Automatic Welding Of Stainless Steel Tubing

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John F. Kennedy Space Center
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INTRODUCTION

In the past, stainless steel tubing used in ground support equipment to contain hypergolic, pneumatic, and hydraulic fluids was fabricated by manual welding or induction brazing processes. Traditionally, it has been required that joints fabricated by these processes be 100 percent radiographically inspected, a costly type of inspection. Today, advances in the state of the art have made automatic welding a desirable, cost effective method of replacing the other methods of fabricating this type of tubing. The automatic process provides a precise control of the welding process parameters, minimizing human error and thereby improving the quality of welds over those made by other processes. When the automatic process is used, with its inherent improvement in quality, a question naturally arises concerning the need for the 100 percent radiographic inspection requirement imposed on other methods.

To determine if the use of automatic welding would allow the reduction of the radiographic inspection requirement, and thereby reduce fabrication costs, a series of welding tests were performed. In these tests an Astro Arc automatic tube welder was used on AISI tubing, Type 304, in the 1/2, 3/4, and 1 1/2 inch diameter sizes. The tubing was representative of that used in the hypergolics, pneumatics, and hydraulics systems in the launch complex. The Astro Arc automatic tube welder had been checked out and calibrated previously during a production job where hypergolic valve box assemblies had been fabricated of similar tubing for Space Shuttle ground support equipment. Optimum welding parameters (machine settings) were obtained from the automatic welding procedures previously qualified during production welding. These parameters and qualified procedures were used by certified welding operators as a baseline for proper machine settings and procedures used during testing.

The optimum parameters were investigated to determine how much variation from optimum in machine settings could be tolerated and still result in a good quality weld. Threshold or borderline conditions were established. The effects of variations in the automatic process controls (machine settings) on the weld quality were investigated by making welds over a range of essential variables and by x-raying the resulting welds to study the effect of changing the process variables on the weld quality. The purpose of this study was to establish a range of essential variables (machine settings) for a given tube size to ensure that welds made within this variable range would be of good quality, thus allowing the requirement for 100 percent radiographic inspection to be reduced.

The process variables studied were the welding amperes, the revolutions per minute (RPM) as a function of the circumferential weld travel speed, and the shielding gas flow. Acceptable tolerance ranges for these variables were determined through correlation with good x-ray quality vs bad x-ray quality of the welds.

Strip chart recordings were made of the amperage and RPM to determine if strip charts were definitive enough to identify a good weld vs a bad weld. Tests showed that the strip chart recordings were not definitive enough to accomplish this objective, and the technique was abandoned.
The investigation showed, however, that the close control of process variables in conjunction with a thorough visual inspection of welds, (as described hereinafter) can be relied upon as an acceptable quality assurance procedure, thus permitting the radiographic inspection to be reduced by a large percentage when using the automatic process. Radiographic inspection can be eliminated during production welding, with a radiographic inspection requirement remaining only for weld certification testing. Currently, the welding specifications at the Kennedy Space Center are being modified to reduce the radiographic requirements and to substitute the automatic process control and weld visual inspection requirements in their place.
TEST METHODOLOGY

EQUIPMENT

The effects of process control variations on weld quality were investigated. The following equipment was used:

1. Astro Arc Power Source and Controls
   Serial No. 328, with a strip chart recorder

2. Astro Arc Welding Head
   A-1250-D, Serial No. 1389

3. Astro Arc Welding Head
   A-2500-D, Serial No. 1262

4. Four Channel Strip Chart Recorder
   Texas Instrument
   Serial No. FL04W60-171666

This equipment had been used during the welding of valve box tubing and had been checked out and calibrated.

MATERIALS

The following materials were used in testing:

1. Tubing, AISI, Type 304, Sizes: 1/4 inch x .035
   3/4 inch x .109, 1 1/2 inch x .049

2. Fittings, AISI, Type 316, 304, consisting of
   Parker-Hannifin Unions, 33 each size

TECHNIQUES

The following describes the techniques used in testing:

1. Automatic Welding Process. The automatic welding process utilizes a power source connected by flexible cables to a welding head, which is clamped on the tube in a manner similar to a pair of tongs. The electrode of the welding head turns 360° around the tubing to make a butt weld. The welding process is gas tungsten, pulsed arc welding. No filler wire is fed into the weld puddle. The addition of filler metal to the weld puddle is accomplished by the use of a weld fitting that has an additional shoulder of metal machined integral with the fitting. The shoulder melts during the welding and provides sufficient additional metal to the weld. The fitting is provided with a raised ring that fits into a groove in the welding head and serves to guide the tungsten welding electrode around the tube and to maintain proper alignment during welding. A photograph of the machine, set up to weld tubing, is shown in Figure 1. A photograph of tubing specimens welded by the automatic process is shown in Figure 2. Closeup views are shown in Figures 3, 4, and 5.
Figure 1. Machine Set Up to Weld Tubing
Figure 2. Tubing Specimens in 1/4, 3/4, and 1 1/2 Inch Sizes, Welded by the Automatic Process
Figure 3. Close-up View of the Weld in 1/4 Inch Size Tubing
Figure 4. Close-up View of the Weld in 3/4 Inch Size Tubing
Figure 5. Close-Up View of the Weld in 1 1/2 Inch Size Tubing
2. Parameters Tested. As a first step, the optimum parameters (machine settings) were established by adopting the automatic welding procedures previously stated as being qualified for this equipment. These procedures were used by certified welding operators as a baseline during testing. The automatic procedures qualified as optimum and the welding operators certified for the three tube sizes (1/4, 3/4, 1 1/2 inch) are shown in the Appendix. During testing, the parameters varied were amperage, RPM, and shielding gas flow. One parameter at a time was varied, and the other parameters were maintained constant at their optimum values. Each parameter was varied in a manner that established threshold or borderline conditions. Threshold conditions were determined by weld quality based upon the point at which defects began to appear in x-rays during radiographic inspection of the welds.

3. Radiographic Inspection. All welds during the investigation were inspected 100 percent by radiography to obtain the data used to establish process control ranges and threshold conditions. In addition, a visual inspection was made of each weld. The visual inspection included the use of a borescope for the inside diameter (ID) inspection of 1/4 inch size tubing. Defects observed at threshold conditions are recorded under Inspection Results in Tables 3.1 through 3.18. The defects recorded include lack of penetration (L0P), concavity, and drop-through.

4. Strip Chart Recordings. Strip chart recordings were made of welds to determine if this method could be used to identify good quality welds vs bad quality welds. A typical strip chart recording is shown in Figure 6.

5. Test Runs. The test was divided into three phases, with each phase corresponding to a specific tube size. The effects of increasing and decreasing the three parameters, amperage, RPM, and shielding gas flow, were investigated. The ranges of acceptable parameters were determined by varying the individual parameters in increments of 5 percent, until the threshold values were found by correlation with the results of the radiographic and visual inspections. One parameter at a time was varied, with the remaining two being maintained constant at optimum settings. When a reject first occurred, due to defects appearing in the x-ray, a repeat run was performed at the parameter deviation just preceding the setting where the reject occurred. This was done to verify each threshold value. One type of defect prominently noted was concavity. The data sheets for individual test runs are included as an Appendix. Visual inspection results are separate from x-ray results.
Figure 6. Typical Strip Chart Recording
TEST RESULTS

Individual test results are reported in the following tables:

**Phase I**

### Table 3.1 - Increasing Amperage Tests

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2*</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 15 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>4</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.

### Table 3.2 - Decreasing Amperage Tests

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3*</td>
<td>Minus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Minus 20 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>5</td>
<td>Minus 15 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 15 percent.
### Table 3.3 - Increasing RPM Tests

Tube size 1/4" x .035

Using the optimum RPM as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5*</td>
<td>Plus 25 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>6</td>
<td>Plus 30 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>7</td>
<td>Plus 25 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.

### Table 3.4 - Decreasing RPM Tests

Tube size 1/4" x .035

Using the optimum RPM as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>RPM DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2*</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Minus 15 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>4</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.
Table 3.5 - Increasing Shielding Gas Tests
Tube size 1/4" x .035
Using the optimum shielding gas flow as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>GAS DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Plus 25 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>6*</td>
<td>Plus 30 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>7</td>
<td>Plus 35 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>8</td>
<td>Plus 30 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 30 percent.

Table 3.6 - Decreasing Shielding Gas Tests
Tube size 1/4" x .035
Using the optimum shielding gas flow as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>GAS DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Minus 25 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4*</td>
<td>Minus 30 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Minus 40 percent</td>
<td>Reject, LOP</td>
</tr>
</tbody>
</table>

*Threshold Value, 30 percent.
### Phase II

#### Table 3.7 - Increasing Amperage Tests

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2*</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.

All three test runs produced satisfactory x-rays. However, visual inspection revealed a borderline condition in each run, consisting of some concavity associated with greater than normal drop-through at the inside diameter (ID) of the tube. This heavier walled tube was found to be very sensitive to changes in amperage.

#### Table 3.8 - Decreasing Amperage Tests

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2*</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Minus 15 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>4</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.
### Table 3.9 - Increasing RPM Tests

Tube size 3/4" x .109

Using the optimum RPM as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>RPM DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Plus 25 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>6</td>
<td>Plus 30 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>7*</td>
<td>Plus 35 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>8</td>
<td>Plus 40 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>9</td>
<td>Plus 35 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 35 percent.

### Table 3.10 - Decreasing RPM Tests

Tube size 3/4" x .109

Using the optimum RPM as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>RPM DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Minus 10 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>3</td>
<td>Minus 3 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 5 percent.

In comparing this narrow range with the wide range in the Increasing RPM Tests results, it becomes apparent that the optimum RPM value should be somewhat higher than the value selected. Since the total range of +35 percent and -5 percent is 40 percent, a more meaningful evaluation is a range of +20 percent and -20 percent.
### Table 3.11 - Increasing Shielding Gas Tests

**Tube size 3/4" x .109**

Using the optimum shielding gas flow as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>GAS DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3*</td>
<td>Plus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Plus 20 percent</td>
<td>Reject, Concavity</td>
</tr>
</tbody>
</table>

*Threshold Value, 15 percent.

### Table 3.12 - Decreasing Shielding Gas Tests

**Tube size 3/4" x .109**

Using the optimum shielding gas flow as a baseline:

<table>
<thead>
<tr>
<th>RUN NO</th>
<th>GAS DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2*</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.

The narrow range indicates that these parameters should be adjusted to a slight modification of the optimum value.
### Phase III

#### Table 3.13 - Increasing Amperage Tests

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5*</td>
<td>Plus 25 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>6</td>
<td>Plus 30 percent</td>
<td>Reject, Concavity</td>
</tr>
<tr>
<td>7</td>
<td>Plus 25 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 25 percent.

#### Table 3.14 - Decreasing Amperage Tests

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>AMPERAGE DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3*</td>
<td>Minus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Minus 20 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>5</td>
<td>Minus 15 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 15 percent.
### Table 3.15 - Increasing RPM Tests

Tube size 1 1/2" x .049

Using the optimum RPM as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>RPM DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4*</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Plus 25 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>6</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 20 percent.

