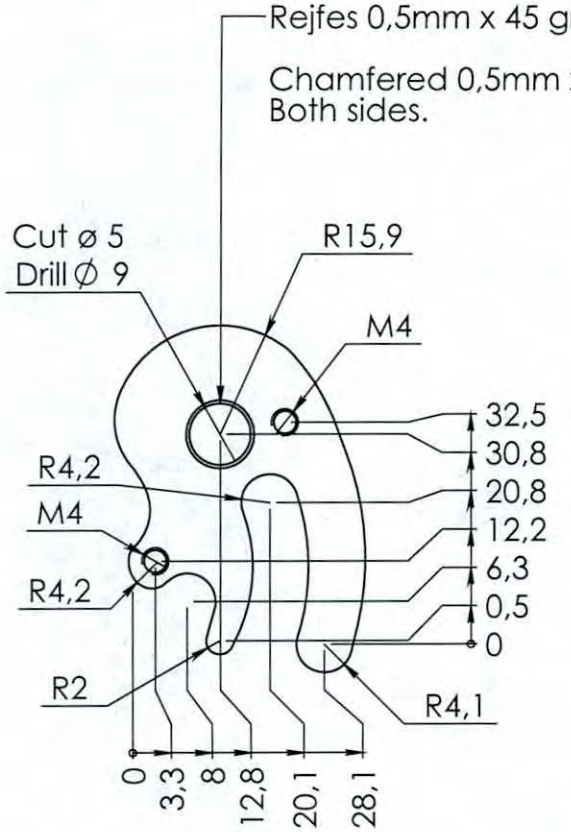


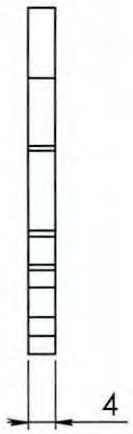


Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Glasbånd m. tape / Glass gasket tape / Morsø 7900	Construction:	RSV	24.04.2013
		Released:		
Material: Material <not specified>		Format:	A4	
Weight kg.: 0.29		Scale:	1:5	
Model no.		Itemno.:	79074200	
Drawingtype: Product Drawing	morsø	Drawing no.:	7600-73 a	
Location of file: C:\Working\7900-73 Glasbånd side.SLDPRT				

Date of print: 24-04-2013





Rev.	Revisions	Sign.:	Date:
b	Ændret det store hul til Ø9. + påført varenummer	TOL	20.02.2013

Dim. without indication of margin acc. to DS/ISO 2768-1 m			
Material:	SPD - DC01AM/EN10130		
Weight kg.:	0.03		
Model no.	-		
Drawingtype:			
Location of file:	C:\Working\7900-76 Lukkekrog Scaled.SLDPRT		

Title:

Lukkekrog

Closing hook

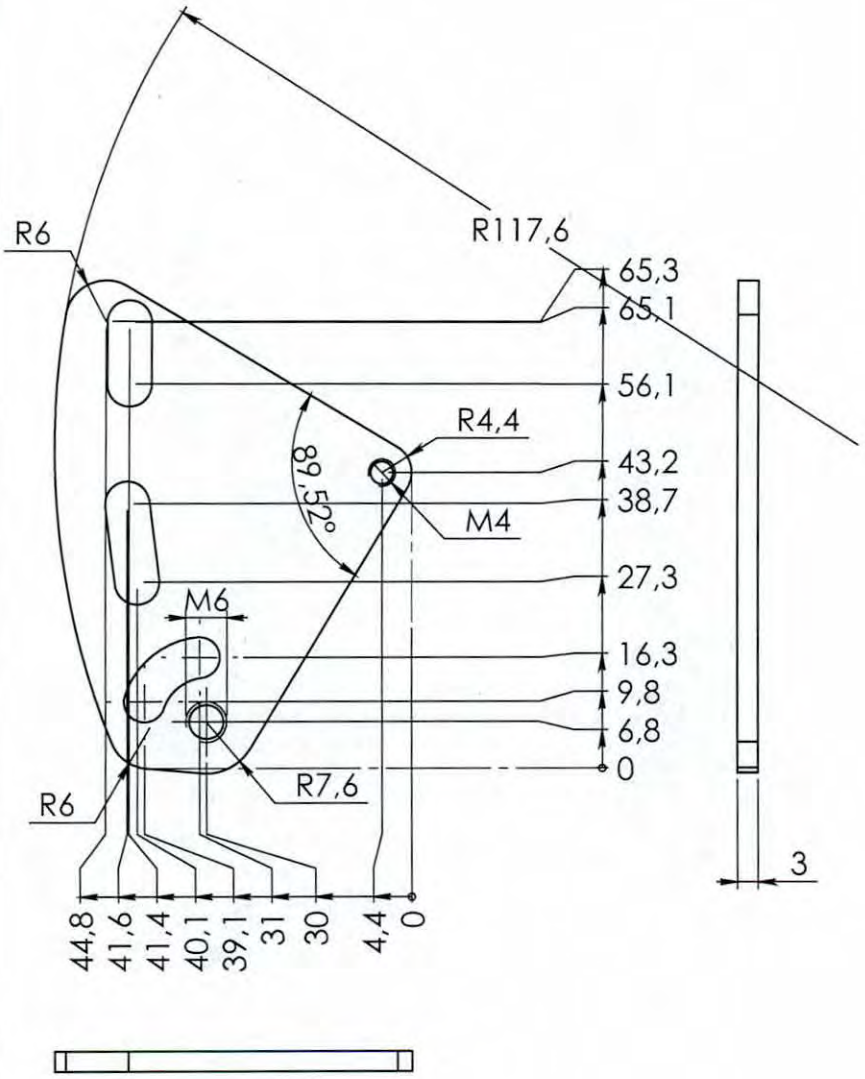
Morsø 7900

Construction:	TOL	05.02.2013
Released:	RSV	30.08.2012
Format:	A4	
Scale:	1:1	
Itemno.:	71793800	

morsø

Drawing no.: **7900-76 b**

Date of print: 20-02-2013



Rev.	Revisions	Sign.:	Date:
b	Hul ændret fra Ø5 til M6. + Påført varenummer	TOL	20.02.2013

Dim. without indication of margin acc. to DS/ISO 2768-1 m		Construction:	LAH 02.02.12
Material:	SPD - DC01AM/EN10130	Released:	RSV 30.08.2012
Weight kg.:	0.05	Format:	A4
Model no.		Scale:	1:1
Drawingtype:		Itemno.:	71793700
Location of file:	C:\Working\7900-77 Plade for lukkekrog.SLDPRT	Drawing no.:	7900-77 b

Title:

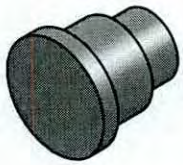
Plade for lukkebeslag

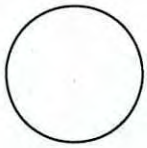
Plate for closing mechanism

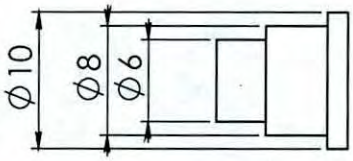
Morsø 7900

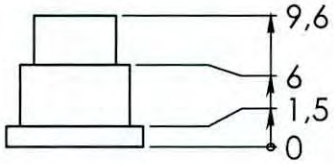
morsø

Date of print: 20-02-2013







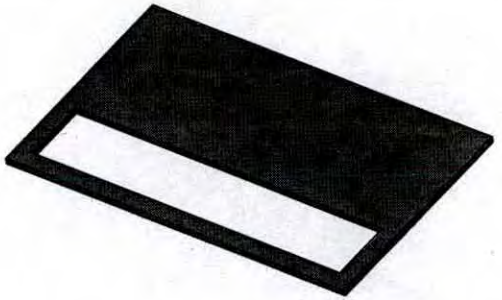


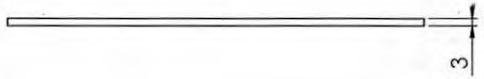
Material CR/NI Steel

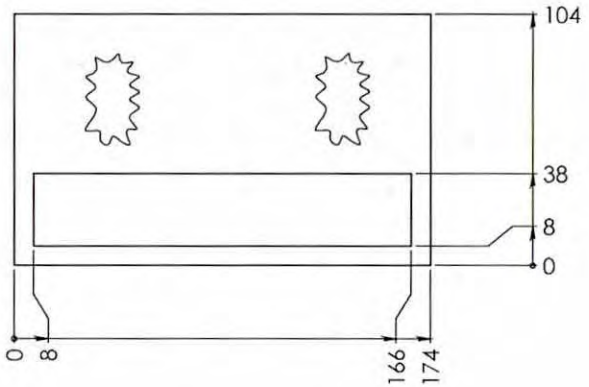
Rev.	Revisions	Sign.:	Date:

	Title:	Construction:	LAH	16-05-2012
	Drejepunkt lukketøj	Released:	RSV	30.08.2012
Material: Ni / Cr steel	**Turning point Closing**	Format:	A4	
Weight kg.: 0.003	**Morsø 7900**	Scale:	**2:1**	
Model no.		Itemno.:	**Part of 71791100**	
Drawingtype:	morsø	Drawing no.:	**7900-78 a**	
Location of file: U:\udv\Tegninger\7900\7900-78 Drejepunkt for lukkekrog.SLDPRT				

Date of print: 30-08-2012

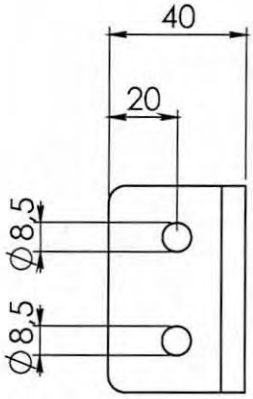


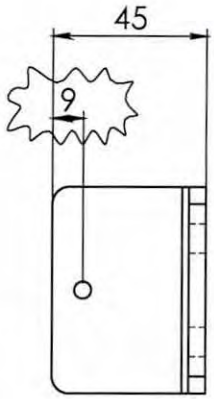


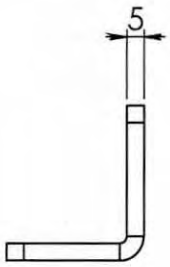


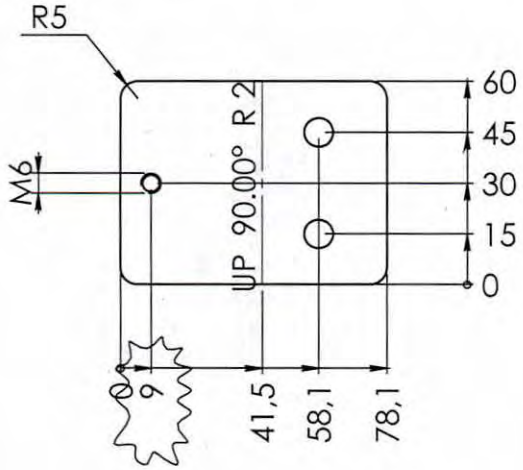
b	Removed the to M6.		RSV	21.09.2012
Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	LAH	03.02.12
Dim. without indication of margin acc. to DS/ISO 2768-1 m	**Mellem plade friskluft boks**	Released:	RSV	30.04.2012
Material: SPD Plade	**Middle plate airtightbox**	Format:	**A3**	
Weight kg: 0.3		Scale:	**1:2**	
Model no.	**Morsø 7900**	Itemno.:	**Part of 71790300**	
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-80 b**	
Location of file:				

Date of print: 21-09-2012





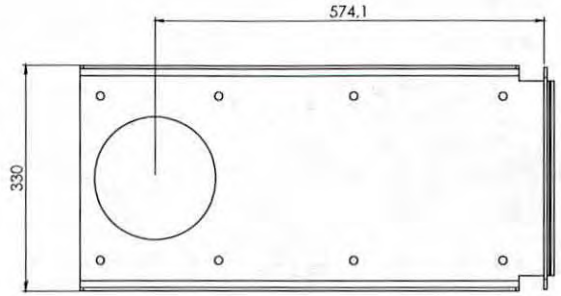


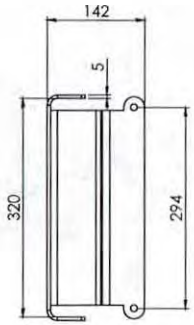


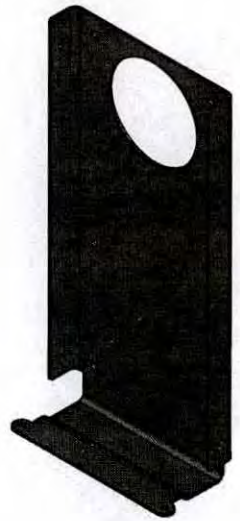
Rev.	Revisions	Sign.:	Date:
b	Changed dimension from 12 to 9.	RSV	18.10.2012

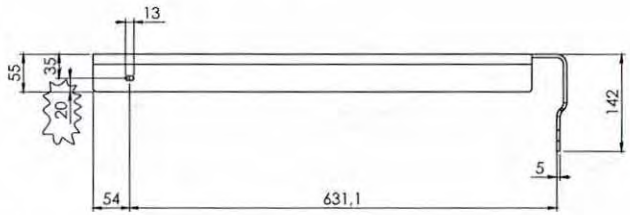
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: **Vinkel f. vægbeslag** **Fitting f. wall fitting** **Morsø 7900**	Construction:	LAH 06.02.12
Material:	SPD Plade		Released:	RSV 30.04.2012
Weight kg.:	0.2		Format:	A4
Model no.			Scale:	1:2
Drawingtype:	Product drawing		Itemno.:	71791500
Location of file:	U:\udv\Tegninger\7900\7900-81 Vinkel for vægbeslag.SLDPRT	morsø	Drawing no.:	7900-81 b

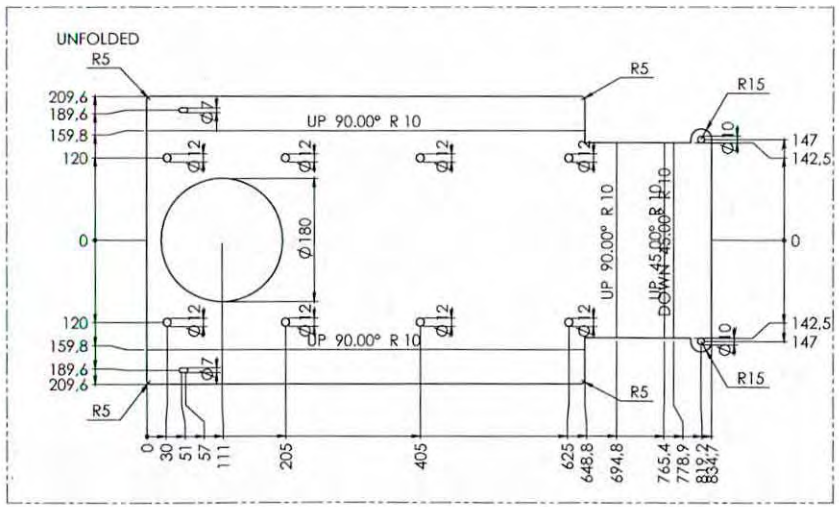
Date of print: 18-10-2012



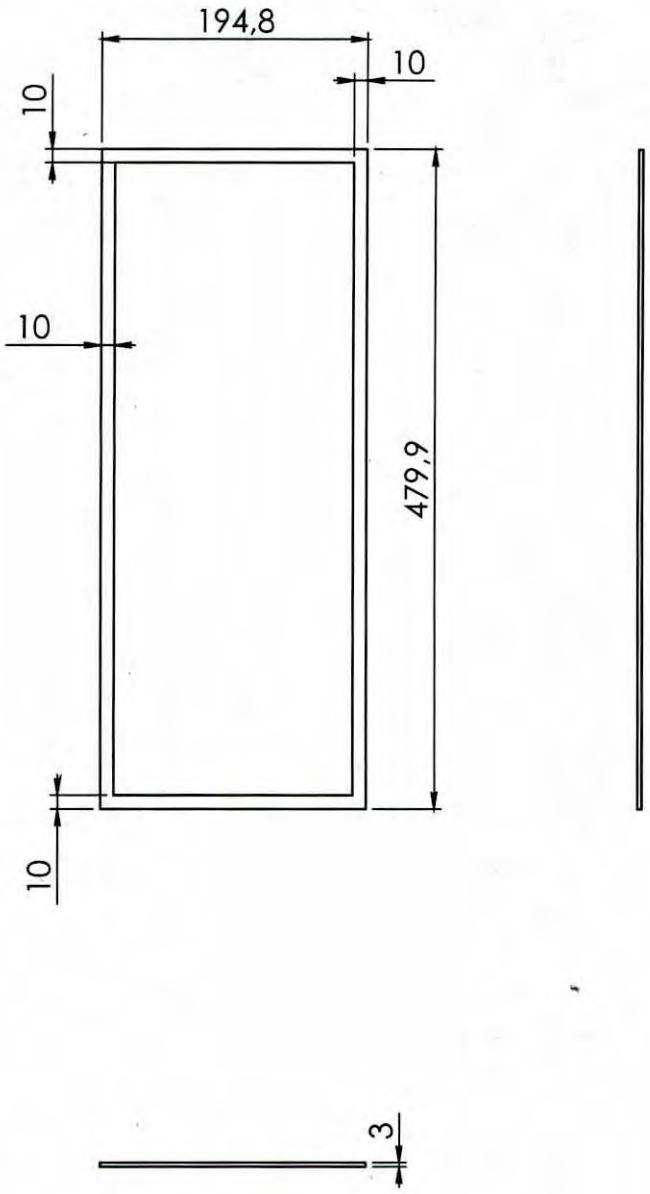








c	Changed dimension from 23 to 20.		RSV	18.10.2012
b	Added dimension for thikness.		RSV	16.10.2012
Rev	Revisions		Sign.:	Date:
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Vægbeslag Wall fitting Morsø 7900	Construction:	LAH	06.02.12
		Released:	RSV	02.05.2012
Material: SPD Plade		Format:	A2	
Weight kg.: 11.52		Scale:	1:5	
Model no.		Permo.:	P - 71791400	
Drawingtype: Product drawing	morsø	Drawing no.:	7900-82 c	
Location of file:				

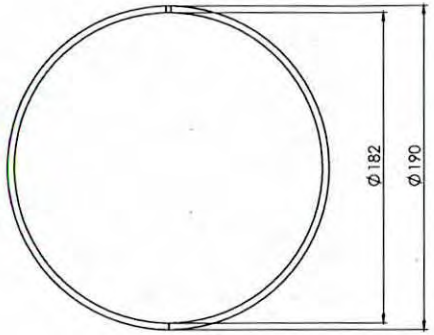


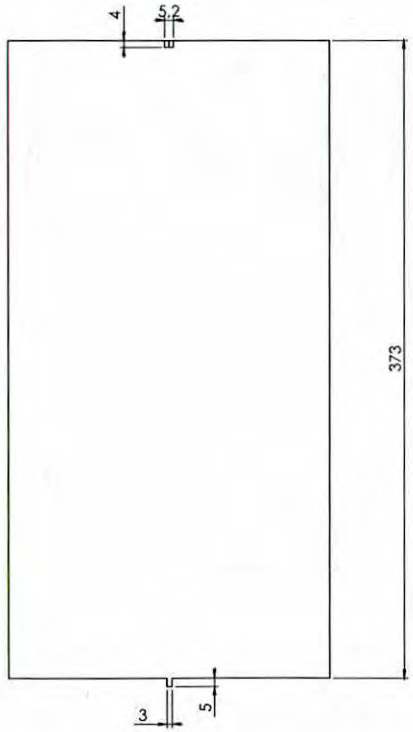
Rev.	Revisions	Sign.:	Date:

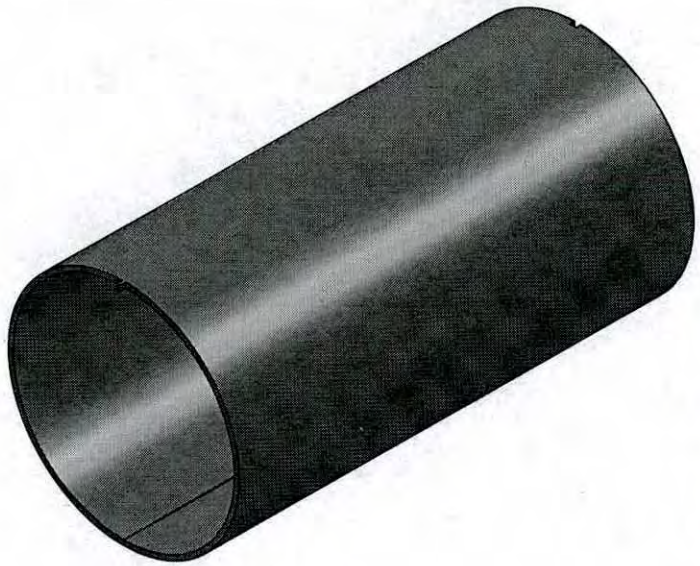
Title:		Construction:	RSV 24.04.2013
Glasbånd m. tape indv. side		Released:	
Glass gasket tape inner side		Format:	A4
Morsø 7900		Scale:	1:5
		Itemno.:	79074200
morsø		Drawing no.:	7900-83 a

Dim. without indication of margin acc. to DS/ISO 2768-1 m	
Material:	E-Glass Fiber
Weight kg.:	0.11
Model no.	-
Drawingtype:	Product drawing
Location of file:	C:\Working\7900-83 Glasbånd indv. side.SLDPRT

Date of print: 24-04-2013



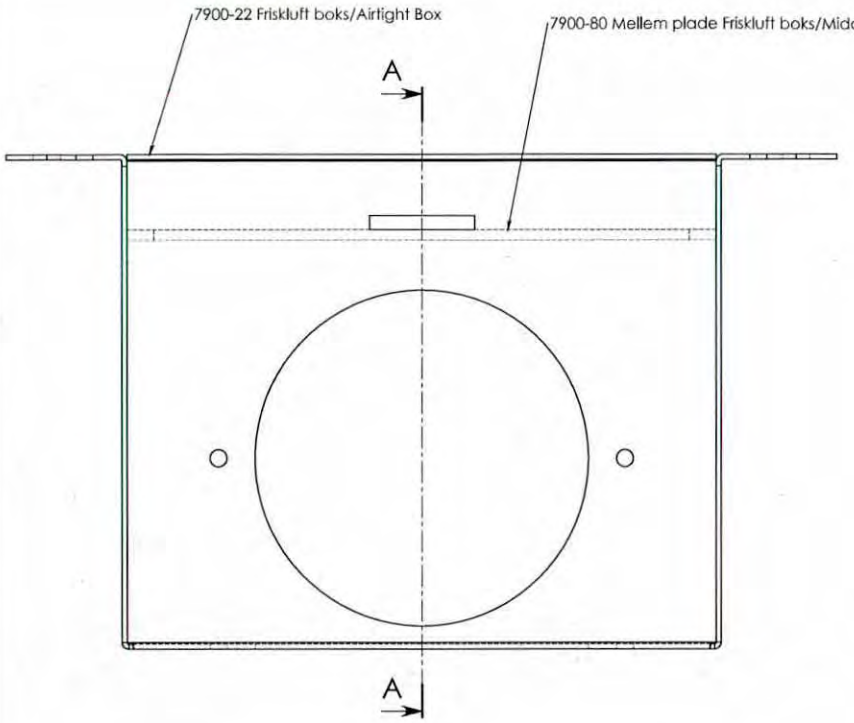


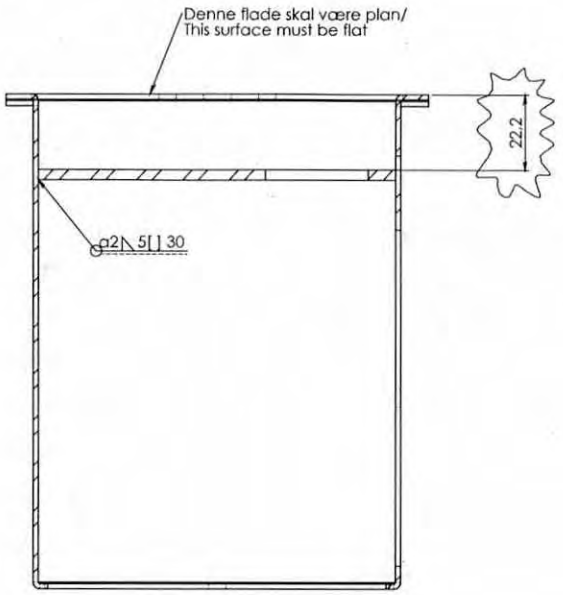


Rev.	Revisions		Sign.:	Date:
	Title:	Construction:	LAH	24.05.12
		Released:	RSV	30.08.2012
	Rør for piedestal	Format:	**A2**	
	Pipe for Pedestal	Scale:	**1:2**	
	Morsø 7900	Item no.:	**Part of 71793100**	
		Drawing no.:	**7900-85 a**	

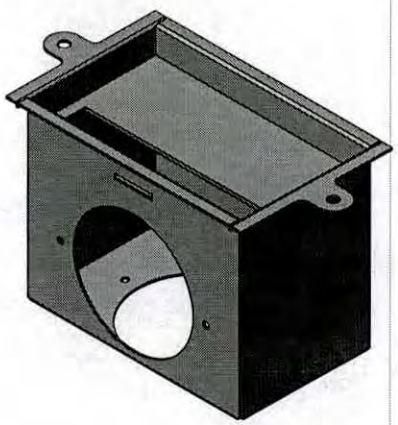
Material:	SPD - DC01AM/EN10130
Weight kg.:	6.7
Model no.	
Drawingtype:	
Location of file:	

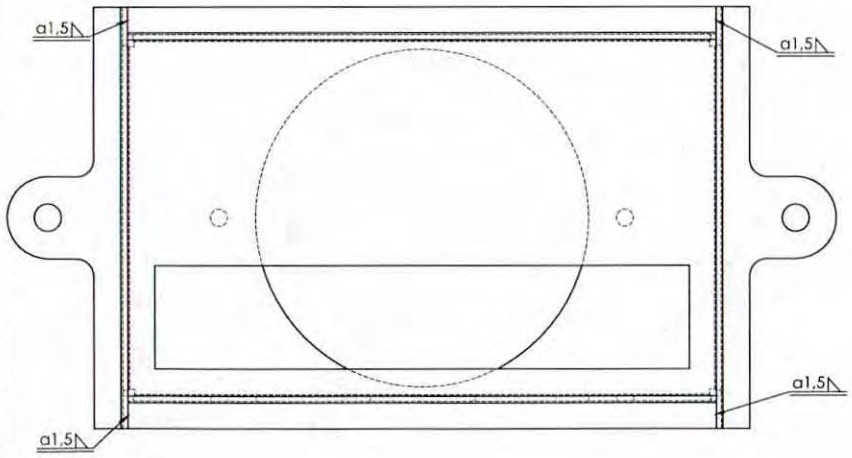
morsø





A-A



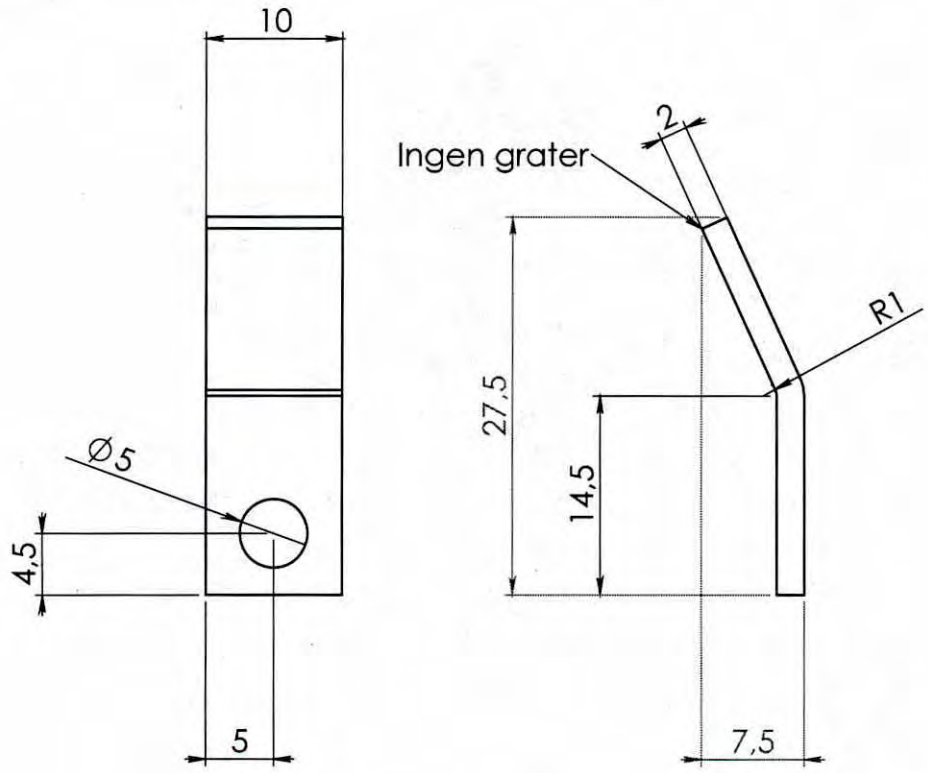


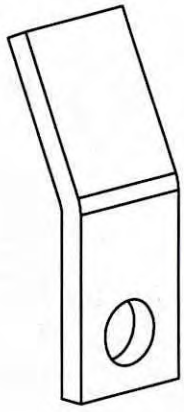
Rev	Revisions	Sign.	Date:
g	Changed dimension to reglangulary hole.	RSV	03.10.2012
f	Removed two M6.	RSV	24.09.2012
e	Added weldings in the corners.	RSV	17.09.2012
d	Moved welding from the top to the bottom side.	RSV	14.09.2012
c	Changed dimension to reglangulary hole.	RSV	06.09.2012

Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title:	
Material:	ERROR!:materiale	Frisklufft boks svejst Airtight Box welded Morsø 7900	
Weight kg.:	1.33		
Model no.			
Drawingtype:	Product drawing		
Location of file:			

Construction:	LAH	10.10.11
Released:	RSV	30.04.2012
Format:	A2	
Scale:	1:1	
Itemno.:	71790300	
Drawing no.:	7900-87 g	

morsø

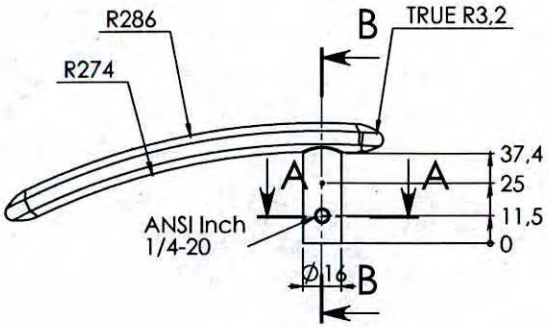


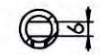


Rev.	Revisions	Sign.:	Date:

Mål uden toleranceangivelse i.h.t. DS/ISO 2768-1 m	Title: **Glasclips 8100**	Construction:	RSV	21.11.05
		Released:	KDU	06.03.06
Material: Rustfri stål		Format:	A4	
Weight: 0. kg		Scale:	**2:1**	
Model no.	**Morsø 8100**	Itemno.:	**71814561**	
Drawingtype: Emnetegning	morsø	Drawing no.:	**8100-132 a**	
Location of file: U:\UDV\tegninger\8100\8100-132 Glasclips 8100.SLDPRT				

Date of print: 24-04-2013





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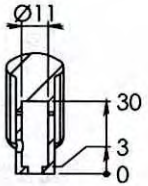
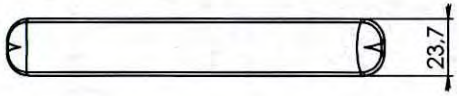
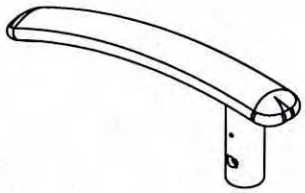


B-B



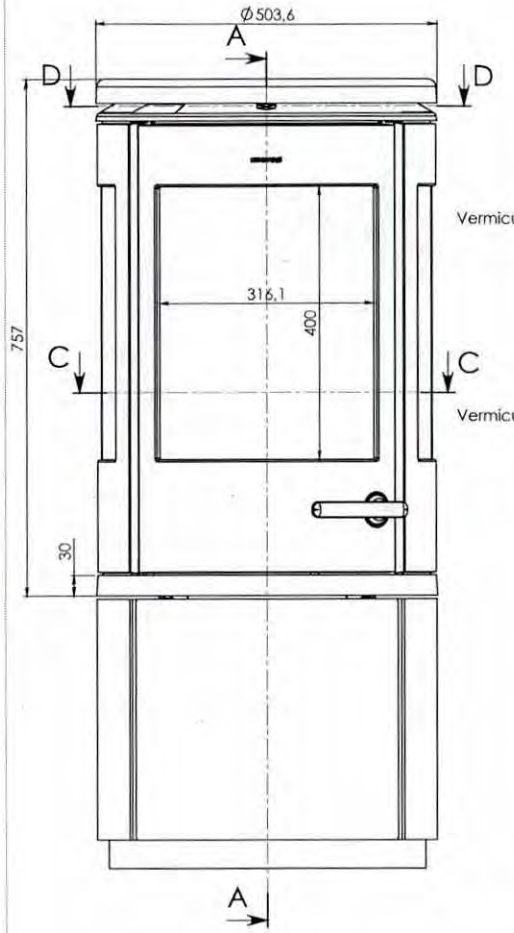


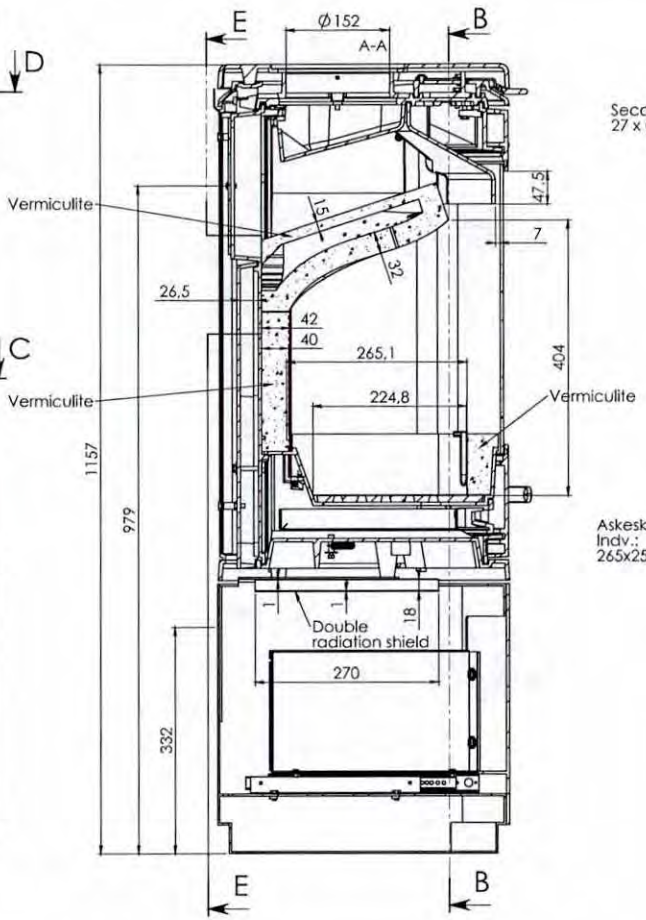
Constructional Drawing

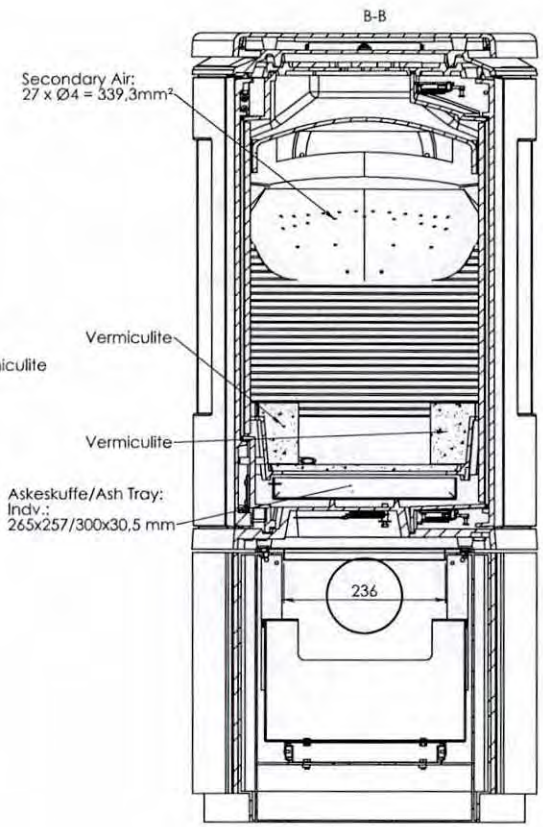
Rev.	Revisions	Sign.:	Date:

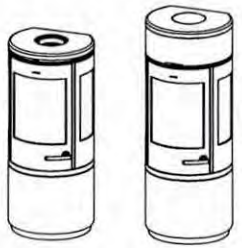
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title: Håndtag fyrdør NA Handle door NA Morsø 7900	Construction:	LAH 10-04-2013
Material:	Rustfri stål - Aisi 304		Released:	
Weight kg:	0.3		Format:	A3
Model no.			Scale:	1:2
Drawingtype:			Itemno.:	
Location of file:		morsø	Drawing no.:	7900-162

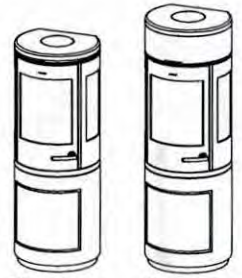
Date of print: 10-04-2013

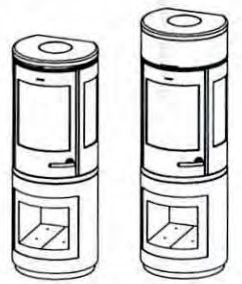


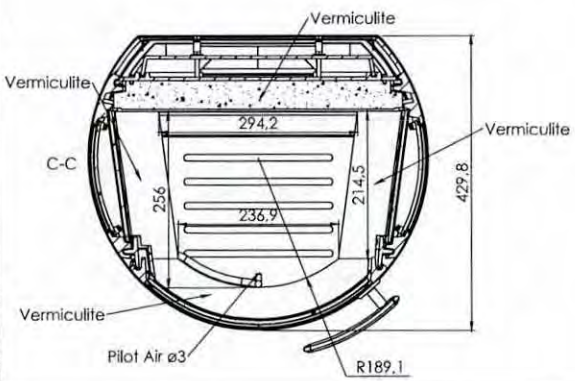


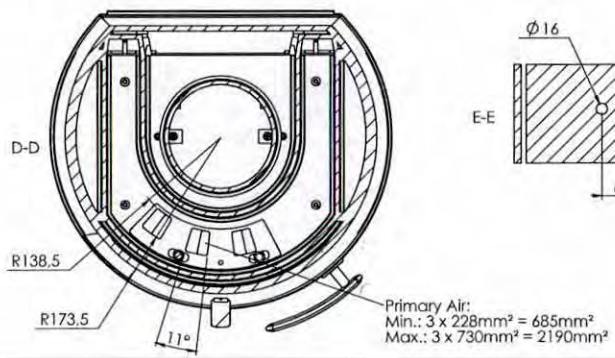


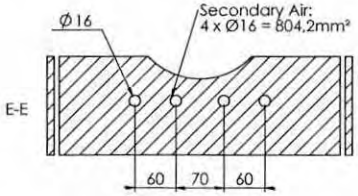






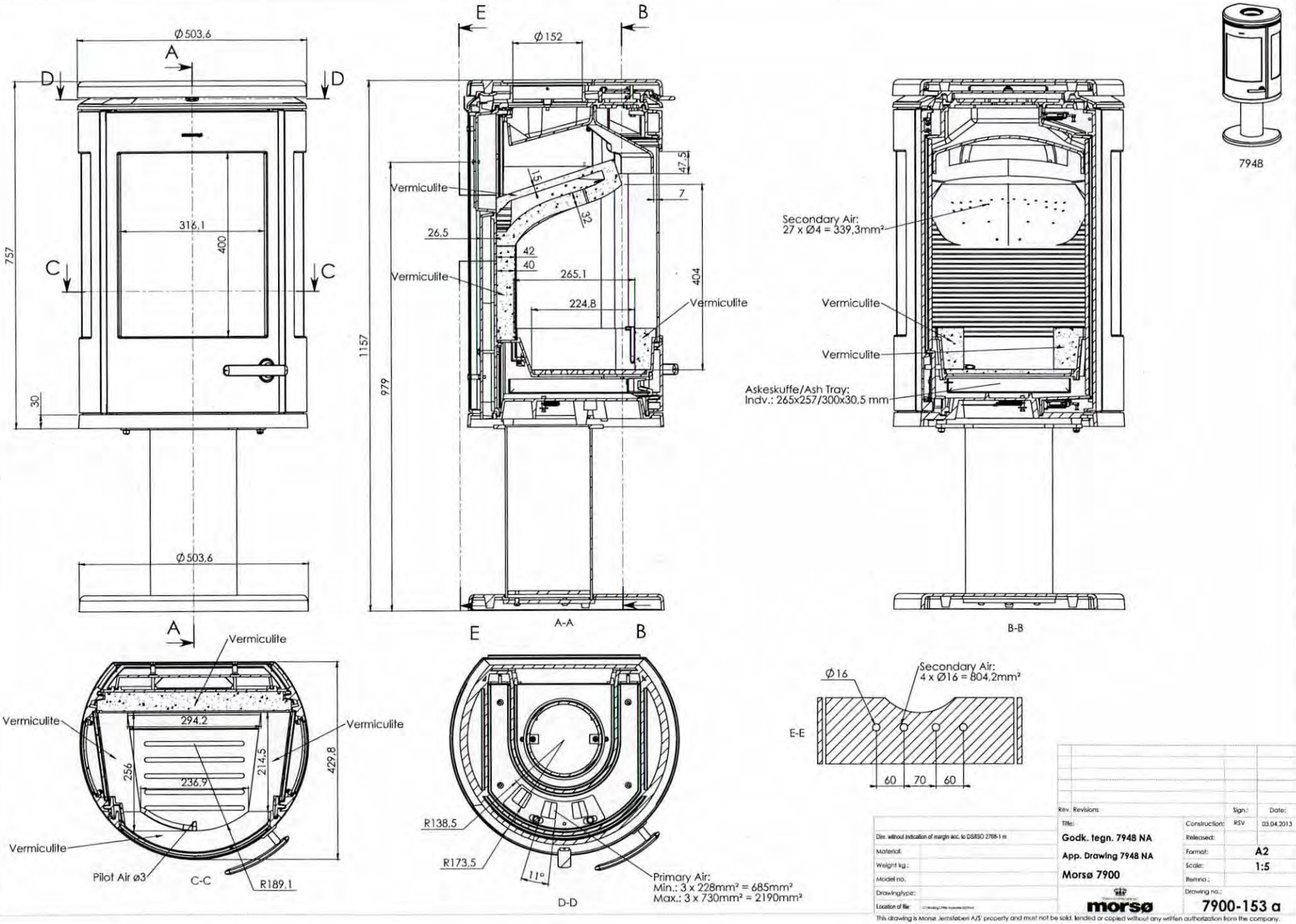






Rev.	Revisions	Sign.	Date:

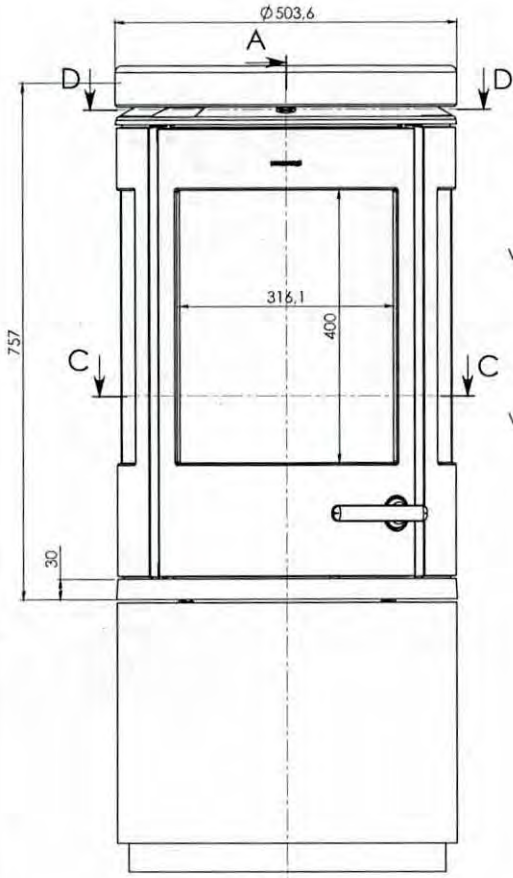
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Godk. tegn. 7943 NA	Construction: RSV	03.04.2013
Material:	App. Drawing 7943 NA	Released:	
Weight kg.:	Morsø 7900	Format:	A2
Model no.:		Scale:	1:5
Drawingtype:		Item no.:	
Location of file:	morsø	Drawing no.:	7900-152 a

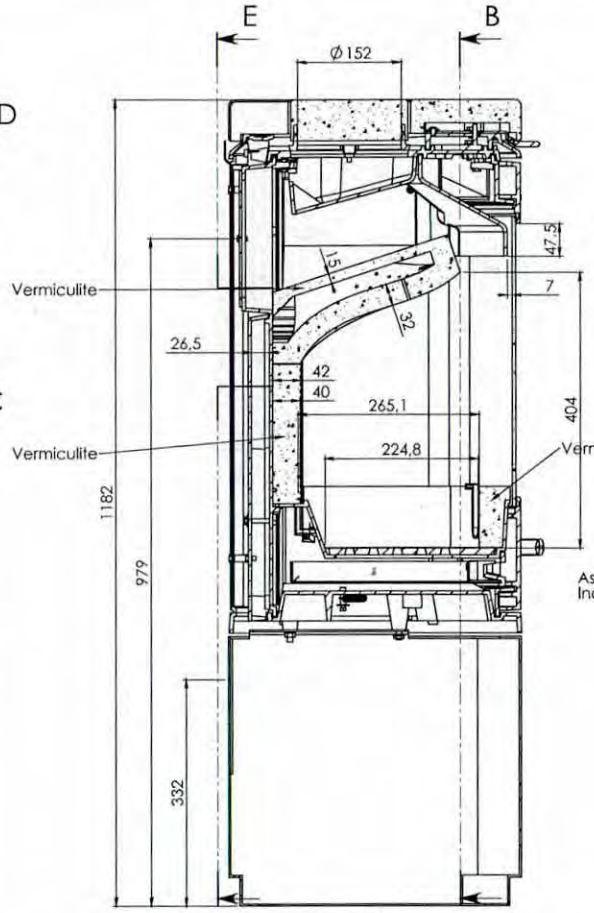


Rev.	Revisions	Sign.:	Date:

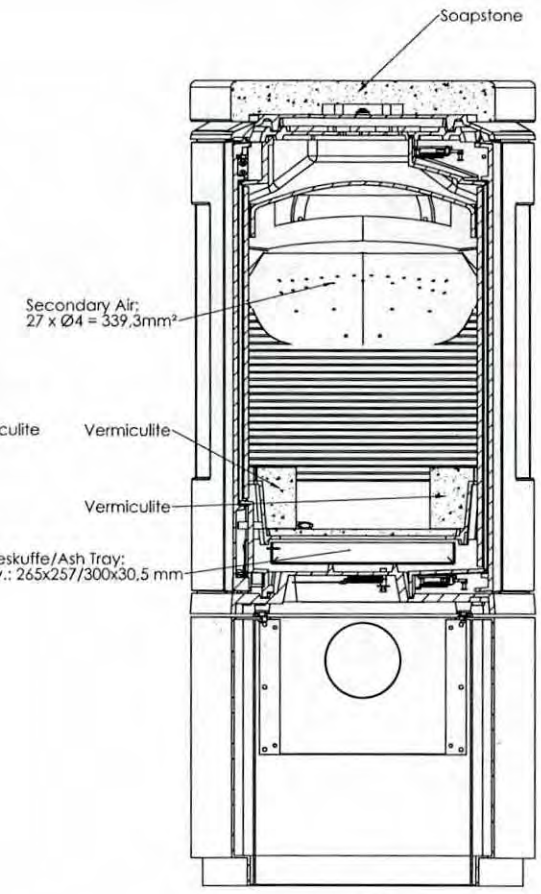
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title:	Construction:	RSV 03.04.2013
Material:	Godk. tegn. 7948 NA	Released:	
Weight kg.:	App. Drawing 7948 NA	Format:	A2
Model no.	Morsø 7900	Scale:	1:5
Drawingtype:		Remno.:	
Location of file:		Drawing no.:	7900-153 a

morsø

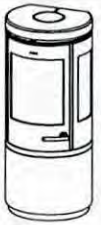




A-A

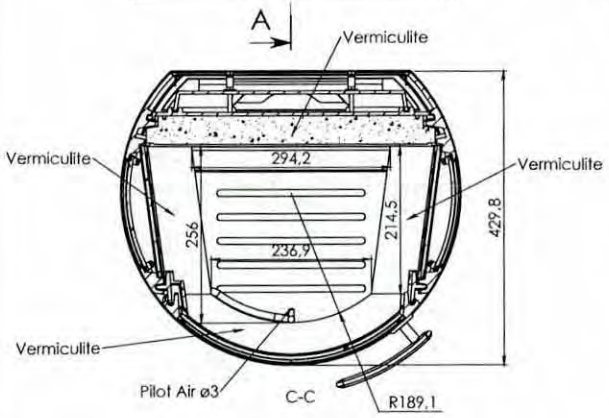


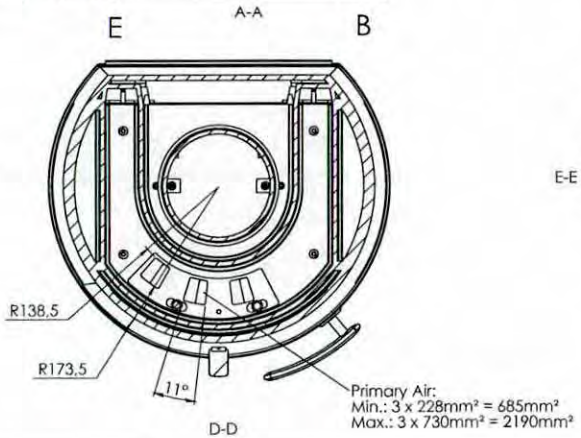
B-B



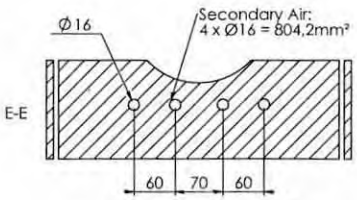
7950

The soapestone top is an option and can be used on Morso variants either Morso 7940, Morso 7943, Morso 7948, Morso 7970 or Morso 7990 stoves, where the cast iron top plate is replaced by a top plate of soapstone.



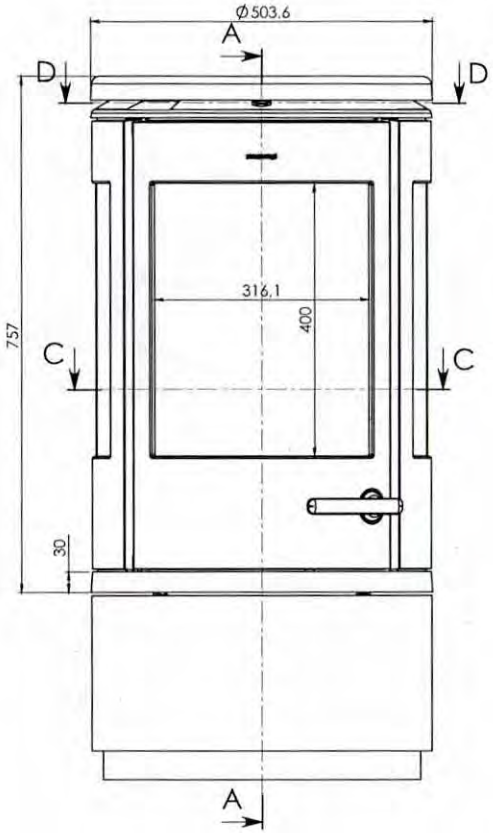


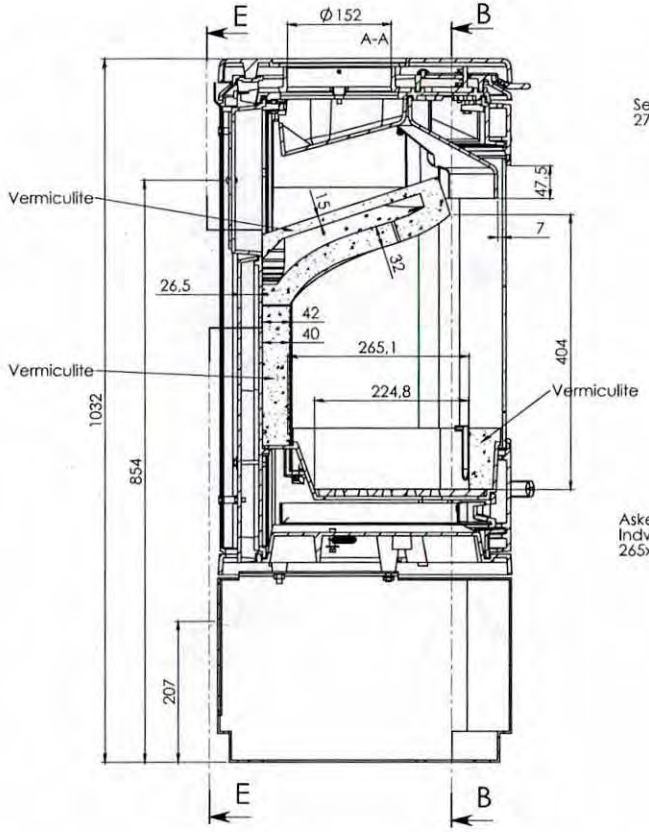
D-D

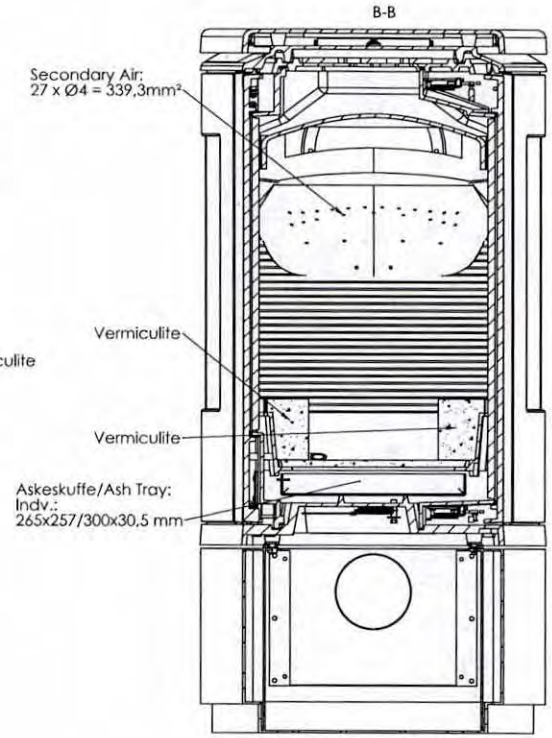


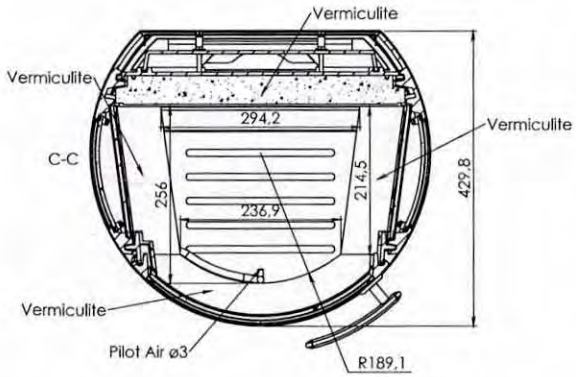
Rev.	Revisions	Sign.	Date

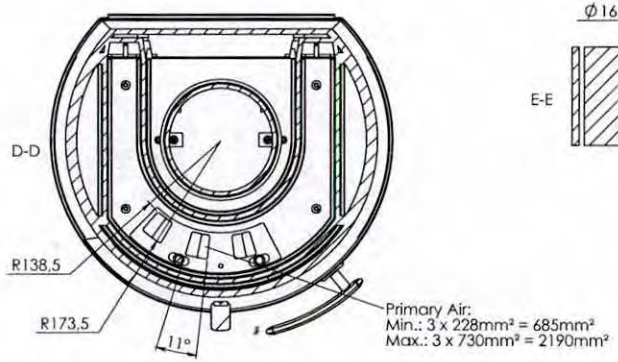
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Godk. tegn. 7950 NA	Construction: RSV	03.04.2013
Material:		Released:	
Weight kg.:	App. Drawing 7950 NA	Format:	A2
Model no.	Morsø 7900	Scale:	1:5
Drawingtype:		Item no.:	
Location of file:	morsø	Drawing no.:	7900-154 a

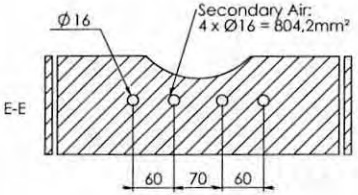






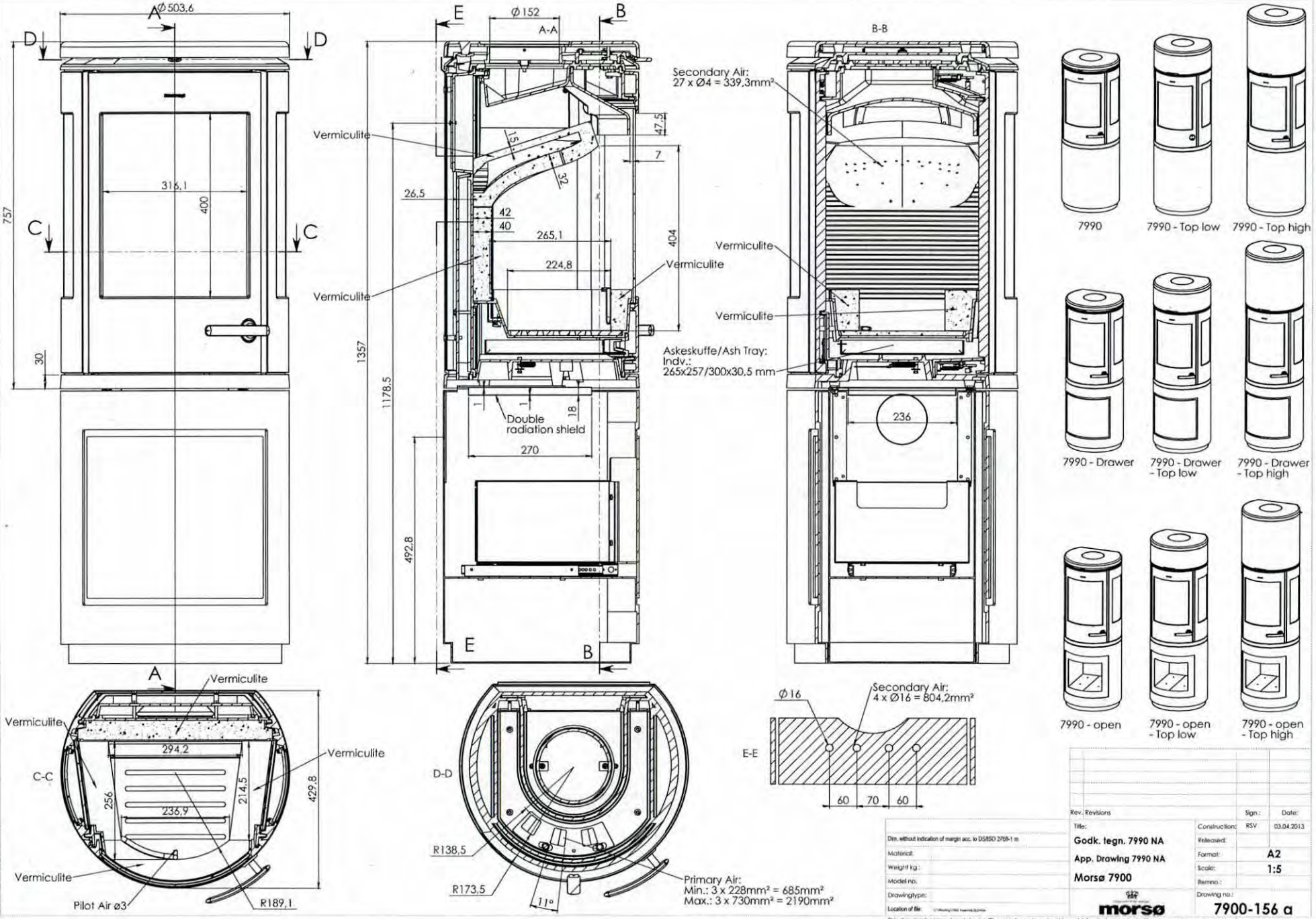






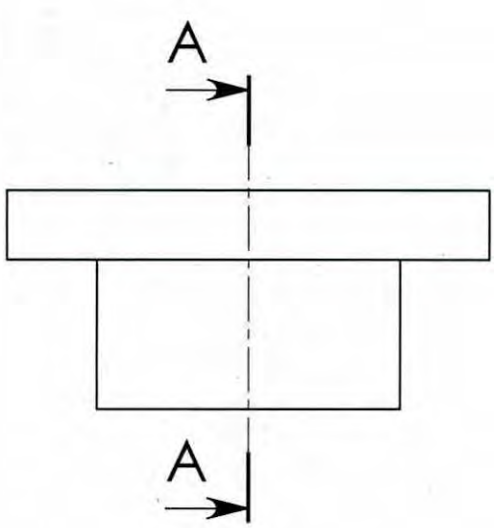
Rev.	Revisions	Sign.:	Date:

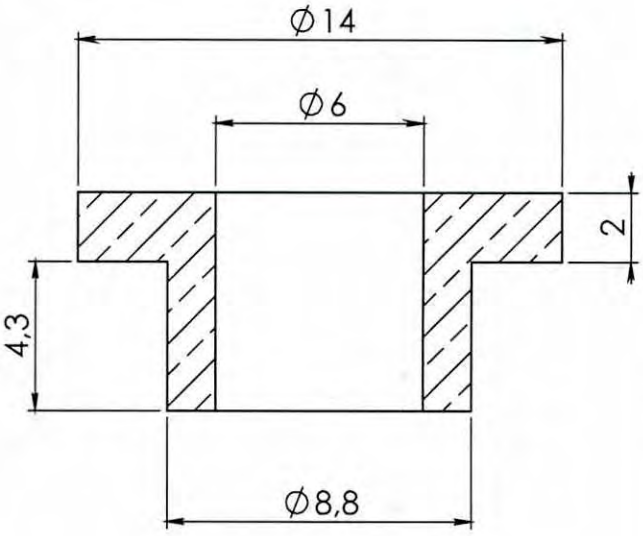
Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Godk. tegn. 7940 NA	Construction: RSV	03.04.2013
Material:	App. Drawing 7940 NA	Released:	
Weight kg.:	Morsø 7900	Format:	A2
Model no.:		Scale:	1:5
Drawingtype:		Item no.:	
Location of file:	morsø	Drawing no.:	7900-151 a



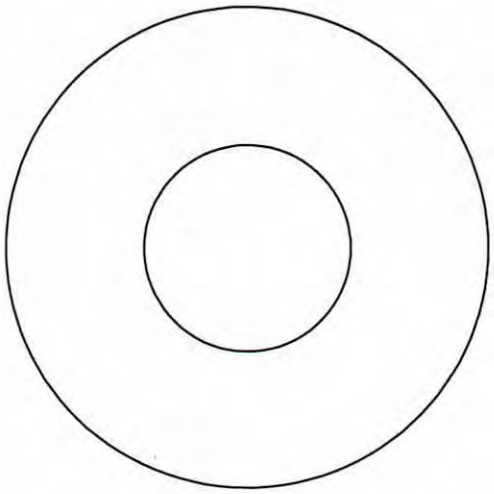
Rev.	Revisions	Sign:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Godk. tegn. 7990 NA	Construction: RSV	03.04.2013
Material:	App. Drawing 7990 NA	Released:	
Weight kg:		Format: A2	
Model no.	Morsø 7900	Scale: 1:5	
Drawingtype:		Item no.:	
Location of file:	morsø	Drawing no.: 7900-156 a	





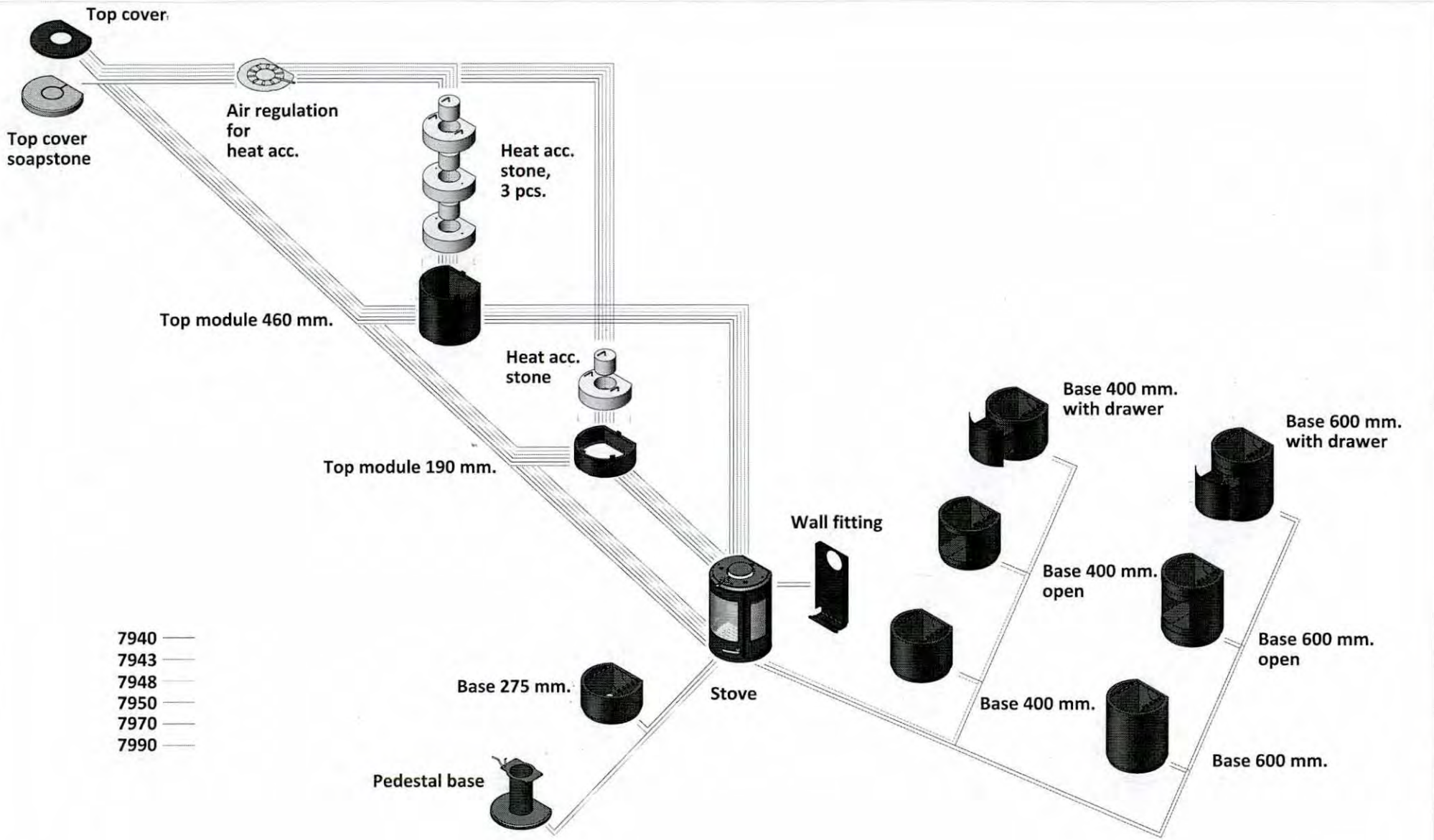
A-A (5 : 1)

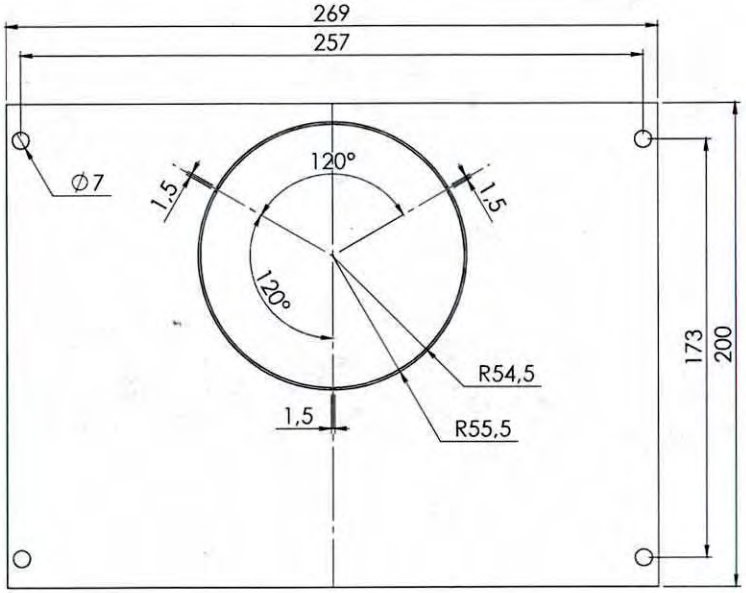


Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 f		Title: **Bøsning Bush Morsø 7900**	Construction:	TOL 05.02.2013
			Released:	TOL 20.02.2013
Material:	Commercial Bronze, UNS C22000 (90-10 Bronze)		Format:	A4
Weight kg.:	0.003		Scale:	**2:1**
Model no.	-		Itemno.:	**54793800**
Drawingtype:		morsø	Drawing no.:	**7900-149 a**
Location of file:	C:\Working\Bøsning bronze 7900 lukkefølj.SLDPRT			

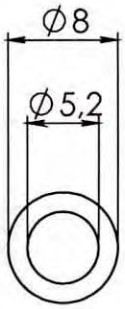
Date of print: 20-02-2013

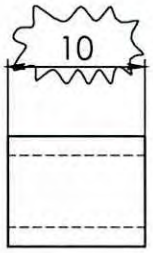

Top cover
Top cover soapstone
Air regulation for heat acc.
Heat acc. stone, 3 pcs.
Top module 460 mm.
Heat acc. stone
Top module 190 mm.
Wall fitting
Base 400 mm. with drawer
Base 600 mm. with drawer
Base 400 mm. open
Base 600 mm. open
Base 400 mm.
Base 600 mm.
Stove
Base 275 mm.
Pedestal base
7940
7943
7948
7950
7970
7990



Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: **Bagplade** **Plate rear** **Morsø 7900**	Construction:	RSV	18.10.12
		Released:	RSV	28.02.2013
Material: SPD - DC01AM/EN10130		Format:	**A3**	
Weight kg: 1.231		Scale:	**1:2**	
Model no.		Itemno.:	**71793900**	
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-131 a**	
Location of file: C:\tf\drawing\7900-131 Bagplade til skaller 7900.SLDPRT				

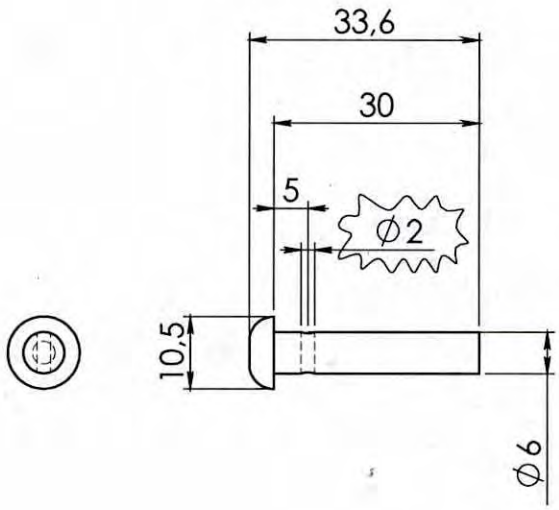




b	Ændret længde fra 8 til 10mm.	RSV	14.08.2012
Rev.	Revisions	Sign.:	Date:

	Title:	Construction:	RSV	09.08.2012
Dim. without indication of margin acc. to DS/ISO 2768-1 m	**Afstandsrør**	Released:		
Material: Rustfri Hydraulikrør	**Ø8/Ø5,2**	Format:	A4	
Weight kg.: 0.002		Scale:	**2:1**	
Model no.	**Morsø 7900**	Itemno.:	**71793661**	
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-126 b**	
Location of file: U:\udv\Tegninger\standardbibliotek\Afstandsrør\Afstandsrør øBxø5.2.SLDPRT				

