

MarShield™

CUSTOM RADIATION SHIELDING PRODUCTS



MARSHIELD NUCLEAR

*When safety & success must be **Absolutely Assured***

www.marshield.com



NUCLEAR LEAD POURS



APPLICATIONS

STORAGE CONTAINERS

CASTINGS

FLASKS

PIPE SLEEVES

"...we specialize in flask, storage container, pipe sleeve and casting lead pours."

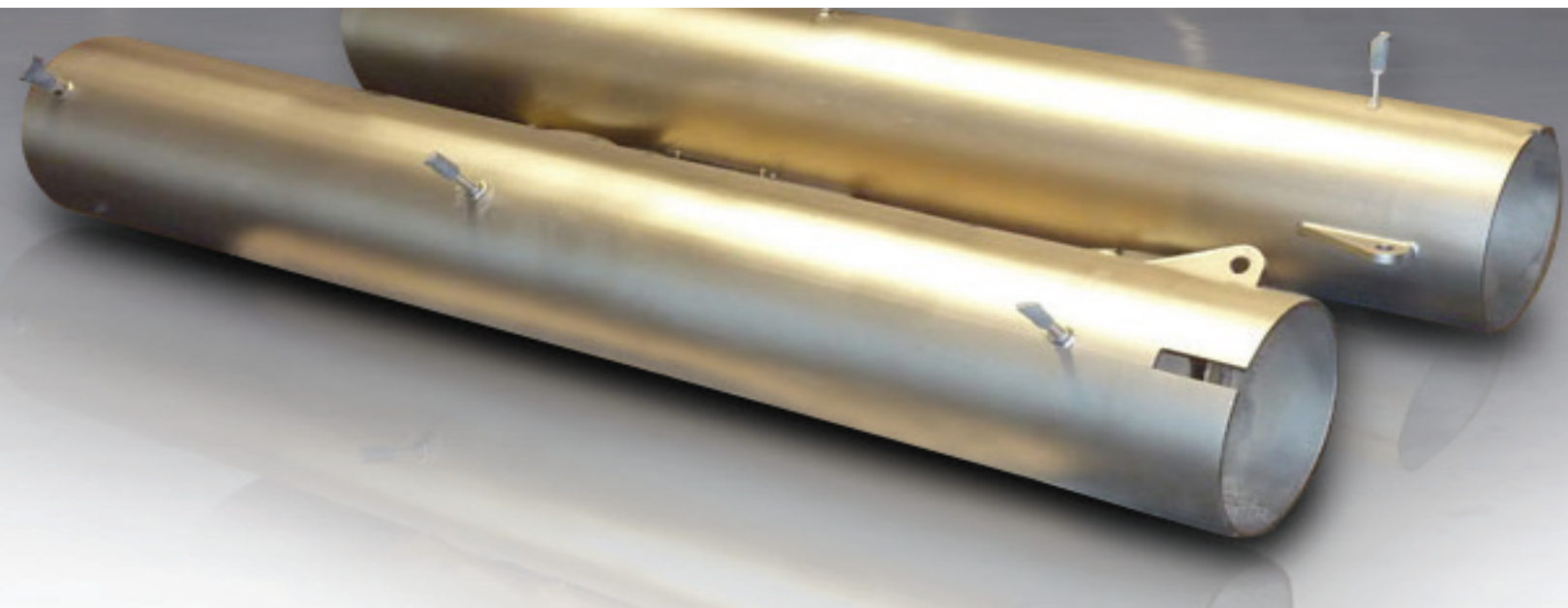
MarShield is a Canadian manufacturer with exceptional experience in custom lead castings and nuclear lead pours. We have proven to be the leaders in this industry by helping our clients from the initial stages of production development, design, fabrication and completion of the documented lead filled components.

With almost four decades of experience, MarShield has the manufacturing facilities, equipment and expertise to continuously pour lead in excess of 100,000 lbs. Our approved, proprietary nuclear pouring and quality control procedures ensure the lowest opportunity for product porosity and the highest density of lead available.

When it comes to Nuclear Safety Standards, Canada is recognized as a world leader for its attention to detail and safety. MarShield has adopted these standards and practices. MarShield is now recognized as the premiere entrusted supplier to every nuclear facility in Canada.

FEATURES & BENEFITS

- Robust quality assurance program
- Approved proprietary nuclear pour procedure
- All facets of each pour including fabrication, heating and cooling are performed in house to provide strict quality control and cost savings
- All lead used is at minimum 99.97% pure, ASTM B-29
- On-site engineering and design assistance is available



CNC MACHINED LEAD PARTS & FABRICATION



Mars supplies full service fabrication and cast parts required for any job specification. Ferrous and Non – Ferrous is available in any fabrication form or cast in weights up to 50,000 lbs.

