



Supplier Quality Manual

DAVCO Technology is committed to providing our customers with the highest quality products at the best value. Total customer satisfaction is our top goal.

As a supplier to DAVCO Technology, your company is a critical link in the on-time, quality and value chain. This manual has been developed to allow our suppliers to understand DAVCO's expectations for quality and delivery. Further, it becomes part of the acceptance of any purchase order that may be issued.

DAVCO Technology has adopted the quality management system standard known as ISO/TS16949 as the basis for our quality system. We strongly urge our suppliers to adopt this standard as well. As a minimum, we require third party registration to ISO:9000 of all of our suppliers.

The scope of this manual extends to suppliers of materials, components or services deemed "*mission critical*" by DAVCO Technology and those having a direct affect on our customers' satisfaction.

We thank you for helping us continue to be the "Supplier of Choice" to our customers.

Mark Bara, President

Raj Hegde, Director of Operations

Molly Marion, Purchasing

Phil Hoffman, Quality Manager

Table of Contents

- Table of Contents ii
- Conformance to Specifications..... 1
- On-Time Delivery..... 1
- Quality System..... 1
- Initial Sample Approval..... 2
- Corrective Action 2
- Special Characteristics 3
 - Statistical Process Control 3
 - Measurement System Analysis..... 3
- DAVCO Owned Tooling and Material..... 3
- Specialized Service Requirements..... 4
 - Calibration Services 4
 - Outside Laboratory/Test Services..... 4
 - Anodizing/Plating Services 5
 - Other Services 5
- Revision History a
- Table of Revisions..... a
- Appendix..... i
 - 8 steps to a successful PPAP submission..... a
 - PPAP Submission Requirements Checksheet b
 - Quality Problem Report..... c
 - QPR Page1 c
 - QPR Page 2. d
 - Sample Numbered/Ballooned Drawing..... e
 - Sample Dimensional Lay-out Report f
 - Sample Control Plan g
 - Supplier Request for Temporary Deviation from Specifications i

Conformance to Specifications

DAVCO requires all supplied products and services to conform completely to all relevant specifications.

Typically, “relevant specifications” will mean the engineering drawings and specifications provided by DAVCO. However, in some cases, industry standards may dictate additional requirements or industry standard practices (spectrography, equipment calibration, etc.).

Any deviation from specifications requires written authorization from DAVCO prior to shipment from your facility.

On-Time Delivery

100% on-time delivery is required. “On-time” is defined by DAVCO as no more than one week early nor more than one week later than the date specified on the schedule provided by DAVCO.

Scheduled services must be completed by the date agreed.

In the event of a potential late delivery, please contact your DAVCO representative as soon as you are aware that a late delivery may be possible. This will allow DAVCO to adjust production schedules (where possible) in order to maintain the satisfaction of our customers.

Quality System

DAVCO requires our suppliers to obtain third party registration to the current version of ISO9000 and strongly encourages all of our suppliers to develop a quality system that meets the requirements of the current version of ISO/TS16949.

This manual as well as the ISO/TS16949 specification reference a number of documents as complements. These include an SPC manual, the Advanced Quality Planning and Control Plan manual, the Measurement Systems Analysis manual and the Production Part Approval Process manual.

These documents are available through the Automotive Industry Action Group (AIAG). Their web site address is <http://www.aiag.org>.

We urge our suppliers to obtain each of these for use in developing a robust quality system and in complying with our requirements.

Suppliers, or potential suppliers, whose Quality Management System is not currently third party registered must:

- 1) Prepare a plan (including a timeline) for becoming registered within two years
- 2) Agree to allow DAVCO to perform on-site quality system audits at least annually.

Initial Sample Approval

For **new parts** and **changes to existing parts**, DAVCO requires the submission of initial samples through the Production Product Approval Process (PPAP).

DAVCO requests a Level 4 submission with the following documents required:

- 1) Complete dimensional and functional lay-out
- 2) Numbered/ballooned drawing. (**NOTE:** The drawing and dimensional/functional lay-out **MUST** be performed using DAVCO Technology's engineering drawings.)
- 3) Material Certification(s)
- 4) Process Control Plan (AIAG format)
- 5) Part Submission Warrant

Refer to the appendix for guidance in successfully submitting a PPAP package to DAVCO Technology.

