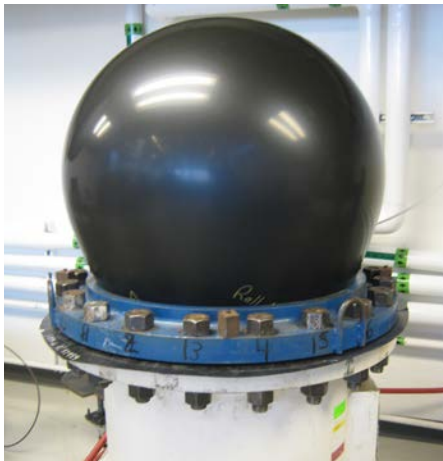


# GEOMEMBRANES

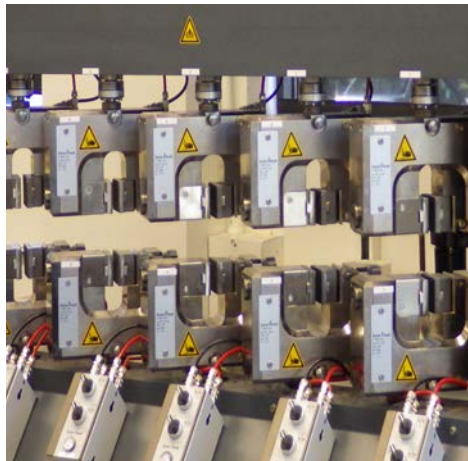
## RESEARCH & DEVELOPMENT, TESTING, EVALUATION, EXPERTISE

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### MECHANICAL PROPERTIES

- Puncture
  - ASTM D4833, D5748, F1306, FTMS101C/2065
- Puncture pyramidal
  - EN 14574
- Seam resistance
  - PE: ASTM D6392, D6214, D4595
  - Seams: D4437
  - Tape: ASTM D7272
  - PVC: D882 mod., D7408
  - Reinforced: ASTM D751, D7747 (Strip), D7749 (Grab)
- Tear resistance
  - Propagation: ASTM D1922
  - Trouser: ASTM D1938
  - Grave: ASTM D624, D1004
  - Reinforced geomembranes: ASTM D751, D5884
- Tensile
  - Elastomers: ASTM D412
  - Multiaxial: ASTM D5617, EN 14151
  - PE: ASTM D6693, ISO 527
  - PVC: ASTM D882
  - Reinforced geomembranes: ASTM D751, D7003 (Strip), D7004 (Grab)
  - Wide width - 10%/min: ASTM D4885
  - Elastic modulus: ASTM D638, ISO 527



- Hydrostatic puncture / Truncated cones
  - ASTM D5514
- Interface shear strength
  - ASTM D5321, ISO 13957-1
- Abrasion resistance
  - Taber: ASTM D4060, D1044
  - Coatings: ASTM D6279
- Compressive properties
  - Elastomers: ASTM D575
  - Plastics: ASTM D695
- Static and kinetic coefficients of friction
  - ASTM D1894
- 2% secant modulus
  - ASTM D5323
- Adhesion of coating
  - ASTM D751, D903
- Flexural strength (2 directions)
  - Plastics: ASTM D790
  - Cellular Foam: ASTM C203
- Grab tensile (Reinforced geomembranes)
  - ASTM D751, D7004
- Hydrostatic resistance
  - ASTM D751A
- Impact resistance
  - ASTM D746
  - Izod: ASTM D256
  - Plastic sheet: ASTM D5420, D4226, D3763
  - Plastic film: ASTM D1709- D7192



