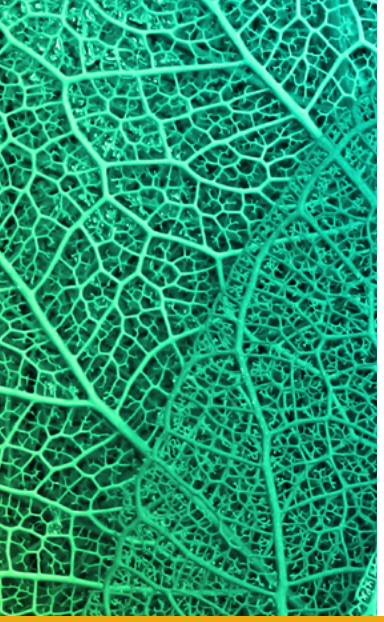
DOW®

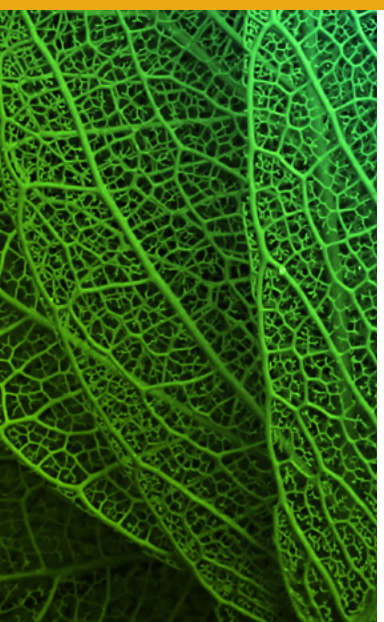
Just what the doctor ordered.

Developing sustainable solutions for medical, pharma and other healthcare applications

JUMP TO A SECTION OR SCROLL



INTRODUCTION



Let's make a change for the better.

Stepping up.

There's an old joke that says, "Change is good. You go first."

A lot of people feel the same way about sustainability. We know it's essential… but nobody thinks it will be easy. Especially in a complex arena like medical, pharmaceutical and healthcare-related products.

At Dow, we believe the best way to balance the needs of society and our planet is to keep moving toward a more sustainable, circular economy.

And the best way for us to help is to combine our knowledge and experience with that of our customers and other experts.

Moving forward.

That's why we're constantly working to improve. Innovating how we source, manufacture and deliver medical grade polymers. Striving to produce thinner, lighter mono-material solutions; designing for recyclability; helping reduce waste and improve recycling systems. And, of course, investing in bio-based feedstocks and exploring other technological breakthroughs.

We're excited by the challenges and opportunities ahead – and hope you'll join us on the journey to develop better, safer, more sustainable solutions.

BLOW-FILL-SEAL CONTAINERS

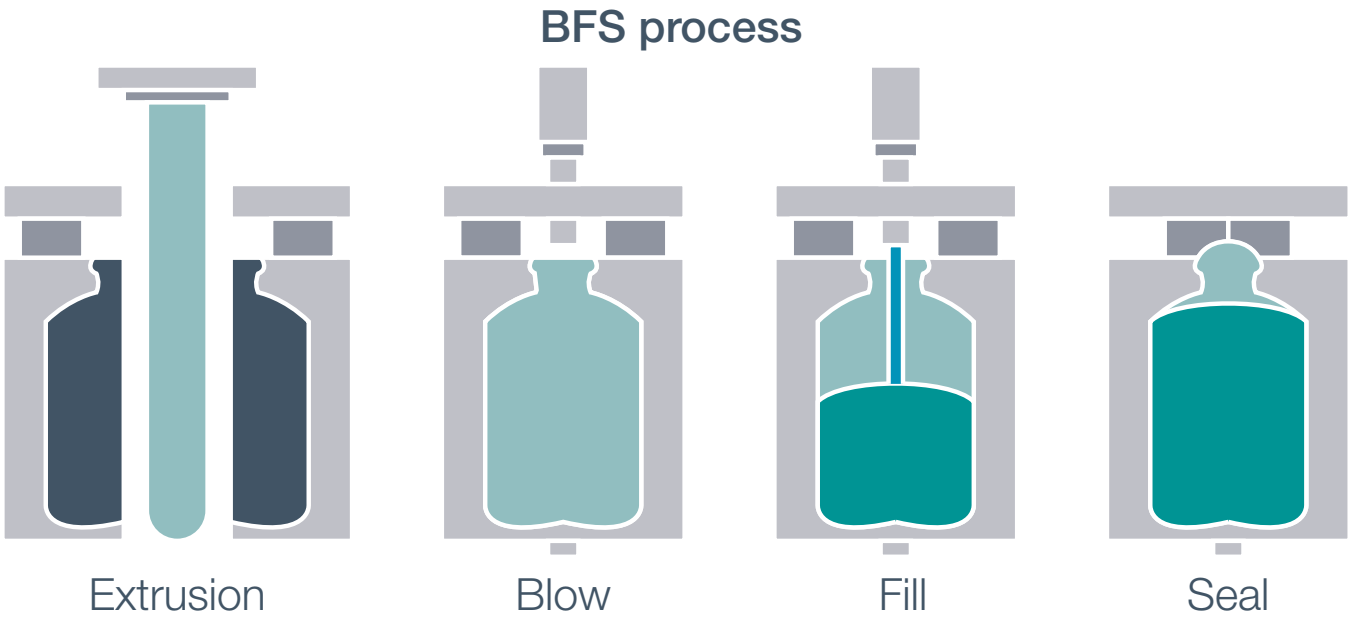
Looking for BFS innovation?
We can fill you in.

