my comfort
by Saint-Gobain

THE VERY FABRIC OF COMFORT, HEALTH AND WELLBEING
Buildings, in particular the energy we consume through using our buildings, has one of the biggest environmental impacts on our planet. They also have a big impact on our lives as we spend up to 90% of our time indoors – either in buildings or vehicles – whether that’s at work, at home, or in our spare time. Yet very few people think, and really challenge, how the buildings they spend time in are actually performing. And what we should expect from our buildings.

We rarely consider whether a building really meets our needs, unless it suddenly isn’t working for us or it makes us feel uncomfortable. How many of us have been in a restaurant where it’s hard to hear our conversation? Or have been disrupted by the noise of neighbours either at home, or work? Or have been in a meeting room at work where the light quality is so poor it’s hard to work? How many of us have been at our children’s schools, and have thought how the rooms echo and the impact this could have on our children’s learning? It’s when we notice these sorts of things, that we begin to question just how comfortable our buildings are.

The Multi-Comfort concept, and ‘My Comfort’ starts from the central premise that all buildings can be designed to:

- Provide the highest levels of all-round comfort for their users;
- Genuinely and positively contribute to our health and wellbeing;
- Deliver the highest levels of efficiency for their owners – saving home owners and bill payers money on energy;
- Achieve the Passivhaus standard of energy efficiency.

Multi-Comfort – for everyone

This book explains, in detail, what it feels like to be in a Multi-Comfort building, and outlines the central design principles behind the Multi-Comfort building concept.

It is intended to inspire and assist owners and designers of both new buildings and those to be upgraded by providing the theories and models that will help us all to achieve improved comfort, health and wellbeing in the buildings we design, construct and use on a daily basis.

Further information about this new building concept, to read in conjunction with this book, can be found online at: www.multicomfort.co.uk

At Saint-Gobain, our aim to be the world leader in sustainable habitat has driven us to create the Multi-Comfort concept for buildings. Incorporating Passive House design, it’s a way of designing and building sustainable, healthy and comfortable home and working environments.

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Foreword

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Peter Hindle MBE
Senior Vice-President & Director of Sustainable Habitat,
Saint-Gobain
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Introducing the idea of Multi-Comfort

When we typically spend 90% of our time indoors or in vehicles, it’s fair to say that the buildings we live, work or play in every day, can have a significant impact on our comfort, health and wellbeing.

Buildings should provide us with a comfortable, healthy habitat in which to be successful, efficient and safe as we set about our daily routines.

Imagine a building that’s not just good for the environment, but good for you — and for all the other people who live, work or play in it too. Imagine a building that combines the highest level of thermal performance with excellent acoustics, visual comfort, superb indoor air quality and outstanding energy efficiency.

Imagine a Multi-Comfort building...
Imagine a building...

...which keeps itself warm using very little energy
...without the need for radiators in every room
...saving you money to spend on what you like
Imagine a building...

...keeping your ideal indoor temperature, all year round
...where every wall is warm to touch
...without draughts – even on the floor
Imagine a building...

...where you’re protected from the noise outside
...where you can’t hear neighbours
...where you can make noise without disturbing others
Imagine a building...

...where sounds you want to hear are crystal clear
...where you can hear perfectly, anywhere in the room
...where you’re not distracted by background noise
Imagine a building...

...which is full of natural light without glare
...where close-up work is easy and colours are rich
...bringing the outdoors inside, making you feel good
Imagine a building...

...with a constant supply of fresh, clean air
...where rooms never feel stuffy
...that keeps you feeling awake and alert all day
Imagine a building...

...that keeps outdoor pollution outside
...which actively purifies the air
...that removes harmful VOC levels
Imagine a building…

...without worry of high energy bills or running costs
...needing little maintenance
...that doesn’t cost the earth to build
...nor the environment
The importance of comfort, health & wellbeing in buildings

The Multi-Comfort building concept is designed to deliver comfort for everyone – in any type of building. Reduced energy usage and lower ongoing operational and maintenance costs mean you can actually save money, while enjoying all the additional long-term benefits of a future-proofed, sustainable building that gives you improved comfort, health and wellbeing - we all deserve Multi-Comfort buildings?

According to the World Health Organization (WHO), health is a state of complete physical, mental and social wellbeing – and not merely the absence of disease or infirmity.

Wellbeing is increasingly being acknowledged as a valid yardstick in public policy. The UK government began to collect data on ‘national wellbeing’ in 2011, to complement existing financial and economic measures of the nation’s progress.

We all value wellbeing
People fundamentally value wellbeing; it is a core metric in our everyday lives. Wellbeing should, therefore, play a central role in the design of buildings. It should also provide a meaningful and real way of evaluating buildings.

Architects and engineers have increasingly been focusing on the question of how to achieve a healthy indoor environment that contributes to people’s feelings of wellbeing. But the relationships between people’s wellbeing and their indoor environments are complex. As a result, controlling and improving indoor environmental factors has largely been dealt with in an individual way, taking factors one at a time and making recommendations for the improvement of each.

Taking a holistic approach to the importance of comfort, health and wellbeing in buildings is the way forward. By carefully considering all the different areas of comfort that a building can (and indeed should) provide, we are able to improve people’s wellbeing within buildings – regardless of the types of buildings and the specific activities taking place inside them.

All-round comfort, at any time
Comfort is a state of physical ease and wellbeing in a given environment. Within a building, various conditions are required to enable people to be comfortable, and to be able to efficiently and effectively perform the tasks relevant to that space.
Multi-Comfort Buildings – The importance of comfort, health & wellbeing in buildings

There are five main considerations that affect people’s perception of comfort inside buildings:

- **Thermal comfort**: determined by air temperature, humidity, draughts, etc.
- **Audio comfort**: determined by parameters such as noise from outdoors, vibrations, clarity of hearing, intelligibility of speech, etc.
- **Visual comfort**: determined by factors such as view, light quality, luminosity, glare, etc.
- **Indoor Air comfort**: determined by indoor air quality parameters such as fresh air supply, pollutants, odours, etc.
- **Economic comfort**: determined by the affordability of constructing, running and maintaining the building.

The four factors of thermal, audio, visual and indoor air comfort in buildings are better understood today than ever before. However, in combination, these factors become powerful tools for designing happy, healthy, energy-efficient buildings that deliver considerable economic benefits – as well as all-round positive wellbeing effects for everyone.

Happy, healthy, energy-efficient buildings
A Multi-Comfort building has temperatures of relative stability, neither too hot nor too cold, so we can function comfortably, whatever we’re doing. Multi-Comfort buildings have the right type and right amount of light, neither too much nor too little, for specific tasks – whether it’s bedtime reading, performing surgery or completing work. Multi-Comfort buildings have audio environments that are well balanced to block out unwanted, harmful noise and enhance those sounds that we want, and indeed need, to hear. In Multi-Comfort buildings, indoor air is kept fresh and clean – while harmful pollutants, whatever the source, are reduced.

The correct balance of these combined factors gives us comfort within a building that we are happy to occupy, where we function efficiently, are healthy and have a high level of wellbeing.

Saint-Gobain: Leading the way in sustainable habitats
As the world’s largest provider of materials and construction technologies, Saint-Gobain creates and delivers innovative, high-performance solutions that enhance our habitats and our daily lives.

Recognised as one of the world’s top 100 most innovative companies, Saint-Gobain has expertise across an exceptional range of materials and technologies, from flat glass and building materials to high-performance polymers and abrasives. For the past 350 years, Saint-Gobain has pioneered the development of innovative materials that shape the way we live.

Our goal is to contribute this rich experience to building a better, more comfortable, more sustainable future. This is what has led us to develop the Multi-Comfort concept.
New research tapping into the public’s energy saving attitudes and behaviours has been revealed by the Energy Saving Trust in the first of a series of public opinion trackers known as the UK Pulse.

The findings from the Ipsos MORI survey of over 2,000 UK respondents show nearly half of householders, 44%, claim to live in homes with draught problems, 37% in homes with condensation problems and 28% in homes with mould. All three issues were even higher among renters.


Toxic Home Syndrome, which affects around 15.3 million houses in the UK, is where a person’s health deteriorates because of the air circulating in their home. Scientists have warned simple day-today tasks, such as doing the washing or cooking dinner, could be putting families at risk of cardiovascular disease, lung cancer and asthma.

