



**CREAMID™ & DURAMID™**  
*Semi-aromatic Polyamides*

# Teknor Apex Company Profile

---



**Established in 1924;**  
headquartered in Pawtucket, RI



Privately held, **family-owned** company



Over **2,000** employees



**6 business units:** Vinyl, TPE, ETP,  
Colorants, Garden Hose & Chemicals



**13 Manufacturing facilities worldwide;**  
USA, Singapore, China, Belgium, Germany



**Net-debt free**

# Core Values

---

## **Integrity:**

We hold ourselves to high ethical standards and promote personal ownership and product stewardship across our businesses. We choose to do the right thing for our employees, customers, and partners.

## **Partnership:**

We form long-term, rewarding relationships with our employees, customers, and suppliers. We believe a strong partnership allows all parties to achieve success through collaboration and open communication.

## **Innovation:**

We foster an atmosphere that encourages creative thinking for our teams to solve challenges. We collaborate to find new approaches to our processes and products so that we may deliver solutions that make a difference. We accept failure as a learning step along the path to mutual success.

## **Respect:**

We embrace and value diversity of thought and experiences others bring forth. We demonstrate genuine appreciation for each other's contributions and treat one another with dignity and fairness.

## **Sustainability:**

We achieve sustainable growth and success through a foundation of a dedicated long-term workforce. We are committed to investing in the development of leaders and strong teams at all levels. We uphold high standards of corporate social responsibility in each of the communities where we operate.

