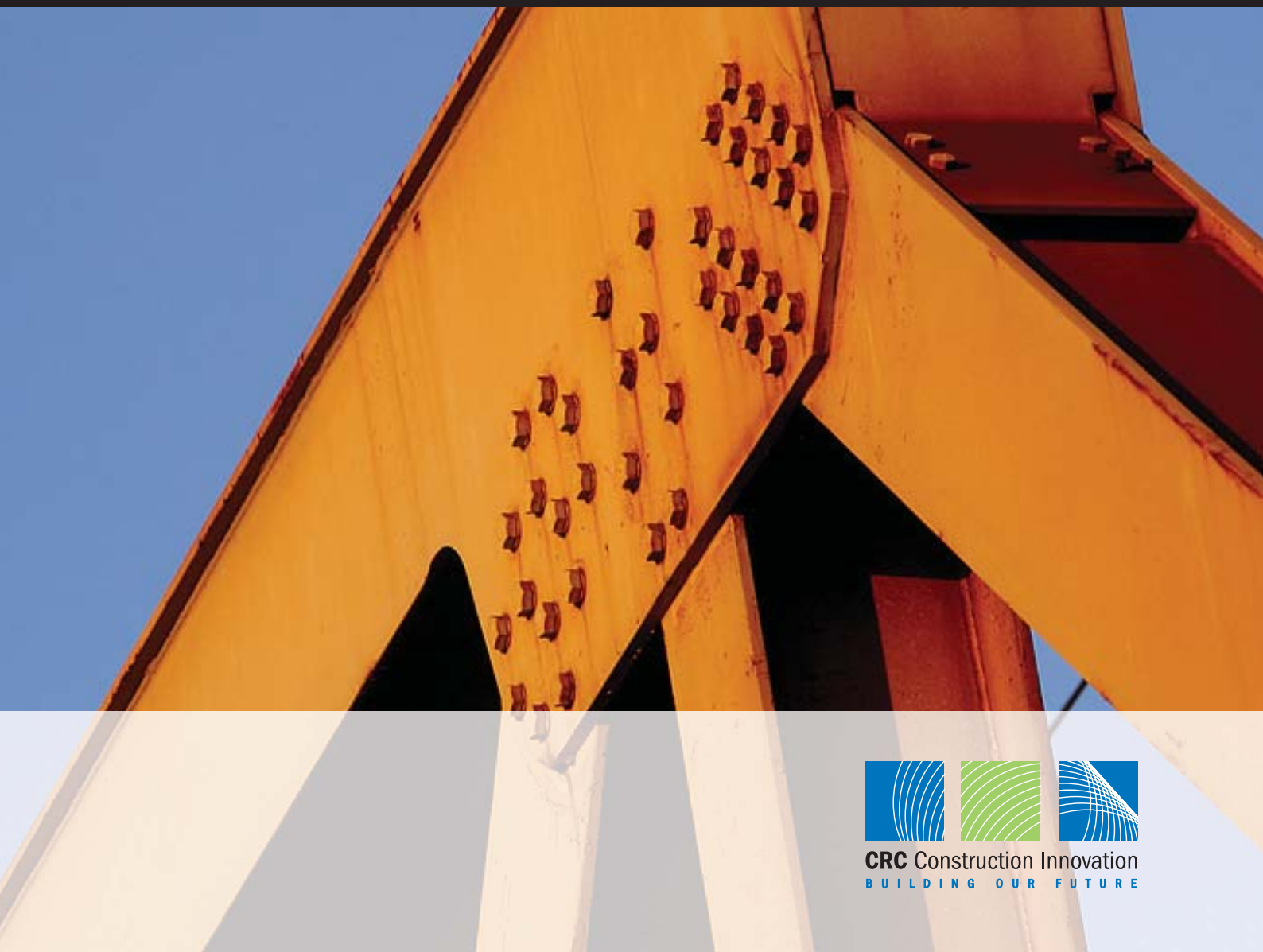
# Predicted lifetimes of metallic building components

## A PRACTICAL DATABASE DERIVED FROM EXPERT OPINION



CRC Construction Innovation
BUILDING OUR FUTURE

# Predicted lifetimes of metallic building components

## A PRACTICAL DATABASE DERIVED FROM EXPERT OPINION

CRC Construction Innovation
BUILDING OUR FUTURE

Office: Cooperative Research Centre for *Construction Innovation*
9th Floor, Level 9, QUT Gardens Point

2 George Street, Brisbane, Qld, 4000 Australia

Telephone: +61 7 3864 1393

Email: enquiries@construction-innovation.info

Web: www.construction-innovation.info



First published 2006 by Cooperative Research Centre for *Construction Innovation,* for Icon.Net Pty Ltd.



ISBN 0-9750977-6-8

For further information on our publications, please visit our

website: www.construction-innovation.info


# Foreword

This publication *Predicted lifetimes of metallic building components* is an outcome from a Cooperative Research Centre (CRC) for *Construction Innovation* project headed by Ivan Cole (CSIRO) with a project team comprising Gerry Shutt (John Holland), Dale Gilbert (Qld Dept of Public Works), Stephen McFallan and Gerardo Trinidad (CSIRO), Swee-Eng Chen and Jamie Mackee (University of Newcastle).

*Construction Innovation* is committed to leading the Australian property, design, construction and facility management industry in collaboration and innovation. We are dedicated to disseminating the practical research outcomes to our industry – to improve business practice and enhance the competitiveness of your firm. Developing applied technology and management solutions, and delivering education and relevant industry information is what our CRC is all about.

# Contents

# 1. Introduction

A reliable and accurate estimate of expected service life for building components is a crucial requirement for lifecycle and environmental impact tools that assist in lifecycle costing, eco-efficiency assessments, building maintenance optimisation and the like. The Cooperative Research Centre for *Construction Innovation* has developed a database, derived from expert opinion, of predicted lifetimes for a range of metallic building components.

Components covered by the database are a representative subset of building materials ranging from nails and ducting through to roofing, window frames and door handles. The construction industry can use the database to give indicative lifetimes of components in different environments for use in design and assessment tools. However, it is *not* recommended that the data be used as an input for determining the structural reliability of a building.

# 2. How to use the database

The database is provided in the form of a table enabling users to look up predicted lifetimes for metallic components in a comparable environment. Not all situations will be covered, as the components were limited to 30 and only those situations where there was good agreement between the experts have been included in this table. The predicted life is shown in the table in two forms: the mode and the mean as well as a standard deviation for the mean value. The mean value is suggested as the most appropriate for use as input into design and assessment tools.

In the database, three parameters are defined for each category:

1. the mode of the distribution
2. a pseudo mean
3. a standard deviation about the pseudo mean.

The pseudo mean is defined by assuming that the values take the midpoint of the interval selected (i.e. a selection in the interval 10–<15years has a value of 12.5 years).

The ‘Response class’ column refers to the methodology described in Section 5.

The database is most suited for use where it is one possible source of input information into life prediction and is balanced against other sources. The database is also useful for making broad decisions about lifecycle or maintenance issues across types of buildings and materials.

# 3. How the database was created

A Delphi survey is a structured group interaction process that is directed in ‘rounds’ of opinion collection and feedback. Opinion collection is achieved by conducting a series of surveys using questionnaires. The result of each previous survey is the basis for formulating the questionnaire to be used in the next round. The Delphi technique is an established method for obtaining consensus and has been used in a variety of research settings.

Professionals such as builders and architects were the primary respondents for this survey. They were selected based on their practical experience and theoretical knowledge. Building material suppliers were also invited to participate in the survey for their detailed knowledge of their specific products. Academics and scientists were included for their understanding of scientific principles in areas relating to material durability and hence possessing expertise

relevant to constructing a durability model.

The survey was conducted via the internet to allow respondents to answer questions at a convenient time.

# 4. Classifications used

## 4.1 Building components included

To make answering the questionnaire manageable, the number of components used in the survey was limited to 30 out of the possible 120 different components or component/material combinations within a building (as listed in Farnell Cost Codes). The 30 components chosen are listed in Table 1 below. These 30 components were also considered in the most common materials and coatings used, and the substrate of the material (in case of fasteners, bracing, building straps etc.).

**Table 1: List of building components used in the survey**

| Microclimate | Component |
|---|---|
| Fully exposed — external | roof sheeting |
| | flashings |
| | gutters |
| | wall cladding |
| Partially exposed — facades | windows, frames, all types (e.g. awning) |
| | doors |
| | bolts |
| | nails |
| | lintels |
| | sarking |
| Roof space | roof strap — storm fixing |
| | purlins |
| | gangnails |
| | purlins/girts |
| Wall cavity | bracing |
| | nails |
| | brick ties |
| | bolts |
| | plumbing pipework |
| Subfloor | metal deck for concrete floor |
| | universal section |
| | pile |
| | bathroom taps |
| Internal | laundry sink |
| | bathroom sink |
| | door handle |
| | curtain rail |
| | suspended ceiling support |
| | air grilles |
| | stairs |

### 4.2 Maintenance

The effect of maintenance was considered where it was thought to be relevant. However, within the survey it was not possible to investigate the type of maintenance applied, only whether it was applied.

In terms of the survey, 'maintenance' may extend from cleaning to repainting, but will not include replacement except for accidental damage (of not more than 1% of system). When assessing life of nails, bolts etc., maintenance refers to maintenance of the substrate (paint on timber etc.).

### 4.3 The three environments considered

Australia experiences a range of different climates and a range of different levels of exposure to degradation agents (primarily marine salts and industrial pollutants). However, the scope of this work is restricted to 'temperate' zones and for simplification, environment classification was limited to three, which represent the extremes of exposure in Australia. These were 'marine', 'industrial' and 'benign', and the advice given to survey respondents is as below:

**Marine** — In order to ensure a consistent answer, a marine location should be treated as the first off-beach building from a surf beach. In order to standardise responses, assume that the dwelling or commercial building is 200 m from the high tide level separated by a road, light vegetation and beach. For those that study corrosion on a professional basis, consider a situation where airborne salinity will be 150 mg/$m^2$.day.

**Industrial** — For consistency, an industrial location is 500 m from heavy industry (steel works or oil refinery) separated by a low vegetation buffer zone. For corrosionists, the airborne sulfate level will be category I2 from ISO 9225.

**Benign** — A location not significantly affected by either marine aerosol or industrial pollutant is defined as benign. Typical locations would be more than 10 km from a surf coast and not within 5 km of an industrial zone.

### 4.4 Failure criteria

The failure criteria to be used were the last issue in defining the scope of the survey. It was decided to survey both life expectancy and aesthetic life of a component. Both of these concepts are somewhat subjective. Life expectancy is when a component stops fulfilling its function and would appear to be an objective concept. However, different users will tolerate different degrees of loss of function.

## 5. How the answers were generated from responses

The responses to individual questions were classified into four classes based on a simple rule:

Class 1. One interval contained more than 50% of responses.
Class 2. Two adjacent intervals contained more than 50% of responses.
Class 3. Three adjacent intervals contained more than 50% of responses.
Class 4. None of the above, or cases where there are two or more (non-adjacent) intervals with the same maximum number of occurrences.

The second round of the survey was used to gain additional information for categories that initially fell into Class 3 or 4 due to lack of consistency in the responses. Only those categories that achieved a Class 1 or 2 outcome after two rounds of the survey are included in the final database.

