
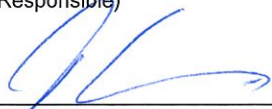



Quality Assurance Specification QR001
General quality assurance requirements to the suppliers of Dürr
Assembly Products GmbH (DAP)

Quality Assurance Specification QR001

General quality assurance requirements to the suppliers of Dürr Assembly Products GmbH (DAP)

Version 1.08

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1 General

This specification forms part of the contract if not agreed otherwise in individual contracts.

The German version is understood as the sole legally binding document.



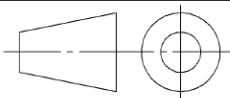

1.1 Terms

The following terms are equally used according to the spirit of this specification:

- Test devices / measuring devices / calibration unit / measuring unit ...
- Inspection report / measuring report / certificate ...
- Invalid/replaced / withdrawn / old standards

1.2 General tolerances

The head of page as shown below is valid in case of invalid/replaced standards specified in page heads.

Weitergabe sowie Vervielfältigung dieser Unterlage ist nicht gestattet. Alle Eigentums- und Urheberrechte verbleiben bei Dürr Assembly Products GmbH.						Zchg. Nr. Auftraggeber	
Nicht bemaßte Kanten ISO 13715 				Allgemeintoleranzen ISO 2768 - m K Tolerierungsgrundsatz ISO 8015 Schweißkonstr. ISO 13920 - B F Form- und Lagetol. ISO 1101, ISO 5459 Passungen ISO 286 Teil 1+2		Maßstab im Original	1:2
						Gewicht	
						kg	
				Datum	Name	Benennung (2. Zeile für Fremdsprache)	
				Bearb.			
				Gepr.			
				Norm			
					Format d.Orig.	A0	
						Zeichnung Nr.	
				Dürr Assembly Products GmbH D-66346 Püttlingen		Version	Blatt 1
						Revision NN	Bl.
Zust.	Änderung	Datum	Name	Urspr.	Ers. für	Ers. durch	

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2 Check dimensions

The dimensions mentioned below must be subject to **special attention** on definition of the scope or severity of inspection (compare DIN406-10: Check dimension):

- All dimensions identified as check dimension according to DIN 406-10
- Length dimensions with more exacting tolerance than specified for class m according to DIN ISO 2768-1:

Tolerance class		Limit allowance for nominal dimensions							
Symbol	Characteristic	from 0.5 up to 3	above 3 up to 6	above 6 up to 30	above 30 up to 120	above 120 up to 400	above 400 up to 1000	above 1000 up to 2000	above 2000
m	mean	+/- 0.1	+/- 0.1	+/- 0.2	+/- 0.3	+/- 0.5	+/- 0.8	+/- 1.2	+/- 2

- All angular dimensions with specified tolerances as per DIN ISO 2768-2
- All fits as per DIN ISO 286-2
- Surface specifications with $R_a \leq 3,2$ (as per DIN EN ISO 1302)
- All form and position tolerances as per DIN EN ISO 1101

Features and tolerances		Toleranced characteristics	Symbols
Single features	Form tolerances	Straightness	—
		Flatness	▭
		Circularity	○
		Cylindricity	⊘
Single or related features		Profile of any line	⌒
		Profile of any surface	⌒
Related features	Orientation tolerances	Parallelism	//
		Perpendicularity	⊥
		Angularity	∠
	Location tolerances	Position	⊕
		Concentricity and coaxiality	◎
		Symmetry	≡
	Run-out tolerances	Circular run-out	↗
Total run-out		↗↘	

3 Test devices

All test devices must be suitable for the application intended
(also see VDA Vol. 5 Chapter 6)

Measuring and test devices must be clearly identified, calibrated in defined periods and be properly maintained. Positive backtracing of calibration standards to national standards must be possible. Information about the calibration status must be visible (also see ISO 9001:2015 Chapter 7.1.5.2)

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4 Sampling

Sampling is defined as follows if not individually specified otherwise:

Batch size (units)	Sampling per batch size (units)
1 up to 2	all
3 up to 15	3
16 up to 25	5
26 up to 50	8
51 up to 90	13
151 up to 280	32
281 up to 500	50
501 up to 1,200	80

The entire lot can be rejected when part of the samples are not in order. DIN ISO 3951 (measuring) and DIN ISO 2859 (attributive) are valid for batch sizes above 1,200 units. In the beginning, application of standards is agreed for inspection level II, normal severity of inspection, one sampling per lot. Values for AQL (Acceptable Quality Level) then must be agreed by individual contract.