### Table 3.16 - Decreasing RPM Tests

Tube size 1 1/2" x .049

Using the optimum RPM as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>RPM DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2*</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Minus 15 percent</td>
<td>Reject, LOP</td>
</tr>
<tr>
<td>4</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

*Threshold Value, 10 percent.
### Table 3.17 - Increasing Shielding Gas Tests

**Tube size 1 1/2" x .049**

Using the optimum shielding gas flow as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>GAS DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Plus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Plus 20 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Plus 30 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Plus 40 percent</td>
<td>Satisfactory</td>
</tr>
</tbody>
</table>

The results indicate an insensitivity to this parameter.

### Table 3.18 - Decreasing Shielding Gas Tests

**Tube size 1 1/2" x .049**

Using the optimum shielding gas flow as a baseline:

<table>
<thead>
<tr>
<th>RUN NO.</th>
<th>GAS DEVIATION</th>
<th>INSPECTION RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minus 5 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>2</td>
<td>Minus 10 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>3</td>
<td>Minus 15 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>4</td>
<td>Minus 30 percent</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>5</td>
<td>Minus 50 percent</td>
<td>Reject, oxidized.</td>
</tr>
</tbody>
</table>

At 50 percent of the optimum gas flow rate, the specimen oxidized.
SUMMARY OF RESULTS

It was found that the following ranges of process variables from optimum produced good quality welds as determined by the radiographic inspection. Any greater deviation resulted in defective welds.

**Tube size 1/4" x .035**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Deviation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amperage Deviation</td>
<td>Increasing</td>
<td>10 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>15 percent</td>
</tr>
<tr>
<td>RPM Deviation</td>
<td>Increasing</td>
<td>25 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>10 percent</td>
</tr>
<tr>
<td>Shielding Gas Flow Deviation</td>
<td>Increasing</td>
<td>30 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>30 percent</td>
</tr>
</tbody>
</table>

**Tube size 3/4" x .109**

<table>
<thead>
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<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Increasing</td>
<td>10 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>10 percent</td>
</tr>
<tr>
<td>RPM Deviation</td>
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<td>20 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>20 percent</td>
</tr>
<tr>
<td>Shielding Gas Flow Deviation</td>
<td>Increasing</td>
<td>15 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>10 percent</td>
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</table>

**Tube size 1 1/2" x .049**

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<thead>
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<th>Deviation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
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<td>25 percent</td>
</tr>
<tr>
<td></td>
<td>Decreasing</td>
<td>15 percent</td>
</tr>
</tbody>
</table>
RPM Deviation

Increasing . . . . . . . . . . . 20 percent
Decreasing . . . . . . . . . . . 10 percent

Shielding Gas Flow Deviation

Increasing . . . . . . . . . . . 40 + percent
Decreasing . . . . . . . . . . . 30 + percent

The results obtained using the strip chart recordings revealed that this method of recording is not reliable for identifying good quality welds vs bad quality welds. All welding data sheets are included in the Appendix.
CONCLUSION

The results of the testing show that when the optimum welding parameters are established by qualifying the welding procedures for specific sizes of tubing, and when welding machine operators are certified, then the automatic tube welding process repeatedly produces good quality welds with a high degree of reliability. Quality of the welds was determined by both radiographic and visual inspections. It was found that the welding parameters could be varied over a considerable range without jeopardizing the weld quality, although this is not a recommended practice. The correlation between the results of the radiographic and visual inspections was good. When the weld passed the visual inspection, there was a high probability that it would pass the radiographic inspection.

The reliability of the automatic tube welding process has been verified by its performance in the recent production welding of tube assemblies for the hypergolics ground support equipment for the Space Shuttle. Approximately 5000 welds were made using the automatic tube welding process at the Kennedy Space Center, and several thousand were made at Michoud in stainless steel tubing, in sizes ranging from 1/4 inch to 2 inch diameters. In both projects, the weld quality was found to be high, requiring very little repair welding. It is estimated that 3 percent of these production welds required minor repairs during their fabrication. This high degree of reliability and low rejection rate is attributed to the close control provided by the automatic process, minimizing human error.

In view of the consistently high quality of the welds reproduced by the automatic tube welding process, both in testing and in production welding, it is concluded that the 100 percent radiographic inspection requirement can be removed when tubing is welded by the automatic process. Good quality welds result when the automatic process parameters are controlled at optimum values. When this control is supplemented by weld visual inspection, good quality welds are assured.
IMPLEMENTATION

Based on the findings of this investigation, the following procedures will be implemented in Kennedy Space Center specifications for welding tubing when the automatic process is used:

1. The Astro Arc Pulsed Gas Tungsten Arc Welding Process or equal will be used with butt weld tube fittings.

2. During the qualification of the welding procedures and the certification of the welding operators, the 100 percent radiographic inspection requirement will remain in effect. The contractor will verify that satisfactory radiographic inspections are attained. During this period, the optimum welding parameters will be determined. The contractor will verify the optimum welding parameters in a qualified welding procedure and certify welding operators, based upon both radiographic and visual inspections.

3. During the production welding phase, after qualification and certification, the radiographic inspection will be eliminated. It will be replaced by a rigid control of process parameters, augmented by 100 percent visual inspection. The control of process parameters and the results of the visual inspection will become part of the inspection record, signed by the contractor. The data to be recorded is as follows:

   a. Weld Number: To be recorded on the data sheet and etched on the tube adjacent to the weld.
   
   b. Welder's Name and Certification Verification
   
   c. Date of Welding
   
   d. Government Specification Number
   
   e. Contractor's Procedure Number
   
   f. Contract or Project Number
   
   g. Tube Material and Size
   
   h. Welding Position
   
   i. Machine Settings

      (1) Arc Amperes (Weld Levels I, II, III, and IV)

      (2) Time (Levels I, II, III, and IV)

      (3) Pulse Low (Amperes)

      (4) Pulse High (Time)
(5) Pulse Low (Time)
(6) Finish Slope
(7) Rotation Delay
(8) Head Speed, RPM
(9) Shielding and Backup Gas Flow, CFH
(10) Arc Voltage
(11) Tungsten Electrode (Length, Bevel, Land, Arc Gap)
(12) Machine Used (Equipment, Manufacturer, Serial Number)
(13) Fitting Type and Manufacturer

Note: During the welding process, every effort must be made to maintain the machine settings (item 1) at their optimum values. If more than one parameter varies measurably, from optimum, the weld shall be rejected. In the case where only one parameter varies not more than 5 percent the weld shall be acceptable.

j. Inspection Report Number

K. Inspection's Signed Verification: Optimum settings maintained as specified in item 1.

l. Weld Visual Inspection Results

m. Approvals or Rejections: Quality/Contractor Signatures, Government Inspector Approval or Rejection Stamp.

4. The following steps shall be performed during the automatic welding process:

a. Turn gas on slowly at tank for torch and backup gas. Check for adequate tank pressure. Check for correct gas and gas flow per weld schedule by depressing gas flow button. Gas must be turned off at tank at the end of work shift. Seal backup gas tube to flow over inside diameter (ID) of weld joint.

b. Attach ground cable to tube when using A3500 head. A ground cable is not required with A2500 head.

c. Check for proper tungsten electrode grinding and gap on fitting. Regrind electrode if contaminated or if shape of point has changed. Point of electrode must be positioned in exact center of fitting lip.

d. Make sure that tube end is cut square and is free from burrs on outside and inside edges and that there is no gap when tube and fittings are clamped in weld head. Clean joint surfaces of finger prints with freon and lense cleaner tissue.
e. Always start weld with gear teeth in housing to prevent arcing from gear ring. This applies to the A2500 weld head. Arc may be struck in any position with the A3500 head.

f. Check each item on weld schedule for proper control panel settings.

g. Check the following:

(1) Gear rotation switch is in forward position
(2) RPM setting is correct
(3) Panel and arc starter switches are on
(4) Pulse-step pulse switch is in correct position
(5) Arc voltage switch is on (A3500 head only)

h. Depress sequence start button and observe root drop-through when possible. Slight amp adjustment (within ±5 percent) may be made during welding to assure uniformity. Time may be added to Level IV to provide overlap if weld start did not give full penetration. These adjustments are not to be considered as variations from optimum.

5. The visual inspection shall be a 100 percent coverage for each weld, including the weld root when it is accessible for viewing. When weld roots are inaccessible for viewing, then the record of process controls will govern acceptance or rejection of the weld root. Any of the following defects shall be unacceptable:

a. Cracks
b. Porosity open to the surface
c. Concavity

6. KSC-SPEC-Z-0016, "Automatic Welding, Stainless Steel Pipe and Tubing, Invar 36 Pipe, Carbon Steel Pipe, Aluminum Pipe, Specification for" (revised to include items 1 through 5 above for tubing) will govern the application of the automatic tube welding process with implementation assuring good quality tube welds at reduced cost.
APPENDIX

Qualification and Certification
and Data Sheets
QUALIFICATION AND CERTIFICATION

ORIGINAL PAGE IS OF POOR QUALITY

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

WELD NO. Q & R-R

MPP NUMBER MPP-LO-0001

REVISION LETTER

WPS NO. 404

PAGE 14 of 14

SPECIFICATION NO. REVISION DATE 7/7/77 OUT OF STAG-028

BACK-UP

PURGE GAS

HEAD

TUBE DATA

INTERNAL GAS ARG

HEAD GAS ARG

O.D. 0.250

FLOW CFH 5+2

FLOW CFH 15+5

WALL 0.035

PRE-PURGE TIME 2 MIN (MIN) (1)

PRE-PURGE TIME 15 SEC (MIN)

ALLOY 304 L

POST-PURGE TIME 1 MIN (MIN)

POST-PURGE TIME 1 MIN (MIN) FTG. P/N 79K00246-1

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW

5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps

025 023 021 018 010

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-9.9 Sec

007 005 005 009 4.0

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED

.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec RPM

0.1 0.1 0.1 3.60

QUALIFICATION POSITIONS

\(\boxed{\text{\texttimes}}\) HORIZONTAL \(\boxed{\text{\texttimes}}\) VERTICAL

WELDERS NAME Tooley STAMP

MACHINE E-200T4 S/N 328

HEAD S/N 1328

ELECTRODE (Sketch)

A 80°

B 015

C 1.329

D .030

QUALITY CONTROL STAMP DATE JUL 1 2 77

APPROVALS:

MFG. D/821 DATE 7/3/77

Q.E. D/81A DATE 7/12/77

ENGR. D/81A DATE 7/17/77

REPORT NUMBER MTR 1287

TENSILE TEST ACCEPTANCE

RADIOGRAPH ACCEPTANCE

DATE JUL 1 2 77

27
QUALIFICATION AND CERTIFICATION

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No. 1208

MPP-L0-0001

SPECIFICATION NO. REVISION. DATE

PURGE GAS

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PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY 304

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 11 Min(MIN) FTG. P/H 12-18-YHY
(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

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<th>WELD LEVEL III</th>
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<td>Time 1-299 Sec</td>
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<td>PULSE HIGH</td>
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<td>RPM</td>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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<td>0.1</td>
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QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [ ] VERTICAL

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)
A .80°
B .010
C 1.073
D .020

APPROVALS:
MFG. D/827
Q.E. D/814
ENGR. D/834

QUALITY CONTROL STAMP DATE 1/1/77
WELDERS NAME Tunks STAMP T

REVISION LETTER PAGE 14 of 14
QUALIFICATION AND CERTIFICATION

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

WELD # CC & DD
IPD # 16
WPS # 2402

SPECIFICATION NO. REVISION. DATE

BACK-UP PURGE GAS HEAD TUBE DATA
INTERNAL GAS ARG . HEAD GAS ARG . O.D. 1.50
FLOW CFH 5+2 . FLOW CFH 15+5 . WALL .049

PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY 304 L
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H 74002-2.049
(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps
093 092 089 087 038

