M-QAP DOCUMENT FOR LEVEL-II SIMULATOR

**S.O No: ASL/21/R&QA/QED(E)/GSE/QR/2416(Date: 11/05/2015)**

**(This MQAP Document Contains 31 Pages & Drawings 86 Pages)**

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**RECORD OF AMENDMENTS**

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| **SL. NO** | **Amendment** | | **Authority Letter** | | **Incorporated by** | | **Affected**  **Drawings/Documents** | |
|  | **No.** | **Date** | **No.** | **Date** | **Name** | **Date** |  |  |
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**LIST OF ABBREVATIONS**

AT : Acceptance test

CKTREF : Circuit reference

CHP : Customer hold point

dB : Decibel

ESS : Environmental stress screening

F : Female

Hz : Hertz

IND : Industrial grade

ICR : Inductor, capacitor, resistor

MIL : Mill grade

M : Male

m.sec : Mille second

MAX : Maximum

MHz : Mega hertz

mm : Mille meter

PCB : Printed circuit board

QAP : Quality assurance plan

QC : Quality control

QT : Quality test

RF : Radio frequency

Rx : Reception

Sl.NO : Serial number

Sec : Seconds

STDS : Standards

Tx : Transmission

V : Volts

**1.0 INTRODUCTION**

The Document gives brief description, specifications, acceptance criteria for raw material & brought out items. It also contains fabrication drawings & assembly of Level II simulator unit system and necessary inspection formats are enclosed.

**The Level-II simulator unit consists of following Items:**

* SIMULATOR RACK 1 NO
* RKVM 1 NO
* SIMULATOR PC 1 NO
* SIMULATOR INTERFACE UNIT(SIU) 1 NO
* SIMULATOR PC WITH TRAY 1 NO

**2.0 SCOPE OF WORK**

* Raw material for the Level-II simulator unit system will meet the requirements as per standards specified in the respective drawings.
* Allot SL. No to material traceability from raw material stage to finished goods stage.
* Level-II simulator unit system fabrication has to be done as per drawings on CNC milling machine.
* Dimensions of the fabricated components will meet as per the drawings.

* Surface treatment has to be done on the mechanical components as per Appendix ‘E’& Appendix ‘F’.
* Hardware assembly will be done as per drawings.
* Packing process will be carried out as mentioned in chapter 8.0.

**3.0 GENERAL REQUIREMENTS**

**3.1 Applicable Drawings**:

All components and assemblies shall be fabricated as per applicable drawings. Drawing changes (revision) shall be incorporated if required; only by the design agency. The latest revision number of the drawings shall be applicable. All documents and drawings to be vetted by SSQAG.

**3.2 Technical Specifications:**

The Technical Specification includes raw material specification, surface finish specifications like chromatisation & Paint.

**3.3 Interchangeability:**

The standardization and quality procedures should make it possible for the interchangeability of systems /sub systems means interchangeable parts,the ability to select components for assembly at random & fit them together within proper tolerances.

**3.4 Stage inspection:**

Stage inspection to be carried out by internal QC, R&QA and SSQAG as per approved QAP Inspection has to be done by the Internal QA at different stages as follows

Raw Material inspection

Machining inspection

Fabricated component dimensional inspection as per drawing

Surface treatment inspection

**3.5 Assembly Inspection:**

The form tolerances and the overall dimension of the assembly shall confirm to the drawings. Remarks pertaining to be the notes given in the drawing shall also be included in the inspection report.

**3.6 Inspection Reports:**

The following inspection reports shall be sent to the customer.

Raw material reports.

COC’s of Brought out components (Mechanical).

Dimensional inspection report.

List of deviation affecting assembly/integration/interchangeability, if any

**Note:** Latest revisions of documents, drawings and standards referred in this document shall be applicable.

**4.0 BILL OF MATERIAL**

**4.1 BILL OF MATERIAL FOR SIMULATOR RACK:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Part no/Reference** | **Make** | **Qty** |
| 1 | SIMULATOR RACK | CRCA | DBPL-RACK-MD-01 | DINRACK | 01 |

