

Cast Iron Rainwater

**ALUMASC**

RAINWATER SYSTEMS

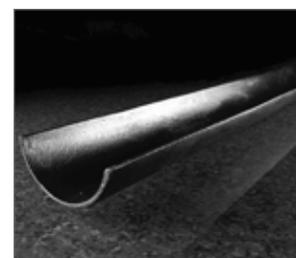
# Primed or Factory-painted?

Costs & Implications



A White Paper 2015

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# Executive Summary

## Primed or factory finished cast iron rainwater?

We all recognise that short term gain frequently has expensive long term consequences. With cast iron rainwater systems, buying primed and painting it on-site versus installing fully-painted factory-finished product, the case for factory finished is, well... 'cast iron'. The arguments and costs presented in this White Paper make factory finished a clear winner.

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Primed and then painted on-site using skilled labour costs 26% more than factory finished over its expected lifetime.

26%

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Primed and then painted on-site with unskilled labour costs 33% more than factory finished over its expected lifetime.

33%

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Leaving primed cast iron rainwater on-site exposed to the weather for the first five years, and painting it when it looks like it needs painting, is 69% more costly.

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69%

# Foreword

When it comes to buying and installing cast iron rainwater, there seem to be two schools of thought.

Buy it primed (i.e. with only the manufacturer's temporary 'transit' coating) then pay a contractor to paint it on-site.

Or, buy it factory finished, pre-painted. The manufacturer's instructions spell out the choice, as the following copy from Alumasc's website makes clear:

*“By failing to prepare, you are preparing to fail.”*

**Benjamin Franklin**



## **Primed Finish**

Alumasc supplies cast iron products factory primed with one coat of protective grey oxide primer. This primer will give protection against corrosion during transportation and short-term undercover storage, and will provide a suitable surface for final painting.

On-site handling and painting are the responsibility of the contractor.



## **Pre-painted Factory Finished**

The renowned quality of Apex Heritage cast iron from Alumasc is now available in a high performance satin pre-finish black.

The finish is a three coat system which is factory applied under controlled conditions and has been specifically developed for cast iron to provide a smooth and long lasting finish.

But manufacturers' statements and recommendations don't make clear to specifiers and property owners what the implications are, particularly the knock-on effects and real cost of their choices. They don't spell them out because it's assumed that everyone knows and has thought about them. But generally people aren't thinking about rainwater products and haven't thought much about the consequences and costs of their choices.

## You only really notice it when there's a problem

For the most part, people don't think about rainwater systems because of where it is on a building. Rainwater gutters, and the fascia and soffits they are fixed to, are used at the junction between roofs and walls. It's a particularly exposed and vulnerable part of the building where extreme weather tests the weaknesses in a building. If water - the great destroyer of buildings - gets in, the consequences for the building can be severe. Yet we don't often look at this part of a building.

*If water - the great destroyer of buildings - gets in, the consequences for the building can be severe.*

Our eyes tend to focus first on roofs or the windows and doors. We may not even 'see' where roof and walls intersect. And what we don't see, we don't think about. It isn't the only reason maintenance gets skipped or delayed, but being out of sight and out of mind is a contributory factor.

We tend to notice it when something is broken or looks like a problem. For example, we immediately see sagging or leaking gutters, running water or green slime on the walls, or seriously flaking paint or rust showing through.

## Protecting buildings from weather and water

Water is extremely damaging to buildings, and gutters and downpipes are one of the building's main lines of defence against water penetration. So when you see problems with rainwater products that are visible from the ground, things are usually serious. By then a lot of damage may have already been done.



If water does penetrate, it damages the fabric of a building, weakening it from damp and various forms of rot and mould that make it unhealthy to live in and potentially destroying its value.

British buildings have to cope with strong winds and storms, extremes of temperature, and seasonal snow which can be heavy and potentially very damaging. Large volumes of rainwater fall on our roofs, sometimes in great bursts which have to be removed quickly in a controlled manner so we stay dry and secure inside. That's what rainwater systems do, that's what they are for. If they succeed, they contribute to sustaining the use and value of the building. If they fail, they contribute to the fall in use and value. False savings in materials and components that impact on maintenance costs and risk the integrity of the property, can be hugely expensive over the lifetime of the building.

