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Non-Domestic Renewable Heat Incentive (RHI)

Heat Loss Assessment User Guide - Version 2

Non-Domestic

www.ofgem.gov.uk

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This User Guide accompanies the Renewable Heat Incentive (RHI) Heat Loss Assessment (HLA). The HLA should be used by all applicants submitting heat loss information to Ofgem when applying for the Non Domestic RHI. The User Guide explains how to complete the HLA, including how to submit heat loss calculation(s) where required. This is the finalised User Guide following consultation on the first draft, which took place between September and October 2013, and has been updated in line with the February 2015 amendments.

Contents

1. Introduction

Overview

This User Guide provides supporting information for applicants to the Non Domestic RHI who wish to assess whether they will be able to disregard heat losses from external pipework, or complete a heat loss calculation, in place of installing additional heat meters. This User Guide will provide you with an overview of the process for completing a Heat Loss Assessment (HLA) and will assist you in determining:

- whether your external pipework may be considered 'properly insulated' and if heat losses may be disregarded;
- whether you may be eligible to submit a heat loss calculation in place of installing any additional required heat meters;
- how to perform a heat loss calculation, if applicable; and
- worked examples of completing the HLA.

2. Process for completing the HLA

The following are the steps to take when completing the HLA. Further guidance on completing individual steps is provided later in this document:

Step 1: Read the 'Instructions' tab to check which sections of the HLA you need to complete.

Step 2: Complete the 'Above Ground Pipework' and/or 'Buried Pipework' tabs for each individual pipe length to see if it may be considered 'properly insulated'. For Above Ground Pipework, you should replicate the details of each set of answers to Question 1 (*rows a to j*) in the table in Question 2. For further information on what constitutes an individual pipe length, please see section 3 of this User Guide.

Step 3: Check the 'What should I do next?' sections of the 'Above Ground Pipework' and 'Buried Pipework' tabs to see which pipe lengths can be disregarded and which should be added to the 'PI Calculator' and 'Non PI Calculator' tabs.

Step 4: Complete heat loss calculations using the 'PI Calculator', 'Non PI Calculator' and 'Storage Tanks' tabs where they are required.

Step 5: View the results of the HLA on the 'Results' tab and update your application form accordingly. Where applicable, a Quarterly Heat Loss Figure (QHLF) should be entered in Question HH123-3. If the heat loss from all non-properly insulated pipework is above 6%, please submit an explanation of why your heat loss calculation should be accepted in line with one of the scenarios outlined in Section 5 of this document.

Step 6: Email a copy of the completed HLA to RHI.Heatloss@ofgem.gov.uk and upload any supporting evidence to your online application form in PDF format.

Step 7: Upload necessary evidence to your online application to confirm that pipes may be considered 'properly insulated' and to verify any heat loss rates that may be required when completing the HLA. The following evidence will need to be provided:

- Photo(s) to confirm whether pipes are 'above ground' or 'buried'.
- For 'above ground' pipework: A copy of the relevant pages from the manufacturer's specification which details the thermal conductivity of the insulation (W/mK) or heat loss rate for the pipe (W/m).
- For 'buried' pipework: A test certificate confirming that your make and model of pipework has been insulated in accordance with one of the relevant standards (see section 2); or a photo that shows a stamp on your pipework indicating that it has been insulated in accordance with one of the standards (if accessible).
- For all heat loss calculations: The copy of the pages from the manufacturer's specification that verify the relevant heat loss rate for the pipe i.e. a W/mK heat loss rate for pre-insulated pipes; or thermal conductivity of the insulation (W/mK).

3. How do I determine whether heat loss from external pipework can be disregarded?

In order to assess whether heat losses from external pipework may be disregarded, the HLA will first determine whether individual external pipe lengths may be considered 'properly insulated'[1].

For above ground external pipework to be classified as 'properly insulated' the Regulations require that the pipework is insulated so that the relevant maximum permissible heat losses set out in British Standard BS5422:2009[2] are not exceeded.

For buried external pipework to be classified as 'properly insulated' the Regulations require that the pipework is insulated in accordance with

- BS EN 253 (2009);
- BS EN 15632:2 and 3 (2010) and BS EN 15632:4 (2009); or
- BS EN 15698:1 (2009).

For above ground pipework, Question 1 on the 'Above Ground Pipework' tab of the HLA will determine whether an individual pipe length may be considered 'properly insulated' and therefore meets this regulatory definition. There are two routes through which to specify the insulation properties of the pipe:

(i) **Specify the heat loss rate for the whole pipe (W/m):** Select 'Yes' to Question 1(e). You will then be required to specify the heat loss rate for the pipework in Question 1(f) as declared in the manufacturer's technical data sheet. This figure is in W/m and is a heat loss rate for the whole pipe (including insulation).

(ii) **Specify the thermal conductivity of the insulation (W/mK):** Select 'No' to Question 1(e). You will then be required to specify the thickness of the insulation (mm) in Question 1(g) and the thermal conductivity of the insulation (W/mK) in Question 1(h). Note that this figure should be for the thermal conductivity of the insulation only (ie not including the liquid carrying pipe).

