International Association of Oil & Gas Producers

SPECIFICATION
S-617Q

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Quality requirements for General-purpose offshore cranes (EN 13852-1)

Revision history

VERSION	DATE	AMENDMENTS
1.0	December 2018	Issue for Publication

Acknowledgements

This IOGP Specification was prepared by a Joint Industry Project 33 Standardization of Equipment Specifications for Procurement organized by IOGP with support by the World Economic Forum (WEF).

Foreword

This specification package was prepared under a Joint Industry Project 33 (JIP33) “Standardization of Equipment Specifications for Procurement” organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Ten key oil and gas companies from the IOGP membership participated in developing this specification under JIP33 Phase 2 with the objective to leverage and improve industry level standardization for projects globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, based on the ten participating members’ company specifications, resulting in a common and jointly approved specification, and building on recognized industry and/or international standards.

The specification package has been developed in consultation with a broad user and supplier base to promote the opportunity to realize benefits from standardization and achieve significant cost reductions for upstream project costs. The JIP33 work groups performed their activities in accordance with IOGP’s Competition Law Guidelines (November 2014).

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The vision from the CPC industry is to standardize specifications for global procurement for equipment and packages, facilitating improved standardization of major projects across the globe. While individual oil and gas companies have been improving standardization within their own businesses, this has limited value potential and the industry lags behind other industries and has eroded value by creating bespoke components in projects. The specification package aims to significantly reduce this waste, decrease project costs and improve schedule through pre-competitive collaboration on standardization.

Following agreement of the relevant JIP33 work group and approval by the JIP33 Steering Committee, the IOGP Management Committee has agreed to the publication of this specification package by IOGP. Where adopted by the individual operating companies, the specification package aims to supersede existing company documentation for the purpose of industry-harmonized standardization.

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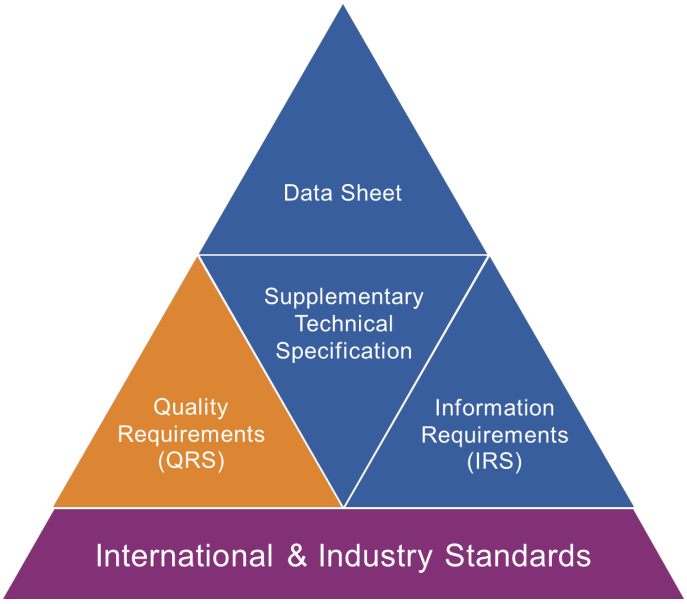
Introduction

The purpose of this quality requirements specification (QRS) is to define quality management requirements for the supply of general-purpose offshore cranes in accordance with IOGP S-617, Supplementary Specification to EN 13852 2nd Edition 2013 General-purpose offshore cranes, for application in the petroleum and natural gas industries.

The QRS includes a conformity assessment system (CAS) which specifies standardized user interventions against quality management activities at four different levels. The applicable CAS level is specified by the user in the equipment datasheet.

This QRS shall be used in conjunction with the supplementary requirements specification (IOGP S-617), information requirements specification (IOGP S-617L) and datasheet (IOGP S-617D) which together comprise the full set of specification documents. The Introduction section in the supplementary requirements specification provides further information on the purpose of each of these documents and the order of precedence for their use.



JIP33 Specification for Procurement Documents
Quality Requirements Specification

1 Scope

To specify quality management requirements for the supply of general-purpose offshore cranes to IOGP S-617 including:

a) manufacturer quality management system requirements;

b) purchaser conformity assessment (surveillance and inspection) activities;

c) traceability requirements;

d) evidence of conformance;

e) factory and site acceptance.

2 Normative references

For the purpose of this document, the documents referenced in IOGP S-617 and those listed below, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9001:2015	Quality management systems – Requirements
API Specification Q1	Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry
EN 13852-1: 2013	Cranes Offshore Cranes Pt 1 General-purpose offshore cranes
IOGP S-617	Supplementary Requirements to EN 13852-1 General-purpose offshore cranes

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IOGP S-617, ISO 9000:2015 (normative to ISO 9001) and the following shall apply.

3.1 Conformity assessment

Demonstration that requirements relating to a product, process, system, person or body are fulfilled.

NOTE 1 Conformity assessment (or assessment) includes but is not limited to review, inspection, verification and validation activities.

NOTE 2 Assessment activities may be undertaken at a supplier's or sub-supplier's premises, virtually by video linking, desktop sharing, etc. or by review of information formally submitted for acceptance or for information.

3.2 Conformity assessment system (CAS)

Systems providing different levels of assessment of the manufacturer's control activities by the purchaser (second party) or independent body (third party) based on the evaluation of the manufacturer's capability to conform to the product or service specification and obligatory requirements.

3.3 Conformity assessment - hold point

Point in the chain of activities beyond which an activity shall not proceed without the approval of the purchaser / purchaser's representative.

3.4 Conformity assessment - witness point

Point in the chain of activities that the manufacturer shall notify the purchaser / purchaser's representative before proceeding. The operation or process may proceed without witness if the purchaser does not attend after the agreed notice period.

3.5 Conformity assessment - surveillance

Observation, monitoring or review by the purchaser / purchaser's representative of an activity, operation, process, product or associated information.

