



PLASTICA ALFA
INNOVATION & WATER TECHNOLOGIES



LEED Reference Guide

UPGRADING PLANTS & PRESERVING
the VALUE of BUILDINGS

INTRODUCTION

The **LEED CERTIFICATION** was developed and introduced in the USA in 1999 by the USA **Green Building Council**, the organization which unites the representatives of the construction and research sectors and of the North American government entities, with the aim of supplying all the building sectors with a useful tool for certifying building sustainability. The certification evaluates and authenticates the environmental, social and economic sustainability, through a flexible system which specifies differentiated formulation for the different types of buildings, while maintaining a coherent basic set-up: LEED New Construction (NC), Existing Buildings (EB), Commercial Interiors (CI), Core & Shell (CS), Homes, Neighborhood Development.

In particular, LEED-NC concerns the construction of new buildings and the relevant restructuring of existing structures.

This document was produced by **Plastica Alfa S.p.A** to illustrate the various ways in which **upgrading to Alfaidro, Alfaidro Faser and Alfaidro Faser UV piping systems** can earn and contribute to **LEED credits**.

Plastica Alfa S.p.A is proud to be a member of the **USGBC** and a pioneering contributor to the development of sustainable, environmentally responsible vision in innovative plants.

Our solutions are addressed to an active contribution to more **resilient and enduring quality of Real Estate developments**, contributing to better preserve their **value in the future**.

UPGRADING TO A HVAC SYSTEM

RELEVANT LEED CREDITS

- **LEED Credit EA 1** (Energy & Atmosphere) Optimize Energy Performance
- **LEED Credit EA 2** On-Site Renewable Energy
- **LEED Credit EA 4** Enhanced Refrigerant Management
- **LEED Credit IEQ 1** (Indoor Environmental Quality) Outdoor Air Delivery Monitoring
- **LEED Credit IEQ 2** Increased Ventilation
- **LEED Credit IEQ 6.2** Controllability of Systems-Thermal Comfort
- **LEED Credit IEQ 7.1** Thermal Comfort-Design

LEED Points: 8-32

Installing a **HVAC system** in place of the current industry standard systems, like central air system or multiple through-the-wall units, covers several **LEED credits**.

The piping is one of the main components of the hydronic system and **Alfaidro** is the highest performing, most cost-effective and most **environmentally friendly piping solution**, as it lasts longer and requires less maintenance in hydronic applications than other systems do and it realizes its full cost benefit during its lifecycle.

EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE

LEED Points: 1-19

Percentage of minimum energy cost savings

NEW BUILDINGS	EXISTINGS BUILDINGS RENOVATIONS	POINTS
12	8	1
14	10	2
16	12	3
18	14	4
20	16	5
22	18	6
24	20	7
26	22	8
28	24	9
30	26	10
32	28	11
34	30	12
36	32	13
38	34	14
40	36	15
42	38	16
44	40	17
46	42	18
48	44	19

The heating and cooling system in a commercial or residential building represents a large portion of a building's total energy usage: roughly 40 to 45%. Improving the efficiency of the heating and cooling system will dramatically reduce overall energy usage.

HVAC systems are more efficient than PTAC or central air systems, they have lower operating costs and energy demands.

Using **Alfaidro** prevents these systems from degrading over time and reduces initial installation costs.

Calculations according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007.
 Projects in California may use Title 24-2005, Part 6 in place of ANSI/ASHRAE/IESNA Standard 90.1-2007.

EA CREDIT 2: ON SITE RENEWABLE ENERGY

LEED Points: 1-7

Percentage of minimum renewable energy

PERCENTAGE RENEWABLE ENERGY	POINTS
1	1
3	2
5	3
7	4
9	5
11	6
13	7

Using on-site renewable energy systems offsets building energy costs. The most convenient sources of on-site renewable energy include solar and geothermal energy. **HVAC systems** can be designed to function at low temperatures, making them ideal for integration with **solar energy collectors** and **geothermal systems**.

Alfaidro and **ALFAIDRO FASER** can be directly buried in the ground and **Alfaidro Faser UV** can directly exposed to the UV rays.

EA CREDIT 4: ENHANCED REFRIGERANT MANAGEMENT

LEED Points: 2

Combining geothermal energy sources with low temperature operating parameters, HVAC&R systems can be engineered to not require any refrigerants for the cooling system and **Alfaidro is perfectly suited to cold-water pipes** because its natural insulation makes the system more efficient and prevents water condensation in most cases.

