



TECHNICAL SPECIFICATION

NEWPCC DEWATERING CENTRIFUGE OVERHAUL SERVICES

MEC-001

City of Winnipeg RFP No. 186-2016

Rev.	Date (Y/M/D)	Description	Author	Checked	Approved
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1 GENERAL

1.1 Introduction

- (1) The North End Water Pollution Control Centre (NEWPCC), located at 2230 Main Street in Winnipeg, Manitoba, treats sewage or wastewater generated from the north and central parts of the city. The NEWPCC utilizes decanter centrifuges to separate solid and liquids from effluent process streams. The existing decanters require routine overhaul services to support ongoing operation and maintenance of the NEWPCC.
- (2) The intent of this contract is not to bring the centrifuges to “like new” condition, because they will likely be removed from service in the next four to seven years, the intent is to keep them in good operating condition for this time.

1.2 Scope

- (1) This specification covers the requirements for overhaul of each the five (5) existing dewatering decanter centrifuges at the NEWPCC.
- (2) The Contractor shall be responsible for the general scope of work outlined below. Additional details and requirements are outlined elsewhere in the specification.
 - .1 Transport of centrifuges from the NEWPCC to the Contractor’s facility including all customs fees and paperwork.
 - .2 Disassembly, cleaning and inspection of the centrifuges c/w reports outlining the findings.
 - .3 Repair and refurbishment of the centrifuges, replacing all worn or damaged parts as approved by the City upon review of the inspection report and Proponent’s recommendations.
 - .4 Assembly, inspection and testing of the refurbished centrifuges c/w reports.
 - .5 Transport of refurbished centrifuges from the Contractor’s repair facility to the NEWPCC including all customs fees and paperwork.
- (3) The Owner shall be responsible for the following scope of work:
 - .1 General cleaning, decommissioning and removal of centrifuges from service and crating of centrifuges for transport.
 - .2 Loading and unloading all materials at the plant site.
 - .3 Installation and commissioning of the refurbished centrifuges in conjunction with the Contractor, as required.

1.3 Codes, Standards and References

- (1) AWS D1.6 – Structural Welding Code - Stainless Steel
- (2) ASTM G65 – Standard Test Method for Measuring Abrasion Using Dry Sand/Rubber Wheel Apparatus
- (3) CSA W47.1 – Certification of Companies for Fusion Welding of Steel
- (4) CSA W59 – Welded Steel Construction (Metal Arc Welding)
- (5) IEEE 43 – Recommended Practice for Testing Insulation Resistance of Electric Machinery

- (6) ISO 1940 – Mechanical Vibration
- (7) Sharples / Pennwalt PM 76000 Operation and Maintenance Manual

1.4 Quality Assurance

- (1) All materials which do not meet the requirements of this Specification and for which no exemption has been granted in writing, will be rejected by the Owner's Representative. Approval for substitutions shall be given only after Contractor has clearly demonstrated that all requirements of this specification are satisfied by the subject material.
- (2) Contractors shall confirm they have a Quality Control Program in place and a relevant Quality Manual(s) that comply with the intent of ISO 9001:2008 or an equivalent program acceptable to the owner. The level of quality control sophistication is dependant on the degree of complexity and the technical requirements of products or equipment provided by the seller. For example, if the seller manufactures pressure vessels, then they must comply with the requirements of ASME Boiler and Pressure Vessel code, which is an acceptable quality program.
- (3) The Contractor shall provide proof satisfactory to the Contract Administrator that the Contractor/Subcontractor has a workplace safety and health program.

1.5 Warranty

- (1) The Contractor shall provide a minimum warranty period of 4000 hours of operation or 18 months from the date of delivery covering all materials and workmanship.
- (2) The Contractor shall be responsible for all shipping costs associated with any warranty work.

