## Chapter 2: Aircraft Visual Inspections

Six aircraft were subject to the detailed visual inspections described in Chapter 1 and Appendix 1.2, Sub-appendix 1.2.3. The first six sections of this chapter discuss the individual aircraft and inspections. The last section of this chapter presents the summary results of all the inspections. The database of specific findings has been presented to ATSRAC as a separate deliverable.

In general, the inspection team followed the Intrusive Inspection Working Group's Protocol for intrusive inspections. However, due to time constraints and the limited availability of candidate aircraft, exceptions to the protocol were made. Other changes to the protocol were allowed after it was determined that those changes would facilitate the inspection without diminishing the extent or quality of the results. General exceptions to the protocol include:

- The selection process for aircraft was abbreviated. The Working Group chairman selected candidates based solely on correspondence with the aircrafts' owners or custodians.
- Due to time constraints and the unavailability of experienced inspectors, the supplemental non-intrusive inspection (protocol 6 of Appendix 1.2) was performed on the DC-9 aircraft only.
- Because it was felt that the findings tags would not influence outcome of the nondestructive testing, inspection tags were not removed prior to examination by the nondestructive testing contractor.

Though not specifically mandated by the protocol, it was assumed that the visual inspection and follow-on non-destructive testing would be performed sequentially in the same week. In actuality, the nondestructive testing was performed several weeks after the visual inspection. Precautions were taken to ensure the state of the aircraft wiring remained constant in the interim.

Aircraft specific exceptions to the protocol are noted below.

Aircraft Inspections lasted between 2 and 4 days, depending on the availability of inspectors, experience level of the working group, and the need to convene the working group for other purposes during the inspection period.

Illustrative pictures of typical zones are shown in Figures 2-1 through 2-8.

**Figure 2-1: Boeing 747 Electronics Rack, EE Bay.**

**Figure 2-2: A300 Cockpit**

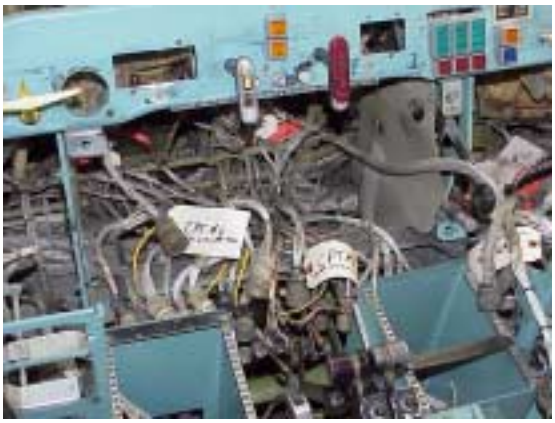

**Figure 2-3: DC-9-1 Cockpit showing specimen and findings labels**

**Figure 2-4: L1011 Wing Leading Edge with red tape demarcating specimens**

**Figure 2-5: DC-9-2 Tail Cone looking forward to bulkhead**

**Figure 2-6: L1011 Under Floor Panels showing excessive dust and lint build-up.**

**Figure 2-7: L1011 Main Cabin showing PCU cables**

**Figure 2-8: DC-10 Wheel Well**

**Airbus A300**

The Airbus A300-B4/203 was inspected in Ardmore, Oklahoma starting on September 24, 1999. It was retired to Ardmore, OK in July 1999 where it remained until the inspection.

The inspection team was composed of:

| | | | |
|---|---|---|---|
| Pall Arnason | NAVAIR | Dave Johnson | USAF |
| Jean-Luc Ballenghien | Airbus | Colin Kane | Airbus |
| Christian Garros | Airbus | Pascal Santi | Airbus |
| Issa Ghoreishi | Boeing | Joe Spielman | DHL |
| Tony Harbottle | Airbus | Chris Smith | FAA |
| Glenn Hiser | FedEx | Fred Sobeck | FAA |

The inspection team followed the Intrusive Inspection Working Group's Protocol for intrusive inspections. Inspection confirmed that the majority of the wire on the aircraft was polyimide.

Some wire damage was found, particularly near connectors. However, it was not certain if this damage was due to in-service degradation or aircraft decommissioning activities. FEP topcoat flaking was common throughout the aircraft.

The inspection team made the determination that no finding rose to the level of a Reportable Significant Condition[1] (RSC)[2].

**DC-9(1)**

The DC-9 was inspected in Ardmore, Oklahoma starting on December 6, 1999. It was retired to Ardmore, OK in August, 1999 where it remained until the inspection.

