

23 00 Transmission filling capacities E46 / E60 / E61 / E63 / E64 / E81 / E82 / E83 / E84 / E85 / E86 / E87 / E90 / E91 / E92 / E93 GS6-37BZ/DZ / MANUAL

Oil grade:		
refer to Operating Fluids		
Oil volume	litre	1.5
Oil fill quantity for initial fill or replacement transmission	litre	1.6

23 00 Transmission in general S7S 47BG

Oil grade, refer to Operating Fluids		
Oil fill quantity for oil change	Litres	2.55
Oil fill quantity for initial fill or replacement transmission	Litres	2.75

23 00 Transmission in general ZF-S5-16 / MECH

Oil grade:		
refer to Operating Fluids		
Oil volume	ltr.	1.05
Oil fill quantity for initial fill or replacement transmission	ltr.	1.15

23 00 Transmission in general 240/5 / MANUAL Overdrive

Oil grade:		
refer to Operating Fluids Specification		
Oil capacity	ltr.	1,05
Oil capacity for refilling or exchange transmission	ltr.	1,15

23 00 Transmission in general 260/5 / MANUAL Overdrive

Oil grade:		
refer to Operating Fluids Specification		
Oil capacity	ltr.	1,25
Oil capacity for refilling or exchange transmission	ltr.	1,35

23 00 Transmission in general 260/5 / MANUAL Sport

Oil grade:		
refer to Operating Fluids Specification		
Oil capacity	ltr.	1,25
Oil capacity for refilling or exchange transmission	ltr.	1,35

23 00 Transmission in general 260/6 / MANUAL Overdrive

Oil grade:		
refer Operating Fluids Specification		
Oil capacity	ltr.	1,25
Oil fill quantity for initial fill or repair transmission	ltr.	1,35

23 00 Transmission in general 265/5 / MANUAL Sport

Oil grade:		
refer Operating Fluids Specification		
Oil capacity	ltr.	1,5
Oil fill quantity for initial fill or repair transmission	ltr.	1,7

23 00 Transmission in general 265/6 / MANUAL Overdrive

Oil grade:		
refer Operating Fluids Specification		
Oil capacity	ltr.	1,5
Oil fill quantity for initial fill or repair transmission	ltr.	1,7

23 00 Transmission in general 280/5 / MANUAL Sport

Oil grade:		
refer Operating Fluids Specification		
Oil capacity	ltr.	1,25
Oil fill quantity for initial fill or repair transmission	ltr.	1,35

23 11 Case and Cover S6-37BZ/DZ / MECH

Temperature for installation of bearings	°C	80
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23 11 Case and Cover ZF-S5-16 / MECH

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 240/5 / MANUAL Overdrive

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 260/5 / MANUAL Overdrive

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 260/5 / MANUAL Sport

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 260/6 / MANUAL Overdrive

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 265/5 / MANUAL Sport

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 265/6 / MANUAL Overdrive

Temperature for installation of bearings	°C	80
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23 11 Housing with lid 280/5 / MANUAL Sport

Temperature for installation of bearings	°C	80
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23 21 Transmission Shafts GS6-37BZ/DZ

Axial play (axial bearing clearance) of:		
Output shaft	mm	0.15 ... 0.19
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

23 21 Transmission Shafts GS6-53DZ / MECH

Axial playÂ (axial bearing play) of:		
Output shaft	mm	
Input shaft	Max. mm	
Output journal:		
Radial runout	Max. mm	0.15
Output flange		
Radial runout	Max. mm	0.15
Axial runout	Max. mm	0.15

23 21 Transmission Shafts S 5 D 200 G / MECH

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	Max. mm	0.04
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

23 21 Transmission Shafts S 5 D 250 G / MECH

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	Max. mm	0.04
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

23 21 Transmission Shafts S 5 D 310 Z / MECH

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

23 21 Transmission Shafts S 6 S 420 G / MECH

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

23 21 Transmission Shafts S 6 S 560 G / MECH

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

23 21 Transmission Shafts ZF-S5-16 / MECH

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	1.1 ... 1.3
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

23 21 Transmission shafts 240/5 / MANUAL Overdrive

Side clearance (radial clearance) of:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Countershaft	mm	0,1 ... 0,2
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 21 Transmission shafts 260/5 / MANUAL Overdrive

Side clearance (radial clearance) of:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Countershaft	mm	0,1 ... 0,2
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 21 Transmission shafts 260/5 / MANUAL Sport

Side clearance (axial radial clearance) of the:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Countershaft	mm	0,13 ... 0,23
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 21 Transmission shafts 260/6 / MANUAL Overdrive