3.6 Conformity assessment - review

Review of the manufacturer's information to verify conformance to requirements.

NOTE Information review requirements are managed on a surveillance basis and as such do not impose schedule constraints, unless specified as Hold points in Annex A or as conditions specified in the associated IRS.

3.7 Critical

That deemed by the organization, product specification or purchaser as mandatory, indispensable or essential, needed for a stated purpose or task, and requiring specific action.

NOTE Primary components as per EN 13852-1, 3.3.1 are critical components.

4 Symbols and abbreviations

For purposes of this document, the following symbols and abbreviations apply:

CAS Conformity assessment system

5 Quality requirements

5.1 Quality management system

The manufacturer shall demonstrate that the quality management arrangements established for the supply of products and services conform to ISO 9001, API Specification Q1 or an equivalent quality management system standard agreed with the purchaser.

5.2 Conformance assessment

Quality plans and inspection and test plans as developed as outputs to operational planning and control for the products or services shall define the specific controls to be implemented by the manufacturer and when applicable, sub-manufacturers, to ensure conformance with the specified requirements.

Controls shall address:

a) crane risk assessment (EN 13852-1, Section 4);

b) primary (critical) components (EN 13852-1, 3.3.1 and IOGP S-617, 4.1);

c) verification requirements (EN 13852-1, Section 6).

Controls shall also address both internally and externally sourced processes, products and services.

Quality plans and inspection and test plans shall include provisions for the purchaser CAS, as specified in the datasheet. See Annex A.

The manufacturer's performance in meeting the requirements will be routinely assessed during execution of the scope and where appropriate, corrective action requested and conformity assessment activities increased or decreased consistent with criticality and risk.

NOTE 1 For industrial well proven solutions CAS level D is specified unless risk assessment of indicates that a more stringent CAS-level is required.

NOTE 2 Irrespective of conformity assessment requirements defined by the customer, either by reference to standard and specification requirements or in the scope, the manufacturer remains responsible for operational planning and control and demonstration of the conformity of products and services with the requirements, including the supplementary requirements specified in S-617 (see ISO 9001, 8.1 and 8.2).

6 Traceability

Material certification and traceability shall be maintained in accordance with EN 13852-1, 7.4.3 and the specific requirements defined in Annex B.

7 Control of nonconforming products and services

Nonconformance with specified requirements identified by or to the manufacturer prior to or during the delivery of the products and services shall be corrected such that the specified requirements are satisfied or the purchaser's acceptance of the nonconformance agreed in accordance with the purchase order conditions. See ISO 9001, 8.2.3, 8.2.4, 8.5.6 and 8.7.

8 Evidence (conformance records)

Plans, procedures, methods and resultant records shall be maintained and provided in accordance with the associated IRS.

Annex A Purchaser conformity assessment requirements

This annex defines four CAS or levels of purchaser assessment.

The manufacturer shall provide for the specified CAS when developing quality plans and inspection and test plans in accordance with Section 5.

	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
1	**Operational planning and control activities**				
1.1	Quality plan (ISO 9001, 8.1 and ISO 10005)	H	H		
1.2	Inspection and Test Plan (ISO 9001, 8.1 and ISO 10005)	H	H	H	H
1.3	Pre-inspection / Pre-production planning	H	W	W	
2	**Design and development activities**				
2.1	**Review of Design inputs and outputs including**				
2.1.1	Design and Development Plan (ISO 9001, 8.2)	H	H		
2.1.2	Risk Assessment (EN 13852-1, Section 4)	H	H	R	R
2.1.3	Failure Mode Effects Analysis (EN 13852-1, 5.2.4 and Annex D)	H	H	R	R
2.1.4	Primary (Critical) component register (EN 13852-1, Section 4.1)	H	R	R	R
2.1.5	Strength and stability calculations (EN 13852-1, 5.2 and Table 4)	H	R	R	
2.1.6	Material selection (EN 13852-1, 5.2.8, Table 4 and Annex E)	H	R		
2.1.7	Equipment and component design (EN 13852-1, 5.3 and Table 4)	H	R		
2.1.8	Drive system design (EN 13852-1, 5.4 and Table 4)	H	R		
2.1.9	Control station, machinery house design (EN 13852-1, 5.5 and Table 4)	H	R		
2.1.10	Noise reduction (EN 13852-1, 5.6 and Table 4)	H	R		
2.1.11	Access and guarding (EN 13852-1, 5.7 and Table 4)	H	R		
2.1.12	Controls, indicators and limiting devices (EN 13852-1, 5.8 and Table 4)	H	R		
2.1.13	Protection systems (EN 13852-1 5.9 and Table 4)	H	R		
2.1.14	Lifting of Personnel(EN 13852-1 5.10 and Table 4)	H	R		
2.2	**Type validation/certification including**				
2.3.1	Prototype qualification if based on existing validated design (ISO 9001 8.3.4)	H	H	H	H
2.3.2	Hazardous Area Equipment (EN 13852-1 5.2.8, and Annex 0) if applicable	H	R	R	
2.4	**Process Qualification/Validation ISO 9001 8.5.1 item f) including as applicable**				
2.4.1	Welding Process Qualification (S-617, 5.2.10)	H	R		
2.4.2	Protective coating systems; (EN 13852-1, C7)	R	R		
3	**Control of external supply**				
3.1	External supply scope, risk assessment and controls (ISO 9001, 8.4)	H	R		
4	**Production and service provision**				
4.1	**Fabrication primary structural and mechanical components**				