# 6. Validation of database

The reliability of the data was tested in three ways:

**(a) Reviewing the internal consistency of data**

Within the database, opinions on closely related questions should be similar and there was found to be good agreement.

**(b) Reviewing against expected trends**

The database showed good correlation with trends expected from considering underlying scientific principles and the microclimates involved. For instance, gutters would be expected to have a shorter predicted life than roofs, as gutters are in a more severe microclimate than roof sheeting, due to greater retention of water and debris in gutters. Additionally, greater pollutant deposition is expected at the edges of buildings where gutters are situated.

**(c) Reviewing against existing experimental data**

Reasonable agreement was found when selected results from the Delphi study were compared with those from CSIRO databases on component life. CSIRO data is from three sources:

- data derived from direct exposure of metal components for 1-2 years
- data derived from CSIRO's holistic model which predicts life based on an understanding of the processes promoting corrosion
- maintenance data from the Queensland Department of Housing dealing with time for significant replacement or repair of housing.

# Appendix: Database of component life

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Gutters | Service life | Marine | Galvanised steel | Yes | 10-15 | 9 | 13 | 2 |
| Commercial | Gutters | Service life | Marine | Galvanised steel | No | 5-10 | 5 | 9 | 2 |
| Commercial | Gutters | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 4 | 6 | 2 |
| Commercial | Gutters | Aesthetic life | Marine | Galvanised steel | Yes | 10-15 | 6 | 11 | 2 |
| Commercial | Gutters | Service life | Industrial | Galvanised steel | Yes | 10-15 | 9 | 15 | 2 |
| Commercial | Gutters | Service life | Industrial | Galvanised steel | No | 5-10 | 5 | 10 | 2 |
| Commercial | Gutters | Time to first maintenance | Industrial | Galvanised steel | Yes | 5-10 | 5 | 8 | 2 |
| Commercial | Gutters | Aesthetic life | Industrial | Galvanised steel | Yes | 5-10 | 6 | 10 | 2 |
| Commercial | Gutters | Service life | Benign | Galvanised steel | Yes | 30-50 | 16 | 32 | 2 |
| Commercial | Gutters | Time to first maintenance | Benign | Galvanised steel | Yes | 10-15 | 15 | 17 | 2 |
| Commercial | Gutters | Aesthetic life | Benign | Galvanised steel | Yes | 20-30 | 13 | 22 | 2 |
| Commercial | Gutters | Service life | Marine | Colorbond | No | 5-10 | 12 | 18 | 2 |
| Commercial | Gutters | Time to first maintenance | Marine | Colorbond | Yes | 5-10 | 7 | 10 | 2 |
| Commercial | Gutters | Service life | Industrial | Colorbond | Yes | 15-20 | 14 | 26 | 2 |
| Commercial | Gutters | Service life | Industrial | Colorbond | No | 10-15 | 12 | 21 | 2 |
| Commercial | Gutters | Time to first maintenance | Industrial | Colorbond | Yes | 5-10 | 7 | 12 | 2 |
| Commercial | Gutters | Aesthetic life | Industrial | Colorbond | Yes | 15-20 | 10 | 17 | 2 |
| Commercial | Gutters | Service life | Benign | Colorbond | Yes | 20-50 | 16 | 36 | 2 |
| Commercial | Gutters | Service life | Benign | Colorbond | No | 30-50 | 16 | 35 | 2 |
| Commercial | Gutters | Aesthetic life | Benign | Colorbond | Yes | 30-50 | 14 | 29 | 2 |
| Commercial | Gutters | Service life | Marine | Zincalume | Yes | 15-20 | 12 | 21 | 2 |
| Commercial | Gutters | Service life | Marine | Zincalume | No | 10-15 | 11 | 15 | 2 |
| Commercial | Gutters | Time to first maintenance | Marine | Zincalume | Yes | 5-10 | 8 | 10 | 2 |
| Commercial | Gutters | Service life | Industrial | Zincalume | Yes | 15-20 | 10 | 24 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Gutters | Service life | Industrial | Zincalume | No | 10-15 | 10 | 16 | 2 |
| Commercial | Gutters | Time to first maintenance | Industrial | Zincalume | Yes | 5-10 | 8 | 12 | 2 |
| Commercial | Gutters | Aesthetic life | Industrial | Zincalume | Yes | 10-15 | 10 | 17 | 2 |
| Commercial | Gutters | Service life | Benign | Zincalume | Yes | 30-50 | 16 | 42 | 2 |
| Commercial | Gutters | Aesthetic life | Benign | Zincalume | Yes | 20-50 | 16 | 28 | 2 |
| Commercial | Doors | Service life | Marine | Aluminium | Yes | 15-20 | 13 | 22 | 2 |
| Commercial | Doors | Service life | Marine | Aluminium | No | 15-20 | 9 | 14 | 2 |
| Commercial | Doors | Time to first maintenance | Marine | Aluminium | Yes | <5-10 | 5 | 7 | 2 |
| Commercial | Doors | Aesthetic life | Marine | Aluminium | Yes | 10-15 | 9 | 13 | 2 |
| Commercial | Doors | Service life | Industrial | Aluminium | Yes | 20-30 | 8 | 24 | 1 |
| Commercial | Doors | Service life | Industrial | Aluminium | No | 15-20 | 4 | 16 | 1 |
| Commercial | Doors | Time to first maintenance | Industrial | Aluminium | Yes | 10-15 | 5 | 9 | 2 |
| Commercial | Doors | Aesthetic life | Industrial | Aluminium | Yes | 10-15 | 10 | 16 | 2 |
| Commercial | Doors | Service life | Benign | Aluminium | Yes | 30-50 | 12 | 37 | 1 |
| Commercial | Doors | Service life | Benign | Aluminium | No | 20-30 | 14 | 31 | 1 |
| Commercial | Doors | Aesthetic life | Benign | Aluminium | Yes | 20-30 | 10 | 22 | 2 |
| Commercial | Doors | Service life | Marine | Colour-coated aluminium | Yes | 20-30 | 13 | 25 | 2 |
| Commercial | Doors | Service life | Marine | Colour-coated aluminium | No | 15-20 | 8 | 17 | 2 |
| Commercial | Doors | Time to first maintenance | Marine | Colour-coated aluminium | Yes | 10-15 | 5 | 10 | 2 |
| Commercial | Doors | Service life | Industrial | Colour-coated aluminium | Yes | 20-30 | 14 | 29 | 1 |
| Commercial | Doors | Service life | Industrial | Colour-coated aluminium | No | 15-20 | 9 | 20 | 1 |
| Commercial | Doors | Time to first maintenance | Industrial | Colour-coated aluminium | Yes | 15-20 | 5 | 12 | 2 |
| Commercial | Doors | Aesthetic life | Industrial | Colour-coated aluminium | Yes | 15-20 | 9 | 18 | 2 |
| Commercial | Doors | Service life | Benign | Colour-coated aluminium | Yes | 30-50 | 14 | 40 | 2 |
| Commercial | Doors | Service life | Benign | Colour-coated aluminium | No | 20-50 | 14 | 33 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Doors | Time to first maintenance | Benign | Colour-coated aluminium | Yes | 15-20 | 11 | 22 | 2 |
| Commercial | Doors | Aesthetic life | Benign | Colour-coated aluminium | Yes | 20-50 | 10 | 28 | 2 |
| Commercial | Doors | Service life | Marine | Galvanised | Yes | 10-20 | 8 | 18 | 2 |
| Commercial | Doors | Service life | Marine | Galvanised | No | 10-15 | 4 | 11 | 2 |
| Commercial | Doors | Time to first maintenance | Marine | Galvanised | Yes | 5-10 | 4 | 7 | 1 |
| Commercial | Doors | Aesthetic life | Marine | Galvanised | Yes | 5-10 | 9 | 12 | 2 |
| Commercial | Doors | Service life | Industrial | Galvanised | Yes | 15-20 | 7 | 20 | 2 |
| Commercial | Doors | Service life | Industrial | Galvanised | No | 10-15 | 4 | 15 | 2 |
| Commercial | Doors | Time to first maintenance | Industrial | Galvanised | Yes | 10-15 | 5 | 9 | 2 |
| Commercial | Doors | Aesthetic life | Industrial | Galvanised | Yes | 10-15 | 8 | 14 | 1 |
| Commercial | Doors | Service life | Benign | Galvanised | Yes | 30-50 | 15 | 37 | 2 |
| Commercial | Doors | Service life | Benign | Galvanised | No | 30-50 | 14 | 27 | 2 |
| Commercial | Doors | Time to first maintenance | Benign | Galvanised | Yes | 10-20 | 11 | 17 | 2 |
| Commercial | Doors | Aesthetic life | Benign | Galvanised | Yes | 20-30 | 11 | 23 | 2 |
| Commercial | Railings | Service life | Marine | Stainless steel grade 316 | Yes | 20-50 | 14 | 36 | 2 |
| Commercial | Railings | Service life | Marine | Stainless steel grade 316 | No | 20-30 | 15 | 27 | 2 |
| Commercial | Railings | Time to first maintenance | Marine | Stainless steel grade 316 | Yes | 5-10 | 14 | 16 | 2 |
| Commercial | Railings | Aesthetic life | Marine | Stainless steel grade 316 | Yes | 20-30 | 8 | 20 | 1 |
| Commercial | Railings | Service life | Industrial | Stainless steel grade 316 | Yes | 30-50 | 13 | 37 | 1 |
| Commercial | Railings | Service life | Industrial | Stainless steel grade 316 | No | 20-30 | 15 | 28 | 1 |
| Commercial | Railings | Time to first maintenance | Industrial | Stainless steel grade 316 | Yes | 5-10 | 14 | 15 | 2 |
| Commercial | Railings | Aesthetic life | Industrial | Stainless steel grade 316 | Yes | 20-30 | 11 | 22 | 2 |
| Commercial | Railings | Service life | Benign | Stainless steel grade 316 | Yes | >50 | 12 | 52 | 1 |
| Commercial | Railings | Service life | Benign | Stainless steel grade 316 | No | >50 | 15 | 48 | 2 |
| Commercial | Railings | Time to first maintenance | Benign | Stainless steel grade 316 | Yes | 30-50 | 19 | 31 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Railings | Aesthetic life | Benign | Stainless steel grade 316 | Yes | 30-50 | 16 | 34 | 2 |
| Commercial | Stairs | Service life | Interior | Galvanised steel | Yes | 20-30 | 31 | 35 | 2 |
| Commercial | Stairs | Service life | Interior | Galvanised steel | No | 20-30 | 14 | 23 | 2 |
| Commercial | Stairs | Aesthetic life | Interior | Galvanised steel | Yes | 20-30 | 10 | 20 | 2 |
| Commercial | Stairs | Time to first maintenance | Interior | Painted steel | Yes | <5 | 6 | 8 | 2 |
| Commercial | HVAC ductwork | Service life | Marine | Galvanised steel | Yes | 20-30 | 8 | 19 | 2 |
| Commercial | HVAC ductwork | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 7 | 9 | 2 |
| Commercial | HVAC ductwork | Service life | Industrial | Galvanised steel | Yes | 20-30 | 9 | 22 | 2 |
| Commercial | HVAC ductwork | Time to first maintenance | Industrial | Galvanised steel | Yes | <5 | 8 | 10 | 2 |
| Commercial | HVAC ductwork | Service life | Benign | Galvanised steel | Yes | 20-50 | 14 | 33 | 2 |
| Commercial | HVAC ductwork | Service life | Benign | Galvanised steel | No | 20-30 | 16 | 29 | 2 |
| Commercial | Flashing | Service life | Marine | Copper | Yes | <50 | 17 | 41 | 2 |
| Commercial | Flashing | Service life | Marine | Copper | No | 20-30 | 16 | 33 | 2 |
| Commercial | Flashing | Time to first maintenance | Marine | Copper | Yes | 20-30 | 19 | 26 | 2 |
| Commercial | Flashing | Service life | Industrial | Copper | Yes | >50 | 18 | 41 | 2 |
| Commercial | Flashing | Service life | Industrial | Copper | No | 30-50 | 16 | 35 | 2 |
| Commercial | Flashing | Service life | Benign | Copper | Yes | >50 | 11 | 55 | 1 |
| Commercial | Flashing | Service life | Benign | Copper | No | >50 | 14 | 50 | 1 |
| Commercial | Flashing | Time to first maintenance | Benign | Copper | Yes | >50 | 19 | 38 | 2 |
| Commercial | Flashing | Service life | Marine | Galvanised steel | Yes | 5-10 | 9 | 16 | 2 |
| Commercial | Flashing | Service life | Marine | Galvanised steel | No | <5 | 9 | 11 | 2 |
| Commercial | Flashing | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 7 | 7 | 1 |