The right process.

Use of plastic for ampoules, vials and other medical and pharmaceutical containers continues to rise, with one production method standing above the rest: the highly efficient blow-fill-seal (BFS) process.

The right material.

Low density polyethylene (LDPE) resins offer BFS applications a unique set of attributes that provide significant advantages compared to traditional glass containers. These lightweight, shatterproof materials enable increased design flexibility and dimensional accuracy – as well as flexibility, squeezability and clarity. They also allow aseptic filling of precise, pre-measured doses in a fully automated process.



The real difference maker.

DOW™ HEALTH+™ Polymers for BFS applications raise the bar even further. Outstanding lot-to-lot consistency and quality allow our advanced LDPE materials to offer exceptional performance and processability. Not only that, but each product is certified according to selected regulatory requirements and backed up by our HEALTH+™ service offering (see page 10). Our current lineup features:

- **DOW™ 20 HEALTH+™ Ultra-Pure Polyethylene**, with very low extractable profiles for high-end vials and ampoules

And our two most recent additions, which include two-year security of supply:

- **DOW™ LDPE 91020 HEALTH+™ Resin** for small ampoules
- **DOW™ LDPE 91003 HEALTH+™ Resin** for flexible bottles requiring sterilization up to 108°C

Please see page 12 for more information on these and other products for BFS applications.

We want to help squeeze more out of your BFS applications. By combining our efforts, we can keep driving innovation, performance, efficiency, safety, security – and sustainability. Please visit www.dow.com or contact your Dow representative to get the conversation started.

BIOPROCESSING BAG FILMS

Better performance is in the bag.

