Teijin's Materials for Gamma-Ray Resistance, Steam Sterilization Use

Unlocking Infinite Potential in Healthcare

TEIJIN LIMITED. Resin & Plastic Processing Business Unit

Introduction

- Teijin has developed a number of resin businesses centered on the polycarbonate resin Panlite®, first commercialized by Teijin in Japan in 1960. Teijin has been researching and developing in the medical field for over 30 years.
- Based on the Company's pioneering spirit of making the impossible possible, Teijin provides solutions that support advanced medical care to meet the needs of its customers.

Wish to safe your devices from all disinfectants
Chemical resistance

Wish to use environment friendly materials
Halogen free flame resistant UL94 V-0

Wish to use safer materials
Biocompatibility (ISO 10993)

Wish to use safe and secure materials
Long term reliability

Wish to replace glass bottles with resin bottles
Airtightness

Wish to use materials that can withstand sterilization
Gamma-ray/ electron-beam sterilization

SUSTAINABLE DEVELOPMENT GOALS

PC transparent grade for medical use

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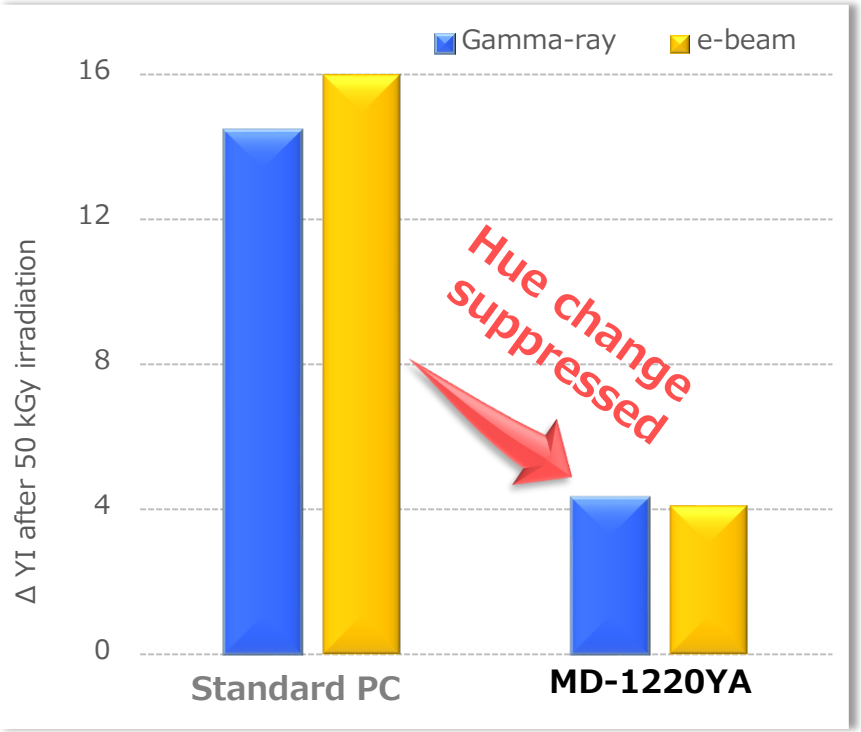
Features

・For biocompatible grade products, an ISO 10993 biocompatibility test was conducted and passed.
・A lineup of products of grades with different moldability levels according to product shapes is provided.

Type		Grade	MVR ※ (cm^3/10min)	Biocompatibility
Gamma-ray/ electron-beam sterilization	General	MD-1220YA	**11**	✓
		MD-1200YA	**19**	✓
	Fat emulsion resistance	MD-1270YB	**5**	✓
Steam sterilization		MD-2220TA	**10**	✓
		MD-2200TA	**18**	✓

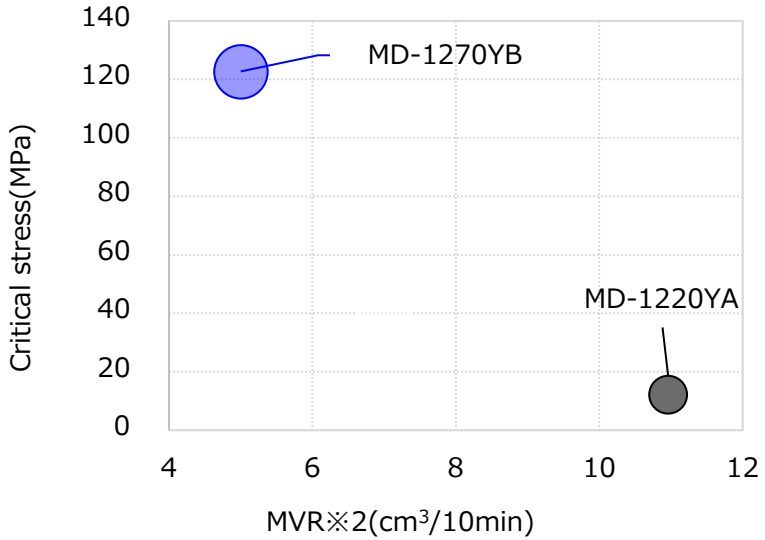
※MVR Measurement condition : 300℃ Load 1.2kg

Gamma-ray/electron-beam sterilization grade



Since a hue change after gamma-ray/electron-beam irradiation is small, products of this category can be safely used for gamma-ray/electron-beam sterilization applications.

