

FlexiBurn Control Module

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Introduction

The Control Module is capable of semi-automatically control of both the FlexiBurn flammability testing rig and the Test Chamber illumination and ventilation. This combination is the preferred option as the FlexiBurn and Test Chamber are designed to work synergistically to aid safety, consistency, productivity and accuracy.

Special care should be taken with gas connections. Ensure this is done by a competent person. Ensure that the correct type of gas regulators are used relevant to the type of gas or gases being used. If only one type of gas is to be used, ensure this is connected to gas port number 1. See the Installation section for more information.

The main parts of the Control Module are listed below:

- LCD touch screen
- Power switch
- Cable connections array (at rear of Control Module)
- Printer connection

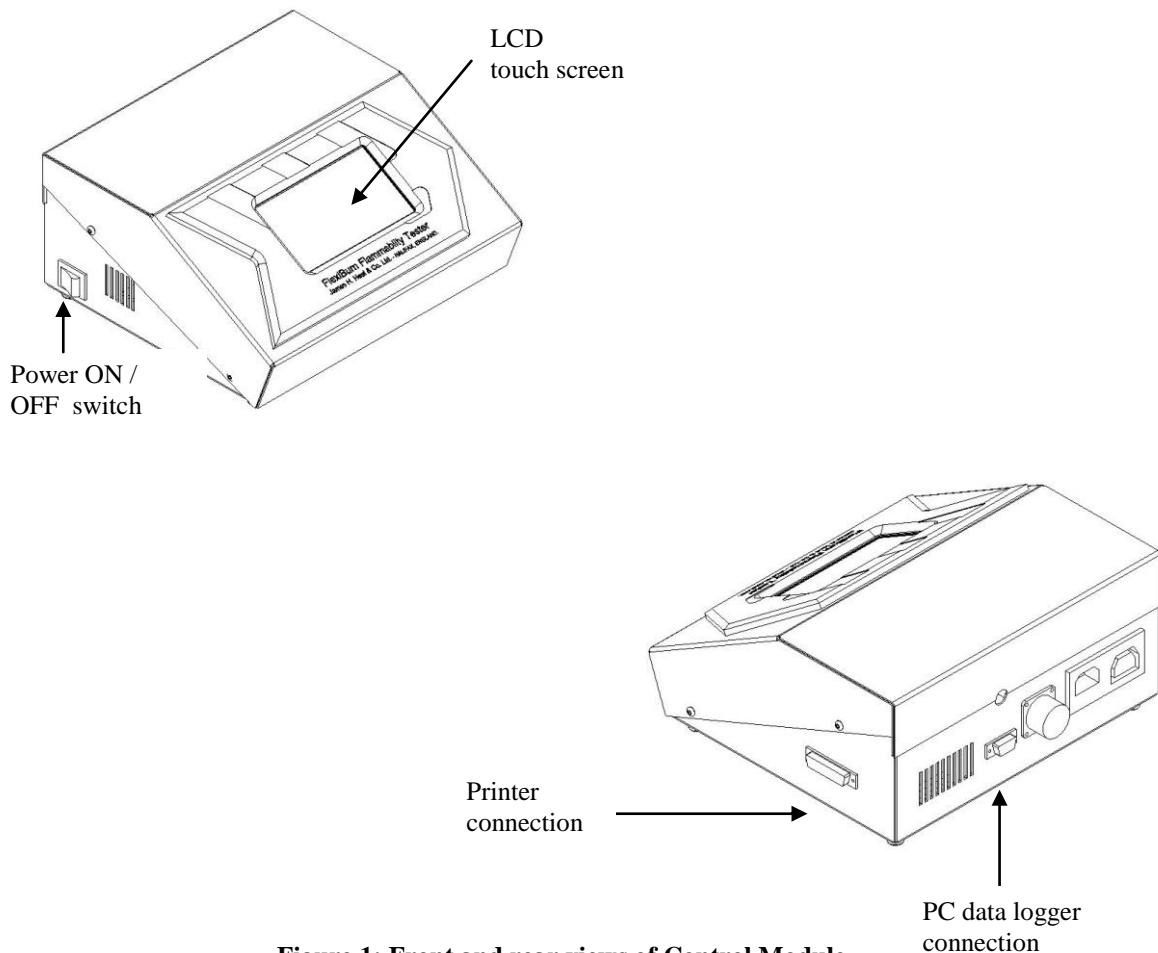


Figure 1: Front and rear views of Control Module

Control Module local printer

An optional local printer is available for direct connection to the Control Module. The Epson LQ 300+ dot matrix printer capable of ESC/P2 code emulation is suitable for this purpose.

The printer can be used to print test reports directly from the Control Module. The output from the Control Module is monochrome only.

The printer is supplied with a single bin multi-sheet paper feeder (see Figure 3). The multi-sheet feeder can handle up to 50 cut sheets of paper (dependent on paper quality).

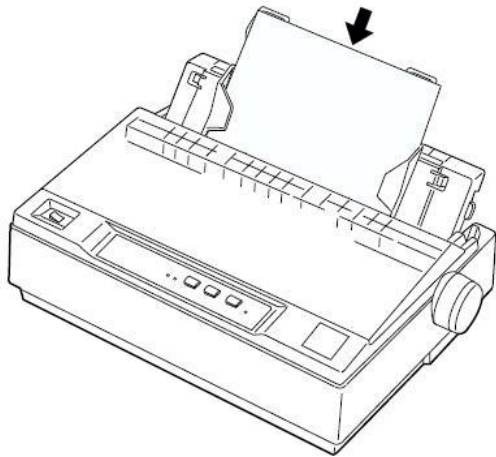


Figure 2: Epson LQ300+ with single sheet feeder

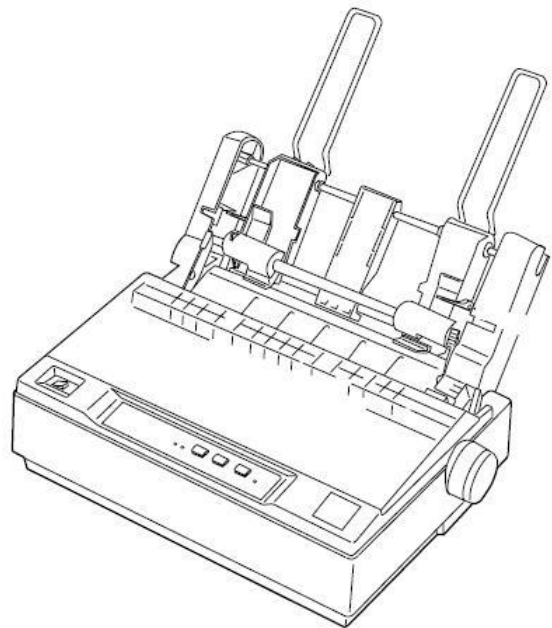


Figure 3: Epson LQ300+ with multi-sheet feeder

It is also possible to print test reports after downloading the test result data to the PC via the FlexiBurn data logging software. The data logging software is supplied as part of the standard FlexiBurn package. Using the data logging software also enables the test results to be saved. The Control Module has limited memory capacity and can only store the results from the latest test.

List of standards

The following is a list of standards stored in the Control Module as part of the FlexiBurn package. Other standards can be added on a bespoke basis by **James H Heal & Co. Ltd** or the user can amend stored standards to suit their own needs. Any amendments to standards which affect the test procedure and with reference to the FlexiBurn apparatus can be sent via e-mail and uploaded to the Control Module from the PC using the FlexiBurn data logger.

When a standard refers to a test as ~A, it means a surface test.

When a standard refers to a test as ~B, it means an edge test.

Some tests may also refer to different size specimens, please ensure the correct specimen size is selected. For example, #1 is 80 x 80mm and #2 is 200 x 80mm (Clause 6.4.1 of 6940:1995).

Some standards may have more than one (1) issue current. Please ensure you select the correct year of issue. The Control Module can store up to 28 standards. The standards library function of the FlexiBurn data logging software can be used to increase the number of available standards by storing those standards not currently in use.

1. BS 5438: 1989 Test 2A
2. BS 5438: 1989 Test 2B
3. BS 5438: 1976 Test 1
4. BS 5438: 1976 Test 2
5. BS 5438: 1976 Test 3
6. BS 5438: 1976 Test 3 (Short)
7. BS 5722: 1991 Test 2A
8. BS 5722: 1991 Test 3A
9. BS 6249: 1982 Part 1
10. EN ISO 6940: 2004 (Surface)
11. EN ISO 6940: 2004 (Edge)
12. EN ISO 6941: 2003 (Surface)
13. EN ISO 6941: 2003 (Edge)
14. EN 13772: 2003
15. EN 1101: 1996 (Surface) (#1)
16. EN 1101: 1996 (Surface) (#2)
17. EN 1101: 1996 (Edge) (#1)
18. EN 1101: 1996 (Edge) (#2)
19. EN 1102: 1996 (Surface)
20. EN 1102: 1996 (Edge)
21. EN 1103: 1996
22. EN ISO 15025: 2002 (Surface)
23. EN ISO 15025: 2002 (Edge)

First switch on

Before using the FlexiBurn Control Module, ensure that the installation has been carried out correctly. Consult the Installation section for full details.

On the left hand side of the Control Module, move the power switch to the on position. When switched on, the power switch will be illuminated (see Figure 1, on Page 4). The LCD touch screen will light up and after a few seconds the MAIN MENU will be displayed.

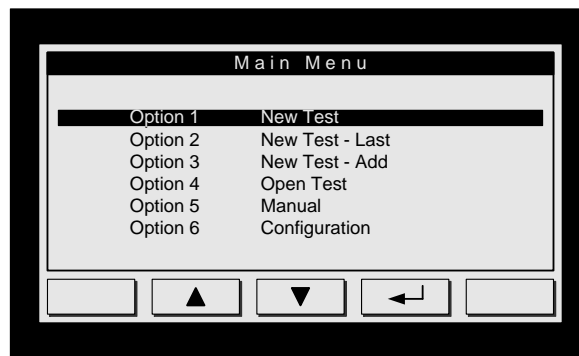


Figure 4: Main Menu

The bottom row of the LCD touch screen, the KEY ROW, typically displays the options available at that time. The Control Module intuitively changes the available options as you move through the test procedure. A maximum of five (5) keys can be displayed. Occasionally, some keys will merge, forming one (1) large key. This can be seen when the ‘afterflame’ and ‘afterglow’ criterion have been set.

All other menus and options can be reached via the MAIN MENU.

The Control Module has limited memory capacity and can only store the results from the latest test. If storage and recall (archiving) of test results is required, the use of the FlexiBurn data logging software is strongly recommended.

Navigating around the FlexiBurn Control Module

Table 1 below, illustrates and describes the main keys used to navigate through the FlexiBurn software on the Control Module.









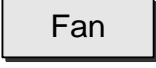
<i>Key</i>	<i>Key name</i>	<i>Description</i>								
	ENTER	<p>This key is used to ‘confirm’ an entry or selection.</p> <p>This key is also used to move through options which may be available on the selected line. For example,</p> <table border="0"> <tr> <td style="padding-right: 20px;">Edge type</td> <td>Raw</td> </tr> <tr> <td></td> <td>Trimmed</td> </tr> <tr> <td></td> <td>Hemmed</td> </tr> <tr> <td></td> <td>N/A</td> </tr> </table> <p>Pressing the ENTER key moves through these options. When the desired option is displayed, press the DOWN key or FORWARD key.</p>	Edge type	Raw		Trimmed		Hemmed		N/A
Edge type	Raw									
	Trimmed									
	Hemmed									
	N/A									
	UP	Moves the cursor up one line.								
	DOWN	Moves the cursor down one line.								
	BACK	Moves back to the previous screen.								
	FORWARD	Moves forward to the next screen.								

Table 1: Main navigation keys

Other keys may be displayed throughout the test procedure. The available keys will change intuitively as you move through the test procedure. In general, a particular key will, where possible, appear in the same position on the key row. Command keys, decision keys and input keys are shown in Table 2, below.

<i>Key</i>	<i>Key name</i>	<i>Description</i>
	ACCEPT	Accept and save the specimen test results and proceed.
	REJECT	Reject the specimen test results and proceed. The results for the current specimen will be deleted. This does not delete any previous specimen results which have been ‘accepted’.
	LAMP	Switches the lamps on or off.
	FAN	Switches the fan on or off.