	PURCHASER ASSESSMENT ACTIVITIES	CAS			
		A	B	C	D
4.1.1	Material identification, traceability and certification review as per and Annex B	W	S	S	
4.1.2	Fabrication dimensional control	W	S		
4.1.3	Welding control, inspection and testing	W	S		
4.1.4	Heat treatment	W	S		
4.2	**Assembly primary components inspection including**				
4.2.1	Component traceability and certification review as per Annex B	W	S	S	
4.2.2	Close tolerance and/or critical dimensions as per drawings	W	S	R	
4.2.3	Protective coatings (EN 13852-1, C7 and Table 4)	W	S		
4.3.4	Structural Assembly (EN 13852-1, 5.2.10 and Table 4)	W	S		
4.3.5	Mechanical Assembly (EN 13852-1, 5.3 and Table 4)	W	S		
4.3.6	Electrical Installation (EN 13852-1, 5.3 and table 4 including Annex O when specified)	W	S		
4.3.7	Instruments and controls installation (EN 13852-1, 5.3 and Table 4)	W	S		
4.3	**Factory Acceptance Testing as per Annex C including**				
4.3.1	Information review	H	H	R	R
4.3.2	Assembly checks, running tests, review results	H	W	S	S
5	**Release of product or service**				
5.1	**Verify conformance to PO including as applicable**				
5.1.1	Weight	W	W	S	
5.1.2	Loose ship item, spares special tools as applicable	H	W	S	
5.1.3	Handling, preservation and packaging	H	W	S	
5.1.4	Final documentation review: as per IRS	H	R	R	R
5.2	Release equipment (for shipment)	H	H	H	H
6	**Site Installation**				
6.1	**Site Acceptance Testing as per Annex D including**				
6.1.1	Information review	H	R	R	R
6.1.2	Assembly checks, running tests, review results	H	H	W	S
	H is hold point, R is review, S is surveillance, and W is witness point. NOTE Definitions for these terms are provided in Section 3.				

Annex B Material traceability and certification requirements

Item		Certificate type	Material traceability level	Additional requirements
Crane equipment	Primary structural materials	3.1	I	Structural components classed as Primary (Critical).
	Lifting equipment - hook / hook block, ropes	3.1	I	Proof load certificates.
	Critical components	3.2	II	As defined in S-617.
Hoses – (hydraulic/ pneumatic)	Pressure Test	3.1	II	Certificate to state which standard manufactured and tested to.
Pressure vessels (e.g. hydraulic accumulators)		3.1	I	
Critical fasteners (bolts/stud bolts/nuts)		3.1	II	
Welding consumables		3.1	I	Primary Structures only
Electrical equipment and instruments, including cables and glands		2.1	III	Hazardous area certificates as selected in S-617D. Electromagnetic compatibility (EMC) certificates.

Explanatory notes:

Certification

A. "2.1" Declaration of Compliance with the purchase order - A document in which the manufacturer declares that the products supplied are in compliance with the requirements of the purchase order, without inclusion of any test results.

B. "2.2" Test Report - A document in which the manufacturer declares that the products supplied are in compliance with the requirements of the purchase order, and in which test results are supplied based on non-specific inspection and testing.

C. "3.1" Inspection Certificate - A document with test results based on specific inspection and testing, issued by the manufacturer and validated by the manufacturer's authorized inspection representative independent of the manufacturing department.

D. "3.2" Inspection Certificate - A document prepared by both the manufacturer's authorized inspection representative, independent of the manufacturing department, and either the Company nominated representative or the inspector designated by the official regulations in which they declare that the products supplied are in compliance with the requirements of the order and for which test results are supplied.
Additionally, Company has specified that all material product testing associated with "3.2" Inspection Certificates shall be performed in the presence of either a Company nominated representative or the inspector designated by the official regulations, and the resultant test report stamped as "Witnessed". Failure to adhere to this requirement may lead to rejection of all material(s) being qualified for production.

Traceability

E. Level I - Full Traceability - Material is uniquely identified and its history tracked from manufacture through stockists (where applicable) to manufacturer and to actual position on the equipment with specific location defined on a material placement record. (The traceability to a specific location only applies to skids / packaged equipment, not to bulks)

F. Level II - Type Traceability - manufacturer maintains a system to identify material throughout manufacture, with traceability to a material certificate.

G. Level III - Compliance Traceability - manufacturer maintains a system of traceability that enables a Declaration of Compliance to be issued by the manufacturer.

Annex C Factory acceptance test (FAT) requirements

C.1 Purpose

The primary purpose of the FAT is to demonstrate to the purchaser that the crane has been manufactured, and performs, in accordance with the specification.

The FAT enables minimization of the in-process quality surveillance by the purchaser.

The values recorded in the measurements assist with this verification, and provide baseline data to the client to aid future maintenance and fault-finding.

A successful FAT will minimize the time and effort required to conduct the site acceptance test (SAT).

C.2 FAT process

Details will vary; however, the elements of the FAT process should be consistent with this document.

The manufacturer is required to prepare and send the proposed FAT procedure to the purchaser for acceptance, suitable for the specific crane being tested and the test location. Insert or delete items and rows as necessary, depending on crane design. The procedure shall follow the guidance within this annex.

“Item Ref” is sequential numbering and should relate back to the relevant section.

The basic elements of a factory acceptance test

Manufacturer preparation

- Assemble, prepare and function test crane.
- Prepare test site, test equipment and information.

Information review

- All operating and maintenance information to be available.
- Material certificate review.

Assembly checks

- Visual inspection of assembled crane.
- Check tags and labels.

Running tests

- Check start and stop devices all functions, including speeds and responsiveness.
- Load, speed and continuous running tests.

Review results

- Assess results against specification.
- Agree actions before shipping and SAT.

C.3 Manufacturer FAT preparation

Before the FAT, the manufacturer shall:

- assemble the crane and complete the inspection;
- lubricate all mechanical components (including prime mover, bearings, winch and slew drive components, ropes, gear teeth, etc.) ready for use;
- function test the crane, including selected load lifting;
- prepare all test loads at the test site;
- ensure that all test equipment is ready;
- confirm in writing that the crane is ready for the FAT.

