

# Covestro Makrolon® ET 3113

Extrusion; high viscosity; UV stabilized; available in transparent colors only; solid sheet; corrugated sheet  
Mechanical property data for samples at 50% RH.

| Physical Properties                | Metric                                               | English                                               | Comments                                     |
|------------------------------------|------------------------------------------------------|-------------------------------------------------------|----------------------------------------------|
| Bulk Density                       | 0.660 g/cc<br>@Temperature 23.0 °C                   | 0.0238 lb/in³<br>@Temperature 73.4 °F                 | pellets; ISO 60                              |
| Density                            | 1.20 g/cc                                            | 0.0434 lb/in³                                         | ISO 1183-1                                   |
| Moisture Absorption at Equilibrium | 0.12 %<br>@Temperature 23.0 °C                       | 0.12 %<br>@Temperature 73.4 °F                        | ISO 62                                       |
| Water Absorption at Saturation     | 0.30 %<br>@Temperature 23.0 °C                       | 0.30 %<br>@Temperature 73.4 °F                        | ISO 62                                       |
| Water Vapor Transmission           | 15.0 g/m²/day<br>@Temperature 23.0 °C                | 0.966 g/100 in²/day<br>@Temperature 73.4 °F           | 85% RH, 100µm film; ISO 15106-1              |
| Oxygen Transmission                | 65.0 cc-mm/m²-24hr-atm<br>@Thickness 0.100 mm        | 165 cc-mil/100 in²-24hr-atm<br>@Thickness 0.00394 in  | ISO 2556                                     |
|                                    | 70.0 cc-mm/m²-24hr-atm<br>@Thickness 0.0254 mm       | 178 cc-mil/100 in²-24hr-atm<br>@Thickness 0.00100 in  | ISO 2556                                     |
| Nitrogen Transmission              | 12.0 cc-mm/m²-24hr-atm<br>@Thickness 0.100 mm        | 30.5 cc-mil/100 in²-24hr-atm<br>@Thickness 0.00394 in | ISO 2556                                     |
|                                    | 13.0 cc-mm/m²-24hr-atm<br>@Thickness 0.0254 mm       | 33.0 cc-mil/100 in²-24hr-atm<br>@Thickness 0.00100 in | ISO 2556                                     |
| Carbon Dioxide Transmission        | 380 cc-mm/m²-24hr-atm<br>@Thickness 0.100 mm         | 965 cc-mil/100 in²-24hr-atm<br>@Thickness 0.00394 in  | ISO 2556                                     |
|                                    | 430 cc-mm/m²-24hr-atm<br>@Thickness 0.0254 mm        | 1090 cc-mil/100 in²-24hr-atm<br>@Thickness 0.00100 in | ISO 2556                                     |
| Linear Mold Shrinkage              | 0.0075 cm/cm<br>@Pressure 50.0 MPa                   | 0.0075 in/in<br>@Pressure 7250 psi                    | 60x60x2 mm; ISO 294-4                        |
| Linear Mold Shrinkage, Flow        | 0.0070 cm/cm<br>@Pressure 50.0 MPa                   | 0.0070 in/in<br>@Pressure 7250 psi                    | 60x60x2 mm; ISO 294-4                        |
| Melt Flow                          | 6.5 g/10 min<br>@Load 1.20 kg,<br>Temperature 300 °C | 6.5 g/10 min<br>@Load 2.65 lb,<br>Temperature 572 °F  | ISO 1133                                     |
| Mechanical Properties              | Metric                                               | English                                               | Comments                                     |
| Ball Indentation Hardness          | 113 MPa<br>@Temperature 23.0 °C                      | 16400 psi<br>@Temperature 73.4 °F                     | ISO 2039-1                                   |
| Tensile Strength at Break          | 70.0 MPa                                             | 10200 psi                                             | 50mm/min; ISO 527-1,-2                       |
| Tensile Strength, Yield            | 65.0 MPa                                             | 9430 psi                                              | 50mm/min; ISO 527-1,-2                       |
| Elongation at Break                | >= 50 %                                              | >= 50 %                                               | 50mm/min,<br>complete break;<br>ISO 524-1,-2 |
|                                    | 130 %                                                | 130 %                                                 | 50mm/min,<br>complete break;<br>ISO 524-1,-2 |
| Elongation at Yield                | 6.3 %                                                | 6.3 %                                                 | 50mm/min; ISO 527-1,-2                       |

