

J.H. BUSCHER, INC.
Standard Specification SS00V
 Revision C, July 31, 2015

GENERAL INSPECTION PRACTICE

Written By:	Date:	Approved By:	Date:
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REVISION STATUS and CONTENTS

Rev C, 7/31/15

REASON FOR CHANGE: Reduce Documentation, Change sampling reference, general revision.

DESCRIPTION OF CHANGE: 1) Combined with SS013, Inspection Sampling. SS013 Retired. 3) Was C= 0 Sampling basis, now ANSI Z= 1.4. 4) Combined internal inspection and incoming databases. 5) Added Par 3.7, Special Inspection Procedures. 6) Section numbers renumbered throughout because of joined documents.

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1) SCOPE

This procedure:

- a. Is a guideline for general inspection practice, including first article.
- b. Covers baseline inspection tools based on inspectable component feature.
- c. Is applicable to components manufactured in house or from an outside vendor.
- d. Can be superseded by the drawing, Work Order, Purchase Order or Manufacturing Procedure.
- e. Is not a step-by-step procedure for general inspection. For detailed instruction on mechanical inspection practice, see references *Measurement & Calibration for Quality Assurance* by Alan S. Morris, or *Measurement and Gaging in the Machine Shop* by the National Tooling and Machining Association.
- f. Establishes general lot inspection guidelines and acceptance criteria based on statistical sampling.
- g. Provides direction for format and maintenance of inspection records, and details use of the computer inspection file system.
- h. Does not cover functional inspection of an end product. That is covered in the Acceptance Test Procedure or any other documents referenced in the Manufacturing Procedure. Specialized inspection procedures will be detailed in – or referenced by – Manufacturing or Acceptance Test Procedures.
- i. Is not a guideline on Statistical Process Control.

2) DOCUMENTS

Reference documents are shown in Table 1. The latest revision of any document is to be used unless otherwise specified.

<i>Document</i>	<i>Title</i>	<i>Published By</i>
AS9102	First Article Inspection Requirements	Society of Automotive Engineers
ANSI Z 1.4	Sampling Procedures and Tables for Inspection by Attribute	American National Standards Institute / American Society for Quality
SS00A	Order Processing	J.H. Buscher, Inc.
SS00C	Purchasing	J.H. Buscher, Inc.
SS00Q	Quality Manual	J.H. Buscher, Inc.
SS01J	FAA Repair Station Manual	J.H. Buscher, Inc.
SS01H	Gage Calibration Procedures	J.H. Buscher, Inc.
SS00Y	Material Handling	J.H. Buscher, Inc.
TABLE 1, Reference Documents		

3) GENERAL PROCEDURE

3.1) Parts or Process Subject to Inspection

- a. All final products. These are to be performance tested 100% unless otherwise directed by the Manufacturing Procedure. See individual Acceptance Test Procedures (ATP).
- b. In-process components as directed by the Manufacturing Procedure or Work Order. See JHBI Standard Specification SS00A, *Order Processing*.
- c. Any product or process used on a shippable product.
- d. Components received on a Purchase Order. See Section 5, Incoming Inspection and JHBI Standard Specification SS00C, *Purchasing*.
- e. Product returned from customer, to be evaluated per the return provisions of SS00A.

3.2 Qualified Inspector

Any individual deemed proficient by the Quality Manager may perform inspection.

3.3) 100% Visual Inspection

At the outset of any lot inspection, the inspector is to select one part at random for 100% visual inspection by feature. The Manufacturing Procedure may require a positive sign-off for this step. The following three steps must be done using this piece:

- a. Perform an attribute-by-attribute check. At this stage, numeric inspection data is not required. The initial piece may be retained for comparison use on subsequent lots. This step need not be redone.
- b. Compare the rest of the inspection lot to the master for missing features. For example: a housing drawing calls for has 4 holes, \varnothing .210 to .216 at a given location tolerance. At this stage of inspection, inspect only for the presence of the 4 holes, not the size or location.
- c. For every piece in the inspection lot, comparisons to the master should be made for burrs, cleanliness, and general workmanship characteristics.

3.4 Calibration

Any inspection tool or gage used to accept product must be within its calibration interval. See JHBI Standard Specification SS01H, *Gage Calibration Procedures*.

3.5) Processing and Handling of Components during the Inspection Process

For directives on segregation of pre-inspection, in-process, post-inspection and scrap components, see JHBI Standard Specification SS00Y, *Material Handling*.

