



## Foster Heat & Light Stabilized (HLS™) Thermoplastic Polyurethane Polymers

Thermoplastic polyurethane (TPU) polymers are susceptible to change when exposed to environmental stress agents such as oxygen, moisture, heat and light. Foster Corporation has developed a targeted stabilizer system (HLS™) which can help to maintain the integrity of the base resin and extend polymer shelf life, by minimizing unanticipated changes in chemistry, molecular weight and color over time. Foster HLS™ formulations are intended for use in medical applications and have passed USP Class VI testing for biocompatibility.

### Test Method & Results

In a study conducted by Foster, the effect of heat and light was evaluated on Pellethane® medical grade polyurethane polymers. The heat study was conducted using ASTM F1980, the standard guide for aging sterile medical devices. In this evaluation, the samples were exposed in an environmental chamber for 6 weeks, 12 weeks and 18 weeks at 55°C to simulate a 1 year, 2 year and 3 year shelf life at 25°C. Light aging samples were fully enclosed in a standard light booth for 6 months, with physical property evaluations conducted at 6 weeks, 12 weeks and 18 weeks. The results of the study concluded that the greatest change experienced by TPU polymers under simulated aging was in regards to color (yellowness index). Polymers exposed to prolong light without the presence of a stabilizer system, experienced 4X more yellowing than the samples containing HLS™.

### Simulated Heat Aging – Foster HLS™ Pellethane® Resins

Resin	Tensile Strength (psi)			Tensile Elongation (%)		
	Initial	3 Years	Retention (%)	Initial	3 Years	Retention (%)
Foster HLS™ Pellethane® 80A	6,535	6,885	105	900	880	98
Foster HLS™ Pellethane® 55D	6,890	6,740	98	345	270	78
Foster HLS™ Pellethane® 72D	8,840	7,200	81	200	120	59

### Light Aging - Foster HLS™ Pellethane® Resins

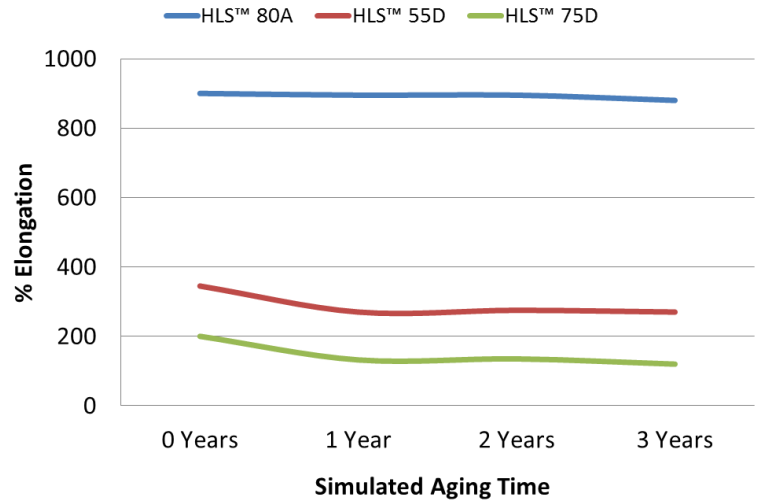
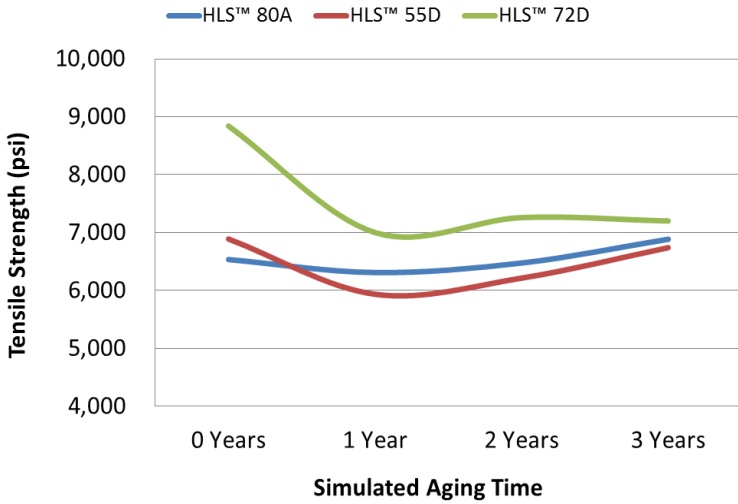
Resin	Tensile Strength (psi)			Tensile Elongation (%)		
	Initial	18 Weeks	Retention (%)	Initial	18 Weeks	Retention (%)
Foster HLS™ Pellethane® 80A	6,535	6,670	102	900	900	100
Foster HLS™ Pellethane® 55D	6,890	6,940	101	345	310	90
Foster HLS™ Pellethane® 72D	8,840	7,100	80	200	120	60