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec
009 012 009 010 9.9

PULSE HIGH PULSE LOW ROTATION HEAD SPEED
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec RPM
0.1 0.1 1.0 1.60

QUALIFICATION POSITIONS

HORIZONTAL VERTICAL

MACHINE E-200T4 S/N 328 1262
HEAD S/N

ELECTRODE (Sketch)
A 80°
B .015
C 1.259
D .030

QUALIFICATION POSITIONS

WELDERS NAME Two Hughes STAMP

RADIOGRAPH ACCEPTANCE 5/14/77
TENSILE TEST ACCEPTANCE 5/16/77
REPORT NUMBER MTB-63-77

APPROVALS:
MFG. D/821 5/4/77
Q.E. D/814 5/4/77
ENG. D/030 5/6/77
QUALITY CONTROL 5/6/77
DATA SHEET
1/4" Increasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<th>PURGE GAS</th>
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<tbody>
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<td>HEAD GAS ARG</td>
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<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.035</td>
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</tbody>
</table>

PRE-PURGE TIME (MIN) 2 MIN | POST-PURGE TIME (MIN) 1 MIN |
PRE-PURGE TIME (SEC) (MIN) 15 | POST-PURGE TIME (MIN) 1 MIN |
ALLOY FTG. P/N (1) Add 1 min (min) for each additional ft. or time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
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<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
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LEVEL I
Time 1-299 Sec
007

LEVEL II
Time 1-299 Sec
005

LEVEL III
Time 1-299 Sec
005

LEVEL IV
Time 1-299 Sec
009

FINISH SLOPE
0.1 to 9.9 Sec
4.0

PULSE HIGH
0.1 to 9.9 Sec

PULSE LOW
1 to 9.9 Sec

ROTATION DELAY
1 to 9.9 Sec

HEAD SPEED RPM
3.50

QUALIFICATION POSITIONS

<table>
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WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE

Q.E. D/814 DATE

ENGR.D/830 DATE

QUALITY CONTROL DATE

VISUAL ACCEPTANCE STAMP

ELECTRODE (Sketch)

A 080°

B .015

C 1.329

D .030

MACHINE E-200T4 S/N 328

HEAD S/N 1328

30
DATA SHEET
1/4" Increasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. 0° time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

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MACHINE E-20074 S/N 328
HEAD S/N 1328

WELDERS NAME STAMP

RADIOPHGRAPHC ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT STAMP
**DATA SHEET**

**1/4" Increasing Amps**

**AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)**

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**BACK-UP PURGE GAS**

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<th>INTERNAL GAS</th>
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<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
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**PRE-PURGE TIME**

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

**POST-PURGE TIME**

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

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<th>WELD LEVEL I</th>
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<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>007</td>
<td>005</td>
<td>008</td>
<td>009</td>
<td>4.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>3.60 RPM</td>
</tr>
</tbody>
</table>

**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

**WELDERS NAME**

**STAMP**

**MACHINE** E-20074 S/N 328

**HEAD S/N** 1328

**ELECTRODE**

- (Sketch)
- A 80°
- B .015
- C 1.329
- D .030

**APPROVALS:**

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR. D/830 DATE
- QUALITY CONTROL DATE

**REJ. CONCavity & EXCESS DROP THRU**
DATA SHEET
1/4" Increasing Amps

ORIGINAL PAGE IS
OF POOR QUALITY.

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
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</thead>
<tbody>
<tr>
<td>WPS No.</td>
<td></td>
</tr>
<tr>
<td>SPECIFICATION NO.</td>
<td>REVISION LETTER</td>
</tr>
<tr>
<td>DATE</td>
<td>TPS A/A 328-001</td>
</tr>
</tbody>
</table>

**BACK-UP PURGE GAS X-Ray Results: Accept**

**HEAD TUBE DATA**

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>HEAD GAS</th>
<th>O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARG</td>
<td>ARG</td>
<td>.250</td>
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</tbody>
</table>

**FLOW CFH**

<table>
<thead>
<tr>
<th>5 to 2+</th>
<th>15+5</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 2</td>
<td>WALL .035</td>
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</tbody>
</table>

**PRE-PURGE TIME**

<table>
<thead>
<tr>
<th>2 MIN(MIN)</th>
<th>15 SEC(MIN)</th>
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<tbody>
<tr>
<td>1 Min(Min)</td>
<td>ALLOY</td>
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</tbody>
</table>

**POST-PURGE TIME**

<table>
<thead>
<tr>
<th>1 Min(Min)</th>
<th>FTG. P/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Min(Min)</td>
<td></td>
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</tbody>
</table>

(1) Add 1 min (Min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>027</td>
<td>025</td>
<td>023</td>
<td>019</td>
<td>010</td>
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**LEVEL**

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>007</td>
<td>005</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**PULSE HIGH**

<table>
<thead>
<tr>
<th>.1 to 9.9 Sec</th>
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<tr>
<td>.1</td>
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**PULSE LOW**

<table>
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<tr>
<th>.1 to 9.9 Sec</th>
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<tr>
<td>.1</td>
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**OPERATION**

<table>
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<th>DELAY</th>
<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>.1</td>
<td>.9</td>
</tr>
<tr>
<td>3.60</td>
<td></td>
</tr>
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**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
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**MACHINE**

<table>
<thead>
<tr>
<th>E-200T4 S/N</th>
<th>328</th>
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<tbody>
<tr>
<td>HEAD S/N</td>
<td>1328</td>
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</table>

**WELDERS NAME**

<table>
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<tr>
<th>STAMP</th>
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**RADIOGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**APPROVALS:**

<table>
<thead>
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<th>MFG. D/821</th>
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<td>Q.E. D/814</td>
<td>DATE</td>
</tr>
<tr>
<td>ENGR. D/830</td>
<td>DATE</td>
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</table>

**QUALITY CONTROL**

<table>
<thead>
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<th>DATE</th>
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33
DATA SHEET
1/4" Increasing Amps

AUTOMATIC BUTT WELD MILLING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-LO-0001</th>
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</table>

**SPECIFICATION NO. REVISION DATE** TSP A/A 328-001 Sample #72 -5%

**PURGE GAS**
- BACK-UP
- X-Ray Results: Accept

**PRE-PURGE TIME** 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY

**POST-PURGE TIME** 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. 0 ft. Time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>026</td>
<td>024</td>
<td>022</td>
<td>019</td>
<td>010</td>
</tr>
</tbody>
</table>

**LEVEL I**
- Time 1-299 Sec
- Level I 007

**LEVEL II**
- Time 1-299 Sec
- Level II 005

**LEVEL III**
- Time 1-299 Sec
- Level III 005

**LEVEL IV**
- Time 1-299 Sec
- Level IV 009

**FINISH SLOPE**
- .1 to 9.9 Sec
- 4.0

**PULSE HIGH**
- .1 to 9.9 Sec
- 0.1

**PULSE LOW**
- .1 to 9.9 Sec
- 0.1

**ROTATION**
- .1 to 9.9 Sec
- 0.9

**HEAD SPEED**
- RPM
- 3.60

**QUALIFICATION POSITIONS**

- [ ] HORIZONTAL
- [ ] VERTICAL

**MACHINE**
- E-200T4 S/N 328
- HEAD S/N 1328

**ELECTRODE**
- (Sketch)
- A 80°
- B .015
- C 1.329
- D .030

**WELDERS NAME**

**STAMP**

**RADIOGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**APPROVALS:**
- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR. D/830 DATE
- QUALITY CONTROL DATE

**VISUAL ACCEPT**

**STAMP**
DATA SHEET
1/4" Decreasing Amps

ORIGINAL PAGE IS OF POOR QUALITY

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP-LO-0001
WPS No.

<table>
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</table>

X-Ray Results: OK

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<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERVAL GAS, ARG</th>
<th>HEAD GAS, ARG</th>
<th>O.D.</th>
<th>WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5+2</td>
<td>15+5</td>
<td>0.250</td>
<td>0.035</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRE-PURGE TIME 2 MIN(MIN)(1)</th>
<th>PRE-PURGE TIME 15 SEC(MIN)</th>
<th>ALLOY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. or time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>024</td>
<td>022</td>
<td>020</td>
<td>017</td>
<td>010</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>09</td>
<td>009</td>
<td>009</td>
<td>009</td>
<td>4.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>3.60 RPM</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.9</td>
<td>3.60</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME __________________ STAMP __________________

MACHINE E-200T4 S/N 328 HEAD S/N 1328

ELECTRODE (Sketch)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>80°</td>
<td>.015</td>
<td>1.329</td>
<td>.030</td>
</tr>
</tbody>
</table>

QUALITY CONTROL STAMP

VISUAL ACCEPT
# Automatic Dutheld Welding Procedure Specification (WPS)

## 1/4" Decreasing Amps

**WPS No.:** MPP-LO-0001

### Specification No. Revision

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>X-Ray Results: Accept</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERVAL GAS: ARG</td>
<td>HEAD GAS: ARG</td>
<td>O.D. 0.250</td>
</tr>
<tr>
<td>FLOW CFH 5±2</td>
<td>FLOW CFH 15±5</td>
<td>WALL 0.035</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY</td>
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</tbody>
</table>

### Program Settings

#### Weld Level I

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
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</thead>
<tbody>
<tr>
<td>6 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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#### Pulse Low

<table>
<thead>
<tr>
<th>PULSE LOW</th>
<th>016</th>
<th>010</th>
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</thead>
<tbody>
<tr>
<td>LEVEL I</td>
<td>022</td>
<td>021</td>
</tr>
<tr>
<td>LEVEL II</td>
<td>005</td>
<td>006</td>
</tr>
<tr>
<td>LEVEL III</td>
<td>009</td>
<td>010</td>
</tr>
<tr>
<td>LEVEL IV</td>
<td>010</td>
<td>010</td>
</tr>
</tbody>
</table>

#### Pulse High

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>009</th>
<th>010</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVEL I</td>
<td>007</td>
<td>008</td>
</tr>
<tr>
<td>LEVEL II</td>
<td>008</td>
<td>009</td>
</tr>
<tr>
<td>LEVEL III</td>
<td>010</td>
<td>011</td>
</tr>
<tr>
<td>LEVEL IV</td>
<td>011</td>
<td>012</td>
</tr>
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### Rotation Speed

<table>
<thead>
<tr>
<th>ROTATION DELAY</th>
<th>4.0</th>
<th>3.60</th>
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</thead>
<tbody>
<tr>
<td>HEAD SPEED</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

### Qualification Positions

- **Vertical**
- **Horizontal**

### Welder's Name

**Stamp**

### Approvals

- MFG. D/821
- Q.E. D/814
- ENGR. D/830
- QUALITY CONTROL

### Tensile Test Acceptance

**Report Number**

### Visual Accept

**Stamp**

### Machine Information

- **E-200T-4** S/N 328
- **328**
- **1328**

### Electrode Information

- **A:** 080°
- **B:** 0.15
- **C:** 1.329
- **D:** 0.030

### Radiograph Acceptance

**Date**

### Visual Check

**Date**

### Head Information

**S/N**
DATA SHEET
1/4" Decreasing Amps

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP-L0-0001</th>
<th>WPS No.</th>
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</thead>
</table>

