

# E-08 Active Filter (3) Installation and Passive Filter (1) Removal and Trials

## Part 1: Scope

- 1.1 The purpose of this specification is; to have a Contractor remove one passive filter and install three (3) active filters plus assist with testing of the of the propulsion system with the new active filters installed so that a complete set of harmonic readings can per performed both alongside (dock trials) and sea trials. The removed passive filter must be handed over to CG TA at the completion of the work

## Part 2: References

### 2.1 Guidance Drawings/Nameplate Data

#### 2.1.4 Drawings

### 2.2 Standards

- 2.2.1 Canadian Coast Guard Fleet Safety Manual
- 2.2.2 Coast Guard ISM Confined Space Entry
- 2.2.3 Coast Guard ISM Hotwork Procedures
- 2.2.4 Coast Guard ISM Lock out Tag out Procedures
- 2.2.5 Coast Guard ISM Fall Protection procedures
- 2.2.6 CWB CSA 47.1 latest revision Division I, II or III
- 2.2.7 TC TP 127
- 2.2.8 IEC 60332-3, 60364-5-52, 60754-0,1,2, IEEE 60332-3

### 2.3 Regulations

- 2.3.1 Canada Shipping Act 2001 Hull Construction Regulations
- 2.3.2 Canada Shipping Act 2001 – Marine Machinery Regulations

### 2.4 Owner Furnished Equipment

**2.4.1** The Contractor must supply all materials, equipment, and parts required to perform the specified work unless otherwise stated.

**2.4.1.1** The Wärtsilä Active filters and the Wärtsilä filter's Current Transformers (CTs) will be owner supplied.

**2.4.1.2** The isolation feeder breakers for above units will be owner supplied

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

#### **3.1 General**

**3.1.1** ABB FSR Allowance - The Contractor must contract ABB Canada to supply a Field Service Representative (FSR) to advise on the removal of one passive filter, prepare the propulsion system for the additional filters, and commission and test the active filters along with the remaining passive filter. For part of the allowance, the ABB FSR will need 3 days to reprogrammed propulsion PLCs and verify connections of the filter units to the ABB plcs and approximately 3 days for the subsequent trials and testing.

The FSR allowance will be \$20,000.00 to be adjusted up or down by 1379 action.

The allowance must be included in the overall bid price for this item.

The contact info for ABB Canada:

Oleg Victor Yefremov  
ABB Marine Canada,  
Mobile: 514-238-5556  
[oleg.yefremov@ca.abb.com](mailto:oleg.yefremov@ca.abb.com)

**3.1.2** Wärtsilä FSR Allowance - The Contractor must contract Wärtsilä Canada to supply a FSR to advise on the installation, commission and test the Active Filters. For part of the allowance, the FSR will need approximately three (3) days to commission the Active Filters and approximately 3 days for the subsequent trials.

The FSR allowance will be \$30,000.00 to be adjusted up or down by 1379 action.

The allowance must be included in the overall bid price for this item.

The contact info for Wärtsilä Canada:

Duane Wong  
Wärtsilä Services  
902-478-9311  
[duane.wong@wartsila.com](mailto:duane.wong@wartsila.com)

- 3.1.3 Madsen FSR Allowance - The Contractor must contract Madsen Turbine and Diesel to supply a FSR to advise on the installation, commission and test Wärtsilä Filters along with the remaining ABB passive filter and measure the results. For part of the allowance, the Madsen FSR will need approximately three (3) days to prepare the vessel controls for trials as well as verify the system connections. The FSR will need approximately one (1) week to trail the vessel and create a written report.

The FSR allowance will be \$25,000.00 to be adjusted up or down by 1379 action. The allowance must be included in the overall bid price for this item.

The contact info for Madsen Turbine and Diesel:

Donald Bradley  
Madsen Turbine and Diesel – Control  
709-726-6774  
[donald.bradley@madsen.ca](mailto:donald.bradley@madsen.ca)

- 3.1.4 Contractor must provide 2 yard workers per FSR for 5 days, working 8 hours per day. FSRs will advise on the type of skill/trade person that is required and when required. Contractor is to note that work already identified in the specification must not be applied to this “allowance”. The allowance will be adjusted by PSPC 1379 and must be included in the overall bid price of this specification item

- 3.1.5 The three (3) Wärtsilä active filters consist of two (2) 270 amp units and 1 90 amp unit. The dimensions and weights can be found in the following documents:

- Datasheet\_P100\_EN.pdf “ADFP100-90/690” 1 unit
- Datasheet\_P300\_EN.pdf “ADFP300-270/690” 2 units

Additional information on sizing of the units can be found in the following drawings:

- ADF P100\_v2\_CD\_100219\_R3.PDF
- ADF P300\_v2\_CD-IP43\_100995\_R0.PDF

- 3.1.6 The Contractor must electrically isolate the two propulsion transformers to allow the removal of the passive filter and installation of the two P300 active filters. The ship service transformer will also require locking out at both the main switchboard and the auxiliary switchboard to allow installation work of the one P100 active filter. All electrical and mechanical lockouts and tag outs must be carried out to the satisfaction of the CGTA, as per the DFO/5737 Fleet Safety Manual, 7.B.5- LOCKOUT AND TAGOUT.

