jaga

THE LOW DOWN ON LOW SURFACE TEMPERATURE RADIATORS

ACHIEVING ENERGY EFFICIENCY, SAFETY AND PLEASING DESIGN AESTHETIC WITH ONE SIMPLE SOLUTION

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Radiators are meant to emit warmth in the buildings in which we live, work and visit. The last thing you want from a radiator is to be burned when touching the unit. However, when surface temperatures soar to more than 140 °F (60 °C), this can be a recurring problem if the proper solution isn't in place.

Thankfully, today there is a safer, more reliable heating solution: radiators that maintain low surface temperatures (LST). These radiators not only provide enhanced safety, but properly maintain temperature levels and promote energy efficiency.

This whitepaper will help you understand how LST radiators function in comparison to traditional radiators. It will also outline the advantages of LST radiators for architects, engineers and developers, and provide real-life examples of buildings that have successfully installed LST solutions.

TRADITIONAL RADIATORS: RADIATION & CONVECTION

Typically, heaters are connected by pipes to boilers, which heat water to circulate throughout the radiator. These units warm rooms partially with the help of radiation, a process that requires the existence of a hot surface. The hotter the surface becomes due to the presence of the heated water, the more heat will enter the space.

Radiators may have certain added features in order to maximize the amount of surface area from which heat can emanate. For instance, cast iron radiators have numerous coils while baseboard heaters may have multiple fins for this purpose.

Heat is also emitted through the process of convection, or the transfer of heat energy by movement of a medium, such as air. Because warm air is less dense than colder air, it rises within a room from the hot heater and spreads around, displacing cooler air to the floor.

Unfortunately, as they work to produce heat, traditional radiators can reach surface temperatures higher than 140°F (60°C), which can cause serious burns in a matter of seconds. This can be a major liability for a building owner because it puts anyone who enters the building at risk, including residents, workers and guests.

LST RADIATORS: POWERING SOLELY THROUGH CONVECTION

In comparison to standard radiators, LST radiators heat rooms solely through convection by using air intake from the bottom and an escape outlet on the top to release the heated air. Convection is powerful when used along with Jaga's low-H20 technology, meaning the unit has very low water volume, allowing it to heat or cool a room quicker than traditional fan coils. In addition to producing more efficient heat, low-H20 technology also allows for the units to maintain room temperatures more accurately.
Jaga casings always have surface temperatures below 109°F, regardless of the temperature of the water flowing through them. They are safe to touch because the casings are isolated from the copper tube which houses the hot water. Other radiator manufacturers have to space their radiant panels off the finished wall to keep them from making contact with high temperatures (making the space behind a magnet for garbage), or place large protective shields in front of their casings.

Because LST radiators do not have high surface temperatures, this results in fewer limitations as to which materials can be used for the radiator's casing, which cover pipework and the heat exchanger. For example, options for casing might include wood, as with Jaga's Knockonwood radiator, or medium density fiber (MDF) boards, as with Jaga's multi-colored Play radiator.

The outer casing of an LST radiator remains cool to the touch at all times, even when the unit is operating at a high heat output. And a floor-level bottom grille ensures that hot surfaces can't be accessed from below by curious hands. This further eliminates the possibility of burns, keeping people around the radiators safe at all times.

JAGA MAXI LST RADIATOR

A PERFECT DEMONSTRATION OF HOW A SAFE AND POWERFUL RADIATOR CAN ALSO BE ELEGANT

MINIMUM TEMPERATURE AND SAFETY COMPLIANCE

Heating systems are important for maintaining proper indoor climate temperatures but they must not compromise the safety of building occupants. In North America, there are certain regulations and recommendations in place that either require or suggest proper acceptable indoor temperatures for buildings. For instance, in the U.S., the Occupational Safety and Health Administration (OSHA) recommends that temperatures in office environments remain between 68 and 76°F. Additionally, the American Society of Heating, Refrigerating, and Air-Conditioning Engineers' (ASHRAE) Standard 55-2010, titled "Thermal Environmental Conditions for Human Occupancy," describes ideal temperature levels as remaining between 68 and 78°F.

In Canada, the Canadian Centre for Occupational Health and Safety recommends that offices keep temperatures between 21 and 23°C (69-73°F). Standard CAN/CSA Z412-00 (R2011) from the Canadian Standards Association (CSA), titled "Office Ergonomics," also provides acceptable temperature ranges for workplaces. These are the same as in ASHRAE's Standard 55-2010. According to these standards, the recommended temperature ranges meet the needs of at least 80 percent of individuals.