Air circulating indoors, contains more than 900 chemicals, particles and biological materials with potential health effects. Coughing, watery eyes, dizziness, sneezing, feeling tired and suffering headaches can be common signs of poor indoor air quality. While more severe symptoms include eye irritation, rashes, muscle pain, respiratory problems, asthma, fever or chills, hearing loss, nose bleeds, wheezing and lung disease.

Air pollution is estimated to be the leading cause of environmental burden of disease in Europe.

Source: Daily Mail Online, 21st January 2015 (www.dailymail.co.uk)

The Environmental Audit Committee believes that air pollution is nearing a ‘public health crisis’, causing nearly as many deaths as smoking. There are an estimated 29,000 deaths annually in the UK from air pollution. Nitrogen dioxide is known to cause inflammation of the airways, reduce lung function and exacerbate asthma. Particulate matter (tiny invisible specks of mineral dust, carbon and other chemicals) are linked to heart and lung diseases, as well as cancer. Some particulate matter lodges in the lungs, while the finest particles can enter the bloodstream, risking damage elsewhere in the body.

The report says that traffic is responsible for 42% of carbon monoxide, 46% of nitrogen oxides and 26% of particulate matter pollution, and that many schools that are sited near major roads should filter the air coming in to the buildings. The report also recommends that new schools, care homes and hospitals should be built far away from major roads because of the dangers of air pollution.

Source: Environmental Audit Committee report, (www.gov.co.uk)

According to the Dementia Services Development Centre (DSiDC) at the University of Stirling, Well-designed homes, which are accessible, with good natural light and good insulation to improve warmth and reduce noise, can promote health and wellbeing. Good design can also help with the management of dementia. People with dementia are calmer and less likely to get lost or become distressed in an environment designed with their needs in mind. This has been recognised by the Department of Health, which has made up to £50m available to NHS trusts and local authorities to help tailor hospitals and care homes to the needs of people with dementia.

Source: Dementia: Finding Housing Solutions, National Housing Federation report.

In hospitals, avoiding stress generated by high sound levels and improving sleep quality helps patients recover faster and facilitates the work of the staff.

The benefits of Multi-Comfort buildings

When we typically spend 90% of our time indoors or in vehicles, it’s fair to say that buildings can have a significant impact on our comfort, health and wellbeing. Let’s review some of the evidence:

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Source: Environmental Audit Committee report, (www.gov.co.uk)
A study of workers in a Californian call centre found that having a better view out of a window was consistently associated with better overall performance: workers were found to process calls 7% to 12% faster. Computer programmers with views spent 15% more time on their primary task, while equivalent workers without views spent 15% more time talking on the phone or to one another.


A comprehensive US study in the late 1990’s suggested a link between the physical office environment and retention and recruitment of staff. One of the most significant results was the importance workers placed on the ‘visual appeal’ of the workplace compared to many other factors.


A meta-analysis in 2006 of 24 studies (including 6 office studies) found that poor air quality (and elevated temperatures) consistently lowered performance by up to 10%, on measures such as typing speed. This analysis appeared to demonstrate that the optimum ventilation rate is between 20 and 30 litres/second (l/s), with benefits tailing off from 30 up to 50l/s. This is significantly higher than minimum standards required, which are typically between 8-10l/s (although these vary considerably by country).


In July 2013, the Zero Carbon Hub (ZCH) and the NHBC Foundation published a report, the culmination of work by the Indoor Air Quality (IAQ) Group, which stressed the point that as new homes become more airtight, adequate ventilation is relied upon increasingly to maintain satisfactory indoor air quality (IAQ). Building on that work, and following industry interest, the ZCH have outlined issues and problems which can arise during the process of delivering ventilation systems in new homes. These issues can of course result in buildings not being adequately ventilated – leading to poor air quality and potentially health issues for occupants. Study ongoing – refer to www.zerocarbonhub.org

Data indicates that around 90% of hospital wards are of a type that is prone to overheating, and the ability to control temperatures is often limited. Awareness of the Government’s Heatwave Plan amongst healthcare professionals and uptake of the actions advised within it should be independently reviewed.

Health and Wellbeing Boards should consider how to ensure delivery of the plan in care homes. The Care Quality Commission should consider setting standards for maximum temperatures in hospitals and make sure staff can control internal temperatures.


A study of nearly 200 office workers found that those who had more natural light exposure at the office had longer sleep duration, better sleep quality, more physical activity and better quality of life compared to office workers with less light exposure in the workplace, according to a study from the University of Illinois at Urbana-Champaign published in the Journal of Clinical Sleep Medicine.

Employees with windows in the workplace received 173% more white light exposure during work hours and slept an average of 46 minutes more per night than employees who did not have natural light exposure in the workplace. Workers without windows reported poorer scores than their counterparts on quality of life measures related to physical problems and vitality, as well as poorer outcomes on measures of overall sleep quality and sleep disturbances. There was also a trend for workers in offices with windows to carry out more physical activity than those without windows. This highlights the importance of exposure to natural light to employee health and the priority designers of office environments should place on natural daylight exposure for workers.

Source: www.technology4change.com, 12th August 2014.

Research has proven that well-designed sound environments in offices and schools favour concentration and facilitate communication, so having a positive effect on the interaction and behaviour of people within such buildings. Learning is more effective and less tiring when pupils can comfortably hear and understand.


Exposure to extreme heat is already a health issue. Currently, one-fifth of homes in England could experience overheating even in a cool summer. Flats, which are generally more at risk of overheating than houses, now make up 40% of new dwellings compared to 15% of new dwellings since 1996. In the UK, excess deaths from high temperatures are projected to triple to 7,000 per year on average by the 2050’s as a result of climate change and a growing and ageing population.


A study of roughly 300 students in the Netherlands found that the presence of windows was consistently associated with improved concentration and attentiveness, so having a positive effect on the interaction and behaviour of people within such buildings. Learning is more effective and less tiring when pupils can comfortably hear and understand.


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In a 2011 lab test which mimicked an office, a range of office-related tasks were carried out with the presence of airborne VOCs. Increasing ventilation from 3 l/s to 20 l/s improved performance by up to 8%. Source: Park JS and Yoon CH (2011) The effects of outdoor air supply rate on work performance during 8-h work period. Indoor Air 21:4, pp 284–290.


A study in 2005 found that 99% of people surveyed reported that their concentration was impaired by office noise such as unanswered phones and background speech. Source: Banbury SP and Berry DC. (2005) Office noise and employee concentration: identifying causes of disruption and potential improvements. Ergonomics 48:1, pp 25–37.

A study in 2011 investigated the relationship between view quality, daylighting and sick leave of employees in administration offices of Northwest University Campus. Taken together, the 2 variables explained 6.5% of the variation in sick leave, which was statistically significant. Source: Elayavé J. (2011) Daylighting Bias and Biophilia: Quantifying the Impact of Daylighting on Occupant Health, August 2014.

One recent lab-based study using simulated decision-making tasks showed CO₂ having a significant detrimental impact (11%–23% worse) at 1,000 parts per million (ppm) compared to 600 ppm, despite 1,000 ppm being widely considered acceptable. Source: Satish U, Mendell MJ, Shekhar K, Hotchi T, Sullivan D, Streufert S, Fisk WJ. (2012) Is CO₂ an Indoor Pollutant? Direct Effects of Low to Moderate CO₂ Concentrations on Human Decision Making Performance. Environ Health Perspect 120:12, pp1671–1677.


A study in 1998 found that there was up to a 66% drop in performance for a ‘memory for prose’ task when participants were exposed to different types of background noise. Source: Banbury SP and Berry DC. (1998) Disruption of office-related tasks by speech and office noise. British Journal of Psychology 89:3, pp 499–517.

A seminal study over 20 years ago showed that workers who had window views of nature felt less frustrated and more patient, and reported better health than those who did not have visual access to the outdoors or whose view consisted of built elements only. Source: Kaplan R. (1992) The psychological benefits of nearby nature, pp 125–133. In Relf D. (ed.) The role of horticulture in human well-being and social development, Timber Press, Portland, Oregon.

