Now in compact version and thus in all multi-panel Kermi steel panel radiators.

X2 INSIDE

KERMI

THERM X2

THE COMPLETE ENERGY-SAVING PROGRAMME.

MADE IN GERMANY

Therm X2
Save energy Gain comfort

Therm X2.
The new standard in heating technology.

THE ENERGY-SAVING INNOVATION

The times demand a new generation of radiators: Therm X2. The energy-saving radiator.

In a time in which energy costs are increasing constantly, legal requirements are becoming more stringent and customer desires for cosy and comfortable living are becoming stronger, Kermi provides a unique solution: Therm X2. The first and worldwide only steel panel radiator with serial flow-through, which saves up to 11% of energy, which at the same time ensuring 100% comfort – at all operating points. A milestone of heating technology, precisely adapted to the requirements of the new standards and regulations and the improved insulation standards for new buildings and renovations.

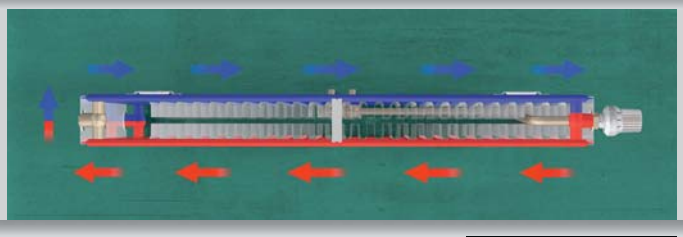
Give your business a real boost – with Therm X2. For a clear competitive edge, complete customer satisfaction, less pricing pressure and greater added value.

WITH THE UNIQUE PLUS IN COMFORT.

THE PROBLEM:

In controlled operation, the rated heating load and required heat output diverge from each other greatly.

PAGE 2



THE SOLUTION:

Therm X2 sets a new standard in heating technology. With serial flow-through instead of parallel flow-through.

PAGE 4

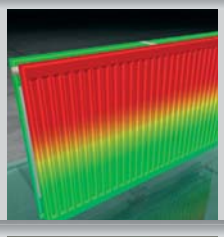
THE NEW REQUIREMENTS:

Maximum radiation output even at low flow rates for optimal comfort.

VDI 6030

THE CHANGED CONDITIONS:

Decreased heating requirements due to improved insulation standards.



Optimal dynamic response.

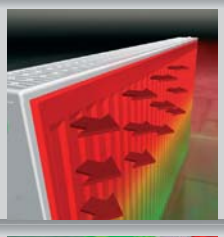
up to 25 % shorter heating up time

PAGE 6

Corresponding addition in radiator design for the desired dynamic heating up output.

DIN EN 12831

Lack of comfort on the part of the customer and unnecessary complaints.



Maximum radiation output into the room at every operating point.

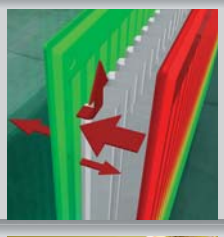
up to 100 % higher radiated portion

PAGE 8

Confirmation of the energy efficiency of all heating system components.

DIN 4701-10 V 18599-5

Increased customer requirement for maximum energy savings.



High heating efficiency.

up to 11 % energy savings

PAGE 10

THE PRODUCT RANGE:

Therm X2
Profil-V / VM
Plan-V / VM

Therm X2
Profil-K
Plan-K
Plan-K Hygiene

Therm X2 Profil-K / Plan-K
Replacement radiators
Verteo-Profil
Verteo-Plan

PAGE 16

Therm X2
Save energy Gain comfort

FUNCTIONAL PROBLEM: CONTROLLED

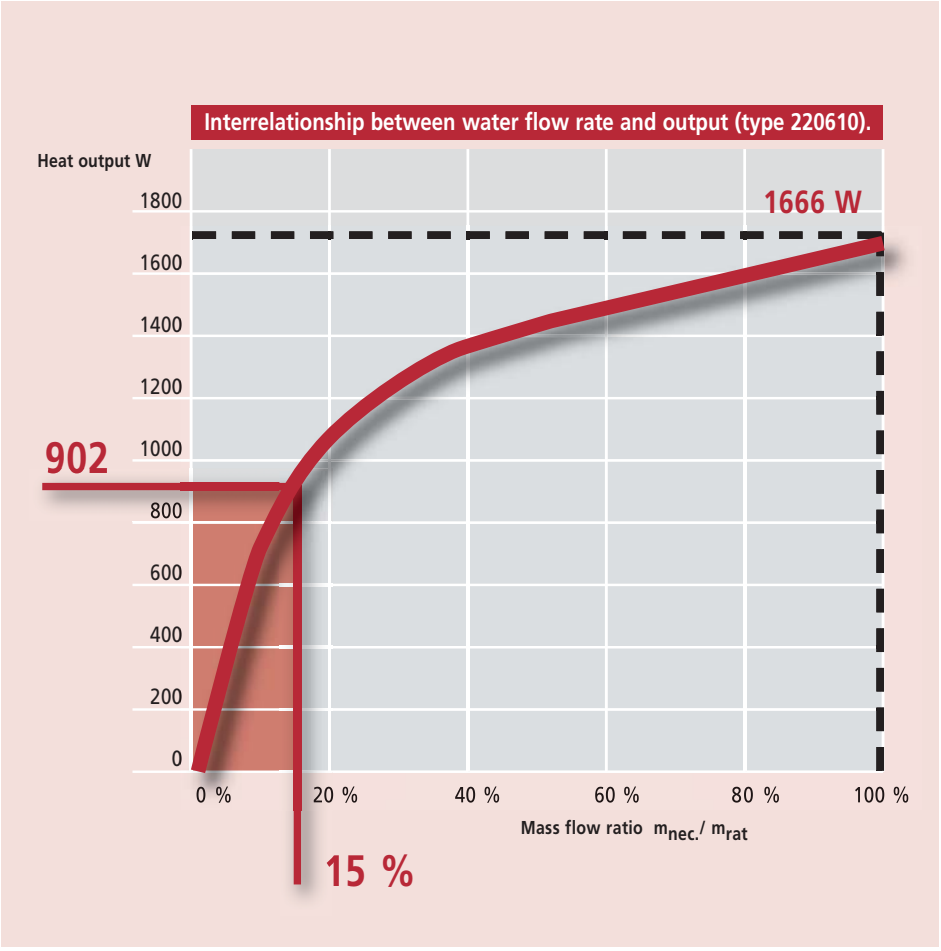
An example from practice shows the weak points of the conventional steel panel radiator technology.

An example from practice shows where the weak points of conventional steel panel radiator technology are today.

Living room in new building or modernised old building, full thermal insulation	
Surface:	31.5 m²
Window 1:	1.3 m²
Window 2:	1.3 m²
Exterior door 1:	2.3 m²
Exterior door 2:	2.3 m²
Single family house	
Building mass:	heavy
Building location:	moderate screening
Air-tightness:	very air-tight
Location:	94526 Metten, Germany
Rated outdoor temperature:	-18° C
Annual mean:	6.3° C

Room heating requirement	
Ventilation heating requirement $ø_V$:	508 W
Transmission heating requirement $ø_T$:	1,174 W
Total requirement $ø_{HL, net}$:	1,682 W
Radiator design acc. to DIN 12831	
Heating requirement $ø_{HL, net}$	1,682 W
Additional heating up output $ø_{R,H}$	794 W*
Rated heating load $ø_{HL}$	2,476 W

*) This value is based on the following assumptions: n = 0,5 1/h, Reheating time = 2 h, Temperature decrease during the setback = 2.2 K
Building mass heavy
>> f_{RH} = 25.2 W/m²; $F_{RH} = A_i * f_{RH}$ = 31.5 m² * 25.2 W/m² = 794 W



Operating point of the radiator	
Rated heating load $ø_{HL}$	2,476 W
Necessary heating requirement $ø_{nec.}$	902 W
Output ratio $ø_{nec.}/ø_{HL}$	36 %
Mass flow ratio $m_{nec.}/m_{HL}$	15 %
Internal heat sources	
People	200 W (2 x 100 W)
Audio/TV system	400 W
Lighting	180 W (3 x 60 W)
Outside heat780 W = 31.5 % of the $ø_{HL}$	
Necessary balance $ø_{nec.}$	902 W

The conclusion:

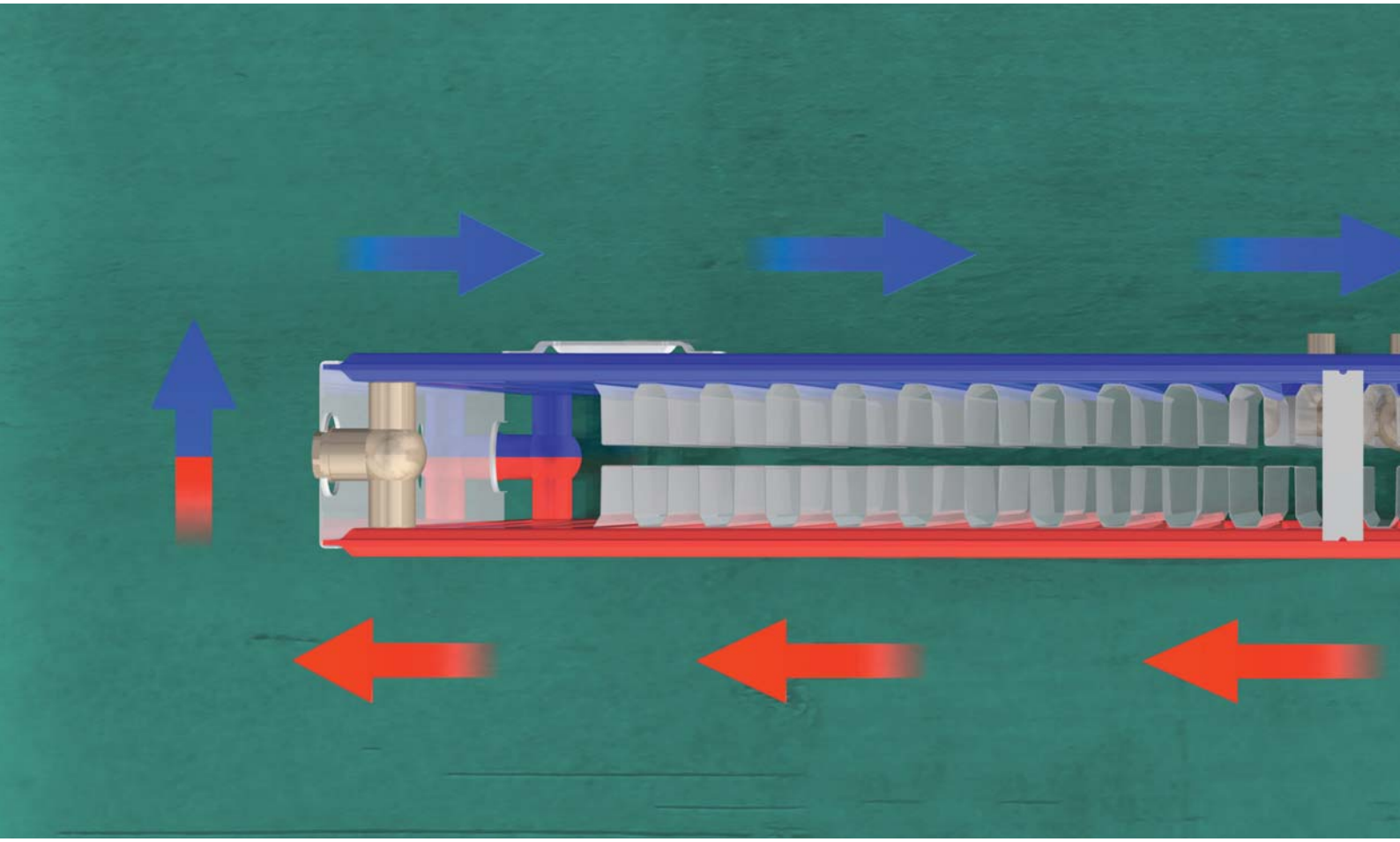
Because of the additional heat sources in the room, in controlled operation 54 % of the maximum heating requirement and thus only 36 % of the possible rated heating load are necessary.

The consequences:

The radiator must reduce the flow rate to 15 %. The mean surface temperature drops to significantly below 40 degrees. The user gets the impression that the heating is defective or out of order. This results in a lack of comfort and unnecessary complaints.

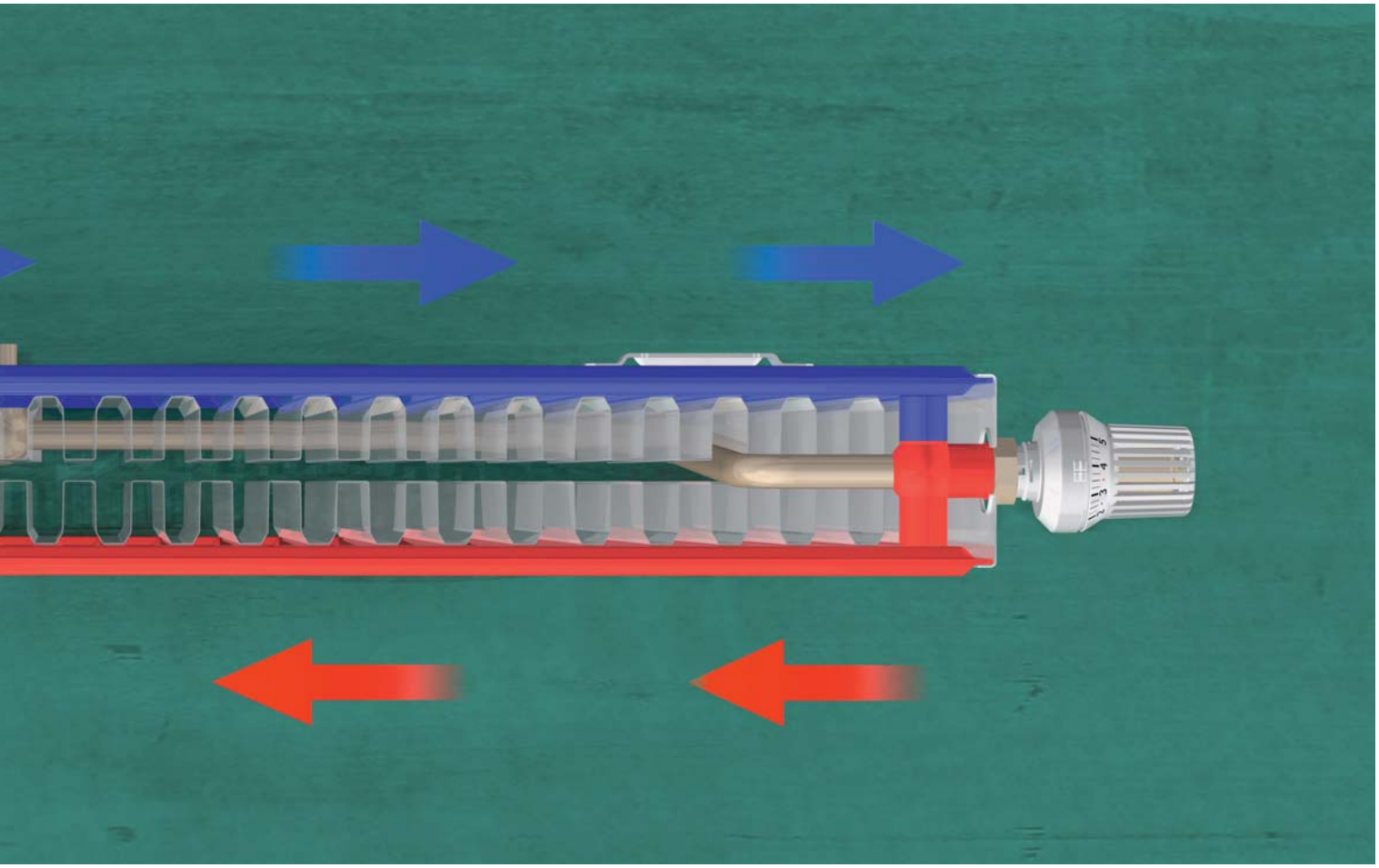
The X2 principle. Conventional steel panel radiator technology with a triple advantage.

THE X2 SOLUTION: SERIAL INSTEAD OF PARALLEL.



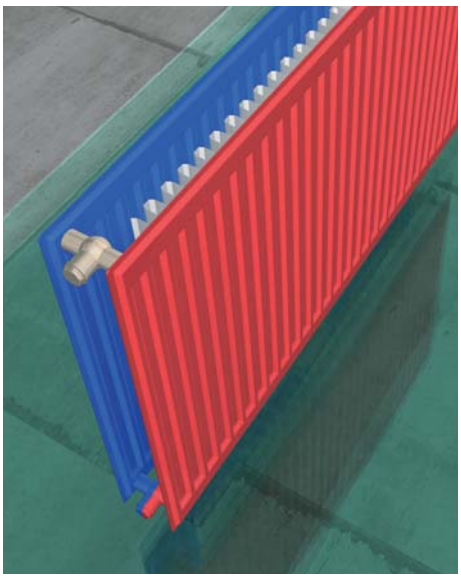
X2 INSIDE

THE SOLUTION



While in existing steel panel radiator technology all of the panels are connected in parallel and thus flowed through at the same time, the Therm X2 uses a completely new, unique principle: serial flow-through. This means that the front panel is connected in series with the panels behind it; the front panel is thus flowed through first.