| Commercial | Flashing | Service life | Industrial | Galvanised steel | Yes | 15-20 | 8 | 18 | 2 |
| Commercial | Flashing | Service life | Industrial | Galvanised steel | No | 10-15 | 8 | 13 | 2 |
| Commercial | Flashing | Time to first maintenance | Industrial | Galvanised steel | Yes | 5-10 | 6 | 9 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Flashing | Service life | Benign | Galvanised steel | Yes | 20-30 | 17 | 38 | 2 |
| Commercial | Flashing | Time to first maintenance | Benign | Galvanised steel | Yes | 10-15 | 18 | 22 | 2 |
| Commercial | Flashing | Service life | Marine | Lead | Yes | >50 | 16 | 43 | 2 |
| Commercial | Flashing | Time to first maintenance | Marine | Lead | Yes | 30-50 | 19 | 33 | 2 |
| Commercial | Flashing | Service life | Industrial | Lead | Yes | <50 | 17 | 45 | 2 |
| Commercial | Flashing | Service life | Industrial | Lead | No | 30->50 | 17 | 40 | 2 |
| Commercial | Flashing | Time to first maintenance | Industrial | Lead | Yes | >50 | 20 | 33 | 2 |
| Commercial | Flashing | Service life | Benign | Lead | Yes | >50 | 11 | 55 | 1 |
| Commercial | Flashing | Service life | Benign | Lead | No | >50 | 13 | 51 | 1 |
| Commercial | Flashing | Time to first maintenance | Benign | Lead | Yes | >50 | 21 | 42 | 1 |
| Commercial | Metal deck work—1$^{st}$ storey | Service life | Marine | Steel | No | 20-30 | 11 | 20 | 2 |
| Commercial | Metal deck work—1$^{st}$ storey | Service life | Industrial | Steel | No | 20-30 | 10 | 24 | 2 |
| Commercial | Metal deck work—1$^{st}$ storey | Service life | Benign | Steel | No | 30-50 | 15 | 38 | 2 |
| Commercial | Metal deck work—subfloor | Service life | Marine | Steel | No | 20-30 | 11 | 16 | 2 |
| Commercial | Metal deck work—subfloor | Service life | Industrial | Steel | No | 15-30 | 11 | 23 | 2 |
| Commercial | Metal deck work—subfloor | Service life | Benign | Steel | No | 30-50 | 15 | 35 | 2 |
| Commercial | Piles | Service life | Industrial | Steel | No | 2-30 | 15 | 25 | 2 |
| Commercial | Piles | Service life | Benign | Steel | No | 30-50 | 14 | 38 | 2 |
| Commercial | Plumbing pipework | Service life | Marine | Copper | No | 20-30 | 13 | 22 | 2 |
| Commercial | Plumbing pipework | Service life | Industrial | Copper | No | 15-30 | 14 | 26 | 2 |
| Commercial | Plumbing pipework | Service life | Benign | Copper | No | 30-50 | 14 | 35 | 2 |
| Commercial | Plumbing pipework | Service life | Marine | Hot-dipped gal | No | 15-20 | 5 | 16 | 1 |
| Commercial | Plumbing pipework | Service life | Industrial | Hot-dipped gal | No | 20-30 | 6 | 20 | 2 |
| Commercial | Plumbing pipework | Service life | Benign | Hot-dipped gal | No | 20-50 | 15 | 33 | 2 |
| Commercial | Purlins with ceiling lining | Service life | Marine | Galvanised steel | No | 15-20 | 10 | 19 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Purlins with ceiling lining | Service life | Industrial | Galvanised steel | No | 15-20 | 17 | 25 | 2 |
| Commercial | Purlins with ceiling lining | Service life | Benign | Galvanised steel | No | >50 | 20 | 43 | 1 |
| Commercial | Purlins without ceiling lining | Service life | Marine | Galvanised steel | No | 10-15 | 7 | 14 | 2 |
| Commercial | Purlins without ceiling lining | Service life | Industrial | Galvanised steel | No | 15-30 | 11 | 20 | 2 |
| Commercial | Purlins without ceiling lining | Service life | Benign | Galvanised steel | No | 30-50 | 16 | 36 | 2 |
| Commercial | Purlins with ceiling lining | Service life | Marine | Zincalume | No | 10-30 | 11 | 20 | 2 |
| Commercial | Purlins with ceiling lining | Service life | Industrial | Zincalume | No | 20-30 | 16 | 27 | 2 |
| Commercial | Purlins with ceiling lining | Service life | Benign | Zincalume | No | 30->50 | 16 | 42 | 2 |
| Commercial | Purlins without ceiling lining | Service life | Marine | Zincalume | No | 15-20 | 8 | 17 | 2 |
| Commercial | Purlins without ceiling lining | Service life | Industrial | Zincalume | No | 10-30 | 10 | 21 | 1 |
| Commercial | Purlins without ceiling lining | Service life | Benign | Zincalume | No | >50 | 17 | 39 | 2 |
| Commercial | Roof sheeting | Service life | Marine | Galvanised steel | No | 10-20 | 10 | 19 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Marine | Galvanised steel | Yes | 5-10 | 4 | 7 | 2 |
| Commercial | Roof sheeting | Aesthetic life | Marine | Galvanised steel | Yes | <5 | 7 | 11 | 2 |
| Commercial | Roof sheeting | Service life | Industrial | Galvanised steel | Yes | 10-15 | 13 | 23 | 2 |
| Commercial | Roof sheeting | Service life | Industrial | Galvanised steel | No | 5-15 | 9 | 16 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Industrial | Galvanised steel | Yes | 5-10 | 9 | 10 | 1 |
| Commercial | Roof sheeting | Aesthetic life | Industrial | Galvanised steel | Yes | 5-10 | 12 | 15 | 2 |
| Commercial | Roof sheeting | Service life | Benign | Galvanised steel | Yes | 30-50 | 13 | 43 | 1 |
| Commercial | Roof sheeting | Service life | Benign | Galvanised steel | No | 30-50 | 13 | 35 | 1 |
| Commercial | Roof sheeting | Time to first maintenance | Benign | Galvanised steel | Yes | 15-20 | 12 | 19 | 2 |
| Commercial | Roof sheeting | Aesthetic life | Benign | Galvanised steel | Yes | 15-30 | 15 | 29 | 2 |
| Commercial | Roof sheeting | Service life | Marine | Colorbond | Yes | 20-30 | 10 | 26 | 2 |
| Commercial | Roof sheeting | Service life | Marine | Colorbond | No | 15-20 | 6 | 17 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Marine | Colorbond | Yes | 10-15 | 5 | 12 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Roof sheeting | Aesthetic life | Marine | Colorbond | Yes | 10-15 | 7 | 16 | 2 |
| Commercial | Roof sheeting | Service life | Industrial | Colorbond | Yes | 20-30 | 12 | 29 | 2 |
| Commercial | Roof sheeting | Service life | Industrial | Colorbond | No | 15-20 | 10 | 22 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Industrial | Colorbond | Yes | 10-15 | 6 | 13 | 1 |
| Commercial | Roof sheeting | Aesthetic life | Industrial | Colorbond | Yes | 20-30 | 9 | 19 | 2 |
| Commercial | Roof sheeting | Service life | Benign | Colorbond | Yes | 30-50 | 13 | 46 | 1 |
| Commercial | Roof sheeting | Service life | Benign | Colorbond | No | 30-50 | 16 | 39 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Benign | Colorbond | Yes | 20-30 | 16 | 24 | 2 |
| Commercial | Roof sheeting | Aesthetic life | Benign | Colorbond | Yes | 20-30 | 17 | 31 | 2 |
| Commercial | Roof sheeting | Service life | Marine | Zincalume | Yes | 15-20 | 13 | 26 | 2 |
| Commercial | Roof sheeting | Service life | Marine | Zincalume | No | 15-20 | 7 | 17 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Marine | Zincalume | Yes | 5-10 | 7 | 11 | 2 |
| Commercial | Roof sheeting | Aesthetic life | Marine | Zincalume | Yes | 15-20 | 8 | 15 | 2 |
| Commercial | Roof sheeting | Service life | Industrial | Zincalume | Yes | 20-30 | 13 | 28 | 2 |
| Commercial | Roof sheeting | Service life | Industrial | Zincalume | No | 15-30 | 10 | 22 | 2 |
| Commercial | Roof sheeting | Time to first maintenance | Industrial | Zincalume | Yes | 5-10 | 9 | 14 | 2 |
| Commercial | Roof sheeting | Aesthetic life | Industrial | Zincalume | Yes | 20-30 | 9 | 19 | 2 |
| Commercial | Roof sheeting | Service life | Benign | Zincalume | Yes | >50 | 13 | 49 | 1 |
| Commercial | Roof sheeting | Service life | Benign | Zincalume | No | 30-50 | 15 | 39 | 1 |
| Commercial | Roof sheeting | Time to first maintenance | Benign | Zincalume | Yes | 15-30 | 14 | 24 | 2 |
| Commercial | Roof sheeting | Aesthetic life | Benign | Zincalume | Yes | 20-30 | 16 | 33 | 2 |
| Commercial | Bottom plates | Service life | Marine | Galvanised steel | No | 15-20 | 6 | 12 | 2 |
| Commercial | Bottom plates | Service life | Industrial | Galvanised steel | No | 15-20 | 10 | 17 | 1 |
| Commercial | Bottom plates | Service life | Benign | Galvanised steel | No | 20-30 | 16 | 30 | 2 |
| Commercial | Purlins—horizontal | Service life | Marine | Galvanised steel | No | 20-30 | 8 | 17 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Purlins—horizontal | Service life | Benign | Galvanised steel | No | 15->50 | 18 | 37 | 2 |
| Commercial | Purlins—vertical | Service life | Marine | Galvanised steel | No | 10-30 | 12 | 19 | 2 |
| Commercial | Purlins—vertical | Service life | Benign | Galvanised steel | No | >50 | 19 | 39 | 2 |
| Commercial | Bottom plates | Service life | Marine | Zincalume | No | 15-20 | 7 | 14 | 2 |
| Commercial | Bottom plates | Service life | Industrial | Zincalume | No | 15-30 | 9 | 18 | 2 |
| Commercial | Purlins—horizontal | Service life | Marine | Zincalume | No | 5-10 | 10 | 17 | 1 |
| Commercial | Purlins—horizontal | Service life | Industrial | Zincalume | No | 20-30 | 12 | 22 | 2 |
| Commercial | Purlins—horizontal | Service life | Benign | Zincalume | No | 20-30 | 18 | 35 | 2 |
| Commercial | Purlins—vertical | Service life | Marine | Zincalume | No | 10-15 | 11 | 19 | 2 |
| Commercial | Purlins—vertical | Service life | Industrial | Zincalume | No | 20-30 | 11 | 23 | 2 |
| Commercial | Purlins—vertical | Service life | Benign | Zincalume | No | 30->50 | 17 | 37 | 2 |
| Commercial | Air grilles | Service life | Interior | Anodised aluminium | No | 15-20 | 15 | 19 | 2 |
| Commercial | Air grilles | Time to first maintenance | Interior | Anodised aluminium | Yes | 5-10 | 10 | 11 | 2 |
| Commercial | Air grilles | Aesthetic life | Interior | Anodised aluminium | Yes | 5-10 | 11 | 15 | 2 |
| Commercial | Air grilles | Service life | Interior | Painted aluminium | Yes | 15-20 | 22 | 27 | 2 |
| Commercial | Air grilles | Time to first maintenance | Interior | Painted aluminium | Yes | <5-10 | 11 | 11 | 2 |
| Commercial | Air grilles | Aesthetic life | Interior | Painted aluminium | Yes | 5-10 | 11 | 14 | 2 |
| Commercial | Bathroom sink | Service life | Interior | Stainless steel | Yes | >50 | 19 | 40 | 2 |
| Commercial | Bathroom sink | Service life | Interior | Stainless steel | No | 20-30 | 19 | 30 | 2 |
| Commercial | Bathroom sink | Aesthetic life | Interior | Stainless steel | Yes | 20-30 | 17 | 26 | 2 |
| Commercial | Bathroom taps | Service life | Interior | Stainless steel | Yes | 30-50 | 18 | 34 | 2 |
| Commercial | Bathroom taps | Service life | Interior | Stainless steel | No | 20-30 | 19 | 29 | 2 |
| Commercial | Bathroom taps | Time to first maintenance | Interior | Stainless steel | Yes | <5 | 9 | 11 | 2 |
| Commercial | Bathroom taps | Time to first maintenance | Interior | Colour-coated brass | Yes | <5-10 | 9 | 11 | 2 |
| Commercial | Bathroom taps | Time to first maintenance | Interior | Polished brass | Yes | 5-10 | 8 | 10 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Bathroom taps | Aesthetic life | Interior | Polished brass | Yes | 5-30 | 17 | 22 | 2 |