CO₂ levels are one way to measure air quality, and can occur as a result of poor ventilation. High CO₂ levels have been found to impact tiredness or decision-making in a number of studies. Source: Bakó-Bíró Zs, Clements-Croome DJ, Kochhar N, Awbi HB and Williams MJ. (2012) Ventilation rates in schools and pupils’ performance. Building and Environment 48, pp 215–223.

More than a quarter of UK adults have had a problem with a nuisance neighbour in the past year, suggests a survey for consumer organisation Which? Loud voices and arguing topped the list of annoyances. Loud music, slamming doors and noisy pets also featured. Overall, 27% of the 2,062 UK adults questioned online by Populus said they had experienced a problem. Of those who had experienced a problem, loud voices were cited by 41%, followed by loud music and TVs (29%). Source: www.bbc.co.uk, 16 September 2014.

Not only is noise a clear distraction that hinders office workers carrying out their work accurately and efficiently, it can also have a detrimental impact on health and levels of stress. Source: Shepherd D, Welch D, Dirks KN, and McBride D. (2013) Do Quiet Areas Afford Greater Health-Related Quality of Life than Noisy Areas? International Journal of Environmental Research and Public Health 10, pp 1284–1303.
A cold home is bad for your health and increases the risks of cardiovascular, respiratory and rheumatoid diseases as well as worsening mental health. Cold homes are a significant contributor to the level of excess winter deaths in the UK every year. In 2009-10, there were an estimated 25,400 excess winter deaths, over 21% are attributable to the coldest quarter of homes.


Research led by a team at the University of Exeter Medical School, found that a failure by people to ventilate their homes could lead to more the development of respiratory problems. The research discovered that adults living in energy efficient social housing may have an increased risk of asthma. Modern efficiency measures are vital to prevent heat loss and reduce energy use, yet some people, particularly those living in fuel poverty, are unlikely to heat a building enough – or ventilate it sufficiently – to prevent the presence of damp and mould, factors that can contribute to asthma.

Source: Environment International.

The health and productivity benefits of good Indoor Air Quality (IAQ) are well established. This can be indicated by low concentrations of CO₂ and pollutants, and high ventilation rates. It would be unwise to suggest that the results of individual studies, even meta-analyses, are automatically replicable for any organisation. However a comprehensive body of research can be drawn on to suggest that productivity improvements of 8-11% are not uncommon as a result of better air quality.


In homes, protection from outside noise contributes to a sense of security and privacy, as well as reducing stress. In the 1990s, the relationship between noise and health was recognised as a serious cause for concern, particularly at night in terms of its effects on our sleep patterns. Significant vibrations, which are caused mainly by external sources, can be particularly disturbing. Traffic noise alone affects the health of nearly one in three Europeans. Depending on its properties (loudness, frequency, etc), noise can have numerous undesirable effects. The obvious effect on health is hearing loss due to high sound levels.

But aside from direct damage to hearing, other consequences of noise exposure have been identified. These include cardiovascular disease, high blood pressure, headaches, hormonal changes, psychosomatic illnesses, sleep disorders, reduction in physical and mental performance, stress reactions, aggression, constant feelings of displeasure and reduction in general wellbeing. Epidemiological studies have shown, for instance, that the risk of heart attack for those living close to very frequently used streets is around 20% higher than for residents of quieter streets, and that the risk of obesity increases with the proximity of an airport.

Source: Environment International.

Good lighting is crucial for building user satisfaction. Several studies in the last decade have estimated productivity gains as a result of proximity to windows, with experts now thinking that the views out are probably the more significant factor, particularly where the view offers a connection to nature.

A growing scientific understanding of biophilic design, and the positive impact of green space and nature on (particularly) mental health, has implications for those involved in healthcare building design, office design and urban planners alike.


Reduced absences may be a key indicator of the benefits of good indoor air quality for businesses. Short term sick leave was found to be 35% lower in offices ventilated by an outdoor air supply rate of 24 l/s compared to buildings with rates of 12 l/s in a 2000 study. The same study estimated the value of increased ventilation to be $400 per employee per year.


Various studies since then have suggested similar conclusions, and although from the healthcare sector, a key report in 2012 estimated the economic benefits to the US of providing patients with views of nature to be US$93 million/year.


There were nearly 1m homes in the UK with damp problems in 2012 according to the English housing survey. Damp problems were most common in privately rented homes, where 9% of private rented houses had damp, compared with 5% of social housing properties. Owner-occupied homes were the least likely to have damp.


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Multi-Comfort building criteria

In order to design and build Multi-Comfort buildings, the following criteria should be met:

### THERMAL

- **Heating & Cooling Energy Demand**
  - RESIDENTIAL New-Build: 15 kWh/m²/p.a
  - RESIDENTIAL Renovation: 25 kWh/m²/p.a
  - NON-RESIDENTIAL New-Build: 15 kWh/m²/p.a
  - NON-RESIDENTIAL Renovation: 25 kWh/m²/p.a

- **Relative Humidity**
  - 40–60% at 300 lux
  - Limit Value: 10%

- **Overheating Prevention**
  - 0.01 W/mK
  - Limit Value: 10%

- **Thermal Bridging**
  - +3 dB of current acoustic regulation level for building type 4
  - N/A in most cases

- **Acoustic Sound Insulation (Design Values)**
  - N/A

- **Acoustic Absorption**
  - N/A

- **Speech Clarity/Intelligibility (c50)**
  - N/A

- **Harmonious Resonance**
  - N/A

### AUDIO

- **Daylight Autonomy**
  - 8am - 6pm DA 60% at 300 lux

- **Airtightness (n50)**
  - 0.6 V/h@50 Pa

- **Ventilation**
  - 30 m³/hr/person

### VISUAL

- **Relative Humidity**
  - Limit: <1.0 V/h@50 Pa
  - Target: <0.6 V/h@50 Pa

- **Acoustic Absorption**
  - N/A

- **Speech Clarity/Intelligibility (c50)**
  - N/A

### INDOOR AIR

- **CONTROL OF VOC’s (3 routes to compliance)**

### ECONOMIC

- **Primary Energy Demand**
  - 120 kWh/m²/p.a
  - 0.08 - 0.15 W/m²K

- **Fabric U-Values**
  - 1.1 Uw DGW and 0.8 Uw TGW

- **Window U-Value**
  - Installed Value

- **OPEX vs CAPEX Analysis**

- **Embodied Energy Analysis**
  - To be agreed with Passivhaus Institute (PHI) based on a review of planned occupancy patterns/ratios

- **Use of EN15616 tested materials or**
  - Internal materials finishes that remove VOC concentration

- **Total VOC Concentration <300µg/m³**
  - + Formaldehyde levels <100µg/m³

- **Total VOC Concentration <150µg/m³**
  - + Formaldehyde levels <100µg/m³

See over for notes
Notes on building criteria (previous page):

1. To endeavour to try and optimise natural lighting levels in existing openings with new glazing solutions, and try to optimise to new build levels. This is subject to being technically (glazing spec allows it) functionally (the opening detail allows this and depth of wall) and economically (financially affordable as to not jeopardise the viability of the project going ahead) feasible.

2. Internal temperature to be designed to achieve 20°C. The excess temperature frequency describes the proportion of hours in the year on which the average room temperature exceeds 25°C.

3. The 10% target over 25°C should be calculated, but in some cases like non-domestic additional calculations using UK methodologies are required for Building Regulations. We recommend adaptive cooling in TM 52 the limits of thermal comfort avoiding overheating in European Buildings. This takes BS EN 15251 on comfort as the main design guidance.

4. Design value to be between 3-6GB of current acoustic regulation for the building type subject to commercial viability and likely on-site performance level.

5. Typically, this criteria is relevant only when the residential dwelling (new or renovation) is of significant open-plan layout. When a significant level of open-plan layout is designed then the criteria should apply and be in line with current reverberation control good practice design.

6. Fabric U-values to be designed to values between 0.8-0.15W/mK depending upon building type, volumetrics and form. A rectangular building will always require a U-value more towards 0.8, whereas a square building would be 0.15.

7. 1.1 Lw DGW (incorporating Double Glazed Window) and 0.8 Lw TGW (incorporating Triple Glazed Window) is offered so that the fabric can be optimised to other comfort criteria like solar gains, daylight and acoustics as appropriate - see website for latest recommendations (www.multicomfort.co.uk). The window internal surface temperature is never below 16.4°C. If the client wishes to follow complete Passivhaus certification then a triple glazing solution is required.

