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Testreport of the roomheater ARESTA 400 of Bosca Chili SA

SGS registration	
Our reference	EZ/07/2173/02
Research period	August 2007
Date report	August 2007
Author report	J. Dekker

Manufacturer	
Company	Chili Bosca.
Name	Attn. Mr L.A. Echenique
Address	Americo vespucio Norte 2077 Santiago Chili

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1 Introduction

1.1 Specification of the type test and the inset appliance

Test report of an inset appliance including open fires fired by solid fuels in accordance with NEN EN 13240:2001 and NEN EN 13240-A2:2004

Laboratory **Name, address**	SGS Nederland BV Leemansweg 51 6827 BX Arnhem
Notified under EC number	0608
Manufacturer Name, address	Bosca Chili Sa Americo vespucio Norte 2077 Santiago Chili
Appliance Name, serial number	ARESTA 400
Nominal heat output	10 kW
Recommended fuels	Wood logs
Principal	Bosca Chili SA
Test category	Initial type test

Description of the roomheater ARESTA 400

Room heater ARESTA 400 is plate metal stove. The combustion chamber of the room heater ARESTA 400 is equipped with a front window door, an ash pan, is insulated with ceramic bricks and a baffle. The secondary air supply can be adjusted by means of a regulator on the top of the stove. Furthermore the room heater is equipped with a wood storage compartment. The flue gas outlet is located at the top of the appliance.

Abstract of the test results:

The following essential characteristics as defined in Annex ZA of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004 have been tested with beech and fir timber (5*5 cm) as fuel and the results are as shown in the table below.

Essential characteristic	**Performance**
Test fuel	Wood logs
Fire safety	Pass
Emission of combustion products, related to 13% O_2	CO: 0.17 vol%
Surface temperature	Pass
Thermal output / Energy efficiency	10.6 kW / 76.4 %
Release of dangerous substances	Pass

Room heater ARESTA 400 is an intermittent burning appliance and can not be connected to a shared flue.

This test report with pages 1 until 13 and the annexes A until E contain the results of the type test in compliance with NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

2 Results

2.1 Assessment of used materials, design and construction in accordance with chapter 4 of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

	Clause	Approved
Production documentation	4.1	
Documentation and/or drawings contain:		
- Specification of used materials		yes
- Nominal heat output using recommended fuels		yes
When fitted with a boiler, specification of the:		
- used welding process		n/a
- permissible max operating temperature, °C		n/a
- permissible max. operating pressure, bar		n/a
- type test pressure, bar		n/a
- water heating output, kW		n/a
Construction	4.2	
General construction	4.2.1	
Use of non-combustible materials		yes
No use of harmful materials		yes
Equipped with grate and ashpan when fired with mineral fuels		n/a
Design of spare parts ensure correct fitting		yes
Integral boiler	4.2.2	n/a
Use of cast iron or steel in accordance with the specification of table 2 until 5		
Seals are located securely		
Adjacent surfaces are gastight		
Cement seals are supported by adjacent metal surfaces		
Welding and welding materials	4.2.2.1.1	n/a
Suitable for welding		
Steel material in accordance with table 3		
Nominal minimum wall thickness	4.2.2.1.2	n/a
In accordance with table 2		
Tolerances in accordance with EN 10029:1991		
Cast iron parts subject to water pressure	4.2.2.2.1	n/a
Mechanical properties in accordance with table 4		

	Clause	Approved
Minimum wall thickness (cast iron) Wall thickness in accordance with table 5	4.2.2.2.2	n/a
Boiler shell tappings Threads of tappings in accordance with table 6 In accordance with the ISO requirements for: - tapered threads - parallel threads Position of reducing bushes Minimum depth of tapping and length of thread in accordance with table 7 Drain socket > ½" and in accordance with ISO 7 or ISO 228	4.2.2.3	n/a
Design of all boiler waterways Free flow of water is ensured, no obstructions Inspection holes ≥ 70 mm x 40 mm or Ø ≥ 70 mm Sealed with gasket or cap	4.2.2.4.1	n/a
Indirect water systems Minimum internal dimensions ≥ 20 mm Minimum internal dimensions ≥ 15 mm (when locally necessary or in areas not in direct contact with burning fuel)	4.2.2.4.2	n/a
Direct water systems Minimum internal dimensions ≥ 25 mm	4.2.2.4.3	n/a
Venting of the water sections Water sections can be vented no undue boiling noises	4.2.2.4.4	n/a
Water tightness Screw holes do not open into waterways	4.2.2.4.5	n/a
Cleaning of heating surfaces Heating surfaces are accessible	4.2.3	 yes
Flue spigot or socket Fitting overlap is: ≥ 25 mm for vertical connection ≥ 40 mm for horizontal connection ≥ 6 mm for inset appliances with insulating mortar infill	4.2.4	 yes n/a n/a
Flueways Minimum dimension: - ≥ 30 mm for bituminous coals and peat briquettes - ≥ 15 mm for all other fuels Easy cleaning with standard brushes or with tools provided by the manufacturer	4.2.5	 n/a yes yes