|                                   |                                                                       |                                                                            |                                              |
|-----------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------|
| Tensile Modulus                   | 2.35 GPa<br>@Temperature 23.0 °C                                      | 341 ksi<br>@Temperature 73.4 °F                                            | 1mm/min,<br>complete break;<br>ISO 527-1,-2  |
| Flexural Strength                 | 96.0 MPa                                                              | 13900 psi                                                                  | 2mm/min; ISO<br>178                          |
|                                   | 72.0 MPa<br>@Strain 3.5 %                                             | 10400 psi<br>@Strain 3.5 %                                                 | 2mm/min; ISO<br>178                          |
| Flexural Modulus                  | 2.35 GPa<br>@Temperature 23.0 °C                                      | 341 ksi<br>@Temperature 73.4 °F                                            | 2mm/min; ISO<br>178                          |
| Flexural Strain at Break          | 7.2 %                                                                 | 7.2 %                                                                      | 2 mm/min; ISO<br>178                         |
| Izod Impact, Notched (ISO)        | 20.0 kJ/m <sup>2</sup><br>@Thickness 3.00 mm,<br>Temperature -30.0 °C | 9.52 ft-lb/in <sup>2</sup><br>@Thickness 0.118 in,<br>Temperature -22.0 °F | ISO 7391/b.o. ISO<br>180-A                   |
|                                   | 70.0 kJ/m <sup>2</sup><br>@Thickness 3.00 mm,<br>Temperature 23.0 °C  | 33.3 ft-lb/in <sup>2</sup><br>@Thickness 0.118 in,<br>Temperature 73.4 °F  | Partial Break; ISO<br>7391/b.o. ISO<br>180-A |
| Charpy Impact Unnotched           | NB<br>@Temperature 23.0 °C                                            | NB<br>@Temperature 73.4 °F                                                 | ISO 179-1eU                                  |
|                                   | NB<br>@Temperature -30.0 °C                                           | NB<br>@Temperature -22.0 °F                                                | ISO 179-1eU                                  |
|                                   | NB<br>@Temperature -60.0 °C                                           | NB<br>@Temperature -76.0 °F                                                | ISO 179-1eU                                  |
| Charpy Impact, Notched            | 1.80 J/cm <sup>2</sup><br>@Thickness 3.00 mm,<br>Temperature -30.0 °C | 8.57 ft-lb/in <sup>2</sup><br>@Thickness 0.118 in,<br>Temperature -22.0 °F | ISO 7391/b.o.ISO<br>179-1eA                  |
|                                   | 8.00 J/cm <sup>2</sup><br>@Thickness 3.00 mm,<br>Temperature 23.0 °C  | 38.1 ft-lb/in <sup>2</sup><br>@Thickness 0.118 in,<br>Temperature 73.4 °F  | ISO 7391/b.o.ISO<br>179-1eA                  |
| Puncture Energy                   | 60.0 J<br>@Temperature 23.0 °C                                        | 44.3 ft-lb<br>@Temperature 73.4 °F                                         | complete break;<br>ISO 6603-2                |
|                                   | 70.0 J<br>@Temperature -30.0 °C                                       | 51.6 ft-lb<br>@Temperature -22.0 °F                                        | complete break;<br>ISO 6603-2                |
| Tensile Creep Modulus, 1 hour     | 2200 MPa<br>@Temperature 23.0 °C                                      | 319000 psi<br>@Temperature 73.4 °F                                         | ISO 899-1                                    |
| Tensile Creep Modulus, 1000 hours | 1900 MPa<br>@Temperature 23.0 °C                                      | 276000 psi<br>@Temperature 73.4 °F                                         | ISO 899-1                                    |