8. MVHR system @ min. 75% efficiency in line with Passivhaus Institute calculation requirement & Passivhaus Institute certification.

9. In renovation projects, where it is not possible to get to the prescribed level, you must demonstrate to the Passivhaus certifier that you have diminished all thermal bridges economically and practically feasible.

10. For best practice, a whole life cycle analysis/casting should be performed to EN 15978. Applies to all materials that creates the wall / roof composition and does not include paints, finishes or furniture.

11. In buildings with normally high Relative Humidity (RH) like swimming pools, expert advice should be sought on details, solutions to prevent moisture migration into the fabric. In addition the % RH could be raised maybe adapted to suit but only if the fabric design and condensation/moisture risk on the fabric is accessed to EN 15026.

12. RH is relative to a temperature of 20°C.

13. Daylight Autonomy (DA) can be used to estimate artificial lighting requirements if lux same as electric lighting criteria. i.e. 300 lux – 100% minus DA output equates to % of annual time in-use where artificial lighting is required.

14. Any PHI approved MVHR should be fitted with F7 grade filter on the inlet and G4 on the extract. Must be a PHI approved MVHR or 12% penalisation in PHPP. MVHR systems are ≤35dBA in the installation/plant room, ≤25dBA in living areas and ≤30dBA in functional areas (kitchens etc).

15. Inlet and outlets of MVHR should be positioned on the same orientated façade/roof.

16. BREEAM UK New Construction - Non-Domestic Buildings 2014 credit Hea 1, Table 11 details average daylight illuminance.

17. The TVOC should be tested in the building. TVOC should represent the total concentration of VOCs in an air sample as closely as possible Formaldehyde concentration level is measured post construction (but pre-occupancy) and is found to be less than or equal to 100µg/m³ averaged over 30 minutes (WHO guidelines, source BRE Digest 464 part 2).

18. For residential the total volatile organic compound (TVOC) concentration is measured post construction (but pre-occupancy) around 28 days and found to be less than 30µg/m³ over 8 hours, in line with the Building Regulation requirements. For non-residential the Total Volatile Organic Compound (TVOC) concentration is measured post construction (but pre-occupancy) around 28 days and found to be less than 150µg/m³ over 8 hours.

19. Using materials that are EN 16516 tested to meeting the same level as Eurofins Gold standard or are Eurofins Gold certified tested products, and/or using products that remove VOC concentration for internal finishes. Applies to all materials that creates the wall / roof composition and does not include paints, finishes or furniture.

20. Internal materials finishes that remove VOC concentration must have certified laboratory testing to prove materials performance, and encapsulates all other materials.

The Passive House Standard & the Multi-Comfort building concept

The Passive House (or Passivhaus) standard represents today’s highest energy standard for buildings. It was developed from the belief that the most inexpensive and environmentally friendly energy is that which is not consumed in the first place.

The Saint-Gobain Multi-Comfort concept builds on the Passive House principles of delivering the highest thermal comfort and reducing CO₂ emissions by also combining excellent audio and visual comfort with superb internal air quality, fire protection and safety.

Criteria from the Multi-Comfort concept that is in line with the Passive House standard is denoted in the previous table by ☑.
Multi-Comfort building design: products & systems

The right use of materials is dependent on the characteristics required of each material, and the role each plays within the overall design strategy for the building.

The final specification should not only optimise energy consumption but primarily provide for user comfort. So it is important to understand the basic principles of the various phenomena in question, and how the characteristics of the specified materials will influence the building’s performance in all its complexity and seasonal variations. However, when it comes to choosing a solution for a given design, experience is key. This is where Saint-Gobain’s expertise in building science can make a material difference.

In the UK and Ireland, some of the best known and respected companies in the construction sector are part of Saint-Gobain. Together they offer a range of high performance comfort-enhancing and energy-saving products and solutions to help create a more sustainable built environment.
Glass in windows and façades can either let sun radiation enter the building or block it, depending on the season; insulation materials, such as mineral wools, will help reduce heat losses or gains; air-tightness membranes will allow limiting unwanted air infiltration and vapour control membranes will allow internal humidity to exit the building, while preventing the humidity from outside from entering, preserving the insulation; renders will help reduce the humidity transfer from the outside and improve insulation; plasters and plasterboards will bring thermal inertia to the envelope and improve thermal comfort.

Saint Gobain offers a wide range of products and solutions for building envelopes. The following have a direct effect on thermal efficiency and comfort:

- Glass in windows and façades can either let sun radiation enter the building or block it, depending on the season;
- Insulation materials, such as mineral wools, will help reduce heat losses or gains;
- Air-tightness membranes will allow limiting unwanted air infiltration and vapour control membranes will allow internal humidity to exit the building, while preventing the humidity from outside from entering, preserving the insulation;
- Renders will help reduce the humidity transfer from the outside and improve insulation;
- Plasters and plasterboards will bring thermal inertia to the envelope and improve thermal comfort.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
Celotex FR5000

Premium performance PIR insulation suitable for use in floors, walls and roofs.

- Low lambda solution delivering lower U-values and thinner solutions.
- Multi-purpose solution suitable for use in floors, walls and roofs.
- In applications featuring a cavity air space, Celotex IQ facers can help deliver enhanced thermal performance.
- Broad range of product thicknesses to meet and exceed Building Regulation U-value targets.
- Tested to BS 476 Parts 6 & 7 delivering Class O fire performance throughout the entire product.

Celotex CG5000

Premium performance PIR insulation specifically for use in partial-fill cavity wall applications.

- Low lambda solution delivering lower U-values and thinner solutions.
- In applications featuring a cavity air space, Celotex IQ facers can help deliver enhanced thermal performance.
- Broad range of product thicknesses to meet and exceed Building Regulation U-value targets.
- Tested to BS 476 Parts 6 & 7 delivering Class O fire performance throughout the entire product.

Celotex RS5000

Premium performance PIR insulation specifically for use in rainscreen cladding applications.

- Low lambda solution delivering lower U-values and thinner solutions.
- Designed for rainscreen cladding applications and acceptable for use in buildings above 18m in height.
- Suitable for use in warm steel frame constructions or can be fixed directly to masonry for overcladding.
- Broad range of product thicknesses to meet and exceed Building Regulation U-value targets.

Celotex GD5000

Premium performance PIR insulation bonded to 9.5mm plasterboard specifically for use in dry-lining applications.

- Low lambda solution delivering lower U-values and thinner solutions.
- BBA certified under Certificate number 94/3080.
- Achieves a fire performance of Euroclass B-s1, d0 in accordance with BS EN 13501-1.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
**Isover CWS 32**

Provides excellent thermal performance in external masonry cavity walls to meet and exceed UK thermal building regulations.

- A glass mineral wool batt supplied in 50-150mm thicknesses. The strong, resilient and flexible batts are 455mm wide to fit between standard wall tie spacing.
- It provides excellent thermal performance in external masonry cavity walls to meet and exceed UK thermal building regulations.
  
  - Thermal conductivity of 0.032 W/mK. Provides excellent thermal performance, reducing heat loss within the building envelope.
  - Manufactured from up to 86% recycled postconsumer glass that would otherwise go to landfill.
  - Isover glass mineral wool insulation has an A1 Euroclass fire rating – the best attainable.
  - Zero Ozone Depletion Potential (ODP) and Global Warming Potential of less than 5.
  - Suitable for use in Multi-Comfort buildings.

**Isover Timber Frame Batt 32**

Provides excellent thermal performance in external timber frame walls to meet and exceed UK thermal building regulations.

- A high density glass mineral wool slab supplied in 50-140mm thicknesses. The strong, resilient and flexible batts are 455mm wide to fit between standard wall tie spacing.
- It provides excellent thermal performance in external timber frame walls to meet and exceed UK thermal building regulations.
  
  - Thermal conductivity of 0.032 W/mK. Provides excellent thermal performance, reducing heat loss within the building envelope.
  - Manufactured from up to 86% recycled postconsumer glass that would otherwise go to landfill.
  - Isover glass mineral wool insulation has an A1 Euroclass fire rating – the best attainable.
  - Zero Ozone Depletion Potential (ODP) and Global Warming Potential of less than 5.
  - Suitable for use in Multi-Comfort buildings.

