

Spec item:	SPECIFICATION	TCMSB Field #
<b>New Wing Shaft Mechanical Seals</b>		

### **Part 1: Scope**

The Louis St. Laurent, Canada's Arctic Class 4 Heavy Icebreaker, displacing 14,737 MT, with a designed draft of 9.91 meters will be replacing the existing packing glands on both outboard wing shafts with new mechanical seals. The vessel has three tail shafts, two wing shafts and one center shaft, Contractor to supply mechanical seal assemblies for both outboard wing shafts.

Each wing shafts is @ 660 mm in diameter and @ 11 meters long, transmitting 9000 shaft horsepower to fixed pitch propeller weighing @ 14,242 kg each.

The vessel operates in the high arctic and may routinely maneuver through 1 - 2 meters of continuous ice with pressure ridges up to 5 meters thick. Ice may vary in hardness from soft new ice to hard mutli-year ice.

- 1.1 The Contractor shall provide all engineering and approvals for the removal of the existing packing glands and the installation of proposed mechanical.
- 1.2 The Contractor shall provide all material associated with new seals as detailed below.
- 1.3 The Contractor shall provide updated drawings to reflect installation of new proposed seals.  
(Applicable to the successful bidder)

### **Part 2: Reference**

#### **Guidance Drawings/Nameplate data**

- 2.1 286-108 Details of Shafting – Wing Shafts.
- 2.2 286-121 Arrangement and Details of Wing Sterntube.
- 2.3 286-397 Arrangement of Shafting.

#### **Owner Furnished Equipment**

- 2.4 The Contractor shall supply all materials, equipment and parts and labour required to perform the specified work unless otherwise stated.

### **Part 3: Technical Description**

#### **Propulsion Shaft Seals**

- 3.1 The vessel shall have mechanical seals fitted at the forward end of each wing shaft stern tube. The shaft seals shall be fabricated from marine grade materials specifically suited for Arctic ice-breaking and the vessels shaft line particulars as indicated above.

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3.2 The seal assembly shall employ a face type sealing element to provide a sea water seal during shaft operation and heavy ice breaking. No relative motion shall occur between the shaft or shaft sleeve and the primary sealing element. The seal shall include an inflatable element to be used while repairing or replacing the operating seal with the vessel waterborne and the shaft at rest. The inflatable seal shall be integral to the supplied mechanical shaft seal.

3.3 The seal must fit onto the existing stern tube bulkhead and around the existing propeller wing shafts and liner. Any modifications required to the vessels structure; bulkhead, mounting flange, shaft, shaft liner etc. must be approved by Lloyd's Register. All engineering and certification costs to be included in Contractors bid.

3.4 All seal components must have the option to be supplied split to allow assembly without uncoupling the shaft with vessel afloat.

3.5 The supplied seal model must have a proven record of operation with reputable marine companies and extensive service on vessels in heavy ice conditions. Supplier shall provide 3 references for vessels currently fitted with identical mechanical shaft seal operating in heavy ice conditions along with contacts and numbers. The seal model must be supported with documentation indicating that it has been tested for shock and vibration to meet MIL-S-901C standard.

3.6 The seal should require no planned adjustment between annual refits and seal components subject to wear should be visible thus enabling inspection without dismantling.

3.7 The inflatable seal must use LP air between 3 - 5 bar and in the event of an "extreme" emergency, be run dynamically.

3.8 As required by the stern tube bearing, these seals shall be supplied with cooling water connections, to allow for a minimum flow of 2500 liters per hour, a pressure control system with pressure gauge at the seal, and necessary piping.

3.9 The seal and components shall have no barred speeds or speed ranges in both forward and aft directions.

3.10 Leakage rate for New Seal Assembly must not exceed 7.2 liters per hour.

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3.11 A list of recommended spare parts including part numbers, pricing and delivery shall be included with bid proposal. Included in the bid price shall be a complete mechanical shaft seal spare along with two 5 year service kits. The supplier of the mechanical shaft seals shall also be the manufacturer representative for service. Service shall be available within 24hrs within Canada. Spare components must be readily available and supportable for the expected lifespan of the Vessel, @ 15 years.

3.12 The Seal and all its components must be certified by Lloyd's Register of Shipping for its intended use. All seal components must be of recent manufacture and all lubricants and seal vulcanizing agents provided must be viable. Age, shelf life and storage conditions must be supplied.

**Part 4: Proof of Performance**

4.1 Contractor shall provide Lloyd's Certificate for all deliverables.

**Part 5: Deliverables**

5.1 Two complete seal assemblies for the wing shafts, one complete seal assembly as a spare and two 5 year overhaul kits, as noted above.

5.2 Updated drawings showing new seal assemblies installed. (Successful Bidder Only)

5.3 Maintenance, installation and overhaul manuals.

5.4 A list of recommended spare parts including part numbers, pricing and delivery.