



## TECHNICAL DATA SHEET

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### Chinastars Reflective Heat Transfer Film

#### DESCRIPTION

Chinastars reflective heat transfer film is composed of micro glass beads bonded to a heat activated adhesives, with a transparent PVC liner to protect the reflective side during handling and for some products an extra plastic liner to protect the adhesive side. It uses reflective glass beads technology and reflects light directly to the original light source to enhance the visibility of anyone who wears it.

Chinastars reflective heat transfer film has excellent durability in home wash and industrial wash, and can be applied to different substrates to meet various requirements of occupational apparel.

Product No.	Retro Reflective Performance <sup>1</sup>	Home Wash <sup>2</sup>	Industrial Wash <sup>3</sup>	Flame Resistant
CS-4002 Grey Transfer Film	R> 260	√	-	-
CS-4002-T Grey Transfer Film for Graphic Design	R> 260	√	-	-
CS-4003 Silver Transfer Film	R> 420	√	-	-
CS-4003E Silver Stretchable Transfer Film	R> 420	√	-	-
CS-4003FR Flame Resistant Transfer Film	R> 420	√	-	√
CSR4600 Industrial Wash Transfer Film	R> 420	√	√	-
CSR 4011 Water Repellent Transfer Film	R> 420	√	-	-
CS-4003-M Silver Transfer Film with Sticky Liner	R> 420	√	-	-
CS-4003E-M Silver Stretchable Transfer Film with Sticky Liner	R> 420	√	-	-
CS-4008 Silver Segmented Transfer Film	R> 420	√	-	-
CS-4003-Z001-Y Silver Segmented Transfer Film	R> 420	√	-	-

<sup>1</sup> Measured on new product at +5.0° entrance and 0.2° observation angles;

<sup>2</sup> ISO 6330 Method 2A at 60°C (140°F) and  $R_A \geq 100$  cd/lux/m<sup>2</sup> (home wash);

<sup>3</sup> ISO 15797:2002 at 75°C(165°F) and  $R_A \geq 100$  cd/lux/m<sup>2</sup>.

## PRODUCT CERTIFICATION

The following Chinastars reflective heat transfer films marked with "√" meet the requirements for reflective material in below listed standards for high visibility garments.

Product No.	OKEO-TEX 100	EN ISO 20471 ANSI/ISEA 107 CSA-Z96-15 AS/NZS 1906	EN 469 EN ISO 14116 EN ISO 11612 NFPA 701 ASTM 1506
CS-4002 Grey Transfer Film	–	–	–
CS-4002-T Grey Transfer Film for Graphic Design	–	–	–
CS-4003 Silver Transfer Film	√	√	–
CS-4003E Silver Stretchable Transfer Film	√	√	–
CS-4003FR Flame Resistant Transfer Film	–	√	√
CSR4600 Industrial Wash Transfer Film	√	√	–
CSR 4011 Water Repellent Transfer Film	√	√	–
CS-4003-M Silver Transfer Film with Sticky Liner	√	√	–
CS-4003E-M Silver Stretchable Transfer Film with Sticky Liner	√	√	–
CS-4008 Silver Segmented Transfer Film	√	√	–
CS-4003-Z001-Y Silver Segmented Transfer Film	√	√	–

## PHYSICAL PERFORMANCE

After the following each exposure testing, Chinastars reflective fabrics  $R_A$  values are above 100 cd/lux/m<sup>2</sup> at +5.0° entrance angle and 0.2° observation angle.

Physical Performance	Test Method
Abrasion	EN 530 Method 2, 5000 cycles
Flexing	ISO 7854 Method A, 7500 cycles
Cold Fold	ISO 4675, -20°C (-4°F)
Temperature Cycle	12 hours @ 50°C (122°F); 20 hours @ -30°C (-22°F)
Wash	ISO 6330 Method 2A @ 60°C (140°F) number of cycles listed

Dry-Clean	ISO 3175 Method 9.1 number of cycles listed
Wet Reflectivity	ANSI 107-2015 Appendix A; EN 20471:2013 Annex C
Flame Resistance	ASTM D6413 char length $\leq$ 4 inches; after flame $<$ 2 seconds

## APPLICATION

### Cutting

Die-cutting is recommended, although it can also be hand-cut or guillotined. Chinastars reflective heat transfer film has a transparent PVC liner to protect the reflective side during handling and for some products an extra plastic liner to protect the adhesive side. Be sure to remove the extra plastic liner on the adhesive side before applying plotter cut.