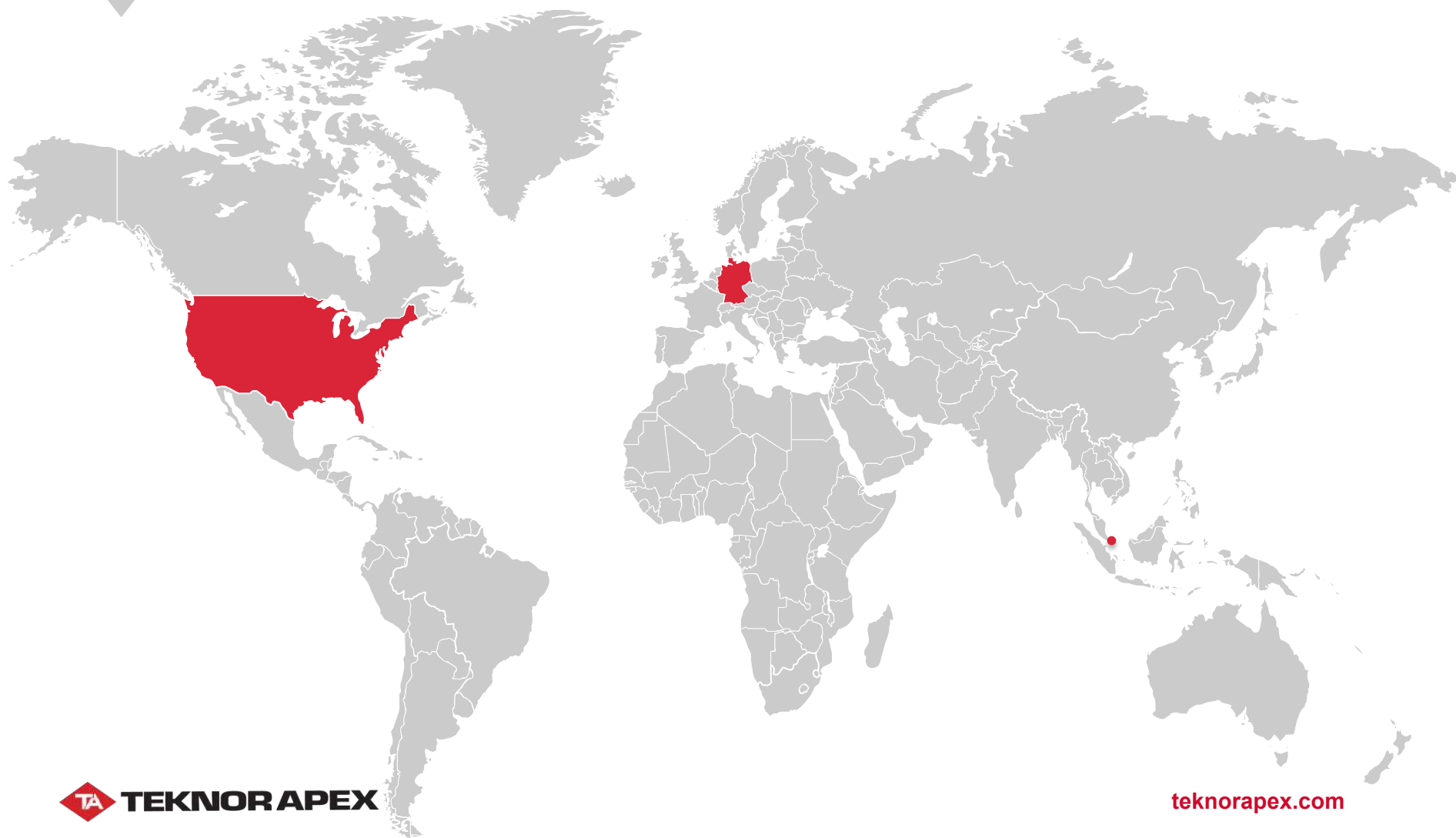
## **Accountability:**

We work diligently to fulfill our commitments and take responsibility for the quality and timeliness of our work. Our dedication to teamwork motivates us to ensure our processes, practices and policies of the company are followed in our pursuit of excellence.

## **Safety:**

We share a commitment to a safe work environment for our employees and have a strict adherence to all safety standards. We are a strong steward of the environment and manage our business to ensure the welfare of the communities in which we operate.