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #19 -15%

X-Ray Results: Accept

BACK-UP PURGE GAS HEAD TUBE DATA

INTERNAL GAS ARG HEAD GAS ARG O.D. 0.250

FLOW CFH 5+2 FLOW CFH 15+5 WALL .035

PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) ALLOY

(1) Pre-Purge time 15 sec(Min)

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>021</td>
<td>020</td>
<td>018</td>
<td>015</td>
<td>010</td>
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LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

<table>
<thead>
<tr>
<th>TIME 1-299 Sec</th>
<th>TIME 1-299 Sec</th>
<th>TIME 1-299 Sec</th>
<th>TIME 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>.007</td>
<td>.005</td>
<td>.009</td>
<td>4.0</td>
<td></td>
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</table>

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED RPM

<table>
<thead>
<tr>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1</td>
<td>.1</td>
<td>3.60</td>
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QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
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</thead>
</table>

MACHINE E-200T4 S/N 328
HEAD S/N 1328

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT STAMP

FORM 38183-1 REV. 6-73

37
DATA SHEET
1/4" Decreasing Amps

AUTOMATIC BUTTHELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
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<tbody>
<tr>
<td>REVISION LETTER</td>
<td></td>
</tr>
<tr>
<td>PAGE</td>
<td>14 of 14</td>
</tr>
<tr>
<td>SPECIFICATION NO.</td>
<td>SPECIFICATION NO. REVISION</td>
</tr>
<tr>
<td>MPP-LO-0001</td>
<td>TPS A/A 329-001 Sample #20 -20%</td>
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<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5±2</td>
<td>FLOW CFH</td>
<td>15±5</td>
</tr>
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</table>

| PRE-PURGE TIME | POST-PURGE TIME | ALLOY |
| 2 MIN(MIN) | 1 MIN(MIN) | 1 MIN(MIN) |

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMERS SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>Ftg.</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>020</td>
<td>013</td>
<td>017</td>
<td>014</td>
<td>010</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
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</tr>
<tr>
<td>007</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1.60</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.9</td>
<td></td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [x] VERTICAL

MACHINE E-200T4 S/N 328
HEAD S/N 1328

WELDERS NAME________________ STAMP________________

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER 1328

APPROVALS:

MFG. D/821________________ DATE________________
Q.E. D/814________________ DATE________________
ENGR.D/830________________ DATE________________

QUALITY CONTROL STAMP ____________________ DATE ____________________

VISUAL REJ. LOP

ELECTRODE (Sketch)

A 80°
B .015
C 1.329
D .030

38
DATA SHEET
1/4" Decreasing Amps

ORIGINAL PAGE IS OF POOR QUALITY.

AUTOMATIC Butt Weld
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPP-LO-0001</td>
<td>WPS No.</td>
<td></td>
</tr>
</tbody>
</table>

**PURGE GAS**
- BACK-UP
- INTERNAL GAS: ARG
- HEAD GAS: ARG
- TUBE DATA: O.D. 0.250

**FLOW CFH**
- 5+2
- 15+5

**WALL**
- 0.035

**PRE-PURGE TIME**
- 2 MIN (MIN)

**POST-PURGE TIME**
- 1 MIN (MIN)

**Alloy**

**X-Ray Results:** Rej. LOP

**PURGE GAS X-Ray Results**
- BACK-UP HEAD TUBE DATA
- ARG ARG O.D. 0.250

**FLOW CFH**
- 5+2
- 15+5

**WALL**
- 0.035

**PRE-PURGE TIME**
- 2 MIN (MIN)

**POST-PURGE TIME**
- 1 MIN (MIN)

**Ftg. P/H**

**Additional Note:** Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>019</td>
<td>017</td>
<td>015</td>
<td>013</td>
<td>010</td>
</tr>
</tbody>
</table>

**LEVEL I**
- Time 1-299 Sec
- Pulse High: 0.1 to 9.9 Sec

**LEVEL II**
- Time 1-299 Sec
- Pulse Low: 0.1 to 9.9 Sec

**LEVEL III**
- Time 1-299 Sec
- Pulse Low: 0.1 to 9.9 Sec

**LEVEL IV**
- Time 1-299 Sec
- Pulse Low: 0.1 to 9.9 Sec

**FINISH SLOPE**
- 4.0

**ROCKET**
- 0.1
- 0.1
- 0.9
- 3.60

**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
</table>

**WELDERS NAME**

**STAMP**

**MACHINE**
- E-200T4 S/N 328
- HEAD S/N 1328

**ELECTRODE (Sketch)**
- A 080°
- B 0.015
- C 1.329
- D 0.030

**REJECT LOP**

**APPROVALS:**
- MFG. 0/821 DATE
- Q.E. 0/814 DATE
- ENGR. 0/830 DATE

**QUALITY CONTROL**

**STAMP**

39
DATA SHEET
1/4" Decreasing Amps

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP-LO-0001

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
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<th>PAGE</th>
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<tr>
<td>MPP-LO-0001</td>
<td></td>
<td>14 of 14</td>
</tr>
</tbody>
</table>

SPECIFICATION NO. REVISION. DATE: TPS A/A 328-001 Sample #22

PURGE GAS
X-Ray Results: Accept

INTERNAL GAS: ARG
FLOW CFH 5±2
PRE-PURGE TIME: 2 MIN (MIN)
POST-PURGE TIME: 1 MIN (MIN)

HEAD GAS: ARG
FLOW CFH 15±5
WALL 0.035
PRE-PURGE TIME: 15 SEC (MIN)
POST-PURGE TIME: 1 MIN (MIN)

ALLOY

FLOW CFH 15±5
WALL 0.035
PRE-PURGE TIME: 15 SEC (MIN)
POST-PURGE TIME: 1 MIN (MIN)

(1) Add 1 min (min) for each additional ft. o". Time between the gas inlet and the joint to be welded:

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>021</td>
<td>019</td>
<td>017</td>
<td>015</td>
<td>010</td>
</tr>
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</table>

LEVEL I
Time: 1-299 Sec
007
PULSE HIGH: .1 to 9.9 Sec
0.1

LEVEL II
Time: 1-299 Sec
005
PULSE LOW: .1 to 9.9 Sec
0.1

LEVEL III
Time: 1-299 Sec
005

LEVEL IV
Time: 1-299 Sec
009
FINISH SLOPE: .1 to 9.9 Sec
4.0

ROTATION DELAY: 0.0 Sec
HEAD SPEED: RPM
3.60

QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>Horizontal</th>
<th>Vertical</th>
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</table>

WELDERS NAME: STAMP

MACHINE: E-200T4
S/N: 328
HEAD S/N: 1328

ELECTRODE (Sketch)
A: 80°
B: 015
C: 1.329
D: 030

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT: STAMP

FORM 30155-1 REV. 6-73
DATA SHEET

1/4" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<td>DATE</td>
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<tr>
<td>BACK-UP PURGE GAS X-Ray Results: Accept</td>
<td></td>
</tr>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
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<tr>
<td>FLOW CFH</td>
<td>FLOW CFH</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY</td>
<td></td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/N</td>
<td></td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.</td>
<td></td>
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PROGRAMMER SETTINGS

<table>
<thead>
<tr>
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<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
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<td>LEVEL I</td>
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<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
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<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<td>007</td>
<td>006</td>
<td>005</td>
<td>.008</td>
<td>4.0</td>
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<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
<td>HEAD SPEED</td>
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<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
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QUALIFICATION POSITIONS

| HORIZONTAL | VERTICAL |

MACHINE E-20074 S/N 328 & 1328

ELECTRODE (Sketch)

APPROVALS:

M.G. D/821 DATE
Q.E. D/814 DATE
ENG.R.D/330 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

DATE

DATE

DATE

DATE

DATE
DATA SHEET
1/4" Increasing RPM

AUTOMATIC BUTT WELDING
WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION DATE
TPS A/A 328-001 Sample #79 +10%

PURGE GAS BACK-UP HEAD TUBE DATA
X-Ray Results: Accept

INTERNAL GAS ARG HEAD GAS ARG O.D. 0.250
FLOW CFH 5+2 FLOW CFH 15+5 WALL 0.035

PRE-PURGE TIME 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY
POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. of time between the gas inlet
and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
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<th>WELD LEVEL</th>
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<th>PULSE LOW</th>
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<td>III</td>
<td>IV</td>
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<tr>
<td>021</td>
<td>018</td>
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<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>007</td>
</tr>
<tr>
<td>005</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
<td>HEAD SPEED</td>
<td>RPM</td>
</tr>
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<td>3.96</td>
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<td>QUALIFICATION POSITIONS</td>
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MACHINE E-200T4 S/N 328
HEAD S/N 1328

QUALITY CONTROL

<table>
<thead>
<tr>
<th>ELECTRODE (Sketch)</th>
<th>WELDER NAME</th>
<th>STAMP</th>
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<tbody>
<tr>
<td>A 80°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B 0.015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C 1.329</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D 0.030</td>
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</tbody>
</table>

RADIOGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:
MFG. D/827 DATE
Q.E. D/814 DATE
ENG. D/830 DATE

QUALITY CONTROL

VISUAL ACCEPT STAMP

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### DATA SHEET

#### AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

**WPS No.**

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>SPECIFICATION NO.</th>
<th>REVISION LETTER</th>
<th>DATE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPP-LO-0001</td>
<td>TPS A/A 328-001</td>
<td>Sample #80 +15%</td>
<td>1/4&quot; Increasing RPM</td>
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</tbody>
</table>

**X-Ray Results:** Accept

**TUBE DATA**

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>HEAD GAS</th>
<th>O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARG</td>
<td>ARG</td>
<td>0.250</td>
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**FLOW CFH**

<table>
<thead>
<tr>
<th>PRE-PURGE</th>
<th>POST-PURGE</th>
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<tbody>
<tr>
<td>5+2</td>
<td>15+5</td>
</tr>
</tbody>
</table>

**PURGE GAS**

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.035</td>
</tr>
</tbody>
</table>

**PRE-PURGE TIME**

(1) **POST-PURGE TIME**

**POST-PURGE TIME**

<table>
<thead>
<tr>
<th>1 MIN(MIN)</th>
<th>FTG. P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Add 1 min (min) for each additional ft. to the joint to be welded.**

#### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>007</td>
<td>005</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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#### QUALIFICATION POSITIONS

- **HORIZONTAL**
- **VERTICAL**

#### WELDERS NAME

- **STAMP**

**MACHINE**

- **E-200T4 S/N 328**
- **HEAD S/N 1328**

**ELECTRODE**

- **(Sketch)**
  - A: 80°
  - B: .015
  - C: 1.329
  - D: .030

**FTG.**

**APPROVALS:**

- MFG. D/821
- Q.E. D/814
- ENGR. D/830

**QUALITY CONTROL**

**STAMP**

**VISUAL ACCEPTANCE**

**DATE**

---

**FORM: 391-61-1 REV. 5/73**

43
DATA SHEET
1/4" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>WPS No.</th>
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<tbody>
<tr>
<td>MPP-LO-0001</td>
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SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #81 +20%

BACK-UP PURGE GAS X-Ray Results: Accept
INTERNAL GAS ARG HEAD GAS ARG O.D. .250
FLOW CFH 5+2 FLOW CFH 15+5 WALL .035

PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>025</td>
<td>023</td>
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<td>018</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
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<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tbody>
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<td>Time 1-299 Sec</td>
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<th>HEAD SPEED</th>
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<tbody>
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QUALIFICATION POSITIONS