Suppliers may use their own internal forms for the above or you may download forms from the DAVCO Supplier Web Portal at www.DAVCOtec.com/supplier.

DAVCO's Quality Department will advise you if additional documentation is required.

NOTE: The DAVCO Quality Department will not accept any submission for which the product does not fully comply with all specifications. If measurements/characteristics/features are found that do not meet DAVCO's requirements you must:

- 1) Correct the items and submit, or
- 2) Contact the DAVCO Engineering Department to request changes to our engineering drawings or specifications.

For suppliers who may be unfamiliar with the PPAP process and documentation please contact the DAVCO Quality Department for training or guidance.

Corrective Action

Sometimes mistakes happen. However, if it is suspected that nonconforming product has been shipped to DAVCO, we require swift and effective action by our suppliers. There are a number of different problem resolution and reporting methodologies including "8D" and "Five-Why". These are both good tools; however DAVCO does not mandate any specific format.

If a problem arises DAVCO *does* require the following actions:

- 1) **Containment.** Isolate ALL suspect material. This includes material in your facility, in transit, in our facility and beyond, if necessary. Contact DAVCO immediately if you have any suspicion that nonconforming product may have been shipped to our facility.
- 2) **Root Cause Analysis.** Address the true cause of the issue and eliminate it. Do not merely address the symptoms.
- 3) **Corrective Action Implementation and Validation.** Implement the corrections identified during your problem analysis activity. Then, validate that they are effective.
- 4) **Communication with DAVCO.** DAVCO requires initial contact within 24 hours of an incident defining containment activities as a minimum. Ideally, the entire case can be closed within two weeks. Complicated issues requiring additional time should be reviewed with the DAVCO Quality Department.
- 5) **Clearly mark subsequent corrected shipments.** Once a problem has been corrected or parts have been sorted each container, for the next three shipments, must be clearly marked as "Conforming", "100% Sorted for _____", or "Certified". We prefer a bright green label.

Special Characteristics

Statistical Process Control

DAVCO indicates some characteristics on engineering drawings with a diamond shaped symbol (\diamond) indicating that the specified feature is critical to the form, fit or function of our product. These characteristics require special treatment as you develop your process controls. As a minimum, characteristics so marked must be treated as follows:

- 1) Statistical data consisting of no less than 30 samples from a production run of no less than 300 pieces must be included with your PPAP submission.
 - a. The control chart must show that the feature is in statistical control
 - b. A minimum P_{PK} of 1.33 must be achieved
- 2) On-going SPC is strongly recommended. If SPC is not used, a suitable alternative should be indicated in the control plan. Typically, alternative methods would include increased sampling frequency using a statistically derived sample size.

NOTE: There may be limited cases where the above is not feasible. Please contact DAVCO's Quality Department if you believe this may be the case.

If a critical characteristic cannot achieve statistical control and/or a P_{PK} of 1.33 you must include 100% inspection of this characteristic in your process controls. Acceptability may be determined by DAVCO.

Measurement System Analysis

Any gauge used to determine conformance to DAVCO's specifications must:

- 1) Be calibrated (with the calibration standard traceable to NIST or another appropriate standards body)
- 2) Have the measurement uncertainty determined at a sensible frequency.

DAVCO Owned Tooling and Material

DAVCO requires that tooling paid for or provided by us be clearly identified as to ownership.

Material (components, parts, etc.) provided by DAVCO for inclusion in an assembly must be maintained in such a manner as to prevent deterioration and damage.

In all cases, tooling or material that becomes unusable must be reported to DAVCO as soon as possible.

Please refer to ISO-9001 section 7.5.4 and ISO/TS16949 section 7.5.4.1 for further information.

Specialized Service Requirements

Calibration Services

Suppliers of calibration services must conduct such calibrations in accordance with the most current standards for the item(s) being calibrated. All calibrations must be traceable to NIST masters. Unless otherwise specified, all suppliers of calibration services must be registered to IEC-17025 or AALA.