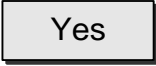
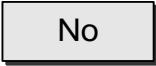


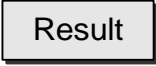




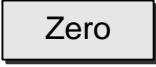

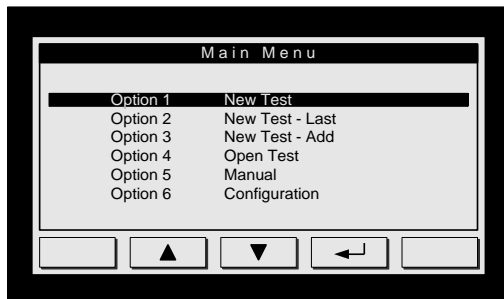
<i>Key</i>	<i>Key name</i>	<i>Description</i>
	AFTERFLAME	Afterflame timer key. This key is double width.
	AFTERGLOW	Afterglow timer key. This key is double width.
	YES	Return a positive response to a question. For example, when prompted with questions regarding observations made during the test, Flaming debris? YES.
	NO	Give a negative response to a question. In many cases this is the default response. To change the response to YES, you must press ENTER before moving DOWN or FORWARD.
	PC	Send the results to the PC (personal computer) using the FlexiBurn data logger software
	PRINT	Send the results to the local printer attached to the Control Module.
	RESULT	View the individual results on the Control Module LCD touch screen.
	START	Commence an operation. For example, after choosing PRINT, when you are satisfied with the Print Format options, press the START key and printing will begin.
	STOP	Discontinues with the previously entered command. For example, STOP moving the burner to zero degrees. Note: the stop command is not always available as many commands are executed immediately and without requiring confirmation.
	TIME	This is a calibration function. Used to check the Control Module timer against a calibrated stopwatch over a 90 second period.
	OFFSET	The 'offset' from zero degrees to move the burner to the ignition position.
	ZERO	Move the burner to the vertical position (zero degrees).
	JOG	Move the burner manually in small increments.

Table 2: Command, decision and input keys

What you should set up before testing

The FlexiBurn Control Module is delivered ready to use in conjunction with the Test Chamber. However, there are some parameters which you should review, bearing in mind your specific installation. It is recommended that you:

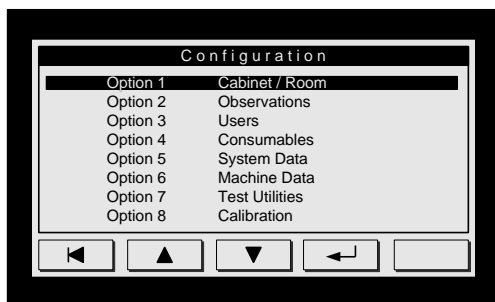
- Check and / or change the Date and Time. The date and time is factory set to BST.
- Increase or decrease the LCD contrast to suit local conditions.
- Change the company name. This appears as the header on the test report.
- Add users to Users drop-down list. Only do this if there is more than one user.
- Add frequently used observations to Observations drop-down list.
- Room details if the FlexiBurn Test Chamber is not included in your installation.



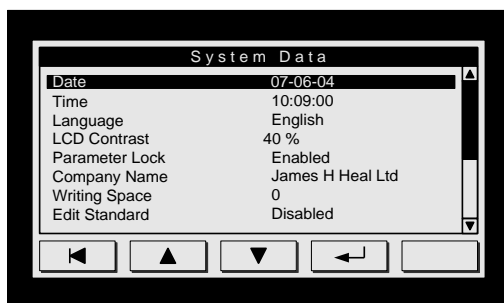
From the MAIN MENU

Press the DOWN key to move to the Configuration option.

Press ENTER to select.



From the Configuration Menu, move DOWN to the System Data option. Press ENTER.



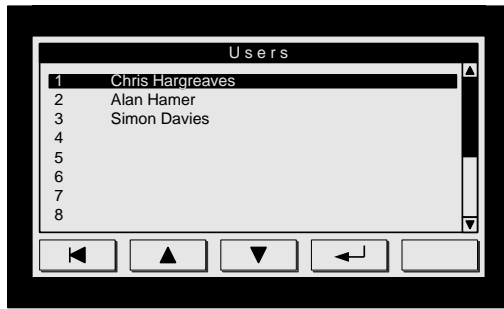
As there are more than lines on this page, you will see a scroll bar on the right hand side of the screen. This indicates that there is more information to be display.

Move DOWN to Parameter Lock.

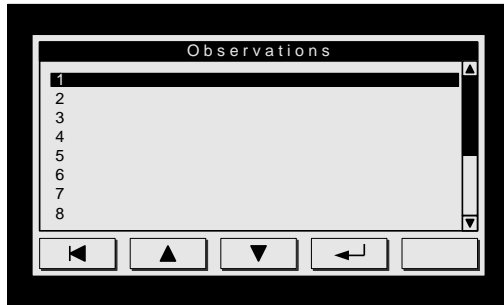
The default value is ENABLED. In order to make changes to the Configuration settings, you must disable the Parameter Lock.

To DISABLE the Parameter Lock, press ENTER, and the display will change to DISABLED.

Once you exit the Configuration menu, the Parameter Lock is automatically Enabled.



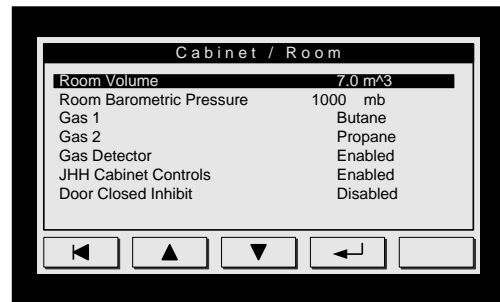
Add the names of frequent users to the drop-down list.



Add frequent observations to the drop-down list.

For example, Non-flaming debris, MT1 NS, MT2 NS, MT3 NS, MT NS, Sparks, Discontinuous hole.

(MT2 NS = Marker Thread 2 - Not Severed).



If you have chosen not to include the Test Chamber in your installation, then change the following parameters in the Cabinet / Room menu:

The room volume: change to the required local value

JHH Cabinet Controls change to DISABLED

Table 3: Initial changes to configuration

Carrying out a test

Flammability testing using the FlexiBurn can be divided into two general categories: those which assess the ignitability of the specimen and those which assess flame spread.

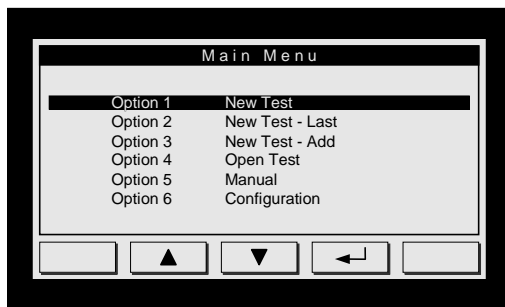
A more recent development is the introduction of a large ignition source (known as the ‘radiator’) in combination with a small igniting flame where ignitability and flame spread are assessed and measured.

The radiator assembly is an optional accessory kit and is essential for testing to EN 13772. The following examples illustrate how to use the FlexiBurn control module in each of the above cases.

Before attempting a commercial test, consider following one or more of the examples to familiarise yourself with the Control Module and other new features of the FlexiBurn.

For details of how to Save and Print automatically, see page 25.

Example 1 – Simple ignitability test

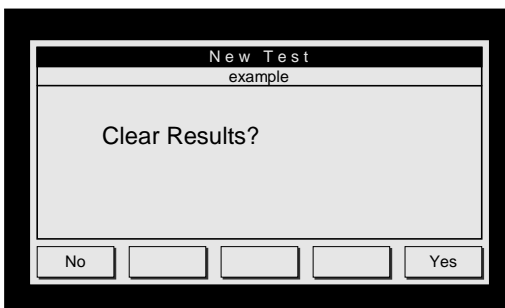


From the MAIN MENU

Select NEW TEST

Press ENTER

If the Control Module already has test results stored in its memory, you will be prompted with Clear Results ? This will normally be the case.

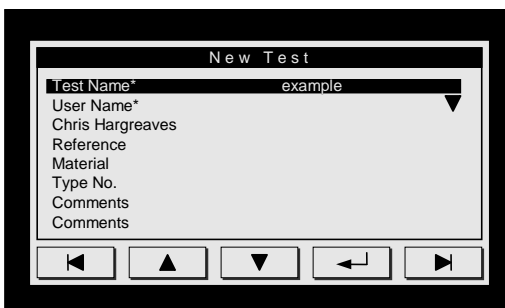


The Control Module can only store one set of specimen results. To proceed with another test, you must clear (delete) the existing results.

Press YES to clear results and proceed.

If you press NO you can not proceed.

Note: results can be sent to the PC for archiving (see Open Test).

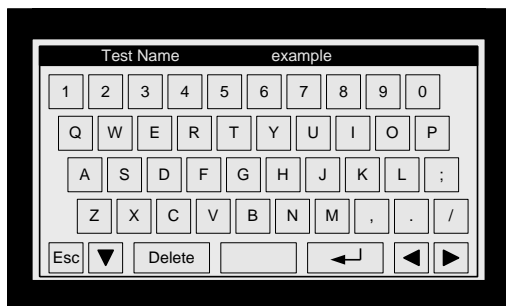


You are now prompted to enter a name for the test. Ideally this should be a unique name/number. For example, order number, batch number, job number, etc.

You will notice that Test Name* and User Name* are followed by an asterisk. This indicates that information is mandatory.

However, a unique name is not mandatory.

Press ENTER.

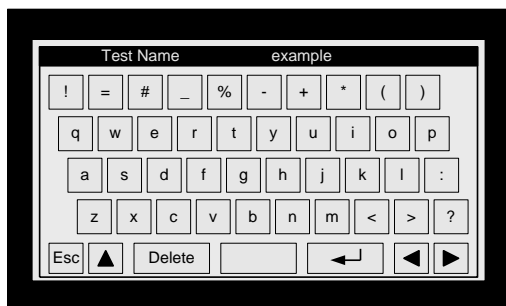


The QWERTY keyboard screen appears whenever the Control Module requires a text input.

Press the shift key (▲ or ▼) on the keyboard to toggle between upper and lower case characters.

The special characters / \ : * ? " < > | are not permitted in test names.

Press the ENTER key to confirm test name and proceed.

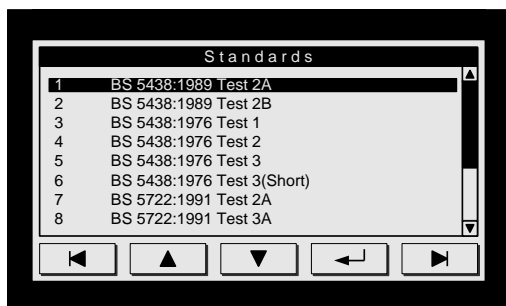


You can enter a user name, a reference, material, type no., and two (2) comments in the same way.

User names can also be selected from a predefined list to streamline this operation.

Comments can be used to add details such as any pre-treatment to which the specimens have been subjected.

Press FORWARD to proceed.



The list of standards is now displayed.

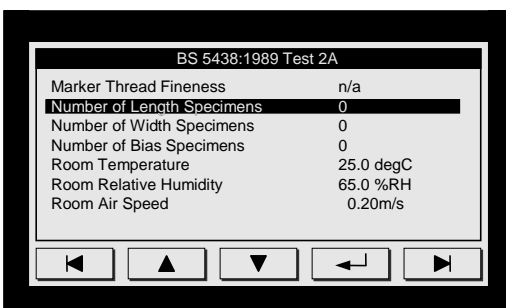
Use the UP / DOWN keys to scroll to the required standard.

The full title of the standard is displayed on the LCD touch screen. The scroll bar indicates that there is more information available, press the DOWN key if required.

Press the ENTER key to confirm the selected standard and load the parameters.

All the standard parameters can be viewed by pressing the DOWN key.

Press FORWARD to proceed.



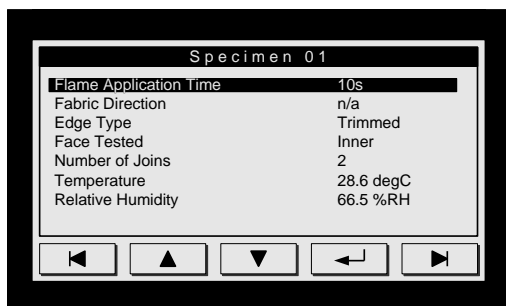
You are now prompted to enter the number of length, width and bias (if applicable) specimens.

Also, you should enter the temperature, relative humidity and air speed in the FlexiBurn Cabinet.

Press the FORWARD key to proceed.

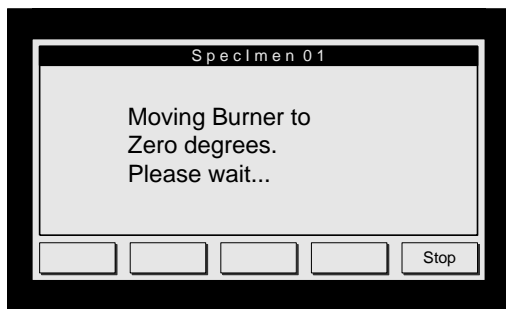
Note: you can measure the air speed using an anemometer.

