Air Techniques International Test Laboratory
1708 Whitehead Rd., Baltimore, MD 21207
Air Techniques International established an independent Filter Test Laboratory in Baltimore, Maryland.

DOE performs a ASME/ANSI NQA-1 Quality Audit.

DOE issued contract to ATI Filter Test Laboratory (ATITL) to perform tasks of the former DOE Filter Test Facility.

Secretary of Energy Memo, June 4, 2001, the Filter Test Lab is to be utilized by DOE Site Contractors.

Testing service is provided to the DOE complex.

DOE work has top priority.


Rejection Categories

**Resistance:** Criteria of \( \leq 1.0 \) “ w.g. for filters rated \( \geq 500\text{-}1250 \text{ cfm} \) and \( 1.3” \) w.g. for filters rated \( \leq 125 - \geq 2000 \text{ cfm} \)

**Penetration:** \( \leq 0.03\% \)

**Manufacturing Defects:**
- Filter Frame/Case Defective
- Gaskets
- Faceguard installation
- Filter pack installation
- Defective media
- Sealant problems
- Separators
- Missing rivets or bolts
- Dimensional tolerance
- Out of square measurements
Rejection Categories

**P.O/ Specification Discrepancy:**
- Missing UL labels
- Labeled incorrectly
- Filters rated incorrectly
- Wrong model number
- Packaging

**Shipping Damage:**
- (Inspect Damage to Shipping Crates, Pallets & Filter Cartons)
- Reject Filter when Damaged
### Summary Of Filter Rejections

<table>
<thead>
<tr>
<th>Fiscal Year (Oct 1 – Sept. 30)</th>
<th>Number Tested</th>
<th>Number Rejected</th>
<th>Percentage Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3,597</td>
<td>354</td>
<td>9.8%</td>
</tr>
<tr>
<td>2001</td>
<td>2,722</td>
<td>217</td>
<td>8.0%</td>
</tr>
<tr>
<td>2002</td>
<td>2,127</td>
<td>102</td>
<td>4.8%</td>
</tr>
<tr>
<td>2003</td>
<td>2,772</td>
<td>151</td>
<td>5.4%</td>
</tr>
<tr>
<td>2004</td>
<td>3,441</td>
<td>215</td>
<td>6.3%</td>
</tr>
<tr>
<td>2005*</td>
<td>2,331</td>
<td>168</td>
<td>7.2%</td>
</tr>
<tr>
<td>2006</td>
<td>2044</td>
<td>213</td>
<td>10.4%</td>
</tr>
<tr>
<td>2007</td>
<td>2472</td>
<td>485</td>
<td>19.6%</td>
</tr>
<tr>
<td>2008**</td>
<td>1554**</td>
<td>184**</td>
<td>11.8%**</td>
</tr>
</tbody>
</table>

*Test facility closed 5 months for relocation and audit

**Partial Year
# Summary Of Filter Rejections

<table>
<thead>
<tr>
<th>Fiscal Year (Oct 1 – Sept. 30)</th>
<th>Resistance</th>
<th>Penetration</th>
<th>Mfg. Defects</th>
<th>P.O./Spec Discrepancy</th>
<th>Shipping Damage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0</td>
<td>43</td>
<td>36</td>
<td>270</td>
<td>5</td>
<td>354</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>30</td>
<td>174</td>
<td>9</td>
<td>4</td>
<td>217</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td>20</td>
<td>42</td>
<td>32</td>
<td>8</td>
<td>102</td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td>26</td>
<td>93</td>
<td>27</td>
<td>5</td>
<td>151</td>
</tr>
<tr>
<td>2004</td>
<td>3</td>
<td>36</td>
<td>86</td>
<td>86</td>
<td>4</td>
<td>215</td>
</tr>
<tr>
<td>2005*</td>
<td>8</td>
<td>19</td>
<td>56</td>
<td>81</td>
<td>2</td>
<td>166</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>47</td>
<td>81</td>
<td>84</td>
<td>1</td>
<td>213</td>
</tr>
<tr>
<td>2007</td>
<td>6</td>
<td>27</td>
<td>238</td>
<td>214</td>
<td>0</td>
<td>485</td>
</tr>
<tr>
<td>2008**</td>
<td>0</td>
<td>38</td>
<td>92</td>
<td>54</td>
<td>0</td>
<td>184</td>
</tr>
</tbody>
</table>

