Technical background

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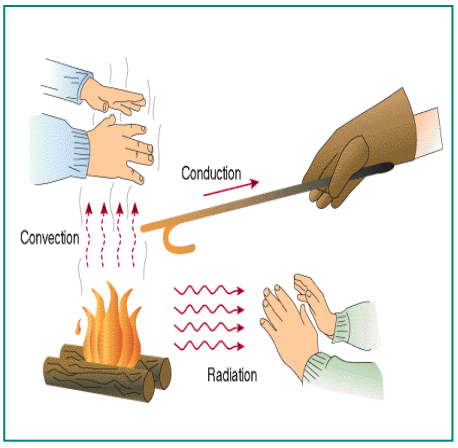
radflek pack

Heat Reflecting Liners (HRL's) made from a various sheet materials were conceived by NASA space scientists to protect orbiting craft from solar radiation. This heat control technology has spawned a variety of terrestrial applications. These include the famous "space" blankets that keep athletes and accident victim's warm, heat-reflecting sheaths for water tanks, air- conditioning ducts, heat-sensitive equipment and even High performance racing car components.

The materials used to produce this radiator reflector system are a further development where mass production techniques have provided a highly reflective composite sheet. When positioned behind a PANEL radiator it will not only prevent heat being absorbed into the wall but it will also improve air flow behind the radiator making it more responsive and much more efficient.



Heat transfer by: Conduction, Convection and Radiation

Heat Transfer and how it can effect the efficiency of radiators in your home

Heat Transfer is the study of how heat is transmitted.
We are all familiar with the fact heat does move - see diagram on the left. When the heated water enters a radiator, the heat is transferred into the metal. Its transfer through the metal is known as Conduction. When the heat gets to the outer surface it "jumps" across to the next solid surface; this is known as Radiation. Air molecules touching the radiator surfaces also heat up which cause the air to become more buoyant; described as Convection.

What is the Emissivity and how does radflek work?

Since all building materials have differing heat transfer properties, when dealing with the concept of energy efficient building materials, it is important to look at the all modes of heat transfer. The most difficult heat transfer mode to control is radiated heat as it can move in all directions at once. The best way to block radiated heat is either to reduce its intensity at source or simply by reflect it back. With its highly reflective and low emissivity surfaces **radflek** accomplishes the latter, by reducing radiant heat transfer into the wall. Without a **radflek** fitted the heat would be absorbed by the wall's solid materials. Where this happens on outer walls the heat will eventually escaping the outside. The emissivity value of **radflek** has been verified at 0.048, so over 96% of the radiating heat striking its surface is reflected back. - see table below. The reflected heat (infrared energy) does not disappear; it adds more warmth to the air between **radflek** and the radiator, increasing the buoyancy of the air current, also known as chimney effect, making the room warm up more quickly and efficiently.

Emissivity

Emissivity (or Emittance), refers to the ability of a material's surface to emit radiant energy. All materials have emissivities ranging from zero to one. The lower the emittance of a material, the lower the heat (infra-red radiant energy) radiated from its surface. Bright aluminium foil has a very low emittance, which explains its use in radiant barriers.

Reflectance

Reflectance (or reflectivity) refers to the fraction of incoming radiant energy that is reflected from the surface. Reflectivity and emissivity are related and a low emittance is indicative of a highly reflective surface.
For example, a bright surface with an emissivity of 0.03 has a reflectance of 97%.

Nominal emissivity value of materials commonly used in the building industry.

Material /surface	Nominal emissivity value	Infrared reflectivity %
Asphalt (Virtually all the radiant energy can be absorbed)	0.90 to 0.98	10 to 2
Brick	0.93	7
Concrete	0.85 to 0.95	15 to 5
Normal window glass	0.95	5
Low E window glass (Low Emissivity)	0.15	85
Limestone	0.36 to 0.90	64 to 10
Marble	0.93	7
Paint (Depending on colour and surface finish)	0.80 to 0.91	20 to 9
White paper (Note, coloured wall paper has even higher emissivity)	0.91	9
Wood	0.90	10
Medium density polyurethane insulation foam	0.85 to 0.90	15 to 10
radflec bright non-tarnish aluminium surface	0.048	96.1
If an aluminium surface is tarnished or dull then the emissivity value can be 0.80		
NB: Reflective materials as used by NASA	Emissivity = 0.03 to 0.04	
Source: Reflective Insulation Manufacturers Association		

Note that brick and even polyurethane foam insulation absorbs most of the infrared energy !