Typically the air speed in the room should be less than 0.2 m/s, i.e., relatively draught free so not to disturb the stability of the flame.



You are now requested to supply data for specimen number 1. You should confirm or amend the flame application time, the test direction, the type of edge (raw, trimmed, hemmed, N/A), face tested, number of joins and the temperature and relative humidity of the conditioning atmosphere.

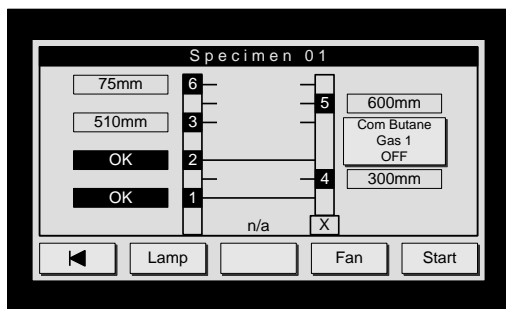
Press the FORWARD key to proceed.



The screen now display the message:

“Moving burner to zero degrees. Please wait...”

You can stop this operation by pressing the STOP key. However, the operation of moving the burner takes place quickly.



The FlexiBurn rig is now represented on the LCD touch screen.

The numbers on the vertical columns represent the marker thread numbers. For this particular test, no marker threads are used.

If any marker threads are in place when not required, then the test will not proceed. This will be indicated by next to the marker thread number. The opposite also applies. If a marker thread is not in place when required, then the test will not proceed.

The type of gas specified in the standard is shown. You can change the gas to an alternative by pressing the GAS button on the LCD touch screen.

The displayed at the bottom of the right hand vertical pillar indicates the carriage switch state. In most circumstances, the test can not proceed until the carriage is in the forward position ready for application of the flame.

Push the carriage forward using the handle until the status of the carriage switch indicates OK.

The START key is disabled until the GAS is ON. To switch the gas on, press the green ignition button on the FlexiBurn rig. When the gas has ignited, check the flame height is correct and adjust if necessary. Close the FlexiBurn Cabinet door.

The GAS indicator on the Control Module should now show ON, and the START key should now be enabled.

When you are ready to proceed press the START key.

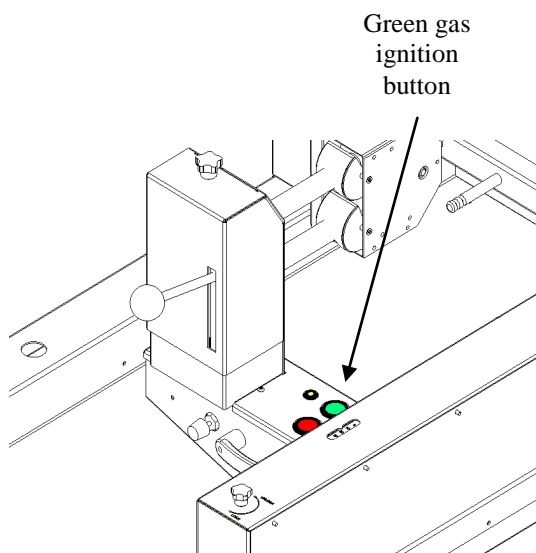
The FlexiBurn extraction fan and lamp will switch off automatically. The test is best observed in dim lighting, but if you prefer you can switch the lamp back on by pressing the LAMP key.

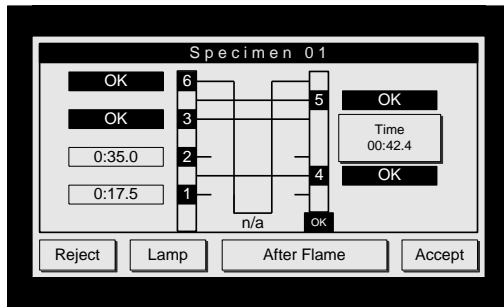
Once the START key is pressed, the test commences immediately after the fan has stopped. In this case, there is a 2 min burner preheat time and the burner will move into the flame application position after this time has elapsed. The time remaining before flame application will be displayed on the LCD touch screen.

To proceed before the full burner preheat time has elapsed, press the FORWARD key.

The flame will then be applied to the specimen for the specified time. At this point be ready to make any required observations such as duration of afterflame, duration of afterglow and flaming debris.

At the end of the flame application time, the gas will switch off and the burner will retract slowly away from the specimen.

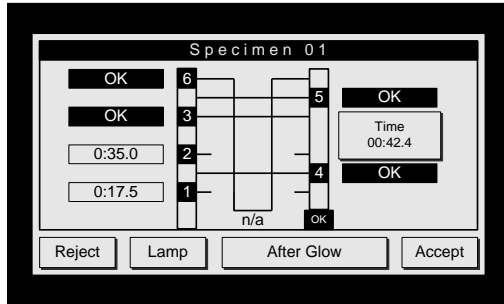




At the end of the flame application time, two (2) keys merge to form one (1) large key. This large key is used to register the times of afterflame and afterglow.

Initially it displays AFTERFLAME, once pressed it changes to AFTERGLOW and when pressed again it is blank.

Note: If the ACCEPT key is pressed before AFTERFLAME and/or AFTERGLOW, the afterflame time and/or afterglow time will be recorded as zero seconds. For some standards this can be a useful feature.

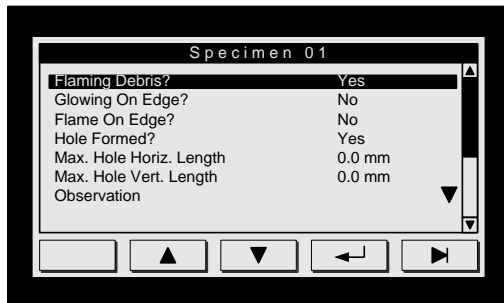
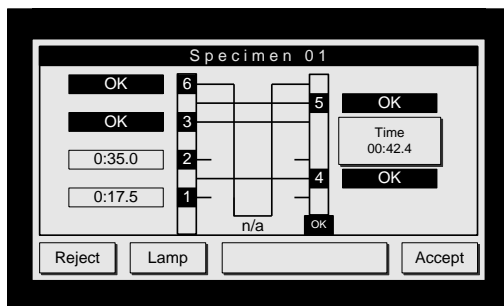


You must be in a suitable position to observe the test specimen and be able to press the afterflame/afterglow timer key.

You can now accept or reject the results for this specimen. If the test was carried out correctly, press ACCEPT to proceed. Otherwise press REJECT and the test results for the current specimen will be deleted.

The FlexiBurn Cabinet extraction fan and lamp will now switch on automatically.

Note: the illustrations to the left also show Marker Thread timer results. In a simple ignitability test these would not be used. They are illustrated in this way to help with other test examples.

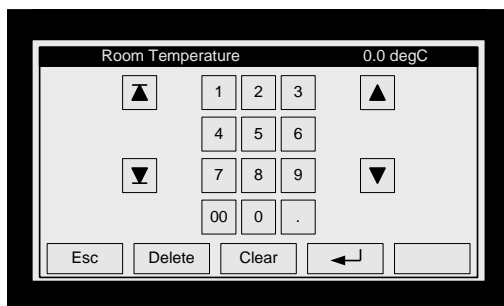


Observations are now recorded.

You can answer YES or NO to some questions while others, such as damaged length, require measurements to be made and the values entered.

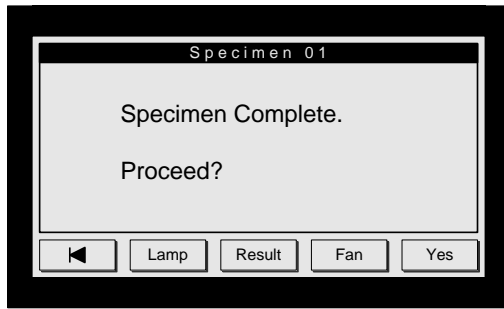
Press the FORWARD key to proceed.

You can also enter observations made during the test by selecting from a predefined list or via the keyboard screen.



The Numeric Keypad is displayed for the entry numeric results such as damaged length. When numeric results are required to be entered, please note the units which are required for the measurement, for example, millimetres.

If an integer (whole number) is required for the input, then the decimal point will not be displayed.

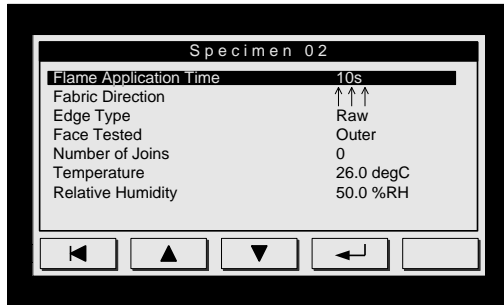


All the details for the specimen are now entered and you are prompted with the message “Specimen complete. Proceed?”.

While on this screen you can switch the lamp and fan on or off if required.

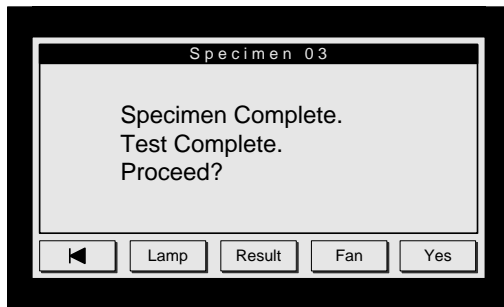
You can also view the RESULT of the current specimen by pressing the results key.

Press YES to proceed with the next specimen.



Again confirm the details of the flame application time, test specimen, and temperature and relative humidity of the conditioning atmosphere.

Repeat for each remaining specimen ensuring the specimen details (e.g., fabric direction) are entered correctly.

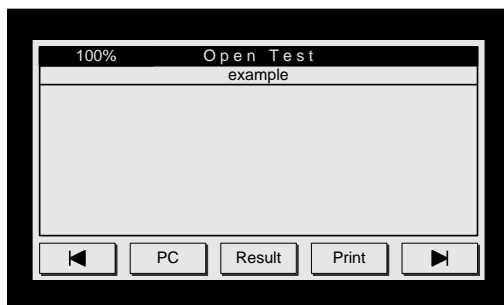


When the results for the last specimen are accepted, the message “Specimen Complete. Test Complete. Proceed?” is displayed.

(Pressing YES will continue with additional specimens).

Press the BACK key until you are returned to the MAIN MENU.

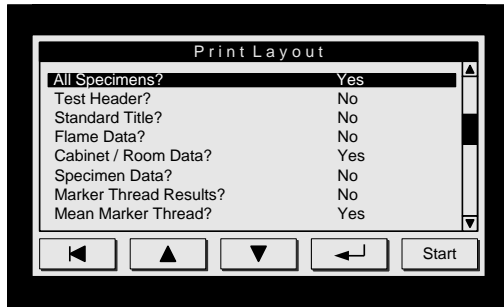
The next step is to produce a test report. You can do this in two ways. By printing from the Control Module directly to the local printer or indirectly by sending the test results to the PC using the FlexiBurn data logging software. If required you can do both.



From the MAIN MENU, choose the OPEN TEST option.

You can send the results to the PC, view them on screen or PRINT them.

Press the PRINT key.



You are now presented with the Print Layout screen.

You can choose which parts of the report to print. If you choose YES, then the option is enabled and those details will be printed on the report. If you choose NO, then those options are disabled and those details are omitted from the report. The default setting is to print only that information required by the standard.

Make any changes you require to the Print Format and then press the START key. The results are printed immediately to the local printer attached to the Control Module.

You can repeat printing as many times as required, changing the Print Format options to suit.

After printing you can then send your results to the PC. In the same way you are then given the Print Layout screen. Choose the options you require and press the START key.

The results will remain in the Control Module until they are cleared.

For details of “Automatic Saving and Printing”, see Page 25.

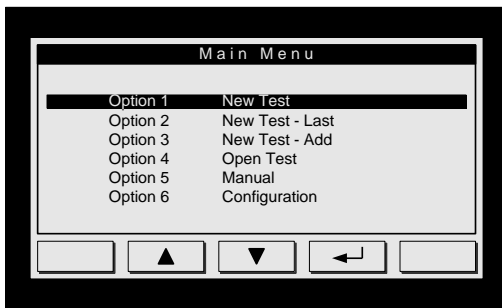
Example 2 – Flame spread

An important feature of these tests is the use of Marker Threads (also known as Trip Threads). These are usually bleached 100% cotton threads of 45 – 50 tex. They are designed to break and stop timers they are connected to when they are severed by the rising flame. The times recorded can be used to assess flame spread or calculate the rate of flame spread. The FlexiBurn has six (6) Marker Thread switches. Typically, only three (3) are used at any one time. Some standards use only two (2). See

Figure 10 and

Figure 11 (Pages 22 and 23) for details of how to setup the Marker Threads. See Table 4: Marker Thread distances on Page 24 for the correct Marker Thread distances.

