CHAPTER 35 - WATCHKEEPING ENGINEER, MOTOR-DRIVEN FISHING VESSEL

PART I - GENERAL REQUIREMENTS OF APPLICANTS

35.1 (1) Every applicant applying for a certificate as Watchkeeping Engineer of a Motor-Driven Fishing Vessel shall:

(a) obtain a medical certificate prescribed by the Crewing Regulations;

(b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:

(i) Marine Emergency Duties Course, set out in TP 4957, for;

(A) Survival Craft (B1); and
(B) Marine Fire Fighting (B2);

(ii) Propulsion Plant Simulator Course Level 1, set out in TP 10935; and

(iii) Marine First Aid Basic Course, set out in TP 13008.

(c) pass a written examination in each of the following subjects:

(i) Engineering Knowledge, General; and
(ii) Engineering Knowledge, Motor; and

(d) pass an oral examination.

(2) The service required by an applicant for a Watchkeeping Engineer Certificate is as follows:

(a) obtain:

(i) a certificate of completion for a Diesel Engine Course of nine months duration from a school listed in TP 10655; and

(ii) a minimum of three months service as set out in subsection (2)(b); or

(b) complete 12 months service as follows:

(i) a minimum of six months sea service as an engineer, assistant engineer, engine-room watch rating or engineer assistant on watch in the engine room of a motor ship of not less than 125 kW propulsion power; and

(ii) the remaining time made up of any combination of the following service:

(A) the manufacture or repair of internal combustion engines or other marine machinery; and

(B) the overhaul of the propulsion machinery of motor ships of not less than 125 kW propulsion power.

PART II - EXAMINATIONS

35.2 The following table lists the written and oral examinations for the Watchkeeping Engineer of a Motor-Driven Fishing Vessel Certificate, the qualifying service required before each may be attempted, and other requirements:

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, General	as Part I	MED B1 MED B2
Engineering Knowledge, Motor	as Part I	PPS Level I MED B1 MED B2
Oral Examinations	-	Pass Engineering Knowledge, General and Motor

35.3 (1) An applicant shall be allowed three and a half hours to complete the paper for each subject.

(2) The written examination for a certificate shall be an examination in which the applicant attempts to select, from a number of given alternatives, the correct answer to each question.

(3) In the written examination there shall be at least:

(a) 60 questions in the Engineering Knowledge, General, paper; and

(b) 60 questions in the Engineering Knowledge, Motor, paper.

(4) The knowledge to be shown by an applicant for a Watchkeeping Engineer Certificate shall be sufficient to ensure the safe and efficient operation, surveillance and running maintenance of ship's machinery normally found in a motor driven fishing vessel of up to 2000 kilowatt propulsion power operating on any voyage.

(5) The written examination is a multiple choice examination similar to that for a Fourth-Class Engineer Certificate, but with fewer questions.

PART III - VALIDITY OF CERTIFICATE

35.4 (1) The Certificate of Watchkeeping Engineer of a Motor-Driven Fishing Vessel is valid as a second engineer or a watchkeeping engineer on a motor-driven fishing vessel of not more than 2000 kilowatt propulsion power on any voyage.

Mandatory Question

(2) Every applicant for a Watchkeeping Engineer of a Motor-Driven Fishing Vessel Certificate is required to prove to the satisfaction of the examiner that he/she is capable of checking, by a safe method, the water level in boilers that are being prepared to raise steam, under pressure, or in the process of being shut-down.

PART IV- SYLLABUSES OF EXAMINATIONS

35.5 Engineering Knowledge, General

ITEM	COLUMN
1.	Hand Tools Construction and safe use of the following hand tools: - hammers; - screwdrivers; - wrenches; - drift punches; - chisels; - hand saws and blades; - files; - hand shears and snips; - twist drill; - reamers and countersinks; - taps and dies; - layout tools; and - portable power tools, drills, grinders and chippers.
2.	Power Tools Construction and safe operation of the following power tools: - drill press; - fixed grinder; - metal turning lathe; - simple milling machine; - surface grinder; - cut-off saw; - valve grinder; and - welding equipment, gas and electric.
3.	Materials of Construction The use of materials and the ability to distinguish between the following common types: - steel; - cast iron; - copper; - zinc; - brass; - aluminium; and - plastics and resins.
4.	Physical Science Mathematics: fundamental arithmetical operations and percentages; measurement of length, mass, area, volume, and of pressure and temperature, in SI units (gauge readings). Mechanics: force, friction, energy, power; simple machines (lever, wheel and axle). Principles, construction and operation of the more usual instruments employed for the control and operation of ship's machinery: measuring temperature, pressure, mass, length and thickness; measuring voltage, current and resistance; testing for contamination of oil and water; testing combustion products.
5.	Fire Prevention, Detection and Extinguishing The chemistry of fire; recognition of fire hazards; identification, maintenance and use of portable fire extinguishers, fire hydrants, hoses and nozzles, fire doors and water-tight doors, ventilation closures, detection devices, alarms and alarm systems, fire pumps, breathing apparatus, sprinkler and smothering systems, and remote emergency stops for machinery