For buried pipework, Question 1 on the 'Buried Pipework' tab of the HLA will provide an indication of whether an individual pipe length may be considered 'properly insulated', however this will be subject to Ofgem's review of the evidence you provide.

What about 'above ground' external pipework for process heating at higher operating temperatures?

If your installation is providing process heating at operating temperatures of 100°C or above, you should select the relevant hot face temperature of the 'above ground' pipework from the drop-down menu in Question 1(b). You will then be required to specify the thickness of the insulation (mm) in Question 1(g) and the thermal conductivity of the insulation (W/mK) in Question 1(h).

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[1] Regulations, Part 1, Regulation 2, definition of 'properly insulated'.
[2] BS 5422:2009: 'Method for Specifying Thermal Insulating Materials for Pipes, Tanks, Vessels, Ductwork and Equipment Operating within the Temperature Range -40°C to +700°C'

Note that for process pipework with a hot face temperature of 100°C or above, specific temperatures values are specified in BS 5422: 2009, rather than temperature ranges. For hot face temperatures not listed in the drop-down menu, calculations shall use the nearest listed higher temperature. For example, for a steam installation with a pipework hot face temperature of 240°C you should select '300°C (process pipework)' from the drop down menu. Alternatively, maximum heat loss values and required insulation thicknesses for intermediate operating temperatures may be deduced by interpolation from BS 5422: 2009 and bespoke calculations submitted to Ofgem for review.

For buried pipework, Question 1 on the 'Buried Pipework' tab of the HLA will provide an indication of whether an individual pipe length may be considered 'properly insulated', however this will be subject to Ofgem's review of the evidence you provide.

What if an individual pipe length is both above ground and buried?

If a singlepipe length is part buried and part above ground, you should treat these as two separate lengths and complete both the 'Above Ground Pipework' and 'Buried Pipework' tabs.

4. Assessing 'properly insulated' external pipe lengths

Individual 'properly insulated' external pipe lengths 10m or less

The associated heat losses from all individual lengths of 'properly insulated' external pipework ≤10m can be disregarded for RHI payment purposes. You will need to enter the length of each individual pipe ≤10m to one decimal place in Question 2 of the 'Above Ground Pipework' tab and Question 1 of the 'Buried Pipework' tab.

The answers you provide should be consistent with the information on your schematic diagram and any photographs provided. Note that pipe lengths may be checked during any future audit of your heating system.

Individual 'properly insulated' external pipe lengths more than10m

The associated heat losses from individual external pipe lengths that are 'properly insulated' and >10m can only be disregarded for RHI payment purposes if the total average annual heat loss from such pipe lengths is ≤3% of the projected annual heat output from the plant. As a result the 'PI Calculator' will need to be completed for all 'properly insulated' pipes that are longer than 10m in length. After completing this calculation the 'results' tab of the HLA will display:

(i) The total average annual heat loss from all individual 'properly insulated' pipe lengths >10m (kWhth). This figure will be automatically populated upon completion of the 'PI Calculator' tab.

(ii) The projected annual heat output from the plant (kWhth). This figure will be automatically populated upon completion of the 'PI Calculator' tab. It can be estimated by multiplying the capacity of the plant (kWth) by the expected total annual operating hours.

(iii) The % of average annual heat loss from all 'properly insulated' pipe lengths >10m compared with the plant's projected annual heat output (kWhth).

Where the average annual heat loss (kWhth) from all external pipe lengths that are 'properly insulated' and >10m in length is ≤3% of the projected annual output of the plant (kWhth), the associated heat loss can be disregarded.

Where the average annual heat loss (kWhth) from all external pipe lengths that are 'properly insulated' and >10m in length is >3% of the projected annual output of the plant (kWhth), the associated heat loss cannot be disregarded.

If the losses cannot be disregarded, one of the following options should be followed:

-Install additional heat meter(s) as required; or
-Enter the Quarterly Heat Loss Figure (QHLF[4]) (kWhth) displayed on the Results tab in Question HH123-3 on the RHI Register.

You should note that for external pipe lengths that are 'properly insulated' and >10m in length, the heat loss calculation will be accepted regardless of the value of the losses.

5. Making a case for submitting a heat loss calculation for non-'properly insulated' pipework

After completing the 'Non PI Calculator', the 'Results' tab of the HLA will indicate the value of the heat loss from all 'Non properly insulated' pipework as a percentage of the projected annual output of the plant (kWhth). Where this figure is greater than 6%, a case will need to be made as to why the heat loss calculation should be accepted in place of installing additional heat meters. This case should be added to Question HK120 on the RHI Register and must satisfy one of the three scenarios outlined below. In addition,appropriate supporting evidence will need to be provided.

Scenario (a)

Where it is physically 'overly burdensome' to install additional meters.