The initial part of carrying out a flame spread test, or any other test, is the same as in the previous example of a simple ignitability test.



Select NEW from the MAIN MENU.

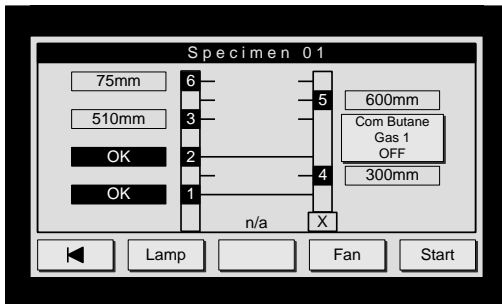
CLEAR the previous results.

Enter the TEST NAME and USER NAME, along with any other identification information.

Select the required STANDARD from the list.

Enter the test SPECIMEN details.

Enter the individual specimen detail.

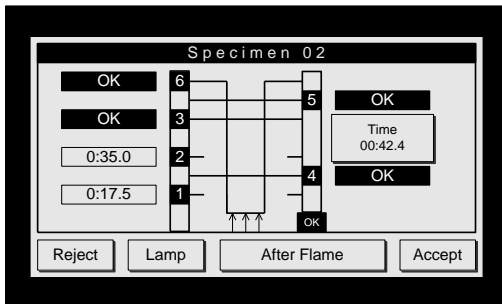


When the representation of the FlexiBurn rig appears, the Marker Threads required for the chosen flame spread test will be indicated.

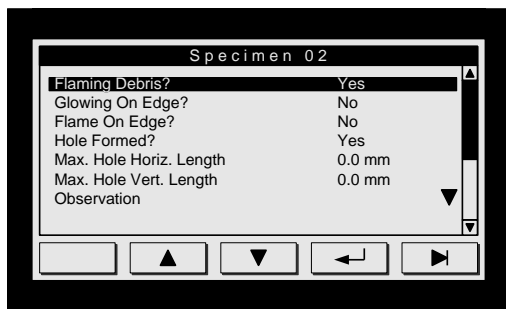
Set up the required Marker Threads as described in

Figure 10 or

Figure 11.

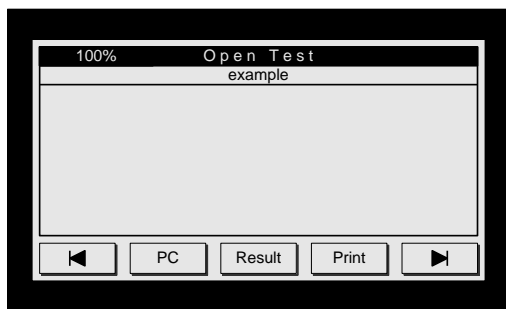


During the test, if the Marker Threads are severed, the time at which they are severed is recorded individually for each Marker Thread in use.



Observations may also be entered as described in the previous example.

If a Marker Thread is not severed during the test, you may wish to record in the Observations as 'MT n NS' (where n is the Marker Thread number and NS is an abbreviation for Not Severed).



Continue to test the remaining specimens.

Produce the test report by returning to the MAIN MENU and choosing OPEN TEST.

For details of "Automatic Saving and Printing", see Page 25.

Example 3 – Flame spread with radiator

The flame spread with radiator test differs from the previous examples mainly in the use of the FlexiBurn rig.

The radiator package is supplied as an optional accessory and is not part of the standard FlexiBurn package. It is used to carry out tests to the standard EN 13772: 2003. The equipment consists of a ceramic radiator which is held in a metal case, a brass test frame incorporating a heat shield and a variable transformer. In order to use the equipment the radiator must be fitted to the standard FlexiBurn. To do this, four (4) of the support struts must be removed from the FlexiBurn and the radiator fitted in place (see Figure 5 and Figure 6).

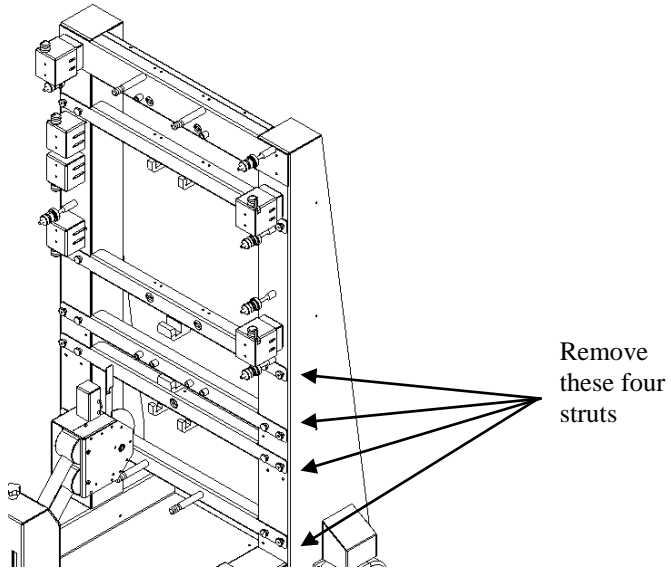


Figure 5: Removing four struts to fit radiator

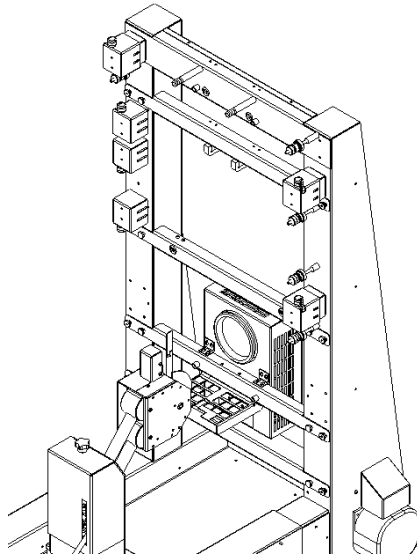


Figure 6: FlexiBurn with radiator fitted (test frame not fitted)

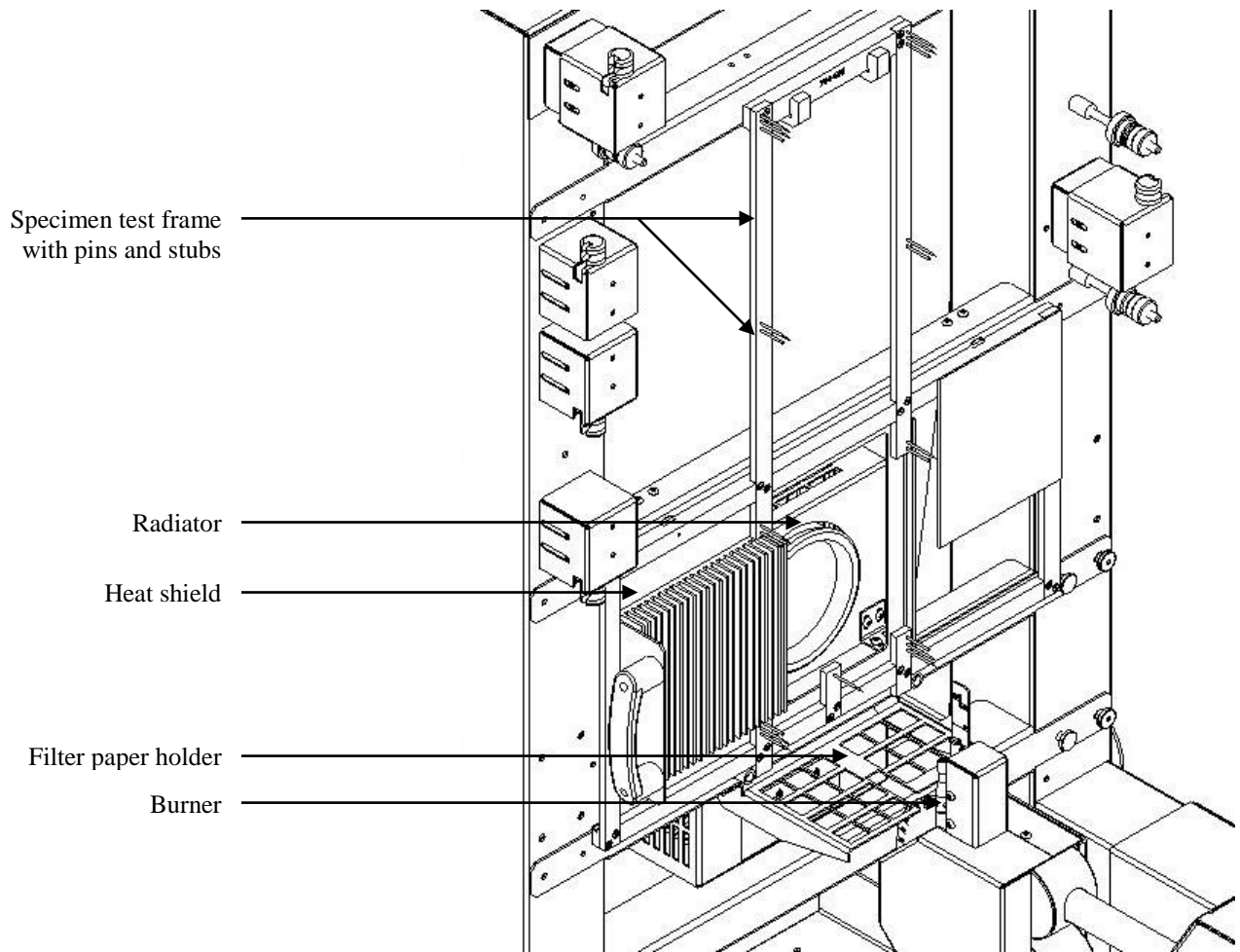


Figure 7: FlexiBurn with test frame, shield and radiator shown

Before starting the test, switch on the radiator at the transformer and leave on for at least 20 minutes before using. While the radiator is heating, keep it covered with the shield. The shield also dissipates the heat, preventing the surrounding metal frames from becoming very hot and also preventing heat damaging the specimen before the test begins.

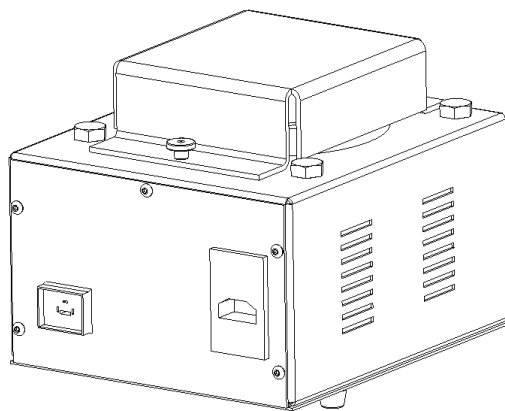


Figure 8: Variable transformer

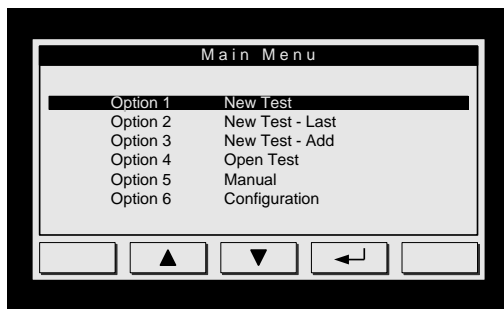
Safety warning

Extreme caution is recommended when carrying out tests using this equipment as the radiator gets extremely hot during operation. The radiator will develop an incandescent glow when at full temperature, but when it is turned off the glow will disappear, but the radiator will be extremely hot. Under no circumstances touch the radiator until you are sure it is completely cool. The brass test frame may also get hot during repeated operation so extreme caution is recommended when handling the test frame. Protective gloves complying with EN 407: 2004 'Protective gloves against thermal risk (heat and/or fire)', are recommended. Gloves conforming to this standard should be marked with the pictogram shown in Figure 9, below.



Figure 9: Heat and Fire hazards EN 407

This safety advice is not exhaustive and the user should carry out their own risk assessments.

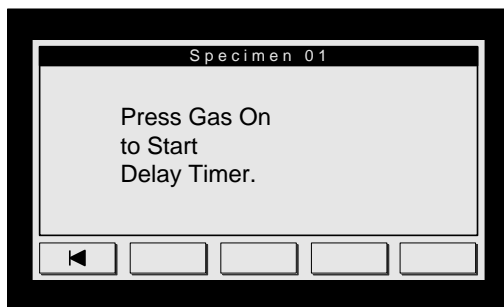


Ensure the shield covers the radiator before mounting test specimens.

Pull the burner carriage back using the handle.

Ignite the burner.

Push the burner carriage forward and the fan will switch off automatically. The burner preheat timer now starts.



When prompted by the Control Module, press the Gas On button while simultaneously moving the shield away from the radiator and exposing the specimen to radiant heat.

The delay timer is used to time the expose of the specimen to radiant heat before application of the flame.

The remainder of the test is conducted as previously described for flame spread.

