

Aluminised Products

## High-integrity steels

Aludip BQ, BQX and BQHE



# When it counts, specify Aludip high-integrity steels.

In the demanding conditions of high temperature and atmospheric corrosion, it is vital that sheet metals retain their structural and coating integrity. Importantly, Aludip high-integrity steels are zinc-free, and can therefore be used safely with stainless steel, without the risk of liquid zinc embrittlement.

Right: Courtesy of Woodside Energy Limited.

**High-integrity steels**  
Aludip high-integrity steels offer a host of properties for performance critical applications such as building, power generating, petrochemical and oil industries and in marine environments.

Aludip high-integrity steels with dedicated properties:

- Strength
- Corrosion resistance
- Heat resistance and reflectivity
- Non-combustible
- High-temperature oxidation resistance
- Sag resistance
- Zinc-free
- Abrasion resistance
- High-emissivity
- Formable
- Excellent surface for painting
- Low radio-frequency interference

The Aludip range of high-integrity steels offers three products. Aludip BQ is the standard product in this range and is the base for the organic coated products, Aludip BQX and Aludip BQHE.

**Aludip Building Quality**  
Aludip BQ is used as insulation cladding in the power generating, petrochemical, and oil industries. Its primary use is in the lagging of pipes, but is also used for ventilation ducting and building cladding. Its hot-dip aluminium-silicon alloy coating provides excellent corrosion resistance in demanding applications.

**Aludip Building Quality Extra**  
Aludip BQX is based upon Aludip BQ, but has a protective organic coating in addition to its alloy coating. It provides extra protection against the harshest atmospheric corrosion, such as sea spray and ‘salt air’ attack, particularly in spaces that are north facing, poorly ventilated, and not regularly washed with fresh rainwater. Typical applications include offshore oilrigs and seashore terminals.

The organic coating on Aludip BQX is available in white or standard grey and offers a uniform surface and colour for applications that require enhanced appearance. Consult Corus about the availability of other colours.

**Aludip Building Quality High-Emissivity**  
Aludip BQHE has a high-emissivity coating and is suitable for applications that require the surface to absorb a high proportion of ambient heat. A typical example is pipe cladding for power stations. The special grey organic coating has an emissivity index exceeding 0.8. This coating also enhances corrosion resistance, and ensures a consistent appearance of Aludip BQHE.



Properties

Strength

Aludip high-integrity steels have a Young’s modulus three times that of pure aluminium sheet. See figure 1 below for typical mechanical properties.

Aludip high-integrity steels retain their strength at high temperatures, as described below.

Figure 1: Mechanical properties

Grade	Tensile strength	Elongation
	R <sub>m</sub> (N/mm²)	A <sub>80</sub> (%)
	Max	Min
BQ, BQX and BQHE	500	22

**Note:** For thicknesses between 0.5mm and 0.7mm inclusive, the minimum elongation value (A<sub>80</sub>) shall be reduced by 2%.

Corrosion resistance

Aludip high-integrity steels have excellent corrosion resistance, far superior to pure zinc and zinc-aluminium alloy coatings. See figure 2, which compares the coating loss of Aludip BQ with two other coatings. Zinc coatings protect the steel substrate through sacrificial oxidation. However, the zinc salts formed in that process are constantly washed away, leaving the steel exposed. Aluminium protects the steel substrate by forming a thin film of aluminium oxide, which does not wash off. The hot-dip aluminium-silicon alloy coating on Aludip high-integrity steels protects the steel substrate by forming an inert barrier. Cut edges and areas of subsequent damage corrode slightly, but stabilise in a short time, preventing corrosion from significantly impairing long-term performance.

The additional organic coatings on Aludip BQX and Aludip BQHE further enhance their corrosion resistance. Figure 3 below shows the results of neutral salt spray tests to ASTM B117. Aludip high-integrity steels also have good resistance to acidic environments.