3.6) Scrap

3.6.1 Definition

A scrap article is any component that fails inspection or is any other manner noncompliant and cannot be reworked to meet specified tolerances.

3.6.2 Disposition

No scrap article may be used in production or prototype components. Scrap must be either a) destroyed, with a record maintained, b) Return-To-Vendor (RTV) on a Material Disposition Report, in accordance with Section 9, or c) Clearly identified and segregated as described in SS00Y. In this instance, scrap may only be used for research or demonstration.

3.7) Special Inspection Procedures

If a component requires inspection procedures beyond standard measuring tools, instructions will be on the Purchase Order or Work Order. Special inspection (e.g. Spectroscopy, magnaflux) can be done by any JHBI department, a vendor or a third party as directed. Special inspection is independent of Acceptance Testing, which is done on all end product.

4) FIRST ARTICLE INSPECTIONS

4.1) Applicability

A unit of the first run of any new product is subject to 100% inspection for all features. This includes:

4.1.1) New Dash Numbers

In the event that a product is new dash number of a Parent Part Number, and shares most of the dimensions with previous dash numbers subject to 100% inspection, only those new features, including marking, require inspection. However, reference to the earlier, first-article-inspected dash number is required on the record.

4.1.2) Similar Products

If a product is substantially similar to previously manufactured products, with variation not exceeding typical dash number differences, first article inspection reports can include references to the previously manufactured product.

4.1.3) Long-Dormant Products

Any product that has not been manufactured for two years or longer is subject to first article.

4.2) First Article Inspection Reports

The First Article Inspection Report (FAIR) is a required written record of the inspection. Unless otherwise specified, report format is optional but the tabular format of AS9102, *First Article Inspection Requirements*, is an industry standard and often the preferred customer choice. The report must include the characteristics measured, tolerance, and actual results (Subcomponent inspection data may be used). For PASS/FAIL attributes, the words PASS or FAIL are to be used instead of check marks.

For any feature inspected using functional or Go/NoGo gages, a reference to the tool can be used in lieu of a numeric value. Example: For a feature having a tolerance block of $\oplus \begin{array}{|c|} \hline \text{.014} \\ \hline \end{array} \text{A} \begin{array}{|c|} \hline \text{B} \\ \hline \end{array} \text{C}$ it is acceptable to write "Passed using Inspection Tool UCXXX", if tool UCXXX is the designated tool for that feature and within calibration. If measuring true position using the coordinate method, the entry is the variation from 0. In the .014 TP example, possible passing entries are .005, 0, .0035, etc.

The serial number, date of inspection, and name or initials of the inspector are required on the report.

4.3) Maintenance of First Article Records.

The Quality Department is responsible for maintaining, by part number, the first article inspection.

5) INCOMING INSPECTION

5.1) All Components

In general, purchased items are to be checked to the provisions of the Purchase Order. It is possible that the vendor or a third party will have performed the physical component inspection. If so, the Purchase Order will so identify, but for all incoming inspection:

- a. Identify Purchase Order line items. Do quantities match?
- b. If a revision letter is called for, is it correct on the packing slip?
- c. Are there any remaining items on the PO line item, or is the shipment a continuation of a previously unfulfilled PO/line item? If so, note in the Notes Section of Incoming Inspection Database, as directed in Section 5.4.
- d. Are all PO required certifications and documents present?

5.2) Category and Inspection Criteria

Anything purchased for use in a higher level assembly will fall into one of 5 categories, each with the following inspection criteria:

- a. Components purchased to a JHBI part number or process. Inspect to the applicable JHBI drawing or specification. Sampling and recording requirements of Section 8 apply unless otherwise directed.
- b. Components purchased to a MIL-Spec, NAS, JAN or equivalent specification. Inspect to the applicable drawing or specification. An MS drawing may be used as purchasing or acceptance criteria even if it no longer an active document.
- c. Components purchased to a vendor part number or specification. The vendor's documentation, as called out on the applicable Purchase Order, is to be used as inspection criteria.
- d. A process such as anodizing, heat-treat, or passivation done to a MIL-Spec, AMS, ASTM or equivalent specification. Process certification is required.
- e. Raw Material. See Section 6.

5.3) Limited-Life Material

Upon receipt of any material or packing list labeled "Limited Life" or "Age-Sensitive", check that the expiration date is both clearly labeled and not expired. This will fall into category 5b or 5c. See SS00Y for handling and storage provisions.

