Safe Heating in Sheltered and Social Housing

Introduction

Specification of heat emitters for sheltered housing and social housing needs to take account of the needs of the residents of these premises, above and beyond the considerations that would normally be applied to dwellings.

In sheltered housing the needs of elderly residents need to be considered to ensure that the heating system is easy to use, provides and maintains the desired comfort temperatures and does not pose a risk to the residents.

In social housing, additional considerations are the relatively high churn of residents and the variety of residents that may occupy the dwelling. These range from very young children to elderly people so the heating system, and the heat emitters in particular, need to allow for all possibilities.

Considerations for heating Sheltered and Social Housing

In terms of overall system design, the heating of sheltered and social housing is little different from any other dwelling. In most cases, the preferred form of heating will constitute a system of radiators located around the dwelling, served by a central boiler. Such a system is responsive, relatively easy to install and familiar to those people living in the dwelling.

The Chartered Institution of Building Services Engineers recommends temperatures for various dwelling areas. These temperatures are:

Bathrooms 26–27°c
Bedrooms 17–19°c
Hall/stairs/landing 19–24°C
Kitchens 17-19°C
Living rooms 20–23°C
Toilets 19–21°C

One of the major considerations when specifying radiators for sheltered or social housing is the vulnerability of residents to burning themselves on hot surfaces such as radiators and associated pipework. The landlord has a Duty of Care to ensure that such risks are identified by a risk assessment and that suitable measures are taken to reduce or negate the risk.

The surface temperature of a conventional radiator would typically be around 75°C, which can cause serious burns from just a few seconds contact. People who are particularly vulnerable to such burns include elderly people and the very young, people with mental illness, people with reduced sensitivity to temperature and those who cannot react quickly enough to prevent injury when the touch a hot surface. Burns can also be caused when an individual falls against a hot surface and is physically unable to move because of a disability or because they have been trapped by the furniture arrangement.

The severity of the injury will increase with the time that the victim is in contact with the hot surface. For this reason, areas where someone may be lying against a radiator for some time before being discovered, such as in self-contained accommodation, pose a higher risk of serious injury

The susceptibility of older people and young children to losing their balance and falling over also dictates that attention is paid to the design of radiators, ensuring there are no sharp corners that can cause serious injury.

Avoiding hot surfaces

Where a radiator system is in use, by far the most practical solution is to guard the heated areas to ensure residents cannot come into contact with hot surfaces. Such guarding measures need to be part of the design of the system, rather than ad hoc measures that may not provide complete protection. This is achieved by the use of low surface temperature radiators, specially designed for this sort of application.

Low surface temperature radiators (LSTs)

Low surface temperature radiators incorporate a casing that covers all hot surfaces, providing a safe, cool-touch solution. The casing of a cool-touch LST covers the pipework as well as the radiator, so that all hot surfaces are concealed and exposed surfaces remain at a safe temperature of no more than 43°C.

Avoiding sharp edges

As mentioned above, another consideration is the risk of elderly residents and very young children falling onto the radiator and injuring themselves from the impact. There is also a risk that visually impaired residents may injure themselves by bumping into or brushing against radiators. Conventional radiators tend to have sharp edges that can cause serious injury. The outer casing of an LST radiator must be designed to avoid sharp edges, using rounded corners and edges to minimise the risk of injury.

Positioning of radiators

With any type of radiator, positioning is important in achieving optimum performance. The standard approach is to position radiators below windows, as this is the area of maximum heat loss from a building. This also helps to prevent condensation forming on cold windows.

As insulation standards improve with the use of the latest thermally efficient double or even triple glazing, in line with the requirements of Approved Document L2 of the Building Regulations, this is less of a consideration, so positioning needs to be considered in relation to the thermal insulation of each building.

Residents of sheltered housing will vary greatly in their mobility, so care must be taken to ensure ease of access for people using wheelchairs and walking frames. In social housing blocks there may also be a need to cater for prams and push chairs.

Useful guidance is provided by Approved Document M of the Building Regulations, which states: “Corridors and passageways in the entrance storey should be sufficiently wide to allow convenient circulation by a wheelchair user. Consideration should be given to the effects of local obstruction by radiators and other fixtures”. This condition is satisfied if “elements such as columns, radiators and fire hoses, do not project into the corridor, or where this is unavoidable, a means of directing people around them, such as a visually contrasting guard rail, is provided”.

In all sheltered and social housing dwellings, greater flexibility in positioning of radiators is achieved through the use of slim line radiators that protrude only a short distance into the room or corridor. This is particularly important in bedrooms where floor space may be limited. Low water content radiators (discussed below) are particularly compact and therefore more versatile from a positioning perspective.

