

Supplier Product Approval Process (SPAP)

EMD uses the Supplier Product Approval Process (SPAP) to document a supplier's compliance to EMD design specifications and process capability to consistently meet those requirements during a production run. The SPAP is applicable to all High Critical and Standard Critical production and service parts and raw material purchased by EMD. SPAP approval is not required for Commodity Parts (standard catalog, off-the-shelf production or service parts). In this case, the supplier should confirm with the EMD Buyer if it is a Commodity Part with no SPAP requirement and must be so noted on the Purchase Order. All EMS 82, 159 and 162 fasteners (grades 5, 8 and metric 8.8, 10.9 and 12.9) and all other Critical Fasteners listed in ETI 506 are never Commodity Parts – for more information, see ETI 506. Material certifications are required with each material lot shipped of all Critical Fasteners.

EMD has categorized all parts into a criticality matrix, Purchased Part Categorization, which is used to scale the SPAP activities to better fit the part. The Purchased Part Categorization will be updated annually (minimum) and is located on the website. If your part is not mentioned, it is assumed to be Standard Critical. All parts in the High Critical category are required to submit a new SPAP annually, even if SPAP (PPAP) approved, by the end of each calendar year beginning 2006.

The supplier must perform SPAP activities and obtain EMD approval in a manner that will not jeopardize the product delivery schedule set by EMD's Purchasing Department. In other words, start this process prior to starting production.

The supplier must perform the SPAP process and obtain EMD approval for the following:

- New production or service parts.
- Any change in the production process, method of manufacture or manufacturing location.
- Change in Process Controls initiated.
- Parts modified by engineering change, EMD or supplier.
- Correction to a discrepancy on material previously approved by EMD under Temporary Approval.
- Use of construction or material that was different than that used in a previously approved part.
- Tooling is new, modified, refurbished, replaced or transferred to other locations.
- Change of sub-contractor for parts or services.
- Parts not shipped to EMD for more than 24 months.

The supplier is responsible to contact the EMD SQE when the SPAP is required. The EMD SQE and the supplier shall establish SPAP issues and schedule the approval process.

New submissions require complete documentation as described in the Approval Process. Submission for all changes listed above, require only those documents affected by the change.

Approval Process (does not apply to Commodity Parts)

The supplier must perform the following steps to obtain SPAP approval for each part number purchased by EMD. SPAP applies to the top level drawing, the part purchased by EMD. The supplier is responsible for the detailed drawing levels, components of the part purchased by EMD, for part approvals and for maintaining controls. Supplier shall provide and/or demonstrate the part approvals and controls upon EMD request. This applies to internally supplied, as well as sub-contracted components.

Step 1. Prior to Starting Production

Requirement for all parts (Standard Critical and High Critical) – Submit Supplier Quality Questionnaire to your SQE for pre-production approval.

Additional Requirement for High Critical Parts – Contact SQE for pre-production approval and to discuss SPAP submission requirements (as listed below), assure understanding for High Critical status and schedule SPAP approval activities.

Step 2. SPAP Submission Requirements

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Requirements for Standard Critical and High Critical Parts –

All documentation must be sent to EMD with the Sample Production Parts.

1. **Product / Process Warrant (PPW) form (EMD PPW1000)** – Supplier must use one PW per part number. The PW shall be complete, legible and accurate. The PW will not be accepted if any of the fields are in error or incomplete.
2. **First Article Inspection with Samples** – The supplier shall submit two parts with measurements of all product features and characteristics (First Article Inspection) unless otherwise specified by the EMD Buyer or SQE. Measurements shall be on marked drawings or check sheets with check sheet item numbers marked on the drawings. For multiple processes, two parts per process e.g. two parts per cavity, tool, cell, assembly lines are required unless otherwise specified. The parts should be the same part(s) that were dimensionally measured and documented on the marked drawing or check sheet. Packaging and/or Box containing PAP parts should be labeled with part number, change level, supplier name, purchase order number, etc. consistent with delivery of normal production or service parts.

Multiple samples may be required for EMD Materials Lab testing. This applies to castings, forgings, gaskets, seals and other critical materials and parts when requested by EMD. See Drawings, Material Specifications, Apparatus Instructions, Engineering Test Instructions and the Purchase Order for more information. The Buyer will supply all drawings and specifications.

