Coronavirus Guidance Webinar
9th June, 2020
All slides and a recording of the webinar are available on the website later this afternoon

- CBI Update
- CLC Update
- Survey on face masks in engineering services launched
  *ECA, BESA, LEIA and SNIPEF seek to understand RPE state-of-play*
- Q&A
- BESA AGM – 2nd July
A new survey which aims to establish the availability, cost and use of respiratory protective equipment (RPE) in engineering services has been launched.

The survey, which is being run by leading engineering services trade bodies ECA, BESA, LEIA and SNIPEF, will take just minutes to complete, and is open to anyone in the engineering services industry.

The availability and cost of RPE, and most notably face masks, has become a major issue since coronavirus struck the UK. Tight fitting face masks are necessary to help protect many engineering services workers against a range of occupational respiratory hazards.

**ECA Director of CSR Paul Reeve commented:**

“Businesses continue to advise us that it is very difficult to obtain some types of protective masks, or that prices have increased dramatically, since the coronavirus outbreak.

“To further represent this issue effectively to Government and other industry stakeholders, we need to convey data on the extent of any problems that are being encountered. We therefore urge the engineering services industry to complete this short but important survey.”

**BESA Director of Member Services Debbie Petford added:** “We are urging businesses to take part in this important survey to ensure we have a full view of the scale of this issue across the sector. The difficulties in sourcing RPE and the increase in prices is affecting productivity and margins, and will continue to affect the ability of the sector to bounce back from this pandemic.”

The survey relates to issues around the procurement and use of tight-fitting face masks (such as FFP2 and 3 models), as opposed to surgical masks or general face-coverings.

The survey can be completed here - [www.surveymonkey.co.uk/r/WSTY3T6](http://www.surveymonkey.co.uk/r/WSTY3T6). It runs until 4pm on Tuesday 23 June.
Heat networks are a demonstrated model for decarbonising heat supply to Swedish DH systems between 1969 and 2015 by heat source.

Specific CO₂ emissions from Swedish DH between 1969 and 2015 by input fuel.

Source: Werner, 2017
However, heat networks in UK were often poor.

Source: SBRI Project, Optimising Heat Networks 2016
Study in 2015 showed a significant performance gap

Performance gap between Actual and Potential (W/dwelling)

Actual: 506
Potential: 70

Source: SBRI Project, Optimising Heat Networks 2016
Advantages of low temp networks

Three stages of development for UK heat networks

...driven by both design and commissioning

Driver of performance gap between Actual and Potential
(W/dwelling)

Source: SBRI Project, Optimising Heat Networks 2016
Advantages of low temp networks

Three stages of development for UK heat networks:

- **Driver of performance gap between Actual and Potential (W/dwelling)**

  - Actual: 506 W/dwelling
  - Design: 246 W/dwelling (57%)
  - Commissioning: 190 W/dwelling (43%)
  - Potential: 70 W/dwelling

Source: SBRI Project, Optimising Heat Networks 2016
Performance hierarchy for heat networks

Hierarchy performance importance: Communal HN

Hierarchy performance importance: District HN
Advantages of low temp networks

Three stages of development for UK heat networks

Most losses due to poor dwelling / HIU performance

Source: SBRI Project, Optimising Heat Networks 2016
Advantages of low temp networks

Three stages of development for UK heat networks

...but major gains are possible through correct installation

Breakdown of Network Losses per Flat by Component (kWh pa)

- Reduction 1,820 -68%
- Losses 850

Final Connection to Dwelling

Flow
Return

Plant, Laterals & Risers

Bypasses Valves

585 = Additional insulation
85 = FTemp
910 = Reduce temps
• Replace valve
• DHW/SH settings
• Keepwarm
315
240
130

Source: SBRI Project, Optimising Heat Networks 2016
But wasn’t always clear if HIU issues were design or installation

Example: Dwelling HIU performance - flow temperature, return temperature & flow rate

