

Project:

Østfold Avfallssortering IKS - MRF

Title:

APPENDIX A5

COMMISSIONING, PERFORMANCE TESTS AND TAKE-OVER



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TABLE OF CONTENT

1	GENERAL.....	3
2	ERECTION COMPLETION	3
3	COLD START- UP/ COMMISSIONING	4
4	TRIAL PERIOD.....	5
5	PERFORMANCE AND FUNCTIONAL TESTS.....	7
6	TAKE-OVER	9
7	ATTACHMENT	9

1 GENERAL

The following will be described in this Appendix:

- Erection Completion
- Cold start-up/Commissioning
- Performance test period
- Take-over of the plant

2 ERECTION COMPLETION

The inspection of the erected plant will verify that installations are properly completed, and the plant is ready and safe for Cold start-up and commissioning. The Erection Completion Certificate will be confirmed by Client and Contractor.

The precondition for the Client's erection inspection is the supply and assembly of all parts of the contractual work. All parts of the plant must be assembled to the point where the start-up/commissioning process can be started in a safe manner.

Installation inspection records with listed defects and comments delivered to and approved by Contractor.

The following items will be inspected:

- a) Technical conditions for the issuance of the Erection Completion Certificate
 - The quality control of the erection has been performed by the responsible organization of the Client and documents on quality control and site documentation (e.g. organization, minutes of meetings, daily reports etc.) are available
 - Detailed Commissioning Plan is established and approved by Client. The plan describes requirements for the first phase of start-up and commissioning.
- b) Fire protection, labour safety and authority permit conditions of the commencement of the individual tests
 - the basic labour safety requirements are complied with,
 - the access, transport and escape routes are ensured,
 - foreign materials have been removed and the Plant area has been cleared.
- c) Authority tests
 - Prior to the commencement of the commissioning works, authority tests shall be performed on all machinery and equipment where an authority permit has to be obtained for putting into operation.

The above conditions are mutually complied with by Contractor and Client, each to the extent of his own scope of liability.

If minor defects (type B defects) are discovered in the course of the inspection, they are to be corrected within the periods specified therein and the erection completion is considered to be successfully completed.

However, if the defects are not minor (type A defects), the erection completion is delayed until such defects have been corrected.

A defect is defined as an “A defect” if:

- Major parts of the plant are missing or incomplete
- The quality of the plant machinery and equipment supplied deviates grossly from the contractually agreed execution (including laws, 3rd Party inspection etc.)
- Facilities for the protection of workers and fire protection are missing or incomplete
- The plant cannot be safely operated or can cause damage/injury to the equipment and/or personnel.

3 COLD START- UP/ COMMISSIONING

The Cold start-up can start after the installation inspections of the equipment have been made, and the Erection certificate is signed by both parties.

The Cold start-up is testing without waste in the plant. Commissioning is testing with waste in the plant. Contractor shall inform Client, at least one week ahead of start commissioning with waste.

Cold start-up/Commissioning includes tests of the different systems of the plant, each item of machinery and equipment and Plant section, completion of the installation, and the associated tests and measurements. A complete I/O-test shall be carried out in the beginning of the Cold start-up. A signed signal list shall be provided for inspection by the client.

The tests shall cover in general the following points (but not limited to):

- testing of the machinery and equipment included in the Scope of Work both under normal conditions and various disturbed conditions.
- testing of the Plant control, regulation, protection, and alarm systems included in the CMS of the Plant.

Contractor shall submit to Client program for the commissioning tests according to the schedule separately agreed upon.

The program must mention the purpose of each test, give instructions for performing the test and give the date when the tests are to be started.

Contractor shall take into account any alterations suggested by Client or the Authorities with respect to the above preliminary test programmes.

Type and number of the measuring equipment required for each test shall be stated in the test programs, and the organization that will make the measurements, especially as far as Client is concerned.

The commissioning tests shall be carried out on Contractor's responsibility and under his supervision according to the test programme agreed upon by both Client and Contractor.

Reports on the commissioning tests shall be prepared by Contractor immediately after completion of each test.

For these tests, Contractor provides and cover the costs for:

- his own personnel and equipment
- lubricants, consumables, etc. for the plant operations (other than Client's supplies – see Appendix G and Appendix A11)
- have necessary wear and spare parts ready for an eventual replacement/remediation

The following must be confirmed before start trial period:

- PLC system is running, and archive is installed
- All safety systems are installed and in function
- Automatic baler system is running - adjustment may be needed
- Capacity > 40 tons/hr
- Blockages are at a minimum
- Quality of material must be >90% of guaranteed values in Appendix 4 - Tested in bunker
- Operation in one shift

During this period the Contractor shall train the Client's personnel.

4 TRIAL PERIOD

After Contractor has completed Commissioning and Client has approved all reports, a Certificate shall be signed by the Parties that Trial Period can start.

During the trial period and until formal takeover, Contractor shall be responsible for a safe and correct operation of the plant. Contractor is also responsible for insurance of the process plant until takeover.

