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Generic Specification for Keyboard Switches of Certified Quality

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GENERIC SPECIFICATION FOR KEYBOARD SWITCHES OF CERTIFIED QUALITY

(From EIA Standards Proposal No. 2207, formulated under the cognizance of the EIA P-13.3 Working Group on Sensitive, Pushbutton and Keyboard Switches.)

1.0 SCOPE AND OBJECT

1.1 Scope

This Generic Specification relates to keyswitches, keypads, and keyboard switches of certified quality. Switches covered by this Specification provide manual interface with electronic logic circuits in commercial, industrial, military, and computer information handling equipment.

Sectional Specifications, based upon this Generic Specification, shall describe the individual types of switches. Blank Detail Specifications, based upon the relevant Sectional Specification, shall describe the requirements for preparing a Detail Specification on a switch or on a group of structurally similar switches. In lieu of Blank Detail Specifications, the Sectional Specification may provide instructions for preparation of Detail Specifications.

1.2 Object

The object of this Generic Specification is to establish a uniform quality certification system, a uniform qualification test sequence, a minimum group of tests for qualification or capability approval inspection, and to provide for consistency in the Sectional Specification for keyboard switches.

2.0 GENERAL

2.1 Related Documents

The following documents of the issue in effect form a part of this Specification to the extent specified herein.

IEC 410	Sampling Plans and Procedures for Inspection by Attributes
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IEC 664	Insulation Coordination Within Low-Voltage Systems
ISO 1000	SI Units and Recommendations for Use of Their Multiples and of Certain Other Units
IECQ QC 001002	Rule of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ)
ANSI/EIA-186	Standard Test Methods for Passive Electronic Component Parts
ANSI/EIA-448	Standard Test Method for Electro-mechanical Switches
ANSI/EIA-476	Marking, Source and Date Code
ANSI/UL 94	Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
ANSI/UL 114	Safety Standards for Office Appliances and Business Machines
ANSI/UL 478	Safety Standards for Electronic Data-Processing Units and Systems
FED-STD-28	Screw-Thread Standards for Federal Services
FED-STD-595	Colors
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes

2.2 Units and Symbols

Units, graphic symbols, and letter symbols shall be, whenever possible, in accordance with the issue in effect of the following publications:

ISO 1000	SI Units and Recommendations for the Use of Their Multiple and Certain Other Units
ANSI/IEEE Y32E	Electrical and Electronic Graphic Symbols and Reference Designations

Graphic symbols and letter symbols peculiar to a group of structurally similar switches shall be defined in the Detail Specification.

2.3 Terminology

Terminology shall be in accordance with the issue in effect of the following publication:

ANSI/IEEE 100	Dictionary of Electrical and Electronics Terms
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Terminology peculiar to a particular switch subfamily shall be defined in the applicable Sectional Specification. Terminology common to all keyboard switches is defined in Appendix A. Terminology peculiar to a group of structurally similar switches shall be defined in the Detail Specification.

2.4 Standard and Preferred Values

The Sectional or Blank Detail Specification may prescribe any standard values or any preferred values for rated and limiting values, characteristics, tolerances, requirements and dimensions applicable to the whole subfamily.

2.4.1 Clearance and Creepage Distances

The Sectional or Detail Specification shall specify either the minimum clearance and creepage distances or the minimum dielectric test voltage under specified air pressure. The acceptability of a switch for a particular application can then be determined based upon the safety requirements which apply to the equipment in which the switch is installed and upon IEC Publication 664. When minimum clearance and creepage distances are specified, the applicable Material Group of IEC Publication 664 shall also be specified for the insulation materials of the switch.

2.5 Marking

The Sectional Specification shall indicate the identification criteria and other information to be shown on the switch and/or package containing the switch.

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2.6 Design Requirements

2.6.1 Materials

Materials shall be capable of meeting the performance requirements specified by the Detail Specification. Printed circuit board material shall also comply with ANSI/UL 114 or ANSI/478 as applicable. Plastic materials shall also be listed for flammability under UL 94 as specified in the Detail Specification. Metals for noncurrent-carrying parts shall be corrosion resistant or shall be suitably protected to resist corrosion.

2.6.2 Finishes

No requirement at present.

2.6.3 Threads

Threads for removable parts shall be in accordance with FED-STD-28. The unified series of threads is preferred.

2.6.4 Electrical Shock Protection

Keyboards shall be designed in a manner such that the keyboard will comply with ANSI/UL 114 or ANSI/UL 478, as applicable, when properly installed in its enclosure.

2.6.5 Maintenance

Switches should be designed to facilitate repair or replacement, as applicable, using standard tools such as screwdrivers, nut drivers, soldering tools, etc. Special tools, when required, shall be specified by the Detail Specification.

2.6.6 Keytop Color

The color for non-illuminated keytop background and legend colors should be selected from FED-STD-595, whenever possible, and specified by the Detail Specification. The color of the illuminated keytops shall be specified by the Detail Specification.