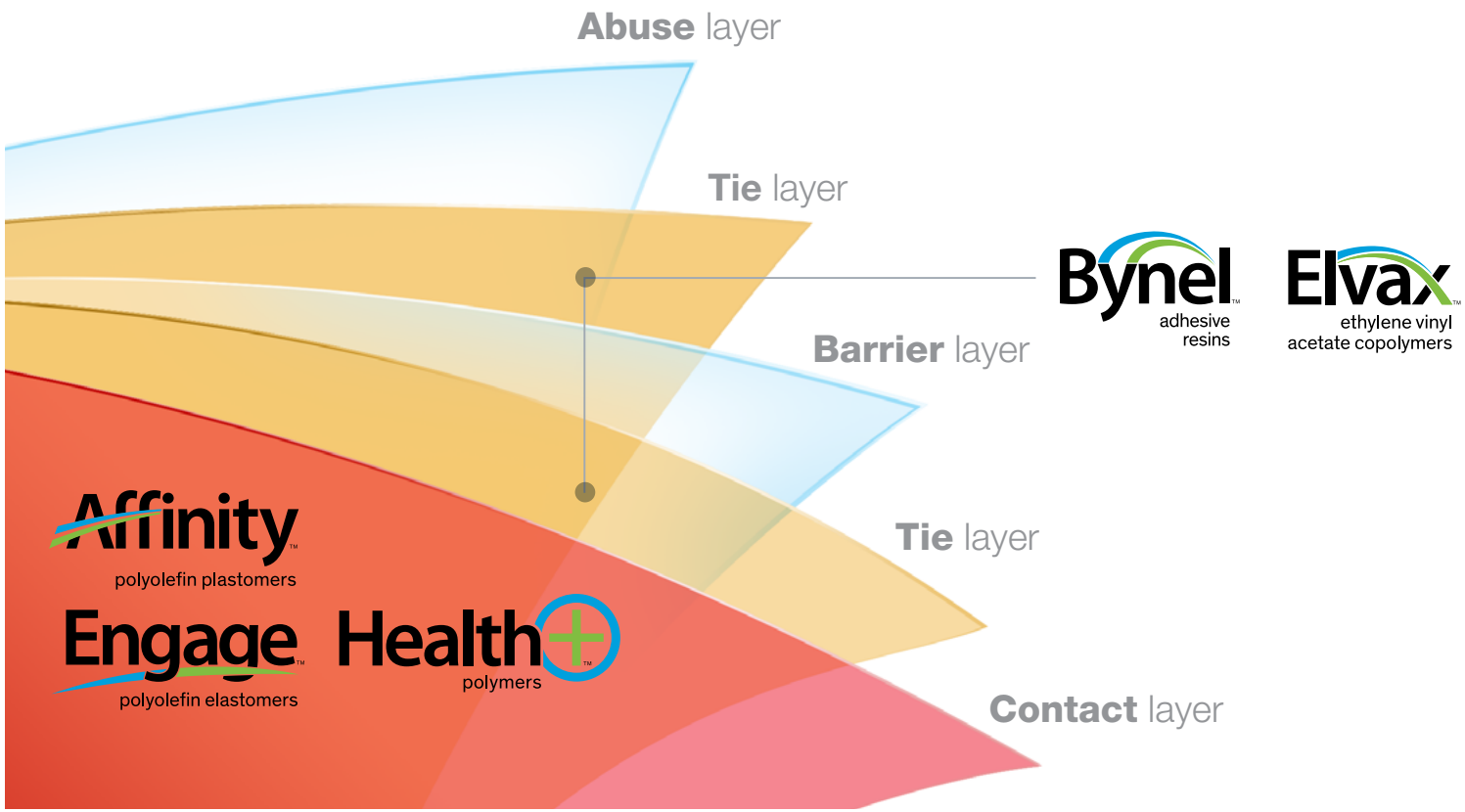
Advanced polymers help improve single-use bioprocessing bag film structures.

Cleanliness. Safety. Reliability. Efficiency. That's what manufacturers expect from single-use systems for biopharmaceutical processing. And it's exactly what we can help deliver. Our rich portfolio of materials for bioprocessing bag film structures includes:

- **Contact layer resins** optimized for cleanliness and excellent sealing properties
  - **ENGAGE™ 8480K HEALTH+™** and **ENGAGE™ 030902 HEALTH+™ Polyolefin Elastomers (POEs)**, which were specifically developed to meet the rigorous demands placed on bioprocessing contact layer film
  - **AFFINITY™ Polyolefin Plastomers (POPs)** for contact layers with exceptional clarity, gloss and abuse resistance, as well as strong sealant performance
- A broad range of **tie layer materials** such as
  - **BYNEL™ Adhesive Resins** for strong, functional bonds with polyethylene and a wide range of other substrates, including nylon and EVOH
  - **ELVAX™ Ethylene Vinyl Acetate (EVA) Copolymers**, which bring together exceptional toughness and clarity with low temperature sealing, flexibility, puncture resistance and more to offer excellent tie layer performance

This unique offering features **DOW™ HEALTH+™ Polymers** (see page 10) for critical layers of the structure, gamma irradiation stability and globally available products to simplify regional development. In addition, our exclusive application development network – **Pack Studios** – can help bring innovative products to market faster. A full product listing is available on pages 12 and 13.

polymers for
bioprocessing film by DOW



We'd love to learn more about your bioprocessing film challenges. Please visit www.dow.com/bioprocessing or contact your Dow representative to get the conversation started.

ADDING EVEN GREATER VALUE

How can we be a **better partner?**

A broad range of options.

In addition to BFS containers and bioprocessing bag films, we offer outstanding materials for an incredible range of applications, including medical fluid bags and tubing, pharmaceutical and nutraceutical bottles, caps, closures and much more. Please see pages 12 and 13 for more information.

Excellent performance. Added assurance.

DOW™ HEALTH+™ Polymers are proven polyethylene (PE) resins designed specifically to meet the stringent requirements placed on healthcare-related applications.

