

Accurate.  
Durable.  
Essential.



Thermo Scientific Harshaw TLD Materials and Dosimeters

# Thermo Scientific

## Harshaw TLD Materials and Dosimeters

Thermo Scientific™ Harshaw™ TLD Materials are available in a wide range of formats to **meet any dosimetry need**, from research, clinical and industrial applications to personnel and environmental monitoring. Harshaw Lithium Fluoride based materials can be used for gamma, beta and neutron monitoring, with an available **high sensitivity, no-fade**, Mg, Cu, P option for low dose or long-wear applications. Additional materials are available for extended dose range coverage.

Harshaw TLD Dosimeters are available in un-mounted forms (rods, chips, powders, micro-cubes and pelletized disks), as well as fixed into multi-element aluminum cards, extremity dosimeters or mounted singly on a Kapton substrate, to meet your exact application need.

### A Proven History

- Manufactured in ISO9001 Certified factory for over 40 years
- Strictly controlled material quality and performance
- 100% quality controlled in a multi-step QC process
- Proven to last, with cards warrantied up to 500 reads, reducing the total cost of ownership of a dosimetry system.





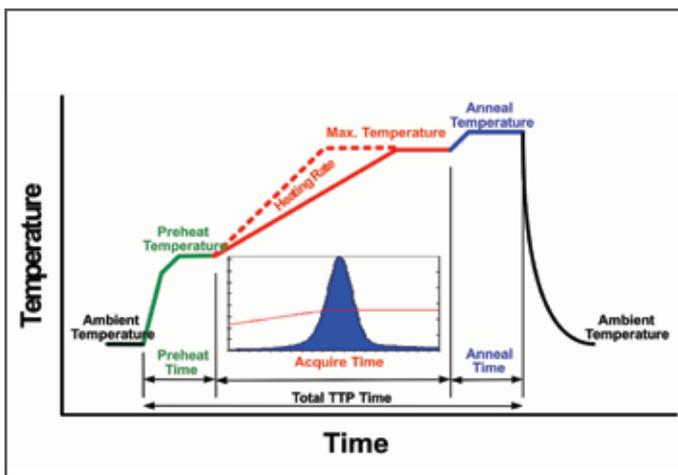
# Multi-element Card Dosimeters for Personnel and Environmental Monitoring

Harshaw TLD Multi-element card dosimeters are available in a variety of configurations for personnel or environmental monitoring of shallow (Hp(0.07)), deep (Hp(10)) and lens of eye (Hp(3)) dose.

Materials in the form of chips or pelletized disks are capsulated in Teflon and mounted in an aluminum card for extended durability. Different materials are available for gamma, beta and neutron monitoring. Each card is uniquely barcoded and available in different colors as an aid to recognition and categorization of issuance or wear periods. Multiple tamper-resistant holders are offered containing optimized filtration for energy discrimination appropriate for each card configuration, with attachments to the lapel and/or belt to meet the wearer needs.

Dose algorithms are also available for our most common multi-element card/holder configurations for use in calculating dose from a card readout. Harshaw dose algorithms were developed by irradiating hundreds of dosimeters to a wide variety of radiation types and energies, simulating hundreds or thousands of mixed fields, and using a neural network technique, to produce intelligent algorithms ensuring accurate calculation of dose. Neural network algorithms are more reliable than competing branching algorithms which have the potential for costly mathematical errors incorrectly assigning dose.

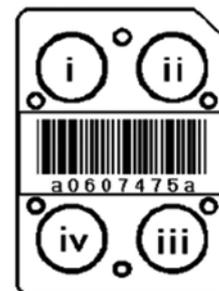
## Time, Temperature Profile



## Typical TLD Card Configuration

### Position/Element 1:

Low Energy Photon  
Discrimination and Lens  
dose (Hp(3))  
• ~300 mg/cm<sup>2</sup> filtration



### Position/Element 2:

Deep dose (Hp(10))  
• 1000 mg/cm<sup>2</sup>  
filtration

### Position/Element 4:

Mid-Energy Photon  
Discrimination and  
Neutron dose  
• Li-6 isotope  
• Various filtration

### Position/Element 3:

Shallow dose  
(Hp(0.07))  
• ~17 mg/cm<sup>2</sup>  
filtration

# Harshaw TLD offers extremity dosimeters in two different formats

## ThermoScientific™ EXT-RAD™ Extremity Dosimeter

- Available in single or double element chipstrates with an attached barcode
- Can be worn in a ring, finger cot, wristband or headband for eye dosimetry, depending on need.

