

## Description

ORALITE® 9900 Brilliant Grade Premium is highly reflective, weatherproof, self-adhesive sheeting with excellent corrosion and solvent resistance for the manufacture of durable permanent outdoor signing. The product complies with the requirements described in the ASTM D4956 standard for Type XI retroreflective sheeting.

## Product Construction

ORALITE® 9900 Brilliant Grade Premium consists of sealed cells of air backed microprisms using total internal reflection. The distinct shape of the sealing identifies the machine direction and the manufacturer of the sheeting (see drawing).

## Reflectivity

ORALITE® 9900 Brilliant Grade Premium meets and/or exceeds the minimum coefficient of retroreflection ( $R_A$ ) shown in Table 1 when tested in accordance with ASTM E810, "Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry". ORALITE® 9900 Brilliant Grade Premium fully meets and/or exceeds the requirements of ASTM D4956 for Type XI.

## Daytime Color

ORALITE® 9900 Brilliant Grade Premium conforms to the daytime color requirements in Table 2 when tested in accordance with ASTM D4956. ORALITE® 9900 Brilliant Grade Premium is available in white, yellow, orange, green, red, blue, brown, fluorescent yellow, fluorescent yellow-green and fluorescent orange.

## Nighttime Color

ORALITE® 9900 Brilliant Grade Premium conforms to the nighttime color requirements in Table 3 when tested in accordance with ASTM D4956 and ASTM E811. The sheeting shall be measured using CIE illuminant A with an observation angle of  $0.33^\circ$  and an entrance angle of  $+5^\circ$ .

## Adhesive

The adhesive is protected by a release liner which shall be removed by peeling, without soaking in water or other solvents. The adhesive produces such a bond that a 1" (50 mm) strip shall support a 1 3/4 pound (0.79 kg) weight for 5 minutes without the strip peeling for a distance of more than 2" (50 mm) when applied to a smooth aluminum surface as specified in the ASTM D4956, section 7.5 adhesion test.

## Impact Resistance

Following application to a smooth surface aluminum rectangle, 0.040" x 3" x 6" [1.01mm x 75mm x 150mm], the specimen is conditioned for 24 hours at  $73^\circ \pm 3^\circ\text{F}$  ( $23^\circ \pm 2^\circ\text{C}$ ) and 50% relative humidity, subject the sheeting to an impact of a 2 lb (0.91 kg) weight with a 5/8" (16 mm) rounded tip dropped from a 10 in-lb (1.13 N-m) setting on a Gardner variable impact tester, IG-1120, as per ASTM D4956, section S2.2.1. The sheeting shall show no cracking or delamination outside the actual area of impact.

## Flexibility

The sheeting is conditioned for 24 hours at  $72^\circ\text{F}$  [ $23^\circ\text{C}$ ] and 50% relative humidity. The release liner is removed and the sheeting is sufficiently flexible to show no cracking when bent in one second's time around a 1/8-inch [3.2mm] diameter mandrel with the adhesive contacting the mandrel.

## Weatherability

ORALITE® 9900 Brilliant Grade Premium meets the requirements of ASTM D4956, Section 6.4. The material is weather resistant and shows no appreciable cracking, scaling, pitting, blistering, edge lifting, curling, or more than 1/32" (0.8 mm) shrinkage or expansion. Retroreflectivity measurements are conducted after outdoor weathering with an observation angle of  $0.20^\circ$  and entrance angles of  $-4^\circ$  and  $+30^\circ$ . The minimum coefficient of retroreflection ( $R_A$ ) after weathering is 80% of the values specified in Table 1.

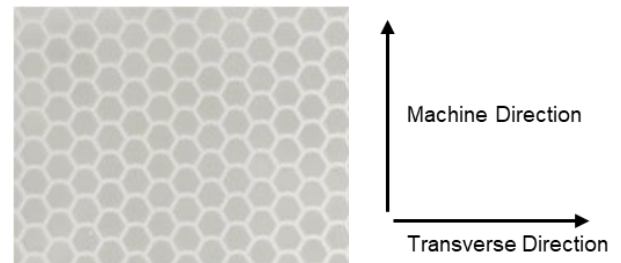
## Solvent Resistance

ORALITE® 9900 Brilliant Grade Premium meets the requirements of LS-300C solvent resistance, section 3.6.7, when tested as specified in Table VI, test method 4.4.6.

## Specular Gloss

ORALITE® 9900 Brilliant Grade Premium shall have a specular gloss of not less than 40 when tested in accordance with ASTM D523 at an angle of  $85^\circ$ .

Sealing Pattern and Application Directions



ORAFOL Americas – GA  
1100 Oracal Parkway  
Black Creek, GA 31308  
Phone: 888.672.2251

ORAFOL Americas – CT  
120 Darling Drive  
Avon, CT 06001  
Phone: 800.654.7570

ORAFOL Canada  
2831 Bristol Circle  
Oakville, Ontario L6H 6X5  
Phone: 888.727.3374

[reflective-americas@orafol.com](mailto:reflective-americas@orafol.com)

[www.orafol.com](http://www.orafol.com)

### Shrinkage

A 9 inch by 9 inch [229mm by 229mm] specimen of the sheeting with liner is conditioned a minimum of one hour at 72°F [23°C] and 50% relative humidity. The liner is then removed and the specimen is placed on a flat surface with the adhesive side up. Ten minutes after the liner is removed and again after 24 hours, the specimen is measured to determine the amount of dimensional change. The specimen will not shrink in any dimension more than 1/32 inch [0.8mm] in 10 minutes and 1/8 inch [3.2mm] in 24 hours.

### Application Instructions

It is recommended that the application temperature to achieve best results is 65°F [18°C] or above.