IEQ CREDIT 1: OUTDOOR AIR DELIVERY MONITORING

LEED Point: 1

The permanent monitoring systems ensure that ventilation systems maintain design minimum requirements.

Each through-the-wall air conditioning unit creates an outdoor air delivery point in a building. The more points of delivery in the building, the more difficult they become to monitor.

By upgrading from a **PTAC system** to a centralized **HVAC&R system**, designers can eliminate several holes in the side of a building, making it much easier to monitor the building's intake points.

IEQ CREDIT 2: INCREASED VENTILATION

LEED Point: 1

Improving indoor air quality (IAQ) and promoting occupant comfort, well-being and productivity by providing additional outdoor air ventilation.

Using a HVAC&R system rather than a forced air system and design the ventilation system to fulfill the requirements of the LEED credit independently of the heating and cooling system. This also allows the air circulation to operate independently of the heating or cooling demand.

IEQ CREDIT 6.2: CONTROLLABILITY OF SYSTEMS - THERMAL COMFORT

LEED Point: 1

Providing a high level of thermal comfort system control by individual occupants or groups in multi-occupant spaces and promoting their productivity, comfort and well-being.

Using zone controls and mixing valves, hydronic systems can be designed to focus heating and cooling into very specific areas, giving each room its own climate control.

IEQ CREDIT 7.1: THERMAL COMFORT—DESIGN

LEED Point: 1

Providing a comfortable thermal environment that promotes occupant productivity and well-being.

Installing a HVAC system provides thermal comfort to a building without introducing exterior pollutants, drafts, humidity, or noise. **Alfaidro** is particularly suited to this application because it **generates less noise** than other piping systems and is **not susceptible to water hammer**.

INSTALLING RAINWATER AND RECYCLED WATER SYSTEMS

RELEVANT LEED CREDITS

- **LEED Credit SS 6.1** (Sustainable Sites) Stormwater Design - Quantity Control (1 point)
- **LEED Credit SS 6.2** Stormwater Design - Quality Control (1 point)
- **LEED Credit WE 1** (Water Efficiency) Water Efficient Technologies (2-4 points)
- **LEED Credit WE 2** Innovation Wastewater Technologies (2 points)
- **LEED Credit ID** (Innovation in Design) w/Exemplary Performance (1 points)

LEED Points: 6-9

Leed Points can be obtained by designing and installing a rainwater collection system, a wastewater recycling system and a non-potable distribution system on the site.

The rainwater and recycled water can be used for suitable applications where potable water would otherwise have been used. This reduces both the building's drain on the local potable water supply and its overall wastewater generation. The building's overall sustainability is improved its environmental impact is reduced.

Rainwater is highly oxygenated and usually contains sediment, which is extremely corrosive to most types of pipe, but Alfaidro PP-RCT pipe is made from high quality polypropylene, which is resistant to corrosion and chemical breakdown. It is safe to direct-bury and won't leach into the water, protecting the local water table from contamination.

Alfaidro system ensures 50-year of service life in rainwater and recycled water applications and this is very important for the building sustainability.

SS CREDIT 6.1: STORMWATER DESIGN - QUANTITY CONTROL

LEED Point: 1

One of the most efficient methods of reducing rainwater run-off is collecting and reusing the stormwater. In order to make effective use of the stormwater, the project should have a reclaimed water system. This system can take the stored stormwater and distribute it throughout the building and grounds for various non-potable applications. **Alfaidro SDR11 and SDR17** is suited for this type of distribution.

SS CREDIT 6.2: STORMWATER DESIGN - QUALITY CONTROL

LEED Point: 1

Before being used in tertiary applications, it is best to treat the collected stormwater to remove sediment. If mechanical treatments are used, **Alfaidro** is an ideal choice for transporting the untreated water from the collection point to the treatment equipment, it is **abrasion and corrosion resistant, and chemically inert**, so it will not be damaged by the **sediment in the water**.

WE CREDIT 1: WATER EFFICIENT LANDSCAPING

LEED Points: 2-4

A reclaimed water system acts as an onsite source of non-potable water. Using this water for irrigation helps reduce the potable water demand. By combining high-efficiency rainwater and recycled water systems with low-demand landscaping, the need for potable water in irrigation can be eliminated.