## Thermo Scientific™ DXT-RAD™ Extremity Dosimeter

- Disk dosimeter, containing an integrated circular barcode to ensure unbroken chain of custody,
- More durable, smaller and easier to wear than available alternatives
- Can be worn in comfortable, adjustable, disposable finger rings, wrist bands or headbands for eye dosimetry.

## Extremity Monitoring

Harshaw TLD extremity dosimeters are available in a variety of materials and with a multiple filtration alternatives, enabling monitoring for gamma, beta or neutrons as needed. Harshaw TLD extremity dosimeters can be worn on the fingers, wrists, or head for monitoring dose to the lens of eye. They are sterilizable for maintaining hygienic conditions and uniquely barcoded for chain of custody and data integrity.

Harshaw TLD extremity dosimeters can be processed using any Harshaw hot gas TLD card reader (Models 4500, 6600 Plus and 8800 Plus) using available extremity dosimeter carrier cards. Automatic card readers equipped with an optional integrated barcode reader will automatically associate the TL response from the individually barcoded extremity dosimeters for maintaining an unbroken chain of custody and ensuring complete dosimeter data tracking.

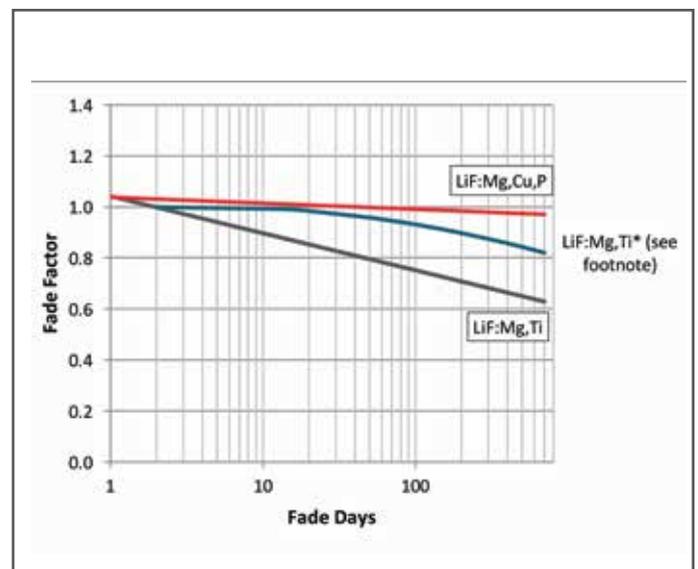
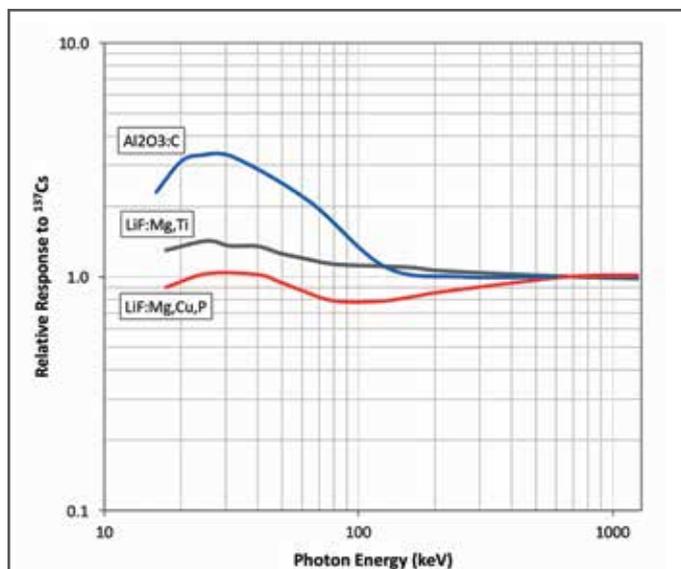


Lithium Fluoride based TLD materials are **near tissue-equivalent** and provide excellent energy response, eliminating the need for extensive mathematical computations to determine dose, improving overall accuracy and reducing the potential for costly errors. Additionally, Lithium Fluoride based materials are **not sensitive to light**, enabling added flexibility in dosimeter handling and processing for **improved productivity** and process efficiency.

