BUCHER
emhart glass

Technical News Bulletin

Owensville, 2 April 2015

Emhart Glass Refractory Orifice Rings

Refractory orifice rings are an integral part of many glass making operations, in particular, the container glass and tableware industries. These orifice rings are the last material the glass comes in contact with prior to entering the mold, and as such, are critical for maintaining consistent gob weights and glass quality. The orifice ring must be dimensionally stable to provide holes of proper size with tight tolerances. The orifice ring must not interact with the glass and create defects in the final product. The orifice ring must be able to withstand the thermal stresses associated with installation into a hot feeder. These relatively small parts can have a dramatic impact on the glass products they help to produce.

Emhart Glass has traditionally manufactured refractory orifice rings using two different methods, slip-casting and uniaxial pressing. In order to compliment these two processing methods, equivalent materials were designed with similar compositions and performance. When a long service life is needed, AZS (alumina-zirconia-silica) orifice rings are supplied in either material 315, when made by slip-casting, or 314, when made by uniaxial pressing. When job changes are frequent and a long service life is not required, high alumina orifice rings are supplied in either material 345, when made by slip-casting, or 311, with made by uniaxial pressing. Orifice rings have also been available for special applications using some of the other various slip-cast materials.

Market trends in recent years have made it necessary for some plants to turn away from long run, pat shops and move to job change shops, where a single shop may utilize 35 to 45 orifice rings a year. In order to address the needs of the ever-changing global market, Emhart Glass is shifting the production of refractory orifice rings to provide greater emphasis on the uniaxially pressed orifice rings. This method provides shorter lead times with greater production yields, making 311 and 314 the primary orifice ring materials for Emhart Glass. Orifice rings will continue to be available in some slip cast materials for specialty applications.

Emhart Glass offers an ultra premium orifice ring material 301 containing 35% zirconium oxide with short lead times.

515 Metering Orifice Rings of the new style (left) and old style (right).

With the aim of further improving our manufacturing efficiencies and reducing reject rates, Emhart Glass has reduced the large base around the metering orifice ring. The large base would often get hung up in the mold and crack. It was found that the base did not serve any practical use, and by reducing the base, it allows customers to be supplied with a better product with reduced weight. The functionality of the orifice ring remains unchanged, the hole sizes and locations remain the same. The sealing bead around the orifice ring is unchanged. Insulating the ring inside of the pan is easier without the large base to work around, leading to improved insulation around the orifice ring. The weight of the orifice ring has been reduced to aid installation. While the metering ring has a different appearance, these changes have improved the overall design by removing wasted material that served no function.

Emhart Glass endures to improve its products and processes in response to the changing needs of the global glass community.

Specifications

	311	314	301
ZrO_2	--	20	35
Al_2O_3	91	69	45
SiO_2	9	11	19
Density (g/cc)	2.6	3.0	3.0
Porosity (%)	23	24	22
MOR (MPa)	16.5	15.9	20.0
Type	Pressed	Pressed	Cast

References

Mix301 – Material Data Sheet for Mix 301
Mix311 – Material Data Sheet for Mix 311
Mix314 – Material Data Sheet for Mix 314