See Figure 9 and Figure 11 (Pages 22 and 23) for details of how to setup the Marker Threads. See Table 4 on Page 24 for the correct Marker Thread distances.

Marker / trip threads

Set up the trip thread markers if required. Trip Threads are also known as Marker Threads. The control module will not allow a test to proceed unless the trip threads required for that test are correctly threaded up.

Horizontal BS 5438: 1976 trip threads run from left to right. These are stainless steel. Vertical BS 5438: 1976 trip thread runs from the top right position to the top left position. BS 1976 marker threads are positioned 5 and 15 mm distance from the specimen face.

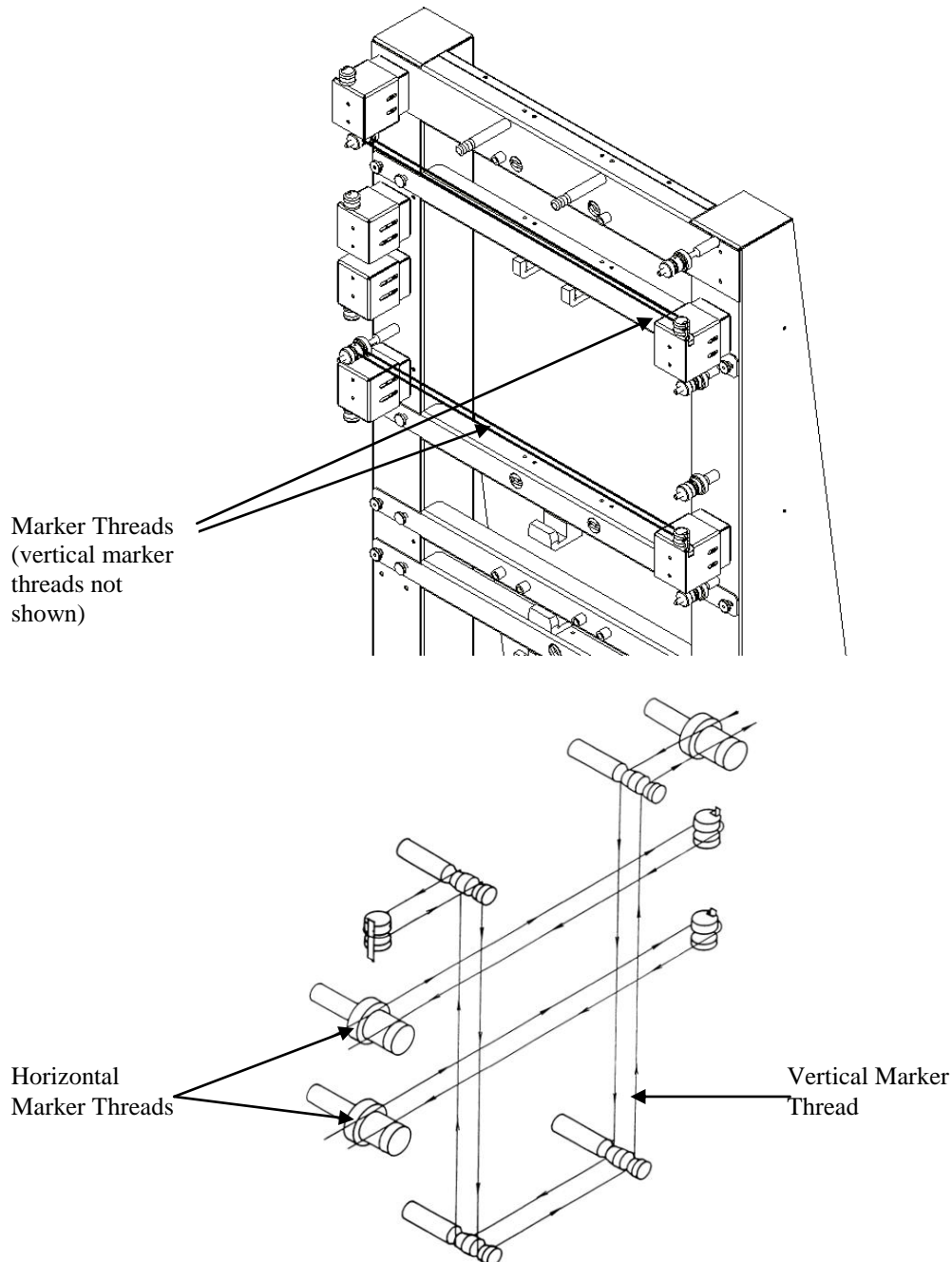


Figure 10: BS 5438: 1976 marker threads

ISO and BS 5438: 1989 run from right to left and these are brass. BS 5438: 1989 marker threads are positioned 1 and 5 mm distance from the specimen face. BS 1989 and ISO standards do not use vertical marker threads.

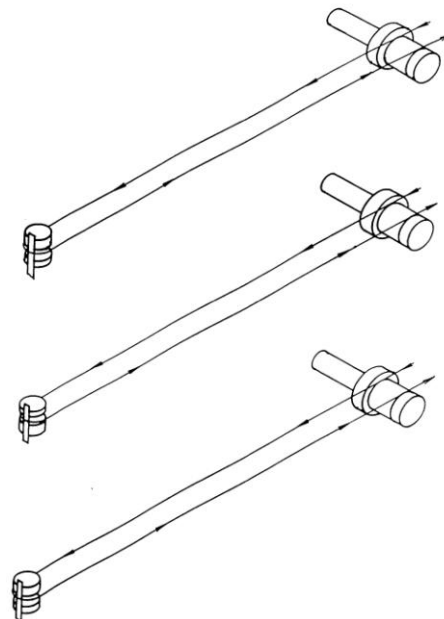
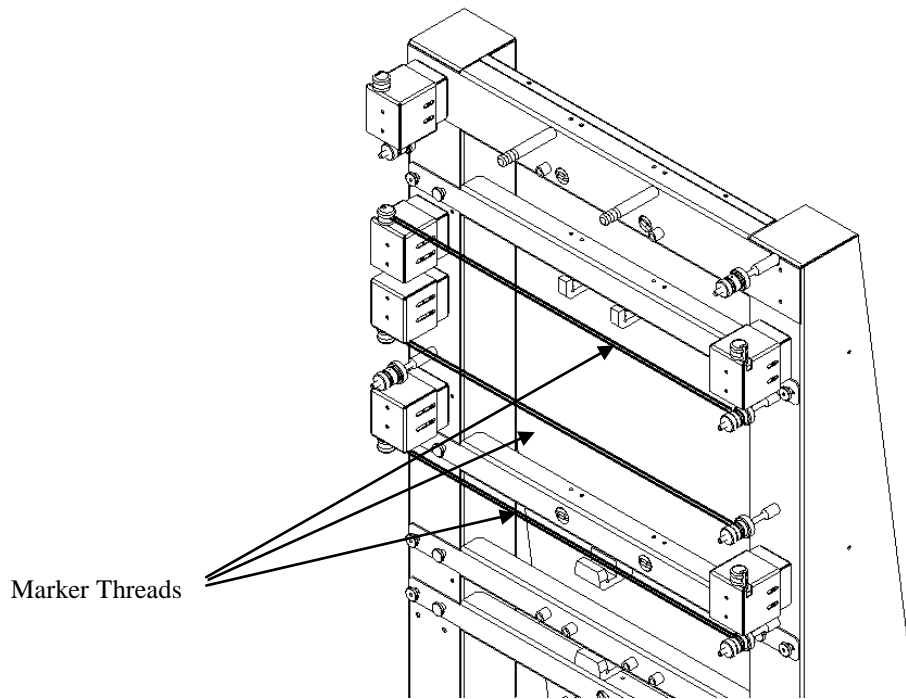


Figure 11: BS 5438: 1989 and ISO marker threads

Marker thread distance from 'nominal ignition point'

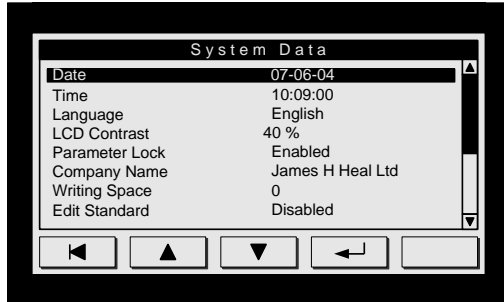
Test #	Name	MT1	MT2	MT3	MT4	MT5	MT6
5	BS 5438: 1976 Test 3				300	600	75
6	BS 5438: 1976 Test 3 (Short)				300		
8	BS 5722: 1991 Test 3A	210	360	510			
12	EN ISO 6941: 2003 (A:Surface)	210	360	510			
13	EN ISO 6941: 2003 (B:Edge)	245	395	545			
14	EN 13772: 2003	245	N/A	545			
19	EN 1102: 1996 (A:Surface)	210	N/A	510			
20	EN 1102: 1996 (B:Edge)	245	N/A	545			
21	EN 1103: 1996	210	N/A	510			

Table 4: Marker Thread distances

Automatic Saving and Printing

You can instruct the Control Module to automatically save your results at the end of a test. In order to Save results, you must be connected via a serial cable (supplied) to the FlexiBurn Data Logging Software running on a PC.

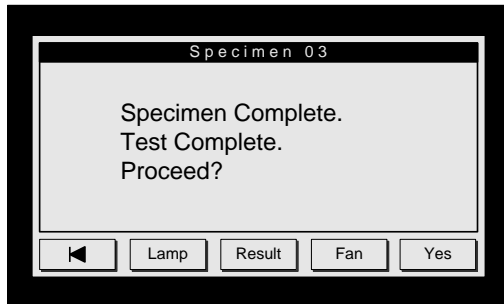
Automatic printing refers to an option in the FlexiBurn Data Logging Software. For convenience this will be discussed below. You cannot print automatically to the Control Module printer.



From the Main Menu select Configuration., then System Data.

Move down to Parameter Lock and set to “Disabled”.

Move down to “Auto Save to PC” and set to “Enabled” (this option is off screen and you need to scroll down the screen).



Carry out your flammability testing on all specimens in that particular test.

When this screen is displayed press

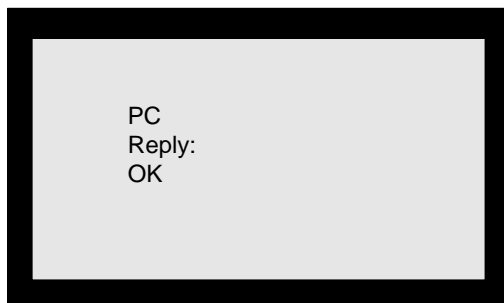


and then



This message is displayed for a short period while the data is transmitted to the PC.

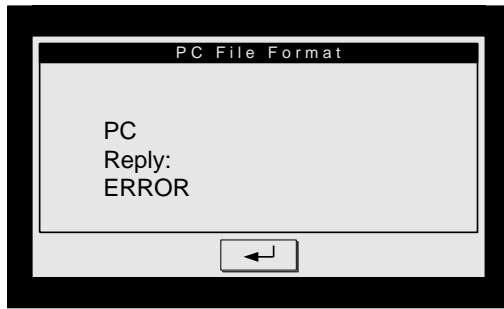
The length of time the message is displayed increases with the number of specimens tested.



When the data has been received correctly by the PC the message “PC Reply: OK”

will be displayed on the Control Module screen.

You can now select New Test, safe in the knowledge that your results have been saved to the PC.



If the data has NOT been received correctly by the PC the message "PC Reply: ERROR" will be displayed on the Control Module screen.

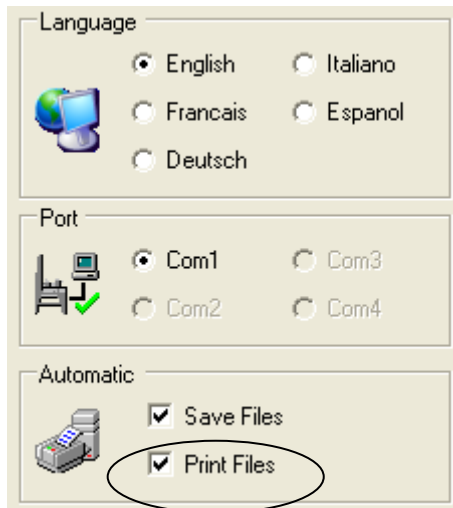
Check the following:

- the serial cable connections are secure at both ends
- the FlexiBurn Data Logging Software is running and communication is ok.



If communications between the Control Module and PC have failed you will see this icon displayed in the FlexiBurn Data Logging window.

After your test results have been sent to the PC, you can configure the FlexiBurn Data Logging Software to automatically print your results. To do this the default printer must be connected to the PC and switched on, and the FlexiBurn Data Logging Software must be running.



To enable Automatic Printing of results from the FlexiBurn Data Logging Software, select the Config option and check the Print Files box.

