

FORMERRA HEALTHCARE SOLUTIONS

Medical Wearables





MEDICAL WEARABLES

Wearable devices can deliver lifesaving medications, monitor dangerous heart arrhythmias and store and transmit important vital sign data. So, it's critically important to select the best FDA-approved materials for skin contact, robustness and chemical resistance, while also ensuring comfort, secure fit and device accuracy through design optimization.

At Formerra, we help you solve your toughest application challenges by providing a specialized approach to the latest material, colorant and additive technologies. With a dedication to sustainable solutions, technical and logistics expertise and innovative design engineering capabilities, we can help you mitigate risk, optimize design, and accelerate product commercialization.



60



3km



82 kg



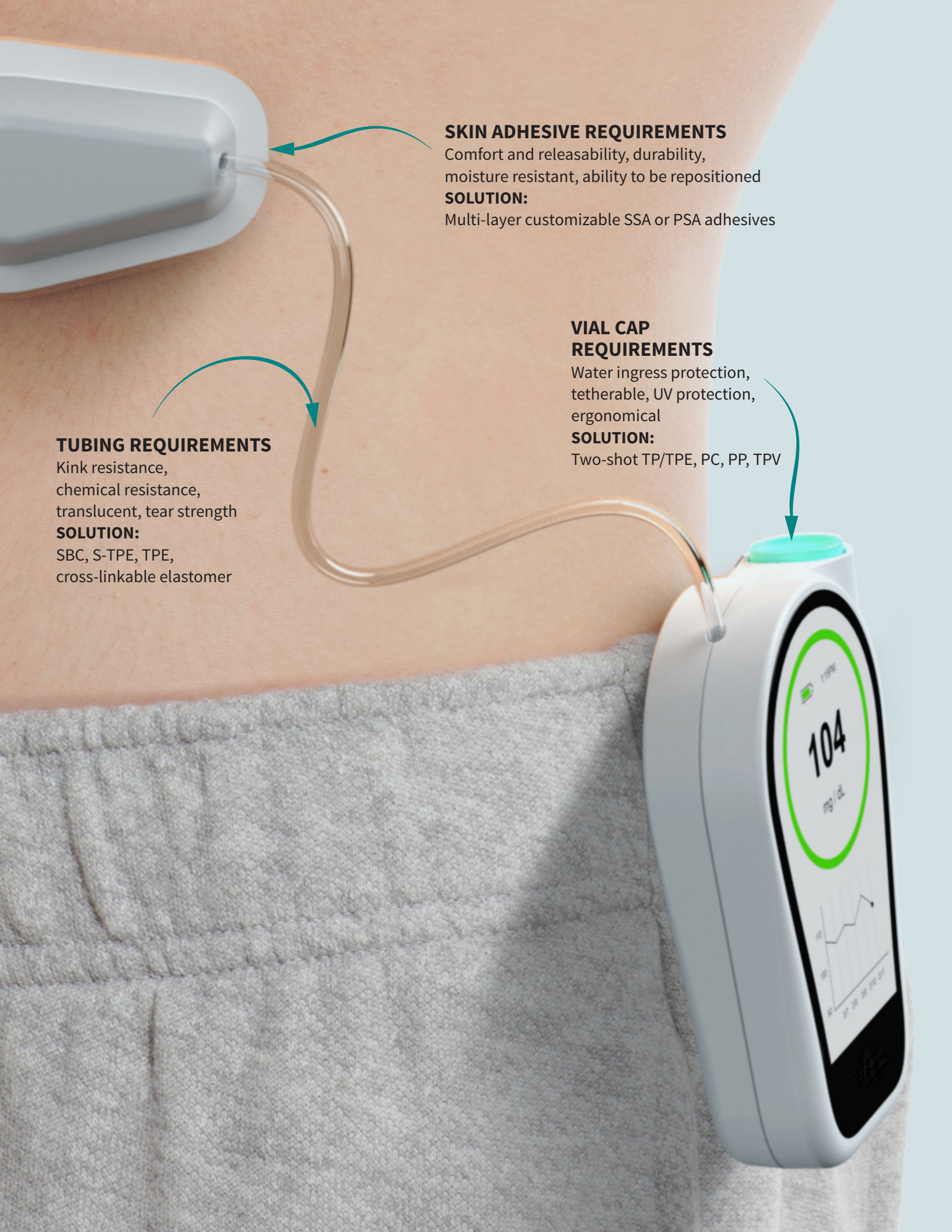


SKIN PATCH CASING REQUIREMENTS

EMI shielding, RFI transmission,
sterilizable, creep and fatigue
resistance, dimensional stability,
surface finish