In controlled operation, the front panel's output is completely sufficient and the downstream panel heats up hardly at all. Only with the increasing need for output does it also contribute to the rapid heating of the room with high convection output.



The innovation for a larger competitive edge: Significantly better dynamics, optimal comfort at every operating point and high energy efficiency.

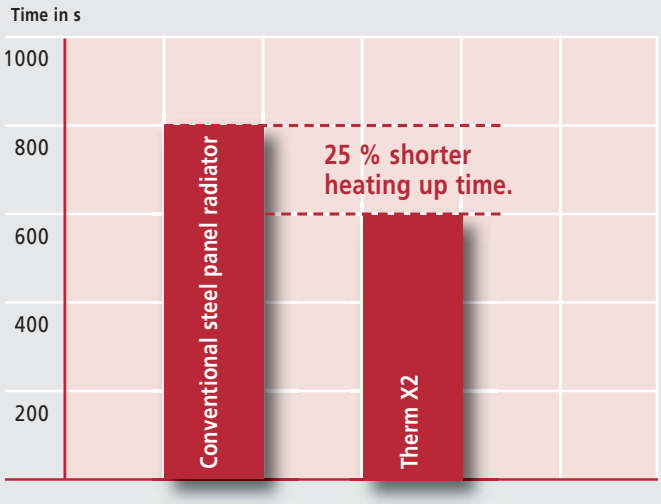
Much quicker
to the desired room
temperature.

SIGNIFICANTLY BETTER DYNAMICS.

Dynamic response

Example: Type 22, height 600, length 1000

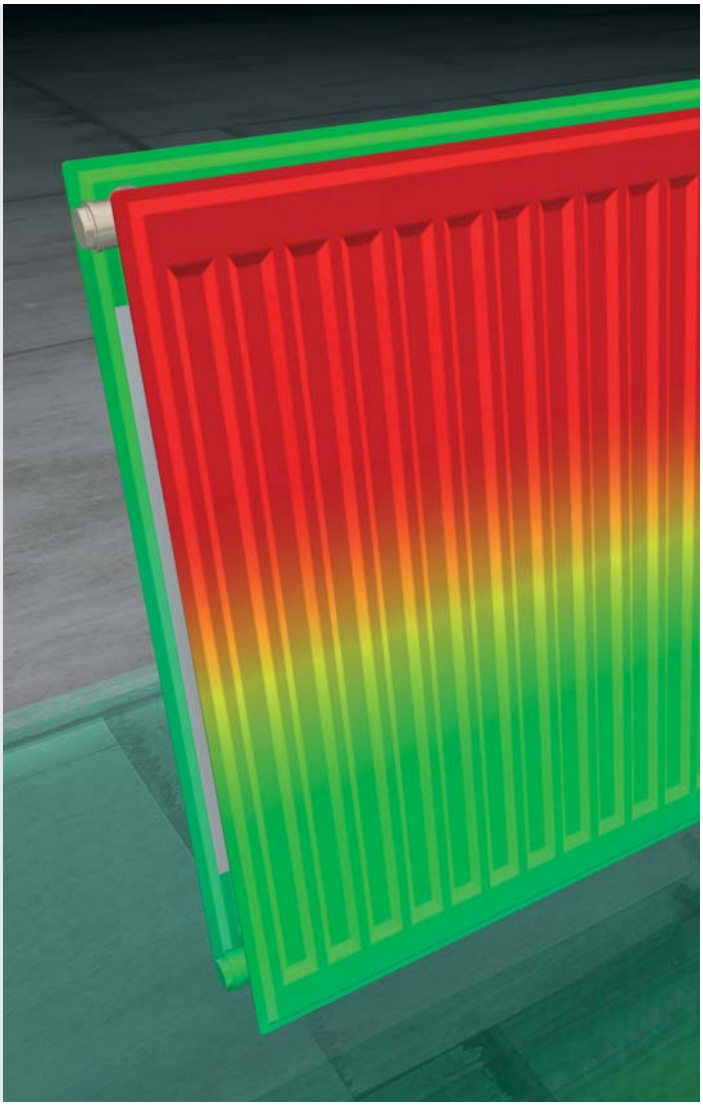
From at rest to the maximum heat output
of the radiator at 100 % mass flow rate.



Conventional steel panel radiator	Kermi Therm X2 steel panel radiator
Valve open all the way for 800 s	Valve open all the way for 600 s
Output = 1158 W (70° C / 55° C)	Output = 1158 W (70° C / 55° C)
T_O after 200 s = 43.5° C	T_O after 200 s = 50° C
T_R after 800 s = 55° C	T_R after 600 s = 55° C

T_O = mean surface temperature
T_R = return temperature
$\dot{m}$ = 66.5 l/h

Thanks to the X2 principle, the Therm X2 achieves its required heat output up to 25 % quicker.



Source: Research report by Prof. Dr.-Ing. Rainer Hirschberg "Dynamic Response and Energy Expenditure of a Steel Panel Radiator with Panels Connected in Series"

Significantly improved dynamics, quick response and shorter heating up times.

The X2 principle of serial flow-through is ingenious – and the result is unique in several ways. This is already clear from the dynamic heating-up response and the significantly shorter response time of the front panel.

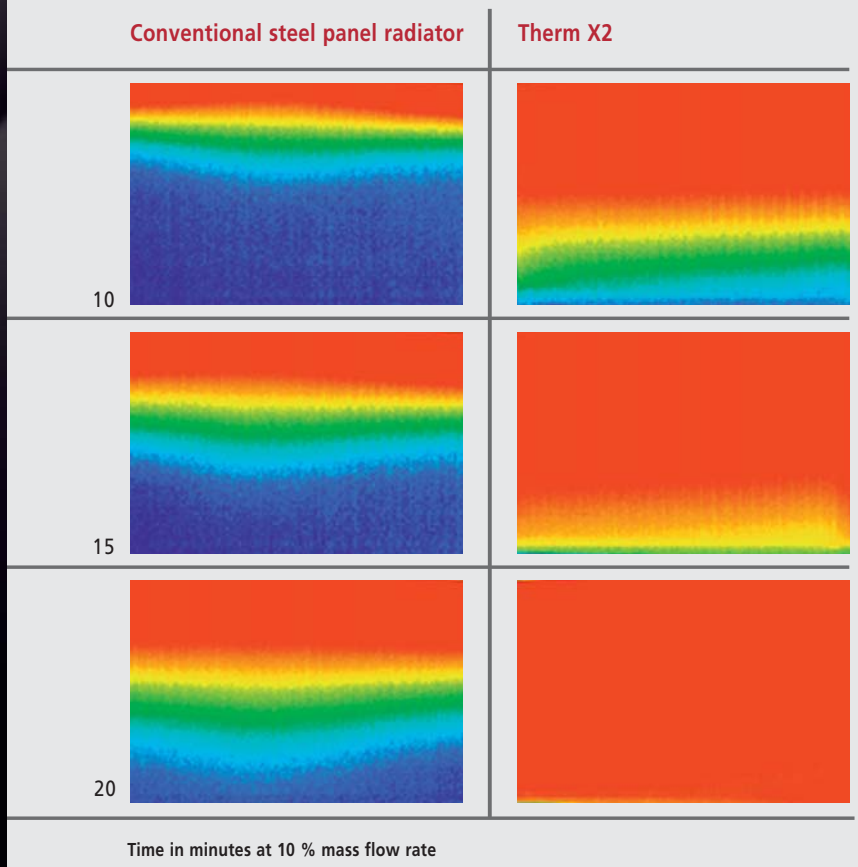
As the comparative example demonstrates, the Therm X2 beats the conventional steel panel radiator by a wide margin. The time the radiator requires to heat up to maximum heat output is up to 25 % shorter.

up to
25 %
shorter
heating up time

up to
100 %
higher radiated portion

up to
11 %
Energy savings

Comparison of heating-up phases



Time in minutes at 10 % mass flow rate

- Significantly improved dynamics
- The front panel can respond quickly
- Heating up time of the radiator reduced by up to 25%
- Quicker heating up of the room

Therm X2
Save energy Gain comfort

Greatly increased radiated portion for optimal heating comfort.