MarShield's specialized services include in house Precision 3D and CNC Machining of lead parts and lead plates utilizing state of the art equipment and the latest CAD-CAM software.

We produce custom lead precision machined parts for the Medical, Communications and Aerospace industries – including guidance systems, RDT security, satellite systems and all aspects of Government defense.

WE PROVIDE:

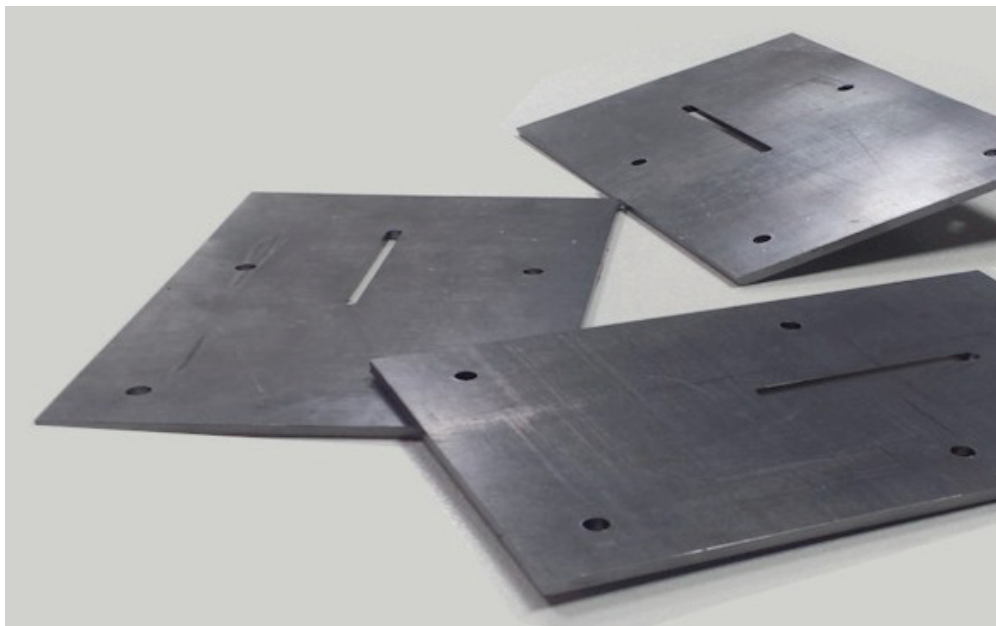
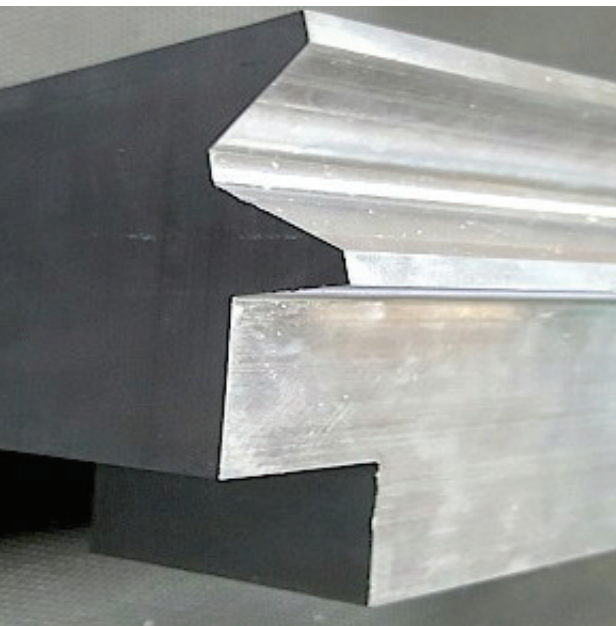
- Tight tolerance custom machining to your specifications
- A quality management system that is certified to both ISO 9001:2015 and CAN3 – Z299.2:85
- An in house Design Assist Team to support any of your machining requirements and prototype development
- Quality packaging of the finished parts and ensure all are labeled, wrapped and secured for expedited service worldwide
- A large stock of over 300 tons of sheet lead, plate and ingots for immediate processing and custom cast shapes ready to machine
- Flexibility – whether you require less than 10 pieces or high-volume production runs of 1000s, we have the capability to meet your needs

COATINGS/FINISHES

If required, all machined parts can be environmentally coated to ensure no exposed lead for health and safety reasons. We offer several coating solutions such as epoxy based coating or powder coating.