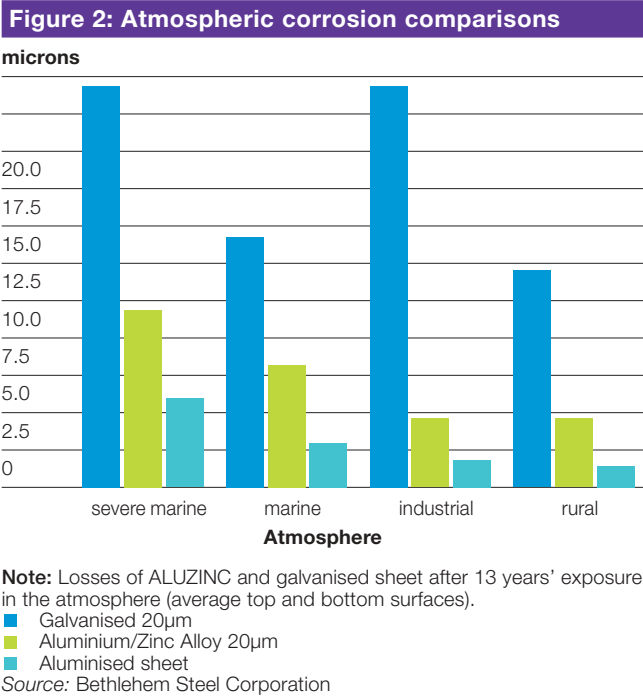
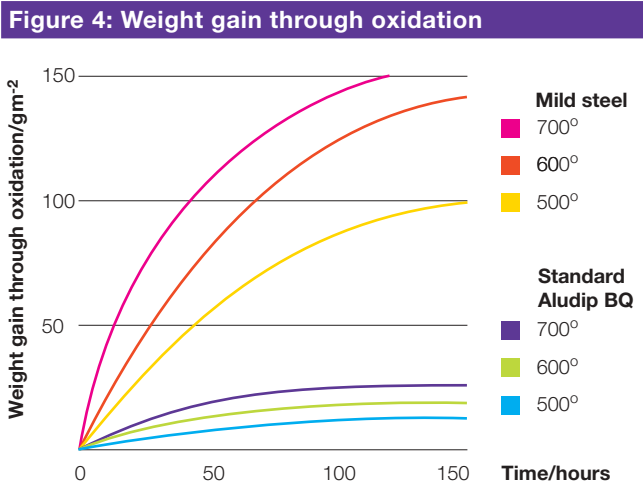


Figure 3: Neutral salt spray test

Product	Time to first corrosion (hours)
BQ	1000
BQX	>1000
BQHE	>1000

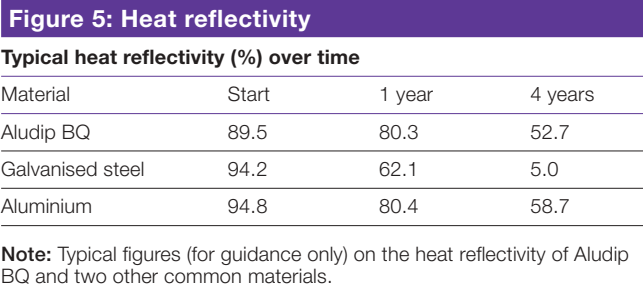
High-temperature oxidation resistance

Aludip high-integrity steels have excellent resistance to oxidation at elevated temperatures. Figure 4 compares the weight gain of Aludip products to mild steel.



Heat resistance and reflectivity

Aludip BQ reflects approximately 80% of incident light and heat at temperatures up to 500°C. Above that temperature, the surface lustre is lost. At 500°C, all Aludip products retain half their mechanical strength; the integrity of the steel is maintained up to approximately 1300°C. Aludip high-integrity steels are non-combustible as defined in BS 476, Part 4. See figure 5 below.



Sag resistance

Good sag resistance means Aludip BQ high-integrity steels can be used at elevated temperatures without suffering distortion.

Zinc-free

Aludip high-integrity steels are zinc-free, and can therefore be used safely with stainless steel. They are free from the risk of liquid-zinc embrittlement, which can cause stainless steel to fracture.

