

Quality Overview

Testing methods, documentation and certifications at Nirotec GmbH & Co. KG

Scope:	Manufacturing, procurement and supply of pipe fittings, flanges and special-form components
Certifications:	DIN EN ISO 9001 · AD 2000 (W0/HP0) · PED 2014/68/EU · ISO 19443 (Nuclear)
Test certificates:	EN 10204 Type 2.2 / 3.1 / 3.2 · NDT per customer specification · PMI
External inspections:	TÜV · SGS · Bureau Veritas · Lloyd's Register · Customer representatives
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1 Introduction

This overview describes the quality management systems, testing methods, documentation standards and inspection processes applied by Nirotec in the manufacturing and supply of pipe fittings. It serves as a basis for technical coordination with customers, EPC contractors and project partners.

Nirotec manufactures and supplies pipe fittings (elbows, tees, reducers, caps) as well as flanges and special-form components from a broad range of materials – from carbon steel through stainless steel and duplex up to nickel-based alloys. Quality and traceability are not an additional service but an integral part of every delivery.

2 Certifications & Quality Management

Nirotec's quality management system is certified and accredited according to the following international standards and regulations:

Certification / Regulation	Scope	Relevance for the customer
DIN EN ISO 9001	Manufacturing, procurement, supply	Documented QM system · audits · continuous improvement
AD 2000 (W0 / HP0)	Pressure-bearing components per German regulations	Approval for pressure vessels and piping in accordance with AD 2000
PED 2014/68/EU	Pressure equipment for the European market	CE marking · categorisation by pressure and medium
ISO 19443	Nuclear sector – supply chain of nuclear facilities	Qualified supply chain for nuclear components

ISO 19443: Nirotec is certified to ISO 19443 and is therefore recognised as a qualified supplier for nuclear applications. The certification covers specific requirements on traceability, documentation and process control.

3 Testing Methods

All testing methods applied at Nirotec are aligned with the relevant product standards (EN 10253, ASME B16.9 etc.), the AD 2000 code as well as customer-specific inspection and test plans (ITP). Testing scopes are defined and documented on a project basis.

3.1 Visual and Dimensional Inspection

Inspection type	Method / Standard	Application
Visual inspection	EN ISO 17637 · ASME V Art. 9	100 % of all delivered parts – surface, marking, geometry
Dimensional check	Per drawing / EN 10253 / ASME B16.9	Wall thickness, outside diameter, angles, lengths, weld bevel profile
Weld seam geometry	EN ISO 5817 · ASME IX	Bead profile, penetration, lack of fusion (visual)

3.2 Non-Destructive Testing (NDT)

Non-destructive tests are carried out according to customer specifications, project standard or pressure equipment category. The following table lists the available methods:

Method	Abbr.	Standard (EN / ASME)	Detectable defects	Typical use
Ultrasonic testing	UT	EN ISO 10160 / ASME V Art. 5	Internal defects, laminations, cracks	Wall thickness, weld seams, special materials
Radiographic testing	RT	EN ISO 17636 / ASME V Art. 2	Volumetric defects, porosity, slag	Weld seams, castings, nuclear
Dye penetrant testing	PT	EN ISO 3452 / ASME V Art. 6	Surface cracks, open defects	Non-magnetic materials (stainless, Ni-based)
Magnetic particle testing	MT	EN ISO 17638 / ASME V Art. 7	Surface and near-surface defects	Ferritic steels (C-steel, 13CrMo, P91)
Eddy current testing	ET	EN ISO 15549 / ASME V Art. 8	Near-surface cracks, material defects	Tubes, thin-walled fittings

3.3 Material Testing

Inspection type	Method	Application / Relevance
PMI – Positive Material Identification	XRF (X-ray fluorescence) or OES	Alloy verification before delivery – prevents material mix-ups
Mechanical testing	Tensile test, Charpy impact test, hardness test	Verification of mechanical properties per standard or project spec
Corrosion testing	IGC test (EN ISO 3651), PREN calculation	For stainless and special alloys on request
Ferrite measurement	Ferritescope per EN ISO 8249	For duplex / super duplex – phase balance (target: 30–60 %)

Inspection type	Method	Application / Relevance
Hardness testing	Vickers HV10 / Brinell HB	After heat treatment and welding (esp. P91, P92, duplex)

4 Documentation & Test Certificates

Every Nirotec delivery is supplied with complete, project-specific documentation. The traceability of each individual part down to the melt is guaranteed as standard.