Alfaidro can be directly buried and is resistant to **freezing, crushing, and leaking**, making it ideal for an **irrigation system**.

WE CREDIT 2: INNOVATIVE WASTEWATER TECHNOLOGIES

LEED Points: 2

W/ LEED CREDIT ID EXEMPLARY PERFORMANCE

LEED Point: 1

TOTAL LEED Points: 3

Treating the building's wastewater on-site helps reduce its total wastewater generation and provides non-potable water for tertiary applications. **Alfaidro pipe is an ideal choice for transporting the untreated water from the collection point to the treatment equipment and for distributing the treated water for irrigation and other applications.**

CREDITS FOR INNOVATION IN DESIGN (ID)

There are many ways to help improve the environment performance of a building. Not all of these can be addressed in a single document and so the USGBC has included LEED credits for design innovation and exemplary performance. These credits are awarded for establishing and meeting an acceptable criteria that improves the buildings overall environmental performance in a significant and measurable way.

Alfaidro piping systems are some of the **most advanced and environmentally responsible pressure piping systems in the world**. Using them to replace the current industry standard materials offers a wide range of performance, longevity and environmental benefits. The primary benefit of **Alfaidro** piping systems is that they have the smallest carbon footprint of any piping system, since polypropylene generates a fraction of the pollution required to create metal systems and it does not contain any of the hazardous materials found in other plastics.

LEED CREDIT ID 1: INNOVATION IN DESIGN

LEED Points: 1-5

Credits can be obtained by using materials that generate significantly lower emissions to manufacture and install, thus reducing the impact on environmental and human health. Also eliminating hazardous chemicals from the potable water can contribute to obtain credits.

LEED CREDIT ID 1.1 REDUCED ENVIRONMENTAL IMPACT OF POTABLE WATER SYSTEM

The current industry standard material for potable piping systems is copper. By using an equivalent polypropylene system, both the requirements for half emissions and half energy can be met.

A study conducted at the Technical University in Berlin shows that a polypropylene piping system produces an average of **less than 50% of the total emissions of a comparable copper piping system**, as well as requiring **less than 50% the energy to manufacture**.

LEED CREDIT ID 1.2 ELIMINATE HAZARDOUS CHEMICALS FROM THE POTABLE PIPING SYSTEM

The current industry-standard material for potable piping systems is copper. By using an equivalent polypropylene system with heat-fusion connections in place of a copper piping system, over 80% of the heavy metals in the system can be eliminated without introducing PVC's, VOC's, or other hazardous chemicals.

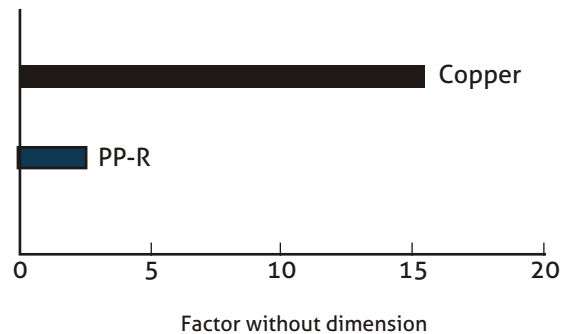
The MSDS for Alfaidro material demonstrate the absence of metals and leaching toxins.

LEED CREDIT ID 1.3 REDUCED ENVIRONMENTAL IMPACT OF HEATING AND COOLING DISTRIBUTION SYSTEM

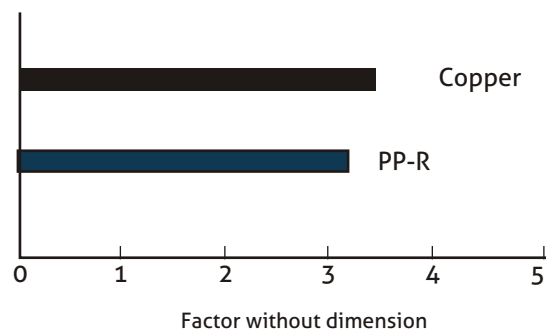
The current industry standard material for hydronic piping systems is steel. By using an equivalent polypropylene system, both the requirements for 50% less emissions and 50% less energy used can be met.

