

## Metamerism (PP)

|        |         | Masstone |       |      |      | Tint (TiO <sub>2</sub> :pigment=9:1) |       |      |      |
|--------|---------|----------|-------|------|------|--------------------------------------|-------|------|------|
|        |         | L*       | a*    | b*   | dE*  | L*                                   | a*    | b*   | dE*  |
| 551A   | D65*→C* | 1.52     | -4.95 | 1.84 | 5.50 | 0.72                                 | -2.78 | 0.92 | 3.02 |
| 552A   | D65*→C* | 1.29     | -3.05 | 1.63 | 3.69 | 0.63                                 | -1.88 | 0.81 | 2.14 |
| 553A   | D65*→C* | 0.98     | -1.5  | 1.34 | 2.24 | 0.4                                  | -0.71 | 0.53 | 0.97 |
| 554A   | D65*→C* | 0.81     | -0.69 | 1.2  | 1.60 | 0.3                                  | -0.23 | 0.37 | 0.53 |
| 555A   | D65*→C* | 1.46     | -5.08 | 1.7  | 5.55 | 0.66                                 | -2.67 | 0.68 | 2.83 |
| Yel119 | D65*→C* | 1.29     | -4.17 | 1.47 | 4.61 | 0.53                                 | -2.08 | 0.42 | 2.19 |
| Br33   | D65*→C* | 0.92     | -1.44 | 1.39 | 2.20 | 0.35                                 | -0.72 | 0.43 | 0.91 |

D65\* : Illuminant D65, 10 degree observer  
C\* : Illuminant C, 2 degree observer

### Test Piece Preparation

| Formula          | Masstone |
|------------------|----------|
| Pigments         | 0.5      |
| TiO <sub>2</sub> | -----    |
| Polypropylene    | 100      |

The weighed pigments were added to 400 grams (14.1 oz) of PP pellets in a polyethylene bag.  
The polyethylene bag were shaken by a shaker for 5 minutes before injection molding at 210°C (410°F)

## Physical Properties

| Particle                | Unit              | P.Brown48                             |      |      |      |      | P.Yel119                         | P.Br33                                |         | P.Yel42           | P.R101                         |
|-------------------------|-------------------|---------------------------------------|------|------|------|------|----------------------------------|---------------------------------------|---------|-------------------|--------------------------------|
|                         |                   | 555A                                  | 551A | 552A | 553A | 554A | Comp.-1                          | Comp.-1                               | Comp.-2 | Yellow Iron Oxide | Red Iron Oxide                 |
| Basic Composition       |                   | (Fe,Al) <sub>2</sub> TiO <sub>5</sub> |      |      |      |      | ZnFe <sub>2</sub> O <sub>4</sub> | Zn(Fe,Cr) <sub>2</sub> O <sub>4</sub> |         | FeOOH             | Fe <sub>2</sub> O <sub>3</sub> |
| Particle Size           | D50 μm            | 0.9                                   | 0.7  | 0.6  | 0.6  | 0.6  | 2.4                              | 0.8                                   | 0.4     | -                 | -                              |
|                         | D90 μm            | 3.3                                   | 2.3  | 1.9  | 2.1  | 2.6  | 31.7                             | 2.8                                   | 1.0     | -                 | -                              |
| Water Content           | %                 | < 0.5                                 |      |      |      |      | < 0.5                            |                                       | -       | 0.8               |                                |
| Oil Absorption          | cc/100g           | 15                                    | 15   | 17   | 15   | 15   | 21                               | 11                                    | 17      | 62                | 25                             |
| Bulk                    | cc/g              | 3.0                                   | 2.6  | 2.6  | 2.3  | 2.0  | 2.7                              | 2.8                                   | 1.2     | 4.2               | 1.6                            |
| Specific Surface Area   | m <sup>2</sup> /g | 5.7                                   | 2.7  | 3.1  | 2.4  | 2.6  | 4.4                              | 6.1                                   | 2.8     | 12.0              | 13.3                           |
| pH                      |                   | 8.3                                   | 8.2  | 9.1  | 7.9  | 8.5  | 6.7                              | 8.9                                   | 8.5     | 4.1               | 4.9                            |
| TSR                     | %                 | 46.5                                  | 36.8 | 32.8 | 29.1 | 26.2 | 41.8                             | 44.5                                  | 23.4    | 23.6              | 30.1                           |
| Magnetic Susceptibility | emu/g             | 0.3                                   | 0.4  | 0.5  | 0.5  | 0.5  | 2.7                              | 0.9                                   | 1.8     | 0.4               | 0.6                            |
| Heat Resistance (PP)    | ΔE                | 1.2                                   | 1.7  | 1.1  | 0.9  | 1.0  | 2.4                              | 2.6                                   | 0.8     | 26.2              | 2.2                            |
| Dispersibility          |                   | Good                                  | Good | Good | Good | Good | Poor                             | Poor                                  | Poor    | Poor              | Poor                           |
| Chemical Resistance     | ΔE(acid)          | 1.1                                   | 1.3  | 2.1  | 0.8  | 1.7  | 2.9                              | 0.4                                   | 1.1     | 1.2               | 0.9                            |
|                         | ΔE(alkali)        | 1.4                                   | 2.1  | 2.2  | 1.2  | 2.4  | 1.7                              | 0.8                                   | 1.7     | 0.8               | 1.1                            |

