

MK3, MARINE CHIMNEY SYSTEM

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1. INTRODUCTION.

FITTING TWIN WALL FLUE SYSTEMS IN BOATS

BS8511:2010 calls for the use of purpose made stainless chimney sections which are CE marked and comply with the requirements of **BSEN1856-1, BS4543.**

Within the proprietary flue manufacturers portfolio of standard parts, there are no components available to facilitate the fitting of flue pipes into boats and so Harworth Heating Ltd have designed a means of doing this generally known as the MK3 Deck Flange system.

This system consists of a specially designed deck flange assembly illustrated in fig3 which will allow accurate vertical alignment of the above deck chimney extension on flat, convex or concave roof profiles and provide a safer and neater way of getting a hot flue pipe through the inner and outer ceiling skins.

Proprietary flue manufacturers allow an air gap distance from combustibles of 50mm from the outside diameter of the flue pipe.

APPEARANCE.

The twin wall flue system is of high quality and manufactured from stainless steel both internally and externally.

Twin wall sections can be purchased powder coated in matt black at an additional surcharge of 25%. Otherwise customers are requested to organise powder coating to their own colour requirements.

The chimney systems are generally referred to as Class 1 systems meaning that they are used in applications where flue gas temperatures can be in excess of **260 deg C.**

In general, they are suitable for the evacuation of fumes from gas, oil, wood and coal fired atmospheric heating appliances commonly known as stoves, cookers and boilers.

2. AVAILABLE SIZES.

DECK FLANGE KITS.

Can be supplied to suit the following:-

For 4" twin wall flue pipes x 6" outer diameter. (Not yet available).

For 5" twin wall flue pipes x 7" outer diameter.

For 6" twin wall flue pipes x 8" outer diameter.

STRAIGHT LENGTHS.

6", 12", 18", 24", 36", 48"

Max outside diameters are 5" and 6".

ELBOWS.

15 degree.

Elbows need to be secured via short, stainless self tapping screws to stop rotation and a locking band.

Max outside diameters are 5" and 6".

LOCKING BANDS

Locking band is included with each straight length, elbow and tee.

Inward facing flanges around the band fit into grooves at chimney length joints.

It is not included in adaptors or terminals.

TERMINALS.

Rain Cap

Weather Tight Cover
Swivel Terminal

ADAPTORS

Adaptors are available in 4-5", 5-5" , 5-6" and 6-6".

Locking bands have to be ordered separately as they are not included with the locking band.
Max outside diameters are 5" and 6".

CHOICE OF DIAMETER.

If the appliance has a 4" flue collar then 5" twin wall would be suitable.

If the appliance has a 5" flue collar the 5" or 6" would be suitable

If the appliance has a 6" flue collar then 6" twin wall is suitable.

As a general rule it is always better to use 6" twin wall on appliances with 5 & 6" flue collars.
See adaptors to establish the size requirement.

3. COMPONENT PART DESCRIPTION SEE FIG 5.

ITEM 1 PRIMARY FLUE.

The primary flue is the first pipe, which comes off the appliance.

This pipe can be made from:-

1. Purpose made vitreous enamel flue pipe 4, 5 and 6" dia.
2. Steel tubes with a minimum wall thickness of 3mm either straight or fabricated, see fig 10 for examples.
- 2a. Stainless steel tubes with a minimum wall thickness of 1mm either straight or fabricated, see fig 10 for examples.
3. Twin wall flue pipes, work out what lengths and or bends are required and order accordingly.

ITEM 2 SINGLE TO TWIN WALL ADAPTOR.

Is the adaptor, which takes the single wall flue pipe (primary flue) into twin wall flue pipe.
Adaptors are available in 4-5", 5-5" , 5-6" and 6-6".

ITEM 3 TWIN WALL FLUE PIPE.

Each length of the 5" & 6" is 38mm longer than its effective length.

Twin wall flue pipe can be a different version of the primary flue or the secondary flue.

It can be supplied in straight lengths, tee pieces, elbows, adjustable lengths, inspection door lengths etc.

Adjustable lengths must not be used as they require a 12" clearance from combustibles.

ELBOWS.

Elbows are not itemised but are available in 15 degree angles.

Elbows need to be secured via short, stainless self tapping screws to stop rotation and a locking band.

ITEM 5. FIRESTOP SPACER.

This is a flat fireproof board designed to keep combustible materials at a specific distance away from the twin wall flue pipe as it passes through the ceiling of the vessel.

ITEM 6. CEILING RING.