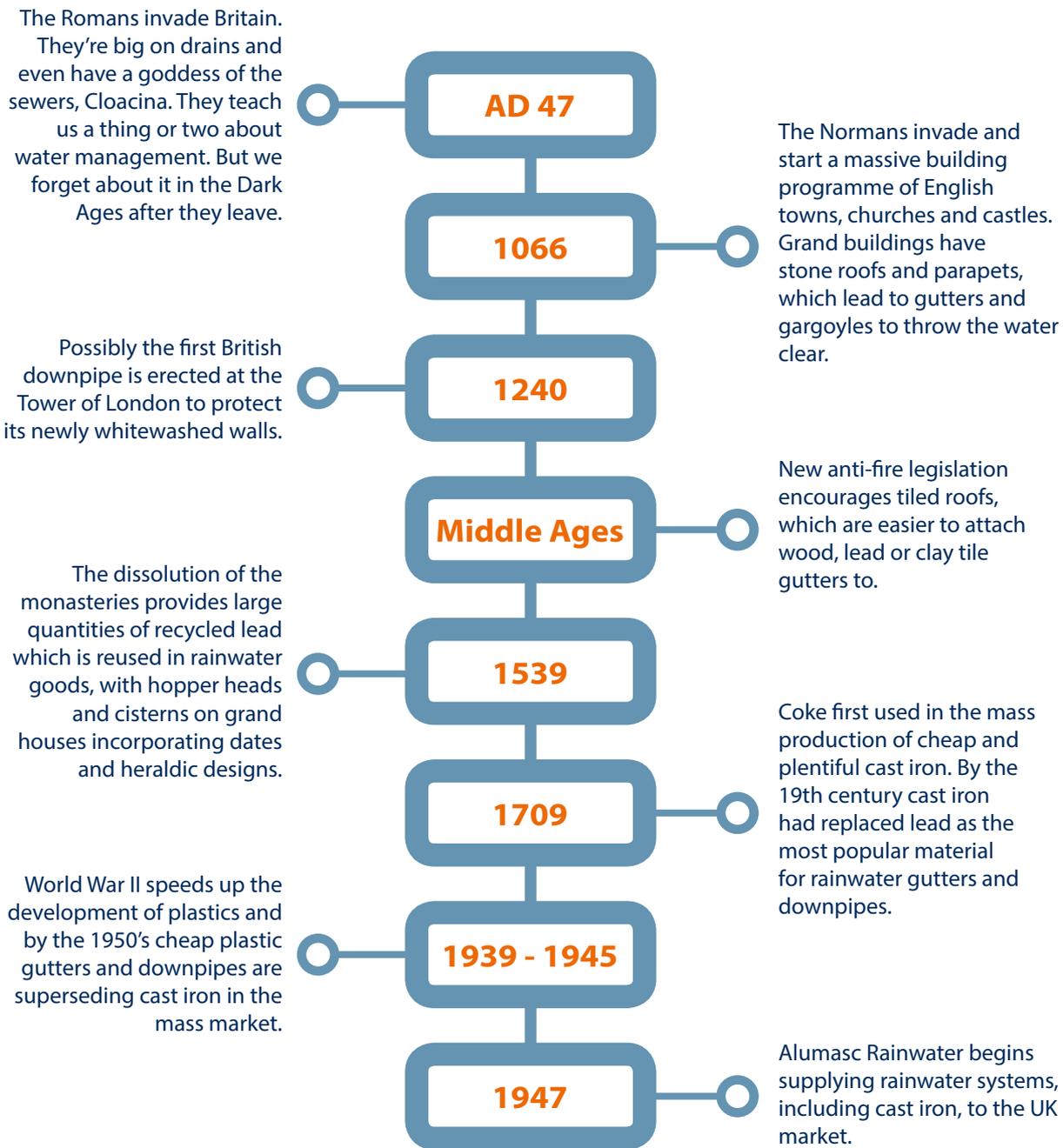
*False savings in materials and components that impact on maintenance costs and risk the integrity of the property can be hugely expensive over the lifetime of the building.*

No one would choose to do any of this, of course. It's the result of arm's length decisions where the consequences may be separated in time from the choice, and where not having the right information makes it easier to choose apparent over real savings.