**Isover Frame Façade Slab**

A low lambda rigid glass mineral wool slab providing a continuous layer of insulation around timber frame constructions.

- A low lambda rigid glass mineral wool slab providing a continuous layer of insulation around timber frame constructions.
- It has excellent thermal performance with a thermal conductivity of 0.031 W/mK and provides a continuous layer of insulation around the frame, reducing cold bridging and allowing very low U-values to be achieved.
  
  - Continuous layer of insulation reduces cold bridging through the frame enabling U-values down to zero carbon levels.
  - Weatherproof breathable facing protects the construction and negates the need for an additional breather membrane.
  - Tongue and groove vertical joints to aid installation and minimise air gaps.
  - Full range of accessories available including wall-ties, spacers and sealing tape.
  - Suitable for use in Multi-Comfort buildings.

**Isover Optima System**

A dry-lining system that significantly improves thermal and acoustic insulation and enhances air-tightness of solid or hard to treat walls.

- Isover Optima is a dry-lining system that significantly improves thermal and acoustic insulation and enhances air-tightness of solid or hard to treat walls.
- The BBA Certified system is a high performance solution for insulating new and older buildings from the inside – making retrofit more achievable due to the flexibility and ease of installation. It is the only “through the wall” IWI system that provides protection from moisture for the complete substrate.
  
  - Meets requirements of Part L Thermal Building Regulations 2010 (England & Wales) and Section 6 (Scotland).
  - The only ‘through the wall’ IWI system - protection from moisture for the complete substrate.
  - Supports ‘snap’ into place for quick installation to the finishing board, removing the need for additional work and saving time.
  - Supports are formed from a fibre reinforced polyamide reducing thermal bridging via the support structure to a minimum.
  - Suitable for use in Multi-Comfort buildings.
**Isover**

**Isover VARIO System**
A high performance membrane unique in providing excellent levels of airtightness with unparalleled protection against moisture.

**Isover**

**Isover CLIMAVE**
A high density glass mineral wool board, faced on both sides. This system offers excellent thermal and acoustic performance in a fire safe system.

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**Leca® Insufill**
A lightweight expanded clay aggregate insulation fill material.

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**Weber**

**weber.therm XP**
A unique external wall insulation system, using specially designed one-coat mineral render.

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For a full, up-to-date listing of Saint-Gobain products and solutions, please visit [www.multicomfort.co.uk](http://www.multicomfort.co.uk)
**Weber weber.therm XM**

Lightweight external wall insulation system incorporating thin-coat polymer render and meshcloth reinforcement.

A lightweight, thin-coat, polymer render system using glass fibre mesh reinforcement, suitable for hand application.

The first coat of render is 3mm and once cured a further 3mm of render can be applied and finished with a top coat with scraped texture or with dry dash aggregate. Alternatively primer and a simple synthetic finish can be applied directly on to the cured base coat in a large selection of colours.

- Provides an attractive, weather-proof and generally maintenance-free new exterior with efficient thermal protection.
- Simplifies wall construction within the new build sector and eases the decoration and re-modeling of existing, tired facades.
- Suitable for low or high rise housing and for all major insulation types.
- Class 0 fire performance (low risk).
- BBA approved certificate no. 91/2691.

**Weber weber.therm XB**

External wall insulation system featuring a real brick slip finish.

A system using authentic brick-slips which are attached directly to insulation and fixed using a high performance polymer mortar. The mortar joints are then recreated using weber.rend BPM pointing mortar. Special ‘pistol’ returns on corners provide the realistic brickwork effect.

- Provides efficient thermal insulation for refurbishment and new build projects.
- British Standard brick dimensions, designated frost resistant.
- Suitable for and effective on most buildings – including lightweight steel frame structures and in-fill panels.
- Eliminates interstitial condensation by creating a ‘warm wall’ construction.
- Hard durable surface reduces problems arising from impact damage and graffiti.

**British Gypsum Gyproc Soundcoat Plus**

A gypsum-based parge coat used on masonry walls to improve thermal and acoustic performance.

- Offers thermal performance on aircrete blocks, lightweight, medium, and dense aggregate blocks.
- Lower heating costs  ·  Reduces CO₂ emissions
- Increases occupant comfort.

**British Gypsum Gyproc ThermaLine PIR**

A high performing insulating plasterboard.

- Provides efficient thermal insulation for refurbishment and new build projects.
- British Standard brick dimensions, designated frost resistant.
- Suitable for, and effective on most buildings – including lightweight steel frame structures and in-fill panels.
- Eliminates interstitial condensation by creating a ‘warm wall’ construction.
- Hard durable surface reduces problems arising from impact damage and graffiti.

- Ideal for use with 4 BBA approved systems – DriLyner tl, DriLyner rv, both systems allowing direct bonding to a masonry wall and Gyplyner iv or Gyplyner universal, using Gypframe metal framing either attached or independent of the external wall.
- Covered by the SpecSure® warranty with guaranteed lifetime performance.
- Backed with pale yellow Polyisocyanurate foam with a 2 x vapour control barrier.
- Moisture resistant version available.

**FEATURES**

- Comprehensive range of colours and finishes including scraped, dry dash, brick-effect or synthetic.

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- Comprehensive range of colours and finishes including scraped, dry dash, brick-effect or synthetic.

- BBA approved certificate no. 91/2691.

- Lower heating costs  ·  Reduces CO₂ emissions
- Increases occupant comfort.

- Ideal for improving the thermal performance of new and existing homes, including rooms in the roof and garage conversions.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit [www.multicomfort.co.uk](http://www.multicomfort.co.uk)
Saint-Gobain Glass

SGG COOL-LITE® SKN

A high performance solar control product range that features excellent levels of neutrality, light transmittance and g-factor.

The range is designed for the commercial market where a high light transmittance and low solar heat gain is required. The high light transmission reduces the need of artificial light and the low g-value significantly reduces the dependency on heating and air conditioning.

SGG COOL-LITE SKN products not only improve well-being by creating a more pleasant working environment, they also reduce energy consumption and help to create a more sustainable building design.

- High light transmissions of up to 70%.
- Low g-values down to 0.23.
- Excellent U-values from 1.0W/m²K.
- High degrees of neutrality.
- Can help reduce the costly requirement of air conditioning.

FEATuRES
- Meets the durability requirements of class C of European standards EN 1096-1 and -2.
- Light and solar performance according to EN 410.

Saint-Gobain Glass

SGG PLANITHERM® ONE T

Offers superior thermal insulation properties for the most demanding of glass specifications, where neutrality and excellent performance are paramount.

With an optimum centre-pane U-value of 1.0W/m²K (16mm 90% argon-filled cavity) it can comfortably meet current Building Regulations by improving whole window U-values for all frame types. It is particularly suited to residential new build and light commercial new build and renovation applications using steel and aluminium frames.

It can also offer considerable reductions in heating over standard glass and is an environmentally friendly solution - given the lower CO₂ emissions associated with reduced energy consumption.

- Helps to eliminate cold areas around windows resulting in greater comfort.
- Reduces incidence of condensation on the inner pane.
- Neutral appearance in both transmission and reflection.
- Maximises entry of natural daylight.

FEATuRES
- Meets the durability requirements of class C of European standards EN 1096 and are CE marked.
- Light and solar performance according to EN 410.

Saint-Gobain Glass

SGG PLANITHERM TOTAL+

A high performance low-E glass and is one of the most energy efficient window glass products available today.

A high performance low-E glass developed in the UK, specifically for the particular needs of the UK market. It has been optimised for even better Window Energy Ratings (WERs) and as such is one of the most energy efficient window glass products available today.

This new coating combines much improved processing qualities and performance, whilst maintaining excellent aesthetics.

- Enhanced Thermal Insulation
- Neutral Appearance
- Exceptional Clarity
- Combine with SGG STADIP SILENCE, SGG COOL-LITE and SGG BIOCLEAN for additional security, solar control and low maintenance benefits.

FEATuRES
- Meets the durability requirements of class C of European standards EN 1096 and is marked.
- Light and solar performance according to EN 410.
- Centre-pane U-values have been rounded in accordance with EN 673.
- For Window Energy Ratings simulators should calculate whole window U-values from first principals using normal surface emissivity (ε = 0.05).