Ease of use

Comfort is a very personal thing and residents need the ability to adjust the temperature to suit their preferences. Effective and efficient control is achieved through the use of thermostatic radiator valves (TRVs) and these should be positioned relatively high on the heat emitter so they can be adjusting without excessive bending. The settings on the TRV should also be clear and easy to read.

Aesthetics

As radiators are such a highly visible element of a room their choice needs to take aesthetic considerations into account as well as performance and safety issues. LST radiators offer a high level of flexibility in this respect as the casing can be adapted to a wide range of spaces and shapes and supplied in a diversity of colours. Or the casing can be designed to blend with other decorative or architectural features so that it is barely visible.

Slim line radiators, discussed above, offer a compact and discrete solution that will suit the aesthetic requirements of many dwellings.

Security and Robustness

In most sheltered housing there is no need for extra robustness within the dwelling itself but in common areas such as corridors it is advisable to specify casings that will withstand the occasional knocks they may receive from trolleys, wheelchairs and walking frames. LST casings with extra strength and impact resistance do not need to be cumbersome and stylish casings are readily available.

In social housing, where young children may be accommodated, the casing should include a bottom grille so that young children on the floor cannot reach any hot surfaces. Grilles should use a mesh that is sufficiently small to prevent objects being inserted through the grille.

In some social housing, it may be necessary to take precautions against tampering and vandalism. Radiator casings should, therefore, be resistant to physical abuse and use tamper-resistant fixings so the casing can only be removed by special tools.

Sizing of radiators

Choosing the right size of radiator is essential for optimising performance. A radiator that is too small for the space will not achieve the required temperature on cold days. One that is too big will achieve the required temperature more quickly but could waste energy doing so if the thermostatic temperature controls do not react quickly enough, or if the radiator is a high mass unit which reacts slowly.

The size of radiator is determined by the volume of the room, the desired temperature and the level of insulation of the room – the latter determining the heat output in watts per cubic metre required to maintain the temperature. The table below gives a rough guide to the watts per cubic metre (W/m^3) needed relating to different levels of insulation.

The calculation used as an example below is just a rough guide. Any engineer will carry out a detailed and specific heat loss calculation and design the system accordingly.

	Watts/m^3	
INSULATION	Room temp 20°C	Room temp 24°C
Excellent	45	55
Good	65	75
Average	85	95
Poor	100	115

Worked example
Using these figures is clearly illustrated by a worked example for a room with excellent insulation, measuring 3m long x 3m deep and 2.5m high. The desired temperature is 24°C and the water temperatures are 80°C flow and 60°C return.

Calculate the volume of the room by multiplying length x depth x height:
3 x 3 x 2.5 = 22.5m^3

For excellent insulation and a desired temperature of 24°C, the W/m^3 = 55
Multiply the room volume by the W/m^3 = 22.5 x 55 = 1237.5W

Thus the required output is 1237.5W but a correction factor needs to be applied to take account of the water temperatures being used in the building, in this case 80°C flow and 60°C return. The correction factor is determined by the Euronorm standard EN442 and for these flow and return temperatures it is 0.9. To arrive at the final output of the radiator the figure derived above (1237.5) is divided by the correction factor (0.9), giving an output of 1375W. A radiator with this output is then selected.