If specifiers and property owners think about the choice between primed and fully factory finished rainwater systems, they may perceive the choices as price or a matter of convenience, roughly similar in impact and cost neutral to property maintenance. Nothing could be further from the truth.

However, it's hard to truly understand the adverse knock-on effects, or establish the real costs for poorly painted cast iron rainwater systems. This paper attempts to put that right.

# Gutters - a potted history



With thanks to The Society for the Protection of Ancient Buildings (SPAB) for these illuminating facts. Founded by William Morris in 1877 to counteract the highly destructive 'restoration' of medieval buildings being practised by many Victorian architects. SPAB is now the largest, oldest and most technically expert national pressure group fighting to save old buildings from decay, demolition and damage.

# Why Cast Iron?

Cast iron is a popular and well-used material for rainwater guttering and downpipes on many heritage and period properties in the UK. It is tough, incredibly strong, lasts for years and is 100% recyclable. If properly manufactured, protected, installed and maintained, cast iron will look good and enhance the properties it is protecting for over 100 years.



It's remarkably good at doing its job of protecting buildings: it's attractive, economically effective and environmentally sustainable.



But if neglected and exposed to the elements without proper protection, cast iron will rust, flake away and crumble to nothing, disappearing in a process of natural recycling.

# What protects Cast Iron?

**The answer is paint.** The paint system, type and quality of paint, number of coats, and how and when that paint is applied influences its durability, lifetime, and ongoing maintenance costs.

Not all architects, specifiers, property owners, facilities managers, contractors and installers are aware of the implications of installing inadequately painted cast iron guttering, or of the maintenance considerations. So they continue with current practice and opt for the cheapest, quickest or most convenient route.

This includes buying cast iron rainwater primed only (i.e. with only the manufacturer's temporary 'transit' coating), and then painting it on-site. They may even buy it primed and install it without painting it at all, assuming they get a few years' protection from the primer coating.

But that is to misunderstand what a primer is and what it's designed to do. And it's a seriously false economy. Not only will subsequent maintenance costs be significantly higher during the lifetime of the cast iron rainwater, but a poor start shortens its life and ensures it loses its looks and ages badly. And by failing in its primary duty to protect against water ingress, that may also have a serious impact on the building itself.

*The paint system, type and quality of paint, number of coats, and how and when that paint is applied influences its durability, lifetime, and ongoing maintenance costs.*

## Primed cast iron rusts rapidly on-site

Primed cast iron rainwater lasts for only a short period of time and should be painted immediately. The primer is factory applied and can be used as temporary protection for the product in transit. That's it. Left unpainted and exposed to the elements, it will start to corrode and rust rapidly.

If you are living in or responsible for a beautiful heritage building or period property, the last thing you want to see is rust stain running down the walls from your cast iron guttering. It will be expensive and difficult to fix.

Rust is extremely difficult to remove because it eats into and creates corrosion pits in the iron substrate. Even after treatment with a brush and powerful anti-corrosion chemicals, small amounts may remain in those pits, which become centres for rust to build and spread aggressively. Depending on the extent of rust and how it's treated, it can necessitate a complete replacement much sooner than planned – a big expense.



**Cast Iron Rainwater left unprotected: the gutter is painted in red primer only**

## Buy primed and paint on-site for equivalent results?

**Not really.** The option of buying primed cast iron rainwater for your contractor or installer to paint on-site may seem sensible, especially if you have paid for them to be on-site anyway. But the extent of protection will vary depending on the quality of their work: the thoroughness of preparation, the consistency and number of coats applied and most important of all the type of paint used!