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</table>

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)
A 80°
B .015
C 1.329
D .030

QUALIFICATIONS WELDERS NAME STAMP
HORIZONTAL VERTICAL
RADIOGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER
APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL DATE
VISUAL ACCEPT STAMP

FORM 2016S-1 REV. 5-73
44
**DATA SHEET**

1/4" Increasing RPM

**ORIGINAL PAGE IS OF POOR QUALITY**

**AUTOMATIC BUTT WELD**

**WELDING PROCEDURE SPECIFICATION (WPS)**

**MPS No.**

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<thead>
<tr>
<th>MPP NUMBER</th>
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<td>INTERNAL GAS</td>
<td>ARG</td>
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<tr>
<td>FLOW CFH</td>
<td>5+2</td>
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<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN (MIN)</td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN (MIN)</td>
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1 Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<th>LEVEL III</th>
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<tbody>
<tr>
<td>Time</td>
<td>1-299 Sec</td>
<td>Time</td>
<td>1-299 Sec</td>
<td>Time</td>
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<tr>
<td>007</td>
<td>005</td>
<td>005</td>
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<td>4.0</td>
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<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
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**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

**MACHINE E-200T4**

**WELDERS NAME**

**STAMP**

**ELECTRODE APPROVALS:**

- MFG. D/821
- Q.E. D/814
- ENGR. D/830

**QUALITY CONTROL**

**STAMP**

**VISUAL ACCEPT**
# DATA SHEET

1/4" Increasing RPM

## AUTOMATIC BUTTWELD

WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION.</th>
<th>DATE</th>
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<tbody>
<tr>
<td>TPS A/A 328-001 Sample #83</td>
<td>+25%</td>
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<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
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<tbody>
<tr>
<td>INTERNAL GAS: ARG</td>
<td></td>
<td>HEAD GAS: ARG</td>
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<tr>
<td>FLOW CFH: 5+2</td>
<td>FLOW CFH: 15+5</td>
<td>WALL: .035</td>
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<tr>
<th>PRE-PURGE TIME</th>
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<tr>
<td>2 MIN(MIN)(1)</td>
<td>1 MIN(MIN)</td>
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## PROGRAMMER SETTINGS

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<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>025</td>
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<td>018</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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<table>
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<tr>
<td>HEAD S/N</td>
<td>1328</td>
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<table>
<thead>
<tr>
<th>ELECTRODE (Sketch)</th>
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<tbody>
<tr>
<td>A 80°</td>
</tr>
<tr>
<td>B .15</td>
</tr>
<tr>
<td>C 1.329</td>
</tr>
<tr>
<td>D .030</td>
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<table>
<thead>
<tr>
<th>WELDERS NAME</th>
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<th>APPROVALS:</th>
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<tbody>
<tr>
<td>STAMP</td>
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FORM 2016-51 REV. 5-73
DATA SHEET
1/4" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP NUMBER
MPP-LO-0001

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #84 +30%

X-Ray Results: Accept

BACK-UP PURGE GAS HEAD TUBE DATA

INTERNAL GAS ARG HEAD GAS ARG O.D. 0.250
FLOW CFH 5+2 FLOW CFH 15+5 WALL .035

PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. of pipe between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
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<tbody>
<tr>
<td>025</td>
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<td>021</td>
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<thead>
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<th>LEVEL</th>
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<tr>
<td>LEVEL I</td>
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<td>LEVEL II</td>
<td>Time 1-299 Sec</td>
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<tr>
<td>LEVEL III</td>
<td>Time 1-299 Sec</td>
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<td>LEVEL IV</td>
<td>Time 1-299 Sec</td>
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<table>
<thead>
<tr>
<th>FINISH SLOPE</th>
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<tr>
<td>.1 to 9.9 Sec</td>
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</table>

<table>
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<tr>
<th>PULSE HIGH</th>
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<tr>
<td>.1 to 9.9 Sec</td>
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<table>
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<tr>
<td>0.9</td>
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QUALIFICATION POSITIONS

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<thead>
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WELDERS NAME STAMP

MACHINE E-200T4 S/N 328 1328

HEAD S/N 1328

ELECTRODE (Sketch)

A 80°
B .015
C 1.329
D .030

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL DATE

VISUAL REJECT LOP STAMP

RADIOPHGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

47
**DATA SHEET**

**1/4" Increasing RPM**

**AUTOMATIC BUTT-WELD WELDING PROCEDURE SPECIFICATION (WPS)**

**WPS No.**

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<td>BACK-UP PURGE GAS</td>
<td>X-Ray Results: Accept</td>
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<tr>
<td>HEAD INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D. 0.250</td>
</tr>
<tr>
<td>WALL FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.035</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)(1)</td>
<td>PRE-PURGE TIME 15 SEC(MIN)</td>
<td>ALLOY</td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>FTG. P/H</td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.</td>
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<td></td>
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</table>

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td>010</td>
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</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<tr>
<td>007</td>
<td>005</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
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<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
<th>RPM</th>
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<td>.1 to 9.9 Sec</td>
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**QUALIFICATION POSITIONS**

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<table>
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<tr>
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<tbody>
<tr>
<td>HEAD S/N</td>
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**ELECTRODE (Sketch)**

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<tr>
<th>A</th>
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<th>C</th>
<th>D</th>
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</thead>
<tbody>
<tr>
<td>80°</td>
<td>.015</td>
<td>1.329</td>
<td>.030</td>
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</tbody>
</table>

**QUALITY CONTROL**

* APPROVALS:
  - MFG. D/821 DATE
  - Q.E. D/814 DATE
  - ENGR.D/830 DATE

**WELDERS NAME**

**STAMP**

**RAPID REVIEW**

**RADIOPHOTO ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**QUALITY CONTROL**

**STAMP**

**VISUAL ACCEPT**
DATA SHEET
1/4" Decreasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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<th>MPP NUMBER</th>
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<tr>
<th>SPECIFICATION NO.</th>
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<th>DATE</th>
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<tbody>
<tr>
<td>TPS A/A 328-001</td>
<td>Sample #73 -5%</td>
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<th>BACK-UP PURGE GAS X-RAY RESULTS: Accept</th>
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<tr>
<td>HEAD TUBE DATA</td>
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<table>
<thead>
<tr>
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<th>ARG</th>
<th>HEAD GAS</th>
<th>ARG</th>
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<th>.250</th>
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<tbody>
<tr>
<td>FLOW CFH 5+2</td>
<td>.250</td>
<td>FLOW CFH 15+5</td>
<td>WALL</td>
<td>.035</td>
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<table>
<thead>
<tr>
<th>PRE-PURGE TIME 2 MIN(MIN) PRE-PURGE TIME 15 SEC(MIN) ALLOY</th>
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</thead>
<tbody>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 'MIN(MIN) FTG. P/H</td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>PROGRAMMER SETTINGS</th>
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<tbody>
<tr>
<td>WELD LEVEL 1 WELD LEVEL 2 WELD LEVEL 3 WELD LEVEL 4 PULSE LOW</td>
</tr>
<tr>
<td>5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps</td>
</tr>
<tr>
<td>025 023 021 018 010</td>
</tr>
</tbody>
</table>

| LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE |
| Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec |
| 007 006 009 4.0 |

| PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED |
| .1 to 9.9 Sec .1 to 9.9 Sec |
| 0.1 0.1 0.9 3.42 |

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<td>WELDERS NAME STAMP</td>
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<td>WELDERS NAME STAMP</td>
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<td>RADIOGRAPH ACCEPTANCE</td>
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<td>TENSIILE TEST ACCEPTANCE</td>
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<td>REPORT NUMBER</td>
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MACHINE E-200T4 S/N 328 HEAD S/N 1328

| APPROVALS: |
| MFG. D/821 DATE |
| Q.E. D/814 DATE |
| ENGR.D/830 DATE |

QUALITY CONTROL STAMP

VISUAL ACCEPT STAMP

<table>
<thead>
<tr>
<th>ELECTRODE (Sketch)</th>
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<tbody>
<tr>
<td>A 080°</td>
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<tr>
<td>B .015</td>
</tr>
<tr>
<td>C 1.329</td>
</tr>
<tr>
<td>D .030</td>
</tr>
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ELECTRODE (Sketch)
DATA SHEET
1/4" Decreasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-00-0001</th>
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X-Ray Results: Accept

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<th>TUBE DATA</th>
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<tr>
<td>GATE</td>
<td>WALL</td>
<td>O.D.</td>
<td>.250</td>
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<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL</td>
<td>.035</td>
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PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
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<td>5 to 199 Amps</td>
</tr>
<tr>
<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td>010</td>
</tr>
</tbody>
</table>

LEVEL I | LEVEL II | LEVEL III | LEVEL IV | FINISH SLOPE
| Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | .1 to 9.9 Sec |
| 007         | 005         | 005         | 009         | 4.0        |

PULSE HIGH | PULSE LOW | ROTATION | HEAD SPEED |
| .1 to 9.9 Sec | .1 to 9.9 Sec | .1 to 9.9 Sec | 3.24 RPM |
| 0.1        | 0.1        | 0.9        |

QUALIFICATION POSITIONS

HORIZONTAL | VERTICAL

WELDERS NAME | STAMP

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

A 80°
B .015
C 1.329
D .030

RADIOPHGRAPHS ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENG. R/D/830 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT STAMP
DATA SHEET
1/4" Decreasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-LO-0001</th>
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<td>IPS/A 328-001 Sample #75-16%</td>
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<tr>
<td>PURGE GAS</td>
<td>X-Ray Results: Accept</td>
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<td></td>
</tr>
<tr>
<td>BACK-UP</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D.</td>
<td>WALL</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN (MIN)</td>
<td>POST-PURGE TIME 1 MIN (MIN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) PRE-PURGE TIME 15 SEC (MIN)</td>
<td>POST-PURGE TIME 1 MIN (MIN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALLOY</td>
<td>FTG. P/N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of the gas length from the gas inlet and the joint to be welded.</td>
<td></td>
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</tbody>
</table>

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
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<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time</td>
<td>1-299 Sec</td>
<td>Time</td>
<td>1-299 Sec</td>
<td>Time</td>
</tr>
<tr>
<td>007</td>
<td>006</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION</td>
<td>DELAY</td>
<td>HEAD SPEED</td>
</tr>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.9</td>
<td>3.06</td>
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QUALIFICATION POSITIONS

| | | |
| HORIZONTAL | ✓ | VERTICAL |

MACHINE E-200T4 S/N | 328 |
HEAD S/N | 1328 |

ELECTRODE (Sketch)

A 80°
B 0.015
C 1.329
D 0.030

WELDERS NAME _ STAMP _
RADIOPHGRAPH ACCEPTANCE _
TENSILE TEST ACCEPTANCE _
REPORT NUMBER _
APPROVALS:
MFG. D/821 _ DATE _
Q.E. D/814 _ DATE _
ENGR. D/830 _ DATE _
QUALITY CONTROL _ STAMP _
VISUAL REJECT L.O.P. _

51
DATA SHEET
1/4" Decreasing RPM

AUTOMATIC BUTT WELD

WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS</th>
<th>A/A</th>
<th>328-001</th>
<th>Sample</th>
<th>#76</th>
<th>-20%</th>
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<td>PURGE GAS</td>
<td>BACK-UP</td>
<td>HEAD</td>
<td>TUBE DATA</td>
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<td></td>
<td></td>
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<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
<td>O.D.</td>
<td>.250</td>
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<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
<td>WALL</td>
<td>.035</td>
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PRE-PURGE TIME 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY

POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/N

(1) Add 1 min (min) for each additional ft. Linear time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>025</td>
<td>023</td>
<td>021</td>
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LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

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<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
</tr>
</thead>
<tbody>
<tr>
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<td>005</td>
<td>005</td>
<td>005</td>
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PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED

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<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>RPM</th>
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<td>0.1</td>
<td>0.1</td>
<td>0.9</td>
<td>2.88</td>
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QUALIFICATION POSITIONS

HORIZONTAL VERTICAL

WELDERS NAME STAMP

MACHINE E-200T4 S/N 328 HEAD S/N 1328

ELECTRODE (Sketch)

A | 80° | B | .015 | C | 1.329 | D | .030 | FTG.