This must be attributable to one of the circumstances listed below:

(i) Physical constraints *(eg not enough room to install a meter etc);*

(ii) Reasons of safety *(eg it is not safe to read the meter in the required location etc);*

(iii) Environmental conditions *(eg the environment that the meter is positioned in might affect its readings); or*

Appropriate supporting evidence might include:

- Pictorial evidence

[4] This QHLF is the 'Annual Average Heat Loss Figure' generated by the heat loss calculation, divided by four and rounded to the nearest kWhth.

- Any relevant details from a heat meter manufacturer's specification
- Any supporting documentation received from the heat meter manufacturer

Scenario (b)

Where it is financially 'disproportionate to install additional meters.

From collaboration with industry, Ofgem has taken this to be where the cost of installing any additional required heat meters would be ≥5% of the total plant installation costs or greater than £50,000. If you think this situation applies to you, you should provide the following supporting evidence:

(i) The total costs (£) associated with installing meters that could otherwise be accounted for by a heat loss calculation. Invoices to support these figures will need to be provided;

(ii) Invoices detailing the total installation cost (£) for the RHI eligible plant; and

(iii) Complete the 'Non PI Calculator' for all 'non properly insulated' external pipe lengths.

Scenario (c)

Where there are negligible ineligible heat losses.

This scenario applies where the associated annual RHI payments related to heat loss would equate to less than £100. If you think this situation applies to you, you should provide a case that includes:

(i) The RHI Tariff for the specific technology of the installation at the time of application. This should be taken from the tariff table found on the RHI website;

(ii) The annual heat loss figure (kWhth) taken from the completed 'Non PI Calculator'.

6. Completing a heat loss calculation

About the Heat Loss Calculator

The 'PI Calculator' and 'Non PI Calculator' are located as separate worksheets within the HLA. These provide a simplified methodology for estimating annual heat losses from external pipework. On completion of one or both of the heat loss calculators, the results will enable Ofgem to determine whether heat losses may be disregarded or whether the heat loss calculation may be accepted in place of installing heat meters in certain circumstances.

The heat loss calculation formula used by these calculators is taken from the Chartered Institute of Building Services Engineers (CIBSE) Guide C (eqa. 3.111). Further information is available on the 'HLC Guide' tab on the HLA.

The spreadsheet contains fields you must complete (marked red) and fields where you may choose to provide further information (marked blue). Completed fields are marked green.

Required = Complete = Optional =

A glossary of key terms used in this section can be found in Section 9 of this User Guide.

General information about your installation

For both the 'PI Calculator' and 'Non PI Calculator', the following information will need to be entered in the spaces provided:

(i) **Location** – The nearest location to the site should be selected from the drop-down menu.

(ii) **Projected Annual Generation (kWhth)** – This figure is the projected annual heat output from the RHI installation. It can be estimated by multiplying the capacity of the plant (kWth) by the expected total annual operating hours.

(iii) **Is the specified insulation in good condition?** – If it is correct, you should check the tick box at the bottom of the page next to the statement – 'The insulation I specified is in good condition.'

User Defined Insulation Types

The 'PI Calculator' and 'Non PI Calculator' also allow you to define three site-specific types of insulation. This should be completed where the pipework is not 'Pre-insulated or Buried' and you wish to manually enter the thermal conductivity of the insulation. The following information is required in each case:

(i) **Name** – The unique name of the user defined insulation.

(ii) **Conductivity** (Flow, W/mK) – The thermal conductivity of the insulation in W/mK at nominal flow temperatures.

(iii) **Conductivity** (Return, W/mK) – The thermal conductivity of the insulation in W/mK at nominal return temperatures.

When all three pieces of this information have been provided the user defined insulation will become available as a selectable 'Insulation Type' within the Distribution System Details section below. Note that in order to select a user defined insulation type you should answer 'No' to the 'Pre-insulated or Buried Pipework?' question and then enter the required details relating to the pipe length below.

Adding and deleting lengths of external pipework

On the calculator tabs of the HLA, each pipe section is defined in a column of cells, for which information will need to be inputted. The associated heat loss is calculated on a monthly basis at the end of each column. The pipe sections are calculated independently and therefore do not need to be defined in a specific order.

To add a pipe section to the calculator, you should click the 'Add' button located near the top of the worksheet. This will add an additional column to the right of any existing pipe sections.

To delete a pipe section you should highlight the full column, right-click and select 'Delete'.

Providing information relating to each individual pipe section

Once a column has been generated for a pipe section, the following three sets of information will need to be provided – Distribution System Details, Fluid Temperature and Operating Hours. Further details on completing these sections are provided below:

1. Distribution System Details

This section describes the physical properties of each pipe length. The following information is required:

(i) **Section Name** – A label describing each particular pipe length.

(ii) **Flow, Return or Flow/Return?** – This is used to identify the pipe section and select the correct insulation thermal conductivity where this has been manually defined by the user. For pre-insulated pipework containing both a flow and return pipe you should select 'Flow/Return' from the drop-down menu.

(iii) **Length** – The pipe section length measured in metres.

(iv) **Pre-insulated or Buried Pipework?** – You should select 'Yes' from the drop-down menu if the pipe section is pre-insulated or buried. You will then be asked to provide answers to questions (v) and (vi) below. You are not required to enter

further details relating to the pipe diameter, insulation type etc. and these cells will be greyed out.