C.4 Test conditions

Testing conditions should mimic anticipated operating conditions as much as possible. Crane testing shall be stopped if there is a risk of lightning strike, where the wind speed is forecast to exceed the allowable limits (indicated on the load charts) or other conditions that could pose a risk to test personnel. Otherwise, testing should continue in any weather conditions that are possible during normal operating i.e. rain or extreme temperature.

The test area shall be ready before the FAT, including barriers and signage.

C.5 Test equipment

All equipment required to complete the FAT shall be supplied by the manufacturer and be appropriately certified and calibrated. This includes equipment to measure speed, distance, pressure, voltage, current and noise. Calibration certificates shall be available for review during the FAT.

C.6 Operating and maintenance information

The end-user operator and maintenance information shall be available during the FAT. This includes all operating, maintenance and parts manuals and circuit diagrams.

C.7 Conformance records and certificates

Before conducting any performance testing, all conformance records and certificates, including those identified in Annex B should be available. The purpose is not for the FAT inspector to validate the contents, but to confirm that all necessary quality activities have been completed and that there are no non-conformances. This information includes material and non-destructive (NDT) certificates, bolt torque and tension records, pressure test certificates, area classification certificates, key design calculations and hydraulic oil cleanliness.

C.8 Acceptance criteria

Code	Meaning	Explanation
P	**P**ass	Meets specification criteria.
A	**A**cceptable	Does not meet specification criteria but is acceptable (documentation to be updated as appropriate).
N	**N**ot Acceptable	Does not meet specification criteria but testing can proceed. Corrective action must be taken prior to shipping or SAT, as agreed.
F	**F**ail	Does not meet specification criteria and corrective action must be completed before proceeding further with FAT.

C.9 Assembly checks

This review is a visual inspection of the assembled crane. It includes checking tags and labels, access systems, leak identification, hydraulic and electric workmanship and fitting of machinery guards. All items shall be described in detail in the checklist.

C.10 Measurements

Measurements such as speed, distance, dimensions, pressure, voltage, current and noise are required to verify compliance to the specification and to provide baseline readings for future maintenance and fault finding.

The table is to record values measured before and during the FAT.

Measurements apply to both running and stationery situations, as described.

The manufacturer may submit selected verified measurement readings in other formats. This may include programmable logic controller (PLC) readings, printouts or electronic records from calibrated instruments. Where values from other calibrated systems are provided, these shall be included as an appendix to the FAT, to form a complete record of all results in one document.

The manufacturer is to include items in the checklist according to the specific crane type and design.

C.11 Running tests

The items listed do not need to be performed in the order listed. Many checks can be performed in a sequence preferred by the manufacturer, to suit conditions, if the requirements are met.

Running tests are done to demonstrate that the crane performs as per the specification. The tests enable the purchaser to confirm primarily that:

- the crane performance is satisfactory;
- the controls operate correctly;
- there are no leaks or other faults;
- the crane can operate continuously, under load, as anticipated on site;
- baseline data and settings have been recorded for future operations and maintenance use.

The running tests include lifting of loads, at speed, and in various combinations, to demonstrate various functions.

The manufacturer shall propose a procedure for testing of the gross overload protection system (GOPS) and constant tension system (CT), if fitted. Where the system is based on a previously validated design, the test procedure may be based on simulation, provided that the results validate the correct operation of the system. The procedure shall allow the purchaser to verify that the system complies with the requirements. This approach recognizes that these safety features rely on specific site conditions to initiate and function.

FACTORY ACCEPTANCE TEST RECORD

Project and Test Details				
Manufacturer			Purchaser	
Project Name			Project Number	
End Client			Facility Name	
Crane Model			Crane Serial Number	
Test Location			FAT Dates	
Personnel in attendance				
Name / Company			Name / Company	
Name / Company			Name / Company	
Name / Company			Name / Company	
Name / Company			Name / Company	
Other project information				

Acceptance criteria codes (refer to C.8 for explanation of codes)

P: Pass **A**: Acceptable **N**: Not Acceptable **F**: Fail

PREPARATION

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
C.3-1	Crane assembled and full inspection complete.				
C.3-2	Required lubrication complete. Tanks at correct level.				
C.3-3	Crane commissioned and function testing complete.				
C.3-4	Limits set: all motions.				
C.3-5	Test loads ready at test area.				
C.3-6	Test equipment ready.				
C.3-7	Crane ready for FAT.				
C.4-1	Test conditions are suitable.				
C.4-2	Test area ready, including barriers and signage.				
C.5-1	Test equipment suitable and ready.				

INFORMATION

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
C.6-1	Installation, operation and maintenance manual is available and complete, with all requirements described in the specification.				
C.6-2	Hydraulic and electric circuit diagrams available.				
C.6-3	General arrangement, assembly drawings and parts manuals available.				
C.6-4	Recommended maintenance checklists and procedures available.				
C.6-5	Failure mode and effect analysis (FMEA) available.				

CONFORMANCE RECORDS AND CERTIFICATES

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
C.7-1	Material and NDT Certificates.				
C.7-2	Bolt torque and tension records.				
C.7-3	Pressure test certificates (pressure vessels, hydraulic hoses & tubing).				
C.7-4	Area classification certificates.				
C.7-5	Function speed and prime mover power calculations.				
C.7-6	Hydraulic oil cleanliness certificates				

ASSEMBLY CHECKS

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
C.9-1	Components correctly tagged and labelled.				
C.9-2	Walkways, ladders, handrails and machinery guards are in place and secure.				
C.9-3	Machine surrounds are clean and free from oil and grease. No evidence of leaks.				
C.9-4	All lubrication points and all components requiring inspection and maintenance do not require special means to access.				
C.9-5	No potential dropped objects. Secondary retention systems secure.				
C.9-6	Adjustable slew backlash system fitted.				
C.9-7	Lifting points permanently marked with identification and safe working load.				
C.9-8	Hydraulic hoses protected, including end fittings.				