Abrasion resistance

The abrasion resistance of Aludip BQ is at least as good as mild steels and galvanised steels.

Formability

Aludip high-integrity steels will withstand moderate lock seaming and forming and can be bent over a diameter equal to twice the thickness of the sheet. The metallic and organic coatings are as formable as the steel substrate and will not flake or peel. Furthermore, the silicon incorporated in the metallic coating allows a thinner alloy layer with greater ductility than a pure aluminium coating.

Painting

The superior corrosion resistance of Aludip BQ means that under normal conditions, it does not need painting. If the application requires painting, Aludip BQ has been tested by the Paint Research Association and found to be an excellent base for paint, especially heat-resistant paint, with no need for expensive pre-treatments. An initial primer coat can be followed by a topcoat with a dry film thickness of less than half the 125 micrometres, usually recommended for exterior durable systems.

# Characteristics

## Product range

*Aludip BQ*  
Hot-dip aluminium-silicon alloy coating on both sides.

*Aludip BQX*  
Hot-dip aluminium-silicon alloy coating and organic coating on both sides.

*Aludip BQHE*  
Hot-dip aluminium-silicon alloy coating with high-emissivity organic coating on top side and standard organic coating on reverse.

The applications of these products are described more fully on page 3.

## Standard

Aludip high-integrity steels are manufactured to EN 10154 : 2002, employing Quality Assurance principles, operating practices and controls certified to ISO 9001:2000.

Aludip conforms to other national and international standards, including ISO 5000, NFA 36/340, ASTM A463M, JIS G3114, and several proprietary specifications.

## Coatings

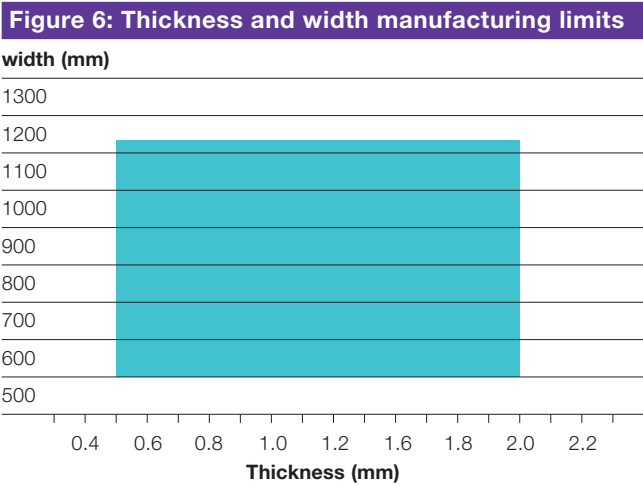
*Metallic coating mass*  
Hot-dip aluminium-silicon alloy coating mass: 240-270g/m<sup>2</sup> (Triple spot test).

*BQX organic coating*  
17µm on top side and 10µm on reverse. Topcoat colour is available in white or standard grey. Consult Corus about other colours.

*BQHE organic coating*  
25µm high-emissivity on top side and 10µm on reverse. Top coat colour is special grey. Consult Corus about other colours.

## Dimensions

Figure 6 below shows the thickness and width manufacturing limits for wide coils.



## Tolerances

Tolerances on thickness, width, flatness and edge camber conform to EN 10143 : 2002. “Thickness” refers to the total thickness of the product, including its coating. It is measured at least 40mm from either edge or at the centre line.

Figure 7 below shows the tolerances on thickness. For coils 1200mm wide or less, the tolerance on width is –0+5mm; for coils greater than 1200mm wide, the tolerance on width is –0+6mm.

Figure 7: Tolerances on thickness			
Nominal thickness		Tolerance for a nominal width of	
>	≤	≤1200	>1200
0.50	0.60	0.06	0.07
0.60	0.80	0.07	0.08
0.80	1.00	0.08	0.09
1.00	1.20	0.09	0.10
1.20	1.60	0.11	0.12
1.60	2.00	0.13	0.14

**Note:** Half thickness tolerances are available. Please consult us for information.

Please consult Corus for details of additional processing services, including the dimensions of cut lengths, profiles and other processed products.

