

## Means Engineering Method

No.: MEM-006

### Work Instruction

Change: A

**Subject: Supplier Direct Part Marking - Grading Standard**

Page: 1 of 3

**1.0 Purpose:**

Create a standard for grading Direct Part Marking of 2D barcodes using Dot Peen or Laser Etching Methods to create a consistent reading at Means manufacturing lines.

**2.0 Scope:**

All suppliers to Means where direct part marking is required.

**3.0 Responsibilities:**

Supplier to Means must have equipment in place for 100% verification to this specification.

**4.0 Definitions (Reference Figure 1):**

- 4.1 DPM = Direct Part Marking
- 4.2 x-dimension = 2d datamatrix distance between cells, 1D barcode minimum width, or dot to dot in dot peen. For example a 20 x 20 datamatrix with 0.5mm x-dimension would be 10mm x 10mm box size.
- 4.3 20 x 20 datamatrix is how many dots are in the vertical and horizontal directions.

**5.0 Engineering Method:**

- 5.1 Camera must have resolution capable to meet minimum x-dimension of barcode, and field of view larger than the whole barcode with included quiet zone.
- 5.2 Means will not verify grade of marks on supplier parts before assembly; information will be readable.
- 5.3 Part Print will callout lighting and grading parameters in TABLE MEM-007-01 formatted per AIAG B-17 Version2 07/09 spec
- 5.4 AIM DPM 2006-1 or newer spec can be used in camera for grading using the lowest Grade of all tests including Decodable, Symbol Contrast, Reflectance Margin, Modulation, Fixed Pattern Damage, Axial Non-Uniformity, Grid Non-Uniformity, Unused Error Correction.
- 5.5 Minimum grading standard recommended by Means for Aluminum or Steel parts using AIAG B-17 standard is "DPM 2.0/7.5-25/470+-20nm/(90D)." Parsed out this is "2.0" = "C" grade or better, "7.5 to 25" is aperture size or x-dimension which is .0075" to .025" (.2mm to .6mm), "470" is wavelength of blue light, "90" is lighting straight at part, and "D" is dome light.
- 5.6 x-dimension (Dot size) minimum is 0.2mm or .0075"
- 5.7 18dot x 18dot datamatrix is minimum if traceability is required for Means manufacturing process
- 5.8 2D datamatrix box size should be maximized to available area up to 20 x 20mm max grid size.
- 5.9 Datamatrix will have (2) x-dimension wide quiet zone around the whole mark.
- 5.10 Verifying quality of laser marked 2D matrix must be achieved without software image filtering that can mask degrading quality of the mark.

- 5.11 2D codes must be verified in the same condition as delivered to the assembly customer, i.e. applied rust inhibitor, and no finishing after grading.
- 5.12 The marking supplier must also demonstrate marking process capability to maintain minimum grading requirement. Correlation Study between Means and supplier will take place at PPAP.
- 5.13 Dot peen should have recommended 120 degree included angle, not marking deeper than 10% of thickness of part, and have 10% of clean space on both sides of the indent.
- 5.14 Standard Rectangular datamatrix can be used only if necessary because of part geometry
- 5.15 More than one datamatrix on visible surface at a time should be limited. Unless both datamatrix should be read at the same time. Then try to make the datamatrix line up horizontally with the same "L" orientation.
- 5.16 Try to limit curve of mark be marking along the axis and not around if possible
- 5.17 Data grid size needs to be at least large enough for requested characters as follows "Grid (Max Characters)"

TABLE 1 – Maximum characters per data grid count

Num of dots	Max Characters	Minimum Size with clean space (mm)
10 x 10	3	2.8
12 x 12	6	3.2
14 x 14	10	3.6
16 x 16	16	4
18 x 18	25	4.4
20 x 20	31	4.8
22 x 22	43	5.2
24 x 24	52	5.6
26 x 26	64	6
32 x 32	91	7.2
36 x 36	127	8
40 x 40	169	8.8
44 x 44	214	9.6

**6.0 References:**

- 6.1 AIM DPM 2006-1
- 6.2 AIAG B-17
- 6.3 MEM-007
- 6.4 ISO/IEC 16022:2006

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Page: 3 of 3

- 6.5 ISO/IEC 15418:2009
- 6.6 ISO/IEC 15424:2008
- 6.7 ISO/IEC 15459
- 6.8 ECC 200

**7.0 Approvals:**

none

**8.0 Revision Record:**

WO#	ECR	ERN	Rev	Revision Change Description	Chgd	Appr	Date
none	01384	00756	A	Initial release	E. Klassen	T. Samyn	08/24/20