

Scratch and Dig Specifications

The scratch and dig standards of MIL-PRF-13830B, are widely used in the optical industry.

Terms and Definitions:

Scratch – Any marking or tearing of the part surface

Dig – A small rough spot or pit in the surface

Scratch and dig specifications defines the allowable defects in a coating or on the surface of an optical element.

Scratch and Dig is specified by a set of two numbers such as 60-40. The first number relates to the maximum width allowance of a scratch as measured in microns. Additionally, the combined length of maximum-size scratches on the surface of the lens in question cannot exceed $\frac{1}{4}$ the diameter of the usable lens area.

The second number indicates the maximum diameter allowance for a dig (pinhole or bubble) in hundredths of a millimeter. The allowable number of maximum size digs within the useful area of the lens is one, and the sum of the diameters of all digs cannot exceed twice the diameter of the minimum size dig number specified.

As seen from the table below, a surface quality of 60-40 permits a scratch of .06mm (60 microns, or 0.0024”) and a dig diameter of .40mm (400 micron, or 0.0158”).

Scratch and Dig Number	Maximum Scratch Width		Maximum Dig or Bubble Diameter		Dig or Bubble Separation Distance	
	mm	Inch	mm	Inch	mm	Inch
#						
120	0.12	0.0047	1.20	0.0473	20	0.787
80	0.08	0.0031	0.80	0.0315	20	0.787
60	0.06	0.0024	0.06	0.0236	20	0.787
50	0.05	0.0020	0.50	0.0196	20	0.787
40	0.04	0.0016	0.40	0.0158	20	0.787
30	0.03	0.0012	0.30	0.0118	20	0.787
20	0.02	0.0008	0.20	0.0079	20	0.787
15	0.015	0.0006	0.15	0.0059	20	0.787
10	0.010	0.0004	0.10	0.0039	1.0	0.040
5	0.005	0.0002	0.05	0.0020	1.0	0.040
3	0.003	0.00012	0.03	0.0012	1.0	0.040