CIDB SEMINAR

Understanding the Testing & Inspection Requirement Under MS 1462 : 2012

Marshidah Mustapa

WHEN YOU NEED TO BE SURE

SGS

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- Malaysian Standards MS 1462
- Inspection & Testing
- Inspection & Testing Requirement Under MS 1462

Malaysian Standard 1462

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Inspection & Testing

- **Inspection ;**
  - an organized examination or formal evaluation exercise.
  - measurements, tests, and gauges applied to certain characteristics in regard to an object or activity.
  - compared to specified requirements and standards for determining whether the item or activity is in line with these targets, often with a Standard procedure and requirement in place to ensure consistent checking.

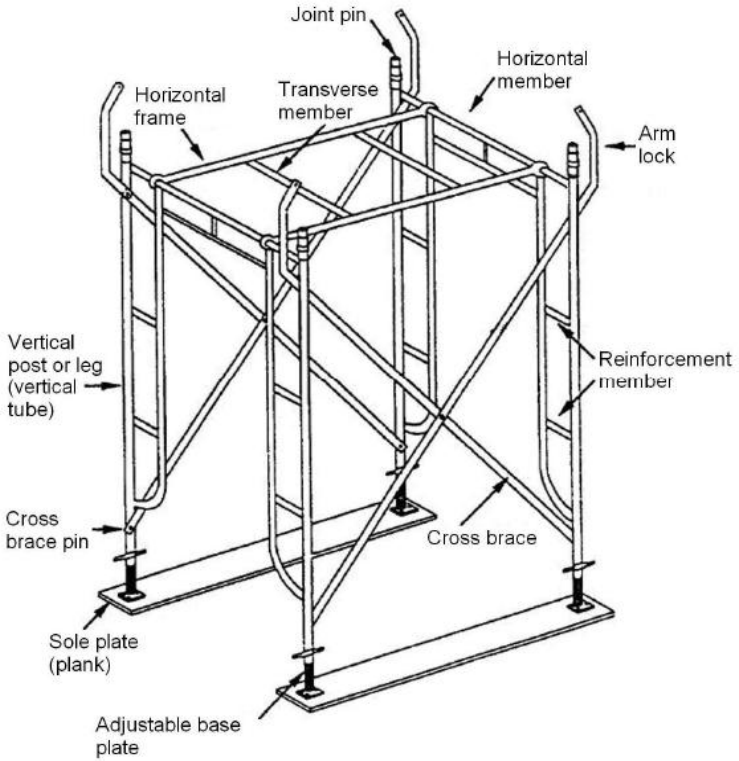
- **Testing** ;
  - evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not.
  - any gaps, errors, or missing requirements in contrary to the actual requirements.

Objective Inspection & Testing

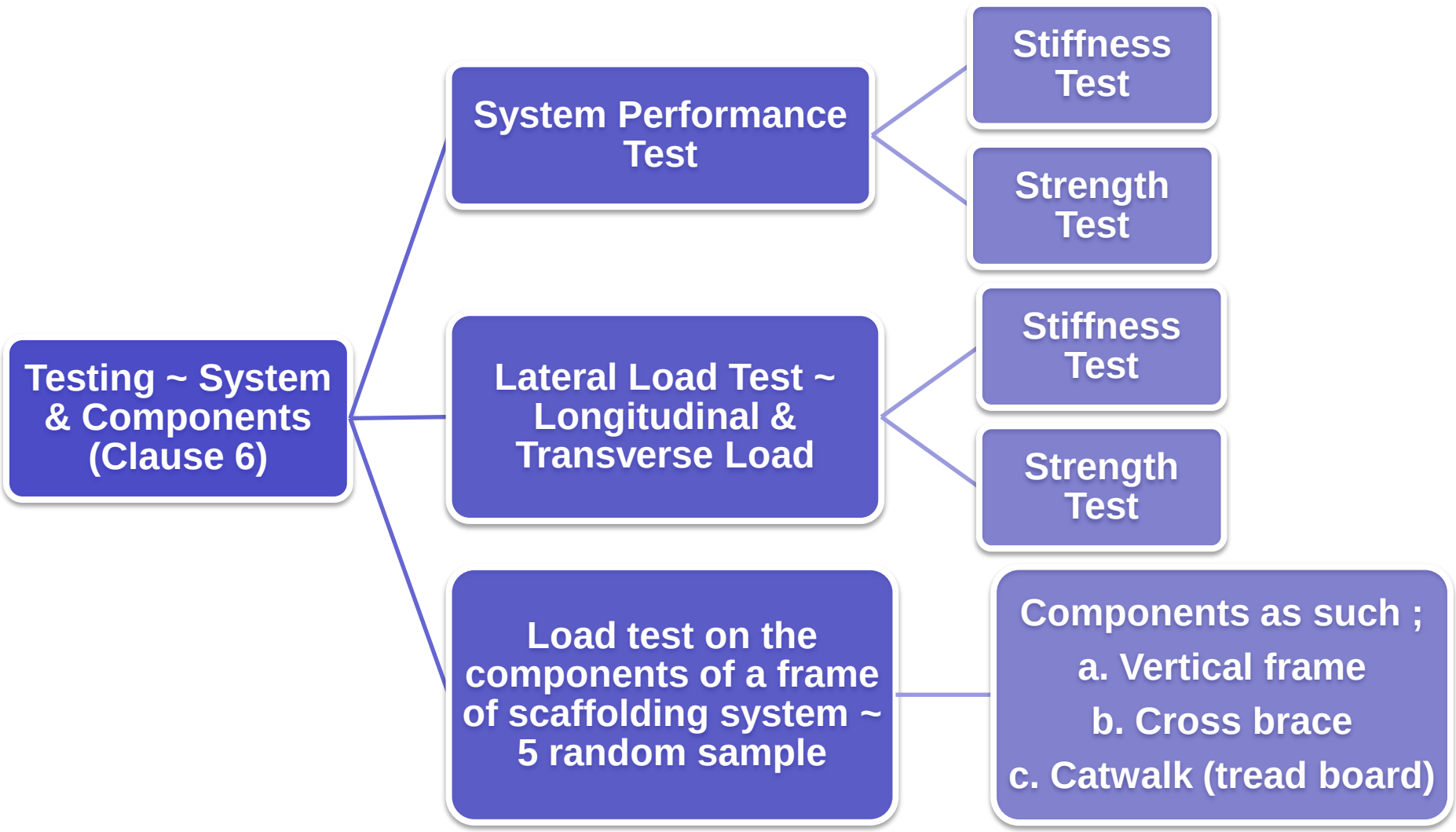
- The purpose of the inspection and testing is to ensure and verify the quality of the material used in as per international and recognized standard such as, Malaysian Standard (MS), British Standard (BS), American Standard (ASTM) and other relevant standards.

- Ensure the scaffolds shall be in good condition, of suitable and sound material and of adequate strength for the purpose for which is used.

Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding



Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding

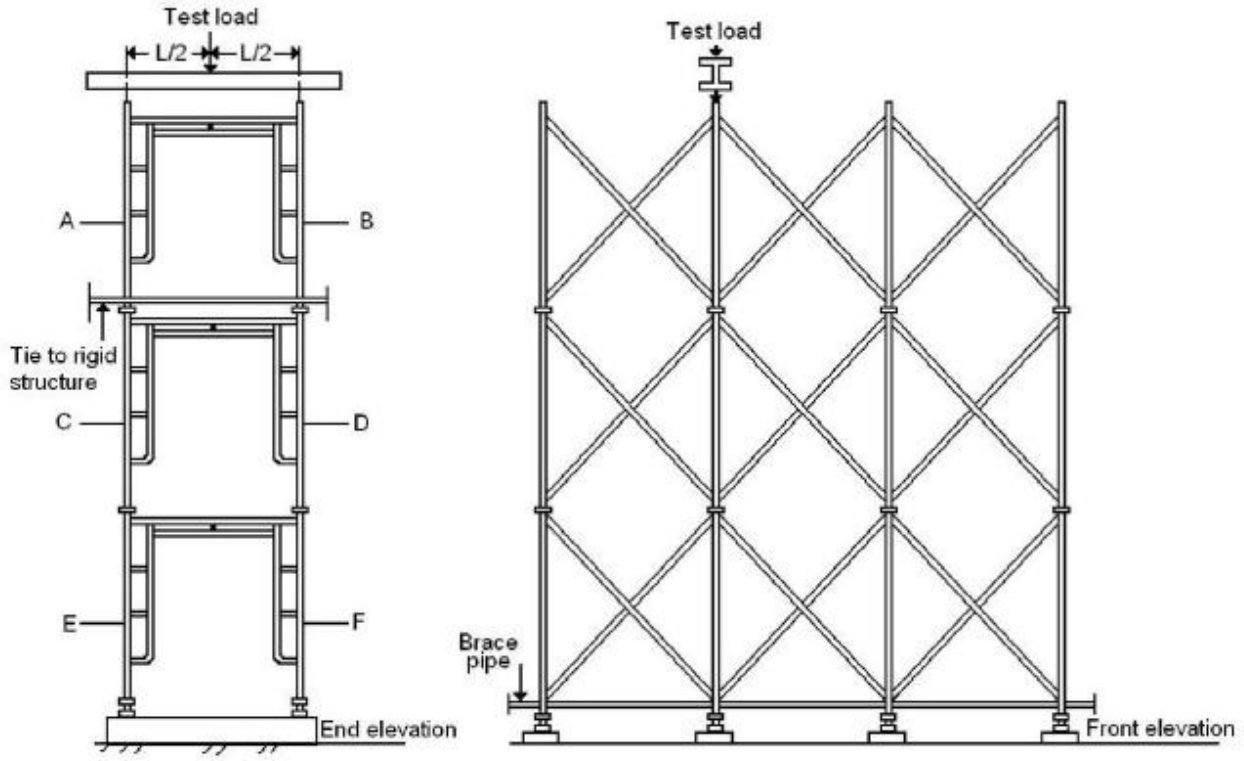


Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding

Table 3. Load test requirements for the components of a frame scaffolding system

Component	Load test requirements *)			Method of test
Vertical frame	*Vertical deflection of horizontal tube* For any size of frame, the vertical deflection under a load of 9.8 kN shall not exceed 10mm.			Annex E1
	Compressive strength of vertical tubes			Annex E2
	Height of frame	Average (kN)	Individual frame (kN)	
	1800mm or lower Exceeding 1800mm	78.5 minimum 73.5 minimum	73.5 minimum 68.6 minimum	
Cross brace	*Compressive strength*	Average Individual	: 8.0 kN : 7.3 kN	Annex F
Horizontal frame	*Deflection and bending strength* 1) The vertical deflection of any individual sample shall not exceed 10mm 2) Bending strength	Average Individual	: 5.4 kN : 4.9 kN	Annex G1
	Shearing strength of clamp (hook)	Average Individual	: 19.6 kN : 17.6 kN	Annex G2
Catwalk (treadboard)	*Deflection and bending strength* 1) The vertical deflection of any individual sample shall not exceed 10mm 2) Bending strength Average : (width of catwalk in mm x 0.0108) kN minimum Individual : (width of catwalk in mm x 0.0098) kN minimum			Annex H1
	Shearing strength of clamp (hook)	Average : (width of catwalk in mm x 0.0392) kN minimum Individual : (width of catwalk in mm x 0.0353) kN minimum		Annex H2
	Deflection and 'punching' strength of expended metal 1) The vertical deflection of an individual sample shall not exceed 10 mm.			Annex H3
	2) 'Punching' strength	Average : (width of catwalk in mm x 0.0108) kN minimum Individual : (width of catwalk in mm x 0.0098) kN minimum		
Adjustable base plate/ U-head	*Proof load test* When tested under a load of 59.8 kN, it shall not show any sign of distortion and the function shall not be impaired.			Annex J
Arm lock	The elongation of any sample shall not exceed 2 mm. Maximum load Average : 6.3 kN minimum Individual : 5.9 kN minimum			Annex K
Wall tie	Average : 9.8 kN minimum for both tensile and compressive loads. Individual : 8.8 kN minimum for both tensile and compressive loads.			Annex L
Bracket	*Slip test* 1) For all types of brackets, no sample shall show a slip of more than 10mm. 2) Strength tests 2.1 Fixed type 2.2 Adjustable type	Average : 44.1 kN minimum Individual : 39.2 kN minimum Average : 25.5 kN minimum Individual : 22.7 kN minimum		Annex M
Cross brace pin	Strength	Average : 6.3 kN minimum Individual : 5.9 kN minimum		Annex N
*) 1 N = (1/9.8) kgf				

Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding



NOTE. A, B, C, D, E and F (located at mid-height of the vertical post) are the locations where the transverse and longitudinal deflections are measured.