### Heat lamination

1. Work on a flat surface where heat and pressure can be applied. Do not heat over seams and stitches.
2. Remove adhesive side liner (if the product has one) before placing heat transfer film on fabric (substrate), exposing dry adhesive. Do not remove reflective side liner.
3. Place reflective transfer film on substrate with the adhesive side down. Use a non-stick slip sheet or cotton fabric between the platen and laminating surface to protect reflective surface from possible contamination. And apply heat and pressure as described in the table below.
4. Allow heat transfer film to cool to room temperature. Remove the reflective liner by lifting one corner and pulling (180°angle) in a continuous, smooth manner.

Additional precautions for heat lamination:

1. Do not exceed lamination temperatures listed above because the clear polyethylene liner may become difficult to remove and affect the physical performance.
2. If high temperatures are required for bond durability, follow lamination steps 1-3 using recommended temperature, remove paper liner, and then laminate again at the higher temperature (using a non-stick slip sheet or cotton fabric to protect reflective surface).
3. The lamination temperature, time, speed and pressure listed below shall be used as a guide. For each fabric, the proper conditions must be tested beforehand to assure adequate adhesion and physical performance.
4. Many fabrics can be used as lamination substrates; however, some substrates such as nylons, water repellent fabrics or mesh fabrics are difficult to adhere to. Continuous testing should be done to ensure acceptable adhesion in mass production. Feel free to contact us for any specific application assistance.










Chinastars Reflective Heat Transfer Film						
Machine	Heat Press Machine			Heated Roll Laminator		
Product No.	Temperature(°C)	Dwell Time (seconds)	Line Pressure (kg/cm <sup>2</sup> )	Temperature (°C)	Rotate Speed (m/min)	Line Pressure (kg/cm <sup>2</sup> )
CS-4002	140-160	8-20	>0.5	120-140	4-8	>2
CS-4002-T	140-160	8-20	>0.5	120-140	4-8	>2





CS-4003	140-160	8-20	>0.5	120-140	4-8	>2
CS-4003E	150-170	10-20	>0.5	130-150	4-8	>2
CS-4003FR	160-200	10-20	>0.5	130-180	3-8	>2
CS-4600	160-200	10-20	>0.5	130-180	3-8	>2
CSR-4011	100-160	12-60	>0.5	120-140	4-8	>2
CSR-4003-M	145-165	8-20	>0.5	125-145	4-8	>2
CSR-4003E-M	155-175	10-20	>0.5	135-155	4-8	>2
CSR-4008	140-160	8-20	>0.5	120-140	4-8	>2
CS-4003-Z001-Y	140-160	8-20	>0.5	120-140	4-8	>2

### Printing

Inks can be printed on the surface of Chinastars reflective heat transfer films. Before printing, all inks shall be tested to ensure acceptable adhesion. Wipe the surface lightly with a soft cloth dampened with isopropyl alcohol may help ink adhesion.

### CARE AND MAINTENANCE INSTRUCTIONS

Product	Wash	Dry	Iron
CS-4002 Grey Transfer Film	 Do not presoak Machine wash warm, 40°C (105°F)	 Tumble dry low	 Cool iron, do not exceed 120°C (248°F)
CS-4002-T Grey Transfer Film for Graphic Design			
CS-4003 Silver Transfer Film			
CS-4003-M Silver Transfer Film with Sticky Liner			
CS-4008 Silver Segmented Transfer Film			
CS-4003-Z001-Y Silver Segmented Transfer Film	 Do not bleach		
	 Do not dry-clean		
CS-4003E Silver Stretchable Transfer Film	 Do not presoak Machine wash warm, 40°C (105°F)	 Tumble dry low	 Cool iron, do not exceed 120°C (248°F)
CSR 4011 Water Repellent Transfer Film			
CS-4003E-M Silver Stretchable Transfer Film with Sticky Liner			
	 Do not bleach		

CS-4003FR Flame Resistant Transfer Film	 Do not presoak Machine wash hot, 60°C (140°F)	 Tumble dry low	 Medium iron, do not exceed 150°C (300°F)
CSR4600 Industrial Wash Transfer Film	 Do not bleach		

Some suggestions for extending the life of reflective transfer film on safety clothing:

1. Use neutral detergent in hand wash. Do not use detergent that contains bleach, acid or alkali.
2. When do machine wash, you may use a mild detergent, but no bleach or fabric softener!
3. Try to avoid wash the reflective products with your work jeans or any clothing with rough fabric or edges. The microscopic glass beads on the reflective transfer film can be worn off by rough texture.

## HANDLING PRECAUTIONS

Most of our reflective transfer films contain aluminum layer, and sweat /oil/ water stains may occur if the surface of the product has direct contact with hands during application and is then exposed to hot and humid conditions. Even though these blemishes won't affect performance of the product, we strongly recommend handling the reflective fabric with gloves and keeping them in the environment of below 26.7 °C (80 °F) and lowering than 70% relative humidity.

## STORAGE AND SHELF TIME

Store in a cool, dry place and use within one year after date of receipt.



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