Guttering that is primed and then painted on-site also needs to be protected from the elements before and during painting. Rust forms as tiny corrosion centres which are practically invisible to the eye. The longer it is left exposed, the greater the likelihood that rust will form and cause long term damage as a result.

Even fast drying water based paint needs time to fully dry (cure or set) and achieve its complete protective properties. And in damp, humid or extreme weather, paint takes far longer to dry than in an environmentally controlled factory setting.

While it is drying, paint is vulnerable to the weather, so painting should be done in the dry. But coming to the end of a project, when time has to be made up, the pressure to finish on time often overrides good practice.

Labour is by far the largest cost in any installation job. So, the small material cost saving from buying primed only and painting the guttering on-site using expensive contractors' labour far outweighs the perceived saving. It doesn't stand up to logic. In fact the logic leans the other way: using labour-saving factory finished cast iron rainwater saves costly on-site labour time.

*Labour is by far the largest cost in any installation job.*

## Skills shortage

Britain's skills shortage is rarely out of the news. One of the unfortunate consequences of the recession has been the severe shortage of skilled construction workers and tradesmen. Not having much work in prospect, many skilled decorators found other employment or retired.

Then with a strong recovery, less skilled and even unskilled tradesmen have been taken on to maintain our buildings. Without adequate training or the knowledge and experience to know what should be done, maintenance is being skimped. Specifiers, property owners, facilities managers and contractors may expect an equivalent result between factory finished and finishing on-site. But even with a lot of inspection and policing, they won't get it.

If sections are painted on-site and assembled during installation, the protective paint coating often gets damaged because the pre-cured paint coating is soft and vulnerable. If areas are missed or insufficient coats applied, rust can appear within 1-2 years of installation and maintenance costs will build up rapidly.

Properly painting an installed primed cast iron gutter on-site is an onerous and difficult task. Guttering or downpipe that's against the wall is very hard to get at, so these areas are often inadequately painted or left unpainted and unseen.

Whether painted on-site or left primed but unpainted for a long period, property owners risk years of higher ongoing costs to repaint and repair rusty guttering. And they'll have to replace it sooner than expected.

## The best option: pre-painted factory finished

The best way to ensure cast iron rainwater remains rust free and beautiful for years, with minimal maintenance, is to install fully factory painted cast iron guttering. Alumasc's fully factory painted cast iron for example is only 13% more expensive than primed cast iron, but it saves the labour cost of on-site painting; a much bigger cost. More significantly, the long-term cost savings far outweigh this modest initial investment.

The Apex certified paint used on Alumasc's Heritage cast iron rainwater is an advanced environmentally-friendly water based three coat system, factory-applied under strictly controlled conditions. Not only does it save on-site labour cost of painting, but the protective paint is applied to a far higher standard so it performs better. Fully factory painted cast iron rainwater can last up to 10 years before it needs repainting. Depending on exposure to the weather, it may need a light touch-up in 5-6 years to maintain the protection.

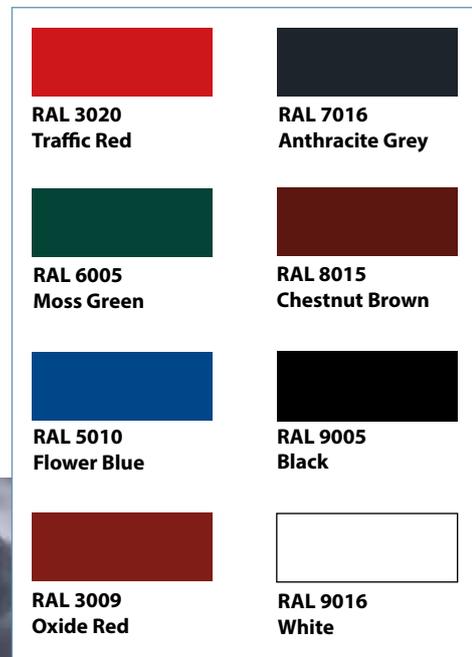
Alumasc's Apex certified factory painted finish has been specifically developed to give a smooth, long lasting finish to cast iron. This is extremely difficult to replicate on-site. If surfaces are not fully and evenly painted rust will set in, exposing weaknesses and putting at risk the entire guttering system and the fabric of the building it protects.



