TITLE: Stability of Structures	**STANDARD:** 225
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Definitions (in relation to this Standard)

Competent	Trained, experienced and qualified
Structural Steel	Typically includes all main frame building, stair towers, bridge crane supports and pipe racks. Can include temporary structures including sheet metal piles.
Formwork	Is the term given to either temporary or permanent moulds into which concrete or similar materials are poured.
False-work	Consists of temporary structures used in construction to support spanning or arched structures in order to hold the component in place until its construction is sufficiently advanced to support itself. False-work also includes temporary support structures for formwork used to mold concrete to form a desired shape.

Cross-References

- Standard 204 – Planning & Preparedness
- Standard 212 – Excavations & Trenching
- Standard 221 – Lifting Operations (Personnel & Planning)
- Standard 224 – Concreting Operations
- Standard 233 – Demolitions, Explosives & Explosive Ordnance

Standard

Stability of Structures

1. Contractor shall ensure that during any construction activities, specifically erection or dismantling operations of new or existing structures, (or any part of such structures), and excavations adjacent to structures, shall not result in a temporary state of weakness, instability or collapse of the said structure.

2. Any formwork, false-work or temporary structure shall be designed by a competent structural engineer (RC and Saudi Council of Engineers requirements to be met) to withstand any foreseeable loads which may be imposed on it during erection, installation, maintenance or dismantling.

3. No part of any structure shall be overloaded as to render it unsafe.

Structural Steelwork

4. Contractor shall conduct a Risk Assessment for all erection and dismantling of structural steelwork (including temporary structures), to be included in the Construction Phase ES&H Plan.

5. Contractor shall submit a Safe Sequence of Works in accordance with Standard 204 – Planning & Preparedness to be included in the Construction Phase ES&H Plan for all erection or dismantling of structural steelwork.

6. The Safe Sequence of Works must address the following, but not limited to:

    - Specific logical sequence of erection
    - Method of erection
    - Preparation of bases, shear keys and anchor bolts
    - Shim packs or leveling nuts
    - Pre-assembly and placement of bents, trusses and frames
    - Constructability issues
    - Alignment checks
    - Allowable specified tolerances
    - Bolting-up / welding of connections
    - Torquing methodology
    - Involvement of supplier representative
    - Lifting & Rigging Plan
    - Equipment to be used for working at height
    - Fall protection
    - Labor, tools & equipment requirements
    - Delivery & unloading methods of steel
    - Storage of materials on site before erection
    - Requirements for temporary braces and guys
    - Worker training
    - Permits
    - Other safety requirements
    - Cladding fixture methodology
    - Column base grouting
    - Final inspection & commissioning

7. No erection or dismantling of structural steelwork is to commence before the Safe Sequence of Works has been approved by Royal Commission. Training records for all erectors must be attached in the Method Statement.

8. Structural steel erection cannot commence until the concrete in the footings, piers and walls and the mortar in the masonry piers and walls (whichever applicable) has either attained 75% of the intended minimum compressive design strength, or sufficient strengths to support the loads imposed during steel erection.

9. Construction activities associated with the erection of structural steel must conform to the above references.

<u>Formwork / False-work</u>

10. All Formwork and False-work shall be designed by a structural engineer, and drawings and calculations submitted to Royal Commission for prior approval before works commence

along with the Safe Sequence of Works as per Standard 204 – Planning & Preparedness; it should also include the sequence for dismantling.

11. Contractor is to ensure that the base the formworks or false-works sits upon is adequate to support the weight of the formwork and concrete and any additional live loads (pumps, vibrating pokers, workers, dynamic force of concrete etc…).

12. All formwork and false-work materials (support frames, jacks, "U"-heads, bearers etc…) are to comply with the relevant specifications required, and are used as per manufacturer's instructions.

13. Erection and dismantling of formwork and false-works shall be under the supervision of a competent civil engineer.

14. Partially erected or dismantled formwork or false-work (i.e. at the end of a working day) shall be made secure against overturning.

15. Once erected, formwork and false-works should be inspected and certified as ready-for-use.

16. Scaffolding or lightweight staging must not be used for False-work.

17. Props for either false-works or formwork must be secured in place to prevent accidental dislodgement.

18. Components of formwork or false-works shall not be mixed (i.e. pins and braces).

19. Usually where formwork / false-works have been used in the construction activity, there is a requirement for a working platform. Working platforms may only be incorporated as a part of the formwork / false-work if it has been included in the design and calculations; otherwise it must be a separate entity.

20. All working at height must comply with Standard 214 – Working at Height.

21. Only the civil engineer in charge of the particular works may give instructions for the striking for each section of formwork, or the dismantling of each section of false-works.

22. Drop stripping is strictly prohibited (components not to be dropped from height).

23. Provide emergency plan

v.	Date	Description	Prep.	Checked	Approved
000	May-2009	Original	MS	WG	HS
001	Oct - 2015	1st Revision	FH	FC	AK