**4.2 BILL OF MATERIAL FOR RKVM ASSEMBLY:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Part no/Reference** | **Make** | **Qty** |
| 1 | DISPLAY FRAME | AL 6061 T6 | DBPL-RKVM-MD-01 | Datasol (B) Pvt Ltd | 01 |
| 2 | DISPLAY TOP PLATE | AL 6061 T6 | DBPL-RKVM-MD-02 | Datasol (B) Pvt Ltd | 01 |
| 3 | DISPLAY REAR PLATE | AL ALLOY 5052 | DBPL-RKVM-MD-03 | Datasol (B) Pvt Ltd | 01 |
| 4 | DISPLAY CB BOTTOM PLATE | AL 6061 T6 | DBPL-RKVM-MD-04 | Datasol (B) Pvt Ltd | 01 |
| 5 | DISPLAY CB PLATE | AL 6061 T6 | DBPL-RKVM-MD-05 | Datasol (B) Pvt Ltd | 01 |
| 6 | DISPLAY CB COVER | AL ALLOY 5052 | DBPL-RKVM-MD-06 | Datasol (B) Pvt Ltd | 01 |
| 7 | DISPLAY LH PLATE | AL 6061 T6 | DBPL-RKVM-MD-07 | Datasol (B) Pvt Ltd | 01 |
| 8 | DISPLAY RH PLATE | AL 6061 T6 | DBPL-KVM-MD-08 | Datasol (B) Pvt Ltd | 01 |
| 9 | DISPLAY SUPPORTING LH PLATE | AL 6061 T6 | DBPL-RKVM-MD-09 | Datasol (B) Pvt Ltd | 01 |
| 10 | DISPLAY SUPPORTING RH PLATE | AL 6061 T6 | DBPL-RKVM-MD-10 | Datasol (B) Pvt Ltd | 01 |
| 11 | KBD TOP FRAME | AL 6061 T6 | DBPL-RKVM-MD-11 | Datasol (B) Pvt Ltd | 01 |
| 12 | KBD CLOSING PLATE | AL 6061 T6 | DBPL-RKVM-MD-12 | Datasol (B) Pvt Ltd | 01 |
| 13 | CONNECTOR PLATE | AL 6061 T6 | DBPL-RKVM-MD-13 | Datasol (B) Pvt Ltd | 01 |
| 14 | KBD CLOSING PLATE 1 | AL ALLOY 5052 | DBPL-RKVM-MD-14 | Datasol (B) Pvt Ltd | 01 |
| 15 | KBD BOTTOM PLATE | AL ALLOY 5052 | DBPL-RKVM-MD-15 | Datasol (B) Pvt Ltd | 01 |
| 16 | KBD CLAMP | AL ALLOY 5052 | DBPL-RKVM-MD-16 | Datasol (B) Pvt Ltd | 01 |
| 17 | KBD LH PLATE | AL 6061 T6 | DBPL-RKVM-MD-17 | Datasol (B) Pvt Ltd | 01 |
| 18 | KBD RH PLATE | AL 6061 T6 | DBPL-RKVM-MD-18 | Datasol (B) Pvt Ltd | 01 |
| 19 | KBD LH WIRE PLATE | AL 6061 T6 | DBPL-RKVM-MD-19 | Datasol (B) Pvt Ltd | 01 |
| 20 | KBD RH WIRE PLATE | AL 6061 T6 | DBPL-RKVM-MD-20 | Datasol (B) Pvt Ltd | 01 |
| 21 | FRONT RACK LOCKING PLATE | AL 6061 T6 | DBPL-RKVM-MD-21 | Datasol (B) Pvt Ltd | 01 |
| 22 | HINGE BLOCK | AL 6061 T6 | DBPL-RKVM-MD-22 | Datasol (B) Pvt Ltd | 01 |
| 23 | NAME PLATE | AL 5051 | DBPL-RKVM-MD-23 | Datasol (B) Pvt Ltd | 01 |
| 24 | CONNECTOR GASKET | SILICONE | DBPL-RKVM-MD-24 | SSD POLYMERS | 01 |
| 25 | M6x12 SOCKET HEAD | A2/A4,GRADE 70 | -------------- | LPS | 04 |
| 26 | M6x10 SOCKET HEAD | A2/A4,GRADE 70 | -------------- | LPS | 02 |
| 27 | M4x12 CSK SCREW | A2/A4,GRADE 70 | -------------- | LPS | 04 |
| 28 | M4x8 CSK SCREW | A2/A4,GRADE 70 | -------------- | LPS | 15 |
| 29 | M3x10 CSK SCREW | A2/A4,GRADE 70 | -------------- | LPS | 67 |
| 30 | M3x10 PAN HEAD SCREW | A2/A4,GRADE 70 | -------------- | LPS | 06 |
| 31 | M3x8 CSK SCREW | A2/A4,GRADE 70 | -------------- | LPS | 48 |
| 32 | M3x8 PAN HEAD SCREW | A2/A4,GRADE 70 | -------------- | LPS | 10 |
| 33 | M3x6 PAN HEAD SCREW | A2/A4,GRADE 70 | -------------- | LPS | 14 |
| 34 | M3x6 CAPTIVE SCREW | A2/A4,GRADE 70 | -------------- | LPS | 02 |
| 35 | M3x4 CSK SCREW | A2/A4,GRADE 70 | -------------- | LPS | 03 |
| 36 | M3 NUTS | A2/A4,GRADE 70 | -------------- | LPS | 04 |
| 37 | M3 PLAIN WASHER | A2/A4,GRADE 70 | -------------- | LPS | 04 |
| 38 | M3 SPRING WASHER | A2/A4,GRADE 70 | -------------- | LPS | 04 |

**4.3 BILL OF MATERIAL FOR SIM PC ASSEMBLY:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Part no/Reference** | **Make** | **Qty** |
| 1 | FRONT PLATE | AL 6061 T6 | DBPL-SIMPC-MD-01 | Datasol (B) Pvt Ltd | 01 |
| 2 | RAER PLATE | AL 6061 T6 | DBPL-SIMPC-MD-02 | Datasol (B) Pvt Ltd | 01 |
| 3 | BOTTOM PLATE | AL 6061 T6 | DBPL-SIMPC-MD-03 | Datasol (B) Pvt Ltd | 01 |
| 4 | RH SIDE PLATE | AL 6061 T6 | DBPL-SIMPC-MD-04 | Datasol (B) Pvt Ltd | 01 |
| 5 | LH SIDE PLATE | AL 6061 T6 | DBPL-SIMPC-MD-05 | Datasol (B) Pvt Ltd | 01 |
| 6 | TOP PLATE | AL6061 T6 | DBPL-SIMPC-MD-06 | Datasol (B) Pvt Ltd | 01 |
| 7 | FAN FRAME | AL6061 T6 | DBPL-SIMPC-MD-07 | Datasol (B) Pvt Ltd | 02 |
| 8 | POWER SUPPLY CLAMP | SS 304 | DBPL-SIMPC-MD-08 | Datasol (B) Pvt Ltd | 01 |
| 9 | SSD PLATE | AL 5052 | DBPL-SIMPC-MD-09 | Datasol (B) Pvt Ltd | 01 |
| 10 | HINGES | AL 6061 T6 | DBPL-SIMPC-MD-10 | Datasol (B) Pvt Ltd | 02 |
| 11 | DOOR | AL 6061 T6 | DBPL-SIMPC-MD-11 | Datasol (B) Pvt Ltd | 01 |
| 12 | CONNECTOR GASKET |  | DBPL-SIMPC-MD-19 | SSD POLYMERS | 01 |
| 13 | NAME PLATE | AL 5051 | DBPL-SIMPC-MD-20 | Datasol (B) Pvt Ltd | 01 |
| 14 | M2x4 PHILIPS PAN HEAD | A2/A4,GRADE 70 | ------- | LPS | 04 |
| 15 | M3x6 PHILIPS PAN HEAD | A2/A4,GRADE 70 | ------- | LPS | 36 |
| 16 | M3x8 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 20 |
| 17 | M3x12 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 25 |
| 18 | M3 NUT | A2/A4,GRADE 70 | ------- | LPS | 16 |
| 19 | M3 SPRING WASHER | A2/A4,GRADE 70 | ------- | LPS | 16 |
| 20 | M3 PLAIN WASHER | A2/A4,GRADE 70 | ------- | LPS | 16 |
| 21 | M4x6 PHILIPS PAN HEAD | A2/A4,GRADE 70 | ------- | LPS | 08 |
| 22 | M4x6 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 08 |
| 23 | M4x8 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 04 |
| 24 | M4x10 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 02 |
| 25 | M4x40 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 08 |
| 26 | M4 NUT | A2/A4,GRADE 70 | ------- | LPS | 02 |
| 27 | M4 SPRING WASHER | A2/A4,GRADE 70 | ------- | LPS | 02 |
| 28 | M4 PLAIN WASHER | A2/A4,GRADE 70 | ------- | LPS | 02 |
| 29 | M3X8 CAPTIVE SCREW | A2/A4,GRADE 70 | DBPL-SPC-MD-21 | Datasol (B) Pvt Ltd | 02 |