Figure C1. Load test on a 3-bay x 3-lift frame scaffolding system

Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding

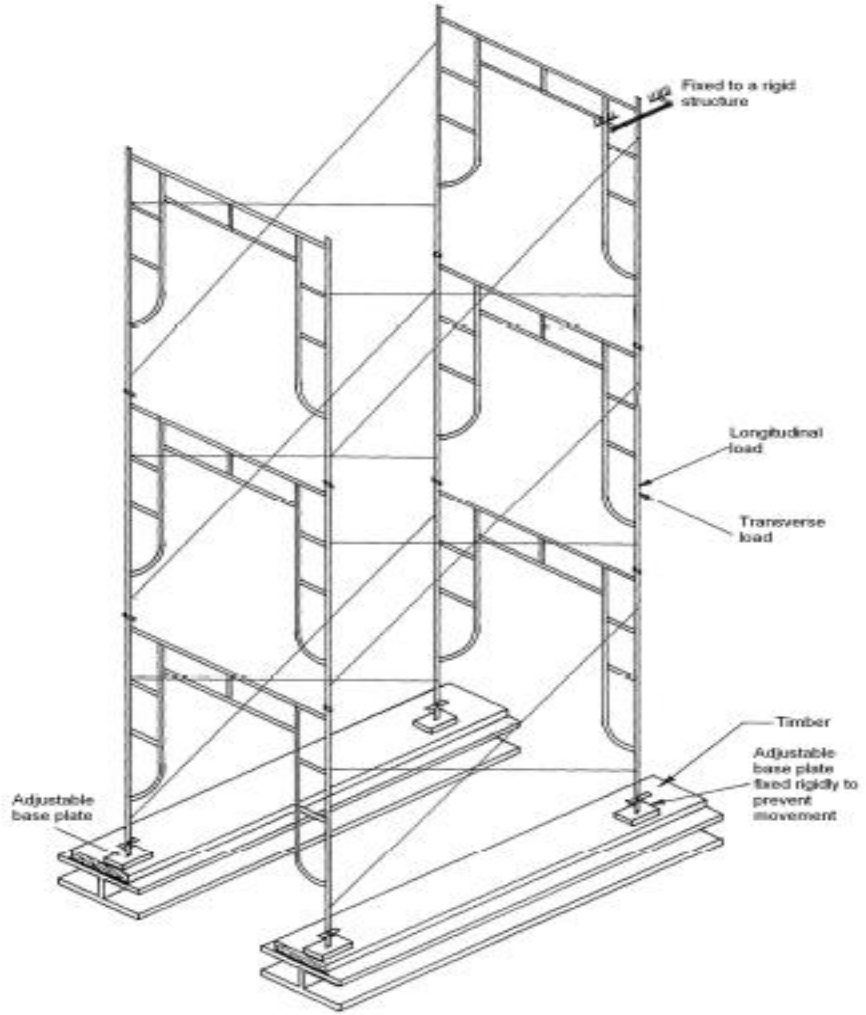


Figure D1. Lateral load test on a 1-bay x 3-lift frame scaffolding system

Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding

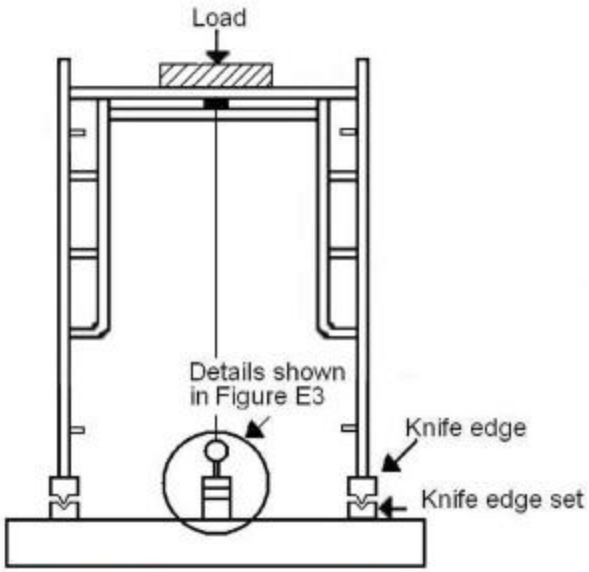


Figure E1. Load test on a horizontal member

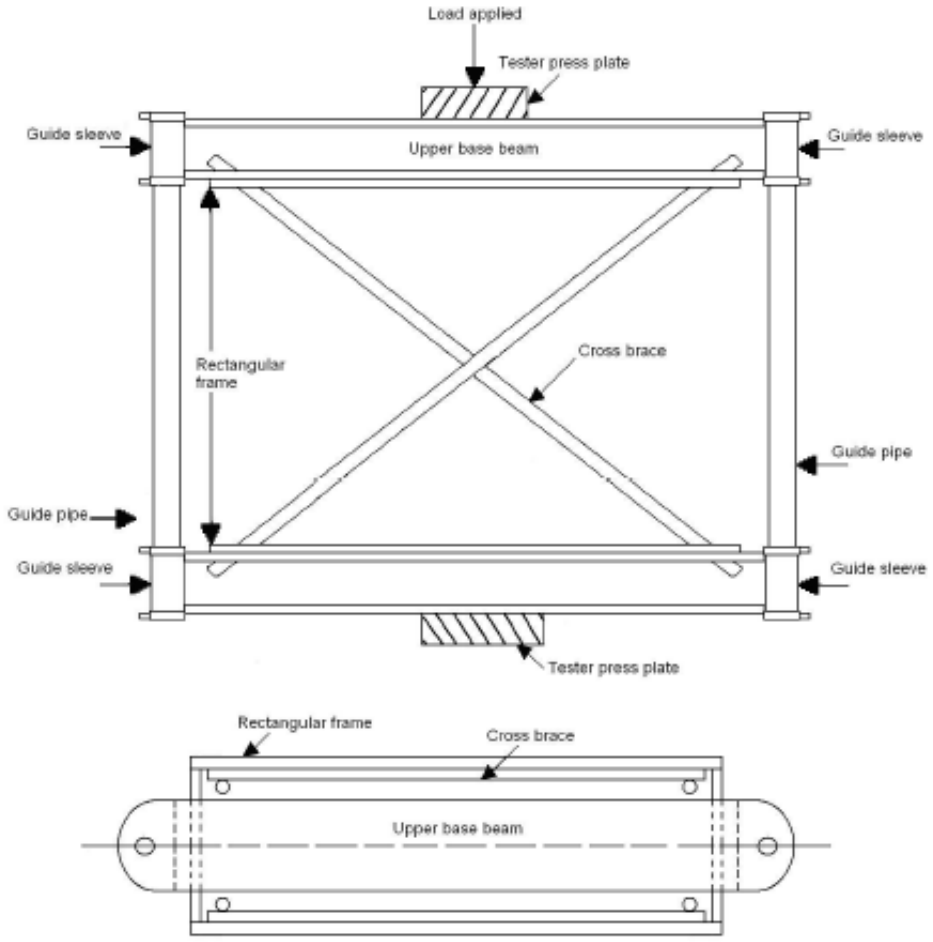
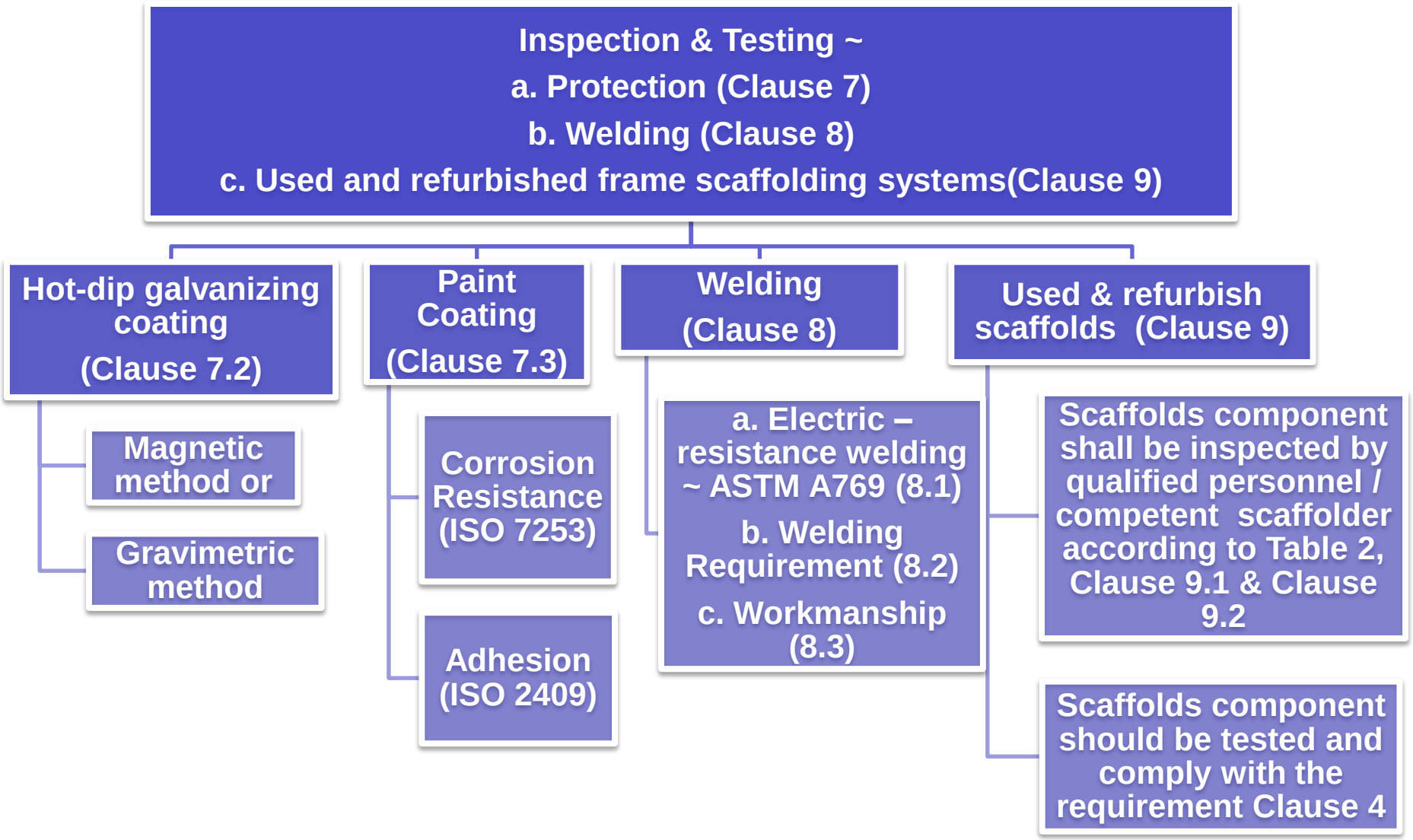
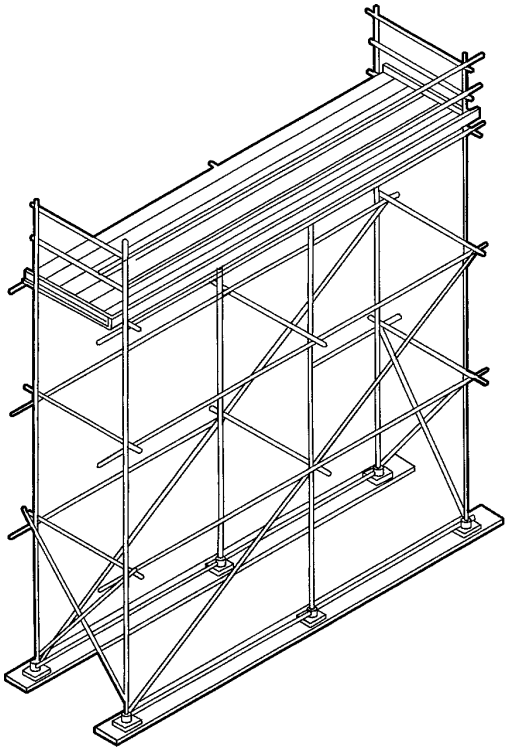


