

## TECHNICAL DATA SHEET

### CSR-4003FR Flame Retardant Reflective Heat Transfer Film

#### DESCRIPTION

Chinastars CSR-4003FR reflective transfer film is composed of micro glass beads bonded to a heat activated flame retardant adhesives, with a transparent PET liner to protect the reflective side during handling. It uses reflective glass beads technology and reflects light directly to the original light source to enhance the visibility of anyone who wears it.

CSR-4003FR has excellent flame retardant property, suitable to be applied on all kinds of fire resistant fabrics.

#### REFLECTIVE PERFORMANCE

The reflective coefficient (R, in cd/lux/m<sup>2</sup>) of CSR-4003FR can meet the requirements in international standards like EN ISO 20471, ANSI/ISEA 107, CSA-Z96-22, AS/NZS 1906.

Observation Angle	Entrance Angle	Minimum Reflectivity	Typical Reflectivity
12'	5°	330	>420

#### WASH PERFORMANCE

Product No.	Home Wash Cycles <sup>1</sup>
CSR-4003FR	50

<sup>1</sup>ISO 6330 Method 2A at 60°C (140°F) and R<sub>A</sub> ≥ 100 cd/lux/m<sup>2</sup> (home wash)

Note: Washing depends on the condition of substrates and heat transfer operations.

#### COLOR

Product No.	Daytime Color	Reflected Color
CSR-4003FR	Silver	White

#### RHYSICAL PERFORMANCE

After the following each exposure testing, CSR-4003FR R<sub>A</sub> 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 at 50°C (122°F); 20 hours at -30°C (-22°F)
Wash	ISO 6330 Method 6N at 60°C (140°F) number of cycles listed
Wet Reflectivity	ANSI 107-2020 Appendix B; EN 20471:2013 Annex C

## CERTIFICATION

CSR-4003FR flame retardant transfer film meet the requirements in below listed standards for high visibility garments.

Product No.	EN ISO 20471 ANSI/ISEA 107	CSA-Z96-22 AS/NZS 1906	EN469 EN ISO 14116 EN ISO 11612
CSR-4003FR	√	√	√

## APPLICATION

### Cutting:

Die-cutting is recommended, although it can also be hand-cut or guillotined. Chinastars reflective heat transfer film has a transparent PET 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.

Machine Product No	Heat Press Machine			Heated Roll Laminator		
	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>
CSR-4003FR	160-200	10-20	>0.5	130-180	3-8	>2

**Printing:**

Inks can be printed on the surface of Chinastars CSR-4003FR flame retardant transfer film. 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**



Do not presoak  
Machine wash warm,  
60°C (140°F)



Tumble  
dry low



Cool iron, Do  
not exceed  
110°C(230°F)



Do not bleach



Do not  
dry-clean

Some suggestions for extending the life of CSR-4003FR flame retardant transfer film:

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 material can be worn off by rough texture.

**HANDLING PRECAUTIONS**

CSR-4003FR flame retardant transfer film contains 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 material 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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