



PLASKOLITE

TUFFAK[®] polycarbonate

A new generation of
engineered sheet products
for signage



Alro Plastics

TUFFAK SL and TUFFAK LD

Tradition of delivering the right elements
for outstanding electric signage

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1) Three-dimensional depth

- » Thermoforming TUFFAK sheet adds dimension to enhance logos, letters, and message
- » Thinner deep draw areas retain strength

2



2) Versatile sheet and reel sizes

- » A broad inventory of standard sheet and reels speeds delivery and facilitates production planning
- » Standard sign colors
- » Custom sizes can minimize material waste in high volume production jobs

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3) TUFFAK LD delivers uniform light diffusion for today's LED signage

- » Eliminates LED hot spots even in deep draw thermoformed areas that are often problematic for other materials
- » Allows shallow channel letter designs: exceptional light diffusion reduces light intensity variations (shadowing) even at smaller LED-diffuser sheet distances
- » Extensive standard color palette: color match technology consistently satisfies demanding corporate jobs
- » Delivers TUFFAK sheet's recognized performance on impact, temperature, and weather resistance
- » UL recognition: Meets the UL 879 standard for use in electric signs
- » UL 94 V-2 flammability rating 0.093" - 0.177"
- » UL 94 V-0 flammability rating 0.236"

Performance that protects the image

» Weather resistance

- UV protection technology provides long lasting outdoor life
- Exceptional toughness properties provide windload and hail impact protection across a broad temperature range

» Unsurpassed durability in production and use

- TUFFAK sheet helps minimize breakage losses for high production yields and ensures on-schedule installation

» Design versatility and dimensional stability

- Allows closer placement of lighting sources to the sign face for more versatile and cost-effective designs
- » UL Listed: TUFFAK sign grades meet UL 879 criteria for use in electric signs
- » UL 94 HB flammability rating

TUFFAK®

TUFFAK NR

Non-reflective, co-extruded sheet

Anti-glare surface treatment provides impact resistant solution to current users of non-glare acrylic.

Non-reflective coating is lighter than most matte finishes reducing "pixel" effect.

INTENDED MARKETS

- » TV enclosures
- » Digital displays
- » Menu boards
- » Graphic panels



TUFFAK NR-C

Non-reflective, coated sheet

Anti-glare surface with abrasion and chemical resistance.

INTENDED MARKETS

- » Digital displays
- » Outdoor menu boards
- » Ruggedized electronics for military, aerospace and consumer products

Characteristics	NR	NR-C
Anti-glare	✓	✓
Non-pixelating	✓	✓
Economical	✓	
Outdoors suitable	✓	✓
2nd surface printing	✓	✓
Chemical resistant		✓
Abrasion resistant		✓
Formability	✓	
Cold bending	✓	
Gloss consistency	✓	

Specifications	NR non-reflective (coex)	NR-C non-reflective, coated
Technology	Non-reflective coex layer	Non-reflective coated surface
Thickness range	0.040" - 0.200"	0.060" - 0.500"
Maximum width	80.70"	48.00"
Maximum length	120.00"	135.00"
Gloss level - 60°	Target 37 ±3	Target 37 ±5
Non-glare layer	One side only	One side only
Weathering	OK >3,500 hrs. Xenon	OK >3,500 hrs. Xenon
Haze (.0118" thick)	19 - 21	19 - 21
Light transmission (0.118" thick)	88 - 91	88 - 91
Masking (non-reflective side)	Adhesive-based	Adhesive-based