	Clause	Approved
Ash pan and ash removal	4.2.6	
Removal of ashes is possible		yes
Volume of ash pan enough for two full charges of fuel		yes
No obstruction of combustion air		yes
Bottomgrate	4.2.7	
Correct fitting is ensured		n/a
Combustion air supply	4.2.8	
Primary air inlet control:		
- manual or automatic control		yes
- adjusting control clearly visible and permanently marked		yes
- no obstruction of the air inlet control by ash or unburnt fuel		yes
Secondary air inlet control:		
- Passage of air is not restricted by fuel		n/a
Control of flue gas	4.2.9	n/a
If flue damper is fitted:		
- easily operable		
- aperture ≥ 20 cm^2 or 3% of the cross-sectional area		
- position of damper can be identified		
If draught regulator is fitted:		
- easily accessible for cleaning		
Firedoors and charging doors	4.2.10	
Charging door large enough for filling with commercially available fuels		yes
Accidental opening is not possible		yes
Positive closure		yes
Flue bypass device	4.2.11	n/a
Easily operable		
Set position can be maintained and identified		
Front firebars and/or deepening plate	4.2.12	
Fuel or ash is retained		yes
Correct fitting is ensured		yes
Accidental dislodging is not possible		yes
Solid mineral fuel and peat briquettes burning appliances	4.2.13	
Equipped with bottomgrate and ashpan		n/a

2.2 Assessment of the safety requirements in accordance with chapter 5 of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

	Clause	Approved
Natural draught Flue draught ≥ 3 Pa If Flue draught is < 3 Pa: - CO-volume ≤ 250 dm^3/10 h	5.1	n/a
Operation with open firedoors No escape of harmful combustion gases No loss of the firebed	5.2	n/a
Strength and leaktightness of boiler shells No leakage or permanent deformation after completion of the tests	5.3	n/a
Temperature in the fuel storage container Temperature ≤ 65 K	5.4	yes
Temperature of the operating components Operating tool provided by manufacturer Touched areas without tools - metal ≤ 35 K - porcelain ≤ 45 K - plastics, wood ≤ 60 K	5.5	yes
Temperature of adjacent combustible materials Temperature ≤ 65 K (see installation and operating manual for information about clearing distances and insulation)	5.6	yes
Thermal discharge control If discharge control is part of appliance: opens at water temperature > 105 °C or opens at water temperature > declared value	5.7	n/a

2.3 Measurements

Test fuel specification in accordance with table B.1 of of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

Test fuel	mois-ture % a.f.	ash % a.f	Volatile matter % dry, ash free	H % a.f.	C % a.f.	S % a.f.	Hu kJ/kg a.f.	Size, lenght cm
Beech	16.4	0.53	83.45	5.34	41.2	< 0.01	15,946	25
Fir timber	13.4	0.84	84.50	5.84	49.9	n.d.	16,085	35

Temperature safety test in accordance with chapter A.4.9.1 and A.4.7 of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

		Clause	Test result	Test result	Approved
Date			**08-06-07**	**08-06-07**	
Test fuel		A.4.7	**Beech**	**Fir**	
Fire box open / closed			**closed**	**closed**	
Total mass	kg	A.4.2	**7.46**	**13.43**	
Number of charges			**3**	**4**	
Settings of controls for: - secondary air			**90%**	**100%**	
Mean flue draught	Pa	6.4	**11.6**	**16.9**	yes
Ambient temperature	°C		**28.1**	**30.2**	
Max. surface temperature					
Trihedron floor	K	5.6	**12**	**16**	yes
Trihedron rear wall (distance 30 cm)	K	5.6	**29**	**64**	yes
Trihedron sidewall (distance 30 cm)	K	5.6	**50**	**62**	yes
Fuel storage container	K	5.4	**28**	**46**	yes
Loss of firebed		5.2	**no**	**no**	yes
Escape of harmful combustion gases		5.2	**no**	**no**	yes
Damage on the appliance caused by the test: none					

Appliance instructions in accordance with chapter 7 of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

Instructions	Clause	Approved
In the language of the country of intended destination	7.1	yes
Not in contradiction to the requirements and test results	7.1	yes
Contains the required information	7.2	yes (see note*)
Contains the required information	7.3	yes (see note**)

*) The following items as required in accordance with 7.2 are missing in the installation instructions:

- The nominal heat output in kW or W;
- The minimum flue draught for nominal heat output;
- The flue gas mass flow in g/s;
- The flue gas temperature directly downstream of the flue spigot/socket in °C under nominal heat out put conditions;
- The floors: the appliance shall be installed on floors with an adequate load-bearing capacity. If an existing construction doesn't meet this prerequisite, suitable measures (e.g. load distributing plate) shall be taken to achieve it.