ADDITIONAL CNC MACHINED MATERIALS

For custom cut Borated Polyethylene for your specific requirements. We also stock Lead Acrylic that can be cut in custom sizes.





LEAD BRICKS



"...ideal for new construction to reduce wall or ceiling thickness and achieve space savings."

MarShield manufactures straight and interlocking lead brick shielding which provides the best choice for construction where temporary or permanent shields or storage areas are required. A choice of straight or interlocking brick offers flexibility in design and construction choices. Lead bricks are commonly used when sheet lead is impractical or unavailable in required sizes.

FEATURES & BENEFITS

- Cast from 99.9% pure lead
- Standard and custom sizes available
- Interlocking bricks use chevron "V" shape tongue and groove to prevent radiation streaming
- Versatile and reusable for multiple applications
- MarShield provides the widest range of thicknesses available in the industry with standard sizes from $\frac{3}{4}$ " to $2\frac{1}{2}$ " thickness of lead

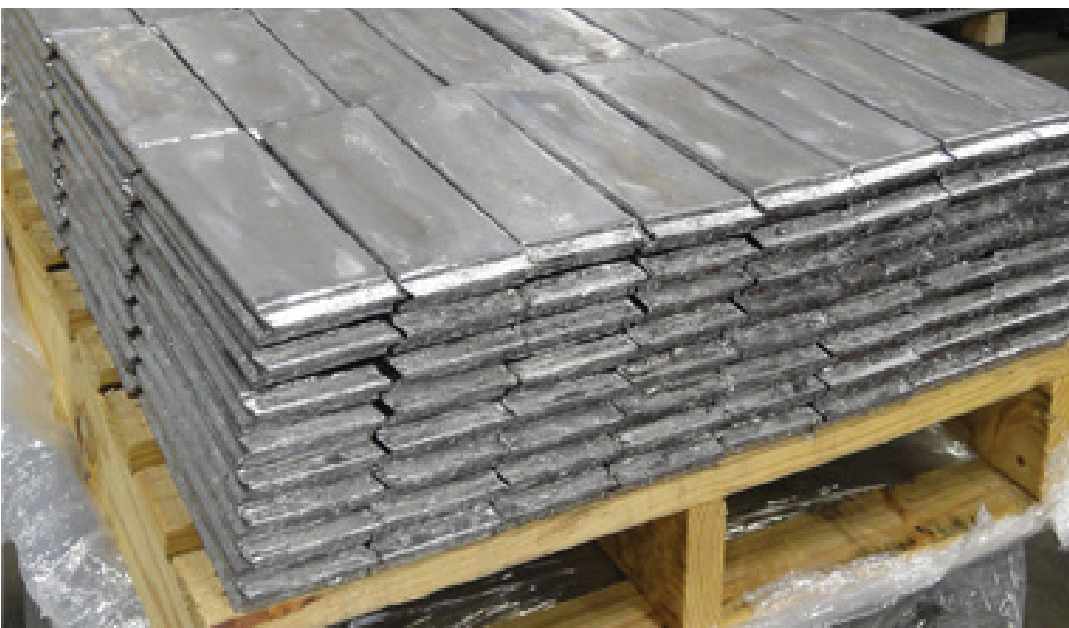


APPLICATIONS

HOT CELLS

RADIOACTIVE MATERIAL
TRANSPORTATION

TEMPORARY SHIELDING



"...MarShield lead shot is an easy, cost-effective shielding solution for areas where solid lead is impractical, due to location, shape, or accessibility."

MarShield lead shot is an easy, cost-effective shielding solution for areas where solid lead is impractical, due to location, shape, or accessibility. Lead shot can also be used to provide temporary shielding by placing the bag around the point source or pouring into a container.

We stock lead shot in standard 25 lb. canvas bags. For added strength and durability, we also offer lead shot in bags manufactured of 600 Denier vinyl coated black nylon. Lead shot is also available in bulk drums.

Our standard lead shot is #8 (.09"/2.29mm diameter). Density is approximately 436 lbs. per cubic foot.

WE OFFER

Chilled Lead Shot – Highly-polished, uniformly-round, accurately-sized and consistently-dense shot. Graphite-coated. Custom embroidery or printing is available on application.

Fire Rated Lead Shot Bags– 12.5 lb. bags of # 7.5 lead shot for Aerospace industry. Encapsulated in 22 oz PVC in Red certified FAR 25.853 (A) complete with lifting handle straps MIL-W-4088K Type II Class IA.





