**Appendix F Recommended Fuel System Inspection Schedules**

The following tables contain recommended inspection items and frequencies for transit tanks, storage tanks and guidance on refilling a transit tank following inspection.

**1. Transit Tank Inspections**

* Transit tanks should be inspected after each onshore fuelling
* General condition of the tanks should also be re-checked weekly
* Lined Carbon Steel Tanks: 6 month and 12 month inspections
* Stainless Steel Tanks: Inspections can be combined every 12 months

The following items shall be checked after each **onshore fuelling of a transit tank**:

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | Tank shell | Visual check for condition. Has the shell suffered any damage since the previous filling? |
| 2 | Filling/discharge and sampling points | Visual check for condition, leakage and caps in place |
| 3 | Lifting frame, lugs and four-point sling | Visual check for signs of damage |
| 4 | Tank top fittings | Check for condition, caps in place, dirt free and watertight |
| 5 | Tank identification | Check that serial number, capacity and contents and hazard identification labels are properly displayed |
| 6 | Tank certificate | Check internal cleanliness certificate is valid and located in the document container. Ensure lifting equipment and IMDG pressure testing certification is in date and tank data plates are hard stamped accordingly |

**2. Receipt Inspections**

On receipt of a tank offshore, the following checks should be carried out as the responsibility of the

HLO, although tasks may be delegated.

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | Custom’s seals | Check that custom’s seals are intact on all points of entry to, or exit from the tank interior. Are there any signs that the contents have been tampered with? |
| 2 | Tank shell | Check for any evidence of damage, i.e. dents or deep scoring. Report any damage as dents may mean damage to the internal paint lining of carbon steel tanks |
| 3 | Tank fill/discharge point | Check for damage, run finger around flanges and threaded connections for any signs of fuel leakage. Check dust caps or plugs are in place |
| 4 | Tank lifting gear | Check lifting lugs, slings and shackles for signs of damage, check split pins are in place |
| 5 | Tank top fittings | Check all fittings are in place, clean and all dust caps are fitted. Check valves are closed and inspection hatches are secure |
| 6 | Tank labels | Check that tank identification and serial number (if different) are clearly visible as well as tank capacity. Check that “Jet A-1”, “Flammable UN 1863” and “Marine Pollutant” stickers are in place |

**3. Weekly Inspection**

Each transit tank whether it is full or empty, onshore or offshore, should be given a weekly inspection similar to the Receipt Inspection as above to ensure that the tank remains serviceable and fit for purpose. The weekly inspection should primarily be for damage and leakage; it may not be possible to check custom’s seals integrity if the tank is in use. The completion of this check should be signed for on the Serviceability Report.

**4. Six Monthly and Twelve Monthly Inspections**

The six-monthly and twelve-monthly inspections should be carried out onshore by a specialist organisation. The scope of the two inspections is identical and should include:

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | Tank Identification plate | Check details |
| 2 | Tank shell | Visual check for damage |
| 3 | Paint condition (external) | Check for deterioration |
| 4 | Paint condition (internal) | Check for deterioration, particularly around seams if applicable |
| 5 | Lining materials (if applicable) | Check for deterioration, lifting, etc. Acetone test should be carried out on any lining repairs |
| 6 | Tank fittings (internal) | Check condition |
| 7 | Tank fittings (external) | Check condition |
| 8 | Access manhole | Check security |
| 9 | Pressure and vacuum relief valves | Check condition and presence of fire-screen gauze; in particular check for leaks |
| 10 | Dipstick assembly | Check constraint, markings and cover/cap for security (where fitted) |
| 11 | Bursting disc | Modern tanks are not fitted with bursting discs. Tanks found to have a bursting disc should be modified to incorporate a relief valve |
| 12 | Inspection hatch assembly | Check lid, seal and swing-bolt condition and security |
| 13 | Bonding | Measure electrical bonding resistance between transit tank frame and shell |
| 14 | General | Examination and test procedures to conform to current rules and industry standards |

**5. Recertification**

It is a legal requirement that “single product” transit tanks shall be re-certified at least every 5 years by an authorised specialist, normally the Fuel Inspection Company functioning under an approved verification scheme. There should also be an intermediate check carried out every 2½ years.

These checks should include re-certification of the pressure/vacuum relief valve. The date of the re-certification should be stamped on the tank inspection plate.