3. **Process Flow Diagram / Description** – The supplier must have a process flow diagram or written description that clearly describes the production process steps and sequences and meets the EMD specified requirements and expectations. The Process Flow Diagrams for a “family” of similar parts are acceptable if the new parts have been reviewed for commonality. The Process Flow must include identification of the exact equipment that will produce the parts as the SPAP is only approved for specific equipment. All changes require resubmitting the SPAP for approval.
4. **Inspection and Test Plan** – The supplier must have an inspection and test plan that clearly describes steps in place to control the production process. The plan must include the part number, drawing revision level, type of the inspection / test, gauges / tools used, sample size, frequency, control method and steps to follow if a non-conformance is detected. The inspection and test plans for a “family” of similar parts are acceptable if the new parts have been reviewed for commonality. This information may be included in the **Process Flow Diagram / Description**.
5. **Functional / Performance Test Results** – The supplier must perform tests for all parts when functional or performance requirements are specified in the design specifications. The supplier must indicate the drawing revision level of the parts tested, the number, revision level of the specifications to which part was tested, and date on which the testing took place. Any authorized engineering change documents (CR) that have not been yet incorporated in the design specifications must be indicated. All tests required should be listed in an understandable format along with the quantity tested and the actual results of each test. When Material, Validation, Performance, Durability, Reliability, or other engineering test requirements are on the design specification, the supplier must get approval from EMD Engineering prior to SPAP and submit the approved EMD Engineering Approval form with the SPAP submission.
6. **Material Test Results** – The supplier must perform tests for all parts when chemical, physical, or metallurgical requirements are specified in the design specifications. All castings and forgings must be tested in accordance with ETI 827 and ETI 930 respectively whether supplied to EMD in the rough, semi-finished or finished conditions. The supplier must indicate the drawing revision level of the parts tested, revision level of the specifications to which part was tested, date on which testing took place. Any authorized engineering change documents (CR) that have not been yet incorporated in the design specifications must be indicated. All tests required should be listed in an understandable format along with the quantity tested and the actual results of each test.
7. **Process Capability Analysis** – Supplier shall maintain records of all **Key Product Characteristic (KPC's)** measurements and submit the data and Capability Analysis, including calculation of Cpk as follows. 1st Submission will accompany PAP submission if Supplier has sufficient data. If less than 30 pieces, supplier will submit the actual measurements for the parts shipped (most likely 2), 1st Submission of SPC analysis shown below will be submitted when 30 pieces have been manufactured. Supplier may use EMD's Excel Workbook (available on our website), equivalent in-house forms or other software.

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1 st SPC Submission	First 30 pieces (after removing assignable causes)
2 nd SPC Submission	Next 30 pieces (include assignable causes, even if parts are scrapped)
Thereafter	Continue every 30 pieces until process is in control with Cpk 1.50 or higher – then maintain records for EMD review as needed. Supplier may now use an appropriate sampling plan for recording data and to maintain process control. Notify SQE whenever process goes out of control.

SQE may waive or modify this requirement for non-normal distributions and/or processes that are proven not capable, but controlled by 100% inspection. EMD may designate other specific data be maintained and submitted in addition to the KPC data. SPC submissions are to be made to the SQE via e-mail.

Additional Requirements for High Critical Parts

Includes all of the requirements for Standard Critical parts Plus the additional requirements listed below. All documentation for High Critical Parts is to be reviewed / approved by SQE prior to start of Production.

1. **PFMEA** – A Process Failure Mode and Effects Analysis is required for all High Critical Parts, with Action Plans for high RPN's.
2. **DFMEA** – A Design Failure Mode and Effects Analysis is required for Design Responsible suppliers for all High Critical Parts, with Action Plans for high RPN's. For non-design responsible suppliers, a DFMEA is required to be reviewed with the EMD Design Responsible Engineer to identify Key Product Characteristics (KPC's), which will be the basis for Supplier's SPC and Process Controls.
3. **Internal Defect Rate Submission Plan** – for ongoing reporting of production inspection / test defects to the EMD SQE and plan for continuous improvement of these rates. This must also include plans and methods for communicating quality spills to EMD for containment planning.
4. **Copies of Visual Controls** – specific to field problems, EMD production problems and/or supplier internal defect rates, which are posted in production areas and reviewed with production personnel to assure that past problems and critical process steps are well communicated.
5. **Quality Notice Tracking and Follow-up Plan** – Submit a summary spreadsheet, including description of issue, of all QN's (PRR's) from the past year and status (open/closed) and plan for closure.
6. **Sub-contractors** – Sub-supplier listing for sourced parts and processes, including contacts for possible joint audits by EMD and the Supplier to assure Quality Controls for sourced parts / processes. List controls that are in-place at the sub-contractor as well as any incoming inspection at the supplier.
7. **Tracking and Trace ability** – Descriptions of part tracking and trace ability systems. Must include description of serial number or date code methodology as well as internal component trace ability. Supplier must maintain a Change Log, listing all changes with effective dates, serial numbers, etc. This will be reviewed and agreed to with SQE.

Step 3. Shipping

When shipping sample(s) to EMD, parts must be packaged separately and identified with "Sample Parts" label as supplied by purchasing. If several part numbers are shipped in one container, each part number must be clearly identified and the "Sample Parts" label must be attached to the container at the upper right hand corner, visible from two sides. The accompanying documentation will be attached to the parts.

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Step 4. SPAP Disposition

Based on the EMD product evaluation results, EMD shall determine the appropriate status of the SPAP:

Approved – The supplier is allowed to ship the remaining parts of the order. SPAP approval granted by one EMD facility applies to all EMD locations. The copy of the approved PPW must be submitted when parts are shipped to EMD facility that did not grant the approval.

Temporary Approval – May be granted if supplier is experiencing problems with meeting design or process requirements, in the following instances:

1. Product not meeting design specifications
2. Documentation not completed
3. Non-production process / tooling used

The temporary approval is granted on a limited quantity basis. No shipments are authorized beyond the quantity approved unless an extension is granted. If the extension is required, the supplier must contact the EMD SQE to initiate this process. The temporary approval granted by one EMD facility does not guarantee authorization to ship to other EMD facilities.

Rejected – The supplier is responsible for all costs incurred due to rejected SPAP and the impact it has on EMD. The supplier must implement corrections, and repeat the SPAP to obtain approval.

EMD shall return an approved / temporary approval / rejected copy of the Warrant to the supplier. All EMD facilities reserve the right to review the SPAP information upon request.