This is the device, which masks the joint between the fire stop spacer and the boat roof lining material. See fig 6 for examples.

ITEM 7 DECK FLANGE KIT SEE FIG 3.

Comprises of:-

1. Deck Flange
2. Vertical support tube.
3. Fasteners to fasten the deck flange to the roof of the vessel.
4. Fire stop spacer machined from compressed vermiculite board.
5. Ceiling ring in either Brass or Stainless (Customer to specify.).
6. Fireproof void filler.

Deck Flange kits have to be welded after the roof angle has been accurately established.

ITEM 8 STORM COLLAR.

The storm collar is fitted above the deck flange and is designed to shed excessive water from the flue pipe. See fig 7,

Use the storm collar as a height gauge to position the top of the pipe above the deck.

ITEM 9 RAIN COWL OR TERMINAL.

Terminals can come in a variety of different types; normally a standard rain cowl or a swinging cowl illustrated in fig 7 is used.

ITEM 10 TOP STUB.

Fitted to form a tapered top to the chimney extension this provides a platform for the fitting of a swivel cowl as shown fig 7.

If a standard rain cap is fitted then the top stub is not required.

Standard rain caps are twist lock fitted and secured with a locking band.

ITEM 17 SHORT LENGTH OF TWIN WALL FLUE PIPE.

This is the transitional length which fits into the deck flange tube; it should be fitted so that the above deck extension can be fitted to it. Use the storm collar as a height gauge to position the top of the pipe above the deck.

ITEM 19 LOCKING BANDS

Are fitted at each twin wall chimney joint to lock the separate chimney sections together. Clamping bands are supplied with each straight length of flue pipe but not the adaptors or top stubs.

FIG.3 DECK FLANGE DRAWING.