HIGH DENSITY CONCRETE



APPLICATIONS

PLANT CONSTRUCTION

NON-DESTRUCTIVE
TESTING ROOMS

PERMANENT SHIELDING

"...high-density blocks are the best choice for structural shielding."

MarShield supplies high-density concrete that is a cost-effective alternative to lead brick shielding in large builds. The significant attenuation provided by high-density blocks surrounding a large source provides a major reduction in additional shielding requirements within a facility.

FEATURES & BENEFITS

- Many sizes of blocks are available
- No hazardous dust emissions during installation
- Weather resistant
- Density up to 300 lbs/ft³, more than 50% higher than standard-density concrete
- Can be used for gamma and neutron shielding





TUNGSTEN RADIATION SHIELDING FOR NUCLEAR, MEDICAL & NDT

MarShield Radiation Shielding are experts in the in the customization of tungsten heavy alloy for the Nuclear Energy, Nuclear Medicine / Radioisotope, diagnostic imaging and non-destructive testing industries.

WHY TUNGSTEN?

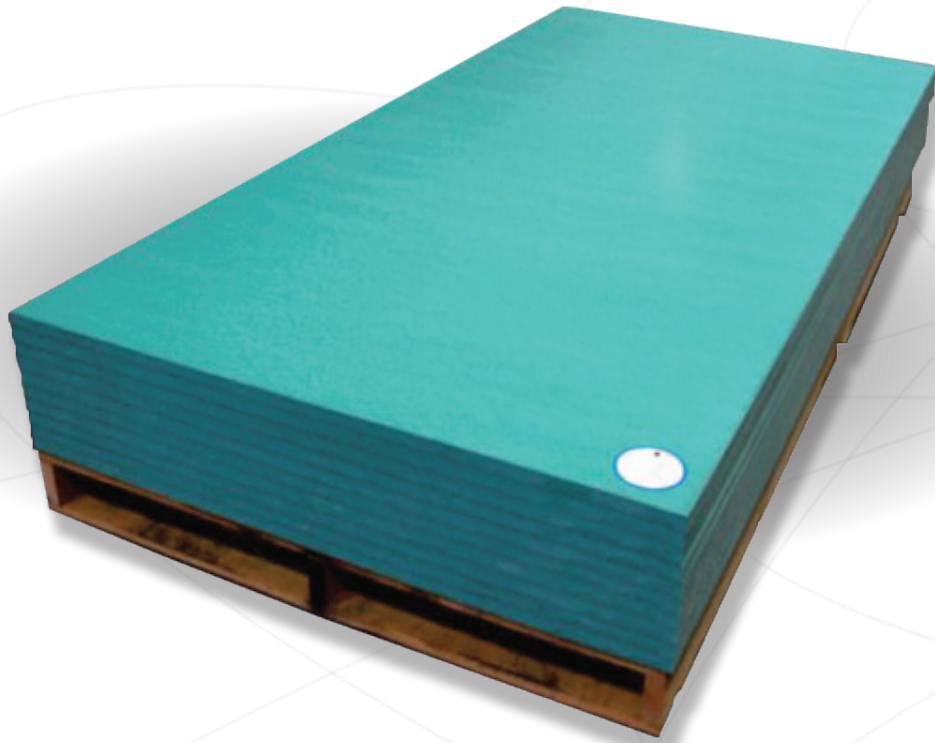
Tungsten Radiation Shielding has a density of up to 18.89 g/cm³ vs. lead at 11.34 g/cm³. It's ease of mechanical processing / machining, high ductility and strength makes it a viable option for many applications where lead is not feasible whether it be for size reduction, maximizing weight in large or small cavities or for radiation shielding. Tungsten Radiation Shielding is strong and highly customizable into precision components.

RADIATION PROTECTION – NUCLEAR, MEDICAL & NDT

- Tungsten Radiation Shielding is an excellent material for shielding, guaranteeing that radiation exposure is kept to a minimum and ensuring that ALARA goals in the workplace. Machinability, radiographic density, strength, low toxicity, and heat resistance allow for superior design adaptability vs. other shielding materials. Tungsten Radiation Shieldings are easily customizable
- Isotope vials and containers
- Custom shielding components
- Collimators for x-ray detectors
- Multi-leaf collimators
- Collimators for radiosurgery



BORATED POLYETHYLENE



APPLICATIONS

HOT CELLS

STORAGE CONTAINERS

DETECTION SYSTEMS

"...a simple solution to protection from neutron radiation."