Contractor must install/remove locks and tags accordingly during the scope of work. Coast Guard will assist the Contractor in identifying the location to perform the lockouts, but will not perform the actual lock out. Contractor must supply and install their own locking devices and retain all keys during the scope of this work. Upon completion of all work the Coast Guard must be in attendance when all locks/tags are removed  
Note, the locking out of the ship service transformer must be co-ordinated with any other activities that may require power from the main switchboard. Once the ship service transformer is locked out there will be no power available on the main switchboard. Contractor must co-ordinate this work with CGTA.

- 3.1.7 Hot work must not commence until the associated work areas have been certified gas free and safe for hot work. Contractor is responsible for any cleaning in the affected areas to prepare for hot work. Contractor is responsible for arranging a certified Marine Chemist to visit the vessel and to carry out the necessary testing to obtain safe entry and safe for hot work certificates. A copy of a gas free/safe for hot work certificate must be given to the CGTA prior to personnel entering the space and a copy of each certificate must be posted in a conspicuous location in close proximity to the manhole cover for each space. Spaces must be tested each day that personnel are required entry in the space. All precautions must be taken to protect all areas from hot work damage. Contractor is responsible for maintaining an adequate fire watch during the course of all hot work. This must include providing various applicable extinguishers and extinguishing mediums as necessary. This must also include any necessary preparations and cleaning in the vicinity of the work area to obtain a gas-free permit. Contractor must take note of the requirements under the DFO/5737 Fleet Safety Manual, 7.B.3 – ENTRY INTO CONFINED SPACES and DFO/5737 Fleet Safety Manual, 7.B.4 – HOTWORK for these spaces
- 3.1.8 Contractor must electrically disconnect the starboard ABB passive filter. The filter unit must be released from the seat and prepped for transport from the motor room to the flight deck of the Ann Harvey, via the central stores & lifted up through the aft cargo hatches.  
The fuses fitted to the starboard transformer, supplying the starboard passive filter must be removed & handed over to CGTA. The outgoing cables to the filter, inside the transformer must be disconnected from the fuse terminals, cable ends insulated and secured within the transformer. The cables at the starboard passive filter location must be coiled up, ends insulated and secured for possible future use.
- 3.1.9 Contractor must assume that various heavy components fitted inside the passive filter housing will have to be disconnected and removed from the housing, if the passive filter unit is placed on its side when moving from the motor room to the central stores area.

All wires must be ID marked for all removed components. ABB FSR will advise on what components need removal. Contractor must return all removed components and reconnect all wiring in good order once the passive filter unit has been landed on to the helicopter flight deck.

3.1.10 Once the passive filter has been landed onto the flight deck and all removed components returned in good order (ABB FSR to inspect and verify), a sturdy wooden shipping container must be fabricated and the filter unit placed into the shipping container. Large desiccant water absorbers must be placed inside the filter unit, 8 x 125 gram individual size bags or equivalent. A waterproof cover must be fitted to the exterior of the shipping container. Reference ABB drawing FAE 520LK 302-1-2-4 RUNKO.pdf for the size of the ABB filter housing and weight.

3.1.11 Contractor must remove the starboard passive filter seat frame from the baseplate. All welds must be ground flush on the seat baseplate.

3.1.12 The contractor must construct two seat frames to allow fitting two P300-270/690 filter units on the starboard ex-passive filter seat base plate. Contractor is to assume that the seats will be fabricated from steel channel, C4 x4.5. The seat must be designed so that the filter units can be bolted to the seat flange. Contractor is to reference the following drawings for information to allow estimating the size of the seat frame:

- ADF P100\_v2\_CD\_100219\_R3.PDF
- ADF P300\_v2\_CD-IP43\_100995\_R0.PDF

CGTA & Wärtsilä FSR must approve the design of the seats before the seats are fabricated. CGTA must also approve the position of the two P300 filter units on the ex-passive filter baseplate prior to fabricating and fitting the filter units. Contractor must ID mark on the base plate the proposed location of the filter units on the base plate so that CGTA has an idea where the filter units will be positioned.

It is known that the two active filter units overall combined width is roughly 80 mm larger than the baseplate. The C channel seat frames must be constructed with this in mind



As fitted starboard ABB passive filter unit, seat and baseplate

**3.1.13** Contractor must install two S8x1 between the motor room and transformer room. CGTA & Wärtsilä FSR will advise on the location of the transits. Once the Transits have been packed and sealed, the transit must be proven water tight by pressurizing the transformer room (air pressure) and placing the motor room into a vacuum & applying snoop or other gas detection leak solution. In addition, the transit must be ultra-sonic sound tested. Any leakages found must be repaired and a retest performed at no charge to CG/PSPC.

Contractor must supply a unit cost to fit a possible third S8x1 transit (1379 action).