## A world of colour

Another reason why specifiers opt for primed and paint it on-site is the misconception that buying primed and painting it later gives them more choice when it comes to colour. But this is not the case.

Alumasc Apex certified cast iron range comes in black and 7 Heritage colours. For bespoke projects, a very wide range of specific colours can be ordered.



## Factory finishing worked for timber windows and works for cast iron rainwater!

Specifiers and property owners will be familiar with the rehabilitation of timber windows. Twenty years ago timber windows had acquired a reputation for poor quality and short life, and the market had moved to PVC-U windows. Many will remember seeing new homes with new timber windows rotting in their first five years.

Timber's fight back involved excellent industry communication campaigns, but more significantly it involved changing how timber windows were made and installed. Identifying what contributed to premature ageing of the windows and putting it right played a crucial role in extending the life and performance of the window and the swing back to timber.

*Identifying what contributed to premature ageing of the windows and putting it right played a crucial role in extending the life and performance of the window and the swing back to timber.*

One key problem was leaving timber windows unprotected and painting them on-site. Leaving protective painting to rough and variable site practice was asking for trouble. By the time they were painted many were not fit to be painted. Once water penetrated the timber it was too late; the damage dramatically shortened the life of the window. Having absorbed water the paint wouldn't stick, and when the temperature rose, water would try to escape from under the paint causing joints to open and the paint to bubble, crack and then flake. Contractors could not be expected to do, and did not do as good a job of painting on-site as a factory applied coating. If the recommended paint system was three or four coats - a primer, undercoat and one or two coats of gloss for example - would it get them on-site, or would it be one or two coats short? Would the coats be evenly applied, all over? Would the paint be applied, as it needed to be, in the dry? The answers were obvious.

The timber industry changed specification and site practice so most timber windows now arrive on-site factory finished and fully protected against the weather, and ready to be installed. The result was a leap in performance and property owner satisfaction. Over a 15 year period the promised lifetimes for top-spec factory finished windows, properly installed and properly maintained, shot up to 67 years (ref Wood Window Alliance).

Cast iron is not timber, but the effect of factory finished rainwater in protecting against variable site practice, and starting off on the right foot are similar.

## 3 products & 3 different jobs in a 3 coat protective paint system

The classic three coats in an external paint system are primer, under or second coat, and a top coat. The three coatings work together as a system with each binding together and doing different jobs in protecting the substrate.

**Primer:** The primary job of the primer is to adhere i.e. stick the paint system to the substrate and provide a key for the undercoat. The primer is usually a thin vulnerable coating that gives only slight temporary protection from the weather if used as a 'transit' coat to protect product on its way to site. It is good practice to keep the unprotected product inside or covered up, and to paint it as soon as possible.

primer

**Under or second coat:** The primary job of the under or second coat is to adhere firmly to the primer or basecoat and provide opacity and a smooth firm base for the topcoat. The undercoat will be flexible enough to move without cracking as the metal rainwater expands and contracts in the heat and cold.

under or  
second  
coat

**Topcoat:** The topcoat adheres to the undercoat, protecting the substrate against corrosive effects of the atmosphere and weather. The topcoat will also look good, providing an attractive colour and finish that resists the build-up of dirt which gets washed away in the rain. The topcoat is sufficiently flexible to expand and contract without cracking as the underlying product expands and contracts in the heat and cold.

topcoat

The topcoat also protects against the damaging effects of UV light, just as sun cream protects our skin. UV light causes brittleness, cracking and premature ageing in coatings. Normally paints use Titanium Dioxide (TiO<sub>2</sub>), the same protective agent we use in sun creams and sun blocks. The topcoat also withstands everyday minor knocks and abrasions which could damage the coating and expose the cast iron below to the atmosphere and weather.

Factory applied finishes are usually different in composition from standard site applied paints. It's possible to use different and tougher two part systems for example, because the mix and application conditions can be controlled in a factory to give better adherence and a more uniform longer-lasting finish. On-site application is at the mercy of several variables such as the weather, the skill and care of the painter and the rough and tumble of a busy site.