Magnetic Susceptibility  
TSR(Total Solar Reflectance)  
Heat Resistance  
Dispersibility  
Chemical Resistance

Measured by Vibrating Sample Magnetometer  
JIS K5602  
Color difference of the test pieces after mold injecting at 210°C and 280°C  
Measured by twin screw extruder.  
acid: Color difference checked by acrylic lacquer after soaking pigment in 5% HCl for 3 days.  
alkali: 20% NaOH

# TOMATEC

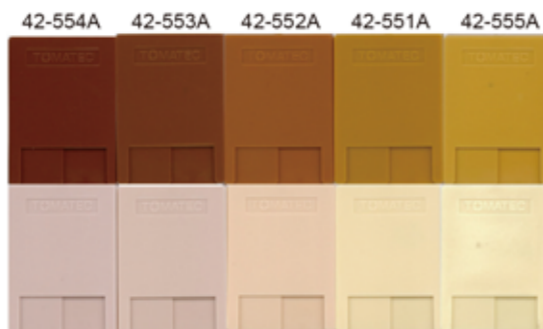
<http://www.tomatec.co.jp>

## New Pigment Brown 48 Aluminum Iron Titanate



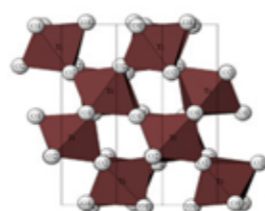
### Product Information

|                   |                                 |
|-------------------|---------------------------------|
| C.I. Generic Name | Pigment Brown 48                |
| C.I. Number       | 775435                          |
| CAS Number        | 1310-39-0<br>12789-64-9         |
| Basic Formula     | $(\text{Fe, Al})_2\text{TiO}_5$ |