These exciting solutions are manufactured to rigorous specifications for lot-to-lot consistency and quality, meaning you get the same materials from initial application development through testing and final commercialization. Equally important, each DOW™ HEALTH+™ Polymer product is certified in accordance with requirements for selected healthcare applications – and they're backed by our HEALTH+™ service offering, which includes but is not limited to:

Health+™ polymers by DOW®

- Secure, global product supply
- 1-year notification of change (NOC) + 1-year right to buy
- Drug master file (DMF) listings
- USP Class VI and/or EU Pharmacopeia
- USP <661.1>

In addition to offering exceptional performance and processability while helping navigate the regulatory compliance process, use of DOW™ HEALTH+™ Polymers can also promote sustainability. Helping to reduce raw material usage, simplify recycling processes and lower greenhouse gas (GHG) emissions/global warming potential (GWP) are just a few of the many opportunities.

Collaborate. Innovate. Accelerate.

Our deep understanding of material science, versatile product portfolio, strong focus on innovation and fundamental belief in collaboration allow us to offer unique resources to help develop the best possible answers for specific application needs.

One example? **Pack Studios** – our exclusive, global network of technical experts, equipment and testing capabilities – which was specifically created to help bring innovative solutions to market faster.

pack STUDIOS

By teaming up, we can produce better, more sustainable medical, pharmaceutical and healthcare-related products. Please contact your Dow representative or visit www.dow.com/contact to get the conversation started.

A robust product offering

Our diverse portfolio of medical grade polymers features proven materials for ampoules, vials, multi-layer films, semi-flexible ports, tubing, rigid/flexible bottles and more. If you don't see what you're looking for here, please feel free to ask. We're always interested in collaborative innovation.

Table 1: DOW™ HEALTH+™ Polymers

Medical Grade Product	Fabrication Method(s)[1]	Typical Application(s)	Shore A Hardness[2]	Density (g/cc)[2]	Melt Index – 190°C/2.16 kg (g/10 min)[2]	Melt Temp. – DSC (°C)[2]	2% Secant Modulus (psi)[2]	Tensile Strength @ Yield (psi)[2]	Biocompatibility Test(s)
The following products use the NOC Policy for DOW™ HEALTH+™ Polymers and require **1-year** notification of change.									
CONTINUUM™ DMDD-6620 HEALTH+™ Bimodal High Density Polyethylene Resin	BM, CBF, BF	Rigid Bottles, Film	–	0.958	0.28	133	170,000	3,600	USP Class VI USP <661.1>
CONTINUUM™ DMDE-6620 HEALTH+™ Bimodal High Density Polyethylene Resin	BM, CBF, BF	Rigid Bottles, Film	–	0.958	0.28	133	170,000	3,600	USP Class VI USP <661.1>
CONTINUUM™ DMDF-6620 HEALTH+™ Bimodal High Density Polyethylene Resin	BM, CBF, BF	Rigid Bottles, Film	–	0.958	0.28	133	170,000	3,600	USP Class VI[3] USP <661.1>[3]
DOW™ 20 HEALTH+™ Ultra-Pure Polyethylene	BM, BF, CF, BFS, IM	Ampoules/Vials, Molded Parts, Film	–	0.920	1.9	108	–	–	USP <661.1>
DOW™ 20A HEALTH+™ Ultra-Pure Polyethylene	BM, BF, CF, BFS, IM	Ampoules/Vials, Molded Parts, Film	–	0.920	1.9	108	–	–	USP <661.1>
DOW™ 20-6064 HEALTH+™ Ultra-Pure Polyethylene	IBM	Flexible Bottles	–	0.920	1.9	109	–	–	USP <661.1>
DOW™ 20-6064A HEALTH+™ Ultra-Pure Polyethylene	IBM	Flexible Bottles	–	0.920	1.9	109	–	–	USP <661.1>
DOW™ 20-6064B HEALTH+™ Ultra-Pure Polyethylene	IBM	Flexible Bottles	–	0.920	1.9	109	–	–	USP <661.1>
DOW™ 20-6064C HEALTH+™ Ultra-Pure Polyethylene	IBM	Flexible Bottles	–	0.920	1.9	109	–	–	USP <661.1>
DOW™ DMDA-8007 HEALTH+™ High Density Polyethylene Resin[IV]	IM, CM	Caps & Closures, Molded Parts	–	0.965	8.3	133	205,000	4,500	USP Class VI USP <661.1>
DOW™ DMDA-8904 HEALTH+™ High Density Polyethylene Resin[IV]	IM, CM	Caps & Closures, Molded Parts	–	0.953	4.4	131	160,000	3,900	USP Class VI USP <661.1>
DOW™ DMDA-8907 HEALTH+™ High Density Polyethylene Resin[IV]	IM, CM	Caps & Closures, Molded Parts	–	0.952	6.8	131	155,000	3,900	USP Class VI USP <661.1>
DOW™ DMDA-8920 HEALTH+™ High Density Polyethylene Resin[IV]	IM	Caps & Closures, Molded Parts	–	0.954	20	130	167,000	4,100	USP Class VI USP <661.1>
DOW™ DMDA-8940 HEALTH+™ High Density Polyethylene Resin[IV]	IM	Caps & Closures, Molded Parts	–	0.951	44	128	148,000	3,900	USP Class VI USP <661.1>
DOW™ LDPE 91003 HEALTH+™ Low Density Polyethylene Resin[IV]	BFS	Ampoules/Vials, Flexible Bottles	–	0.927	0.2	114	–	–	USP Class VI USP <661.1>
DOW™ LDPE 91020 HEALTH+™ Low Density Polyethylene Resin[IV]	BF, CF, BFS, IM	Ampoules/Vials, Molded Parts, Film	–	0.923	2.0	–	–	–	USP Class VI USP <661.1>
DOW™ LDPE 690 HEALTH+™ Low Density Polyethylene Resin[IV]	BF, CF, BFS, IM	Ampoules/Vials, Molded Parts, Film	–	0.920	2.0	112	26,200 (MD) 30,000 (TD)	1,790 (MD – 2 mil) 1,760 (TD)	USP Class VI USP <661.1>
DOW™ LDPE 692 HEALTH+™ Low Density Polyethylene Resin[IV]	BF, CF, BFS, IM	Ampoules/Vials, Molded Parts, Film	–	0.922	0.75	112	–	1,830 (MD – 2 mil) 1,660 (TD)	USP Class VI USP <661.1>
ENGAGE™ 8480K HEALTH+™ Polyolefin Elastomer	BF, CF, IM	Film, Molded Parts	–	0.902	1.0	99	11,800	–	USP Class VI[3] USP <661.1>[3]