| Commercial | Curtain rails | Aesthetic life | Interior | Aluminium | Yes | 10-15 | 10 | 16 | 2 |
| Commercial | Door handles | Service life | Interior | Stainless steel | Yes | >50 | 19 | 37 | 2 |
| Commercial | Door handles | Service life | Interior | Polished brass | Yes | 20-30 | 18 | 34 | 2 |
| Commercial | Door handles | Time to first maintenance | Interior | Polished brass | Yes | 5-10 | 17 | 16 | 2 |
| Commercial | Suspended ceiling system | Service life | Interior | Aluminium | No | 15-20 | 17 | 28 | 2 |
| Commercial | Suspended ceiling system | Aesthetic life | Interior | Aluminium | No | 10-15 | 10 | 20 | 2 |
| Commercial | Suspended ceiling system | Service life | Interior | Galvanised steel | No | 20-30 | 13 | 21 | 2 |
| Commercial | Suspended ceiling system | Aesthetic life | Interior | Galvanised steel | No | 15-20 | 11 | 19 | 2 |
| Commercial | Suspended ceiling system | Service life | Interior | Steel | No | 10-15 | 16 | 20 | 2 |
| Commercial | Suspended ceiling system | Aesthetic life | Interior | Steel | No | 15-20 | 5 | 13 | 2 |
| Commercial | Universal (U) sections | Service life | Benign | Galvanised steel | No | 30-50 | 17 | 39 | 2 |
| Commercial | Universal (U) sections | Service life | Marine | Steel | No | 20-30 | 10 | 18 | 2 |
| Commercial | Universal (U) sections | Service life | Industrial | Steel | No | 20-50 | 7 | 16 | 2 |
| Commercial | Universal (U) sections | Service life | Benign | Steel | No | 30-50 | 11 | 35 | 1 |
| Commercial | Wall cladding | Service life | Marine | Galvanised steel | Yes | 30-50 | 9 | 16 | 2 |
| Commercial | Wall cladding | Service life | Marine | Galvanised steel | No | 15-20 | 10 | 12 | 2 |
| Commercial | Wall cladding | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 5 | 7 | 2 |
| Commercial | Wall cladding | Service life | Industrial | Galvanised steel | Yes | 15-20 | 9 | 20 | 2 |
| Commercial | Wall cladding | Service life | Industrial | Galvanised steel | No | 5-15 | 10 | 16 | 2 |
| Commercial | Wall cladding | Time to first maintenance | Industrial | Galvanised steel | Yes | 10-15 | 6 | 9 | 2 |
| Commercial | Wall cladding | Service life | Benign | Galvanised steel | Yes | 30-50 | 14 | 35 | 2 |
| Commercial | Wall cladding | Service life | Benign | Galvanised steel | No | 15-20 | 14 | 27 | 2 |
| Commercial | Wall cladding | Aesthetic life | Benign | Galvanised steel | Yes | 20-30 | 11 | 24 | 2 |
| Commercial | Wall cladding | Service life | Marine | Colorbond | Yes | 20-30 | 9 | 19 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Wall cladding | Service life | Marine | Colorbond | No | 5-10 | 8 | 14 | 2 |
| Commercial | Wall cladding | Time to first maintenance | Marine | Colorbond | Yes | 5-10 | 3 | 14 | 1 |
| Commercial | Wall cladding | Aesthetic life | Marine | Colorbond | Yes | 5-10 | 9 | 14 | 2 |
| Commercial | Wall cladding | Service life | Industrial | Colorbond | Yes | 20-30 | 10 | 23 | 2 |
| Commercial | Wall cladding | Service life | Industrial | Colorbond | No | 10-20 | 10 | 18 | 2 |
| Commercial | Wall cladding | Time to first maintenance | Industrial | Colorbond | Yes | 5-10 | 6 | 10 | 2 |
| Commercial | Wall cladding | Aesthetic life | Industrial | Colorbond | Yes | 10-20 | 10 | 17 | 2 |
| Commercial | Wall cladding | Service life | Benign | Colorbond | Yes | 30-50 | 15 | 39 | 2 |
| Commercial | Wall cladding | Service life | Benign | Colorbond | No | 20-50 | 16 | 34 | 2 |
| Commercial | Wall cladding | Aesthetic life | Benign | Colorbond | Yes | 20-30 | 13 | 26 | 2 |
| Commercial | Window frames | Service life | Marine | Aluminium | Yes | 20-30 | 13 | 26 | 2 |
| Commercial | Window frames | Service life | Marine | Aluminium | No | 15-20 | 10 | 18 | 2 |
| Commercial | Window frames | Time to first maintenance | Marine | Aluminium | Yes | <5 | 6 | 8 | 2 |
| Commercial | Window frames | Aesthetic life | Marine | Aluminium | Yes | 10-20 | 10 | 15 | 2 |
| Commercial | Window frames | Service life | Industrial | Aluminium | Yes | 30-50 | 10 | 30 | 2 |
| Commercial | Window frames | Service life | Industrial | Aluminium | No | 20-30 | 6 | 19 | 2 |
| Commercial | Window frames | Time to first maintenance | Industrial | Aluminium | Yes | 10-20 | 6 | 10 | 2 |
| Commercial | Window frames | Service life | Benign | Aluminium | Yes | 30-50 | 13 | 43 | 1 |
| Commercial | Window frames | Service life | Benign | Aluminium | No | 20-30 | 14 | 34 | 2 |
| Commercial | Window frames | Aesthetic life | Benign | Aluminium | Yes | 20-30 | 10 | 25 | 2 |
| Commercial | Window frames | Service life | Marine | Colour-coated aluminium | Yes | 20-30 | 13 | 29 | 2 |
| Commercial | Window frames | Service life | Marine | Colour-coated aluminium | No | 15-20 | 8 | 18 | 2 |
| Commercial | Window frames | Time to first maintenance | Marine | Colour-coated aluminium | Yes | 10-15 | 6 | 11 | 2 |
| Commercial | Window frames | Aesthetic life | Marine | Colour-coated aluminium | Yes | 20-30 | 10 | 18 | 2 |
| Commercial | Window frames | Service life | Industrial | Colour-coated aluminium | Yes | 20-30 | 12 | 30 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Commercial | Window frames | Service life | Industrial | Colour-coated aluminium | No | 15-20 | 7 | 20 | 2 |
| Commercial | Window frames | Time to first maintenance | Industrial | Colour-coated aluminium | Yes | 10-15 | 5 | 12 | 2 |
| Commercial | Window frames | Aesthetic life | Industrial | Colour-coated aluminium | Yes | 20-30 | 9 | 19 | 2 |
| Commercial | Window frames | Service life | Benign | Colour-coated aluminium | Yes | 30-50 | 11 | 42 | 1 |
| Commercial | Window frames | Service life | Benign | Colour-coated aluminium | No | 20-30 | 13 | 34 | 2 |
| Commercial | Window frames | Aesthetic life | Benign | Colour-coated aluminium | Yes | 20-30 | 8 | 26 | 2 |
| | | | | | | | | | |
| Residential | Roof sheeting | Service life | Marine | Galvanised steel | Yes | 10-15 | 6 | 18 | 1 |
| Residential | Roof sheeting | Service life | Marine | Galvanised steel | No | 5-15 | 5 | 9 | 2 |
| Residential | Roof sheeting | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 5 | 6 | 1 |
| Residential | Roof sheeting | Aesthetic life | Marine | Galvanised steel | Yes | 5-10 | 5 | 9 | 2 |
| Residential | Roof sheeting | Service life | Industrial | Galvanised steel | Yes | 20-30 | 8 | 23 | 1 |
| Residential | Roof sheeting | Service life | Industrial | Galvanised steel | No | 10-15 | 5 | 13 | 1 |
| Residential | Roof sheeting | Time to first maintenance | Industrial | Galvanised steel | Yes | 10-15 | 4 | 9 | 1 |
| Residential | Roof sheeting | Aesthetic life | Industrial | Galvanised steel | Yes | 10-15 | 7 | 12 | 2 |
| Residential | Roof sheeting | Service life | Benign | Galvanised steel | Yes | >50 | 15 | 47 | 1 |
| Residential | Roof sheeting | Service life | Benign | Galvanised steel | No | 30-50 | 19 | 34 | 2 |
| Residential | Roof sheeting | Aesthetic life | Benign | Galvanised steel | Yes | 10-20 | 16 | 24 | 2 |
| Residential | Roof sheeting | Service life | Marine | Colorbond | Yes | 20-30 | 10 | 24 | 2 |
| Residential | Roof sheeting | Aesthetic life | Marine | Colorbond | Yes | 5-15 | 7 | 12 | 2 |
| Residential | Roof sheeting | Time to first maintenance | Industrial | Colorbond | Yes | 5-10 | 8 | 11 | 2 |
| Residential | Roof sheeting | Aesthetic life | Industrial | Colorbond | Yes | 20-30 | 9 | 14 | 2 |
| Residential | Roof sheeting | Service life | Benign | Colorbond | Yes | 30->50 | 13 | 47 | 2 |
| Residential | Roof sheeting | Service life | Marine | Zincalume | Yes | 20-30 | 8 | 22 | 2 |
| Residential | Roof sheeting | Service life | Marine | Zincalume | No | 5-15 | 6 | 13 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Roof sheeting | Time to first maintenance | Marine | Zincalume | Yes | 5-15 | 5 | 9 | 2 |
| Residential | Roof sheeting | Aesthetic life | Marine | Zincalume | Yes | 15-20 | 6 | 12 | 2 |
| Residential | Roof sheeting | Service life | Industrial | Zincalume | Yes | 20-30 | 8 | 26 | 2 |
| Residential | Roof sheeting | Aesthetic life | Industrial | Zincalume | Yes | 15-20 | 8 | 14 | 2 |
| Residential | Roof sheeting | Service life | Benign | Zincalume | Yes | >50 | 13 | 49 | 2 |
| Residential | Roof sheeting | Service life | Benign | Zincalume | No | 20-30 | 18 | 38 | 2 |
| Residential | Roof sheeting | Time to first maintenance | Benign | Zincalume | Yes | 10-20 | 16 | 24 | 2 |
| Residential | Roof sheeting | Aesthetic life | Benign | Zincalume | Yes | 20-30 | 16 | 27 | 2 |
| Residential | Bracing | Service life | Industrial | Galvanised steel — softwood frame | No | 20-30 | 15 | 24 | 2 |
| Residential | Bracing | Service life | Benign | Galvanised steel — softwood frame | No | 30->50 | 17 | 43 | 2 |
| Residential | Bracing | Service life | Benign | Galvanised steel — hardwood frame | No | 30->50 | 17 | 43 | 2 |
| Residential | Bracing | Service life | Benign | Galvanised steel — metal frame | No | >50 | 16 | 43 | 2 |
| Residential | Brick ties | Service life | Marine | Stainless steel grade 316 | No | 30->50 | 20 | 33 | 2 |
| Residential | Brick ties | Service life | Industrial | Stainless steel grade 316 | No | >50 | 17 | 39 | 2 |
| Residential | Brick ties | Service life | Benign | Stainless steel grade 316 | No | >50 | 10 | 53 | 1 |
| Residential | Brick ties | Service life | Marine | Galvanised steel | No | 10-20 | 5 | 12 | 2 |
| Residential | Brick ties | Service life | Industrial | Galvanised steel | No | 10-15 | 14 | 20 | 2 |
| Residential | Brick ties | Service life | Benign | Galvanised steel | No | >50 | 17 | 41 | 2 |
| Residential | Gangnails | Service life | Marine | Galvanised steel — hardwood | No | 5-15 | 11 | 14 | 2 |
| Residential | Gangnails | Service life | Industrial | Galvanised steel — hardwood | No | 20-30 | 10 | 19 | 2 |
| Residential | Gangnails | Service life | Benign | Galvanised steel — hardwood | No | 30-50 | 14 | 38 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Gangnails | Service life | Marine | Galvanised steel — softwood | No | <5 | 7 | 8 | 1 |
| Residential | Gangnails | Service life | Industrial | Galvanised steel — softwood | No | 20-30 | 11 | 17 | 2 |
| Residential | Gangnails | Service life | Benign | Galvanised steel — softwood | No | 30-50 | 18 | 40 | 2 |
| Residential | Roof straps | Service life | Marine | Galvanised steel — hardwood | No | 5-10 | 11 | 15 | 2 |
| Residential | Roof straps | Service life | Industrial | Galvanised steel — hardwood | No | 20-30 | 10 | 19 | 2 |
| Residential | Roof straps | Service life | Benign | Galvanised steel — hardwood | No | 30-50 | 16 | 39 | 1 |
| Residential | Roof straps | Service life | Marine | Galvanised steel — softwood | No | <5-10 | 12 | 15 | 2 |
| Residential | Roof straps | Service life | Industrial | Galvanised steel — softwood | No | 20-30 | 11 | 18 | 2 |