The inspection team was composed of:

| | | | |
|---|---|---|---|
| Pall Arnason | NAVAIR | Robert McGuire | FAA |
| Jean-Luc Ballenghien | Airbus | Larry Stevick | Northwest Airlines |
| Ashok Bhattacharya | Boeing | Joe Spielman | DHL |
| Edward Block | NADA | Chris Smith | FAA |
| Paul Buron | Boeing | Fred Sobeck | FAA |
| Walter Cinibulk | Raychem | Don Tandy | Tensolite |
| Xavier Mas | Airbus | Hank Zuberer | United Airlines |
| Dominique Mazzarino | Airbus | | |

The inspection team followed the Intrusive Inspection Working Group's Protocol for intrusive inspections. Inspection confirmed that the majority of the wire on the aircraft was PVC/Glass/Nylon.

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[1] A Reportable Significant Condition (RSC) is a specific condition which, in the absence of information to the contrary, the working group could not confirm as having little or no safety impact for a broad fleet of revenue service aircraft. Any finding the working group classified as an RSC was reported to the manufacturer for analysis and resolution. All RSC's are discussed in detail in Chapter 6.

[2] The subsequent determination that delamination had initiated on several wires in the LCL bundle was at that time categorized as an RSC.

The team members found that many tie straps were installed and terminated with an improper tool leaving sharp edges, which could cause injury or abrade wiring. Improper tension was also a concern. Improper plastic tie straps were used in SWAMP areas (particularly the wheel wells). In wheel wells, some of the straps were installed above mechanical pulleys, which is unacceptable in military applications.

The inspection team made the determination that no finding rose to the level of a potential RSC.

**747**

The 747 was inspected in Roswell, New Mexico starting on February 7, 2000. The aircraft was retired to Roswell, NM in May, 1999 where it remained until the inspection.

The inspection team was composed of:

| | | | |
|---|---|---|---|
| Pall Arnason | NAVAIR | Dominique Mazzarino | Airbus |
| Jean-Luc Ballenghien | Airbus | Robert McGuire | FAA |
| Peter Bersuch | Airbus | Ian McLellan | Transport Canada |
| Edward Block | NADA | Tom Newcombe | FAA |
| Walter Cinibulk | Raychem | Larry Stevick | Northwest Airlines |
| Jean Pierre Ferlier | Alcatel Cable | Lonnie Williams | Boeing |
| Issa Ghoreishi | Boeing | Hank Zuberer | United Airlines |
| Dave Johnson | USAF | Lukas Zuellig | Swissair |
| Xavier Mas | Airbus | | |

The inspection team followed the Intrusive Inspection Working Group's Protocol for intrusive inspections, with the exception that the aircraft was retired for 9 months (the protocol called for a maximum retirement of 6 months). Inspection confirmed that the majority of the wire on the aircraft was Poly X, but a significant number of other wire types were also present.[3]

The inspection team found a wire in the cockpit showing evidence of charring caused by short circuit. Also in the cockpit the cockpit the team found three adjacent wires in a bundle having insulation damage exposing the conductor.

In the forward cargo compartment, just behind the avionics rack, the team found severe chafing in a power feeder cable down to and into the conductor. This chafing was due to two power feeder cables coming in contact with one another and rubbing due to vibration (these power feeders coming in contact with one another was an isolated incident, and is not common to other 747's).

The inspection team made the determination that the power feeder chafing rose to the level of a potential RSC. The inspection team notified the manufacturer about the chafed power feeder.

**DC-9(2)**

The DC-9 was inspected in Miami, Florida starting on May, 2000. It was retired to Miami, Florida in December, 1999 where it remained until the inspection.

The inspection team was composed of:

[3] See, Appendix 4.2, Raytheon report.

| | | | |
|---|---|---|---|
| Pall Arnason | NAVAIR | Lee Koegel | FAA |
| Jean-Luc Ballenghien | Airbus | Dominique Mazzarino | Airbus |
| John Beatty | Tensolite | Roberto Mata | Sandia National Labs |
| Peter Bersuch | Airbus | Robert McGuire | FAA |
| Edward Block | NADA | Ian McLellan | Transport Canada |
| Walter Cinibulk | Raychem | Cliff Pettigrew | Boeing |
| Christian Garros | Airbus | Chris Smith | FAA |
| David Johnson | USAF | Elvin Wheeler | FAA |

Though the protocol called for the participation of inspectors who took part in the model specific inspections, no such inspectors could attend this inspection. Otherwise, the inspection team followed the Intrusive Inspection Working Group's Protocol for intrusive inspections. Inspection confirmed that the majority of the wire on the aircraft was PVC/Glass/Nylon.