AVERAGE CORRECTION FACTORS ACCORDING TO EN442 - 75/65/20

Tv	TL	Tr >20	25	30	35	40	45	50	55	60	65	70	75	80	85
90	20	0.63	0.69	0.75	0.81	0.87	0.94	1.00	1.07	1.13	1.20	1.27	1.34	1.41	1.48
	24	0.54	0.59	0.65	0.71	0.77	0.83	0.90	0.96	1.03	1.09	1.16	1.23	1.29	1.36
85	20	0.57	0.63	0.69	0.75	0.81	0.87	0.94	1.00	1.07	1.13	1.20	1.27	1.34	
	24	0.48	0.54	0.59	0.65	0.71	0.77	0.83	0.90	0.96	1.03	1.09	1.16	1.23	
80	20	0.51	0.57	0.63	0.69	0.75	0.81	0.87	0.94	1.00	1.07	1.13	1.20		
	24	0.43	0.48	0.54	0.59	0.65	0.71	0.77	0.83	0.90	0.96	1.03	1.09		
75	20	0.46	0.51	0.57	0.63	0.69	0.75	0.81	0.87	0.94	1.00	1.07			
	24	0.37	0.43	0.48	0.54	0.59	0.65	0.71	0.77	0.83	0.90	0.96			
70	20	0.41	0.46	0.51	0.57	0.63	0.69	0.75	0.81	0.87	0.94				
	24	0.32	0.37	0.43	0.48	0.54	0.59	0.65	0.71	0.77	0.83				
65	20	0.35	0.41	0.46	0.51	0.57	0.63	0.69	0.75	0.81					
	24	0.27	0.32	0.37	0.43	0.48	0.54	0.59	0.65	0.71					
60	20	0.30	0.35	0.41	0.46	0.51	0.57	0.63	0.69						
	24	0.23	0.27	0.32	0.37	0.43	0.48	0.54	0.59						
55	20	0.26	0.30	0.35	0.41	0.46	0.51	0.57							
	24	0.18	0.23	0.27	0.32	0.37	0.43	0.48							
50	20	0.21	0.26	0.30	0.35	0.41	0.46								
	24	0.14	0.18	0.23	0.27	0.32	0.37								
45	20	0.16	0.21	0.26	0.30	0.35									
	24	0.13	0.17	0.22	0.26	0.31									
40	20	0.10	0.14	0.18	0.23	0.27									
	24	0.12	0.16	0.21	0.26										
35	20	0.06	0.10	0.14	0.18										
	24	0.08	0.12	0.16											
30	20	0.03	0.06	0.10											
	24	0.05	0.08												

EXAMPLE

Average correction factor for boiler temperatures 82/71/21 °C = 1.15

The indicated outputs with ΔT 50 and ΔT 60 are the exact outputs. ΔT 50 output measured in accordance with EN 442 and ΔT 60 output calculated according to EN 442. An average correction factor is given in the table above for all other ΔT outputs, applicable for all dimensions.

If necessary, the radiator manufacturer will be able to assist with these calculations.

Energy Efficiency and Sustainability

Many residents of sheltered and social housing will be managing on low incomes, so it is important to ensure the heating system is as efficient as possible. This requirement is reinforced by the Government's commitment to provide 'affordable warmth' for all social housing by 2010. For that reason, many operators of social housing may have 'affordable warmth' targets they are required to meet.

Most conventional perimeter heating fluctuates widely through the course of the day, starting at full output on a cold morning and gradually easing off as the ambient temperature rises. However, it is also important that the heating system reacts quickly to changes in the space temperature caused by other factors, such as variable occupancy of rooms or solar heat gains, especially in modern well insulated buildings.

The high water volume and high mass of conventional radiators makes them quite slow to respond in this respect. A more responsive, and therefore more efficient, solution is the use of low mass low water content heat emitters. These contain as little as 10% of the water content of a traditional radiator, so they buffer less heat and react at least three times faster to fluctuations in temperature. As a result, they heat up immediately if the temperature falls below the set-point and stop heating as soon as the set-point is exceeded. Independent testing by the Building Research Establishment has shown that this can provide a saving in energy consumed of between 5% and 15% depending on outside weather conditions.

Sustainability

Sustainability is an important consideration in the design of new social housing projects and attaining the requirements will include meeting energy targets and using recyclable products wherever possible.

Maintenance

Once an efficient system has been designed and installed it will require regular maintenance to ensure that efficiency continues. As well as servicing of boilers, radiators should be bled annually and visibly inspected for leaks or damage. Because of thermal air currents, there will also be a build up dust on grilles and these will require regular cleaning.

The chosen radiators should therefore be easy to access and maintain by authorised personnel. With LST radiators, access should be as easy as possible without compromising on security. Useful features to look for are the ability to remove grilles separately from the casing for cleaning, as well as the ability to remove the casing completely without needing to drain the central heating system. This latter feature will also be useful when decorating is carried out.

About Jaga

Jaga offers a wide range of safe, cool-touch LST radiators, designed to minimise risk and comply with regulations without compromising on performance or style. Jaga’s LST radiators are created through a combination of innovation, experience and engineering excellence, making them ideal for any project where safety is paramount.

Widely used in care homes, schools, hospitals and other applications where vulnerable people need protection from hot surfaces, Jaga's LST radiators include features such as low mass low water content (low-H_2O), impact resistance, anti-tamper fixings and dirt-repellent finishes. For ease of maintenance, casings can be removed and replaced without disturbing the heating elements.

The compact nature of Low-H_2O radiators allows them to be built into a wall recess or behind seating and other wall-mounted items to provide a powerful and efficient, yet unobtrusive LST heating solution.

Sustainability and the environment

Jaga has a policy of manufacturing ecologically sustainable products, using the minimum amounts of raw materials and energy in their construction, backed by the use of environmentally friendly paint shops without solvents and with total recovery. All Jaga products are fully recyclable.