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Inspection Guidelines

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TADANO

European Operations

TADANO FAUN GmbH
Faunberg 2
91207 Lauf an der
Pegnitz

TADANO DEMAG GmbH
Europa Allee 2
66482 Zweibrücken

TADANO DEMAG GmbH
Dinglerstraße 26
66482 Zweibrücken

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Last Author Markus Herz

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1. Foreword

This guideline is intended to ensure and maintain the product quality of purchased parts for Tadano Demag GmbH and Tadano Faun GmbH, hereinafter referred to as TADANO.

It defines and explains all quality-related requirements, methods, and tools pertaining to the inspection of purchased parts.

2. Scope

An inspection guideline is a higher-level regulation that takes precedence over all subordinate general and specific requirements.

The hierarchy of all contractual documents is listed below:

Contracts

1. Master contract
2. Quality assurance agreement
3. Purchase contract, Work contract

Contract documents:

4. Quality guidelines/Inspection guidelines
(overarching guidelines for cooperation with suppliers)
5. Technical drawings
(specific requirements for the manufacture, testing, and properties of purchased parts)
6. Technical specifications/requirements
(Specific requirements for the manufacture, testing, and properties of purchased parts)
7. Technical standards
(General Requirements for the Manufacture, Inspection, and Properties of Purchased Parts)

The contractual documents underlying the contract serve as the binding basis for assessing the quality and compliance with the specifications of the contractual items.

3. Monitoring of measuring and testing equipment

Measuring and testing equipment in use must be subject to regular monitoring and calibration. Damaged or expired measuring and testing equipment must be stored separately (quarantine) or disposed of at all times.

4. Test Planning / Test Concept

The basis for ensuring product quality is a supplier's testing concept that covers all process steps. All process steps must be designed with the goal of preventing defects. From the receipt of raw materials to the shipment of a finished product, sufficient testing steps must be implemented to ensure product quality. The minimum scope of a testing concept is defined below:

- Commercial and technical incoming goods inspections
- In-process inspections
- Final inspections
- Regular internal audits

5. First article / production part

Definition of a first-article sample:

Initial sample parts are components manufactured by the supplier using standard production equipment and under standard production conditions; they must always be validated through a full inspection for process validation and product approval. Successful inspection and evaluation of initial samples, along with their documentation by TADANO Quality Management, results in the granting of production approval.

See Appendix A:

Testing Guidelines – Appendix A (First Article Inspection Cover Sheet)

Definition of a production part:

Production parts are components or assemblies that are manufactured entirely by the supplier using standard production equipment and under standard production conditions. To maintain product quality, production parts are subjected to a random inspection by TADANO Quality Management upon receipt of goods.

6. Inspections and Documentation

In principle, an adequate and prompt inspection of incoming goods requires the immediate provision of the contract items and the inspection documentation.

6.1. Submission of Inspection Documentation

Test documentation for initial samples and production parts must be submitted electronically to TADANO Quality Management (pap-supplierquality@tadano.com) in the file formats listed below:

- Microsoft Word (.docx)
- Microsoft Excel (.xlsx)
- Microsoft PowerPoint (.pptx)
- Adobe Acrobat Document (.pdf)

If inspection documentation is submitted in other file formats, the documentation will be deemed not to have been delivered. For large volumes of data, TADANO Quality Management may arrange with the supplier to transmit the data via available IT programs.

6.2. Type and Scope of Inspections

The type and scope of inspections for the delivery of initial samples and production parts are defined according to the following classification into quality classes. All necessary inspections and documentation in accordance with the contracts, specifications, technical drawings, and for the release of the contractual items must be performed and documented. The requirements described here by TADANO Quality Management are defined as the minimum scope.

In special or exceptional cases, a testing standard must be defined that describes the required performance and certification of tests for the release of the contract items.