In a meeting immediately subsequent to the inspection the working group determined that three specific findings constituted RSC's to be reported to the aircraft manufacturer[4]:

- The inspection team found blackening and severe embrittlement of wires leading to the wing tip lighting at both wing tips. There was some speculation that this might be due to wing-tip light modifications, which resulted in either localized heating or excessive electrical loading of the wire.
- The inspection team found severe embrittlement and failures of plastic bundle ties in the vicinity of the internal fluorescent lighting. This failure was not observed in other locations on the aircraft.
- The inspection team found burnt wires beneath spiral wrap in the tail cone on corresponding wire bundles on either side of the aft staircase. There was no indication of burn on the spiral wrap, indicating that the wrap was put in place after the burning had occurred, or that the failure was internally generated as in a short between wires.

Overall, the inspection team found the general condition of the wire to be poor. In particular, the wire in the tail cone exhibited widespread cracking of the outer nylon jacket, discoloration of the wire inconsistent with staining, and apparent embitterment when flexed.

**DC-10**

The DC-10 was inspected in Venice, Italy starting on June 27, 2000. The airplane was flown to Venice, where it was undergoing a passenger to cargo conversion. Because the conversion included a complete avionics and electrical system upgrade, all electrical wires on the aircraft (with the exception of the power feeder cables) were available to be inspected, tested, and removed.

The inspection team was composed of:

| | | | |
|---|---|---|---|
| Jean-Luc Ballenghien | Airbus | Issa Ghoreishi | Boeing |
| John Beatty | Tensolite | Dominique Mazzarino | Airbus |
| Edward Block | NADA | Robert McGuire | FAA |
| Paul Buron | Boeing | Chris Smith | FAA |
| Walter Cinibulk | Raychem | Hank Zuberer | United Airlines |
| Christian Garros | Airbus | Lukas Zuellig | Swissair |

[4] The subsequent discovery of a breach in a power-feeder cable was later identified as a forth RSC for this aircraft.

Though the protocol called for the participation of inspectors who took part in the model specific inspections, no such inspectors could attend this inspection. Hank Zuberer from United Airlines had similar aircraft inspection experience.

Because the aircraft was in the process of being modified for eventual return to service, minor adjustments to the protocol were made. In particular, the inspection team was not allowed to remove any power feeder cables, therefore no power feeders were selected for further testing.

Inspection confirmed that the majority of the wire in the cockpit was Cross-Linked ETFE (the targeted wire type). Wire in the passenger cabin, however, appeared to be mostly polyimide.

The inspection team made the determination that no finding rose to the level of a potential RSC.

**L1011**

The L1011 was inspected in Tucson, Arizona starting on June 16, 2000. It was retired to Tucson, AZ in June, 1999 where it remained until the inspection.

The inspection team was composed of:

| | | | |
|---|---|---|---|
| Jean-Luc Ballenghien | Airbus | Dave Johnson | USAF |
| Edward Block | NADA | Dominique Mazzarino | Airbus |
| Walter Cinibulk | Raychem | Robert McGuire | FAA |
| Christian Garros | Airbus | Ian McLellan | Transport Canada |
| Issa Ghoreishi | Boeing | Hank Zuberer | United Airlines |

Though the protocol called for the participation of inspectors who took part in the model specific inspections, no such inspectors could attend this inspection. Hank Zuberer from United Airlines had similar aircraft inspection experience. Otherwise, the inspection team followed the Intrusive Inspection Working Group's Protocol for intrusive inspections, with the exception that the aircraft was retired for 12 months (the protocol called for a maximum retirement of 6 months). Inspection confirmed that the majority of the wire on the aircraft was Polyimide.

The inspection team made the determination that no finding rose to the level of a potential RSC[5].

**Summary Results**

Each condition was individually classified according to categories established by the working group. The Working Group based its condition categories on the categories established by the ASTF non-intrusive inspection working group for their inspection of 81 revenue service aircraft. Though the categories used in this present study are more specific, there exists a unique combination of these categories that allows the direct comparison of the findings of this project with those of the non-intrusive inspections. The categories used in this present study were defined as:

**Connectors**

**Insert Damage or Deterioration**: Any damage or deterioration to a connector insert. Includes missing parts.
**Contact Arcing**: Any evidence of arcing on the connector contacts.
**Contact Fretting**: Any evidence of fretting (wear) on the connector contacts.
**Missing or Damaged Backshell**: Any damage, deterioration, or mis-configuration of the connector backshell.