| Residential | Roof straps | Service life | Benign | Galvanised steel — softwood | No | 30-50 | 18 | 40 | 2 |
| Residential | HVAC duct work | Service life | Marine | Galvanised steel | Yes | 15-30 | 15 | 23 | 2 |
| Residential | HVAC duct work | Service life | Marine | Galvanised steel | No | 10-15 | 5 | 13 | 2 |
| Residential | HVAC duct work | Time to first maintenance | Marine | Galvanised steel | Yes | 5-10 | 3 | 5 | 1 |
| Residential | HVAC duct work | Service life | Industrial | Galvanised steel | Yes | 20-30 | 15 | 29 | 2 |
| Residential | HVAC duct work | Service life | Industrial | Galvanised steel | No | 10-20 | 7 | 16 | 2 |
| Residential | HVAC duct work | Time to first maintenance | Industrial | Galvanised steel | Yes | 5-10 | 4 | 8 | 1 |
| Residential | HVAC duct work | Service life | Benign | Galvanised steel | Yes | 30-50 | 14 | 40 | 1 |
| Residential | HVAC duct work | Service life | Benign | Galvanised steel | No | 20-30 | 17 | 34 | 2 |
| Residential | Metal deck for subfloor | Service life | Marine | Steel | No | 15-30 | 9 | 25 | 2 |
| Residential | Metal deck for subfloor | Service life | Industrial | Steel | No | 20-30 | 16 | 29 | 2 |
| Residential | Metal deck for subfloor | Service life | Benign | Steel | No | >50 | 17 | 49 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Metal deck — 1st storey | Service life | Marine | Steel | No | 20->50 | 22 | 30 | 2 |
| Residential | Metal deck — 1st storey | Service life | Industrial | Steel | No | >50 | 21 | 38 | 1 |
| Residential | Metal deck — 1st storey | Service life | Benign | Steel | No | >50 | 15 | 52 | 1 |
| Residential | Doors | Service life | Marine | Aluminium | Yes | 20-30 | 8 | 16 | 2 |
| Residential | Doors | Service life | Marine | Aluminium | No | 15-20 | 6 | 11 | 2 |
| Residential | Doors | Time to first maintenance | Marine | Aluminium | Yes | <5 | 4 | 6 | 1 |
| Residential | Doors | Aesthetic life | Marine | Aluminium | Yes | 10-15 | 4 | 9 | 2 |
| Residential | Doors | Service life | Industrial | Aluminium | Yes | 15-30 | 9 | 21 | 2 |
| Residential | Doors | Service life | Industrial | Aluminium | No | 10-20 | 7 | 14 | 2 |
| Residential | Doors | Time to first maintenance | Industrial | Aluminium | Yes | 5-15 | 4 | 8 | 2 |
| Residential | Doors | Aesthetic life | Industrial | Aluminium | Yes | 10-15 | 6 | 12 | 2 |
| Residential | Doors | Service life | Benign | Aluminium | Yes | >50 | 19 | 41 | 2 |
| Residential | Doors | Service life | Benign | Aluminium | No | 10-15 | 18 | 26 | 2 |
| Residential | Doors | Time to first maintenance | Benign | Aluminium | Yes | 10-15 | 6 | 14 | 2 |
| Residential | Doors | Aesthetic life | Benign | Aluminium | Yes | 20-30 | 8 | 19 | 2 |
| Residential | Doors | Service life | Marine | Colour-coated aluminium | Yes | 10-15 | 10 | 19 | 2 |
| Residential | Doors | Service life | Marine | Colour-coated aluminium | No | 5-10 | 7 | 12 | 2 |
| Residential | Doors | Time to first maintenance | Marine | Colour-coated aluminium | Yes | <5 | 6 | 7 | 1 |
| Residential | Doors | Aesthetic life | Marine | Colour-coated aluminium | Yes | 5-10 | 6 | 11 | 2 |
| Residential | Doors | Service life | Industrial | Colour-coated aluminium | Yes | 20-30 | 14 | 24 | 2 |
| Residential | Doors | Service life | Industrial | Colour-coated aluminium | No | 10-15 | 10 | 16 | 2 |
| Residential | Doors | Time to first maintenance | Industrial | Colour-coated aluminium | Yes | 5-10 | 5 | 10 | 1 |
| Residential | Doors | Aesthetic life | Industrial | Colour-coated aluminium | Yes | 5-15 | 7 | 12 | 2 |
| Residential | Doors | Service life | Benign | Colour-coated aluminium | Yes | >50 | 18 | 43 | 2 |
| Residential | Doors | Service life | Benign | Colour-coated aluminium | No | 20-30 | 18 | 31 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Doors | Time to first maintenance | Benign | Colour-coated aluminium | Yes | 15-20 | 11 | 18 | 2 |
| Residential | Doors | Aesthetic life | Benign | Colour-coated aluminium | Yes | 20-30 | 12 | 23 | 2 |
| Residential | Doors | Service life | Marine | Galvanised steel | Yes | 10-15 | 6 | 13 | 1 |
| Residential | Doors | Service life | Marine | Galvanised steel | No | 5-10 | 5 | 8 | 1 |
| Residential | Doors | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 4 | 6 | 1 |
| Residential | Doors | Aesthetic life | Marine | Galvanised steel | Yes | 5-10 | 3 | 6 | 1 |
| Residential | Doors | Service life | Industrial | Galvanised steel | Yes | 15-20 | 6 | 17 | 2 |
| Residential | Doors | Service life | Industrial | Galvanised steel | No | 10-15 | 6 | 11 | 1 |
| Residential | Doors | Time to first maintenance | Industrial | Galvanised steel | Yes | <5 | 4 | 6 | 1 |
| Residential | Doors | Aesthetic life | Industrial | Galvanised steel | Yes | 10-15 | 4 | 9 | 2 |
| Residential | Doors | Service life | Benign | Galvanised steel | Yes | 30->50 | 19 | 38 | 2 |
| Residential | Doors | Time to first maintenance | Benign | Galvanised steel | Yes | 15-20 | 6 | 12 | 2 |
| Residential | Doors | Aesthetic life | Benign | Galvanised steel | Yes | 10-20 | 7 | 14 | 2 |
| Residential | Flashing | Service life | Marine | Copper | Yes | >50 | 24 | 37 | 1 |
| Residential | Flashing | Service life | Marine | Copper | No | >50 | 25 | 31 | 2 |
| Residential | Flashing | Service life | Industrial | Copper | Yes | >50 | 22 | 40 | 1 |
| Residential | Flashing | Time to first maintenance | Industrial | Copper | Yes | 5-10 | 23 | 25 | 2 |
| Residential | Flashing | Service life | Benign | Copper | Yes | >50 | 15 | 51 | 1 |
| Residential | Flashing | Service life | Benign | Copper | No | >50 | 22 | 46 | 1 |
| Residential | Flashing | Service life | Marine | Galvanised steel | Yes | 10-15 | 12 | 17 | 2 |
| Residential | Flashing | Service life | Marine | Galvanised steel | No | <5-10 | 13 | 14 | 2 |
| Residential | Flashing | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 9 | 11 | 2 |
| Residential | Flashing | Service life | Industrial | Galvanised steel | Yes | 20-30 | 9 | 22 | 2 |
| Residential | Flashing | Service life | Industrial | Galvanised steel | No | 5-15 | 12 | 16 | 2 |
| Residential | Flashing | Time to first maintenance | Industrial | Galvanised steel | Yes | 5-10 | 8 | 13 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Flashing | Service life | Benign | Galvanised steel | Yes | >50 | 20 | 40 | 2 |
| Residential | Flashing | Time to first maintenance | Benign | Galvanised steel | Yes | 10-15 | 22 | 28 | 2 |
| Residential | Flashing | Service life | Marine | Lead | Yes | 20-30 | 18 | 38 | 1 |
| Residential | Flashing | Service life | Marine | Lead | No | 15-20 | 23 | 33 | 1 |
| Residential | Flashing | Time to first maintenance | Marine | Lead | Yes | 10-15 | 22 | 26 | 2 |
| Residential | Flashing | Service life | Industrial | Lead | Yes | 30-50 | 10 | 48 | 1 |
| Residential | Flashing | Service life | Industrial | Lead | No | 20-30 | 18 | 34 | 2 |
| Residential | Flashing | Time to first maintenance | Industrial | Lead | Yes | 15-20 | 20 | 28 | 1 |
| Residential | Flashing | Service life | Benign | Lead | Yes | >50 | 7 | 58 | 1 |
| Residential | Flashing | Service life | Benign | Lead | No | >50 | 14 | 48 | 2 |
| Residential | Gutters | Service life | Marine | Galvanised steel | Yes | 5-10 | 7 | 11 | 2 |
| Residential | Gutters | Service life | Marine | Galvanised steel | No | <5 | 5 | 10 | 2 |
| Residential | Gutters | Time to first maintenance | Marine | Galvanised steel | Yes | <5 | 3 | 4 | 1 |
| Residential | Gutters | Aesthetic life | Marine | Galvanised steel | Yes | <5 | 8 | 7 | 1 |
| Residential | Gutters | Service life | Industrial | Galvanised steel | Yes | 10-15 | 6 | 14 | 2 |
| Residential | Gutters | Service life | Industrial | Galvanised steel | No | 5-10 | 3 | 9 | 1 |
| Residential | Gutters | Time to first maintenance | Industrial | Galvanised steel | Yes | <5 | 4 | 5 | 1 |
| Residential | Gutters | Aesthetic life | Industrial | Galvanised steel | Yes | 5-10 | 7 | 8 | 2 |
| Residential | Gutters | Service life | Benign | Galvanised steel | No | 10-15 | 16 | 21 | 2 |
| Residential | Gutters | Time to first maintenance | Benign | Galvanised steel | Yes | 10-15 | 19 | 15 | 1 |
| Residential | Gutters | Service life | Marine | Colorbond | Yes | 10-15 | 10 | 18 | 2 |
| Residential | Gutters | Service life | Marine | Colorbond | No | 5-10 | 8 | 12 | 2 |
| Residential | Gutters | Time to first maintenance | Marine | Colorbond | Yes | <5 | 9 | 8 | 1 |
| Residential | Gutters | Aesthetic life | Marine | Colorbond | Yes | <5-10 | 9 | 11 | 2 |
| Residential | Gutters | Service life | Industrial | Colorbond | Yes | 15-30 | 15 | 24 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Gutters | Service life | Industrial | Colorbond | No | 10-15 | 10 | 16 | 2 |
| Residential | Gutters | Time to first maintenance | Industrial | Colorbond | Yes | 5-10 | 8 | 12 | 1 |
| Residential | Gutters | Aesthetic life | Industrial | Colorbond | Yes | 20-30 | 10 | 14 | 2 |
| Residential | Gutters | Service life | Benign | Colorbond | Yes | 30->50 | 18 | 40 | 2 |
| Residential | Gutters | Time to first maintenance | Benign | Colorbond | Yes | 10-15 | 17 | 20 | 1 |
| Residential | Gutters | Service life | Marine | Zincalume | Yes | 15-20 | 7 | 15 | 2 |
| Residential | Gutters | Service life | Marine | Zincalume | No | 5-10 | 7 | 11 | 2 |
| Residential | Gutters | Time to first maintenance | Marine | Zincalume | Yes | <5 | 8 | 7 | 1 |
| Residential | Gutters | Aesthetic life | Marine | Zincalume | Yes | <5-10 | 8 | 9 | 2 |
| Residential | Gutters | Service life | Industrial | Zincalume | Yes | 15-20 | 9 | 19 | 1 |
| Residential | Gutters | Service life | Industrial | Zincalume | No | 5-15 | 7 | 14 | 2 |
| Residential | Gutters | Time to first maintenance | Industrial | Zincalume | Yes | 5-10 | 7 | 9 | 1 |
| Residential | Gutters | Aesthetic life | Industrial | Zincalume | Yes | 5-10 | 7 | 12 | 1 |
| Residential | Gutters | Service life | Benign | Zincalume | Yes | 20-30 | 18 | 36 | 1 |
| Residential | Gutters | Service life | Benign | Zincalume | No | 15-20 | 17 | 26 | 1 |
| Residential | Gutters | Time to first maintenance | Benign | Zincalume | Yes | 10-15 | 17 | 18 | 1 |
| Residential | Roof member | Service life | Marine | Galvanised steel | No | 20-50 | 20 | 39 | 2 |
| Residential | Roof member | Service life | Industrial | Galvanised steel | No | 30-50 | 18 | 33 | 2 |
| Residential | Roof member | Service life | Benign | Galvanised steel | No | >50 | 18 | 43 | 1 |
| Residential | Roof member | Service life | Marine | Zincalume | No | 15-20 | 19 | 28 | 2 |
| Residential | Roof member | Service life | Benign | Zincalume | No | >50 | 17 | 47 | 1 |
| Residential | Wall members — bottom plate | Service life | Marine | Galvanised steel | No | 10-30 | 17 | 23 | 1 |
| Residential | Wall members — bottom plate | Service life | Benign | Galvanised steel | No | >50 | 17 | 47 | 1 |