**) The following items as required in accordance with 7.3 are missing in the operating instructions:

- Ventilation requirements for the simultaneous operation with other heating appliances;
- The correct operations for seasonal use and under adverse flue drought or adverse weather conditions;
- Advice about the actions to be taken in the event of a chimney fire;
- Advice on whether the appliance is capable of continuous or intermittent operation and instructions on how this is achieved.

Marking in accordance with chapter 8 of NEN-EN 13240:2001 and NEN-EN 13240 A2:2004

	Clause	Approved
Permanently and legibly marked	8	yes
Readable	8	yes
Durable and abrasion proof	8	yes
No discoloration or detachment	8	yes
Contains the required information	8	yes

- A copy of the type shield can be found in annex D of this test report.

3. Authentication

Name and address of the principal:

Company	Bosca Chili S.A.
Name	Mr. Echenique
Address	Americo vespucio Norte 2077
Postal code and residence	Santiago
Country	Chili

Names and functions of the cooperators:

T. Boom	-Senior Consultant
J. Dekker	-Consultant / Measurement technician

Names and establishments to which part of the research was put out to contract:

Not applicable

Date upon which, or period in which, the research took place:

August 2007

Signed by:

T. Boom
Senior Consultant

Approved by:

E.C.V. van Bussel
Location manager

Annex 1 Installation and operating manual

BOSCA®

Owner´s Manual

ARESTA 400 Wood Stove

Installation and Operating Instructions

Save These Instructions

Please read this entire manual before you install and use your BOSCA ARESTA 400 Wood Stove. Failure to follow instructions may result in property damage, bodily injury, or even death.

INTRODUCTION

We would like to congratulate you for selecting our BOSCA ARESTA 400. By purchasing a BOSCA product, you receive the advantage of the strength, guarantee and the more than 20 years experience BOSCA has in producing stoves and heaters equipped with double air combustion systems, which enable efficient consumption of the wood, as well as minimum impact to the general environment.

Bosca Chile S.A. is the leading company in the production of wood stoves in Chile, with more than 250,000 stoves sold and there are Bosca products installed in houses in Spain, Portugal, Argentina, Uruguay, Ecuador, and Mexico. In the production of our stoves, we use only the finest materials. This, along with the experience of the members of our staff, means for you a product of high quality and dependability.

Please read this entire manual before you install and use your BOSCA ARESTA 400. The purpose of this manual is to familiarize you with your ARESTA 400's safe installation, operation and maintenance. It contains information that will be useful, so save it for future reference.

INSTALLATION

For your ultimate safety and the proper function of your stove, it should be installed in accordance with the instructions of this Manual.

The first step is to decide where is the most appropriate place to install your stove.

It is important to install the stove in an area with adequate air circulation and flow. This allows the warm air to more easily reach the intended rooms. Additionally, your stove's placement should enable, and not be an obstacle to, free movement of people, especially children.

Your stove and chimney connector must be far enough from combustible materials to meet all clearance requirements.

The floor

One of the main necessary precautions when installing a wood stove is to leave sufficient space between the stove (top, sides, back, front, and under stove pipes) and any other material that can catch fire.

Installation Clearances

It is extremely important that you respect required installation distances and that you respect local installation regulations. This is for your safety! The manufacturer is not responsible for the product, if it is not installed following these recommendations. These clearances may only be reduced by means approved by the regulatory authority.

A combustible surface is anything that can burn (i.e. sheet rock, wall paper, wood, fabrics etc.) These surfaces are not limited to those that are visible and also include materials that are behind non-combustible materials. If you are not sure of the combustible nature of a material, consult your local fire officials.

This prevents any amount of condensed or liquid creosote from running down the outside of the pipe or the stovetop. All joints, including the flue collar connection must be secured with three sheet metal screws to ensure that the sections do not separate.

For the best performance the chimney connector should be as short and direct as possible, with no more than two 90 elbows. The maximum horizontal run is 36" and a recommended total length of stovepipe should not exceed 10 feet. Always slope horizontal runs upward ¼" per foot toward the chimney.

No part of the chimney connector may pass through an attic or roof space, closet or other concealed space, or through a floor ceiling. All sections of the chimney connectors must be accessible for cleaning.