Gauge blocks must be calibrated in accordance with ISO-10012-1 and ANSI 2540-1, or the most current industry accepted standards.

A Certificate of Calibration must be delivered to DAVCO with the device(s) being calibrated.

Calibration Certifications must contain the following information:

- 1) A description of the item(s) being calibrated, including unique identifiers where applicable
- 2) Date calibration is performed
- 3) Due date for next calibration (DAVCO will provide calibration interval information)
- 4) Standard(s) to which item(s) are calibrated
- 5) "As found" calibration (deviation from expected nominal)
- 6) Where applicable, corrected calibration readings
- 7) Identification of calibration equipment with date of last calibration
- 8) Signature or other identifier of person certifying the calibration results.

Note: If calibration is discovered to deviate significantly from the expected nominal or other expected results we request urgent communication with the DAVCO Quality Department. This will allow us to quickly evaluate the possibility that nonconforming product could have been produced or shipped.

Outside Laboratory/Test Services

Outside laboratories must be accredited by AALA or a similar accreditation body.

Suppliers of outside laboratory services must provide a legible copy of all relevant Scopes of Accreditation to DAVCO each time they renew their accreditation.

An original laboratory report should be mailed to DAVCO as soon as it becomes available. A facsimile may be sent in the interim where information is needed quickly.

As a minimum, each laboratory report must contain the following information:

- 1) Report/test date and unique laboratory report number
- 2) Test specimen identification
- 3) Summary or reference to test procedures
- 4) A statement describing the specification to which the test specimen is being compared
- 5) Actual test results
- 6) Where applicable, a "Statement of Conformance"
- 7) Signature and title of appropriate supplier representative certifying the results.

Anodizing/Plating Services

Suppliers providing anodized finish or plating services must meet the following:

- 1) A copy of the latest relevant specifications must be on file at the location performing the anodizing operation
- 2) The supplier must have the capability to measure and accurately report on each required specification. (Use of an accredited outside testing laboratory is an acceptable alternative if results can be reported in a timely manner.)
- 3) Meet all requirements of each specification which may include:
 - Coating thickness
 - Corrosion resistance (e.g. salt spray, fog chamber, etc.)
 - Appearance (e.g. color, finish, etc) where applicable.
- 4) Provide certification with each production lot stating that each lot conforms 100% to relevant specifications.
- 5) At least annually, provide DAVCO with a laboratory report, A2LA or similarly accredited, listing each specification, actual test results and a "Statement of Conformance."

Where coating thickness is a function of process controls (cycle times, solution concentrations, etc.) the appropriate use of Statistical Process Controls (SPC) is strongly advised. Copies of relevant control charts should be available to DAVCO upon request.

Other Services

If your particular product or service does not appear to have been addressed above, please contact DAVCO for advice on how to proceed. Maintaining open communication between our companies is the best way to achieve a mutually beneficial relationship.

Revision History

Table of Revisions		
Revision Date	Author	Change Description
02/12/2009	P. Hoffman	Released.
03/03/2009	P. Hoffman	Added section on SPC and MSA.
05/20/2009	P. Hoffman	Editorial changes per M. Bara, R. Hegde review.

Appendix

Note: Forms found in this section may be used by DAVCO's suppliers, though we will accept your internal documents as long as they achieve the desired intent.

Many of these forms may be found in their original format at www.DAVCOtec.com/supplier.

