# Documents required to apply for bridge and gantry crane registration – pro forma

It is vital that designers and applicants check the submission for all items identified in the table as the items listed are used as a screening tool in the processing of these applications. Any application found not to meet the requirements set out in this document will not be reviewed and will be returned to the applicant.

## General notes regarding drawings

All drawings must be up to date and A3 (if electronic, printed to scales in A3 size). Drawings must contain the following information:

* title block including crane name and project particulars
* drawing number
* revision status and history with associated dates
* approval path and history
* approved for construction / fabrication (IFC / IFF) or as built status.

Submission of a drawing register (a list of drawings with revision status) is also recommended.

## General notes regarding design calculations

The following points highlight areas that have found to be inadequately addressed in previous submissions.

### Loading conditions

* Fatigue analysis in accordance with AS/NZS 1418 *Cranes, hoists and winches*.
* Seismic analysis in accordance with AS 1170.4 *Structural design actions – Earthquake actions in Australia*. This must be considered for the design of both the crane and runways.
* Wind loads, aerodynamic factors, sliding and stability analysis in accordance with AS 1170.2 *Structural design actions – Wind actions* and AS/NZS 1418. If AS 3990 *Mechanical equipment – Steelwork* has been used, the calculations must show how the serviceability wind loading was derived.
* Calculations considering thermal loads must be submitted if it is deemed by the designer to be a thermally sensitive structure (e.g. long constrained structures).

### Connection details

* Minimum weld sizes in accordance with AS 1554 *Structural steel welding*.
* Fatigue or stress concentrations.
* Bearing requirements.
* Lamellar tearing and the like.
* Types of bolts (e.g. high grades and torque requirements, slotted holes).
* Design intent of friction or bearing type joints to be on drawings.

### Design assumptions

* Effective plate outstands, including web portions, to be in accordance with relevant Australian Standard.

### Design checks

* Secondary effects in accordance with AS/NZS 1418, AS 4100 *Steel structures* and/or AS 3990, as applicable, must be considered. Examples of these include:
  + forces on bolt groups which resist torsion in combination with shear and tension, including prying
  + stress concentrations on welds which include torsion, vertical and horizontal shear
  + an assessment ensuring the end stop loads have a suitable resistance path back to the support structure (e.g. vertical bracing).
* Deflection checks in accordance with:
  + AS/NZS 1418.1 clause 5.6.2 (accounting for combined actions)
  + AS/NZS 1418.18 clause 5.13.
* An assessment of the combined stresses relating to the vertical loads on the web in accordance with   
  AS/NZS 1418.18 clause 5.7.3.3.
* Bending and prying checks for the end plate at the connection between the bridge beam and end carriage.
* Load distribution onto the bridge beam(s) accounting for any eccentricity of the hoist or of the hook position in the hoist.

### Finite element analysis

* If finite element analysis is used the modelling must account for **all** eccentricities and restraints, and the analysis must account for appropriate non-linear material, geometric and build quality considerations.
* Designers should verify or validate these results to confirm the accuracy of the model created.

### Alternative approaches

* If the designer chooses to use an alternative approach to the standard based on specific technical literature, the reference to that and a copy of the literature must be attached to the submission.

| **OFFICE USE ONLY** | | | |
| --- | --- | --- | --- |
| **Crane type** | Bridge crane  Gantry crane  Semi gantry crane | **Crane location** | Inside  Outside |
| **Class and MRC** | C1  C2  C3  C4 | **Older building** | Yes  No |
| **End carriage type** | Serially produced  Purpose designed | **Wind speed region** | A  B  C  D |
| **Mine site** |  |

## Drawings and calculations required for crane registration [rr. 6.34(3)(a)-(b)]

Please ensure that all parameters such as crane classification, maximum rated capacity (MRC), loading, materials, crane speeds and dimensions are consistent throughout the entire submission.

| **Criteria** | **Drawings submitted**  (please reference drawing number) | **Calculations submitted**  (please reference page numbers) |
| --- | --- | --- |
| **Crane structure** | | |
| General arrangement (GA) for the crane1 |  | N/A |
| Crab and hoist(s)2, including the support frame |  |  |
| Bridge beam(s)3 |  |  |
| End carriages2 or portal trestles / legs |  |  |
| Connections, including:   * bridge beam to end carriage * trestle connections (if applicable) * storm lock device (if applicable) |  |  |
| **Crane support structure** | | |
| Drawings for the support structure4 |  | N/A |
| Runway beams5 |  |  |
| Connections, including:   * end stop to runway * runway to corbel * corbel to support column * support column to foundations (base connection) |  |  |
| Support structure   * structural system for resisting end stop loads |  |  |

*Notes:*

1. *The General Arrangement drawing(s) or specific conditions of use document should cover the following items:*
   * *design assumptions not covered by the crane classification or other stability or use requirements*
   * *alignment requirements for the rails and support structure including provisions for foundation movement and settlement*
   * *wind loading assumptions, including in service wind speed*
   * *seismic load assumptions, including importance factor used*
   * *special or specific build requirements (e.g. if bearing between flange and web is necessary, this must be highlighted in the drawings)*
   * *weld type, size and symbols, electrode grade (if the lowest grade is not used), NDT requirements if applicable*
   * *bolt grade(s), sizes, arrangement and installation category*
   * *steel grades itemised per product*
   * *any other specific condition of use or manufacturing requirements.*
2. *For serially produced items, an assembly/general arrangement drawing is required. This should show weights and dimensions. A certificate of compliance must also be submitted, stating the component meets the requirements of AS/NZS 1418.*
3. *Drawings of the bridge beam(s) must include relevant cross sections and/or elevations.*
4. *Drawings of the runway and support structure must include:* 
   * *a plan view at runway level*
   * *any relevant cross sections and/or elevations*
   * *bases and foundations.*
5. *Drawings of the runway beams must include relevant cross sections and/or elevations.*

## Verification required for crane registration [r. 6.34(3)(c)]

Verification documents must include a signature, date, drawings, including revision numbers, verified, calculations verified and relevant parts of AS/NZS 1418 complied with.

Verification documents must **not** reference *Occupational Health and Safety Act 1984* and regulations.

| **Criteria** | **Document submitted** (please reference drawing number) |
| --- | --- |
| Verification document for the crane and the crane support structure |  |