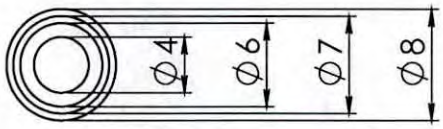
Date of print: 15-08-2012

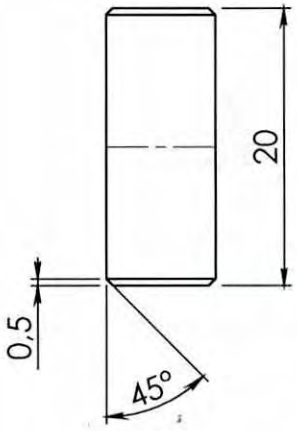


Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title:	Construction:	RSV	07.08.2012
Material: Automatstål	**Ø6x30 Din 660**	Released:	RSV	13.08.2012
Weight kg.: 8.2	**med Ø1,5 hul**	Format:	A4	
Model no.	**Morsø 7900**	Scale:	1:1	
Drawingtype: Product Drawing		Itemno.:	54701400	
Location of file: U:\udv\Tegninger\Bolteware\DIN 660 KN KULLRIG NIT.SLDPRT	morsø	Drawing no.:	7900-124 a	

Date of print: 13-08-2012

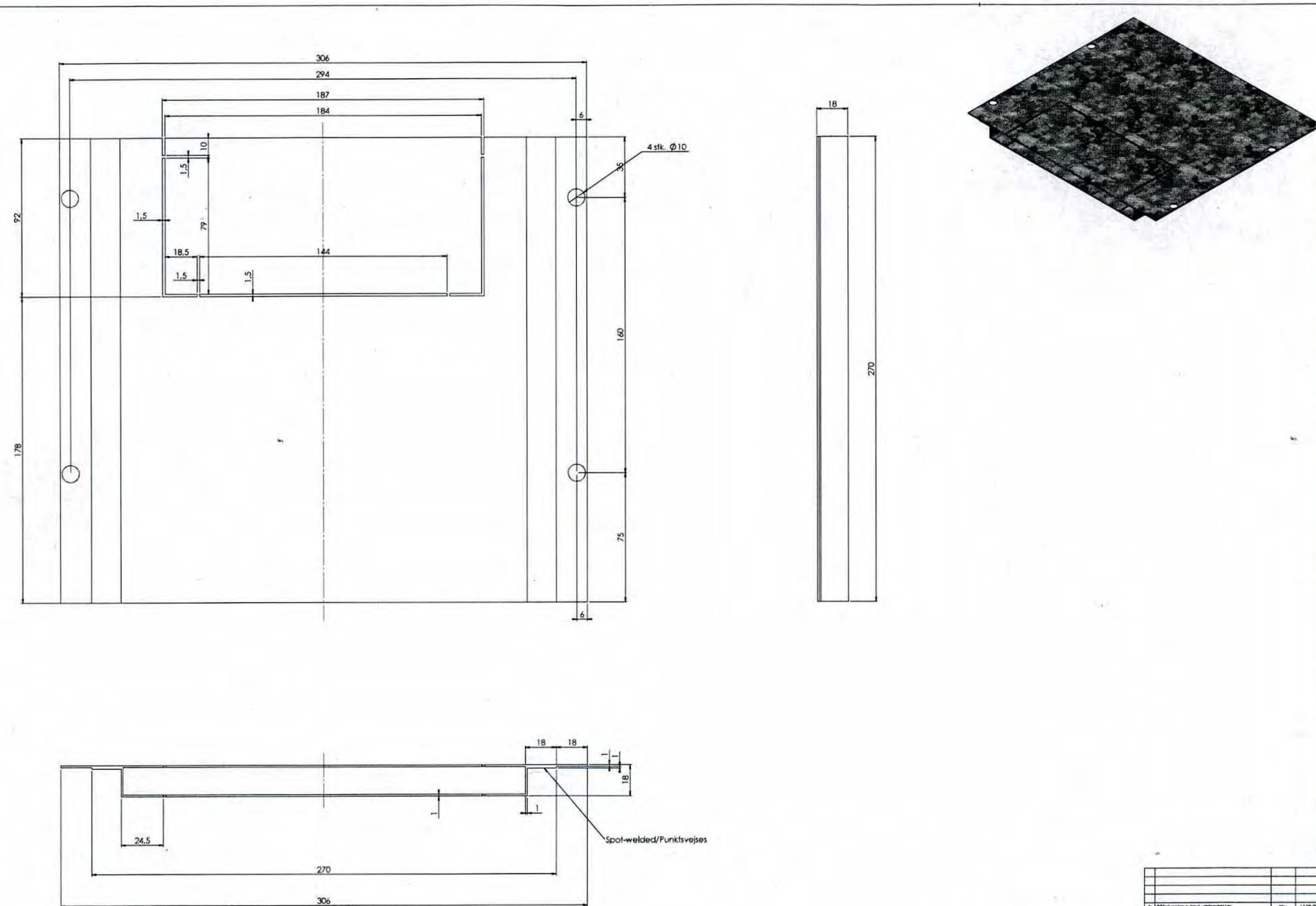




Rev.	Revisions	Sign.:	Date:

	Title:	Construction:	RSV	10.07.12
Dim. without indication of margin acc. to DS/ISO 2768-1 m	**Rustfri rør til wire**	Released:		
Material: Rustfri Automatstål	**Stainless Pipe for wire**	Format:	A4	
Weight kg.: 0.006	**Morsø 7900**	Scale:	**2:1**	
Model no.		Itemno.:	**71793561**	
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-123 a**	
Location of file: U:\udv\Tegninger\7900\7900-123 Rustfri rør til wire 7900.SLDPRT				

Date of print: 10-07-2012



b	Påført rektangulært udslagsbrikker	RSV	17.08.2012
Rev	Revisions	Sign.:	Date:

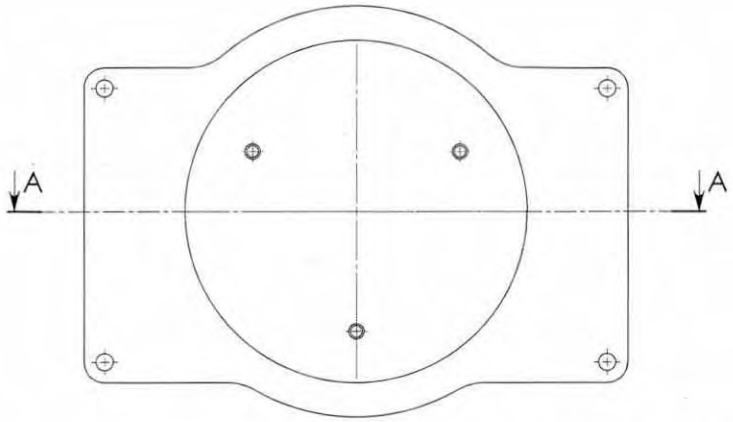
Dim. without indication of margin acc. to DS/ISO 2768-1 m	
Material	Galvanized plate
Weight kg:	1,28
Model no.	-
Drawingtype:	Product drawing

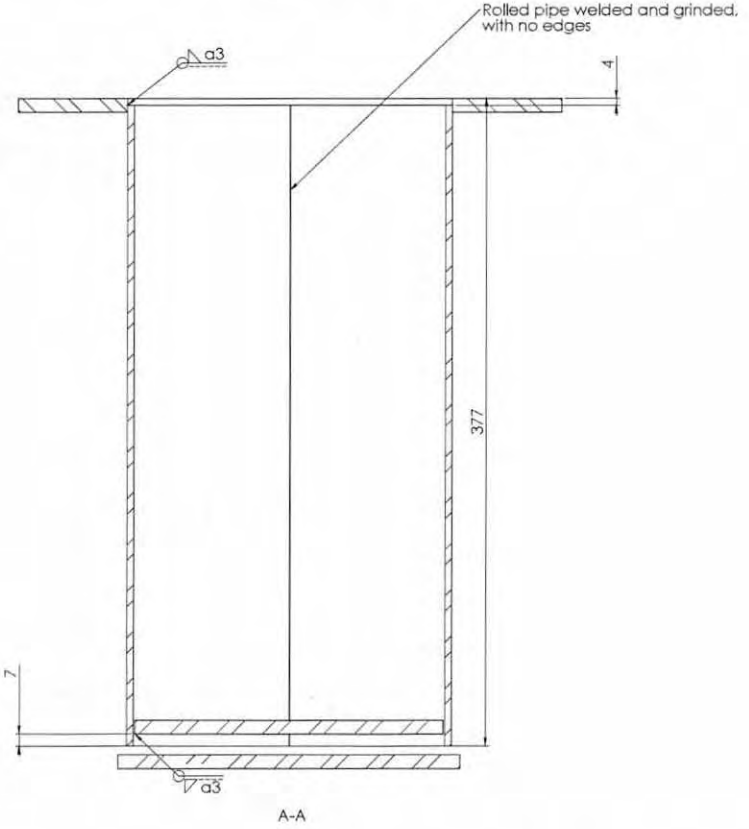
Title:
Strâleskærm bund
Radiate plate bottom
Morsø 7900

morsø

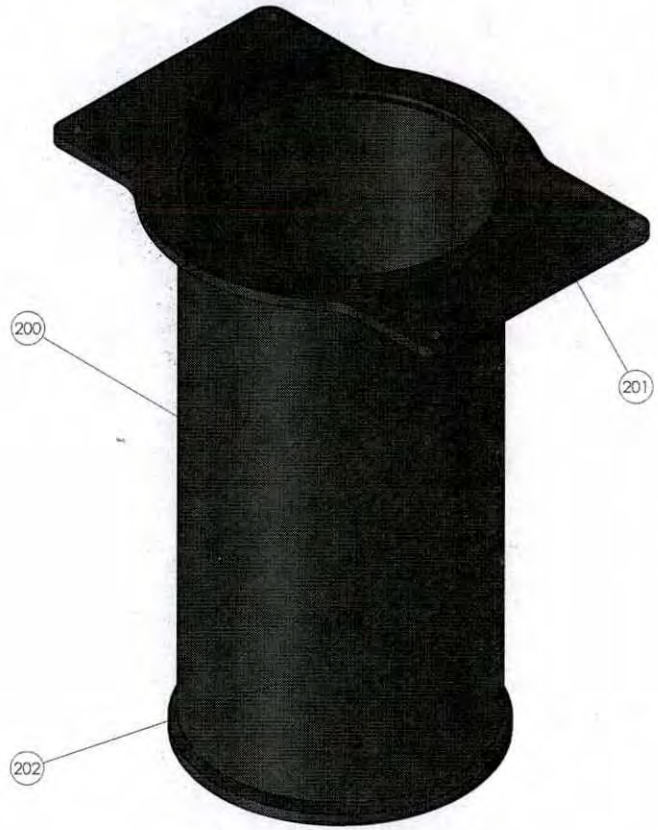
Construction:	RSV	25.06.2012
Released:	RSV	15.06.2012
Format:	A1	
Scale:	1:1	
Item no.	71793300	
Drawing no.:	7900-113 b	

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
200	7900-85 Rør for piedestal	Rør for piedestal	1
201	7900-102 Topplade for piedestal	Topplade for piedestal	1
202	7900-103 Flange i rør for piedestal	Flange i rør Piedestal	1





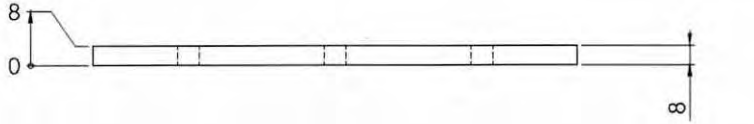
A-A

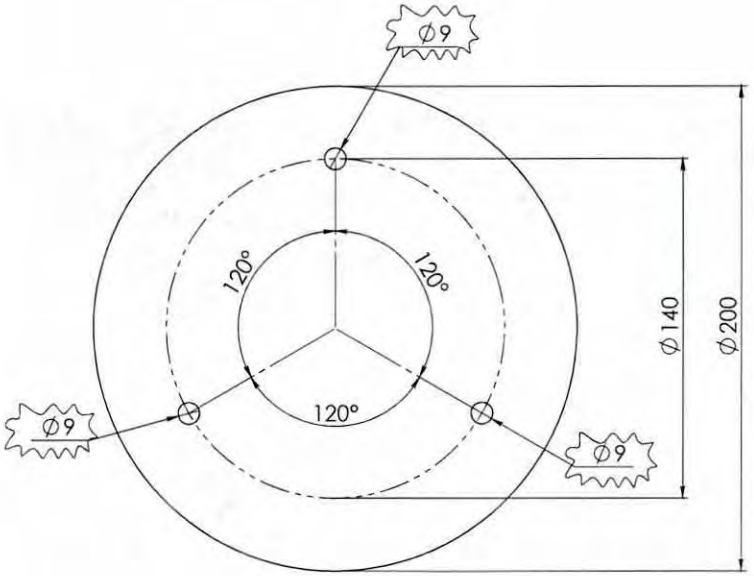


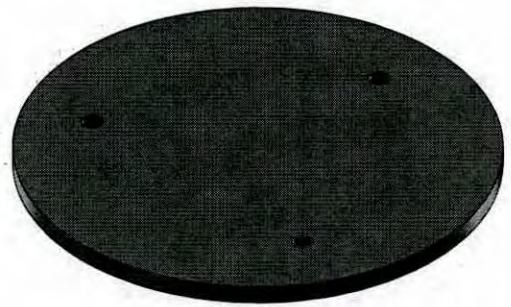
Rev.	Revisions	Sign.:	Date:
b	Moved tap from bag to front.	RSV	19.03.2013

Title:		Construction:	LAH 24.05.12
Piedestal		Released:	RSV 30.08.2012
Pedestal		Format:	**A2**
Morsø 7900		Scale:	**1:2**
		Itemno.:	**71793100**
Material:		Drawing no.:	**7900-105 b**
Weight kg.:	21.0		
Model no.			
Drawingtype:	Assembly drawing		
Location of file:			

morsø

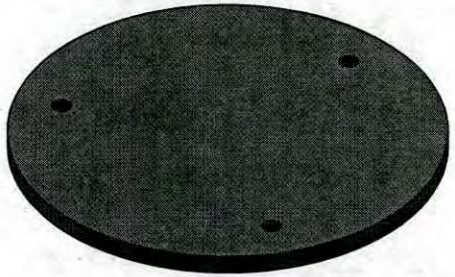


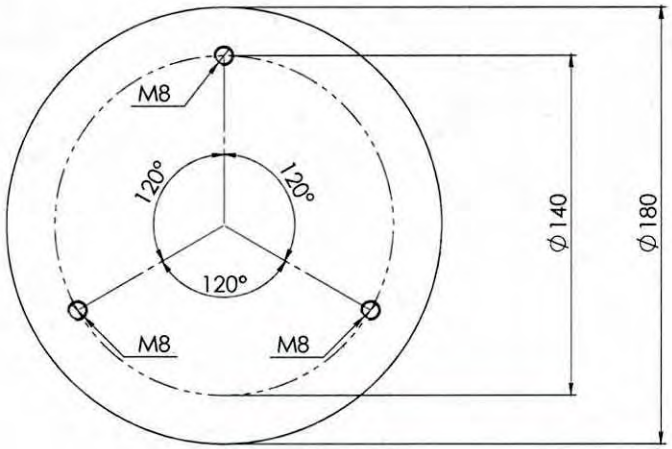




Rev.	Revisions	Sign.:	Date:
a	Changed holes.	RSV	14.08.2012

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title: Mont.flange piedestal / Mount. flange Piedestal / Morsø 7900	Construction:	LAH	24.05.12
		Released:	RSV	14.08.2012
Material: SPD - DC01AM/EN10130		Format:	A3	
Weight kg: 1.9		Scale:	1:2	
Model no.		Itemno.:	71793200	
Drawingtype: Product drawing	morsø	Drawing no.:	7900-104 a	
Location of file:				

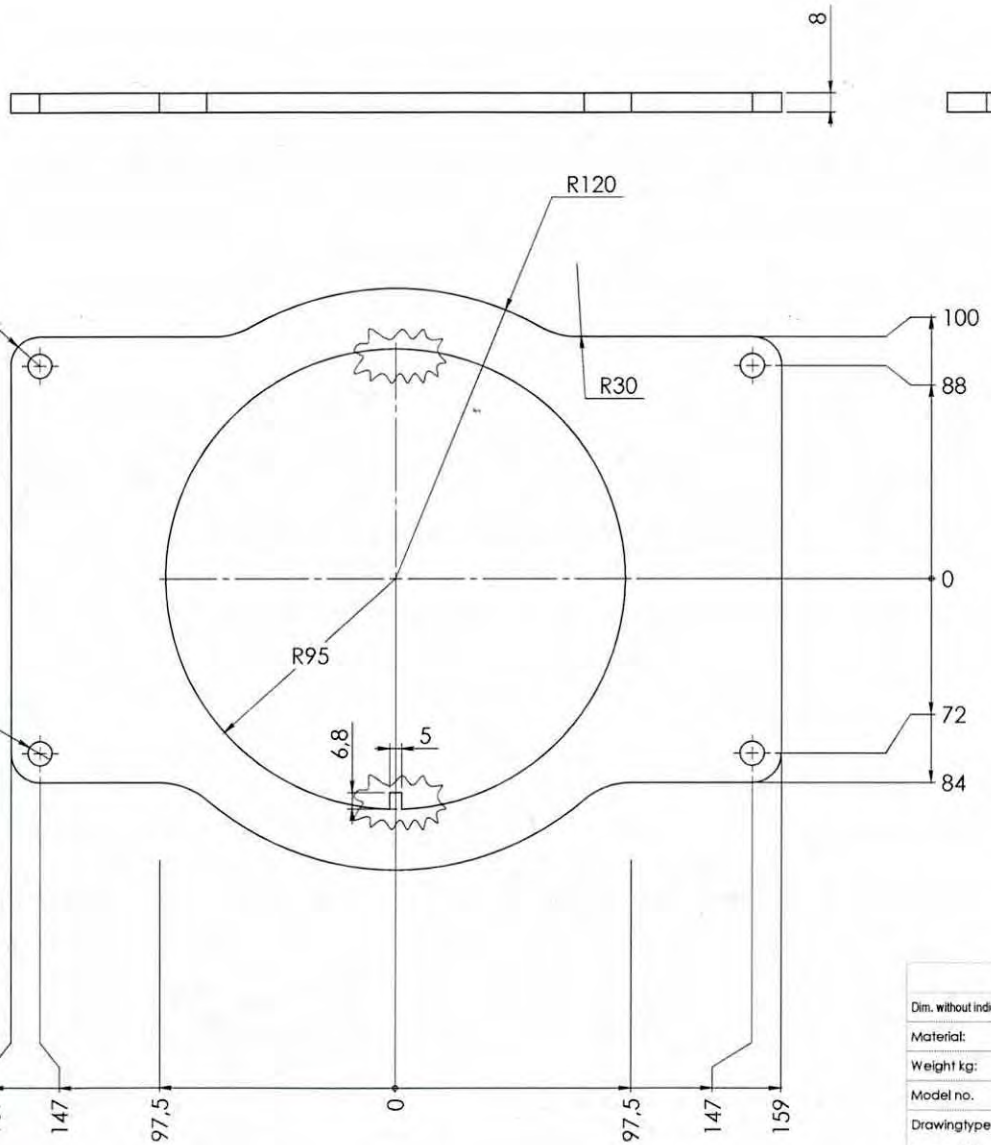




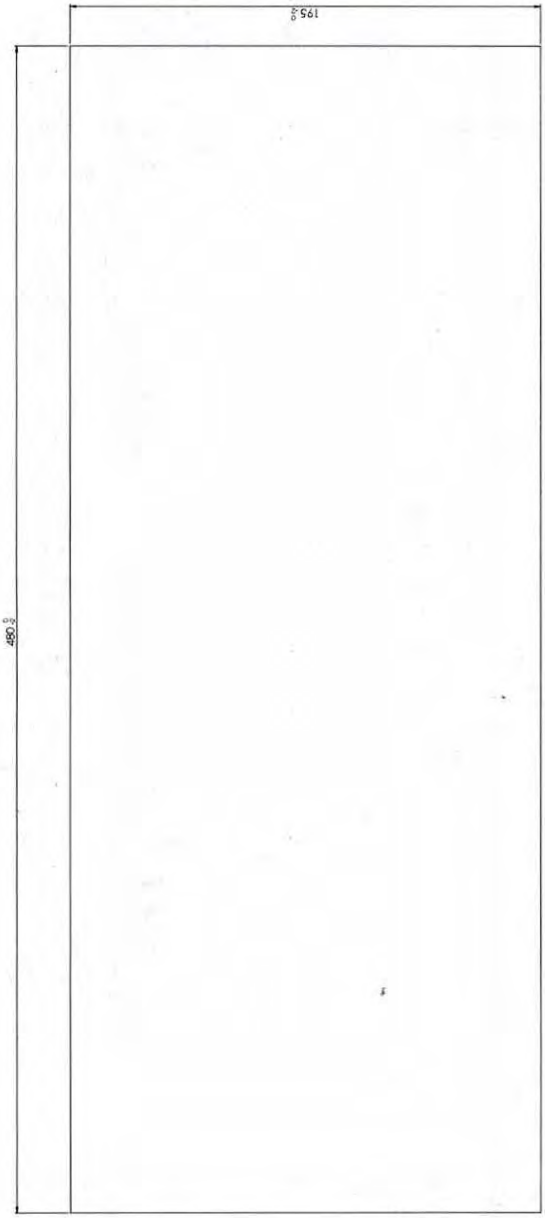
Rev.	Revisions	Sign.:	Date:

	Title:	Construction:	LAH	24.05.12
Dim. without indication of margin acc. to DS/ISO 2768-1 m	**Flange i rør Piedestal**	Released:	RSV	30.08.2012
Material: SPD - DC01AM/EN10130	**Flange in pipe Pedestal**	Format:	**A3**	
Weight kg: 1.6		Scale:	**1:2**	
Model no.	**Morsø 7900**	Itemno.:	**Part of 71793100**	
Drawingtype: Product drawing	morsø	Drawing no.:	**7900-103 a**	
Location of file:				

Date of print: 30-08-2012



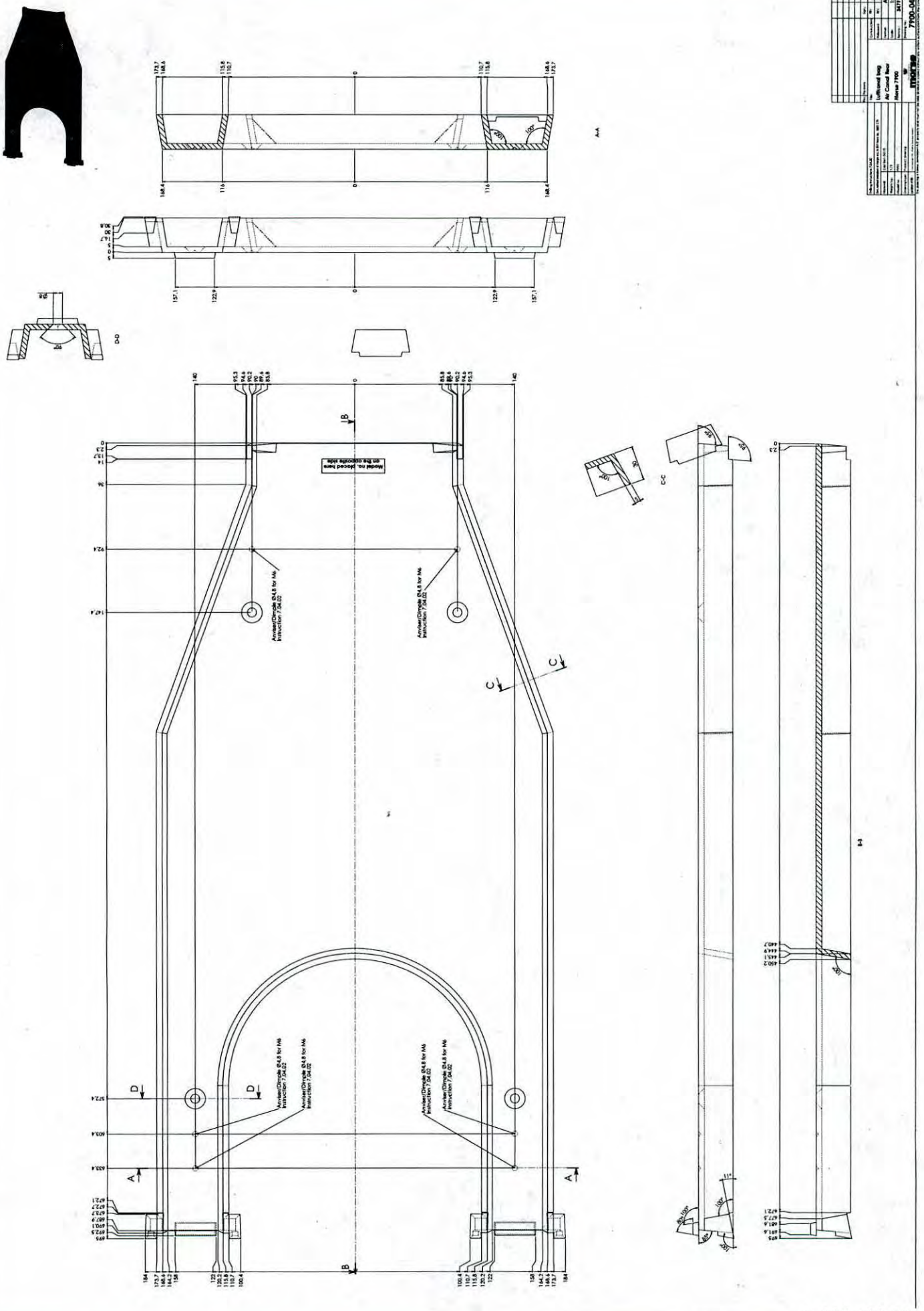
		b Moved a tap from bag to front.	RSV	18.03.2013
		Rev. Revisions	Sign.:	Date:
		Title:	Construction:	LAH 24.05.12
Dim. without indication of margin acc. to DS/ISO 2768-1 m		**Topplade for piedestal**	Released:	RSV 30.08.2012
Material:	SPD - DC01AM/EN10130	**Topplate for Pedestal**	Format:	**A3**
Weight kg:	2.21		Scale:	**1:2**
Model no.		**Morsø 7900**	Itemno.:	**Part of 71793100**
Drawingtype:	Product drawing	morsø	Drawing no.:	**7900-102 b**
Location of file:	C:\Mydrawing\7900-102 Topplade for piedestal.DWG			

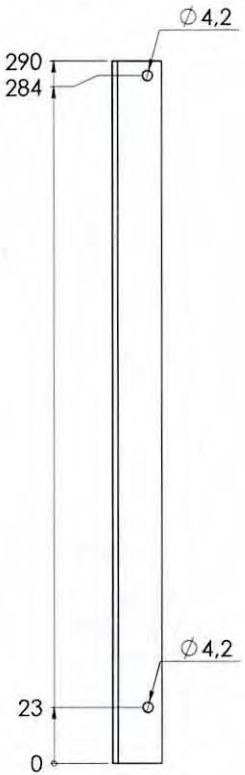


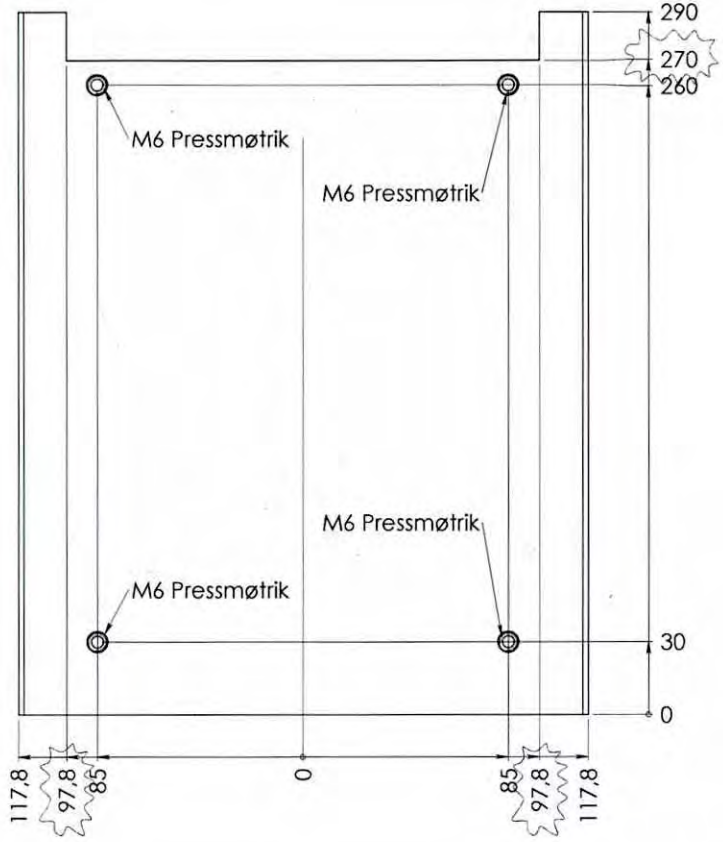
Rev.	Revisions			Sign.	Date
	Title		Construction	BSV	2011.01.11
	Glas indv. side		Released	KO.	15.06.2012
	Glass inner side		Format		A1
	Morse 7900		Scale		1:1
			Material no.		7979300
			Drawing no.		7900-08 a

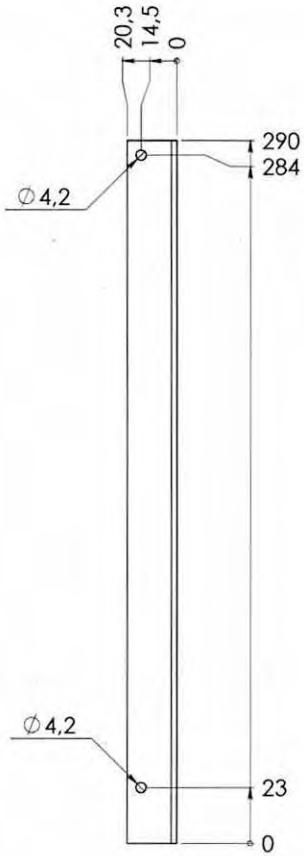
Dim. without indication of height acc. to ISO 2768-1 m
Material: Ceramic Glass
Weight kg: 1,15
Modelno.: -
Drawingtype: Product drawing
Location of file:

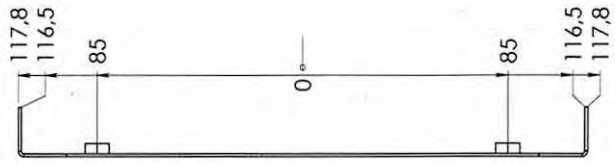
morsø









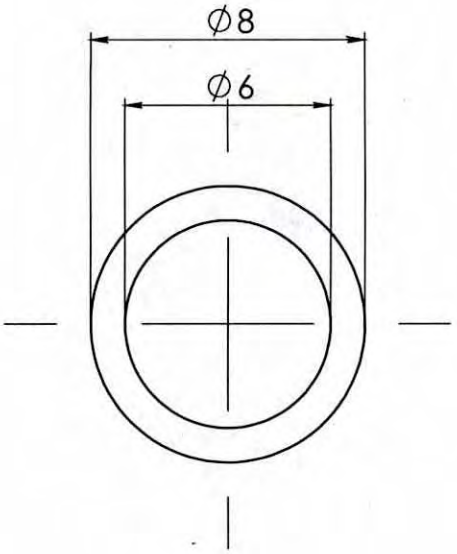


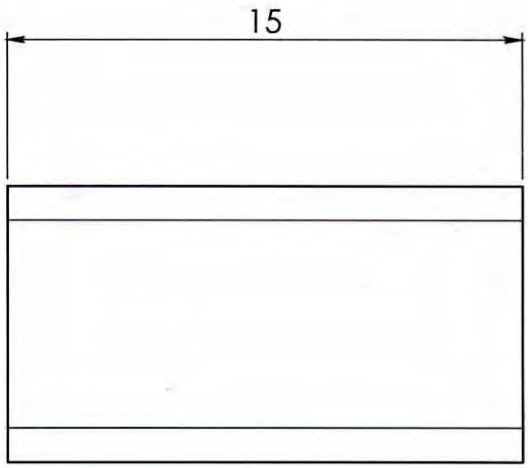
Rev.	Revisions		
b	Påført udskæring for montering til 7900.	RSV	10.08.2012

Title:	**Afstandsplade skuffe 7642**	Construction:	KDU 20.01.05
		Released:	KDU 07.07.08
Dim. without indication of margin acc. to DS/ISO 2768-1 m		Format:	**A3**
Material:	SPD Plade	Scale:	**1:2**
Weight kg:	0.73	Itemno.:	**71761000**
Model no.	-	Drawing no.:	**7600-63 b**
Drawingtype:	Product Drawing		
Location of file:			

Morsø 7600

morsø

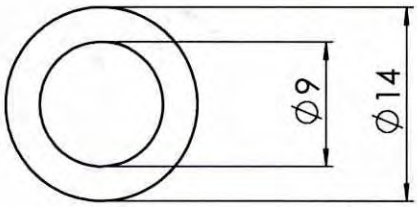




Rev.	Revisions	Sign.:	Date:

Mål uden toleranceangivelse i.h.t. DS/ISO 2768-1 m	Title: **Afstandsrør ø8x1 L= 15 Hydraulikrør galv. Morsø 3400**	Construction:	RSV	24.09.03
		Released:	RSV	24.09.03
Material:		Format:	A4	
Weight: 0, kg		Scale:	**5:1**	
Model no.		Itemno.:	**54349000**	
Drawingtype: Emnetegning	morsø By appointment to the Royal Danish Court	Drawing no.:	Side 1 of 1	
Location of file: U:\udv\Tegninger\standardbibliotek\Afstandsrør\Afstandsrør ø8x1.SLDPRT		**3400-120 a**		

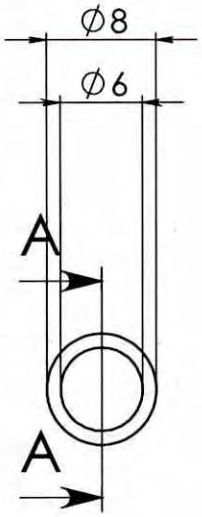
Date of print: 12-01-2010

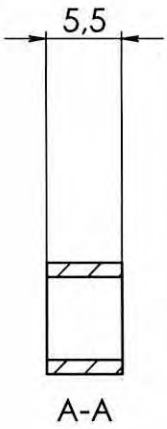


Rev.	Revisions	Sign.:	Date:

Mål uden toleranceangivelse i.h.t. DS/ISO 2768-1 m	Title: **Afstandsrør ø14x2.5 L=10**	Construction:	RSV	20.11.03
		Released:		
Material: Galv.hydralikrør		Format:	A4	
Weight: 0,01 kg		Scale:	**2:1**	
Model no.		Itemno.:	**541803**	
Drawingtype: Emnetegning	morsø By appointment to the Royal Danish Court	Drawing no.:	**2100-173 a**	
Location of file: U:\udv\Tegninger\standardbibliotek\Afstandsrør\Afstandsrør ø14x2.5.SLDPRT				