High-density borated polyethylene, supplied by MarShield, is a lightweight, cost-effective solution for attenuation and absorption of neutrons.

FEATURES & BENEFITS

- 5% boron content by weight, stocked in 1" X 48" X 96" sheets
- Consistent density and homogeneity
- Durable over a wide temperature range
- Easy installation and fabrication
- Custom cutting and CNC machining services available
- Low density polyethylene also available with no boron content

LEAD LINED CABINETS



APPLICATIONS

DECAY CABINETS

UNIT DOSE CABINETS

PREPARATION ENCLOSURE

BASE CABINETS

RADIOISOTOPE
STORAGE CABINETS

WASTE CABINETS

PET UNIT DOSE CABINETS

PHANTOM CABINETS

MarShield manufactures a wide range of standard or custom designed lead lined laboratory furniture suitable for nuclear medicine or radiochemistry laboratories. Our comprehensive line is tailored and designed to meet your specific requirements.

FEATURES & BENEFITS

- Standard models are available with a choice of three lead thicknesses: $\frac{1}{4}$ ", $\frac{1}{2}$ " or 1"
- Custom models are available with lead thicknesses of $\frac{1}{4}$ " to greater than 6"
- All lead used in the fabrication of our cabinets is at minimum 99.94% pure lead, ASTM B-29
- All sides of each cabinet, cupboard doors and drawer faces are lead-lined with encapsulated lead
- Each cabinet is designed with 4" high adjustable legs, making it easier to install or move the cabinet with a forklift
- All shelves and drawers offer 100 lb capacity with the drawer or shelf fully extended
- Removable, easy glide drawers for ease of cleaning and decontamination
- All standard models include the option of having 304 stainless steel surfaces, with a #4 finish and 4" high backsplash
- Individual, key-locked drawers and doors to prevent unauthorized use
- Heavy duty hinges and locks





LEAD WOOL BLANKETS



APPLICATIONS

STACKABLE DOSE REDUCTION

LARGE AREA HOT SPOTS

TEMPORARY WORK STATIONS

"...we can supply any configuration to best address your requirements."

MarShield lead blankets are made using lead wool or lead plate if requested. The lead wool is flexible for ease of handling, with lead strands from .005" to .015" in diameter.

FEATURES & BENEFITS

- Easy and cost-effective radiation shielding solution
- Lead, quilted to an ANSI approved inner cover to ensure no shifting
- Standard and custom sizes available
- #5 brass grommets spaced as required
- Vinyl-laminated sheeting for applications up to 125°F (51.7°C) or silicon laminated up to 500°F (260°C)
- Standard colour choice of yellow, green or white, custom colours available on request
- Meets or exceeds Federal Specification QQ-C-40 Type II Grade C
- On-site engineering and design assistance is available

LEAD LINED STORAGE CONTAINERS



"...we ensure that the final design is functional and meets regulatory requirements."

MarShield manufactures a comprehensive line of custom-designed, lead-lined storage containers to meet your exact requirements. We employ a fully-qualified design team to help with every step of the process.

FEATURES & BENEFITS

- Manufactured from A36 or 44W carbon steel with a stainless-steel option available
- Lead-lined or filled with ASTM B-29 pure lead, 99.94% grade
- Grounded smooth, free from sharp corners and edges
- All lead is fully encapsulated with no potential for exposure
- Lead shielding thickness from 1/32" to greater than 2"
- Heavy duty hinges and locks

APPLICATIONS

RADIOACTIVE MATERIAL
TRANSPORTATION

VIAL PIGS FOR PET AND OTHER
HIGH ENERGY RADIONUCLIDES

UNIT DOSE FOR
RADIOPHARMACEUTICALS



SOLUTIONS

T-Flex® products are a great solution for all your shielding needs. Tungsten, Bismuth and Iron-based attenuating materials are available. T-Flex® can be molded into any shape, allowing the application of localized shielding directly at the source. Isolated hot spots can be shielded using T-Flex®, eliminating the need to shield larger areas surrounding the hot spot. T-Flex® can be engineered to meet weight, size, and radiation attenuation specifications. T-Flex® products have saved power plants time and money during maintenance shutdowns. All T-Flex® products are non-toxic and free of hazardous materials. T-Flex® shielding materials allow us the ability to create light weight, easy-to-use, customizable products. Customer feedback indicates that T-Flex® is a user friendly and effective means of reducing radiation fields. The weights and sizes available make T-Flex® easy to handle, with improved ergonomics, reducing the prospect of lifting and handling injuries. T-Flex® can provide attenuation properties similar to lead products, but at half the weight.



