Product News

Xtract™ Contamination Removal

Xtract™ 3-D BullsEye® Sight Glass – new & improved

The Data behind the Improvements, Including Switch from Acrylic to Polyamide

Introduction

The 3-D BullsEye has become an indispensable tool that permits both color and clarity of oil to be checked on small wet sump applications such as pumps and gearboxes, while allowing an unobstructed 360° view of the oil level from any angle. Compared to conventional flush-faced sight glasses, the 3-D BullsEye is easier to inspect and less prone to discoloration.

Improvements

Lubrication Engineers – in conjunction with our partners – is constantly looking at ways to improve our reliability products so they last longer and provide even greater benefit to our customers. With that mindset, we have included in our line of Xtract™ sight glasses a new redesigned 3-D BullsEye that improves durability and usability in the field.

The biggest change to the 3-D BullsEye design is the material from which these products are manufactured. Originally made from poly (methyl methacrylate) – better known as "acrylic" – the upgraded BullsEye is made from UV-resistant polyamide material. This new material offers some very distinct performance improvements over acrylic, without compromising the structural integrity and performance of the sight glass.

Comparison

Durability

One of the deciding factors in making this material change was the enhanced performance of the new polyamide material compared to the conventional acrylic product.

Figure 1 shows that the average impact resistance of the polyamide 3-D BullsEye is more than three times higher than the acrylic version.

In addition to being more impact resistant, the new polyamide 3-D BullsEye meets – and in many cases exceeds – the relevant performance specifications of the acrylic version. Table 1 shows a comparison of relative strength test data for both the polyamide and acrylic versions.

Figure 1. Comparison of Average Impact Resistance of 3-D BullsEye

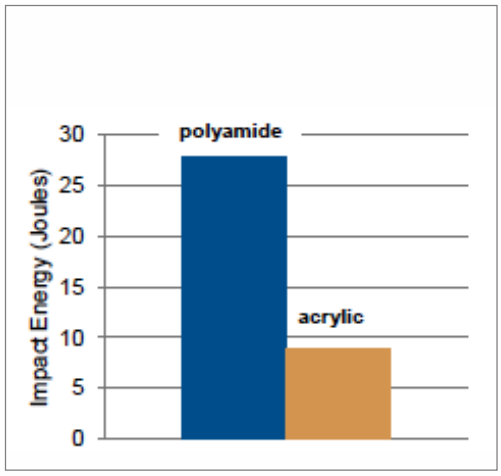

Table 1. Comparison of Relative Strength

	Acrylic	Polyamide
Average impact resistance **(joules)***	8.9	27.8
Weighted vertical force **275 lb (125 kg)**	Pass	Pass
Fatigue strength **DIN53442, 23°C (MPa)**	15	32.5
Cracking resistance **(flexural stress resistance in hexane) (MPa)**	24	48
Operating temperature range	-40°-200°F -40°-93°C	-40°-200°F -40°-93°C

***Note: Actual impact resistance varies by product number.**

Chemical Compatibility

The 3-D BullsEye sight glass can be used for a variety of mineral and synthetic oils. By switching from acrylic to polyamide, the 3-D BullsEye is chemically compatible with an even wider range of fluids, as shown in Table 2.

Table 2. Comparison of Chemical Compatibility

	Acrylic	**Polyamide**
Mineral oils	Pass	Pass
Poly alphaolefin (PAO)	Pass	Pass
Poly alylene glycol (PAG)	Pass	Pass

Other Improvements
In addition to providing improved strength, durability and chemical compatibility, the change from acrylic to polyamide has permitted a change in the way the 3-D BullsEye is manufactured from machined to injection molded.

Thanks to the new manufacturing process, new design features have been added. These include ribs evenly distributed around the circumference of the body as shown in Figure 2, which can be used to better grip the 3-D BullsEye during installation and can be aligned with the oil level for more accurate level checks.

In addition, the 3-D BullsEye is 10-50 percent thinner (depending on product number), but with increased strength as outlined on the previous page. Thinner walls make observing the oil level much easier, removing errors due to light distortion and parallax.

The UV stabilization of the polyamide also makes it less likely to discolor or become opaque through prolonged exposure to sunlight.

Figure 2. *Ribs are evenly distributed around the body in the updated 3-D BullsEye.*

Applications

With its excellent durability, ease of installation, compatibility with a broad range of fluids and the ability to see the oil level from every angle, the 3-D BullsEye is an excellent addition to any wet-sump application including small pumps, gearboxes and blowers where maintaining the correct oil level is a critical aspect of lubrication and overall equipment reliability.

In some small pumps, a change in oil level of as little as ± ¼" can make the difference between proper lubrication and lube starvation. The 3-D BullsEye makes it much easier to check oil level.

Acrylic vs. Polyamide 3-D BullsEye

Feature	Acrylic	Polyamide	Significance
Impact resistance	Good	Excellent	The ability not to break when struck by a foreign object is an important characteristic in applications where there is a possibility of impact. The new polyamide 3-D BullEye has, on average, three times the impact resistance of the acrylic version.
Fatigue strength	Good	Excellent	Some materials can become weak with prolonged use, resulting in breakage or the formation of stress cracks. The fatigue strength of the polyamide 3-D BullsEye is twice that of the acrylic version.
Susceptibility to stress cracking	Fair	Excellent	If the inside of the 3-D BullsEye becomes fractured due to stress cracks, it can be difficult to see the correct level. Polyamide has a higher resistance to fatigue stress than acrylic, making it much less likely to form internal cracks.
Vertical weighted force	Excellent	Excellent	Both acrylic and polyamide models meet and exceed the 275 lb test limit for an applied force when mounted in the vertical orientation.
UV resistance	Good	Excellent	When equipment is operating outside, the effects of UV light can cause haziness or changes in transparency to occur. In enhanced UV testing, polyamide was able to exceed the 20,000 hour accelerated test protocol.
Chemical compatibility	Fair	Excellent	Polyamide is better able to withstand mineral oils and most types of synthetic oils.
Wall thickness	0.135”-0.25”	0.125”	Having thinner walls without compromising overall strength means less distortion of light and an increased ability to see the correct oil level.
Transparency	Excellent	Excellent	Polyamide is slightly more transparent than acrylic and is less likely to fog, haze or stain during long term use.
Temperature rating	-40°-200° F -40°-93° C	-40°-200° F -40°-93° C	Both acrylic and polyamide materials function well at most normal operating temperature ranges.
Scratch resistance	Excellent	Excellent	Both acrylic and polyamide are durable materials that have excellent scratch resistance.
Ease of installation	Fair	Good	With a new design that includes ribs to provide addition grip during installation, the new 3-D BullsEye is even easier to install.
Ease of visual level check	Very Good	Excellent	The 3-D design of the BullsEye makes checking level easy. By aligning the ribs on the new design with the correct oil level, level checks are even more accurate.
Size availability	Excellent	Excellent	3-D BullsEyes are available in a range of sizes and threads including NPT, BSPP and Metric

For additional information on the 3-D BullsEye or our other sight glass products, contact LE at 800-537-7683 or info@le-inc.com.

LEX-3DBESGDS_122 1-16, rev. 2-16