5.4) Inspection Database

All components inspected per 5.1 or 5.2 are to be entered into the inspection database, INSP.dbf – one entry per Purchase Order line item. Any computer program capable of writing to a database file may be used. Note the same database is used for internal Work Orders, as described in Section 8. The database table contains the following headings:

- a. **WO_ITEM*** For purchased parts, this is the Purchase Order Number, followed by the PO line item number. For example, PO 1215, Line item 2, is 1215.2
- b. **DATE*** Date inspected (not necessarily date received)
- c. **VENDOR*** From whom received.
- d. **DESCRIPTION*** From the PO Line, or minimal information describing product.
- e. **QTY*** Quantity received.
- f. **QTY_ACC*** Quantity successfully passing inspection.
- g. **INSP_BY*** Name or initials of whomever performs inspection.

- h. **DISP*** Accepted (OK or ACC), Return to Vendor (RTV) or See ... (Reference document, MDR, etc.)
- i. **NOTES** Optional comments, e.g. 20 Pcs of 60 Pc PO, Insp process via cert, RTV on MDR XXX ...

* *Denotes required entry*

5.5) Records

The Incoming Inspection Database of 5.4, as well as the sampling results if required, and retaining copies of the received documentation, are the responsibility of the Quality and Production Control departments.

6) RAW MATERIAL INSPECTION

Any purchased material that is not designated for tooling or research is to be inspected. Material inspection may be of one of two ways, certification or chemical analysis. Additional inspection criteria, as detailed in 6.4, may be required.

6.1) Material Identification and Retention

All incoming material is to be identified with Purchase Order and item Number in accordance with JHBI Standard Specification SS00Y, *Material Handling*. An identified sample of every material lot is to be retained.

6.2) Certification

6.2.1) Certification, Nonmetals, Solders and Brazing Alloys

There must be origin, identification and traceability of any material. Certifications on packing lists are acceptable provided all of the criteria are met.

6.2.2) Certification, Metals

For metals, excluding solders and brazing alloys, there must be a mill-traceable certification that has, at a minimum, chemical composition breakdown and lot-traceable manufacturer's number. The inspector is to check the reported values against the Purchase Order reference document specification limits. Acceptable specifications for material and composition limits include: QQ, AMS, ASTM, MIL-HDBK-5, or manufacturer's published data (e.g. Carpenter, Allegheny Ludlum). Using manufacturer's data is acceptable only when the material was purchased to a manufacturer's specification or product number.

6.3) Chemical Analysis

If the material origin is uncertain or it is required by the customer, chemical analysis of a purchased material may be performed. These processes include but are not necessarily limited to: optical emission, spectrographic analysis, and niton-X-Ray fluorescence analysis.

6.4) Additional Requirements

Beyond chemical breakdown, inspectors must always check material for every Purchase Order provision. This may include DFARS compliance, conflict-free material requirements, finish, heat treat or passivation requirements.

7) INSPECTION TOOLS by FEATURE

Preferred gages by component feature are given in Table 1 and should be used unless a functional or Go/NoGo gage is available. Any inspection gage is to be calibrated per JHBI Standard Specification SS01H, *Gage Calibration Procedures*.

All dimensions are in inches

TOLERANCE	INSPECTION TOOL	REDUNDANT METHOD
OUTSIDE DIAMETERS		
.0000-.0005	Indicator Micrometer	Micrometer
.00051-.005	Micrometer	Caliper
≥.0051	Caliper	Any
INSIDE DIAMETERS		
.0000-.001	Air Probes	Pins / Bore Mic
.0011-.004	Gage Pins & Micrometers	Calipers/Bore Mic
≥.0041	Gage Pins & Micrometers	Caliper
COUNTERSINKS		
ALL	Scope	Gage Pins
CHAMFERS		
ALL	Scope	Gage Pins
ANGLES		
ALL	Sine Plate	
TAPPED HOLES		
ALL	Thread gages	Visual
THREADED ODs		
ALL	Fit with Mating Part	Visual
TAP HOLE DEPTHS		
ALL	# of turns with thread gage	# of turns with screw or mating part
ID GROOVES		
ALL	Height Gage & Gage Blocks	Mold & Scope
OD GROOVES		
<.004	Blade Micrometer	
≥.0041	Calipers	
WIDTH OF OUTSIDE GROOVE		
ALL	Pins / Scope	Calipers

TABLE 2, Dimensional Inspection Gage by Component Feature *continued on next page*