# Teknor Apex produces Engineering Thermoplastic (ETP) compounds in the United States, Germany & Singapore



# Creamid: High performance structural metal replacement polyamide now produced in the U.S.

---

## **CREAMID™-S**

- Semi-aromatic highly-filled polyamides
  - **Main characteristics:**
    - E-Modulus up to 22,000 MPa possible (e. g. as metal replacement)
    - aesthetic surface (no glass fiber streaks)
    - high stiffness also in conditioned state
    - very good flowability
    - low warpage
-

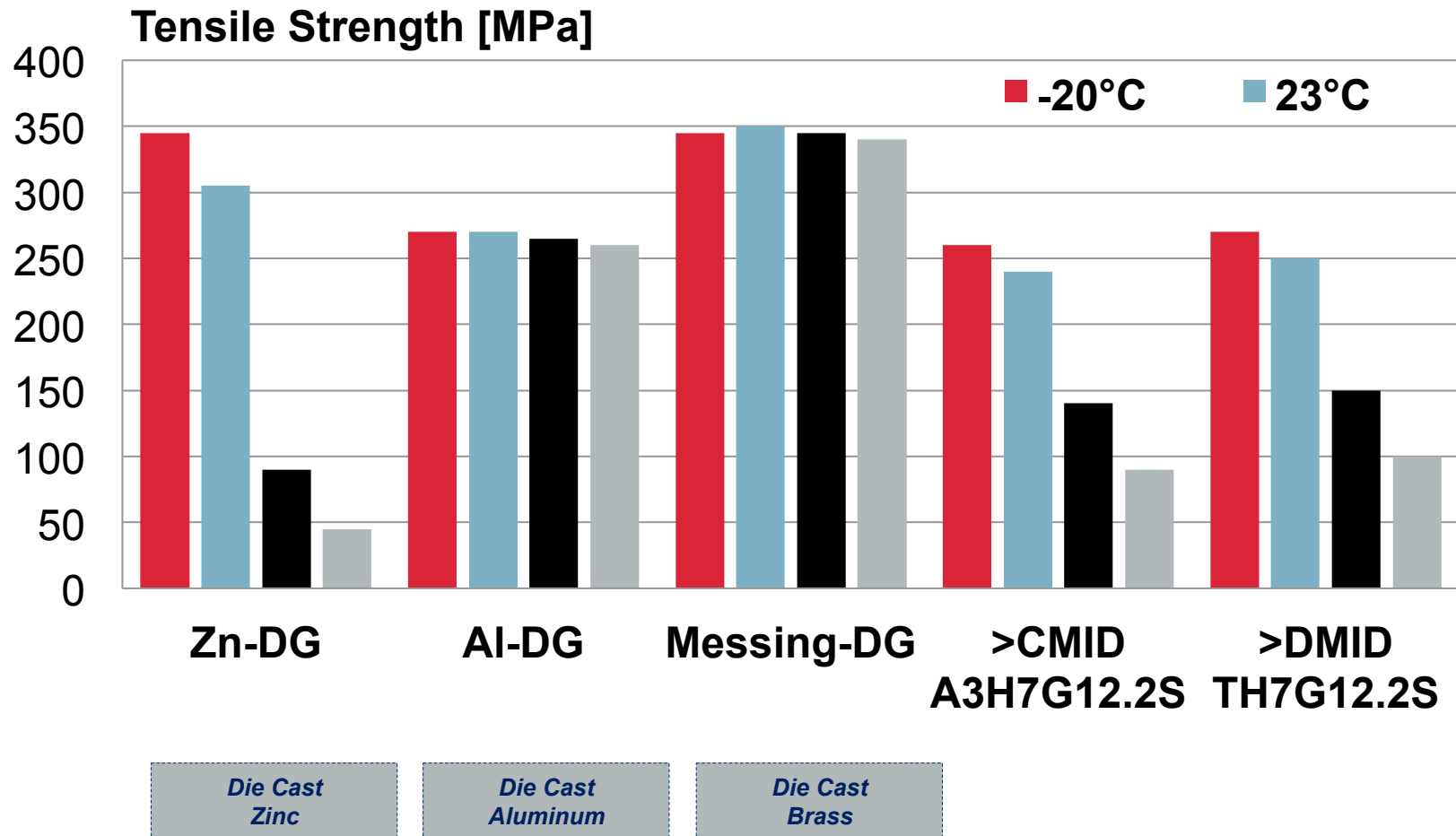
# Duramid: Ultra-high performance metal replacement polyamide for special use-cases, now produced in the U.S.