SageGlass

SageGlass®

An electronically tintable glass for windows, skylights and curtain walling allowing complete control of solar heat gain and glare.

The next step in glass technology and gives designers the ability to use a dynamic response to the constantly changing climate in the built environment.

SageGlass is a beautiful and cost-effective way to control sunlight with or without blinds, occupants control glare and heat gain while maintaining a connection to the outdoors. SageGlass also allows passive heat gain and optimisation of daylight producing savings of up to 23% on annual building energy.

- Light transmission range: 61% to >23%.
- Solar factor g range: 0.41 to 0.06.
- U value low as 0.6 W/m²K.
- Reduces CO₂ emission by 19%.
- Annual energy use savings of up to 23%.

FEATuRES
- Tints on demand manually or automatically.
- Control options include iOS and smart app.
- Fits into all types of framing system.
- Various colour options available.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
Materials that provide sound insulation by having low acoustic transmission, such as glass in windows and facades, and mineral wools, will help protect building occupants from outside noise. It is to be noted that the transmission characteristics of a material is dependent on the frequency of the sound being transmitted.

Absorbing materials, such as special plasterboards, or mineral wools, will help reduce airborne and impact noises inside the building, which will also be influenced by the choice of wall or floor covering.

Audio Comfort

Audio comfort in a building is dependent on the acoustic characteristics of the building fabric, as regards acoustic transmission and absorption. Saint-Gobain offers several product categories that have a direct impact on acoustic comfort:

- Materials that provide sound insulation by having low acoustic transmission, such as glass in windows and facades, and mineral wools, will help protect building occupants from outside noise. It is to be noted that the transmission characteristics of a material is dependent on the frequency of the sound being transmitted.
- Absorbing materials, such as special plasterboards, or mineral wools, will help reduce airborne and impact noises inside the building, which will also be influenced by the choice of wall or floor covering.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
**Isover Acoustic Partition Roll (APR1200)**

Provides high levels of acoustic insulation in walls and floors to meet acoustic requirements in domestic and non-residential applications.

A glass mineral wool roll supplied in 600mm and 400mm widths to fit between standard stud and joist spacings. It provides high levels of acoustic insulation in walls and floors to meet acoustic requirements in domestic and non-residential applications.

- Covered by the SpecSure® Warranty with guaranteed lifetime performance when used as a part of British Gypsum drywall and acoustic floor systems.
- Manufactured from up to 86% recycled postconsumer glass that would otherwise go to landfill.
- Isover glass mineral wool insulation has an A1 Euroclass fire rating – the best attainable.
- Zero Ozone Depletion Potential (ODP) and Global Warming Potential of less than 5.
- Suitable for use in Multi-Comfort House buildings.

**Isover RD Party Wall Roll**

Designed for use in E-WM-17, E-WM-20 and E-WM-24 Robust Detail separating wall constructions.

A glass mineral wool roll supplied in a 75mm, 100mm, 125mm and 150mm thickness. The strong, resilient and flexible rolls are ready-cut to 2x455mm to fit between standard wall tie spacing.

It is designed for use in E-WM-17, E-WM-20 and E-WM-24 Robust Detail separating wall constructions to exceed acoustic performance requirements set out in Building Regulations Approved Document E (England and Wales).

- Meets the full requirement to deliver zero U-value for party walls as defined in Building Regulations (Approved Document L1A, Table 3).
- Proprietary component of three Robust Detail constructions (E-WM-17, E-WM-20 and E-WM-24) and conforms to the generic full-fill mineral wool specifications.
- Removes the requirement for pre-completion testing and parge coats prior to drylining.
- Manufactured from up to 86% recycled postconsumer glass that would otherwise go to landfill.
- Suitable for use in Multi-Comfort House buildings.

**Ecophon Akusto Wall**

Designed to complement acoustic ceilings, Ecophon Akusto Wall panels provide additional absorption in a range of colours and surfaces.

A complement to acoustic ceilings, Ecophon Akusto panels solve acoustic challenges whilst also providing opportunities to follow current trends in design and installation. An array of colours and different textured finishes ensure that Akusto is suitable for a range of applications.

Akusto Wall with Texona, Akutex FT and Super G surfaces are available in size 2700 x 600 x 40mm, and are manufactured from a fully recyclable high performance glasswool.

- Akusto Wall offers additional sound absorption to support our acoustic ceilings.
- Available in a range of trims, colours and surface designs.
- Easy to install in either new build or retrofit projects.
- Panels manufactured from lightweight glasswool, provides the equivalent of Class A absorption.

**Ecophon Focus**

A range of design opportunities through different edge solutions, size, colours, and installation options.

Ecophon’s most comprehensive system family, Focus will always offer a range of design opportunities in a range of different edge designs, colours, forms, levels changes and installation options. This flexibility allows it to be used in most application areas, including commercial and office environments.

Ecophon Focus includes concealed, semi-concealed and linear designs alongside traditional exposed grid solutions. The tiles are high density glass wool utilising 3RD Technology. The surface is a reinforced sandwich construction, and the visible surface has an Akutex™ FT coating.

- Flexible, high performance acoustic ceiling available in comprehensive range of edges.
- Suitable for most environments, including offices and classrooms.
- Wide range of sizes and colours available.
- Class A acoustic performance.
- Fully recyclable, low carbon solution with high recycled content.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
Ecophon Master Rigid

Optimised acoustic ceiling for spaces when strict demands are made on good acoustics and speech intelligibility.

The Ecophon Master Rigid family includes three different edge designs. By using a surface 10x stronger than standard, and tiles that can be locked into the grid, Master Rigid offers Class A acoustic absorption in a robust ceiling tough enough for demanding school conditions.

The system consists of Ecophon Master Rigid tiles, Ecophon Extra Bass and Ecophon Connect grid system. The tiles are high density glass wool utilising 3RD Technology. The surface is a reinforced sandwich construction, and the visible surface has an Akutex™ FT coating.

- Optimised, high performance acoustic ceiling available in A, E and Dp edges.
- Impact resistant, ‘locked in’ tiles that remain fully demountable.
- Class A acoustic performance.
- Extra Bass pads provide additional absorption at low frequencies, of particular importance in SEN classrooms.
- Fully recyclable, low carbon solution with high recycled content.

Ecophon Solo is a free hanging acoustic ceiling solution primarily used when it is not possible or desirable to install a full wall-to-wall ceiling. Solo is simple to install either into new build or for retrofit into existing buildings. The panel is manufactured from high density glass wool utilizing 3RD Technology, with Akutex™ FT surface on both sides. Solo is an unframed free hanging unit offering a high degree of design possibilities. The different suspension systems, used in combination with the engineered Connect Absorber anchor give opportunities to create several layers and angles.

- Freehanging acoustic ceiling rafts.
- Wide range of shapes, sizes and colours available.
- Easy to install in new build or retrofit projects.
- Panels manufactured from lightweight glasswool, provides the equivalent of Class A absorption.
- Fully recyclable, low carbon solution with high recycled content.

Ecophon Solo allows freedom of design and the opportunity to easily retrofit acoustic treatments into existing spaces.

British Gypsum SILENT FLOOR

A flooring system offering enhanced levels of sound insulation, achieved by providing an acoustically decoupled ceiling system.

The secret of our Silent Floor system lies in the resiliently mounted ceilings and impact resistant walking surfaces. These floors outperform standard floors by up to 15dB – a real improvement.

- Improves airborne and impact sound insulation of existing timber joist floors.

British Gypsum GypWall QUIET IWL

A lightweight, non-loadbearing acoustic separating wall system.

A twin frame acoustic separating wall that requires no bracing. Can be used in residential or commercial applications to meet a specific level of sound insulation performance.

The system includes 2 x 15mm Gyproc SoundBloc board, two frames of Gyproc T-Studs with 100mm Isover Acoustic Partition Roll (APR 1200) insulation.

- An approved Robust Detail construction that can be used to meet Building Regulations Approved Document E for separating walls.
- Accommodates services between the twin stud frameworks.
- Covered by the SpecSure® warranty with guaranteed lifetime performance.