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL DATE

VISUAL REJECT LOC STAMP

STAMP
DATA SHEET

1/4" Increasing Shielding Gas

AUTOMATIC BUTTFIELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<tr>
<th>MPP NUMBER</th>
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<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS/328-001 Sample #92 +5%</th>
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<table>
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<tr>
<th>BACK-UP PURGE GAS</th>
<th>X-Ray Results: Accept</th>
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</thead>
<tbody>
<tr>
<td>INTERNAL GAS. ARG</td>
<td>HEAD GAS ARG O.D. .250</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 16 WALL .035</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY</td>
<td></td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H</td>
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</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. o: Time between the gas inlet and the joint to be welded.</td>
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<thead>
<tr>
<th>PROGRAMMER SETTINGS</th>
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<tr>
<td>WELD LEVEL I</td>
</tr>
<tr>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>025</td>
</tr>
</tbody>
</table>

| LEVEL I | LEVEL II | LEVEL III | LEVEL IV | FINISH SLOPE |
| Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | .1 to 9.9 Sec |
| 007 | 005 | 005 | .009 | 4.0 |

| PULSE HIGH | PULSE LOW | ROTATION DELAY | HEAD SPEED |
| .1 to 9.9 Sec | .1 to 9.9 Sec | .1 to 9.9 Sec | RPM |
| 0.1 | 0.1 | 0.9 | 7.60 |

<table>
<thead>
<tr>
<th>QUALIFICATION POSITIONS</th>
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<tbody>
<tr>
<td>WELDERS NAME STAMP</td>
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<tr>
<td>RADIOGRAPH ACCEPTANCE</td>
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<tr>
<td>TENSILE TEST ACCEPTANCE</td>
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<tr>
<td>REPORT NUMBER</td>
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</table>

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)
A 80°
B .015
C 1.329
D .030

QUALIFICATION POSITIONS:
HORIZONTAL
VERTICAL

VISUAL ACCEPT

FORM 3216-S-1 REV. 5-73

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DATA SHEET
1/4" Increasing Shielding Gas

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #94 +10%

<table>
<thead>
<tr>
<th>BACK-UP PURGE GAS</th>
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</thead>
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<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS: ARG</td>
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<tr>
<td>FLOW CFH: 5+2</td>
<td>FLOW CFH: 17</td>
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<tr>
<td>O.D. .250</td>
<td>WALL .035</td>
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</tbody>
</table>

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>010</td>
</tr>
<tr>
<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td></td>
</tr>
</tbody>
</table>

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
<table>
<thead>
<tr>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
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</thead>
<tbody>
<tr>
<td>007</td>
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<td>009</td>
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</tbody>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>3.60 RPM</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.9</td>
<td></td>
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QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
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</thead>
</table>

MACHINE E-200T4 S/N 328 HEAD S/N 1328

WELDERS NAME ___________ STAMP ___________
RADIOPHOT ACCEPtANCE ___________
TENSILE TEST ACCEPTANCE ___________
REPORT NUMBER ___________
APPROVALS:
MFG. D/821 ___________ DATE ___________
Q.E. D/814 ___________ DATE ___________
ENGR.D/830 ___________ DATE ___________
QUALITY CONTROL ___________ DATE ___________

ELECTRODE (Sketch)
C 80°
B .015
C 1.329
D .030

VISUAL ACCEPT ___________ STAMP ___________
DATA SHEET
1/4" Increasing Shielding Gas

ORIGINAL PAGE IS OF POOR QUALITY

 specifications:
WELDING PROCEDURE SPECIFICATION (WPS) - WPS No.

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**SPECIFICATION NO. REVISION.**

<table>
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**X-Ray Results:** Accept

**PURGE GAS**

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<tr>
<th>BACK-UP</th>
<th>INTERNAL GAS</th>
<th>HEAD GAS</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PURGE GAS</td>
<td>ARG</td>
<td>ARG</td>
<td>O.D.</td>
</tr>
<tr>
<td>CFH</td>
<td>5+2</td>
<td>18</td>
<td>.250</td>
</tr>
<tr>
<td>WALL</td>
<td>.035</td>
<td></td>
<td></td>
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**PRE-PURGE TIME**

<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>2 MIN(MIN)</th>
<th>PRE-PURGE TIME</th>
<th>15 SEC(MIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOY</td>
<td>(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.</td>
<td></td>
<td></td>
</tr>
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**WELD LEVEL**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td>010</td>
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**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>007</td>
<td>005</td>
<td>006</td>
<td>009</td>
<td>4.0</td>
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**PULSE HIGH**

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>0.1</td>
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</tbody>
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**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

**WELDERS NAME**

**MACHINE E-200T4 S/N**

**HEAD S/N**

**ELECTRODE APPROVALS**

- A 80°
- B .015
- C 1.329
- D .030

**QUALITY CONTROL**

55
# DATA SHEET

**1/4" Increasing Shielding Gas**

**AUTOMATIC BUTT WELD WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-001 Sample #96 +30%</th>
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<tbody>
<tr>
<td>MPP-00-0001</td>
<td>I</td>
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</table>

**PURGE GAS**

- BACK-UP HEAD GAS
- TUBE DATA

**INTERNAL GAS**

- ARG

**HEAD GAS**

- ARG

**X-Ray Results**: Accept

**FLOW CFH**

- 5

**FLOW CFH**

- 2

**FLOW CFH**

- 20

**WALL**

- .035

**PRE-PURGE TIME**

- 2 MIN

**PRE-PURGE TIME**

- 15 SEC

**ALLOY**

- .009

**POST-PURGE TIME**

- 1 MIN

**POST-PURGE TIME**

- 1 MIN

**FTG. P/N**

- N/A

(1) Add 1 min (min) for each additional ft. o' length between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
</tbody>
</table>

- 0.025

- 0.023

- 0.021

- 0.018

- 0.010

- LEVEL I
  - Time 1-299 Sec
  - 0.007

- LEVEL II
  - Time 1-299 Sec
  - 0.005

- LEVEL III
  - Time 1-299 Sec
  - 0.006

- LEVEL IV
  - Time 1-299 Sec
  - 0.009

- FINISH SLOPE
  - .1 to 9.9 Sec

- Rotation delay
  - 4.0

- PULSE HIGH
  - .1 to 9.9 Sec

- PULSE LOW
  - .1 to 9.9 Sec

- HEAD SPEED
  - RPM

- .1

- .1

- .0

- .0

- .0

- .0

- .360

**QUALIFICATION POSITIONS**

- HORIZONTAL

- VERTICAL

**WELDERS NAME**

**STAMP**

**MACHINE E-200T4 S/N**

- 328

**HEAD S/N**

- 1328

**REPORT NUMBER**

**ELECTRODE (Sketch)**

- APPROVALS:
  - MFG. D/821
  - Q.E. D/814
  - D/930

**QUALITY CONTROL**

**STAMP**

**VISUAL ACCEPT**
## AUTOMATIC QUIGFIELD

### WELDING PROCEDURE SPECIFICATION (WPS)

#### ORIGINAL PAGE IS OF POOR QUALITY

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<tr>
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<td>DATE</td>
</tr>
<tr>
<td>BACK-UP PURGE GAS</td>
<td>X-Ray Results: Reject L.O.F.</td>
</tr>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
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<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 21</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN (MIN)</td>
<td>PRE-PURGE TIME 15 SEC (MIN)</td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN (MIN)</td>
<td>POST-PURGE TIME 1 MIN (MIN)</td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.</td>
<td></td>
</tr>
<tr>
<td>PROGRAMMER SETTINGS</td>
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<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<td>025</td>
<td>023</td>
<td>021</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Yima 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>007</td>
<td>005</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
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<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
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<td>.1 to 9.9 Sec</td>
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<tr>
<th>QUALIFICATION POSITIONS</th>
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<tbody>
<tr>
<td>[ ] HORIZONTAL [ ] VERTICAL</td>
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<table>
<thead>
<tr>
<th>MACHINE E-200T4 S/N</th>
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<tbody>
<tr>
<td>HEAD S/N</td>
<td>1328</td>
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<table>
<thead>
<tr>
<th>ELECTRODE (Sketch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 80°</td>
</tr>
<tr>
<td>B .015</td>
</tr>
<tr>
<td>C 1.329</td>
</tr>
<tr>
<td>D .030</td>
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<table>
<thead>
<tr>
<th>WELDERS NAME</th>
<th>STAMP</th>
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<tbody>
<tr>
<td>RADIOGRAPH ACCEPTANCE</td>
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<tr>
<td>TENSILE TEST ACCEPTANCE</td>
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<td>REPORT NUMBER</td>
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<tr>
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<tr>
<td>Q.E. D/814</td>
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<td>ENGR.D/830</td>
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<tr>
<td>QUALITY CONTROL</td>
</tr>
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</table>

| VISUAL ACCEPT | |

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DATA SHEET
1/4" Increasing Shielding Gas

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>TPS</th>
<th>PAGE</th>
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</table>

SPECIFICATION NO. REVISION. DATE TPS A/A 328-0001 Sample #98 +50%

BACK-UP PURGE GAS X-Ray Results: Reject L.O.F HEAD TUBE DATA

INTERNAL GAS ARG HEAD GAS ARG O.D. .250

FLOW CFH 5+2 FLOW CFH 22 WALL .035

PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) ALLOY

BACK-UP HEAD TUBE DATA

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS:

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td>010</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<td>006</td>
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<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION</th>
<th>HEAD SPEED</th>
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<td>.1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>RPM</td>
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<td>0.1</td>
<td>0.9</td>
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</table>

QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME STAMP

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

A 80°
B .015
C 1.329
D .030

WELDERS NAME STAMP

RADIOPHANT ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL STAMP

VISUAL ACCEPT
DATA SHEET
1/4" Increasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP NUMBER: MPP-LO-0001
MPP-LO-0001

SPECIFICATION NO. REVISION. DATE  TPS A/A 328-001 Sample #99 60%

BACK-UP PURGE GAS X-Ray Results: Reject L.O.F

INTERNAL GAS ARG HEAD GAS ARG O.D. .250
FLOW CFH 5+2 FLOW CFH 24 WALL .035

PRE-PURGE TIME 2 MIN (MIN) PRE-PURGE TIME 15 SEC (MIN) ALLOY
POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. O' time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<th>WELD LEVEL IV</th>
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<tr>
<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td>010</td>
</tr>
</tbody>
</table>

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec
007          006       005       009       4.0