**4.4 BILL OF MATERIAL FOR SIU ASSEMBLY:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Part no/Reference** | **Make** | **Qty** |
| 1 | BOTTOM PLATE | AL 6061 T6 | DBPL-SIU-MD-01 | Datasol (B) Pvt Ltd | 01 |
| 2 | FRONT PLATE | AL 6061 T6 | DBPL-SIU-MD-02 | Datasol (B) Pvt Ltd | 01 |
| 3 | TOP PLATE | AL 6061 T6 | DBPL-SIU-MD-03 | Datasol (B) Pvt Ltd | 01 |
| 4 | RAER PLATE | AL 6061 T6 | DBPL-SIU-MD-04 | Datasol (B) Pvt Ltd | 01 |
| 5 | LEFT SIDE PLATE | AL 6061 T6 | DBPL-SIU-MD-05 | Datasol (B) Pvt Ltd | 01 |
| 6 | RIGHT SIDE PLATE | AL6061 T6 | DBPL-SIU-MD-06 | Datasol (B) Pvt Ltd | 01 |
| 7 | POWER SUPPLY PLATE | AL 5052 | DBPL-SIU-MD-07 | Datasol (B) Pvt Ltd | 02 |
| 8 | POWER SUPPLY PLATE SUPPORTING-1 | AL 5052 | DBPL-SIU-MD-08 | Datasol (B) Pvt Ltd | 01 |
| 9 | TB SUPPORTING PLATE-1 | AL 5052 | DBPL-SIU-MD-09 | Datasol (B) Pvt Ltd | 03 |
| 10 | TB SUPPORTING PLATE-2 | AL 5052 | DBPL-SIU-MD-10 | Datasol (B) Pvt Ltd | 03 |
| 11 | NAME PLATE | AL 5051 | DBPL-SIU-MD-17 | Datasol (B) Pvt Ltd | 01 |
| 12 | CONNECTOR GASKET | PURE SILICONE ELASTOMER | DBPL-SIU-MD-18 | SSD POLYMERS | 01 |
| 13 | M3x8 PHILIPS PAN HEAD | A2/A4,GRADE 70 | ------- | LPS | 08 |
| 14 | M3x8 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 120 |
| 15 | M3x8 SOCKET HEAD SCREW | A2/A4,GRADE 70 | ------- | LPS | 10 |
| 16 | M3 NUTS | A2/A4,GRADE 70 | ------- | LPS | 40 |
| 17 | M4x6 PHILIPS PAN HEAD | A2/A4,GRADE 70 | ------- | LPS | 12 |
| 18 | M4x6 PHILIPS CSK SCREW | A2/A4,GRADE 70 | ------- | LPS | 06 |

**4.5 BILL OF MATERIAL FOR SIMULATOR PC WITH TRAY ASSEMBLY:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Part no/Reference** | **Make** | **Qty** |
| 1 | BOTTOM PLATE | AL 6061 T6 | DBPL-TRAY-MD-01 | Datasol (B) Pvt Ltd | 01 |
| 2 | FRONT PLATE | AL 6061 T6 | DBPL-TRAY-MD-02 | Datasol (B) Pvt Ltd | 01 |
| 3 | TOP PLATE | AL 6061 T6 | DBPL-TRAY-MD-03 | Datasol (B) Pvt Ltd | 01 |
| 4 | RAER PLATE | AL 6061 T6 | DBPL-TRAY-MD-04 | Datasol (B) Pvt Ltd | 01 |
| 5 | LEFT SIDE PLATE | AL 6061 T6 | DBPL-TRAY-MD-05 | Datasol (B) Pvt Ltd | 01 |

**5.0 PROCESS FLOW CHART FOR MECHANICAL COMPONENTS**

B

STOP

A

FABRICATION

REJECTED

MECHENICAL PROPERTIES ON SAMPLE

REJECTED

REJECTED

ACCEPTED

ACCEPTED

CHEMICAL ANALYSIS ON SAMPLE

IQC & SSQAG INSPECTION

STORE RAW MATERIAL PROCUREMENT AS PER BOM

START

NDT-006 WILL BE CARRIED FOR THE MATERIAL ABOVE 12mm ULTRASONIC TEST

REJECTED

ACCEPTED

IQC & SSQAG INSPECTION(DIMENSION & DP TEST)