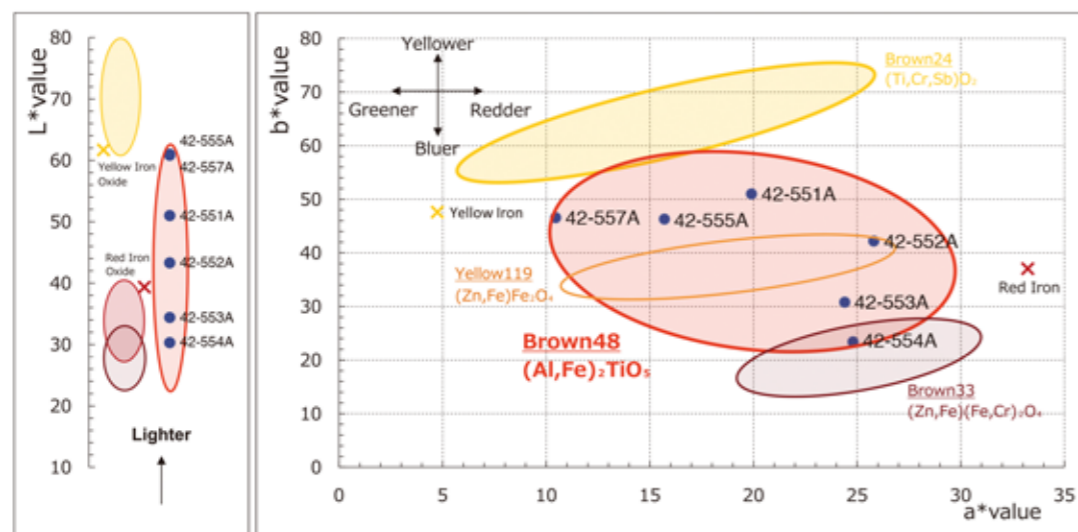


### Advantages

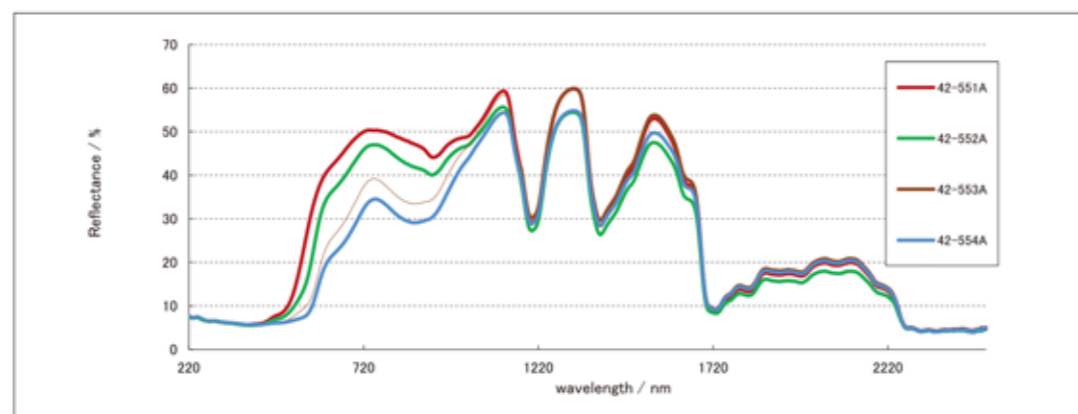
- ◆ Stable crystal structure  $\Rightarrow$  Pseudo-brookite - Aluminum Iron Titanate
- ◆ High Dispersibility ◆ Low Magnetism
- ◆ High Durability (heat, weather, chemicals)
- ◆ Friendly to human and environment  
 $\Rightarrow$  Cr, Sb, Ni, Cu, Zn, Ba, Bi or V – not contained
- ◆ FDA Compliant



