

TABLE OF CONTENT

1. Introduction	3
2. Bitumen modification	6
2.1. Resistance to ageing	6
2.2. Susceptibility to temperature changes	8
2.3. Selected methods of rheological properties of bitumen	9
2.3.1. Bitumen modification with sulphur addition	10
2.3.2. Modification of bitumen with addition of mineral powder ...	12
2.3.3. Modification of bitumen with polymer additives	17
3. Theoretical basis for selection of bitumen and SBS in waterproofing products	25
3.1. SBS structure and properties	25
3.2. Selection of bitumen and SBS in terms of their structure and compatibility	29
4. Modern waterproofing materials for flat roofs	35
4.1. Genesis of polymer roofing membranes	35
4.2. Current trends in development of polymer bitumen membranes	37
4.3. Alternative polymer roofing materials for flat roofs	42
4.4. Laboratory ageing of polymer bitumen roofing materials	45
5. Research methodology	48
6. The analysis of rheological state of SBS modified bitumens based on viscosity measurements	52
6.1. Test results	52
6.1.1. Group composition of bitumens	53
6.1.2. Measurements of bitumen dynamic viscosity	54
6.2. The example of analysis of rheological state of bitumens tested with the use of coefficients	60
7. The impact of SBS variety on bitumen characteristics	63
7.1. Methodology of tests	63
7.2. Test results and their analysis	64
8. The impact of aging of SBS modified bitumen on its selected technical characteristics	68
8.1. Test methods	68
8.2. Test results and their analysis	69
8.2.1. Ageing tests in a thin layer using TFOT method	69
8.2.2. Measurement of penetration before and after ageing with TFOT method	72
8.2.3. Measurement of penetration before and after ageing with TFOT method	76
8.2.4. Measurements of the capacity of mastic adhesion to concrete and steel substrates before and after ageing with TFOT method	78
9. Possibilities of slowing down ageing processes in bitumen	84
9.1. Methodology of study	84
9.2. Test results and their analysis	85
10. Low temperature characteristics of SBS modified bitumens	88
10.1. Methodology of studies	88
10.2. Test results and their analysis	90
10.2.1. Determination of critical temperature using BBR method	90

10.2.2. Determination of breaking point by Fraass method.....	98
10.3. Comparative analysis of breaking point and critical temperature values	100
11. Determination of SBS content in bitumen on the basis of viscosity measurements	105
11.1. Measurement of dynamic viscosity of bitumen.....	105
11.2. Verifying tests	110
Bibliography	113