

## Contents

|  |           |
|--|-----------|
| <b>00 - Technical data</b>   | <b>1</b>  |
| <b>1 Identification</b>  | <b>1</b>  |
| 1.1 PR number and type of brake system   | 1         |
| <b>2 Safety information</b>  | <b>2</b>  |
| 2.1 Safety precautions when working on the high-voltage system                         | 2         |
| 2.2 Safety precautions when working in the vicinity of high-voltage components         | 3         |
| 2.3 Safety precautions when working on vehicles with start/stop system                 | 3         |
| 2.4 Safety precautions when using testers and measuring instruments during a road test | 3         |
| <b>3 Repair instructions</b>   | <b>4</b>  |
| 3.1 Identification plates  | 4         |
| 3.2 Use of impact wrenches   | 4         |
| 3.3 Rules for cleanliness  | 5         |
| 3.4 Nuts, bolts  | 5         |
| 3.5 Contact corrosion  | 5         |
| <b>4 Technical data</b>  | <b>7</b>  |
| 4.1 Technical data for brakes  | 7         |
| <b>5 Brake test</b>  | <b>9</b>  |
| 5.1 General notes  | 9         |
| 5.2 Testing vehicles with front-wheel drive  | 9         |
| 5.3 Testing vehicles with all-wheel drive  | 9         |
| 5.4 Checking parking brake   | 10        |
| 5.5 Checking brake discs   | 10        |
| <b>6 Electrical components</b>   | <b>13</b> |
| 6.1 Starting diagnosis   | 13        |
| <b>45 - Anti-lock brake system</b>   | <b>15</b> |
| <b>1 General notes</b>   | <b>15</b> |
| 1.1 Notes for repair work on ABS   | 15        |
| <b>2 Overview of fitting locations</b>   | <b>16</b> |
| 2.1 Overview of fitting locations - ABS/ESP  | 16        |
| <b>3 Control unit and hydraulic unit</b>   | <b>19</b> |
| 3.1 Assembly overview - control unit and hydraulic unit                                | 19        |
| 3.2 Removing and installing ABS control unit J104 / ABS hydraulic unit N55             | 21        |
| 3.3 Separating control unit from hydraulic unit  | 25        |
| 3.4 Attaching control unit to hydraulic unit   | 26        |
| <b>4 Sensors</b>   | <b>28</b> |
| 4.1 Assembly overview - speed sensors on front axle                                    | 28        |
| 4.2 Assembly overview - speed sensors on rear axle                                     | 28        |
| 4.3 Removing and installing front wheel speed sensor G45 / G47                         | 29        |
| 4.4 Removing and installing rear wheel speed sensor G44 / G46                          | 30        |
| 4.5 Checking ABS sensor ring   | 30        |
| 4.6 Removing and installing brake light switch   | 31        |
| <b>46 - Brakes - mechanism</b>   | <b>33</b> |
| <b>1 Front brakes</b>  | <b>33</b> |
| 1.1 Assembly overview - front brakes   | 33        |
| 1.2 Removing and installing brake pads   | 43        |
| 1.3 Removing and installing brake caliper  | 52        |
| 1.4 Renewing brake caliper   | 57        |
| 1.5 Removing and installing brake disc   | 65        |
| 1.6 Removing and installing splash plate   | 66        |
| 1.7 Removing and installing pad wear indicator wire                                    | 66        |



|                                       |  |            |
|---------------------------------------|--|------------|
| <b>2</b>                              | <b>Rear brakes</b> .....   | <b>69</b>  |
| 2.1                                   | Assembly overview - rear brakes .....                                | 69         |
| 2.2                                   | Removing and installing brake pads .....                             | 72         |
| 2.3                                   | Removing and installing brake caliper .....                          | 79         |
| 2.4                                   | Renewing brake caliper .....   | 82         |
| 2.5                                   | Removing and installing brake carrier .....                          | 85         |
| 2.6                                   | Removing and installing brake disc .....                             | 86         |
| 2.7                                   | Removing and installing splash plate .....                           | 87         |
| 2.8                                   | Removing and installing pad wear indicator wire .....                | 87         |
| <b>3</b>                              | <b>Parking brake</b> .....   | <b>89</b>  |
| 3.1                                   | Assembly overview - parking brake .....                              | 89         |
| 3.2                                   | Removing and installing parking brake motor V282 / V283 .....        | 89         |
| 3.3                                   | Releasing parking brake manually .....                               | 91         |
| <b>4</b>                              | <b>Brake pedal</b> .....   | <b>93</b>  |
| 4.1                                   | Assembly overview - brake pedal .....                                | 93         |
| 4.2                                   | Removing and installing mounting bracket .....                       | 94         |
| 4.3                                   | Separating brake pedal from brake servo .....                        | 96         |
| 4.4                                   | Connecting brake pedal to brake servo .....                          | 97         |
| 4.5                                   | Removing and installing brake pedal .....                            | 98         |
| <b>47 - Brakes - hydraulics</b> ..... | <b>100</b>   |            |
| <b>1</b>                              | <b>Front brake caliper</b> .....                                     | <b>100</b> |
| 1.1                                   | Assembly overview - front brake caliper .....                        | 100        |
| 1.2                                   | Removing and installing brake caliper piston .....                   | 101        |
| <b>2</b>                              | <b>Rear brake caliper</b> .....                                      | <b>107</b> |
| 2.1                                   | Assembly overview - rear brake caliper .....                         | 107        |
| 2.2                                   | Removing and installing brake caliper piston .....                   | 107        |
| <b>3</b>                              | <b>Brake servo/brake master cylinder</b> .....                       | <b>112</b> |
| 3.1                                   | Assembly overview - brake servo/brake master cylinder .....          | 112        |
| 3.2                                   | Removing and installing brake servo .....                            | 121        |
| 3.3                                   | Removing and installing brake master cylinder .....                  | 128        |
| 3.4                                   | Removing and installing brake fluid reservoir .....                  | 132        |
| 3.5                                   | Removing and installing brake fluid level warning contact F34 .....  | 135        |
| 3.6                                   | Removing and installing brake system pressure accumulator VX70 ..... | 136        |
| <b>4</b>                              | <b>Vacuum system</b> .....   | <b>140</b> |
| 4.1                                   | Assembly overview - vacuum pump .....                                | 140        |
| 4.2                                   | Checking non-return valve .....                                      | 143        |
| 4.3                                   | Removing and installing non-return valve .....                       | 144        |
| 4.4                                   | Removing and installing vacuum pump .....                            | 146        |
| 4.5                                   | Removing and installing brake servo pressure sensor .....            | 149        |
| 4.6                                   | Checking vacuum system .....   | 149        |
| <b>5</b>                              | <b>Hydraulic system</b> .....  | <b>154</b> |
| 5.1                                   | General notes on brake fluid .....                                   | 154        |
| 5.2                                   | Bleeding hydraulic system .....                                      | 155        |
| 5.3                                   | Pre-bleeding brake system pressure accumulator VX70 .....            | 160        |
| 5.4                                   | Leak test .....  | 161        |