Inspection of Welded Structures

Quality Class:	Contract Item (Component)					
QK1	Unmachined welded structures weighing less than 50 kg made of steel or aluminum, cladding parts made of steel or aluminum					
QK2	Machined welded structures weighing less than 50 kg, made of steel or aluminum					
QK3	Welded structures weighing ≥ 50 kg made of steel or aluminum					
Testing/Documentation	First article			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		0	0	0	0	0
List of subcontractors		0	X	0	0	0
Firing sequence plan / Box plan		0	0	0	0	0
Welding Qualification (WPQ)		0	0	0	0	0
Welding Procedure Specification (WPS)		0	0	0	0	0
Welding sequence plan		0	0	0	0	0
Quality Control Plan / Test Plan		0	X	0	0	0
List of welding consumables		0	0	0	0	0
Proof of volumetric testing (UT, RT) if required		0	X	0	0	0
Proof of surface crack testing (MT, PT) if required		0	X	0	0	0
Evidence of visual inspection (VT)		0	X	0	0	0
Measurement report (per series, batch, or lot)		X	X	0	0	0
Technical drawing with inspection features (per series, batch, or lot)		X	X	0	0	0
Functional test (support beams in frame)		0	0	0	0	0
Material Data Sheets for Coating Systems		0	0	0	0	0
Test report on surface roughness (blasted components)		0	0	0	0	0
Test Report: Cross-hatching (primed components)		0	0	0	0	0
Test report for coating thickness measurement (primed/painted components)		0	X	0	0	0
Test report on gloss level (painted components)		0	0	0	0	0

Table 1: Inspection/Documentation of Welded Structures

Marking X: Submission of documentation upon delivery of the contract item.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of Sheet Metal Blanks

Quality Class:	Contract item (component)					
QK1	Unmachined sheet metal blanks (with and without weld seam preparation), folded sheet metal blanks; sheet metal blanks with holes/threads					
QK2	Mechanically machined sheet metal blanks (milling, turning)					
QK3	Extension plates					
Inspection/Documentation	First-article sample			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		○	○	○	○	○
Firing sequence plan / Box plan		○	○	○	○	○
Quality Control Plan / Test Plan		○	○	○	○	○
Proof of ultrasonic testing (UT)		○	○	○	○	○
Evidence of visual inspection (VT)		○	○	○	○	○
Measurement report (per series, batch, or lot)		X	X	○	○	○
Dimension Report (Flatness, Angularity)		X	X	○	○	○
Technical drawing with inspection features (per series, batch, or lot)		○	○		○	○
Surface roughness test report (blasted components)		○	○	○	○	○

Table 2: Inspection/Documentation of Sheet Metal Blanks

Marking X: Submission of documentation upon delivery of the contract item.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of Electrical and Electronic Components

Quality class:	Subject of the contract (component)					
QK1	Light bulbs, headlights, lamps, heaters, switches, relays, other sensors, other instruments, standard wiring harnesses (catalog items), display screens, camera systems, cables, contacts, connectors					
QK2	Custom wiring harnesses, electrical control units, position sensors, smart displays (HMI), heating and air conditioning units, slip ring assemblies					
QK3	CAN SIL2 – Sensors, CAN SIL2 – Instruments					
Testing/Documentation	First-article part			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Visual Inspection Certificate (VT)		X	X	○		
Dimension report (per series, batch, or lot)		X	X	○		
Test report for pressure test / leak test (per series, batch, or lot)		X	X	○	○	○
Proof of ozone resistance (per series, batch, or lot)		○	X	○	○	○
Proof of UV resistance (per series, batch, or lot)		○	X	○	○	○
Functional Test Report		X	X	○	○	○
Quality Control Plan / Test Plan		X	X	○	○	○
Salt spray test		○	X	○	○	○
EMC/EMP Certification		○	X	○	○	○
Material Data Sheet (per series, batch, or lot)		X	X	○	○	○
Safety Data Sheet (per series, batch, or lot)		○	X	○	○	○

Table 3: Scope of testing for electrical and electronic components

Marking X: Submission of documentation upon delivery of the subject matter of the contract.

Marking O: Submission of documentation upon request by TADANO Quality Management.

Testing of hydraulic/pneumatic components

Quality class:	Subject of the contract (component)					
QK1	Hydraulic control valves (standard parts), pneumatic control valves (standard parts), hydraulic steering gears, rotary actuators					
QK2	Hydraulic control valves (specifically configured), pneumatic control valves (specifically configured), hydraulic control blocks, hydraulic motors and pumps					
QK3	Hydraulic check valves, Pneumatic check valves					
Testing/Documentation	First Article			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		O	O			
Visual inspection report (VT)		O	O	O	O	O
Measurement report (per series, batch, or lot)		O	X			
Technical drawing with inspection features (per series, batch, or lot)		X	X	O	O	O
Test report for coating thickness measurement (if painted)		X	X			
Test report for pressure testing / leak testing (per series, batch, or lot)		O	X		O	O
Proof of purity (per series, batch, or lot)		O	O			
Functional test report		X	X			
Quality Control Plan / Test Plan		X	X			
Material Data Sheet (per series, batch, or lot)		X	X	O	O	O
Safety Data Sheet (per series, batch, or lot)		X	X	O	O	O

Table 4: Scope of testing for hydraulic/pneumatic components

Marking X: Submission of documentation upon delivery of the subject matter of the contract.