[5] Subsequently the working group reconsidered the visual findings for this aircraft. At that time it was determined that a finding on the wiring in the cockpit overhead circuit breaker panel rose to the level of RSC.

**Loose or Worn B-Nuts**: Any damage, deterioration, or mis-configuration, mis-installation or loosening of connector B-Nuts. Includes missing B-nuts.
**Connector Corrosion**: Corrosion on or in connector.
**Other Connector Conditions**: Other connector conditions not specifically listed above.

**Terminations**

**Condition and Security of Ground Points**: Any damage, deterioration, or mis-configuration of ground points.
**Inadequate Drip Loops**: Missing or ineffective drip loops.
**Incorrect Hardware Build-up, Torque**: Mis-configuration or loosening of wire terminations.
**Heat Damaged Terminations**: Evidence of heat damage to terminations or termination hardware.
**Corroded Terminations**: Corroded terminations or termination hardware.
**Contaminated Terminations:** Contamination terminations and termination hardware.
**Other Termination Conditions:** Other termination conditions not specifically listed above.

**Installation**

**Inadequate Clearance to Structure**: Wire with insufficient clearance to aircraft structure or components (excluding other wire).
**Inadequate Wire Segregation:** Insufficient segregation of wire or wire bundles. Includes inappropriate contact of bundles without clamping or support.
**Missing or Deteriorated Pressure Seals:** Missing, deteriorated, or damaged pressure seals.
**Sleeving/Conduit Condition:** Damaged, deteriorated or mis-configured wire sleeving or conduit.
**Bend Radius:** Inappropriate bend radius.
**Clamp Condition, Sizing, or Spacing:** Any problem associated with clamping and support of wire or wire bundles.
**Missing or Deteriorated Grommets:** Missing, deteriorated, or damaged grommets.
**Excessive Slacking:** Excessive play in a wire or wire bundle.
**Excessive Tension:** Excessive tension in a wire or wire bundle.
**T-Strip Condition, Hardware Build-up:** Same as Terminations, Incorrect Hardware Build-up, Torque.
**Missing or Damaged Wire Ties:** Missing, damaged, or mis-configured wire ties.
**Other Installation Conditions:** Other installation conditions not specifically listed above.

**Wire**

**Inadequate Repair:** An inadequate or inappropriate repair to *wire*.
**Degraded Repair:** A deteriorated *wire* repair.
**Heat Damage:** Heat Damaged *wire*.
**Arcing:** Evidence of arcing from a *wire*.
**Vibration Damage:** a.k.a *wire* chafing
**Collateral Damage:** Indirect *wire* or *wire bundle* damage resulting from a traumatic event in the vicinity of that wire or bundle.
**Cracked Insulation:** A breach or partial breach in the *wire* insulation resulting from excessive embrittlement of the insulation.
**Nontraumatic Abrasion:** a.k.a *wire* chafing. Despite the redundancy with Vibration Damage, this category must remain in order to ensure compatibility (comparability) to ASTF categories.

**Traumatic Damage:** Any damage to a *wire* or *wire bundle* resulting from sudden impact, excessive shear, excessive compression, excessive tension, or incision.
**Broken Shield:** Severed or partially severed wire shielding.
**Broken Conductor:** Severed or partially severed wire conductor.
**Exposed Shield:** Exposed wire shield
**Exposed Conductor:** Exposed wire conductor.
**Fluid or Chemical Contamination:** Unexpected fluid or chemical contamination on *wire*.
**Wire Corrosion:** Corrosion of *wire* conductor or chemically induced deterioration of *wire* insulation.
**Other Wire Conditions:** Other *wire* condition not specifically mentioned above.

Table 2-1 shows the correspondence of categories used in this intrusive inspection project with categories used in the ASTF nonintrusive project.

Table 2-2 is a summary of all findings and significant[6] findings by aircraft and finding category. Aircraft specific figures represent all findings throughout all zones. Totals are given for

- all findings on all aircraft,
- all significant findings for all aircraft,
- findings from all aircraft on pre-selected specimens, and
- significant findings from all aircraft on pre-selected specimens only.