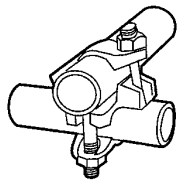
Figure F1. Load test on cross braces

Part 1: Prefabricated scaffolds - Specification for steel frame scaffolding

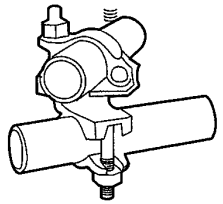


Part 2: Tubular (Tube & Coupler) Scaffolds – Section 1 : Specification for steel tubes

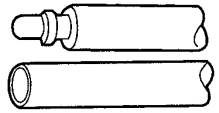




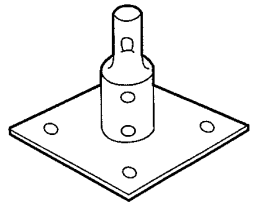
RIGHT ANGLE CLAMP



SWIVEL CLAMP



END FITTINGS



BASE PLATE

Part 2: Tubular (Tube & Coupler) Scaffolds – Section 1 : Specification for steel tubes

Inspection & Testing (Clause 8) ~

Tube shall be supplied with non-specific inspection and testing in accordance with EN 10021 unless option 5 is specified.

Type Of Inspection

- In accordance with EN 10021 unless option 5 is specified (non specific inspection and testing)
- Option 5 ~ the tubes shall be supplied with specific inspection and testing

Inspection Documents

Type of inspection document

- In accordance with EN 102014 (Type 2.1 and 2.2)
- Inspection certificate type 3.1B in accordance with 10204

Content of inspection documents

- In accordance with EN 101618.
  - a. Certificate of compliance with the order (2.1)
  - b. A test report (2.2) or an inspection certificate 3.1B