(v) **External Heat Loss Rate (W/mK)** – This should be verified from the relevant manufacturer's technical data sheet. For pre-insulated pipework containing both a flow and return pipe you should select 'Flow/Return' from the drop-down menu and provide an external heat loss rate for the whole pipe in W/mK.

(vi) **Based on ground or air temperature?** - Manufacturers base their heat loss rate on either the ground temperature surrounding the pipe or the external air temperature above the pipe. You should select which of these criteria the heat loss rate refers to from the drop-down menu.

Where a pipe section is not pre-insulated, you should select 'No' from the drop-down menu and provide answers to questions (i) to (xi) below:

(i) **Nominal Diameter** – Select either the nominal diameter or 'User Defined outside diameter (o.d.)' (mm) from the drop-down menu. Note that the 'Nominal Diameter' values are for steel pipe and taken from the British Standard, BS:3600.

(ii) **Outside Diameter** – If 'User Defined o.d.' has been selected, enter the measured outside diameter (mm).

(iii) **Insulation Type** – Select the insulation type. If a 'User Defined Insulation' has been defined it will be available in the drop-down menu.

(iv) **Insulation Thickness** – Select the insulation thickness (mm). Or, to enter a 'User Defined' insulation thickness, select this option from the drop-down menu.

(v) **User Defined Insulation Thickness** – If 'User Defined' has been selected, enter the measured thickness (mm).

(vi) **Surface Emissivity** – Surface emissivity is a measure of how reflective a surface is. The table below sets out a list of typical pipe finishes and the appropriate level of emissivity. You should select the degree of insulation surface emissivity from the drop-down menu.

Surface	Finish	Emissivity
Aluminium	Polished	Low
	Dull/rough/anodised	Medium
Painted Surface	Light (white)	Medium
	Dark (black)	High
Plastic pipe casing	White	Medium
Cloth	Felt (black)	High
Copper	Polished	Low
	Dull/anodised	Medium
Steel	Stainless/polished/unoxidised	Low
	Oxidised	Medium

(vii) **External Condition** – Select the external condition from the drop-down menu adjacent to the pipe section ('exposed' or 'sheltered').

(viii) **No. Valves** – Enter the number of valves. Heat losses from valves are higher than from the basic pipe. Therefore the number of valves is identified and a separate calculation carried out by the spreadsheet.

(ix) **Valves Insulated?** – Identify whether or not the valves are insulated from the drop-down menu.

(x) **No. Flanges** – Enter the number of flanges. Heat losses from flanges are higher than from the basic pipe. Therefore the number of flanges is identified and a separate calculation carried out by the spreadsheet.

(xi) **Flanges Insulated?** – Identify whether or not the flanges are insulated from the drop-down menu.

2. Fluid Temperature

This section requires you to input monthly values based on projected operational conditions. For each pipe section, these should reflect the projected operating temperatures for that section. If you are providing details for a combined Flow/Return pipe you should enter the average of the flow and return fluid temperatures.

3. Operating Hours

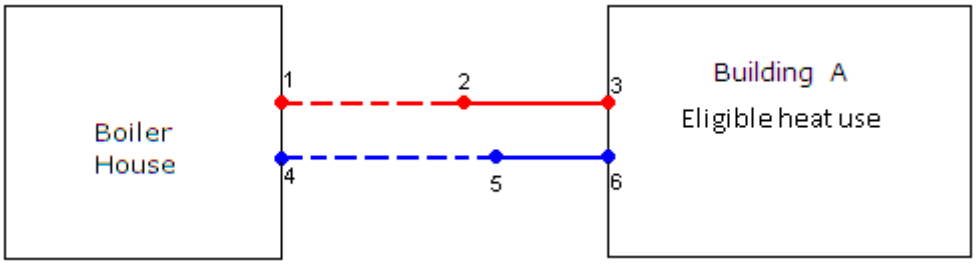
This section requires you to input monthly values based on projected operational conditions. For each pipe section, these should reflect the projected operating hours for that section.

7. Further information regarding the heat loss calculation

How is an external pipe length defined when completing a heat loss calculation?

The 'PI Calculator' and 'Non PI Calculator' allow the assessment of numerous individual external pipe lengths. For the purpose of a heat loss calculation, a new pipe length is defined as beginning where a pipe size or insulation changes, or where a pipe changes from above ground to below ground. This is illustrated through the two examples provided below:

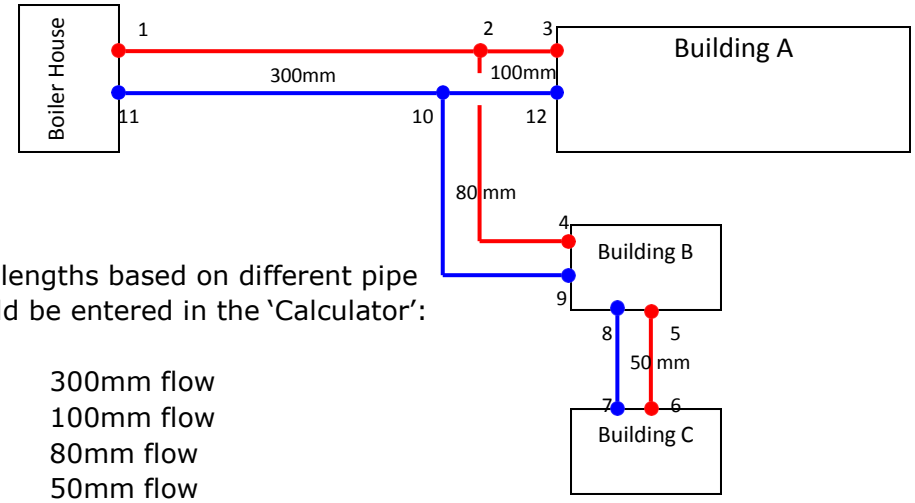
Figure 1: Pipework Example 1



Four pipe lengths should be entered in the 'Calculator':

1-2 Underground flow
2-3 Above ground flow
4-5 Underground return
5-6 Above ground return

Figure 2: Pipework Example 2



Eight pipe lengths based on different pipe sizes should be entered in the 'Calculator':

1-2	300mm flow
2-3	100mm flow
2-4	80mm flow
5-6	50mm flow
7-8	50mm return
9-10	80mm return
10-11	300mm return
10-12	100mm return

What if I need to account for losses from other items of plant such as an accumulator tank?

Where losses from external accumulator tanks need to be accounted for, you should complete the 'Storage Tanks' tab on the HLA. Note that any external tanks cannot be considered 'properly insulated' in line with the RHI Regulations and therefore associated losses will be deducted from periodic support payments. The results of the 'Storage Tanks' calculator will be reflected in the QHLF displayed on the 'Results' tab of the HLA.

Where losses from other items of plant such as pumps need to be accounted for, Ofgem will consider calculations submitted by applicants on a case by case basis.

Air Temperature

CIBSE have developed Test Reference Years (TRY) of weather data that include air temperatures. This data is real weather data for which an average is determined on a month by month basis. Hourly data is available for a number of sites across the UK. Average temperatures can be estimated based on the CIBSE TRY weather data to use in the standard calculation method for heat losses from pipes.

Monthly average outside air temperatures have been calculated for 13 locations around the UK. These locations provide a reasonable spread of conditions across the UK. Where a specific area isn't included it doesn't necessarily mean that your calculation is wrong; for example Glasgow offers a reasonable approximation to the west coast of Scotland and Western Isles.

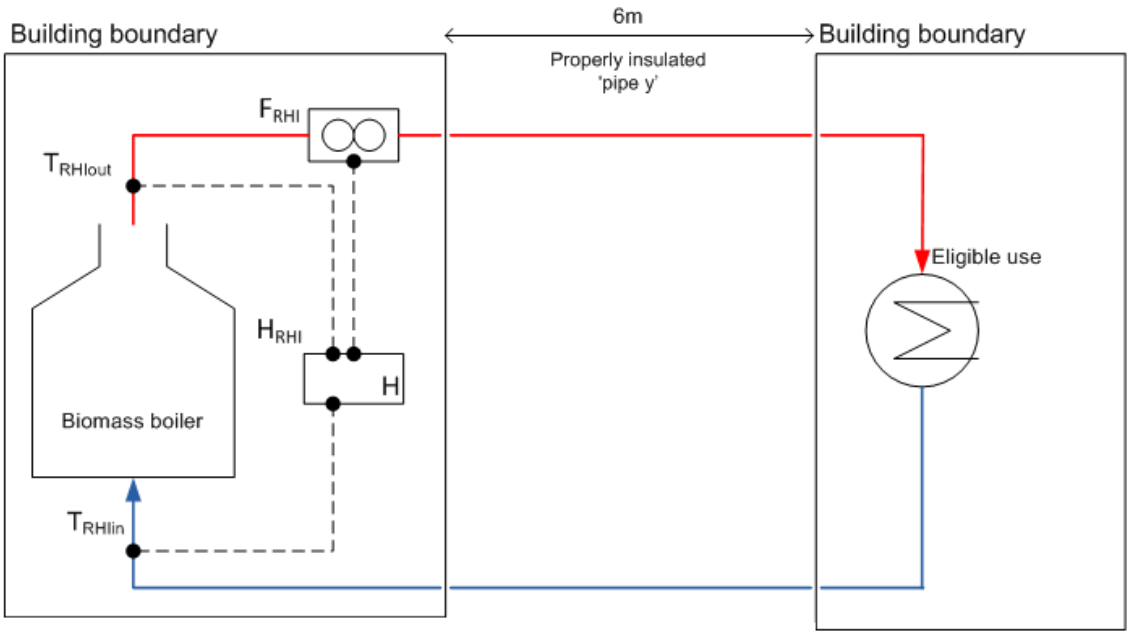
Ground Temperatures

Ground temperatures across the UK were provided by the 'Electrical Research Association' at a given depth and for a given month of the year.