Table 2-3 compares the results of the intrusive inspections with those of the non-intrusive inspections. The figures are in findings per 1000 findings (i.e. the row totals are all 1000). The totals represent

- non-intrusive findings (by category) per 1000 total finds
- intrusive findings per 1000 total finds
- significant intrusive findings per 1000 significant finds

It should be noted that all data has undergone a preliminary validation, but only those findings involving a wire condition have received full validation (working group review and approval of the findings description and classification).

| Intrusive Categories | ASTF Nonintrusive Categories |
|---|---|
| **Connectors** | **Connectors** |
| Insert Damage or Deterioration | Insert Damage or Deterioration |
| Contact Arcing | Contact Arcing/Fretting |
| Contact Fretting | |
| Missing or Damaged Backshell | Missing or Damaged Backshell |
| | Connector Backshell Strain Relief |
| Loose or Worn B-Nuts | Loose or Worn B-Nuts |
| Connector Corrosion | Other Connector Conditions |
| Other Connector Conditions | |

[6] A significant finding was defined by the inspection protocol to be any finding which – if the aircraft were still in revenue service – would require repair.

| **Terminations** | **Terminations** |
|---|---|
| Condition and Security of Ground Points | Condition and Security of Ground Points |
| Inadequate Drip Loops | Inadequate Drip Loops |
| Incorrect Hardware Build-up, Torque | Incorrect Hardware Build-up, Torque |
| Heat Damaged Terminations | Heat Damaged/Corroded Terminations |
| Corroded Terminations | |
| Contaminated Terminations | Other Termination Conditions |
| Other Termination Conditions | |
| **Installation** | **Installation** |
| Inadequate Clearance to Structure | Inadequate Clearance to Structure |
| Missing or Deteriorated Pressure Seals | Missing or Deteriorated Pressure Seals |
| Sleeving/Conduit Condition | Sleeving/Conduit Condition |
| Bend Radius | Bend Radius |
| Clamp Condition, Sizing, or Spacing | Clamp Condition, Sizing, or Spacing |
| Missing or Deteriorated Grommets | Missing or Deteriorated Grommets |
| Excessive Slacking | Excessive Slacking |
| T-Strip Condition, Hardware Build-up | T-Strip Condition, Hardware Build-up |
| Missing or Damaged Wire Ties | Other Installation Conditions |
| Excessive Tension | |
| Inadequate Wire Segregation | |
| Other Installation Conditions | |
| **Wire** | **Wire** |
| Inadequate Repair | Previous Repairs, Condition of |
| Degraded Repair | |
| Heat Damage | Heat/Vibration Damage |
| Vibration Damage | |
| Collateral Damage | Indirect Damage |
| Cracked Insulation | Cracked/Abraded Insulation |
| Non-traumatic Abrasion | |
| Traumatic Damage | |
| Broken Shield | Broken Shield/Conductor |
| Broken Conductor | |
| Exposed Shield | Exposed Shield/Conductor |
| Exposed Conductor | |
| Fluid or Chemical Contamination | Fluid or Chemical Contamination |
| Wire Corrosion | Wire Corrosion |
| Arcing | Other Wire Conditions |
| Other Wire Conditions | |

