



Harnessing and Protection Products

Raychem Integrated Harnessing Systems & Products11-2

Raychem Heat-Shrinkable Tubing

- Polyolefin**11-3 to 11-4
- Fluoropolymer**11-4 to 11-5
- Dual Wall**11-5 to 11-6
- Elastomeric**11-7
- Heavy-Duty**11-8 to 11-9
- Fabric**11-9
- Altera Medical Grade**11-9 to 11-10
- Conduit**11-11

Raychem Heat-Shrinkable Molded Parts11-11 to 11-13

Flexible Cable Protection System11-13

Raychem MIL-STD-1553B

Databus Products11-14 to 11-15

Reference these additional Raychem products used in harnessing applications in Section 6 of this catalog:

Raychem Interconnection Devices & Connectors

- MTC Connectors**6-22
- Connector Accessories**6-27
- Wire-to-Wire Splicing**6-49
- Insulated Terminals & Disconnects**6-49
- Wire Termination to Pin/Post/Tab**6-49
- Shield Termination**6-49
- Coaxial Cable Termination**6-50
- Cable-to-Cable Splicing**6-50
- Shielded Contacts**6-50



HarnWare Harness Design Software

- Simple to use for designing complex harness assemblies
- Drag-and-drop harness design based on Microsoft Visio program
- Supports Raychem Integrated Harnessing Systems (RIHS)
- Selects or recommends proper components based on RIHS requirements
- Three-dimensional visualization tool available (HarnVis Module)
- Harness layout board conversion and print-out (full-scale) feature
- Polymer component surface area calculation for NBCCS application
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Harness Assembly and Services

- Harness design service from equipment pin outs and layout
- Harness prototype manufacturing for fit and/or initial functional check
- Complete service – design, prototype, and production
- Reverse engineering service – produce harness design from undocumented harnesses
- Production harness manufacturing to customer prints
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Integrated Harnessing Systems

- Simplified parts selection for various environmental and operational requirements
- Material compatibility within a system component family
- 700 Series systems for NBC contamination survivability applications – System 770, System 780 and System 790
- System 100 for low halogen emission requirements
- System 200 and System 300 for aggressive temperature (200°C) and fluid environments
- Other systems (System 10, 20, 25, 30) for various conventional environmental requirements
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Kits and Assemblies

- Prepackaged combinations of Raychem components for assembly and material management convenience – T-FIT Kits and NAVSEA Kits
- Factory assembled connector/molded part interface – KTKK, TCFS, TCFR, etc. – for assembly labor savings using conventional or shielded Rayaten boots
- Special purpose kits for splicing cables (SESK for conventional and UJIS cables), corrosion protection (RayOLOn sealing sleeves), and others
- Kitting for harnessing
- MTC connector kitting and pre-assemblies
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



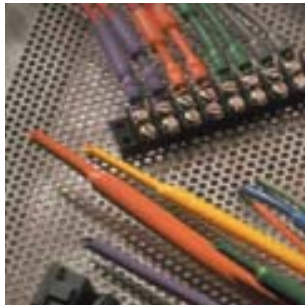
Versafit

- Highly flame-retardant, very flexible, low-shrink-temperature polyolefin tubing
- 2:1 shrink ratio
- Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components
- Very flexible; doesn't easily wrinkle when bent
- Highly flame retardant; UL/CSA VW-1 rated
- Hot stamps extremely well
- Higher temperature rating, better thermal stability, and higher resistance to physical abuse than non-crosslinked material
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBO's and PBBEs), which are classified as environmentally hazardous substances
- UL-recognized and CSA-certified
- Meets AMS-DTL-23053/5, Classes 1 and 3
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



RNF-100

- Flexible, flame-retardant, general purpose polyolefin tubing
- 2:1 shrink ratio
- Superior abrasion and solvent resistance when compared with that of many flexible, general purpose polyolefin tubings
- Excellent physical, chemical, and electrical properties that meet or exceed industrial and military standards for highly reliable, general purpose tubing
- Flexible; conforms to irregular shapes
- Flame-retardant (colors only)
- Wide range of sizes and colors
- Meets AMS-DTL-23053/5, Classes 1 and 2
- UL-recognized and CSA-certified
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"