TEMPERATURE/HUMIDITY RANGES FOR COMFORT

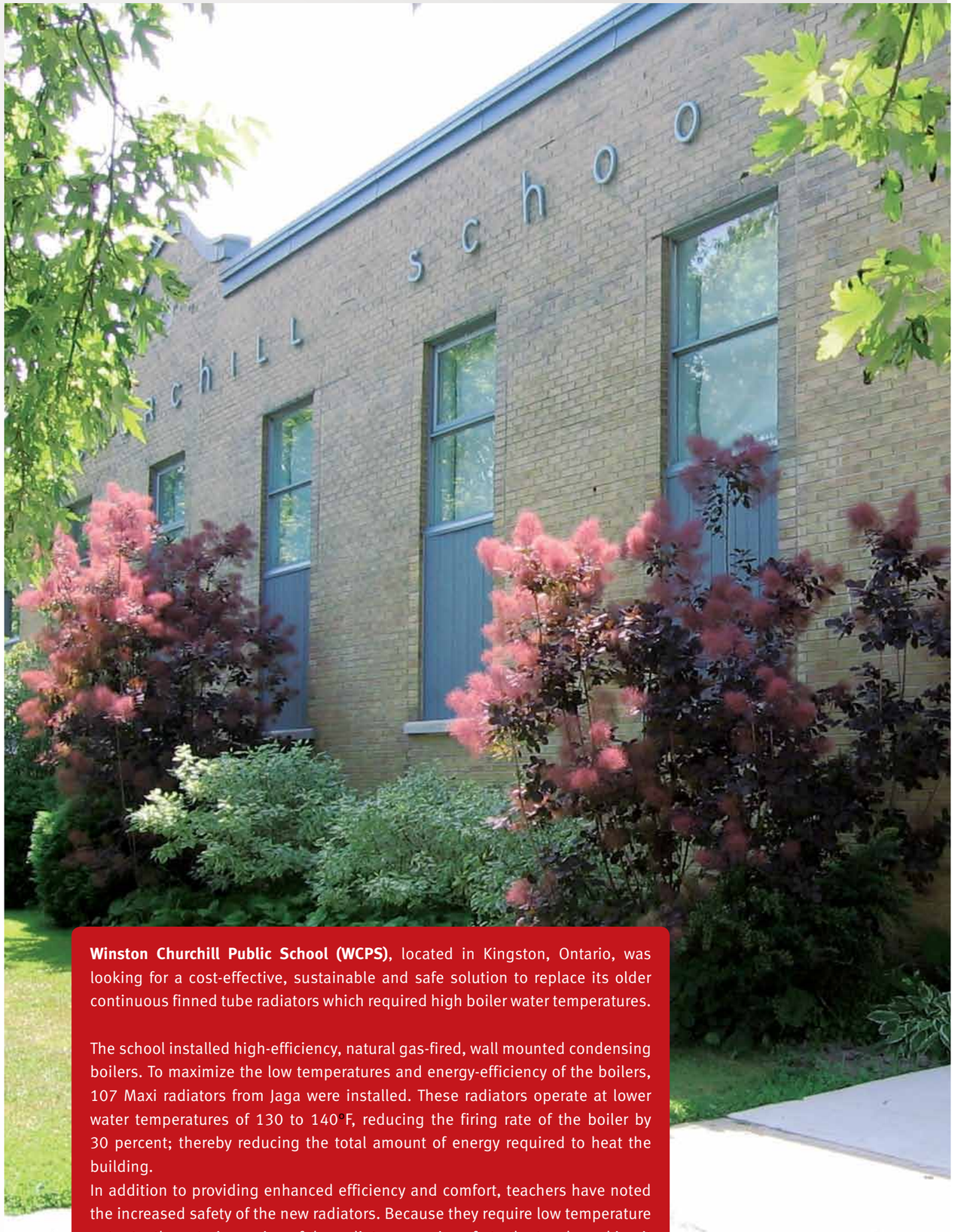
Conditions	Relative Humidity	Acceptable Operating Temperatures	
		°C	°F
Summer (light clothing)	If 30%, then	24.5 - 28	76 - 82
	If 60%, then	23 - 25.5	74 - 78
Winter (warm clothing)	If 30%, then	20.5 - 25.5	69 - 78
	If 60%, then	20 - 24	68 - 75

Source: Apapted from ASHRAE 55-2010.

It is also common for states and cities in the U.S. to set their own requirements for acceptable temperature levels and heating safety. For instance, the New York City Department of Housing Preservation and Development requires property owners to provide tenants with heat between Oct. 1 and May 31, a period known as "Heat Season." Owners must ensure that:

- The inside temperature is at least 68°F when the outside temperature falls below 55°F between 6 a.m. and 10 p.m.; and,
- The inside temperature is at least 55°F when the outside temperature falls below 40°F between 10 p.m. and 6 a.m.