Buried pipes will vary in depth but will be at least 500mm below surface level if installation has followed good practice. The temperatures at this depth have therefore been used in the Heat Loss Calculator.

8. Worked Examples

Example 1: All external pipework is above ground, 'properly insulated' and <10m.



Step 1: Complete Question 1 of the ''Above Ground Pipework' tab to see if the pipe length may be considered 'properly insulated'.

Question 1: 'Properly Insulated' External piping		
a	Piping material:	**Metal**
b	Average temperature of fluid running through pipes (or hot face temperature of process pipework) (deg C):	**≤ 95ºC**
c	Pipe diameter (mm), excluding any insulation:	**38**
d	Is the pipe diameter entered above the nominal or outside measurement?	**Nominal**
e	Use the manufacturer heat loss declaration instead of specifying insulation properties?	**No**
f	The heat loss rate for the pipework (W/m) defined in the manufacturer declaration:	
g	Insulation thickness (mm):	**50**
h	Thermal conductivity of the insulation (W/m per deg K):	**0.037**
i	What is the surface finish of the insulation?	**Low emissivity**
j	Using the above evidence that you have provided the adjacent cell should provide you with an answer as to whether Ofgem will/ won't accept your insulation as being 'properly insulated'.	**PASS**

NB. In this example the pipe length is 'above ground' and may be considered 'properly insulated'.

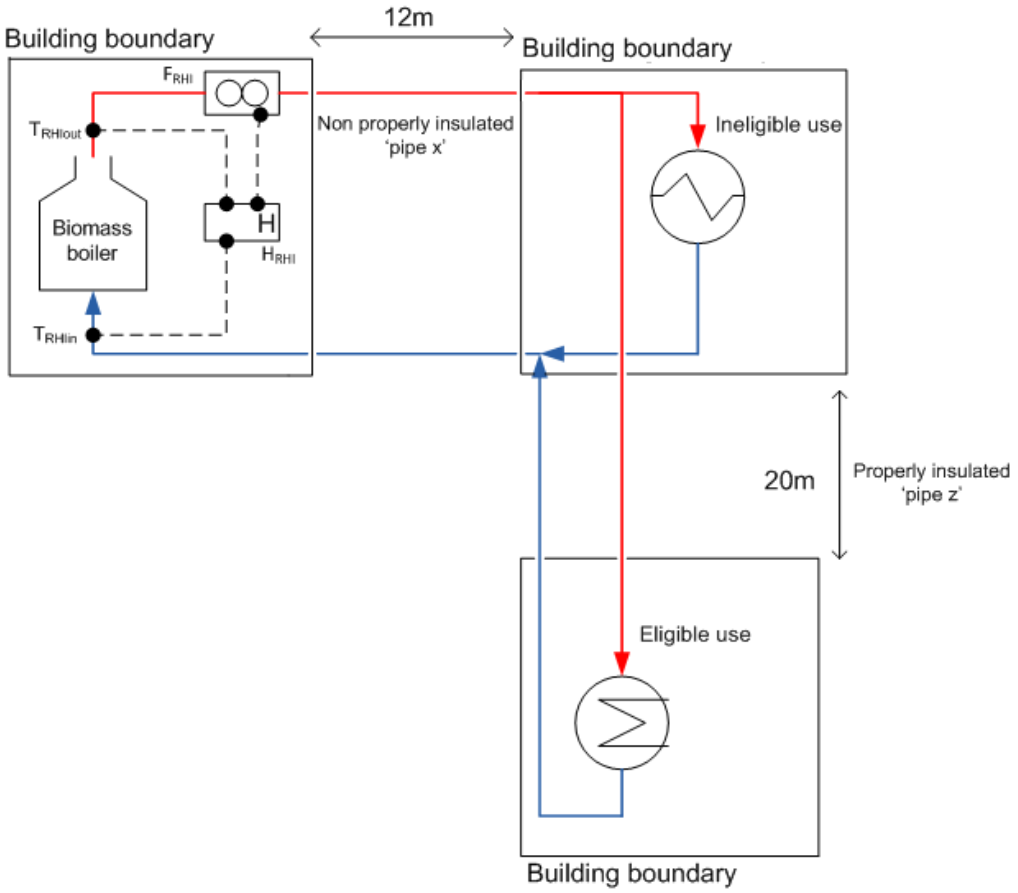
Step 2: Replicate the details in rows 'a' to ''j' into the table in Question 2. Label the pipe length so that it can be identified on your schematic diagram, and enter the length.

	Description of pipe to enable it to be identified on schematic:	Flow and return, Pipe Y
	Pipe Length (m):	6.0
a	Pipe material:	Metal
b	Average temperature of fluid running through pipes (or hot face temperature of process pipework) (deg C):	≤ 95ºC (hot water)
c	Pipe diameter (mm), excluding any insulation:	38.0

d	Is the pipe diameter entered above the nominal or outside measurement?	Nominal
e	Use the manufacturer heat loss declaration instead of specifying insulation properties?	No
f	The heat loss rate for the pipework (W/m) defined in the manufacturer declaration:	
g	Insulation thickness (mm):	50
h	Thermal conductivity of the insulation (W/m per deg K):	0.037
i	What is the surface finish of the insulation?	Low emissivity
j	Result of 'Properly Insulated' Test above?	PASS
k	What should I do next?	**Disregarded**

The results of the table will confirm that you can disregard the heat losses from the external pipework. This means the losses will not be deducted as part of your payment formula.