CHIMNEY

DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE. DO NOT CONNECT TO ANY AIR DISTRIBUTION DUCT OR SYSTEM.

Factory Built Chimney

When a metal prefabricated chimney is used, BOSCA's installation instructions must be followed. You must also purchase (from BOSCA or its authorized retailer) and install the ceiling support package or wall pass-through and "T" section package, firestops (where needed), insulation shield, roof flashing, chimney cap, etc. Maintain proper clearance to the structure as recommended by BOSCA. The chimney must be the required height above the roof or other obstructions for safety and proper draft operation. (See fig. 3)

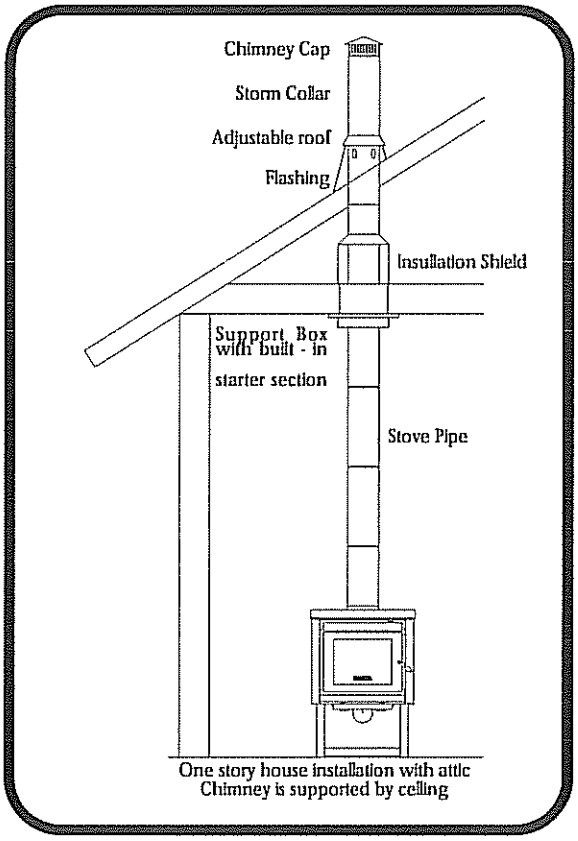


Fig. 3

Chimney Height

A masonry chimney or a listed factory-build chimney must be the required height above the roof and any other nearby obstructions. The chimney must be at least 3' (90 cm) higher than the highest point where it passes through the roof and at least 2' (60 cm) higher than the highest part of the roof or structure that is within 10' (305 cm) of the chimney, measured horizontally (See fig. 6).

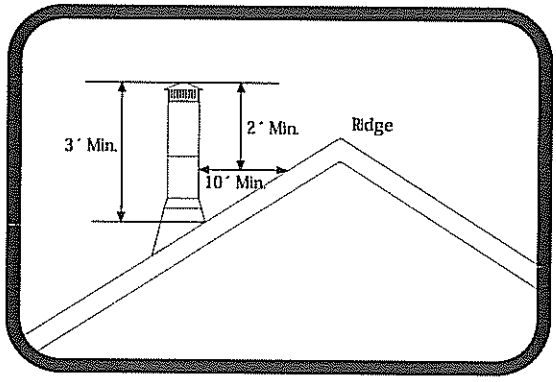


Fig. 6

OPERATING AND LIGHTING INSTRUCTIONS

Your ARESTA 400's performance depends largely on how it is operated. Please read this section carefully before lighting your first fire.

When you light your first fire, the stove will emit some smoke and the smell of paint. This is normal. Open the windows to vent the room and eliminate the smell .

Before lighting your stove, ensure that the baffle is correctly installed. For baffle installation instructions, see page 12 (Maintenance).

Lighting

Place crushed sheets of paper or firelighters in the center of the firebox.

Place some kindling on top of the paper and some small split logs, preferably in a vertical position.

Light the fire and close the door.

Open the door of the ashtray and leave it this way for approximately 3 minutes or until the split logs are alight.

Add the load of firewood, placing the lightest logs directly over the fire and the heavier ones on top of these.

Close the door of the firebox and maintain the door of the ashtray open for approximately 5 more minutes.

Once the logs are alight, close the door and place the Air Control on HIGH for 20 minutes.

When the stove reaches the operation temperature and there is sufficient draft, graduate the Air Control to the desired position. It is recommendable to slowly adjust this command before graduating to the MEDIUM position (prolonged combustion).

You will find by experience how to best manage your stove to your liking. You must not expect an immediate reaction from the fire when moving the Air Control. The flame will not intensify nor extinguish quickly as it would with liquid or gas fuels. Solid fuels, like firewood, react slowly.