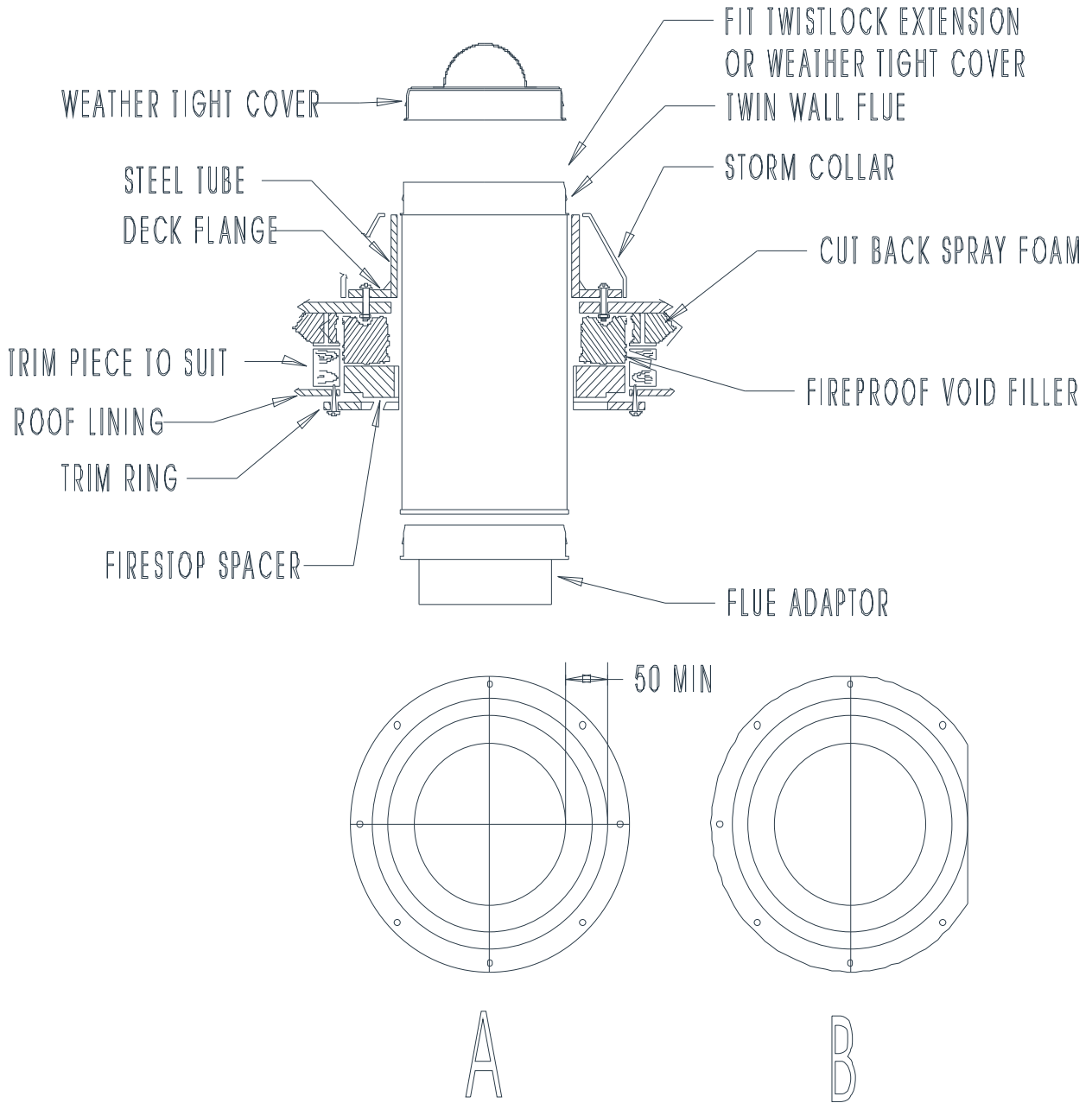
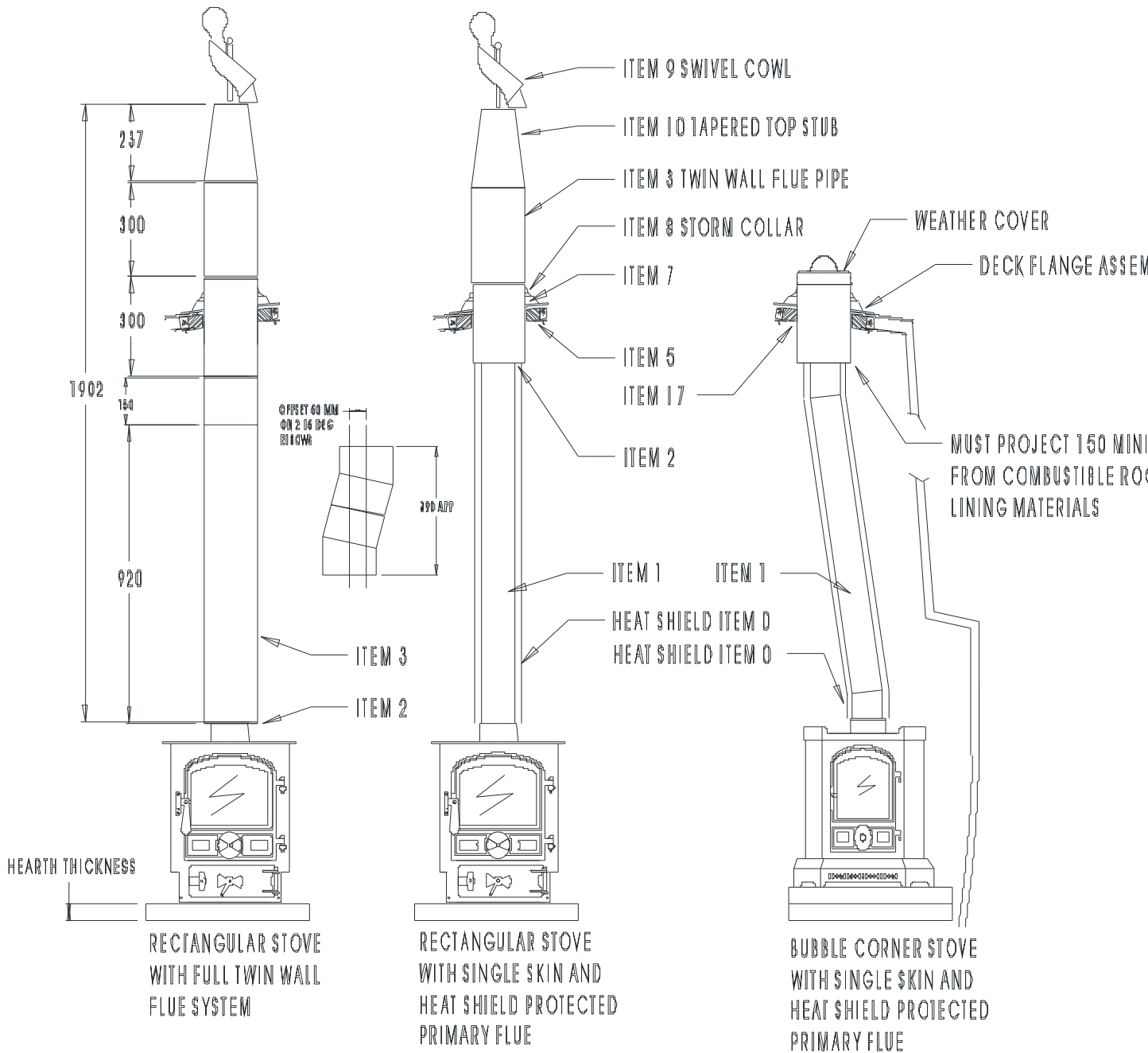


FIG.5 CHIMNEY SYSTEM COMPONENT PARTS.



