

# CAMERA CALIBRATION CERTIFICATE

CAMERA TYPE : RC20  
LENS TYPE : 21/4 NAGA-F  
LENS NO. : 7176

Calibration date: 16.11.1993

LEICA AG, HEERBRUGG

*Leica*

*Leica Heerbrugg Ltd  
CH-9435 Heerbrugg*

*Calibration Department  
Supervisor*



Aperture: 4.0  
 Filter on goniometer: 450 NM  
 Filter on camera: --  
 Principal distance for focussing distance 900 m : 214.74 mm

**Radial distortion (micrometers) referred to principal point of symmetry (PPS)**  
 (Positive values denote image displacement away from center)

Radius mm	Half - Sides				Mean
	1	3	2	4	
10	1.4	0.6	1.1	1.0	1.0
20	2.1	1.1	2.1	2.2	1.8
30	3.1	2.6	3.3	3.8	3.2
40	4.2	4.5	4.1	5.5	4.5
50	4.3	4.9	3.9	6.2	4.8
60	2.6	4.1	2.7	4.3	3.4
70	0.9	2.3	0.2	3.1	1.6
80	-1.0	1.4	-0.4	1.6	0.4
90	-1.2	-0.2	-1.2	0.0	-0.6
100	-2.8	-1.8	-1.7	-0.9	-1.8
110	-3.1	-3.0	-2.0	-1.5	-2.4
120	-2.5	-3.7	-2.6	-2.8	-2.9
130	-2.4	-3.3	-1.4	-2.2	-2.3
140	-1.0	-1.3	0.8	-0.6	-0.5
148	0.1	-0.8	2.2	0.6	0.5

**Photographic resolution (line pairs per millimeter)**

International 3-line test-chart, contrast (log) : 2.0

Aperture: 4.0  
 Filter: 450 NM  
 Film: KODAK TECHNICAL PAN 2415  
 Developer: KODAK HC110

Angle (deg)	0	5	10	15	20	25	30	35
Radial:	75	84	74	82	56	48	46	49
Tangential:	75	75	65	63	53	55	50	45

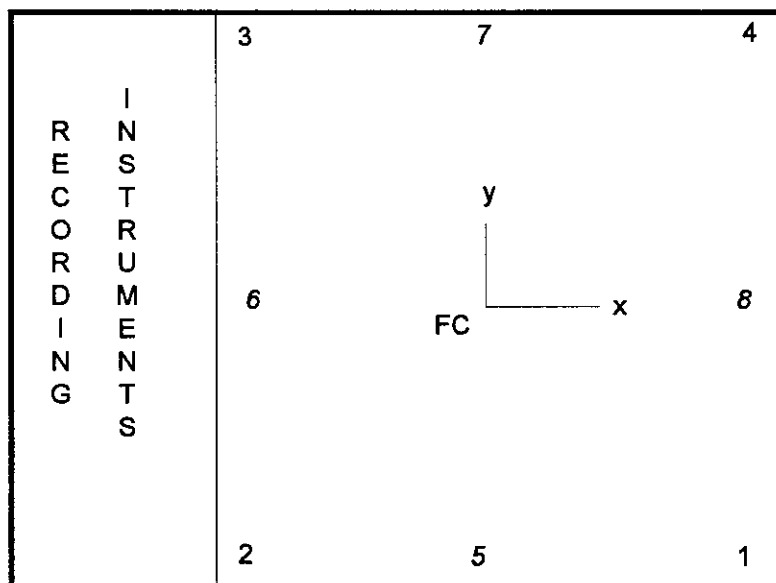
AWAR (Area weighted average resolution) in lp/mm: 57