A study conducted at the Technical University in shows that a **polypropylene piping system** produces an average of less than 50% of the total emissions of a comparable steel piping system, as well as requiring less than 50% the energy to manufacture.

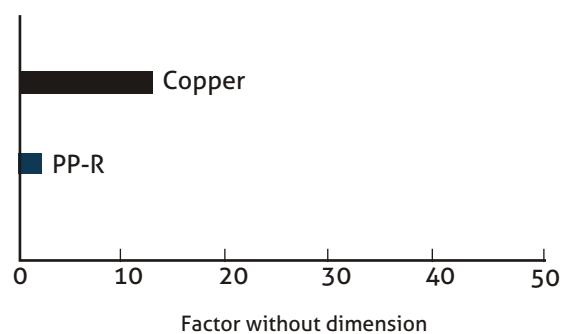
Standardized Comparison (VENOB) of various pipe materials Impact on the Environment - **Emission in Air**



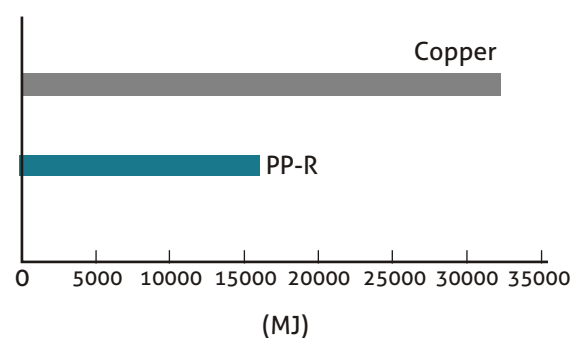
Standardized Comparison (VENOB) of various pipe materials Impact on the Environment - **Emission in WATER**



Standardized Comparison (VENOB) of various pipe materials Impact on the Environment - **Emission in SOIL**



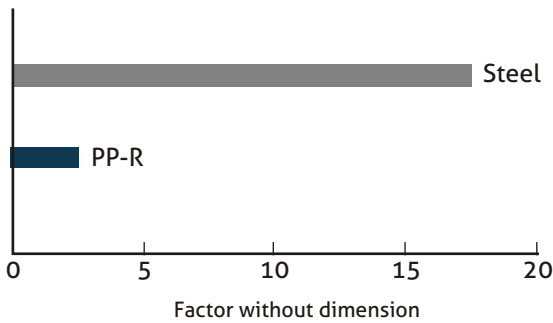
Energy Equivalent Value of the complete Piping System for a 16-Family Housing complex



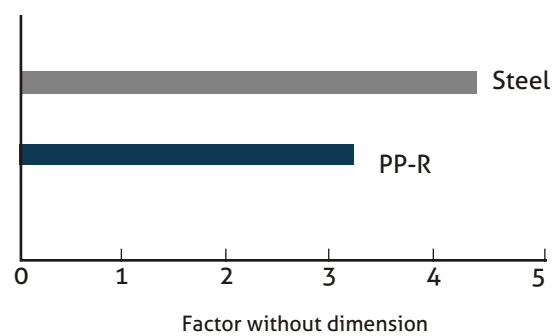
LEED CREDIT ID 1.4 ELIMINATE HAZARDOUS CHEMICALS FROM THE HYDRONIC PIPING SYSTEM

The current industry-standard material for potable piping systems is copper. By using an equivalent polypropylene system with heat-fusion connections in place of a copper piping system, over 80% of the heavy metals in the system can be eliminated without introducing PVC's, VOC's, or other hazardous chemicals. The MSDS for **Alfaiidro** material demonstrate the absence of metals and leaching toxins.

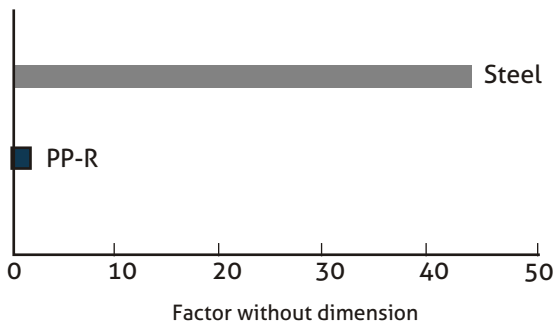
Standardized Comparison (VENOB) of various pipe materials Impact on the Environment - **Emission in Air**