4. INSTALLATION.

PRE INSTALLATION CONSIDERATIONS.

BS8511:2010. Code of practice for the installation of solid fuel heating and cooking appliances in small craft, gives instruction on distances from combustibles for both the flue system and the solid fuel appliance.

Before starting designing a flue system, it is important to carefully plan pipe length selection to avoid the situation where a flue pipe joint might fall within the confines of the roof space as this is **NOT ALLOWED** under BS8511:2010

Although adjustable lengths of twin wall flue pipe are available (50 - 200), they must not be

used because of the distance from combustible requirement of 300mm which negates the advantage of the normal 50mm distance from combustibles for elbows and non adjustable lengths.

Individual lengths of flue pipe are quickly and simply fastened together using a twist lock mechanism and to increase joint strength and rigidity a circular, screw fixed locking band is attached over the joint, no additional joint seal is normally required.

When installing twin wall flue systems reference must be made to:-

The appliance manufacturer's instructions relative to the Flue Diameter and either the height of the flue or the required flue vacuum reading.

Fig 3 illustration shows details of how the deck flange kit is fitted through the deck of a steel boat, no joints are allowed in the flue pipe as it passes through the roof space.

The normal allowable air gap clearance between the outer diameter of a twin wall flue pipe and combustible material is 50mm; take care to ensure that this clearance is maintained when fitting the deck flange assembly.

Fig 3 illustration shows the twin wall flue pipe projecting down into the vessel by 150mm, if the flue pipe is required to be twin wall down to the appliance outlet then extra lengths 6", 12", 18", 24", 36", 48" can be purchased.

Note that a flue adaptor is required to connect the twin wall flue pipe up to the appliance outlet socket.

In the case of Corner Solid Fuel Bubble stoves the primary flue will need to be constructed from 3mm thick steel or 1mm thick stainless steel, single skin flue otherwise the space saving and integrated design options will be lost.

BS 8511 calls for a horizontal distance from combustibles to be 3 times its diameter from unprotected combustibles.

In the case of Corner Solid Fuel Bubble Stoves this distance can be reduced to 150mm with the use of suitably designed heat shields which should be fitted around the flue pipe and stand off, from the pipe, by a distance of 20mm.

Where installers are prepared to heat shield the vertical cabin sides adjacent to the flue pipe then this distance can be as specified in our technical installer manual. (Corner Solid Fuel Marine Stove.)

Paint is classed as a combustible material and as a consequence where it is applied to the metal parts of the deck flange and boat roof it must be of a fireproof nature within a distance of 50mm from the flue pipe.

Fireproof paint can be purchased from our sales dept.

POSITION THE APPLIANCE

Position the stove as required into a suitable fireplace and hearth compliant with the requirements of BS8511:2010

ESTABLISH THE POSITION OF THE FLUE OUTLET HOLE IN THE ROOF OF THE BOAT.

There are real problems with offsetting the flue pipe as the minimum offset with 5" twin wall, using 2 x 15 deg bends is 2", it is not possible to use adjustable flue pipe and the shortest length of twin wall 6" which would increase the offset to 8".

If the hole is directly over the flue outlet on the stove then a straight flue can be used.

If hole is offset from the stove flue outlet then a flue pipe with suitable offset must be constructed, twin wall bends are available in 15, 30 and 45 deg however 45 deg bends are not recommended.

NEVER USE A STRAIGHT PIPE AT AN ANGLE, USE PIPES AS ILLUSTRATED IN FIG 10 OR PURCHASE/ MANUFACTURE, PURPOSE MADE EQUIPMENT AS DETAILED IN FIG 5 ITEM 1.

CUT THROUGH THE ROOF.

Before cutting through the outer steel roof make sure that the ceiling ring will fit on the inner roof section, note that in some cases it may be necessary to trim the ceiling ring as per B in fig 3.

Establish the through ceiling position of the flue pipe and mark the centre point.

