

# Laser Marking Guide for PK

## I . Light-on-dark (Light mark on a dark surface)

Foaming is usually desired on a black or dark surface. The plastic material is heated locally by the laser beam forming gas pockets. As a result , the material starts to foam and leaves a foamed, light mark. The foam rises approximately 40 microns from the surface and occurs at a depth of about 60 microns in the polymer surface. very high contrasts can be obtained through foaming, in particular in black or dark colors.

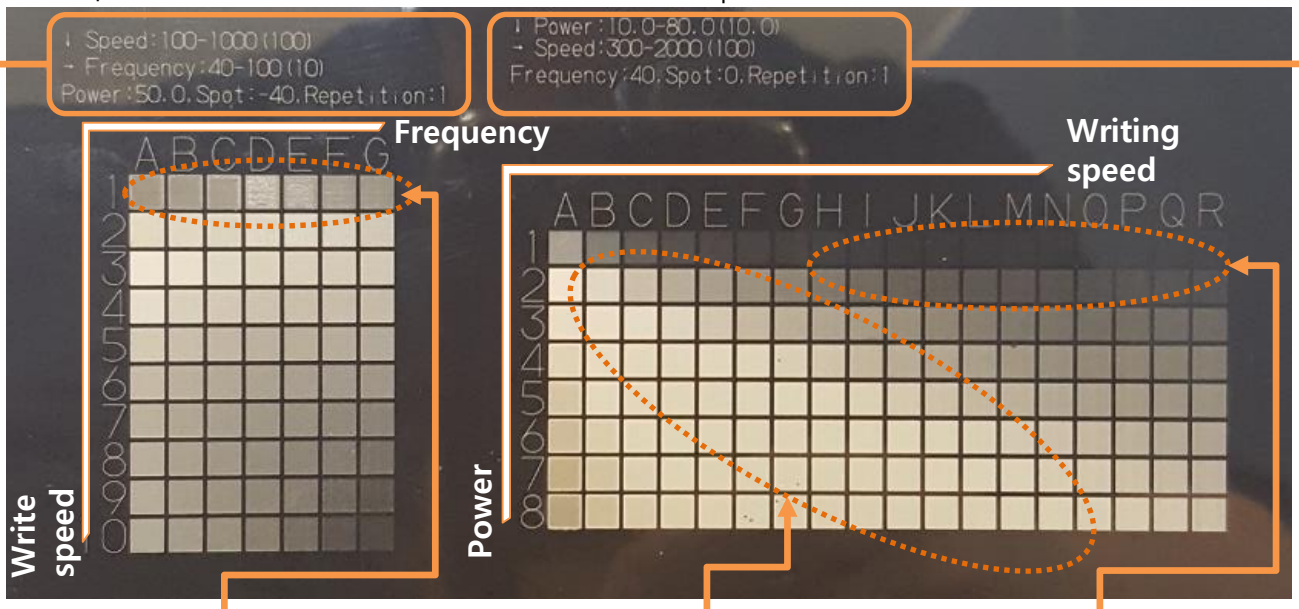
POLYKETONE Polymers shows fair to good contrast on black surface.

Typical proper conditions are :

- Wavelength : 355nm (532 & 1063nm are under evaluation)
- Pulse frequency : 40 –100 kHz
- Write speed : 500 – 2000 mm/s

Evaluation set-up to determine effect of equipment settings on marking quality. The optimum settings and effect can be chosen as follows :

- Write speed(vertical axis, 100-1000mm/s) vs Frequency(horizontal axis, 40-100kHz)
  - Wavelength : 355nm
  - Power : 50%
  - Spot : -200 $\mu$ m(Equip. unit -40)
  - Repetition : 1
- Power(vertical axis, 10-80%) vs Write speed(horizontal axis, 300-2000mm/s)
  - Wavelength : 355nm
  - Frequency(Q-Switch) : 40 kHz
  - Spot : 0 $\mu$ m
  - Repetition : 1



Excessive foaming:  
Low writing speed  
with increasing  
energy input

Good area:  
Good contrast obtained,  
no excessive degradation,  
various shades of marks  
possible.

No contrast:  
High writing speed,  
too little energy input

## II. Dark-on-Light (Dark mark on a Light surface)

The high local heating causes very local carbonization of the polymer matrix, leaving a black dark mark on the surface. This effect is best seen on light colored materials. Extreme carbonization may lead to excessive local heating and carbonization, which can affect the physical properties of the matrix. In several cases, the marking tends more towards a dark, brownish mark.