This inspection can be performed by the worker himself.

5 Marking of inspected samples

If inspection is not 100%, ie batch sizes > 3 units, the inspected parts must be clearly identified (eg color marking, adhesive check marks, engraving, etching, electric stylus, numbering hammer ..). Such identification must be durable until inspection by the orderer.

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6 Inspection report

The contractor is obliged to coordinate in advance relevant content for a required inspection report.

6.1 Identification of inspected parts with related inspection report

As a rule, these inspected individual parts are to be permanently identified with a unique serial number (engraving, etching, electric engraver, number punches for parts with subsequent surface coating, etc.).

This serial number is combined from the 6-digit vendor number (to be requested from the principal) and a unique, consecutive 5-digit number of the vendor (e.g., 123456-00012). Unique means that no serial number must appear more than once. Even if the material numbers are different. The serial number is to be managed by the vendor.

Exception: if the supplier already has a serial number managed by him, this must be used for this purpose.

If a permanent identification cannot be realised in a useful manner, the principal (QA department) must be approached.

6.2 Minimum contents of the inspection report

The following items must be included in the report:

- Clear identification of the specimen
- The drawing (including assembly drawings) number used for the inspection. If version, revision and sheet number are shown on the drawing, they must be also documented (information in the drawing title block).
- Ordering number of the customer
- Name / address of the customer
- Specification of the measuring device including number and date of the calibration certificate and testing conditions (at least the temperature)
- The following items with measured values must be shown for manufactured components measured in a coordinate system:
 - Supporting plane of the measurement object (with measuring values for the individual support points including form factors of the generated supporting plane)
 - Alignment of the coordinate system
 - Alignment procedure such as Best fit, 3-2-1, etc.
 - Measured values of the individual reference points in all 3 coordinates
- Measuring values / results
 - plus following information for geometrical measuring values
 - Inspection point (designation of the inspection point)
 - Desired value
 - Lower tolerance limit

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- Upper tolerance limit
- OK / NOK assessment
- Note
- For complex geometrical objects, additional information such as Number of measuring points, form factor (for, e.g., circles, cylinders)
- Minimum information required for all remaining measuring values / results (if not agreed otherwise)
 - Inspection point (designation of the inspection point)
 - OK / NOK assessment
 - Note
- Overall assessment, date and signature of the tester

6.3 Archiving the inspection report

Inspection reports must be filed for 10 years.

6.4 Delivery of the inspection report

The test report is to be sent in electronic form to the responsible purchaser (email address is specified in the written order) and to the following email address:
qs-dap@durr.com.

The inspection report must be submitted bilingually in German and English (that means both languages within the same inspection protocol) if additional contractual provisions are not provided.

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7 Raw materials / material

7.1 Raw materials

The following recodification of used raw materials must be observed in the manufacturing drawings:

	Old name according to DIN on the drawing	To be replaced by new name according to DIN EN
Hot-rolled rounds	DIN 1013	DIN EN 10060
Hot-rolled squares	DIN 1014	DIN EN 10059
Hot-rolled hexagons	DIN 1015	DIN EN 10061
Hot-rolled flats	DIN 1017	DIN EN 10058
Equilateral angle steel	DIN 1028	DIN EN 10056-1
Unequal angle steel	DIN 1029	DIN EN 10056-1
Cold-rolled sheet steel	DIN 1541	DIN EN 10131
Hot-rolled sheet steel	DIN 1543	DIN EN 10029
Seamless precision steel tubes	DIN 2391	DIN EN 10305-1
Welded precision steel tubes	DIN 2395	DIN EN 10305-5
Seamless steel pipes	DIN 2448	DIN EN 10220
Welded steel pipes	DIN 2458	DIN EN 10220
Hot-worked square and rectangular steel pipes	DIN 59410	DIN EN 10210-2
Cold-worked square and rectangular steel pipes	DIN 59411	DIN EN 10219-2
Bright rounds	DIN 671	DIN EN 10278
Bright flats	DIN 174	DIN EN 10278
Bright squares	DIN 178	DIN EN 10278
Bright hexagons	DIN 176	DIN EN 10278