[1] Legend: PE = profile extrusion, BF = blown film, CF = cast film, EC = extrusion coating, IM = injection molding, BM = blow molding, CBF = compression blow forming, BFS = blow-fill-seal, IBM = injection blow molding, CM = compression molding
[2] These are typical properties, not to be construed as specifications.
[IV] Approved for use in intravenous applications (e.g., prefilled syringes, IV bags and tubing [excluding blood bags and tubing])
[3] TERC assessed for compliance via cross-read from a similar tested product
[4] If products are described as "experimental" or "developmental": (1) product specifications may not be fully determined; (2) analysis of hazards and caution in handling and use are required; (3) there is greater potential for Dow to change specifications and/or discontinue production; and (4) although Dow may from time to time provide samples of such products, Dow is not obligated to supply or otherwise commercialize such products for any use or application whatsoever.

Table 2: Standard Medical Grade Polymers

Medical Grade Product	Fabrication Method(s)[1]	Typical Application(s)	Shore A Hardness[2]	Density (g/cc)[2]	Melt Index – 190°C/2.16 kg (g/10 min)[2]	Melt Temp. – DSC (°C)[2]	2% Secant Modulus (psi)[2]	Tensile Strength @ Yield (psi)[2]	Biocompatibility Test(s)
The following products use the NOC Policy for Dow-determined Medical Resins, and require **6-month** notification of change.									
AFFINITY™ PL 1850G Polyolefin Plastomer	PE, BF, CF	Tubing, Film	–	0.902	3.0	98	15,700 (MD) 16,600 (TD)	1,440 (MD – 0.8 mil) 790 (TD)	USP Class VI ISO 10993-4 – Hemolysis ISO 10993-5 – Cytotoxicity
AFFINITY™ EG 8100G Polyolefin Plastomer[IV]	BF, CF	Film	–	0.870	1.0	55	–	–	USP Class VI
AFFINITY™ PL 1880G Polyolefin Plastomer[IV]	BF, CF	Film	–	0.902	1.0	99	13,300 (MD) 13,400 (TD)	1,050 (MD – 2 mil) 1,000 (TD)	ISO 10993-10 – Irritation/ Sensitization
AFFINITY™ PL 1880GB Polyolefin Plastomer[IV]	BF, CF	Film	–	0.902	1.0	99	13,300 (MD) 13,400 (TD)	1,050 (MD – 2 mil) 1,000 (TD)	ISO 10993-10 – Irritation/ Sensitization
ATTANE™ 4203 Ultra Low Density Ethylene/Octene Copolymer	BF, CF	Film	–	0.905	0.8	123	13,000 (MD) 13,600 (TD)	900 (MD – 1 mil) 850 (TD)	USP Class VI
DOWLEX™ 2035 Polyethylene Resin[IV]	CF, EC	Film	–	0.919	6.0	124	–	1,610 (MD – 1 mil) 1,510 (TD)	USP Class VI
DOWLEX™ 2517 Polyethylene Resin	IM	Molded Parts	–	0.917	25.0	124	34,000	1,400	USP Class VI
ELVAX™ 3182-2 Ethylene Vinyl Acetate Copolymer	BF, CF	Film	–	0.950	3.0	72	–	–	–
