Harmonize™ Technical Bulletin

Kerr RESTORATIVES

DESCRIPTION

Harmonize is a highly-loaded, primarily nano-scale restorative dental composite. It features low shrinkage, strength and durability for posterior restorations and outstanding color match, polishability, gloss retention and blending ("chameleon effect") for anterior restorations.

The filler proportions and morphology contribute to ideal handling characteristics, also aided by a rheological modifier that provides an enhanced thixotropic effect when sculpting. Harmonize is a classic Vita-matched system in both enamel and dentin shades, along with the inclusion of special bleach, translucent and transparent options.

Kerr developed Harmonize to remove the complexity of achieving visually seamless transitions between tooth and restorative materials while also providing mechanical properties that ensure excellent restoration service life.

FILLER SYSTEM (INORGANIC)

The primary filler in Harmonize is composed of spherical silica and zirconia particles formed from a molecular suspension. This manufacturing method permits precise control over the size and shape of the system components.

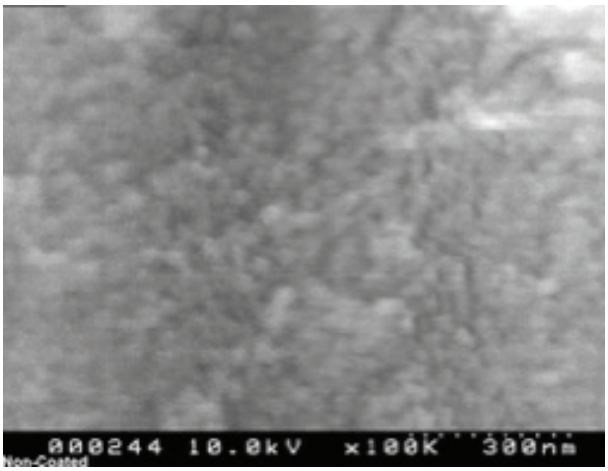

Figure 1: SEM Filler Image

In addition to this nanoscale filler, Harmonize also contains an amount of 400 nanometer barium glass particles. This gives Harmonize an effective particle range of 5 – 400 nanometers. This combination helps provide strength, polishability, radiopacity, wear resistance and ideal viscosity and handling.

ART FILLER

Harmonize features Adaptive Response Technology (ART) – elements of the filler system which actually have two components. First, the zirconia and silica nano-particles are in an arrangement that imparts special optical properties.

More specifically, it permits light diffusion characteristics that are similar to human enamel. Enamel tends to reflect or transmit more diffuse light at shorter wavelengths (ie – blue) and more collimated or specular reflection/transmission at longer wavelengths (ie – red). The zirconia/silica nano-particles work together to mimic this characteristic, which provides better restoration blending, commonly known as the "chameleon effect". In this sense, Harmonize adapts to the light wavelength to improve the esthetic outcome – a feature completely unique to this material.

The second component of the ART filler system is a rheological modifier, which acts as a stabilizing network if left undisturbed. Under this condition, the apparent viscosity of the material is higher, which prevents material creep, commonly known as "slump".

If any energy source is applied to the composite material, such as that from a sculpting instrument, the attractive forces that create the stabilizing network are temporarily broken, and the apparent viscosity is reduced. This makes the material softer and easier to carve, yet it remains non-sticky due to the high proportion of filler to resin. In this sense, the filler system is adaptive to the action of the operator, helping to eliminate some of the typical challenges associated with defining and maintaining proper restoration anatomy.

FILLER SYSTEM SUMMARY

Fill ratio by weight	**81%**
Fill ratio by volume	**64.5%**
Smallest primary particle size	**~5 nanometers**
Largest primary particle size	**400 nanometers**
Average particle size	**~50 nanometers**

RESIN (ORGANIC)

Harmonize contains the following resin components

BisGMA – Provides strength

BisEMA – Controls volumetric shrinkage

TEGDMA – Provides viscosity control

CLASSIC VITA SHADES

Harmonize is available in classic Vita shades in both enamel and dentin opacities. Additionally, 2 bleach shades, 4 translucent shades and 1 transparent shade are available.

Enamel	**A1**	**A2**	**A3**	**A3.5**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D2**	**D3**	**D4**
Dentin	**A1**	**A2**	**A3**	**A3.5**	**A4**			**B3**					**C4**			

See reverse side for additional shades and measurements

HARMONIZE PHYSICAL CHARACTERISTICS

Volumetric Shrinkage (%)	1.91
Flexural Strength (MPa)	142
Fracture Toughness (MPa $*m^{1/2}$)	1.41
Compressive Strength (MPa)	366
Flexural Modulus (GPa)	13.1
Diametral Tensile Strength (MPa)	56
Depth of cure (mm) A2 Enamel	2.0
Depth of cure (mm) A2 Dentin	1.5
Polishability (gloss units)	78.5
Gloss Retention (gloss units)	74.0
Radiopacity (%Al)	250

L*a*b* VALUES AND TRANSLUCENCY (1MM DISCS)

Shade	L*	a*	b*	Opacity (%)
A1E	81.48	-1.58	17.78	62.34
A2E	79.00	1.24	21.15	62.67
A3E	76.97	2.56	24.59	62.83
A3.5E	74.79	2.91	24.07	62.92
A4E	69.06	4.46	27.65	64.73
B1E	81.58	-1.94	17.46	62.01
B2E	78.14	-0.03	21.12	61.90
B3E	74.36	2.30	26.40	61.09
B4E	73.72	2.50	27.03	62.81
C1E	76.07	-0.85	19.04	62.90
C2E	74.05	0.67	18.61	64.84
C3E	71.26	2.15	23.70	62.97
C4E	65.90	4.53	24.02	66.25
D2E	80.54	-1.30	17.28	63.03
D3E	75.45	1.02	21.16	62.80
D4E	74.12	0.42	24.60	65.15
A1D	81.07	-0.70	17.62	71.00
A2D	78.56	3.40	23.64	70.74
A3D	75.57	3.66	23.93	71.53
A3.5D	74.24	4.36	26.24	72.30
A4D	69.15	4.61	24.69	73.87
B3D	76.02	2.71	26.42	70.48
C4D	68.05	4.89	24.18	71.73
XL	83.72	-2.30	12.59	62.58
XL2	82.97	-1.96	15.86	71.32
Translucent Clear	82.04	-1.74	9.56	38.22
Translucent Amber	79.58	2.32	10.56	39.23
Translucent Blue	72.45	-2.93	6.04	40.27
Translucent Gray	78.73	-0.37	10.11	40.70
Super Clear	84.03	-0.80	12.21	20.60

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