Handrails & balustrades

The construction of handrails and balustrades is a critical issue that can often leave a builder and/or contractor exposed to costly litigation – especially if failure occurs. More importantly, the emotional and economic impact on the community and individuals due to injury, permanent disability or death is enormous.

It is vitally important to remember that any works you perform must provide and ensure the safety of the building users and occupants. You can achieve this by addressing the performance requirements as set down in the [Building Code of Australia](http://www.masterbuilders.asn.au/laws-codes-and-regulations/building-act/building-code-of-australia) (BCA), and covered in detail in [AS 1170.1:2002 *Structural design actions – Permanent, imposed and other actions*](http://infostore.saiglobal.com/store/Details.aspx?ProductID=356304).

The second most important thing to do is correctly assess the level of serviceability and resistance that is required for the connections throughout the proposed works. In other words, you cannot just use any nail/screw/bolt/mechanical fixing or form of jointing that you think might be alright.

Remember, the plans and detailed drawings are often only a guide to the requirements for handrails and balustrades. As a builder or contractor you should question anything that is not specific and clarify accordingly. Specific advice may need to be sought from a registered structural engineer in some cases.

A summary of the key issues is provided below; however, members can also [contact Master Builders](http://www.masterbuilders.asn.au/contact-us) for further guidance and advice. General guidance with respect to timber construction may also be found through [Timber Queensland](http://www.timberqueensland.com.au/).

Thirteen common defects

Thirteen common defects that you can and should avoid when constructing handrails and balustrades are outlined below.

1. Incorrect timber species selected for the exposed location, which allows degradation to occur.
2. Detached painted finishes to timbers because all loose and powdery material was not fully removed from the pink pre-primed timber product before painting.
3. Punched nail holes to external timbers not adequately stopped with exterior filler.
4. Cut timber ends not primed before installation in external locations, which allows degradation to occur.
5. Corrosion of metal fasteners and brackets within one kilometre of coastal locations.
6. Metal fasteners and brackets that readily corrode as they are not suitable for treated timbers.
7. Detached painted finishes to steel work as it was not hand or power tool cleaned to remove all rust prior to the application of painted finishes.
8. Inadequate coating class level for galvanized steel members that are left untreated in exposed locations or embedded in concrete finishes.
9. Handrail spans over size due to incorrect species/material choice, which will allow excessive and structurally unsound movement/deflection to occur.
10. Inadequate fixings at the connections throughout the handrail and balustrade works, which are unable to accommodate the in service impact loads.
11. Applied finishes not provided in accordance with the manufacturers recommendations.
12. Handrail height is less than one metre high because the subsequent installation of the floor finishes has reduced the overall height. The overall geometry of the works is not in accordance with the BCA.
13. Handrail and balustrade not constructed in accordance with the approved plans/specification and contract documentation.

Classification of the structure

The classification of a structure determines the purpose for which it is designed. Depending on the actual location of the handrail and balustrade connections within the building, they will need to be specified to have a particular level of resistance. This level of resistance will vary depending on whether the works are to be internal, external, form part of a fire exit or are required to restrain crowds or people under panic conditions.

Fixing & connectors

Airborne salts in coastal regions, industrial environments and weather exposed positions provide highly corrosive situations. All metal connections will need to be selected on the basis that they will be fit for purpose and compatible with the handrail/balustrade material.

The connections, which include all screws, nails, bolts and brackets, are to be specified with a specific level of corrosion protection to avoid premature breakdown due to exposure and/or corrosive reaction due to incompatibility with the base materials.

Durability

The raw materials used within the handrails and balustrades will need to be selected to provide a suitable level of durability depending upon the proposed location of the works. Not all timber species are suitable for exterior works and a durability class 1 or 2 species is an essential requirement.

Numerous finishes are available for metal products and they need to be provided with a protection level class that is appropriate for the proposed location such as hot dipped zinc coated or aluminium/zinc coatings, stainless steel, aluminium or applied paint finishes in accordance with the manufacturers recommendations.

Glazing as a balustrade needs to comply with [AS 1288:2006 *Glass in buildings – Selection and installation*](http://infostore.saiglobal.com/store/Details.aspx?ProductID=219686).

Spans & structural properties

The materials used within handrail and balustrade construction have physical limitations that should not be exceeded. As the span of the handrail and balustrade sections increase, they will be exposed to ever increasing levels of flexure within the member sections and connection points. Degradation of the connections will occur and total failure of the member sections is possible under normal impact loads.

Members and components should be adequately sized to accommodate the design impact loads for the proposed works.

Detailing & finishing

When you apply subsequent finishes to handrail and balustrade materials they should be provided strictly in accordance with the manufacturer’s recommendations. Preparation is commonly not performed correctly and subsequent cosmetic failures are expensive to rectify.

The BCA also provides specific tolerances that are to be adhered to with respect to handrail heights, climbable zones, baluster spacings and platform levels.