| Residential | Wall members — horizontal | Service life | Industrial | Galvanised steel | No | 15-20 | 18 | 31 | 2 |
| Residential | Wall members — horizontal | Service life | Benign | Galvanised steel | No | >50 | 14 | 49 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Wall members — vertical | Service life | Benign | Galvanised steel | No | >50 | 14 | 49 | 1 |
| Residential | Wall members — bottom plate | Service life | Marine | Zincalume | No | 10-15 | 18 | 22 | 2 |
| Residential | Wall members — bottom plate | Service life | Industrial | Zincalume | No | 15-20 | 19 | 28 | 2 |
| Residential | Wall members — bottom plate | Service life | Benign | Zincalume | No | >50 | 21 | 45 | 1 |
| Residential | Wall members — horizontal | Service life | Marine | Zincalume | No | 15-20 | 17 | 25 | 2 |
| Residential | Wall members — horizontal | Service life | Industrial | Zincalume | No | 20-30 | 18 | 31 | 2 |
| Residential | Wall members — horizontal | Service life | Benign | Zincalume | No | >50 | 20 | 46 | 1 |
| Residential | Wall members — vertical | Service life | Benign | Zincalume | No | >50 | 21 | 45 | 2 |
| Residential | Window frames | Service life | Marine | Aluminium | Yes | 20-30 | 11 | 21 | 1 |
| Residential | Window frames | Service life | Marine | Aluminium | No | 5-10 | 12 | 16 | 1 |
| Residential | Window frames | Time to first maintenance | Marine | Aluminium | Yes | <5-10 | 5 | 8 | 2 |
| Residential | Window frames | Service life | Industrial | Aluminium | Yes | 20-30 | 10 | 26 | 1 |
| Residential | Window frames | Service life | Industrial | Aluminium | No | 20-30 | 9 | 17 | 2 |
| Residential | Window frames | Time to first maintenance | Industrial | Aluminium | Yes | 5-15 | 7 | 10 | 2 |
| Residential | Window frames | Service life | Benign | Aluminium | Yes | 30-50 | 14 | 44 | 1 |
| Residential | Window frames | Service life | Benign | Aluminium | No | 20-30 | 17 | 29 | 2 |
| Residential | Window frames | Time to first maintenance | Benign | Aluminium | Yes | 15-20 | 17 | 24 | 1 |
| Residential | Window frames | Aesthetic life | Benign | Aluminium | Yes | 30-50 | 13 | 24 | 2 |
| Residential | Window frames | Service life | Marine | Colour-coated aluminium | Yes | 20-30 | 12 | 24 | 2 |
| Residential | Window frames | Aesthetic life | Marine | Colour-coated aluminium | Yes | 5-10 | 12 | 15 | 2 |
| Residential | Window frames | Service life | Industrial | Colour-coated aluminium | Yes | 20-30 | 14 | 28 | 1 |
| Residential | Window frames | Time to first maintenance | Industrial | Colour-coated aluminium | Yes | 5-15 | 7 | 14 | 2 |
| Residential | Window frames | Aesthetic life | Industrial | Colour-coated aluminium | Yes | 5-10 | 14 | 18 | 2 |
| Residential | Window frames | Service life | Benign | Colour-coated aluminium | Yes | 3-50 | 12 | 45 | 2 |
| Residential | Window frames | Service life | Benign | Colour-coated aluminium | No | 10->50 | 19 | 34 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Window frames | Aesthetic life | Benign | Colour-coated aluminium | Yes | 30-50 | 13 | 25 | 2 |
| Residential | Plumbing pipework | Service life | Marine | Copper | No | 20-30 | 16 | 33 | 2 |
| Residential | Plumbing pipework | Service life | Industrial | Copper | No | 30-50 | 11 | 31 | 1 |
| Residential | Plumbing pipework | Service life | Benign | Copper | No | >50 | 14 | 48 | 1 |
| Residential | Plumbing pipework | Service life | Marine | Hot-dipped gal | No | 15-20 | 15 | 24 | 2 |
| Residential | Plumbing pipework | Service life | Industrial | Hot-dipped gal | No | 20-50 | 15 | 32 | 2 |
| Residential | Plumbing pipework | Service life | Benign | Hot-dipped gal | No | >50 | 15 | 47 | 1 |
| Residential | Railings | Service life | Marine | Stainless steel | Yes | >50 | 20 | 35 | 2 |
| Residential | Railings | Service life | Marine | Stainless steel | No | 5-15 | 21 | 27 | 2 |
| Residential | Railings | Time to first maintenance | Marine | Stainless steel | Yes | 5-10 | 7 | 10 | 2 |
| Residential | Railings | Aesthetic life | Marine | Stainless steel | Yes | 5-10 | 12 | 13 | 1 |
| Residential | Railings | Service life | Industrial | Stainless steel | Yes | 30-50 | 16 | 36 | 2 |
| Residential | Railings | Service life | Industrial | Stainless steel | No | 10-15 | 20 | 26 | 2 |
| Residential | Railings | Time to first maintenance | Industrial | Stainless steel | Yes | 5-10 | 5 | 10 | 1 |
| Residential | Railings | Aesthetic life | Industrial | Stainless steel | Yes | 5-10 | 11 | 17 | 1 |
| Residential | Railings | Service life | Benign | Stainless steel | Yes | >50 | 7 | 58 | 1 |
| Residential | Railings | Service life | Benign | Stainless steel | No | 30-50 | 12 | 45 | 1 |
| Residential | Railings | Time to first maintenance | Benign | Stainless steel | Yes | 10-15 | 10 | 20 | 2 |
| Residential | Railings | Aesthetic life | Benign | Stainless steel | Yes | 30-50 | 17 | 30 | 2 |
| Residential | Wall claddings | Aesthetic life | Marine | Galvanised steel | Yes | <5 | 4 | 6 | 2 |
| Residential | Wall claddings | Service life | Industrial | Galvanised steel | Yes | 10-15 | 6 | 16 | 1 |
| Residential | Wall claddings | Service life | Industrial | Galvanised steel | No | 5-10 | 7 | 11 | 2 |
| Residential | Wall claddings | Time to first maintenance | Industrial | Galvanised steel | Yes | <5 | 6 | 7 | 2 |
| Residential | Wall claddings | Aesthetic life | Industrial | Galvanised steel | Yes | 10-15 | 8 | 12 | 2 |
| Residential | Wall claddings | Service life | Benign | Galvanised steel | Yes | 30-50 | 14 | 36 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Wall claddings | Service life | Benign | Galvanised steel | No | 20-30 | 16 | 26 | 1 |
| Residential | Wall claddings | Time to first maintenance | Benign | Galvanised steel | Yes | 15-20 | 17 | 20 | 2 |
| Residential | Wall claddings | Aesthetic life | Benign | Galvanised steel | Yes | 15-20 | 16 | 22 | 2 |
| Residential | Wall claddings | Service life | Marine | Coated steel | Yes | 10-20 | 5 | 18 | 2 |
| Residential | Wall claddings | Service life | Marine | Coated steel | No | 5-15 | 6 | 13 | 2 |
| Residential | Wall claddings | Time to first maintenance | Marine | Coated steel | Yes | 5-10 | 4 | 8 | 2 |
| Residential | Wall claddings | Aesthetic life | Marine | Coated steel | Yes | 10-15 | 5 | 10 | 1 |
| Residential | Wall claddings | Service life | Industrial | Coated steel | Yes | 15-20 | 9 | 22 | 1 |
| Residential | Wall claddings | Service life | Industrial | Coated steel | No | 10-15 | 6 | 14 | 2 |
| Residential | Wall claddings | Time to first maintenance | Industrial | Coated steel | Yes | 5-10 | 2 | 9 | 1 |
| Residential | Wall claddings | Aesthetic life | Industrial | Coated steel | Yes | 15-20 | 7 | 13 | 2 |
| Residential | Wall claddings | Service life | Benign | Coated steel | Yes | >50 | 15 | 48 | 1 |
| Residential | Wall claddings | Service life | Benign | Coated steel | No | 30-50 | 16 | 35 | 1 |
| Residential | Wall claddings | Time to first maintenance | Benign | Coated steel | Yes | 10-20 | 18 | 24 | 2 |
| Residential | Wall claddings | Aesthetic life | Benign | Coated steel | Yes | 20-50 | 17 | 27 | 2 |
| Residential | Air grilles | Time to first maintenance | Interior | Anodised aluminium | Yes | <5 | 4 | 6 | 2 |
| Residential | Air grilles | Service life | Interior | Painted aluminium | No | 5-10 | 19 | 22 | 2 |
| Residential | Air grilles | Time to first maintenance | Interior | Painted aluminium | Yes | <5 | 6 | 8 | 1 |
| Residential | Air grilles | Aesthetic life | Interior | Painted aluminium | Yes | 10-15 | 18 | 18 | 2 |
| Residential | Bathroom taps | Service life | Interior | Colour-coated brass | Yes | 15-20 | 20 | 28 | 2 |
| Residential | Bathroom taps | Service life | Interior | Colour-coated brass | No | 10-15 | 14 | 19 | 1 |
| Residential | Bathroom taps | Time to first maintenance | Interior | Colour-coated brass | Yes | 5-10 | 4 | 6 | 2 |
| Residential | Bathroom taps | Aesthetic life | Interior | Colour-coated brass | Yes | 5-10 | 6 | 10 | 2 |
| Residential | Bathroom taps | Service life | Interior | Polished brass | Yes | 15-20 | 20 | 28 | 1 |
| Residential | Bathroom taps | Service life | Interior | Polished brass | No | 10-15 | 19 | 22 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Bathroom taps | Time to first maintenance | Interior | Polished brass | Yes | 5-10 | 5 | 7 | 2 |
| Residential | Bathroom taps | Aesthetic life | Interior | Polished brass | Yes | 10-15 | 6 | 10 | 2 |
| Residential | Curtain rails | Service life | Interior | Aluminium | Yes | 20-30 | 15 | 31 | 2 |
| Residential | Curtain rails | Service life | Interior | Aluminium | No | 20-30 | 16 | 24 | 1 |
| Residential | Curtain rails | Time to first maintenance | Interior | Aluminium | Yes | <5 | 8 | 10 | 2 |
| Residential | Curtain rails | Aesthetic life | Interior | Aluminium | Yes | 15-20 | 18 | 20 | 2 |
| Residential | Curtain rails | Service life | Interior | Powder coated steel | Yes | 20-30 | 8 | 17 | 2 |
| Residential | Curtain rails | Service life | Interior | Powder coated steel | No | 15-20 | 7 | 13 | 1 |
| Residential | Curtain rails | Time to first maintenance | Interior | Powder coated steel | Yes | <5 | 7 | 8 | 1 |
| Residential | Curtain rails | Aesthetic life | Interior | Powder coated steel | Yes | 15-20 | 7 | 11 | 2 |
| Residential | Door handles | Service life | Interior | Stainless steel | Yes | 30->50 | 20 | 36 | 2 |
| Residential | Door handles | Service life | Interior | Stainless steel | No | 20-30 | 17 | 24 | 2 |
| Residential | Door handles | Time to first maintenance | Interior | Stainless steel | Yes | <5 | 12 | 12 | 1 |
| Residential | Door handles | Aesthetic life | Interior | Stainless steel | Yes | 15-20 | 6 | 14 | 2 |
| Residential | Door handles | Service life | Interior | Polished brass | Yes | >50 | 21 | 32 | 1 |
| Residential | Door handles | Service life | Interior | Polished brass | No | 15-20 | 18 | 23 | 2 |
| Residential | Door handles | Time to first maintenance | Interior | Polished brass | Yes | <5 | 6 | 8 | 1 |
| Residential | Door handles | Aesthetic life | Interior | Polished brass | Yes | 10-15 | 7 | 11 | 2 |
| Residential | Kitchen sink | Service life | Interior | Stainless steel | Yes | >50 | 17 | 45 | 2 |
| Residential | Kitchen sink | Service life | Interior | Stainless steel | No | 15-20 | 19 | 28 | 2 |
| Residential | Kitchen sink | Aesthetic life | Interior | Stainless steel | Yes | 10-15 | 15 | 20 | 2 |
| Residential | Stairs | Service life | Interior | Galvanised steel | Yes | >50 | 16 | 46 | 1 |
| Residential | Stairs | Service life | Interior | Galvanised steel | No | 30-50 | 14 | 34 | 2 |
| Residential | Stairs | Time to first maintenance | Interior | Galvanised steel | Yes | 10-15 | 17 | 17 | 2 |