Side clearance (radial clearance) of:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Countershaft	mm	0,1 ... 0,2
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 21 Transmission shafts 265/5 / MANUAL Sport

Side clearance (axial radial clearance) der:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Countershaft	mm	0,1 ... 0,2
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 21 Transmission shafts 265/6 / MANUAL Overdrive

Side clearance (radial clearance) of:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Countershaft	mm	0,1 ... 0,2
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 21 Transmission shafts 280/5 / MANUAL Sport

Side clearance (axial radial clearance) der:		
Output shaft	mm	0 ... 0,09
Drive shaft	mm	0 ... 0,09
Output pin		
Radial runout	max mm	0,07
Output flange		
Radial runout	max mm	0,07
Lateral runout	max mm	0,1

23 22 Gears (Layshaft) GS6-53DZ / MECH

Press-off and press-on force		
5th gear wheel	kN	50
4th gear wheel	kN	50

23 22 Gears (Layshaft) S 5 D 200 G / MECH

Press-off and press-on force		
5th gear wheel	kN	50 ... 70
4th gear wheel	kN	

23 22 Gears (Layshaft) S 5 D 250 G / MECH

Press-off and press-on force		
5th gear wheel	kN	50 ... 70

23 22 Gears 240/5 / MANUAL Overdrive

Press-off force at room temperature		
5th gear wheel	t	4,5 ... 5,5
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--

23 22 Gears 260/5 / MANUAL Overdrive

Press-off force at room temperature		
5th gear wheel	t	5,5 ... 6,8
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	t°C	4.9 ... 6.8 approx. 120

23 22 Gears 260/5 / MANUAL Sport

Press-off force at room temperature		
5th gear wheel	t	5,5 ... 6,8
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	t°C	4.9 ... 6.8 approx. 120

23 22 Gears 260/6 / MANUAL Overdrive

Press-off force at room temperature		
5th gear wheel	t	5,5 ... 6,8
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	tca. °C	4,9 ... 6,8120

23 22 Gears 260/6 / MANUAL Overdrive

Press-off force at room temperature		
5th gear wheel	t	5,5 ... 6,8
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	tca. °C	4,9 ... 6,8120

23 22 Gears 265/5 / MANUAL Sport

Press-off force at room temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	tca. °C	5 ... 6150

23 22 Gears 265/6 / MANUAL Overdrive

Press-off force at room temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	tca. °C	5 ... 6150

23 22 Gears 280/5 / MANUAL Sport

Press-off force at room temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	tca. °C	5 ... 6150

23 22 Gears 280/5 / MANUAL Sport

Press-off force at room temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	--
5th gear wheel	tca. °C	5 ... 6150

23 22 Gears ZF-S5-16 / MANUAL Overdrive

Press-off force at room temperature		
3rd gear wheel	t	7,5
4th gear wheel	t	8,0
5th gear wheel	t	8,0
Press-on force at preheating temperature		
3rd gear wheel	t°C	--
4th gear wheel	t°C	0,015150 ... 180
5th gear wheel	t°C	--

23 23 Synchronisation guide bushes 240/5 / MANUAL Overdrive

Press-off force		
1st/2nd and 5th/reverse gear	t max	3,0
3rd/4th gear	t max	2,7
Press-on force		
1st/2nd and 5th/reverse gear	t max	2,1
3rd/4th gear	t max	1,9
Bearing bushes	ca. Â°C	80

23 23 Synchronisation guide bushes 260/5 / MANUAL Overdrive

Press-off force		
1st/2nd and 5th/reverse gear	t max	3,7
3rd/4th gear	t max	3,0
Press-on force		
1st/2nd and 5th/reverse gear	t max	2,5
3rd/4th gear	t max	2,1
Bearing bushes	ca. Â°C	80

23 23 Synchronisation guide bushes 260/5 / MANUAL Sport

Press-off force		
1st/2nd and 5th/reverse gear	t max	3,7
3rd/4th gear	t max	3,0
Press-on force		
1st/2nd and 5th/reverse gear	t max	2,5
3rd/4th gear	t max	2,1
Bearing bushes	ca. Â°C	80

23 23 Synchronisation guide bushes 260/6 / MANUAL Overdrive

Press-off force		
1st/2nd and 5th/reverse gear	t max	3,7
3rd/4th gear	t max	3,0
Press-on force		
1st/2nd and 5th/reverse gear	t max	2,5
3rd/4th gear	t max	2,1
Bearing bushes	ca. Â°C	80

23 23 Synchronisation guide bushes 260/6 / MANUAL Overdrive

Press-off force		
1st/2nd and 5th/reverse gear	t max	3,7
3rd/4th gear	t max	3,0
Press-on force		
1st/2nd and 5th/reverse gear	t max	2,5
3rd/4th gear	t max	2,1
Bearing bushes	ca. Â°C	80