TUFFAK NR and NR-C

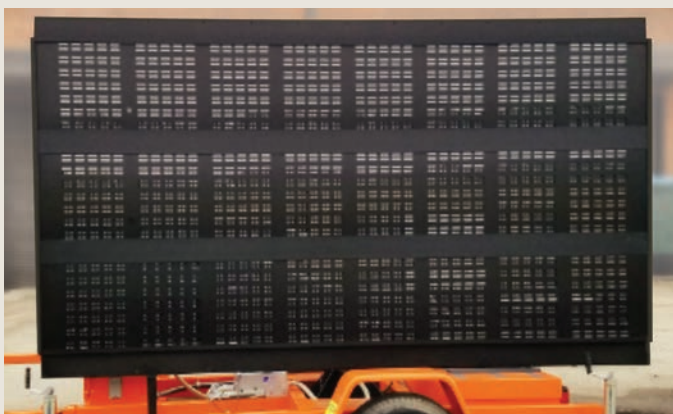
Non-reflective sheet applications



Menu boards



Medical monitors



Message centers



Heavy duty gauges



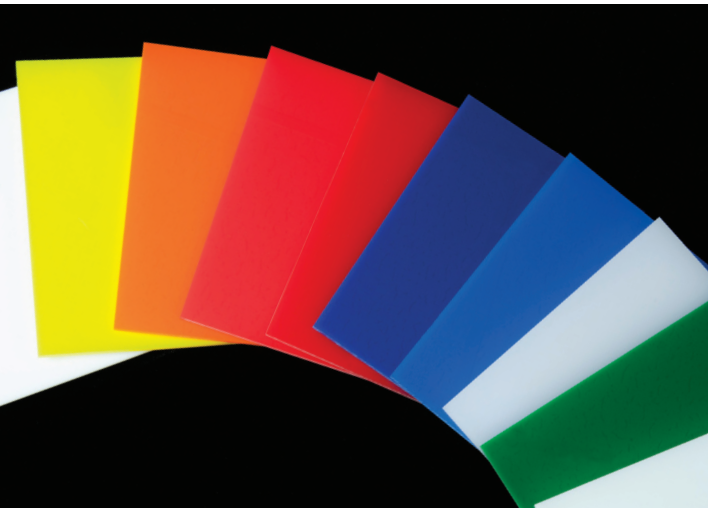
Outdoor signage



Fuel dispensers

TUFFAK SL matte and TUFFAK AR

Abrasion resistant • Glare reduction



TUFFAK SL matte adds a design dimension to high performance signage

- » Non-glare finish on UV protected side
- » Same high performing physical properties as TUFFAK SL

TUFFAK AR transparent sheet expands design and application options

- » Durable hard coated surface on one or two sides offers abrasion resistance for applications that need frequent cleaning and in high traffic areas
- » Anti-graffiti protection for indoor and outdoor kiosks/signs in airports, hotels, and other public facilities
- » Enhanced chemical resistance
- » UL 972 burglary resistant
- » UL 94 HB flammability rating
- » UL 94 V-0 > 0.394"

Competitive PC

TUFFAK LD B27

TUFFAK LD B48

Images and graphs demonstrate TUFFAK LD's ability to completely eliminate LED hot spots, even when thinned by 50%.

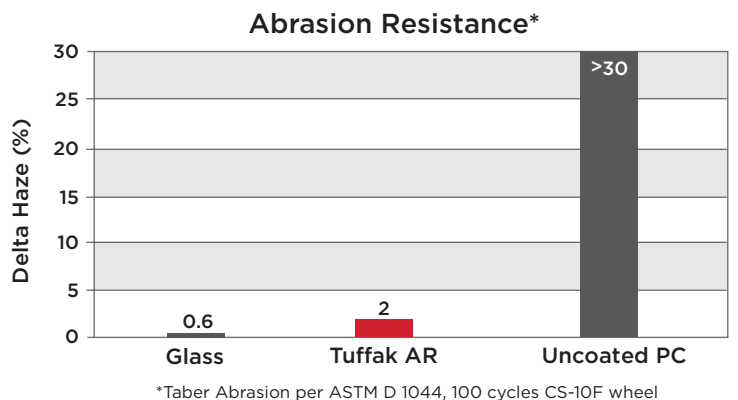
Thermoformed polycarbonate domes are all photographed with the same backlighting LEDs. Peaks in the light intensity vs. position graph for the competitive PC show strong LED hot spots. No peaks are present in the TUFFAK LD graphs.

Temperature Resistance (ASTM D 648)

Material	Heat Deflection Temperature (°F) @ 66 psi	Heat Deflection Temperature (°F) @ 264 psi
TUFFAK	280	270
Acrylic (PMMA)	190	181

Impact Resistance (ASTM D 3763)

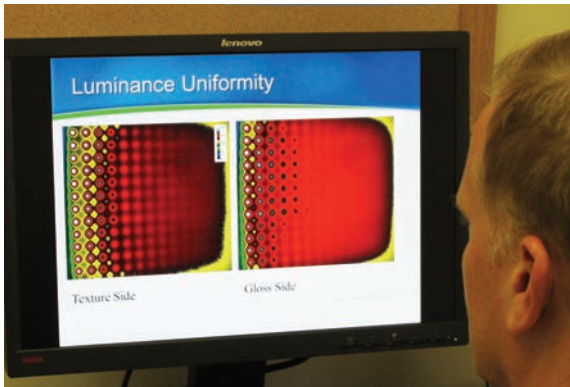
Material	Total Energy (ft-lbs)
TUFFAK @ 0.125"	> 46
Acrylic (PMMA)	2





The power of global. The service of local.

Plaskolite is one of the leading manufacturers of high quality polycarbonate products, which are continually leaders in global markets. Behind the technologically sophisticated solutions you'll find the expertise of the global Plaskolite network. Customer focus, innovation and environmental protection are objectives of equal importance in our corporate policy.



For complete information on TUFFAK signage products, call **800.254.1707** or visit our website **www.plaskolite.com**

- » Code compliance and UL listings
- » Product information
- » Fabrication and forming guide



These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale.

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