Using the deck flange as a marking template, cut the hole in the roof to the same inside diameter of the deck flange.

Fabricate the deck flange assembly.

CUT THE INNER ROOF LINING.

Use the outside diameter of the fire stop spacer to mark out for cutting the roof lining.

If required fit new trim timbers.

POSITION THE DECK FLANGE.

After the hole is cut, position the deck flange concentrically over it and mark out for drilling the fastener holes.

Drill the holes and temporarily bolt the deck flange to the cabin roof.

Fit the vertical support tube into the deck flange making sure that it is positioned vertically.

Mark the tube in its vertical position and tack weld it to the flange, making sure that the chimney will finish up in its correct vertical position.

Remove the tacked up assembly and finish welding all around the joint.

After welding, dress the joint and the underside of the flange to make sure that there is a clean flat surface.

Using the stainless fasteners supplied with the kit, bolt the assembly to the boat with a suitable seal applied between the joint.

(Black, high temperature silicone adhesive, not provided in the deck flange kit.)

FIRE STOP SPACER.

The fire stop spacer will provide heat protection for any combustible materials located near to the through roof location.

It will be fitted around the flue pipe in the cavity between the ceiling lining material and the roof steelwork or outer skin.

The centre hole in the spacer may need to be profiled to suit the outside diameter of the twin wall flue pipe; this can be done using a half round rough file.

Make sure that any combustible foam insulation is removed from the cavity into which the fire stop spacer is to be fitted.

When the twin wall flue pipe passes through the roof space make sure that no combustible materials come within 50 mm of the outer skin of the twin wall.

Fireproof void filler is provided with the kit to provide a fireproof fill for any void around the outer skin of the twin wall.

A tube of black fireproof silicone will be required to form weather tight seals; this is not provided with the kit and must be purchased as an extra.

CEILING PLATE.

The ceiling plate will be fitted inside the boat to finish off the through roof fitting of the flue pipe and mask the joint between the fire stop spacer and the pre cut roof lining.

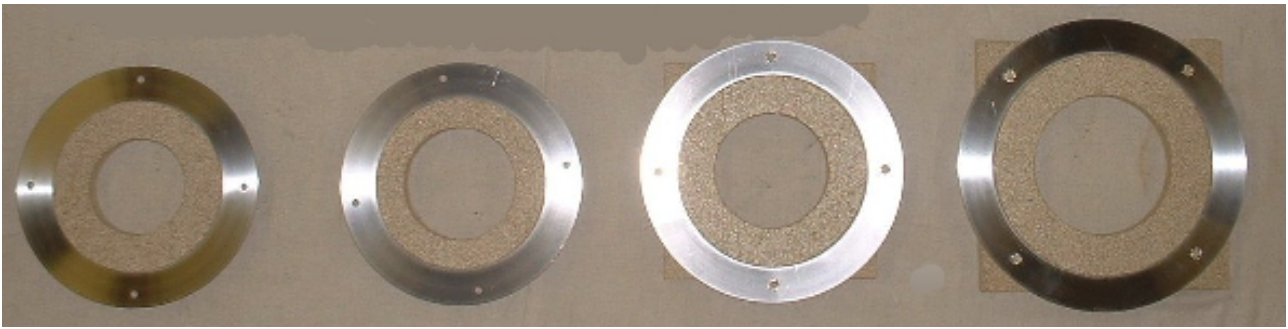
It will be screwed up to the trimming timber or roof lining via fasteners as illustrated.

Make sure that the trimming timbers are at least 50mm from the outer skin of the twin wall flue pipe as it passes through the roof space.

Fireproof void filler is provided with the kit to provide a fireproof fill for any void around

the outer skin of the twin wall.

FIG 6 BOAT STYLE INTERNAL TRIM RINGS AND FIRESTOP SPACERS.



FINISHING.

Assemble the flue system in a dummy run to make sure that everything fits as planned. Use the storm collar as a height gauge to position the top of the short transitional pipe (fig3) above the deck.

Note that the black silicone can be used to seal the twin wall into the deck flange.

Just seal the top of the deck flange, do not put too much silicone into the joint as it may be necessary to remove the twin wall flue section if it gets damaged.

The objective is to form a weather tight seal.

Fit the storm collar item 8 fig 3.

Note the storm collar can be sealed top and bottom with the fireproof silicone provided with the kit.

FINISHING WHERE SINGLE SKIN PRIMARY FLUE PIPES HAVE BEEN USED.

Slide the twin wall flue pipe into the deck flange and let it locate onto the vertical support tube generally as per fig 3.