FLEXIBILITY

T-Flex® products maximize shielding effectiveness while keeping weight to a minimum. T-Flex® is ideal for applications that require custom mouldable shapes along with flexibility; such as small-bore pipes, elbows and valves. T-Flex® products are available as blankets, ribbon wrap, pipe shields, floor tiles, magnetic tiles, and molded shapes - flexible or rigid. Fasteners and securing methods are also available, including magnets, grommets and locking devices. T-Flex® Tungsten, Bismuth, and Iron products are rated for continuous use up to 350° F/176° C.

T-Flex® Highlights:

- Efficient placement of shielding closest to source
- Install in seconds through "slip-over-the component" design, integral fasteners and/or magnets
- Keep radiation fields ALARA, achieving dose reduction goals by adding these highly effective shielding materials to your shielding tool box
- Lead alternative with no hazardous materials
- Mold to any shape
- Easily cut for in field adjustments





T-FLEX®

RIBBON WRAP

These highly flexible T-Flex® strips can be spiral wrapped around equipment and components for a quick hot spot shielding solution. Standard ribbon length is 8 feet (approximately 2.4 m) and material can be cut in the field easily using typical cutting tools.



BLANKETS

T-Flex® blankets are an alternative to lead blankets, providing similar radiation attenuation characteristics without the potential hazard. Blankets can be easily cut in the field using a utility knife, but are durable, standing up to normal wear and tear. Increased flexibility over standard lead blankets makes T-Flex® blankets easier to handle and allows for shielding to be placed closer to the source.



Material	Size	lb/ft ²	Attenuation	Weight
T-Flex® Tungsten	1' x 3'	10	19%	30 lb
T-Flex® Tungsten	1' x 3'	15	27%	45 lb
T-Flex® Tungsten	1' x 4'	10	19%	40 lb
T-Flex® Tungsten	1' x 4'	15	27%	60 lb
T-Flex® Bismuth	1' x 3'	10	20%	30 lb
T-Flex® Bismuth	1' x 3'	15	29%	45 lb
T-Flex® Bismuth	1' x 4'	10	20%	40 lb
T-Flex® Bismuth	1' x 4'	15	29%	60 lb

CUSTOM

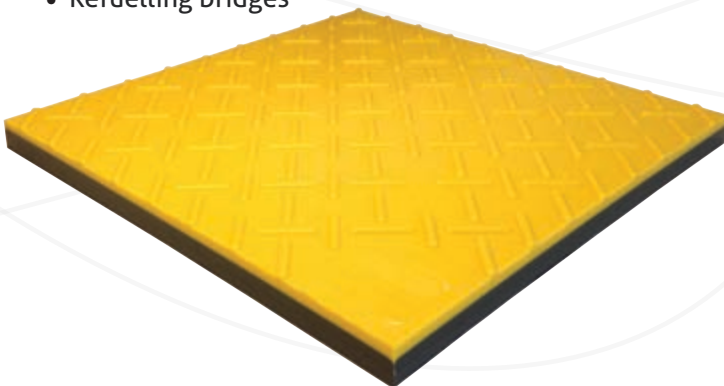
The silicone base for T-Flex® allows for manufacturing of complex and custom shapes. Custom-moulded shapes allow the shielding to be installed as close to the source as possible, making it more effective at reducing dose rates, helping to keep doses ALARA.



FLOOR SHIELDING

T-Flex® floor shielding is designed to provide economical and ergonomic solutions for shielding sources located below workers. Each tile combines the attenuation properties of T-Flex® with the durability of a work mat. Floor mats can be cut for in field adjustment as required. Floor shielding features a non-slip diamond tread surface. Sample applications include:

- Dry cask platforms
- Scorpion platforms
- Refuelling bridges



Material	lb/ft ²	Thickness	Attenuation
T-Flex® Tungsten	10	0.375"	25%
T-Flex® Bismuth	10	0.515"	24%
T-Flex® Iron	10	0.765"	18%
T-Flex® Tungsten	15	0.505"	32%
T-Flex® Bismuth	15	0.725"	33%
T-Flex® Iron	15	1.125"	26%
T-Flex® Tungsten	20	0.645"	39%
T-Flex® Bismuth	20	0.945"	41%
T-Flex® Iron	20	1.475"	32%

FOUR DECADES OF TRUSTED EXPERIENCE



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