**6. Static Storage Tank Inspections**

Static storage tanks shall be inspected either annually or bi-annually depending on the type of tank.

* Mild steel: at least once per year
* Stainless steel: two year interval is acceptable

**Note**: where a track record of minimal findings during internal inspections can be evidenced, inspection intervals may be extended to three years for both mild and stainless steel tanks at the discretion of the third party fuel Inspection Company.

If excessive accumulation of contaminants or degradation of internal surfaces is found following extension to a three-yearly frequency, the inspection frequency should be reverted to biennial or annual as required.

When due for inspection the tank should be drained and vented with the manhole access cover removed.

The Static storage tank inspection should include the following:

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | Cleanliness | Clean tank bottom as required |
| 2 | Tank internal fittings | Check condition |
| 3 | Lining material (if applicable) | Acetone test (note this check need only be carried out on new or repaired linings) |
| 4 | Paint condition | Check for deterioration, particularly around seams |
| 5 | Access to tank top fittings | Check condition of access ladder/platform |
| 6 | Inspection hatch | Check lid, seal and swing-bolt condition and security |
| 7 | Access manhole cover | Check lid, seal and swing-bolt condition and refit cover securely |
| 8 | Pressure and vacuum relief valve | Check condition and presence of fire-screen gauze, in particular check for leaks |
| 9 | Floating suction | Check condition, continuity of bonding and operation. Ensure float is empty |
| 10 | Valves | Check condition, operation and material |
| 11 | Sump/drain line | Check condition, operation and material |
| 12 | Grade identification | Ensure regulation Jet A-1 markings are applied and clearly visible |
| 13 | Contents gauge | Check condition and operation |
| 14 | Bonding | Measure electrical bonding resistance between tank and system pipework |

**7. Six-monthly inspection**

Six-monthly inspections should only be carried out by an authorised Fuel Inspector.

**Note**: An authorised Fuel Inspector is defined as an individual who is independent from the company procuring the service, is technically qualified and competent and can demonstrate relevant experience on offshore refuelling systems.

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | Transit tanks | Carry out weekly tank checks  |
| 2 | Suction hose and hose coupling | *EN ISO 1825 rubber hoses:** Straighten hose and inspect entire length for soft spots, bulges, blistering, cuts, abrasions, kinks or crushing. No white canvas should be visible through the skin of the hose.
* Check hose end clamps for security

*B-Flex annular convoluted hoses:** Check hose has not been coiled too tightly
* Check condition of outer protective cover where fitted
* Feel along hose length, checking for crush damage

*General checks:** Check complete assembly for leaks
* Check correct operation of hose coupling

Check captive dust plug is present |
| 3 | Static storage tanks | * Check all tank top fittings are in place, clean and all dust caps are fitted
* Check valves are closed and inspection hatches secure
 |
| 4 | Pump skid/cabinet | * Check coupling between motor and pump for wear and signs of misalignment
* Remove, clean and inspect Y-strainer baskets.

If excessive contaminants are found, increase the frequency to every 3 months. Check pump bearings are adequately greasedRefer to refuel system supplier/pump manufacturer’s recommended maintenance schedule for additional items.*For air motor driven systems:** Check air-line lubricators are topped up with suitable oil and drain air-line water taps

*For electric motor driven systems:** Check pump drive gearbox oil level and top up as required

For electric motor driven systems: All electrical circuits to be checked by a qualified electrician. |
| 5 | All filtration units (transfer/delivery filter vessels) | * Check vessels for condition, security of fittings, evidence of leakage and correct product identification labels.
* Obtain fuel sample from each filtration unit and perform fuel quality checks.

If consistently unacceptable samples are evident during the check, it could indicate the presence of bacteriological growth. This requires additional action:* Open filter vessel and inspect for surfactants, bacteriological presence, mechanical damage and lining condition (as applicable).
* Clean out any sediment and carry out a water test on the water separator element (as applicable).
* Inspect the coalescer/monitor elements (as applicable) and renew as necessary.
* Reassemble and repeat testing.
 |
| 6 | Flow meter | * Lubricate the meter register head, drive and calibration gears with petroleum jelly.
* Remove, inspect and clean strainer basket as necessary. If significant quantities of contaminants are found, the reason should be established and remedial action taken.
* Re-install or renew strainer as required, taking care to locate the seals correctly.
 |
| 7 | Differential pressure gauges | * Check condition and security of gauges.
* Check for correct operation during functional testing and check for full scale deflection and return to ‘zero’ where gauges have been set up with test valves.