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
C.9-9	Electrical cables, wiring, junction boxes and glands fitted correctly.				
C.9-10	All machinery guards are fitted.				
C.9-11	Operator cabin meets specification requirements. Fully enclosed and weatherproof, correct minimum dimensions. Separate emergency escape. Dimmable lighting. HVAC unit. Adjustable operator seat and trainer seat. Correct windows, wipers and washers.				
C.9-12	Crane and pedestal adaptor includes brackets for slew bearing jacking, as per datasheet.				
C.9-13	No water collection areas, potential corrosion.				
C.9-14	Demonstration of PLC data download procedure.				

MEASUREMENTS

[Note: backlash measurements on winches apply to open pinion / gear winch designs only, not internal components]

CAS	Item Ref	Component / System	Values (include units)		Code (P, A, N or F)		Note
			Design	Measured	Manufacturer	Purchaser	
ABC	C.10-1	Pinion / gear backlash: Hoist winch drive 1	mm				
ABC	C.10-2	Pinion / gear backlash: Hoist winch drive 2	mm				
ABCD	C.10-3	Pinion / gear backlash: slew drive 1	mm				
ABCD	C.10-4	Pinion / gear backlash: slew drive 2	mm				
ABC	C.10-5	Pinion / gear backlash: Luff drive 1	mm				
ABC	C.10-6	Pinion / gear backlash: Luff drive 2	mm				
ABCD	C.10-7	Main hoist up speed, max number of falls, no load. 10 m	s				
ABCD	C.10-8	Main hoist up speed, max falls, max load. 10 m	s				
ABCD	C.10-9	Main hoist down speed, max falls, max load. 10 m	s				
AB	C.10-10	Main hoist up speed, min falls. 10 m	s				
ABCD	C.10-11	Aux hoist up speed, single fall, no load. 10 m	s				
ABCD	C.10-12	Aux hoist up speed, single fall, max load. 10 m	s				
ABCD	C.10-13	Aux hoist down speed, single fall, max load. 10 m	s				

CAS	Item Ref	Component / System	Values (include units)		Code (P, A, N or F)		Note
			Design	Measured	Manufacturer	Purchaser	
ABCD	C.10-14	Luff in, no load, maximum to minimum radius.	s				
ABCD	C.10-15	Luff out, no load, minimum to maximum radius.	s				
ABC	C.10-16	Luff in, max hoist load on hook, maximum radius to ~12 m radius.	s				
AB	C.10-17	slew, 1 revolution - right	s				
AB	C.10-18	slew, 1 revolution - left	s				
AB	C.10-19	Knuckle maximum to minimum extension, no load.	s				
AB	C.10-20	Knuckle minimum to maximum extension, no load.	s				
ABC	C.10-21	Noise level, in cabin, prime mover running, no motions. HVAC operating.	dB(A)				
ABC	C.10-22	Noise level, in cabin, full speed luff up, full speed main hoist up with maximum load. HVAC operating.	75 dB(A)				
ABC	C.10-23	Noise level, 1 m from machinery house, full speed luff up, full speed main hoist up with maximum load.	85 dB(A)				
ABCD	C.10-24	Maximum load (main hoist).	t				
ABCD	C.10-25	Maximum load (auxiliary hoist).	t				
ABCD	C.10-26	Record ambient temperature during continuous running test.		°C			

RUNNING TESTS

CAS	Item Ref	Description	Date	Code (P, A, N or F)		Note
				Manufacturer	Purchaser	
ABCD	C.11-1	Prime mover start and stop devices function correctly, including all emergency stops.				
ABCD	C.11-2	PLC/RCL: All load charts and alarms function correctly.				
ABCD	C.11-3	PLC/RCL: Operator interfaces function correctly.				
ABCD	C.11-4	Check correct operation of personnel lifting mode, when selected.				
ABCD	C.11-5	All motion limits function correctly (up/down, in/out, left/right).				
ABCD	C.11-6	RCL calibrated correctly, all hoists. Record values in MEASUREMENTS section.				
ABCD	C.11-7	Crane motions are smooth, progressive, predictable and proportional to control lever movements.				
AB	C.11-8	Confirm that maximum response times comply with EN 13852-1, Table 2.				
ABCD	C.11-9	Wire rope spooling is correct for all operating variations: no-load and loads, all speeds.				

CAS	Item Ref	Description	Date	Code (P, A, N or F)		Note
				Manufacturer	Purchaser	
ABCD	C.11-10	Hook block storage and impact protection adequate. No fouling of hooks and ropes.				
ABCD	C.11-11	GOPS functions correctly (manufacturer define testing procedure).				
ABCD	C.11-12	CT functions correctly (manufacturer define testing procedure).				
AB	C.11-13	Stall test (brake hold): main hoist winch.				
AB	C.11-14	Stall test (brake hold): aux hoist winch.				
AB	C.11-15	Stall test (brake hold): luff winch.				
AB	C.11-16	Stall test (brake hold): swing.				
ABCD	C.11-17	All lights are fitted and working: access lights, flood lights, aviation lights.				
ABCD	C.11-18	Main hoist up and down max load (max falls), full hoist speed. Record values in MEASUREMENTS section.				
ABCD	C.11-19	Aux hoist up and down max load (max falls), full hoist speed. Record values in MEASUREMENTS section.				
ABCD	C.11-20	Luff in & out full speed with max radius rated capacity on hook, full range. Record values in MEASUREMENTS section.				
ABC	C.11-21	Combined hoisting, luffing and swinging under full load, to demonstrate datasheet power compliance and control responsiveness.				
ABCD	C.11-22	All emergency functions operate as per specification and datasheet requirements.				
AB	C.11-23	Overload tests to be proposed, according to specification and datasheet.				
AB	C.11-24	4 h continuous running test, following guideline described below. Ensure no leaks, abnormal temperatures or unacceptable functions.				
C	C.11-25	2 h continuous running test, following guideline described below. Ensure no leaks, abnormal temperatures or unacceptable functions.				
D	C.11-26	1 h continuous running test, following guideline described below. Ensure no leaks, abnormal temperatures or unacceptable functions.				