**Table 2-1: Correspondence of condition categories to ASTF condition categories.**

| | CONNECTORS | | | | | | | TERMINATIONS | | | | | | | INSTALLATION (GENERAL) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Insert Damage or Deterioration | Contact Arcing | Contact Fretting | Missing or Damaged Backshell | Loose or Worn B-Nuts | Connector Corrosion | Other Connector | Condition and Security of Ground Points | Inadequate Drip Loops | Incorrect Hardware Build-up, Torque | Heat Damaged Termination | Corroded Terminations | Contaminated Terminations | Other Terminations | Inadequate Clearance to Structure | Inadequate Bundle Segregation | Missing or Deteriorated Pressure Seals | Sleeving Condition | Bend Radius | Clamp Condition, Sizing, or Spacing | Missing or Deteriorated Grommets | Excessive Slacking | Excessive Tension | T-Strips Condition, Hardware Build-up | Debris Accumulation | Significant Dust and Lint Build-up | Missing or Damaged Wire Ties | Other Installation | Inadequate Repair | Degraded Repair | Heat Damage | Arcing |
| A300-1 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 6 | 0 | 1 | 0 | 1 | 0 | 3 | 5 | 0 | 0 | 0 | 4 | 10 | 0 | 9 | 5 | 1 | 2 | 3 | 0 | 5 | 4 | 0 | 0 | |
| DC-9-1 | 1 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 1 | 2 | 0 | 10 | 1 | 1 | 28 | 0 | 1 | 5 | 10 | 34 | 1 | 1 | 1 | 1 | 6 | 9 | 4 | 7 | 1 | 1 | 1 | |
| 747-1 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 2 | 1 | 0 | 3 | 0 | 2 | 33 | 7 | 0 | 8 | 12 | 38 | 3 | 10 | 6 | 1 | 10 | 10 | 5 | 32 | 2 | 2 | 0 | |
| DC-9-2 | 1 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 30 | 4 | 0 | 2 | 14 | 21 | 3 | 10 | 1 | 0 | 4 | 7 | 1 | 21 | 5 | 0 | 14 | |
| DC-10 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 19 | 0 | 0 | 0 | 5 | 17 | 3 | 8 | 2 | 1 | 1 | 5 | 0 | 19 | 1 | 0 | 0 | |
| L1011 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 28 | 1 | 0 | 1 | 3 | 14 | 3 | 19 | 3 | 0 | 6 | 5 | 2 | 8 | 6 | 1 | 0 | |
| **Totals** | 5 | 1 | 0 | 5 | 2 | 5 | 15 | 10 | 4 | 4 | 0 | 17 | 2 | 8 | 143 | 12 | 1 | 16 | 48 | 134 | 13 | 57 | 18 | 4 | 29 | 39 | 12 | 92 | 19 | 4 | 15 | 2 |
| **Significant** | 3 | 1 | 0 | 5 | 2 | 1 | 5 | 9 | 1 | 3 | 0 | 8 | 1 | 6 | 101 | 10 | 0 | 10 | 22 | 70 | 8 | 42 | 10 | 2 | 13 | 17 | 9 | 36 | 12 | 2 | 15 | |
| **Totals Pre-selected** | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 3 | 0 | 0 | 13 | 1 | 0 | 2 | 7 | 10 | 0 | 2 | 1 | 0 | 3 | 3 | 3 | 4 | 4 | 0 | 7 | |
| **Pre-selected Significant** | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 9 | 1 | 0 | 1 | 3 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 2 | 2 | 0 | 7 | |

**Table 2-2 Visual Inspection Findings by Aircraft**

| | CONNECTORS | | | | | | | TERMINATIONS | | | | | INSTALLATION (GENERAL) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INSERT DAMAGE/DETERIORATION | CONTACT ARCING/FRETTING | MISSING DUMMY CONTACTS/SEAL PLUGS | MISSING/DAMAGED BACKSHELLS | CONNECTOR BACKSHEEL STRAIN RELIEF | LOOSE OR WORN B-NUTS | OTHER | GROUND POINTS - CONDITION/SECRUITY | INADEQUATE DRIP LOOPS(S) | CORRECT HARDWARE BUILDUP/TORQUE | HEAT DAMAGE/CORROSION | OTHER | INADEQUATE CLEARANCE TO STRUCTURE | MISSING/DETERIORATED PRESSURE SEALS | SLEEVING/DONUITS CONDITION | BEND RADIUS (10X WIRE/BUDNLE DIA.) | CLAMP CONDITION/SIZING/SPACING | MISSING/DETERIORATED GROMMETS | DEBRIS ACCUMULATIONS ON WIRE BUNDLES | EXCESSIVE SLACK/SAG BETWEEN CLAMPS | T-STRIP CONDITION/HARDWARE BUILDUP | SIGNIFICANT DUST AND LINT BULDUP | OTHER | PREVIOUS REPAIRS/CONDITION OF |
| **Non-Intrusive/1000** | 16 | 1 | 8 | 15 | 22 | 5 | 31 | 28 | 3 | 4 | 14 | 15 | 97 | 2 | 58 | 11 | 146 | 14 | 58 | 76 | 16 | 73 | 44 | |
| **Intrusive/1000** | 5 | 1 | 0 | 5 | x | 2 | 21 | 10 | 4 | 4 | 18 | 10 | 149 | 1 | 17 | 50 | 140 | 14 | 30 | 59 | 4 | 41 | 135 | |
| **Significant Intrusive/1000** | 5 | 2 | 0 | 9 | x | 3 | 10 | 15 | 2 | 5 | 14 | 12 | 172 | 0 | 17 | 37 | 119 | 14 | 22 | 72 | 3 | 29 | 107 | |

**Table 2-3: Visual Inspection Finding Comparison Between the Intrusive And Non-Intrusive Inspections**