

# DANOLINE LEED 2009 DECLARATION

## LEED 2009 credit opportunities using Danoline acoustic solutions

The opportunities for Danoline gypsum-based, acoustic wall and ceiling solutions to contribute to earning credits are found in the 2009 LEED Categories shown below.

For the following LEED Rating Systems:

- New Construction and Major Renovation
- Schools New Construction and Major Renovation
- Core and Shell Development
- Commercial interiors

### Energy & Atmosphere

#### • EA Credit 1: Optimize energy performance

##### Intent

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

##### Contribution

Due to their inbuilt natural porosity and a thermal conductivity of approximately 0.18 W/m C (non-perforated), gypsum boards and tiles can quickly adapt to their environment. Therefore warming and cooling in rooms with gypsum linings is quickly achieved.

Furthermore with suspended perforated ceilings, it is possible to take advantage of the increased airflow through the surface. The increased transfer of air within the overlaying air space and between the room, allows for an improved cooling and heating effect and a levelling out of temperature fluctuations.

### Materials and Resources

#### • MR Credit 2: Construction Waste Management

50% recycling / salvaging = 1 point

75% recycling / salvaging = 2 points

##### Intent

To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

##### Contribution

Gypsum board waste from building sites is 100% recyclable, irrespective of the materials origin.

Furthermore Danoline's packaging materials are fully separable and recyclable under the following categories

- Cardboard
- PE plastic
- Paper

#### • MR Credit 4.1: Recycled Content: 10% (post-consumer + ½ pre-consumer)

#### • MR Credit 4.2: Recycled Content: 20% (post-consumer + ½ pre-consumer)

##### Intent

To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

## Contribution

There are four sources of gypsum used in the production of gypsum boards for Danoline acoustical ceilings and these fall into the following categories:

### Virgin Materials

- Natural raw gypsum: 0-2.5% (according to the availability of alternative sources)  
Source: Spain from quarries nearby the port of Garrucha

### Non virgin-material

- Post industrial by-product gypsum: 80-90% (according to availability)  
Source: Local power plants in Denmark within a maximum radius of approx. 200km
- Post consumer gypsum board waste 4-9% (according to availability)  
Source: Gips Recycling A/S, Hobro
- Pre-consumer gypsum board waste 5-11% (according to availability)  
Source: Own factory Hobro in Denmark

### Total Recycled Content

The total content of non-virgin gypsum varies between:  
97.5-100% (according to availability)

The content of post-consumer cardboard used in our plasterboard products is: 100%

## Indoor Environmental Quality:

- **IEQ credit 3.1: Construction Indoor Air Quality Management Plan – During Construction**
- **IEQ Credit 3.2: Construction Indoor Air Quality Management Plan – Before Occupancy**

### Intent

To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.

### Contribution

Gypsum board hardening is not based on the addition of reactive materials in the form of volatile organic compounds and such like, therefore, the use of gypsum products does not cause health nuisances during construction or in-service. All the surface finishes applied to Danoline products are also classified as non-hazardous and for reasons of indoor climate safety and consideration for the environment, there are no added biocides. Furthermore Danoline products have no detectable levels of formaldehyde.

Danoline is registered with the voluntary Danish Indoor Climate Labelling scheme (DIM - Dansk Indeklima Mærkning"). The purpose of indoor climate labelling is to improve the indoor climate in buildings and is the first labelling scheme to deal with construction materials in the service phase.

DIM covers degasification - based on the time value in days it takes for the most slowly degassed individual substance to drop below the substance's smell and irritation threshold; and Particulate discharge - based on the release of particles determined from sedimentable dust consisting of particles (including fibres) in the first part of the product's lifetime.

The results for Danoline products are shown below

- Certificate no. DK-008, untreated products. Declared indoor climate value has been established as 10 days. Particulate discharge classified as low.
- Certificate no. DK-007, finished products. Declared indoor climate value has been established as 10 days. Particulate discharge classified as low.