If the fire is initiated as instructed, a good base is established for an effective combustion that is smokeless and that does not pollute.

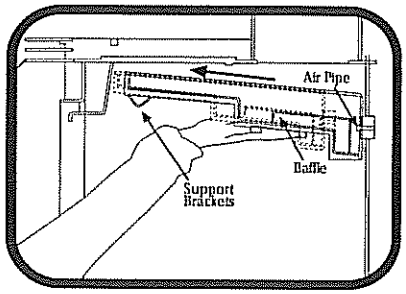


Fig. A

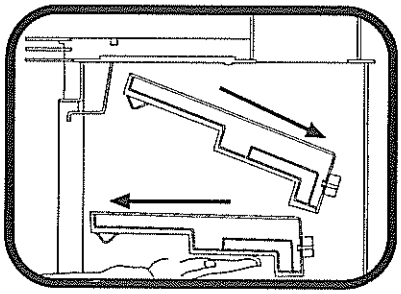


Fig. B

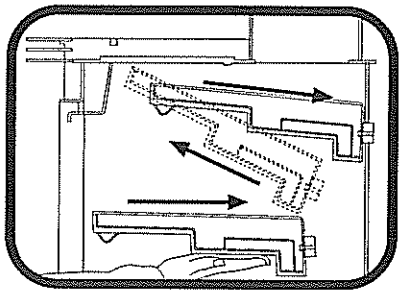


Fig. C

Disposal of Ashes

Your unit's firebox has a grooved base, through which the ashes from the wood burned automatically deposit into the ashbin. When the ashbin is full, make sure that the stove and the ashes are cold (remember that the coals can remain hot for up to 36 hours) and place the ashes 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 dispersed they should be retained in the closed container until all cinders have thoroughly cooled.

Glass Replacements

The front glass is a ceramic glass, especially made for use in wood stoves, and should therefore not be marred by normal use of the stove.

If for any reason the glass does break, it will be necessary to replace it. Never operate your stove with broken glass.

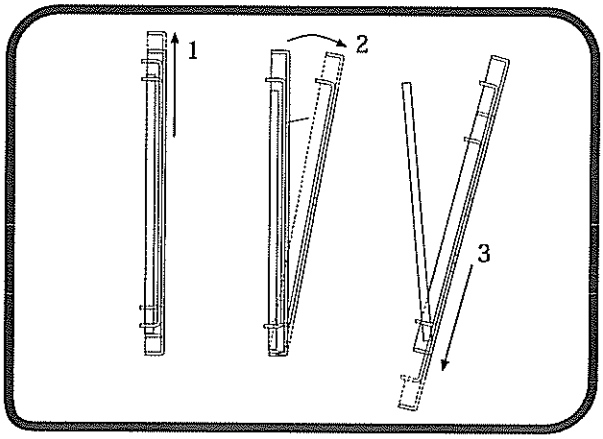


Fig. 7

Replace the glass as follows:

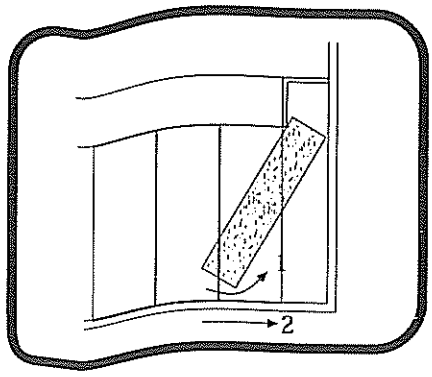
- Make sure that the fire is completely extinguished and the stove is cold.
- Protect your hands with gloves that are appropriate for this type of work.
- Remove the front door, carefully pushing it upward (fig 7).
- Place the door on a flat surface.
- Unscrew the bolts that hold down the stainless-steel frame on the stove door.
- Separate the door frame from the glass. The glass should be loose on the door, once the frame has been removed.
- Place a new sheet of glass on the door, reset the frame in its original position, then screw the frame in place on the door.
- Reinstall the door, inserting the bottom part first, then the top part.
- Before lighting a new fire, ensure that the door is seated in its correct position.

Use only ceramic glass for use in wood stoves. Do not use other type of glass.

If the ceramic glass of your stove needs to be replaced, contact your Official BOSCA Dealer.

Refractory Brick Replacement

Your ARESTA 400's firebox interior is covered with heat-refracting brick. Some brick may break due to normal use of the appliance or from impact when loading wood.



f this occurs, proceed as follows, after making sure that any fire is extinguished and the appliance and brick are cold:

- Use gloves to protect your hands
- Clean any ashes from the firebox
- Take hold of the brick to be replaced, and push it upwards. This should leave you enough space to move the bottom of the brick toward the center of the firebox
- Clean any pieces of brick remaining in the space where the new brick will be placed
- To insert the new brick, place the upper end in the molding in the top part of the firebox
- Once the upper part of the brick is well seated, push it towards the inside surface of the firebox, until the brick is completely seated in place.