---

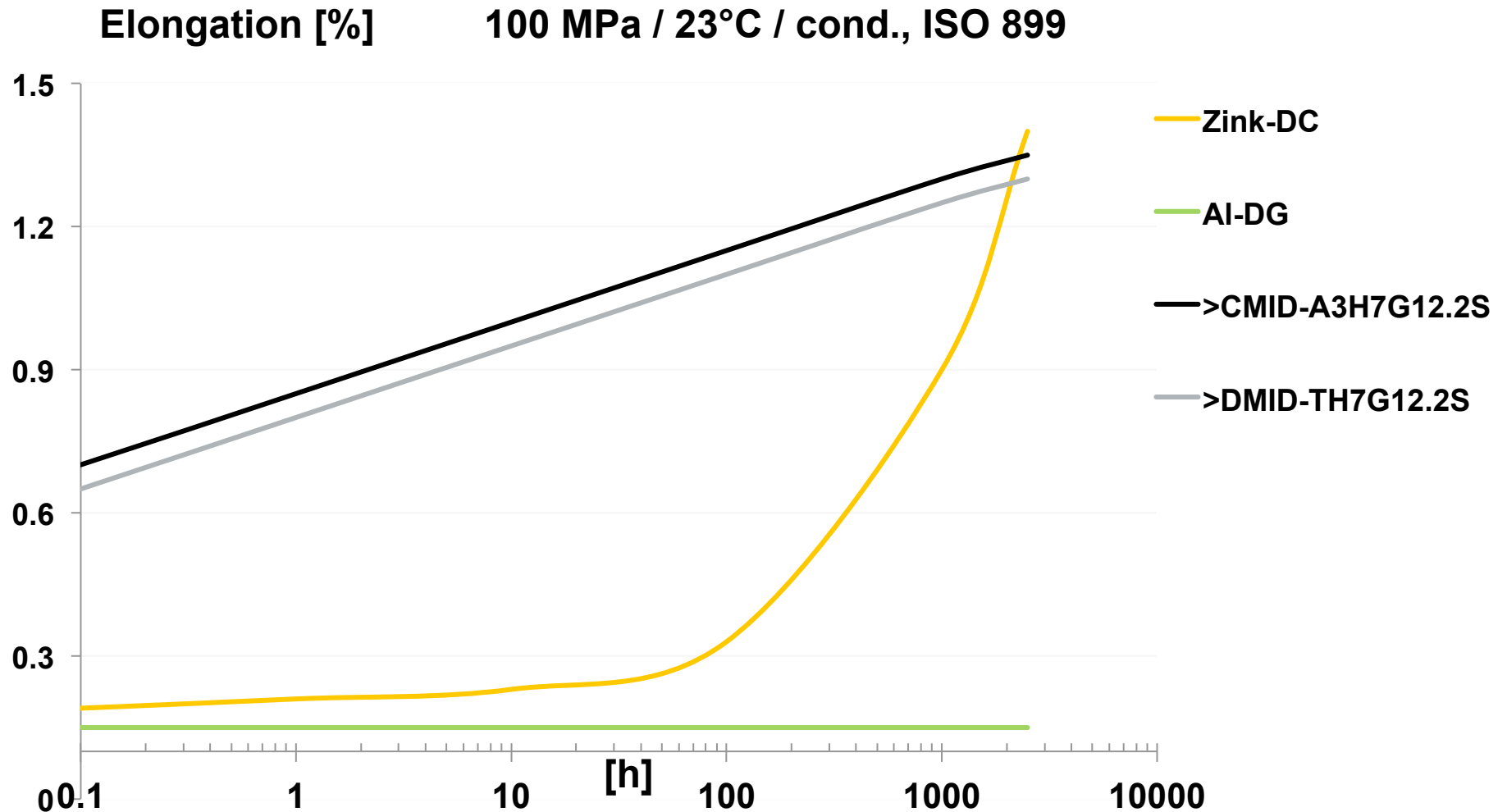
## **DURAMID™**

- Semi-aromatic modified, highly filled unique polyamides for special high requirements
  - **Main characteristics:**
    - E-Modulus up to 25,000 MPa possible (e. g. as metal replacement)
    - aesthetic surface (no glass fiber streaks)
    - high stiffness also in conditioned state
    - excellent flowability
    - extremely low warpage
    - extreme notched impact strength
    - high strength cross fibre
-

# Creamid & Duramid offer comparable strength to metal at a lower density and cost



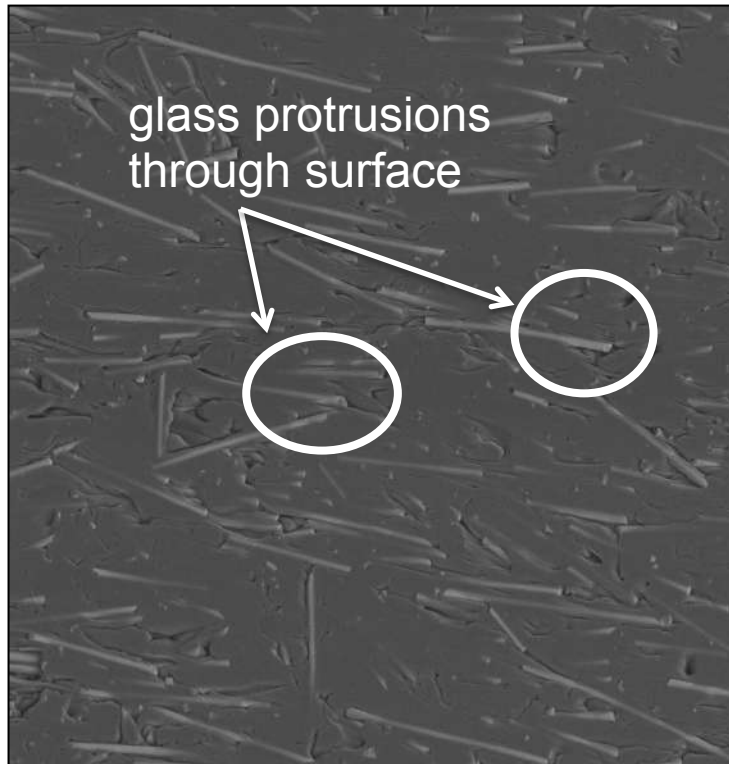
# Creamid & Duramid creeping behavior for parts under load