Marking O: Submission of documentation upon request by TADANO Quality Management.

Inspection of hydraulic/pneumatic connecting elements

Quality Class:	Contract Item (Component)					
QK1	Standard couplings (stock items), standard fittings (stock items)					
QK2	Pre-assembled suction hose, pre-assembled pressure hose, suction hose (raw material), pressure hose (raw material) Pre-assembled pipe, pipe (raw material), brazed fittings					
QK3						
Testing/Documentation	Initial sample part			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		O			O	
Soldering qualification		O			O	
Dimension report (per series, batch, or lot)		X			O	
Technical drawing with inspection features (per series, batch, or lot)		X			O	
Inspection report for coating thickness measurement (per series, batch, or lot)		X			O	
Test report for pressure testing / leak testing (per series, batch, or lot)		X			O	
Proof of ozone resistance (per series, batch, or lot)		X			O	
Proof of UV resistance (per series, batch, or lot)		X			O	
Proof of purity (per series, batch, or lot)		O		O	O	
Functional Test Report		X			O	
Quality Control Plan / Test Plan (per series, batch, or lot)		O			O	
Material data sheet (per series, batch, or lot)		X		O	O	
Safety Data Sheet (per series, batch, or lot)		X			O	

Table 5: Scope of testing for hydraulic/pneumatic fasteners

Marking X: Submission of documentation upon delivery of the subject matter of the contract.

Marking O: Submission of documentation upon request by TADANO Quality Management.

Inspection of hydraulic/pneumatic cylinders

Quality Class:	Contract Item (Component)					
QK1						
QK2	Other hydraulic cylinders, Other pneumatic cylinders					
QK3	Telescopic, rocker, support, steering, counterweight, and suspension cylinders					
Testing/Documentation	First-article part			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		O	X			O
Welding Qualification (WPQ)		O	X			O
Welding Procedure Specification (WPS)			O			O
Welding sequence plan			O			O
List of welding consumables			O			O
Evidence of visual inspection (VT)			O			O
Dimension report (per series, batch, or lot)		X	X		O	O
Technical drawing with inspection features (per series, batch, or lot)		X	X		O	O
Test report for coating thickness measurement (if painted)			X			O
Test report for pressure testing / leak testing (per series, batch, or lot)		X	X		O	O
Proof of purity (per series, batch, or lot)		O	X			O
Functional Test Report		X	X		O	O
Quality Control Plan / Test Plan		X	X		O	O
Material data sheet (per series, batch, or lot)		X	X		O	O
Safety data sheet (per series, batch, or lot)		X	X		O	O

Table 6: Testing/Documentation of Hydraulic/Pneumatic Cylinders Marking X: Submission of documentation upon delivery of the subject matter of the contract.

Marking O: Submission of documentation upon request by TADANO Quality Management.

Inspection of fluid containers/pressure vessels

Quality Class:	Contract Item (Component)					
QK1	Plastic liquid containers, seamed liquid containers, other liquid containers					
QK2	Welded steel or aluminum oil tanks					
QK3	Welded fuel tanks made of steel or aluminum, air tanks					
Testing/Documentation	First-article part			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		o	o	o	o	o
Quality Control Plan / Test Plan		o	o		o	o
Measurement report (per series, batch, or lot)		o	x	o	o	o
Test report on surface roughness (blasted components)			o			
Test report for coating thickness measurement (primed/painted components)		o	x		o	o
Test report for gloss level (painted components)		o	o		o	o
Functional Test Report		o	o	o	o	o
Test report for pressure testing / leak testing (per series, batch, or lot)		x	x	o	o	o
Verification of purity requirements		x	x		o	o

Table 7: Scope of testing for liquid containers/pressure vessels

Mark X: Submission of documentation upon delivery of the subject matter of the contract.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of Wheels, Tires, and Rims

Quality Class:	Contract Item (Component)					
QK1	Tires, tires as part of wheels					
QK2	-					
QK3	Rims, rims as part of wheels					
Testing/Documentation	First-article part			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1			○			
Quality Control Plan / Test Plan			○	○		○
Measurement report (per series, batch, or lot)			○			
Surface roughness test report (blasted components)			○			
Test report for coating thickness measurement (primed/painted components)						
Test Report on Gloss Level (Painted Components)			○			
Test report for functional testing			X	○		○