TOLERANCE	INSPECTION TOOL	REDUNDANT METHOD
GROOVE WIDTH OF INSIDE		
ALL	Disk Micrometers	Mold & Scope
<.0050	Height Gage	
>.0051	Calipers	Mold & Scope
WIDTH of SLOTS		
< .005	Gage Pins & Micrometers	Gage Pins & Micrometers
> .0051	Calipers	
CORNER BREAKS		
ALL	Visual / Scope	
FILLET RADII		
ALL	Visual / Scope	Optical Comparator
⊕ POSITION		
ALL	Height Gage or Calipers	
◎ CONCENTRICITY		
ALL	Indicator, V-Block	
↗ CIRCULAR RUNOUT		
ALL	Indicator	
↗ TOTAL RUNOUT		
ALL	Indicator, V-Block	
∕∕ FLATNESS		
ALL	Indicator	
∕∕ PARALLELISM		
ALL	Indicator / Micrometer	
⊥ PERPENDICULAR		
ALL	Indicator / V-Block	
≡ STRAIGHTNESS		
ALL	Indicator	
○ ROUNDNESS		
ALL	V-anvil micrometer, 3-Point Check	Lathe & Indicator
≡ or ⊕ SYMMETRY		
ALL	Indicator, Height Gage	
FINISHES		
ALL	Visual against a known standard.	

TABLE 2, Dimensional Inspection Gage by Component Feature *continued from previous page*

8) INSPECTION SAMPLING

Use the reference information of this Section as a general guideline. Sampling numbers herein do not override any customer requirements. The customer Purchase Order and internal Work Order directives have priority over this document.

8.1) Functional vs. Attribute Inspection

Unless directed otherwise by the Acceptance Test Procedure (ATP), any performance requirement is subject to 100% inspection. This includes, but is not necessarily limited to: flow, pressure, coil resistance, dielectric strength, insulation resistance, bonding resistance and identification. Inspection sampling is permitted only for dimensional, finish or other nonfunctional characteristic.

8.2) Nomenclature

The terms attribute and feature are synonymous, in our case a qualifiable or quantifiable nonperformance characteristic with both acceptance and rejection criteria. An attribute may have discrete limits, e.g. A slot width of $.205 \pm .007$, but it is still an attribute.

8.3) Reference

Refer to ANSI Z 1.4, *Sampling Procedures and Tables for Inspection by Attribute* for inspection sample size by lot, and any information not given here.

8.4) Required Information

Five pieces of information are needed before sample size can be determined:

- a. **Lot Size**
- b. **Inspection Level** Default Level is normal.
- c. **Sampling Level:** Single, Double, or Multiple Sampling
- d. **Lot Acceptance History** Used to determine Inspection Level.
- e. **AQL** The *Associated Quality Level* is an index representing acceptable quality for a component. The lower the AQL, the more stringent the inspection. A component can have different AQLs for different features. Characteristics having a tighter tolerance, or a history of wide variation from the nominal will generally have a lower AQL. See Table 3.

8.5) Responsibility

Responsibility for creation and maintenance of inspection files lies with the Quality Dept. Responsibility for determining Acceptance Quality Limits (AQL) by characteristic lies with the drawing originator. Inspection can be done by any qualified employee.

8.6) AQL by Feature Tolerance

Unless other specified on the Work Order, Purchase Order or Drawing, AQLs will be assigned by feature tolerance as given in Table 3. AQL Sample sizes by lot sizes are given in ANSI Z 1.4.

<i>Feature</i>	<i>Tolerance</i>		<i>AQL</i>
	<i>From</i>	<i>To</i>	
Dimensions or Diameters	>0.010	∞	2.5
Diameters	>0.004	≤ 0.010	2.5
Dimensions	>0.004	≤ 0.010	1.0
Diameters	>0.0004	≤ 0.004	1.0
Dimensions	>0.0004	≤ 0.004	1.0
Dimensions or Diameters	0	≤ 0.0004	1.0
Fits	All		100%
Surface Finishes	∞	≤ 63	4.0
Surface Finishes	>63	$1/\infty$	1.0
Notes or other callouts	All		4.0

TABLE 3, Default AQL by Feature Tolerance

Note that the tolerance refers to total, so tolerances of ± 0.005 or $+0.003/-0.007$ are both .010.

Any feature not listed above is assigned an AQL of 4.0.