SOLUTION:

Long Fiber Technologies, PA66,
PC, PC/ABS, PBT, PP



SKIN ADHESIVE REQUIREMENTS

Comfort and releasability, durability, moisture resistant, ability to be repositioned

SOLUTION:

Multi-layer customizable SSA or PSA adhesives

TUBING REQUIREMENTS

Kink resistance, chemical resistance, translucent, tear strength

SOLUTION:

SBC, S-TPE, TPE, cross-linkable elastomer

VIAL CAP REQUIREMENTS

Water ingress protection, tetherable, UV protection, ergonomical

SOLUTION:

Two-shot TP/TPE, PC, PP, TPV

**DEVICE CONNECTIVITY
REQUIREMENTS:**

EMI shielding, RFI transmission

SOLUTION:

Long Fiber Technologies, PA66,
PC, PC/ABS, PBT, PP

**TOUCH SCREEN DISPLAY
REQUIREMENTS:**

Scratch resistance,
chemical resistance, clarity,
resistive touch capability,
toughness

SOLUTION:

Copolyester, PC, Clear ABS

**FRONT BEZEL
(OVERMOLDED)
REQUIREMENTS:**

Impact resistance,
chemical resistance, IP67,
water ingress protection,
hermetically sealable,
laser weldable

SOLUTION:

PC/PBT, PC, PC/ABS, TPE, TPV,
laser weldable additives

**VIAL ACCESS WINDOW
REQUIREMENTS:**

Excellent clarity, scratch resistance
and exceptional toughness for
visualization of medicant levels

SOLUTION:

Acrylic, copolyester, PC

**PUMP HOUSING
REQUIREMENTS:**

Impact resistance,
chemical resistance, IP67,
water ingress protection,
hermetically sealable,
laser weldable

SOLUTION:

PC/PBT, PC, PC/ABS, TPE, TPV,
laser weldable additives



RIGID COMPONENTS: DIAGNOSTIC & MONITORING

Copolyester, PBT & PC/PET Blends		
Copolyester	Eastman Tritan™ (Copolyester)	Durability, reliability, and toughness; impact resistance; chemical resistance to disinfectants and hand sanitizers, drug carrier solvents and lipids found in the body, or enteral feeding solutions; color retention for opaque and excellent clarity with no color shift for clear parts; no black specks; free of BPA, BPS, antimony, and halogens; high bond strength to tubing; no annealing required
Polybutylene Terephthalate (PBT)	DuPont™ Crastin® (PBT)	Excellent surface appearance; good printability; low extractables and volatiles; excellent gamma sterilization performance; good chemical resistance; alternative to nylon for low moisture uptake and dimensional stability; low wear/low friction (Crastin® SC164 and SC193)
	DuPont™ Crastin® & Rynite® (FR-PBT)	30% glass reinforced; UL94 V-0; good-excellent mold flow and electrical properties; high strength, stiffness, dimensional stability and heat resistance (Crastin® CE15330 and Rynite® FR530)
Polycarbonate/ Polyester (PC/PET)	Covestro Makroblend® (FR- & Non-FR- PC/PET)	Opaque; high strength; excellent toughness; chemical resistance; skin contact biocompatibility
	Trinseo EMERGE™ (FR- & Non-FR PC/PET)	Chemical resistance to hospital disinfectants; UL94 V-0 and HB options; ISO 10993 tested
PC & PMMA		
Polycarbonate (PC)	Covestro Apec® (HH-PC)	High heat transparent, strong co-polycarbonate; suitable for autoclave sterilization; good hydrolysis resistance and biocompatible
	Covestro Makrolon® (PC)	Transparent and opaque; excellent impact resistance; sterilizable by gamma, EtO, e-beam and steam; biocompatible per ISO 10993-1 and USP Class VI ; low friction options
	Trinseo EMERGE™ & CALIBRE™ (PC)	Ignition resistant; transparent and opaque options; UL94 V-0, V-2, and HB options; glass-filled also available
PolyMethyl Methacrylate (PMMA)	Trinseo Plexiglas® Acrylics (PMMA)	Water-white clarity, transparency, BPA free and ease of processing; excellent resistance to lipids and plasticizers, withstands sterilization to disinfectants such as bleach and alcohols; select grades are formulated for gamma sterilization recovery and chemical resistance; ISO 10993 and USP Class VI tested
PA, Rigid TPU & Rigid PVC		
Polyamide (Nylon, PA)	DuPont™ Zytel® (PA66)	Good toughness, chemical resistance and colorability; excellent stiffness and strength; acceptable EtO,gamma, e-beam and autoclave sterilization (Zytel® SC310 and Zytel® FGFE5171)
	DuPont™ Zytel® (PA612)	Good toughness and colorability; acceptable EtO and autoclave sterilization (limited gamma/e-beam sterilization performance); improved dimensional stability, chemical resistance, and reduced aqueous extractables versus PA66 (Zytel® SC315)

