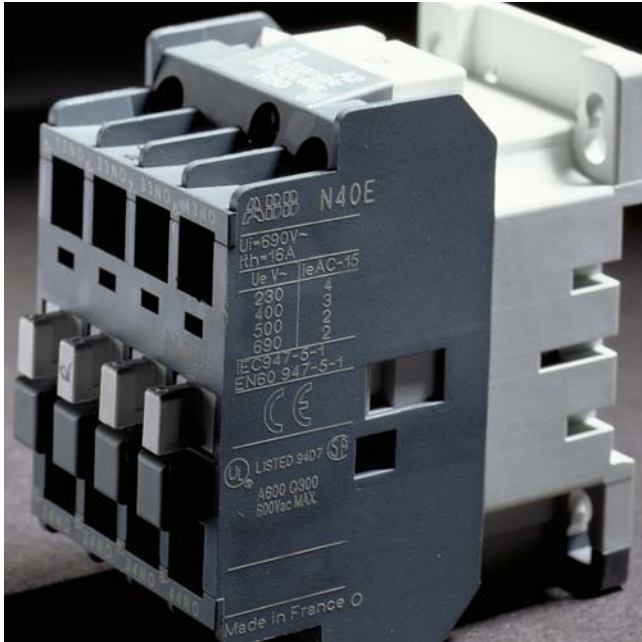


## LASER MARKING OF ENGINEERING COMPOUNDS



This technical brochure provides detailed information on laser marking.

A number of different effects occur when a laser hits a thermoplastic material, and some of these effects are not completely understood. What is evident is that the interaction between the laser and the thermoplastic compound depends on a number of factors, and the results of the interaction differ.

For example, **grey PA66** without fillers may be possible to mark, but self-extinguishing PA66 may be impossible to mark.

**In order for a thermoplastic to be possible to mark by laser, the material must absorb energy from the laser beam and consequently change colour (or exhibit a similar effect).** Such

absorption may occur naturally with the sole polymer or may require the addition of pigments and/or additives.

Most thermoplastic compounds that are not pigmented (in their original colour) cannot be marked with a laser or can be marked only slightly because they do not absorb laser light (the wavelength of a standard Nd:YAG laser is 1064 nm).

**Thermoplastics without fillers or pigments** (natural thermoplastics) can be divided into three general categories according to their ability to be marked:

- 1. Thermoplastics that adequately absorb laser energy and consequently carbonise, which results in a noticeable darkening of the area where the laser hits. Examples of these materials include PES and PSU.**
- 2. Thermoplastics which absorb laser energy erratically and carbonise in an irregular way, which results in marks that are not uniform (i.e., discontinuous marking). Examples of these materials include PS, SAN and ABS.**

This group also comprises styrene resins and polyesters (PET and PBT).

If a suitable pigment or special additives are incorporated, these materials can be marked more uniformly, and high-quality marking can be obtained.

In both these groups, optimisation of a pigment/additive mix for a dark background can result in a mark whose light colour approaches white.

### **3. Thermoplastics with low or negligible absorption.**

This group includes **PA, POM, PP, PE and PPS**. In their original, uncoloured state, these materials cannot be marked by laser. However, a mark with a light colour approaching white can be obtained by adding a dark pigment.

When certain of these thermoplastics are pigmented with light colours, lightly coloured marking results, and darkly coloured marking can be obtained by incorporating special additives.

**Laser marking may be strongly** influenced by the addition of fillers, reinforcers, special additives, self-extinguishing additives and other additives.

Contrary to what one might think, the presence of fibreglass reduces the ability to be marked only slightly.

Due to their intrinsic colour, some types of fillers or self-extinguishing additives may reduce the ability to be marked by laser.

On the other hand, the additives in certain self extinguishing systems may improve the contrast of laser marking.