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	Old name according to DIN on the drawing	To be replaced by new name according to DIN EN
Aluminum round rods	DIN 1799	DIN EN 755-3
Aluminum square rods	DIN 59700	DIN EN 755-4
Aluminum rectangular rods	DIN 1770	DIN EN 755-5
Aluminum hexagon rods	DIN 59701	DIN EN 755-6
Seamless round tubes	DIN 9107	DIN EN 755-7
Aluminum angle sections	DIN 1771	DIN 1771
Aluminum sheets, cold-rolled up to approx. 5mm	DIN 1783	DIN EN 485-4
Aluminum plates, warm-rolled from approx. 6mm-200mm	DIN 59600	DIN EN 485-3
Aluminum checker plate	DIN 59605	DIN EN 1386
Aluminum square tubes		DIN EN 754-4
Aluminum rectangular tubes		DIN EN 755-7 DIN EN 757-7

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7.2 Material

The following recodification of used materials must be observed in the manufacturing drawings:

Old designation as per DIN in the drawing	to be replaced by new des. as per DIN EN	Material code	
RSt 37-2	S235J0	1.0114	
RSt 37	S235J0	1.0114	
St 37	S235J0	1.0114	
St 37-2	S235J0	1.0114	
St 52-3	S355J0	1.0553	
St 52-3 U	S355J0	1.0553	
St 52	S355J0	1.0553	
St 1203	DC 01	1.0330	
16MnCr5	16MnCr5	1.7131	
C45	C45	1.0503	
42CrMo4	42CrMo4	1.7225	
14CrMoV6.9	14CrMoV6.9	1.7735	
90MnCrV8	90MnCrV8	1.2842	
X5CrNi18-10 (V2A)	X5CrNi18-10	1.4301	
St 37-2K	S235JRC+C	1.0122	+C = cold-drawn +SH = sheared
St 50-2K	E295GC+C	1.0533	+SL = ground +PL =polished
St 60-2K	E335GC+C	1.0543	
St52-3K	S355J2C+C	1.0579	
C45K	C45+C	1.0503	
AlMg3	EN AW-AlMg3	3.3535	

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Old designation as per DIN in the drawing	to be replaced by new des. as per DIN EN	Material code	
AlMgSi0,5	EN AW-AlMgSi	3.3206	
AlMgSi1	EN AW-AlSi1MgMn	3.2315	
AlZnMgCu1,5	EN AW-AlZn5,5MgCu	3.4365	

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8 Welding

8.1 General

The following conditions must be fulfilled if not specified otherwise in individual contracts.

8.2 Welding details in drawings

Welding stamps on older drawings – with invalid/replaced standards – must be replaced by the stamp as shown below. The stamp indicates whether or not heat treatment is required.

Brennschnittguete 331 / thermal cutting performance 331 nach/according to DIN EN ISO 9013	
Schweissausfuehrung / execution of the welding Bewertungsgruppen / quality levels	
Stahl /steel DIN EN ISO 5817 B	Aluminium DIN EN ISO 10042 B
Allgemeintoleranzen fuer Schweiss- konstruktionen /general tolerances for welded constructions DIN EN ISO 13920 B/F	
Kehlnahtdicken ohne Bemassung in Abhaengigkeit zur Materialdicke / thickness of fillet welds against material thickness	
Materialdicke / material thickn. s _{min} (mm)	Nahtdicke/ throat thickn. a (mm)
bis 6 ueber 6 bis 12 ueber 12 bis 15 ueber 15 bis 20 ueber 20 bis 30 ueber 30 bis 40 ueber 40 bis 50	3 4 5 6 7 8 10
<input type="checkbox"/> Spannungsarmgeglueht nach Waermebehandlungsanweisung / stress relief heat treatment acc. to heat treatment instruction	
Pruefung von Schweißern / approval testing of welders	
Stahl /steel DIN EN ISO 9606-1	Aluminium DIN EN ISO 9606-2
Bescheinigung ueber Materialpruefung / inspection document for material testing Werkzeugnis 2.2 /comp. certificate 2.2 DIN EN 10204	

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8.3 Welding qualification

Welding operators must adduct evidence for qualification according to DIN EN ISO 9606-1 for required techniques and materials (see details in the drawings).