*For delivery filter vessels:** Obtain weekly differential pressure readings for each vessel during refuelling under full flow conditions. If no refuel has taken place during the week, draw off fuel into a drum at full flow to take the readings.
* Record the readings.

*For transfer filter vessels:** Obtain weekly differential pressure readings for each vessel during refuelling under full flow conditions. If no replenishment has taken place during the week, the readings may be taken during the next replenishment.
* Record readings.
 |
| 8 | Automatic air eliminators | * Prime and check for correct operation of all installed air eliminators. If a manual air vent valve is fitted, replace it with an automatic type.
 |
| 9 | System pressure relief valves | * Visually check for condition and note certification frequency and due dates on the system inspection report.
 |
| 10 | Dispensing cabinet pressure gauge | * Check for correct operation of the dispensing system fuel pressure gauge.
 |
| 11 | Hose reel  | * Check tension on chain drive and adjust if necessary.
* Ensure reel rewind mechanism operates correctly by testing operation using powered and manual rewinds (as appropriate).
* Check bearings and rewind gears are adequately greased – apply grease as required.
* Check air-line lubricators for air driven rewind motors are adequately topped up with suitable oil and drain air-line water traps (as appropriate).
* Check air-line lubricator drip feed rate is set correctly (as appropriate).
* Inspect inlet swirl and swan neck hose connection for condition.
 |
| 12 | Fuel delivery hose | * Unwind hose onto the helideck and subject to pump pressure examine entire length for soft spots, bulges, blistering, cuts, abrasions, kinks or crushing. No white canvas should be showing through the skin of the hose. Pay particular attention to sections of hose within 45cm of couplings as they are prone to deterioration.
* Check hose end clams for security.
* Record results
 |
| 13 | Fuel nozzles | * Check general condition, cleanliness and correct operation to ensure lock-off and no leaks.
* Remove, inspect and clean cone strainers as necessary. If significant quantities of contaminant are found, take remedial action.
* Re-install or renew strainers as required, taking care to locate the seals correctly.
* Check dust caps are present and secure

**Note**: No lubrication except petroleum jelly should be applied to any of the pressure refuelling coupling or gravity nozzle parts |
| 14 | Spill container | Accumulated fuel should be drained from the spill container and disposed of |
| 15 | Earth bonding/EPU | * Check general condition, security and electrical continuity (max permissible reading of 25 ohms) on the following earth bonding equipment:
	+ Tank earth leads and clamps
	+ Refuelling nozzle secondary bonding lead, jack plug and clips
	+ Main aircraft bonding/EPU lead, and jack plug
* Carry out checks for correct function of the following:
* Main aircraft bonding/EPU reel automatic or manual rewind mechanism
 |
| 16 | General system checks | * Check for leaks and general appearance
* Visually inspect painted components for condition of paint linings. Repairs should be carried out where fuel quality and system integrity cannot be compromised
* Ensure good housekeeping is maintained, cleaning any blocked drains, removing any rubbish as necessary
 |
| 17 | Documentation | Record all checks |

**8. Annual Inspections**

Annual inspections should be carried out by an authorised Fuel Inspector. The content of the annual inspection includes all the items in both the three-monthly and six-monthly inspections and the following additional items:

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | All filtration units (transfer/delivery filter vessels) | **Note:** For onshore installations, filter elements need only be replaced “on condition” or every three years. For offshore installations filter elements should be replaced annually. * Drain down and open filter vessels.
* Remove, inspect then discard existing disposable type elements (i.e. coalescer and monitor elements).
* Remove, inspect and carry out water test on separator element if fitted. Satisfactorily inspected and tested separator elements should then be bagged for re-fitment on completion of cleaning.
* Clean vessel internal surfaces, base plates and manifolds. For lined vessels, check all areas of lining for signs of deterioration.
* Carry out lining repairs as necessary. Conduct acetone, dry film thickness and/or pin hole detection test on vessel interior linings if applicable. (See note)

**Note:** These need only be carried out to check for correct curing when lining is new or has been repaired. * Fit new disposable elements.
* Fit tested separator element or renew as required (if fitted).
* Fit new head gasket / seal, close up the vessel and tighten the head securing bolts.
* Mark the filter body with the dates of the filter element change.
 |
| 2 | Delivery hose | * Ascertain when the hose was fitted from system records.