Source: Guru Pinpoint
Two separate initiatives came out of BEIS funded SBRI project

1. BESA HIU Test Standard
2. Acceptance Testing
UK HIU Test Standard
1. Dynamic Domestic hot water (DHW)
   • 1% time
   • 25% volume*
2. Space heating (1, 2, 4 kW)
   • 14% time
   • 55% volume*
3. Standby / keep warm
   • Different function for mechanical/electrical HIUs
   • 85% time
   • 20% volume*

* If HIU and dwelling systems are meeting design intent

Allows assessment of performance in typical conditions
Advantages of low temp networks

Three stages of development for UK heat networks

Provides data on DHW and space heating performance

Example: Test point 2a results, DHW only, DH 70°C supply

Example: Test 1b, 2kW space heating
...and keep-warm

Example: Test point 4a results, Keep-warm, DH 70°C supply
Advantages of low temp networks

Three stages of development for UK heat networks

Tests allow assessment of performance against expectation

Source: Guru Pinpoint
Tests allow assessment of performance against expectation

Standby
- 40°C flow temperature
- 32°C return temperature

Space heating
- 43°C return temperature

DHW
- 22°C return temperature

Source: Guru Pinpoint
Two separate initiatives came out of BEIS funded SBRI project

1. BESA HIU Test Standard
2. Acceptance Testing
Acceptance Testing core part of overall delivery process

Outline the practical implications of key decisions in the process

Optimise designs to reduce complexity/oversizing and identifying risks

Witnessing of key equipment install and comparing against specification

Inspect and review all stages of commissioning to identify potential issues

Ensuring performance requirements have been met through rigorous testing

Providing ongoing monitoring support to identify options to improve performance

Three stages of development for UK heat networks

Acceptance Testing core part of overall delivery process
Acceptance Testing Process

Establish Acceptance Testing Criteria
- **Review** design to determine criteria
- Client, designer and contractor **sign-off** on criteria

Initial Acceptance Testing
- Identify **systemic issues**
- Determine (pragmatic) **solutions**
- **Sign-off** on changed Criteria and/or approach (if required)
- **Roll-out** to rest of development

Acceptance Testing
- **Test** dwelling level performance
- **Contractor** rectifies any issues (if required)
- **Re-test**

Certification
- **Issue certificate** with test results – 100% dwellings

Advantages of low temp networks

Three stages of development for UK heat networks
Agreed Acceptance Testing Parameters for London based project