Fat emulsion resistance grade



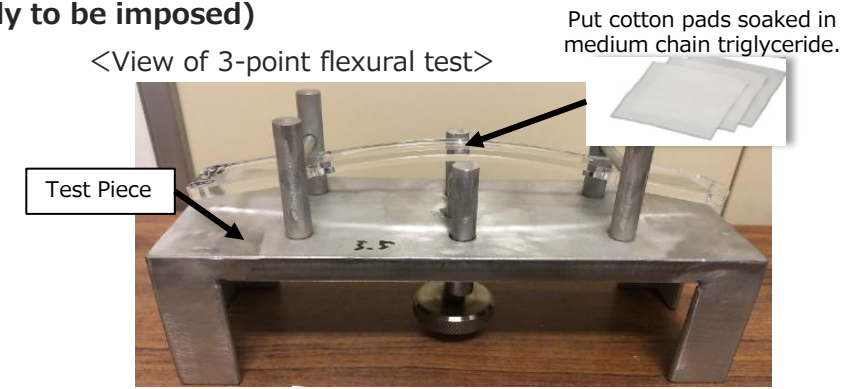
※1 : Stress: Maximum stress a test piece can bear without rupturing
Measurement was performed by the 3-point flexural test in the right figure.

※2 : MVR Measurement condition : 300℃ Load1.2kgf

※The values shown in the figure are representative values but not guaranteed values.

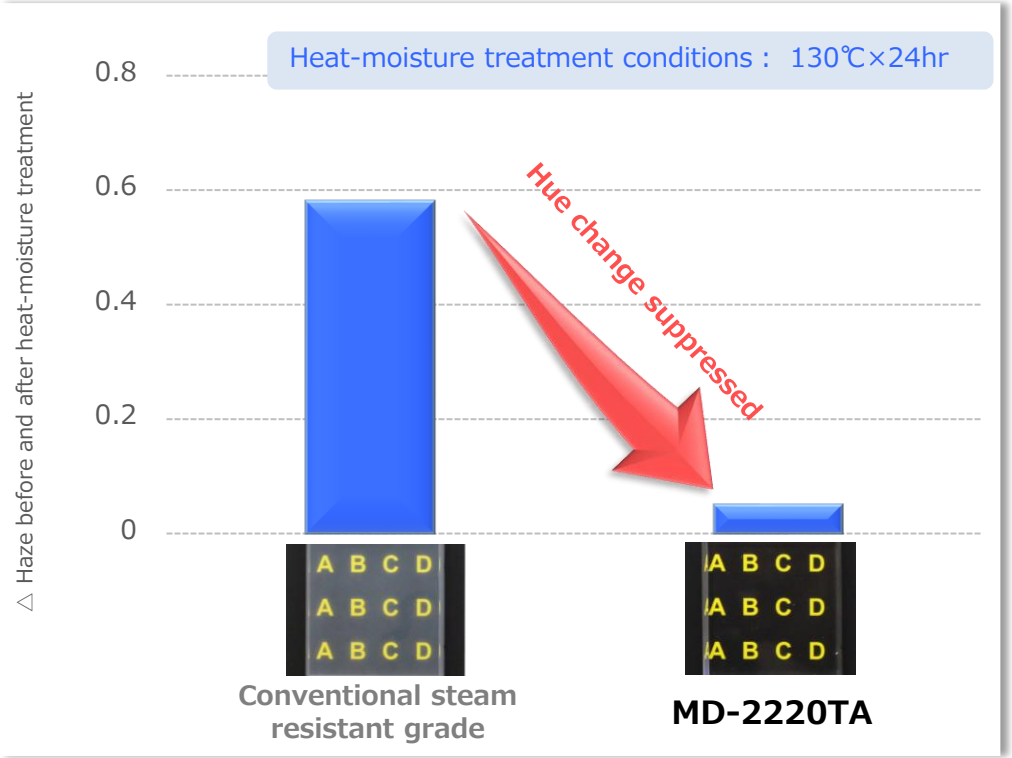
Compared to general PCs, MD-1270YB is characterized by suppressing the discoloration caused by gamma-ray/electron-beam irradiation and having high fat emulsion resistance suitable for disposable applications (particularly when stress is likely to be imposed)

<View of 3-point flexural test>



The predetermined stress is applied to the test piece by using a forcible three-point flexure jig. With Bemcot wipes soaked in middle chain fatty acid oil placed in the center of the test piece, the test piece was left to stand for three days and then checked for ruptures. By testing at various levels of stress, the maximum stress the test piece could bear without rupturing was measured.

Steam sterilization grade



Since a hue change caused by heat-moisture treatment is small, and the deterioration of physical properties can be controlled, products of this category can be safely used for steam sterilization applications.

PC transparent grade for medical use
Physical properties

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Property	Unit	Standard	Condition	Gamma-ray/electron-beam sterilization			Steam・EOG sterilization	
				MD-1220YA	MD-1200YA	MD-1270YB	MD-2220TA	MD-2200TA
				Standard	High flowability	Fat emulsion resistance	Standard	High flowability
Density	kg/m^3	ISO 1183	-	**1,200**	**1,200**	**1,200**	**1,200**	**1,200**
MVR	$cm^3/10min$	ISO1133	300℃ Load1.2kgf	**11**	**19**	**5**	**10**	**18**
Tensile stress at yield	MPa	ISO 527-1 ISO 527-2	50mm/ min	**63**	**63**	**64**	**61**	**61**
Tensile stress at break	MPa			**80**	**72**	**81**	**78**	**75**
Tensile strain at break	%			**132**	**119**	**127**	**128**	**126**
Flexural strength	MPa	ISO 178	2mm/ min	**96**	**96**	**95**	**92**	**93**
Flexural modulus	MPa			**2,360**	**2,350**	**2,360**	**2,280**	**2,320**
Charpy impact strength	kJ/m^2	ISO 179	notched	**77**	**46**	**83**	**74**	**66**
Heat deflection temperature	℃	ISO 75-1 ISO 75-2	1.80MPa	**127**	**125**	**127**	**130**	**128**

※The values shown in the figure are representative values but not guaranteed values.