Delivery hoses should be pressure tested and recertified (ISO 1825) every two years. However, for operational expediency, duty holders may elect to replace the hose at the prescribed interval or earlier if any defects are found which cannot be repaired. In the absence of facilities for offshore testing, a removed hose should be tested and re-certified onshore. The hose will have a ten-year life from date of manufacture  |

**9. Miscellaneous Inspection Frequency**

Inspection of some items of equipment within the fuelling system fall outside of the standard frequencies. This may be because of individual component manufacturer’s recommendations or over-riding platform or vessel standards as examples. Generally, where there is a conflict in inspection frequency, it is preferred that the more stringent standard is adopted. The inspection scopes listed below should be carried out by an authorised Fuel Inspector:

|  |  |  |
| --- | --- | --- |
|  | **Item** | **Inspection** |
| 1 | Pressure relief valves | Change-out or recertification frequency for relief valves fitted to filter vessels, static storage tanks, pipework or other equipment is often dictated by installation specific standards. Relief valves fitted to transit tanks are always managed under IMDG test requirements, i.e. 2½ year frequency. Relief valves may be included in a general installation relief valve register but should only be changed out by an authorised third-party Fuel Inspector. Wherever possible relief valve change-out should be aligned with scheduled invasive work on the equipment to which it is fitted (e.g. filter change or static storage tank internal inspection). |
| 2 | Flow meter | Flow meters may be included in a general installation instrumentation register but should only be changed out by an authorised Fuel Inspector. The flow meter calibration frequency should be in accordance with the manufacturer recommendations. This may be based on elapsed time or throughput. If there is evidence of inaccuracy, such as metered quantities not aligning with aircraft instrument readings, investigation and/or rectification/calibration may need to be completed. |
| 3 | Gauges and instrumentation | Pressure and differential pressure gauge calibration or replacement frequencies may be based on gauge type, criticality, manufacturer or operator requirements.  |

**10. Sample reclaim tanks**

Product reclamation tanks should be visually inspected quarterly for cleanliness or pass a microbiological growth test, as recommended, by the affected fuel supplier. Clean as required.

**11. Filling of transit tanks after inspection**

Transit tanks should be inspected after each onshore refuelling. The tank should then be dipped to ascertain the quantity of fuel in the tank in order to calculate the volume of fuel required to fill the tank. Assuming the tank is in serviceable condition, the following actions should then be completed:

1. Draw fuel from transit tank sample line and discard until the samples appear free from water and solid contaminants.

2. Carry out fuel quality check.

3. Once satisfied that the fuel is free from contaminants and suspended water, draw off sufficient fuel to measure its specific gravity with a clean hydrometer. The fuel temperature should also be noted in order to correct the measured specific gravity to a relative density (RD) using a correction chart.

4. The RD of the fuel sample taken from the transit tank should be compared with that of the previous recorded RD after the last tank filling. The RD of the previous batch of fuel should be taken from the previous release note or from the label on the retained sample. If the difference in relative densities exceeds 3.0 kg/m3 the contents of the transit tank may have been contaminated with some other product refilling should not take place and the contents of the tank may need to be disposed of.

5. Assuming the RD of the returned fuel is within specification, connect the bonding wire to the transit tank then connect the delivery hose coupling to the tank filling point and start the transfer pump to fill the tank. When the meter register head indicates that the required quantity of fuel has been transferred, stop the transfer pump, remove the coupling from the tank and then remove the bonding connection. The dust cap should then be replaced on the filling point.

6. Leave the tank to settle for ten minutes. A further sample should be drawn from the tank once it has been filled. The sample should be subjected to a RD check following the same process given in paragraph 4 and the density should be within 3.0kg/m3 of the composite RD of the bulk tank contents and transit tank residue. This sample should be transferred to a retention can which should be labelled with the tank number, the fuel batch number, date of filling and measured RD. The sample should then be retained safely until the tank is offered again for refilling in order to continue the fuel traceability. This fuel sample will be required as a proof of fuel quality in the event of an aircraft incident where fuel may be considered to be a causal factor.

7. The tank should then be sealed to prevent tampering and a release note completed with all the required particulars; special attention should be paid that the correct grade of fuel is included on this release note.

8. A copy of the release note should be secured in the tank document container and a further copy retained for reference.