ENGAGE™ 8003 Polyolefin Elastomer[IV]	BF, CF	Film	84	0.885	1.0	77	4,730	–	USP Class VI USP <661.1>
ENGAGE™ 8100 Polyolefin Elastomer[IV]	BF, CF	Film	73	0.870	1.0	60	1,900	–	USP Class VI
ENGAGE™ 8150 Polyolefin Elastomer	BF, CF	Film	70	0.868	0.5	55	2,090	–	USP Class VI[3]
ENGAGE™ 8400 Polyolefin Elastomer	IM	Molded Parts	72	0.870	30.0	60	1,750	–	USP Class VI[3]
ENGAGE™ 8401 Polyolefin Elastomer	IM	Molded Parts	84	0.885	30.0	80	4,440	–	USP Class VI
ENGAGE™ 8402 Polyolefin Elastomer[IV]	IM, PE	Molded Parts, Tubing	88	0.902	30.0	96	10,400	–	USP Class VI
ENGAGE™ 8407 Polyolefin Elastomer	IM	Molded Parts	72	0.870	30.0	60	1,750	–	USP Class VI
ENGAGE™ 8411 Polyolefin Elastomer	IM	Molded Parts	81	0.880	18.0	76	2,970	–	USP Class VI
ENGAGE™ 8440G Polyolefin Elastomer (USP and ISO tested)	BF, CF, IM, PE	Film, Molded Parts, Tubing	86	0.897	1.6	93	7,880	–	USP Class VI ISO 10993-5 – Cytotoxicity ISO 10993-10 – Irritation/ Sensitization
ENGAGE™ 8450 Polyolefin Elastomer	BF, CF, IM, PE	Film, Molded Parts, Tubing	90	0.902	3.0	97	11,000	–	USP<661> ISO 10993-5 – Cytotoxicity
ENGAGE™ 8540 Polyolefin Elastomer	BF, CF, IM	Film, Molded Parts	90	0.909	1.0	104	15,600	–	USP Class VI[3]
D5535.00 Developmental Olefin Block Copolymer[IV, 4]	BF, CF	Film, Compatibilizer	–	0.879	6.5	137	–	–	USP Class VI
INFUSE™ 9000 Olefin Block Copolymer	BF, CF	Film	–	0.877	0.5	120	–	–	USP Class I
INFUSE™ 9107 Olefin Block Copolymer	BF, CF	Film	–	0.866	1.0	121	–	–	USP Class VI
DOW™ HDPE 08454N High Density Polyethylene Resin	EC, IM	Film, Molded Parts	–	0.954	7.0	124	97,000	3,000	USP Class VI
DOW™ HDPE 12450N High Density Polyethylene Resin	IM	Molded Parts	–	0.950	12.0	129	117,000	3,400	USP Class VI
DOW™ HDPE 25455N High Density Polyethylene Resin	IM	Molded Parts, Testing & Diagnostics	–	0.955	25.0	129	136,000	3,700	USP Class VI
DOW™ LDPE 955I Low Density Polyethylene Resin[IV]	IM	Molded Parts	–	0.923	35.0	112	43,000	1,400	USP Class VI
UNIVAL™ DMDA-6230 NT 7 High Density Polyethylene Resin	BM, BF	Molded Parts, Film	–	0.949	0.25	130	130,000	3,400	USP Class VI
UNIVAL™ DMDD-6230 NT 7 High Density Polyethylene Resin	BM, BF	Molded Parts, Film	–	0.949	0.25	130	130,000	3,400	USP Class VI ISO 10993-5 – Cytotoxicity

We'd love to help solve your application challenges. Please contact your Dow representative or visit www.dow.com/contact to get the conversation started.

For more information about Dow, visit **www.dow.com/about.** To contact a Dow representative, visit **www.dow.com/contact**.

Form No. 768-935-01-1023 SMG
SMG 15301