During the test period the plant shall be operated by the Clients personnel under the supervision of Contractor. Contractor shall use its commissioning staff to train and support the Client's employees during the trial period. After the trial period, the Clients personnel shall be fully trained and capable of operating, trouble shooting and maintaining the plant without support from Contractor.

The Trial Period shall last for a period of 12 weeks run with positive proof. During this period Contractor shall:

- Put the Plant and all its installations in full and continuous operation at his own expense. Contractor shall provide all materials (except for incoming material to be sorted), equipment, tools, spare parts and wear parts, supervisors, etc. for conducting this trial operations, maintenance etc.

- Demonstrate the reliability and the uninterrupted continuous operation of the Plant under all load conditions required and secure that the maintenance is made correctly and fully.
- Continue with training of Client's operation, maintenance and administrative personnel.
- Conduct the necessary performance and acceptance tests.
- Together with client's personnel, Contractor shall plan all maintenance tasks in accordance with schedules. This includes maintenance, which is done daily, weekly or monthly.

There will be daily follow up meetings which covers the following areas:

- Safety (incidents or accidents)
- Quality (Incoming material, faulty and broken bales, other quality issues)
- OEE (Overall Equipment Effectiveness) including planned and unplanned stop time
- Delivery (incoming or outgoing trucks)
- Management (i.e. workers presence)

During these meetings it will be decided if the plant has to stop and correct technical issues or can continue to run.

There will be weekly meetings in which the stop time will be analysed, and decisions will be made on priorities. Necessary changes should be performed as far as possible at the evenings or in the weekends. Focus is to minimize the stop time and to secure a robust sorting plant long term.

During this Trial period, Contractor shall be allowed to make any minor adjustments which may be necessary, provided that such adjustments do not in any way interfere with the trial or result in reducing the output or decreasing the efficiency.

In the Trial period Contractor shall also pay all costs accruing in this period, such as costs of spares and wear parts, lubricants, metering facilities, etc. Costs of handling material/plastic in and out, electricity, water, wires, wastewater and Client's personnel is covered by Client.

The incoming material to be sorted shall be as representative a sample as possible.

Contractor shall not be liable for any costs associated with the delivery of incoming material/plastic to the site or its removal along with the products of any trial.

5 PERFORMANCE AND FUNCTIONAL TESTS

In the start of the trial period (week no. 3) a performance test shall be done and with mass balances to verify the requirements defined in Appendix A4.

The following shall be fulfilled to be able to continue the test period:

- Capacity >40 tons/hr
- Quality of material must be >95% of guaranteed values in Appendix A4 - Tested in bunker
- Hit rate/yield of materials >90% of guaranteed values according to Appendix A4.

If the results of these tests are not fulfilled, Contractor shall do necessary improvements in the plant. When these are done, a new test shall be carried out during min. 2 days. The trial period shall be prolonged with the same no. of days from the first unsuccessful test to the successful one.

During the trial period there will be picking analysis performed by Contractor on outgoing material to verify its quality during normal operation. When issues occur, it is expected that Contractor will adjust the readers.

In week 9 the whole plant shall be operated at >40 tons/h capacity. Necessary stops to clean out the plant and make it ready for mass balance tests.

During these tests (min. 2 tests) the following shall be fulfilled for both tests:

- Purity of materials in bunkers as min. in the guarantees stated in Appendix A4
- Hit rate/yield as a min. stated in Appendix A4

At the end of the Trial period a 3 weeks (week 10,11 and 12) performance and functional test shall be carried out. These tests shall have the aim to verify that all performance guarantees as per Appendix A4, functional and environmental requirements are fulfilled.

During the performance and functional test period, the plant is to be operated at 100% load, confirming 40 tons/hr and availability of 85%. Bypassing of units, in case of problems, is not allowed. Operation at part load is only to be accepted on approval of Client. The Plant is to be considered out of operation at load below the minimum load defined in the Appendix A4.

The performance and functional tests shall last for a period of 3 weeks of operation (i.e. max 7,5 hours per shift) and shall not be interrupted by any form of stop or regulation that will result in not satisfying the guarantee, functional and environmental demands. In lack of infeed material, the operational time will be shortened, and only actual operating time will be counted.

However, the Plant is allowed to be out of operation due to faults and repair up to 3 (three) times. Each of the stops shall be of a maximum duration of 1,5-hour net, i. e. without including time for running down and starting up of the Plant.

If, for reasons attributable to Contractor, one or more of these operational stops exceed 1,5-hour duration, or if more than 3 (three) stops occur, the Performance test period shall be prolonged with one week plus the duration of the operational stop exceeding the limits for stops. If stops of duration more than 1,5 hour occur during this extended Performance test period, the period shall be prolonged again according to the same rules.

Contractor and Client together shall monitor and document all performance guarantee values as defined as well as utility consumption as specified in the Contract agreement, inclusive monitoring of parameters that are not a part of the documentation by the CMS system.