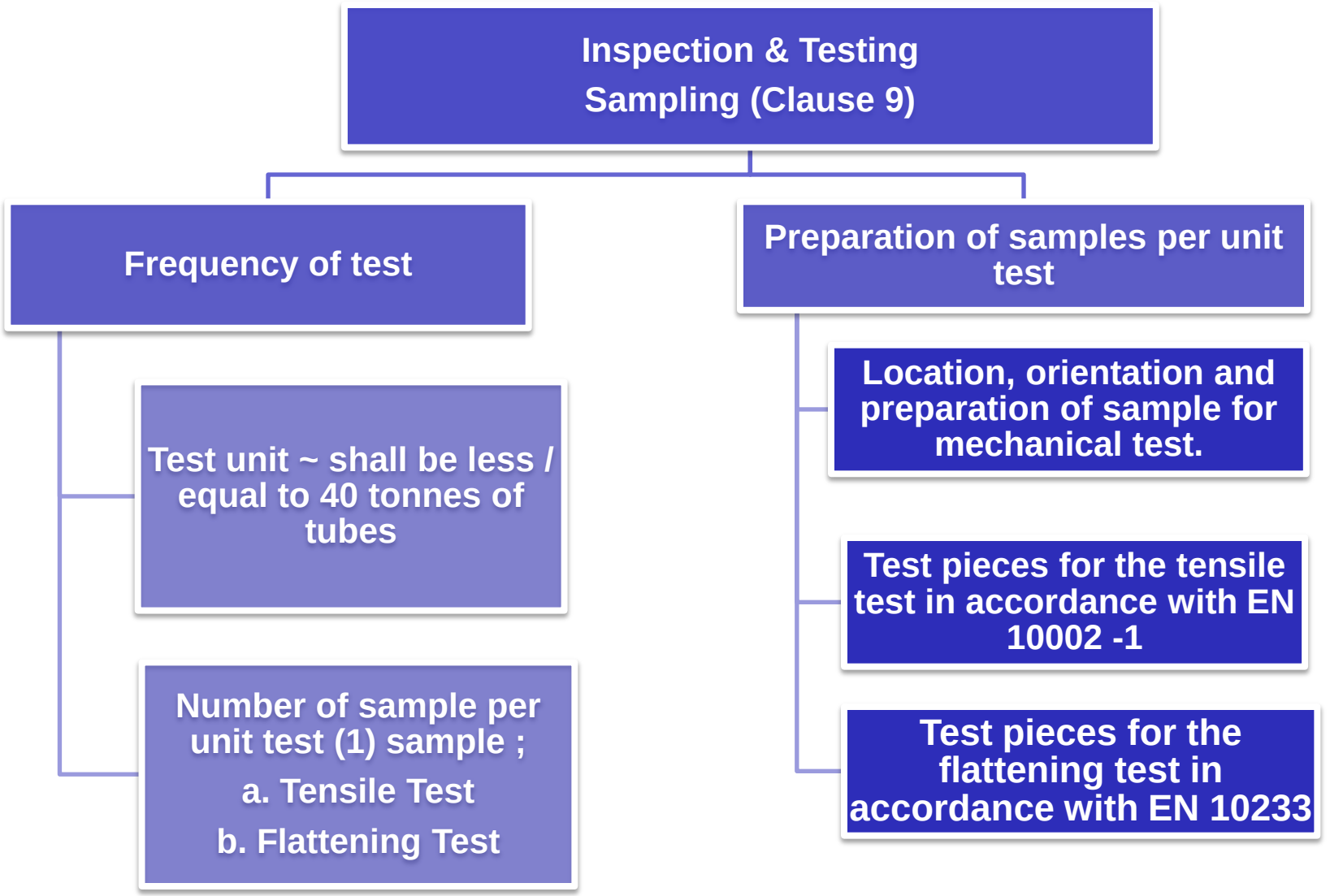
Part 2: Tubular (Tube & Coupler) Scaffolds – Section 1 : Specification for steel tubes

Summary of inspection and testing in accordance with Table 3.

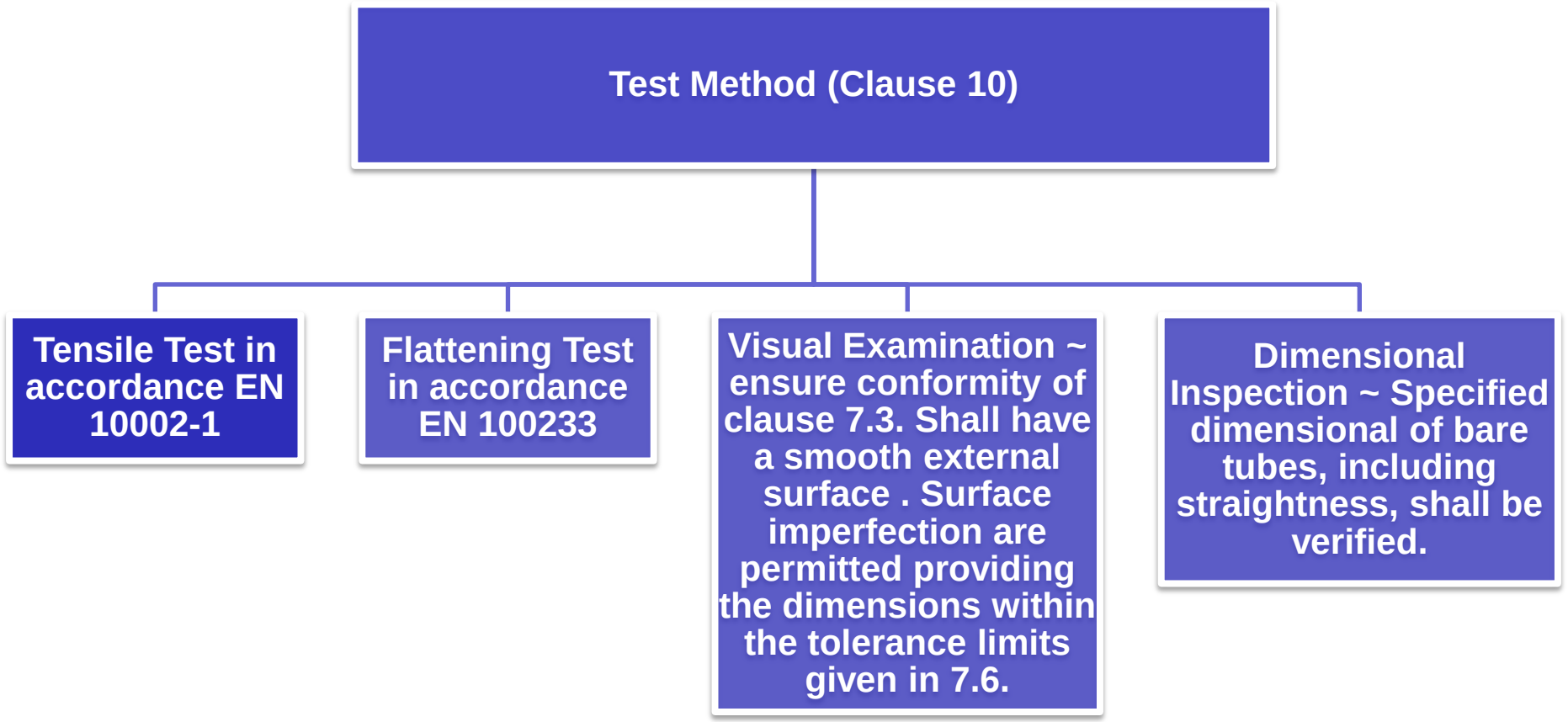
Table 3 — Inspection and tests

Type of inspection or test	Frequency of testing		Refer to clause
Mandatory	**Non-specific inspection**	**Specific inspection**	
Cast analysis	Manufacturers Procedure	Manufacturers Procedure	7.2
Tensile	Manufacturers procedure	1/test unit	7.2 ; 10.1
Flattening [a]	Manufacturers procedure	1/test unit	7.2 ; 10.2
Visual examination	See 7.3 ; 10.3		
Dimensional inspection	See 7.4 ;7.6;10.4		
[a] Welded tube only.			