Material	Type	Dosimetry Application	Linear Range	Fading	Available Forms*
Lithium Fluoride LiF:Mg,Ti	TLD-100 (Li natural)	Research, Clinical	10 $\mu$ Gy - 1 Gy	<20% in 3 months <5% in 3 months corrected	Chips, MicroCube, Square Rod, Rod, Unsorted Chips, Powder, Pelletized Chip, Pelletized Disk
	TLD-600 (Li-6 isotope)	Neutron			
	TLD-700 (Li-7 isotope)	Gamma, Beta			
Lithium Fluoride LiF:Mg,Cu,P	TLD-100H (Li natural)	Environmental, Personnel, Extremity	1 $\mu$ Gy - 10 Gy	Negligible in 3 months <5% up to 2 years	Pelletized Chip, Pelletized Disk, Powder
	TLD-600H (Li-6 isotope)	Neutron			
	TLD-700H (Li-7 isotope)	Gamma, Beta, Environmental			
Calcium Fluoride Dysprosium, CaF <sub>2</sub> :Dy	TLD-200	Environmental	0.1 $\mu$ Gy - 10 Gy	10% in 1st 24 hr 16% total in 2 weeks	Chip
Calcium Fluoride Manganese, CaF <sub>2</sub> :Mn	TLD-400	Environmental and High Dose	0.1 $\mu$ Gy - 100 Gy	8% in 1st 24 hr 12% total in 2 weeks	Chip

\*Visit thermofisher.com or contact customer service for exact specifications and ordering information for available material forms.

### Response Curves (tissue equivalency for LiF, competing material).



\* LiF:Mg,Ti, Main dosimetric peaks (4+5), all fade normalized to 2 days

**Specification/Ordering Information** Not all models are shown, refer to thermofisher.com or contact customer service for a complete model listing.

## Multi-Element TLD Cards

### Personnel Dosimeters

Model Holder	Radiation Types Measured			Obtainable Dose Equivalent Measurements				TLD Card Material		Algorithm
	Gamma, X-Ray (Photons)	Beta	Neutron	Deep Hp(10)	Shallow Hp(0.07)	Lens	Neutron Deep	LiF:Mg,Ti Card Short Description/ Series Part Number	LiF:Mg,Cu,P Card Short Description/ Series Part Number	
8806	X		X	X			X	6776 / TLDCARD-43C		28103
8814	X	X		X	X			0110 / TLDCARD-21C		
						X		1110 / TLDCARD-31C		28514
			X			X	7776 / TLDCARD-43C		28463	
8825	X	X		X	X			0110 / TLDCARD-21C		
						X		1110 / TLDCARD-31C		28514
			X			X	7776 / TLDCARD-43C		28464	
8840	X	X		X	X				0110H / TLDCARD-25P	
						X		1110H / TLDCARD-35P		
			X			X	7776H / TLDCARD-47P	28132		
8850	X	X		X	X				0110H / TLDCARD-25P	
						X		1110H / TLDCARD-35P		
			X			X	7776H / TLDCARD-47P	COMS000191		

### Environmental Dosimeters

Model Holder	Radiation Types Measured			Obtainable Dose Equivalent Measurements		TLD Card Material	Algorithm	Comments
	Gamma, X-Ray (Photons)	Beta	Neutron	Ambient	Directional	LiF:Mg,Cu,P Card Short Description/ Series Part Number		
8855	X	X		X	X	0110H / TLDCARD-25P		
						0770H / TLDCARD-27P		For environments with neutrons
						1111H / TLDCARD-45P	28547	
						7777H / TLDCARD-47P	28547	For environments with neutrons