RP-4800

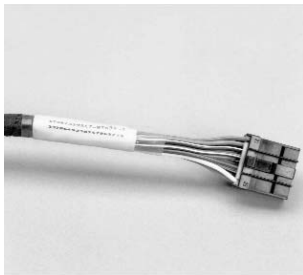
- High-shrink-ratio, flame-retardant polyolefin tubing
- 4:1 shrink ratio
- Conforms well to highly variable substrate dimensions
- Has excellent physical, chemical, and electrical properties that meet or exceed industrial and military standards
- Shows no significant degradation when exposed to common solvents and chemicals, including aviation fuel and hydraulic fluid
- Meets AMS-DTL-23053/5, Class 1 Overexpanded
- UL-recognized
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”

Raychem Heat-Shrinkable Tubing — Fluoropolymer



RW-175

- High-temperature, chemical-resistant polyvinylidene fluoride tubing
- 2:1 shrink ratio
- Tough, semirigid, very-thin-wall insulation
- High flame-resistance, meeting the requirements of AMS-DTL-23053, Test C, with UL/CSA VW-1 rating
- High-temperature performance that meets or exceeds military and industrial standards
- Protection from most industrial solvents, fuels and chemicals
- Part of the MicroFit family of small-diameter, high-shrink-ratio tubing with recovered inside diameters as small as 0.178mm (.007”)
- Meets AMS-DTL-23053/8
- UL-recognized and CSA-certified
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



RT-375

- Clear, flame-resistant, flexible fluoropolymer tubing
- 2:1 shrink ratio
- Exceptional clarity and clarity stability
- Toughness, chemical resistance, and high-temperature performance
- High flame-resistance; UL/CSA VW-1 rated
- Approximately 40 percent thinner walls than most general purpose polyolefin tubings
- Meets AMS-DTL-23053/18, Class 2
- UL-recognized and CSA-certified
- Order Catalog 1654025, “Wire and Cable, Harnessing and Protection Products”



RT555

- Fluid-resistant, chemical-resistant, crosslinked fluoropolymer tubing with extended temperature range
- Resistance to high temperatures, solvents, corrosive chemicals and radiation
- Extreme resistance to hydrocarbons
- Low outgassing; successfully tested for NASA outgassing requirements
- Highly flame-retardant
- 40 percent lighter weight than Viton® fluoroelastomer tubing
- System 300 tubing
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”

Raychem Heat-Shrinkable Tubing — Dual Wall



ATUM

- High-shrink-ratio, adhesive-lined polyolefin tubing
- 3:1 and 4:1 shrink ratios allow for connector-to-cable sealing
- Tubing environmentally seals and protects components and interconnections
- Medium wall provides increased mechanical protection
- ATUM adhesive bonds to a wide variety of plastics, rubbers and metals, including polyethylene, aluminum, steel, and copper
- Meets AMS-DTL-23053/4, Class 3
- UL-recognized (black only, except sizes 3/1 and 4/1)
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”

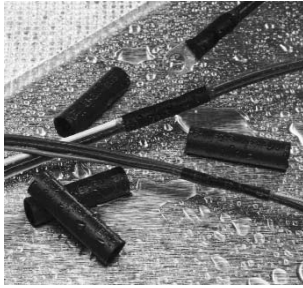


DWP-125

- Flexible, high-shrink-ratio, adhesive-lined polyolefin tubing
- 3:1 shrink ratio allows for insulation and sealing of irregular shapes
- Medium wall provides increased mechanical protection while maintaining flexibility when installed
- DWP-125 adhesive bonds to a wide variety of plastics, rubbers and metals, including polyethylene, neoprene and steel
- UL-recognized and CSA-certified
- Meets the material properties of AMS-DTL-23053/4, Class 3 (except for sealing efficiency)
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Viton® is a registered trademark of Dupont Dow Elastomers L.L.C.



