USER INFORMATION CARD

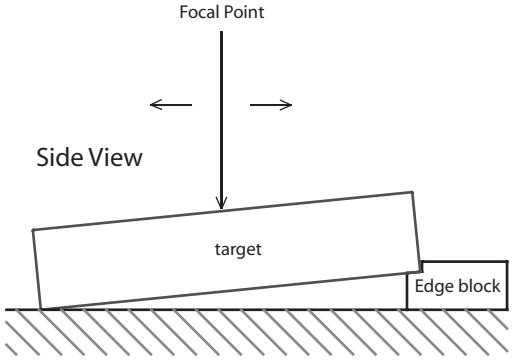
Depth of Field

Edge blocks - The ratio edge blocks included with this target are designed to hold the target at different angles for use with DOF measurements. Depending on the magnification of the objective being used, different edge blocks will be required.

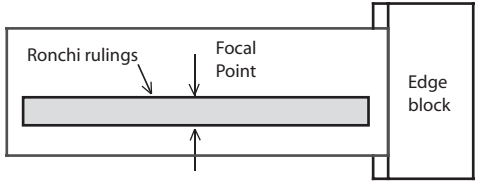
To calculate far field:
1. Align the target so it is perpendicular to the stage of the optical system
2. Choose the ronchi ruling that allows for max. resolution for best acuity (see Resolution on reverse side)
3. Place the right edge of the target on the appropriate edge block
4. Focus on the far right edge of the ruling.
5. Note the position at this point, using either a digital stage or the microscale located below the line pair rulings
6. Move along the length of the target (distance between target and objective is increasing) until adjacent line pairs cannot be differentiated from one another.
7. Measure this distance Lf
8. Divide the measured linear distance Lf by the value of the ratio block that is being used (e.g. 20/1). The resulting number is the value of the far field.

Lf=far field linear distance

Depth of Field: The range of sharpness in front of and behind the subject or object being focused on



Far field = Lf/block ratio
Near field = Ln/block ratio
Total DOF = Near + Far field



Top View

Low mag. obj. -> long focal distances -> higher edge block
High mag. obj. -> short focal distances -> lower edge block

To calculate near field:
1. Align the target so it is perpendicular to the stage of the optical system
2. Choose the ronchi ruling that allows for max. resolution for best acuity (see Resolution on reverse side)
3. Place the right edge of the target on the appropriate edge block
4. Focus on the far left edge of the ruling.
5. Note the position at this point, using either a digital stage or the microscale located below the line pair rulings
6. Move along the length of the target (distance between target and objective is decreasing) until adjacent line pairs cannot be differentiated from one another.
7. Measure this distance Ln
8. Divide the measured linear distance Ln by the value of the ratio block that is being used (e.g. 20/1). The resulting number is the value of the near field.

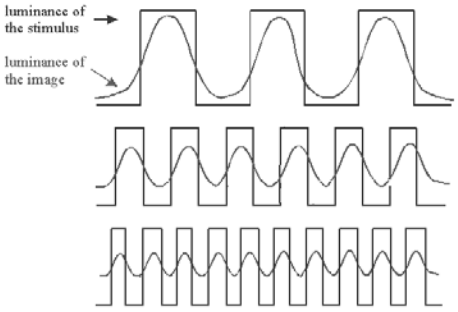
Ln=near field linear distance

USER INFORMATION CARD

Modulation

Modulation = (Lmax-Lmin)/(Lmax+Lmin)

where Lmax is the maximum luminance of the grating and Lmin is the minimum



Modulation Transfer Function (MTF)

MTF(v)= Mi/Mo

where Mi is the image modulation and Mo is the object modulation, and v is spatial frequency

Resolution

low spatial freq. ronchi ruling

high spatial freq. ronchi ruling

Max. horizontal LP/mm measured resolution - move up the variable frequency portion of the target until the segment is reached where you have minimum acceptable resolvable acuity

Max. resolution for best acuity - starting at the point of max. measurable resolution, back down the scale until there is a clean black/white transition between the lines

Feature sizes: 4X-20X target

Concentric circles

5.0 mm OD, 0.25 mm increments, 20 micron line width
4.0 mm OD, 0.25 mm increments, 15 micron line width
3.0 mm OD, 0.25 mm increments, 10 micron line width
2.0 mm OD, 0.10 mm increments, 7.5 micron line width
1.0 mm OD, 0.10 mm increments, 5 micron line width

Grids

4.5 mm square, 0.25 mm spacing, 20 micron line width
4.5 mm square, 0.25 mm spacing, 15 micron line width
4.5 mm square, 0.25 mm spacing, 10 micron line width
4.5 mm square, 0.10 mm spacing, 15 micron line width
4.5 mm square, 0.10 mm spacing, 10 micron line width
4.5 mm square, 0.10 mm spacing, 5 micron line width
2.55 mm square, 0.075 mm spacing, 10 micron line width
2.55 mm square, 0.075 mm spacing, 5 micron line width
2.55 mm square, 0.050 mm spacing, 5 micron line width
2.55 mm square, 0.050 mm spacing, 2.5 micron line width

Ronchi rulings

60-380 line pairs per mm (in increments of 20)

Linear microscale

0 - 68.2 mm
20 divisions per mm
50 microns per division

Edge blocks

5/1 ratio
10/1 ratio
End support

Distortion

pincushioning barreling

Distortion - an alteration in shape and/or proportions of an image

For an optical system to be free of distortion,it must have uniform lateral magnification over its entire field. Some common types of distortion include pincushioning, barreling, and spherical aberration.

Pincushion distortion - magnification increases towards edge of field
Barrel distortion - magnification decreases towards edge of field

Field of View:

(if a digital stage and reticle with crosshair are present)

1. Make sure that the system being used to view the target is fitted with a reticle that has a crosshair
2. Set up the target so that it is parallel to the X-Y axis, with the ronchi rulings oriented vertically
3. Using a low ruling on the target, line up the right edge of the field of view with the last line of the ronchi ruling
4. Zero the readout on the digital stage, then move the X-Y stage so that the crosshair is now over the line that was previously at the edge of the field of view
5. Multiply the resulting value by 2 to get the field of view

(if a digital stage and crosshair reticle are not present)

1. Center the microscale in the field of view, with the scale oriented horizontally
2. Line up the edge of the microscale (0 mm) with the extreme left edge of the field of view.
3. Without moving the stage at all, observe the right edge of field of view and note what the measurement on the scale is

NOTE: this method is much less accurate than using a digital stage. It is recommended that a digital stage be used whenever possible