Alumasc uses a three coat factory applied system which includes a two-part epoxy primer underneath the top coat. An Apex certified label is added to each length of gutter or downpipe to confirm that the product has been coated under factory conditions.

*Alumasc uses a three coat factory applied system which includes a two-part epoxy primer underneath the top coat.*



## Costs & consequences of primed only and on-site painting

The table on Page 18 shows the cumulative product, installation and maintenance costs for cast iron over a 25 year period and how costs vary with the different painting methods A to D.

Maintenance cycles are standard 5 year periods, starting with the installed cost for each method. Based on assumptions set out below, the cost of maintenance for each maintenance period is added.

The figures in the table are indicative but based on actual cast iron rainwater products, including paint, labour and scaffolding using actual material and contractors' costs for a typical three bedroom detached property. All costs are in today's costs and inflation free.

### **A = Certified Factory Painted Finish @ £8,244**

**Includes product and labour costs for installation and access costs eg scaffolding. This installation will need painting at 10 years, its first maintenance cycle.**

### **B = Primed & Painted on-site proper job @ £9,636:**

**Includes product and labour costs for painting and installing, and access costs. 'Proper job' implies painted on-site carefully and thoroughly by a skilled qualified painter. This installation will need painting after 5 years and need more rubbing down and preparation than pre-painted after the first cycle of two. Add 10% to the cost after 20 years.**

### **C = Primed & Painted on-site poor job @ £9,636:**

**Includes product and labour costs for painting and installing, and access costs. 'Poor job' implies painted poorly on-site by partly skilled or unskilled labour e.g. missing bits at the back and other hard to reach areas, having an uneven or too thin coat or maybe missing a coat. Add 10% at 10 years and 20% at 25 years.**

**D = Installed primed @ £7,300 & painted only after 5 years:**

Includes product and labour costs for installation and access costs. Primed only product is installed and left unprotected against the weather and physical knocks and abrasions for a year or two until it looks like it needs painting. By then rust will be ingrained and impossible to eradicate. Add 50% at 5 years and 10 years, 70% at 15, 20 and 25 years.

Overall our assumptions used to calculate the costs in the table are conservative. They may not fully reflect the damage rust would do, particularly in Case D where the primed product has been exposed for 5 years, nor the precise labour and access costs eg scaffolding. In reality we believe the cumulative effect is more severe on costs in mid to later stage cycles when rust has eaten its way under the paint. The effects of a failing rainwater system on the property have not been included, although the effects will be appreciable close to replacement.

### Comparisons of cumulative product, installation and maintenance costs for cast iron over 25 years with different painting methods

Cycles	Method A	Method B	Method C	Method D
5 Year intervals	Pre-Painted in factory controlled environment Apex Certified	Primed & Painted on-site proper i.e. skilled job	Primed & Painted on-site poor i.e. unskilled job	Installed primed & then painted after 5 years
<b>Installed cost</b>	<b>£8,244</b>	<b>£9,636</b>	<b>£9,636</b>	<b>£7,300</b>
Year 5	n/a	5000	5000	7500
Year 10	5000	5000	5500	7500
Year 15	5000	5000	5500	8500
Year 20	5000	5500	6000	8500
Year 25	5000	5500	6000	8500
<b>Cumulative cost over 25 years</b>	<b>£28,244</b>	<b>£35,636</b>	<b>£37,636</b>	<b>£47,800</b>
Indexed on cumulative cost over 25 years	100	126.2	133.3	169.2

It is hard to change how things are done in any organisation, and maintenance practices are no different. Without a positive will to change there is an inbuilt bias to doing what was done before. But the penalties in extra cost, reduced protection for property and unsightly rainwater gutters and downpipes are severe as the indices make plain. Taking the total costs of factory finished rainwater over 25 years as 100, then the costs for painting immediately on-site using skilled labour (Method B) are 126.2, while using unskilled labour (Method C) raises the costs to 133.3. Leaving primed rainwater unprotected for the first 5 year maintenance period (Method D) increases the total cost to 169.2.