8.7) True Position Tolerance

For any feature locations governed by true position, e.g. $\text{⊕} \text{⌀} .014 \text{Ⓜ} \text{A} \text{B} \text{Ⓜ} \text{C} \text{Ⓜ}$, the tolerance is the diameter of the circle: .014 as seen in the example.

8.8) Sample Selection

The samples are to be taken at random from the lot. If there are several boxes or rows, avoid taking the entire sample from consecutive parts. If different sample sizes are needed for different characteristics, pull the difference as needed. Do not replace the original samples.

8.9) Defects

If an out-of-tolerance condition on a sample part is discovered, the defective characteristic is to be checked 100% throughout the lot. All nonconforming parts are to be either scrapped or processed on a MDR (See Section 5). No component can be accepted having an out-of-tolerance condition.

8.10) Inspection Database

Lot data is to be entered into the inspection database INSP.DBF, using any program capable of reading and writing .DBF files. This is the same database described in Paragraph 5.4, although some entries are recorded differently for internal vs. purchased components.

8.10.1) Data to be recorded

The following lot data must be recorded.

- a. **WO_ITEM*** For internal Work Orders, this is the Work Order Number, as described in JHBI Standard Specification SS00A, *Order Processing*.
- b. **DATE*** Date inspected (not necessarily date received).
- c. **VENDOR*** For Internal Work Orders, we are the vendor.
- d. **DESCRIPTION*** Part or subassembly name, from WO.
- e. **QTY*** Quantity put into inspection.
- f. **QTY_ACC*** Quantity successfully passing inspection.
- g. **INSP_BY*** Name or initials of whomever performs inspection.
- h. **DISP*** Accepted (OK or ACC), Scrap, Rework, or See ... (Reference document, MDR, etc.)
- i. **NOTES** Optional comments, e.g. 20 Pcs of 60 Pc PO, Insp process via cert, RTV on MDR XXX ...

* *Denotes required entry*

8.10.2) Other Database Information

If a defect is recorded and a Material Disposition Report (MDR) – as described in Section 9 – is processed, record the presence of the MDR under “NOTES”. If there are any other observations about the inspection that the inspector would like recorded, save this information in the “NOTES” entry. Any scrap not covered by the MDR should be listed under “NOTES”. For routine inspection, no entry is need for NOTES. Note if lots are split, as described in SS00A.

9) MATERIAL DISPOSITION REPORTS

In the event a nonconforming part must be returned to a vendor either for replacement or rework, a Material Disposition Report must be issued by the Quality Department and processed by the Production Control Department. A sample follows. The information below is to be included.

- A. **MDR Number:** Last 2 digits of the year, followed by three digits in sequence, beginning each year with 001.
- B. **Quantity Affected:** Number being processed for nonconformities.
- C. **Discrepancy:** Note all nonconformities. If more than one nonconformity is detected, quantities for all must be listed.
- D. **Report By:** Initials or name of person doing inspection.
- E. **Engineering:** Initials or name of whomever makes disposition decision.
- F. **Vendor:** The vendor name – JHBI for internal orders.
- G. **Disposition:** What is to be done with part(s), as determined by the cognizant Engineering representative. Return to Vendor dispositions do not require any sign-offs. This may be rework, scrap
- H. **Date:** In MM/DD/YY format.

9.1) Maintenance

One copy of the MDR is to be kept with the parts, and another retained by the Quality Department. When the parts are processed and either reworked, replaced or scrapped, file either copy of the MDR in the Master MDR file, located in the Quality Department.

J.H. BUSCHER, INC.	
227 F Thorn Ave:	MATERIAL DISPOSITION REPORT
Orchard Park, New York 14127 USA	Number: 15 -005
Ph: 716-667-2003	Date: 02/30/15
Part Number: FDXJZ	Description : Nozzle, Supply
Revision: A	Work Order: 1920.3 WO Qty: 30
Discrepancy: List all nonconformities (qty) below	Qty Affected: 7
1) Ø.118 is Ø.122 (7 pcs)	
2) .002/.004 Lip is .006 + (5 pcs)	
Disposition: RTV for Rework for use as PN FDXK0 (has larger diameter). Nozzle is the same except for larger hole. Clean up lip and stone flat.	Vendor: James Bond Mfg: V007
Engineering: Kelvin Rankine	
Report By: J.Smith	

FIGURE 1, SAMPLE MDR

9.2) MDR Format

The format is optional provided all the information required is provided to the vendor.

9.3) Post-Rework Inspection

Parts are to be processed normally as described in this document. If the rework is isolated, the inspection may be limited accordingly.