Use the storm collar as a height gauge to position the top of the short transitional pipe (fig3) above the deck.

As a temporary support and so as to establish the correct length of the flue pipe, self tap the twin wall to the vertical support tube to hold it in position. (Use short self tappers 8mm max length)

Fit the flue pipe and mark it off at the finished length to allow final connection into the twin wall adaptor fig3.

Cut the flue pipe to its final, correct length and then re fit the twin wall to its correct position as per fig 3.

Note that the black silicone can be used to seal the twin wall into the deck flange.

Just seal the top of the deck flange, do not put too much silicone into the joint as it may be necessary to remove the twin wall flue section if it gets damaged.

The objective is to form a weather tight seal.

Fit three or four self-tapping screws through the vertical support tube to hold the twin wall firmly in position, use stainless self tappers 10mm long max,

Fit the storm collar item 8 fig 3.

Note the storm collar can be sealed top and bottom with the fireproof silicone provided with the kit.

ABOVE DECK EXTENSION.

When the assembly has gone off, (24hrs) fit the twist lock chimney extensions as required.

SEE ITEM 3 FIG 5.

A short extension is used for cruising and a longer extension is used when mooring.
Fit a rotating cowl to minimise the effects of down draughting.

GENERAL MINIMUM FLUE HEIGHTS FOR BOAT STOVES.

Subject to appliance manufacturers specific instructions in compliance with BS 8511 - 2011
Note that the height of the flue directly relates to the flue vacuum that it can generate.
Stove makers have to specify a flue vacuum required for the safe operation of their products.

Normally a boat flue of 2.1 meters tall is only capable of generating a vacuum of .03" WG (.1mbar) therefore where makers specify flue vacuum requirements of more than .03" it would not be safe to fit the appliance in a boat.

DISTANCE FROM COMBUSTIBLES

Twin wall insulated flue pipes 50mm air gap.

Heat shield protected single skin flue pipes 150mm (Can be further reduced with the use of additional insulation boards.

See SOLIFTEC sheet re heat protection panels or Corner Solid Fuel Technical Installer manual.)

FIG 7 MK3 FLUE FITTED TO A LUXE MOTOR WITH DYNAMIC TYPE SWEEP VENTURI COWL.



SPECIAL FABRICATED FLUE PIPES.

If the flue has to be offset to clear an obstacle or meet a required position then the flue pipe can be offset as illustrated in fig 10.

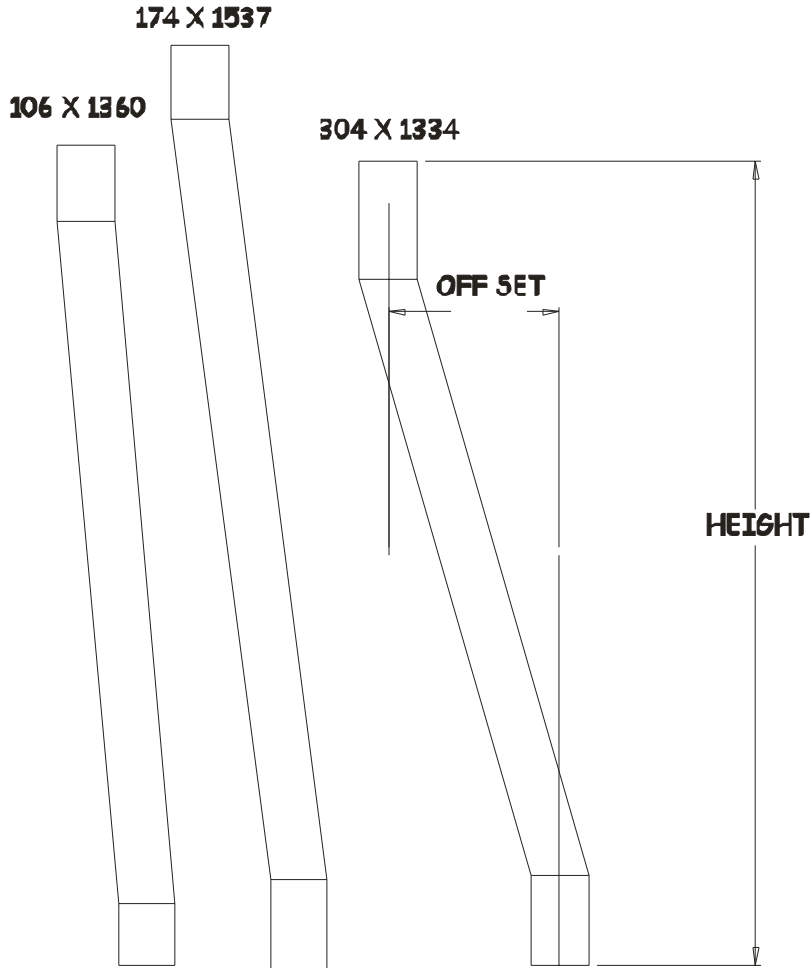
Note that it is important to keep the stove and chimney connections vertical, as illustrated.
Class one flue pipes for solid fuel appliances must be made from 3mm wall thickness, steel tubes by a qualified welder.