3.0 QUALITY ASSESSMENT PROCEDURES

3.1 Product or Capability Approval Procedures

The manufacturer shall contact the National Supervising Inspectorate for specific instructions on obtaining qualification approval. Qualification approval shall be granted upon satisfactory completion of the inspections prescribed for qualification approval and upon satisfactory fulfillment of the instructions of the National Supervising Inspectorate. These inspections shall consist of a fixed sample quantity subjected to the specified sequence of test. The test samples shall be drawn from current production or as agreed with the National Supervising Inspectorate.

The manufacturer shall comply with:

- a) The general requirements of the rules of procedure governing qualification approval.
- b) The requirements for the primary stage of manufacture.

3.1.1 Qualification Inspection Tests

The tests required for qualification inspection are prescribed in Table 1. The minimum qualification inspection for any switch shall be the Group P (Test Phase P1 thru P4) and Test Group A (all Test Phases). Any of the other test groups (B through G) may be prescribed by the relevant specification. When the additional tests groups are prescribed, the identity of the test group, the sequence of the tests, and the minimum sample quantity shall be in accordance with Table 1. When the relevant specification prescribes tests not in Table 1, the relevant specification shall include the additional tests either within an existing test group(s) or as an additional test group(s).

In the event qualification is sought on a variant of a previously qualified switch, qualification inspection shall be limited to those tests for which the test results on the previously qualified switch are not valid for the variant.

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3.1.2 Test Specimens

The minimum number of test specimens shall be in accordance with Table 1. The test specimens shall be representative of the type(s) for which qualification is sought. See clause 3.3. Test specimens shall not be included in lots released for delivery.

3.1.3 Extent of Qualification Approval

Qualification approval may be granted for all switches which are structurally similar to the qualification test specimens or, in the case of capability approval, qualification approval will be granted for the range of products described in the Detail Capability Approval Specification.

3.1.4 Maintenance of Qualification Approval

The requirements of IECQ QC 001002 apply.

3.1.5 Suspension or Withdrawal of Qualification Approval

The requirements of IECQ QC 001002 apply.

3.1.6 Significant Changes

The manufacturer shall report to the National Supervising Inspectorate any technical modifications which could adversely affect the results of the qualification inspection tests. Technical modifications include changes in design, material, technology, manufacturing procedures and/or manufacturing location.

3.2 Primary Stage of Manufacture

The primary stage of manufacture and all subsequent processes shall be carried out under the direct surveillance of the manufacturer's approved chief inspector. They may be carried out by subcontractors providing equivalent disciplines apply, unless otherwise specified by the Sectional or Detail Specification. The primary stage of manufacture shall be defined in the Sectional Specification.

3.3 Structurally Similar Switches

Structurally similar switches for product qualification detail specifications are switches produced by the same manufacturer with essentially the same design, materials, processes and methods. They are such that the results of a given test carried out on one type of these switches can be recognized as being valid for other types of the group. They are separately identifiable.

Structurally similar switches for capability approval specifications are switches produced by the same manufacturer with essentially the same design, materials, processes and methods, and which are within the range of products described in the "Detail Capability Approval Specification.

The manufacturer shall submit to the National Supervising Inspectorate a certified statement of the structural similarities between the types of switches for which qualification is sought and a recommended grouping of switches for each test of the qualification inspection test sequence. The National Supervising Inspectorate shall determine the appropriate grouping of structurally similar components.

3.4 Quality Conformance Inspection:

The Blank Specification associated with the Sectional Specification shall prescribe the test schedule for Quality Conformance Inspection. This schedule may also prescribe the grouping (formation of inspection lots), sampling and period over which production lots may be grouped for lot-by-lot and periodic inspection. Inspection Levels and AQL's shall be specified by the Blank Detail Specification and shall be selected from those given in IEC Publication 410 or MIL-STD-105.

3.4.1 Certified Records of Released Lots

When the Detail Specification specifies the issuance of a Certified Record of Released Lots, it shall prescribe the tests for which the results shall be presented and shall specify how these results shall be expressed. As a minimum, these records shall contain attributes information (i.e. number of components tested and number of defective components) for tests in the subgroups covered by periodic inspection without reference to the parameters for which rejection was made.

3.4.2 Delayed Delivery

Switches held for more than 36 months following the release of the inspection lot shall be re-examined prior to delivery. The procedure of the re-examination shall be approved by the National Supervising Inspectorate. Once a lot has been reinspected, its quality is reassured for 36 months.

3.4.3 Release of Lots for Delivery

The lots shall be released or rejected on the basis of the lot-by-lot tests unless otherwise prescribed in the relevant specification.

3.4.4 Delivery of Tested Switches

Only switches subjected to lot-by-lot inspections may be included in the lot to be delivered. Switches subjected to qualification or periodic inspections shall not be included in the lot to be delivered.

3.4.5 Formation of Inspection Lots

For the purpose of quality conformance inspection, structurally similar switches may be combined into an inspection lot.

3.4.6 Lot-by-Lot Inspection Tests

The minimum requirements for lot-by-lot inspection shall be prescribed in the Sectional Specification.

3.4.7 Periodic Inspection Tests

The tests required for periodic inspection shall be prescribed by the Sectional Specification. The periodic inspection shall be performed at intervals no greater than 36 months.