CONTINUOUS RUNNING TEST GUIDELINE

Minor changes may be made to suit different crane types.

Load should be approximately 50 % of maximum rated onboard capacity at maximum radius.

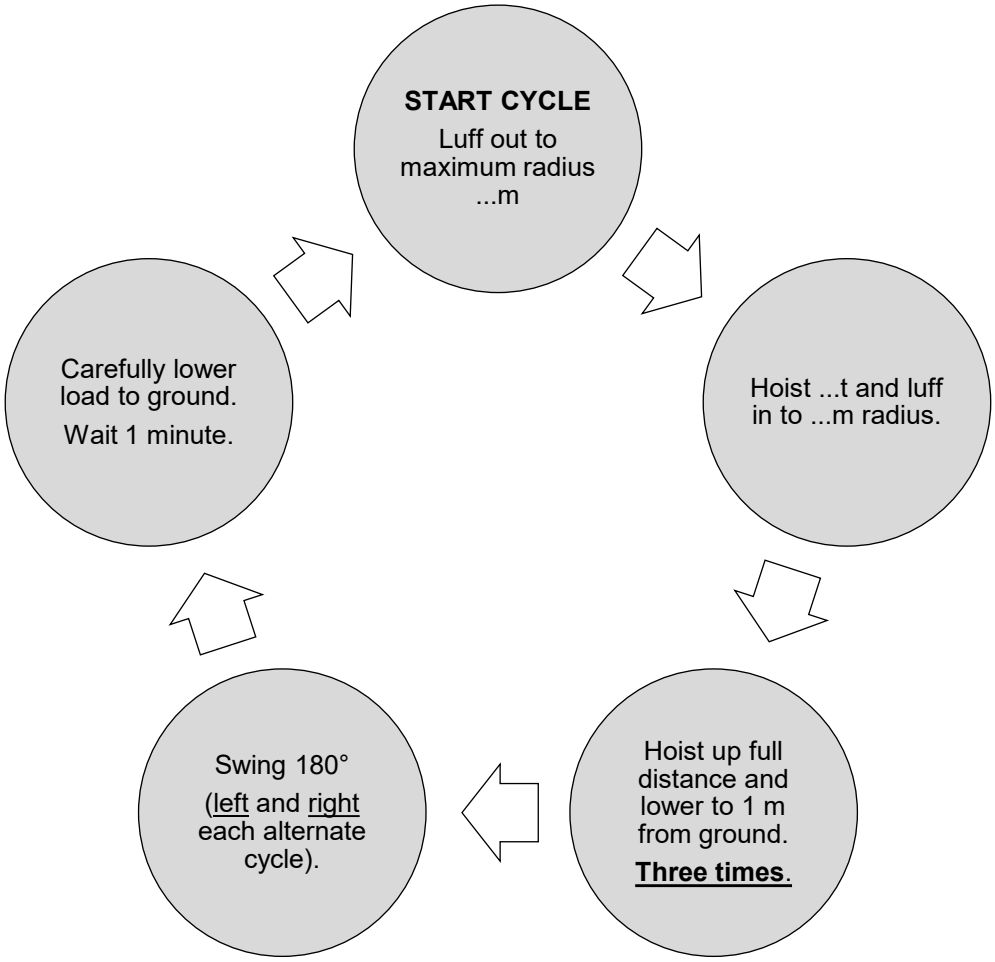
Luff in radius is a mid-radius, approximately 30 % of maximum radius.

Each hour the test should be paused for five minutes for the crane operator and test team to take a break.

If the continuous running test is suspended once underway, due to technical issues, then the test may have to be restarted, at the discretion of the purchaser.

The manufacturer is to ensure that all test personnel are appropriately qualified and competent.

Steps:



NOTES

Note	Item Ref	Comment	Punch List (Y/N/NA)

PUNCH LIST

Note	Action	Actionee	Agreed date

Annex D Site acceptance test (SAT) requirements

D.1 Purpose

The purpose of the SAT is to verify that the crane:

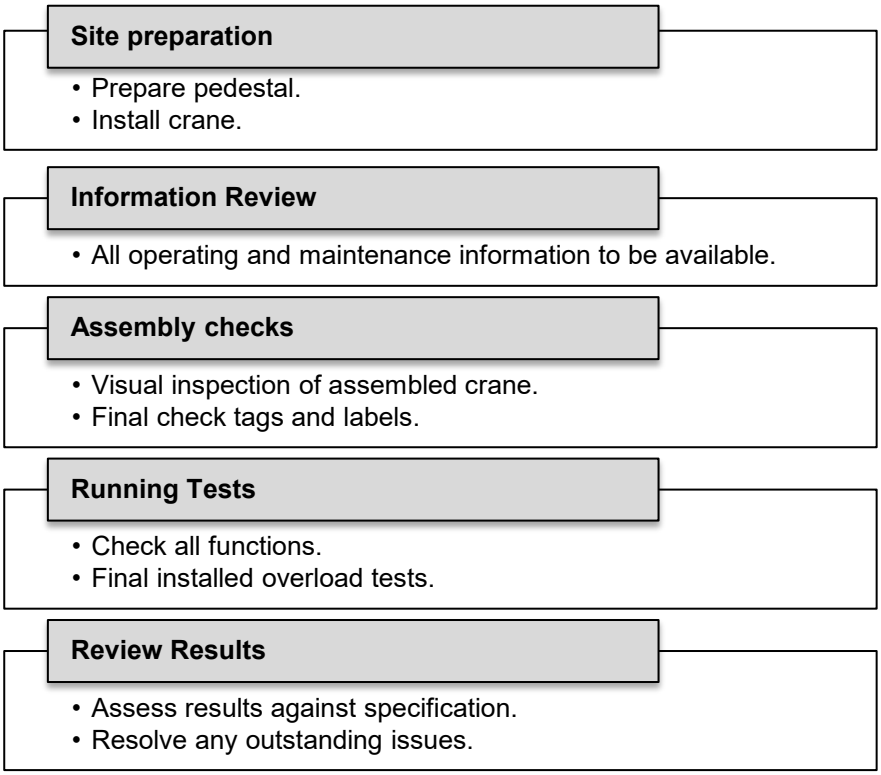
- has been installed correctly on its site pedestal;
- is fully commissioned and ready for use;
- meets specified independent verification requirements.

