npo®
Radiation Shielding

# Radiography


- Gamma shielding for radiography sources such as Co-60, Cs-137, Ir-172 and Se-75
- Flexible shielding blankets for primary beam radiation as well as scatter radiation
- Guide tube shielding for projection style radiation
- Custom T-Flex pieces to shield specific instrumentation

| Radiography Blankets | |
|---|---|
| **Isotope** | **Attenuation** |
| Se-75 | 85% |
| Ir-192 | 60% |

| Guide Tube Shielding | |
|---|---|
| **Isotope** | **Attenuation** |
| Se-75 | 80% |
| Ir-192 | 55% |

# Technical Specifications

Radiography is a non-destructive testing (NDT) technique that uses a radioactive source to detect flaws or defects in the internal structures, typically pipes. This testing process requires an "exclusion zone" to keep workers safe. The use of shielding shrinks the exclusion zone and improves safety and efficiency.

NPO T-Flex Bismuth blankets are large and flexible shielding pieces that can greatly reduce primary beam radiation as well as scatter radiation. The PVC covers add durability and handleability.

Guide tube shielding reduces the flash dose taken while performing projection style radiography. Using T-Flex Bismuth wrapped in durable steel mesh sleeve, shields the source throughout the length as it is fed through the guide tube.

Below are the technical specifications which apply to all T-Flex® products.

| SPECIFICATIONS | |
|---|---|
| MATERIAL: | METAL IMPREGNATED POLYMER (TUNGSTEN, BISMUTH, IRON, BORON, BISMUTH/BORON BLEND) |
| SAFETY: | REFER TO SDS (SEPARATE DOCUMENT) |
| SITE PREPARATION: | ENSURE SURFACE IS FREE OF PROTRUSION OR SHARP AREAS. CONSIDER ALL INSTALLATION CONDITIONS |
| USAGE: | SECURE TO SURFACE VIA MAGNETS, STRAPS, OR OTHER SPECIFIED DEVICES |
| GENERAL CONDITION: | FLEXIBLE WITH NO SIGNS OF CRACKING OR BRITTLENESS, DARK GREY IN COLOR (OPTIONAL: COLORED OUTER LAYER) |
| HANDLING: | USING PRIOR TRAINING OR A MOCK UP DEMONSTRATION IS RECCOMMENDED BEFORE INSTALLATION |
| PHYSICAL PROPERTIES: | • TENSILE: 320 psi (22 Bar)<br>• ELONGATION: 158%<br>• TEAR: 34.5 lbf/in (390 N/cm)<br>• DUROMETER: 46 |
| MATERIAL DENSITY: | • T-FLEX TUNGSTEN: 0.25 $lb/in^3$ (6.9 $g/cm^3$ )<br>• T-FLEX BISMUTH: 0.16 $lb/in^3$ (4.3 $g/cm^3$ )<br>• T-FLEX BORON: 0.045 $lb/in^3$ (1.245 $g/cm^3$ )<br>• T-FLEX NEUTRON (BORON/BISMUTH BLEND): 0.093 $lb/in^3$ (2.57 $g/cm^3$ ) |
| THERMAL PROPERTIES: | • CONTINUOUS OPERATING TEMPERATURE (REGULAR): 350°F (177°C)<br>• CONTINUOUS OPERATING TEMPERATURE (HIGH TEMP): 400°F (205°C)<br>• MAXIMUM TEMPERATURE: 450°F (232°C)<br>• ASTM E-84: CLASS A<br>• NFPA 701-2010: PASS |
| RAD STABILITY: | INCIPIENT TO MILD DAMAGE (25% DAMAGE) UP TO OVER 10E8 RADS (1000 KGY)<br>(PER NASA SP-8053) |
| BORIC ACID SUBMERSION: | • AFTER 96 HOURS: NO NOTICEABLE DEGREDATION OF THE T-FLEX<br>• ICP-OES ANALYSIS DID SHOW MEASURABLE AMOUNTS OF LEACHED TUNGSTEN IN BORIC ACID SOLUTION |
| LEACHABLES TEST: | • ASTM D4327-03: ACCEPTABLE<br>• ASTM D1976-07: ACCEPTABLE |