Minimum temperatures and safe heating are also important in educational and daycare facilities and are typically set in place by state departments (see "Winston Churchill Public School" sidebar). Although the exact language may differ, the requirements still share the same concern for attention to safety. For instance, within its "Minimum Standards for Child-Care Centers," the state of Texas outlines that "air conditioners, electric fans and heaters must be mounted out of all children's reach or have safeguards that keep any child from being injured." New York's daycare center licensing requirements states that "radiators and pipes located in rooms occupied by children must be covered to protect them from injury." And in Pennsylvania, daycare facilities must maintain indoor temperatures of at least 65°F, while in schools, "heating shall provide for the maintenance of normal room temperature."



Winston Churchill Public School (WCPS), located in Kingston, Ontario, was looking for a cost-effective, sustainable and safe solution to replace its older continuous finned tube radiators which required high boiler water temperatures.

The school installed high-efficiency, natural gas-fired, wall mounted condensing boilers. To maximize the low temperatures and energy-efficiency of the boilers, 107 Maxi radiators from Jaga were installed. These radiators operate at lower water temperatures of 130 to 140°F, reducing the firing rate of the boiler by 30 percent; thereby reducing the total amount of energy required to heat the building.

In addition to providing enhanced efficiency and comfort, teachers have noted the increased safety of the new radiators. Because they require low temperature outputs, the exterior casing of the radiators remain safe to the touch, making it the perfect solution for schools where young children are present.

THE BENEFITS OF LST

LST radiators provide ideal solutions for maintaining minimum temperatures because they are also much safer than conventional radiators. In fact, they provide benefits for a variety of people involved in the planning and construction of a building, including architects, engineers and developers.

ARCHITECTS

Both radiator design and positioning can impact safety. Conventional radiators typically have to be strategically placed in a room to ensure proper output and distance from other features or furniture that may not be well suited near a hot unit. These radiators also tend to have sharp edges that can cause injury. This limits creativity for architects because they need to carefully plan the room around the heating element.

In comparison, LST radiators provide flexibility of design because the surface temperature is kept at a safe level. When using a low-H20 LST radiator, it can be recessed into a wall or cabinet without worry of it becoming too hot or being inefficient. With LST radiators, architects are no longer limited to certain materials, such as steel. The outer casing of the radiator can be constructed from high-grade veneer, painted MDF, chrome-plated aluminum and another custom material. The outer casing of an LST radiator can also be designed to avoid sharp edges, using rounded corners to minimize the risk of injury when the unit is not recessed. Thus, placement, aesthetic and safety are not sacrificed.

ENGINEERS

When specifying heating for establishments, engineers want to understand the estimated output of a heater, and find a balance between the correct temperature levels and safety. Sometimes, traditional radiators require a panel to be placed at the front to protect people from the unit's hot surface temperatures. These panels block radiation, reducing effectiveness of the unit and resulting in a colder space. And when these panels are in place, an engineer can't easily determine the performance level for the unit.

LST radiators eliminate this issue because they do not have high surface temperatures and don't require modifications to protect people from being burned. As long as there is a grille on the top and bottom, engineers can calculate a certified output for the unit.

LST radiators are also ideal because they provide maximum safety and assurance of performance despite the design that the architect desires. They can also maximize the efficiency of high-efficiency condensing boilers (see "Les Habitations Jeanne-Mance" sidebar). Engineers and architects will no longer wage battles over design and efficiency because LST radiators support everyone's needs.

DEVELOPERS

Developers are focused on building valuable properties, whether they are high-rise condominiums, schools and universities, hospitals or office buildings. One way to make a building more desirable is to increase comfort and safety for tenants, employees and guests (see "The Marine Gateway on the Canada Line" sidebar). Incorporating LST radiators to heat a building is one way to accomplish this.

Families especially will have greater peace of mind if they don't have to worry about the presence of hot radiator surfaces near children in their home or at school, or elderly relatives at a nursing home or hospital.

MAINTAINING AN EFFICIENT AND SAFE ENVIRONMENT

Once an efficient and safe system has been designed and installed, it will require regular maintenance to ensure ongoing efficiency and safety. As well as servicing boilers, radiators should be regularly inspected for leaks or damage. Because of thermal air currents, there will be a buildup of dust on grilles and they will require regular cleaning.

Therefore, the chosen radiators should be easy to access and maintain. With LST radiators, access will 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.