Table 8: Scope of inspection for wheels, tires, and rims

Marking X: Submission of documentation upon delivery of the subject matter of the contract.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of Forged or Rolled Components

Quality Class:	Contract Item (Component)					
QK1	Forged rings with $R_{p0.2}$ yield strength < 690 MPa, bolts with $R_{p0.2}$ yield strength < 690 MPa, rolled tubes					
QK2	Forged rings with $a_{0.2\%}$ yield strength \geq 690 MPa, bolts with $a_{0.2\%}$ yield strength \geq 690 MPa					
QK3	Machined slewing rings, forged clevises					
Testing/Documentation	Initial sample part			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		X	X	O	O	O
Quality Control Plan / Test Plan		O	O	O	O	O
Dimension Report		O	X	O	O	O
Dimension Report (Gear Teeth and Fits)			X			O
Proof of forging degree		X	X	O	O	O

Table 9: Scope of testing for forged and rolled components

Marking X: Submission of documentation upon delivery of the contractual item.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of cast components

Quality Class:	Contract Item (Component)					
QK1	Other steel castings with $R_{p0.2}$ yield strength < 690 MPa					
QK2	Cast counterweights					
QK3	Cast steel components with a yield strength of ≥ 690 MPa at 0.2% elongation, cast clevises, cast rope winches					
Testing/Documentation	First article			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1		O	X	O	O	O
Quality Control Plan / Test Plan		O	O			O
Measurement report (per series, batch, or lot)		X	X		O	O
Weighing log		X			O	
Proof of volume testing (UT, RT) if required			X			O
X-ray inspection (if required)			X			O

Table 10: Scope of inspection for cast components

Marking X: Submission of documentation upon delivery of the contract item.

Marking O: Submission of documentation upon request by TADANO Quality Management.

Testing of Screws

Quality class:	Subject of the contract (component)					
QK1	Screws with a strength class ≤ 10.9					
QK2						
QK3	Bolts with a strength class > 10.9					
Inspection/Documentation	Initial sample			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1			X	O		O
Dimension report (per series, batch, or lot)			O			O
Coating test report (per series, batch, or lot)			X	O		O

Table 11: Scope of testing for screws

Marking X: Submission of documentation upon delivery of the contract item.

Marking O: Submission of documentation upon request by TADANO Quality Management.

Inspection of Ropes and Lifting Slings

Quality class:	Subject of the contract (component)					
QK1	Other ropes					
QK2						
QK3	Crane ropes (hoisting ropes, retraction ropes, swing ropes, intermediate ropes, auxiliary ropes, pulling ropes, runner ropes, top-up ropes, retaining ropes), fall protection ropes, load hooks, slings, lower blocks					
Testing/Documentation	First-article inspection			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Certificates / Type Approval Certificate 3.1			X	O		X
Quality Control Plan / Test Plan			O			O
Dimension Report (Diameter & Length)			X			O
Functional test report (rope tensile test)			X	O		O
Test report for functional testing (fitting tensile test)			X	O		O

Table 12: Scope of testing for ropes and slings

Marking X: Submission of documentation upon delivery of the subject matter of the contract.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of Other Components

Quality Class:	Subject of the contract (component)					
QK1	Catalog items, insulation material, panes (glass), other Kanban parts					
QK2	-					
QK3						
Inspection/Documentation	First Article			Production part		
	QK1	QK2	QK3	QK1	QK2	QK3
Acceptance Test Certificate 3.1				O		
Dimension report (per series, batch, or lot)				O		
Functional test report (per series, batch, or lot)				O		

Table 13: Scope of testing for other components

Mark X: Submission of documentation upon delivery of the subject matter of the contract.

Mark O: Submission of documentation upon request by TADANO Quality Management.

Inspection of mechanical components (functional parts)

Quality Class:	Subject of the contract (component)
QK1	Seats
QK2	Engines, transmissions, radiators, exhaust systems, eddy current brakes, energy chains, exhaust pipes
QK3	Vehicle axles, wheel brakes, cab, upper structure cab, steering linkage, lattice mast structures with attachments

For the components listed above, the scope of testing and documentation for initial samples and production parts shall be determined by TADANO Quality Management on a case-by-case basis.

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