2 PRODUCTS

2.1 Existing Centrifuges

- (1) General:
 - .1 Type: Decanter Centrifuge
 - .2 Make: Sharples / Pennwalt
 - .3 Model: PM 76000
 - .4 No. of Units: 5
- (2) Power: 575 V / 3 ph / 60 Hz

2.2 Materials

- (1) Bowl:
 - .1 Bowl Liner: 316 SS
 - .2 Wear Sleeves (i.e. Saddles): Tungsten carbide

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|-----|--|--|
| .3 | Wear Ring: | 316 SS c/w solid tungsten carbide mosaic wear tiles or hard surface on all product contact surface on ID |
| (2) | Conveyor: | 316 SS |
| .1 | Accelerator: | 316 SS c/w min 0.060" thick hard surface coating applied prior to final machining |
| .2 | Feed Nozzles: | 316 SS body/holder c/w bonded tungsten carbide nozzle |
| .3 | Feed Zone Liner: | 316 SS c/w min 0.060" thick hard surface coating applied prior to final machining |
| .4 | Feed Cone Inserts: | Cobalt #3 body c/w tungsten carbide insert |
| .5 | Feed Cone Retainers: | 316 SS |
| .6 | Feed Tube: | 316 SS |
| .7 | Hard Surfacing: | Co-Cr-W Alloy 694 (Coast Metal 64) w/ min. HRC 53 hardness or equal |
| .8 | Wear Tiles: | SS body c/w tungsten carbide wear segment |
| (3) | Gaskets and O-rings: | Buna or Viton O-rings, Viton conveyor seals |
| (4) | Repair Seal/Bearing Running Surfaces: | Chrome / HVOF |
| (5) | Tungsten Carbide: | Kennametal #714 or equal |
| (6) | The listed materials represent the minimum requirements for all components. All proposed replacement parts shall meet or exceed the listed requirements. The Contractor shall identify if the proposed materials of construction differ from those listed above and shall provide documentation to demonstrate that they meet the minimum requirements. | |
| (7) | All materials shall be new and conform to the minimum requirements of the material specifications. Specifications, mill certificates and Non-Destructive Examination (NDE) records shall be provided for all metals and issued to the Owner for the permanent record. These documents shall include, but are not limited to, heat numbers, chemical compositions/analysis and mechanical properties. | |
| (8) | All wear and hard surfacing components shall be tested in accordance with ASTM G65. The Contractor shall identify the proposed wear and hard surfacing materials and provide material test certificates. | |

2.3 Welding

- (1) All welded joints and materials must be selected, designed, performed and tested in conformity with the requirements of the latest editions of CSA Standard W59. Welded joints in materials not covered by CSA W59 shall conform to AWS D1.6.
- (2) Welders and welding procedures shall be approved and certified by the Canadian Welding Bureau, in accordance with CSA W47.1.
- (3) The Contractor shall provide records of welder qualifications and weld procedures.
- (4) Where the Contractor is located outside of Canada they shall indicate the jurisdictional certifications and standards that apply.

3 CENTRIFUGE OVERHAUL

3.1 General

- (1) This section details the requirements for the overhaul of each the six (6) existing dewatering decanter centrifuges located at the NEWPCC. The following paragraphs referring to the centrifuge in singular apply to each centrifuge unless specified otherwise.
- (2) The Contractor shall furnish all tools and labour for all overhaul activities including supply of all consumables, including initial fill of all fluids.
- (3) All overhaul activities shall be completed in accordance with the O&M Manual for the existing centrifuges. Cautions and guidelines are summarized in Binder 1, Section 2, Chapter 8, Bulletin 5/8/1 of the O&M.

3.2 Decommissioning of Existing Centrifuge

- (1) The Owner shall be responsible for general cleaning, decommissioning, removal from service and crating the centrifuge for shipment.
- (2) Motors and belts may be removed from the centrifuge by the City prior to pickup by the Contractor. The Contractor shall furnish all necessary equipment to facilitate Assembly Inspection and Testing requirements outlined in Section 3.5 as required.
- (3) The Contractor shall be responsible for loading, transportation and unloading of the centrifuge from the plant site to the Contractor's repair facility. The Contractor shall assume that centrifuges will be refurbished and shipped one at a time. Refer to Section 3.6 for additional details.

