

Contents

	Foreword	1
1	Introduction.....	1
2	Geotechnical properties of sample materials: crushed Opalinus claystone, MX80 bentonite and mixtures	7
2.1	Characteristics of sample materials	7
2.1.1	Crushed Opalinus claystone	7
2.1.2	MX80 Bentonite	10
2.1.3	Claystone/bentonite mixtures.....	12
2.1.4	Synthetic pore water.....	13
2.2	Water retention	14
2.2.1	Test methodology	14
2.2.2	Test results	17
2.3	Compressibility	24
2.3.1	Test methodology	24
2.3.2	Test results	25
2.4	Swelling capacity	30
2.4.1	Test methodology	30
2.4.2	Test results	31
2.5	Water permeability.....	34
2.5.1	Test methodology	34
2.5.2	Test results	34
2.6	Gas permeability.....	35
2.6.1	Test methodology	36
2.6.2	Test results	37
3	Barrier performance of selected claystone/bentonite mixtures	45
3.1	Repository relevant conditions considered.....	45
3.2	Test methodology	46
3.2.1	Equipment and samples	46

3.2.2	Test procedure	51
3.3	Results of hydro-mechanical testing	54
3.3.1	Hydration and swelling.....	54
3.3.2	Consolidation and water permeability	56
3.3.3	Gas penetration and impact.....	61
3.3.4	Dismantled samples	65
3.4	Results of thermal testing	68
3.4.1	Thermal effects on hydration and swelling	68
3.4.2	Thermal effects on consolidation and water permeability	68
3.4.3	Thermal effect on gas penetration	72
4	Summary and conclusions	77
	Acknowledgements	80
	References	81
	List of figures	89
	List of tables	93