6.	Lifesaving The use of life jackets, lifeboats, inflatable life rafts, and distress signals; emergency duties, stations and drills.
7.	Basic First Aid Treatment for sudden illness and accidents, including cuts, burns, fractures and asphyxia.
8.	Safe Working Practices Work procedures and precautions necessary to prevent hazards and maintain safe working conditions.
9.	Pollution Prevention Basic principles of pollution-prevention laws and regulations applicable to Canadian ships; pollution-prevention procedures, including bunkering operations, the discharge of bilge and ballast water, and the operation of oily-water separators.
10.	Pumps and Piping Construction, operation and maintenance of reciprocating pumps, centrifugal pumps, screw-displacement and gear pumps, injectors and ejectors; piping systems, including steam and feed-water system (auxiliary boilers), bilge and ballast systems, fuel and lubricating oil systems, valves, drains, traps and other fittings, the precautions to be observed in the operation of piping systems with regard to pipe expansion, water hammer, cross connections, venting and overflow, and routine pumping operations.
11.	Power Transmission Thrust, intermediate and propeller shafts; thrust, intermediate and propeller shaft bearings; alignment; couplings; gear types and systems.
12.	Steering Gear Common types of steering gear; emergency steering arrangements; starting, checks and operation.
13.	Underwater Fittings Rudders; fixed, variable and controllable-pitch propellers; stern glands; sea suction and discharge valves, mountings on the hull.
14.	Deck Machinery Windlass, capstan and winch.
15.	Fuels Types of fuel; storage, transfer, heating, cooling, filtration, and purification of fuels.
16.	Lubricants Types and application of lubricants; storage, transfer, heating, cooling, filtration, purification and disposal of lubricants.
17.	Electricity and Magnetism Fundamentals: direct and alternating current; definitions of current, pressure, resistance, and power; conductors and insulators; wet and dry cells; identification of simple circuits. Measurement and protective devices: voltmeter, ammeter, ohmmeter; ground lights, fuses and circuit breakers. Generators, alternators and motors: construction and operation of AC machines; basic maintenance procedures. Electric circuits: alarm circuits, navigation light circuits, main and emergency light and power circuits, and basic maintenance procedures.
18.	Hydraulic Systems Pumps, motors, piping, fittings and control devices; hydraulic fluids; packings and seals.
19.	Pneumatic Systems Compressors, air receivers, heat exchangers, filters, piping, fittings and control devices; precautions and safeguards necessary to prevent fires and explosions.
20.	Refrigeration Construction and operation of refrigeration systems; types, properties and hazards of refrigerants; systems, including quick freeze, coolers, direct and indirect.
21.	Auxiliary Boilers and Equipment Types and construction of boilers; operating and safety procedures; mountings and fittings; fuel system; feed system; and heat exchangers.

22.	Auxiliary Internal Combustion Engines Basic construction and operating procedures; cooling and lubrication systems; fuel system, including fuel pumps, injectors and carburettor; starting devices and ignition systems; recognition and correction of malfunctions; and precautions and safeguards necessary to prevent crankcase explosions.
23.	Watchkeeping Procedures Routine associated with taking over and accepting a watch; recording of significant gauge readings and understanding their importance; routine duties during a watch; recording of accidents to machinery and hull; duties when handing over a watch; recording and calculation of ship's fuel supply; routine starting and stopping of machinery; and emergency stopping of machinery.

35.6 Engineering Knowledge, Motor

ITEM	COLUMN
1.	Compression Ignition Engines General principles of construction and operation of two stroke and four stroke cycle engines; methods of supercharging, turbocharging and scavenging; methods of starting and reversing; power transmission systems, including couplings, clutches and gears; applications of the compression ignition engine in a single- and multiple engine installation and a diesel electric installation.
2.	Lubrication Systems Lubricants and lubricant additives; pumps, piping, heat exchangers and filters; and the construction, operation and maintenance of purifiers.
3.	Cooling Systems Air and liquid cooling; pumps, piping and heat exchangers; and temperature control and expansion arrangements.
4.	Fuel Fuels and fuel additives; heating, filtration and purification; piping; and injection pumps and injectors.
5.	Governors General principles, construction, operation, and maintenance of mechanical, hydraulic, electronic and pneumatic governors.
6.	Maintenance Overhaul, repair, adjustment and lay-up of engines, transmission and interrelated systems, including lubrication, cooling, fuel, compressed air and exhaust systems; and preventive maintenance, including running repairs and recognition and correction of malfunctions.

35.7 Oral Examination

ITEM	COLUMN
1.	The oral examination for a Watchkeeping Engineer of a Motor-Driven Fishing Vessel will be based on practical knowledge, safe working practices and Oil Pollution Prevention, and may include references to the applicant's answers in the written examination.