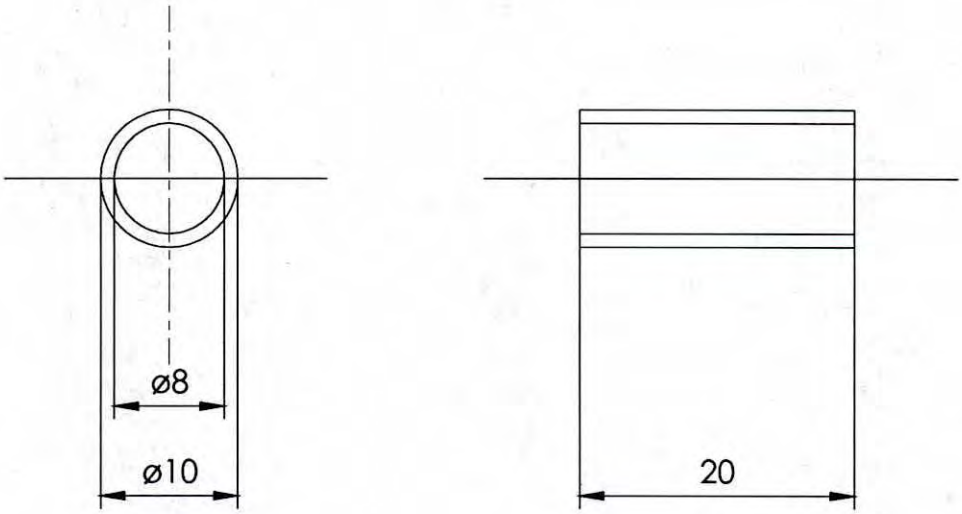
Date of print: 12-01-2010





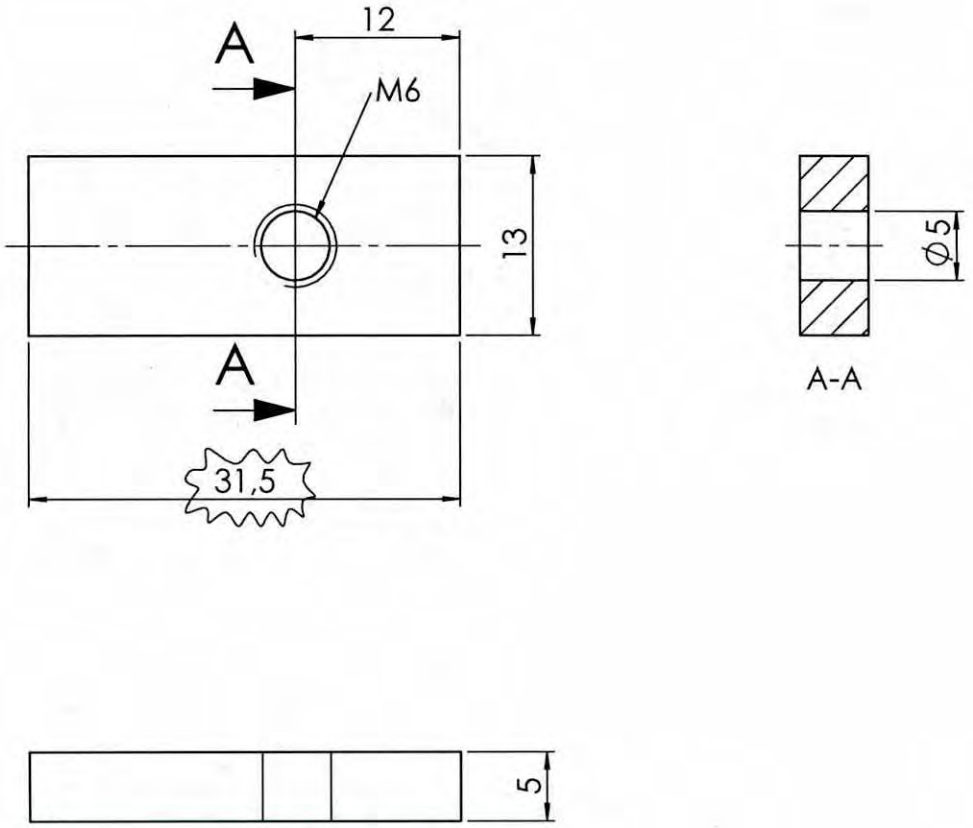
b	Længde ændret fra 3,5mm		KDU	30.04.03
Rev.	Revisions		Sign.:	Date:
		Construction:	RSV	06.03.03
	Title: **Afstandsrør ø8x1 L=5,5**	Released:	RSV	06.03.03
Material:	Ø8 x 1 mm hydraulikrør galv.	Format:	A4	
Weight:	0,7 g	Scale:	**2:1**	
Model no.		Itemno.:	**54202500**	
Drawingtype:	Emnetegning	Drawing no.:	**2000-185 b**	
Location of file:	U:\udv\Tegninger\standardbibliotek\Afstandsrør\Afstandsrør ø8x1.SLDPRT	morsø By appointment to the Royal Danish Court		

Date of print: 12-01-2010



Matr:10x1 Hydraulikrør galv. varenr.712602

Titel: Afstandsrør ø10x1 L=20	Sign.: RS	Dato: 970113	Revision	Sign.	Dato
	Tegn.form.: A4	Målforhold 2:1			
Tegningsnummer: 1400-302-4	Varenummer: 542635				
morso / Jernstøberi A/S	Filnavn: 1400-302				



Rev.	Revisionstekst:	Sign.:	Dato:
c	Ændret længde tilbage til 31,5 mm.	RSV	13.11.2008
b	Øget længde.	RSV	11.04.2008

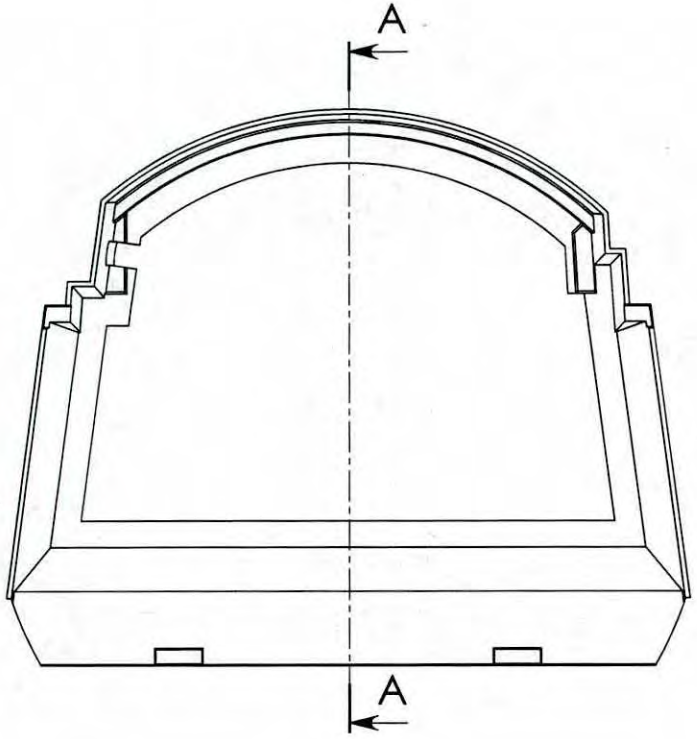
Materiale:	Sort fladjern			Konstr.:	RSV 03.03.2000
Vægt:	0,015 kg.	Bearbejdes:		Frigivet:	
Overfladebeh.:			m²	Tegn.format:	A4
Måltolerance:	Mål uden toleranceangivelse DS/ISO 2768-1 m			Målforhold:	2:1
Ruhedstolerance:				Varenr.:	44256700
Værktøjsnr.:				Tegningsnr.:	1400-204 c
Tegningstype:	Emnetegning				

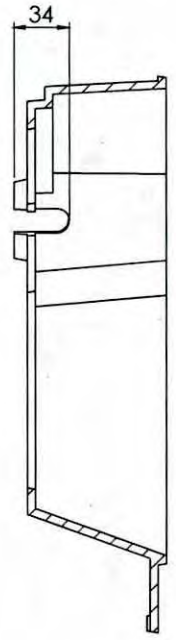
Titel: **Lus med gevind**

Morsø 1400

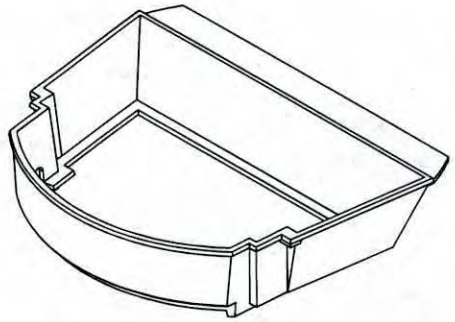
morsø — By appointment to the Royal Danish Court

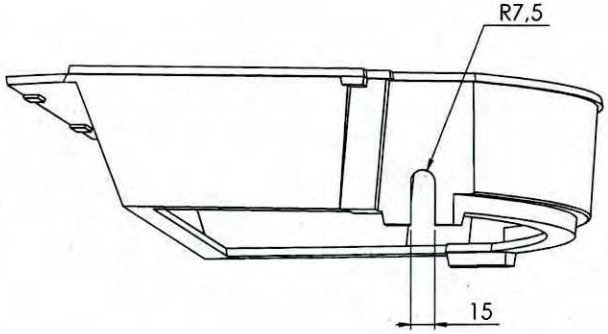
1400-204 lus med gevind - Sheet1





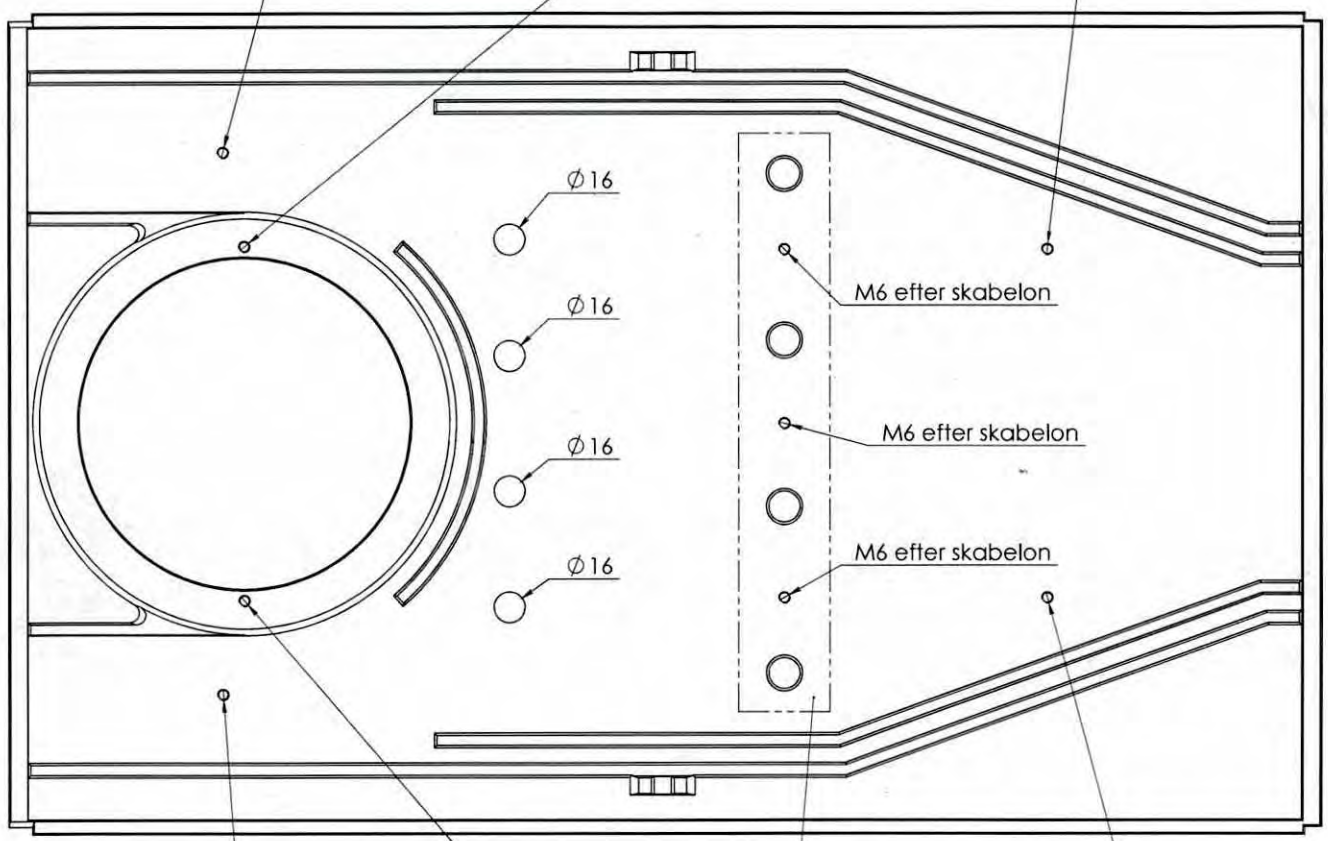
A-A

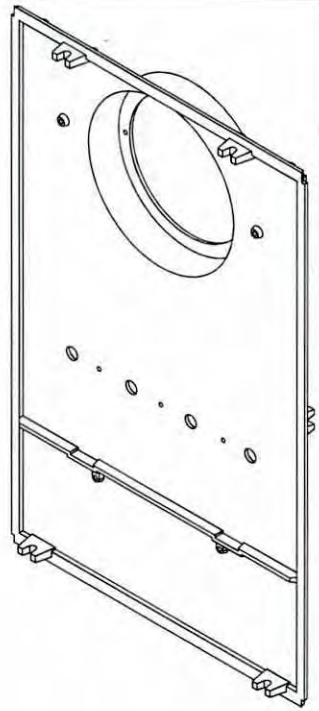




		Rev. Revisions	Sign.:	Date:
		Title:	Construction:	RSV 06.05.2013
Dim. without indication of margin acc. to DS/ISO 2768-1 m		**Risteramme**	Released:	
Material:	Cast Iron GG15	**Grate frame**	Format:	**A3**
Weight kg:	5.09		Scale:	**1:3**
Model no.	**7913**	**Morsø 7900**	Itemno.:	**44791300**
Drawingtype:	Work up drawing	morsø	Drawing no.:	**13-44791300 a**
Location of file:	C:\Working\7900-17 Risteramme 7900.SLDPRT			

Date of print: 06-05-2013

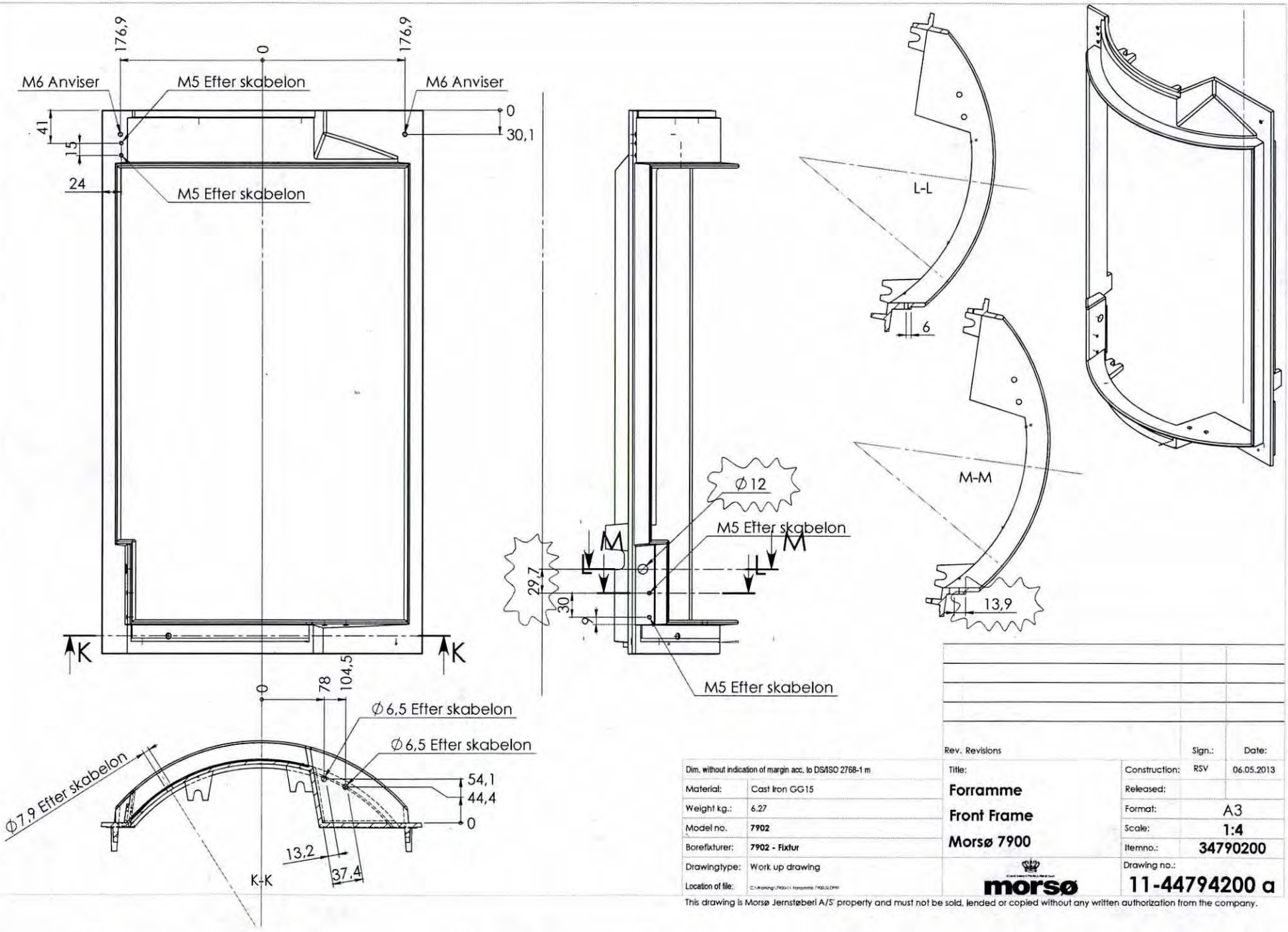




The four holes will be covered by a plate/
De fire huller bliver lukket med en plade

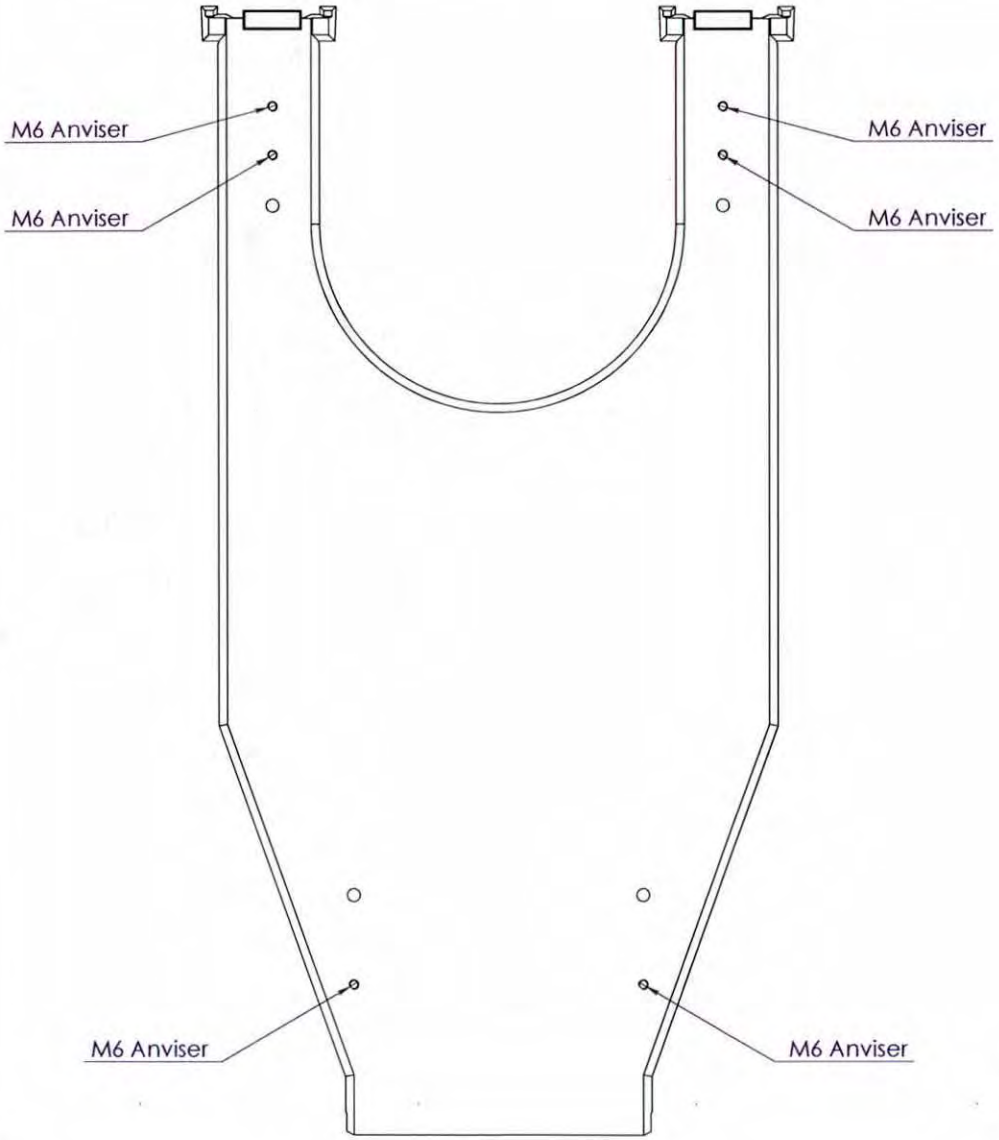
Rev.	Revisions	Sign.	Date
b	Påført 3 stk. M6 gennemgående.	RSV	30.04.2013

Dim. without indication of margin acc. to DS/ISO 2768-1 m	Title:	Construction:	RSV	03.05.2013
Material: Cast Iron GG15	**Bagplade indv. NA**	Released:		
Weight kg.: 11.94	**Rear plate inside NA**	Format:	A3	
Model no. **7906**	**Morsø 7900**	Scale:	**1:2.5**	
Borefixturer: **7906 Skabelon**		Itemno.:	**P - 44794000**	
Drawingtype: Work up drawing	morsø	Drawing no.:	**12-44794000 a**	
Location of file:				



Rev.	Revisions	Sign.	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title:	Construction:	RSV 06.05.2013
Material:	Cast Iron GG15	Forramme Front Frame Morsø 7900	Released:	
Weight kg.:	6.27		Format:	A3
Model no.	7902		Scale:	1:4
Borefixturer:	7902 - Fixtur		Itemno.:	34790200
Drawingtype:	Work up drawing	morsø	Drawing no.:	11-44794200 a
Location of file:	C:\Working\7900-11 Forramme 7900.SLDPRT			



Rev.	Revisions	Sign.:	Date:

Dim. without indication of margin acc. to DS/ISO 2768-1 m		Title:	Construction:	RSV	13.05.2013
Material:	Cast Iron GG15	**Luftkanal bag NA**	Released:	RSV	28.08.2012
Weight kg.:	7.75	**Air Canal Rear NA**	Format:	A3	
Model no.	**7911**	**Morsø 7900**	Scale:	**1:3**	
Borefixturer:	**Efter anviser på plan**		Itemno.:	**44794100**	
Drawingtype:	Work up drawing	morsø	Drawing no.:	**04-44794100 a**	
Location of file:					

Date of print: 13-05-2013

Section 2

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

OMNI follows the guidelines of ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories," and the quality assurance/quality control (QA/QC) procedures found in *OMNI*'s Quality Assurance Manual.

OMNI's scope of accreditation includes, but is not limited to, the following:

- ANSI (American National Standards Institute) for certification of product to safety standards.
- To perform product safety testing by the International Accreditation Service, Inc. (formerly ICBO ES) under accreditation as a testing laboratory designated TL-130.
- To perform product safety testing as a "Certification Organization" by the Standards Council of Canada (SCC).
- Serving as a testing laboratory for the certification of wood heaters by the U.S. Environmental Protection Agency.

This report is issued within the scope of *OMNI*'s accreditation. Accreditation certificates are available upon request.

Sample Analysis

Analysis Worksheets
Tared Filter and Beaker Data
Solvent Blank Data

OMNI-Test Laboratories, I...
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/18/13 Test Crew: A. Kravitz Run #: 1
Sample Train #: A Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: G858 Tare wt.: .1171 D/T in desiccators: 3/20/13 Preliminary wt.: -	3/22/13	1200	.1198	.5001	9.3	64.2	
	3/25/13	0900	.1197	.5001	8.8	68.1	
Rear Filter Lab/ ID #: G859 Tare wt.: .1169 D/T in desiccator: 3/20/13 Preliminary wt.: -	3/22/13	1200	.1173	.5001	9.3	64.2	
	3/25/13	0900	.1172	.5001	8.8	68.1	
Probe Lab/ ID #: 15 Tare wt.: 114.3408 Cleaned by: D/T in desiccator: 3/20/13 Preliminary wt.: -	3/22/13	1200	114.3410	.5001	9.3	64.2	
	3/25/13	0900	114.3411	.5001	8.8	68.1	
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: D/T in desiccator: Preliminary wt.:							

Technician signature: _____ Date: 3/25/13

PRINT

Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Equipment Numbers: 23, 131, 343
Run #: 1
Train #: A
Date: 03/18/13

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G858	119.7	117.1	2.6
B. Rear filter catch	Filter	G859	117.2	116.9	0.3
C. Probe catch	Probe	15	114341.1	114340.8	0.3

Total Particulate, mg :	3.2

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: [signature] Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/18/13 Test Crew: A. Kravitz Run #: 1
Sample Train #: B Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6866 Tare wt.: .1131 D/T in desiccators: 3/20/13 Preliminary wt.: —	3/22/13	1200	.1164	.5001	9.3	69.2	AK
	3/25/13	0900	.1164	.5001	8.8	68.1	AK
Rear Filter Lab/ ID #: 6861 Tare wt.: .1168 D/T in desiccator: 3/20/13 Preliminary wt.: —	3/22/13	1200	.1171	.5001	9.3	69.2	AK
	3/25/13	0900	.1170	.5001	8.8	68.1	AK
Probe Lab/ ID #: 32 Tare wt.: 114.7416 Cleaned by: AK D/T in desiccator: 3/20/13 Preliminary wt.: —	3/22/13	1200	114.7417	.5001	9.3	69.2	AK
	3/25/13	0900	114.7418	.5001	8.8	68.1	AK
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: D/T in desiccator: Preliminary wt.:							

Technician signature: [signature] Date: 3/25/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847

Equipment Numbers: 23, 131, 343

Run #: 1
Train #: B
Date: 03/18/13

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G860	116.4	113.1	3.3
B. Rear filter catch	Filter	G861	117.0	116.8	0.2
C. Probe catch	Probe	32	114741.8	114741.6	0.2

Total Particulate, mg :	3.7

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: [signature] Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/22/13 Test Crew: A. Kravitz Run #: 2
Sample Train #: A Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6865 Tare wt.: .1191 D/T in desiccators: 3/22/13 1330 Preliminary wt.: .1228	3/25/13	0900	.1225	.5001	8.8	68.1	AK
	3/26/13	1630	.1224	.5002	9.1	71.7	AK
Rear Filter Lab/ ID #: 6866 Tare wt.: .1198 D/T in desiccator: 3/22/13 1330 Preliminary wt.: .1199	3/25/13	0906	.1199	.5001	8.8	68.1	AK
	3/26/13	1630	.1198	.5002	9.1	71.7	AK
Probe Lab/ ID #: 12 Tare wt.: 114.2826 Cleaned by: AK D/T in desiccator: 3/22/13 1336 Preliminary wt.: 114.2829	3/25/13	0900	114.2829	.5001	8.8	68.1	A
	3/26/13	1630	114.2830	.5002	9.1	71.7	A
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: D/T in desiccator: Preliminary wt.:							

Technician signature: Date: 3/26/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Equipment Numbers: 23, 131, 343
Run #: 2
Train #: A
Date: 03/22/13

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G865	122.4	119.1	3.3
B. Rear filter catch	Filter	G866	119.8	119.8	0.0
C. Probe catch	Probe	12	114283.0	114282.6	0.4

Total Particulate, mg :	3.7

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: [signature] Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/22/13 Test Crew: A. Kravitz Run #: 2
Sample Train #: B Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6867 Tare wt.: .1187 D/T in desiccators: 3/22/13 1330 Preliminary wt.: ~~1.1228~~ .1227	3/25/13	0906	.1226	.5001	8.8	68.1	AG
	3/26/13	1630	.1227	.5002	9.1	71.7	AG
Rear Filter Lab/ ID #: 6868 Tare wt.: .1191 D/T in desiccator: 3/22/13 1330 Preliminary wt.: ~~1.1200~~ .1197	3/25/13	0906	.1194	.5001	8.8	68.1	AG
	3/26/13	1630	.1193	.5002	9.1	71.7	AG
Probe Lab/ ID #: 55 Tare wt.: 123.2329 Cleaned by: AG D/T in desiccator: 3/22/13 1330 Preliminary wt.: 123.2333	3/25/13	0906	123.2333	.5001	8.8	68.1	AG
	3/26/13	1630	123.2333	.5002	9.1	71.7	AG
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: D/T in desiccator: Preliminary wt.:							

Technician signature: AG Date: 3/26/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Equipment Numbers: 23, 131, 343
Run #: 2
Train #: B
Date: 03/22/13

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G867	122.7	118.7	4.0
B. Rear filter catch	Filter	G868	119.3	119.1	0.2
C. Probe catch	Probe	55	123233.3	123232.9	0.4

Total Particulate, mg :	4.6

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: [signature] Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/22/13 Test Crew: A. Kravitz Run #: 3
Sample Train #: A Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6869 Tare wt.: .1191 D/T in desiccators: 3/22/13 Preliminary wt.: –	3/25/13	0900	.1240	.5001	8.8	68.1	AK
	3/26/13	1630	.1242	.5002	9.1	71.7	AK
Rear Filter Lab/ ID #: 6870 Tare wt.: .1190 D/T in desiccator: 3/22/13 Preliminary wt.: –	3/25/13	0900	.1198	.5001	8.8	68.1	AK
	3/26/13	1630	.1198	.5002	9.1	71.7	AK
Probe Lab/ ID #: 57 Tare wt.: 123.1792 Cleaned by: AK D/T in desiccator: 3/22/13 Preliminary wt.: –	3/25/13	0900	123.1800	.5001	8.8	68.1	AK
	3/26/13	1630	123.1800	.5002	9.1	71.7	AK
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: D/T in desiccator: Preliminary wt.:							

Technician signature: [signature] Date: 3/26/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847

Equipment Numbers: 23, 131, 343

Run #: 3
Train #: A
Date: 03/22/13

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G869	124.2	119.1	5.1
B. Rear filter catch	Filter	G870	119.8	119.0	0.8
C. Probe catch	Probe	57	123180.0	123179.2	0.8

Total Particulate, mg :	6.7

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: [signature] Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/22/13 Test Crew: A. Kravitz Run #: 3
Sample Train #: B Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6871 Tare wt.: .1205 D/T in desiccators: 3/22/13 Preliminary wt.: —	3/25/13	0900	.1260	.5001	8.8	68.1	
	3/26/13	1630	.1258	.5002	9.1	71.7	
Rear Filter Lab/ ID #: 6872 Tare wt.: .1192 D/T in desiccator: 3/22/13 Preliminary wt.: —	3/25/13	0900	.1200	.5001	8.8	68.1	
	3/26/13	1630	.1201	.5002	9.1	71.7	
Probe Lab/ ID #: 68 Tare wt.: 122.4380 Cleaned by: A D/T in desiccator: 3/22/13 Preliminary wt.: —	3/25/13	0900	122.4389	.5001	8.8	68.1	
	3/26/13	1630	122.4387	.5002	9.1	71.7	
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: — D/T in desiccator: — Preliminary wt.: —							

Technician signature: _____ Date: 3/26/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name:	Morso	Equipment Numbers:	23, 131, 343	Run #:	3
Model:	7900			Train #:	B
Project No.:	192-S-23-8.3			Date:	03/22/13
Tracking No.:	1847				

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G871	125.8	120.5	5.3
B. Rear filter catch	Filter	G872	120.1	119.2	0.9
C. Probe catch	Probe	68	122438.7	122438.0	0.7

Total Particulate, mg :	6.9

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: _____ Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/25/13 Test Crew: A. Kravitz Run #: 4
Sample Train #: A Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6873 Tare wt.: .1198 D/T in desiccators: 3/25/13 1400 Preliminary wt.: .1236	3/26/13	1630	.1234	.5002	9.1	71.7	AM
	3/27/13	0830	.1233	.5001	9.9	69.8	AM
Rear Filter Lab/ ID #: 6874 Tare wt.: .1206 D/T in desiccator: 3/25/13 1400 Preliminary wt.: .1211	3/26/13	1630	.1209	.5002	9.1	71.7	AM
	3/27/13	0830	.1208	.5001	9.9	69.8	AM
Probe Lab/ ID #: 3 Tare wt.: 116.0112 Cleaned by: AM D/T in desiccator: 3/25/13 1400 Preliminary wt.: —	3/26/13	1630	116.0123	.5002	9.1	71.7	A
	3/27/13	0830	116.0119	.5001	9.9	69.8	A
	3/27/13	1430	116.0118	.5001	10.2	70.8	AM
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: D/T in desiccator: Preliminary wt.:							

Technician signature: _____ Date: 3/27/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Equipment Numbers: 23, 131, 343
Run #: 4
Train #: A
Date: 03/25/13

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G873	123.3	119.8	3.5
B. Rear filter catch	Filter	G874	120.8	120.6	0.2
C. Probe catch	Probe	3	116011.8	116011.2	0.6

Total Particulate, mg :	4.3

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: [signature] Date: 3/28/13

OMNI-Test Laboratories, Inc.
Portland, OR

Filter Train Analysis Worksheet

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/25/13 Test Crew: A. Kravitz Run #: 4
Sample Train #: B Train assembled by: A. Kravitz
Balance ID #: OMNI – 00023 Thermo/Hygro meter ID #: OMNI - 343
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab/ ID #: 6875 Tare wt.: .1231 D/T in desiccators: 3/25/13 1400 Preliminary wt.: .1231	3/26/13	1630	.1230	.5002	9.1	71.7	AK
	3/27/13	0830	.1231	.5001	9.9	69.8	AK
Rear Filter Lab/ ID #: 6876 Tare wt.: .1196 D/T in desiccator: 3/25/13 1400 Preliminary wt.: .1199	3/26/13	1630	.1199	.5002	9.1	71.7	AK
	3/27/13	0830	.1198	.5001	9.9	69.8	AK
Probe Lab/ ID #: 5 Tare wt.: 114.7838 Cleaned by: AK D/T in desiccator: 3/25/13 1400 Preliminary wt.: –	3/26/13	1630	114.7844	.5002	9.1	71.7	AK
	3/27/13	0830	114.7841	.5001	9.9	69.8	AK
	3/27/13	1430	114.7842	.5001	10.2	70.8	AK
O-Rings *(ASTM E2515 Only)* Lab/ ID #: N/A Tare wt.: ____ D/T in desiccator: ____ Preliminary wt.: ____							

Technician signature: _____ Date: 3/27/13

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Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name:	Morso	Equipment Numbers:	23, 131, 343	Run #:	4
Model:	7900			Train #:	B
Project No.:	192-S-23-8.3			Date:	03/25/13
Tracking No.:	1847				

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	G85	123.1	119.1	4.0
B. Rear filter catch	Filter	G876	119.8	119.6	0.2
C. Probe catch	Probe	5	114784.2	114783.8	0.4

Total Particulate, mg :	4.6

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: _____ Date: 3/26/13

PROBE TARES

Date Placed in Desiccator: 8/6/12 Technician: A. Kravitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Probe Size/ID# (47)	Date: 8/8/12 Time: 1130 RH%: 3.9 T (F): 73.7 Initials: [illegible]	Date: 8/13/12 Time: 1515 RH%: 7.0 T (F): 79.3 Initials: [illegible]	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
55	123.2327	123.2329			Morso	7900	12-5-23-8.3	2
63	121.6054	121.6056						
18	114.4009	114.4011						
32	114.7411	114.7413						
2	115.0212	115.0213						
12	114.2825	114.2825						
69	123.0814	123.0815						
35	114.3293	114.3294						
6	115.3499	115.3499						
54	122.8302	122.8302						
31	114.3789	114.3789						
64	122.8537	122.8537						
8	115.5949	115.5949						
29	114.2800	114.2800						

Final Technician signature: [signature] Date: 8/29/12

PROBE TARES

Date Placed in Desiccator: 12/10/12 Technician: A. Kravitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Probe Size/ID# 47	Date: 12/14/12 Time: 1000 RH%: 6.8 T (F): 74.3 Initials: AK	Date: 12/17/12 Time: 1600 RH%: 4.9 T (F): 72.1 Initials: AK	Date: 12/18/12 Time: 1100 RH%: 5.6 T (F): 72.5 Initials: AK	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
68	122.4381	122.4380	—		Morso	7900	192-5-23-8.3	3
88	114.1499	114.1492	114.1490					
21	114.3928	114.3923	114.3921					
9	115.6913	115.6907	115.6907					
7	114.9837	114.9835	—					
52	122.7719	122.7717	—					
01	114.7316	114.7307	114.7306					
2	115.0211	115.0211	—					
6	115.3461	115.3456	115.3454					
16	114.2632	114.2628	114.2626					
50	121.7684	121.7679	121.7677					
67	122.9640	122.9639	—					
18	114.4014	114.4013	—					
56	123.0851	123.0851	—					

Final Technician signature: [signature] Date: 12/18/12

PROBE TARES

Date Placed in Desiccator: 9/17/12 Technician: A. Kravitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # [3] (Balance audit mfr. Std.: 500 ± 0.72)

Probe Size/ID# (47)	Date: 9/21/12 Time: 1445 RH%: 7.6 T (F): 74.8 Initials: AK	Date: 9/24/12 Time: 1400 RH%: 4.8 T (F): 74.4 Initials: AK	Date: 9/25/12 Time: 1000 RH%: 5.7 T (F): 75.7 Initials: AK	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
50	121.7692	121.7697	121.7697					
28	114.7456	114.7458	114.7459					
69	123.0807	123.0809	—					—
59	122.9357	122.9353	122.9355					
15	114.3409	114.3408	—		Morso	7900	192-5-23-8.3	1
14	114.5433	114.5433	—					—
12	114.2826	114.2826	—		Morso	7900	192-5-23-8.3	2
6	115.3496	115.3496	—					
32	114.7415	114.7416	—		Morso	7900 ~~192-5-23-8~~	192-5-23-8.3	1
5	114.7838	114.7838	—		Morso	↓	↓	4
29	114.2806	114.2805	—					
3	116.0115	116.0111	116.0110* 2		Morso	7900	192-5-23-8.3	4
57	123.1795	123.1791	123.1792		Morso	↓	↓	3
53	122.9264	122.9260*	122.9262					