3.3 Teardown and Inspection

- (1) Disassemble the centrifuge and clean all components in accordance with manufacturer's recommendations.
- (2) Inspect components by suitable visual and non-destructive methods.
- (3) The teardown and inspection checklist included in Appendix A shall be completed by the Contractor. The checklist represents the minimum inspection requirements. The Contractor shall identify if any additional inspections are required and may provide additional checklists to document inspection and teardown as required.
- (4) Photograph existing condition of all wear areas and all parts requiring repair or replacement. Minimum resolution shall be 3 megapixels.
- (5) Measure and document all bearing and seal fits.
- (6) Perform insulation resistance test on motors, if applicable, as per IEEE 43 and provide test records.
- (7) Provide recommendations for any required repairs and replacements including an itemized cost breakdown and schedule. Labour and material costs shall be shown separately for all items. Hourly labour rates for all shop trades (welder, millwright, etc.) shall be included in the bid submission.
- (8) Summarize the findings of the inspection in a report and submit to the Owner for review and approval prior to commencing repairs. The inspection report shall include, but not be limited to, the following:

- .1 Completed inspection checklist.
- .2 Photographic records of existing conditions and areas requiring repair or replacement.
- .3 Documented bearing and seal fit measurements.
- .4 Motor insulation resistance test results. If applicable.
- .5 Recommendations for all repairs and replacements.
- .6 Identify materials of construction for all recommended repairs or replacement parts.
- .7 Itemized cost breakdown and schedule to complete all recommended repairs. Labour and material costs for each item shall be listed separately

3.4 Repair and Refurbishment

- (1) As a minimum, the Contractor shall complete the following work:
 - .1 Replacement of all bearings, gaskets, seals, o-rings and belts.
 - .2 General gearbox overhaul including replacement of all bearings, gaskets, seals, o-rings and oil.
- (2) The Contractor shall refurbish each centrifuge, replacing all worn or damaged parts identified in the inspection report and approved by the Owner.
- (3) All repairs or replacement parts shall be of equivalent or better material and strength as existing components.

3.5 Assembly, Inspection and Testing

- (1) The bowl and conveyor shall be dynamically balanced in the shop to meet the requirements of ISO 1940 G 2.5. Balance reports shall be provided for each component.
- (2) Reassemble components, align parts, and verify all critical dimensions, assembly tolerances and runouts in accordance with manufacturer's recommendations. All critical dimensions, assembly tolerances and runouts shall be documented and provided to the Owner.
- (3) Run Test:
 - .1 The Contractor shall perform a Run Test at full rated equipment speeds under dry conditions. As a minimum the test shall include measurements of vertical and horizontal acceleration and temperature at the bearings and gearbox temperature. Test duration shall be a minimum of 4 hr and measurements shall be recorded in 30 min intervals. Refer to 3.2(2).
 - .2 Provide Test Plan and Procedure(s) for review two (2) weeks after receipt of order. This shall outline all test procedures to be performed.
 - .3 Run Test Results shall be provided for review and approval by the Owner prior to equipment shipment. Under no circumstances shall the Contractor ship any items prior to receipt of approved test results.
 - .4 The Owner reserves the right to witness any tests they deem necessary.
- (4) Document final assembly and testing in a report and submit to the Owner for review and approval prior to delivery of materials to site. The final assembly report shall include, but not be limited to, the following:

- .1 Dynamic balance reports.
- .2 Records of critical dimensions, assembly tolerances and runouts.
- .3 Run test plan, procedure(s) and reports.