8.4 Edge preparation

Edge preparation is according to DIN EN ISO 9692-1 if not specified otherwise in the drawing.
Parts in the weld zone must be bright before tack welding (from from rust, mechanical residues, oil, color, grease, scale, dust etc).

8.5 Heat treatment: Welding in cold-worked areas / normalizing

If welding is performed in cold-worked areas including adjacent areas of width "5 t" , the requirements shown in **DIN 1993-1-8 (Eurocode3)** (e.g., normalising before welding) must be met. "t" corresponds to the sheet thickness in this case. Particulars are set out in DIN 1993-1-8 (Eurocode3).

8.6 Heat treatment: Stress-relief annealing

Necessity of stress-relief annealing must be read from the drawing (welding stamp).

Note! Parts must be annealed prior to final mechanical fine machining.

Procedure:

Parts are heated up in a temperature range from 550 up to 650 °C with slow cooling down for stress relief without major change of characteristics. Heating up and cooling down of steel components must be slow and even to prevent crack formation and thus new stress in the part.

Heating and cooling rates: From 50 up to 80 K/h.

The selected annealing temperature is maintained for at least 1 hour. The annealing time depends on the selected temperature and thickness of the parts. Annealing time is at least 2 minutes/mm material thickness.

Stress-relief annealing is not allowed for stainless steel with portions of niobium and tantalum!

The heat treatment report must be also supplied.

8.7 Welding

Free-size tolerances and execution of the weld must be met as specified in the drawing.

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Welding of downward and upward seams is not allowed! Attention must be paid to full coverage of the seam root and avoidance of lack of fusion.

Each welder is responsible for faultless execution of his work (self-test by the worker)!

8.8 Inspection

All weld seams must be subject to **visual inspection as per EN 970** during and after making.

8.9 Visual inspection of the complete part

The following visual checks must be performed:

- Execution of work and surface quality according to drawings.
- Cleaness of surfaces and drillings.
- Removal of loose scale, rust, slag and weld splatter.

9 Communication of modifications

Technical modifications or supplements required by manufacture must be agreed by DAP in advance. In each case, the purchasing department must be informed in writing or by telephone to ensure modification of the technical documentation.

10 Communication of difference

Defects / deviations must be written in an informal paper and immediately be sent to DAP, Quality Assurance Department or Purchasing, for assessment and decision about the further course of action. Delivery can only be made after receipt of DAP's release in writing.

Mailadress for Quality Assurance Department:
qs-dap@durr.com

11 Expenses of certification

All expenses arising for the certification of product quality are part of the contract between DAP and the contractor.
Such expenses are taken over by the contractor.

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12 Modification history

Modification of the Quality Assurance Specification QR001	
03-11-2020	V1.08 Chap. 6.4 Revision
11-16-2017	V1.07 Chap. 3, Revision Chap. 6.1, Addition Chap. 10, Addition
11-20-2015	V1.06 Chap. 8.2, New table Chap. 8.3, Chap. 8.5, New standard Chap. 8.6, Heat treatment report
11-20-2013	V1.05 20.11.13: Revision, revision identification 06.06.13: Revision, Chap. 6 06.10.12: Chap. 6.2 revised
2-11-2011	V1.04 New : Chapter 1.1 ; 1.2 ; 7 ; 8 ; 12; 6.2: Indication of the drawing (incl. of status) used for inspection. Version and revision number on the drawing must be documented, if available. (See for details in the head of page) Chapter 4: Supplement: Rejection of the entire lot is possible when part of the samples is not in order.
9-10-2010	V1.03 Release by Horst Hartmann
	V1.00-V1.02 Internal version prior to 1st release