

CAMERA CALIBRATION CERTIFICATE

CAMERA TYPE : RC20
LENS TYPE : 21/4 NAGA-F
LENS NO. : 7171

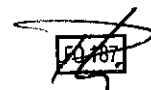
Calibration date: 14.11.1996

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 : 213.55 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 | 0.1 | -0.4 | -0.3 | 0.2 | -0.1 |
| 20 | 0.0 | -1.0 | -0.3 | -0.4 | -0.4 |
| 30 | -0.5 | -0.6 | -0.4 | -0.4 | -0.4 |
| 40 | 0.3 | 0.5 | 0.0 | 0.5 | 0.3 |
| 50 | 0.2 | 0.3 | -0.1 | 0.7 | 0.2 |
| 60 | -1.1 | 0.2 | -0.7 | 0.1 | -0.3 |
| 70 | -1.5 | -0.7 | -2.1 | -0.4 | -1.1 |
| 80 | -2.4 | -0.8 | -1.7 | -0.9 | -1.4 |
| 90 | -1.4 | -1.4 | -1.8 | -1.8 | -1.6 |
| 100 | -2.1 | -1.6 | -1.9 | -2.0 | -1.9 |
| 110 | -1.7 | -2.2 | -1.5 | -2.2 | -1.9 |
| 120 | -0.5 | -1.4 | -1.5 | -1.4 | -1.2 |
| 130 | 1.0 | 0.8 | 0.6 | 0.6 | 0.7 |
| 140 | 2.4 | 2.8 | 2.3 | 2.5 | 2.5 |
| 148 | 4.0 | 3.4 | 3.9 | 2.9 | 3.5 |

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 | 75 | 83 | 82 | 50 | 43 | 37 | 49 |
| Tangential: | 75 | 75 | 82 | 70 | 53 | 49 | 50 | 40 |

AWAR (Area weighted average resolution) in lp/mm: 55

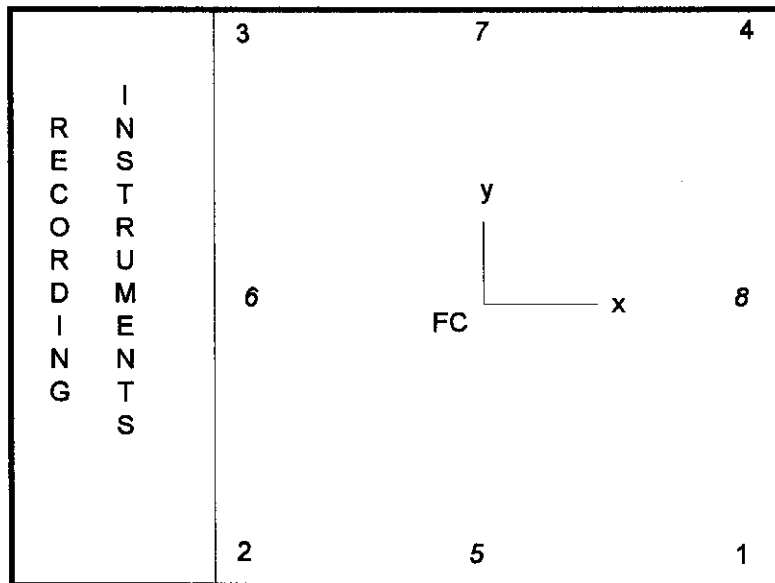


Principal point of autocollimation (PPA) and principal point of symmetry (PPS) referred to central cross (FC), see diagram

| | x (mm) | y (mm) |
|-----|--------|--------|
| PPA | -0.001 | 0.004 |
| PPS | -0.004 | -0.001 |

Fiducial marks, referred to central cross (FC)

| | x (mm) | y (mm) | | x (mm) | y (mm) |
|---|----------|----------|---|----------|----------|
| 1 | 106.002 | -106.003 | 5 | -0.002 | -109.999 |
| 2 | -106.002 | -106.002 | 6 | -110.006 | -0.001 |
| 3 | -106.003 | 106.004 | 7 | 0.000 | 110.000 |
| 4 | 106.004 | 106.005 | 8 | 110.000 | 0.002 |