If you need to replace Refractory Bricks, check with your Official BOSCA Dealer.

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.

The chimney connector and chimney should be inspected at least every two months during the heating season to determine if creosote build up has occurred.

If creosote has accumulated it should be removed to reduce the risk of a chimney fire.

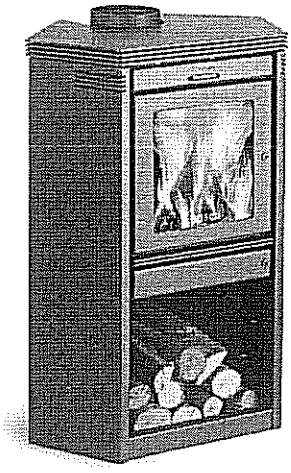
TROUBLE SHOOTING

Your ARESTA 400 will operate with few problems, and most of those will occur due to incorrect operation, poor-quality wood, improper installation, or failure to clean the flue piping.

The following lists solutions to the most common problems in the operation of the ARESTA 400:

Problem	Solution
Insufficient Heat	-Use seasoned wood -Reload your stove when it has a good bed of embers - Set the Air Control in "Médium" or "High" position.
Stove smokes	-Use seasoned wood - It is normal for your stove to emit smoke during the first few minutes of operation. The smoke will dissipate when the firebox reaches the normal operating temperature..
Sooted Glass	- Use seasoned wood - Keep the Air Control at "Medium" or "High" position - Make sure that the gasket is in good condition.
Melted Baffle	- If your heater is more than 2 years old, replace the baffle.-

Annex 2 Drawings



ARESTA 400 WOOD STOVE

The ARESTA 400 have a contemporary look and feel as the stove is more vertical than wide. The ARESTA 400 natural convection design promotes soft graceful heating with refractary bricks and provides a wonderful unobstructed view of the fire to compliment its aesthetic design, specially for corners.
The ARESTA 400 stove is ideal for smaller area heating needs and create a cozy atmosphere. The ARESTA Series stoves are also excellent heaters at 8500 Kcal/hr and their combustion design promotes fast starting of the fire, while the natural convection heat begins to warm the area rapidly.
The air-control levers are conveniently located in above of the stove for easy adjustment of heat output and burn time. The ARESTA Series stoves have a heavy duty ash pan for convenient ash removal without manually shoveling ashes from the firebox.