**Test facility closed 5 months for relocation and audit**

**Partial Year**
HEPA FILTERS TESTED / REJECTED

# Filters Tested and % Failure by Fiscal Year

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th># Filters</th>
<th>% Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3800</td>
<td>0.0%</td>
</tr>
<tr>
<td>2001</td>
<td>2850</td>
<td>5.0%</td>
</tr>
<tr>
<td>2002</td>
<td>1900</td>
<td>10.0%</td>
</tr>
<tr>
<td>2003</td>
<td>1500</td>
<td>15.0%</td>
</tr>
<tr>
<td>2004</td>
<td>1200</td>
<td>20.0%</td>
</tr>
<tr>
<td>2005</td>
<td>1000</td>
<td>25.0%</td>
</tr>
<tr>
<td>2006</td>
<td>900</td>
<td>30.0%</td>
</tr>
<tr>
<td>2007</td>
<td>800</td>
<td>35.0%</td>
</tr>
<tr>
<td>2008</td>
<td>700</td>
<td>40.0%</td>
</tr>
</tbody>
</table>

(10 months)
HEPA FILTER REJECTION BY NUMBER

Total Filters Rejected by Fiscal Year

Fiscal Year

# Filters Rejected

0 50 100 150 200 250 300 350 400 450 500

(10 months)
HEPA FAILURES BY TYPE

# Failures (Resistance, Penetration & Manufacturing) by Fiscal Year

Fiscal Year

# Failures

(10 months)

Resistance Penetration Manufacturing
HEPA FAILURES BY TYPE

# Failures (PO/Specification Discreps & Shipping) by Fiscal Year

Fiscal Year

# Failures

0 50 100 150 200 250 300


(10 months)

PO/Spec Discreps

Shipping Damage
ATI FILTER TEST FACILITY
OPERATIONS
ATITL Quality Program Plan

1.0 POLICY
2.0 SCOPE
3.0 REFERENCES
4.0 DEFINITIONS
5.0 ORGANIZATION
   5.1 Structure
   5.2 Functional Responsibilities
6.0 QUALITY ASSURANCE REQUIREMENT
7.0 DESIGN CONTROL
8.0 PROCUREMENT CONTROL
9.0 INSPECTION & TEST
10.0 DOCUMENT CONTROL
ATITL Quality Program Plan

11.0 CONTROL OF PURCHASED ITEMS AND SERVICES
12.0 IDENTIFICATION AND CONTROL OF ITEMS
13.0 CONTROL OF PROCESSES
14.0 PERSONNEL TRAINING, QUALIFICATION AND CERTIFICATION
15.0 CONTROL OF MEASURING AND TEST EQUIPMENT
16.0 HANDLING, STORAGE AND SHIPPING
17.0 INSPECTION, TEST AND OPERATING STATUS
18.0 CONTROL OF NONCONFORMING ITEMS
19.0 CORRECTIVE ACTIONS
20.0 QUALITY ASSURANCE RECORDS
21.0 QUALITY ASSURANCE AUDITS

APPENDICES

Figures – Organization Chart
RECOMMENDED SHIPPING CRATE
NOT RECOMMENDED FILTER SHIPPING METHODS
UNLOADING FILTER BOXES
# INSPECTION CHECK LIST

**AIR TECHNIQUES INTERNATIONAL TESTING LABORATORY**

--- FILTER VISUAL INSPECTION CHECK LIST ---

<table>
<thead>
<tr>
<th>Customer:</th>
<th>P.O. #:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Reference for Acceptance Criteria:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## RECEIVING INSPECTION