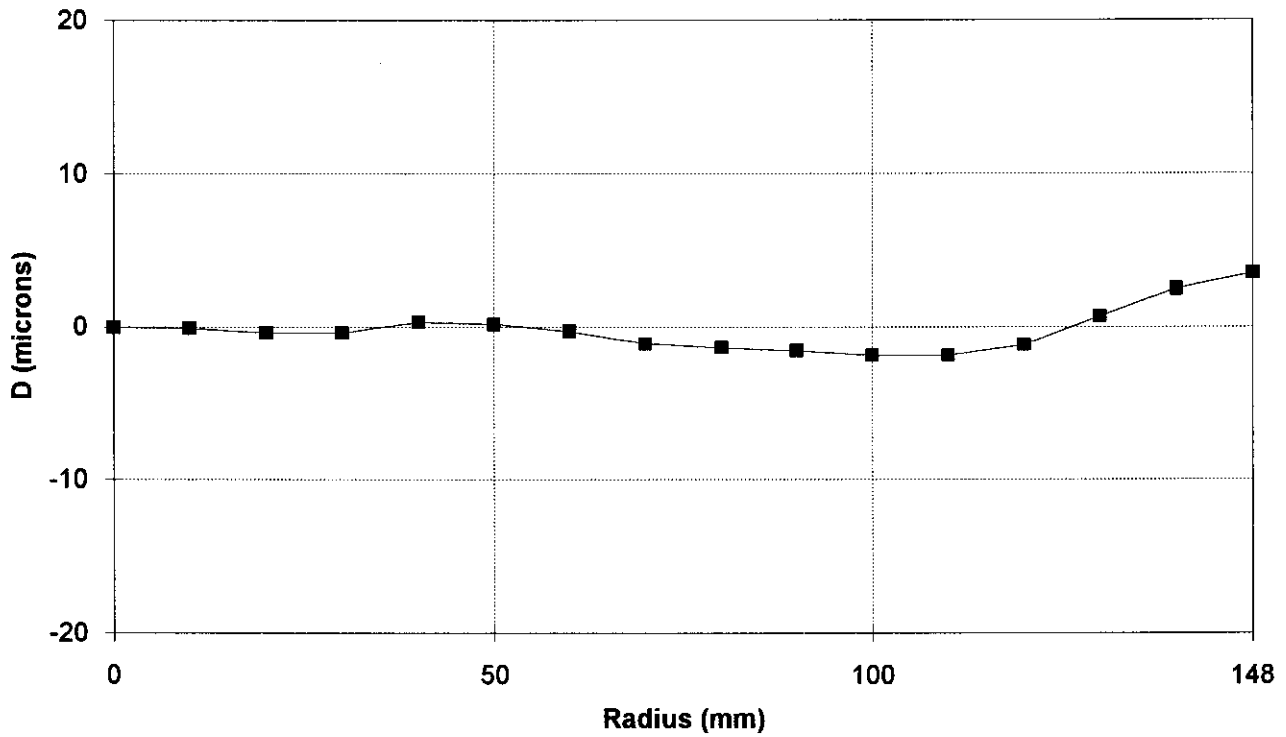


as seen on focal plane frame

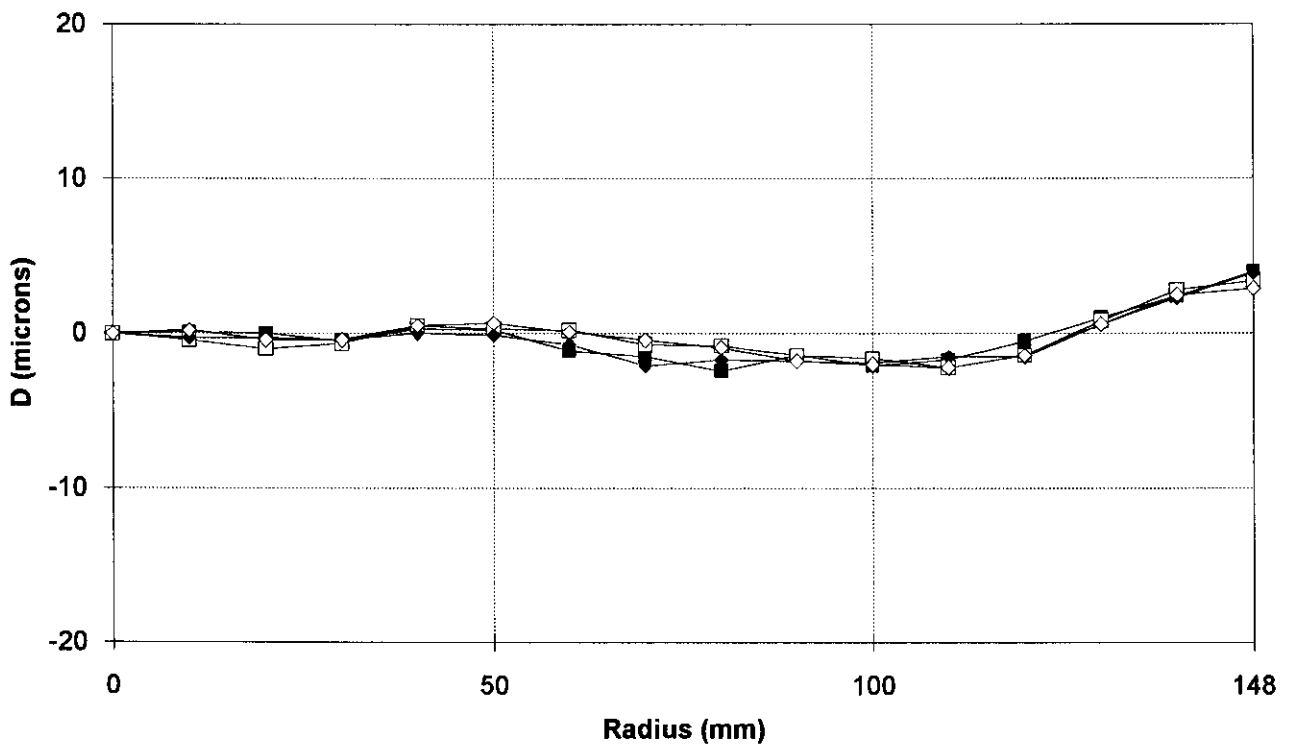


Aperture: 4.0
Filter on goniometer: 450 NM
Filter on camera: --
Principal distance for focussing distance 900 m : 213.55 mm

Mean radial distortion



Radial distortion for semi-diagonals referred to PPS



■ 1 □ 3 ◆ 2 ◇ 4