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED RPM
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec
0.1          0.1       0.9       3.60

QUALIFICATION POSITIONS

WELDERS NAME STAMP

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)
A 80°
B .015
C 1.329
D .030

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL STAMP

VISUAL ACCEPT
DATA SHEET
1/4" Decreasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

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SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #66 -5%

X-Ray Results: Accept

BACK-UP PURGE GAS HEAD TUBE DATA
INTERNAL GAS ARG HEAD GAS ARG O.D .250
FLOW CFH 5+2 FLOW CFH 14 WALL .035

PRE-PURGE TIME MIN(1) PRE-PURGE TIME 15 SEC ALLOY
POST-PURGE TIME MIN(1) POST-PURGE TIME 1 MIN(1) FTG. P/H
(1) Add 1 min (min) for each additional ft. 0. Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps
025 023 021 018 010 010

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec
007 005 005 009 4.0

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED
.1 to 9.9 Sec .1 to 9.9 Sec 1 to 9.9 Sec RPM
0.1 0.1 0.9 3.60

QUALIFICATION POSITIONS

MACHINE E-20074 S/N 328 HEAD S/N 1328

ELECTRODE (Sketch)
A 80°
B .015
C 1.329
D .030

WELDERS NAME STAMP
RADIOPHGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER
APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL STAMP

DECREASING SHIELD GAS
DATA SHEET
1/4" Decreasing Shielding Gas

ORIGINAL PAGE IS OF POOR QUALITY

AUTOMATIC BUTT WELD WELDING PROCEDURE SPECIFICATION (WPS)

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<td>O.D. .250</td>
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<td>FLOW CFH 5+2</td>
<td>FLOW CFH 12</td>
<td>WALL .035</td>
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<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)(1)</td>
<td>PRE-PURGE TIME 15 SEC(MIN)</td>
<td>ALLOY</td>
<td></td>
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<tr>
<td>POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N</td>
<td>(1) Add 1 min (min) for each additional ft. 0&quot; Time between the gas inlet and the joint to be welded.</td>
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PROGRAMMER SETTINGS

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<td>021</td>
<td>018</td>
<td>010</td>
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<tr>
<td>LEVEL I Time 1-299 Sec</td>
<td>LEVEL II Time 1-299 Sec</td>
<td>LEVEL III Time 1-299 Sec</td>
<td>LEVEL IV Time 1-299 Sec</td>
<td>FINISH SLOPE .1 to 9.9 Sec</td>
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<td>005</td>
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<td>009</td>
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<tr>
<td>PULSE HIGH .1 to 9.9 Sec</td>
<td>PULSE LOW .1 to 9.9 Sec</td>
<td>ROTATION DELAY .1 to 9.9 Sec</td>
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<td>3.60</td>
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QUALIFICATION POSITIONS

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WELDERS NAME STAMP |

RADIOPHGRAPH ACCEPTANCE |

TENSILE TEST ACCEPTANCE |

REPORT NUMBER |

APPROVALS:

MFG. D/821 DATE |

Q.E. D/814 DATE |

ENGR. D/830 DATE |

QUALITY CONTROL STAMP |

VISUAL ACCEPT |

FORM 20165-1 REV. 5.73
DATA SHEET

1/4" Decreasing Shielding Gas

AUTOMATIC BUTTHELD
WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION DATE

TPS A/A 328-001 Sample #88 -25%

PURGE GAS X-Ray Results: Accept
BACK-UP HEAD TUBE DATA

INTERNAL GAS ARG HEAD GAS ARG O.D. .250
FLOW CFH 5+2 FLOW CFH 15+5 11 WALL .035

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps
025 023 021 018 010

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec
007 005 005 .009 4.0

PULSE HIGH PULSE LOW ROTATION HEAD SPEED
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec RPM
0.1 0.1 0.9 3.60

QUALIFICATION POSITIONS

WELDERS NAME STAMP

RADIONOGRAPH ACCEPTANCE

MACHINE E-200T4 S/N 328
HEAD S/N 1328

REPORT NUMBER

APPROVALS:
MFG. D/821 ______ DATE
Q.E. D/814 ______ DATE
ENGR.D/830 ______ DATE
QUALITY CONTROL DATE

REJECT LOW CONCAVITY

ELECTRODE (Sketch)
A 80° B .015 C 1.329 D .030

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DATA SHEET
1/4" Decreasing Shielding Gas

AUTOMATIC OUTSIDE
WELDING PROCEDURE SPECIFICATION (WPS)

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X-Ray Results: Accept

Purge Gas

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<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
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<td>WALL GAS: ARG</td>
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PRE-PURGE TIME: 2 MIN(MIN)(1) PRE-PURGE TIME: 15 SEC(MIN) ALLOY

POST-PURGE TIME: 1 MIN(MIN) POST-PURGE TIME: 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. or Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<td>018</td>
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LEVEL I

<table>
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<tr>
<th>LEVEL II</th>
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<th>FINISH SLOPE</th>
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<tbody>
<tr>
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<tr>
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<tr>
<th>PULSE HIGH</th>
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<th>HEAD SPEED</th>
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QUALIFICATION POSITIONS

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WELDER NAME STAMP

MACHINE: E-200T S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

A 80°
B .015
C 1.329
D .030

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENG. D/830 DATE
QUALITY CONTROL STAMP

VISUAL ACCEPT

REPORT NUMBER

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

SAMPLE NUMBER 328

FORM: 2014S-1 REV. 5-73

63
DATA SHEET
1/4" Decreasing Shielding Gas

AUTOMATIC BUTTWEDE
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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PURGE GAS
X-Ray Results: REJECT L.O.P

<table>
<thead>
<tr>
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<th>POST-PURGE TIME</th>
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<td>1 MIN(MIN)</td>
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<td>15 SEC(MIN)</td>
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(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
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<th>WELD LEVEL IV</th>
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<tbody>
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<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
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<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<td>007</td>
<td>005</td>
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<thead>
<tr>
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<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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QUALIFICATION POSITIONS

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<th>WELDERS NAME</th>
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<tr>
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MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE APPROVALS:

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<th>DATE</th>
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QUALITY CONTROL:

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VISUAL ACCEPTANCE:

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FORM 2015-01 REV. 5-73

64
**DATA SHEET**

1/4" Decreasing Shielding Gas

**ORIGINAL PAGE IS OF POOR QUALITY**

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**AUTOMATIC BUTT WELD WELDING PROCEDURE SPECIFICATION (WPS)**

**WPS No.**  

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<td>14 of 14</td>
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</table>

**SPECIFICATION NO.**  

**REVISION.**  

**DATE**  

TPS A/A 328-001 Sample #91-601

---

**PURGE GAS**  

- BACK-UP
  - INTERNAL GAS: ARG
  - HEAD GAS: ARG
  - TUBE DATA: O.D. 0.250
  - FLOW CFH: 5+2
  - WALL: 0.035

**X-Ray Results:** Accept

---

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
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<th>WELD LEVEL III</th>
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<td>025</td>
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<td>021</td>
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**LEVEL I**  

- Time: 1-299 Sec
- Pulse High: 0.1 to 9.9 Sec
- Pulse Low: 0.1 to 9.9 Sec
- Finish Slope: 1.0
- Rotation: .1 to 9.9 Sec
- Delay: .1 to 9.9 Sec
- Head Speed: 3.60 RPM

---

**QUALIFICATION POSITIONS**

- WELDERS NAME
- STAMP
- RADIOGRAPH ACCEPTANCE
- TENSIILE TEST ACCEPTANCE
- REPORT NUMBER
- APPROVALS:
  - MFG. D/821
  - Q.E. D/814
  - ENGR. D/830
- QUALITY CONTROL
- STAMP

---

**ELECTRODE APPROVALS:** (Sketch)

---

**MACHINE E-200T4 S/N**  

328

**HEAD S/N**  

1328

---

**FORM 30165-1 REV. S-73**

---

65
DATA SHEET
1/4" Decreasing Shielding Gas

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>WPS No.</th>
</tr>
</thead>
</table>

**SPECIFICATION NO. REVISION. DATE**
TPS A/A 328-001 Sample #92 -70%

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X-Ray Results: Accept</td>
<td></td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>INTERVAL GAS</th>
<th>ARG</th>
<th>HEAD GAS</th>
<th>ARG</th>
<th>O.D.</th>
<th>WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>5</td>
<td>.250</td>
<td>.035</td>
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<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>2 MIN</th>
<th>MIN</th>
<th>ALLOY</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN</td>
<td>MIN</td>
<td>FTG. P/H</td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td></td>
</tr>
<tr>
<td>025</td>
<td>023</td>
<td>021</td>
<td>018</td>
<td>010</td>
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</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>007</td>
<td>005</td>
<td>005</td>
<td>009</td>
<td>4.0</td>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>3.60 RPM</td>
</tr>
</tbody>
</table>

**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

| MACHINE E-20074 S/N | 328 |
| HEAD S/N            | 1328 |

<table>
<thead>
<tr>
<th>WELDERS NAME</th>
<th>STAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| WELDING MACHINE | E-200T4 |
| REPORT NUMBER   |         |

**ELECTRODE (Sketch)**

- A: 80°
- B: .015
- C: 1.329
- D: .030

**QUALITY CONTROL**

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE

**REJECT**

- STAMP
DATA SHEET
3/4" Increasing Amps

AUTOMATIC BUTT/WELDING PROCEDURE SPECIFICATION (WPS)

### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>078</td>
<td>077</td>
<td>077</td>
<td>076</td>
<td>042</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DEPLY</td>
<td>HEAD SPEED</td>
<td></td>
</tr>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
</tr>
<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

### QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [X] VERTICAL

MACHINE E-20074 S/N 328
HEADED S/N 1328

ELECTRODE (Sketch)

- A: 80°
- B: .010
- C: 1.073
- D: .020

ELECTRODE APPROVALS:

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE
- QUALITY CONTROL DATE

REJ. CONCAVITY & EXCEPTS DROP THRU
**DATA SHEET**

**3/4" Increasing Amps**

**AUTOMATIC OUT OF HELD**

**WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>WPS No.</th>
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</thead>
<tbody>
<tr>
<td>KPP-LO-0001</td>
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**SPECIFICATION NO. REVISION. DATE** TPS A/A 328-001 Sample #35 +10%

**BACK-UP PURGE GAS HEAD TUBE DATA**

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>ARG</th>
<th>HEAD GAS</th>
<th>ARG</th>
<th>O.D.</th>
<th>0.750</th>
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<tbody>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
<td>WALL</td>
<td>0.109</td>
</tr>
</tbody>
</table>

**PRE-PURGE TIME 2 MIN(MIN) (1) POST-PURGE TIME 15 SEC(MIN)**

<table>
<thead>
<tr>
<th>ALLOY</th>
<th></th>
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</thead>
</table>

**ADD 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.**

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>081</td>
<td>080</td>
<td>080</td>
<td>079</td>
<td>042</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.00 RPM</td>
</tr>
<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td></td>
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</table>

**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th></th>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
</table>

**MACHINE E-200T4 S/N 328**

**HEAD S/N 1328**

**ELECTRODE (Sketch)**

| ELECTRODE (Sketch) | A .80" | B .010 | C 1.073 | D .020 |

**WELDERS NAME STAMP**

**RADIOPHGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**APPROVALS:**

<table>
<thead>
<tr>
<th>APPROVALS:</th>
<th>MFG. D/821 DATE</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Q.E. D/814 DATE</td>
</tr>
<tr>
<td></td>
<td>ENGR.D/830 DATE</td>
</tr>
<tr>
<td></td>
<td>QUALITY CONTROL DATE</td>
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</tbody>
</table>