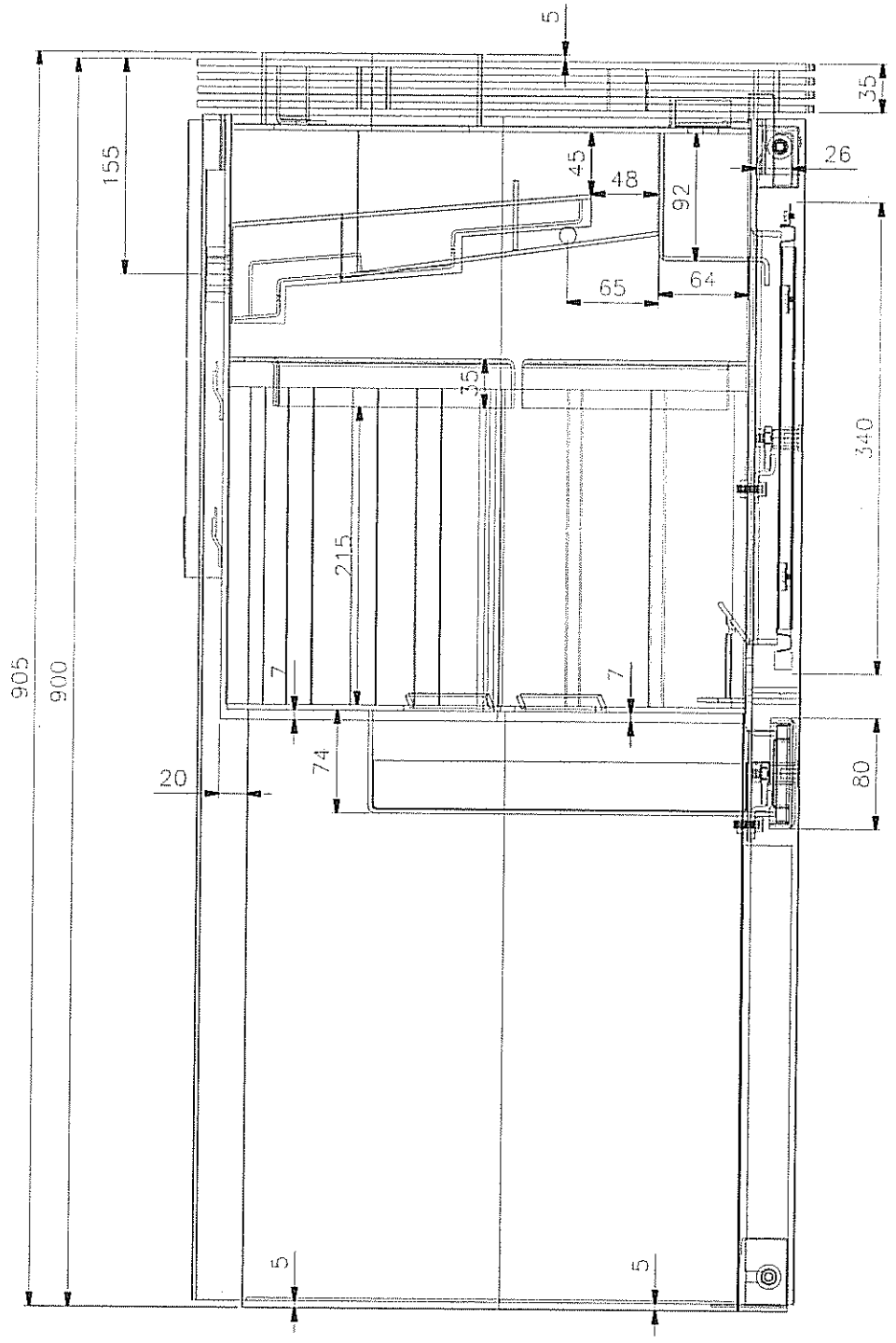
Construction details
. Foundation constructed of steel plates folded and welded with MIG welding.
. Surface specially treated for maximum paint adherence.
. Paint: resistant to high temperatures.
. Ceramic glass: from 5 mm thickness, resistant to high temperatures and heat shock.
. Insulating element: graphite.

Raw Materials
. Steel
- Hot rolled: 4 mm, for firebox (A37-24ES)
- Cold rolled: between 0,5 and 1,9 mm, for cobres and accesories (SAE 1010)

. Glass: Neoceram (NipponElectric Glass Co. Ltda., Japan)
. Paint: Charcoal, High Temperature (Forrest Paint Co. USA)
. Insulating Elements: Black Fibberglass Tape-Black Fibberglass Rope (Fil-Tec, Inc. USA)