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Design value</th>
<th>Comment</th>
<th>Acceptance threshold</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Settings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHW setting</td>
<td>Based on kitchen tap delivery</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Space heating setting</td>
<td>35 °C</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Space heating pump</td>
<td>Schedule to be applied by flat type</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>pO₂ setting</td>
<td>10 kPa</td>
<td>May require minimal adjustment to achieve space heating flow temp</td>
<td>5 kPa, 15 kPa</td>
<td></td>
</tr>
<tr>
<td><strong>Standby readings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow rate</td>
<td>0.004 m³/h</td>
<td>Standard (HIU) standby flow rate</td>
<td>N/A</td>
<td>Based on analysis of HIU performance</td>
</tr>
<tr>
<td>Flow temp</td>
<td>45 °C</td>
<td>DHW set point</td>
<td>N/A</td>
<td>System overshoot around set point, valve hysteresis</td>
</tr>
<tr>
<td>Return temp</td>
<td>Flow temp -8 °C</td>
<td>Expected (HIU) standby return temp</td>
<td>N/A</td>
<td>Based on analysis of HIU performance</td>
</tr>
<tr>
<td><strong>Cold water delivery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final kitchen outlet temp</td>
<td>N/A</td>
<td>Measured at kitchen tap, run until temp stabilises</td>
<td>N/A, 21 °C</td>
<td>HSE guidelines, 1°C for measurement accuracy</td>
</tr>
<tr>
<td><strong>DHW delivery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to 45 °C</td>
<td>45 s</td>
<td>Measured at kitchen tap</td>
<td>N/A, 45 s</td>
<td>Resident expectation</td>
</tr>
<tr>
<td>Final kitchen outlet temp</td>
<td>6 l/min</td>
<td>Building Regulations Water Calculator</td>
<td>6 l/min</td>
<td>Measurement accuracy and pressure variation</td>
</tr>
<tr>
<td>Bath outlet temp</td>
<td>45 °C</td>
<td>DHW set point</td>
<td>42 °C, 48 °C</td>
<td>1°C for measurement accuracy, 2°C for valve hysteresis</td>
</tr>
<tr>
<td><strong>DHW readings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow temp</td>
<td>50 °C</td>
<td>Design primary flow temp</td>
<td>55 °C, 65 °C</td>
<td>Allowance for temp drop and measurement accuracy</td>
</tr>
<tr>
<td>Return temp</td>
<td>20 °C</td>
<td>Calculated DHW return temp</td>
<td>N/A, 25 °C</td>
<td>Based on analysis of HIU performance</td>
</tr>
<tr>
<td><strong>Space heating reading</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return temp</td>
<td>25 °C</td>
<td>Calculated space heating return temp</td>
<td>N/A</td>
<td>Based on analysis of HIU performance</td>
</tr>
<tr>
<td><strong>UFH readings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow temp</td>
<td>35 °C</td>
<td>Design temp</td>
<td>30 °C, 40 °C</td>
<td>Measurement accuracy</td>
</tr>
<tr>
<td>Manifold flow rate</td>
<td>Design flow rate based on commissioning sheet</td>
<td>Design 0.25 l/min, Design +0.25 l/min</td>
<td></td>
<td>Measurement accuracy</td>
</tr>
</tbody>
</table>
Advantages of low temp networks

Three stages of development for UK heat networks

Non invasive testing process
Acceptance Test profile

Source: Guru Pinpoint
Good performance is clearly visible

Standby
40°C flow temperature
32°C return temperature

Space heating
43°C return temperature

DHW
22°C return temperature

Source: Guru Pinpoint
...as is poor performance (= non compliance)

Standby
64°C flow temperature
60°C return temperature

DHW
30°C return temperature

Source: Guru Pinpoint
Acceptance Testing now a well-established process

- 34 developments where have carried out / carrying out Acceptance Testing
- 12 client organisations who have specified Acceptance Testing
- >4,700 dwellings tested to date
FairHeat has helped developed Guru Verify with BEIS funding

Assisting development of new app to improve transparency, speed, cost effectiveness and compliance of new heat networks
Guru Verify

Test results immediately available
# CERTIFICATE of Heat Performance Compliance

**Dwelling location:** Flat 104, First floor, block A.

This certificate states that the HIU has passed all the acceptance criteria and is compliant with the regulations.

## Visual checks of the HIU

<table>
<thead>
<tr>
<th>Details</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation compliant with views</td>
<td>✔️</td>
</tr>
<tr>
<td>Filling loop</td>
<td>✔️</td>
</tr>
<tr>
<td>Circuit stratification</td>
<td>✔️</td>
</tr>
<tr>
<td>Space heating set to</td>
<td>3.5</td>
</tr>
<tr>
<td>Domestic Hot Water settings</td>
<td>2.5</td>
</tr>
</tbody>
</table>

## HIU standby mode (real heat meter readings)

<table>
<thead>
<tr>
<th>Details</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>0.00kW</td>
</tr>
<tr>
<td>Flow rate</td>
<td>0.0036m³/h</td>
</tr>
<tr>
<td>Flow temperature</td>
<td>48°C</td>
</tr>
<tr>
<td>Return temperature</td>
<td>40°C</td>
</tr>
</tbody>
</table>

