

Engineering Plastics for Neutron Radiation Shielding



Borated polyethylene products of Mitsubishi Chemical Group (MCG) - Advanced Materials Division

Borotron® UH015 | UH030 | UH050
Borotron® HM015 | HM030 | HM050

Trends

Nuclear and medical radiation shielding applications require materials providing safety and protection for environment and people, exhibiting high hydrogen density and low weight at acceptable cost.

Most radiation fields are combinations of different kinds of radiation, such as fast neutrons, thermal neutrons, primary gamma and secondary gamma rays.

Fast neutrons are most effectively shielded by materials with high hydrogen content. They are slowed to thermal energies by collision with

hydrogen atoms. Thermal neutrons can be virtually eliminated by the presence of high thermal neutron cross-section materials such as boron. Primary gamma rays are best shielded with lead or other high density materials. Secondary gamma rays are created as the result of the capture of thermal neutrons by hydrogen. These capture-gamma rays can be minimized by adding boron.

MCG Advanced Materials solution

Borated UHMW-PE and
HMW-PE grades

Dimensionally stable plastics
with high hydrogen content
and added boron

Customer Benefits

- Consistent density and homogeneity
- Superior dimensional stability over a wide temperature range
- Easy to handle and fabricate to a variety of shapes and parts
- Low weight
- Acceptable cost versus other shielding materials

Borotron® Borated Polyethylene

Borotron® - borated PE grades - has been used as a medical and industrial shielding material to attenuate and absorb neutron radiation. This easily fabricated polymer material also offers designers greater durability and function over a wider range of temperatures than traditional materials.

Whereas essentially any type of PE is suitable for shielding against high energy neutron radiation, borated PE combines the effect of moderation of fast neutrons and absorption of lower energy thermal neutrons.

Applications

- Medical vaults and doors
- Hot cells
- Nuclear storage and transport containers
- Nuclear waste management
- Particle accelerators
- Nuclear detection systems

Borotron® Product Range

BRAND	BORON %
Borotron® UH015 HM015	1,5%
Borotron® UH030 HM030	3,0%
Borotron® UH050 HM050	5,0%

UH = Ultra High Molecular Weight Polyethylene

HM = High Molecular Weight Polyethylene

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*: „30 days“ applies to Ketron® PEEK-CLASSIX™ LSG white only.

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