### Warranty

12-year limited warranty for White, Yellow, Green, Red, Blue and Brown.

10-year limited warranty for Fluorescent Yellow-Green and Fluorescent Yellow.

3-year limited warranty for Orange and Fluorescent Orange.

Contact your ORAFOL Americas Inc. representative for details.

**Table 1. Coefficient of Retroreflection (R<sub>A</sub>)\***

Observation Angle	0.20°		0.50°		1.00°	
	-4°	30°	-4°	30°	-4°	30°
Entrance Angle						
Colors						
White	580	220	420	150	120	45
Yellow	435	165	315	110	90	34
Orange	200	77	150	53	42	16
Green	58	22	42	15	12	5
Red	87	33	63	23	18	7
Blue	26	10	19	7	5	2
Brown	17	7	13	5	4	1
Fluorescent Yellow-Green	460	180	340	120	96	36
Fluorescent Yellow	350	130	250	90	72	27
Fluorescent Orange	175	66	125	45	36	14

\*all values have units of cd/fc/ft<sup>2</sup> (cd/lx/m<sup>2</sup>)

**Table 2. Color Specification Limits (Daytime)**

Color	Chromaticity Coordinates†								Luminance Factor (Y%)	
	1		2		3		4		Min.	Max.
	x	y	x	y	x	y	x	y		
White	0.303	0.300	0.368	0.366	0.340	0.393	0.274	0.329	≥ 27	
Yellow	0.498	0.412	0.557	0.442	0.479	0.520	0.438	0.472	15	45
Orange	0.558	0.352	0.636	0.364	0.570	0.429	0.506	0.404	10	30
Green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	0.771	3.0	12
Red	0.565	0.346	0.629	0.281	0.735	0.265	0.648	0.351	2.5	15
Blue	0.140	0.035	0.244	0.210	0.190	0.255	0.065	0.216	1.0	10
Brown	0.430	0.340	0.610	0.390	0.550	0.450	0.430	0.390	1.0	9.0
Fluorescent Yel-Grn	0.387	0.610	0.369	0.546	0.428	0.496	0.460	0.540	60	---
Fluorescent Yellow	0.479	0.520	0.446	0.483	0.512	0.421	0.557	0.442	40	---
Fluorescent Orange	0.583	0.416	0.535	0.400	0.595	0.351	0.645	0.355	25	---

†The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with Standard Illuminant D65.



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120 Darling Drive  
Avon, CT 06001  
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ORAFOL Canada  
2831 Bristol Circle  
Oakville, Ontario L6H 6X5  
Phone: 888.727.3374

**Table 3. Color Specification Limits (Nighttime)**

Color	Chromaticity Coordinates‡							
	1		2		3		4	
	x	y	x	y	x	y	x	y
White	0.475	0.452	0.360	0.415	0.392	0.370	0.515	0.409
Yellow	0.513	0.487	0.500	0.470	0.545	0.425	0.572	0.425
Orange	0.595	0.405	0.565	0.405	0.613	0.355	0.643	0.355
Green	0.007	0.570	0.200	0.500	0.322	0.590	0.193	0.782
Red	0.650	0.348	0.620	0.348	0.712	0.255	0.735	0.265
Blue	0.091	0.133	0.230	0.240	0.180	0.370	0.033	0.370
Brown	0.595	0.405	0.540	0.405	0.570	0.365	0.643	0.355
Fluorescent Yel-Grn	0.480	0.520	0.473	0.490	0.523	0.440	0.550	0.449
Fluorescent Yellow	0.554	0.445	0.526	0.437	0.569	0.394	0.610	0.390
Fluorescent Orange	0.625	0.375	0.589	0.376	0.636	0.330	0.669	0.331

‡ The four pairs of chromaticity coordinates determine the acceptable color in terms of the CIE 1931 Standard Colorimetric System measured with Standard Illuminant A.

**Note:**

All ORALITE® products are manufactured within an ISO 9001:2008 controlled manufacturing environment and batch traceability is possible on the basis of the roll number.

**IMPORTANT NOTICE**

When using ORALITE® sheeting, please comply with relevant national specifications. ORAFOL recommends obtaining the current requirements from your local authority and ensure product conformance with such requirements. Please contact ORAFOL for further information.

All ORALITE® products are subject to careful quality control throughout the manufacturing process and are warranted to be of merchantable quality and free from manufacturing defects. Published information concerning ORALITE® products is based upon research which the Company believes to be reliable, although, such information does not constitute a warranty. Because of the variety of uses of ORALITE® products and the continuing development of new applications, the purchaser should carefully consider the suitability and performance of the product for each intended use, and the purchaser shall assume all risks regarding such use. All specifications are subject to change without prior notice.

Surfaces to which the material will be applied must be thoroughly cleaned from dust, grease or any contamination which could affect the adhesion of the material. Freshly lacquered or painted surfaces should be allowed to dry for at least three weeks and to completely cure respectively. The compatibility of selected lacquers and paints should be tested by the user, prior to application of the material. The self-adhesive reflective material can only be used for dry application. The low tensile strength of the material can make the removability of the reflective film more difficult. Please review applicable application information published by ORAFOL.

No warranty is given for purposes other than those listed in the Technical Datasheet or which are not processed according to ORAFOL's processing and handling instructions. The durability of the signs will depend on a variety of factors, including but not limited to substrate selection and preparation, compliance with recommended application guidelines, geographic area, exposure conditions and maintenance of the product and finished sign. Sign failures caused by the substrate or improper surface preparations are not the responsibility of ORAFOL. Please refer to the full warranty document available at [www.orafolamericas.com](http://www.orafolamericas.com) for detailed information.



**WARNING** – This product may expose you to chemicals which are known in the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to – [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

ORALITE® is a trademark of ORAFOL Europe GmbH



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