

INFORM

INFORMATION FOR HISTORIC BUILDING OWNERS

Care and Maintenance of Corrugated Iron



Maintenance Issues

Corrugated iron buildings are particularly susceptible to damage from grass or other build up of soil / garden vegetation growing against the sheets and trapping moisture which accelerates corrosion. A sound understanding of the building is required. Entirely prefabricated buildings may have a visible manufacturers nameplate which could lead to a search of archive catalogues for referencing. Cleaning gutters and general maintenance is particularly required with corrugated iron structures as decay can happen quickly. Groundwater splashing onto walls also accelerates decay.

Junction details, where ventilators and windows etc. have been inserted are problem areas. A good seal is difficult to achieve in the original construction and associated sealing materials often break down and do not perform effectively

Corrugated iron roofs may also be found to overlie relatively intact thatch, retained for the insulation it provides, or an intact traditional cruck frame – both worthy of preservation. Corrugated iron has been the saviour of many vernacular buildings.



Corrosion

Since all metals corrode, the primary problem in dealing with corrugated iron is attempting to slow down the rate of corrosion. Corrosion can lead to coating loss, loss of structural strength or integrity, and serious corrosion of the iron can lead to the complete loss of the sheets.

Since the sheets are not permeable to moisture, condensation is a problem, and wetting and drying cycles remain the primary cause of decay – internally and externally. The quality of early galvanising was variable. This often fails, resulting in an oxidised surface (rusty appearance) which is aesthetically pleasing for many due to its natural colouration. In many cases the rusted roofs are seen as an integral part of the rural landscape. Rainwater run off over the rusty sheets onto masonry can be a problem. Where exposed stone is marked in this way the staining is virtually impossible to remove.

Coating Failure

Coating failure is common on galvanised surfaces. Effective coating requires the use of a mordant wash to provide a chemical etch for the primer layer, or the use of an etching primer for galvanised surfaces. Often, neither was used.

Although there are some firms still making corrugated iron sheets it is important to retain the original sheets as, in many cases, the matching profiles and sizes may be no longer available. It is technically feasible to re-galvanise existing sheets, and to patch repair them in some cases, although the thin gauge of metal makes this difficult to achieve.

It is inadvisable to install new sheets directly on top of existing corroding sheets. This will trap moisture, and accelerate corrosion of the new sheet by creating a corrosion cell. Moisture movement and entrapment by capillary action between the sheets is also likely.



Accelerated corrosion by overlaying sheets and causing capillary action

Any repairs should follow the philosophy of the minimum intervention necessary to reduce the loss of historic material. Wholesale dismantling may be required for full repairs, and the services

of an experienced professional should be sought to ensure that this does not place undue stress on other components.

Firms experienced in the repair of traditional ironwork should be employed, but it should be appreciated that few will have experience of working with corrugated iron. Sheet metal workers who are sympathetic to the historic qualities of the material and possess a knowledge of how it performs may also be considered.

Painting

Over painting sheets should follow traditional practice. It may be possible to identify the original paint on existing ironwork and other local examples might provide an indication of the original colour. The use of red lead for roofs and walls was common. This material is still available and its use does not require statutory consent to use. Green and red colours were fairly commonly applied, as were creams and browns in the twentieth century.





Introduction

With a pedigree of almost two hundred years corrugated iron is a much undervalued material that was used extensively in traditional construction. The material is relatively light, portable and its adaptability means that it was often used to replace or cover a thatch roof, or construct a large agricultural or industrial building. This INFORM provides some historical background, and addresses the physical properties of the material and its uses. It also covers the conservation, repair and maintenance of corrugated iron in a variety of situations.

The architectural iron industry in Scotland was world leading at the end of the 19th century, and corrugated iron was extensively used as a construction material. Scottish firms such as Robertson and Lister, AJ Main, and William Bain and Co developed their specialism in the manufacture of iron building components and entire buildings using corrugated iron.

Materials

Corrugated iron was patented in 1828 with corrugations made in flat iron sheets by passing the thin plates through rollers to provide rigidity and additional structural strength. Until the 1920s corrugated sheets were manufactured by a broad range of ironworkers in various lengths, usually up to a maximum of ten feet. Sheet thickness varied from around 0.5mm to 1.5mm depending on the application. Galvanising of the iron with zinc became increasingly common at the end of the 19th century.