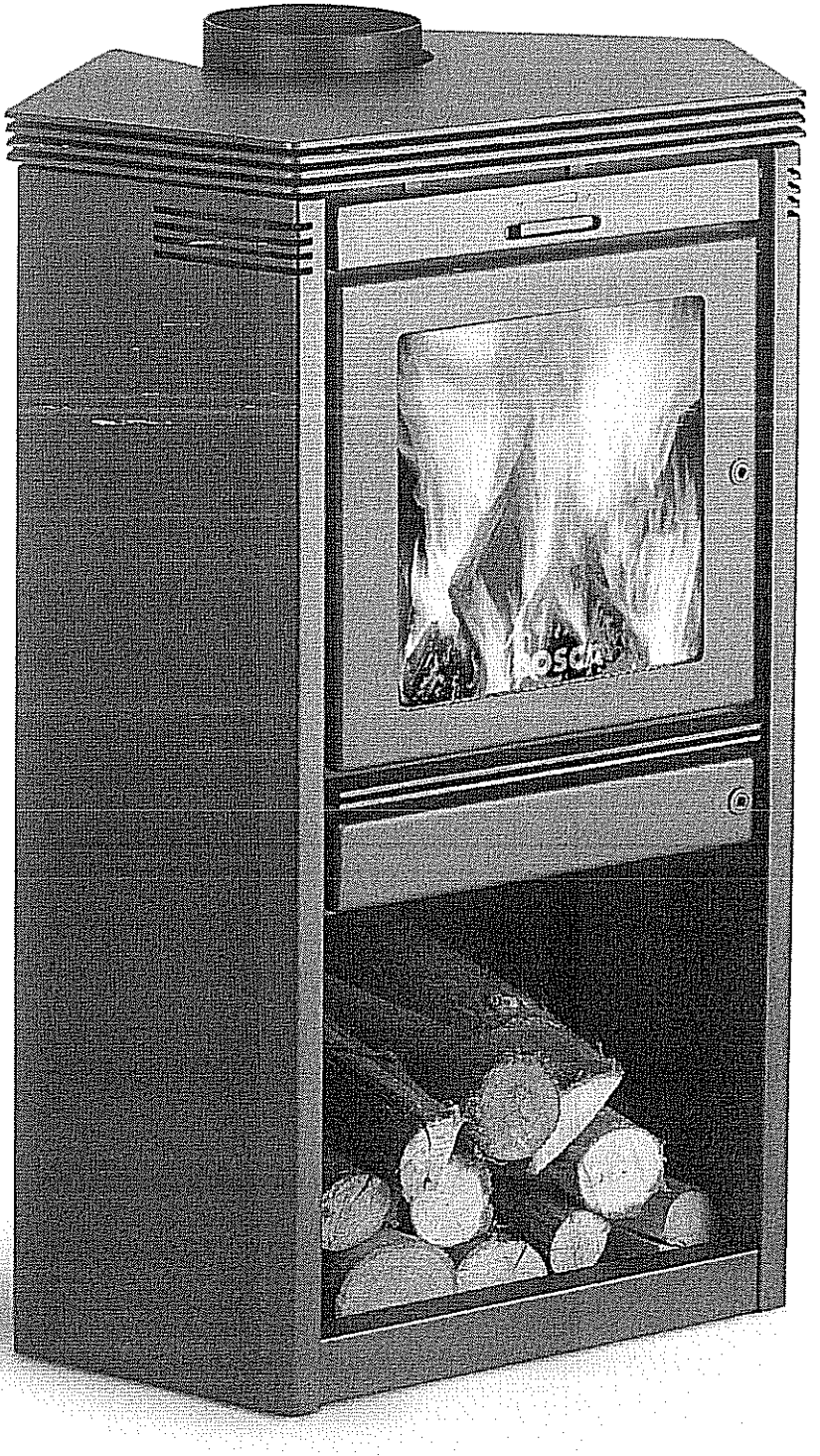
Technical Details
. Kcal/hr: 8.500
. Heating capacity m2: 70-120
. Weight: 102 Kg
. Color: Black Charcoal
. Flue collar size: 6"
. Long Lenth: 35 cm
. Height: 90 cm
. Width: 62 cm
. Depth: 44 cm

CORTE TOTAL



PROY.			TOLERANCIAS DE NO ESPECIFICARSE OTRAS DIMENSIONES EN mm. ±1 ANGULARES ±1/2°		REVISION	FECHA	CAMBIO O ADICION	
DIB.					MATERIAL	DIMENSION	COMERC. TRAT. TERM.	ACABADO
REV.			cantidad	NEC.	NOMBRE			
APROB.					CORTE TOTAL	ESCALA S/E	BOSCA S.A.	DIB. N°
	NOMBRE	FECHA	UNIDAD O MONTAJE		ARESTA 400	DIB.DE MONT.N° 0000000	AMERICO VESPUCIO N° 2077 FONO : 6232308 FAX : 6241891 HUECHURABA – STGO.	N° 00 DE 00 0000000

Annex 3 Photography



Annex 4 Type shield

Example of a CE type shield

CE

Bosca chilli sa

07

EN 13240:2001 and EN 13240 A2:2004

Room heater fired by solid fuel

ARESTA 400

Distance to combustible materials: Side: 30 cm minimum
Back: 30 cm minimum

Recommended fuels : Woodlogs

Fuel: woodlogs

Emission of CO in combustion products	: 0,17 %
Flue gas temperature	: 473 °C
Thermal output	: 10 kW
Energy efficiency	: 76.4 %

Read and follow the operating instructions!

Annex 5 Measurement uncertainties

Sampling/analysis methods used, measuring standards and uncertainties. All measurements mentioned in this table are covered by ISO 9001 certification. Measurements marked with an asterisk are also accredited by RvA Testing under no. L-O92. The table is valid from 17 February 2006 till 28 February 2009.

No.	Component	SGS Procedure/Standard	Uncertainties [1)]
*	Determination of the CO_2 concentration (nondispersive infrared)	Emm-006, Emm-007 (conform NEN ISO 12039)	< ± 8%.
*	Determination of the CO concentration (nondispersive infrared)	Emm-006, Emm-008, Emm-009, Emm-013 (NEN ISO 12039)	< ± 8%.
*	Determination of the gas temperature (thermocouple)	Emm-025 (conform ISO/DP 8756, VDE/VDI 3511, VDE/VDI 3512 Blatt 2)	< ± 0.75% of the measured value of ± 1.5 °C (largest value)

The stated uncertainties refer to the 95% confidence interval (2 sigma). The stated percentages are related to the actual measurement results, unless indicated otherwise.