With LST heating solutions, facilities are able to provide safety without compromising energy efficiency or design aesthetic. Whether you're an architect, engineer or developer, it's important to understand how LST radiators function and the benefits that they provide so that you can find opportunities to incorporate them into future projects and better maintain compliance with minimum temperature and safety requirements when they are outlined by key administrations, associations and departments.

Les Habitations Jeanne-Mance in Montreal, Quebec is a group of public housing facilities originally built in the late 1950s. The original heating and cooling systems, installed in the early 60s, were fin-tube radiators considered current technology for that period. Over time, the radiators accumulated an extensive amount of dirt that made them inefficient. Further, they were used in conjunction with outdated boilers that only operated at about 80-85 percent efficiency. Ultimately, this meant that while heat still radiated from the units, it took a lot more energy to achieve the desired temperature.

To improve the sustainability, energy efficiency and living environment within the residences, the management organization began a 10-year modernization project which included updating the heating and cooling systems. When project engineers installed a high-efficiency condensing boiler that would operate at approximately 95 percent efficiency, they knew they needed a low-temperature heating solution in order to maximize the efficiency return.

Jaga's Basic Wall-Mounted heat emitters provided the ideal solution. They equipped smaller apartments with approximately four units each, installing up to 10-12 units in larger townhomes. A total of 2,800 Jaga units will be installed by the completion of the project.

By coupling the Jaga system with thermostatic valves, engineers for the project believe they will experience approximately 10 to 15 percent energy savings over the previous solution. In addition to the savings, the system will also improve comfort for residents because it will achieve the desired temperature at a much quicker rate. A low-temperature solution also provides added safety for residents because the heating unit wouldn't burn those who touch it.

The Marine Gateway on the Canada Line in Vancouver, B.C. features 415 condominiums, 46 rental apartments, 240,000 square feet of Leadership in Energy and Environmental Design (LEED®) Gold office space and 220,000 square feet of retail.

Developers needed an energy-efficient heating system that could also work with the onsite district energy system—meaning it must function at low water temperatures. Lastly, they wanted a solution that was compact and unimposing in the living spaces, but powerful enough to provide lasting comfort in the varying Vancouver climate.

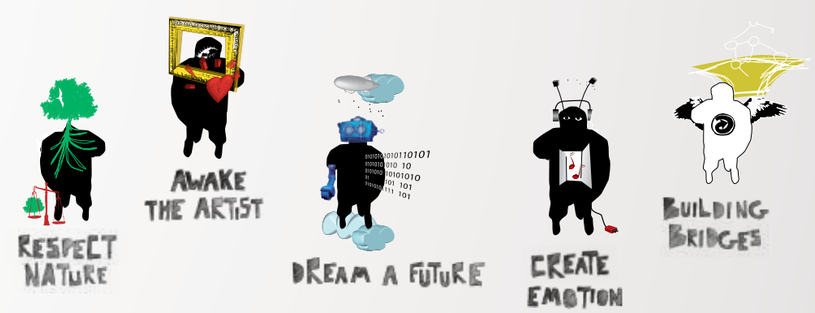
To meet these needs, developers installed thousands of Jaga's Strada Dynamic Boost Effect (DBE) heating units, a type of LST radiator. The Strada DBEs operate at low-water temperatures, meaning they can react quickly to temperature changes and keep residents comfortable. They are safe to the touch at all times, eliminating the risk of being burned. Also, the radiators themselves are very compact, effectively heating the small apartments without encroaching on the living space.

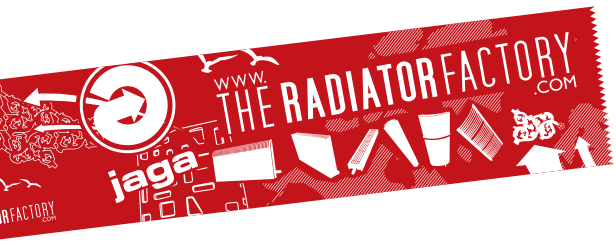
ABOUT JAGA CANADA CLIMATE SYSTEMS INC.

Jaga offers a wide range of safe, cool-touch LST (Low Surface Temperature) radiators, designed to minimize 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 schools, care homes, 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-H20) heat exchangers, impact resistance, anti-tamper fixings and dirt-repellant finishes. For ease of maintenance, casings can be removed and replaced without disturbing the heating elements.

The compact nature of Low-H20 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.





Jaga Canada Climate Systems Inc.
University Ave. E.
Suite 12A
Waterloo, Ontario N K M
Canada

E: info@jaga-canada.com
W: www.jaga-canada.com