

Technical Note		TN-006	
Test: Space heating circuit capacity, Low temperature		Test no.: 1d, 1e, 1f	
Assumption: Space Heating Low Temperature		Assumption no: 15, 16	
Rev: 001	Date: 09.04.2020	Author: Valeria Khnykina	Checked: Gareth Jones

1. Introduction

Temperature settings that are used for the low temperature regime space heating test in the BESA HIU Test Standard (Rev 09) have been selected as representative of typical for an underfloor heating operating temperature.

The low temperatures selected for the test are:

- Space heat flow temperature t_{22} – 45°C,
- Space heat return temperature t_{21} – 35°C.

The purpose of this review is to identify if these temperatures are representative of a typical underfloor heating installation, and if lower operating temperatures as 40/30°C be suitable.

2. Considerations for reducing Low Temperature setting for tests 1d, 1e, 1f

As a part of this review, a number of design guides and manufacturer documentation have been reviewed.

3. Consideration 1

Manufacturer’s design guides refer to floor surface typical temperature 29°C degrees in comfort zone areas with room temperatures of 20 degrees [1], without specifying UFH flow and return temperatures. The temperature differential of 9 degrees provides heating output up to 100W/m².

Theoretical return temperature of 30°C can be achieved with the surface temperature of 29 degrees. It is suitable to operate an UFH circuit at 40°C flow temperature if the system is designed for it (see Consideration 2).

4. Consideration 2

Wet UFH flow and return temperatures depend on the construction type of the floor surface, UFH pipe diameter and spacing between UFH pipes [2].

Screed floor construction and tighter spacing between UFH pipes allow for lower flow and return temperatures. Floor covering thermal resistance (carpets, vinyl, laminate etc.) also affects UFH operating temperatures. For example, carpeted floors have higher resistance and require increased flow and return operating temperatures.

In case of screed floors 30-35 °C mean water temperature with a 10 degrees delta T is acceptable for most installations.

Floating floor systems require 45-50°C mean temperatures and clipboard panels floor operate at 35-40°C mean temperature (at 10 degrees delta T) [2].

5. Consideration 3

This is the summary of underfloor temperature requirements from different sources:

- BS EN1264-2 - maximum temperature for the floor surface in occupied spaces is 29°C [1].
- NHBC/BSRIA Underfloor Heating guide [3] refers to BS EN1264-2 in the required floor surface temperature. It also says that the temperature at which water is required for underfloor heating is 35° to 45°C, however it doesn't specify flow and return temperatures for different floor types.
- UPNOR Design Guide [2] settings section recommends the thermostatic head is set to the required water flow temperature for the underfloor heating system, typical settings as follows: Screed floors: 40 – 45°C, Wooden floors: 50 – 55°C.
- Updated CP1 (2020 - unreleased draft document) [4] refers to typical flow temperature of 45°C and return temperature of 35°C.
- BRE District heating guide [5] says that underfloor heating systems can operate with lower flow and return temperatures, typically 35 °C/30 °C. There is no reference to different flooring types.

6. Conclusions

Specified test temperatures should be representing a “standard application”. In this case the current temperatures 45/35 degrees can be applied to different UFH construction and floor surfaces, apart from some that require even higher operating temperatures (Floating floor and carpeted surfaces).

Achieving lower operating temperatures in the range of 40°C flow and 30°C degrees return is possible with screed floor and flooring surface with low thermal resistance, however this limits the applicable system type which can affect the test suitability for existing typical conditions.

7. Recommendation

The recommendation is to maintain current UFH test temperatures:

- Space heat flow temperature t22 – 45°C,
- Space heat return temperature t21 – 35°C.

8. References

[1] BS EN 1264-2 2008, Water based surface embedded heating and cooling systems. Floor heating: Prove methods for the determination of the thermal output using calculation and test methods

[2] UPNOR Installation Guide for Underfloor heating System, Technical Information, 04/2016

[3] NHBC/BSRIA NF71 Underfloor heating, A guide for house builders, September 2016

[4] CP1 Unreleased DRAFT of the new version

[5] BRE District Heating Guide, 2014