Final Technician signature: [signature] Date: 9/25/12

FILTER TARES

Date Placed in Desiccator: 3/18/13 Technician: A. Krawitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Dried per Method 5, 2h in oven, 2h in dessicator

Filter Size/ID# 102 (47) 110 55	Date: 3/18/13 Time: 1606 RH%: 10.1 T (F): 70.7 Initials: AK	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
G876	.1196				Morso	7900	192-5-23-8.3	4
G877	.1205							
~~G885~~ G878	.1194							
G879	.1194							
G880	.1203							
G881	.1192							
G882	.1188							
G883	.1209							
G884	.1201							
G885	.1194							
G886	.1209							
G887	.1193							
G888	.1189							
G889	.1204							

Final Technician signature: [signature] Date: 3/18/13

FILTER TARES

Date Placed in Desiccator: 3/18/13 Technician: A. Kravitz Balance ID # 23

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Dried per Method 5 - 2h in oven, 2h in dessicator

Filter Size/ID# 102 (47) 110 55	Date: 3/18/13 Time: 1600 RH%: 10.1 T (F): 70.7 Initials: AK	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
G862	.1154							
G863	.1146							
G864	.1155							
G865	.1191				Morso	7900	192-5-23-8.3	2
G866	.1198				↓	↓	↓	↓
G867	.1187							
G868	.1191							
G869	.1191				Morso	7900	192-5-23-8.3	3
G870	.1190				↓	↓	↓	↓
G871	.1205							
G872	.1192							
G873	.1198				Morso	7900	192-5-23-8.3	4
G874	.1206				↓	↓	↓	↓
G875	.1191							

Final Technician signature: [signature] Date: 3/18/13

FILTER TARES

Date Placed in Desiccator: 2/8/13 Technician: A. Urwitz Balance ID # 244

Thermo/Hygro meter ID #: 343 Audit Weight ID # 131 (Balance audit mfr. Std.: 500 ± 0.72)

Filter Size/ID# 102 (47) 110 55	Date: 2/13/13 Time: 0900 RH%: 8.9 T (F): 70.8 Initials: AU	Date: 2/15/13 Time: 0900 RH%: 9.0 T (F): 71.2 Initials: AU	Date: Time: RH%: T (F): Initials:	Date: Time: RH%: T (F): Initials:	Manufacturer	Appliance	Project No.	Run No.
6848	.1144	.1144						
6849	.1187	.1186						
6850	.1154	.1153						
6851	1154	1153						
6852	.1181	.1180						
6853	.1178	.1177						
6854	.1136	.1139						
6855	.1176	.1175						
6856	.1177	.1176						
6857	.1130	.1129						
6858	.1169	.1171			Morso	7900	192-S-23-8.3	1
6859	.1170	.1169			↓	↓	↓	↓
6860	.1132	.1131						
6861	.1169	.1168						

Final Technician signature: [signature] Date: 2/15/13

Calibrations

Methods 28 and 5G

ID #	Lab Name/Purpose	Log Name	Attachment Type
23	Scale/Analytical Balance	Analytical Balance – Mettler Instrument	Calibration Certificate
131	500 mg Weight	Standard Weight, 500 mg – Ohaus	Calibration Certificate
132	10 lb Weight	Standard Weight, 10 lb.	Calibration Log
185	Weight Indicator	Platform Scale – Weigh-Tronix	Service Work Order
209	Barometer	Barometer – Princo	Manual Cover
335	Control Module	Automated Emissions Sampling Box – Apex	Calibration Logs
336	Control Module	Automated Emissions Sampling Box – Apex	Calibration Logs
340	Moisture Meter	Wood Moisture Meter – Delmhorst	See Fuel Data Sheets
343	Hygrometer/Thermometer	Digital Thermometer – Omega	Calibration Certificate
410	Microtector	Microtector – Dwyer	Manual
417	Anemometer	Vane Thermo-Anemometer – Extech	Calibration Certificate
420	Gas Analyzer	Infrared Gas Analyzer – Fuji Electric	Manual Cover
431	Wood Moisture Calibrator	Wood Moisture Calibrator – Delmhorst	Calibration Log

Certificate of Calibration

Certificate Number: **524447**

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

OnSite

ACCREDITED
0723.01
Calibration

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

PO: **OTL-13-001**
Order Date: 01/28/2013
Authorized By: **N/A**

Property #: OMNI-00023
User: N/A
Department: N/A
Make: Mettler
Model: AE200
Serial #: E17657
Description: Scale 205g
Procedure: DCN 500818/500887
Accuracy: ±0.0004g ±1 LSD

Calibrated on: 01/28/2013
*Recommended Due: 07/28/2013
Environment: 20 °C 32 % RH
As Received: Out of Tolerance
As Returned: Within Tolerance
Action Taken: Adjusted
Technician: 53

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Received uut out of tolerance by as much as -.0013g. Adjusted to tolerance.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
503A	Rice Lake	1mg-200g (Class O)	Mass Set	12/07/2013	517746

Measurement Data

Parameter / Measurement Description	Range Unit	Reference	UUT	Variance	Min	Max	Uncertainty	
Before				× = OOT condition			Accredited = ✓	
Force								
	g	1.00000	1.0001	-0.00010	0.99950	1.00050	0.016	✓
	g	20.00000	20.0001	-0.00010	19.99950	20.00050	0.0225	✓
	g	50.00000	49.9998	0.00020	49.99950	50.00050	0.0357	✓
	g	100.00000	99.9995	0.00050	99.99950	100.00050	0.0731	✓
	g	150.00000	149.9989×	0.00110	149.99950	150.00050	0.109	✓
	g	180.00000	179.9987×	0.00130	179.99950	180.00050	0.131	✓
	g	200.00000	199.9988×	0.00120	199.99950	200.00050	0.041	✓
	mg	1.00000	0.9999	0.00010	0.99950	1.00050	5.8E-5	✓
	mg	10.00000	9.9999	0.00010	9.99950	10.00050	5.77E-5	✓
	mg	100.00000	100.0000	0.00000	99.99950	100.00050	5.77E-5	✓
After							Accredited = ✓	
	g	1.00000	1.0000	0.00000	0.99950	1.00050	0.016	✓
	g	20.00000	20.0000	0.00000	19.99950	20.00050	0.0225	✓
	g	50.00000	49.9998	0.00020	49.99950	50.00050	0.0357	✓
	g	100.00000	99.9998	0.00020	99.99950	100.00050	0.0731	✓
	g	150.00000	150.0000	0.00000	149.99950	150.00050	0.109	✓
	g	180.00000	179.9999	0.00010	179.99950	180.00050	0.131	✓
	g	200.00000	199.9999	0.00010	199.99950	200.00050	0.041	✓
	mg	1.00000	1.0000	0.00000	0.99950	1.00050	5.8E-5	✓
	mg	10.00000	10.0000	0.00000	9.99950	10.00050	5.77E-5	✓
	mg	100.00000	100.0000	0.00000	99.99950	100.00050	5.77E-5	✓

Reviewer

3 Issued 02/08/2013 Rev # 14

Inspector

Supplemental Calibration Report

Certificate Number: **413631**

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Customer:	Omni-Test Laboratories		
Property ID:	OMNI-00131	PO:	OTL-08-490
Make:	Ohaus	Order Date:	11/04/2008
Model:	500mg	Procedure:	DCN 500901
Serial #:	27503	Calibrated on:	11/05/2008
Description:	500mg WEIGHT	Technician:	92

Parameter Measurement Description	Range	Unit	Reference	UUT	Variance	Min	Max	Uncertainty	
Before/After								Accredited = ✓	
Mass									
		mg	**500.0000**	**500.123**	**-0.1230**	**499.28**	**500.72**	**0.00011**	✓

SCALE WEIGHT CALIBRATION DATA SHEET

Weight to be calibrated: 10 lb

ID Number: 132

Standard Calibration Weight: 10 lb

ID Number: 255

Scale Used: MTW-150K

ID Number: 353

Date: 2/19/13 By: A. Kravitz

Standard Weight (A) (Lb.)	Weight Verified (B) (Lb.)	Difference (A - B)	% Error
10.0	10.0	0.0	Ø

*Acceptable tolerance is 1%.

This calibration is traceable to NIST using calibrated standard weights.

Technician signature: Date: 2/19/13

ATN: BRUCE DAVIS

Weigh-Tronix, Inc.
7933-SW Nimbus Ave. #28
Beaverton, OR 97005
503-626-3008
1-800-878-3008

WEIGH-TRONIX

SERVICE WORK ORDER

SHIP TO
NAME OMNI ENVIRONMENTAL SERVICES
ADDRESS 5465 SW WESTERN AVE
CITY BEAVERTON STATE OR ZIP 97075
PHONE 503 - 643-3788
FAX
CONTACT Bruce or Richard

JOB No. 111991
CUSTOMER No.
Order Date / /
Start Date / /
Complete Date 1 / 11 / 99

BILL TO
NAME
ADDRESS PO BOX 743
CITY STATE ZIP
ATTN:

P.O. No. 99-007

EQUIPMENT

S/N	Location	Type	Cap.	Recommendations and Remarks
5547		WI-127	1K	10,000 DIV
21676		3030	1K	

COMMENTS:

Rental 1 Month

Set up calibrated 1000 x 0.1 LB per. order tested. good.

PARTS:

2.5

Qty.	Description	Price	Total

ZONE _____ VEHICLE _____
TECHNICIAN LD

SERVICE SUMMARY

Reg.	Agree.	Pref.	Inst.

Hrs. @ _____
Mileage
Parts
Shop Supplies
Other
TOTAL

THIS IS NOT AN INVOICE

I acknowledge all service has been performed satisfactorily, as stated above. All parts installed are warranted for thirty days from this date.

Authorized Signature Bruce Davis

WEIGH-TRONIX
Rental / Sales / Service

Print Name Bruce Davis

DAMAGE TO RENTAL/DEMO EQUIPMENT IS SOLELY THE RESPONSIBILITY OF THE USER WHILE IN THEIR POSSESSION!

DISTRIBUTION: WHITE – OFFICE YELLOW – FILE PINK – CUSTOMER

Thermal Metering System Calibration
Y Factor

Manufacturer:	Apex
Model:	XC-60
Serial Number:	
OMNI Tracking No.:	336
Calibrated Orifice:	☐ Yes

Average Gas Meter y Factor	Orifice Meter dH@
1.013	N/A

Calibration Date:	11/30/12	
Calibrated by:	A. Kravitz	
Calibration Frequency:	6 Months	
Next Calibration Due:	5/30/2013	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	29.6	"Hg
Signature/Date:		12/10/12

Previous Calibration Comparision

Date	5/21/2012	Acceptable Deviation (5%)	Deviation
y Factor	1.01	0.0505	0.003
Acceptance	Acceptable		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.002
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	1	
	Calib. Date	22-Aug-11	
	Calib. Value	0.9980	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	0.85	2.40	1.28
Initial Reference Meter	545.905	551.973	558.562
Final Reference Meter	551.973	558.562	567.703
Initial DGM	0	0	0
Final DGM	6.121	6.637	9.214
Temp. Ref. Meter (°F), Tr	68.0	68.0	68.0
Temperature DGM (°F), Td	82.0	82.0	82.0
Time (min)	40.1	27.1	50.3
Net Volume Ref. Meter, Vr	6.068	6.589	9.141
Net Volume DGM, Vd	6.121	6.637	9.214
Gas Meter y Factor =	**1.013**	**1.011**	**1.013**
Gas Meter y Factor Deviation (from avg.)	0.001	0.002	0.001
Orifice dH@	**N/A**	**N/A**	**N/A**
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. y = [Vr x (y factor (ref)) x (Pb + (Pr/ 13.6)) x (Td + 460)]/ [Vd x (Pb + (Pd / 13.6)) x (Tr + 460)]

** 3. dH@ = 0.0317 x Pd / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is ±0.14 ft^3/min. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET
0-1" Magnehelic Gauge

Range: 0-1" WC ID Number: 336 (B)

Calibration Instrument: Digital Manometer (A) ID Number: OMNI- 396

Date: 12/10/12 By: A. Kravitz

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer (A) ("WC)	Magnehelic Gauge (B) ("WC)	Difference (A - B)	% Error of Full Span*
0.0 – 0.2	~~0.234~~ 0.163	~~0.2~~ 0.17	0.01	1%
0.2 – 0.4	0.234	0.24	0.01	1%
0.4 – 0.6	0.451	0.46	0.01	1%
0.6 – 0.8	0.654	0.67	0.02	2%
0.8 – 1.0	0.917	0.93	0.02	2%

*Acceptable tolerance is 4%.

The uncertainty of measurement is ±0.1" WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: _____ Date: 12/10/12

Reviewed by: _____ Date: 12/10/12

Thermal Metering System Calibration
Y Factor

Manufacturer:	Apex
Model:	XC-60
Serial Number:	
OMNI Tracking No.:	335
Calibrated Orifice:	☐ Yes

Previous Calibration Comparision

Date	5/21/2012	Acceptable Deviation (5%)	Deviation
y Factor	1.01	0.0505	0.005
Acceptance	Acceptable		

Average Gas Meter y Factor	Orifice Meter dH@
1.005	N/A

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.002
Acceptable dH@ Deviation	N/A
Maximum dH@ Deviation	N/A
Acceptance	Acceptable

Calibration Date:	11/30/12	
Calibrated by:	A. Kravitz	
Calibration Frequency:	6 Months	
Next Calibration Due:	5/30/2013	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press., Pb:	29.6	"Hg
Signature/Date:		12/10/12

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	S/N	1	
	Calib. Date	22-Aug-11	
	Calib. Value	0.9980	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Reference Meter Pressure ("H2O), Pr	0.00	0.00	0.00
DGM Pressure ("H2O), Pd	2.64	0.92	1.57
Initial Reference Meter	530.372	535.73	540.862
Final Reference Meter	535.73	540.862	545.905
Initial DGM	0	0	0
Final DGM	5.375	5.205	5.114
Temp. Ref. Meter (°F), Tr	64.0	68.0	69.0
Temperature DGM (°F), Td	74.0	80.0	82.0
Time (min)	23.3	37.8	28.5
Net Volume Ref. Meter, Vr	5.358	5.132	5.043
Net Volume DGM, Vd	5.375	5.205	5.114
Gas Meter y Factor =	**1.007**	**1.004**	**1.004**
Gas Meter y Factor Deviation (from avg.)	0.002	0.001	0.001
Orifice dH@	**N/A**	**N/A**	**N/A**
Orifice dH@ Deviation (from avg.)	N/A	N/A	N/A

where:

1. Deviation = |Average value for all runs - current run value|

** 2. $y = [Vr \times (y \text{ factor (ref)}) \times (Pb + (Pr/13.6)) \times (Td + 460)] / [Vd \times (Pb + (Pd/13.6)) \times (Tr + 460)]$

** 3. $dH@ = 0.0317 \times Pd / (Pb\ (Td + 460)) \times [\ (Tr + 460) \times time) / Vr\ ]^2$

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272, or NIST traceable laboratory

** Equations come from EPA Method 5

The uncertainty of measurement is ±0.14 ft^3/min. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

DIFFERENTIAL PRESSURE GAUGE CALIBRATION DATA SHEET
0-1" Magnehelic Gauge

Range: 0-1" WC ID Number: 335 (B)

Calibration Instrument: Digital Manometer (A) ID Number: OMNI-396

Date: 12/10/12 By: A. Kravitz

This form is to be used only in conjunction with Standard Procedure C-SPC.

Range of Calibration Point ("WC)	Digital Manometer (A) ("WC)	Magnehelic Gauge (B) ("WC)	Difference (A - B)	% Error of Full Span*
0.0 – 0.2	~~0.780~~ 0.147	~~0.79~~ 0.15	0.00	0%
0.2 – 0.4	0.257	0.26	0.00	0%
0.4 – 0.6	0.575	0.59	0.01	1%
0.6 – 0.8	0.780	0.79	0.01	1%
0.8 – 1.0	0.844	0.86	0.02	2%

*Acceptable tolerance is 4%.

The uncertainty of measurement is ±0.1" WC. This is based on the reference standard having a TAR (Test Accuracy Ratio) of at least 4:1.

Technician signature: _____ Date: 12/10/12

Reviewed by: _____ Date: 12/10/12

Temperature Calibration
EPA Method 28 and 5G

Booth:	Temperature Monitor Type:	Identification Number:
Emissions 1	Type K TC	OMNI 335/336

Reference Temperature Monitor Type:	Identification Number:
Omega CL23A	OMNI 373

Calibration Performed By:	Date:	Ambient Temperature:	Barometric Pressure:
A. Urwitz	11/30/12	68	~~29~~ 29.60

Reference Point Source	Temperature Monitor (EF)							
		Method 5G Dilution Tunnel						
OMEGA Thermocouple Simulator Serial #	Method 28 Room	Meter (Tm) A	Meter (Tm) B	Filters (Tf) A	Filters (Tf) B	Tunnel (Tt)	Stack ~~Dryer~~ (Ts)	DB
0	0	0	0	0	1	0	0	
100	100	100	100	100	101	100	100	
300	301	300	300	301	301	300	300	
500	501	500	506	501	501	500	500	
700	701	700	706	701	701	700	700	

Technician signature: _____ Date: 11/30/12

VWR Temperature Hygrometer Calibration Procedure and Data Sheet

Frequency: Every Two Years

Step 1: Locate NIST traceable standard.

Step 2: Place unit to be calibrated, tracking No. OMNI- 00343 , inside OMNI desiccate box on the same shelf with the NIST traceable standard.

Step 3: After a period of not less than four hours record the temperature and humidity of both units in the spaces provide below.

Step 4: If the unit to be calibrated matches the NIST standard within ± 4%, it is acceptable. If not, the unit needs to be sent to a repair company or replaced.

Verification Data:

Date: 9/12/12 Technician: A. Kawar

Time in desiccate: 08:20 Recording time: 13:27

NIST Standard Temperature: 75.3 °F NIST Standard Humidity: 12.6

Test Unit Temperature Reading: 75.2 °F Test Unit Humidity Reading: 12.4

Test unit OMNI- 343 is ✓ or was not ___ within acceptable limits.

Technician Signature: A. Kawar

Comments: _____

Negative Pressure or Vacuum Measurement

Zero the gage. Connect the source of vacuum or negative pressure to the right side gage connection (5) and proceed as described under Positive Pressure Measurement Section above. Remember that the pressure measured in this way is negative.

Differential Pressure Measurement

Differential pressures may be measured by connecting the higher (more positive) pressure to the left connection (2) and the lower pressure to the right connection (5).

Storage

Turn meter circuit switch to "off" position and withdraw "hook" point well clear of fluid (by turning Micrometer counter-clockwise) when gage is not in use. This will conserve the batteries and minimize build-up of oxides, etc., on the hook." Keep the unit covered and in an area free of strong solvent fumes.

Maintenance

When the meter reading becomes reduced or the pointer movement gets sluggish (with circuit on and "hook" point in fluid), the following should be done:

Remove the hook point (by unscrewing) and clean the tip lightly using fine crocus cloth. Wipe off all grit and dirt with a clean rag, reassemble and recheck meter operation.

If the meter operation continues to be sluggish, replace the size AA, 1½ volt battery. (Replace the battery at least once a year to avoid deterioration of battery and damage to gage. Leakproof alkaline battery is recommended.)

To replace the battery, remove center screw (10) located in the back of the electronic enclosure. Cover (9) will come off exposing the battery. Pull the old battery out and push a new battery into the battery holder with the positive (center) terminal to the right (to the end marked with a + on the holder).

If the fluid becomes contaminated and requires replacement; empty old fluid from gage; flush out with clear water and replace with distilled water and Dwyer A126 Fluorescein Green Color Concentrate mixed 3/4 oz. concentrate to each quart of water. (CAUTION: Do not substitute other gage fluids as proper gage operation depends on use of the specified gage fluid to provide proper surface tension, wetting ability and electrolyte capability with unity specific gravity.)

If the gage bore is very dirty, a mild soap solution may be used to aid in cleaning prior to flushing with clear water. (CAUTION; Do not clean with liquid soaps, special solvents, degreasers, aromatic hydro-carbons, etc. Such cleaners and solvents frequently contain chlorine, fluorine, acetone and related compounds which will permanently damage the gage, and prevent proper operation.)

If meter becomes inoperative and cannot be made to operate properly by cleaning "hook" tip or replacing battery, return the entire gage to Dwyer Instruments, Inc., for service.

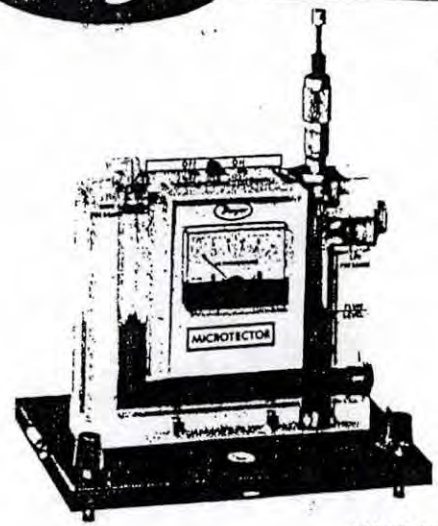
"Microtector" ®
A Product From
Dwyer Instruments, Inc.
"The Low Pressure People"

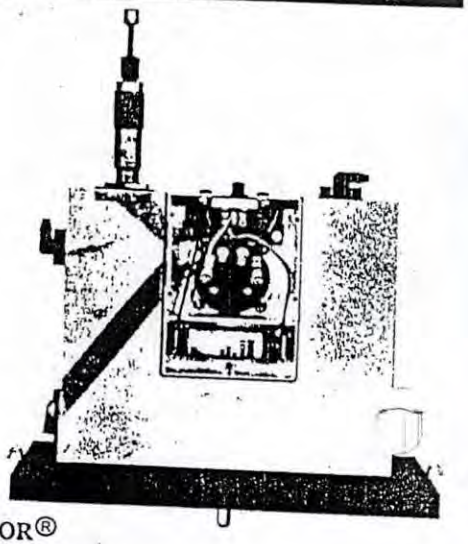
38-440190-00

DWYER INSTRUMENTS, INC.
P. O. Box 373, Michigan City, Indiana 46360, U.S.A.
Phone: Area 219/872-9141
Direct Chicago Line: Area 312/733-7883

2-37 of 2-57

MICROTECTOR®
Operating and Maintenance Instructions





MICROTECTOR®
Specifications and Features*

Time Proven Hook Gage Manometer Combined with Modern Electronics For Easier, Faster, more Accurate Precision Pressure Measurements.

~~Accurate and Repeatable to ±.0002 inches water column~~ (.000009 P.S.I.).

Pressure Range 0-2" w.c. Positive, Negative or Differential Pressures.

Non Toxic and Inexpensive Gage Fluid Consists of Distilled Water Mixed with a Small Amount of Dwyer Color and Wetting Agent Concentrate.

Convenient, Portable, Light Weight, and Self-Contained, the Unit Requires No External Power Connections and is Operated by a 1½ Volt Penlight Cell.

A.C. Detector Current Eliminates Hook Plating, Fouling and Erosion.

Micrometer Complies with Federal Specification GGG-C-105A and is Traceable to a Master at the National Bureau of Standards.

Three Point Mounting with Dual Leveling Adjustment and Circular Level Assure Rapid Set Up.

Durablock® Precision Machined Acrylic Plastic Gage Body.

Sensitive 0-50 Microamp D.C. Meter Acts as Detector and Also Indicates Battery and Hook Probe Condition.

Heavy One Half Inch Thick Steel Base Plate Provides Steady Mounting.

Top Quality Glass Epoxy Circuit Board and Solid State-Integrated Circuit Electronics.

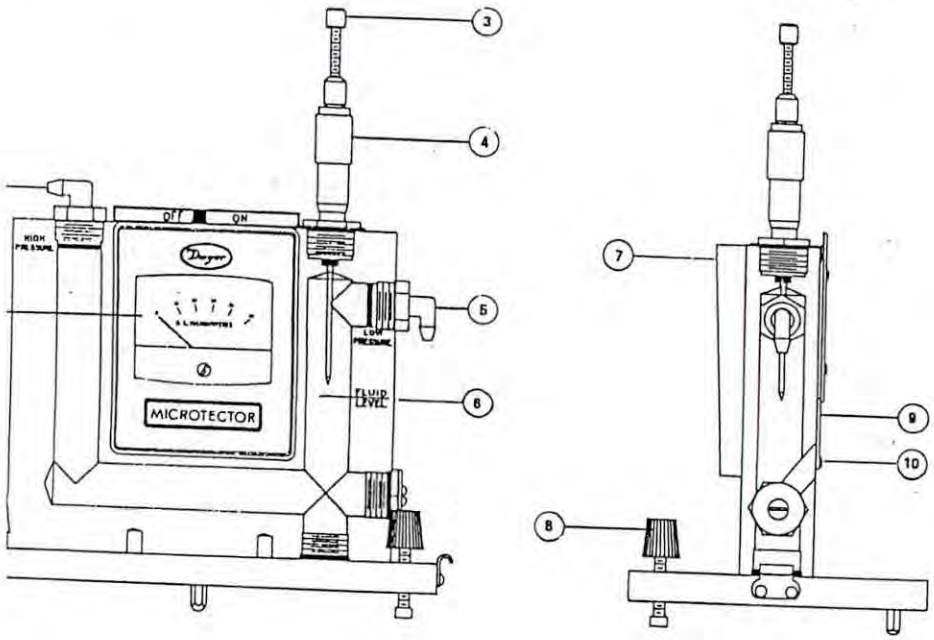
Electronic Enclosure of Tough Molded Styrene Acrylonitrile Provides Maximum Protection to Components Yet Allows Easy Access to Battery Compartment.

Rugged Sheet Steel Cover and Carrying Case Protects the Entire Unit When Not in Use.

Accessories Included are (2) 3 Foot Lengths Tygon Tubing, (2) 1/8" Pipe Thread Adapters and 3/4 oz. bottle of Fluorscein Green Color Concentrate with Wetting Agent.

**Patent Applied For*

DWYER INSTRUMENTS, INC.
P. O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Telephone 219/872-9141 or
Chicago 312/733-7883



MICROTECTOR® GAGE

Precision Pressure Measurement

: Dwyer Microtector® combines the
e proven principles of the Hook Gage
e manometer and modern solid state
:grated circuit electronics. It provides
inexpensive means of achieving ac-
ıcy and repeatability within ± .00025
ıes water column throughout its 0 to
nches w.c. range. It is truly a new
dard in precision pressure measuring
ces.

Principles of Operation

ressure to be measured is applied to
manometer fluid which is displaced in
ı leg of the manometer by an amount
al to ½ the applied pressure. A mi-
neter mounted hook is then lowered
l it contacts the manometer gage
l. The instant of contact is detected
mpletion of a low power A.C.
Current for this circuit is supplied
½ volt penlight cell feeding two
onductor amplifiers which act as a
nning multivibrator operating at a
ncy of approximately two kilo-
hertz. Completion of the A.C. circuit activates a bridge rectifier which provides the signal for indication on a sensitive (0 to 50 microamps) D.C. microammeter.

On indication of contact the operator stops lowering the hook and reads the micrometer which indicates one half the applied pressure. By reading the micrometer to the closest .000125 inches a total accuracy of .00025 inches w.c. is easily achieved. The micrometer complies with Federal Specification GGG-C-105A and is traceable to a master at the National Bureau of Standards.

Locating and Opening

Stand the Microtector and case on a firm flat level surface. Remove the cover by releasing the latches and lifting straight up. If it is necessary to move the gage without case, handle only the base plate or clear acrylic block. (CAUTION: Do not handle gage by grasping meter-electronic package housing Item 7 on drawing.)

Fluid Level

Level the gage by adjusting the two front leveling screws (Item 8 on drawing) until the bubble in the spirit level is centered in the small circle. After leveling the gage, open both rapid shut off valve tube connectors (2 and 5). Back off the Micrometer (4), if necessary, to make sure that the point or "Hook" is not immersed in the gage fluid. The fluid level in the gage should now coincide with the mark on the right hand bore plus or minus approximately 1/32 inch (6). If the level of fluid is too high, fluid can be removed with an eye dropper, pipette or carefully poured out of the right connection (5). If the level is too low, remove the top left rapid shut off valve tube connector (2), and add distilled water pre-mixed with the proper amount of Dwyer green concentrate. (See maintenance instruction for proportions.) After correcting the fluid level, reinstall the rapid shut off connectors and with them in the open position, relevel the Microtector. The gage is now ready to be zeroed.

Zeroing

Turn the Micrometer barrel (4) until its lower end just coincides with the zero mark on the internal vertical scale *and* the zero on the barrel scale coincides with the vertical line on the internal scale. Note that the internal scale is graduated every .025" from 0 to 1.00 inch and the barrel scale is graduated in one thousandths from 0 to .025." Turn the meter circuit switch at the top of gage to the "on" position. While holding the barrel at the zero position (and with the gage level), raise or lower the "hook" by turning the top knurled knob (3) until the "hook" or point is above, but near the fluid.

Check to be sure that the meter (1) registers zero. Watch the meter, hold the barrel (4) and lower the hook slowly by turning the top knurled knob (3). As the knob is turned, the point of the "hook" will contact the fluid and the meter pointer will move from zero to some upscale position. After making contact, turn the hook out of the fluid by turning the Micrometer barrel counter-clockwise to a reading of .010 or more. Again watch the meter and, this time, lower the hook by turning the Micrometer barrel. The "hook" position where the meter pointer begins to move up scale is the zero position. This position should correspond to the zero reading on the Micrometer. Adjust the hook in relation to the Micrometer barrel by turning the top knob while holding the barrel steady. Repeat lowering the hook, watching the meter for contact, and adjusting the hook until the zero position and zero reading exactly coincide. The gage is now zeroed and should not be moved.

An alternate method of zeroing and reading can be used wherein, instead of zeroing the gage completely, a zero correction reading is taken and recorded then subtracted from the final read... Comparable results can be obtained either method.

Positive Pressure Measurement

With the fluid at its proper level, a pressure of 2.0" water column maximum can be measured. Positive pressure should be applied to the top left connection (2) with the Micrometer zeroed as described above. This will permit simple direct readings to be taken.

After an unknown pressure has been applied at the top left connection, the fluid level will drop in the left bore and rise over the "hook" point in the right bore. Note the indicating meter pointer has moved upscale because the "hook" is immersed in the fluid. Turn the Micrometer counter-clockwise until the "hook" point leaves the fluid as indicated by meter pointer dropping to zero o... scale. Then slowly turn the Micrometer down until its point or "hook" just touches the fluid surface causing movement of the meter pointer. Withdraw the hook and repeat several times noting each time the Micrometer reading where the meter pointer movement begins. The average of these readings multiplied by two is the pressure applied to the gage. (Avg. reading x 2 = pressure applied in inches w.c.)

When the readings are complete the pressure should be removed and the zero-setting of the Microtector® rechecked. Any change in the zero position will indicate inaccurate readings. Should this happen the zero-set and pressure measurement procedure should be repeated.

BULLETIN NO. **H-11**

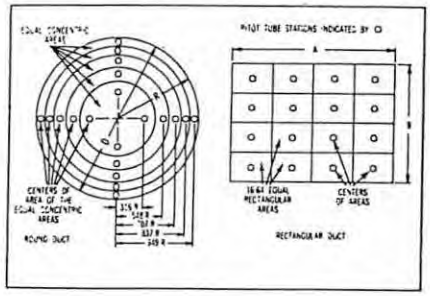
AIR VELOCITIES WITH THE DWYER PITOT TUBE

AIR VELOCITY

The total pressure of an air stream flowing in a duct is the sum of the static or bursting pressure exerted upon the sidewalls of the duct and the impact or velocity pressure of the moving air. Through the use of a pitot tube connected differentially to a manometer, the velocity pressure alone is indicated and the corresponding air velocity determined.

For accuracy of plus or minus 2%, as in laboratory applications, extreme care is required and the following precautions should be observed:

1. Duct diameter 4" or greater.
2. Make an accurate traverse per sketch at right, calculate the velocities and average the readings.
3. Provide smooth, straight duct sections a minimum of 8½ diameters in length upstream and 1½ diameters downstream from the pitot tube.
4. Provide an egg crate type straightener upstream from the pitot tube.



In making an air velocity check select a location as suggested above, connect tubing leads from both pitot tube connections to the manometer and insert in the duct with the tip directed into the air stream. If the manometer shows a minus indication reverse the tubes. With a direct reading manometer, air velocities will now be shown in feet per minute. In other types, the manometer will read velocity pressure in inches of water and the corresponding velocity will be found from the curves in this bulletin. If circumstances do not permit an accurate traverse, center the pitot tube in the duct, determine the center velocity and multiply by a factor of .9 for the approximate average velocity. Field tests run in this manner should be accurate within plus or minus 5%.

The velocity indicated is for dry air at 70°F., 29.9" Barometric Pressure and a resulting density of .075#/cu. ft. For air at a temperature other than 70°F. refer to the curves in this bulletin. For other variations from these conditions, corrections may be based upon the following data:

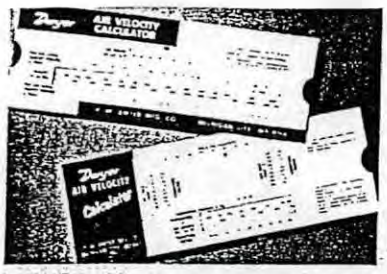
$$\text{Air Velocity} = 1096.2 \sqrt{\frac{P_V}{D}}$$

where P_V = velocity pressure in inches of water
D = Air density in #/cu. ft.

$$\text{Air Density} = 1.325 \times \frac{P_B}{T}$$

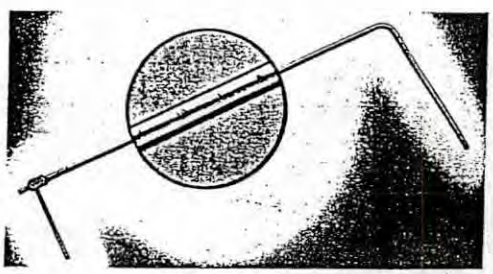
where P_B = Barometric Pressure in inches of mercury
T = Absolute Temperature (indicated temperature °F plus 460)

Flow in cu. ft. per min. = Duct area in square feet x air velocity in ft. per min.



AIR VELOCITY CALCULATOR

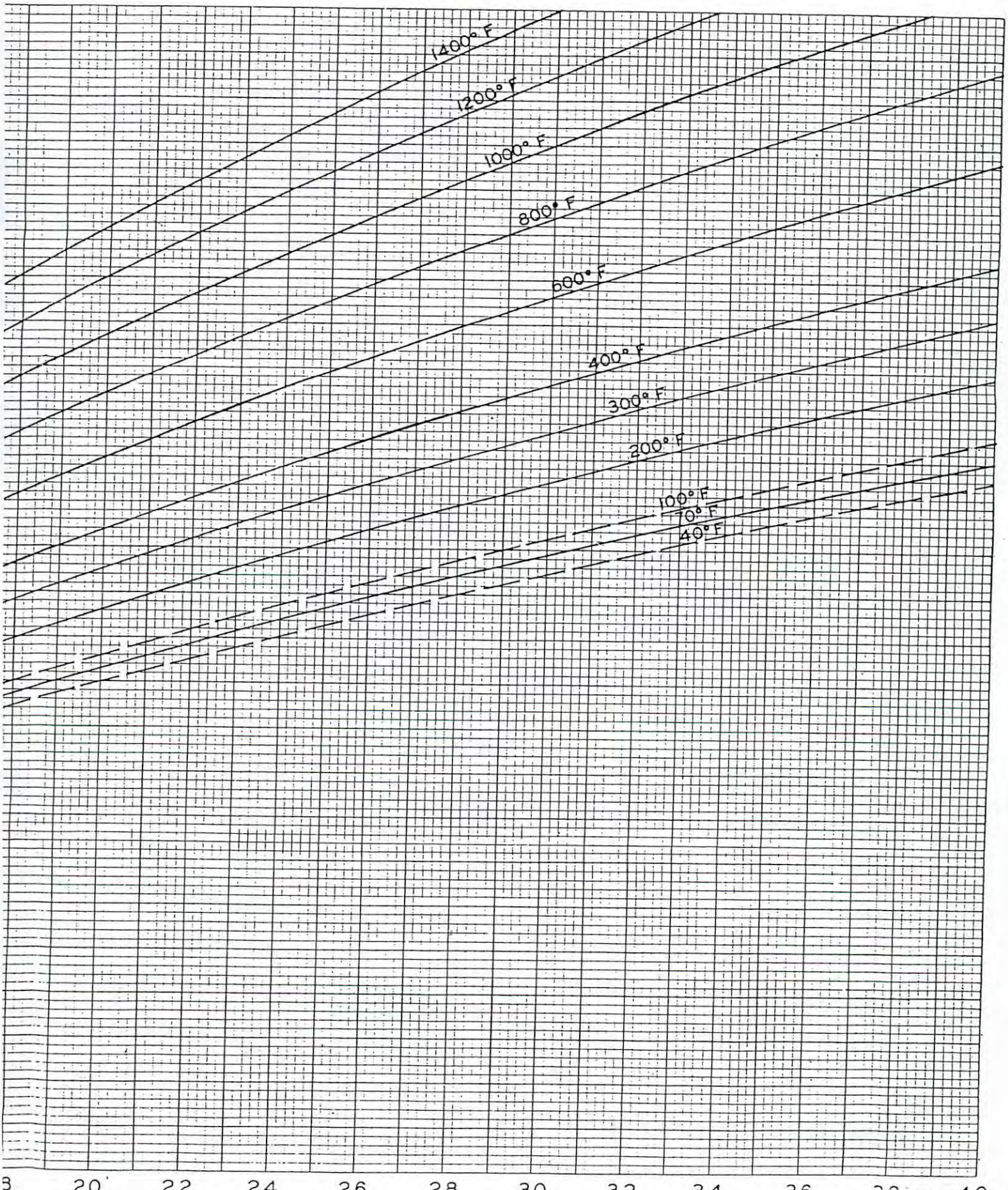
Computes velocity based on air density corrected for conditions of temperature and pressure. Eliminates tedious calculations. Ranges from .01 to 10" water corresponding to 400 to 20,000 FPM. Furnished with each pitot tube.