ES2000

- Flame-retardant, high-shrink-ratio, adhesive-lined, semirigid polyolefin tubing
- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals and other components
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range
- UL-recognized
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



ES Caps

- High-shrink-ratio, adhesive-lined, semirigid polyolefin caps
- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Mechanically tough jacket provides strain relief and abrasion protection
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range
- UL-recognized
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



SCL

- Semirigid, encapsulant-lined polyolefin tubing
- 3:1 shrink ratio
- Splash-resistant, moisture-resistant covering; not intended for use where immersion in fluids is required
- Rugged protection against abrasion, vibration and flexing
- Excellent strain relief and insulation of weak points
- UL-recognized
- Meets AMS-DTL-23053/4, Class 1
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



RayBlock Kits

- Heat-shrinkable water-blocking systems
- Environmentally seals wire bundles of up to 20 wires
- RayBlock 85 products withstand temperature excursions to 105°C (221°F)
- RayBlock 105 products withstand temperature excursions to 120°C (248°F)
- Provides excellent strain relief and reduces noise
- Offers a low-profile installed product only marginally larger than the cable bundle itself
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



DR-25

- Flexible, chemical- and abrasion-resistant tubing
- 2:1 shrink ratio
- Flame-retardant
- Resistant to aviation and diesel fuels, hydraulic fluids and lubricating oils
- High-temperature fluid resistance and long-term heat resistance
- Meets AMS-DTL-23053/16
- System 25 tubing
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



NT-MIL

- Flexible, rugged, modified elastomeric tubing
- Remains flexible at temperatures as low as -70°C (-94°F) without cracking
- Withstands heat shock at 200°C (392°F) without dripping, flowing or cracking
- Offers outstanding resistance to abrasion and physical abuse while providing the flexibility and strain relief needed in rugged harnessing applications
- Resistant to most fluids and solvents, including aviation and ground vehicle fuels, lubricating oil, and hydraulic fluids
- Meets the stringent requirements of AMS-DTL-23053/1, Classes 1 and 2
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Fluoroelastomer Tubing

- Chemical-resistant, high-temperature tubing made with Viton® fluoroelastomer
- High resistance to impact and abrasion
- Resistance to a wide variety of fuels, lubricants, acids and solvents at elevated temperatures
- Flexibility at low temperatures without cracking
- Meets AMS-DTL-23053/13
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Viton® is a registered trademark of Dupont Dow Elastomers L.L.C.



HRHF/HRNF/HRSR

- High-ratio tubing
- 5.6:1 shrink ratio
- Offers toughness and durability
- Provides excellent insulation and abrasion protection
- Available in semirigid flame-retardant (SR), standard (NF), and high-flex, flame-retardant (HF) materials
- Available with or without factory-applied sealants and adhesives
- FR (flame-retardant) callouts meet the flame-retardant material requirements of AMS-DTL-23053/15
- HRHF and HRSR have the following agency approvals:
 - ABS (American Bureau of Shipping)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



RHW

- Rugged, heavy wall, adhesive-lined polyolefin tubing
- Shrink ratios as high as 3.5:1
- Withstands mechanical abuse for increased product reliability
- Highly resistant to impact and abrasion
- Provides a high level of strain relief when installed on splices and joints
- Resistant to chemicals, moisture and oils
- Provides a complete moisture-proof seal preventing corrosion of underlying components
- Available in black (all sizes) and red (sizes 9/3, 13/4, 20/6, and 33/8 only)
- UL listed (sizes 9/3 through 70/21 only)
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



SST/SST-FR

- Self-sealing tubing
- Shrink ratios as high as 3:1
- Thick-wall insulation, strain relief and abrasion protection
- Thick adhesive liner forms an effective barrier against fluids and moisture; no need for greases, tape or epoxy
- Available in flame-retardant (FR) and non-flame-retardant materials
- SST has the following agency approvals:
 - ABS (American Bureau of Shipping)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)
- Meets AMS-DTL-23053/15, Classes 1 and 2
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



XFFR

- Halogen-free, flame-retardant tubing
- Shrink ratios as high as 3:1
- Emits minimal amounts of toxic or acid gases during combustion
- Resists moisture, fungus and weathering
- Meets performance requirements of MIL-C-24640 and MIL-C-24643 cable jackets
- XFFR has the following agency approvals:
 - ABS (American Bureau of Shipping)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"