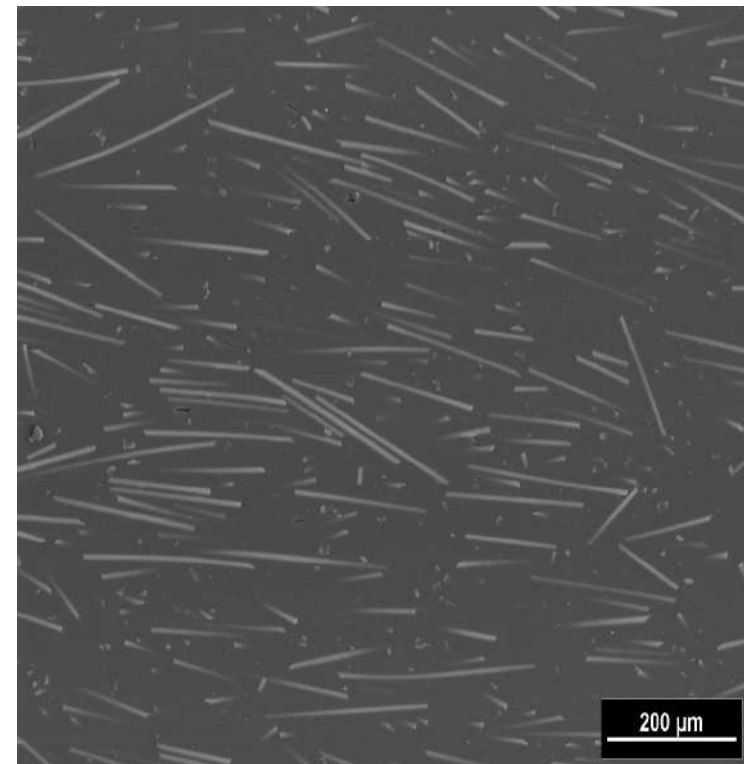


# Creamid offers aesthetical surface at high glass loading levels

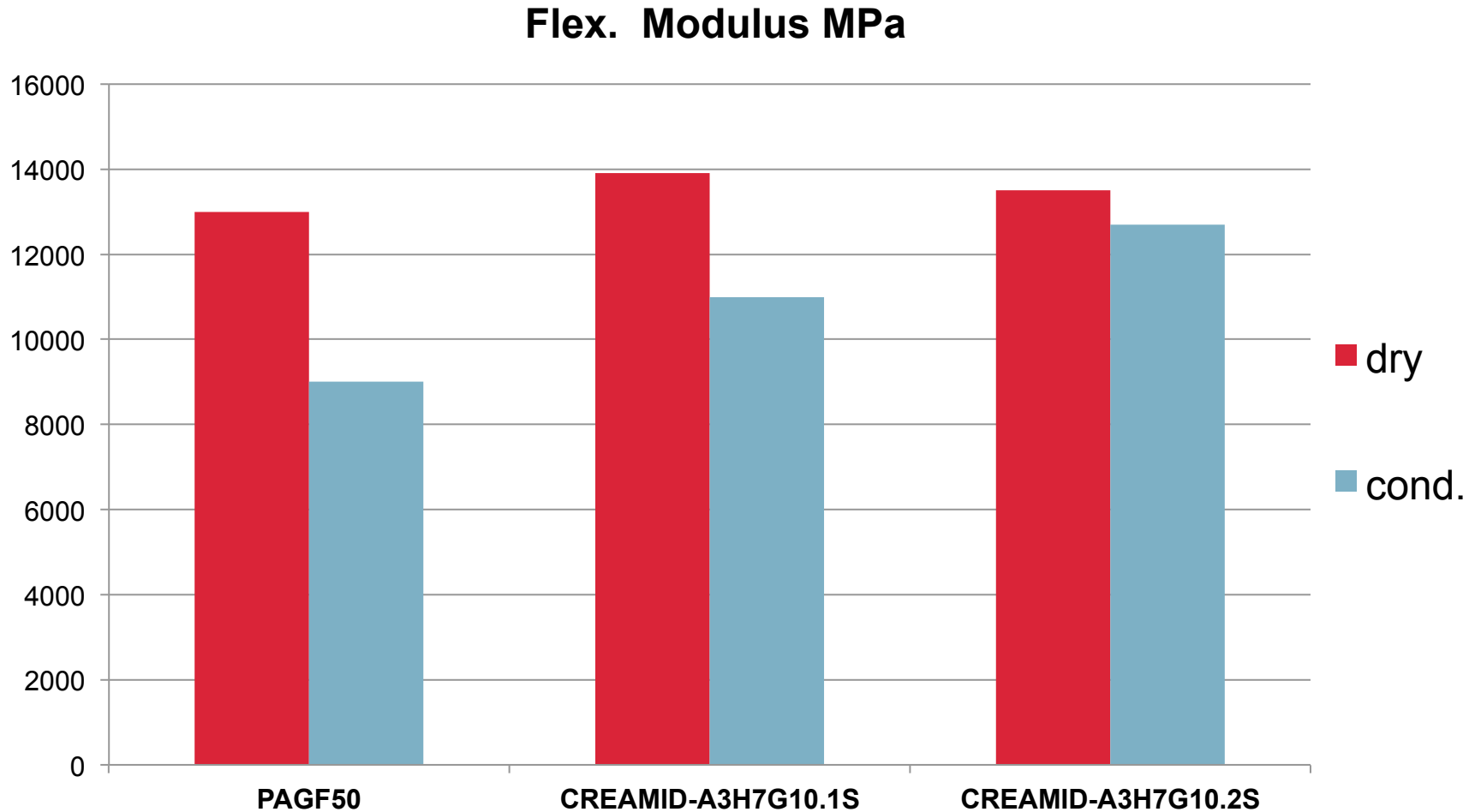
PA66 50% Glass Filled  
Standard Surface Topography