The default Configuration is:

Language = English

Port = Com1

Automatic = Save Files

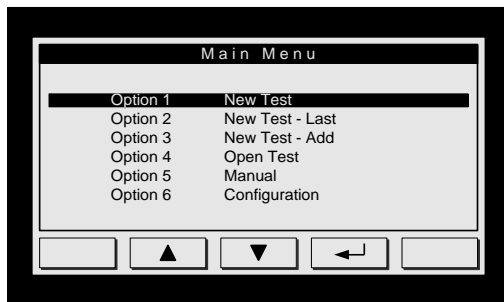
Adding or amending a standard

The FlexiBurn Control Module can store the parameters for up to 28 standards. Standards can be added or amended to suit individual requirements. To add a *new* standard you must know all the parameter settings. Standards can only be created via the FlexiBurn Control Module. The example below will illustrate amending an *existing* standard.

You may want to modify an existing standard for several reasons, for example:

- Change the default number of specimens
- Change the specimen size (ensure you have the correct specimen test frame and template)
- Change the Print Layout to suit your customer requirements
- Change the default flame application time
- Test in only one direction
- Use a different gas or burner type

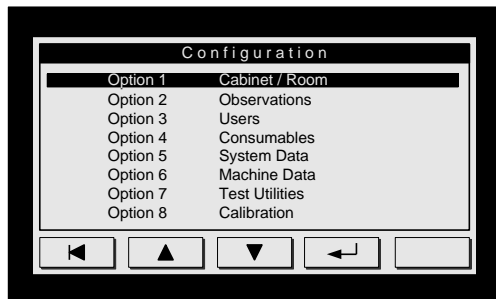
The following operations must only be carried out by a responsible and experienced user. If you change a standard stored in the FlexiBurn Control Module then the original standard is changed. It is not possible to delete a standard from the FlexiBurn Control Module. It is recommended that the FlexiBurn data logging software (supplied) is used to manage and archive (backup) standards.



From the MAIN MENU

Press the DOWN key to move to the Configuration option.

Press ENTER to select.

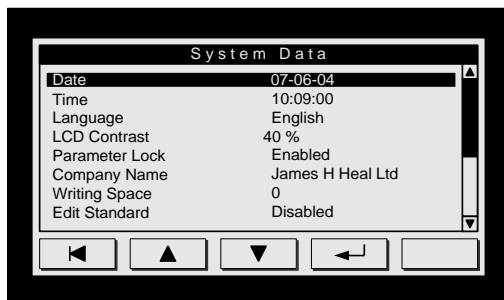


From the Configuration Menu, move DOWN to the System Data option. Press ENTER.

As there are more than lines on the page, you will see a scroll bar on the right hand side of the screen. This indicates that there is more information to be display.

Move DOWN to Parameter Lock.

The default value is ENABLED. In order to make changes to the Configuration settings, you must disable the Parameter Lock.

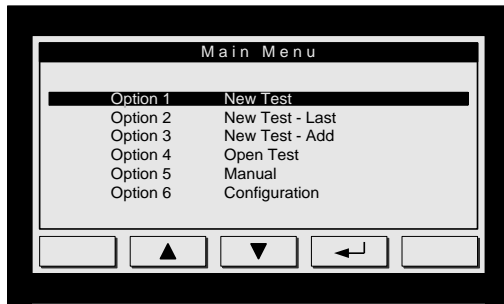


To DISABLE the Parameter Lock, press ENTER, and the display will change to DISABLED.

Once you exit the Configuration menu, the Parameter Lock is automatically Enabled.

Move DOWN Edit Standard and press ENTER to change from Disabled to Enabled. This parameter will remain enabled until changed back by the operator.

The standard can now be edited.

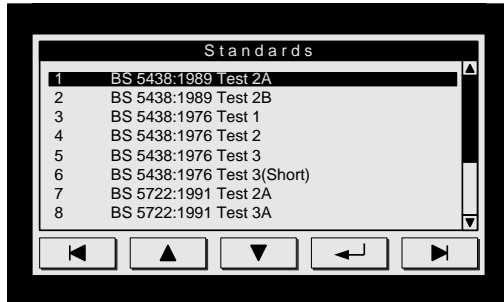


Move BACK to the MAIN MENU and select NEW TEST by pressing ENTER.

You must clear the results to proceed.

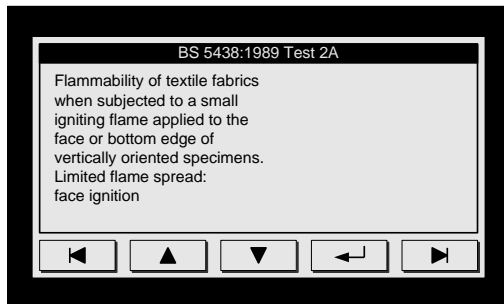
You must enter a TEST NAME. However, this does not need to be meaningful as it is not used to create the new standard name. You must also enter a USER NAME.

Press the FORWARD key and the existing STANDARDS list will be displayed.



Scroll to an exiting standard which most resembles the new standard in order to minimise the number of parameter changes required.

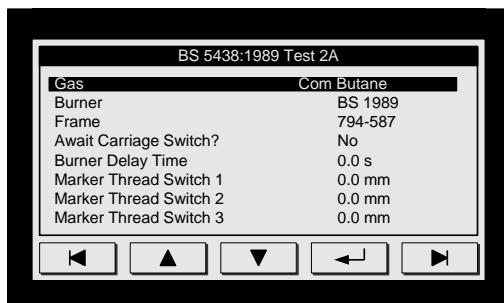
Press ENTER to select the standard.



You can edit the full title of the standard by pressing the ENTER key twice (x2).

Each line is edited separately.

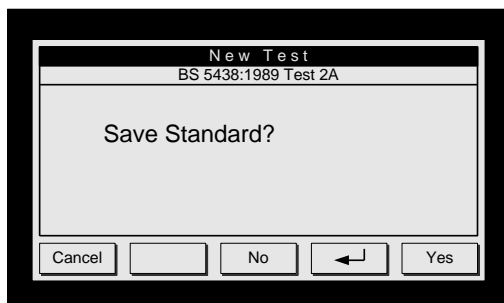
The standard title which appears on the standards list can be edited at the end of this procedure.



Press the DOWN key to move to parameter list.

Scroll UP / DOWN the parameter list and change as required.

When all changes have been completed, press the BACK key.



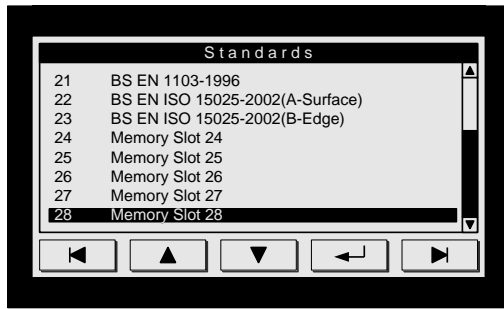
CANCEL returns to the parameter list for further editing if required.

NO returns to the standards list.

ENTER enables editing of standard name which will appear in the standards list.

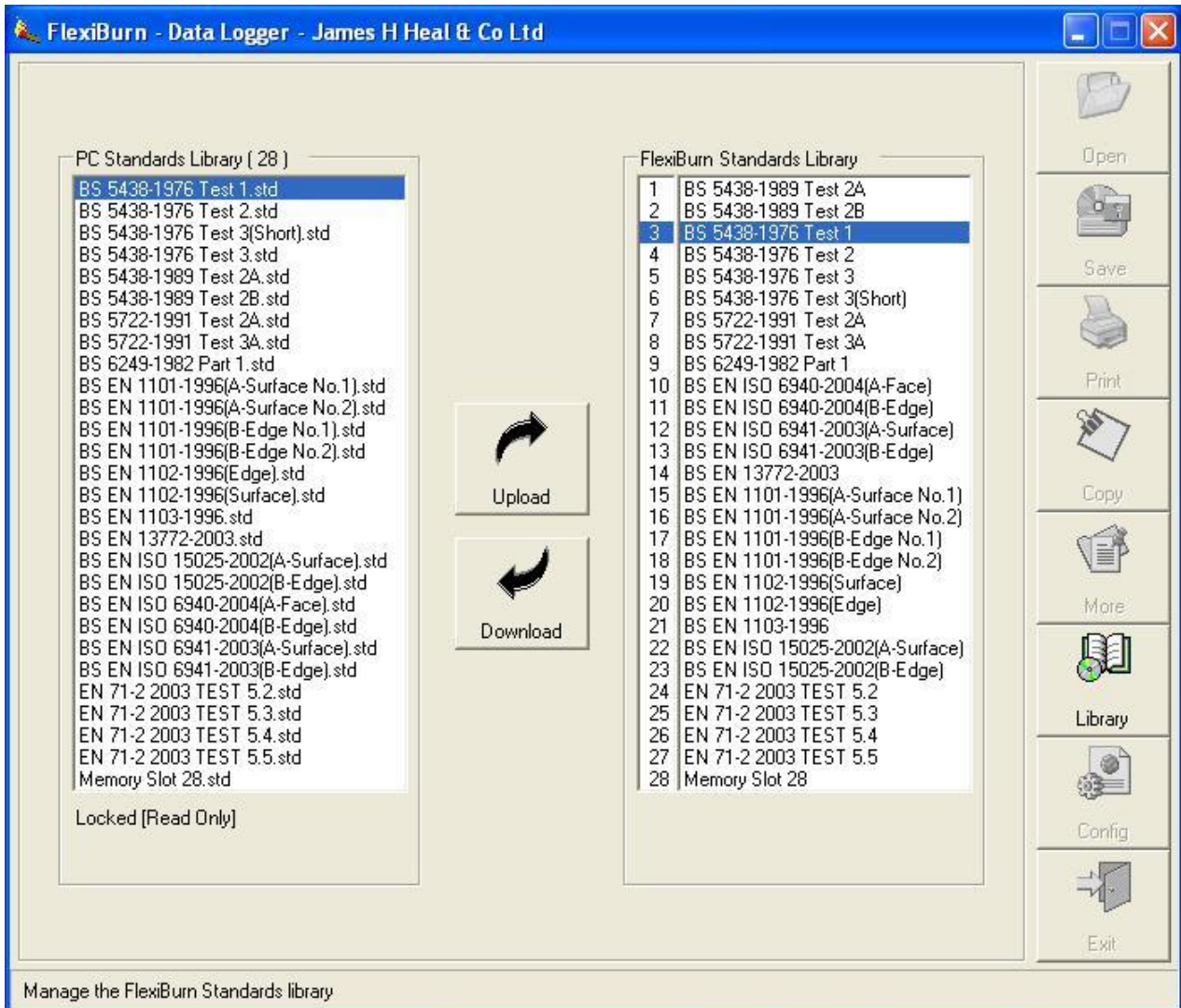
YES saves the standard with revised parameter settings and/or standard name change.

Return to the SYSTEM MENU and change the Parameter Lock to Enabled and then the Edit Standard parameter to Disabled. Return to the MAIN MENU.



To create a new standard, proceed as for amending an existing standard except choose an empty (blank) memory slot. In the picture shown, the empty memory slots are 24 to 28.

To create a new standard you must know all the parameter settings for the test.



Backup or archive your amended or new standards by downloading them from the FlexiBurn Control Module to the PC using the FlexiBurn data logging software.

Use the Library function.

Toy testing with FlexiBurn

The Toy Cage and 45 degree Test Frame have been specially developed for testing toys according to EN 71-2 Safety of toys – Flammability. These are available as optional accessories and are supplied complete with CD containing the appropriate software. Instructions for installing software is supplied with the CD.