The Plant must fulfil all the Contract requirements and all the tests must have been carried out satisfactorily before takeover can take place. Client shall be notified in plenty of time so that participation in such tests is possible. Contractor shall prepare and submit test logs from such tests. If Client is notified of tests, but does not attend, Contractor's test log shall be regarded as giving a correct description of the test unless Client proves otherwise.

The Performance and functional test period may be deemed acceptable when the Plant has reached a satisfactory status and the accomplishment of:

- The Plant has been operated satisfactorily for the Test Operation period, including possible extensions due to operational stops attributable to Contractor
- The results of the functional test are successful and documented by Contractor in a test report
- The Plant is safe for operation
- The training of Client staff has been satisfactorily completed
- A successful real-life test of the backup procedure for the Control Monitoring System (CMS)
- The as build documentation is received (with agreed LOP list)

6 TAKE-OVER

The Take-over is conditioned by:

- The Plant shall be clean and painted
- The Construction site used by Contractor shall be cleaned
- The operation and maintenance documentation is available in a form approved by Client
- Online support/connection for all sorting equipment is established and described
- The Performance tests has been completed and accepted by Client

In connection with the take-over of the Plant, a last inspection of the Contract work shall be done. Contractor is obliged to remedy the faults and shortcomings identified during this inspection within a reasonable deadline set by Client.

Take-over of the Contract Work takes place by the Parties jointly, after being given at least 14 days' prior notice by Contractor, carrying out take-over proceedings in which the Contract Work are inspected and a Take-over Protocol is established according to Client's format. This shall take place when the delivery date is reached and the Plant is completed, has undergone the tests specified by the Contract agreement and is ready for take-over, or if only minor parts of the Contract Work remain to be carried out.

Such remaining work must not hinder safe and continuous operations in compliance with the guarantees, or in any other way have consequences for other suppliers' work. If this is the case, Client may refuse to sign the Take-over Certificate.

7 ATTACHMENT

Attachment 1: Execution Plan for Performance Test and Training

EXECUTION PLAN FOR PERFORMANCE TESTS AND TRAINING																													
Testing phase / Time		Warm Commissioning						Trial Period						Trial Period						Trial Period/Training									
		M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
		Week 0						Week 1						Week 2						Week 3									
Activities	Throughput**			36																40	40	40	40	40					
	Availability***																												
	Client Staff Training	N	N	N	N	N		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y					
	Daily Shift Protocol	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y ^{†1}		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y					
	Recovery Tests*																												
	Purity Tests*			>90%																			>90%						
	Mass Balance Tests																						>95%						
	Other Tests			Visual																			Y						
Shifts per day**		1 shift/day						1 shift/day						1 shifts/day						1 shifts/day									

^{†1} Ready 100%

EXECUTION PLAN FOR PERFORMANCE TESTS AND TRAINING																													
Testing phase / Time		Trial Period/Training						Trial Period/Training						Trial Period/Training						Trial Period/Training									
		M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
		Week 4						Week 5-6						Week 7						Week 8									
Activities	Throughput**	40	40	40	40	40		40	40	40	40	40		40	40	40	40	40		40	40	40	40	40					
	Availability***																			>85%	>85%	>85%	>85%	>85%					
	Client Staff Training	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y					
	Daily Shift Protocol	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y					
	Recovery Tests*																												
	Purity Tests*																												
	Mass Balance Tests	Daily Mass Balance calculated from PLC rapport						Daily Mass Balance calculated from PLC rapport						Daily Mass Balance calculated from PLC rapport						Daily Mass Balance calculated from PLC rapport									
	Other Tests																												
Shifts per day**		1 shift/day						1 shift/day						1 shift/day						1 shift/day									

EXECUTION PLAN FOR PERFORMANCE TESTS AND TRAINING																															
Testing phase / Time		Trial Period						Trial Period						Trial Period						Trial Period											
		M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S		
		Week 9						Week 10						Week 11						Week 12											
Activities	Throughput**	40	40	40	40	40		40	40	40	40	40		40	40	40	40	40		40	40	40	40	40							
	Availability***	>85%	>85%	>85%	>85%	>85%		>85%	>85%	>85%	>85%	>85%		>85%	>85%	>85%	>85%	>85%		>85%	>85%	>85%	>85%	>85%							
	Client Staff Operating 100%	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y							
	Daily Shift Protocol	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y							
	Recovery Tests*			100 %						100 %						100 %						100 %									
	Purity Tests*			100 %						100 %						100 %						100 %									
	Mass Balance Tests			Y						Y						Y				Daily Mass Balance calculated from PLC rapport						Daily Mass Balance calculated from PLC rapport					
	Other Tests																														
Shifts per day**		1 shift/day						1 shift/day						1 shifts/day						1 shifts/day											

* % of guarantee values in Appendix A4

** Prerequisite in order to meet the targets: Availability of input material

*** Availability to be agreed upon before test is started. Target on 85% availability