D.2 SAT process

Details will vary; however, the elements of the SAT process should be consistent with this document.

The manufacturer is required to prepare and send the proposed SAT procedure to the purchaser for acceptance, suitable for the specific crane being tested and the test location. This procedure shall follow the guidance within this annex.

The basic elements of a site acceptance test



D.3 SAT preparation

Before the SAT, the purchaser shall:

- install the crane on its pedestal, using the manufacturer's recommendations;
- prepare all test loads at the test site;

- ensure that all test equipment is ready;
- ensure that all shipping materials have been removed (packing, etc.) and that no deterioration or damage has occurred to the crane from transport to site.

D.4 Test conditions

Crane testing shall be stopped if there is a risk of lightning strike, where the wind speed is forecast to exceed the allowable limits (indicated on the load charts), other conflicting site activities or other conditions that could pose a risk to test personnel.

The site shall be ready before the SAT, including barriers and signage.

D.5 Test equipment

All equipment required to complete the SAT shall be supplied by the manufacturer, unless otherwise agreed by the user, and be appropriately certified and calibrated. This includes equipment to measure speed, distance, pressure, voltage and current.

D.6 Operating and maintenance information

The typical information available to the end-user operator and maintenance technicians shall be available during the SAT. This includes all operating, maintenance and parts manuals and circuit diagrams.

D.7 Conformance records and certificates

Copies of all information must be available at the SAT, but these should already have been reviewed before the SAT itself.

D.8 Acceptance criteria

Code	Meaning	Explanation
P	**P**ass	Meets specification criteria.
A	**A**cceptable	Does not meet specification criteria but is acceptable (documentation to be updated as appropriate).
N	**N**ot Acceptable	Does not meet specification criteria but testing can proceed. Corrective action must be taken prior to shipping or SAT, as agreed.
F	**F**ail	Does not meet specification criteria and corrective action must be completed before proceeding further with SAT.

D.9 Assembly checks

This review is a visual inspection of the assembled crane. It includes verifying no transport damage, including leak identification. All items shall be described in detail in the checklist.

D.10 Measurements

The table is to record values measured during the SAT.

Measurements apply to both running and stationery situations, as described.

The manufacturer is to include items in the checklist according to the specific crane type and design.

D.11 Running tests

The items listed do not need to be performed in the order listed. Many checks can be performed in a sequence to suit conditions, as long as the requirements are met.

Running tests are done to demonstrate that the crane performs as per the specification. The tests enable the purchaser to confirm primarily that the crane:

- has been transported, installed and commissioned correctly;
- performance is satisfactory;
- limits and other settings are set as per final operating requirements.

The running tests include lifting of loads, at speed, to demonstrate various functions.

SITE ACCEPTANCE TEST RECORD

Project and Test Details				
Manufacturer			Purchaser	
Project Name			Project Number	
End Client			Facility Name	
Crane Model			Crane Serial number	
Test Location			SAT Dates	
Personnel in attendance				
Name / Company			Name / Company	
Name / Company			Name / Company	
Name / Company			Name / Company	
Name / Company			Name / Company	
Other project information				

Acceptance criteria codes (refer to C.8 for explanation of codes)

P: Pass **A**: Acceptable **N**: Not Acceptable **F**: Fail

PREPARATION

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
D.3-1	Crane assembled and full inspection complete.				
D.3-2	Required lubrication complete. Tanks at correct level.				
D.3-3	Crane commissioned and function testing complete.				

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
D.3-4	Limits set: all motions.				
D.3-5	Test loads ready at test area.				
D.3-6	Test equipment ready.				
D.3-7	Crane ready for SAT.				
D.4-1	Test conditions are suitable.				
D.4-2	Test area ready, including barriers and signage.				
D.5-1	Test equipment suitable and ready.				

INFORMATION

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
D.6-1	Installation, operation and maintenance manual is available.				
D.6-2	Hydraulic and electric circuit diagrams available.				
D.6-3	General arrangement, assembly drawings and parts manuals available.				
D.6-4	Recommended maintenance checklists and procedures available.				

CONFORMANCE RECORDS AND CERTIFICATES

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
D.7-1	All information available from completed FAT.				
D.7-2	Bolt torque and tension records (site installation).				

ASSEMBLY REVIEW

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
D.9-1	Components correctly tagged and labelled.				
D.9-2	Walkways, ladders, handrails and machinery guards are in place and secure.				
D.9-3	Machine surrounds are clean and free from oil and grease. No evidence of leaks.				
D.9-4	No potential dropped objects.				
D.9-5	Inspect major load path structural components.				

Item Ref	Description	Date	Code (P, A, N or F)		Note
			Manufacturer	Purchaser	
D.9-6	Check hoist and luff ropes, and/or boom cylinders and hook blocks.				
D.9-7	Hydraulic hoses protected, including end fittings.				
D.9-8	Electrical cables, wiring, junction boxes and glands fitted correctly.				
D.9-9	All machinery guards are fitted.				
D.9-10	Demonstration of PLC data download procedure.				