| Residential | Stairs | Aesthetic life | Interior | Galvanised steel | Yes | 10-15 | 15 | 20 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Residential | Stairs | Service life | Interior | Painted steel | Yes | >50 | 18 | 41 | 2 |
| Residential | Stairs | Service life | Interior | Painted steel | No | 15-20 | 15 | 26 | 2 |
| Residential | Stairs | Time to first maintenance | Interior | Painted steel | Yes | 10-15 | 5 | 10 | 2 |
| Residential | Stairs | Aesthetic life | Interior | Painted steel | Yes | 5-10 | 8 | 14 | 1 |
| Residential | Suspended ceiling supports | Service life | Interior | Aluminium | No | >50 | 19 | 40 | 2 |
| Residential | Suspended ceiling supports | Service life | Interior | Galvanised steel | No | 30->50 | 18 | 38 | 2 |
| Residential | Suspended ceiling supports | Aesthetic life | Interior | Galvanised steel | No | 20-30 | 17 | 27 | 2 |
| Residential | Suspended ceiling supports | Service life | Interior | Steel | No | 30->50 | 19 | 37 | 2 |
| | | | | | | | | | |
| Connectors | Bolts | Service life | Marine | Brass in hardwood | No | 5-10 | 21 | 21 | 2 |
| Connectors | Bolts | Time to first maintenance | Marine | Brass in hardwood | Yes | <5 | 18 | 12 | 2 |
| Connectors | Bolts | Aesthetic life | Marine | Brass in hardwood | Yes | 5-10 | 16 | 14 | 1 |
| Connectors | Bolts | Service life | Industrial | Brass in hardwood | No | 15-20 | 13 | 19 | 2 |
| Connectors | Bolts | Time to first maintenance | Industrial | Brass in hardwood | Yes | 5-10 | 7 | 10 | 2 |
| Connectors | Bolts | Service life | Benign | Brass in hardwood | Yes | >50 | 18 | 46 | 1 |
| Connectors | Bolts | Service life | Benign | Brass in hardwood | No | 30-50 | 16 | 36 | 1 |
| Connectors | Bolts | Time to first maintenance | Benign | Brass in hardwood | Yes | 10-20 | 15 | 19 | 2 |
| Connectors | Bolts | Aesthetic life | Benign | Brass in hardwood | Yes | 20-30 | 17 | 22 | 2 |
| Connectors | Bolts | Service life | Marine | Brass in softwood | Yes | 10-15 | 21 | 27 | 2 |
| Connectors | Bolts | Service life | Marine | Brass in softwood | No | 5-10 | 19 | 17 | 2 |
| Connectors | Bolts | Time to first maintenance | Marine | Brass in softwood | Yes | <5 | 5 | 7 | 2 |
| Connectors | Bolts | Aesthetic life | Marine | Brass in softwood | Yes | <5 | 9 | 10 | 2 |
| Connectors | Bolts | Service life | Industrial | Brass in softwood | Yes | 30-50 | 18 | 28 | 2 |
| Connectors | Bolts | Time to first maintenance | Industrial | Brass in softwood | Yes | 5-10 | 6 | 10 | 2 |
| Connectors | Bolts | Aesthetic life | Industrial | Brass in softwood | Yes | <5 | 17 | 15 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Connectors | Bolts | Service life | Benign | Brass in softwood | Yes | >50 | 23 | 43 | 1 |
| Connectors | Bolts | Service life | Benign | Brass in softwood | No | 30->50 | 21 | 35 | 2 |
| Connectors | Bolts | Time to first maintenance | Benign | Brass in softwood | Yes | 15-20 | 17 | 17 | 2 |
| Connectors | Bolts | Service life | Marine | Hot-dipped gal in hardwood | Yes | 20-30 | 18 | 24 | 2 |
| Connectors | Bolts | Time to first maintenance | Marine | Hot-dipped gal in hardwood | Yes | <5 | 9 | 10 | 2 |
| Connectors | Bolts | Aesthetic life | Marine | Hot-dipped gal in hardwood | Yes | <5 | 11 | 12 | 2 |
| Connectors | Bolts | Service life | Industrial | Hot-dipped gal in hardwood | Yes | 20-30 | 15 | 24 | 2 |
| Connectors | Bolts | Time to first maintenance | Industrial | Hot-dipped gal in hardwood | Yes | <5 | 9 | 9 | 2 |
| Connectors | Bolts | Aesthetic life | Industrial | Hot-dipped gal in hardwood | Yes | <5 | 11 | 12 | 2 |
| Connectors | Bolts | Service life | Benign | Hot-dipped gal in hardwood | Yes | 30->50 | 14 | 48 | 2 |
| Connectors | Bolts | Service life | Benign | Hot-dipped gal in hardwood | No | >50 | 20 | 38 | 2 |
| Connectors | Bolts | Aesthetic life | Benign | Hot-dipped gal in hardwood | Yes | 30-50 | 18 | 30 | 2 |
| Connectors | Bolts | Service life | Marine | Hot-dipped gal in softwood | Yes | 20-30 | 10 | 19 | 2 |
| Connectors | Bolts | Service life | Marine | Hot-dipped gal in softwood | No | <5 | 8 | 11 | 1 |
| Connectors | Bolts | Time to first maintenance | Marine | Hot-dipped gal in softwood | Yes | <5 | 7 | 7 | 1 |
| Connectors | Bolts | Aesthetic life | Marine | Hot-dipped gal in softwood | Yes | <5 | 5 | 7 | 2 |
| Connectors | Bolts | Service life | Industrial | Hot-dipped gal in softwood | No | 15-20 | 7 | 12 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Connectors | Bolts | Time to first maintenance | Industrial | Hot-dipped gal in softwood | Yes | <5 | 7 | 9 | 2 |
| Connectors | Bolts | Aesthetic life | Industrial | Hot-dipped gal in softwood | Yes | 10-15 | 7 | 9 | 2 |
| Connectors | Bolts | Service life | Benign | Hot-dipped gal in softwood | Yes | 30-50 | 18 | 38 | 2 |
| Connectors | Bolts | Service life | Benign | Hot-dipped gal in softwood | No | 30-50 | 18 | 27 | 2 |
| Connectors | Bolts | Service life | Marine | Steel in hardwood | Yes | 5-10 | 7 | 8 | 2 |
| Connectors | Bolts | Service life | Marine | Steel in hardwood | No | <5 | 3 | 5 | 1 |
| Connectors | Bolts | Time to first maintenance | Marine | Steel in hardwood | Yes | <5 | 3 | 4 | 1 |
| Connectors | Bolts | Aesthetic life | Marine | Steel in hardwood | Yes | <5 | 3 | 4 | 1 |
| Connectors | Bolts | Service life | Industrial | Steel in hardwood | Yes | 5-15 | 10 | 12 | 2 |
| Connectors | Bolts | Service life | Industrial | Steel in hardwood | No | <5 | 7 | 7 | 1 |
| Connectors | Bolts | Time to first maintenance | Industrial | Steel in hardwood | Yes | <5 | 5 | 6 | 1 |
| Connectors | Bolts | Aesthetic life | Industrial | Steel in hardwood | Yes | <5 | 5 | 7 | 1 |
| Connectors | Bolts | Service life | Benign | Steel in hardwood | Yes | >50 | 21 | 46 | 1 |
| Connectors | Bolts | Service life | Benign | Steel in hardwood | No | 10-15 | 21 | 22 | 2 |
| Connectors | Bolts | Time to first maintenance | Benign | Steel in hardwood | Yes | <5 | 17 | 13 | 2 |
| Connectors | Bolts | Aesthetic life | Benign | Steel in hardwood | Yes | <5-10 | 16 | 14 | 2 |
| Connectors | Bolts | Service life | Marine | Steel in softwood | Yes | 5-10 | 7 | 9 | 2 |
| Connectors | Bolts | Service life | Marine | Steel in softwood | No | <5 | 3 | 4 | 1 |
| Connectors | Bolts | Time to first maintenance | Marine | Steel in softwood | Yes | <5 | 2 | 4 | 1 |
| Connectors | Bolts | Aesthetic life | Marine | Steel in softwood | Yes | <5 | 2 | 4 | 1 |
| Connectors | Bolts | Service life | Industrial | Steel in softwood | Yes | 5-10 | 15 | 14 | 2 |
| Connectors | Bolts | Service life | Industrial | Steel in softwood | No | <5 | 7 | 7 | 1 |
| Connectors | Bolts | Time to first maintenance | Industrial | Steel in softwood | Yes | <5 | 5 | 5 | 1 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Connectors | Bolts | Aesthetic life | Industrial | Steel in softwood | Yes | <5 | 4 | 5 | 1 |
| Connectors | Bolts | Service life | Benign | Steel in softwood | Yes | 10-15 | 16 | 24 | 2 |
| Connectors | Bolts | Service life | Benign | Steel in softwood | No | 10-15 | 16 | 20 | 2 |
| Connectors | Bolts | Time to first maintenance | Benign | Steel in softwood | Yes | 5-10 | 11 | 12 | 1 |
| Connectors | Bolts | Aesthetic life | Benign | Steel in softwood | Yes | <5-10 | 16 | 13 | 2 |
| Connectors | Nails | Service life | Marine | Steel in softwood | Yes | <5 | 11 | 10 | 2 |
| Connectors | Nails | Service life | Marine | Steel in softwood | No | <5 | 5 | 6 | 2 |
| Connectors | Nails | Time to first maintenance | Marine | Steel in softwood | Yes | <5 | 2 | 4 | 2 |
| Connectors | Nails | Aesthetic life | Marine | Steel in softwood | Yes | <5 | 2 | 3 | 1 |
| Connectors | Nails | Service life | Industrial | Steel in softwood | Yes | 15-20 | 10 | 15 | 2 |
| Connectors | Nails | Service life | Industrial | Steel in softwood | No | <5 | 6 | 9 | 2 |
| Connectors | Nails | Aesthetic life | Industrial | Steel in softwood | Yes | <5 | 3 | 5 | 1 |
| Connectors | Nails | Service life | Benign | Steel in softwood | Yes | >50 | 23 | 38 | 1 |
| Connectors | Nails | Service life | Benign | Steel in softwood | No | 30-50 | 21 | 30 | 2 |
| Connectors | Nails | Time to first maintenance | Benign | Steel in softwood | Yes | <5-15 | 17 | 16 | - |
| Connectors | Nails | Service life | Marine | Steel in hardwood | Yes | 10-15 | 12 | 19 | 2 |
| Connectors | Nails | Service life | Marine | Steel in hardwood | No | 10-15 | 7 | 12 | 1 |
| Connectors | Nails | Time to first maintenance | Marine | Steel in hardwood | Yes | <5 | 6 | 8 | 1 |
| Connectors | Nails | Aesthetic life | Marine | Steel in hardwood | Yes | <5 | 6 | 8 | 1 |
| Connectors | Nails | Time to first maintenance | Industrial | Steel in hardwood | Yes | <5 | 7 | 10 | 2 |
| Connectors | Nails | Aesthetic life | Industrial | Steel in hardwood | Yes | <5 | 5 | 8 | 1 |
| Connectors | Nails | Service life | Benign | Steel in hardwood | No | 5-10 | 19 | 32 | 2 |
| Connectors | Nails | Time to first maintenance | Benign | Steel in hardwood | Yes | 5-10 | 20 | 24 | 1 |
| Connectors | Nails | Aesthetic life | Benign | Steel in hardwood | Yes | 5-10 | 21 | 31 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Connectors | Nails | Service life | Marine | Galvanised steel in softwood | Yes | 20-30 | 12 | 17 | 2 |
| Connectors | Nails | Service life | Marine | Galvanised steel in softwood | No | <5 | 8 | 10 | 2 |
| Connectors | Nails | Time to first maintenance | Marine | Galvanised steel in softwood | Yes | <5 | 4 | 7 | 2 |
| Connectors | Nails | Aesthetic life | Marine | Galvanised steel in softwood | Yes | <5 | 6 | 7 | 1 |
| Connectors | Nails | Service life | Industrial | Galvanised steel in softwood | Yes | 10-15 | 9 | 17 | 1 |
| Connectors | Nails | Service life | Industrial | Galvanised steel in softwood | No | 5-15 | 8 | 12 | 2 |
| Connectors | Nails | Time to first maintenance | Industrial | Galvanised steel in softwood | Yes | 10-15 | 5 | 9 | 2 |
| Connectors | Nails | Aesthetic life | Industrial | Galvanised steel in softwood | Yes | 10-15 | 5 | 8 | 2 |
| Connectors | Nails | Service life | Benign | Galvanised steel in softwood | Yes | >50 | 20 | 46 | 1 |
| Connectors | Nails | Service life | Benign | Galvanised steel in softwood | No | 30-50 | 18 | 34 | 1 |
| Connectors | Nails | Aesthetic life | Benign | Galvanised steel in softwood | Yes | 15-20 | 17 | 21 | 2 |
| Connectors | Nails | Service life | Marine | Galvanised steel in hardwood | Yes | 10-15 | 7 | 10 | 2 |
| Connectors | Nails | Service life | Marine | Galvanised steel in hardwood | No | 10-15 | 5 | 6 | 2 |
| Connectors | Nails | Time to first maintenance | Marine | Galvanised steel in hardwood | Yes | <5 | 2 | 4 | 2 |
| Connectors | Nails | Aesthetic life | Marine | Galvanised steel in hardwood | Yes | <5-15 | 6 | 7 | 2 |
| Connectors | Nails | Service life | Industrial | Galvanised steel in hardwood | Yes | 15-20 | 8 | 14 | 2 |