After fabrication flue pipes must be tested for weld integrity to ensure that they do not leak and comply with -:

BS1344 Parts 1 and 7, BS1344 Part 3, BS 1449 Part 1, BS6461 Part 1. Building Regulations Part J

The pipes illustrated are classified by offset and height i.e. 106 offset x 1360 height.
As per fig 10, any bend should be as gentle as possible.

FIG. 10 SPECIALLY MANUFACTURED OFFSET FLUE PIPES.



Note that where single skin flue pipes have to be constructed, suitably designed heat shields must be fitted.

The heat shields should be fitted around the flue pipe and stand off, from the pipe, by a distance of 20mm. obviously where there are no combustible materials within the specified distance of **3 x's the flue diameter**, the additional protection would not be required unless there was another safety issue to consider.

If necessary an additional heat shield may be applied to the lining of the boat where the flue passes in a vertical direction through the boat, the heat shield can be made from sheet metal or fire board and must be fitted on minimum 10mm stand offs.

Make sure that where stand off heat shield are used air can freely circulate up and behind the heat shield.

5. PARTS LIST

Mk 3 Marine Flue System Parts List

ITEM NO	DESCRIPTION	PT NO
COMPLETE DECK FLANGE KIT PART NOS		
ITEM 7	COMPLETE KIT FOR 4" or 5" FLUE PIPES WITH 4" TWIN WALL ADAPTOR	
ITEM 7	COMPLETE KIT FOR 4" or 5" FLUE PIPES WITH 5" TWIN WALL ADAPTOR	77-02-825
ITEM 7	COMPLETE KIT FOR 5" or 6" FLUE PIPES WITH 6" TWIN WALL ADAPTOR	77-02-826
TWIN WALL FLUE PIPES 5" DIA		
ITEM 17	STRAIGHT PIPE 6"	DEK-5STC-L6
ITEM 17	STRAIGHT PIPE 12"	DEK-5STC-L12
ITEM 3	STRAIGHT PIPE 18"	DEK-5STC-L18
ITEM 3	STRAIGHT PIPE 24"	DEK-5STC-L24
ITEM 3	STRAIGHT PIPE 36"	DEK-5STC-L36
ITEM 3	STRAIGHT PIPE 48"	DEK-5STC-L48
TWIN WALL FLUE PIPES 6" DIA		
ITEM 17	STRAIGHT PIPE 6"	DEK-6STC-L6
ITEM 17	STRAIGHT PIPE 12"	DEK-6STC-L12
ITEM 3	STRAIGHT PIPE 18"	DEK-6STC-L18
ITEM 3	STRAIGHT PIPE 24"	DEK-6STC-L24
ITEM 3	STRAIGHT PIPE 36"	DEK-6STC-L36
ITEM 3	STRAIGHT PIPE 48"	DEK-6STC-L48
	ELBOW 5" DIA	DEK-5STC-E15
	ELBOW 6" DIA	DEK-6STC-E15
TOP STUBS		
ITEM 10	TOP STUB 5"	77-02-927
ITEM 10	TOP STUB 6"	77-02-927A
FLUE PIPE ADAPTORS		
ITEM 2	4" SINGLE WALL TO 5" TWIN WALL	DEK-5STC-1A
ITEM 2	5" SINGLE WALL TO 5" TWIN WALL	DEK-5STC-A
ITEM 2	5" SINGLE WALL TO 6" TWIN WALL	DEK-6STC-1A
ITEM 2	6" SINGLE WALL TO 6" TWIN WALL	DEK-6STC-A
STORM COLLARS		
ITEM 8	STORM COLLAR 5" TWIN WALL	DEK-5STC-SC
ITEM 8	STORM COLLAR 6" TWIN WALL	DEK-6STC-SC
CHIMNEY TERMINALS, WEATHER CAPS & RAIN COWLS		
ITEM 9	4" SWIVEL COWL	77-02-451
ITEM 9	5" SWIVEL COWL	77-02-459
ITEM 9	6" SWIVEL COWL	77-02-593
ITEM 9	WEATHER CAP FOR 5" TWIN WALL	77-02-827
ITEM 9	WEATHER CAP FOR 6" TWIN WALL	77-02-828
ITEM 9	STANDARD TWIN WALL RAIN COWL 5"	DEK-5STC-RC
ITEM 9	STANDARD TWIN WALL RAIN COWL 6"	DEK-6STC-RC
LOCKING- CLAMPING BANDS		
ITEM 19	5" LOCKING BAND (each straight piece of flue pipe come complete with a locking band)	DEK-5STC-LB
ITEM 19	6" LOCKING BAND (each straight piece of flue pipe come complete with a locking band)	DEK-6STC-LB