REWORK

REJECTED

ACCEPTED

SURFACE TREATMENT

ACCEPTED

IQC & SSQAG INSPECTION (VISUAL)

REJECTED

ACCEPTED

HAND OVER TO STORES

STOP

**6.0 MANUFACTURING PROCESS OF MECHANICAL COMPONENTS**

|  |  |  |  |
| --- | --- | --- | --- |
| SL.No | Description | Tools | Remarks |
| **1** | **Raw Material Procurement** |  |  |
|  | * Check the drawings for standards of the material. * Procure raw material as per part list & drawings. * After purchase of raw material check for dimensions. * Punch the identification marking on the raw material. | Steel rule,  Vernier calipers & Punch | Inspected by Internal  QC |
| **2** | **Testing of Raw Material & Bought out items inspection** |  |  |
|  | * Ensure no blow holes in raw material by conducting Ultra -sonic test **para7.2.7** * Cut material from the raw material lot as required for testing. (Chemical analysis and mechanical properties tests.) * Raw material acceptance will be done as per **Appendix**   **‘B’.**   * All brought out items shall cleared as per **Para 7.3** | Ultrasonic test | Inspected by internal  QC &  SSQAG |
| **3** | **Machining** |  |  |
|  | * After acceptance of raw material, send the material for machining. * The machining is done as per drawings placed at **APPENDIX ‘A’** on CNC milling machine. * Check the dimensions of the components after completion of the job. | End mills cutter(solid carbide) | Inspected by internal  QC |
| **4** | **Fabricated Components Dimensional inspection** |  |  |
|  | * After completion of machining. * Check the fabricated components dimensions as per mechanical drawings placed at **Appendix‘A’.** * Ensure no cracks on machined components by conducting DP Test. | Vernier calipers, proper gauges | Inspected by internal  QC &  SSQAG |
| **5** | **Surface Protection Treatment** |  |  |
|  | * After clearing of the machined components send those components for surface Protection. * For mechanical components, chromatisation & Paint has to be done as mentioned in the respective drawings. * Check the surface finish of the components visually& review COC’s of surface acceptance criteria for plated components as per **Appendix ‘E’ & ‘G’** | **---------** | Inspected by internal  QC &  SSQAG |
| **6** | **Handover to Stores** |  |  |

**7.0 QA PLAN FOR FABRICATION OF LEVEL-II SIMULATOR (MECHANICAL)**

**INTRODUCTION:**

The firm has to machine the Level-II simulator as per the respective drawings from materials given in **Appendix ‘A’.**

**7.1 RAW MATERIAL SPECIFICATION AND QA REQUIREMENTS:**

The raw material shall meet the requirements given in **Appendix ‘B’**

The QA requirements for Al.Alloy Plate 6061 T6 are given in **Appendix ‘B’**

**7.2 QA REQUIRMENTS FOR FABRICATION**:

**7.2.1** Before starting the fabrication all the test certificates of the concerned raw material should be verified the raw materials should meet requirements given in **Appendix ‘B’.** The raw materials shall be duly identified with respect to the test reports and traceability to be maintained. **7.2.2** The components shall be fabricated as per the respective drawings given the **Appendix ‘A’**.The fabricated components shall be subjected to the following inspection.

**7.2.3 VISUAL INSPECTION:** All the components shall be visually inspected to ensure that there are no surface defects and other abnormalities.

**7.2.4 DIMENSIONAL INSPECTION:** All the dimensions shall be inspected as per the respective drawings and the inspection result shall be recorded in the inspection report placed at **Appendix ‘C’.**All the threaded components and tapped holes shall be checked with go/no-go gauges. Any deviation observed shall be reported as non-conformance and clearance for the same shall be taken from inspection agency before further processing.

**7.2.5 D.P TEST:** All the fabricated components shall be subjected to DP test as per ASTME 165 and no surface defects are permitted.

**7.2.6 SURFACE TREATMENT:** All the internal and external surface of the components made of aluminum alloy shall be subjected to chromate coating as per MIL-C-5541F and external surface with Paint.

**7.2.7 NON-DESTRUCTIVE TEST PROCEDURE:** This non-destructive testing specifies the requirements for ultrasonic inspection by pulse echo technique in accordance with ASTM B544. Acceptance criteria is Class A .

**7.3 QA REQUIREMENTS FOR BROUGHT OUT COMPONENTS**

**7.3.1 GASKET**

**Material Specification: Pure Silver Filled Silicon Elastomer 999B**

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | SHORE HARDNESS |  | 58 - 72 |
| 2 | TENSILE STRENGTH (MIN) | (Kg/cm2) | 200 min |
| 3 | % ELONGATION in 50.0mm GL (MIN) |  | 200-500% |
| 4 | OPERATING TEMPERATURE | °C | -55°C TO 160°C |

Visual inspection : 100%

Dimensional inspection : 100%

Pure Silver filled Silicon Elastomer Properties are cleared with COC.

**SPECIFICATIONS AND QUALITY ASSURANCE REQUIREMENTS FOR STAINLESS STEEL FASTENERS**

**A. SPECIFICATIONS:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sl.No.** | **Description** | **Size** | **Material** | **Property class** | **Ref.Std.** | **Finish** |
| 1. | Philips Pan head | M2x8 | SS A2 or A4 as per IS 1367 part 14 | 70 as per 1367 part 14 for screws & nuts | IS 1366  Passivation in accordance with AMS 2700 | |
| M3x6 |
| M3x8 |
| M3x10 |
| M4x6 |
| 2. | Philips CSK screws | M3x4 |
| M3x8 |
| M4x6 |
| M4x8 |
| M4x10 |
| 3. | Socket head cap | M3x8 |
| M6x10 |
| M6x12 |
|  |
| 4. | M2 Nuts |  |
| 5. | M3 Nuts |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6. | M3 Spring washers |  |  | |  |  |
| 7. | M3 Plain washers |  |  |  |  |  |

**B. QUALITIY ASSURANCE REQUIREMENTS:**

The following test shall be performed at product level on sample basis.