Part 2: Tubular (Tube & Coupler) Scaffolds – Section 1 : Specification for steel tubes



Part 2: Tubular (Tube & Coupler) Scaffolds – Section 1 : Specification for steel tubes

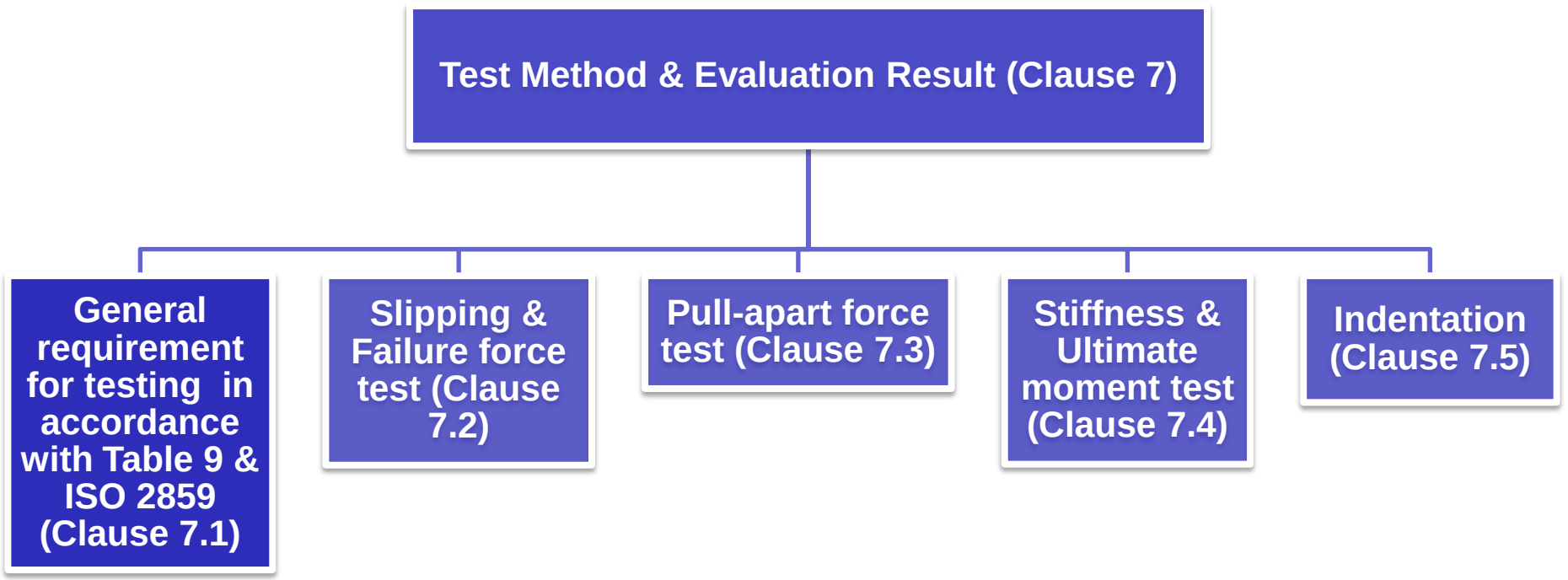


Part 2: Tubular (Tube & Coupler) Scaffolds – Section 2 : Specification for aluminium tubes

- Aluminium scaffolds shall be produced by extrusion
- Drifting expanding test for extruded aluminium scaffold tubes.

Part 2: Tubular (Tube & Coupler) Scaffolds – Section 3 : Specification for steel and aluminium couplers, fitting and accessories

Part 2: Tubular (Tube & Coupler) Scaffolds – Section 3 : Specification for steel and aluminium couplers, fitting and accessories



Part 2: Tubular (Tube & Coupler) Scaffolds – Section 3 : Specification for steel and aluminium couplers, fitting and accessories

Reference tubes and bar for coupler test (Table 7)

Table 7 — Reference tubes and bar for coupler tests

Reference	Structural form	Material	Yield strength or hardness	Wall thickness	Wall thickness tolerance mm
RT_{S1}	Tube	Steel	235 N/mm^2 ≤ R_{eH} ≤ 265 N/mm^2	3.2 mm	+ 0,1 - 0,2 (including corrosion resistance)
RT_{S2}	Tube	Steel	315 N/mm^2 ≤ R_{eH} ≤ 345 N/mm^2	2.7 mm	+ 0,1 - 0,2 (including corrosion resistance)
RT_{S3}	Tube	Steel	235 N/mm^2 ≤ R_{eH} ≤ 265 N/mm^2	4.0 mm	+ 0,1 - 0,2 (including corrosion resistance)
RT_A	Tube	Alluminium alloy	195 N/mm^2 ≤ R_{eH} ≤ 215 N/mm^2	4.0 mm	+ 0,1 - 0,2
RB	Bar	Steel	250 Brinell		See Clause 5

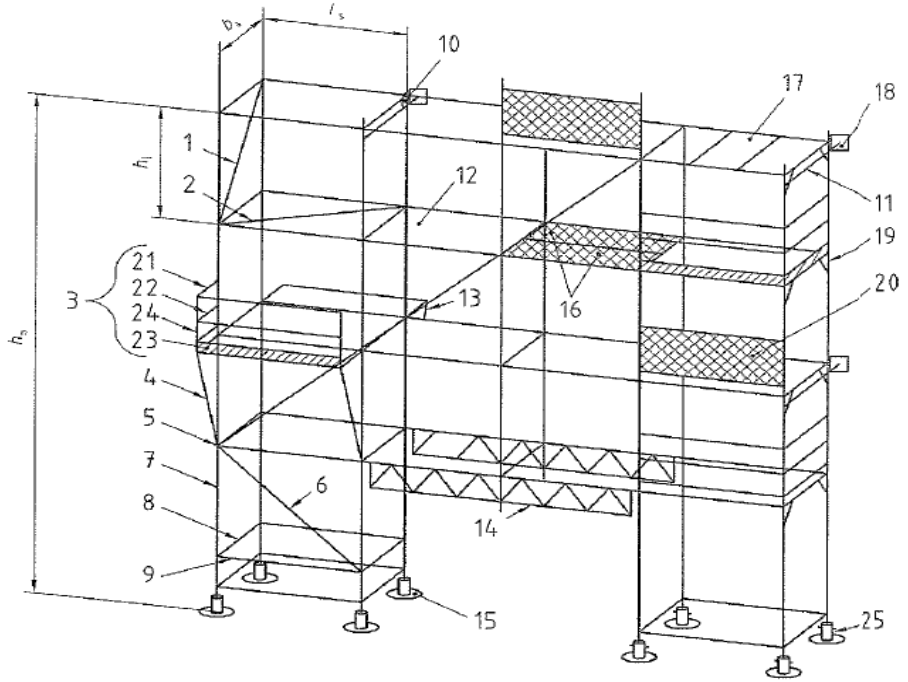
Part 2: Tubular (Tube & Coupler) Scaffolds – Section 3 : Specification for steel and aluminium couplers, fitting and accessories

Minimum number of test for each coupler type and class and configuration

Table 9 — Minimum number of tests for each coupler type and class and configuration