Features

Significant enhanced performance improvement (+15dB) over a standard Building Regulation internal floor.

Features

- Satisfies BS5234 requirements up to and including Severe Duty.
- An approved Robust Detail construction (E-WS-2) achieves a minimum of DnTw + Cl 45dB
- Sound insulation airborne: 66 - 70 (Rw dB)
- Fire resistance: 60 - 120 (mins)

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
**British Gypsum**

**GypWall ROBUST**

A high impact-resistant partition system for use where a more durable structure is required.

Providing a lightweight, cost-effective, non-loadbearing partition suitable for all types of commercial, healthcare and educational buildings.

- High impact resistance.
- Single layer 60 minutes fire resistance to EN standards.
- Available in 70mm, 92mm and 146mm stud options.
- Accommodates services within the stud cavity.
- Achieves high levels of sound insulation with a single layer.
- Covered by the SpecSure® warranty with guaranteed lifetime performance.

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**GypWall EXTREME**

British Gypsum’s ultimate impact resistant partition for use where extra durability is required above and beyond Severe Duty.

GypWall EXTREME is able to cope with the rigours of intensive high traffic use in commercial applications.

- Capable of securing heavy fixtures on a single layer without the need for additional patressing.
- Extremely durable and resilient linings.
- Excellent resistance to vandalism.
- Reduces maintenance cycle costs.
- Extremely cost effective system compared to other fibre board offerings due to hybrid construction.
- Covered by the SpecSure® warranty with guaranteed lifetime performance.

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**GypWall RAPID dB Plus**

A specialist non loadbearing partition for use in housing.

An internal partition system incorporating 15mm Gyproc SoundBloc RAPID linings, Gypframe AcouStuds and Isover Acoustic Partition Roll (APR1200) glass mineral wool insulation.

- GypWall RAPID dB Plus combines high levels of performance and a narrow footprint, compared with timber and masonry alternatives.
- Speed and efficiency of installation are achieved through the use of lightweight Gypsum stud framing and single layer Gyproc SoundBloc RAPID linings, with a special width and thickness configuration.
- Services are easily accommodated within the partition; through the pre-finished service cut-outs within Gypframe AcouStuds.
- Covered by the SpecSure® warranty with guaranteed lifetime performance.

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**DriLyner sI**

Upgrade to existing walls with DriLyner sI, incorporating Gyproc TriLine – a sound insulating plasterboard laminate.

A 12.5mm Gypsum Wallboard bonded to a glass mineral wool backing. This is bonded to the masonry walls.

- Can provide up to 13Db improvement to existing internal walls.
- Flanking sound transmission can be greatly reduced.
- Allows minor surface irregularities to be taken out with the drylining cavity formed by the gypsum adhesive dabs.

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Refer to the White Book System Selector for performance options at www.british-gypsum.com

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For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
**British Gypsum**

**Two coat plaster**

Thistle plasters offer a full range of specific and multi-purpose solutions for a wide range of internal plastering needs and backgrounds.

*Thistle HardWall* can be used on most masonry backgrounds. High impact resistance.

*Thistle BondingCoat* is used on smooth, low suction or flexible backgrounds.

*Thistle MultiFinish* is a versatile final coat plaster.
- A relatively easy way to increase acoustic performance for existing masonry walls.
- A thickness of only 13mm minimises the reduction in room size.

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**GypWall CLASSIC**

A highly versatile metal stud partition system.

A versatile internal partitioning system.
- Quick to install compared to masonry or timber frame alternatives and allows transformation of building layouts with minimal disruption.
- Non-hygrosopic Gypframe metal framework will not twist, warp or rot.
- Easy accommodation of services within the stud cavity due to pre-cut service holes within the Gypframe metal studs.

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**Gyptone QUATTRO**

A sound-absorbing perforated gypsum system ideal for use in acoustic walls, ceilings or modular units.

A versatile acoustic system available in tiles, long span planks or monolithic boards.

Gyptone QUATTRO provides up to class B sound absorption and includes VOC absorbing ACTIVair technology as standard.
- Available in lay-in tile, corridor plank or monolithic boards for a seamless finish.
- Up to class B sound absorption: $\alpha_W = 0.85$ for control of acoustic reverberation.
- Can be used to create flat, curved or contoured surfaces, finished in any colour.
- VOC-absorbing ACTIVair technology available as standard in Gyptone boards.

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**Eurocoustic TONGA**

A high performance ceiling system that offers excellent sound absorption, fire protection, light reflectance and humidity resistance.

An acoustic ceiling system available as standard tiles or long span acoustic planks up to 2.4m.

Eurocoustic TONGA offers class A sound absorption and excellent resistance to fire and humidity.
- Versatile system available in standard tiles or long planks up to 2.4m length.
- Class A sound absorption: $\alpha_W = 1.0$ for management of acoustic reverberation.
- 30 minutes fire protection: 30 minutes to BS 476 PT.23:1987 (in approved system).
- Up to 100% humidity resistant at 40°C: Tested to class D to EN 13964:2014.
Multi-Comfort building design – products & systems – Audio

Saint-Gobain Glass
SGG STADIP SILENCE®
Significantly reduces the effect of exterior noise in buildings situated near noisy locations such as airports.

Combines two layers of glass bonded together with a transparent plastic interlayer. The interlayer reduces the level of acoustics transmitted through the glass helping to reduce external noise pollution and create more tranquil and comfortable interiors.

The interlayer is also capable of filtering up to 99% of UV radiation; therefore the use of Saint-Gobain Glass SGG STADIP SILENCE helps reduce the fading of furnishings. Its interlayer is transparent and therefore features excellent optical qualities.

- Excellent levels of sound insulation without the need for thick, heavy glass.
- Even sound insulation across the entire frequency range.
- Distortion free transparency.
- Can achieve P2A safety and security properties at 6.8mm.

Saint-Gobain PAM
Ensign EEZI-FIT
Cast iron above ground drainage system, kitemark approved to BS EN877.

- Acoustically the quietest systems on the market.
- Testing verifies Green Glue releases a minimum amount of VOC’s and contributes to LEED credits with exceptional indoor environmental quality.
- Tested and safe: Mold resistant per ATM D3273 and fire resistance per ASTM E119 and UL263.

Green Glue Noiseproofing Compound
A sound insulation compound, acting as a damping layer between construction boards.

- Single component with no mixing required, the viscoelastic compound is provided in cartridges and pail configurations to allow for easy application.
- Suitable for new construction and renovation, commercial and residential and professional and do-it-yourselfers.
- Water base low VOC formulation is environmental friendly and easy to clean up.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
Multi-Comfort building design – products & systems – Visual

Visual Comfort

Visual comfort in a building can be managed through the size and positions of the openings, the orientation of the façades, the consideration of shade-casting or view-blocking obstructions close to the building, solar protection devices, the reflectance of the surfaces, the layout of furniture and the overall aesthetics of indoor space.

Saint-Gobain offers several product categories that have a direct impact on visual comfort and aesthetics:

- Transparent products, such as glass, films or architectural membranes, which allow access to daylight and views through windows, doors, partitions;
- Translucent products that allow daylight while preserving privacy;
- Opaque interior products, such as wall coverings, ceiling or flooring products, which can contribute to the distribution of daylight and to the aesthetic of the space;
- Lighting products, such as lighting textiles or ceiling tiles, which can be excellent complementary light sources, especially in glare management;
- Opaque exterior products, which can help to throw natural light in to brighten dark spaces in city buildings;
- Light products, such as lighting textiles or ceiling tiles, which can be excellent complementary light sources, especially in glare management;
- Opaque exterior products, which can help to throw natural light in to brighten dark spaces in city buildings.

International Timber

Accoya

Imagine a wood that is sustainable, has zero toxicity and provides dimensional stability and durability that exceeds all durable timbers.

Produced through a modification process, taking a sustainable plantation grown softwood and through an acetylation process which is entirely non-toxic. The chemical structure of the wood is modified from the surface to the core, providing outstanding performance making it ideal for use in cladding applications. The product has been tested over prolonged periods in all types of weathering conditions – above and below ground and even in water.

- Consistent quality throughout from surface to core. No need to apply chemical preservatives when cut or planed.
- Non-toxic, protecting the environment from the harmful effects of poisons leaching out of typical wood treatment. It can be safely reused or recycled.
- Offers improved thermal insulation in comparison with commonly used wood species. It is ideal for applications where energy conservation is important.