## Extremity Dosimeters

### EXT-RAD Specifications and Ordering Information

EXT-RAD Dosimeter Model	Part Number	Mass Density (mg/cm <sup>3</sup> )	TLD Material Type	Application	Useful Range
XD-107H	26975	7	TLD-100H LiF:Mg,Cu,P (Natural Lithium Fluoride)	Photon, Beta Neutron-Free Environment	0.20 mSv – 10 Sv (20 mrem - 1000 rem)
XD-707H	26978	7	TLD-700H LiF:Mg,Cu,P (Lithium-7 Fluoride)	Photon, Beta Neutron Environment	0.20 mSv – 10 Sv (20 mrem - 1000 rem)
XD-100	26974	100	TLD-100 LiF:Mg,Ti (Natural Lithium Fluoride)	Photon Neutron-Free Environment	0.20 mSv – 1 Sv (20 mrem - 100 rem)

## DXT-RAD Specifications and Ordering Information

DXT-RAD Dosimeter Model	Part Number	Mass Density	TLD Material Type	Application	Useful Range	Fading
DXT-107H	26995	7 mg/cm <sup>2</sup>	TLD-100H LiF:Mg,Cu,P (Natural Lithium Fluoride)	Photon, Beta (3.3 mg/cm <sup>2</sup> cap) Neutron-Free Environment	0.20 mSv – 10 Sv (20 mrem - 1000 rem)	Negligible
DXT-707H	26998	7 mg/cm <sup>2</sup>	TLD-700H LiF:Mg,Cu,P (Lithium-7 Fluoride)	Photon, Beta (3.3 mg/cm <sup>2</sup> cap) Neutron Environment	0.20 mSv – 10 Sv (20 mrem - 1000 rem)	Negligible
DXT-100	26994	100 mg/cm <sup>2</sup>	TLD-100 LiF:Mg,Ti (Natural Lithium Fluoride)	Photon Neutron-Free Environment	0.20 mSv – 10 Sv (20 mrem - 1000 rem)	5%/yr at 20 °C with anneal
DXT-600	26996	100 mg/cm <sup>2</sup>	TLD-600 LiF:Mg,Ti (Lithium-6 Fluoride)	Photon, Neutron Used with DXT-700 For Neutron Measurements	0.20 mSv – 10 Sv (20 mrem - 1000 rem)	5%/yr at 20 °C with anneal
DXT-700	26997	100 mg/cm <sup>2</sup>	TLD-700 LiF:Mg,Ti (Lithium-7 Fluoride)	Photon Neutron Environment	0.20 mSv – 10 Sv (20 mrem - 1000 rem)	5%/yr at 20 °C with anneal

## Caps for the DXT-RAD Extremity Dosimeter

Part Number	Filtration	Application
28573	3.3 mg/cm <sup>2</sup>	Photon, Beta, Neutron
28908	3.3 mg/cm <sup>2</sup>	Photon, Beta, Neutron (designed for use with DXT-707H-2 dosimeter)
500597	42 mg/cm <sup>2</sup>	Photon, Neutron

## Options and Accessories

- Etched Barcodes (available on Multi-Element Cards)
- Manual Filter-Holder Openers
- Model 8866 Automatic Holder Opener
- Carrier Cards (EXT-RAD, DXT-RAD)
- DXT-RAD Ring and Cap Manual Loader/Unloader Station
- Manual DXT-RAD Carrier Card Loader/Unloader
- Vacuum Tweezers (115 VAC/220 VAC)
- External Ringlet Bar Code Reader and Software for DXT-RAD
- EXT-RAD Pouch Impulse Heat Sealer Assembly



## Thermo Scientific™ RADSafe™ Certified Services Configurable services tailored to your specific needs

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## Spare Parts

Looking for spare parts for this instrument?

Visit our spare parts website at [www.analyticalinstrumentparts.com](http://www.analyticalinstrumentparts.com)



Find out more at [thermofisher.com/dosimetry](http://thermofisher.com/dosimetry)