STAINLESS STEEL PITOT TUBES

Test confirmed unity coefficient and lifetime construction of No. 304 stainless steel. Inch graduations show depth of insertion for traversing. Complies with AMCA and ASHRAE specifications. Sizes 12" to 60" long. Hand or fixed mounting types.

LITHOGRAPHED IN U.S.A. 3/84


1400° F
1200° F
1000° F
800° F
600° F
400° F
300° F
200° F
100° F
70° F
40° F
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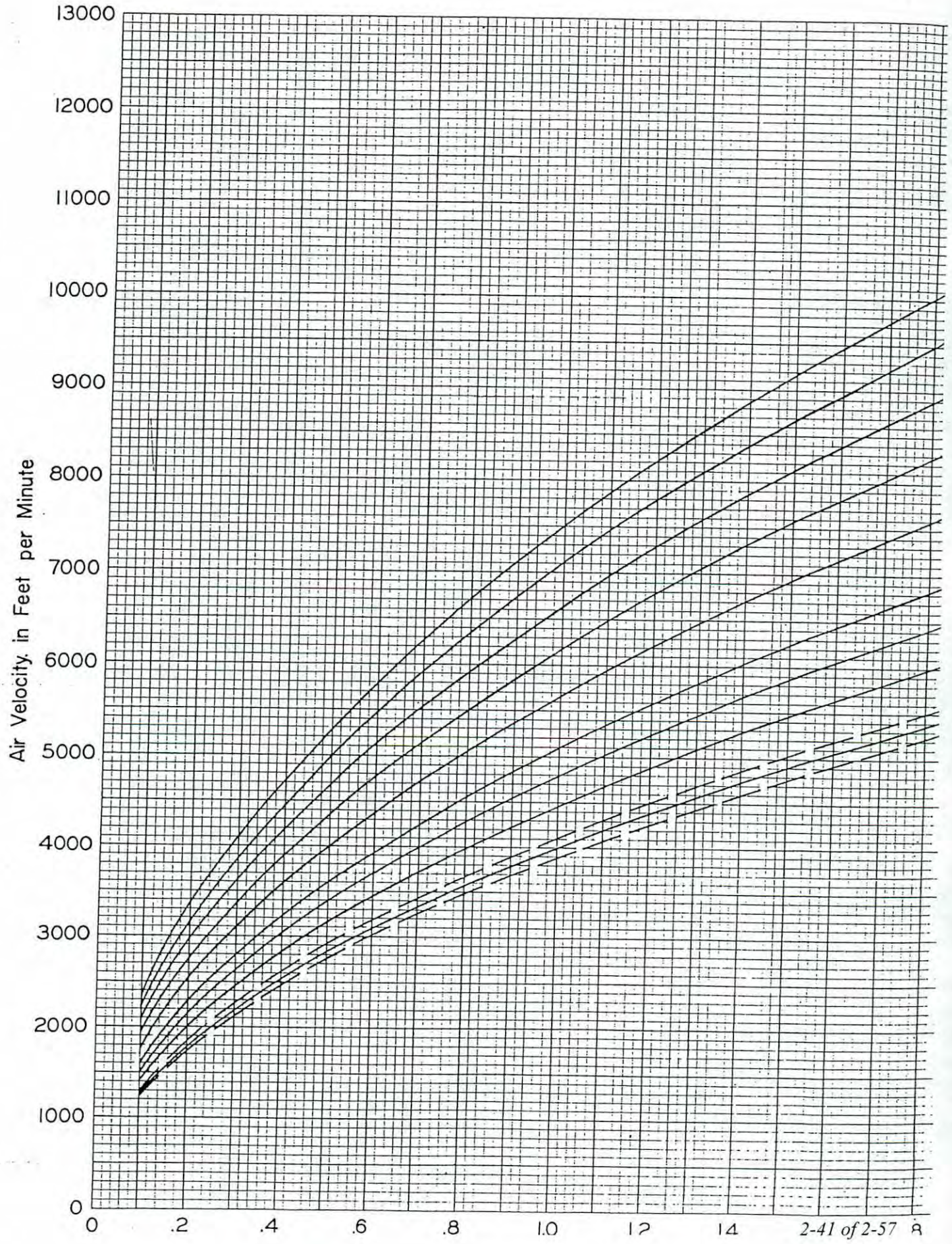
2.6
2.8
3.0
3.2
3.4
3.6


13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Air Velocity, in Feet per Minute
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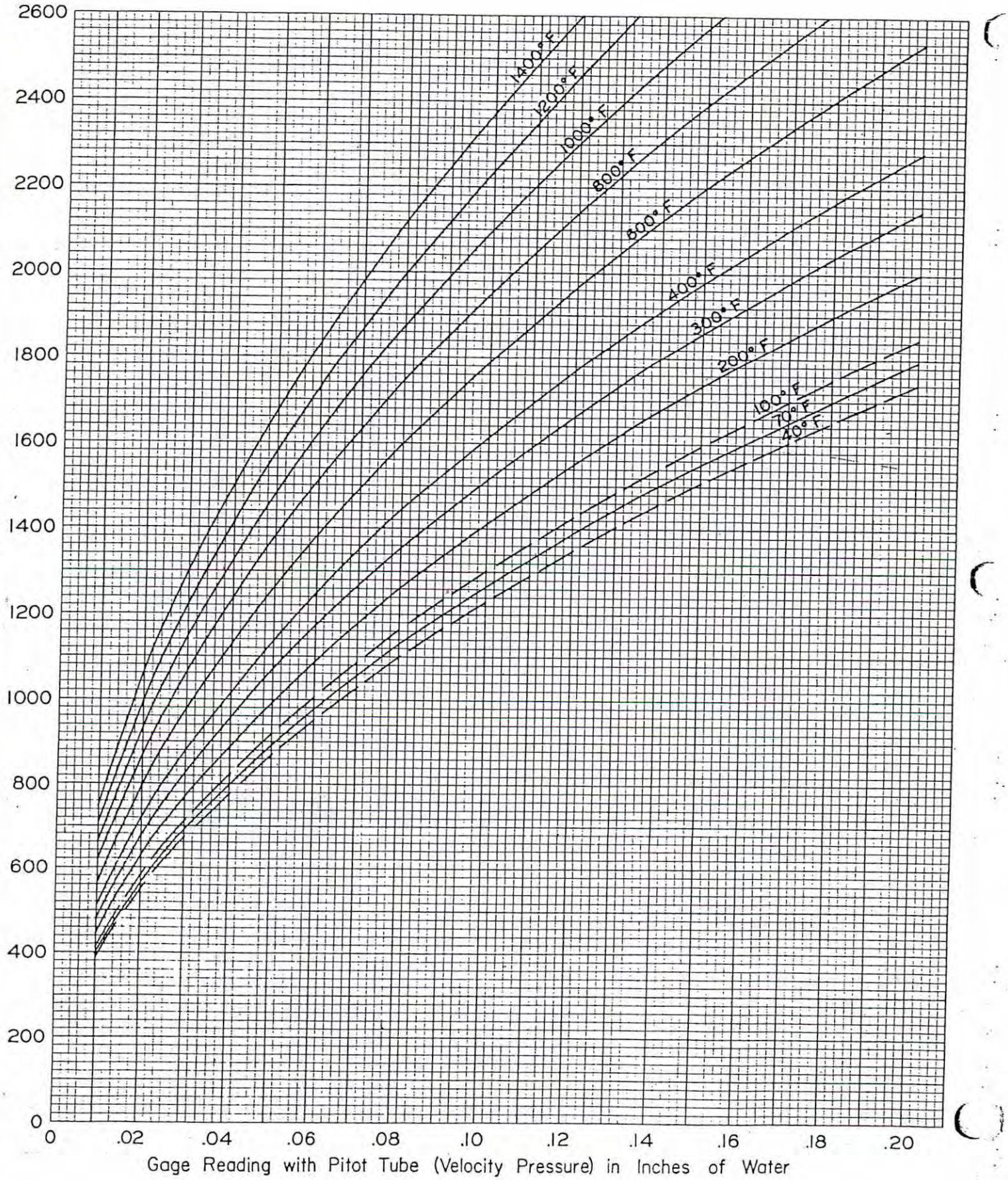
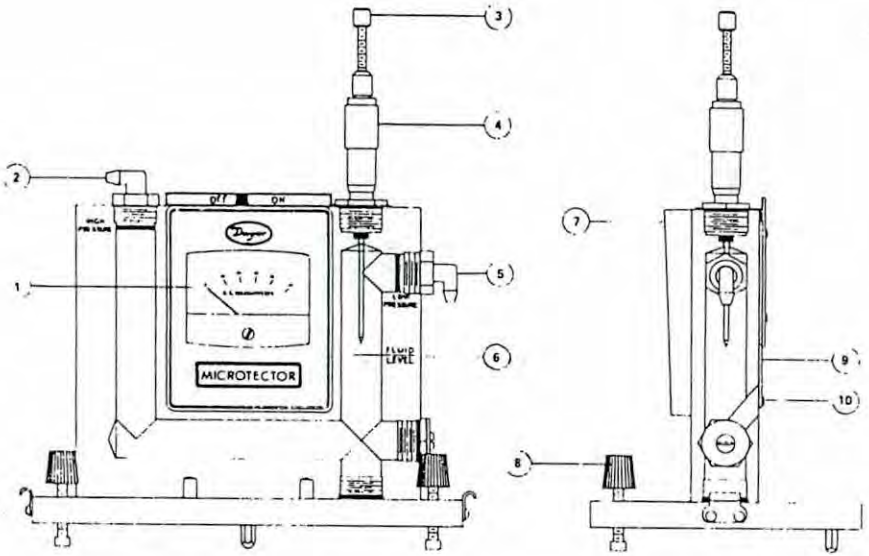
.4
.6
.8
1.0
1.2
1.4


2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1400° F
1200° F
1000° F
800° F
600° F
400° F
300° F
200° F
100° F
70° F
40° F
0
.02
.04
.06
.08
.10
.12
.14
.16
.18
.20
Gage Reading with Pitot Tube (Velocity Pressure) in Inches of Water



MICROTECTOR® GAGE

Precision Pressure Measurement

The Dwyer Microtector® combines the time proven principles of the Hook Gage type manometer and modern solid state integrated circuit electronics. It provides an inexpensive means of achieving accuracy and repeatability within ± .00025 inches water column throughout its 0 to 2 inches w.c. range. It is truly a new standard in precision pressure measuring devices.

Principles of Operation

A pressure to be measured is applied to the manometer fluid which is displaced in each leg of the manometer by an amount equal to ½ the applied pressure. A micrometer mounted point is then lowered until contacts the manometer gage fluid. The instant of contact is detected by completion of a low power A.C. circuit. Current for this circuit is supplied by a 1½ volt penlight cell feeding two semiconductor amplifiers which act as a free-running multivibrator operating at a frequency of approximately two kilohertz. Completion of the A.C. circuit activates a bridge rectifier which provides the signal for indication on a sensitive (0 to 50 microamps) D.C. microammeter.

On indication of contact the operator stops lowering the point and reads the micrometer which indicates one half the applied pressure. By interpolating eight divisions, (each being .000125" w.c.) between .001 micrometer graduations, a total accuracy of .00025 can easily be achieved. The micrometer complies with Federal Specification GGG-C-105A and is traceable to a master at the National Bureau of Standards.

Locating and Opening

Stand the Microtector® and case on a firm flat level surface. Remove the cover by releasing the latches and lifting straight up. If it is necessary to move the gage without case, handle only the base plate or clear acrylic block. (CAUTION: Do not handle gage by grasping meter-electronic package housing Item 7 on drawing.)

Fluid Level

Level the gage by adjusting the two front leveling screws (Item 8 on drawing) until the bubble in the spirit level is centered in the small circle. After leveling the gage, open both rapid shut off valve tube connectors (2 and 5). Back off the Micrometer (4), if necessary, to make sure that the point is not immersed in the gage fluid. The fluid level in the gage should now coincide with the mark on the right hand bore plus or minus approximately 1/32 inch (6). If the level of fluid is too high, fluid can be removed with an eye dropper pipette or carefully poured out of the right connection (5). If the level is too low, remove the top left rapid shut off valve tube connector (2), and add distilled water pre-mixed with the proper amount of Dwyer green concentrate. (See maintenance instruction for proportions.) After correcting the fluid level, reinstall the rapid shut off connectors and with them in the open position, relevel the Microtector.® The gage is now ready to be zeroed.

Zeroing

Turn the Micrometer barrel (4) until its lower end just coincides with the zero mark on the internal vertical scale *and* the zero on the barrel scale coincides with the vertical line on the internal scale. Note that the internal scale is graduated every .025" from 0 to 1.00 inch and the barrel scale is graduated in one thousandths from 0 to .025." Turn the meter circuit switch at the top of gage to the "on" position. While holding the barrel at the zero position (and with the gage level), raise or lower the point by turning the top knurled knob (3) until the point is above, but near the fluid.

Check to be sure that the meter (1) registers zero. Watch the meter, hold the barrel (4) and lower the point slowly by turning the top knurled knob (3). As the knob is turned, the point will contact the fluid and the meter pointer will move from zero to some upscale position. After making contact, turn the point out of the fluid by turning the Micrometer barrel counter-clockwise to a reading of .010 or more. Again watch the meter and, this time, lower the point by turning the Micrometer barrel. The point position where the meter pointer begins to move up scale is the zero position. This position should correspond to zero reading on the Micrometer. Adjust the point in relation to the Micrometer barrel by turning the top knob while holding the barrel steady. Repeat lowering the point, watching the meter for contact, and adjusting the point until the zero position and zero reading exactly coincide. The gage is now zeroed and should not be moved.

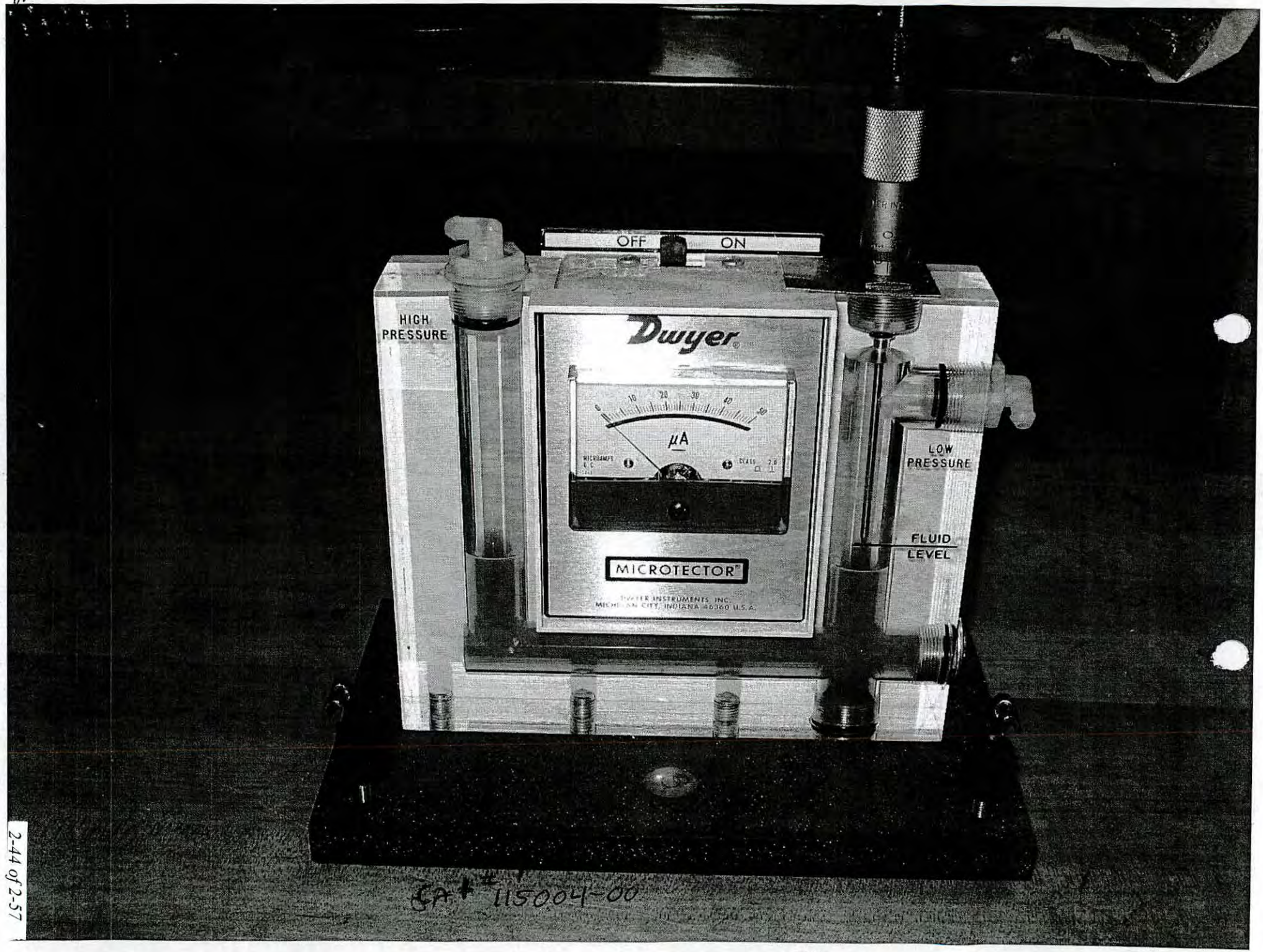
An alternate method of zeroing and reading can be used wherein, instead of zeroing the gage completely, a zero correction reading is taken and recorded then subtracted from the final reading. Comparable results can be obtained with either method.

Positive Pressure Measurement

With the fluid at its proper level, a pressure of 2.0" water column maximum can be measured. Positive pressure should be applied to the top left connection (2) with the Micrometer zeroed as described above. This will permit simple direct reading to be taken.

After an unknown pressure has been applied at the top left connection, the fluid level will drop in the left bore and rise over the point in the right bore. Note the indicating meter point has moved upscale because the point is immersed in the fluid. Turn the Micrometer counter-clockwise until the point leaves the fluid as indicated by the meter pointer dropping to zero on scale. Then slowly turn the Micrometer down until its point just touches the fluid surface causing movement of the meter pointer. Withdraw the point and repeat several times noting each time the Micrometer reading where the meter pointer movement begins. The average of these readings multiplied by two is the pressure applied to the gage. (Avg. reading x 2 = pressure applied in inches w.c. The degree of uncertainty for the operator and instrument is indicated by the difference in these readings.)

When the readings are complete the pressure should be removed and the zero-setting of the Microtector® rechecked. Any change in the zero position will indicate inaccurate readings. Should this happen the zero-set and pressure measurement procedure, should be repeated.


OFF
ON
HIGH PRESSURE
Dwyer
μA
LOW PRESSURE
FLUID LEVEL
MICROTECTOR

EA+ 115004-00

Certificate of Calibration

Certificate Number: **525343**

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Omni-Test Laboratories
13327 NE Airport Way
Portland, OR 97230

PO: **OTL-13-003**
Order Date: 2/6/2013
Authorized By: **N/A**

Property #: OMNI-00417
User: N/A
Department: N/A
Make: Extech
Model: 451126
Serial #: 08120397
Description: Anemometer
Procedure: DCN 404947/400331
Accuracy: ± 3% READING

Calibrated on: 2/7/2013
*Recommended Due: 2/7/2014
Environment: 20 °C 40 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 112

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Returned/returned in case.

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
568	TSI	8705	DP-CALC	9/10/2013	513436
497A	Hart Scientific	1502A	Precision Digital Thermometer	8/14/2013	511627
601A	Burns Engineering	200G05B085	INDUSTRIAL PRT	2/7/2014	496515

Measurement Data

Parameter / Measurement Description	Range	Unit	Reference	UUT	Variance	Min	Max
Before/After							
Air Velocity							
		FPM	545.0	541	4.0	529.0	561.0
		FPM	940.0	925	15.0	912.0	968.0
		FPM	1590.0	1612	-22.0	1542.0	1638.0
Temperature / Ambient							
		°F	72.280	71.72	0.560	70.280	74.280

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

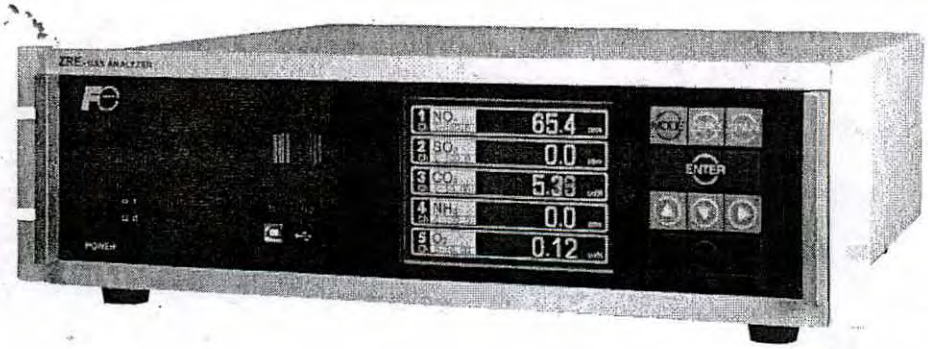
Issued 2/8/2013 Rev # 14

Inspector

Instruction Manual

NDIR TYPE INFRARED GAS ANALYZER

TYPE: ZRE



Fuji Electric Systems Co., Ltd.

INZ-TN1ZREc-E

OMNI Environmental, Inc.
OMNI-Test Laboratories, Inc.

WOOD MOISTURE CONTENT CALIBRATION WORKSHEET

Moisture Content Standard OMNI ID #: OMNI-00431 (5440P)

Reference Moisture Content Standard: **OMNI # 00430**

[#430] (#431) (#430) JE

Date	Temp. (°F)	Barometric Pressure (in Hg)	Fixed Moisture %	Fixed Moisture %	Observed Moisture % [#431]		Initials
4/29/11	72	30.3	22%	12%	22%/12%	22%/12%	SW
8/10/11	85	29.2	22%	12%	22%/12%	22%/12%	SW
11/29/11	73	30.15	22%	12%	22%/12%	22%/12%	SW
6/14/12	71	30.21	22%	12%	12.0%/22.0%	12.0%/22.0%	AM
9/19/2012	74	30.20	22%	12%	12.0/22.0	12.0/22.0	JC
12/31/2012	67° F	30.25 in Hg	22%	12%	12.0	22.0	JE
3/28/2013	71 °F	30.10 in Hg	22%	12%	12.0	22.0	JC
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			
			22%	12%			

Notes: _____

Technician signature: _____ Date: 4/29/11

Example Calculations

Equations and Sample Calculations - Method 5G

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

BR	Dry burn rate, kg/hr
m_n	Total particulate matter collected, mg
$V_{m(std)}$	Volume of gas sampled corrected to standard conditions, dscf
v_s	Average dilution tunnel gas velocity, ft/sec
C_s	Particulate concentration, g/dscf
Q_{sd}	Average dilution tunnel gas flow rate, dscf/min
E	Particulate emission rate, lbs/hr
PR	Proportional rate variation, %

Dry Burn Rate

Using equation 28-3:

$$BR = \frac{60 \times W_{wd}}{\theta} \times \frac{100 - \%M_w}{100}$$

Where,

BR	=	Dry burn rate, lb/hr
W_{wd}	=	Mass of wood burned (wet basis) during test run, lb
θ	=	Total time of test run, minutes
$\%M_w$	=	Average moisture content of test fuel charge, wet basis percent

Sample Calculation:

Dry basis moisture of fuel = 20.03%

Using the equation 28-2 for converting dry basis moisture to wet basis moisture,

$$\%M_w = \frac{20.03 \times 100}{20.03 + 100}$$

$$\%M_w = 16.69\%$$

The wet weight of the fuel charge was 7.8 pounds. Converting pounds to kilograms yields a weight of 3.538 kg. The run time for this run was 180 minutes. Therefore, the burn rate equation appears thus:

$$BR = \frac{60 \times 3.538 \times (100 - 16.69)}{180 \times 100}$$

$$BR = 0.98\ kg/hr = 2.17\ lb/hr$$

Total Particulate Matter Collected

$$m_n = F_1 + F_2 + R - (V_a \times B_a)$$

Where:

m_n	=	Total particulate matter collected, mg
F_1	=	Particulate matter collected on front filter, mg
F_2	=	Particulate matter collected on rear filter, mg
R	=	Residue from evaporated probe and filter holder acetone rinse, mg
V_a	=	Volume of acetone evaporated probe and filter holder actone rinse, ml
B_a	=	Acetone blank value, mg/ml

Sample Calculation:

$m_n = 12.6 - 0.4 + 4.7 - (180 \times 0.0040)$

$m_n = 16.2$ mg

Volume of Gas Sampled Corrected to Dry Standard Conditions

Using equation 5-1:

$$V_{m(std)} = V_m \times Y \times \left(\frac{T_{std}}{P_{std}}\right) \times \frac{\left(P_b + \frac{\Delta H}{13.6}\right)}{T_m}$$

Where:

K	=	17.64 °R/in. Hg
T_{std}	=	528 °R
P_{std}	=	29.92 in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_b	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

$$V_{m(std)} = 98.434 \times 1.01 \times \left(\frac{528}{29.92}\right) \times \frac{30.03 + \frac{0.7}{13.6}}{532.5}$$

$$V_{m(std)} = 99.116\ ft^3$$

Dilution Tunnel Gas Velocity

Using equations 2-7 and 2-6, calculated at each recorded interval:

$$v_s = k_p \times C_p \times \sqrt{\Delta P} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

$$M_s = M_d \times (1 - B_{ws}) + 18.0 \times B_{ws}$$

Where:

v_s	=	Average dilution tunnel gas velocity, ft/sec
k_p	=	Pitot tube constant: $85.49 \frac{ft}{sec} \left[\frac{(lb/lb\text{-}mole) \times (inches\ Hg)}{(^oR) \times (inches\ H_2O)}\right]^{\frac{1}{2}}$
C_p	=	Pitot tube coefficient (0.99 for standard pitot tube; 0.84 may be used for S-type pitot tubes constructed according to Method 2 procedures), unitless
ΔP	=	ΔP measured during the pre-test flow traverse of the dilution tunnel; the square root of the ΔP values are averaged for this calculation, in. H_2O
P_b	=	Barometric pressure at test site, in. Hg
P_g	=	Static Pressure of tunnel, in. Hg
P_s	=	Absolute tunnel pressure, = $P_b + P_g$
M_s	=	Molecular weight of tunnel gas; assume M_d =29 lb/lb-mole (per method 5G)
B_{ws}	=	Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
T_s	=	Dilution tunnel temperature, °R; (°R = °F + 460)

Sample calculation:

$$M_s = 29 \times (1 - 0.04) + 18.0 \times 0.04 = 28.56$$

$$v_s = 85.49 \times 0.99 \times \sqrt{0.0351} \times \sqrt{\frac{(548)}{(30.03 + \frac{-0.45}{13.6}) \times (28.56)}}$$

$$v_s = 12.69 \frac{ft}{sec}$$

Particulate Concentration

Using equation 5G-2:

$$C_s = 0.001 \frac{g}{mg} \times \frac{m_n}{V_{m(std)}}$$

Where:

C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscf
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

$$C_s = \frac{0.001 \times 16.2}{99.116}$$

$$C_s = 0.000163 \ g/dscf$$

Average Dilution Tunnel Gas Flow Rate

Using equation 2-8, calculated at each recorded interval:

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

Q_{sd}	=	Gas flow rate corrected to dry, standard conditions, dscf/hr
3600	=	Conversion from seconds to hours
B_{ws}	=	Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
v_s	=	Average dilution tunnel gas velocity, ft/sec
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 538°R
$T_{s(avg)}$	=	Average absolute dilution tunnel temperature, °R, (°R = °F + 460)
P_b	=	Barometric pressure at test site, in. Hg
P_g	=	Dilution tunnel static pressure, in. Hg
P_s	=	Absolute dilution tunnel gas pressure, in Hg, (Hg = $P_b + P_g$)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.04) \times 12.69 \times \frac{(\pi \times 3^2)}{144} \times \frac{528}{548} \times \frac{30.03 + \frac{-0.45}{13.6}}{29.92}$$

$$Q_{sd} = 8313.36\ dscf/hr = 138.56\ dscf/min$$

Particulate Emission Rate

Using equation 5G-3 and 5G-4:

$$E = C_s \times Q_{sd}$$

$$E_{adj} = K_3 \times E^{0.83}$$

Where:

E = Particulate emission rate, g/hr

E_{adj} = Particulate emission rate, adjusted, g/hr

C_s = Concentration of particulate matter in the stack, corrected to dry, standard conditions, g/dscf

Q_{sd} = Average dilution tunnel gas flow rate, dscf/hr

K_3 = Constant, 1.82 for metric units, 0.643 for English units

Sample calculation:

$$E = 0.000163 \times 8313.36$$

$$E = 1.36\ g/hr$$

$$E_{adj} = 1.82 \times 1.36^{0.83}$$

$$E = 2.35\ g/hr$$

Proportional Rate Variation

Using equation 5H-9, calculated at each recorded interval:

$$PR = \frac{\theta \times (V_{mi} \times V_s \times T_m \times T_{si})}{10 \times (V_m \times V_{si} \times T_s \times T_{mi})} \times 100$$

Where:

PR	=	Percent proportional rate
θ	=	Time of test, min
S_i	=	Measured tracer gas concentration for the "i^{th}" interval, in this case, the inverse of the calculated flow in the stack based on CO_2 concentrations in the stack and in the dilution tunnel
$V_{mi(std)}$	=	Volume of gas sample measured by the dry gas meter during the "i^{th}" 10 minute interval, dscf
V_m	=	Volume of gas sample as measured by dry gas meter, dscf
V_{si}	=	Average gas velocity in the dilution tunnel during each 10 minute interval, i, of the test run, m/sec
V_s	=	Average gas velocity in the dilution tunnel, m/sec
T_{mi}	=	Absolute average dry gas meter temperature during each 10 minute interval, i, of the test run, °R
T_m	=	Absolute average dry gas meter temperature, °R
T_{si}	=	Absolute average gas temperature in the dilution tunnel during each 10 minute interval, i, of the test run, °R
T_s	=	Absolute average gas temperature in the dilution tunnel, °R

Sample calculation (for the reading at 50 minutes into test run 1):

$$PR = \frac{180 \times 5.6 \times 12.69 \times 533 \times 552}{10 \times 98.434 \times 12.63 \times 548 \times 532} \times 100$$

$$PR = 103.8\%$$

Section 3

Owner's Manual(s)

By appointment to The Royal Danish Court

morsø

Installation and Operating Instructions

7900 series

For use in North America

Morsø 7943

Read this entire manual before you install and use your new room heater. If this room heater is not properly installed, a house fire may result. To reduce the risk of fire, follow the installation instructions. Failure to follow instructions may result in property damage, bodily injury, or even death.

Contact local building officials about restrictions and installation/inspection-requirements in your area.

Save these instructions

MORSØ JERNSTØBERI A/S . DK-7900 NYKØBING MORS
E-Mail: stoves@morsoe.com · Website: www.morsoe.com

We congratulate you on your choice of a Morsø stove. Morsø has been producing some of the world's best stoves since 1853. If you follow this installation- and operating instruction carefully, we can assure you many years of warmth and pleasure.

Optional Accessories
A wide range of accessories (such as handling gloves, fireside tools, glass cleaner and heatproof paint) are available for use with your Morsø stove. They help with day-to-day running and maintenance. Contact your Morsø dealer for more information.

The Morsø 7900 series meets the U.S. Environmental Protection Agency's emission limits for wood heaters sold on or after July 1, 1990

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED www.nficertified.org

We suggest that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training

The Morsø 7900 series have been tested by OMNI-Test Laboratories, Inc. The test standards are ANSI/UL-1482 for the United States and ULC S627 for Canada.

The stove is listed for burning wood only. Do not burn other fuels.

Under specific test conditions this heater has been shown to deliver heat at rates ranging from 11 600 - 26 700 BTU/hr.

Cast iron
Cast iron is a live material. There are no two ovens that are identical. This is partly due to the tolerances of the casting process, partly because the ovens are a work of craftsmanship. Minor unevennesses may also occur in the cast iron surface.

CONTENTS:

1.0 Installation of your Morsø stove

Installation of woodburning stoves must be safe and legal.

If your Morsø stove is not installed correctly, it may cause a house fire. To reduce the risk of fire, the installation instructions must be followed carefully. Contact the local building officials about restrictions and installation inspection in your area.

Before you start installing your stove, make sure that:

- The stove and chimney connection are placed far enough from combustible materials to meet all clearance requirements.
- The floor protection must be adequate and must be made correctly according to 'the requirements.

All neccessary approvals are needed from the local building officials.

The data plate, which is located on the back of the stove, provides information regarding safety testing information, name of certified testing laboratory, and installation requirements.

Installation requirements vary in different districts, and the local building officials have the final authorization to approve your installation. You should discuss the installation with them before beginning. Please ask your dealer for further information.

Do not connect to any air distribution duct or system.

Important: If the installation instructions are not followed carefully, it may cause dangerous situations like chimney - and house fires. Follow the instructions carefully and do not deviate from them as it may cause injuries to people or property.

1.1 Checking loose parts in the stove

After unpacking, check that the fire bricks are firmly in position and have not shifted in transit. Check also that the air control works freely.

Before starting the initial fire, make sure that the baffles is placed correctly.

Standard Accessories

A Morsø glove and ceramic flue connection gasket are standard accessories that usually can be found in the ashpan or firebox area.

1.2 The chimney / flue system

Note that the flue system must be independently secured and must not rely on the stove for support.

The stove must not be connected to a chimney flue serving any other appliance. (Several flues may run up a single chimney stack; use one flueway per appliance).

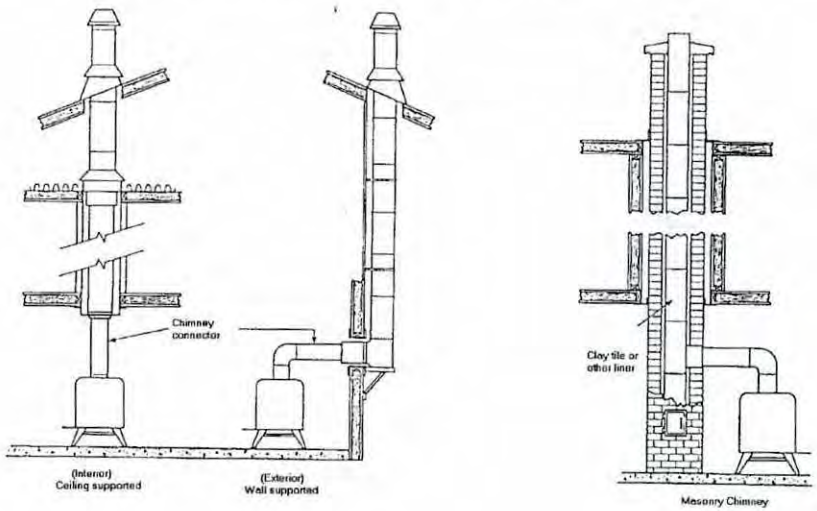
Use a residential type masonry or listed type HT factory-built chimney.

High Temperature (H.T.) Chimney Standard UL-103-1985 (2100° F.) or a code-approved masonry chimney with flue liner for the USA, and High Temperature (650°C) Standard ULC S-629 for Canada.

The internal dimensions of the chimney connector and chimney must not be less than 6 inches diameter (or equivalent cross section), and should not be significantly larger than this. Too large a section will tend to allow the flue gases to cool excessively, causing sluggishness or unpredictability in the stove's performance.