International Timber

Western Red Cedar

Sourced from West coast of Canada with either PEFC or CSA certification it is ideal for internal or external cladding.

Western Red Cedar is naturally resistant to decay and insect attack. If left uncoated it will season to an attractive silver grey appearance over a period of time in areas with low air pollution. Cedar offers superior acoustic qualities too, helping to reduce noise or confine it to specific areas. It is also an excellent material for thermal insulation – in summer keeping the building cool and in winter preventing heat from escaping.

- It has a very low shrinkage factor. It is the most resistant of all coniferous species to warping, twisting and checking.
- It is one of the lightest commercially available softwoods. It has a low density of 330 – 390 kg/m³, making it an easy wood to transport, handle and erect on site.
- Its low density and high proportion of air spaces makes Cedar the best thermal insulator of all commonly available softwood species. It is far superior to brick, concrete and steel.

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For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
**British Gypsum**

**GypWall CURVE**

A highly cost-effective system specially designed to provide curved walls and linings.

This system can be installed in all types of buildings to deliver design flexibility and aesthetic impact. Suitable for a wide range of applications, for example receptions, communal areas and atria.

- Uniquely designed channel can be quickly and easily shaped to radius.
- No need for curved timber templates.
- Use a skim plaster finish to enhance the installation – Thistle Magnetic Plaster which attracts magnets or Thistle PureFinish plaster which contains ACTIVair technology, improving air quality by absorbing formaldehyde.
- Covered by the SpecSure® warranty with guaranteed lifetime performance.

Refer to the White Book System Selector for performance options at www.british-gypsum.com

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**British Gypsum**

**Rigitone 8-15-20 SUPER**

A sound-absorbing perforated gypsum system ideal for use in acoustic walls, ceilings or modular units.

This seamless acoustic system suitable for ceilings, walls and modular units. Rigitone 8-15-20 SUPER can be used to form beautiful flat, contoured or curved surfaces, and finished in any colour.

- Eye-catching perforated design with circular perforations and seamless finish.
- Can be used to create flat, curved or contoured surfaces, finished in any colour.
- Ideal for use in walls, ceilings and modular raft/island units.
- Gypsum core and supporting metal frame (CasoLine mf) is 100% recyclable.

Refer to the White Book System Selector for performance options at www.british-gypsum.com

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**Saint-Gobain Glass**

**SGG PLANICLEAR®**

The standard substrate of Saint-Gobain Glass. A mid-iron glass which features neutral aesthetics and higher light transmission.

Available in an extensive range of thicknesses suitable for a wide variety of applications. It can be toughened or laminated for safety benefits or silvered to produce mirrors.

It is also suitable for screen printing, acid etching, decoration, sand blasting, lacquering or edge working.

- Low levels of heat absorption – more heat can be transmitted through the glazing.
- High light transmission – increases the amount of natural daylight.
- Neutral aesthetics.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk

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**Saint-Gobain Glass**

**SGG DIAMANT®**

A unique colourless glass with very low iron oxide content; as a result the glass features excellent neutrality.

A unique colourless ‘extra-white’ float glass with very low iron oxide content. As a result the glass has a very high light transmittance and excellent levels of neutrality. It is therefore the only clear glass which allows a natural and true reproduction of white and pastel colours when enamelled, lacquered or screen printed.

It is also suitable for screen printing, acid etching, decoration, sand blasting, lacquering or edge working.

- Optimum transparency
- Unfiltered natural light
- High energy transmittance
- Neutral aesthetics

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
**Performance Plastics**  
**Thermalbond**

A double sided adhesive foam to create space for structural glazing silicone application, allow its optimal curing and temporarily bond the glass to the frame.

**FEATURES**
- Life Cycle Assessment data available and provides for points for LEED indoor Environmental Quality Standard
- Open cell structure with water vapor transmission rate > 2.0 g/h•m² insures sufficient moisture for silicone curing. More than 10x than of closed cell spacers
- No load deformation at 25 kPa, insures stable joint dimension even with heavy insulated glass window façade systems.

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**Weber**  
**weber.pral M**

One-coat, through-coloured monocouche render.

A one-coat, ready-mixed, cementitious, weather resistant, through-coloured render, suitable for most types of brick or blockwork.

Factory produced from carefully selected raw materials for consistency of product, it only requires the addition of water on site.

- The through colour and one coat features allow fast application with shorter programme periods, thereby reducing associated scaffolding and site costs and permitting the completion of ground works at an earlier stage.
- Through coloured for low maintenance – decoration not required.
- Ready mixed - only water required to be added on site for ease of use.
- Formulated to be spray applied by render pump for faster application.
- BBA approved certificate no. 05/4268.

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**Weber**  
**weber.floor 4650 design colour**

A through coloured, pump applied self levelling floor screed.

A through-coloured, cement-based floor screed, containing special cement, sand and additional binders. The material is a pumpable, rapid set and self levelling compound. It can be used in commercial and retail environments, store rooms and industry with light truckload. The floor can be used to contribute to the aesthetic design of the room.

- For application depths between 4-15mm.
- Rapid setting – foot traffic after 3-5 hours and light traffic after 24 hours.
- Durable and hard wearing.
- Excellent spreading and smoothing characteristics.
- Available in a range of 10 colours.
Indoor Air Comfort

Saint-Gobain offers several product categories that have a direct impact on indoor air quality:

- Products with the lowest emissivity possible for the building envelope in insulation, dry lining, facade, wall or floor covering.
- Products contributing to the performance of ventilation systems such as high performance windows, doors, and technical insulation.
- Products that help purify indoor air by scavenging certain VOCs, such as formaldehyde.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
British Gypsum
Gyproc SoundBloc with ACTIVair technology

A gypsum plasterboard with a higher density core and ACTIVair technology.

- The higher density core design of this board enables the wall, partition and ceiling systems to provide greater sound insulation performance levels over standard products by reducing the transmission of sound between rooms.
- Includes ACTIVair technology.

Weber
weber.set rapid SPF

A rapid-setting, low-dust, cement-based floor and wall tile adhesive.

- Supplied in Light grey: 10 kg and 20 kg, White: 20 kg bags.
- Manufactured under BSI Quality Assurance Scheme ISO 9001.

- A rapid-setting, flexible, low-dust, cement-based floor and wall tile adhesive, available in light grey or white for interior and exterior use.
- It is used to fix all ceramic floor and wall tiles, mosaic, quarry, terrazzo, terracotta, porcelain and natural stone in situations where some movement or vibration is likely.
- Low Dust Technology makes it more comfortable to use and reduces cleaning time.
- Particularly suitable for situations where some movement or vibration is likely or when tiles are very large.
- Ready for light foot traffic and grouting after 2 hours.
- Suitable for wooden floors overboarded with WBP plywood or suitable tile backer board.
- Can be used as a pourable adhesive.

Graham
Warmflow Ground Source Heat Pump

Used with an MVHR system to pre-warm the air brought in to the building.

- The Warmflow Ground Source Heat Pump is one of the most efficient and intelligent heat pumps in its class.
- Its Microprocessor controls all aspects of the appliance and if configured to do so upon installation can control all the heating system functions through its user friendly interface such as 7 day independent timer for heating and hot water, weather compensating, frost protection, domestic hot water storage temperature and operation of its immersion.
- British designed and manufactured specifically for the UK market.
- Fully modulating outputs 3 - 10kw and 6 - 18kw units.
- Inbuilt monitoring system of flow temp, flow rates and system temp for easy commissioning.
- Installer friendly wiring center.

British Gypsum
Gyproc SoundBloc with ACTIVair technology

A gypsum plasterboard with a higher density core and ACTIVair technology.

- Enhanced acoustics performance dependant on the system that it is incorporated in.
- Tests show that ACTIVair decomposes 70% of the formaldehyde in a controlled test environment.

- Fully MCS approved. Tested COP of 5.08 - 80 W/35
- Electronic controlled expansion valves to optimise efficiency.
- User friendly interface Covering all aspects of heat pump and system control, the brain of the system.

For a full, up-to-date listing of Saint-Gobain products and solutions, please visit www.multicomfort.co.uk
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