PTS-CREAMID- A3H7G10.1S  
Aesthetical Surface Topography

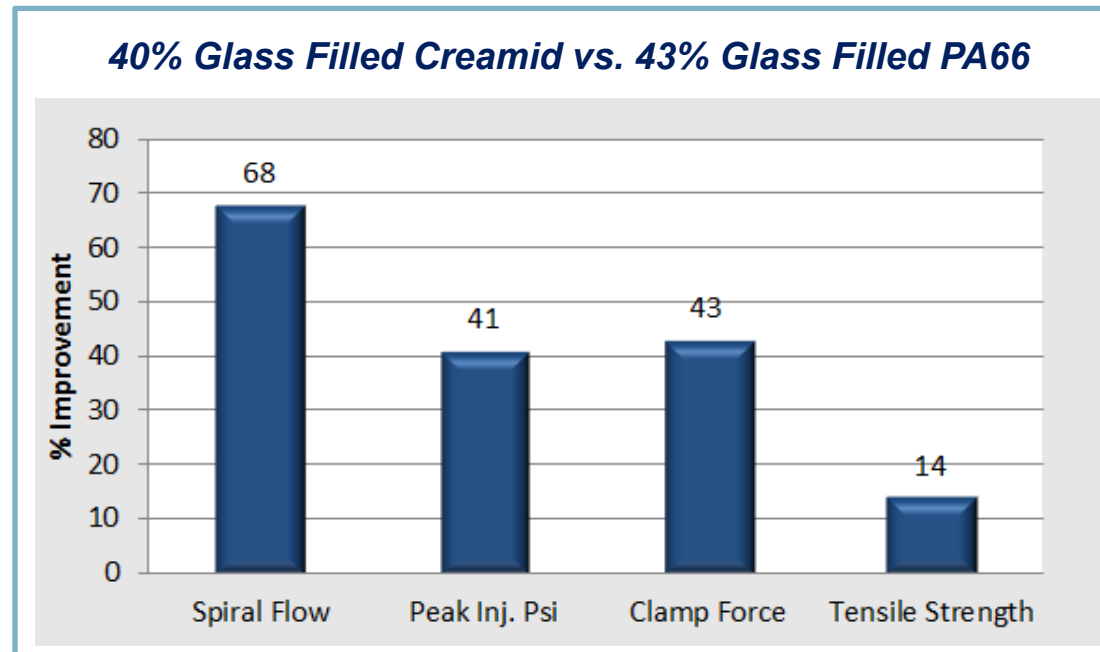


# Creamid “.2S” series reduces variation in physical properties during conditioning



## Creamid offers a significant improvement vs. standard PA66 glass filled materials at similar glass filler levels

*Creamid semi-aromatic nylons provide higher tensile, greater flow length, lower injection pressure, and improved aesthetics vs. aliphatic nylon compounds.*



# Better flow creates value at the press, in the part and during tool design

---

## ***Injection Molding***

- Lower peak injection pressure & clamp force
- Increase process window
- Shorter cycle times
- Ability to run mold in a smaller press to reduce operating cost
- Easier to fill out thin sections of the part

## ***Finished Parts***

- Enhances surface aesthetics, better distinctiveness of image
- Reduce warp (If warp is caused by pressure and not caused by fiber orientation or cooling)

## ***Tool Design***

- Allows the toolmaker to increase the number of cavities
- Greater flow lengths can reduce number of gates required per part and eliminating the possibility of additional knit lines