Type of coupler	Coupler class	Coupler configuration	Type of test	Number of tests					Clause
				Reference tubes (see Table 7)					
				RT_{S1}	RT_{S2}	RT_{S3}	RT_A	RB	
Right angle coupler (RA)	A AA	---	Slipping force F_s	10	---	---	5	---	8.2.1
			Failure force F_f	---	---	---	---	5	8.2.2
			Pull apart force F_p	---	---	---	---	5	8.3
			Indentation	---	5	---	---	---	8.5
	B BB	---	Slipping force F_s	10	---	---	5	---	8.2.1
			Failure force F_f	---	---	---	---	5	8.2.2
			Pull apart force F_p	---	---	---	---	5	8.3
			Cruciform bending moment M_B	10	---	---	5	---	8.4.1
			Rotational moment M_T	5	---	---	5	---	8.4.2
			Indentation	---	5	---	---	---	8.5
	---	AA + AA BB + BB	Slipping force F_s	10	---	---	5	---	8.2.1
Swivel coupler (SW)	A B	---	Slipping force F_s	10	---	---	5	---	8.2.1
			Failure force F_f	---	---	---	---	5	8.2.2
			Indentation	---	5	---	---	---	8.5
Parallel coupler (PA)	A B	---	Slipping force F_s	10	---	---	5	---	8.2.1
			Failure force F_f	---	---	---	---	5	8.2.2
			Indentation	---	5	---	---	---	8.5
Sleeve coupler (SF)	A B	---	Slipping force F_s	10	---	---	5	---	8.2.1
	B	---	Bending moment M_B	---	---	5	---	---	8.4.3

Part 3: Prefabricated Scaffolds – Section 1 : Specification for steel and aluminium modular system scaffolding



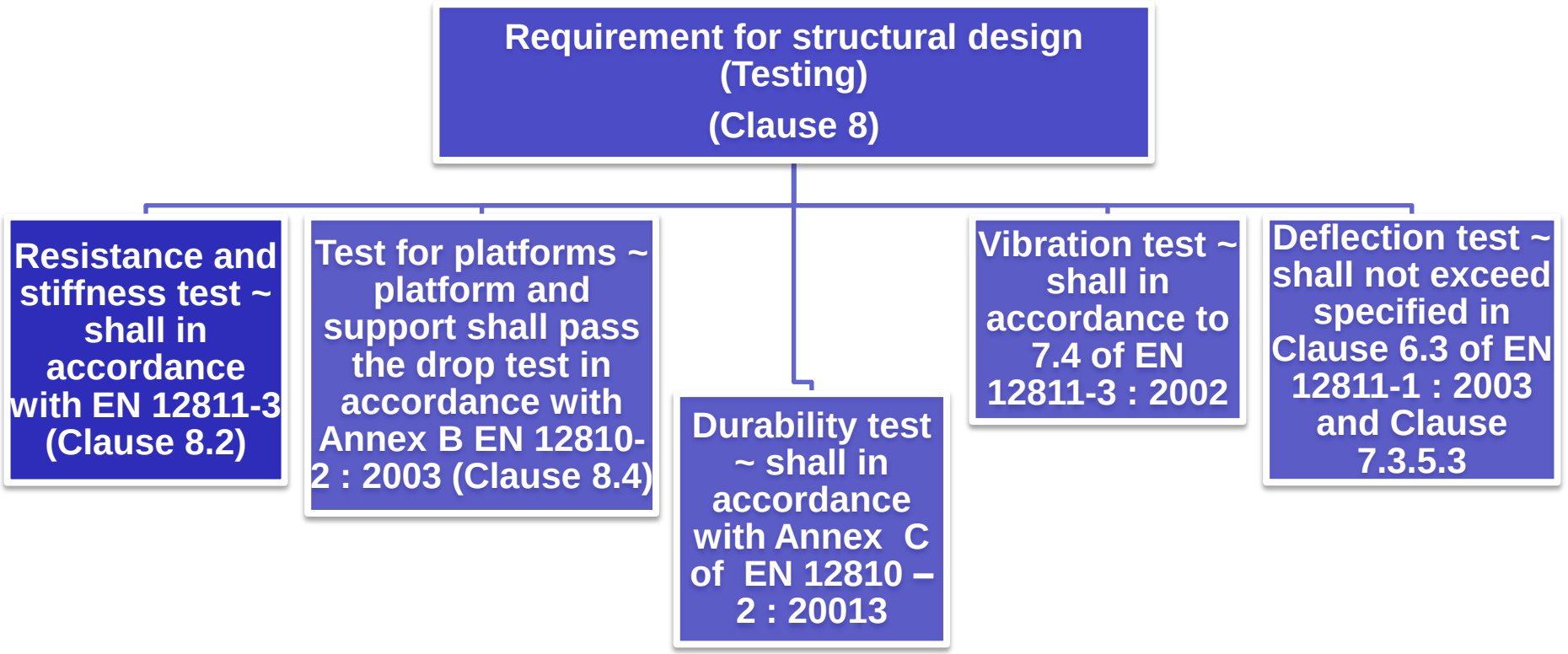
Part 3: Prefabricated Scaffolds – Section 1 : Specification for steel and aluminium modular system scaffolding

Inspection Documents (Clause 6)

- Inspection documents shall to be supplied with a test report 2.2 in accordance with EN 10204 or specific test report 2.3.

- Steel with nominal yields stress higher than 235 N/mm^2 , cast iron, aluminium alloys and steel tubes for standards with a nominal wall thickness less than 2.9mm ~ require inspection certificates 3.1B of EN 10204 at least.

Part 3: Prefabricated Scaffolds – Section 1 : Specification for steel and aluminium modular system scaffolding



Part 3: Prefabricated Scaffolds – Section 2 : Particular methods of structural design for steel and aluminium modular system scaffoldings