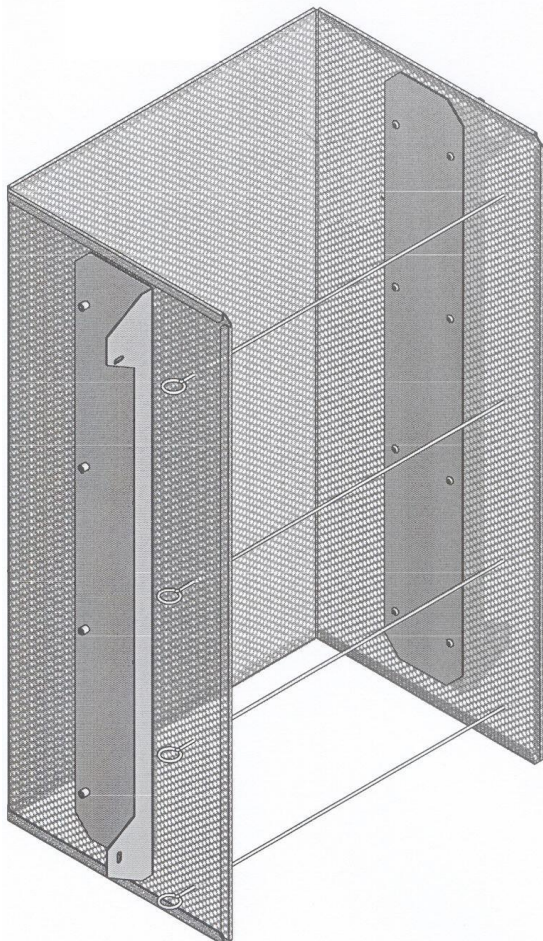


Figure 12: Toy Cage with skewers

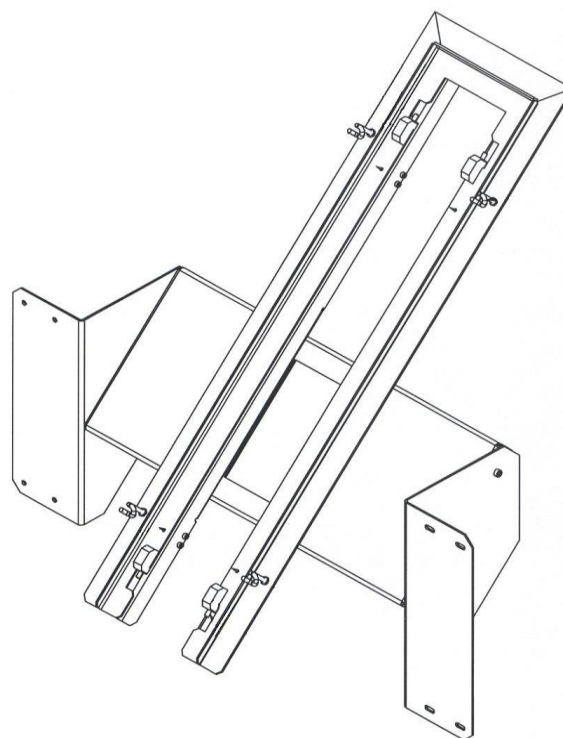


Figure 13: 45 degree Test Frame

EN71-2 describes five (5) test methods: Tests 5.2, 5.3 and 5.5 use the Toy Cage, while Test 5.4 employs the 45 degree Test Frame. Test 5.6, toys with a maximum dimension greater than 520mm, cannot be carried out using FlexiBurn.

Tests carried out in the Toy Cage are ignitability tests. Test 5.4, using the 45 degree Test Frame, is used to measure the rate of flame spread and utilises two (2) marker trip threads linked to timing devices to accomplish this.

The 45 degree Test Frame is fixed with eight (8) screws and the Toy Cage is fixed with just four (4) screws.

Before fitting either the Toy Cage or 45 degree Test Frame, all the support struts must be removed to provide space for the toy accessories.



Health & Safety Warning

Due to the bulk and weight of the Toy Cage and 45 degree Test Frame, they must be installed and uninstalled by two (2) people. The toy testing accessories are too heavy for one (1) person. Attempting to fit them alone is likely to result in damage to person and/or instrument.

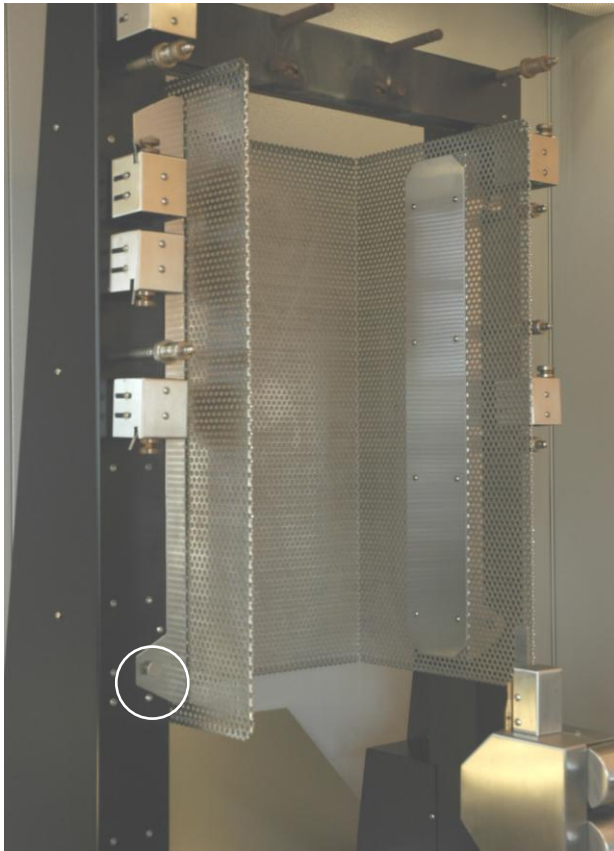


Figure 14: Fitting the Toy Cage (above)

To fit the Toy Cage into the FlexiBurn:

- Remove all of the support struts.
- Pull the burner back as far as it will go and move to the “down” position.
- Fold the flame height indicator scale down so that it is not damaged.
- Using two (2) people, one on either side of the FlexiBurn, lift the Toy Cage over the burner arm and fit the four (4) holding screws, as shown in Figure 14.
- Secure the toy using one (1) or more skewers.
- Move the burner into the test position and reposition the toy if required.
- The burner arm can be in the “up” or “down” position, which ever is the more convenient.



Figure 15: Fitting the 45 degree Test Frame (above)

To fit the 45 degree Test Frame into the FlexiBurn:

- Remove all of the support struts.
- Pull the burner back as far as it will go and move to the “down” position.
- Fold the flame height indicator scale down so that it is not damaged.
- Using two (2) people, one on either side of the FlexiBurn, lift the 45 degree Test Frame over the burner arm and fit the eight (8) holding screws, as shown in Figure 15.

Marker threads for Test 5.4

Before setting up the marker threads, ensure the specimen is secured on the four (4) pins and under the U-shaped plate. Apply only slight tension to the specimen to ensure it is straight.

Two (2) marker threads are used to measure the rate of flame spread. One at 50mm from the lower edge of the specimen and the other 550mm from the lower edge of the specimen. These are linked to MT1 and MT2 timers.

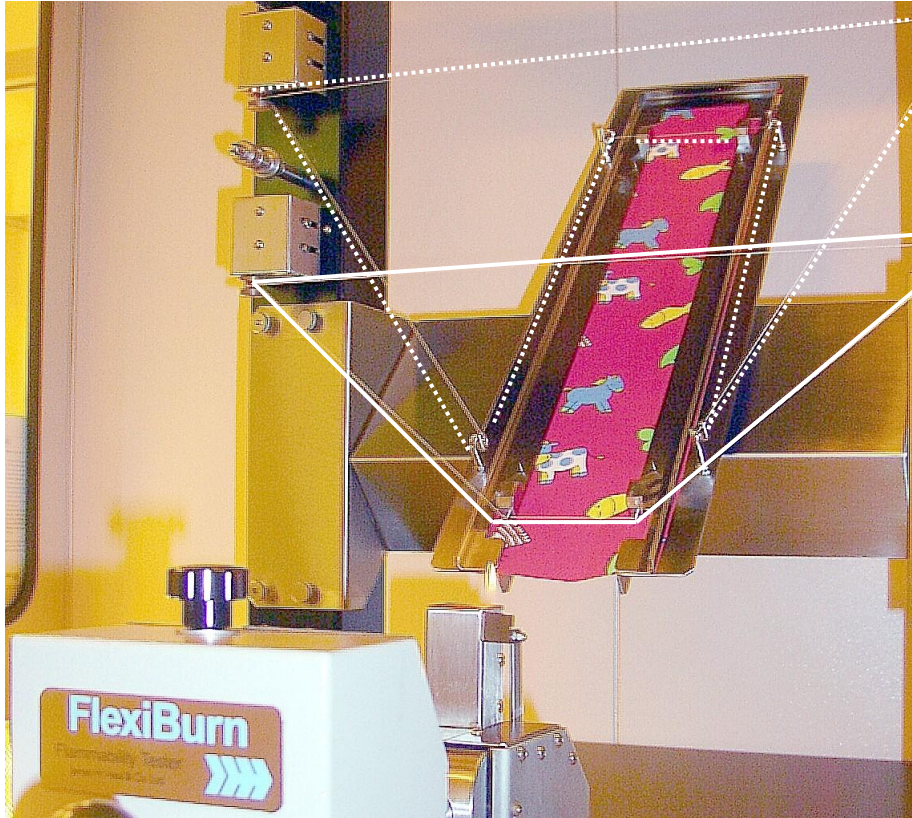


Figure 16: Marker thread arrangements for Test 5.4

Carrying out the Toy tests

EN71-2 describes five (5) test methods: Tests 5.2, 5.3 and 5.5 use the Toy Cage, while Test 5.4 employs the 45 degree Test Frame. Test 5.6, toys with a maximum dimension greater than 520mm, cannot be carried out using FlexiBurn.

<i>Test</i>	<i>Toy Cage or 45 degree Test Frame</i>	<i>Flame height (mm)</i>	<i>Flame application time (s)</i>	<i>Burner orientation (degrees)</i>	<i>Distance from burner tip to specimen (mm)</i>
5.2	Cage	20 ± 2	2 ± 0.5	0 (vertical)	10 approx.
5.3	Cage	20 ± 2	5 ± 0.5	45	5 approx.
5.5	Cage	20 ± 2	3 ± 0.5	45	5 approx.
5.4	Frame	40 ± 3	10 ± 1	0 (vertical)	30 ± 2

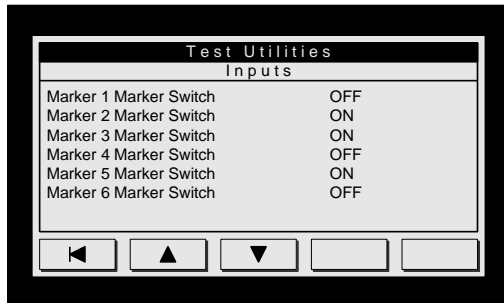
Table 5: Some Toy Testing parameters

When the burner is to be applied at 45 degrees (Tests 5.3 and 5.5), push the burner **forward** and set the correct distance between the burner tip and the specimen. Ignite the gas and press START to begin the test. The burner preheat time starts, after which the burner moves to 45 degrees and applies the flame to the specimen for the specified duration. Make the required observations.

When the burner is to be applied in the vertical position (zero degrees)(Tests 5.2 and 5.4), the test procedure is slightly different to above. Set the correct distance between the burner tip and the specimen. Pull the burner **backward**, ignite the gas and press START to begin the test. The burner preheat time starts. You must now re-enter the Test Chamber and push the burner forward to the application position. At the same time the flame application timer will start. Remove yourself immediately from the room and make the required observations. If you are performing Test 5.4, the marker thread timers will operate.

Test utilities

The Control Module has a number of test utilities for checking the correct function of the apparatus. These are all accessed from the Configuration menu. However, these options are generally only made available to HEALINK Service Engineers who can use the information for diagnostic purposes.

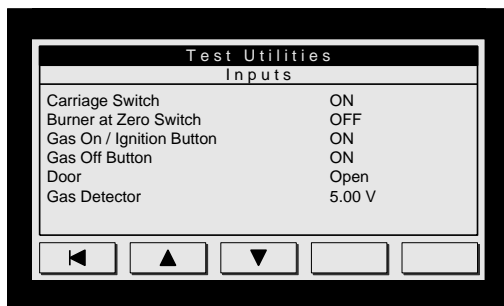


Inputs

Marker Thread switches:

OFF = switch in the 'thread in place' state.

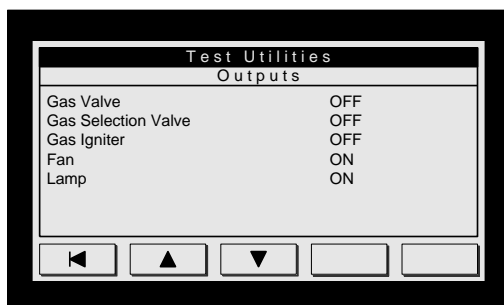
ON = switch in the 'thread not in place' state.



Inputs

Gas Detector input is an analogue signal from 0 to 5 volts.

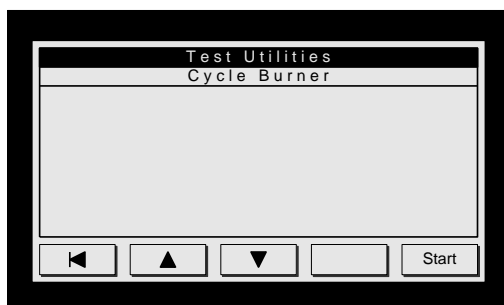
(The Gas Detector feature is no longer used).



Outputs

Gas valve refers to the main gas valve near the robotic arm.