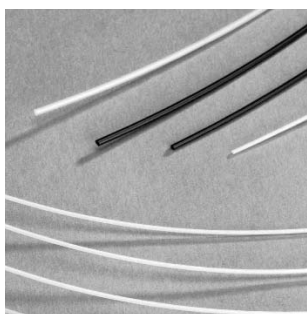
Raychem Heat-Shrinkable Tubing — Fabric



HFT5000

- Highly flexible woven fabric tubing
- 2:1 shrink ratio for easy installation onto different substrate diameters and sizes
- Polyethylene/polyester construction for excellent abrasion resistance over a wide temperature range
- Halogen-free
- Heat-shrinkable to grip substrates tightly without additional fixing
- Highly flexible woven fabric construction for easy installation onto awkward substrates such as bent hoses
- Resistant to harsh environments
- Low shrink temperature for safe installation onto heat-sensitive substrates
- Easily cut with standard industrial cutting equipment
- UL-recognized
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"

Raychem Heat-Shrinkable Tubing — Altera Medical Grade



MT1000

- High-temperature, semirigid fluoropolymer tubing
- 2:1 shrink ratio
- Tough, semirigid, very-thin-wall insulation
- Excellent resistance to a variety of fluids
- USP Class VI material; no heavy metals
- Part of the MicroFit family of small-diameter, high-shrink-ratio tubing with recovered inside diameters as small as 0.178mm (.007")
- Compatibility with gamma, ETO, steam and dry-heat sterilization
- Optional inner adhesive lining in sizes 1/8" and larger (MT1000A)
- Double-bagged packaging
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"





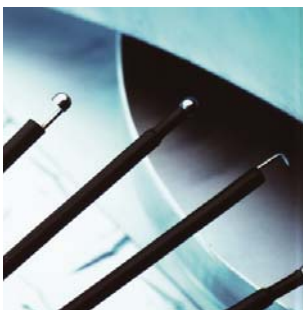
MT2000

- USP Class VI, lubricious, thin-wall polyolefin
- 2.5:1 shrink ratio
- Lubricity comparable to FEP
- Excellent electrical insulation properties
- Can be manufactured with a very thin wall
- USP Class VI material; no heavy metals
- Part of the MicroFit family of small-diameter, high-shrink-ratio tubing with recovered inside diameters as small as 0.178mm (.007")
- Compatibility with gamma and ETO sterilization
- Optional inner adhesive lining in sizes 3.0mm and larger (MT2000A)
- Plastic spools and double-bagged packaging
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



MT3000

- USP Class VI, high-temperature, flexible fluoropolymer tubing
- 2:1 shrink ratio
- Tough, flexible, very-thin-wall insulation
- Excellent resistance to a variety of fluids
- USP Class VI material; no heavy metals
- Compatibility with steam (limited cycles), gamma, ETO, and dry-heat sterilization
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



MT5000

- USP Class VI, flexible polyolefin tubing
- 2:1 shrink ratio
- Flexibility
- Available in a variety of colors
- Excellent electrical insulation properties
- USP Class VI material; no heavy metals
- Compatibility with gamma and ETO sterilization
- Optional inner adhesive lining in sizes 1/8" and larger (MT5000A)
- Plastic spools and double-bagged packaging
- Order Catalog 1654025, "Wire and Cable, Harnessing and Protection Products"



HCTE

- Helical Convolex tubing with high crush resistance
- Provides mechanical protection for electrical wiring systems
- Highly flame-retardant
- Highly flexible
- Resistant to a variety of fluids
- High crush resistance
- System 300 conduit tubing
- Not heat-shrinkable
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”

Raychem Heat-Shrinkable Molded Parts



End Caps

- Seal cable ends from moisture penetration
- Protect cylindrical objects from corrosion
- Provide insulation and abrasion protection
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Connector Strain-Relief Boots

- Available with adapter “lip” for better sealing and durability
- Available without “lip” for installation directly onto connector
- Straight, 45 & 90 degree boots available
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Uniboats

- Flexible convoluted construction
- Able to bend in any direction
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Transitions

- Strain relief for cable joints
- Sealing provided by available adhesive pre-coat
- Abrasion protection
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Breakout Boots

- Strain relief for “broken out” conductors of power cables
- Seal “broken out” power cable conductors
- Meet US Navy, Lloyds, DNV & ABS requirements
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Feedthroughs

