

## Metalwork

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### Introduction

Maintenance is key to protecting your metal architectural features from oxidation. Metals vary in hardness and durability, and when exposed to oxygen, they form an oxide layer.

There are two types of metals; ferrous (wrought and cast iron, steel, tin) and non-ferrous (aluminum, copper, bronze, stainless steel). Oxidization of non-ferrous metals may help prevent the metal from further deterioration, whereas oxidization of ferrous metals increases the metal's deterioration rate.

Deterioration of all metals is encouraged by pollutants and moisture. These pollutants can come from the air, acidic rainwater, wood (red cedar and oak), moss, and certain materials in Portland cement and lime mortar. Mixing of different metals will also enable electro-chemical corrosion.

Cleaning and repairing metals often requires the help of an experienced professional to limit damages to the metal, property and health of workers and residents. The inspection of structural metal (steel or iron work), and consequent interventions, if any, should be made by a structural engineer. If replacing any metal that has badly deteriorated, always replace in kind.

### Metals and Paint

Ferrous metals should be painted to inhibit their quick oxidation and subsequent deterioration, and non-ferrous metals, such as copper, bronze, and stainless steel, should be left uncovered. An architectural conservator should be consulted prior to any paint removal from metals as the removal method will depend on the type of metal and the paint previously applied. Refer to the Region of Waterloo Practical Guide: Paint & Colour for further details.

### Iron Reinforcement Rods and Cramps

The oxidation of iron reinforcement rods and cramps within your masonry construction can lead to fractures within the building fabric. These fractures, caused by the pressure resulting from corroded iron, can easily be identified by the rust coloured stains coming from the fracture. Prevention is necessary to avoid these cracks. Water should always be directed away from the masonry in order to keep the structure dry, and sand should be used on slippery surfaces instead of salt in the winter.

### Cast Iron

Cast iron, an iron alloy with high carbon content, has been extensively used both structurally and ornamentally. Its use was very popular as a construction material for main street storefronts from the mid-to-late 19<sup>th</sup>-century due to its inexpensive prefabrication, resistance to compression loads and corrosion (in comparison to wrought iron and steel), and ability for quick on-site installation. Although cast iron cannot be shaped by hammering, rolling or pressing like wrought iron and steel due to its comparative brittleness and hardness, it does provide better resistance against buckling. Cast iron was originally believed to be fire resistant, but was found to buckle due to temperature changes between fire and its extinguishment. For this reason, as well as its insufficient tensile strength, cast iron is used for cladding and decorative purposes.

Cleaning and paint removal methods include abrasive (wire brushing and sandblasting), thermal (flame cleaning), and chemical processes.

### Fences

Metal fences have a tendency to rust at their base, especially if located near a walkway or road that is salted during the winter. Routine inspection will enable you to remove light rust with a wire brush before priming and repainting is done. Primer should never be applied over rust as this will not stop the corrosion, but will simply hide it temporarily. If rust can not be removed with a wire brush, you can use low-pressure sandblasting. Ensure that any surrounding surfaces will not be damaged, and that a primer is applied immediately after the sandblasting is complete. If primer is not applied promptly, your fence will have already rusted by the next day. A badly deteriorated fence can also be removed and repaired at a metal shop to avoid damage

### Tin Ceiling Tiles

Tin ceiling tiles, a popular ceiling choice from the 1880s to 1920s, were traditionally manufactured from stamped-steel panels and covered with paint. Utilized as a fire-proofing device, the tiles were nailed to a grid of wood strips. Their fire protection potential has been scrutinized, however, as the wood framing beneath the tiles can be ignited regardless of the tiles' non-combustible composition. An enflamed structure would fare much better if the tiles were installed over an earlier plaster ceiling. In spite of their name, tin ceiling tiles were not originally coated with tin. However today's tin ceiling tiles are tin plated.

Tin ceilings were most likely painted with lead-based paint. Multiple layers of paint may be hiding detailing or deterioration. Read the Region of Waterloo's [Practical Guide: Asbestos, Mold & Lead Abatement](#) before beginning your repainting, repair or removal project. Tin ceiling tiles should never be cleaned using abrasive methods, such as sandblasting.

### References

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