We recommend the length of the chimney system should be at least 16 feet (not required) above the stove in normal domestic situations, measured from the flue collar to the top of the chimney. Local conditions like for example - roof constructions, large trees nearby and high altitude, may influence the chimney draft and height. Therefore, contact the local professional chimney sweep or your Morsø dealer.

Typical Factory-Built or Masonry Chimney Installations



1.3 Flue Connection

The stove is supplied from the factory with a round blanking plate blocking off the top and rear flue exit (behind the rear shield plate). A flue collar are placed in the firebox area.

Use a 24 MSG black or blue chimney connector or listed double wall chimney connector. Refer to local codes and the chimney manufacturer's instructions for precautions required for passing a chimney through a combustible wall or ceiling. Remember to secure the chimney connector with a minimum of three screws to the product and to each adjoining section.
The collar can be fitted to the rear outlet. Simply knock out the round panel on the rear heat shield plate to reveal the cast iron plate. Untwist the blanking plate and the flue collar and swap their positions. Re-secure by pushing down and tighten the enclosed screws.
Position the stove and connect to the flue system.

Wear gloves and protective eyewear when drilling, cutting or joining sections of chimney connector

1.4 Connection to the existing chimney

A chimney connector is the double-wall or single-wall pipe that connects the stove to the chimney. The chimney itself is the masonry or prefabricated structure that encloses the flue. Chimney connectors are used only to connect the stove to the chimney.

Double-wall connectors must be tested and listed for use with solid-fuel burning appliances. Single-wall connectors should be made of 24 gauge or heavier gauge steel. Do not use galvanized connector; it cannot withstand the high-temperatures that smoke and exhaust gases can reach, and may release toxic fumes under high heat. The connector must be 6 inches (150mm) in diameter.

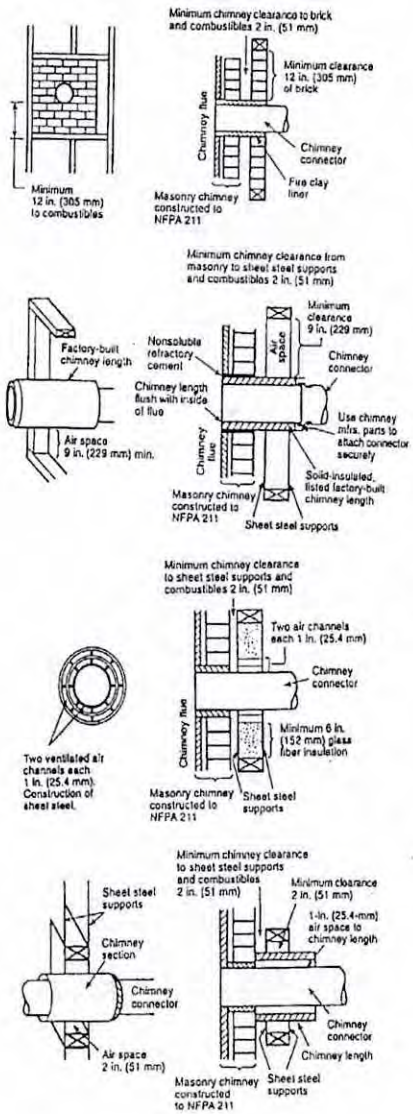
If possible, do not pass the chimney connector through a combustible wall or ceiling. If passage through a combustible wall is unavoidable, refer to the sections on Wall Pass- Throughs. Do not pass the connector through an attic, a closet or similar concealed space when installing the chimney connectors.

It is important to keep the flue gases moving smoothly in the right direction. Do not vent into a large void at this location; rather form one continuous section all the way up. Use mild bends (e.g. 45° vs. 90°) rather than sharp angles where a change of direction is required. All parts of the venting must be accessible for cleaning purposes.
In horizontal runs of chimney, maintain a distance of 18 inches from the ceiling. Keep it as short and direct as possible, with no more than two 90 degree turns. Slope horizontal runs of connector upward 1/4 inch per foot (20 mm per metre) going from the stove toward the chimney. The recommended maximum length of a horizontal run is 3 feet (1 metre), and the total length should be no longer than 8 feet (2.5 metres).
Information on assembling and installing connectors is provided by the manufacturer's instructions exactly as you assemble the connector and attach it to the stove and chimney.

Be sure the installed stove and chimney connector are correct distances from near by combustible materials. See the clearance paragraph page 8.

Where passage through a wall or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365.

Chimney Connector Systems and Clearances from Combustible Walls for Residential Heating Appliances



A Minimum 3.5-in thick brick masonry all framed into combustible wall with a minimum of 12-in brick separation from clay liner to combustibles. The fireclay liner shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

B Solid-insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1-in. or more of insulation with a minimum 9-in. air space between the outer wall of the chimney length and combustibles.

C Sheet steel chimney connector, minimum 24 gauge in thickness, with a ventilated thimble, minimum 24 gauge in thickness, having two 1-in. air channels, separated from combustibles by a minimum of 6-in. of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gauge in thickness.

D Solid insulated, listed factory-built chimney length with an inside diameter 2-in. larger than the chimney connector and having 1-in. or more of insulation, serving as a pass-through for a single wall sheet steel chimney connector of minimum 24 gauge thickness, with a minimum 2-in. air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12-in. chimney section spaced 1-in. away from connector using sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports securely fastened to wall surfaces of minimum 24 gauge thickness. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

1.5 Positioning the stove

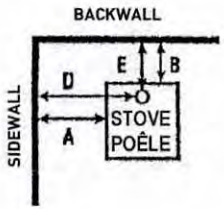
Distance to walls and lintel

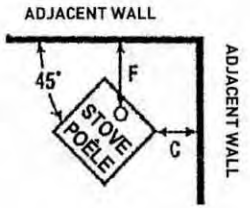
When the stove is positioned near combustible materials, observe all current local and national building regulations with regards to clearances. Whatever regulations apply to your area, do not in any case install the stove within 8 inches of combustible materials around the sides or 16 inches above the top of the stove (fireplace installations require greater clearances above the stove - see below in the clearance chart). These distances may need to be increased if the materials are sensitive to heat. Note also that wall paper and other decorative materials may become detached with the effects of heat and care should be taken to ensure that they do not fall towards the stove in such an event.

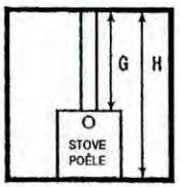
When the stove is positioned near non-combustible materials, a gap of 4 inches or more is recommended for cleaning purposes and to ensure that heat circulates around the stove and out into the room.

If using rear exit, the floor protection must extend beneath the chimney connector and 2-in beyond each side.

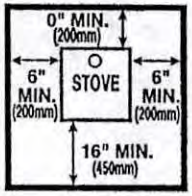
CLEARANCE REQUIREMENTS	STANDARD RESIDENTIAL FREESTANDING INSTALLATIONS (SINGLE AND DOUBLEWALL CONNECTOR):	
	SINGLE WALL	DOUBLE WALL
A. SIDEWALL TO UNIT	23" (585 mm.)	23" (585 mm.)
B. BACKWALL TO UNIT	5" (127 mm.)	5" (127 mm.)
C. CORNERWALL TO UNIT	7" (178 mm.)	7" (178 mm.)
D. SIDEWALL TO CONNECTOR	29.5" (750 mm.)	29.5" (750 mm.)
E. BACKWALL TO CONNECTOR	8.5" (216 mm.)	8.5" (216 mm.)
F. CORNERWALL TO CONNECTOR	14.5" (369 mm.)	14.5" (369 mm.)
G. UNIT TO CEILING	37.5" (953 mm.)	37.5" (953 mm.)
H. FLOOR TO CEILING	-	-
REAR VENT OUT THE BACKWALL CONFIGURATION		
A. SIDEWALL TO UNIT	23" (585 mm.)	23" (585 mm.)
B. BACKWALL TO UNIT	7" (178 mm.)	7" (178 mm.)
D. SIDEWALL TO CONNECTOR	29.5" (750mm.)	29.5" (750mm.)







FLOOR PROTECTION REQUIREMENTS	NON -COMBUSTIBLE MATERIAL BENEATH STOVE	
	USA	CANADA
EXTENDING DISTANCE, BACK	-	8" (200 mm.)
EXTENDING DISTANCE, RIGHT SIDE	6"	8" (200 mm.)
EXTENDING DISTANCE, LEFT SIDE	6"	8" (200 mm.)
EXTENDING DISTANCE, FRONT	16"	18" (450 mm.)



FLOOR PROTECTOR MUST BE NON-COMBUSTIBLE MATERIAL. IT MUST EXTEND BENEATH HEATER, AND TO THE FRONT / SIDES / REAR AS INDICATED

Distance to furniture

The recommended minimum distance from stove to furniture is 30 inches. Note that some furniture is more easily affected by heat and may need to be moved to a greater distance. This is your responsibility.

In addition other combustible materials, away from the stove. In general, a distance of 30 inches must be maintained between the stove and moveable combustible item such as drying clothes, newspapers, firewood etc.

DO NOT INSTALL IN A MOBIL HOME

WARNING:
NEVER DRAW COMBUSTION AIR FROM A WALL, FLOOR OR CEILING CAVITY OR FROM ANY ENCLOSED SPACE SUCH AS AN ATTIC OR GARAGE.
DO NOT INSTALL IN SLEEPING ROOM.

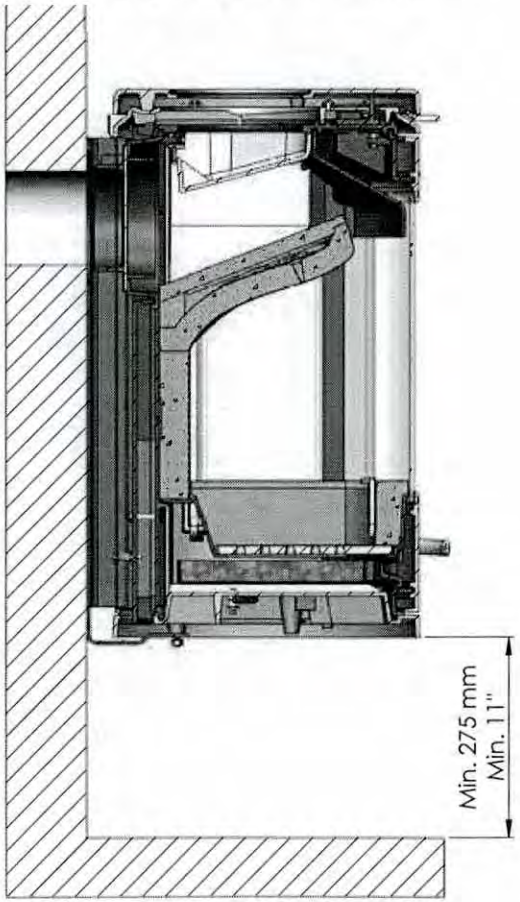
1.6 Positioning the 7970 stove model (wallmounted)

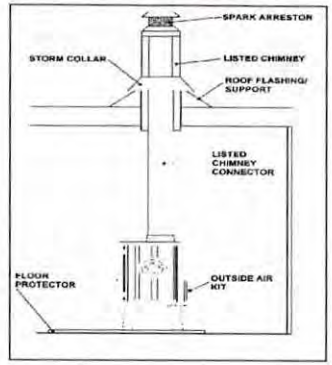
The stove must be installed on a non-combustible wall.

The wall-mounting fixture is provided with four holes for mounting expansion bolts in the wall. The bolts must be sized to secure that the wall and the materials it is made from are capable of supporting the stove. If in doubt, contact an expert. The weight of the empty stove is approx. 160 kg (353 lbs.). The wall-mounting fixture may be used as drilling template.

Mount the wall-mounting fixture on the wall. If the flue exit is wanted to the rear, build a wall bushing correctly into the wall (see illustration).

Lift the wood stove in place so that it rests on the bottom part of the wall-mounting fixture, and secure it again to the fixture by means of the screws included.





Note:

Acid Protection

If acid-washing the masonry around the stove, protect the stove surface with an acid-proof cover

Fresh Air Inlet

Unless there is deemed to be sufficient ambient leakage of air into the room via doorways, windows and the like, a dedicated fresh air inlet will be needed. This inlet should have 2 square inches (1250 square mm) of free air space. This is particularly important where the room is well sealed, or where an extractor hood or ventilation system disturbs the natural air pressure. Such an inlet should not be on a wall that is usually subject to negative pressure from normal wind pattern. Avoid placing the inlet directly across the room from the stove, thus causing a cold air draft.

2.0 Operation

2.1 Before you start firing

For Use with Solid Wood Fuel Only. Do Not Overfire, If Heater or Chimney Connector Glows You Are Overfiring. Inspect and Clean Chimney Frequently. Under Certain Conditions of use creosote buildup may occur rapidly. Because of risk of smoke and flame spillage, operate only with door fully closed.

CAUTION:

Hot while in operation. Keep children, clothing and furniture away. Contact may cause skin burns.
DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE
DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS
DO NOT USE A GRATE, ANDIRONS, OR OTHER WAYS OF ELEVATING THE FIRE - BUILD FIRE DIRECTLY ON HEARTH.
DO NOT USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER OR FLUID OR SIMILAR LIQUIDS TO START OR FRESHEN UP A FIRE IN THIS HEATER. KEEP ALL SUCH LIQUIDS AWAY FROM THE HEATER WHILE IT IS IN USE

Choosing your fuel
All types of natural wood can be burned on your stove, but they must be well seasoned and dry. Once the wood is cut to length, it should be split down middle - to suit the dimentions given below -to allowmoisture to evaporate.

Cut the wood to a length of max 12 inches (30 cm) and approx. 3 to 3.5 inches (7-8 cm) in section. If you can weigh your wood, aim for around 2 lbs. For correct combustion and heat output, wood fuel should contain no more than 20% moisture; this can easily be checked by using the Morsø Moisture Meter (part # 62929900)

To naturally season wood fuel, stack and store it under cover in an airy location where fresh air can move through each piece. Some soft woods may take as little as one good summer to season whereas harder woods such as oak, maple, and elm may require seasoning up to 18 months. Avoid overly dry wood that is gray in color as under certain conditions it can cause performance problems, such as back-puffing and sluggishness. Well seasoned wood will be light to hold and will show signs of cracking from the center-out in the ends. If your wood spits or sizzles when b urnt, and your stove's door glass persistently mists up, your wood is not properly seasoned. Never use drift wood (from the sea), whose salt content may cause corrosion, nor construction wood that may have been impregnated with chemicals.

CAUTION Do not place fuel within the installation clearances for the stove or within the space required for loading fuel and ash removal.

Starting the First Fire
The initial fire should be small, so that the stove paint can cure and the main plates of the stove can settle into position. Some fumes will be given off by the paint. Ventilate the room during this phase.
The setting of the air control, lighting techniques and loading intervals will depend on chimney draft, the fuel used, the heat required and so on. Some basic techniques are outlined below.

In principle
Your stove should be with Primary and Secondary air and Pilot air inlets.
Primary Air is controlled using the lever situated over the door. Moving the control lever to right position will open the air inlet and will allow a supply of preheated air to enter the firebox via the 'airwash' system situated inside the stove and above the glass.

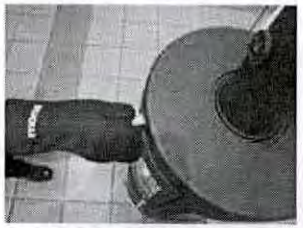
The secondary air is injected into the flue gases above the fire resulting in a cleaner, more efficient combustion process. The supply of secondary air and Pilot air is fixed open and is not adjustable. For extra safety, your stove should be with a removable handle.

2.2 Lighting and loading intervals
When first lighting the stove, a large volume of air is needed. When the stove is cold, you should leave the door open an inch or two for the first few minutes and open the primary air supply completely. While the door is open, do not leave the stove unattended.

To form a reasonable bed of ash on the floor of the stove, you should use 2-4 pounds of dry kindling at the initial lighting. If possible, maintain a 1-1.5 inch (2-3 cm) layer of ash on the floor of the combustion chamber for added insulation.

Step-by-step procedure

1. The air supply must be fully open. Move the control lever to the right position



2. For lighting the fire use 3-5 pounds of dry kindling wood.

3. Light the fire. An ember bed will quickly be formed by lighting with firestarters, Morsø kindling bags or 7-10 pieces of twisted paper under the dry kindling wood.

4. After lighting, partially close the door, leaving it open an inch or two to allow in plenty of combustion air.

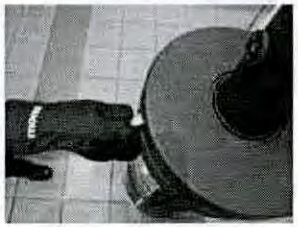
5. When the chimney is warm after about 5-10 minutes, the door should be closed.

6. A suitable layer of ember will be formed after about 15-20 minutes.

7. When ready to reload, use a poker to spread the embers across the firebox floor, bringing plenty towards the front of the stove.

7. Lay 2 pieces of wood onto the embers. Leave half an inch or more between each piece. Max. fuelload 4,0 pounds/h.

8. Close the door. Leave the primary air supply fully open.
   If it does not light, leave the door slightly ajar to allow the necessary amount of air in to ignite the wood.
   Close the door again once the wood has kindled.
   After a few minutes, adjust the primary air supply to suit your heating requirements.
   Make sure that there is always enough air to sustain clear, enduring flames when you reduce the amount of combustion air, and afterwards.



9. For refueling, add a layer of wood while there are still plenty of live embers, repeat steps 7-8.

Do not for any reason attempt to increase the firing of your heater by altering the air control adjustment range outlined in these directions.

Warning: Fireplace stoves must never be left unattended with the door open.

If the door is left partly open, gas and flame may be drawn out of the fireplace stove opening, creating risks from both fire and smoke. We recommend that you fit a smoke detector in the room where the stove is installed.

DO NOT OVERFIRE THIS HEATER. Overfiring may cause a house fire, or can result in permanent damage to the stove. If any part of the stove glows, you are overfiring.

The maximum recommended weight of wood fuel per load is 4.0 lbs/hr. (2.0 kg/h) (approx 3 split logs).

Under normal firing, the average flue temperature in the stove pipe, measured 20 cm above the stove, is approx. 300° C (550°F). The maximum flue temperature in the stove pipe must not exceed 450° C (750°F). If the flue temperature exceeds 450°C (750°F), it is considered as over firing and may cause premature wear and tear of the stove.

To help gauge the correct running temperature of your stove, we recommend you use the Morsø Flue Gas Thermometer (part # 62901200). The Flue Gas Thermometer magnetically attaches onto the stove pipe approx 20 cm (8") above the stove's top plate and measures the surface temperature of the stove pipe. Please see your authorized Morsø Dealer for availability.

Draft conditions
If smoke or fumes come out of your stove when lightning up and reloading, or if the fire simply will not respond, a poor draft is almost certainly to blame. (In a very few cases, there may be insufficient fresh air getting into the room - see installation advice above). Take advice from your stove supplier on how best to upgrade your flue system to improve draft.

Rules of woodburning
If you want less heat, put fewer logs on the stove and reduce the amount of air. It is still important to maintain a good layer of embers.

Less heat - less wood - less air
Greater heat - more wood - more air
Soot deposits will settle on the glass if the stove is run too slowly or if your wood is not well seasoned.

We would strongly recommend that you do not leave your stove alit at night. It harms the environment, and constitutes very poor use of the wood, as the gases in the wood do not ignite at the low temperature, but settle as soot (unburned gases) in the chimney and stove instead.

3.0 MAINTENANCE

When perfoming maintenance on your stove, always protect yourself, using safety goggles and gloves.

3.1 Exterior Maintenance

The stove surface is painted with heat-resistant Senotherm paint. It is best kept clean by vacuuming with a soft brush attachment or by wiping with a lint-free cloth.
Over a period of time, the painted surface may become slightly grey. A can of Morsø touch-up spray paint should be available from your stove supplier. This can be applied - in accordance with the instructions - in just a few minutes. When first firing after touching up, the stove will give off a slight smell as the paint cures. Make sure to ventilate the room well during this phase.

3.2 Internal maintenance

Glass

If the stove is generally run at the correct temperatures, there should be little or no dirt on the glass. If dirt does settle during lighting, most will burn off as temperatures increase.For heavier deposits that will not burn off, use morsø glass cleaner, applied when the glass is cold, in accordance with the instructions. Never use abrasive cleaners on the glass surface.

Reasons for dirty glass

- **Fuel too wet**
- **Logs too large or not split**
- **Combustion temperatures too low**
- **Logs to close to glass (side windows)**

Replace broken glass immediately.
Do not operate your stove if the glass in the door is damaged.

If you need to replace the glass, it should be replaced with the high temperature ceramic class supplied by Morsø, contact your Morsø dealer.

Installing the glass

Never install the glass when the stove is in function.

Ceramic glass replacement

Ceramic glass cannot be recycled because it has a higher melting point that ordinary glass. If ceramic glass is mixed with ordinary glass, the raw material is spoiled, and the reclaiming process may be halted. Take care that the ovenproof glass does not end up among ordinary recycled waste. That will be a great benefit to the environment.

Note: Should be handed in to a recycling station as ceramic glass.

Door glass replacement.

1. When you open the door, you will find two hinge pins, one in each hinge. Remove the two hinge pins, lift the door off the hinges and place it face down on a sheet of cardboard or other nonabrasive fabric.

2. Unscrew the 4 bolts that secure the glass. (In the event that a bolt sheers off when being unscrewed, remove the remaining body of the bolt by drilling down its centre with 1/8 inch high speed steel drill bit. Smaller drill bits may be successful, but do not use a lager bit. Make sure the bit stays away from the edges of the bolt - this may damage the thread in the cast iron).

3. Remove the old ceramic gaskets and clean up the surface underneath with wire wool or emery paper to remove loose particles.

4. Place the new gasket material in position around the perimeter of the window area, making sure to pinch them to the length in such a way that they make a continuous seal. Leave no gaps.

5. Place the new glass in position on the strips and screw home the fresh bolts and fitting by hand.

6. Finally, give each of the bolts an extra half turn or so. The glass should held tight enough by that cleaning will not dislodge it. Do not over-tighten the bolts as this may put excessive pressure on the glass, resulting in cracking - important!

To reduce the risk of breaking the glass, avoid striking the glass or slamming the door.

Internal service parts
The flame-path equipment - consisting of the ashpan, grate, firebricks, Cast iron fire plates, glass, baffle and flue collar - are subject to the extremes of heat produced by the fire. From time to time, one or other of these parts may need replacing as a matter of routine maintenance.

NOTE: The flame-path equipment, the ceramic rope and the paint finish are not covered by guarantee.

All of these service parts can be bought from your morsø dealer, and we recommend that damaged parts are replaced as soon as possible to avoid collateral damage.
Should the baffle be distorted by an overfire, the stove will still function, although its efficiency may be compromised. Replace it as soon as possible.

Reasons for fast internal wear and tear

Persistent heavy firing
Soot and ashes left to accumulate

Gasket
The gasket around the perimeter of the door may harden over a period of time. It should be replaced if it becomes difficult to close the doors or if air starts to leak in around the perimeter of the doors, causing the fire to become a little less controllable. A morsø rope gasket kit is available from your stove supplier.

3.3 Cleaning the Stove and the Flue

Check for soot above the baffle plate and around the flue outlet every month or so to start with. If the stove suddenly becomes sluggish, check for a soot fall around the flue collar or in the flue/chimney.

The chimney and chimney connector should be inspected at least once every two months during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated, it should be removed to reduce the risk of a chimney fire.

Clean the flue/chimney - all the way from the stove to the flue terminal point above the house.

A good routine is to clean the flue after each heating season in any case, and inspect prior to the season to ensure that bird's nests or other blockages have not occurred during the off season.

Ash disposal
Empty the ashpan on a daily basis or as needed. Ash allowed to build up towards the underside of the grate will trap heat and could cause premature failure of the grate.

Empty the ashpan according to this procedure:
Open the front door, and use a shovel or poker to stir excess ash through the ash slots in the grate down into the ash pan. Take out the ash pan, making sure to keep it level to avoid spilling ash.

Dispose the ash in a metal container with a tight fitting lid.

The closed container of ashes should be placed on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally disperded, they should be retained in the closed container until all cinders have thoroughly cooled.

Return the ash pan to its original position in the stove, and close the door.

CAUTION:
Never empty a stove in operation.
Never use your household or shop vacuum cleaner to remove ash from the stove;
always remove and dispose of the ash properly.

Creosote - formation and need for removal
When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited this creosote makes an extremely hot fire. When burning wood, the chimney and chimney connector should be inspected at least once every two months during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated, it should be removed to reduce the risk of a chimney fire.

Chimney sweeping
Inspect the system regularly during the heating season as part of a regular maintenance schedule. To inspect the chimney, let the stove cool completely. Then, using a mirror, sight up through the flue collar into the chimney flue. If you cannot inspect the flue system in this fashion, the stove must be disconnected to provide better viewing access.
Clean the chimney using a brush the same size and shape as the flue liner. Run the brush up and down the liner, causing any deposits to fall to the bottom of the chimney where they can be removed through the clean-out door.
Clean the chimney connector disconnecting the sections, taking them outside, and removing any deposits with a stiff wire brush. Reinstall the connector sections after cleaning, being sure to secure the joints between individual sections with sheet metal screws.
If you cannot inspect or clean the chimney yourself, contact your local Morsø Dealer or a professional chimney sweep.

If you do experience a chimney fire, act promptly and:
Close the air control.
Get everyone out of the house.
Call the Fire Department.

Annual maintenance
Before the heating season, perform a thorough cleaning, inspection and repair:
Thoroughly clean the chimney and chimney connector.
Inspect the chimney for damage and deterioration. Replace weak sections of prefabricated chimney.
Have a mason make repairs to a masonry chimney.
Inspect the chimney connector and replace any damaged sections.
Check gasketing for wear or compression, and replace if necessary.
Check the glass for cracking; replace if needed.
Check door and handle for tightness. Adjust if needed.

3.4 Leaving the stove for extended periods

Important:
If the stove is to be left unused for any period of time, clean it out thoroughly and leave the air control slightly open to allow airflow. Make sure that the flue does not allow rainwater to come anywhere near the stove; install a chimney cap, but do not block off the flue completely.
These measures should ensure there is a slight movement of air through the stove, and that the body of the stove remains dry, right into the corners.
Any ash left within an unfired stove can attract moisture like blotting paper. If moisture is allowed to settle within the stove, rust will form. Rust expands as it takes a grip. This can lead to undue pressure on the stove joints, and this in turn may result in damage to the stove.

NOTE: It is best to thoroughly clean the stove after the heating season has concluded. Adding a dessicant, such as kitter litter, into the ash pan helps absorb moisture during the summer months. Be sure to remove this prior to the heating season.

We hope you have many years of carefree warmth in its company. Some initial experimentation with loading and running techniques will decide your normal routine. If you have any problems after this short learning phase, please refer to your stove dealer. Should they be unable to help for any reason, please contact us in writing at the address on the front of this publication.

Section 4

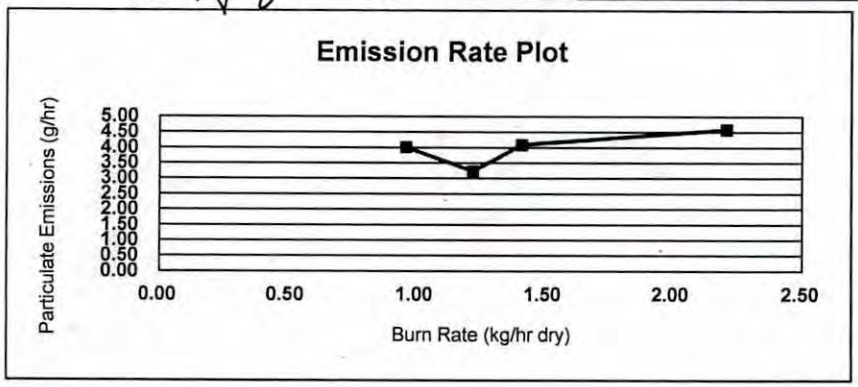
Test Data by Run

EPA Weighted Average Emissions
EPA Method 28

Client: Morso
Stove Model: 7900
Test Dates: 3/18/13-3/25/13
Project Number: 192-S-23-8.3
Tracking Number: 1847
Signature/Date: 4/1/13

Status: Final
Stove Type: Non-Catalytic Stove

Weighted Average (g/hr)
4.0



Run #	3	
Burn Rate (dry kg/hr)	0.96	
Category	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	4.01	
Cap (g/hr)	15.00	
Weighting Factor	0.559	34.96%
Heat Output (BTU/hr)	11600	

Run #	2	
Burn Rate (dry kg/hr)	1.22	
Category	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	3.23	
Cap (g/hr)	15.00	
Weighting Factor	0.362	22.65%
Heat Output (BTU/hr)	14742	

Run #	4	
Burn Rate (dry kg/hr)	1.41	
Category	3	
Overall Efficiency (%)	63%	
Emissions (g/hr)	4.09	
Cap (g/hr)	15.00	
Weighting Factor	0.378	23.65%
Heat Output (BTU/hr)	17038	

Run #	1	
Burn Rate (dry kg/hr)	2.21	
Category	4	
Overall Efficiency (%)	63%	
Emissions (g/hr)	4.58	
Cap (g/hr)	18.00	
Weighting Factor	0.300	18.74%
Heat Output (BTU/hr)	26705	

Run 1

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Run: 1
Test Date: 03/18/13

Burn Rate	**2.21 kg/hr dry**
Average Tunnel Temperature	107 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	11.9 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7611.9 dscf/hour
Average Delta p	0.030 inches H20
Average Delta H	0.93 inches H20
Total Time of Test	60 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	8.63 cubic feet	8.25 cubic feet	9.01 cubic feet
Average Gas Meter Temperature	80 degrees Fahrenheit	79 degrees Fahrenheit	82 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	8.6 dscf	8.2 dscf	9.0 dscf
Total Particulates - mn		3.2 mg	3.7 mg
Particulate Concentration (dry-standard)	0.00040 grams/dscf	0.00039 grams/dscf	0.00041 grams/dscf
Particulate Emission Rate	3.04 grams/hour	2.96 grams/hour	3.12 grams/hour
Adjusted Emissions	**4.58 grams/hour**	4.47 grams/hour	4.68 grams/hour
Difference from Average		0.10 grams/hour	0.10 grams/hour
7.5% of the average emission rate	0.34		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 1

Manufacturer:	Morso	
Model:	7900	
Tracking No.:	1847	
Project No.:	192-S-23-8.3	
Test Date:	18-Mar-13	
Beginning Clock Time:	10:33	
Recording Interval:	10	min.
Total Sampling Time:	60	min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.032	0.040	0.040	0.030	0.018	0.026	0.032	0.024	"H2O
Initial Temp.	106	106	106	106	106	110	112	113	oF

OMNI Equipment Numbers: 23, 131, 132, 185, 209, 335, 336, 340, 343, 410, 417, 420, 431

PM Control Module:	335/336				
Dilution Tunnel MW(dry):	29.00	lb/lb-mole			
Dilution Tunnel MW(wet):	28.56	lb/lb-mole			
Dilution Tunnel H2O:	4.00	percent			
Dilution Tunnel Static:	-0.600	"H2O			
Pitot Tube Cp:	0.99				
Meter Box Y Factor:	1.005	(1)	1.013	(2)	
Barometric Pressure:	Begin	Middle	End	Average	
	30.27	30.27	30.27	30.27	"Hg

Signature/Date: 4/19/13

Tunnel Velocity:	11.93	ft/sec.
Intial Tunnel Flow:	125.9	scfm
Average Tunnel Flow	126.9	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check (1):	0.002	cfm@"Hg
Post-Test Leak Check (2):	0.004	cfm@"Hg
Fuel Moisture (dry basis %):	23.14	
Total Particulate (1):	3.2	
Total Particulate (2):	3.7	

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF													Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	0.000	0.000			0.70	0.70	73	77	0.1	0.9	108	0.030			6.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	423	68	69	N/A	N/A	74	N/A
10	1.368	1.496	0.14	0.15	0.98	0.99	74	77	0.95	1	116	0.030	102	102	4.3	-1.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	610	74	75	N/A	N/A	72	N/A
20	2.744	3.004	0.14	0.15	0.98	0.98	77	79	0.95	1	115	0.030	102	102	2.5	-1.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	592	74	77	N/A	N/A	73	N/A
30	4.117	4.506	0.14	0.15	0.96	0.96	79	82	1	1.1	114	0.030	101	101	1.1	-1.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	571	75	77	N/A	N/A	73	N/A
40	5.490	6.002	0.14	0.15	0.97	0.96	81	85	1.01	1.1	104	0.030	100	99	0.6	-0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	466	74	77	N/A	N/A	72	N/A
50	6.868	7.503	0.14	0.15	0.97	0.96	83	86	1.01	1.1	99	0.030	99	99	0.4	-0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	418	73	75	N/A	N/A	72	N/A
60	8.249	9.010	0.14	0.15	0.97	0.97	83	86	1.01	1.1	95	0.030	99	99	0.0	-0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	395	71	74	N/A	N/A	71	N/A
Avg/Total	8.249	9.010	0.14	0.15	0.93	0.93	78.57	81.71			107.27	0.030	100.59	100.62									0		72.71	74.86	N/A	N/A		N/A

Method 28 Preburn Data

Run Data

Client:	Morso	Test Run:	1
Model:	7900	Date:	3/18/2013
Project Number:	192-S-23-8.3	Test Crew:	A. Kravitz
Tracking Number:	1847	Equipment:	335, 336, 185
Coal Bed Range (lb):	1.20-1.50		

Logged Data

			Temperatures (F)								
Elapsed Time (min)	Scale (lb)	Stack Draft (in H2O)	Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	7.3	N/A	475	68	N/A*	N/A*	N/A*	N/A*	N/A*	N/A	N/A
10	5.4		529	69							
20	3.6		556	69							
30	4.2		597	71							
40	2.7		567	71							
50	1.8		545	72							
60	1.4		436	71							
	Averages:		529.29	70.14							

3/28/13

* Firebox temperatures not recorded for this run. However, it is not nessecary because this run has a high burn rate, and has no chance of exceeding ΔT requirements

4-6 of 4-30

Run Notes

Client: Morso
Model: 7900
Project #: 192-S-23-8.3
Tracking #: 1847
Run #: 1 Date: 3/18/13
Test Crew: A. Kravitz
OMNI Equipment ID #(s): 335, 336, 185

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

Fully Open

SECONDARY: Fixed

TERTIARY: N/A

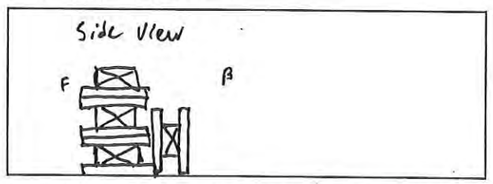
FAN: N/A

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
27:00			2.4 lbs			
60:00					Leveled	End PB

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Done @ 0:30
DOOR: Closed @ 3:00
PRIMARY AIR: Set @ 0:00
OTHER: N/A

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

Fully Open

SECONDARY: Fixed

TERTIARY: N/A

FAN: N/A

Technician signature: Date: 3/22/13

FUEL DATA

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/18/13 Test Crew: A. Kravitz Run #: 1
OMNI Equipment ID #: 340, 431
FUEL LOAD PREPARED BY: A. Kravitz
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings			Type
1	8 ft	20.7	24.6	20.2		2×4
2	____ ft					
3	____ ft					

Length of cut pieces: 13+9 inches 13" x 3 / 9" x 4 Pre-Burn Fuel Average Moisture: 21.83

Time (clock): 0900 Room Temperature (F): 73 Initials: AK

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 0
CALCULATED LOAD WEIGHT: ~~6~~ 5.3-6.3 ACTUAL LOAD WEIGHT: 6.0 (2 × 4)
0 (4 × 4)
6.0 Total

FUEL PIECE LENGTH: 12"

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	23.8	24.5	24.5	2×4
2	23.8	22.6	23.5	
3	23.5	22.5	22.0	
4	20.6	24.5	21.9	
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 23.14

Time (clock): 0900 Room Temperature (F): 73 Initials: AK

Technician signature: [signature] Date: 3/22/13

OMNI-Test Laboratories, Inc.
Portland, OR

Supplemental Data EPA 5G/5H

Client: Morso

Model: 7900 Project #: 192-S-23-8.3 Tracking #: 1847

Date: 3/18/13 Run #: 1 Booth: E1

Test Crew: A. Kravitz Start Time: 10:33 Stop Time: 11:33

OMNI Equipment #(s): 132, 185, 209, 335, 336, 410, 417, 420

Stack Gas Leak Check:

Initial: NA

Final: NA

Dilution Tunnel Gas Leak Check (5H only):

Initial: NA

Final: NA

Calibrations: Span Gas CO_2: 16.75 O_2: NA CO: 4.340 CO_2 (DT): NA

Mid Gas CO_2: 10.02 O_2: NA CO: 2.533 CO_2 (DT): NA

	Pre Test			Post Test		
Time	Zero	Span	Mid	Zero	Span	Mid
O_2	NA			NA		
CO_2	NA			NA		
CO	NA			NA		
CO_2 (DT)	NA			NA		
	NA			NA		