**Note: The repaint cost is based on taking all the products down, cleaning, making fit, repainting and reinstalling**

Counter-intuitively, bad practice bears heavily on costs early on. After just 25 years, cost D is almost 70% more than A because the costs of maintenance are high – so high it is cheaper to fully replace at 30 years.

The costs of bad practice are felt and paid for early. But when things get that bad not only is the system failing to protect the building, but it also looks terrible.



The point the table makes is that the start has a major effect on how long products last and how well they perform. Priming and painting on-site is intrinsically harder and more costly. It is harder to control conditions on-site, and the quality of installation and painting have a major impact on effective lifetime and costs. The desire to control these factors is the rationale for off-site manufacturing.

- **How long on-site – protected or not – before the products were installed?**
- **Were all the coats applied, and applied before the weather got at the metal? Bear in mind a primed coating is only good for travel, not for sitting around on-site.**
- **Were the coats evenly applied?**
- **Was the guttering left to dry for the right amount of time and in the right environment?**
- **If installed, did the paint reach all areas? Once installed some parts become hard to reach, and hard to paint. These are the vulnerable points which become attacked by weather and the atmosphere. Paint breaks down and then rust starts to eat into the metal. These factors eventually affect the building that the product is intended to protect.**

In older, poorly maintained properties we can see where the product no longer protects and the building has sustained significant damage. The cost of correcting this damage is multiples of the cost of the product and its recommended maintenance.

Damage is usually done at the start and is then compounded by poor practice or being unable to rectify the problems in subsequent cycles. But the costs, the very big costs, are what happens afterwards. At each cycle the questions and decisions are, do we do this properly? Do we correct what was skimped before and the damage already sustained? Including the hidden damage? Can we actually turn back the clock by spending more, or is that damage now putting us on a permanently higher cost path?

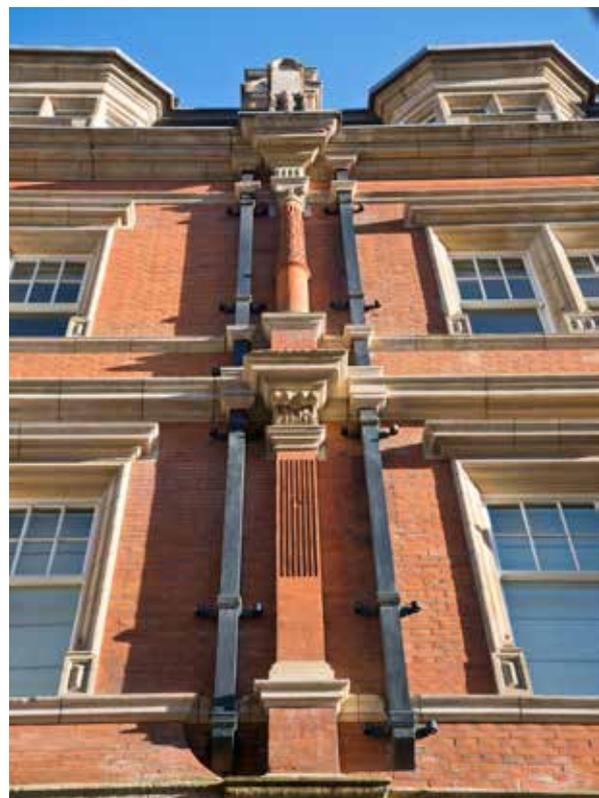
*Priming and painting on-site is intrinsically harder and more costly*

# About Alumasc

## Alumasc has been casting gutters for 70 years.

It sometimes surprises property owners and specifiers that cast iron is available in a rainbow range of colours which are suitable for contemporary as well as Heritage buildings, and not just in black. Additional BS or RAL colours can be matched. Contact Alumasc for details.

Alumasc's three coat factory finished paint system has a fast drying water based QAD finish coat based on a high-solids styrene acrylic emulsion suitable for decorative and structural steel. It is applied over an undercoat and a water based two part epoxy primer. It contains a flash rust inhibitor.