RIGID COMPONENTS: DIAGNOSTIC & MONITORING (cont.)

PA, Rigid TPU & Rigid PVC

Rigid Thermoplastic Polyurethane (TPU)	Covestro Texin® (TPU)	Biocompatible; excellent chemical resistance; bondable to polar substrates like PC; sterilizable by gamma, EtO, e-beam and dry heat; rigid 65 to 80 Shore D grades
Rigid Polyvinyl Chloride (PVC)	GEON® Performance Solutions Resilience™ HC (PVC)	Excellent chemical resistance; maintains physical integrity and color after frequent cleaner and/or disinfectant wipe down; inherently flame retardant to UL94 5VA; high impact toughness; USP Class VI

Styrenics & PC/ABS Blends

Styrenics	Trinseo MAGNUM™ (ABS) & STYRON™ (PS)	Opaque; custom colors; excellent impact and flow; low residuals; ISO 10993 tested
	INEOS Styrolution NAS® (SMMA)	Sparkling clarity; color neutrality; good rigidity; easy processing; no pre-drying needed; excellent alcohol resistance
	INEOS Styrolution Zylar® & Clearblend® (MBS)	Exceptional toughness; excellent clarity; low specific gravity; no pre-drying needed; excellent thermal stability; superior chemical resistance
	INEOS Styrolution Lustran® (SAN)	Rigid; heat resistant; outstanding transparency; good overall chemical resistance; superior processing; good scratch resistance
	INEOS Styrolution Styrolux® (SBC)	Good transparency and excellent toughness; easy and versatile processing; great for adding toughness to styrenic polymer blends
	INEOS Styrolution Terluc® HD (MABS)	Good clarity; good heat and overall chemical resistance; good impact strength; good solvent bonding to PVC; outstanding surface quality
	INEOS Styrolution Lustran® & Novodur® HD (ABS)	Opaque appearance; outstanding chemical resistance; high impact strength; excellent balance of properties; ease of processability; bondable
Polycarbonate/ABS (PC/ABS)	Covestro Bayblend® (PC/ABS)	Excellent mechanical and thermal properties; toughness, rigidity & dimensional stability; opaque; biocompatible per ISO 10993-1 and USP Class VI; flame retardant options available
	Trinseo EMERGE™ (FR- & Non-FR PC/ABS)	Ignition resistant; opaque; high flow; easy processing; UL94 V-0 and HB options; ISO 10993 tested

POM (Acetal), PP & PE

Polyoxymethylene (Acetal, POM)	DuPont™ Delrin® (POM)	Excellent low wear/low friction; excellent surface appearance; good chemical resistance; alternative to nylon for low moisture uptake and dimensional stability; acceptable for EtO and autoclave sterilization (not recommended for gamma/e-beam sterilization)
Polypropylene (PP) & Polyethylene (PE)	INVISTA™ (PP)	Good strength and stiffness; easy processing; sterilizable grades available
	Pinnacle™ (PP)	
	Dow™ HEALTH+ Polymers™ (PE)	
	Lyondellbasell™ (PP) & (PE)	

FLEXIBLE COMPONENTS: DIAGNOSTIC & MONITORING

Applications include:

- O-rings
- Gaskets
- Bumpers
- Soft touch grips/handles
- Keypads/Displays
- Diaphragms
- Seals