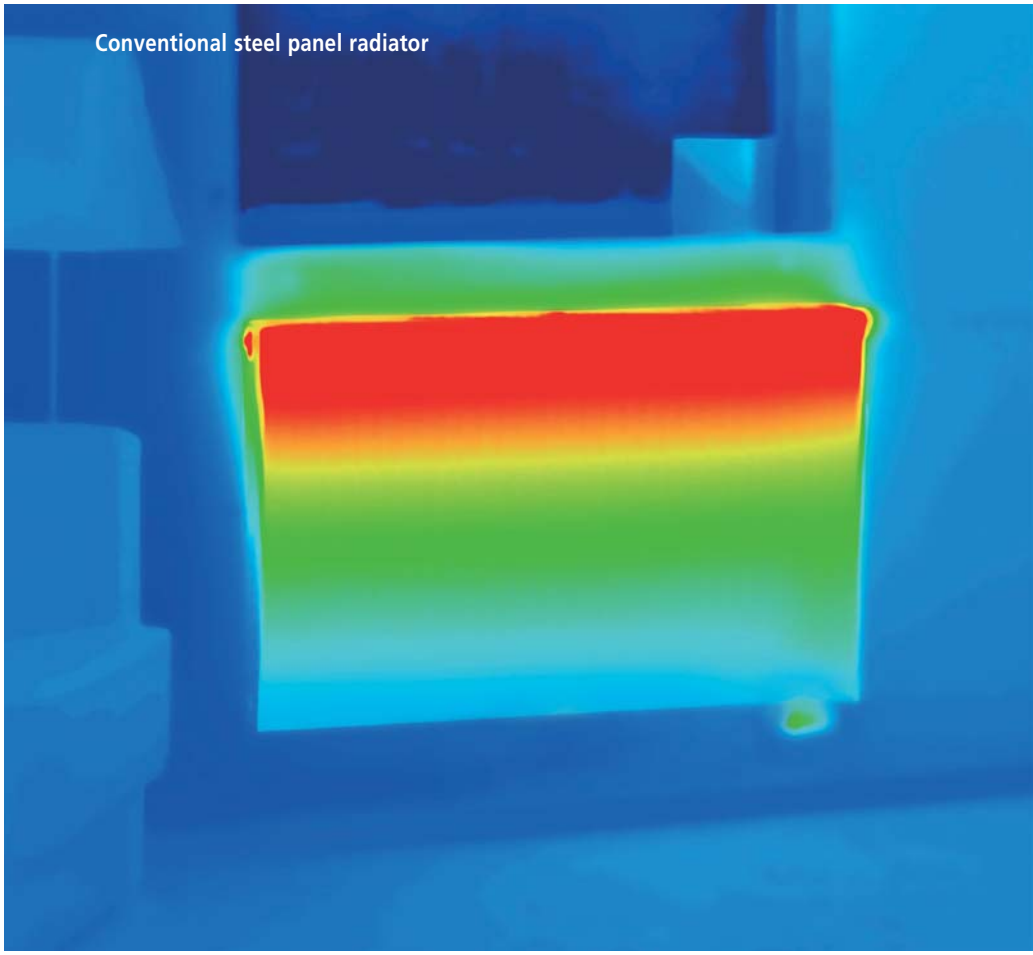
MAXIMUM COMFORT AT ALL TIMES.

DIN EN 12831 requires the following with regard to dynamic heating-up response:
"For rooms with intermittent heating operation, a reheating factor must be determined in agreement with the user."

The consequence:
The heat output that has to be installed must be increased by the required reheating output.

The result:
More of the controlled operation takes place under partial load. This reduces the radiated portion and thus the comfort.

On the other hand, VDI 6030 requires:
"In order to ensure optimal comfort at all times, the radiator should provide maximum radiation output even at low flow rates in partial load operation."



For example, in controlled operation at 20 % of the nominal mass flow rate (= approx. 65 % of the heat output of the radiator), the radiation output of the Therm X2 into the room is approx. 1.5 times higher for types 12 and 22 and 2 times higher for type 33, relative to conventional steel panel radiators.

Radiation output Therm X2 Profil-V / -VM / -K, Therm X2 Plan-V / -VM / -K

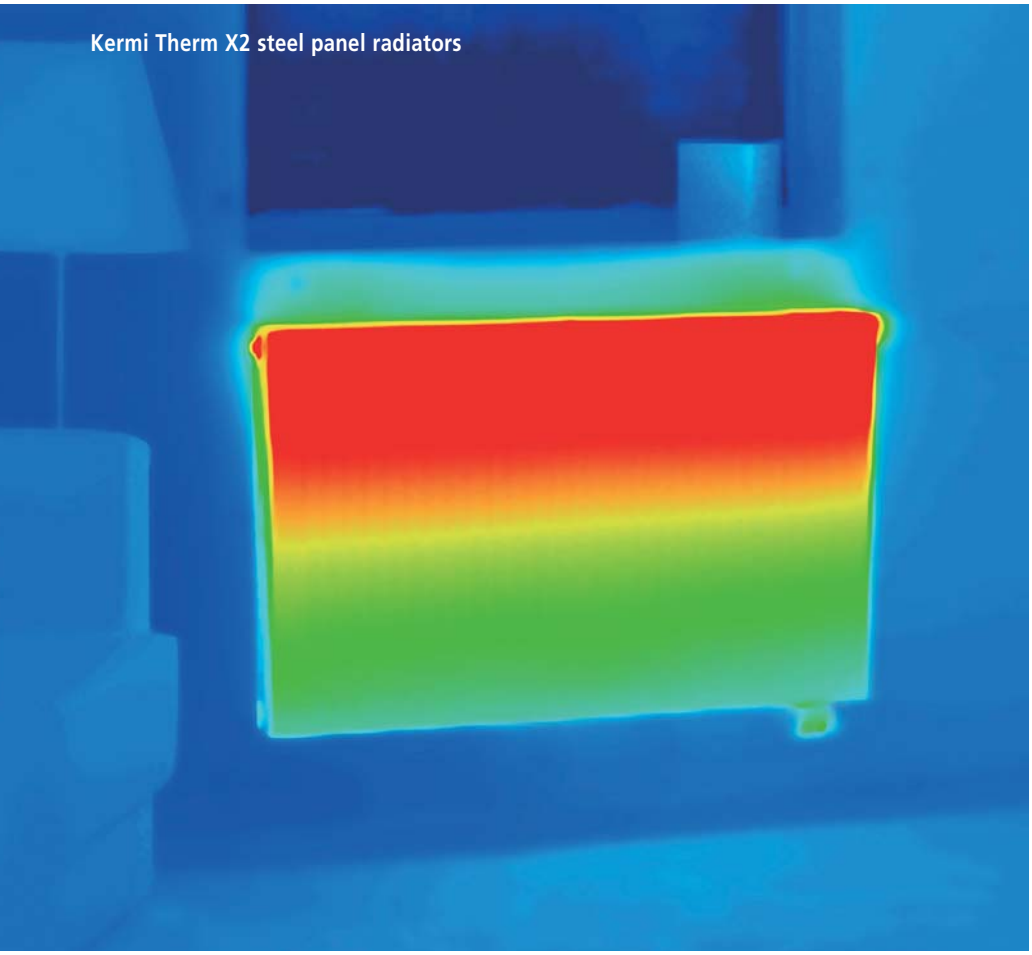
Radiated portion	Type 12	Type 20	Type 22	Type 30	Type 33
Conventional steel panel radiator	20 %	35 %	20 %	20 %	10 %
Therm X2	30 %	45 %	30 %	30 %	20 %

Source: Research report from WSPLab, Dr.-Ing. Harald Bitter "Metrological Research on Steel Panel Radiators to Determine the Room-Side Radiation Output"

up to
25 %
shorter
heating up time

up to
100 %
higher radiated portion

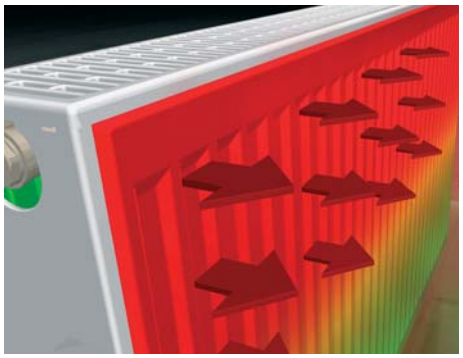
up to
11 %
Energy savings


Kermi Therm X2 steel panel radiators

Example: Typ 33 060 100, Flow temperature 50° C

Time [min]	Mass flow rate [%]	Mean surface temperature [°C]		Ø [%]
		Therm X2	Conventional steel panel radiator	
after 10	10	approx. 40	approx. 31	29
after 15	10	approx. 43	approx. 32	34
after 20	10	approx. 45	approx. 33	36

Thus the Therm X2 not only successfully counteracts the negative effects of DIN EN 12831 on the partial-load behaviour. It is also the only steel panel radiator that optimally fulfils the requirements of VDI 6030. For high customer satisfaction through a significant gain in feel-good warmth and comfort.