3.6 Packaging and Delivery

- (1) After review and approval of the final assembly and testing report, the equipment shall be taken apart as required for shipment. The disassembled parts shall be match-marked to facilitate erection and protected against possible damage.
- (2) The Contractor shall be responsible for crating, loading and transportation from the Contractor's repair facility to the plant site.
- (3) The Contractor is responsible for arranging suitable packaging and protection for all components, equipment and materials to ensure that the goods arrive at the plant site in good order, after being subjected to the normal hazards of land, marine and/or air transport, including, but not limited to, atmospheric attack, vibration, rough handling, transportation shocks, high humidity, condensation, moisture, salt water spray and outside storage.
 - .1 Assembled components shall be packaged such that dynamic loads during shipment will not cause fatigue or damage of contacting surfaces.
 - .2 Unbalanced or overhung components susceptible to damage by shock loads during shipment shall be disassembled before packaging for shipment. Components shall be held in place so that no shifting, hanging or swinging of any part in the package could be possible and shall be protected from damage from the fixations themselves. All containers shall be constructed so that they are a close fit to the components or the components are securely attached to the container to prevent any movement.
 - .3 Suitable blocking, straps and skids shall be provided to protect the equipment during shipment, off-loading, hauling and lay-down at the Site.
 - .4 Shafts shall be blocked to prevent bearing damage during transport due to vibration.
 - .5 All shipping containers shall be clearly labelled and referenced to the Packing Lists.
 - .6 Un-assembled pins, bolts, studs and nuts shall be wrapped and treated so as to exclude moisture and be protected from corrosion.
 - .7 Dimensions of packaging shall meet the requirements of transportation limits from the factory to the site.
- (4) The Owner shall be responsible for unloading the refurbished centrifuge at the plant site.
- (5) The Contractor shall be responsible for shipping of all materials between the plant site and the Contractor's repair facility including insurance of each shipment.
- (6) The Contractor shall confirm all delivery dates with the Owner including date of departure and anticipated date of arrival prior to release of shipment.
- (7) The Contractor shall be responsible for all import/export paperwork as well as all fees associated with the import/export process.

3.7 Installation of Refurbished Centrifuge

- (1) The Owner shall be responsible for installation and on-site commissioning of the refurbished centrifuge.

3.8 On-Site Technical Support

- (1) The Contractor shall provide hourly, daily and weekly rates for on-site technical support.

**APPENDIX A
INSPECTION CHECKLIST**

Inspection Checklist



Owner: City of Winnipeg
Project: NEWPCC Dewatering Centrifuge Maintenance
Location: Winnipeg, MB
Date: March 9, 2016
Rev: 0

Job No.:		Machine Type:	Decanter Centrifuge
Technician:		Make:	Sharples / Pennwalt
Inspection Date:		Model:	PM 76000
		Equipment No.:	
		Serial No.:	

O&M Reference				Inspection Tasks		Condition			Notes
Binder	Section	Chapter	Bulletin	No.	Description	Good	Repair	Replace	
GENERAL									
1	2	9	5/9/5	G1	Inspect drive pulley.				
1	2	10	5/10/9	G2	Inspect cover and cover liner.				
GEARBOX									
1	2	12	5/12/2	GB1	Drain oil from gear box.				
				GB2	Remove gear box from centrifuge, disassemble and clean.				
				GB3	Inspect gear box bearings. Measure and record bearing and seal fits.				
				GB4	Inspect first stage gear assembly and sun gear.				
				GB5	Inspect second stage gear assembly.				
1	2	14	5/14/3	GB6	Inspect gear box adapter.				
BOWL									
1	2	15	5/15/3	B1	Inspect rotating assembly pulley and spacers.				
1	2	16	5/16/3	B2	Dismantle and inspect front hub assembly. Measure and record bearing and seal fits.				
				B3	Inspect front hub liquid discharge area for wear including plate dams.				
1	2	17	5/17/2	B4	Dismantle and inspect rear hub assembly. Measure and record bearing and seal fits.				
1	2	19	5/19/5	B5	Remove and inspect bowl and bowl shell liner.				
				B6	Inspect solids end wear sleeves (saddles).				
				B7	Inspect solids end wear ring.				
CONVEYOR									
1	2	18	5/18/5	C1	Remove conveyor from bowl and inspect.				
				C2	Remove and inspect accelerator.				
				C3	Remove and inspect feed nozzles.				
				C4	Remove and inspect feed zone liner.				
				C5	Remove and inspect feed cone inserts and retainers.				
				C6	Remove and inspect feed tube.				
				C7	Inspect conveyor flights and support pedestals.				
				C8	Remove and inspect tension bar.				
-	-	-	-	C9	Inspect polymer tubes.				
1	3	-	471B	C10	Inspect conveyor hard surfacing.				
			551	C11	Inspect wear tiles on the solids discharge end of the conveyor.				