**Number of Filters IAW Shipping Papers**

- Satisfactory
- Unsatisfactory
- N/A

**Filters Received Upright (pleats vertical)**

- Satisfactory
- Unsatisfactory
- N/A

**Cartons/Filters Undamaged**

- Satisfactory
- Unsatisfactory
- N/A

**Crate/Pallets Undamaged**

- Satisfactory
- Unsatisfactory
- N/A

**Characteristics As Specified in Customer Purchase Order or Specifications.**

<table>
<thead>
<tr>
<th>Number of Filters</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame Material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frame Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaskets:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Type Location/Size Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL-986 Label</td>
<td></td>
</tr>
<tr>
<td>Faceguards</td>
<td></td>
</tr>
<tr>
<td>Separators</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required Labels/Marking/Identification</th>
<th>Edges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Edges of Frame Sealed</td>
<td></td>
</tr>
<tr>
<td>Frame Edges/Faces Free of Splinters/Rough</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gaskets Secure and Undamaged</th>
<th>Filter Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid Seal Gasket Undamaged</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No Damage to Filter Media</th>
<th>Squareness of Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Dimensions</td>
<td>Hidden Shipping Damage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Filter Pack Tightness</th>
<th>Other:</th>
</tr>
</thead>
</table>

---

**ATI TEST LABORATORY**

ISO 9001, NQA-1, & DOE CERTIFIED
DAMAGED BOX & FILTER
INSPECTION
CASE SQUARE INSPECTION
# PENTRATION / RESISTANCE TEST

## ATI – Air Techniques International

### TEST LABORATORY

### FILTER TEST REPORT

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>FILTER SERIAL NUMBER</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Accept</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## TEST RESULTS

<table>
<thead>
<tr>
<th>ITEM No.</th>
<th>FILTER SERIAL NUMBER</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## TEST CRITERIA

- **DOP PENETRATION**: 0.03% @ 20% RATED FLOW
- **RESISTANCE**
- **IN, W.C. @ 100% RATED FLOW**
- **SPECIFICATION**: DOE STD 3020

## TEST CONDITIONS

- **TEMPERATURE**: °F
- **TEST FLOW**: (ACFM)
- **PENETRATION**
- **RESISTANCE**
- **BAROMETRIC PRESSURE**: mm HG
- **Humidity in % RH**
- **DAMAGE**
- **OTHER**

## TEST RESULTS

### RESISTANCE

<table>
<thead>
<tr>
<th>% PENETRATION</th>
<th>100%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**ATI TEST LABORATORY**

ISO 9001, NQA-1, & DOE CERTIFIED
FILTER TEST
TEST LABEL - REPACKING
RE-BOX FILTER
RE-PACK FILTERS IN CRATE
SHIPPING
REJECT EXAMPLES
GASKET - REJECT

[Images of gasket details]
FLUID SEAL - REJECT
CASE - REJECT
FILTER CASE - REJECT
FILTER CASE - REJECT
Summary

- ALL MANUFACTURERS’ FILTER QUALITY HAS VARIED DURING LAST NINE YEARS AS SHOWN BY THE FILTER TEST FACILITY (FTF) REPORTS

- A NEED FOR SPECIFICATION CONSISTENCY
  (Reference To ASME AG-1 &/or DOE-STD-3020-2005)

- A NEED FOR MANUFACTURERS’ TO TIGHTEN QUALITY CONTROL

- A NEED FOR QUALITY CONTROL INSPECTIONS OF MANUFACTURERS IN ADDITION TO AUDITS
Any Questions?

- Eric Hanson, ATI President
- Dave Crosby, Vice President of Filter Testing
- Julie Stormo, Lab Manager
- Jan Fretthold, Lab Supervisor
- ATI Test Lab e-mail address: ATITL@atitest.com
  410-277-8981 (phone)
  410-277-3448 (fax)
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