6. SAFETY ISSUES.

6-1. INSTALLATION/USE: MUST BE IN COMPLIANCE WITH MANUFACTURERS INSTRUCTIONS.

6-2. WITHOUT SPECIFIC MARINE FITTING AND USER INSTRUCTIONS, A SOLID FUEL HEATING APPLIANCE MUST NOT BE FITTED ON A BOAT.

6-3. FITTING INSTRUCTIONS FOR A DOMESTIC APPLIANCE ARE NOT ADEQUATE.

FOR FURTHER INFORMATION REFER TO BS8511:2010 Code of practice for the installation of solid fuel heating and cooking appliances in small craft.

6-2 FUMES - PROTECTION FROM.

These are some of the main causes of fume or smoke to leak from the appliance.

- The chimney is blocked or clock cold.
- There are too many bends in the chimney.
- The chimney is not airtight.
- Downdraughting or Vortexing is occurring.
- The Flue is not high enough to generate the required vacuum.
- Inadequate ventilation in the boat.
- A mixture of the above mentioned problems.

Don't leave an appliance running overnight.

Make sure that the chimney is cleaned and swept every 6 months.

Make sure that the solid fuel appliance is cleaned out regularly.

Make sure that the vessel is fitted with:-

Optical Smoke Alarm to BS EN14604

Carbon Monoxide Alarm to BS EN50291

6-3 FIRE - PROTECTION FROM AND DISTANCE FROM COMBUSTIBLES

Fire can be caused by a variety of potential danger points and because of the space limitation in boats this risk is ever present and must be adequately assessed.

Assure yourself by carrying out heat radiation tests.

Run the stove and check out the temperature on all surrounding, adjacent or nearby combustible materials and make sure that they are adequately protected from the effects of heat radiation.

Protection can be gained by the use of -:

- Sheet metal heat shields and spacers.
- Heat resistant boards.
- Fireguards.
- Adequately designed hearths.

Combustible materials can be-:

- Wooden furniture.
- Curtains.
- Wooden panels or frames adjacent to the flue pipe.
- Carpet or flooring close to the appliance.
- Items near to the appliance, which could fall onto it and ignite.
- Plaster boards covered in card or paper covering

6-4 BURNS - PROTECTION FROM.

During normal use, many parts of appliances and appliance chimney's can become too hot to touch.

Always fit secure, suitable, fireguards and flue pipe heat shields.

When working on or near to stoves or chimneys ALWAYS USE heatproof gloves.

Most stove door glass panels conform to the requirements of BS 1945: 1971 and satisfies the heating appliance (Fireguards Safety) regulations 1991 but it does get very hot and must not be touched whilst the stove is running.

6-5 RELEVANT STANDARDS

BS1344 Parts 1 and 7, BS1344 Part 3, BS 1449 Part 1, BS6461 Part 1. Building Regulations Part J

BS8511:2010 Code of practice for the installation of solid fuel heating and cooking appliances in small craft.

BS EN14604 Optical Smoke Alarms

BS EN50291 Carbon Monoxide Alarms

7. FURTHER READING

7-1 LINKS

http://www.oilstoves.co.uk/webdocs/articles/Building_Regs_J_Combustion.pdf

http://www.oilstoves.co.uk/webdocs/technical/Bubble/Bubble_Corner_Oil_Installation_Instructions.pdf

7-2 MORE INFO ABOUT RAYBURNS

http://www.oilstoves.co.uk/webdocs/articles/History_of_Rayburn_Solid_Fuel_Cookers.pdf

7-3 PRICE LISTS

<http://www.oilstoves.co.uk/prices.php>

7-4 INSTALATION AND USER MANUALS

<http://www.oilstoves.co.uk/techman.php?Bubble>

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