**1. CHEMICAL COMPOSITION**:

One number of random samples from each batch of fasteners shall be checked for chemical composition either by wet chemical method in accordance with ASTM E 353 or by spectroscopic method and shall conform to the following requirement.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ELEMENT** | **% COMPOSITION BY WEIGHT** | | | |
| **A2** | | **A4** | |
| **MIN** | **MAX** | **MIN** | **MAX** |
| Carbon | - | 0.08 | - | 0.08 |
| Manganese | - | 2.0 | - | 2.0 |
| Silicon | - | 1.0 | - | 1.0 |
| Phosphorous | - | 0.05 | - | 0.05 |
| Sulphur | - | 0.03 | - | 0.03 |
| Chromium | 17.0 | 20.0 | 16.0 | 18.5 |
| Nickel | 8.0 | 13.0 | 10.0 | 14.0 |
| Molybdenum | - | - | 2.0 | 3.0 |

**2. VISUAL AND DIMENSIONAL INSPECTIONS**:

All the fasteners shall be subjected to 100 % visual inspection. Following sampling plan shall be followed for dimensional inspection and go & no-go gauge check. If any deviation is observed on any parameter in the sample then the complete lot shall be inspected for that parameter.

|  |  |
| --- | --- |
| **LOT SIZE (No’s)** | **SAMPLE SIZE (No’s)** |
| Up to 150 | 13 |
| 151-280 | 20 |
| 281-500 | 29 |
| 501-1200 | 34 |
| 1201-3200 | 42 |
| 3201-10000 | 50 |

**3. PASSIVATION:**

* 1. All the fasteners shall be passivated in accordance with SAE AMS 2700.

**3.2** For each batch of fasteners passivation, two samples shall also be passivated and one sample should be subjected to the following tests for batch acceptance.

**3.2.1 VISUAL INSPECTION:**

After completion of processing, there shall be no evidence of etching, pitting, smutting, frosting, dimensional changes, or other chemical attack on the fasteners.

**3.2.2 CORROSION RESISTENCE TEST:**

Humidity Test: The sample shall be free from visible red rust after exposure to 95% minimum relative humidity at 35-46°C for not less than 23 hours.

(Or)

Water Immersion Test:The sample shall be free from visible red rust after alternately immersing in deionizer or distilled water for one hour and allowing to dry in room temperature air for one hour, until 24 hours (12 cycles) have elapsed.

(Or)

Salt Spray Test: The sample shall withstand exposure to 2 hours ± 10minutes in a salt spray environment operated in accordance with ASTM B 117. The sample shall not evidence of red rust following completion of the test.

**3.3 REPORTS:**The firm shall furnish with each batch of passivation, along with the above test reports, a separate report stating that the parts with identification nos. have been processed, tested and conform to the specified requirements.

**4. BREAKING TORQUE TEST FOR SCREWS/BOLTS:**

A minimum of 3 samples for every production lot of screws, shall be subjected to breaking torque test in accordance with IS 1367(Part 14).

**5. PROOFING LOAD TEST FOR NUTS:**A minimum of 3 samples for every production lot of nuts shall be subjected to tensile proofing load test. Proof load corresponding to property class 70 specified in IS 1367 –part14 shall be applied axially to the nut in a normal tensile testing machine.

The full proofing load shall be held for 15 seconds. The nut shall resist the load without failure by stripping or rupture and shall be removable by fingers after the load is released. After the removal of the load, the nut should be visually inspected for any micro cracks to ensure the integrity.

**6. PACKING:**

6.1 Fasteners, which are thoroughly cleaned, shall only be packed. The fasteners shall be packed separately in polythene bags weighing not more than 5 kg

The bags shall be sealed with a small bag of silica gel kept inside.  
1) Manufacture’s name 2) Description &Property class.

3) Quantity 4) Batch No &S.L.No.

6.2 The polythene bags shall be packed in a cardboard/wooden box. On the box details as mentioned above shall be labeled.

**7. CERTIFICATES:**

Each batch of fasteners shall be supplied with the applicable test certificates.

**8. PACKING DETAILS OF LEVEL-II SIMULATOR UNITS:**

After clearing of all QA/AT Tests for the Level-II Simulator unit pack the hardware in appropriate packing boxes. Packing details are as follows.

* Insert the shaped foam /thermo coal into the packing box for tight sitting of the Level-II simulator units.
* Clean the launcher interface unit with cotton cloth
* Keep dust caps for connectors of the hardware
* Place the Level-II Simulator units in the packing box and pack it with adhesive tape
* SL.No. to be stick on the packing box for clear identification of the Level-II Simulator units. Keep the entire packed Level-II Simulator units in the cargo packing box and roll the adhesive tape on the cargo box
* Affix SL.No, qty, batch no, customer details on the cargo box
* Dispatch those Level-II Simulator units for the customer