**Duke Street: A recent Alumasc Cast iron Rainwater installation**

## Alumasc Rainwater: Best performing product under test conditions

### Accelerated weathering Salt Spray Test

Recent salt spray tests were undertaken by independent testing house Chemetall Ltd on three samples of Alumasc's certified factory painted cast iron rainwater system.

Scratching a large X into the paint finish down to the bare metal tests coating adhesion under adverse conditions. Poor adhesion allows rust to creep laterally underneath the coating breaking the bond between coating and metal. Once rust has a hold it will spread, resulting in familiar images of neglected cast iron rainwater (eg page 19).

Photography was taken at 264 hours, 504 hours, 768 hours and 1008 hours.

The first four test images on this page show Alumasc's factory certified finish still performing after 1008 hours accelerated weather testing.

Images on subsequent pages show other cast iron rainwater brands being tested under identical accelerated weather Salt Spray test conditions by the same testing house.

The results clearly show, **Alumasc Rainwater is the best performing product under test conditions.**



**Alumasc's certified factory painted finish at 264 hours of accelerated weather testing...**



**...at 504 hours of accelerated weather testing**



**...at 768 hours of accelerated weather testing**



**...and at 1008 hours of accelerated weather testing**

## Test Report: S14 250 Cast Iron Rainwater - Alumasc

All three samples are Alumasc Rainwater in the current certified three coat paint finish. These included the following components:

1. **Stoppered**
2. **Outlet**
3. **Fascia bracket**

### Test method:

- Place in neutral salt spray ASTM B117
- Scribed with a St Andrews cross using a 0.3mm blade
- The dry film thickness was checked
- Checking every 168 hours
- Maximum creep of 5mm at the score

All three samples continued to 1008 hours, passing the 1000 hour salt spray test.



## Comparing Alumasc's performance against other cast iron rainwater brands

**Test:** to assess the neutral salt spray ASTM B117 performance on black painted gutter and rainwater sections. The sample gutters are primed only and painted on-site by unskilled labour. The test results on Pages 25-28 show the point at which rust creeps through with different types of paint.

### Test method:

- Place in neutral salt spray ASTM B117
- Scribed with a St Andrews cross using a 0.3mm blade
- The dry film thickness was checked
- Checking every 168 hours
- Maximum creep of 5mm at the score

The length of any single infiltration of 5mm+ is taken off test.

The reported results of the creep-age (paint removal or/and score creep) in mm is always the maximum measurements taken along one score leg/edge.

Testing continues until all samples have been affected. Having cut through the paint finish to the bare metal, the salt spray test measures how long the paint finish withstands corrosion and how badly affected it is. For example, rust affects the exposed metal but the extent of paint being peeled off alongside the scoring shows the creep beneath the surface, and therefore the breakdown of the finish.

*The Salt Spray Test measures how long the paint finish withstands corrosion*

## Test Report: S14 324 Cast Iron Rainwater - Alumasc

**Alumasc gutter with  
Primer and an Acrylic  
top coat**

**Testing continued to  
840 hours.**



**Alumasc gutter with  
Primer and an Acrylic  
top coat**

**Testing continued to 336  
hours.**



## Test Report: S14 339 Cast Iron Rainwater - Alumasc

This test looks at the durability of Alumasc system with **NO** undercoat.  
Two samples were tested to 168 hours.

**Alumasc gutter primed and  
painted on-site with no undercoat**

**Testing continued to 168 hours.**



## Test Report: S14 324 Cast Iron Rainwater - Competitor Brand A

### Competitor Brand A Pre-painted

**Broke down at 168 hours -  
the first check.**



## Test Report: S14 339 Cast Iron Rainwater - Competitor Brand B

This test looks at the durability of Competitor Brand B Pre-painted.

### Competitor Brand B Outlet

**Broke down at 336 hours.**



Call us to request a sample of our Cast Iron Rainwater or visit our website and download our Rainwater Systems Technical Brochure



# ALUMASC

## RAINWATER SYSTEMS

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