POLYKETONE Polymers shows fair to good contrast on white surface.

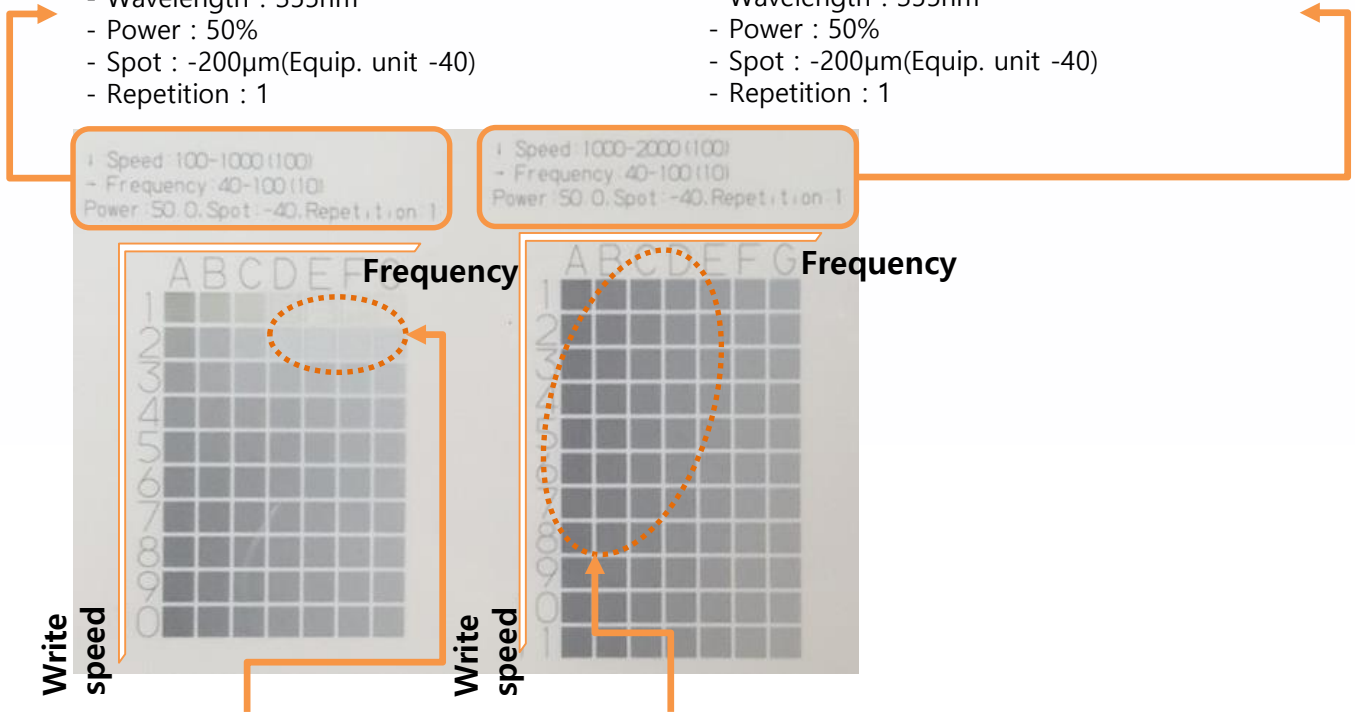
Typical proper conditions are :

- Wavelength : 355nm (532 & 1063nm are under evaluation)
- Pulse frequency : 40 –80kHz
- Write speed : 200 – 2000 mm/s

Evaluation set-up to determine effect of equipment settings on marking quality. The optimum settings and effect can be chosen as follows :

- Write speed(vertical axis, 100-1000mm/s) vs Frequency(horizontal axis, 40-100kHz)
- Wavelength : 355nm
- Power : 50%
- Spot : -200µm(Equip. unit -40)
- Repetition : 1

- Write speed(vertical axis, 1000-2000mm/s) vs Frequency(horizontal axis, 40-100kHz)
- Wavelength : 355nm
- Power : 50%
- Spot : -200µm(Equip. unit -40)
- Repetition : 1



No contrast:  
High writing speed,  
too little energy input

Good area:  
Good contrast obtained,  
no excessive degradation,  
various shades of marks  
possible.