Furthermore Danoline products achieve the best classification (A+) when analyzed for VOC emissions in accordance with French labelling requirements.

Danoline Tiles is further classified ISO Class 5 in accordance with ISO 14644-1: Classification of air cleanliness.

- **IEQ credit 4.1: Low-Emitting Materials – Adhesives and Sealants (1 point)**
- **IEQ credit 4.1: Low-Emitting Materials – Paint and Coatings (1 point)**

## **Intent**

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

## **Contribution**

Gypsum board hardening is not based on the addition of reactive materials in the form of volatile organic compounds and such like, therefore, the use of gypsum products does not cause health nuisances during construction or in-service. All the surface finishes applied to Danoline products are also classified as non-hazardous and for reasons of indoor climate safety and consideration for the environment, there are no added biocides. Furthermore Danoline products have no detectable levels of formaldehyde or PCP (pentachlorophenol).

Danoline is registered with the voluntary Danish Indoor Climate Labelling scheme (DIM - Dansk Indeklima Mærkning"). The purpose of indoor climate labelling is to improve the indoor climate in buildings and is the first labelling scheme to deal with construction materials in the service phase.

DIM covers degasification - based on the time value in days it takes for the most slowly degassed individual substance to drop below the substance's smell and irritation threshold; and Particulate discharge - based on the release of particles determined from sedimentable dust consisting of particles (including fibres) in the first part of the product's lifetime.

The results for Danoline products are shown below:

- Certificate no. DK-008, untreated products. Declared indoor climate value has been established as 10 days. Particulate discharge classified as low.
- Certificate no. DK-007, finished products. Declared indoor climate value has been established as 10 days. Particulate discharge classified as low.

Futhermore Danoline products achieve the best classification (A+) when analyzed for VOC emissions in accordance with French labelling requirements.

Danoline Tiles is further classified ISO Class 5 in accordance with ISO 14644-1: Classification of air cleanliness.

## • **IEQ credit 8.1: Daylight & Views: Daylight (1 Point)**

### **Intent**

To provide building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building

### **Contribution**

Gypsum board surfaces are ideal for applying various types of paints and laminates. The nature of the surface can vary from high gloss to matt surfacing. Gloss has a bearing on reflections at very oblique incidences of light. Thus great mattness gives very little reflection, but good light deflection. The structure and colour also affects reflection.

Painted Danoline ceilings are supplied as standard with a white painted surface. The paint is a gloss 5 water based acrylic paint which appears as gloss 2 on the gypsum substrate. The painted surface has a fine, matt texture, providing great light dispersion (deflection) to ensure optimal exploitation of daylight and artificial working light without troublesome reflections. Perforated boards reflect light back in many directions and thus create a great scattering of light.

These features are instrumental in allowing Danoline products to take excellent advantage of reflected light, so rooms in which gypsum ceilings have been used are perceived as being light and pleasant. In functional terms, the surface can therefore be used beneficially in for example rooms where work is done at computer monitors.

## Light reflection of surfaces

Danoline Standard White Paint

Light Reflection:

82.6% - Non-perforated

70-75 % - Perforated

Danoline White foil

Light Reflection: 86.3%

## • IEQ credit 9: Enhanced Acoustical Performance (1 Point)

### Intent

To provide classrooms that facilitates better teacher-to-student and student-to-student communications through effective acoustical design.

### Contribution

With modern interactive teaching methods, short reverberation times are important in supporting dialogue. However short reverberation times compromise rhetoric and can mean that quiet sounds are difficult to hear. In order to achieve the ideal sound conditions a number of factors must be taken into account and a balance between privacy and speech intelligibility found.

For short reverberation times, the correct placing of absorbers in the ceiling and on the walls is important to ensure good absorption and at the same time avoid a delayed echo. Absorbent materials with an absorption profile up to  $\alpha_w$  0.7 are ideal for rooms designed for speaking and teaching. Absorbent materials with an absorption profile of  $\alpha_w$  0.7 and above are good for reducing noise.