## Surface quality and treatment

Aludip high-integrity steels are skin-passed to the requirements of EN 10154 : 2002, surface ‘B’. Aludip BQ can be supplied with chemical passivation, protective oil, or both.

## Packing

Plain banded, paper wrapped, or full export packing is available.

## Coil weight

The maximum coil weight is 19 tonnes.

## Other specifications

Please consult Corus for information about the availability of specifications outside those shown in this section.

## The advantages of Aludip high-integrity steels

- Low-cost alternative to stainless steel and aluminium
- Greater mechanical strength than aluminium, allowing lighter gauges to be used
- Higher melting point of aluminium (650-660°C) compared with zinc (419°C)
- No risk of extensive pools of melted aluminium in a fire, due to the low aluminium content of Aludip
- Where material is to be painted, Aludip’s excellent corrosion resistance saves on pre-treatments and paint
- Safe to use with stainless steel
- Products with enhanced appearance available





## Exceptional service

### Supply-chain services

Long experience combined with logistical expertise allows Corus to establish highly efficient supply-chain arrangements.

Corus can arrange downstream handling and processing to shorten the chain of supply to its customers and to meet specific project requirements. This includes material processing services and just-in-time delivery of large coils, small coils, sheet, and profiles. Details of supply chain services, including processing and dimensional ranges of sheet and profiles are available from Corus at the location shown on the back cover of

this brochure or from the relevant overseas office. Consult Corus for information about how we can help you get Aludip high-integrity steels processed and delivered how you want them and when you want them.

### Proven reputation

Aludip high-integrity steels have been used successfully by international companies such as Exxon, Shell and BP. They have been used around the world on major projects such as the Rihand Power Station in India, Castle Peak ‘B’ and Blackpoint in Hong Kong, and the MNLG DUA plant in Malaysia.

## Using Aludip high-integrity steels

### Aludip high-integrity steels are high-performance products that will give excellent service. Their performance is enhanced by proper processing and by good practice in end-product design.

Corus can help you choose the right Aludip product for your application and can advise you on proper processing methods to obtain the best results. Consult Corus for more information about using Aludip high-integrity steels.

#### Fabrication

The tightly adherent coating and its relatively thin alloy layer give good fabricating properties. Because the coating is relatively soft, tools should be well lubricated and more care should be taken when fabricating Aludip high-integrity steels than when fabricating uncoated mild steel.

#### Welding Aludip BQ

Good welded joints can be obtained using most conventional processes, together with modified procedures adapted to the special properties of the alloy coating. Resistance welding by spot or seam welding systems gives the same mechanical strength as welding bare steel. BS 1140 contains the parameters for spot welding; BS 6265 for seam welding.

Equally effective are metal active gas welding systems (sometimes called gas metal arc), which use consumable electrode wire and gas shields such as argon or carbon dioxide, or a mixture of the two. Pulsed metal active gas

systems offer considerable advantages over conventional processes, including more control over penetration and a minimum of spatter.

Consult Corus for advice about the weldability of Aludip BQ. Aludip BQX and BQHE are not suitable for welding.

#### Painting

Aludip BQX and Aludip BQHE are both pre-painted. Aludip BQ provides an excellent base for paint, both in its passivated and unpassivated forms.

#### Storage

Aludip BQ is normally supplied in the oiled and chromated condition to reduce the risk of water staining. However, it is essential that both sheet and coil be stored in dry, protected conditions before use. The ingress of water or condensation can lead to unsightly surface staining. Careful and well-managed storage will prevent such problems.

#### Product health and safety data sheets

Aludip BQ is covered by the Corus Product Health and Safety Data Sheet number 66, BQX and BQHE by number 68.

Above: Sepetiba Port, Brazil.

Far right: Drax Power Station.



More information

For more information, please contact Corus at the address shown on the back cover of this brochure. Enquiries from outside the UK should be addressed to the nearest Corus sales office or agent, as listed below. For focused supply solutions to major projects around the world, contact Corus International Projects.

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