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SOCIETY OF AUTOMOTIVE ENGINEERS, Inc.
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AEROSPACE STANDARD

AS 107C

Issued 11-1-42
Revised 3-1-60

SURFACE FINISH (RMS)

1. SCOPE: This standard provides a method for the application of surface finish control primarily to aircraft engine and propeller parts. Recommendations for a Surface Roughness Standard are contained in A.S.A. publication B46 and this S.A.E. Aeronautical Standard contains a summary of information therein plus other information which has been compiled from current manufacturing practice.

2. DEFINITIONS:

2.1 Surface: The surface of an object is the boundary which separates that object from another substance or object.

2.2 Nominal Surface: A two-dimensional boundary of separation which is absolutely true and smooth and whose shape and extent is defined by a drawing or descriptive specification.

2.3 Surface Qualities: The physical characteristics of a surface, such as roughness, waviness, lay, flaws, etc.

2.4 Roughness: That deviation from nominal surface evidenced by minute contiguous irregularities occurring on the nominal surface. Roughness in itself does not alter the trueness of a surface.

2.5 Waviness: That deviation from nominal surface evidenced by recurrent irregularities having the form of waves. These deviations are of greater magnitude than surface roughness which may be superimposed on waviness.

2.6 Flaws: Irregularities of any sort which occur at only one place or at relatively infrequent and widely varying random intervals in a surface. A flaw may be a scratch, a ridge, a hole, a peak, a crack or a check, etc.

2.7 Microinch (Mu In.): One millionth (.000001) part of the U.S. Standard linear inch.

2.8 RMS: A linear unit of measurement which represents the square root of the mean of the sum of the squares of the height (in microinches) of the roughness irregularities. RMS values shall be taken from a meter of an instrument made for measuring surface roughness. **The meter shall read the average roughness height in RMS over a distance, or cut-off of .030.**

2.9 Roughness Scale: A series of index numbers of varying magnitude from zero upward as indicated in this Standard.

2.10 Roughness Height (Roughness Number): A physical measurement in RMS microinches which represents the maximum permissible degree of roughness of the surface to which it is applied except that, where two numbers are used, the larger shall be the maximum and the smaller the minimum permissible degree of roughness. The physical measurement shall be the maximum sustained reading of a series of readings, taken normal to the surface and in the direction giving the greater value (usually across the lay).

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2.11 Roughness Width: The distance between the successive ridges which constitutes the predominant pattern of the surface roughness.

2.12 Waviness Scale: A series of numerical values from zero upward as indicated in this Standard.

2.13 Waviness Height Value: A physical measurement in inches which represents the maximum vertical distance from peak to valley of the waves.

2.14 Waviness Width Value: A physical measurement in inches of the distance from peak to peak of the waves.

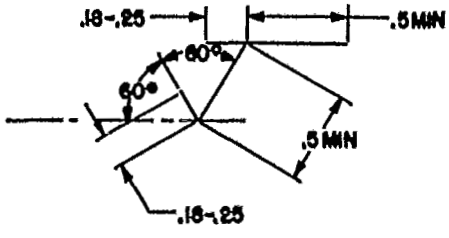
2.15 Lay: The direction of tool marks, or grain, of surface roughness.

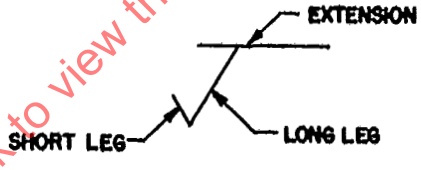
2.16 Lay Designation: A series of symbols as indicated in this Standard.