**3.1.14** Contractor must fabricate and fit a mounting frame in the main switchboard/transformer room for the P100 90/690 active filter unit. The frame must be fitted at a location to the starboard outboard side of the starboard Propulsion Transformer FR 57-58, forward of the vent duct. The frame must incorporated into the existing angle frame located in the area

CGTA must ID the exact location of the P100 active filter unit

CGTA & Wärtsilä FSR must approve of the frame design before it is constructed



Location for the P100 Filter unit

- 3.1.15 Contractor must mount and secure the two P300 and one P100 active filters to the designated seat/frame mount locations. A Contractor supplied ground wire must be fitted and secured from the frame of each filter housing to the ship hull steel. The size of the ground wire must be sized to the capacity of the filter unit supply breaker (400 amp for P300 and 160 amp for P100).
- 3.1.16 Contractor must apply 2 coats of primer and 2 top coats of finish paint (match the existing surrounding colours) to all new and disturbed steel pertaining to the installation of the filter units, cables trays and breaker boxes.
- 3.1.17 The contractor must provide all crane and rigging needed to land two P300 Wärtsilä active filters units in the Motor Room and one P100 Wärtsilä active filter in the main switchboard/transformer room. The contractor must provide all crane and rigging to remove the uninstalled starboard ABB passive filter from the motor room to the flight deck.
- 3.1.18 Contractor must assist Wärtsilä & Madsen with installing the 3 new active harmonic filter power supply isolation breakers. There will be one supply breaker fitted to each main propulsion transformer and one breaker fitted to the ship service transformer. New GSM breakers ( 3 units) must be fitted into a Contractor supplied electrical panel boxes (3) with access door.  
All open /non-insulated electrical connections must have a clear insulated barrier guard

fitted to prevent electrical shock (Plexiglas).

The two 400 amp breaker units with electrical panel box will be mounted at the propulsion transformer, one per transformer as directed by Wärtsilä FSR & approved by CGTA.

The 160 amp breaker with electrical panel will be fitted at/near the ship service transformer, as directed by Wärtsilä FSR & approved by CGTA

GSM breakers being supplied are: Schneider Compact NSX units, 2x NSX400HB1 & 1x NSX250R TM160D.

3.1.19 The Contractor must supply and install all necessary cabling needed for the installation of the filters. Wärtsilä FSR will advise on actual cabling required.

For bidding purposes, Contractor is to quote on supplying and installing the following cables:

- 2 x 3 conductor 600 MCM armour braded marine rated (90deg C) cables, 35 meter long each (70 meters total length).
- 1 x 3 conduction 2/0 armour braded marine rated (90 deg C) cable, 20 meters long
- 12 x3 conductor 14/3 armour braded shielded marine rated (90m deg C) 35 meter long each (CT cabling & PLC connections 420 meters total length).

The bid price for the cables must be included in the overall bid price for this specification item

Actual cables required will be adjusted by 1379 action

3.1.20 Under the direction of the Wärtsilä FSR, contractor must install the Active Filter CTs in the propulsion transformers and ship service transformer as per drawing: 72-801-1 MAIN SWITCHBOARD.pdf. Information on the CTs ca be found in data sheet: 100\_ASK 165.5 1A.pdf.

Contractor is to note that these CTs are fitted over the buss bars. The Buss bars will require removal in order to slide the CT's over the buss bars. All buss bar released/removed fasteners must be replaced with new bolts, "Belleville" washers and nuts. Wiring must be fitted from the CTs to active filters.

A total of 9 CT's will be installed, 3 CT's per active filter unit.

3.1.21 Contractor must install suitable wiring trays and coated metal wiring securing devices as per TP127 for the cables listed in 3.1.19

3.1.22 Dock Trials – The contractor must allow for one (1) day of dock trials to allow the ABB, Wärtsilä, and Madsen FSRs to test and confirm the newly install filters are connected properly and working.

3.1.23 Sea Trails – The contractor must allow two (2) days at 12 hours each of sea trials to allow for the testing and documentation of the filter responses.

## 3.2 Location

**3.6.1** Motor room, Main switchboard/transformer room, Auxiliary switchboard

### **3.3 Interferences**

**3.7.1** The Contractor must be responsible for the identification of interference items, their temporary removal, storage, and refitting to vessel.

## **Part 4: Proof of Performance**

### **4.1 Inspection**

**4.1.1** All work must be subject to inspection by the Chief Engineer or delegate and ABS Class surveyor.

### **4.2 Testing**

**4.2.1** Testing has been covered within section 3

### **4.3 Certification**

**4.3.1** All ABS (Transport Canada recognized) approval certificates for materials being fitted must be supplied to the Chief Engineer prior to installation of product and must be approved by the attending ABS surveyor prior to purchase.

## **Part 5: Deliverables**

### **5.1 Drawings/Reports**

**5.1.1** Contractor must hand over all test results from the dock trials and sea trials.

**5.1.2** AutoCAD drawings of the P300 seats must be supplied to CGTA.

**5.1.3** Updated drawings electrical drawings from ABB, Wärtsilä & Madsen pertaining to the Harmonic Filter installation must be handed over to CGTA

### **5.2 Spares**

**5.2.1** NA