## HIU domestic hot water mode (real heat meter readings)

<table>
<thead>
<tr>
<th>Details</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>12.1kW</td>
</tr>
<tr>
<td>Flow rate</td>
<td>0.187m³/h</td>
</tr>
<tr>
<td>Flow temperature</td>
<td>69°C</td>
</tr>
<tr>
<td>Return temperature</td>
<td>21°C</td>
</tr>
</tbody>
</table>

## HIU space heating mode (real heat meter readings)

<table>
<thead>
<tr>
<th>Details</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>2.50kW</td>
</tr>
<tr>
<td>Flow rate</td>
<td>0.006m³/h</td>
</tr>
<tr>
<td>Flow temperature</td>
<td>71°C</td>
</tr>
<tr>
<td>Return temperature</td>
<td>49°C</td>
</tr>
</tbody>
</table>

## Domestic hot water

<table>
<thead>
<tr>
<th>Details</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery time to 45°C at kitchen</td>
<td>45 sec</td>
</tr>
<tr>
<td>Final kitchen tap outlet temperature</td>
<td>50°C</td>
</tr>
<tr>
<td>Final both top outlet temperature</td>
<td>46°C</td>
</tr>
<tr>
<td>Kitchen tap flow rate</td>
<td>6L/min</td>
</tr>
<tr>
<td>Kitchen/Living 1 setting</td>
<td>2.2</td>
</tr>
</tbody>
</table>

## Space heating

<table>
<thead>
<tr>
<th>Details</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room radiator</td>
<td>45°C</td>
</tr>
<tr>
<td>Bedroom 1 radiator</td>
<td>30°C</td>
</tr>
<tr>
<td>En-suite radiator</td>
<td>46°C</td>
</tr>
<tr>
<td>Bedroom 2 radiator</td>
<td>6L/min</td>
</tr>
<tr>
<td>Bathroom radiator</td>
<td>2.3</td>
</tr>
</tbody>
</table>

**Certificate number: 202000129**
Acceptance Testing delivers good performance

Example Network Flow & Return Temperatures, Quayside Totnes (The Guinness Partnership): 5 July 2018

Flow Temperature (°C)  Return Temperature (°C)  Delta Temperature (°C)  Average Power (kW)

Source: Guru Pinpoint
Example Network Flow & Return Temperatures, Northolt Road (Origin & Hill): 29 January 2020

Heat Network Losses <70W / dwelling

Source: Guru Pinpoint
"Since the scheme opened, the heating system has been fabulous. Residents regularly tell me that they've never had such low heating bills. It's a wonderful system for ensuring the wellbeing of our residents."

Claire Taylor, Housing and Care Manager at Quayside
Benefits of Acceptance Testing

- **Clients:**
  - Network and dwelling performing as per design
  - Large reduction in return visits and call outs
  - Happy residents

- **Contractors:**
  - Upskilling
  - Reduced revisits & call outs
  - Assurance to clients for future work

- **Designers:**
  - Knowledge that design intent has been achieved
  - Feedback into future designs

- **Residents:**
  - System that works
  - Reduced overheating
  - Cheaper bills
  - Better reliability
Acceptance Testing about to be part of CP1 (2020)

• CP1 (2020) Minimum Requirement:
  • 10% of initial dwellings to be independently tested
  • If any fail, then an additional 10% until a full set of 10% pass
  • Additional 10% random (with additional 10% if any fail)

• CP1 (2020) Best Practice:
  • 100% independently tested
Acceptance Testing = proven performance

Example Network Performance, Northolt Road: 07 June 2020

Flow Temperature: 59.600 °C
Return Temperature: 25.200 °C
Webinar Programme

Coming Up:

**Friday 12th June – International Women in Engineering Day** – Elizabeth Donnelly, CEO of the Women’s Engineering Society will be joined by a panel of women from BESA member companies talking about their experiences in the building engineering sectors.

**Tuesday 16th June – LEV** – Adrian Sims, Vent-Tech Ltd & Jane Bastow, P & J Dust Extraction Ltd
Thank you

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covid19@thebesa.com