8 steps to a successful PPAP submission

- 1) **Review drawings for issues and get them addressed up front.** When engineering drawings are provided, make it a practice to thoroughly review all specifications. If you do not believe you can meet the requirements, inform DAVCO immediately.
- 2) **Submit to a released copy of the DAVCO drawing.** If a released version of the DAVCO engineering drawing is not available, contact the DAVCO Quality Department for direction on how to proceed. Do not submit to advanced information.
- 3) **Submit to a ballooned drawing / numbered print.** All dimensions and notes must be numbered and referenced in the submission package.
- 4) **Complete a full sample inspection report.** The sample inspection report must address every note and dimension on the drawing. Include the target and tolerances for all dimensions. Show whether the inspection passes or fails on the inspection report. Make sure the report is signed and all fields are complete in the header section.
- 5) **Show ranges or multiple measurements for dimensions designated as such.** When the drawing calls for a dimension in two or more places (example R1.5 3x), the inspection results must show two or more measurements or list the highest and lowest measurement for the dimension as a range or if the results are the same for each dimension checked, simply state the number of places it was verified.
- 6) **Show qualified statements of conformity.** On notes where the inspection is more of an attribute check, such as with burrs or material conformance, the standard practice for notation of conformance will be: "Conforms per _____". The blank should be filled in with a qualifier such as visual inspection, an attribute gauge (gage xyz), or a material certification. Do not simply state "conforms" without identifying the method or tool used to determine conformance.
- 7) **Include all certifications and test results in the submission.** If material is specified on the drawing, the certification must be provided. If an ASTM or mil spec is shown on the drawing as part of the material specifications then the material certification must show compliance to that specification. This holds true for finish certifications or test specifications. All documents must show compliance to the engineering drawing and all of the applicable specifications.
- 8) **Do not assume.** Do not assume that DAVCO will know that the DAVCO specification is equivalent to another. It is best to check and document the traceability of such items before the submission takes place. The DAVCO print requirements are the only criteria used when reviewing the submissions received. This will help ensure that your submission will be in compliance and that approval will be granted quickly.

PPAP Submission Requirements Checksheet

Supplier: _____

DAVCO Part Number: _____
 DAVCO Revision Level: _____

Submission Level Requested

Level 1 Level 2 Level 3 Level 4 Level 5

	<i>Requirement</i>	<i>Req?</i>	<i>Observations</i>	<i>OK?</i>
1	Design Record			
2	Engineering Change Documents			
3	Customer Engineering Approval			
4	Design FMEA			
5	Process Flow Diagram			
6	Process FMEA			
7	Control Plan			
8	Measurement System Analysis Studies			
9	Dimensional Results			
10	Material, Performance Test Results			
11	Initial Process Studies			
12	Qualified Laboratory Documentation			
13	Appearance Approval Report			
14	Sample Product			
15	Master Sample			
16	Checking Aid			
17	Records of Compliance with Customer Specific Requirements			
18	Part Submission Warrant			

Quality Problem Report

QPR Page1

Discovered by: <input type="checkbox"/> Customer <input type="checkbox"/> Operator <input type="checkbox"/> QC <input type="checkbox"/> Other:	Customer:	
	Customer Contact:	
	Customer Phone:	
	Part Number:	

Problem Description	Date		By
	Opened		
	Update		
	Update		
	Closed		

Team Members/ Title or Position

_____	_____
_____	_____
_____	_____
_____	_____

Containment Information		Date	By
Internal			
In-transit			
At Supplier			
At Customer*			
Customer contact info:			

*If nonconforming product is suspected to be at a customer location contact the customer immediately.

Items Investigated/Actions Taken	R/C?	Date	By

(R/C= Root Cause. Possible answers: Y=Yes, N=No, C=Contributory)

