

CONTENTS:

FOREWORD	3
1. MARINE POWER PLANTS	6
1.1 MARINE POWER PLANTS	6
1.2 MECHANICAL DRIVES	7
1.2.1 DIRECT DRIVE	7
1.2.2 DIESEL GEARED DRIVE	8
1.3 DIESEL-ELECTRIC POWER PLANTS	9
1.3.1 STADT STASCHO DIESEL- ELECTRIC PROPULSION	12
1.4 HYBRID DRIVES	13
1.4.1 HYBRID POWER PLANT OF THE AHTS SIEM PEARL	14
1.4.2 VARIABLE FREQUENCY DRIVES	16
2. DIESEL ENGINES	18
2.1 DIESEL ENGINES	18
2.2 CONSTRUCTION OF LOW-SPEED ENGINE - LARGE PARTS	25
2.3 CONSTRUCTION OF LOW-SPEED ENGINE - RUNNING GEAR	33
2.4 FOUR-STROKE DIESEL ENGINE WÄRTSILÄ 46F	40
2.5 COMMON-RAIL SYSTEM OF RT-FLEX ENGINES	48
2.6 TURBOCHARGING AND SCAVENGE AIR SYSTEM	51
2.7 TURBOCHARGER	52
2.8 ENGINE CONTROL SYSTEM FOR WÄRTSILÄ RT-FLEX ENGINES	54
2.9 ENGINE MANUALS	56
2.10 CRANKCASE EXPLOSIONS	58
3. TRANSMISSION SYSTEM	59
3.1 SHAFT LINE	59
3.2 STERN TUBE	61
3.3 STERN TUBE SEALS	62
3.4 STERN TUBE LUBRICATING OIL SYSTEM	64
4. PROPULSORS	65
4.1 GENERAL	65
4.2 SCREW PROPELLERS	66
4.3 AZIMUTHING THRUSTERS	68
4.4 ELECTRIC PODDED PROPULSORS	72
4.5 VOITH-SCHNEIDER PROPULSOR	75
4.6 WATERJET	76
4.7 CP PROPELLER EQUIPMENT	78
5. STEERING SYSTEM	81
5.1 STEERING GEARS	81
5.2 RUDDERS	85
6. AUXILIARY SYSTEMS	89
6.1 PIPING SYSTEMS	92
6.1.1 PIPES CARRYING FUEL OIL AND FLAMMABLE LIQUIDS	92
6.2 VALVES	93

6.3	FUEL OIL SYSTEMS	95
6.4	HFO BUNKERING, STORAGE AND TRANSFER SYSTEM	95
6.5	HFO TREATMENT SYSTEM.....	98
6.6	HFO SUPPLY SYSTEM.....	101
6.7	LUBRICATION OIL SYSTEMS	104
6.8	COOLING WATER SYSTEMS	106
6.9	STARTING AND CONTROL AIR SYSTEM	111
6.10	EXHAUST GAS SYSTEM	113
7.	VARIOUS SYSTEMS.....	115
7.1	BILGE SYSTEM	115
7.2	BALLAST WATER SYSTEM	118
7.3	FIRE-FIGHTING SYSTEMS.....	120
7.3.1	FIRE ON BOARD!	120
7.3.2	CLASSIFICATION OF FIRES	122
7.3.3	FIRE SAFETY OF ENGINE ROOMS	123
7.3.4	FIRE FIGHTING SYSTEMS.....	124
7.4	INERT GAS SYSTEMS	127
8.	VARIOUS EQUIPMENT	130
8.1	PUMPS	130
8.1.1	DISPLACEMENT PUMPS.....	130
8.1.2	CENTRIFUGAL PUMPS.....	134
8.2	HEAT EXCHANGERS.....	137
8.2.1	BOXCOOLERS	137
8.2.2	SPERRE RACK COOLERS	137
8.2.3	PLATE HEAT EXCHANGER (PHE)	139
8.2.4	SPERRE PLEAT COOLERS	140
8.3	FILTERS	141
8.3.1	BOLL AUTOMATIC FILTER.....	141
8.3.2	DUPLEX FILTER.....	143
8.3.3	ALFA LAVAL LUBRICATING OIL FILTER	143
8.4	MARINE BOILERS.....	145
9.	ENVIRONMENTAL PROTECTION	149
9.1	BIOLOGICAL SEWAGE TREATMENT.....	149
9.2	GARBAGE DISPOSAL	150
9.3	OILY WATER SEPARATOR (OWS).....	152
9.4	BALLAST WATER TREATMENT SYSTEMS	154
9.5	NO _x REDUCTION	158
9.6	SO _x REDUCTION	160
9.7	SO _x SCRUBBERS.....	161
10.	ENGINE ROOM LAYOUT	164
10.1	BASIC GUIDELINES FOR ENGINE ROOM LAYOUT	164
10.2	EXAMPLE OF THE ENGINE ROOM LAYOUT	167