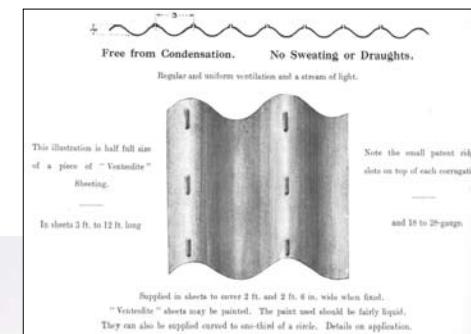
Sheet pitch and profiles

A wide variety of pitches was available, with standard dimensions varying from 25 – 153mm. For domestic purposes, a 76mm (3 inch) pitch was common. A range of profiles were manufactured, with firms such as FW Braby developing their own branded lines.

Coatings

A range of coatings was employed to protect corrugated iron from the elements. Oil (usually linseed) based paints were used extensively in conjunction with red lead paint, with pitch and bitumen to a lesser extent. The galvanising process involved the iron sheet being dipped into a bath of molten zinc to form a protective layer on the metal surface. The zinc coating chemically protected the iron from corrosion.

There were a number of patented 'rustless coatings' developed in the late nineteenth and early twentieth centuries then formed protective oxide layers on the surface of the metal and were often known as the Barff process after the inventor.

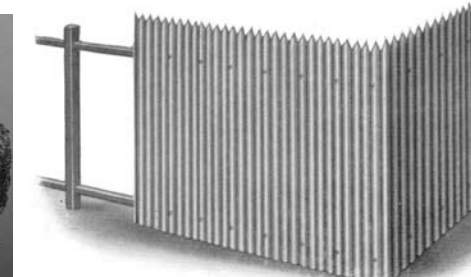


Construction details and techniques

Supplied in a range of sizes and profiles corrugated iron was frequently used for roofing and walling, and to a lesser extent for fencing and other innovative uses.

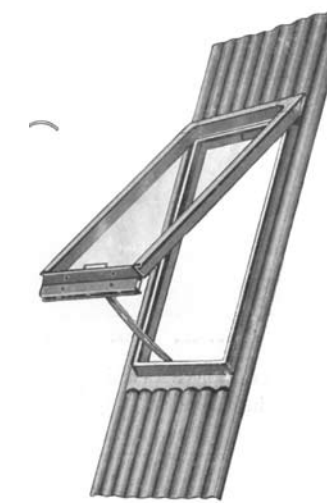


Portable farm worker shed



Galvanised corrugated unclimbable fencing.

Manufacturers quickly developed other components that allowed them to construct a building from a frame and corrugated sheet. This included ridging details, ventilators and windows. The retention of these pieces is especially important as most cannot be sourced now.



No. 81. Swing or Opening Light.

"Eclipse" Corrugated Ridging.



In 5 ft. lengths, 18 in., 21 in., or 24 in. girth. by 22-gauge.

Specialist fixings were required to suit the corrugated sheets, including hooks and bolts (usually galvanised) with specially shaped washers with which to effect watertight seals – particularly on varying profiles. Where these remain, they should be carefully saved, cleaned and set aside for reuse.

Galvanized Bolts, Nuts and Washers.

Size.	Per Gross.
$\frac{1}{4}$ in. \times $\frac{1}{4}$ in. ...	4 9
1 in. \times $\frac{1}{4}$ in. ...	5 0
$1\frac{1}{2}$ in. \times $\frac{1}{4}$ in. ...	5 6
2 in. \times $\frac{1}{4}$ in. ...	6 6

Galvanized Cone Head Screws.

Sizes.	Per Gross.	Per Cwt.*
$1\frac{1}{4}$ in. \times 12 G. ...	2 3	61 0
2 in. \times 14 " ...	3 6	58 6
$2\frac{1}{4}$ in. \times 16 " ...	5 0	57 0
3 in. \times 18 " ...	7 6	55 6

See also page 101 for Gutter Screws.

Galvanized Cone Head Nails.

Size.	Per Gross.	Per Cwt.*
2 in. \times 5 W.G. ...	2 0	33 0
$2\frac{1}{4}$ in. \times 4 " ...	2 6	32 9
3 in. \times 3 " ...	3 0	32 3

Galvanized Drive Screws.

2 $\frac{1}{4}$ in., 2 $\frac{1}{2}$ in., 3 in. ...	41/3 per cwt.*
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Galvanized Spring Head Nails.

2 $\frac{1}{2}$ in. \times 9 g. ...	1/10 $\frac{1}{2}$ per gross.
50 gross, 1/9 per gross.	100 gross, 1/7 $\frac{1}{2}$ per gross.

Galvanized Hook Bolts and Nuts.