Root Cause

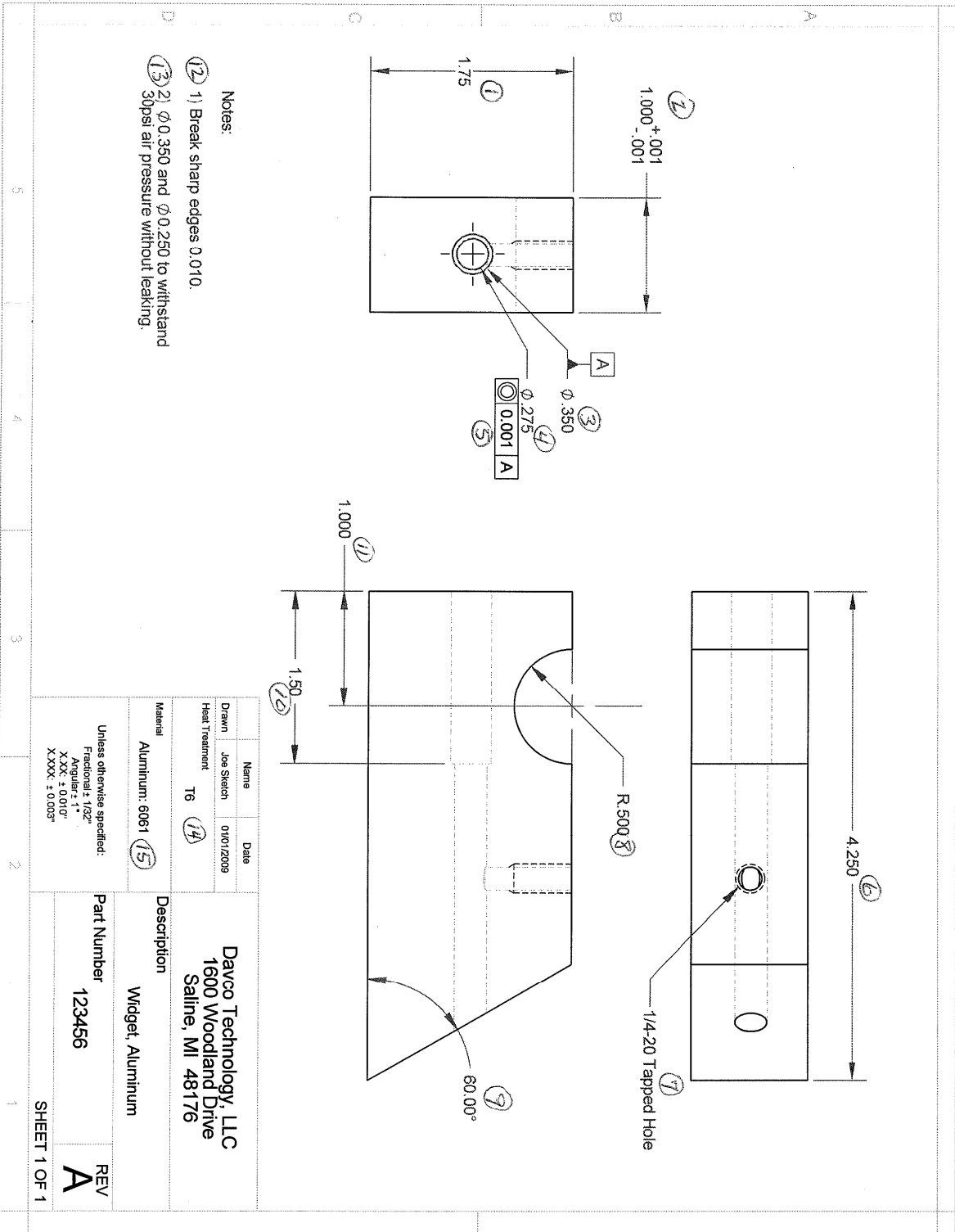
Corrective Action

Preventive Action

Verification

Additional Information/Comments/Observations: _____

Sample Numbered/Ballooned Drawing



Sample Control Plan

Control Plan for:		Key Contact Name: Joe Quality	Contact Phone: 555-555-5555	Customer Approvals																			
<input type="checkbox"/> Prototype <input type="checkbox"/> Pre-Launch <input checked="" type="checkbox"/> Production		Core Team: Production, Quality, Eng.	Plan Approval Date: 02/01/2009	Engineering Name:	Date:																		
Part Number: 123456	Revision Level/Date: A/01/01/2009	Document Revision History <table border="1"> <thead> <tr> <th>Date</th> <th>By</th> <th>Change Description</th> </tr> </thead> <tbody> <tr> <td>05/15/2009</td> <td>Q. Eng</td> <td>Added annual cert to material controls.</td> </tr> <tr> <td>07/21/2009</td> <td>Q. Eng</td> <td>Added dock audit. (See QPR 09-001)</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Date	By	Change Description	05/15/2009	Q. Eng	Added annual cert to material controls.	07/21/2009	Q. Eng	Added dock audit. (See QPR 09-001)										Quality Name:	Date:
Date	By			Change Description																			
05/15/2009	Q. Eng	Added annual cert to material controls.																					
07/21/2009	Q. Eng	Added dock audit. (See QPR 09-001)																					
Part Name/Description: Widget, Aluminum		Other Approvals as Required:		Date:																			
Supplier Name: The Machining Company 123 Any Street Anytown, XX 12345																							