X2 INSIDE

Because of the additional heating load according to DIN EN 12831 that has to be calculated into the design, as well as the additional heatsources in the room, the maximum radiator output requirement is only demanded on about 10 days. That means that during 90 % – 95 % of the heating season, controlled operation takes place at a partial load of between 10 % and 30 % of the mass flow rate.

Thus the mean surfacetemperature decreases significantly. The result is a corresponding lack of comfort and complaints that take a great deal of time and expense to deal with. With Therm X2 it is very different. This is evident from the thermography comparison: a significantly higher mean surface temperature on the front panel. And consequently a radiated portion that is up to 100 % greater.

- Maximum thermal comfort at all times, even in partial load operation
- Significantly higher mean surface temperature of the front panel
- Increased radiated portion = more heating comfort

Therm X2
Save energy Gain comfort

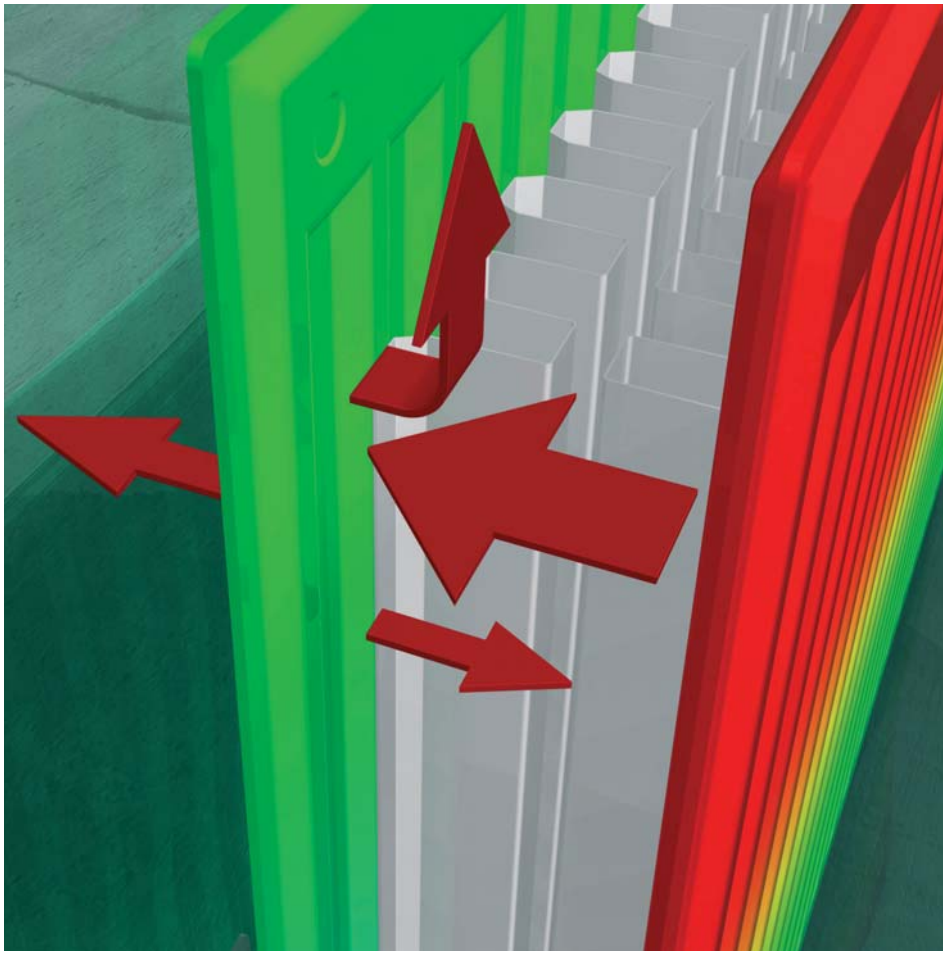
Innovative technology that is effective in saving energy.

HIGH HEATING EFFICIENCY.

DIN 4701-10 V 18599-5

DIN 4701-10 and DIN V 18599-5 describe the energy efficiency of all heating system components in the German Energy Saving Ordinance confirmation.
For radiators the standard reference values have up until now been used exclusively for this. Improved specific characteristic values have been a false indication up until now.

X2 INSIDE



Shorter heating up times, a higher radiated portion and lower radiation loss and the longer hot water path give the Therm X2 an energy efficiency that is unparalleled in the field of steel panel radiators. In controlled operation the rear panel is hardly heated at all. Due to the low heat output towards the wall side, it performs a radiation shielding function.

All of this, in conjunction with factory preset valve inserts, leads to a reduction in energy costs of up to 11 %.

Based on the expenditure numbers currently specified in the DIN 4701-10 standard, the use of Therm X2 produces for e_C in conjunction with a P controller (design after 2K or 1K) an improvement of the expenditure number by 0.03 or by 0.02 when a PI controller is used.

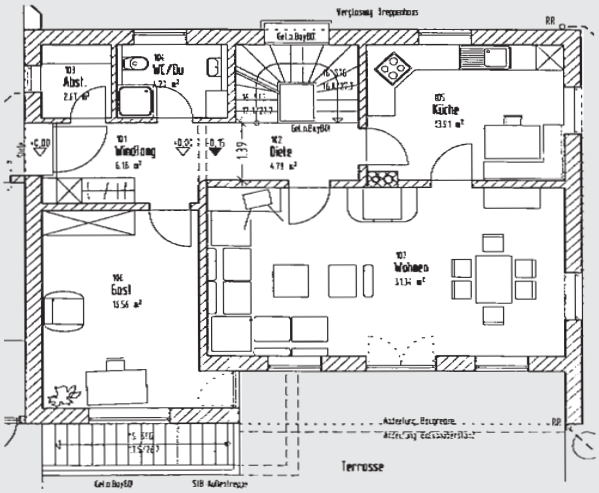
The degrees of utilisation specified in DIN V 18599 likewise improve when Therm X2 is used. The value to be used for η_C improves by 0.03 when a P controller is used (design after 1K or 2K) or by 0.02 when a PI controller is used.

- **High heating efficiency**
- **Reduction of heating costs**
- **Effective contribution to protecting the environment**

up to 25 %
shorter heating up time

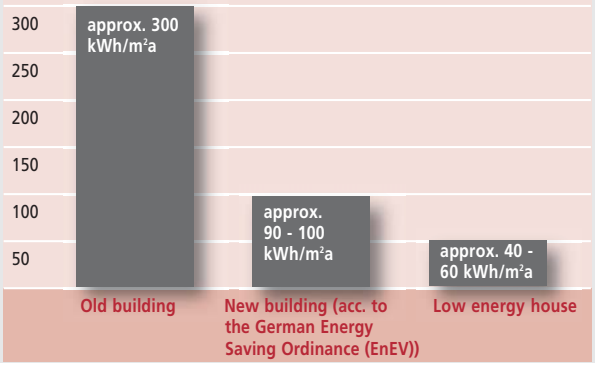
up to 100 %
higher radiated portion

up to 11 %
Energy savings



Annual primary energy requirement: Comparison of old building, new building and low energy house

Source: dena – the German Energy Agency



An investment that pays of quickly, as the example below shows.

Basis: Comparison of old building, new building and low energy house. In each case with an area to be heated of 190 m² distributed over cellar, ground floor and top floor.

	Old building	New building (acc. to the German Energy Saving Ordinance (EnEV))	Low energy house
Total annual heating requirements by building standard	57,000 kWh/a	18,050 kWh/a	9,500 kWh/a
Potential annual savings in kWh with Therm X2 (11 %)	6,270 kWh/a	1,986 kWh/a	1,045 kWh/a
Potential annual savings in litres of heating oil (10 kWh/l) with Therm X2	629 l/a	199 l/a	105 l/a
Potential annual cost savings with Therm X2*	607 €	192 €	101 €
Potential cost savings**			
after 10 years	6,884.35 €	2,180.04 €	1,147.39 €
after 15 years	10,048.63 €	3,182.07 €	1,674.77 €
after 20 years	13,233.60 €	4,190.64 €	2,205.60 €
after 25 years	16,442.55 €	5,206.81 €	2,740.43 €

*) Heating oil EL (extra light), price for 3000 l (95.50 €/100 l) incl. VAT
**) An annual increase in the price of heating oil of 3 % is assumed

Performance of the comparison on a house with an area to be heated of 190 m² distributed over cellar, ground floor and top floor.