MEASUREMENTS

CAS	Item Ref	Component / System	Values (include units)		Code (P, A, N or F)		Note
			Design	Measured	Manufacturer	Purchaser	
ABCD	D.10-1	Slew bearing clearance measurements (4 points North, South, East, West, boom max / min)	mm				
ABCD	D.10-2	Overload test (max rated capacity + overload at maximum radius)	t				
ABCD	D.10-3	Overload test main hoist (max rated capacity)	t				
ABCD	D.10-4	Overload test aux hoist (max rated capacity)	t				
ABCD	D.10-5	Record ambient temperature during continuous running test.		°C			

RUNNING TESTS

CAS	Item Ref	Description	Date	Code (P, A, N or F)		Note
				Manufacturer	Purchaser	
ABCD	D.11-1	Prime mover start and stop devices function correctly, including all emergency stops.				
ABCD	D.11-2	PLC and rated capacity limiter (RCL): all load charts, alarms and operator interfaces function correctly.				
ABCD	D.11-3	All motion limits function correctly (up down, in/out, left/right).				
ABCD	D.11-4	Rope layers confirmed correctly tensioned prior to lifting of loads.				
ABCD	D.11-5	RCL calibrated correctly, all hoists. Record values in MEASUREMENTS section.				
ABCD	D.11-6	Crane motions are smooth, progressive, predictable and proportional to control lever movements.				
ABCD	D.11-7	Wire rope spooling is correct for all operating variations: no-load and loads, all speeds.				
ABCD	D.11-8	All lights are fitted and working: access lights, flood lights, aviation lights.				

CAS	Item Ref	Description	Date	Code (P, A, N or F)		Note
				Manufacturer	Purchaser	
ABC	D.11-9	Combined hoisting, luffing and slewing under full load, to demonstrate datasheet power compliance, control responsiveness and site power supply (electric prime mover/electric cranes).				
ABCD	D.11-10	All emergency functions operate as per specification and datasheet requirements.				
ABCD	D.11-11	30 min continuous running test, following guideline described below. Ensure no leaks, abnormal temperatures or unacceptable functions.				

CONTINUOUS RUNNING TEST GUIDELINE

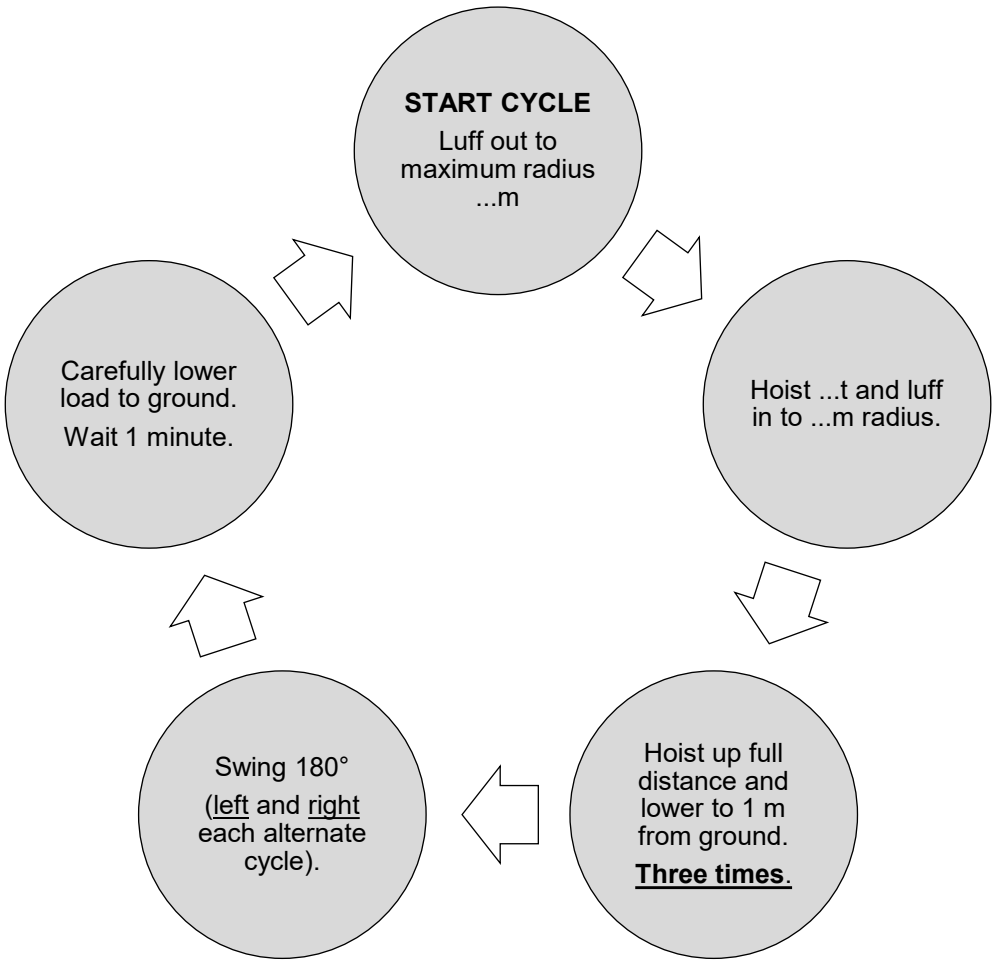
Minor changes may be made to suit different crane types and site conflicting activities or restrictions.

Load should be approximately 25 % - 50 % of maximum rated on-board capacity at maximum radius.

Luff in radius is a mid-radius, approximately 30 % of maximum radius.

If the continuous running test is suspended once underway, due to technical issues, then the test may have to be restarted, at the discretion of the purchaser.

Steps:



NOTES

Note	Item Ref	Comment	Punch List (Y/N/NA)

PUNCH LIST

Note	Action	Actionee	Agreed date

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