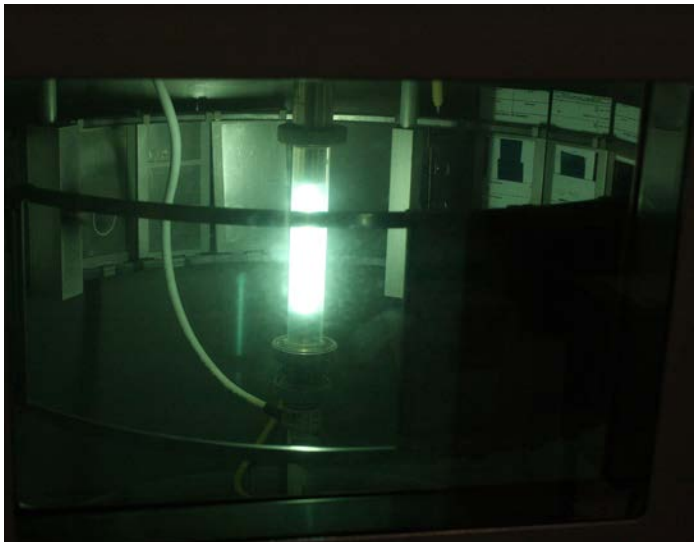
### DURABILITY

- Guidelines for the assessment of durability
  - ASTM D5819, ISO 13434, EN 12226
- Chemical compatibility
  - ASTM D5747, D5322, EPA 9090
- Chemical resistance for landfill applications
  - EN 14414
- Resistance to oxidation
  - ISO 13438, EN 14575
- Resistance to leaching
  - EN 14415
- Oven aging
  - ASTM D5721, ASTM D3045, D573, D572
- Microbiological resistance/soil burial
  - ASTM G160, D3083, EN 12225
- Stress cracking resistance
  - ASTM D1693, D5397, F2136 EN 14576
- UV (Fluorescent)
  - ASTM D7238, D4329, D4587, G154, GRI GM11, EN 12224
- UV (Xenon)
  - ASTM D 2565, D4459, D6695, D4355, G155, ISO 4892
- UV (carbon arc)
  - ASTM G153
- Salt spray
  - ASTM B117
- Oxidative induction time DSC
  - ASTM D3895, D5885

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### ■ PHYSICAL PROPERTIES

- Asperity height  
ASTM D7466  
GRI GM12
- Density  
ASTM D792, ISO 1183
- Thickness  
PVC: ASTM D1593  
Smooth PE: ASTM D751, D5199, ISO9863-1  
Textured PE: ASTM D5994
- Weight  
ASTM D751, ISO9864
- Ash content  
ASTM D5630, D2584
- Carbon black content  
ASTM D1603, D4218, ISO 6964
- Hardness  
ASTM D2240, EN SO 868, ASTM D2583
- Melt flow index  
ASTM D1238, ISO 1133
- Water absorption  
ASTM D570, D2842
- Carbon black content  
ASTM D1603, D4218
- Carbon black dispersion  
ASTM D5596, D3015, ISO 18553

### ■ THERMAL CHARACTERISTICS

- Coefficient of thermal expansion  
ASTM E831/D696
- Composition analysis TGA  
ASTM E1131
- Glass transition temperature DMA  
ASTM E1640, D7028
- Glass transition temperature DSC  
ASTM E1356, E793, D3418
- Melt/ Crystallisation characteristics  
ASTM E794, E793, D3418
- Thermal stability TGA  
ASTM E2550
- Brittleness temperature  
ASTM D746
- Dimensional stability  
ASTM D1204
- OIT  
ASTM D3895, EN 728
- HP-OIT  
ASTM D5885
- Low temperature bend test  
ASTM D2136

### ■ CHEMICAL RESISTANCE

- Chemical exposure, permeation durability to challenge chemicals
- Toxicity and VOCs analysis
- Specialized equipment such as:  
HPLC-MS, GC-MS, HS-GC-MS, TD-GC-MS, FT-IR
- Microscopic analysis
- PVC plasticizers (content, molecular-weight)  
ASTM D2124, D7176
- Volatile loss  
ASTM D1203
- Water extraction  
ASTM D1239, D3083

### ■ BARRIER PROPERTIES

- Water vapor transmission rate  
ASTM F1249, E96 (A, B, BW)
- Water permeability  
EN 14150
- Gas permeability  
ASTM D1434
- Oxygen transmission rate  
ASTM D3985