Example 2: A combination of 'properly insulated' and 'non properly insulated' pipework.



Step 1: Complete Question 1 of the 'Above Ground Pipework' tab for each individual pipe length above ground to see if they may be considered 'properly insulated' and replicate these details into Question 2.

	Description of pipe to enable it to be identified on schematic:	Flow and return, Pipe Y
	Pipe Length (m):	40.0
a	Pipe material:	Metal
b	Average temperature of fluid running through pipes (or hot face temperature of process pipework) (deg C):	≤ 95ºC (hot water)
c	Pipe diameter (mm), excluding any insulation:	38
d	Is the pipe diameter entered above the nominal or outside measurement?	Nominal
e	Use the manufacturer heat loss declaration instead of specifying insulation properties?	No
f	The heat loss rate for the pipework (W/m) defined in the manufacturer declaration:	
g	Insulation thickness (mm):	50
h	Thermal conductivity of the insulation (W/m per deg K):	0.037
i	What is the surface finish of the insulation?	Low emissivity
j	Result of 'Properly Insulated' Test above?	PASS
k	What should I do next?	**Add to PI Calculator**

The results of the table will confirm that you need to add the pipework details to the PI Calculator tab to assess the estimated heat loss.

Step 2: Complete Question 1 of the 'Buried Pipework' tab for each individual pipe length which is buried to see if they may be considered 'properly insulated'.

	Length (m)	**Description of pipe to enable it to be identified on schematic:**	**Pipework make and model**	**Pipework insulated in accordance with:**	**What should I do next?**
1	**12.0**	**Pipe X - Combined flow & return**	**Smith's Pipework - Duo**	None of the above	Add to Non PI Calculator

In this example the pipework is not insulated in accordance with any of the standards required in the Regulations (see section 2) and therefore it cannot be considered 'properly insulated'. The pipe length should be added to the 'Non PI Calculator'.

Step 3: In order to obtain the results of the heat loss calculations you are required to complete both the 'PI Calculator' and 'Non PI Calculator'.

'PI Calculator':

Projected Annual Generation	kWh	100,000

Distribution System Details

Pipe Sections	Units	Total	▼	▼	▼
Section Name	-	-	*Example*	Pipe Z	Pipe Z
Flow or Return?	-	-	*Flow*	Flow	Return
Length	m	40	*1000*	20	20
Pre-insulated or Buried Pipework?	-	-	*No*	No	No
Not Pre-insulated					
Nominal Diameter	mm	-	*40*	User Defined o.d.	User Defined o.d.
Outside Diameter	mm	-	*-*	38	38
Insulation Type	-	-	*85% Magnesia*	Glass Fibre	Glass Fibre
Insulation Thickness	mm	-	*25*	50	50
User defined insulation thickness	mm	-	*-*	-	-
Surface Emissivity	-	-	*Medium*	Low	Low
External Condition	-	-	*Exposed*	Exposed	Exposed
No. Valves	-	0	*1*	0	0
Valves Insulated?	-	-	*No*	-	-
No. Flanges	-	0	*1*	0	0
Flanges Insulated?	-	-	*No*	-	-
Pre-insulated or Buried					
Ext. Heat Loss Rate	W/m K	-	*-*	-	-
Based on *ground* or *air temperature*?			*-*	-	-

Fluid Temperature

Month	Units	Total			
January	ºC	-	*80*	80	60
February	ºC	-	*80*	80	60
March	ºC	-	*80*	80	60
April	ºC	-	*80*	80	60
May	ºC	-	*80*	80	60
June	ºC	-	*80*	80	60
July	ºC	-	*80*	80	60
August	ºC	-	*80*	80	60
September	ºC	-	*80*	80	60
October	ºC	-	*80*	80	60
November	ºC	-	*80*	80	60
December	ºC	-	*80*	80	60

Operating Hours

Month	Units	Total			
January	hrs	-	*600*	200	200
February	hrs	-	*550*	200	200
March	hrs	-	*500*	200	200
April	hrs	-	*450*	200	200

'Non PI Calculator':

Projected Annual Generation	kWh	100,000

Distribution System Details

Pipe Sections	Units	Total		
Section Name	-	-	*Example*	Pipe X
Flow or Return?	-	-	*Flow*	Flow/Return
Length	m	12	*1000*	12
Pre-insulated or Buried Pipework?	-	-	*No*	Yes
Not Pre-insulated				
Nominal Diameter	mm	-	*40*	
Outside Diameter	mm	-	*-*	
Insulation Type	-	-	*85% Magnesia*	
Insulation Thickness	mm	-	*25*	
User defined insulation thickness	mm	-	*-*	
Surface Emissivity	-	-	*Medium*	
External Condition	-	-	*Exposed*	
No. Valves	-	0	*1*	
Valves Insulated?	-	-	*No*	
No. Flanges	-	0	*1*	
Flanges Insulated?	-	-	*No*	
Pre-insulated or Buried				
Ext. Heat Loss Rate	W/mK	-	*-*	0.296
Based on *ground* or *air temperature*?			*-*	Ground