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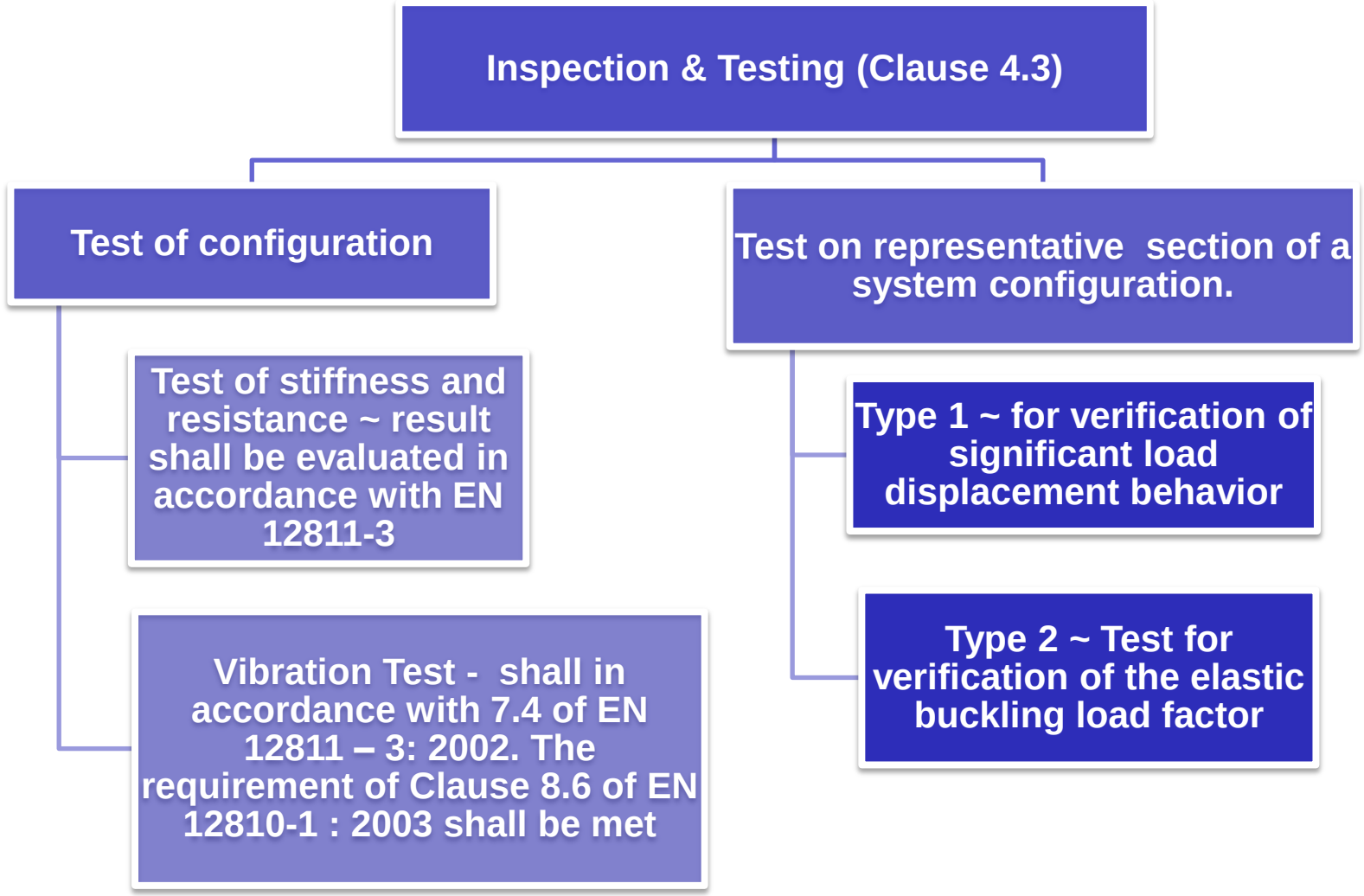


Metal Scaffolds ~ Part 4: Temporary Works Equipment – Section 2 : Information on requirement

Metal Scaffolds ~ Part 4: Temporary Works Equipment – Section 2 : Information on materials

Inspection & Testing (Clause 3.3)

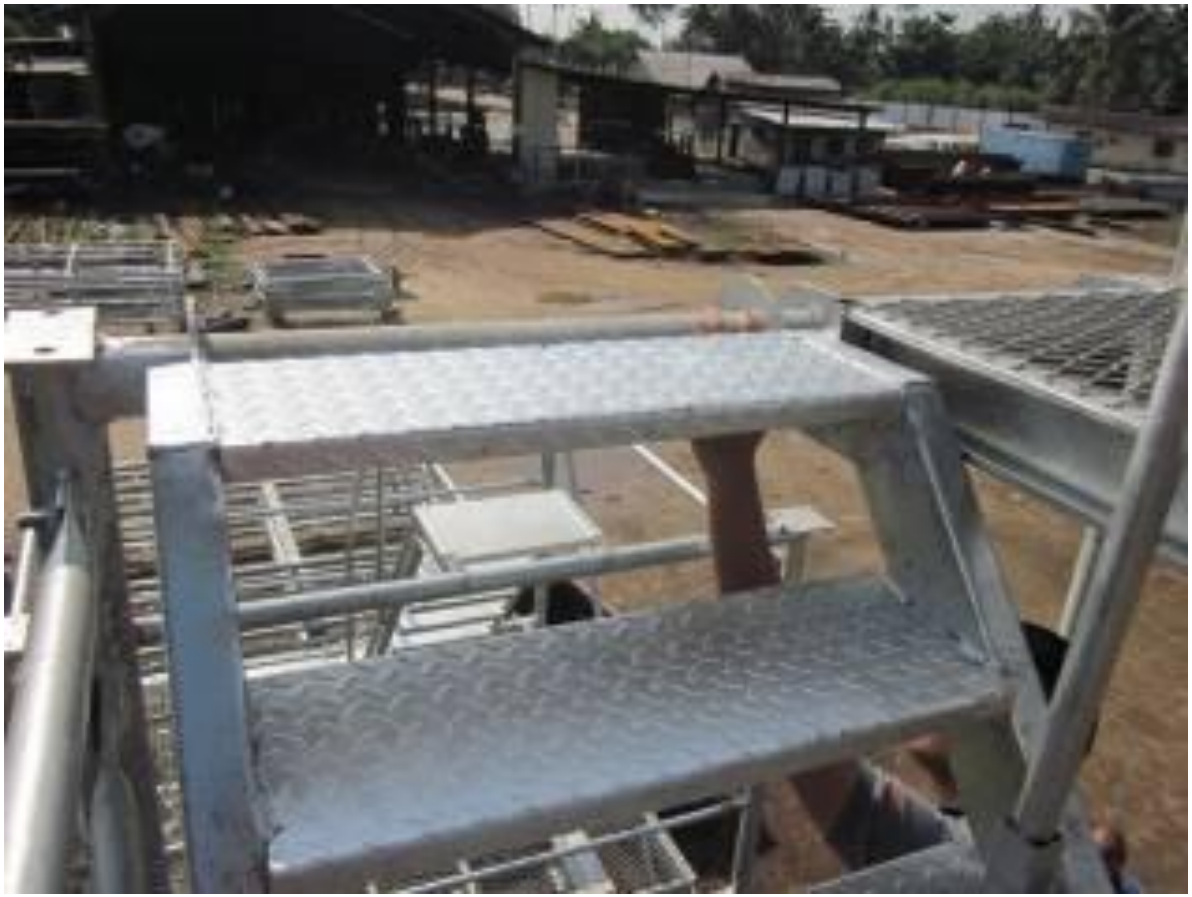
Material & component which affect the load bearing behavior / health and safety aspect shall be delivered with an inspection document in accordance with EN 10204. The minimum level shall be 2.2.

- **Cast Iron (Clause 5)**
  - Prototype Testing - shall be tested by macrographs and micrograph
  - Inspection and testing – shall be in accordance with EN 10204 with inspection documents type 3.1B
- **Aluminium Alloy (Clause 6)**
  - Inspection and testing – shall be in accordance with EN 10204 with inspection document 3.1B.
- **Timber & Timber based material**
  - Material specified in ENV 1995-1-1 shall be used. Services class 2 is the most appropriate.

Example Non Compliance Workmanship

Welding Defect – Burn Through

Example Non Compliance Workmanship



Slide Protection not available

Example Non Compliance Workmanship

Coupler not installed

Conclusion

- Increase safety and quality.
- Reduce technical and commercial risk.
- Added value ~ improve quality, maintain safety and ensure compliance.

THANK YOU

WHEN YOU NEED TO BE SURE

SGS