The acoustic properties of Danoline perforated gypsum products are achieved partly by vibrations in the panelling material; partly by resonance vibrations through perforation holes and partly by diffusion of sound. Perforated gypsum therefore provides not only good sound absorption but also good sound reflection and hence good dispersion of speech sound.

Danoline perforated tiles have a broadband absorption profile, providing good sound absorption in the intermediate frequency range. This is where the consonants containing the most important signals in our comprehension and perception of the spoken language are located. The surfaces of Danoline acoustic gypsum products have the additional advantage of being able to be maintained (painted) without any deterioration to their acoustic properties.

*For the following LEED 2009 Rating systems:*

- Existing Buildings: Operations and maintenance

## Materials and Resources

### • MR Credit 3: Sustainable Purchasing – Facility Alterations and Additions (1 point)

#### Intent

To reduce the environmental and air quality impacts of the materials acquired for use in the upgrade of buildings

#### Contribution

There are four sources of gypsum used in the production of gypsum boards for Danoline acoustical ceilings and these fall into the following categories:

Virgin Materials

- Natural raw gypsum: 0-2.5% (according to the availability of alternative sources)  
Source: Spain from quarries nearby the port of Garrucha

## Non-virgin materials

- Post industrial by-product gypsum: 80-90% (according to availability)

Source: Local power plants in Denmark within a maximum radius of approx. 200km

- Post consumer gypsum board waste 4-9% (according to availability)

Source: Gips Recycling A/S, Hobro

- Pre-consumer gypsum board waste 5-11% (according to availability)

Source: Own factory Hobro in Denmark

## Total Recycled Content

The total content of non-virgin gypsum varies between:

97.5-100% (according to availability)

The content of post-consumer cardboard used in our plasterboard products is: 100%

Gypsum board hardening is not based on the addition of reactive materials in the form of volatile organic compounds and suchlike, therefore, the use of gypsum products does not cause health nuisances during construction or in-service. All the surface finishes applied to Danoline products are also classified as non-hazardous and for reasons of indoor climate safety and consideration for the environment, there are no added biocides. Furthermore Danoline products have no detectable levels of formaldehyde.

## • MR Credit 8: Solid Waste Management – Facility Alterations and Additions (1 point)

### Intent

To divert construction and demolition debris from disposal to landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

### Contribution

Gypsum board waste from building sites is 100% recyclable, irrespective of the materials origin.

Furthermore Danoline's packaging materials are fully separable and recyclable under the following categories:

- Cardboard
- PE plastic
- Paper

## Indoor Environmental Quality

### • IEQ credit 1.4: Indoor Air Quality Best Management Practices – Reduce Particulates in Air Distribution (1 point)

#### Intent

To reduce exposure of building occupants and maintenance personnel to potentially hazardous particulate contaminants, which adversely affect air quality, human health, building systems and the environment.

#### Contribution

Gypsum board hardening is not based on the addition of reactive materials in the form of volatile organic compounds and suchlike, therefore, the use of gypsum products does not cause health nuisances during construction or in-service. All the surface finishes applied to Danoline products are also classified as non-hazardous and for reasons of indoor climate safety and consideration for the environment, there are no added biocides. Furthermore Danoline products have no detectable levels of formaldehyde.

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- Certificate no. DK-007, finished products. Declared indoor climate value has been established as 10 days Particulate discharge classified as low.

Furthermore Danoline products achieve the best classification (A+) when analyzed for VOC emissions in accordance with French labelling requirements.

Danoline Tiles is further classified ISO Class 5 in accordance with ISO 14644-1: Classification of air cleanliness.

• **IEQ Credit 3.1: Green Cleaning – High Performance Cleaning Program (1 point)**

**Intent**

To reduce exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building systems and the environment.

**Contribution**

Danoline products are easy to clean and require no special chemicals for general cleaning. Vacuuming and wiping over with a cloth dampened in just water is normally sufficient to remove dust and minor dirt.

For more stubborn marks a mild detergent may be used. Re-painting where necessary is carried out with a water based paint applied with a paint roller.