



Contents

00 - Technical data	1
1 Safety information	1
1.1 Safety precautions when working on air conditioning systems	1
1.2 Safety precautions when working on high-voltage system	2
1.3 Safety precautions when working in the vicinity of high-voltage components	2
1.4 Safety precautions when tow-starting or towing	3
2 Repair notes	4
2.1 Rules for cleanliness when working on high-voltage system	4
3 General information on air conditioning	5
3.1 Other reference material	5
3.2 Basics of air conditioning technology	5
3.3 Vapour pressure table for refrigerant R134a	7
3.4 Refrigerant R134a	8
3.5 Properties of refrigerant R134a	9
3.6 Refrigerant oil	11
3.7 Comfort	13
3.8 How air conditioning works	14
3.9 General work safety	14
3.10 Safety measures when working on vehicles with air conditioning and when working with refrigerant R134a	17
3.11 Basics for working on refrigerant circuit	18
4 General information on refrigerant circuit	21
4.1 Components of refrigerant circuit	21
4.2 Design of refrigerant circuit	32
4.3 Evacuation and charging valves for quick-release couplings of air conditioner service station on refrigerant circuit	33
4.4 Switches and senders in refrigerant circuit and related connections	35
4.5 Electrical components not installed in refrigerant circuit	40
4.6 Pressures and temperatures in refrigerant circuit	43
4.7 Refrigerant circuit with expansion valve	43
4.8 Refrigerant circuit with restrictor and reservoir	45
4.9 Test and measurement work that can be performed using a pressure gauge	47
4.10 Air conditioner service and recycling equipment	48
4.11 Notes to repairs on refrigerant circuit	49
5 Laws and regulations	50
5.1 Laws and regulations	50
5.2 Recycling and refuse law	55
5.3 Maintaining records on refrigerant	56
87 - Air conditioning system	57
1 Working with air conditioner service station	58
1.1 Important instructions for working with the air conditioner service station	59
1.2 Connecting a air conditioner service station for measuring and testing	59
1.3 Purging refrigerant circuit	60
1.4 Evacuating refrigerant circuit	61
1.5 Charging refrigerant circuit	62
1.6 Bringing air conditioning system into service after charging	63
1.7 Filling refrigerant into internal pressure vessel	64
1.8 Emptying air conditioner service station	64
1.9 Vehicles with high-voltage system (hybrid vehicles)	64
1.10 Blowing through refrigerant circuit with compressed air and nitrogen	65
1.11 Cleaning refrigerant circuit	67



1.12	For vehicles that have connections on both low-pressure and high-pressure sides of refrigerant circuit	99
2	Refrigerant circuit	100
2.1	Renewing components	100
2.2	Checking pressures with pressure gauge	107
2.3	Checking systems with a restrictor and collector (with internally regulated air conditioner compressor)	111
2.4	Checking systems with an expansion valve and reservoir (with internally regulated air conditioner compressor)	115
2.5	Checking systems with an expansion valve and reservoir (without regulated air conditioner compressor)	120
2.6	Checking systems with a restrictor and reservoir and air conditioner compressor regulating valve N280 (with externally regulated air conditioner compressor)	121
2.7	Checking systems with an expansion valve, receiver and air conditioner compressor regulating valve N280 (with externally regulated air conditioner compressor)	126
2.8	With expansion valve, receiver and electrical air conditioner compressor	137
2.9	Investigating leaks	138
3	Testing equipment and tools	149
3.1	List of test equipment, tools and materials	149