Gas selection valve refers to gas port 1 or port 2 (off = port 1, on = port 2)

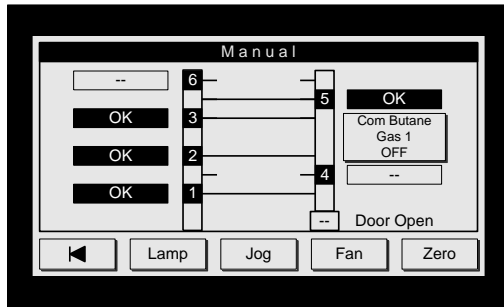


Cycle burner

Cycles the burner between 0 and 90 degrees with a small pause at the end of each cycle.

Press the START key to begin cycling the burner. Press STOP to end cycling.

Manual operation



This option is available from the MAIN MENU.

It is often used for testing the function of the equipment.

You can quickly see the status of the FlexiBurn on this screen.

Parameter definitions

This section describes the parameters which are used to define a standard. Where applicable, it shows the numeric range allowed in number fields and number of characters allowable in text fields.

Group	Parameter	Comments	Range	Unit
Title	Standard Name Issue Date	Normative reference and issue date.	0 - 32	text
	Title 1	These 8 lines are used for the full title and description of the standard.	0 - 32	text
	Title 2		0 - 32	text
	Title 3		0 - 32	text
	Title 4		0 - 32	text
	Title 5		0 - 32	text
	Title 6		0 - 32	text
	Title 7		0 - 32	text
	Title 8		0 - 32	text
Machine Data	Gas	The type of gas used for the test may be recorded using this parameter. Options available : n/a Butane Commercial butane Propane Commercial propane Methane Other		
	Burner	The type of burner used for the test may be recorded using this parameter. 8 characters maximum. Options available : n/a BS 1976 BS 1989 ISO 1995 Custom		

	Frame	The type of specimen frame (and template) used for the test may be recorded using this parameter. Options available : n/a 794-581 794-582 794-583 794-586 794-587 794-606 794-608 794-609 794-610 794-632 (Toy Cage) 794-633 (45° Test Frame)		
	Await Carriage Switch?	Ask question ~	Yes / No	
	Burner Delay Time	When radiator is used on EN 13772 it is applied for 30 seconds prior to burner moving into position. If this parameter > 0 then pressing the gas on button will trigger the timer to start. Once the timer has elapsed the burner will then move into position.	0 - 3600	s
Trip Thread	Marker Thread Switch 1	Marker threads can be used to record flame spread times. To enable a marker, enter the distance in mm from the lower edge of the specimen to the marker thread. Set this parameter to 0 if it is not required on a document.	0 - 1000	mm
	Marker Thread Switch 2		0 - 1000	mm
	Marker Thread Switch 3		0 - 1000	mm
	Marker Thread Switch 4		0 - 1000	mm
	Marker Thread Switch 5		0 - 1000	mm
	Marker Thread Switch 6		0 - 1000	mm
	Marker Thread Fineness		Linear density (yarn count) of the Marker Thread in tex system.	0 - 999

Flame	Ignition Criterion	<p>Ignition criterion is defined as the time at or above which afterflame persists on the specimen after the pre-set ignition time has elapsed. i.e. The time at which ignition is deemed to have occurred.</p> <p>This feature can be used to automatically adjust the flame application time in minimum ignition time or ease of ignition tests.</p> <p>After a test, the duration of flaming result (afterflame) is compared with the ignition criterion time. If it is greater or equal to the criterion time then ignition will be deemed to have occurred.</p> <p>Set the time to 0 if you wish to manually state if ignition occurs.</p>	0 - 60	s
	Afterglow Criterion	<p>Afterglow criterion is defined as the time at or above which afterglow persists on the specimen after the afterflame or igniting flame extinguishes and at which point afterglow is allowed to be recorded.</p> <p>In tests where there is little or no afterglow, it is sometimes desirable to record that time as zero.</p> <p>If the afterglow result equals or exceeds the criterion then the result will be as recorded. However, if the result is less than the criterion then the result will be shown as zero.</p> <p>Set the time to 0 to disable this feature.</p>	0 - 60	s
	Flame Application Time	<p>This parameter controls the length of time in seconds, that the flame is applied to the specimen during a test.</p>	0.1 - 3600	s
	Burner Preheat Time	<p>Some flammability tests require a burner preheat time of 2 minutes to allow the flame to stabilise before a test begins.</p> <p>If you use this feature, you will not be able to start a test until the preheat time has elapsed or you press the PASS option.</p> <p>Set this parameter to 0 if it is not required on a document.</p>	0 - 60	min
	Flame Height	<p>The flame height in mm may be recorded using this parameter.</p> <p>Set to 0 for n/a</p>	0 - 99	mm
	Flame Height Tolerance (+/-)	<p>The flame height tolerance in mm may be recorded using this parameter.</p> <p>Set this parameter to 0 if it is not required on a document.</p>	0 - 10	mm
	Flame Reach	<p>The flame reach in mm may be recorded using this parameter.</p> <p>Set to 0 for n/a</p>	0 - 99	mm
	Flame Reach Tolerance (+/-)	<p>The flame reach tolerance in mm may be recorded using this parameter.</p> <p>Set this parameter to 0 if it is not required on a document.</p>	0 - 10	mm
	Burner Angle (orientation)	<p>The angle of the burner in degrees may be recorded using this parameter. It is measured from the vertical, e.g. for surface ignition the angle is 90 degrees.</p>	0 - 90	degree

	Burner Retract?	Retract the burner back towards zero after the flame application time has elapsed. Ask question ~	Yes / No / Fast	
Specimens	Specimen Length	The specimen length dimension in mm may be recorded using this parameter.	1 - 900	mm
	Specimen Width	The specimen width dimension in mm may be recorded using this parameter.	1 - 600	mm
	Number of Length Specimens	You can specify how many length direction tests are required by using this parameter. The instrument will automatically jump to the RESULTS option when sufficient tests have been carried out. Set this parameter to 0 if it is not required on a document.	0 - 32	
	Number of Width Specimens	You can specify how many width direction tests are required by using this parameter. The instrument will automatically jump to the RESULTS option when sufficient tests have been carried out. Set this parameter to 0 if it is not required on a document.	0 - 32	
	Number of Bias Specimens	You can specify how many bias direction tests are required by using this parameter. The instrument will automatically jump to the RESULTS option when sufficient tests have been carried out. Set this parameter to 0 if it is not required on a document.	0 - 32	
Questions	Flaming Debris?	Ask question ~	Yes / No	
	Glowing On Edge?	Ask question ~	Yes / No	
	Flame On Edge?	Ask question ~	Yes / No	
	Hole On Edge?	Ask question ~	Yes / No	
	Hole Formed?	Ask question ~	Yes / No	
	Surface Flash?	Ask question ~	Yes / No	
	Manual Ignition?	Ask question ~	Yes / No	
	Maximum Damaged Length?	Ask question ~	Yes / No	

Print Layout	All Specimens?	Used to print out either ALL specimen results or Single (currently selected specimen) result. Yes = ALL.	Yes / No	
	Test Header?	Reference Material Type No. Comments 1 Comments 2	Yes / No	
	Standard Title?	Include the Title 1 - Title 8 lines (full standard title).	Yes / No	
	Flame Data?	Gas Gas Input Frame Burner Burner Preheat Time Flame Height / Reach Flame Height / Reach Tolerance Burner Angle / Orientation Burner Delay Time	Yes / No	
	Cabinet / Room Data?	Room Temperature Room Relative Humidity Room Air Speed Room Volume Room Barometric Pressure	Yes / No	
	Specimen Data?	Specimen Length Specimen Width Number of Specimens Length Number of Specimens Width Number of Specimens Bias Edge Type Face Tested Number of Joins Temperature Relative Humidity	Yes / No	
	Marker Thread Results?	Marker Thread Fineness Marker Thread Switch Marker Thread Switch Time	Yes / No	

	Mean Marker Thread?	Marker Thread Fineness Marker Thread Switch Marker Thread Switch Time - mean values If Rate of Flame Spread is enabled then also Rate of Flame spread calculations (mm/s) - mean values	Yes / No	
	Rate of Flame Spread?	Rate of Flame Spread calculations (mm/s)	Yes / No	
	Afterflame Result?	Afterflame Time Ignition Occurred / Not Occurred	Yes / No	
	Afterglow Result?	Afterglow Time Glowing Occurred / Not Occurred	Yes / No	
	Observations?	Flaming Debris Glowing On Edge Flame On Edge Hole On Edge Hole Formed Max. Hole Length Horiz. Max. Hole Length Vert. Surface Flash Manual Ignition Max. Damaged Length Observations	Yes / No	
	Statement?	The default statement is: Results may not apply to situations where there is restricted air supply or prolonged exposure to large sources of intense heat. If enabled (Yes) then the statement is printed at the top of each report.	Yes / No	
	Writing Space	The number of lines for specimen details and comments on documents can be set using this parameter. This parameter is a copy of Writing Space on System Data page of Configuration. It gives easy access to change this parameter whilst printing out test results rather than having to go back to Configuration to change it.	0 - 10	lines

Glossary of terms used in the flammability testing of textiles

For a more comprehensive list of terms and definitions used in the description of the burning behaviour of textiles and textile products see ISO 4880.

AFTERFLAME

Persistence of flaming of a material, under specified test conditions, after the ignition source has been removed.

AFTERFLAME TIME

DURATION OF FLAME

Length of time for which a material continues to flame, under specified test conditions, after the ignition source has been removed. Expressed in seconds.

AFTERGLOW

Persistence of glowing of a material after cessation of flaming, under specified test conditions, or, if no flaming occurs, after the ignition source has been removed.

AFTERGLOW TIME

DURATION OF AFTERGLOW

Self-extinguishability (deprecated).

Self-extinguishing (deprecated).

Length of time for which a material continues to glow, under specified test conditions, after cessation of flaming or after the ignition source has been removed. Expressed in seconds.

BURN, intransitive verb

Undergo combustion.

BURNED AREA

That part of the damaged area of a material that has been destroyed by combustion or pyrolysis, under specified test conditions. Expressed in square metres. (cf. damaged area).

COMBUSTION

Exothermic reaction of a combustible substance with an oxidiser, accompanied by flames and/or glowing and/or emission of smoke.

CHAR, noun

Carbonaceous residue resulting from pyrolysis or incomplete combustion.

CHAR, verb

Form carbonaceous residue during pyrolysis or incomplete combustion.

COMBUSTIBLE, adjective

Capable of burning.

COMBUSTION

Exothermic reaction of a combustible substance with an oxidiser, accompanied by flames and/or glowing and/or emission of smoke.

DAMAGED AREA

Total of the areas of a material permanently affected by thermal phenomena under specified test conditions:

loss of material, shrinking, softening, melting, charring, combustion, pyrolysis, etc. Expressed in square centimetres. (cf. burned area).

DAMAGED LENGTH

Char length (deprecated).

Maximum extent, in a specified direction, of the damaged area of a material under specified test conditions. Expressed in centimetres. In some standards, char length is defined by a specific test method.

EASE OF IGNITION

Ease with which a material can be ignited under specified test conditions. (cf. minimum ignition time).

FLAME, noun

Zone of combustion in the gaseous phase from which light is emitted.

FLAME, verb

Undergo combustion in the gaseous phase with emission of light.

FLAME SPREAD

Propagation of a flame front.

FLEXIBURN

Multi-purpose vertical flammability tester for textiles and textile products.

Successor to the Rhoburn vertical flammability tester.

Manufactured by James H. Heal & Co. Ltd., Halifax, England.

RATE OF FLAME SPREAD

Burning rate (deprecated).

Rate of burning (deprecated).

Distance travelled per unit time, under specified test conditions, by a flame front during its propagation. Expressed in metres per second.

FLAME SPREAD TIME

time taken by a flame on a burning material to travel over a specified distance or surface area under specified test conditions. Expressed in seconds.

HEAT FLUX**DENSITY OF HEAT FLOW RATE**

Thermal intensity, indicated by the rate at which heat crosses a given surface per unit area of that surface. Expressed in watts per square centimetre or kilowatts per square metre.

IGNITION

Initiation of combustion.

MELT DRIP, noun

Flaming debris (deprecated).

Falling droplets of molten material, either burning or not.

MINIMUM IGNITION TIME

Minimum time of exposure of a material to an ignition source to obtain sustained combustion under specified test conditions. Expressed in seconds.

SMOKE

Visible suspension of solid and/or liquid particles in gases resulting from combustion or pyrolysis.

SMOULDERING

Slow combustion of a material without light being visible and generally evidenced by an increase in temperature and/or by smoke.

SURFACE FLASH

Rapid spread of flame over the surface of a material without ignition of its basic structure.

However, if the latter occurs simultaneously or sequentially with surface flash, it is not considered as a part of surface flash.

Notes