Size.	Per gross.	Per cwt.*
3 in. \times $\frac{1}{4}$ in. ...	6 6	46 6
$3\frac{1}{2}$ in. \times $\frac{1}{4}$ in. ...	7 0	45 6
4 in. \times $\frac{1}{4}$ in. ...	8 0	44 6
4 in. \times $\frac{3}{8}$ in. ...	10 6	40 0
$4\frac{1}{2}$ in. \times $\frac{3}{8}$ in. ...	11 3	39 0
5 in. \times $\frac{3}{8}$ in. ...	11 9	38 3
4 in. \times $\frac{1}{2}$ in. ...	14 0	38 3
$4\frac{1}{2}$ in. \times $\frac{1}{2}$ in. ...	15 9	38 3

The above are our stock sizes, but we can supply any size or shape of Hook Bolt to suit special purlins, &c. Washers extra—see next column.

Embossed Curved Washers.

No. 1. Sizes stocked. Galvanized. For $\frac{1}{4}$ in., $\frac{3}{8}$ in., and $\frac{1}{2}$ in. Screws and Nails. Zinc. For $\frac{1}{4}$ in. and $\frac{3}{8}$ in. Screws and Nails. Galvanized after made (18 W.G.) ...	2/6 per gross.
Zinc (16 W.G.) ...	4/- "

No. 2. These Washers are sometimes preferred to our Round Curved Washers. Zinc (16 W.G.) for $\frac{1}{4}$ in. or $\frac{3}{8}$ in. Screws ...	5/- per gross.
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Curved Diamond Washers.

No. 3. Galvanized after Manufacture. For $\frac{1}{4}$ in. or $\frac{3}{8}$ in. Screws and Nails. Per gross, 3/3 Per cwt., 42/-*
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Galvanized Limpet Washers.

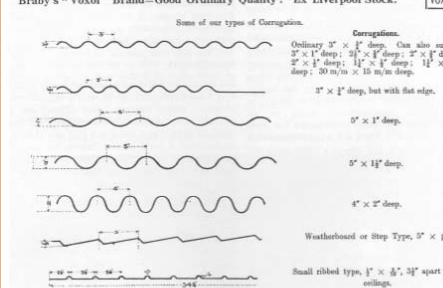
No. 1 ...	6/9 per gross.
To pass $\frac{1}{4}$ in., $\frac{1}{8}$ in., and $\frac{3}{8}$ in.	
No. 2 ...	4/6 per gross.
To pass $\frac{3}{8}$ in.	
No. 4 ...	4/3 per gross.
For use with Drive Screws.	

HIGH-GRADE GALVANIZED CORRUGATED SHEETS.

THE life of a Galvanized Sheet depends upon the coating of zinc or galvanizing. Hence it is of real economy to use High-grade Galvanized Sheets. Our Sheets answer this description and we give the galvanizing of the Sheets our special care. All Sheets are well coated with zinc. Having our own Rolling Mills and Galvanizing Plant we can regulate the quality from raw material to finished product; the result is that our Sheets ARE WITHOUT A SUPERIOR ON THE MARKET. We have the largest variety of corrugations and can produce sheets to suit any requirement. Lengths, 4' to 12'. Widths, 1' to 6'. Gauges, 12 to 30 gauge. Can be supplied curved to any radius.

THE "BRABY" QUALITY MEANS LONGER LIFE.

- Braby's "Sun" Brand—Very Best Double-Coated.
- Braby's "Empress" Brand—Extra Heavily Coated.
- Braby's "Eclipse" Brand—Extra Coated: Specially Selected.
- Braby's "Castle" Brand—Good Ordinary Quality: Prime Sheets.
- Braby's "Voxol" Brand—Good Ordinary Quality: Ex Liverpool Stock.



In a prefabricated structure the corrugated sheets were secured to an internal timber or metal frame. This was either left as a finished building if for agricultural use, or for domestic needs internally insulated and covered in timber lining or plaster. The sheet corrugations lend themselves well to lap joints, often overlapping by 150mm and by 1-2 corrugations where sheets are adjacent. As condensation was a major issue perforated sheets were also developed.

Further reading and information

Scotland's Listed Buildings: What Listing Means to Owners and Occupiers,
Historic Scotland (2006) Free publication
<http://historic-scotland.gov.uk/index/publications/pubsforowners.htm>

The Scottish Ironwork Foundation
Visit <http://www.scottishironwork.org>

INFORM; Boundary Ironwork – A guide to re-instatement
INFORM; Iron Gates and Railings
Historic Scotland, 2005

Technical Advice Note 29 – Corrugated Iron and Other Ferrous Cladding
Historic Scotland, 2004

Ashurst, J and Ashurst N, 1988, Practical Building Conservation; English Heritage Technical Handbook. Vol. 4. Metals, Aldershot; Gower Technical Press

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