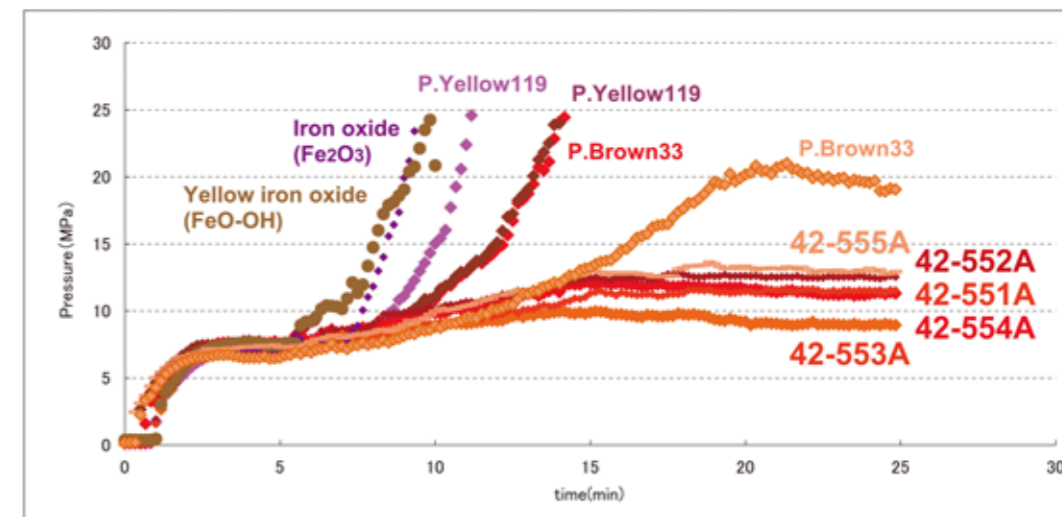
### Color Space -Masstone-



### Spectral Curves



### Dispersibility



test condition

|                             |                     |                         |   |
|-----------------------------|---------------------|-------------------------|---|
| • Apparatus                 | Twin screw extruder | • Temperature           | 260 C ( 500 F )   |
| • Screw diameter            | 15 mm               | • Screw rpm             | 200   |
| • Screw length              | 30 L/D              | • Resin                 | MFI 1.3 LDPE pellet   |
| • Screen                    | Sintered filter     | • Throughput rate Resin | 0.5 kg / hrs  |
| • Screen diameter           | 0.79 inches         | • Pigment               | 0.3 kg / hrs  |
| • Nominal retention microns | 20                  | • Procedure             | purge 5 minutes, run 10 minutes, then purge various minutes |

### Heat Stability

| Sample Name                                      |             | Masstone     |              |              |              | Tint         |              |              |              |
|--|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|  |             | $\Delta L^*$ | $\Delta a^*$ | $\Delta b^*$ | $\Delta E^*$ | $\Delta L^*$ | $\Delta a^*$ | $\Delta b^*$ | $\Delta E^*$ |
| 551A / P.Brown48                                 | 210°C       | -            | -            | -            | -            | -            | -            | -            | -            |
|  | 280°C       | 0.39         | 0.40         | 0.38         | 0.67         | -0.72        | -0.15        | -0.39        | 0.83         |
|  | 280°C, 5min | 0.84         | 0.76         | 1.32         | 1.74         | -0.80        | -0.27        | -0.72        | 1.11         |
| 552A / P.Brown48                                 | 210°C       | -            | -            | -            | -            | -            | -            | -            | -            |
|  | 280°C       | 0.14         | 0.18         | 0.00         | 0.22         | -0.60        | -0.03        | -0.17        | 0.62         |
|  | 280°C, 5min | 0.59         | 0.59         | 0.70         | 1.09         | -0.56        | -0.16        | -0.31        | 0.66         |
| 553A / P.Brown48                                 | 210°C       | -            | -            | -            | -            | -            | -            | -            | -            |
|  | 280°C       | 0.16         | 0.11         | -0.13        | 0.23         | -0.50        | -0.09        | -0.21        | 0.55         |
|  | 280°C, 5min | 0.34         | 0.65         | 0.58         | 0.93         | -0.42        | -0.28        | -0.33        | 0.60         |
| 554A / P.Brown48                                 | 210°C       | -            | -            | -            | -            | -            | -            | -            | -            |
|  | 280°C       | -0.13        | -0.43        | -0.42        | 0.61         | -0.49        | 0.01         | -0.10        | 0.50         |
|  | 280°C, 5min | -0.34        | -0.69        | -0.56        | 0.95         | -0.46        | -0.19        | -0.22        | 0.54         |
| Yellow iron oxide (FeO-OH)                       | 210°C       | -            | -            | -            | -            | -            | -            | -            | -            |
|  | 280°C       | -7.14        | 6.97         | -3.39        | 10.54        | -2.58        | 2.67         | -0.04        | 3.71         |
|  | 280°C, 5min | -16.33       | 18.01        | -9.65        | 26.16        | -9.32        | 12.33        | -1.33        | 15.52        |
| Red iron oxide (Fe <sub>2</sub> O <sub>3</sub> ) | 210°C       | -            | -            | -            | -            | -            | -            | -            | -            |
|  | 280°C       | -2.36        | -1.55        | -1.91        | 3.41         | -1.54        | -0.18        | -1.94        | 2.48         |
|  | 280°C, 5min | -1.70        | -0.44        | -1.27        | 2.17         | -1.77        | -0.73        | -2.40        | 3.07         |

Illuminant D65, 10 degree observer

#### Test Piece Preparation

| Formula          | Masstone | 1:4 TiO <sub>2</sub> Tint |
|------------------|----------|---------------------------|
| Pigments         | 0.5      | 0.1                       |
| TiO <sub>2</sub> | -----    | 0.4                       |
| Polypropylene    | 100      | 100                       |

The weighed pigments were added to 400 grams (14.1 oz) of PP pellets in a polyethylene bag. The polyethylene bag were shaken by a shaker for 5 minutes before injection molding at 210°C(410°F) or 280°C(536°F) for heat stability evaluation.