4.1 Test Certificates per EN 10204

Certificate type	Designation	Content	Issuer
Type 2.1	Declaration of compliance	Confirmation of compliance with standard – no test data	Manufacturer
Type 2.2	Test report	Test results from non-specific testing	Manufacturer
Type 3.1	Inspection certificate 3.1	Specific test results, by manufacturer-authorized body	Manufacturer (authorized)
Type 3.2	Inspection certificate 3.2	Test results by independent inspection body	Manufacturer + independent body

Standard at Nirotec: EN 10204 Type 3.1. Type 3.2 (with an independent body: TÜV, SGS, Bureau Veritas, Lloyd's etc.) is available on request for all products.

4.2 Standard Documentation Scope of Supply

Document	Standard	On request
Inspection certificate EN 10204 (3.1)	✓	3.2 possible
Heat analysis / chemical composition	✓	
Mechanical test results (if required)	per standard	Extended
Dimensional inspection report	✓	
Visual inspection report	✓	
PMI report (XRF)	on request	✓
NDT reports (UT / RT / PT / MT)	on request	✓
Heat treatment record (PWHT)	if required	✓
Declaration of conformity (PED)	if applicable	
ITP (Inspection & Test Plan)	for projects / nuclear	✓
Inspection report (third party / TÜV)	on request	✓

5 External Inspections & Audits

Nirotec coordinates and supports external inspections by customers, engineering offices and independent inspection bodies. The following organisations have been involved in projects:

Organisation	Type of inspection	Typical projects
TÜV (various entities)	Type 3.2 inspection, pressure equipment testing	Power plants, chemical plants, high-pressure systems
SGS Industrial Services	Type 3.2 inspection, quality audits	Offshore, petrochemical, international projects
Bureau Veritas (BV)	Marine inspection, marine approvals	Marine, offshore platforms, CuNi piping
Lloyd's Register (LR)	Classification, offshore inspection	Offshore, shipbuilding
Customer representative / Third Party Inspector	Project-specific surveillance	EPC mega-projects, customer-specific inspection plans
Authorities (depending on project)	Regulatory inspections by country	Nuclear power plants, regulated industries

6 Nuclear Applications – Special Requirements

Nirotec is certified to **ISO 19443** and supplies qualified pipe fittings and flanges for the nuclear sector. Nuclear requirements go beyond standard quality systems and include:

Requirement	Description
ITP (Inspection and Test Plan)	Project-specific inspection and acceptance plan – aligned with customer and authorities
Extended traceability	Heat traceability, batch separation, continuous documentation chain
Qualified supply chain	Only audited and approved sub-suppliers – per ISO 19443 Annex B
Special material requirements	Restricted residual contents, heat restrictions (e.g. Al in P91), NACE requirements
Extended NDT	RT + UT as standard, PT/MT depending on material, third-party inspection by approved bodies
Documentation package	Complete project-specific dossier – EN 10204 3.2, ITP, NDT, PWHT, PMI
ITNS-relevant processes	Identification and control of safety-relevant activities (ITNS = Important to Nuclear Safety)

7 Project-Specific Quality Services

Nirotec flexibly adapts the scope of quality and testing to project requirements – from simple standard deliveries to complex EPC projects with a full documentation package:

Service	Content	Typical requirement
Customer-specific inspection plans (ITP)	Preparation and alignment of project- and customer-specific ITP	EPC projects, nuclear, offshore

Service	Content	Typical requirement
Heat restrictions	Selection and verification of melts per project specifications	P91/P92 (Al limit), nuclear, NACE
Material verification / PMI	100 % PMI inspection of all parts prior to delivery	Petrochemical, high-alloy materials
Customised documentation packages	Compilation of all test records per delivery note or component	Power plant projects, international projects
External inspection by customers	Schedule coordination, provision of inspection rooms and documents	EPC contractors, large-scale plant projects
Hardness verification after PWHT	Documented hardness test after heat treatment	P91, P92, 13CrMo, duplex welded joints
Preservation and packaging	Specific preservation, marking, wooden crates / sea-freight preparation	Export, long-term storage, sea freight

8 Traceability

Full traceability of every supplied component down to the originating melt is standard at Nirotec – not an option. This applies to both internally manufactured and externally procured components.

Level	Information	Record
Melt	Heat number, alloy analysis	EN 10204 3.1 / mill certificate
Batch / heat	Heat number, heat-treatment parameters	Heat-treatment record
Semi-finished product / pipe	Pipe dimensions, standard, material, supplier	Incoming inspection certificate, goods-in inspection
Manufactured part	Production order number, lot number	Production record, stamp marking
Inspection	Test results (visual, dimensional, NDT)	Inspection report, NDT report
Delivery	Delivery note, certificate package, component marking	EN 10204, inspection report

9 Contact & Inquiries

For project-specific quality requirements, ITP alignments or technical questions, we are pleased to assist:

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All information in this document is provided without guarantee. The project-specific quality requirements as agreed and the applicable standards at the time of order placement shall prevail.