

# ISO/TR 18228-9:2022-04 (E)

## Design using geosynthetics - Part 9: Barriers

---

<b>Contents</b>		<b>Page</b>
Foreword .....		v
Introduction .....		vi
1	Scope .....	1
2	Normative references .....	1
3	Terms and definitions .....	1
4	Pictograms .....	2
4.1	Product and function .....	2
4.2	Applications .....	2
4.2.1	Containment application, non-landfill (CA) .....	2
4.2.2	Chemical containment, non-landfill (CC) .....	2
4.2.3	Construction waterproofing (CW) .....	3
4.2.4	Landfill base lining (LBL) .....	3
4.2.5	Landfills caps (LC) .....	3
4.2.6	Secondary containment (SC) .....	4
4.2.7	Transport infrastructure applications (TIA) .....	4
4.2.8	Tunnels (Tu) .....	5
4.2.9	Water retaining structure (WRS-e), e.g. balancing ponds, dams, dykes and canals (usually empty) .....	5
4.2.10	Water retaining structure (WRS-f), e.g. reservoirs, canals (usually full) .....	5
5	Design Criteria .....	6
6	Materials .....	7
6.1	General .....	7
6.2	HDPE .....	7
6.3	LLDPE .....	7
6.4	fPP .....	7
6.5	PVC .....	7
6.6	EPDM .....	7
6.7	Bitumen .....	7
6.8	EIA (ethylene interpolymer alloy) .....	7
6.9	Bentonite .....	7
6.10	Sodium bentonite .....	8
6.11	Calcium bentonite .....	8
7	Properties relevant to design .....	8
7.1	General .....	8
7.2	Chemical resistance .....	9
7.3	Physical properties .....	9
7.4	Durability/weathering .....	10
7.4.1	General .....	10
7.4.2	Mechanisms of degradation of the GBR .....	10
7.4.3	Mechanisms of degradation of the joints .....	10
8	Principles of design .....	11
8.1	General .....	11
8.2	Subgrade preparation .....	11

8.3	Slope stability .....	11
8.4	Climate conditions .....	12
8.5	Temperature effects (thermal expansion and stiffness) .....	12
8.6	Protection and testing .....	12
8.6.1	Puncture protection .....	12
8.6.2	Installation issues, excluding jointing .....	12
8.6.3	QC on site .....	13
8.6.4	Hydraulic uplift .....	14
ISO/TR 18228-9:2022(E) 9 Example design chart .....		14
Bibliography .....		16