**Principal point of autocollimation (PPA) and  
principal point of symmetry (PPS)**  
referred to central cross (FC), see diagram

	x (mm)	y (mm)
PPA	-0.012	-0.005
PPS	-0.020	-0.024

**Fiducial marks, referred to central cross (FC)**

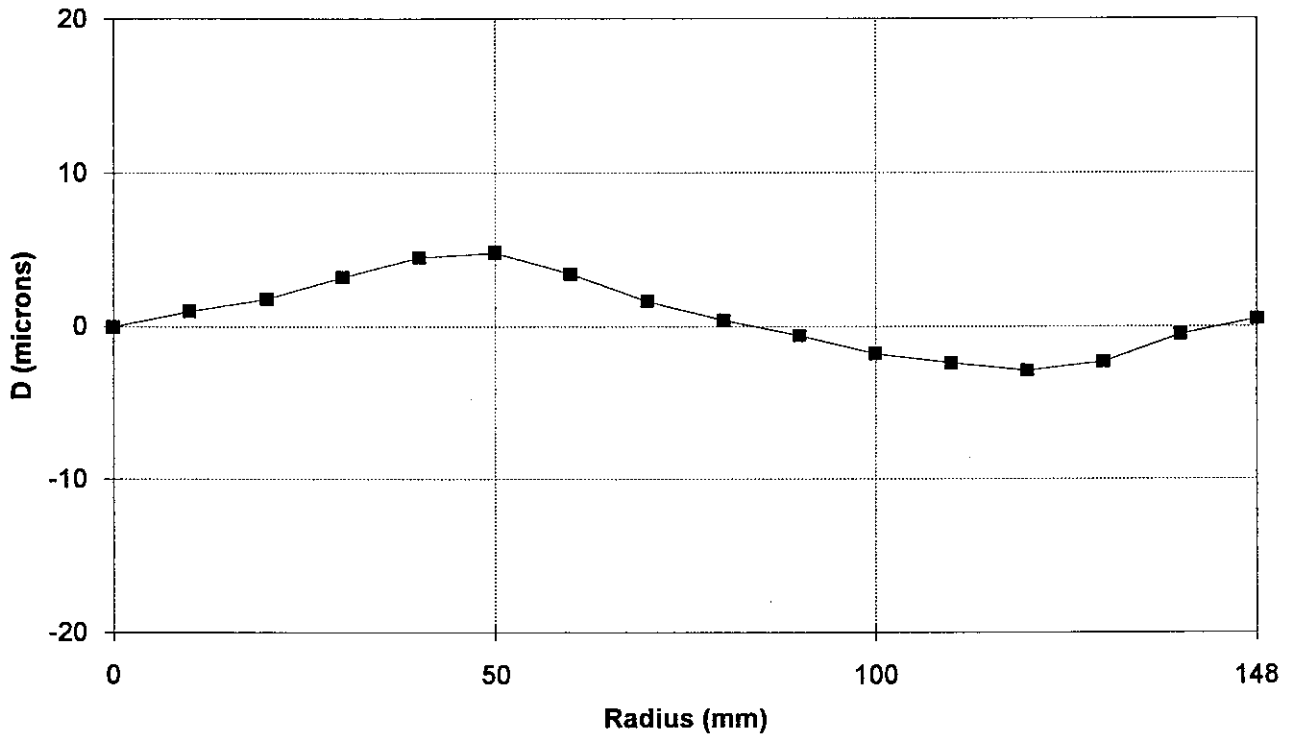
	x (mm)	y (mm)		x (mm)	y (mm)
<b>1</b>	105.999	-106.000	<b>5</b>	-0.002	-109.975
<b>2</b>	-106.001	-105.999	<b>6</b>	-110.007	0.001
<b>3</b>	-105.999	106.000	<b>7</b>	-0.003	110.019
<b>4</b>	106.002	106.001	<b>8</b>	110.000	0.005



as seen on focal plane frame

Aperture: 4.0  
Filter on goniometer: 450 NM  
Filter on camera: --  
Principal distance for focussing distance 900 m : 214.74 mm

### Mean radial distortion



### Radial distortion for semi-diagonals referred to PPS