The total heating requirements are as follows:

Old building standard:	57,000 kWh/a
New building (acc. to German Energy Saving Ordinance):	18,050 kWh/a
Low energy standard:	9,500 kWh/a

Source: Research report by Prof. Dr.-Ing. Rainer Hirschberg "Dynamic Response and Energy Expenditure of a Steel Panel Radiator with Panels Connected in Series" and "Valve Presetting - Setting Ranges, Hydraulic Balancing, Evaluation of Energy Efficiency" and research report of the Dresden University of Technology "Evaluation of Therm X2 Radiators by means of Simulation"

Efficient energy savings of up to 11 % via:

X2 Inside technology (up to 6 % energy savings)

- Faster heating up time. The forced flow-through produces a shorter heating cycle, shorter operating and the valve closes more quickly.
- Higher radiated portion into the room. Induced by the higher mean surface temperature of the front panel at every operating point.
- Lower radiation loss on the outer surfaces. Induced by the lower mean surface temperature of the rear panel at every operating point.
- Larger ΔT between flow and return. The hot water must travel a longer distance within the radiator (different heat exchanger characteristic). This increases the energy yield, especially in partial load operation at low mass flow rates, and lower losses occur in the distribution and generation.

Valves with k_V preset at the factory (up to 6 % energy savings)

- Valves with k_V preset at the factory ensure practically ideal hydraulic conditions in the heating system ex factory.
- In addition, about 20 % of the pump drive current is saved.

With energy savings of up to 11 %, the Therm X2 is a valuable plus factor in determining the building's energy efficiency for the energy certificate.

EVALUATION OF THE X2 TECHNOLOGY BY MEANS OF REAL MEASUREMENTS

Comparative measurements between Therm X2 and conventional steel panel radiators

- 1. Measurement: Heap pump (VL 40° C)
- 2. Measurement: Condensing boiler (VL 55° C)
- 3. Measurement: Low-temperature boiler (VL 70° C)

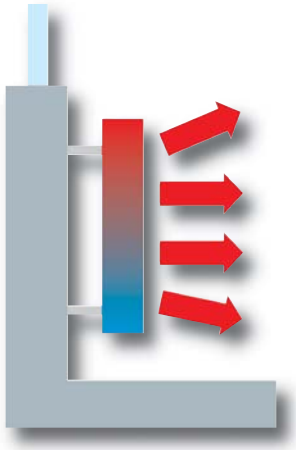
Measurement: Heap pump

Specified system temperatures: Flow (T_V): 40.0° C, Air (T_L): 20.0° C

	Conventional steel panel radiator	Therm X2	Δ
Mass flow rate:	65+-1 l/h	65+-1 l/h	-
Rated mass flow rate:	123 l/h	123 l/h	-
Ratio of $m_{nec.}/m_{des.}$:	52 %	52 %	-
Flow temperature:	41.8° C	42.1° C	-
Return temperature:	31.8° C	30.5° C	- 1.3° C (- 6 %)
Mean surface temperature of the front panel	32.4° C	37.6° C	+ 5.2° C (+ 16 %)
Mean surface temperature of the rear panel	33.1° C	30.1° C	- 3.0° C (- 9 %)

Radiation into the room

$$q = E * Cs * \left(\frac{T}{100}\right)^4$$

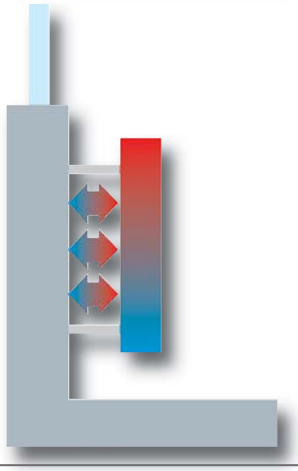


Conventional steel panel radiator	Therm X2	Δ
q = 250.97 W/m²	q = 268.50 W/m²	+ 7 %

Mean surface temperatures of the front panel:
Conventional steel panel radiator = 32.4° C
Therm X2 = 37.6° C

Radiation exchange with wall / window

$$q_{12} = E * C_{12} * \left[\left(\frac{T_{panel}}{100}\right)^4 - \left(\frac{T_{wall.window}}{100}\right)^4\right]$$



Conventional steel panel radiator	Therm X2	Δ
q_{12} = 47.71 W/m² (wall)	q_{12} = 38.22 W/m²	- 20 %
q_{12} = 53.87 W/m² (window)	q_{12}= 44.71 W/m²	- 17 %

Mean surface temperatures:
Conventional steel panel radiator = 33.1° C
Therm X2 = 30.1° C
Wall = 17.0° C
Window = 14.0° C

Formula symbols:
q = Heat flow density [W/m²]
C = Radiation exchange constant [W/m²K4]
E = Emission ratio
T = Mean surface temperature [K]

Methodology:

Evaluation of the results is based on a snap reading. To do this, a measuring point was captured at the end of the heating up phase. All calculations are based on this measuring point. The same measuring point was used for all heat generators / temperature levels. It was thus possible to achieve exact comparability of the results.

Measurement: Condensing boiler

Specified system temperatures: Flow (T_V): 55.0° C, Air (T_L): 20.0° C

	Conventional steel panel radiator	Therm X2	Δ
Mass flow rate:	64+-1 l/h	64+-1 l/h	-
Rated mass flow rate:	123 l/h	123 l/h	-
Ratio of $m_{nec.}/m_{des.}$:	51 %	51 %	-
Flow temperature:	54.1° C	54.2° C	-
Return temperature:	39.3° C	36.7° C	- 2.6° C (- 6 %)
Mean surface temperature of the front panel	42.1° C	48.0° C	+ 5.9° C (+ 14 %)
Mean surface temperature of the rear panel	43.8° C	37.6° C	- 6.2° C (- 14 %)

Conventional steel panel radiator	Therm X2	Δ
q = 284.41 W/m²	q = 306.31 W/m²	+ 8 %

Mean surface temperatures of the front panel:
Conventional steel panel radiator = 42.1° C
Therm X2 = 48.0° C

Conventional steel panel radiator	Therm X2	Δ
q_{12} = 83.87 W/m² (wall)	q_{12} = 62.46 W/m²	- 26 %
q_{12} = 88.80 W/m² (window)	q_{12} = 68.12 W/m²	- 23 %

Mean surface temperatures:
Conventional steel panel radiator = 43.8° C
Therm X2 = 37.6° C
Wall = 17.0° C
Window = 14.0° C

Measurement: Low-temperature boiler

Specified system temperatures: Flow (T_V): 70.0° C, Air (T_L): 20.0° C

	Conventional steel panel radiator	Therm X2	Δ
Mass flow rate:	67+-1 l/h	67+-1 l/h	-
Rated mass flow rate:	123 l/h	123 l/h	-
Ratio of $m_{nec.}/m_{des.}$:	53 %	53 %	-
Flow temperature:	69.8° C	69.9° C	-
Return temperature:	40.7° C	38.7° C	- 2.0° C (- 5 %)
Mean surface temperature of the front panel	49.2° C	59.0° C	+ 9.8° C (+ 20 %)
Mean surface temperature of the rear panel	52.4° C	39.5° C	- 12.9° C (- 25%)

Conventional steel panel radiator	Therm X2	Δ
q = 310.92 W/m²	q = 350.51 W/m²	+ 13 %

Mean surface temperatures of the front panel:
Conventional steel panel radiator = 49.2° C
Therm X2 = 59.0° C

Conventional steel panel radiator	Therm X2	Δ
q_{12} = 115.71 W/m² (wall)	q_{12} = 68.89 W/m²	- 40 %
q_{12} = 119.57 W/m² (window)	q_{12} = 74.33 W/m²	- 38 %

Mean surface temperatures:
Conventional steel panel radiator = 52.4° C
Therm X2 = 39.5° C
Wall = 17.0° C
Window = 14.0° C

Conclusion for the evaluations of the real measurements:

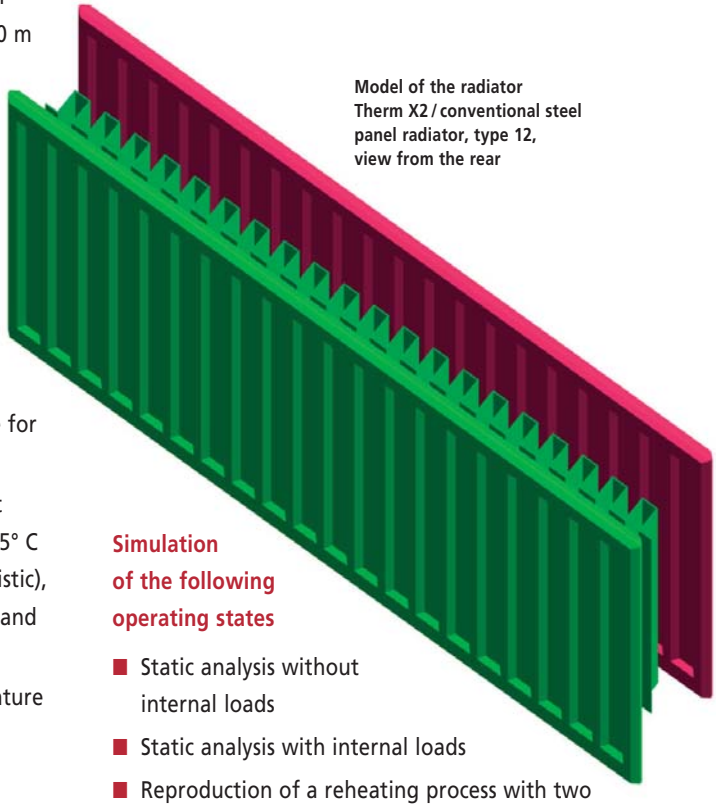
- higher mean surface temperature of the front panel; thus higher radiation output into the room
- lower mean surface temperature of the rear panel; thus significantly lower heat output towards the enclosure surface
- larger Δ between flow and return, thus more heat is output to the room

EVALUATION OF ENERGY EFFICIENCY OF

Model parameters and boundary conditions

- Modelling of the Therm X2 and the comparable standard radiator in an empty model room with 4.0 m x 5.0 m floor space and a height of 2.5 m
- Modelling of an exterior wall (4.0 m x 2.5 m) with 18 % proportion of windowsurface
- Thermal insulation level equivalent to low energy house
- Reproduction of radiator type 12 with profiled surface, simplified convection plate and uniform mean surface temperature for each panel
- Performance of static and transient simulation, outdoor temperature –5° C (or outdoor temperature characteristic), with and without air change, with and without internal loads
- Control to 22° C perceived temperature

The radiator model consists of two profiled panels and a convection plate.

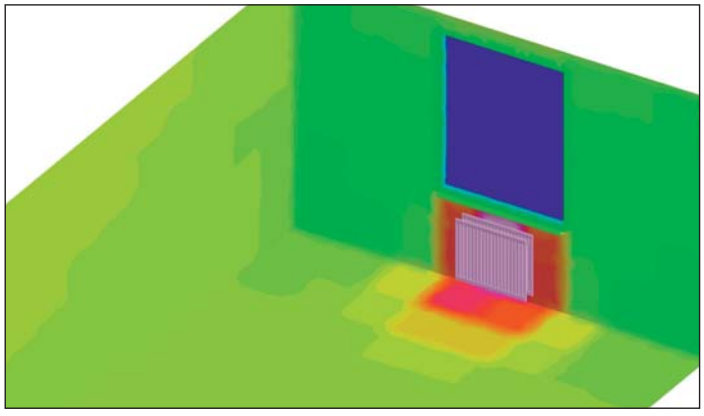


Model of the radiator Therm X2 / conventional steel panel radiator, type 12, view from the rear

Simulation of the following operating states

- Static analysis without internal loads
- Static analysis with internal loads
- Reproduction of a reheating process with two sizes of radiator with changed ventilation
- Dynamic investigation of a daily cycle

Creating the models for the room and radiator



Model room with radiator under the window

Static analysis without internal loads

The static simulation without internal loads and without air change obtained the following results[1]:

Variant	Con-troller	$\dot{Q}_{k\text{-}A}$ [W]	$\dot{Q}_{s\text{-}A}$ [W]	$\dot{Q}_{k\text{-}B}$ [W]	$\dot{Q}_{s\text{-}B}$ [W]	$\dot{Q}_{tot}$ [W]	$\dot{Q}_{cal}$ [W]	Factor [%]
Conventional steel panel radiator	P	22.01	77.72	54.68	51.61	206.02	205.99	
Therm X2	P	26.00	98.06	32.96	29.29	186.31	186.46	– 9.57

Results of the numeric analyses. Source: Forschungsbericht der TU Dresden "Evaluation of Therm X2 Radiators by means of Simulation"

$Q_{k\text{-}A}$ = convective heat flow of panel on room side	
$Q_{s\text{-}A}$ = radiative heat flow of panel on room side	26 % higher for Therm X2
$Q_{k\text{-}B}$ = convective heat flow of panel on wall side	
$Q_{s\text{-}B}$ = radiative heat flow of panel on wall side	43 % lower for Therm X2
Result	Heat requirement for Therm X2 lower by 9.57 % = higher heating efficiency

THE X2 TECHNOLOGY BY MEANS OF SIMULATION.

Results

The results show a significant difference in the heat requirements between the standard radiator and the Therm X2. For the depicted data the differences amount to 9-10 %. Other calculation variants showed somewhat smaller values, but still approx. 5-10 %. The advantages of the Therm X2 are largely based on the fact that the high radiated portion of the front panel space becomes effective.

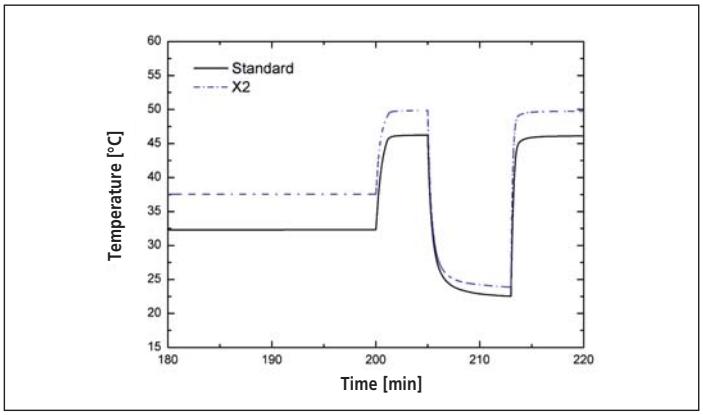
Static investigation with internal loads

Analogously to the static investigations of an empty room without internal loads, now an internal load of 120 W is applied to the room continuously. Before the completely coupled calculations are performed with room air - flow, first a building and system simulation is performed. This will be used to investigate whether a savings potential can be detected for the Therm X2 relative to the conventional steel panel radiator.

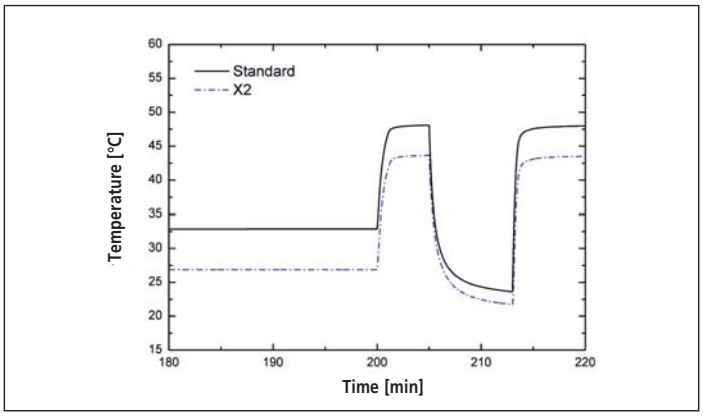
- Outdoor temperature a: –5° C
- Air change n = 0.0 h^{-1}
- Radiator type 12, length 700
- Internal loads 120 W, modelled as a source with even effects in the room, 50 % via convection, 50 % via radiation

Reproduction of a reheating process

The reproduction of a reheating process with changed ventilation produced the following results with regard to the mean surface temperatures:



Characteristic of the mean surface temperature for the front radiator panel (facing towards the room)



Characteristic of the mean surface temperature for the rear radiator panel (facing away from the room)

Static analysis with internal loads

The table shows selected data from the completely coupled calculation for and outdoor temperature of –5° C.

Variant	Con-troller	$\dot{Q}_{k-A}$ [W]	$\dot{Q}_{s-A}$ [W]	$\dot{Q}_{k-B}$ [W]	$\dot{Q}_{s-B}$ [W]	$\dot{Q}_{tot}$ [W]	$\dot{Q}_{cal}$ [W]	Factor [%]
Conventional steel panel radiator	P	11.78	29.52	14.47	25.68	81.46	83.45	
Therm X2	P	17.98	44.56	5.31	8.97	76.82	78.31	– 6.12

Selected results of the numeric analyses with room air flow variant with internal loads of 120 W

Q_{k-A} = convective heat flow of panel on room side	
Q_{s-A} = radiative heat flow of panel on room side	51 % higher for Therm X2
Q_{k-B} = convective heat flow of panel on wall side	
Q_{s-B} = radiative heat flow of panel on wall side	65 % lower for Therm X2
Result	Heat requirement for Therm X2 lower by 6.12 % = higher heating efficiency

Summary:

The static calculations with and without internal loads show significant energy saving benefits of the Therm X2 relative to the standard radiator under the assumed boundary conditions. They are in the 5 - 10 % range.
The mean surface temperatures of the panels (room-side panel higher, wall-side panel lower) show significant advantages for the Therm X2.