Fluid Temperature

Month	Units	Total		
January	ºC	-	*80*	70
February	ºC	-	*80*	70
March	ºC	-	*80*	70
April	ºC	-	*80*	70
May	ºC	-	*80*	70
June	ºC	-	*80*	70
July	ºC	-	*80*	70
August	ºC	-	*80*	70
September	ºC	-	*80*	70
October	ºC	-	*80*	70
November	ºC	-	*80*	70
December	ºC	-	*80*	70

Operating Hours

Month	Units	Total		
January	hrs	-	*600*	200
February	hrs	-	*550*	200
March	hrs	-	*500*	200
April	hrs	-	*450*	200
May	hrs	-	*400*	200

Step 4: The results of the heat loss calculation(s) can be obtained from the 'Results' tab.

Results of heat loss calculation for 'properly insulated' pipe lengths >10m			
1	AUTOMATIC CALCULATION. Total calculated **average annual heat loss from all individual 'properly insulated' pipe lengths >10m** (kWhth).	1,093	Automatically populated upon completion of the "PI Calculator".
2	P**rojected annual heat output from the plant** (kWhth)	100,000	Automatically populated upon completion of the "PI Calculator".
3	AUTOMATIC CALCULATION. The **calculated %** of average annual heat loss from all individual 'properly insulated' pipe lengths >10m compared with the plant's projected annual heat output (kWhth):	1.09%	As the figure calculated is <3% these losses will be disregarded.

Question 3: Heat Loss Assessment Results			
a	Average annual heat lost from 'Non Properly Insulated' pipe lengths (kWhth) and external storage tanks	504	For Example: '6058'. *NB - Do NOT type 'kWhth' after the number.*
b	Average annual heat loss from 'Properly Insulated' pipe lengths >10m (kWth)		For Example: '112603'. NB - Do NOT type 'kWhth' after the number.
c	Projected annual heat output (kWhth)	100,000	
d	Total average annual heat loss from all 'Non Properly Insulated' pipe lengths, 'Properly Insulated' pipe lengths >10m (kWth) and external storage tanks.	504	
e	AUTOMATIC CALCULATION. The calculated % of average annual heat loss from the Heat Loss Calculator for 'Non Properly Insulated' pipework compared with the plant's projected annual heat output (kWhth)	0.5%	This will automatically calcuate the percentage. If the figure calculated is >6% it will need an internal assessment by Ofgem.
f	Heat loss calculation	Approved	
g	AUTOMATIC CALCULATION. Quarterly heat loss figure (QHLF) (kWhth)	126	Enter this figure into Question HH123-3 of the IT Register.

NB. The average annual heat loss from all 'non properly insulated' pipe lengths is <6% of the projected annual output of the plant. As a result, the heat loss calculation is

accepted and a QHLF is generated that will be deducted from periodic support payments. This figure should be entered in Question HH123-3 of the RHI Register.

In this example the average annual heat loss from all 'properly insulated' pipe lengths that are >10m in length is ≤3% of the projected annual output of the plant. These heat losses can therefore be 'disregarded' and are not included in the QHLF

9. Glossary

EHO	Eligible Heat Output: the heat output that the RHI payment is paid on (See RHI Guidance, Volume 1, Chapter 7 'Metering Eligibility Requirements').
External Conditions	Refers to the exposure of the pipe to air flow (wind) and the cooling effect this has. A simplified approach has been taken compared with CIBSE Guide C. A pipe is either sheltered, ie in still air, or exposed, ie open to the wind.
Flow	Pipe carrying heating water from the boiler to the heat use.
Heat Loss Assessment	A spreadsheet based tool to be completed by all applicants who wish to assess whether they will be able to disregard heat losses from external pipework, or complete a heat loss calculation, in place of installing additional heat meters.
Heat Loss Calculation	The output produced by a Heat Loss Calculator (see below).
Heat Loss Calculator	A spreadsheet contained within the Heat Loss Assessment that calculates projected heat losses from external pipework.
Nominal Diameter	The label given to the approximate internal diameter of a pipe.
Pre-insulated	Piping which is supplied with the insulation bonded to the pipe in the factory and encased in an outer protective pipe. This type of pipe is designed for use below ground but can be used above ground. The fluid carrying pipe can be steel, aluminium or plastic.
Return	Pipe carrying heating water back from the heat use to the boiler.
Surface Emissivity	A measure of the radiant energy that is absorbed or emitted from the surface. The emissivity depends on the surface finish. Shiny light coloured surfaces have a low to medium emissivity, while dark or dull surfaces have a medium to high emissivity.