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: Ø Final: Ø

Stack Diameter (inches): 6

Induced Draft: Ø

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 3/11/13 Initials: AK

Tunnel Traverse	
dP (in H_2O)	T(°F)
.032	106
.040	106
.040	106
.030	106
.018	106
.026	110
.032	112
.024	113
NA	NA
Static P:	-0.60

	Initial	Middle	Ending
P_b (in/Hg)	30.32	30.32	30.32
Ambient (°F)	74	73	71

Technician signature:

Date: 3/22/13

Run 2

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Run: 2
Test Date: 03/22/13

Burn Rate	**1.22 kg/hr dry**
Average Tunnel Temperature	85 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	11.5 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7659.5 dscf/hour
Average Delta p	0.029 inches H20
Average Delta H	0.97 inches H20
Total Time of Test	110 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	15.78 cubic feet	15.22 cubic feet	16.35 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	78 degrees Fahrenheit	80 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	15.9 dscf	15.3 dscf	16.5 dscf
Total Particulates - mn		3.7 mg	4.6 mg
Particulate Concentration (dry-standard)	0.00026 grams/dscf	0.00024 grams/dscf	0.00028 grams/dscf
Particulate Emission Rate	2.00 grams/hour	1.86 grams/hour	2.14 grams/hour
Adjusted Emissions	**3.23 grams/hour**	3.04 grams/hour	3.42 grams/hour
Difference from Average		0.19 grams/hour	0.19 grams/hour
7.5% of the average emission rate	0.24		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 2

Manufacturer:	Morso	
Model:	7900	
Tracking No.:	1847	
Project No.:	192-S-23-8.3	
Test Date:	22-Mar-13	
Beginning Clock Time:	11:00	
Recording Interval:	10	min.
Total Sampling Time:	110	min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.022	0.030	0.034	0.030	0.030	0.020	0.034	0.030	"H2O
Initial Temp.	93	93	93	93	93	93	93	93	oF

OMNI Equipment Numbers: 23, 131, 132, 185, 209, 335, 336, 340, 343, 410, 417, 420, 431

PM Control Module:	335/336					
Dilution Tunnel MW(dry):	29.00	lb/lb-mole				
Dilution Tunnel MW(wet):	28.56	lb/lb-mole				
Dilution Tunnel H2O:	4.00	percent				
Dilution Tunnel Static:	-0.660	"H2O				
Pitot Tube Cp:	0.99					
Meter Box Y Factor:	1.005	(1)	1.013	(2)		
Barometric Pressure:	Begin	Middle	End	Average		
	30.37	30.38	30.39	30.38	"Hg	

Signature/Date: 4/19/13

Tunnel Velocity:	11.50	ft/sec.
Intial Tunnel Flow:	125.0	scfm
Average Tunnel Flow	127.7	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check (1):	0.003	cfm@"Hg
Post-Test Leak Check (2):	0.005	cfm@"Hg
Fuel Moisture (dry basis %):	19.88	
Total Particulate (1):	3.7	
Total Particulate (2):	4.6	

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF												Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	0.000	0.000			0.70	0.70	73	75	0.82	0.9	93	0.029			5.9		290	802	189	284	276	N/A	368.2	308	67	68	N/A	N/A	70	-0.090
10	1.380	1.465	0.14	0.15	0.99	0.94	73	75	0.93	1	83	0.029	101	100	5.0	-0.9	269	768	194	296	285	N/A	362.4	320	68	70	N/A	N/A	69	-0.095
20	2.763	2.946	0.14	0.15	0.99	0.94	75	76	0.93	1	86	0.029	101	101	4.0	-1	273	691	197	291	283	N/A	347.0	382	68	70	N/A	N/A	68	-0.099
30	4.141	4.428	0.14	0.15	0.99	0.94	76	78	0.94	1	87	0.029	101	101	3.1	-0.9	290	627	199	282	275	N/A	334.6	406	69	70	N/A	N/A	67	-0.102
40	5.523	5.913	0.14	0.15	0.99	0.94	77	79	0.94	1	87	0.029	101	101	2.3	-0.8	309	581	199	275	271	N/A	327.0	420	68	70	N/A	N/A	67	-0.103
50	6.910	7.401	0.14	0.15	0.99	0.95	78	80	0.94	1	86	0.029	101	101	1.6	-0.7	329	546	200	269	263	N/A	321.4	397	68	70	N/A	N/A	67	-0.100
60	8.292	8.891	0.14	0.15	0.99	0.95	79	80	0.94	1	86	0.029	101	101	1.2	-0.4	331	547	200	263	257	N/A	319.6	362	68	70	N/A	N/A	69	-0.095
70	9.674	10.380	0.14	0.15	0.99	0.95	79	81	0.94	1	85	0.029	100	101	0.8	-0.4	318	604	197	264	260	N/A	328.6	331	68	70	N/A	N/A	70	-0.092
80	11.060	11.871	0.14	0.15	0.99	0.94	80	82	0.94	1	86	0.029	101	101	0.6	-0.2	306	657	194	275	267	N/A	339.8	303	69	70	N/A	N/A	70	-0.088
90	12.444	13.363	0.14	0.15	0.99	0.94	81	83	0.94	1	83	0.029	100	100	0.4	-0.2	284	697	193	287	274	N/A	347.0	291	70	71	N/A	N/A	70	-0.086
100	13.829	14.858	0.14	0.15	0.98	0.94	82	83	0.94	1	80	0.029	100	100	0.2	-0.2	268	746	191	295	281	N/A	356.2	277	69	71	N/A	N/A	70	-0.086
110	15.216	16.353	0.14	0.15	0.99	0.95	82	83	0.94	1	80	0.029	100	100	0.0	-0.2	255	806	191	299	285	N/A	367.2	262	68	70	N/A	N/A	69	-0.084
Avg/Total	15.216	16.353	0.14	0.15	0.97	0.92	77.92	79.58			85.17	0.029	100.62	100.62									1		68.33	70.00	N/A	N/A		-0.093

Method 28 Preburn Data

Run Data

Client:	Morso	Test Run:	2
Model:	7900	Date:	3/22/2013
Project Number:	192-S-23-8.3	Test Crew:	A. Kravitz
Tracking Number:	1847	Equipment:	335, 336, 185
	Coal Bed Range (lb): 1.18-1.48		

Logged Data

			Temperatures (F)								
Elapsed Time (min)	Scale (lb)	Stack Draft (in H2O)	Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	4.6	-0.116	618	70	277	493	125	150	151	N/A	N/A
10	3.5	-0.107	478	71	329	420	152	180	191		
20	2.7	-0.104	455	71	369	386	169	203	214		
30	2.1	-0.097	391	71	368	400	179	220	225		
40	1.7	-0.093	347	71	349	560	181	235	238		
50	1.5	-0.088	309	70	318	675	183	259	255		
60	1.3	-0.086	286	69	294	786	187	282	273		
	Averages:	-0.099	412.00	70.43	329.14	531.43	168.00	218.43	221.00		

3/28/13

Run Notes

Client: Morso
Model: 7900
Project #: 192-S-23-8.3
Tracking #: 1847
Run #: 2 Date: 3/22/13
Test Crew: A. Krawitz
OMNI Equipment ID #(s): 335, 336, 185

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

3/8 Open

SECONDARY: Fixed

TERTIARY: N/A

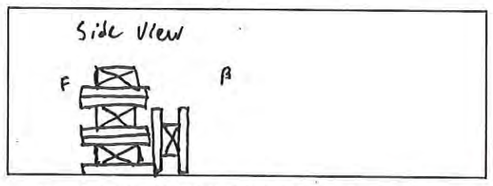
FAN: N/A

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
60:00	No Adjustments				Leveled	End PB

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Done @ 0:40
DOOR: Closed @ 2:30
PRIMARY AIR: Set @ 5:00
OTHER: N/A

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

3/8 Open

SECONDARY: Fixed

TERTIARY: N/A

FAN: N/A

Technician signature: [signature] Date: 3/22/13

FUEL DATA

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/22/13 Test Crew: A. Kravitz Run #: 2
OMNI Equipment ID #: 340, 431
FUEL LOAD PREPARED BY: A. Kravitz
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER -- DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length	Readings			Type
1	8 ft	20.7	19.9	20.1	2x4
2	____ ft				
3	____ ft				

Length of cut pieces: 13+9 inches 13"x3 9"x4 Pre-Burn Fuel Average Moisture: 20.23

Time (clock): 0900 Room Temperature (F): 70 Initials: AK

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 0
CALCULATED LOAD WEIGHT: 46 5.3-6.3 ACTUAL LOAD WEIGHT: 9.9 (2 × 4)
0 (4 × 4)
5.9 Total

FUEL PIECE LENGTH: 12"

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE	READINGS			TYPE
1	19.7	20.1	19.5	2x4
2	20.4	20.1	19.8	"
3	19.9	21.0	20.2	"
4	19.3	19.3	19.3	"
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 19.88

Time (clock): 0900 Room Temperature (F): 70 Initials: AK

Technician signature: [signature] Date: 3/22/13

OMNI-Test Laboratories, Inc.
Portland, OR

Supplemental Data EPA 5G/5H

Client: Morso

Model: 7900 Project #: 192-S-23-8.3 Tracking #: 1847

Date: 3/22/13 Run #: 2 Booth: E1

Test Crew: A. Kravitz Start Time: 1100 Stop Time:

OMNI Equipment #(s): 132, 185, 209, 335, 336, 410, 417, 420

Stack Gas Leak Check:
Initial: Ø
Final: Ø

Dilution Tunnel Gas Leak Check (5H only):
Initial: NA
Final: NA

Calibrations: Span Gas CO_2: 16.75 O_2: NA CO: 4.340 CO_2 (DT): NA
Mid Gas CO_2: 10.02 O_2: NA CO: 2.533 CO_2 (DT): NA

	Pre Test			Post Test		
Time	Zero	Span	Mid	Zero	Span	Mid
	0952	0954	0955			
O_2	NA	—	—	NA	—	—
CO_2	0.00	16.75	10.19			
CO	0.000	4.341	2.562			
CO_2 (DT)	NA	—	—	NA	—	—

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 10.0 Final: 10.0

Pitot Tube Leak Test: Initial: Ø Final: Ø

Stack Diameter (inches): 6

Induced Draft: Ø

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 3/11/13 Initials: AK

Tunnel Traverse	
dP (in H_2O)	T(°F)
.022	93
.036	
.034	
.030	
.020	
.030	
.034	
.030	
NA	NA
Static P:	-0.66

	Initial	Middle	Ending
P_b (in/Hg)	30.37	30.38	30.39
Ambient (°F)	70	67	70

Technician signature:

Date: 3/22/13

Run 3

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Run: 3
Test Date: 03/22/13

Burn Rate	**0.96 kg/hr dry**
Average Tunnel Temperature	84 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	11.5 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7665.3 dscf/hour
Average Delta p	0.029 inches H20
Average Delta H	0.96 inches H20
Total Time of Test	140 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	20.10 cubic feet	19.42 cubic feet	20.78 cubic feet
Average Gas Meter Temperature	82 degrees Fahrenheit	81 degrees Fahrenheit	82 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	20.1 dscf	19.4 dscf	20.9 dscf
Total Particulates - mn		6.7 mg	6.9 mg
Particulate Concentration (dry-standard)	0.00034 grams/dscf	0.00035 grams/dscf	0.00033 grams/dscf
Particulate Emission Rate	2.59 grams/hour	2.65 grams/hour	2.53 grams/hour
Adjusted Emissions	**4.01 grams/hour**	4.09 grams/hour	3.94 grams/hour
Difference from Average		0.07 grams/hour	0.07 grams/hour
7.5% of the average emission rate	0.30		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
	Results Are Acceptable		

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 3

Manufacturer:	Morso	
Model:	7900	
Tracking No.:	1847	
Project No.:	192-S-23-8.3	
Test Date:	22-Mar-13	
Beginning Clock Time:	14:20	
Recording Interval:	10	min.
Total Sampling Time:	140	min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.022	0.030	0.034	0.030	0.030	0.020	0.034	0.030	"H2O
Initial Temp.	93	93	93	93	93	93	93	93	oF

OMNI Equipment Numbers: 23, 131, 132, 185, 209, 335, 336, 340, 343, 410, 417, 420, 431

PM Control Module:	335/336				
Dilution Tunnel MW(dry):	29.00	lb/lb-mole			
Dilution Tunnel MW(wet):	28.56	lb/lb-mole			
Dilution Tunnel H2O:	4.00	percent			
Dilution Tunnel Static:	-0.660	"H2O			
Pitot Tube Cp:	0.99				
Meter Box Y Factor:	1.005	(1)	1.013	(2)	
Barometric Pressure:	Begin	Middle	End	Average	
	30.39	30.39	30.37	30.38	"Hg

Signature/Date: 4/19/13

Tunnel Velocity:	11.49	ft/sec.
Intial Tunnel Flow:	125.0	scfm
Average Tunnel Flow	127.8	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check (1):	0.001	cfm@"Hg
Post-Test Leak Check (2):	0.005	cfm@"Hg
Fuel Moisture (dry basis %):	21.18	
Total Particulate (1):	6.7	
Total Particulate (2):	6.9	

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF												Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	0.000	0.000			0.70	0.70	76	76	0.06	-0.3	93	0.029			6.0		273	939	208	319	300	N/A	407.8	311	65	66	N/A	N/A	66	-0.090
10	1.374	1.470	0.14	0.15	1.00	0.94	76	76	0.96	1	85	0.029	101	101	5.0	-1	266	929	215	324	298	N/A	406.4	310	69	68	N/A	N/A	68	-0.090
20	2.756	2.948	0.14	0.15	0.98	0.93	77	77	0.96	1	88	0.029	102	102	4.1	-0.9	267	854	216	318	295	N/A	390.0	358	70	70	N/A	N/A	69	-0.097
30	4.138	4.427	0.14	0.15	0.98	0.93	78	79	0.96	1	88	0.029	101	101	3.2	-0.9	279	785	216	308	289	N/A	375.4	359	71	71	N/A	N/A	70	-0.096
40	5.522	5.906	0.14	0.15	0.98	0.93	80	80	0.97	1	89	0.029	101	101	2.5	-0.7	292	712	216	299	287	N/A	361.2	375	71	72	N/A	N/A	70	-0.098
50	6.906	7.387	0.14	0.15	0.99	0.93	81	82	0.97	1	90	0.029	101	101	1.8	-0.7	314	657	215	291	281	N/A	351.6	384	72	72	N/A	N/A	71	-0.099
60	8.290	8.870	0.14	0.15	0.98	0.93	82	83	0.97	1	88	0.029	101	101	1.3	-0.5	328	636	215	285	276	N/A	348.0	355	72	73	N/A	N/A	71	-0.094
70	9.679	10.354	0.14	0.15	0.98	0.93	83	84	0.97	1	86	0.029	101	101	1.0	-0.3	324	702	216	281	275	N/A	359.6	298	72	73	N/A	N/A	71	-0.087
80	11.066	11.840	0.14	0.15	0.98	0.94	83	85	0.97	1	84	0.029	100	100	0.8	-0.2	308	751	215	283	280	N/A	367.4	274	72	73	N/A	N/A	71	-0.084
90	12.457	13.326	0.14	0.15	0.97	0.94	84	85	0.97	1	83	0.029	100	100	0.7	-0.1	289	767	213	287	287	N/A	368.6	258	72	72	N/A	N/A	72	-0.082
100	13.847	14.814	0.14	0.15	0.98	0.94	84	85	0.97	1	81	0.029	100	100	0.5	-0.2	273	775	211	291	291	N/A	368.2	251	71	72	N/A	N/A	71	-0.081
110	15.239	16.305	0.14	0.15	0.99	0.94	84	85	0.97	1	79	0.029	100	100	0.3	-0.2	259	766	210	293	294	N/A	364.4	246	69	71	N/A	N/A	70	-0.081
120	16.633	17.798	0.14	0.15	0.99	0.94	84	85	0.97	1	78	0.029	100	100	0.2	-0.1	248	784	210	295	294	N/A	366.2	238	68	70	N/A	N/A	69	-0.080
130	18.025	19.292	0.14	0.15	0.98	0.94	83	85	0.97	1	77	0.029	100	100	0.1	-0.1	242	796	210	299	295	N/A	368.4	235	68	70	N/A	N/A	69	-0.080
140	19.418	20.784	0.14	0.15	0.99	0.94	83	84	0.97	1	77	0.029	100	100	0.0	-0.1	237	803	210	302	292	N/A	368.8	231	68	70	N/A	N/A	69	-0.079
Avg/Total	19.418	20.784	0.14	0.15	0.96	0.92	81.20	82.07			84.40	0.029	100.64	100.63									39		70.00	70.87	N/A	N/A		-0.088

Method 28 Preburn Data

Run Data

Client:	Morso	Test Run:	3
Model:	7900	Date:	3/22/2013
Project Number:	192-S-23-8.3	Test Crew:	A. Kravitz
Tracking Number:	1847	Equipment:	335, 336, 185
Coal Bed Range (lb):	1.20-1.50		

Logged Data

			Temperatures (F)								
Elapsed Time (min)	Scale (lb)	Stack Draft (in H2O)	Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	4.2	-0.114	566	69	291	866	199	316	279	N/A	N/A
10	3.4	-0.103	420	69	332	724	212	329	294		
20	2.7	-0.1	389	67	349	661	217	324	294		
30	2.2	-0.097	375	67	350	692	217	314	293		
40	1.9	-0.091	321	66	336	770	214	310	291		
50	1.8	-0.089	295	66	310	853	210	311	296		
60	1.5	-0.09	306	66	285	917	207	316	300		
65	1.4	-0.089	303	66	275	926	207	319	302		
	Averages:	-0.097	371.88	67.00	316.00	801.13	210.38	317.38	293.63		

3/28/13

Run Notes

Client: Morso
Model: 7900
Project #: 192-S-23-8.3
Tracking #: 1847
Run #: 3 Date: 3/22/13
Test Crew: A. Kravitz
OMNI Equipment ID #(s): 335, 336, 185

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

5/16 Open

SECONDARY: Fixed

TERTIARY: N/A

FAN: N/A

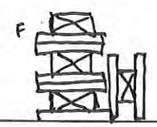
PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
65:00	No Adjustments				leveled	End PB

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)

Side View



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Done by 0:30
DOOR: Closed @ 4:00
PRIMARY AIR: Set @ 5:00
OTHER: N/A

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

5/16 Open

SECONDARY: Fixed

TERTIARY: N/A

FAN: N/A

Technician signature: [signature] Date: 3/22/13

FUEL DATA

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/22/13 Test Crew: A. Kravitz Run #: 3
OMNI Equipment ID #: 340, 431
FUEL LOAD PREPARED BY: A. Kravitz
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL
MOISTURE CONTENT (METER -- DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length	Readings			Type
1	8 ft	24.6	23.8	20.2	2x4
2	____ ft				
3	____ ft				

Length of cut pieces: 13+9 inches 13"x3 9"x4 Pre-Burn Fuel Average Moisture: 22.90 %
Time (clock): 12:45 Room Temperature (F): 68 Initials: AK

TEST FUEL
FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 0
CALCULATED LOAD WEIGHT: ~~x6~~ 5.3-6.3 ACTUAL LOAD WEIGHT: 6.0 (2 × 4)
0 (4 × 4)
FUEL PIECE LENGTH: 12" 6.0 Total

MOISTURE CONTENT (METER -- DRY BASIS)

PIECE	READINGS			TYPE
1	19.2	20.8	21.6	2x4
2	20.6	19.2	19.7	
3	20.9	23.1	22.8	
4	20.4	22.6	23.0	
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.18
Time (clock): 1:30 Room Temperature (F): 69 Initials: AK

Technician signature: Date: 3/22/13

OMNI-Test Laboratories, Inc.
Portland, OR

Supplemental Data EPA 5G/5H

Client: Morso

Model: 7900 Project #: 192-S-23-8.3 Tracking #: 1847

Date: 3/22/13 Run #: 3 Booth: E1

Test Crew: A. Kravitz Start Time: 14:20 Stop Time: 16:40

OMNI Equipment #(s): 132, 185, 209, 335, 336, 410, 417, 420

Stack Gas Leak Check:
Initial: Ø
Final: Ø

Dilution Tunnel Gas Leak Check (5H only):
Initial: N/A
Final: N/A

Calibrations: Span Gas CO_2: 16.75 O_2: N/A CO: 4.340 CO_2 (DT): N/A
Mid Gas CO_2: 10.02 O_2: N/A CO: 2.533 CO_2 (DT): N/A

	Pre Test			Post Test		
Time	Zero	Span	Mid	Zero	Span	Mid
	1300	1301	1303	1645	1646	1647
O_2	N/A	—		N/A	—	
CO_2	0.00	16.75	10.15	0.01	16.76	10.14
CO	0.000	4.346	2.561	-0.009	4.329	2.546
CO_2 (DT)	N/A	—		N/A	—	

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 16.0 Final: 16.0

Pitot Tube Leak Test: Initial: Ø Final: Ø

Stack Diameter (inches): 6

Induced Draft: Ø

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 3/11/13 Initials: AK

Tunnel Traverse	
dP (in H_2O)	T(°F)
See	Run
	2
N/A	N/A
Static P:	-0.66

	Initial	Middle	Ending
P_b (in/Hg)	30.39	30.35	30.37
Ambient (°F)	68	71	64

Technician signature: [signature]

Date: 3/22/13

Run 4

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Manufacturer: Morso
Model: 7900
Project No.: 192-S-23-8.3
Tracking No.: 1847
Run: 4
Test Date: 03/25/13

Burn Rate	**1.41 kg/hr dry**
Average Tunnel Temperature	93 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	11.7 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	7584.9 dscf/hour
Average Delta p	0.030 inches H20
Average Delta H	0.94 inches H20
Total Time of Test	90 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	12.89 cubic feet	12.46 cubic feet	13.32 cubic feet
Average Gas Meter Temperature	82 degrees Fahrenheit	81 degrees Fahrenheit	83 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	12.7 dscf	12.3 dscf	13.2 dscf
Total Particulates - mn		4.3 mg	4.6 mg
Particulate Concentration (dry-standard)	0.00035 grams/dscf	0.00035 grams/dscf	0.00035 grams/dscf
Particulate Emission Rate	2.65 grams/hour	2.65 grams/hour	2.64 grams/hour
Adjusted Emissions	**4.09 grams/hour**	4.09 grams/hour	4.08 grams/hour
Difference from Average		0.01 grams/hour	0.01 grams/hour
7.5% of the average emission rate	0.31		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		

Results Are Acceptable

Wood Heater Test Data - EPA Method 5G

Run: 4

Manufacturer: Morso
Model: 7900
Tracking No.: 1847
Project No.: 192-S-23-8.3
Test Date: 25-Mar-13
Beginning Clock Time: 12:16
Recording Interval: 10 min.
Total Sampling Time: 90 min.

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.026	0.034	0.038	0.028	0.014	0.032	0.034	0.030	"H2O
Initial Temp.	96	96	96	96	96	96	96	96	oF

OMNI Equipment Numbers: 23, 131, 132, 185, 209, 335, 336, 340, 343, 410, 417, 420, 431

PM Control Module: 335/336
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4.00 percent
Dilution Tunnel Static: -0.640 "H2O
Pitot Tube Cp: 0.99
Meter Box Y Factor: 1.005 (1) 1.013 (2)
Barometric Pressure:

Begin	Middle	End	Average
30.04	30.02	30	30.02 "Hg

Signature/Date: 4/19/13
Tunnel Velocity: 11.68 ft/sec.
Intial Tunnel Flow: 125.0 scfm
Average Tunnel Flow: 126.4 scfm
Tunnel Area: 0.1963 ft2
Post-Test Leak Check (1): 0.001 cfm@"Hg
Post-Test Leak Check (2): 0.005 cfm@"Hg
Fuel Moisture (dry basis %): 20
Total Particulate (1): 4.3
Total Particulate (2): 4.6

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF													Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	0.000	0.000			0.70	0.70	73	75	0.81	0.8	96	0.030			5.6		313	718	170	222	229	N/A	330.4	358	69	69	N/A	N/A	72	-0.094
10	1.373	1.459	0.14	0.15	0.98	0.92	75	76	0.94	1	97	0.030	101	101	4.4	-1.2	296	771	177	249	245	N/A	347.6	423	74	73	N/A	N/A	72	-0.099
20	2.751	2.932	0.14	0.15	0.97	0.92	77	79	0.95	1	97	0.030	101	101	3.4	-1	297	714	182	261	258	N/A	342.4	433	75	75	N/A	N/A	72	-0.101
30	4.130	4.408	0.14	0.15	0.96	0.92	80	81	0.95	1	97	0.030	101	101	2.4	-1	304	658	188	266	264	N/A	336.0	446	76	76	N/A	N/A	72	-0.103
40	5.513	5.888	0.14	0.15	0.96	0.92	82	83	0.95	1	95	0.030	101	101	1.7	-0.7	318	594	192	269	266	N/A	327.8	422	76	76	N/A	N/A	72	-0.100
50	6.899	7.369	0.14	0.15	0.96	0.91	83	85	0.96	1	94	0.030	101	101	1.0	-0.7	328	578	194	269	267	N/A	327.2	437	76	76	N/A	N/A	73	-0.100
60	8.286	8.852	0.14	0.15	0.96	0.92	85	86	0.96	1	90	0.030	100	100	0.7	-0.3	329	638	195	275	274	N/A	342.2	369	75	76	N/A	N/A	72	-0.093
70	9.677	10.338	0.14	0.15	0.97	0.92	85	87	0.96	1	88	0.030	100	100	0.5	-0.2	310	694	195	284	288	N/A	354.2	336	75	75	N/A	N/A	73	-0.090
80	11.069	11.826	0.14	0.15	0.96	0.92	86	87	0.96	1	86	0.030	100	100	0.3	-0.2	291	724	193	290	293	N/A	358.2	313	74	75	N/A	N/A	73	-0.088
90	12.461	13.316	0.14	0.15	0.97	0.92	86	88	0.96	1	85	0.030	100	100	0.0	-0.3	272	729	191	295	300	N/A	357.4	298	74	74	N/A	N/A	72	-0.087
Avg/Total	12.461	13.316	0.14	0.15	0.94	0.90	81.20	82.70			92.50	0.030	100.56	100.57									27		74.40	74.50	N/A	N/A		-0.096

Method 28 Preburn Data

Run Data

Client:	Morso	Test Run:	4
Model:	7900	Date:	3/25/2013
Project Number:	192-S-23-8.3	Test Crew:	A. Kravitz
Tracking Number:	1847	Equipment:	335, 336, 185
Coal Bed Range (lb):	1.12-1.40		

Logged Data

			Temperatures (F)								
Elapsed Time (min)	Scale (lb)	Stack Draft (in H2O)	Stack	Ambient	FB Top	FB Bottom	FB Back	FB Left	FB Right	Cat. In	Cat. Out
0	6.8	-0.11	589	67	134	518	73	92	92	N/A	N/A
10	5.6	-0.105	477	68	209	365	97	137	136		
20	4.6	-0.101	434	68	258	280	119	154	155		
30	3.7	-0.103	454	69	289	250	134	160	166		
40	2.7	-0.106	510	69	327	273	146	173	178		
50	2.1	-0.1	432	70	351	310	159	185	190		
60	1.6	-0.095	381	71	335	540	165	201	210		
68	1.4	-0.091	344	71	316	693	168	220	227		
	Averages:	-0.101	452.63	69.13	277.38	403.63	132.63	165.25	169.25		

3/25/13

Run Notes

Client: Morso
Model: 7900
Project #: 192-S-23-8.3
Tracking #: 1847
Run #: 4 Date: 3/25/13
Test Crew: A. Krawitz
OMNI Equipment ID #(s): 335, 336, 185

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

PRIMARY:

2/16 Open

SECONDARY: Fixed

TERTIARY: N/A

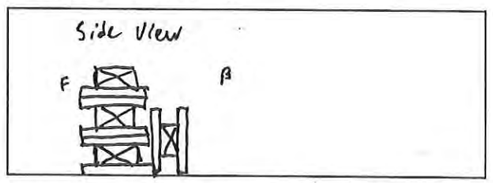
FAN: N/A

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
68:00	No Adjustments				Leveled	End PB

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Done @ 0:20
DOOR: Closed @ ~~1:30~~ 3:00
PRIMARY AIR: Set @ 5:00
OTHER: N/A

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)
PRIMARY:

2/16 Open

SECONDARY: Fixed

TERTIARY: N/A

FAN: N/A

Technician signature: [signature] Date: 3/25/13

FUEL DATA

Client: Morso
Model: 7900
Project #: 192-S-23-8.3 Tracking #: 1847
Date: 3/25/13 Test Crew: A. Kravitz Run #: 4
OMNI Equipment ID #: 340, 431
FUEL LOAD PREPARED BY: A. Kravitz
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL
MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings			Type
1	8 ft	19.3	20.5	20.1		2x4
2	____ ft					
3	____ ft					

Length of cut pieces: 13 & 9 inches 13"x3 9"x4 Pre-Burn Fuel Average Moisture: 20.23
Time (clock): 1045 Room Temperature (F): 68 Initials: AK

TEST FUEL

FUEL TYPE AND AMOUNT: 2 × 4 4 4 × 4 0
CALCULATED LOAD WEIGHT: 4 @ 5.3-6.3 ACTUAL LOAD WEIGHT: 5.6 (2 × 4)
0 (4 × 4)
FUEL PIECE LENGTH: 11" 5.6 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	21.1	20.8	22.7	2x4
2	14.2	20.0	14.2	
3	19.3	20.4	19.1	
4	20.2	19.1	19.3	
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 20.0

Time (clock): 1045 Room Temperature (F): 68 Initials: AK

Technician signature: Date: 3/25/13

OMNI-Test Laboratories, Inc.
Portland, OR

Supplemental Data EPA 5G/5H

Client: Morso

Model: 7900 Project #: 192-S-23-8.3 Tracking #: 1847

Date: 3/25/13 Run #: 4 Booth: E1

Test Crew: A. Kravitz Start Time: 12:16 Stop Time: 13:46

OMNI Equipment #(s): 132, 185, 209, 335, 336, 410, 417, 420

Stack Gas Leak Check:
Initial: ø
Final: ø

Dilution Tunnel Gas Leak Check (5H only):
Initial: N/A
Final: N/A

Calibrations: Span Gas CO_2: 16.75 O_2: N/A CO: 4.340 CO_2 (DT): N/A
Mid Gas CO_2: 10.02 O_2: N/A CO: 2.533 CO_2 (DT): N/A

	Pre Test			Post Test		
Time	Zero	Span	Mid	Zero	Span	Mid
O_2	1107	1105	1106	1420	1421	1422
CO_2	N/A			N/A		
CO	0.00	16.75	10.13	0.01	16.71	10.07
CO_2 (DT)	0.000	4.340	2.556	-0.013	4.299	2.516
	N/A			N/A		

Air Velocity (ft/min): Initial: <50 Final: <50

Scale Audit (lbs): Initial: 10.0 Final: 10.6

Pitot Tube Leak Test: Initial: ø Final: ø

Stack Diameter (inches): 6

Induced Draft: ø

% Smoke Capture: 100

Flue Pipe Cleaned Prior to First Test in Series:

Date: 3/11/13 Initials: AK

	Initial	Middle	Ending
P_b (in/Hg)	30.04	30.02	30.00
Ambient (°F)	72	71	70

Tunnel Traverse	
dP (in H_2O)	T(°F)
.026	96
.034	
.038	
.028	
.014	
.032	
.034	
.030	
N/A	N/A
Static P:	-.64

Technician signature:

Date: 3/25/13

Section 5

Sampling Procedures and Test Results

INTRODUCTION

Morsø Jernstøberi A/S retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the 7900 Series wood stove. The 7900 Series wood stove is a non-catalytic, freestanding, radiant-type room heater. The firebox is constructed of cast iron. Usable firebox volume was measured to be 0.83 cubic feet and the stove is vented through a 6-inch diameter flue collar located at the top of the unit.

The testing was performed at *OMNI*'s testing facility in Portland, Oregon. The unit was received in good condition and logged in on March 10, 2013, then assigned and labeled with *OMNI* ID #1847 *OMNI* representative Aaron Kravitz conducted the certification testing and completed all testing by March 25, 2013. The EPA was notified of the testing dates in a letter dated March 18, 2013. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Jesper Larsen of Morsø Jernstøberi A/S and is on file at *OMNI*'s testing facility.

The 7900 Series wood stove was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the 4 test runs included in the results indicate a particulate emission rate of 4.0 grams per hour. Test runs were conducted in each of three burn rate categories (0.80-1.25 kg/hr, 1.25-1.90 kg/hr, and maximum). Emissions for each of their individual test runs did not exceed the cap. The 7900 Series results are within the emission limit of 7.5 grams per hour for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

The wood heater was sealed after completion of testing in compliance with the EPA regulation as follows:

- "DO NOT TAMPER" labels were placed on the door and on all other openings.
- Plastic material sealed with "DO NOT TAMPER" labels and tape was wrapped around the unit.
- The unit was sealed in a wood box constructed for the unit and secured with steel banding.
- "DO NOT TAMPER" labels were placed on all outer surfaces of the box.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this report. The results in this report are limited to the item submitted.

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	2.21	4.58
2	1.22	3.23
3	0.96	4.01
4	1.41	4.09
Weighted particulate emission average of 4 test runs: 4.0 grams per hour.		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure ("Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	74	71	30.27	30.27	<50	<50
2	68	70	30.37	30.39	<50	<50
3	66	69	30.39	30.37	<50	<50
4	72	72	30.04	30.00	<50	<50

Table 1.3.1 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight in lbs)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lbs)
1	7.3	21.8	1.4
2	4.6	20.2	1.3
3	4.2	22.9	1.4
4	6.8	20.2	1.4

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft^3)	Fuel Loading Density Wet Basis (lbs/ft^3)	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	6.0	0.8	7.50	23.1	12	4	0
2	5.9	0.8	7.38	19.9	12	4	0
3	6.0	0.8	7.50	21.2	12	4	0
4	5.6	0.8	7.00	20.0	11	4	0

Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	60	11.9	126.9	107
2	110	11.5	127.7	85
3	140	11.5	127.8	84
4	90	11.7	126.4	93

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average[a]	Ending Surface Temperature Average[a]	Surface Delta T[b]
1	----	----	----
2	368.2	367.2	1.0
3	407.8	368.8	39.0
4	330.4	357.4	-27.0
a. All temperatures are in degrees F.			
b. Represents the difference between beginning and ending average surface temperatures.			

Table 1.6 – Pretest Configuration

Run	Combustion Air	Fuel Added	Fuel Removed	Time (min)
1	Fully open	7.3 lbs at start; 2.4 lb added; coal bed 1.4 lbs	0	60
2	4 mm open	4.6 lbs at start; no addition; coal bed 1.3 lbs	0	60
3	Fully closed	4.2 lbs at start; no addition; coal bed 1.4 lbs	0	65
4	7 mm open	6.8 lbs at start; no addition; coal bed 1.4 lbs	0	68

Table 1.7 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (H_2O)	Primary Air Setting (mm)	Run Time (min)	Average Draft (H_2O)
1	2.21	0	Fully open	60	----
2	1.22	0	4 mm open	110	-.093
3	0.96	0	Fully closed	140	-.088
4	1.41	0	7 mm open	90	-.096

Table 1.8 – Test Configurations

Run	Five-Minute Startup	Combustion Air
1	Bypass: N/A. Fuel Loading: Done @ 0:30. Door: Closed @ 3:00. Primary Air: Set @ 0:00. Other: N/A. Secondary: Fixed. Tertiary: N/A. Fan: N/A.	Fully open
2	Bypass: N/A. Fuel Loading: Done @ 0:40. Door: Closed @ 2:30. Primary Air: Set @ 5:00. Other: N/A. Secondary: Fixed. Tertiary: N/A. Fan: N/A.	4 mm
3	Bypass: N/A. Fuel Loading: Done @ 0:30. Door: Closed @ 4:00. Primary Air: Set @ 5:00. Other: N/A. Secondary: Fixed. Tertiary: N/A. Fan: N/A.	Fully closed
4	Bypass: N/A. Fuel Loading: Done @ 0:20. Door: Closed @ 3:00. Primary Air: Set @ 5:00. Other: N/A. Secondary: Fixed. Tertiary: N/A. Fan: N/A.	7 mm

TEST RESULTS AND DISCUSSION

A total of 4 test runs were performed on the 7900 Series wood stove. 4 test runs were conducted in the following categories and included in the weighted average emission level results: two in the 0.80 to 1.25 kg/hr dry category; one in the 1.25 to 1.90 kg/hr dry category; and one at maximum.

The weighted particulate emission rate was measured to be 4.0 g/hr.

The proportionality results for all 4 test runs were acceptable. Quality check results for each test run are presented in Section 2 of this report.