| Building type | Component | Measure | Environment | Material | Maintenance | Mode (years) | SD (years) | Mean (years) | Response class |
|---|---|---|---|---|---|---|---|---|---|
| Connectors | Nails | Service life | Industrial | Galvanised steel in hardwood | No | 5-15 | 7 | 9 | 2 |
| Connectors | Nails | Service life | Benign | Galvanised steel in hardwood | Yes | >50 | 19 | 32 | 1 |
| Connectors | Nails | Time to first maintenance | Benign | Galvanised steel in hardwood | Yes | 5-15 | 17 | 13 | 2 |
| Connectors | Nails | Aesthetic life | Benign | Galvanised steel in hardwood | Yes | >50 | 18 | 30 | 2 |

INDUSTRY

GOVERNMENT

RESEARCH

ARUP

Bovis Lend Lease

BROOKWATER

John Holland

WOODS BAGOT

dem

Rider Hunt

Queensland Government
Department of Main Roads

Queensland Government
Department of Public Works

Queensland Government
State Development, Trade and Innovation

Building Commission

Department of Housing and Works

BRISBANE CITY

BSA

ABCB

CRC Construction Innovation
BUILDING OUR FUTURE

CSIRO

RMIT UNIVERSITY

The University of Newcastle
AUSTRALIA

QUT

The University of Sydney

Curtin
University of Technology

CRC Construction Innovation
BUILDING OUR FUTURE

Cooperative Research Centre
for *Construction Innovation*

9th Floor, L Block, QUT Gardens Point
2 George Street, Brisbane QLD 4000 Australia

Telephone: (07) 3864 1393

Email: enquiries@construction-innovation.info

Web: www.construction-innovation.info

# Predicted lifetimes of metallic building components

## A PRACTICAL DATABASE DERIVED FROM EXPERT OPINION

Project Partners

John Holland

Queensland Government
Department of **Public Works**

CSIRO

The University of Newcastle
AUSTRALIA

September 2006

Established and supported under the Australian Government's Cooperative Research Centres Program

CRC AUSTRALIA

ISBN 0-9750977-6-8