23 23 Synchronisation guide bushes 265/5 / MANUAL Sport

Press-off force		
Press-on force		
Bearing bushes	ca. Å°C	80

23 23 Synchronisation guide bushes 265/6 / MANUAL Overdrive

Press-off force		
Press-on force		
Bearing bushes	ca. Å°C	80

23 23 Synchronisation guide bushes 280/5 / MANUAL Sport

Press-off force		
Press-on force		
Bearing bushes	ca. Å°C	80

23 23 Synchronisation guide bushes 280/5 / MANUAL Sport

Press-off force		
Press-on force		
Bearing bushes	ca. Å°C	80

23 23 Synchronisation guide bushes ZF-S5-16 / MANUAL Overdrive

Press-off force		
Press-on force		
1st/2nd and 5th/reverse gear	t max	0,08
Bearing bushes	ca. Â°C	80

23 23 Synchronisation 240/5 / MANUAL Overdrive

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation 260/5 / MANUAL Overdrive

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation 260/5 / MANUAL Sport

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation 260/6 / MANUAL Overdrive

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation 265/5 / MANUAL Sport

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation 265/6 / MANUAL Overdrive

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation 280/5 / MANUAL Sport

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronisation ZF-S5-16 / MANUAL Overdrive

Distance between synchroniser ring and clutch body		
New condition	mm	1,0 ... 1,3
max. degree of wear	mm	0,8
Reverse gear		
New condition	mm	0,5 ... 0,6
max. degree of wear	mm	0,4

23 23 Synchronization GS6-37BZ/DZ / MECH

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.05
Wear limit size	mm	1.0
3st/4nd gear	mm	0.8 ... 1.40
Wear limit size	mm	0.7
5/6st gear	mm	0.95 ... 1.5
Wear limit size	mm	0.75
Reverse gear		
New condition	mm	0.65 ... 1.25
Max. wear limit size	mm	0.5

23 23 Synchronization GS6-53DZ

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	2.70 ... 3.50
3rd/4th gear	mm	2.40 ... 3.10
5th/6th gear	mm	1.75 ... 2.10
Max. wear limit size	mm	
Reverse gear		
New condition	mm	2.70 ... 3.25
Max. wear limit size	mm	

23 23 Synchronization Guide Sleeves GS6-37BZ/DZ / MECH

1st / 2nd gear	kN	10 ... 36
3rd / 4th gear	kN	20 ... 58
5th / 6th gear	kN	19 ... 55

23 23 Synchronization Guide Sleeves GS6-53DZ / MECH

Press-off and press-on force	kN	50 / 2
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23 23 Synchronization Guide Sleeves S 5 D 200 G / MECH

Press-off and press-on force	kN	10 ... 20
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23 23 Synchronization Guide Sleeves S 5 D 250 G / MECH

Press-off and press-on force	kN	10 ... 20
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23 23 Synchronization S 5 D 200 G / MECH

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.1
3rd gear	mm	1.1 ... 1.5
4th/5th gear	mm	0.9 ... 1.5
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	1.1 ... 1.7
Max. wear limit size	mm	0.5

23 23 Synchronization S 5 D 250 G / MECH

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.1
3rd gear	mm	1.1 ... 1.5
4th/5th gear	mm	0.9 ... 1.5
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	1.1 ... 1.7
Max. wear limit size	mm	0.5

23 23 Synchronization S 5 D 310 Z / MECH

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.1 ... 1.6
3rd gear	mm	0.95 ... 1.35
4th/5th gear	mm	0.95 ... 1.35
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.7 ... 1.15
Max. wear limit size	mm	0.5

23 23 Synchronization S 6 S 420 G / MECH

Distance between synchronizer ring and clutch body		
New condition		
Max. wear limit size	mm	0.8
Reverse gear		
Max. wear limit size	mm	0.5

23 23 Synchronization S 6 S 560 G / MECH

Distance between synchronizer ring and clutch body		
New condition		
Max. wear limit size	mm	0.8
Reverse gear		
Max. wear limit size	mm	0.5

23 31 Inner shifting parts 240/5 / MANUAL Overdrive

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts 260/5 / MANUAL Overdrive

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts 260/5 / MANUAL Sport

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts 260/6 / MANUAL Overdrive

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts 265/5 / MANUAL Sport

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts 265/6 / MANUAL Overdrive

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts 280/5 / MANUAL Sport

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8

23 31 Inner shifting parts ZF-S5-16 / MANUAL Overdrive

Gearshift fork guide width		
1st... 5th gear		
Degree of wear	mm	4,8