**APPENDIX-A**

**LIST OF RKVM DRAWINGS**

|  |  |  |  |
| --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Drawing no/Reference** |
| 1 | RKVM ASSEMBLY | --------- | DBPL-RKVM-MD-ASM-01 |
| 2 | RKVM ASSEMBLY EXPLODED VIEW | --------- | DBPL-RKVM-MD-ASM-02 |
| 3 | RKVM FASTENERS MOUNTING DETAILS | --------- | DBPL-RKVM-MD-ASM-03 |
| 4 | DISPLAY FRAME | AL 6061 T6 | DBPL-RKVM-MD-01 |
| 5 | DISPLAY TOP PLATE | AL 6061 T6 | DBPL-RKVM-MD-02 |
| 6 | DISPLAY REAR PLATE | AL ALLOY 5052 | DBPL-RKVM-MD-03 |
| 7 | DISPLAY CB BOTTOM PLATE | AL 6061 T6 | DBPL-RKVM-MD-04 |
| 8 | DISPLAY CB PLATE | AL 6061 T6 | DBPL-RKVM-MD-05 |
| 9 | DISPLAY CB COVER | AL ALLOY 5052 | DBPL-RKVM-MD-06 |
| 10 | DISPLAY LH PLATE | AL 6061 T6 | DBPL-RKVM-MD-07 |
| 11 | DISPLAY RH PLATE | AL 6061 T6 | DBPL-KVM-MD-08 |
| 12 | DISPLAY SUPPORTING LH PLATE | AL 6061 T6 | DBPL-RKVM-MD-09 |
| 13 | DISPLAY SUPPORTING RH PLATE | AL 6061 T6 | DBPL-RKVM-MD-10 |
| 14 | KBD TOP FRAME | AL 6061 T6 | DBPL-RKVM-MD-11 |
| 15 | KBD CLOSING PLATE | AL 6061 T6 | DBPL-RKVM-MD-12 |
| 16 | CONNECTOR PLATE | AL 6061 T6 | DBPL-RKVM-MD-13 |
| 17 | KBD CLOSING PLATE 1 | AL ALLOY 5052 | DBPL-RKVM-MD-14 |
| 18 | KBD BOTTOM PLATE | AL ALLOY 5052 | DBPL-RKVM-MD-15 |
| 19 | KBD CLAMP | AL ALLOY 5052 | DBPL-RKVM-MD-16 |
| 20 | KBD LH PLATE | AL 6061 T6 | DBPL-RKVM-MD-17 |
| 21 | KBD RH PLATE | AL 6061 T6 | DBPL-RKVM-MD-18 |
| 22 | KBD LH WIRE PLATE | AL 6061 T6 | DBPL-RKVM-MD-19 |
| 23 | KBD RH WIRE PLATE | AL 6061 T6 | DBPL-RKVM-MD-20 |
| 24 | FRONT RACK LOCKING PLATE | AL 6061 T6 | DBPL-RKVM-MD-21 |
| 25 | HINGE BLOCK | AL 6061 T6 | DBPL-RKVM-MD-22 |
| 26 | NAME PLATE | AL 5051 | DBPL-RKVM-MD-23 |
| 27 | DISPLAY LIFTING HANDLE | AL 6061 T6 | DBPL-RKVM-MD-24 |
| 28 | DISPLAY FRMAE MASKING | --------- | DBPL-RKVM-MSK-25 |
| 29 | DISPLAY TOP PLATE MASKING | --------- | DBPL-RKVM-MSK-26 |
| 30 | DISPLAY REAR PLATE MASKING | --------- | DBPL-RKVM-MSK-27 |
| 31 | DISPLAY CB PLATE MASKING | --------- | DBPL-RKVM-MSK-28 |
| 32 | DISPLAY LH PLATE MASKING | --------- | DBPL-RKVM-MSK-29 |
| 33 | DISPLAY RH PLATE MASKING | --------- | DBPL-RKVM-MSK-30 |
| 34 | KBD TOP FRAME MASKING | --------- | DBPL-RKVM-MSK-31 |
| 35 | KBD CLOSING PLATE MASKING | --------- | DBPL-RKVM-MSK-32 |
| 36 | CONNECTOR PLATE MASKING | --------- | DBPL-RKVM-MSK-33 |
| 37 | KBD CLOSING PLATE 1 MASKING | --------- | DBPL-RKVM-MSK-34 |
| 38 | KBD BOTTOM PLATE MASKING | --------- | DBPL-RKVM-MSK-35 |
| 39 | KBD LH PLATE MASKING | --------- | DBPL-RKVM-MSK-36 |
| 40 | KBD RH PLATE MASKING | --------- | DBPL-RKVM-MSK-37 |
| 41 | KBD LH WIRE PLATE MASKING | --------- | DBPL-RKVM-MSK-38 |
| 42 | KBD RH WIRE PLATE MASKING | --------- | DBPL-RKVM-MSK-39 |
| 43 | FRONT RACK LOCKING PLATE MASKING | --------- | DBPL-RKVM-MSK-40 |
| 44 | HINGE BLOCK MASKING | --------- | DBPL-RKVM-MSK-41 |
| 45 | DISPLAY LIFTING HANDLE | --------- | DBPL-RKVM-MSK-42 |

