

Engineering Plastics for Neutron Radiation Shielding



Mitsubishi Chemical Advanced Materials borated Polyethylenes:

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.

Mitsubishi Chemical 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

Mitsubishi Chemical Advanced Materials

Europe

Mitsubishi Chemical Advanced
Materials Europe NV
Galgenveldstraat 12
8700 Tielt, Belgium
T +32[0] 51 42 35 11
F +32[0] 51 42 33 10
contact@mcam.com

North America

Mitsubishi Chemical Advanced
Materials Inc.
2120 Fairmont Avenue
PO Box 14235 - Reading, PA 19612-4235
T 800 366 0300 | +1 610 320 6600
F 800 366 0301 | +1 610 320 6638
contact@mcam.com

Asia-Pacific

Mitsubishi Chemical Advanced
Materials Asia Pacific Ltd.
Unit 7B, 35/F, Cable TV Tower,
9 Hoi Shing Road, Tsuen Wan, Hong Kong
T +852 2470 26 83
F +852 2478 99 66
contact@mcam.com

All statements, technical information and recommendations contained in this publication are presented in good faith and are, as a rule, based upon tests and such tests are believed to be reliable and practical field experience. The reader, however, is cautioned that Mitsubishi Chemical Advanced Materials does not guarantee the accuracy or completeness of this information and it is the customer's responsibility to determine the suitability of the products of Mitsubishi Chemical Advanced Materials in any given application.

The products of Mitsubishi Chemical Advanced Materials should not be used for applications involving medical devices that are intended to remain implanted in the human body continuously for a period exceeding 24 hours (30 days*), or are intended to remain in contact with internal human tissue or bodily fluids for more than 24 hours (30 days*), or as critical components of medical devices that are essential to the continuation of human life.

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

Mitsubishi Chemical Advanced Materials is not a medical device manufacturer and the information herein does not constitute any express or implied warranties or representations whatsoever, including, but not limited to, all warranties provided for by any applicable law, any implied warranty of merchantability, of fitness for a particular purpose, any warranty against hidden defects or redhibitory defects or vices, or that the products of Mitsubishi Chemical Advanced Materials are manufactured in accordance with the quality standards appropriate and necessary for materials intended for use in implantable medical device applications and in applications that are essential to the restoration or continuation of a bodily function important to the continuation of human life.

Borotron® is a registered trademark of the Mitsubishi Chemical Advanced Materials group.