

OXYGEN INDEX

BS 2782:141 & ISO 4589-2

This is a widely used, but frequently misinterpreted test which provides a single figure related to ignitability.

Limiting Oxygen Index (LOI) is the per cent concentration of oxygen at which a small specimen will only just burn downwards in a candle like manner. The test is probably the most well-known of the standard fire tests. The apparatus holds a small specimen of material which is clamped vertically in a tube in an atmosphere where the relative concentration of oxygen and nitrogen can be changed. The aim is to test the flammability of the sample with a small pilot flame to find the minimum oxygen concentration required to just sustain combustion of the sample. The result is usually expressed as:

$$n = \frac{100 \times O_2}{O_2 + N_2} \%$$

The test result is on a numerical scale which simplifies comparison of materials. It is very repeatable and is used for quality assurance and to indicate the potential flammability of a material. However it is essentially a small flame test and while a high index is indicative of a less easily ignited and less flammable material, materials with high limiting oxygen index (LOI) values (i.e. greater than 21) undergo flaming combustion at oxygen concentrations below 5%, in a fully developed, real fire. This is one of the very few test apparatus where steady burning conditions can be replicated on a small scale.

SOME TYPICAL VALUES	LOI
Std Polyurethane foam	16.5
PMMA (Perspex)	17.3
Poly(ethylene)	17.4
Poly(propylene)	17.4
Poly(styrene)	17.8
Plywood	23.0
Nylon 6.6	24-29
Polycarbonate	25-44
Nomex	28.5
Polyester (GRP)	21-43
Phenolic	26-64
PVC (unplasticised)	45-49
(PTFE)	95