# CREAMID & DURAMID

## *Property Tables*

TYPICAL PROPERTIES	UNIT	TEST STANDARD	STANDARD GRADES							FOOD CONTACT & DRINKING WATER	
			PTS-CREAMID A3H7G4.2S*9217	PTS-CREAMID A3H7G6.2S*9217	PTS-CREAMID B3H2G6*9000	PTS-CREAMID A3H7G8.2S*9217	PTS-CREAMID A3H7G10.2S*9217	PTS-CREAMID B3H7G10*9000	PTS-CREAMID A3H7G12.2S*9217	PTS-CREAMID A3H2G8.2S*9001	PTS-CREAMID A3H2G10.2S*9001
ISO 1043			PA66+PA6I/6T-GF20	PA66+PA6I/6T-GF30	PA6-GF30	PA66+PA6I/6T-GF40	PA66+PA6I/6T-GF50	PA6-GF50	PA66+PA6I/6T-GF60	PA66+PA6I/6T-GF40	PA66+PA6I/6T-GF50
Density	g/cm <sup>3</sup>	ISO 1183	1.29	1.38	1.36	1.48	1.58	1.59	1.73	1.47	1.57
Water Absorption	%	ISO 62	0.8	0.7	1	0.6	0.4	0.5	0.3	0.5	0.4
24h Saturation			5	4.8	5.6	3.7	3	4.1	2.3	4.2	3
<b>MECHANICAL PROPERTIES</b>			<i>(dry / cond)</i>	<i>(dry / cond)</i>	<i>(dry/cond)</i>	<i>(dry / cond)</i>	<i>(dry / cond)</i>	<i>(dry/cond)</i>	<i>(dry / cond)</i>	<i>(dry / cond)</i>	<i>(dry / cond)</i>
Tensile modulus	MPa	ISO 527-1/-2	7000 / 6600	10000 / 9500	9500 / 5300	13200 / 13000	17500 / 17000	16600 / 12600	21000 / 20000	13000 / 11000	17500 / 17000
Stress at break	MPa	ISO 527-1/-2	135 / 125	180 / 165	160 / 100	220 / 210	245 / 240	225 / 170	260 / 235	230 / 185	245 / 240
Strain at break	%	ISO 527-1/-2	3 / 3	2.8 / 2.9	3 / 7	3 / 3	3 / 3	3.4 / 3.9	3 / 3	4 / 3.6	3 / 3
Charpy impact strength, +23° C	kJ/m <sup>2</sup>	ISO 179-1eU	35 / 35	45 / 45	70 / 90	60 / 70	75 / 75	75 / 75	70 / 70	70 / 75	75 / 75
Charpy notched impact strength, +23° C	kJ/m <sup>2</sup>	ISO 179-1eA	5 / 5	8 / 10	13 /	12 / 12	15 / 16	12 / 13	13 / 13	12 / 12	15 / 16
Izod impact notched, +23° C	kJ/m <sup>2</sup>	ISO 180/A	5 / 5	8 / 10	11 / 20	12 / 12	14 / 15	12 / 14	13 / 13	12 / 12	14 / 15
Flexural modulus, +23° C	MPa	ISO 178	5500 / 5300	8200 / 8000	8500 / 5000	10500 / 10000	13500 / 12500	13700 / 10700	17000 / 16000	11200 / 9000	13500 / 12500
Flexural strength	MPa	ISO 178	175 / 155	240 / 200	215 / 115	280 / 275	340 / 330		350 / 345	300 / 220	340 / 330
<b>THERMAL PROPERTIES</b>											
Melting temperature, DSC: 10 K/min	°C	ISO 113571/-3	265	265	222	265	265	222	265	265	265
Viscat softening temperature (VST) 50 K/h, 10N 50 K/h, 50 N	°C	ISO 306	250	250	220	250	250	223	250	250	250
	°C		235	235	215	240	240	218	245	235	240
Temp. of deflection under load (HDT) 0,45 N/mm <sup>2</sup> 1,8 N/mm <sup>2</sup>	°C	ISO 75-2	250	255	220	255	255	220	255	250	255
	°C		ISO 75-1	230	235	210	235	235	215	205	235

