SUPPLEMENTARY INSTRUCTIONS AND SPECIFICATIONS
FOR PREPARATION OF OVERBORE FUEL - PT-IP-381-A-FP

C. A. STRAND

March 23, 1962

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OVERBORED CVIN fuel for charging under the proposed Plant Improvement Program is fabricated according to the standard "F" process with a few exceptions. Due to the size and weight of individual components and cores, it was necessary to modify the process and change several of the process times to produce a fuel of equal or better quality than standard production. The following additions and modifications to the standard lead-dip fuel element manufacturing process are required for production of Model CVIN fuel elements.

1. **Bare Core Testing**

Since the massive cores may have a tendency for splitting and cracked cores have been found in as-received lots, all cores should be tested for both internal and external cracks. Presently the test is being made on a prototypical unit used for both UT-2 grain size and surface testing. Because of the longer translation time required for crack testing, it is necessary to run the two tests separately. Translation times for grain size testing and crack testing are 5 and 12 seconds, respectively. A standard containing internal and external cracks for use in setting up the crack tester has been delivered to Quality Control.
2. Core Pickle

Core pickle is increased to a range of 6 to 7 minutes to prevent rapid oxidation and aid surface inspection.

3. Core Inspection

Every core should be carefully inspected to detect cracks on the core internal and external surfaces.

4. Core End Plugging

Insert lead plugs in each end of fuel cores. Either manual or automatic plugging may be used. Standard sheet lead from the Sheet Metal Shop has been used for plugging. Lead plugs and/or lead strip should be degreased prior to use.

5. Duplex Lead Time

Lead preheat time shall be 32 to 35 seconds.

6. Duplex AlSi Braze Time

Duplex AlSi braze time shall be 6 to 8 seconds.

7. Can-Sleeve Preheat

Can-sleeve preheat time shall be 75 to 85 seconds. Preheat time is obtained by using auxiliary preheat baskets.

8. Quenching

Pressure quench fuel elements according to standard F405.0 issued by Quality Control with the one exception. Manually quenched pieces will not be acceptable due to the probability of cap cocking which causes spire cracking.

9. Facing

Face fuel elements according to attached drawing. Note that minimum braze coverage at each end is 0.200 in. rather than 0.250 in. for standard fuel.

10. Projection Welding

a. Self-Support Projections:

Attach 0.065 in. (+0.003 -0.001 in.) self-support projections stamped from 0.045 in. stock. Self-support location in each row shall be 1-1/4 in. ± 1/16 in. and 5-5/16 in. ± 1/16 in. from the cap end. Rail position, alignment, and circumscribed circle diameter shall be checked by a full length slotted tube gage having dimensions listed as follows:
Diameter Across Slots:

<table>
<thead>
<tr>
<th>Slots</th>
<th>Top End</th>
<th>Bottom End</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st pair</td>
<td>2.135 in.</td>
<td>2.132 in.</td>
</tr>
<tr>
<td>2nd pair</td>
<td>2.132 in.</td>
<td>2.135 in.</td>
</tr>
</tbody>
</table>

Groove Width:

<table>
<thead>
<tr>
<th>Slots</th>
<th>1/4 In. From Top</th>
<th>1/4 In. From Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>.285</td>
<td>.287</td>
</tr>
<tr>
<td>No. 2</td>
<td>.285</td>
<td>.285</td>
</tr>
<tr>
<td>No. 3</td>
<td>.287</td>
<td>.287</td>
</tr>
<tr>
<td>No. 4</td>
<td>.288</td>
<td>.287</td>
</tr>
</tbody>
</table>

Tube Diameter: 2.002 in. in four places.

This gage will be used until a gage having slot widths of 0.280 in. is obtained.

b. Bumper Projections

Attach standard bumpers used on Model OIIIN pieces 1-1/2 in. ± 1/16 in. and 5-1/2 in. ± 1/16 in. from the cap end when requested. Rail position, alignment, and circumscribed circle diameter shall be checked by a 1 in. ring gage having the following dimensions until a full length slotted tube gage is available.

| Diameter across slots | 2.075 in. |
| Tube diameter         | 2.000 in. |
| Slot width            | 0.255 in. |

Provisions should be made for testing closure zone integrity on the UT-4 tester as soon as a test is established. All fuel elements should be etched, weld inspected, radiographed, plate gaged, and autoclaved in the 313 Building according to the methods set up for handling the pieces now in use. Since overall fuel element length is 0.100 in. less than that of standard fuel, location of permissible marred surfaces on the cap and base ends will of necessity be the specified limit minus 0.050 in. (see F405.1, a, 3, 4, and 5). Inspection and testing procedures should be in accordance with existing quality control standards.

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