Part or Process Number	Process Name, Operation Description	Machine Name, Identification	Characteristics			Special Characteristic Class	Methods					Reaction Plan**
			No.	Product	Process		Specification	Measurement Method	Sample Size	Frequency	Control Method	
1 and 2	Receiving			Aluminum 6061			Chemistry per Aluminum Association	Supplier certification	N/A	Each shipment Annually	Chemistry check-sheet. Verification by third party accredited laboratory.	Do not unload shipment. Contact supplier. Initiate quarantine activities.
				Heat Treatment			T6	Supplier certification	N/A	Each shipment Annually	Chemistry check-sheet. Verification by third party accredited laboratory.	Do not unload shipment. Contact supplier. Initiate quarantine activities.
4	Mill	VMC-001		Machine primary rectangular shape			1.000±0.001	Micrometer	5	100	Control chart	Initiate quarantine activities
							1.75±0.010	Caliper	5	100	Check sheet	Initiate quarantine activities

Part or Process Number	Process Name, Operation Description	Machine Name, Identification	Characteristics			Special Characteristic Class	Methods					Reaction Plan**
			No.	Product	Process		Specification	Measurement Method	Sample Size	Frequency	Control Method	
							4.250±0.003	Caliper	5	100	Check sheet	Initiate quarantine activities
				Create R0.500			R0.500±0.003	Comparator	1	100	Check sheet	Initiate quarantine activities
				Location of R0.500			1.000±0.003	CMM	1	100	Check sheet	Initiate quarantine activities
				Break sharp edges			0.010±0.003	Visual	100%	Continuous	N/A	Initiate quarantine activities
6	Drilling Operation Station #1	Brother TC229		Drill through hole and counter bore.			Ø0.350±0.003	Plug gauge G-0001	5	100	Check sheet	Initiate quarantine activities
							1.50±0.010	Plug gauge G-0001	5	100	Check sheet	Initiate quarantine activities
							Ø0.275±0.003	Plug gauge G-0002	5	100	Check sheet	Initiate quarantine activities
							Concentricity of Ø0.275 to datum A	CMM	1	Hour	Check sheet	Initiate quarantine activities
6	Drilling Operation Station #2	Brother TC229		Tapping operation			¼-20	Thread gauge TG-0001	5	100	Check sheet	Initiate quarantine activities
				Machine 60° nose angle			60°±1°	Comparator	1	Hour	Check sheet.	Initiate quarantine activities
8	Pressure Test	LeakDetect2000		Leak resistance of Ø0.250 and Ø0.350			30 psi min with no leak	Digital pass/fail device	100%	Continuous	Check sheet	Scrap part
	Dock Audit			All characteristics listed above except leak testing			As above.	As above	2	100	Dock audit check sheet	Initiate quarantine activities

Supplier Request for Temporary Deviation from Specifications

Section ①

Supplier: Complete ALL fields in section 1 of this form. Submit to DAVCO Engineering Department.

_____ Company Name	_____ Date of Request
_____ Requestor Name	_____ Part Number
_____ Requestor Phone/Email	_____ Suspect Quantity
_____ DAVCO Specification(s):	_____ Actual:
_____	_____
_____	_____
Other Information: _____	

Check here if additional sheet(s) attached.

Will a corrective action investigation be conducted with a copy sent to the DAVCO Quality Dept.?
 Yes No Due Date: _____

Section ②

DAVCO Engineering Department: Complete the fields in section 2 of this form. Return a copy to the supplier, send a copy to the DAVCO Quality Manager and file the original.

<p>Deviation Request Disposition:</p> <p><input type="checkbox"/> Approved</p> <p><input type="checkbox"/> Denied</p> <p><input type="checkbox"/> Other: _____</p> <p>_____</p>
--

Disposition by (print): _____

Title: _____

Date: _____

Signature: _____

Rationale (Optional): _____

Check here if additional sheet(s) attached.