3. SURFACE FINISH SYMBOL:

3.1 The symbol to be used to designate surface finish shall be the check mark and extension as shown.

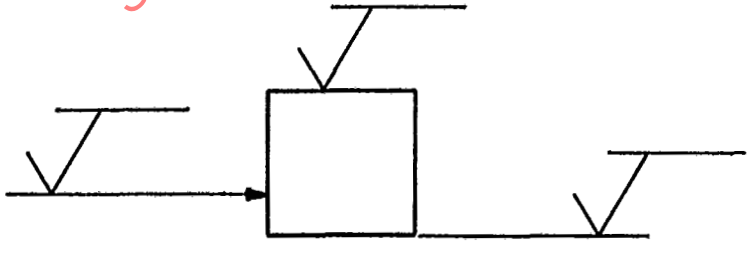
3.2 Dimensions of the symbol, as follows, are basic and may be proportionately smaller or larger as drawing requirements dictate.





3.3 On drawings, or in specifications, this symbol shall be referred only to the profile of a surface.

3.4 The point of shall be either on the line depicting the surface, on the witness line, or on an arrow pointing to the surface as shown. The long leg and extension shall be to the right as the drawing is read.



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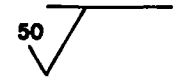
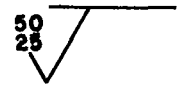
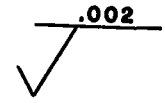
3.5 The maximum roughness number shall be placed adjacent to and on the inside of the long leg, as shown. Ref. Paragraph 2.10



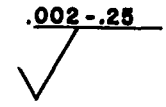
3.5.1 The maximum and minimum roughness numbers shall be placed as shown. Ref. Paragraph 2.10



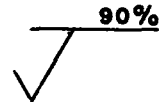
3.6 The maximum waviness height value when used, shall be placed above the extension line.



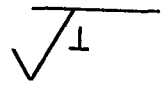
3.7 The maximum waviness width value, when required, shall be placed to the right of the waviness height value.



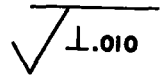
3.8 To control contact area, when required, the percentage value shall be placed above the extension line. Ref. Paragraph 4.3



3.9 The lay designation, when used, shall be placed below the extension line adjacent to and on the outside of the long leg.



3.10 The maximum roughness width value, when required, shall be placed to the right of the lay symbol.



4. SCALES:

4.1 Roughness Scale Numbers (Microinches - RMS):

1	5	13	32	80	200	500
2	6	16	40	100	250	
3	8	20	50	125	320	
4	10	25	63	160	400	

4.2 Waviness Height Value (Inches):

.00002	.0001	.0005	.0020	.0100
.00005	.0002	.0010	.0050	

4.3 Contact Area: To control the contact area, when required, the value shall be specified in percentage of the contact area (90% - 75% - 50% preferred): thus, 90% blue indicates that the surface shall show 90% contact with a mating bluing gage.

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4.4 Standards have not been established for waviness width and roughness width numbers.

5. LAY DESIGNATION:

= Parallel to the line of the surface indicated.

⊥ Perpendicular to the line of the surface indicated.

X Angular in both directions to the line of the surface indicated.

M Multi-directional.

C Approximately circular relative to the center of the surface indicated.

R Approximately radial relative to the center of the surface indicated.

6. GENERAL NOTES:

6.1 To control machined surfaces not specifically indicated, the following general note (entered on the drawing, or in specifications in the column for such notes) may be used:

"SURFACE ROUGHNESS ON ALL MACHINED SURFACES SHALL BE XX MICROINCHES RMS UNLESS OTHERWISE SPECIFIED".

7. PLATED SURFACES:

7.1 Where only one symbol, without an appended qualifying note, is used on a plated, coated or processed machined surface, it shall always signify that control applies to the base metal surface before plating, coating or processing.

8. METHOD OF INSPECTION:

8.1 Inspection of surface roughness may be by:

8.1.1 Physical measurement with a profile measuring machine, capable of giving RMS readings or equivalent.

8.1.2 Visual comparison of the work to standard specimens of similar material having the required degree of finish, the same type of finish and approximately the same contour.

8.2 Inspection of surface waviness shall be by any standard devices for linear measurement, bluing gages or light gages as required. Measurement of waviness less than .0001 inches will ordinarily require the use of optical flats or similar devices.

8.3 Inspection of lay shall be visual.

NOTE: REFERENCE STANDARD:

B 46 - American Standards Association

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