**LIST OF SIMULATOR PC DRAWINGS**

|  |  |  |  |
| --- | --- | --- | --- |
| **SL.No** | **Description** | **Materials** | **Drawing no/Reference** |
| 1 | SPC ASSEMBLY | --------- | DBPL-SPC-MD-ASM-01 |
| 2 | SPC ASSEMBLY EXPLODED VIEW | --------- | DBPL-SPC-MD-ASM-02 |
| 3 | FRONT PLATE | AL 6061 T6 | DBPL-SIMPC-MD-01 |
| 4 | REAR PLATE | AL 6061 T6 | DBPL-SIMPC-MD-02 |
| 5 | BOTTOM PLATE | AL 6061 T6 | DBPL-SIMPC-MD-03 |
| 6 | RH SIDE PLATE | AL 6061 T6 | DBPL-SIMPC-MD-04 |
| 7 | LH SIDE PLATE | AL6061 T6 | DBPL-SIMPC-MD-05 |
| 8 | TOP PLATE | AL 6061 T6 | DBPL-SIMPC-MD-06 |
| 9 | FAN FRAME | AL 6061 T6 | DBPL-SIMPC-MD-07 |
| 10 | POWER SUPPLY CLAMP | SS 304 | DBPL-SIMPC-MD-08 |
| 11 | SSD PLATE | AL 5052 | DBPL-SIMPC-MD-09 |
| 12 | HINGES | AL 6061 T6 | DBPL-SIMPC-MD-10 |
| 13 | DOOR | AL 6061 T6 | DBPL-SIMPC-MD-11 |
| 14 | FRONT PLATE MASKING | --------------- | DBPL-SIMPC-MSK-12 |
| 15 | REAR PLATE MASKING | --------------- | DBPL-SIMPC-MSK-13 |
| 16 | BOTTOM PLATE MASKING | --------------- | DBPL-SIMPC-MSK-14 |
| 17 | RH SIDE PLATE MASKING | --------------- | DBPL-SIMPC-MSK-15 |
| 18 | LH SIDE PLATE MASKING | --------------- | DBPL-SIMPC-MSK-16 |
| 19 | TOP PLATE MASKING | --------------- | DBPL-SIMPC-MSK-17 |
| 20 | DOOR MASKING | --------------- | DBPL-SIMPC-MSK-18 |
| 21 | CONNECTOR GASKET | PURE SILICONE | DBPL-SIMPC-MD-19 |
| 22 | NAME PLATE | AL 5051 | DBPL-SIMPC-MD-20 |

**APPENDIX-B**

**QA PLAN FOR AL.ALLOY 6061 T6**

1. **SCOPE:**

This quality assurance plan is applicable for the AL material plates/bars:

MATERIAL SPECIFICATION ------- AL. Alloy 6061 T6 AMS 4027

QUANTITY -------- As per requirement

1. **SIZE:** The size of Bars may be finalized by the vendor to realize the components as shown in respective drawings and serial No, mentioned on material for traceability.

**3) CHEMICAL ANALYSIS:** One sample shall be checked for chemical analysis by spectroscopic method. The result shall confirm to the following percentages by weight.

|  |  |  |  |
| --- | --- | --- | --- |
| **SL.No** | **Element** | **Specifications** | |
| **Min** | **Max** |
| 1 | Silicon | 0.4 | 0.8 |
| 2 | Manganese | - | 0.15 |
| 3 | Chromium | 0.04 | 0.35 |
| 4 | Titanium | - | 0.15 |
| 5 | Copper | 0.15 | 0.4 |
| 6 | Zinc | - | 0.25 |
| 7 | Magnesium | 0.8 | 1.2 |
| 8 | Iron | - | 0.7 |
| 9 | Other Elements, each | - | 0.05 |
| 10 | Other Elements, total | - | 0.15 |
|  |  |  | |

1. **Ultrasonic Test for T>12mm:** All the bars whose diameter/thickness is above 12 mm will be subjected to ultrasonic inspection in accordance with SAE AMS 2630 B, and acceptance level is class A. Ultrasonic inspection shall be carried out by qualified ASNT/ISNT personnel.

**5) Mechanical Properties:**

Three samples for Mechanical Testing shall be checked as per IS: 1608-2005 and result shall conform to following:

|  |  |  |  |
| --- | --- | --- | --- |
| Nominal Thickness millimeters | Tensile Strength MPa | Yield strength at 0.2% offset MPa | Elongation in 50.8 mm or 4D % |
| 0.15 to 0.18,incl | 290 | 241 | 4 |
| Over 0.18 to 0.23,incl | 290 | 241 | 6 |
| Over 0.23 to 0.51,incl | 290 | 241 | 8 |
| Over 0.51 to 12.67,incl | 290 | 241 | 10 |
| Over 12.67 to 25.40,incl | 290 | 241 | 9 |
| Over 25.40. to 50.80,incl | 290 | 241 | 8 |
| Over 50.80 to 101.60,incl | 290 | 241 | 6 |
| Over 101.60 to 152.40,incl | 276 | 241 | 6 |

**APPENDIX-C**

**LEVEL-II SIMULATOR UNITS DIMENSIONAL INSPECTION REPORT**

**Project : Level-II Simulator units Date: xx.xx.2015**

**Subsystem : RKVM,SIMULATOR PC & SIU**

**Work center : DATASOL (B) PVT LTD.**

**Drawing No : ------------------**

**Description : ------------------**

Deviation for uncontrolled dimension conform specification: **IS 2102-1993** as per medium.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Actual dimension (mm)** | **Measured Dimension (mm)** | | | | | | | **Remarks** |
| SL.No |  |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |  |  |
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**Comments, if any**

**ACCEPTED/REJETED INTERNAL QC: SSQAG:**

**APPENDIX-D**

**QA PLAN FOR SS 304 MATERIAL**

1. **SCOPE**

This quality assurance plan is applicable for the SS Material bars

1. **MATERIAL SPECIFICATION**

SS Material as per (AISI 304) AMS 5639

1. **QUANTIY** As per requirement
2. **SIZE**

The size of Rods may be finalized by the vendor to realize the components as shown in respective drawings and Serial No, mentioned on the material for Traceability.