- Provide water tight, fume tight seal through bulkheads
- Single and multiple cable entry configurations available
- Heat-shrinkable to cover a variety of cable diameters
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



QFT Configurable Transitions

- Make 2:1, 3:1 & even 4:1 transitions with same part
- Seal splices against water penetration
- Low shrink temperature polyolefin
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



shrinkHOoP Cable-Clamp Grommets

- Superior strain relief to tapes
- Fast, easy installation
- Fittings enhance reliability of connections under extreme conditons of use in the manufacture of machinery and construction
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Adhesives

- Thermoplastics, thermosets & sealants
- Remain flexible after installation
- Resistant to many fluids and solvents
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”

Flexible Cable Protection System



AMP Flexible Cable Protection System

- For cables that require better protection
- Choice of corrugated plastic tubing, protective metal or plastic conduit, and fittings
- Fittings allow reliable connections to be made and enhance reliability under extreme conditions of use in the manufacture of machinery and construction
- Recognized under the Component Program of Underwriters Laboratories Inc.
- Certified by Canadian Standards Association
- Certified by VDE
- Order Catalog 1307244, “AMP Flexible Cable Protection System”





Ultra Lightweight In-line Databus Couplers

- Provide coupling points for data communication systems operating on MIL-STD-1553B protocol with reduced size and weight without sacrificing performance
- Available in single, double, 3, 4, 5, and 6 stub configurations
- Environmentally sealed
- Connectors of choice can be terminated by users
- Ultra lightweight (1 stub: 6.5g max.; 2 stubs: 9.5g max.)
- In-line profile that makes wire bundle mounting possible
- 360° continuous low impedance cable shield terminations
- Reliable solder termination of all components
- Potted circuit elements for maximum durability and in-use reliability
- Ease of installation
- Altitude immersion resistance
- Mean time between failures >1,000,000 hours
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



In-line Couplers

- Provide coupling points for data communication systems operating on MIL-STD-1553B protocol
- Provided in one or two stub configurations
- Environmental sealing
- User terminates connector of choice to the cables provided with the coupler
- Available in completed custom harness assemblies – Contact Tyco Electronics
- Lightweight (1 stub: 10g max.; 2 stubs: 15g max.)
- In-line profile that makes wire bundle mounting possible
- 360° continuous low impedance cable shield terminations
- Potted circuit elements for maximum durability and in-use reliability
- Ease of installation
- Altitude immersion resistance
- Optional eyelet configurations for bulkhead mounting
- Mean time between failures >1,000,000 hours
- Order Catalog 1654025, "Raychem Wire and Cable, Harnessing and Protection Products"



Discrete Connectors, Terminators and Accessories

- Hardware to build MIL-STD-1553B databus harness assemblies including threaded and bayonet connectors, bus or stub terminators, dust caps, etc.
- Lightweight, rugged and compact design
- Removable pin or socket contacts using Raychem SolderTact contacts
- Termination with Raychem MIL-STD-1553B cables, including EMP hardened versions
- Termination time of 1 to 2 minutes
- Inspectable solder terminations
- Reworkable and repairable terminations
- Strain relief built into the design
- 1000 hour salt spray resistant plating available
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Box Couplers

- Provide coupling points for data communication systems operating on MIL-STD-1553B protocol packaged into light, robust coupler modules with connector versatility
- Up to 8 stub connectors can be arrayed on the “face” of the box coupler. Bus connectors can also be on the “face” or on the “side” of the box
- Designed with Raychem D-621 series corrosion resistant threaded-type or bayonet-type connectors (4 keying configurations)
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Space Grade Databus Components

- Provide coupling points for data communication systems operating on MIL-STD-1553B protocol for applications that require low outgassing levels that meet NASA spec. SP-R-0022A requirements
- Complete line of space-qualified MIL-STD-1553B components
- Lightweight
- Rugged construction
- Customer specific functional testing service available – contact Tyco Electronics
- Stress screening: x-rays, vibration, thermal cycling
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”



Custom Databus Harness Assemblies

- Custom cable assemblies using customer-specified cables and/or connectors
- Turn-key databus harness solution for convenience and reliability
- Assemblies are fully tested to customer specification
- Order Catalog 1654025, “Raychem Wire and Cable, Harnessing and Protection Products”