TYPICAL PROPERTIES	UNIT	TEST STANDARD	FLAME RETARDANT				SPECIALTY			
			PTS-CREAMID A3H2G5FRSE*800	PTS-CREAMID A3H2G6FRSE*800	PTS-CREAMID B3H2GY6FR*800	PTS-CREAMID A3H2G8.2FRS*9200	PTS-CREAMID B3H2G3ZB*800	PTS-CREAMID AH2GX6E*9200	PTS-CREAMID A3H2G6.1L02*9000	PTS-DURAMID B3H2G6Z2*800
ISO 1043			PA66+PA6I/6T-GF25 FR	PA66+PA6I/6T-GF30 FR	PA-GF30 FR	PA66+PA6I/6T-GF40 FR	PA6-HI-GF15	PA66-GF30	PA66+PA6-GF30 Z2	PA6-HI-GF30
Density	g/cm <sup>3</sup>	ISO 1183	1.4	1.42	1.39	1.54	1.22	1.35	1.38	1.32
Water Absorption 24h Saturation	% %	ISO 62	0.6 3.8	0.8 3.3	2 5	0.4 3	6.5	0.6 5	1 5	0.9 5.5
<b>MECHANICAL PROPERTIES</b>			<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry / cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>
Tensile modulus	MPa	ISO 527-1/-2	9300 / 7900	10700 / 9000	7000 / 4500	13800 /	6200 /	9400 /	10500 / 6000	8700 / 5200
Stress at break	MPa	ISO 527-1/-2	140 / 110	145 / 125	110 / 65	160 /	110 /	140 /	170 / 115	
Strain at break	%	ISO 527-1/-2	3.7 / 3.7	3 / 3	5 / 50	2.5 /	3.2 /	2.2 /	2.5 / 7.5	6 / 9
Charpy impact strength, +23°C	kJ/m <sup>2</sup>	ISO 179-1eU	50 / 50	45 / 45	50 / 40	40 /	60 /	40 /	60 / 80	100 / 120
Charpy notched impact strength, +23°C	kJ/m <sup>2</sup>	ISO 179-1eA	9 / 10	9 / 9	7 / 7	10 /	12 /	10 /	8 / 11	23 / 30
Izod impact notched, +23 °C	kJ/m <sup>2</sup>	ISO 180/A	8 / 9	8 / 8	7 /	10 /	12 /	9 /	8 / 12	24 /
Flexural modulus, +23 °C	MPa	ISO 178	8000 / 6300	9600 / 7500	5600 /	10400 /	4600 /	8200 /	7200 / 5300	
Flexural strength	MPa	ISO 178	180 / 140	180 / 150	135 /	220 /	140 /	200 /	220 / 135	
<b>THERMAL PROPERTIES</b>										
Melting temperature, DSC: 10 K/min	°C	ISO 113571/-3	265	265	222	265	222	258	258	222
Viscat softening temperature (VST) 50 K/h, 10N 50 K/h, 50 N	°C °C	ISO 306	250 240	250 235		245 225	215 190	252 245		220 200
Temp. of deflection under load (HDT) 0,45 N/mm <sup>2</sup> 1,8 N/mm <sup>2</sup>	°C °C	ISO 75-2 ISO 75-1	245 235	250 235	213 188	255 235	200 160	260 250		210 200

TYPICAL PROPERTIES	UNIT	TEST STANDARD	SPECIALTY				
			PTS-CREAMID B3H7G7Z2*9000	PTS-CREAMON A3HZM8*9200	PTS-CREAMID B3H2G10*9000	PTS-DURAMID TH7G10.2S*9207	PTS-DURAMID TH7G12.2S*9207
ISO 1043			PA6-HI-GF35	PA66+PA6I/6T-MD40	PA6-GF50	PA66+PA6I/6T-GF50	PA66+PA6I/6T-GF60
Density	g/cm <sup>3</sup>	ISO 1183	1.38	1.49	1.59	1.58	1.72
Water Absorption		ISO 62					
24h	%		0.5	0.5	0.5	0.4	0.3
Saturation	%		5.1	4.2	4.1	3.5	2
<b>MECHANICAL PROPERTIES</b>			<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>	<i>(dry/cond)</i>
Tensile modulus	MPa	ISO 527-1/-2	10100 /	10000 / 5100	16600 / 12600	18000 / 17500	25000 / 22000
Stress at break	MPa	ISO 527-1/-2	160 /	100 /	225 / 170	255 / 240	260 / 240
Strain at break	%	ISO 527-1/-2	4.9 /	2.3 /	3.4 / 3.9	3 / 3	2.5 / 3
Charpy impact strength, +23° C	kJ/m <sup>2</sup>	ISO 179-1eU	100 /	35 /	75 / 75	75 / 75	65 / 70
Charpy notched impact strength, +23° C	kJ/m <sup>2</sup>	ISO 179-1eA	20 /	5 /	12 / 13	19 / 20	20 / 20
Izod impact notched, +23° C	kJ/m <sup>2</sup>	ISO 180/A	20 /	4 /	12 / 14	18 / 19	20 / 20
Flexural modulus, +23° C	MPa	ISO 178	8000 /	8000 /	13700 / 10700	14000 / 13000	18500 / 16500
Flexural strength	MPa	ISO 178	200 /	150 /		340 / 330	350 / 310
<b>THERMAL PROPERTIES</b>							
Melting temperature, DSC: 10 K/min	° C	ISO 113571/-3	222	258	222	270	265
Viscat softening temperature (VST)		ISO 306					
50 K/h, 10N	° C		220		223		250
50 K/h, 50 N	° C		210		218		250
Temp. of deflection under load (HDT)							
0,45 N/mm <sup>2</sup>	° C	ISO 75-2	220		220	256	255
1,8 N/mm <sup>2</sup>	° C	ISO 75-1	200		215	247	245