BEWARE OF OTHER UNTESTED BRANDS OF RADIATOR REFLECTOR WHERE CLAIMS OF EFFICIENCY HAVE NOT BEEN VERIFIED BY AN INDEPENDENT TESTING AUTHORITY. BE SUSPISSIOUS OF BRANDS WHERE YOU CAN SEE THROUGH THE PRODUCT WHEN HELD TO THE LIGHT, THE REFLECTIVE SURFACE IS NOT BRIGHT OR CAN TARNISH. STAY CLEAR OF PRODUCTS THAT ARE GLUED TO THE WALL AS HEAT WILL CONDUCT THROUGH THEM DIRECTLY INTO THE WALL AND WILL BE WASTED.

Radiator systems with Condensing Boilers
In order for condensing boilers to reach their optimum efficiency the water returning to the boiler should ideally be less than 50°C for most of its operational time. The radiators should have been sized by the heating engineer to operate at lower temperatures and yet still achieve the desired room temperature. By fitting a **radflek** kit behind the radiator, virtually all the available heat is encouraged to transfer into the room and not be lost into the wall. The lower operating temperatures required by condensing boilers can reduce the useful radiation and air convection from the radiators, so it's important heat is not lost through the wall behind the radiator.

Older radiator systems with Non-Condensing Boilers
Older boilers and radiator systems are normally designed to operate at higher temperatures than condensing boiler systems, so radiators in older systems can be smaller in size. By fitting a **radflek** kit behind the radiator, virtually all the available heat is encouraged to transfer into the room and not be lost into the wall. Although the higher operating temperatures would potentially increase the useful heat, much of the heat radiating from the back surface of a panel radiator just warms the wall and conducts away into the wall's structure.

NOTE: Homes built to the old Building Regulations usually have walls with much HIGHER U-values than the current requirement. The HIGHER the U-value the more heat will conduct through the wall. In older houses where radiators are mounted on outer walls and adjoining walls to other properties, even more heat can escape.

Radiator Cabinets
In many homes in order to improve appearance the radiator is hidden in a purpose designed cabinet. Unfortunately fitting a cabinet will greatly reduce the efficiency of the radiator and much more heat will be absorbed by the wall.
It is strongly recommended that a **radflek** should ALWAYS be installed behind the radiator when a radiator cabinet is fitted.

Heat loss into a wall behind a radiator – a simple test
You can test the heat loss into a wall behind a radiator for yourself.
First place your hand on a wall next to the radiator to feel its temperature – it will be relatively cool. Then carefully place your fingers on the wall behind the radiator, **BE CAREFULL NOT TO TOUCH THE HOT RADIATOR**. You will be amazed how warm the wall is behind the radiator when compared with the adjacent wall temperature. Most of the heat you feel is being carried away through the wall by conduction. With a **radflek** kit fitted, by placing you fingers between the wall and the **radflek** sheet you will discover the wall is virtually cold! This test proves the **radflek** is doing its job.

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radflek™
don't waste warmth

Which size kit should I buy?

Usage

The **nbs/radflek kits** are sized to fit radiators with a nominal height of no more than 650mm x nominal length of 1300mm, or radiators with a nominal height of no more than 1250mm x a nominal length of 700mm.
The **sheets can be cut** to fit smaller or lower radiators including low "U" shaped radiators fitted underneath bay windows – refer nbs INSTRUCTIONS.
The following tables give you some idea how many cut sheets can be made from a 600mm x 1200mm sheet supplied in the kit.

Examples of size and number of HORIZONTAL proportion radiators per radflek™ sheet.

Radiator size	Height mm	Length mm	Height mm	Length mm	Height mm	Length mm	Height mm	Length mm
mm	350	1300	400	700	650	700	650	1300
Radiators per **radflek** sheet	**2**		**3**		**2**		**1**	
Cut sheet size mm	300 x 1200		350 x 600		600 x 600		600 x 1200	

Examples of size and number of VERTICAL proportion radiators per radflek™ sheet.

Radiator size	Height mm	Length mm	Height mm	Length mm	Height mm	Length mm	Height mm	Length mm
mm	1250	400	650	400	650	500	1250	700
Radiators per **radflek** sheet	**2**		**4**		**3**		**1**	
Cut sheet size mm	1200 x 300		600 x 300		600 x 400		1200 x 600	
All sizes are nominal								

PLEASE NOTE, A radflek™ SHEET CAN BE CUT TO ANY SIZE BUT THERE WILL BE WASTAGE WITH SOME SIZES

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