



# Coast guard for metal components



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NEW ZEALANDERS LOVE TO LIVE BESIDE THE SEA. BUT ALONG WITH THE GREAT VIEWS COMES A CHALLENGE FOR BUILDING DESIGNERS SPECIFYING METAL COMPONENTS IN A SALT-LADEN ENVIRONMENT.

**SEVERAL DOCUMENTS** classify the risk of corrosion for metal building components based on the exposure of the element to wind-driven sea spray and the severity of the application:

- NZS 3604:2011 *Timber-framed buildings*
- E2/AS1
- ISO 9223 *Corrosion of metals and alloys – Corrosivity of atmosphere – Classification, determination and estimation*
- AS/NZS 2312:2002 *Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings*
- AS/NZS 2728:2013 *Prefinished/prepainted sheet metal products for interior/exterior building applications – Performance requirements.*

### NZS 3604 section 4

NZS 3604:2011 references ISO 9223 and has three exposure zone classifications for building sites de-

pending on the severity of wind-driven salt spray:

- Exposure zone B is defined as low risk.
- Exposure zone C is defined as medium risk.
- Exposure zone D has a high risk.

Table 4.3 *Steel items such as nails and screws used for framing and cladding* gives the required corrosion resistance of metal fixings for the corrosion zone the building is located within.

Table 4.1 covers bolts, nail plates and other structural fixings. Table 4.2 covers weights of galvanised coatings required on fixings.

### E2/AS1

Table 20 in E2/AS1, the Acceptable Solution to the Building Code clause E2 *External moisture*, which also references ISO 9223, uses the same exposure zone classifications B, C and D as NZS 3604:2011 and includes an additional exposure zone E, defined as coastal regions subject to rough seas and breaking surf.

Exposure zone E is not referred to in NZS 3604:2011 because the corrosion protection requirements for structural fixings in exposure zones D and E are the same.

E2/AS1 Table 20 defines the use of metal cladding, flashings and fixings according to exposure. Note 2 of the table defines three levels of exposure:

- Hidden – the material is not visible, that is, it is concealed behind another element.
- Exposed – the material is visible and receives rain washing (doesn't apply to steel wall cladding).
- Sheltered – the material is visible but not rain washed.

Note 2 also says that all metal wall claddings shall be considered as sheltered because not all of the wall surface is likely to be readily rain washed, which may affect overall cladding performance.

E2/AS1 Table 20 does not cover recent additions to the market such as AM (aluminium/➤

**Table 1**

## SUMMARY OF ENVIRONMENTAL CLASSIFICATIONS

CORROSION RISK	NZS 3604:2011	E2/AS1	AS/NZS 2312:2002	ISO 9223 CATEGORY	AS/NZS 2728:2013 PRODUCT TYPE
Very low	–	–	A	C1	1
Low	B	B	B	C2	2
Medium	C	C	C	C3	3
High	D	D	D	C4	4
Very high/industrial	–	E	E-I	C-5I	5
Very high/marine/ geothermal	–	E	E-M	C-5M	6
Inland tropical	–	–	F	–	–

zinc/magnesium) and ZM (zinc/aluminium/magnesium) coated steel.

Metal components in contact or passed over by run-off must be compatible. Use E2/AS1 Tables 21 and 22 respectively to determine component compatibility.

### **AS/NZS 2312**

AS/NZS 2312:2002 follows environmental zone classifications of NZS 3604:2011 and E2/AS1 but breaks zone E into industrial and marine situations.

### **ISO 9223**

ISO 9223 has six environmental zone classifications (C1 to C-5M) and, like AS/NZS 2312, breaks the C5 classification into industrial and marine situations.

### **AS/NZS 2728**

AS/NZS 2728:2013 defines corrosion categories ranging from 1 (very low) to 6 (very high marine or geothermal).

### **Overlapping categories**

The environmental descriptors (such as distance from breaking surf or shoreline) for each classification in the above documents do differ, as does the classification identifier – the letter or number

given to classify the level of risk from very low to very high (marine or geothermal).

Developing a precise definition of environmental categories has been extremely difficult, so AS/NZS and ISO (International Organisation for Standardisation) standards have overlapping categories that incorporate a range of conditions (see Table 1).

For example zone C in NZS 3604 says 'inland coastal areas with medium risk from wind-blown sea spray salt deposits. This zone covers mostly coastal areas with relatively low salinity. The extent of the affected area varies significantly with factors such as winds, topography and vegetation.'

By comparison, ISO 9223 category C3 states 'moderate coastal characterised by:

- little or no salt deposits
- the occasional smell of salt in the air
- (zone) typically starts 500–1,000 m from breaking surf, such as is found on exposed coasts, or in the immediate vicinity of calm salt water such as estuaries.'

### **Cladding fastenings and fixings**

The durability requirements of fastenings and fixings are set out in NZS 3604:2011 section 4.

Nails and screws for all cladding fixings may generally be galvanised steel. Before making a

final selection be sure to read NZS 3604 Table 4.3 notes 3, 4 and 8 to ensure in-use conditions will be met. This includes in exposure zone D to achieve not less than 15-year durability.

However, where a cladding also acts as bracing, fixings must have 50-year durability. In this case, stainless steel (type 304 minimum) or silicon bronze nails and screws must be used.

Where stainless steel nails are used, they must be annular grooved. Stainless steel nails and screws are not permitted with galvanised steel and not recommended for use with aluminum or coated steel in exposure zone D.

Where different materials are used for metal cladding and fastening, the compatibility of the fixing with the cladding must be considered.

### **Check with supplier**

Before confirming a metal component selection, designers should check with the metal supplier that the material is suitable (particularly for unfinished and prefinished metal claddings) for that specific environment to ensure product warranties will be valid.

Also check fixings, as some cladding manufacturers may require more durable fixings than those required by the above standards and the Building Code. ◀