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Specifications USAF Target 1951

The high-resolution USAF Test Target by Opti-Cal is mounted in a black anodized aluminum microscope slide. In conformity to 1951 US Air Force MIL-STD-150A, it provides all structures down to group 11, element 6. Thus, it is the highest resolution target available on the commercial market and therefore, the ideal testing solution for all your high-resolution microscope systems.

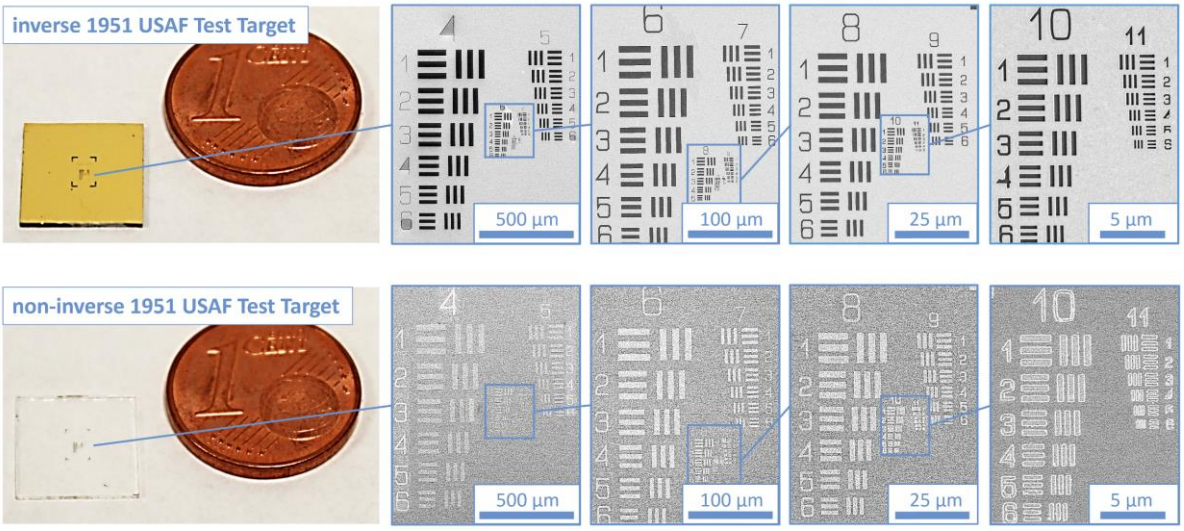

Fig. 1: USAF Test Target 1951. Negative (top row) and positive (bottom row) test target with scanning electron micrographs of each structure.

The resolution representing spatial frequency of the Test Targets, meaning the amount of line pairs per mm, are given by the expression

$$res = 2^{\text{group}+(\text{element}-1)/6}, \qquad [res] = \text{line pairs / mm}$$

and can be found in Tab. 1. The resulting bar and space widths are given in Tab. 2, where the minimal feature size of all our high-resolution USAF Targets is around 135 nm bar width.

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The Targets are available as **negative** and **positive** types, respectively.

- Negative USAF Target:
  clear, transparent lines on an opaque background (roughly 3 nm Cr + 100 nm Au)
- Positive USAF Target:
  opaque lines (50 nm Cr) on a clear, transparent background.

For all samples, a (10 x 10 x 0.55) mm fused silica is used as transparent, amorphous substrate material. As illustrated by Fig. 1, the Test Targets are of highest quality and resolution.

Tab. 1: Spatial frequency (resolution). Shown as nominal line pairs per mm. The element number is written left or right to the lines, the group number is written on top of each area, respectively.

element number	group number							
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	16.0	32.0	64.0	128.0	256.0	512.0	1024	2048
2	18.0	35.9	71.8	143.7	287.4	574.7	1149	2299
3	20.2	40.3	80.6	161.3	322.5	645.1	1290	2580
4	22.6	45.3	90.5	181.0	362.0	724.1	1448	2896
5	25.4	50.8	101.6	203.2	406.4	812.7	1625	3251
6	28.5	57.0	114.0	228.1	456.1	912.3	1825	3649

Tab. 2: Bar (or space) widths. Shown as nominal calculations in µm. The element number is written left or right to the lines, the group number is written on top of each area, respectively.

element number	group number							
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	31.250	15.625	7.813	3.906	1.953	0.977	0.488	0.244
2	27.841	13.920	6.960	3.480	1.740	0.870	0.435	0.218
3	24.803	12.402	6.201	3.100	1.550	0.775	0.388	0.194
4	22.097	11.049	5.524	2.762	1.381	0.691	0.345	0.173
5	19.686	9.843	4.922	2.461	1.230	0.615	0.308	0.154
6	17.538	8.769	4.385	2.192	1.096	0.548	0.274	0.137