Flexible Component Solution Needs:

- Flexible & comfortable against the body
- Water-tight seals
- Durable buttons or user interface
- Chemically resistant materials

TPE, TPC-ET, TPU, TPV & Flexible PVC

Thermoplastic Elastomers (TPE)	Avient Versaflex™ HC Overmolding Series (TPE)	Proven healthcare solutions with hardness ranges 42–65 Shore A; autoclave, radiation and EtO sterilizable; bondable to many substrates; customizable haptics
Thermoplastic Polyester Elastomers (TPC-ET)	DuPont™ Hytrel® (TPC-ET)	BPA-free; excellent flex fatigue and toughness; low temperature flexibility; good chemical resistance; grades ranging from 30–82 Shore D durometer
Thermoplastic Polyurethane (TPU)	Avient NEU™ Specialty Engineered Materials (TPU)	Biocompatible; various durometer ranges; autoclave, radiation and EtO sterilizable
	Covestro Texin® (TPU)	Biocompatible; soft touch; sterilizable; good chemical and abrasion resistance and toughness; excellent bonding to polar substrates like PC; 70 to 95 Shore A grades
Thermoplastic Vulcanizate (TPV)	Avient Versalloy™ (TPV)	Proven healthcare solutions with hardness ranges 45–90 Shore A; autoclave, radiation and EtO sterilizable; natural and colorable; smooth texture; bonds to PP
	Celanese Santoprene™ (TPV)	Durable sealing performance; elastic recovery; excellent chemical resistance; compliance with medical standards
Flexible Polyvinyl Chloride (PVC)	GEON Performance Solutions Geon™ Flexible PVC	Engineered exclusively for the healthcare market; transparent and opaque colors; radiopaque grades available; durometer ranges from 55A to 40D; gamma and EtO sterilizable

Thermoset Elastomers, Thermoset Adhesives & Thermoplastic Adhesives

Thermoset Elastomers	DuPont™ Liveo™ Liquid Silicone Rubber (LSR)	Biocompatible; non-irritating and non-sensitization; sterilizable; made without plasticizers, phthalates or latex; used in Liquid Injection Molding (LIM) process
	DuPont™ Liveo™ High Consistency Rubber (HCR)	Biocompatible; non-irritating and non-sensitization; sterilizable; made without plasticizers, phthalates or latex; used in extrusion or compression molding process
Thermoset Adhesive	DuPont™ Liveo™ Soft Skin Adhesive	Skin friendly; repositionable; solventless two-part system; non-irritation and non-sensitization; used for device attachment to the skin
Thermoplastics Adhesive	DuPont™ Liveo™ Silicone Pressure Sensitive Adhesive (PSA)	Skin friendly; one-part solvent silicone adhesive; high adhesion; used for device attachment to the skin

SBC

Styrene Butadiene Copolymer (SBC)	INEOS Styrolution Styroflex® (SBC)	Rubber-like mechanics; outstanding resilience; toughness and transparency; extremely high elasticity; excellent bonding to other polymers
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FORMERRA

Healthcare Supplier Line Card

You face a unique set of challenges when designing parts for the healthcare industry. In addition to maintaining an effective manufacturing and supply chain operation, you're challenged with designing products that must meet strict regulatory and quality assurance standards. At Formerra, we help you achieve these goals with our comprehensive portfolio of leading suppliers, on-time delivery and a host of services focused on helping you succeed.



FORMERRA HEALTHCARE SOLUTIONS

At Formerra, we're prepared to help you:

- Mitigate risk
- Optimize design
- Accelerate commercialization

Contact us today to learn more about how we can help you overcome your toughest challenges.



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MEDICAL WEARABLES MAKE REMOTE PATIENT CARE POSSIBLE

Your medical wearables and handheld devices need to be durable and properly perform every time. With the right polymers, your devices will not only look great, but they will resist cracking and bring greater comfort to both the patient and the physician.

- Ambulatory Pumps
- Mobile EKG Heart Monitors
- Smart Sensor Patches
- Mobility Analysis Wearables
- Vital Signs Monitors
- Sleep Tracking Wearables
- Blood Pressure Monitors
- Pain Management Wearables
- Wearable Defibrillators
- Glucose Sensors, Monitoring & Insulin Dispensing
- Smart Clothing



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