1. **CHEMICAL ANALYSIS** One sample shall be checked for chemical analysis by Spectroscopic Method .The result shall confirm to the following percentages by weight.

|  |  |  |  |
| --- | --- | --- | --- |
| **SL.No** | **Element** | **Specifications** | |
| **Min** | **Max** |
| 1 | Carbon |  | 0.08 |
| 2 | Manganese |  | 2.00 |
| 3 | Silicon |  | 1.00 |
| 4 | Phosphorous |  | 0.04 |
| 5 | Sulphur |  | 0.03 |
| 6 | Nickel | 8.00 | 12 |
| 7 | Molybdenum |  | 1.00 |
| 8 | copper |  | 1.00 |
| 9 | Chromium | 18.0 | 20.0 |

1. **Ultrasonic Inspection**

All the bars whose diameter/thickness is above 12 mm will be subjected to ultrasonic inspection in accordance with SAE AMS 2630 B, and acceptance level is class A. Ultrasonic inspection shall be carried out by qualified ASNT/ISNT personnel

1. **Hardness Test** Hardness shall be checked as per IS:1500-2005 and result shall conform to following Max .Hardness :187 BHN
2. **MECHANICAL TEST REQUIREMENTS**

Three samples for each HT batch shall be tested for Mechanical Properties, as per IS:1608-2005 and result shall conform to following

|  |  |  |  |
| --- | --- | --- | --- |
| **UTS (Min) Mpa** | **Yield Strength (Min) Mpa** | **% Reduction Area (Min)** | **% Elongation in 4D(Min)** |
| 517 | 207 | 50 | 40 |

**APPENDIX-E**

**QA PLAN FOR CHROMATISATION**

1.0 All the aluminum components shall be, subjected to AL chrome treatment. Chromation process shall conform specification as per MIL-C-5541F, TYPE II CLASS- 3.

2.0 The firm shall submit a detailed process plan for chromation and take the approval from ASL.

3.0 Qualification Test:

Chromate conversion coating shall be carried out as per MIL-C-5541F; TYPE II CLASS -3 on two test samples of the same alloy and **after 24 hours** shall be subjected to the following tests.

3.1 Visual Inspection: The coating shall be uniform in appearance, colored to light iridescent gold. The film shall be continuous, free from powdery areas, breaks, scratches and other damages.

3.2 Adhesion Test: The coating shall be adherent and non-powdery. The specimen shall be subjected to peel test as per ASTM B 571.

3.3 Electrical Resistance: When measured at 9V and a 2A current the resistance should be less than 0.1Ω.

3.4 Corrosion Resistance Test: One specimen shall be subjected to corrosion resistance testing neutral salt spray as per ASTM B 117 for duration of 168 hours after which there shall be no evidence, to the unaided eye. Of more than a total of 8 isolated spots or pits, not larger than 1 mm in diameter. Each individual specimen shall not have more than more than five isolated spots or pits, none larger than 1mm diameter on the respective surfaces. Spots within 10 mm of the edges of the specimen are not counted.

4.0 Acceptance Test:

The process qualified as per procedure given in **para 3** shall be used for chromating the components. For each batch of component chromating, one representative sample shall also be processed which should meet the test requirements mentioned in the **para 3.1 & 3.3** for batch acceptance.

5.0 Reports:

The firm shall furnish with each batch of conductive chromatisation, a report stating that the parts have been processed, tested and conform to the specified requirements.

**APPENDIX-F**

**QA PLAN FOR PASSIVATION**

1.0 All the Corrosion Resistant steel components shall be, subjected to Passivation, in accordance with ASTM A 967- 01

2.0 The firm shall submit a detailed process plan for passivation and take the approval from ASL.

3.0 PROCESS QUALIFICATION:

The process shall be qualified by doing passivation on the sample panels of 50 dia x 10 Thk. Or 100 x 100 x t (t >1mm) and tested as given below:

3.1 VISUAL INSPECTION:

After completion of processing, there shall be no evidence of etching, pitting, smutting, frosting, dimensional changes, or other chemical attack on the parts.

3.2 Corrosion Resistance Test:

3.2.1 Humidity Test: The sample shall be free from visible red rust after exposure to 95% minimum relative humidity at 35-45°C for not less than 23 hours.

(Or)

3.2.2 Water Immersion Test: The sample shall be free from visible red rust after alternatively immersing in de-ionized or distilled water for one hour and allowing it to dry in room temperature air for one hour, until 24 hours (12cycles) have elapsed.

(Or)

3.2.3 Salt Spray Test: The sample shall withstand exposure to 2 hours ±10 minutes in a salt spray environment operated in accordance with ASTM B 117.

The sample shall not show the evidence of red rust following completion of the test.

4.0 Acceptance Test:

The process qualified as per procedure given in Para 3 shall be used for passivating the components. For each batch of component passivation,two sample blanks shall also be passivated and one blank should be subjected to the tests as Para 3 for batch acceptance.

5.0 Reports:

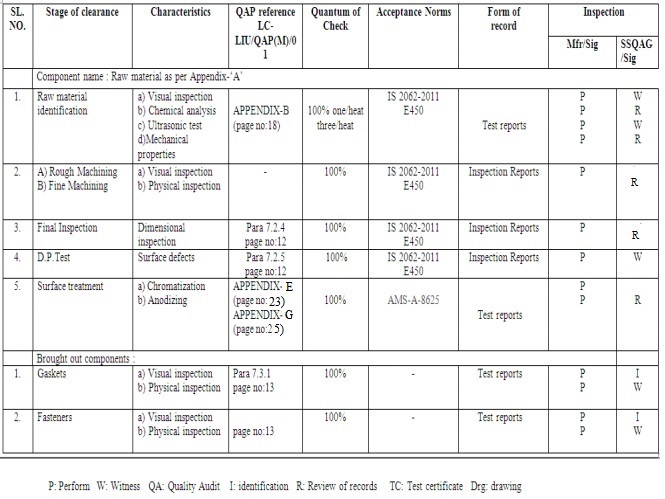
The firm shall furnish with each batch of passivation, along with above test reports, a separate report, stating that the parts (with identification nos.)Have been processed, tested and confirm to the specified requirements.

**APPENDIX-G**

**Painting process**

**APPENDIX-H**

**Batch acceptance (performance verification) test QA Matrix**

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