### Yellowness after Light Aging - Pellethane® Grades

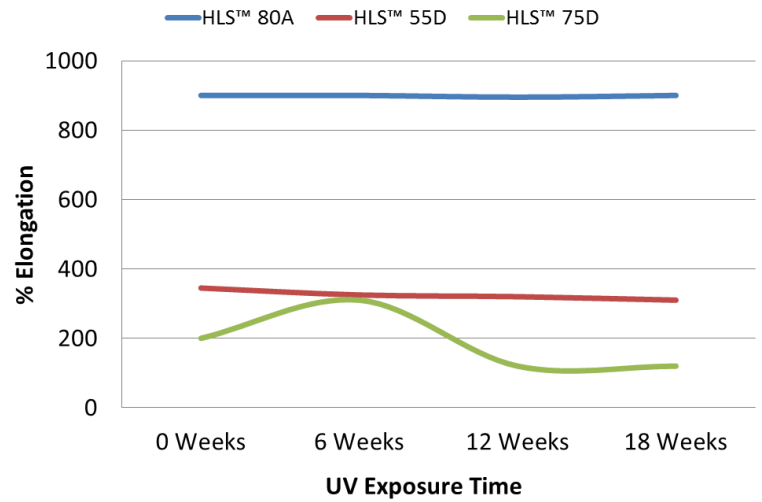
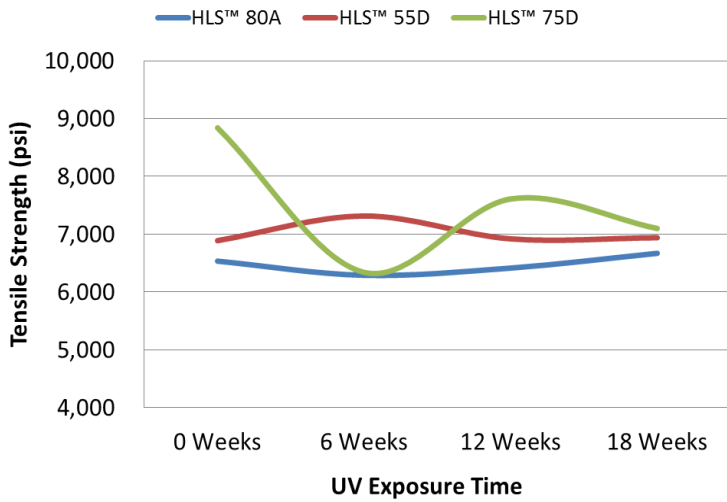
Resin	Yellowness Index				
	Initial	6 Weeks	12 Weeks	18 Weeks	Change over time (%)
Pellethane® 80A Control	5	10	14	18	260%
<b>Foster HLS™ Pellethane® 80A</b>	<b>9</b>	<b>11</b>	<b>13</b>	<b>14</b>	<b>56%</b>
Pellethane® 55D Control	8	15	20	24	200%
<b>Foster HLS™ Pellethane® 55D</b>	<b>12</b>	<b>14</b>	<b>17</b>	<b>18</b>	<b>50%</b>
Pellethane® 72D Control	5	12	17	22	340%
<b>Foster HLS™ Pellethane® 72D</b>	<b>9</b>	<b>15</b>	<b>16</b>	<b>18</b>	<b>111%</b>

\*Pellethane is a registered trademark of Lubrizol Corporation

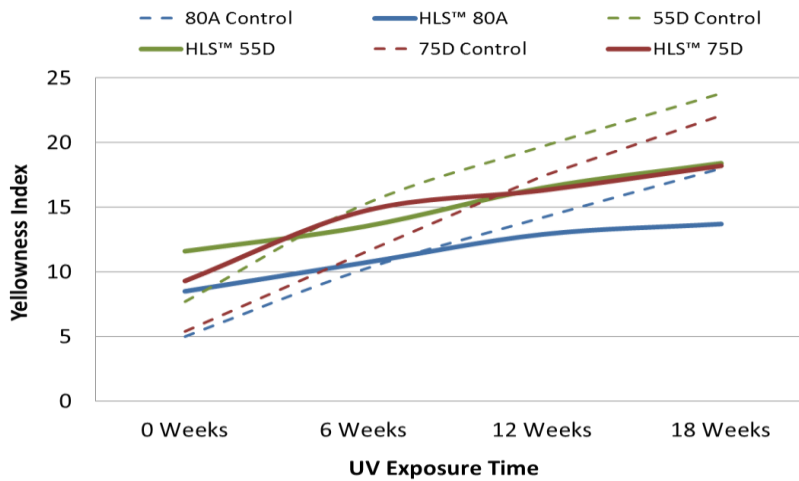
## Simulated Heat Aging - Pellethane® Thermoplastic Polyurethane



## Light Aging - Pellethane® Thermoplastic Polyurethane



## Yellowness Index after Light Aging - Pellethane® Thermoplastic Polyurethane



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