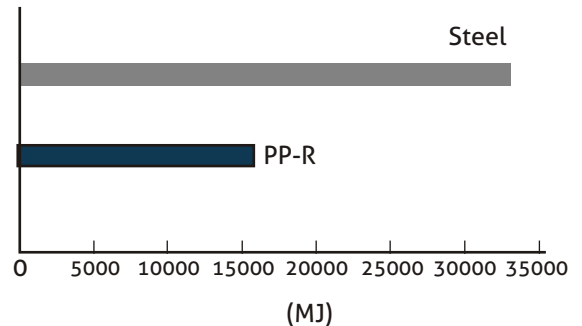
Standardized Comparison (VENOB) of various pipe materials Impact on the Environment - **Emission in WATER**



Standardized Comparison (VENOB) of various pipe materials Impact on the Environment - **Emission in SOIL**



Energy Equivalent Value of the complete Piping System for a 16-Family Housing complex



CREDIT CONTRIBUTIONS

There are several credits for which upgrading to **Plastica Alfa S.p.A** is not a significant enough improvement to earn a full point. However, it can still contribute to the overall credit. We refer to these as "credit contributions".

Credit contributions are important to an overall LEED rating.

For example, **switching to Plastica Alfa S.p.A can significantly reduce on-site pollutants**. This helps lower the number of other materials that need to be addressed in order to receive the point. And using **Plastica Alfa S.p.A** in place of the standard materials actually improves performance rather than diminishing it.

Percentage of minimum energy cost savings

NEW BUILDINGS	EXISTINGS BUOLDINGS RENOVIATIONS	POINTS
12	8	1
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Calculations according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007.
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Furthermore, the friction factor of metal systems, particularly steel, tends to increase over time, as corrosion and scaling begin to restrict water-flow.

Alfaidro piping systems are not subject to corrosion or scaling and will continue to perform at the same level throughout the life of the system.

MR CREDIT 2: CONSTRUCTION WASTE MANAGEMENT

Polypropylene is a completely recyclable material. Waste pieces of the material are neither sharp nor hazardous and can easily be collected and stored for recycling. Simplify the process of gathering and storing waste materials by replace metal piping systems with a safer polypropylene system, such as **Alfaidro**.

EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE
LEED Points: 1-19

The pumps used to transport water and other fluids around the site play a significant role in the total electricity consumption of the building.

Friction in the piping system results in lost pumping energy, as well as reduced performance and a shortened life-cycle for the pumps and motors.

Alfaidro piping systems have a lower friction factor than copper or steel piping systems.

Replacing a standard metal piping system with an equivalent polypropylene piping system can **reduce the amount of pumping energy lost** in the system, improving overall efficiency.

In the case of a steel hydronic system, 50% difference in the pipe friction factor can yield a 30% savings in annual energy use of the pumping system.

The total percentage of the building's energy use is dependent on the size and application of the system, as well as the other energy consuming systems on the site.

Minimum percentage debris to be recycled or salvaged for each point threshold

RECYCLED OR SALVAGED	Points
50%	1
75%	2

IEQ CREDIT 3.1: CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN—DURING CONSTRUCTION - LEED Point: 1

During construction, the fumes generated by welding, soldering and gluing a piping system together can contaminate the air inside the site, as well as permeate absorbent materials such as paints, carpets, insulation, etc.

The use of **Alfaidro, having an heat-fusion connections, eliminate the fumes produced by soldering, welding and gluing the piping systems** together. This helps minimize the number of pollutant sources in the building, as well as reducing the risk of contamination for absorptive materials.

IEQ CREDIT 4.1: LOW-EMITTING MATERIALS - ADHESIVES AND SEALANTS

Many plastic piping systems are joined using glues or chemical welding. These processes often generate a large volume of dangerous VOC's on a jobsite. VOC's are dangerous to human health as well as the environment and atmosphere. PVC welding, CPVC welding, plastic cement and adhesive primers can account for up to 1800 g/L of VOC's on the site, 22% of the total allowable VOC's on a job site. The majority of these processes are used in piping applications. The function of these applications can often be handled by a different piping material, making it easy to completely remove these sources of indoor emissions from the site.

Alfaidro piping systems are VOC free, and are joined using a safe and clean heat-fusion process. This makes them an ideal candidate to replace glued and chemically welded systems in most cases.



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UNI EN ISO 9001: 2008
UNI EN ISO 14001: 2004



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