Therm X2 Profil valve radiators with lateral or centre connection.

THERM X2 PROFIL-V/VM

- With unique X2 technology.
- Distinctive profiled look.
- Integrated valve trim with preset k_V values.
- Lateral connection right/left or with centre connection.
- Universally connection ready for single- and two-pipe systems.
- Type 12, 22, 33
- Heights 300 - 900 mm
- Lengths 400 - 3000 mm*

*not for all types and lengths

Innovative, futuristic technology. Distinctive look.

In addition to the uniquely innovative X2 technology for reduced energy consumption and greater comfort, the Therm X2 Profil-V/VM valve radiator has all the attributes of trend-setting heat distribution in terms of quality and design. From the high-quality brilliantly coated wraparound panel to the fully integrated valve trim with preset k_V values ex factory.

For the version with a centre connection, radiator type and dimensions can still be freely determined even after pipe installation.

Therm X2 Plan valve radiators with lateral or centre connection.

THERM X2 PLAN-V/VM

- With unique X2 technology.
- Smooth, brilliantly coated front cover.
- Integrated valve trim with preset k_V values.
- Lateral connection right/left or with centre connection.
- Universally connection ready for single- and two-pipe systems.
- Type 12, 20, 22, 30, 33
- Heights 300 - 900 mm
- Lengths 400 - 3000 mm*

*not for all types and lengths

Unique energy saving technology with an appealing visual effect.

With its brilliantly smooth design, Therm X2 Plan-V/VM brings not just feel-good warmth and more comfort to every room, it can be harmoniously integrated into virtually every room situation too. The valve is integrated and set ex factory to the respective heat output. This not only saves on extra energy, but also on on-site hydraulic balancing in the vast majority of properties.

The smooth, attractive look conceals the unique, patented X2 technology. For efficient energy savings and cosy comfort at every operating point – instead of unnecessary, time-consuming complaint processing.

Therm X2 Profil compact radiators with lateral connection.

THERM X2 PROFIL-K

- With unique X2 technology.
- Distinctive profiled look.
- Universally connection ready for single- and two-pipe systems.
- Type 12, 22, 33
- Heights 300 - 900 mm
- Lengths 400 - 3000 mm

Innovative, futuristic technology. Distinctive look.

The basic version with Kermi's high standard of quality. Universal X2 energy saving technology for every room and every heating requirement.

Finished, complete, installation-friendly, specially packed. Brilliantly coated, with top and side cover.

Therm X2 Plan compact radiators

Plan compact hygiene radiators with lateral connection.

THERM X2 PLAN-K PLAN-K HYGIENE

- With unique X2 technology.
- Smooth, brilliantly coated front cover.
- Universally connection ready for single- and two-pipe systems.
- Type 12, 20, 22, 30, 33
- Heights 300 - 900 mm
- Lengths 400 - 3000 mm

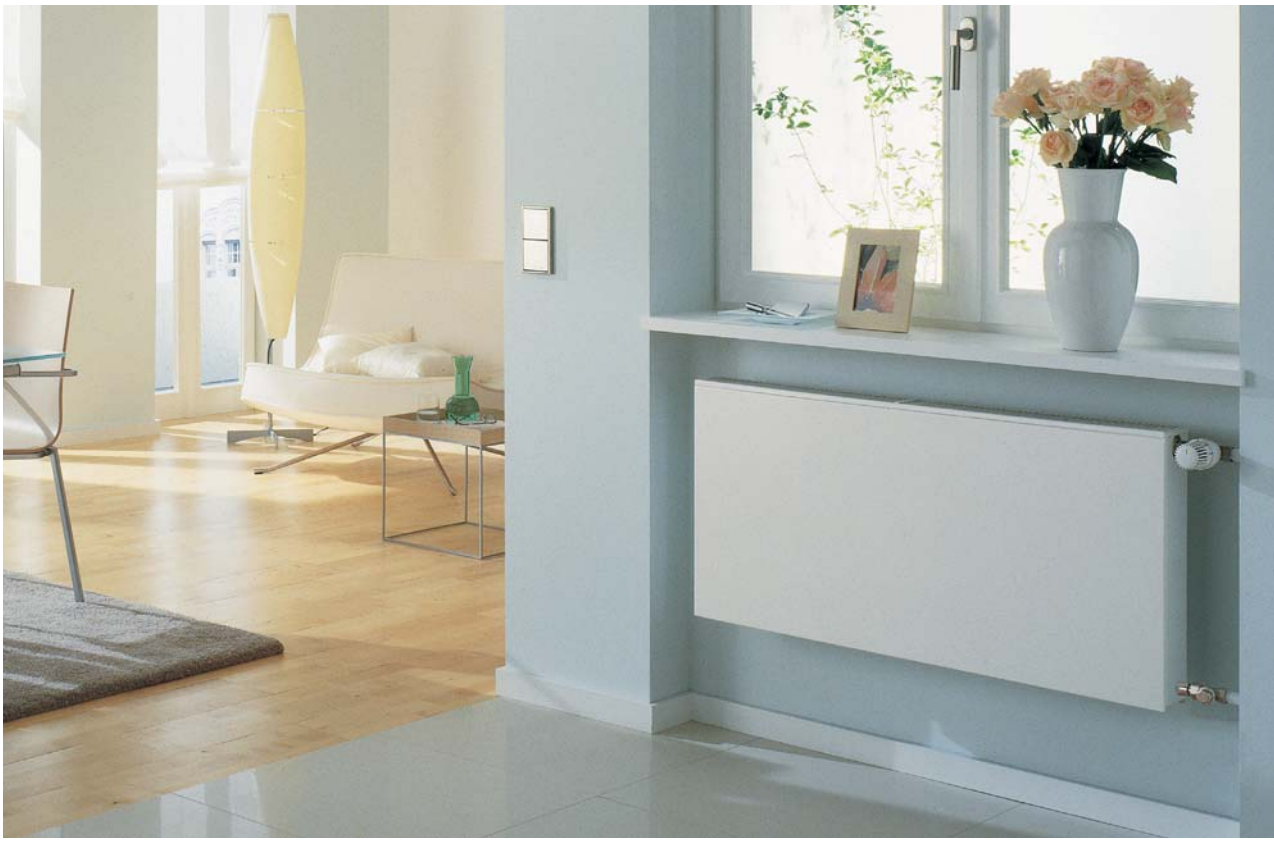
Universal energy saving technology with an appealing visual effect.

Brilliant and flat all the way to the edges. Suitable for all heat sources and variable for single- and two-pipe systems. The hygienic version is specially aimed at facilities like hospitals were a maximum on hygiene is required. Open on both sides and on the top for easy cleaning. High-quality coating is resistant to disinfectants.

Therm X2
Profil compact-/
Plan compact replace-
ment radiators with
lateral connection.

THERM X2 PROFIL-K/PLAN-K REPLACEMENT RADIATORS

- With unique X2 technology.
- Quick radiator replacement thanks to connection centre lines that exactly fit those of the old DIN radiators.
- Just a few installation steps without special equipment.
- Connection centre line 500, 900 mm
- Type 12, 22, 33
- Lengths 400 - 3000 mm
- Depths 64, 100, 155 mm



Innovative energy saving technology as a special, quick, uncomplicated renovation solution.

Precisely aimed at the obsolescent DIN radiators with the standard connection centre lines 500 and 900 mm, which represent over 90 % of the demand. For compeletely problem-free radiator replacement in a few installation steps, without any special equipment.

Verteo-Profil radiators
Verteo-Plan radiators –
Energy-saving heating in slimline panel format.

VERTEO-PROFIL
VERTEO-PLAN

- With unique X2 technology.
- Supersmooth front section or distinctive profiled look.
- Side panel standard.
- Universal connection capability via 6 connecting sleeves for all multi-panel versions.
- Optionally with Kermi valve shut-off block.
- Type 10, 20, 21, 22
- Lengths 400, 500, 600, 700 mm
- Heights 1600, 1800, 2000, 2200 mm

Slimline heating technology that saves space and energy.

The space-saving solution for harmonious room integration. With supersmooth front section or in distinctive profiled look. With unique, innovative X2 technology. Versatile and universal for customised heating requirements. Heat outputs 650 - 3100 watts. 4 different heights and 4 lengths.

X2 INSIDE

Kermi GmbH
Pankofen-Bahnhof 1
94447 Plattling
GERMANY

Tel. +49 9931 501-0
Fax +49 9931 3075

www.kermi.com
info@kermi.com

A company in the

AFG
Arbonia-Forster-Holding AG