**REJ. CONCAVITY & EXCESS DROP THRU**
DATA SHEET
3/4" Increasing Amps

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>REVISION LETTER</td>
<td></td>
</tr>
<tr>
<td>PAGE</td>
<td>13 of 14</td>
</tr>
</tbody>
</table>

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #36 4 Amps

Below +10% Level

X-Ray Results: Accept

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<thead>
<tr>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
</tr>
<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN (MIN)</td>
<td>POST-PURGE TIME</td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN (MIN)</td>
<td>ALLOY</td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. "O"-line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>077</td>
<td>076</td>
<td>076</td>
<td>075</td>
<td>042</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>LEVEL</th>
<th>LEVEL</th>
<th>LEVEL</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td>1.00</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

MACHINE E-200T4 S/N 328
HEAD S/N 1328

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/630 DATE
QUALITY CONTROL STAMP
REJ. SLIGHT CONCAVITY

FORM: 2016-5-1 REV. 9-73

69
# DATA SHEET

## 3/4" Increasing Amps

### AUTOMATIC BUTT WELD

**WELDING PROCEDURE SPECIFICATION (WPS)**

- **WPS No.**
- **SPECIFICATION NO.** MPP-LO-0001
- **REVISION Letter**
- **PAGE** 14 of 14

**X-Ray Results:** Accept Below +10% Level

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PURGE GAS</td>
<td>INTERNAL GAS: ARG</td>
<td>O.D. 0.750</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.109</td>
</tr>
</tbody>
</table>

**PRE-PURGE TIME 2 MIN(MIN)(1) POST-PURGE TIME 15 SEC(MIN) ALLOY**

- **POST-PURGE TIME 1 MIN(MIN)**
- **FTG. P/N**

(1) Add 1 min (min) for each additional ft. at Time between the gas inlet and the joint to be welded.

### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>075</td>
<td>074</td>
<td>074</td>
<td>073</td>
<td>042</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELEY</td>
<td>HEAD SPEED</td>
<td></td>
</tr>
<tr>
<td>.1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
<td></td>
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<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td>1.00</td>
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</tr>
</tbody>
</table>

### QUALIFICATION POSITIONS

- **MACHINE E-200T4 S/N** 328
- **HEAD S/N** 1328

### WELDERS NAME STAMP

- **QUALIFICATION POSITIONS**
  - HORIZONTAL
  - VERTICAL

- **ELECTRODE (Sketch)**
  - A 80°
  - B .010
  - C 1.073
  - D .020

- **REPORT NUMBER**

- **APPROVALS:**
  - MFG. D/821 DATE
  - Q.E. D/814 DATE
  - ENGR.D/830 DATE

- **QUALITY CONTROL DATE**

- **ACCEPT STAMP**
DATA SHEET
3/4" Decreasing Amps

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
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<tbody>
<tr>
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<td>REVISION LETTER</td>
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<tr>
<td>DATE</td>
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<td>Sample</td>
<td>#10 -5%</td>
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PURGE GAS X-Ray Results: Accept

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>HEAD GAS</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARG</td>
<td>ARG</td>
<td>O.D.</td>
</tr>
<tr>
<td>0.750</td>
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<td></td>
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</table>

FLOW CFH

<table>
<thead>
<tr>
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<th>PRE-PURGE TIME</th>
<th>POST-PURGE TIME</th>
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</thead>
<tbody>
<tr>
<td>WALL</td>
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<td>MIN(MIN)</td>
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<tr>
<td>0.109</td>
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<td></td>
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</tbody>
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FLOW CFH

<table>
<thead>
<tr>
<th>FLOW CFH</th>
<th>WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15+5</td>
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<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>POST-PURGE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MIN(MIN)</td>
<td>1 MIN(MIN)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALLOY</th>
<th>FTG. P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of pipe between the gas inlet and the joint to be welded.</td>
<td></td>
</tr>
</tbody>
</table>

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>0.070</td>
<td>0.069</td>
<td>0.069</td>
<td>0.068</td>
<td>0.042</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
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<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>0.018</td>
<td>0.017</td>
<td>0.016</td>
<td>0.017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
</tr>
<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td>1.00</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

<table>
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| MACHINE E-200T4 S/N | 328 |
| HEAD S/N | 1328 |

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DATA SHEET
3/4" Decreasing Amps

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP NUMBER
MPP-LQ-0001

SPECIFICATION NO. REVISION
MPS No.

DATE TPS A/A 328-001 Sample #1 -10%

BACK-UP PURGE GAS X-Ray Results: Accept
INTERNAL GAS ARG HEAD GAS ARG O.D. 0.750
FLOW CFH 5-2 FLOW CFH 15+5 WALL .109
PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN)

PURGE GAS
HEAD TUBE DATA

INTERNAL GAS ARG HEAD GAS ARG O.D. 0.750
FLOW CFH 5-2 FLOW CFH 15+5 WALL .109
PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN)

PURGE GAS
HEAD TUBE DATA

PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 15 SEC(MIN)
(1) Add 1 min (min) for each additional ft. of time between the gas inlet
and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec RPM

QUALIFICATION POSITIONS.

WELDERS NAME STAMP
HORIZONTAL VERTICAL

MACHINE E-20074 S/N 328
HEAD S/N 1328

ELECTRODE
(Sketch)

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT STAMP

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DATA SHEET
3/4" Decreasing Amps

ORIGINAL PAGE IS OF POOR QUALITY

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.

SPECIFICATION NO. REVISION. DATE TPS/A 328-001 Sample #12 -15%

BACK-UP PURGE GAS HEAD TUBE DATA
INTERNAL GAS ARG HEAD GAS ARG O.D. 0.750
FLOW CFH 5+2 FLOW CFH 15+5 WALL 0.109

PRE-PURGE TIME 2 MIN(MIN) (1) POST-PURGE TIME 1 MIN(MIN) ALLOY
(1) Add 1 min (min) for each additional ft. 0" Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps
063 062 062 061 042

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec
018 017 016 .017 9.9

PULSE HIGH PULSE LOW ROTATION HEAD SPEED RPM
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec
0.2 0.1 3.6 1.00

QUALIFICATION POSITIONS

HORIZONTAL VERTICAL

WELDERS NAME STAMP
RADIOPHGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER
APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/630 DATE
QUALITY CONTROL STAMP

VISUAL REJECT LOP
### DATA SHEET

**3/4" Decreasing Amps**

#### AUTOMATIC BUTT WELDING

**WELDING PROCEDURE SPECIFICATION (WPS)**

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<td>LOP</td>
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<tr>
<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS: ARG</td>
<td>O.D. 0.750</td>
<td>TUBE DATA</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.109</td>
<td></td>
</tr>
</tbody>
</table>

| PRE-PURGE TIME 2 MIN(MIN) 1 PRE-PURGE TIME 15 SEC(MIN) ALLOY |
| POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N |
| (1) Add 1 min (min) for each additional ft. or time between the gas inlet and the joint to be welded. |

#### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
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<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>059</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
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<td>016</td>
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<td>9.9</td>
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<tr>
<th>PULSE HIGH</th>
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<th>HEAD SPEED</th>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
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<td>0.2</td>
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<td>3.6</td>
<td>1.00</td>
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#### QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

<table>
<thead>
<tr>
<th>MACHINE</th>
<th>E-20074 S/N 328</th>
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<tr>
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<td>1928</td>
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<th>ELECTRODE (Sketch)</th>
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<tr>
<td>A 80°</td>
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<tr>
<td>B .010</td>
</tr>
<tr>
<td>C 1.073</td>
</tr>
<tr>
<td>D .020</td>
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<table>
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<tr>
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<th>WELDERS NAME</th>
<th>STAMP</th>
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<td>STAMP</td>
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| APPROVALS: |
| MFG. D/821 | DATE |
| Q.E. D/814 | DATE |
| ENGR.D/830 | DATE |

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<tr>
<th>VISUAL REJECT LOP</th>
<th>STAMP</th>
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74
### DATA SHEET

3/4" Decreasing Amps

**AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)**

**MPP NUMBER**

- MPP-L0-0001

**SPECIFICATION NO. REVISION. DATE**

- TPS A/A 328-0001 Sample #14

**PURGE GAS**

- X-Ray Results: Reject LOP

**BACK-UP**

- INTERNAL GAS = ARG

**HEAD**

- HEAD GAS = ARG

**TUBE DATA**

- O.D. = 0.750

**FLOW CFH**

- 5+2

**FLOW CFH**

- 15+5

**WALL**

- 0.109

**PRE-PURGE TIME**

- 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY

**POST-PURGE TIME**

- 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. 60° time between the gas inlet and the joint to be welded.

### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
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<td>060</td>
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</table>

**LEVEL I**

- Time 1-299 Sec

**LEVEL II**

- Time 1-299 Sec

**LEVEL III**

- Time 1-299 Sec

**LEVEL IV**

- Time 1-299 Sec

**FINISH SLOPE**

- 0.1 to 9.9 Sec

**PULSE HIGH**

- 0.2

**PULSE LOW**

- 0.1

**ROTATION DELAY**

- 1.0 Sec

**HEAD SPEED**

- 9.3 RPM

**QUALIFICATION POSITIONS**

- HORIZONTAL

- VERTICAL

**WELDERS NAME**

**STAMP**

**MACHINE**

- E-200T4 S/N 328

- HEAD S/N 1328

**ELECTRODE (Sketch)**

- A 80°

- B' .010

- C 1.073

- D .020

**APPROVALS**

- MFG. D/821

- Q.E. D/814

- ENGR. D/830

**QUALITY CONTROL**

**DATE**

**VISUAL REJECT LOP**

**STAMP**

**REPORT NUMBER**

**RADIOPHGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**DATE**

**DATE**

**DATE**

**DATE**

**DATE**
DATA SHEET
3/4" Decreasing Amps

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

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SPECIFICATION NO. REVISION DATE TPS A/A 328-001 Sample #15

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<td>HEAD GAS: ARG</td>
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<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL: 0.109</td>
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<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
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X-Ray Results: Reject LOP

PROGRAMMER SETTINGS

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<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
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<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
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<td>8.9</td>
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<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
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<tr>
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<td>0.1</td>
<td>3.6</td>
<td>1.00</td>
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<tr>
<td>HEAD SPEED</td>
<td>RPM</td>
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QUALIFICATION POSITIONS

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MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE

QUALITY CONTROL DATE

WELDERS NAME STAMP
RADIOGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER

VISUAL REJECT LOP
# Automatic Butt Weld

## Welding Procedure Specification (WPS)

**WPS No.**

### MPP-LO-0001

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### Specification No. Revision. Date

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### Purge Gas and Head Tube Data

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<tr>
<th>Flow CFH 5+2</th>
<th>Flow CFH 15+5</th>
<th>Wall</th>
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### Pre-Purge Time

1. Pre-Purge Time 2 Min (min) (1)
2. Pre-Purge Time 15 Sec (min) (ALLOY)

### Post-Purge Time

1. Post-Purge Time 1 Min (min) (FTG, P/H)
2. (1) Add 1 min (min) for each additional ft. 60° time between the gas inlet and the joint to be welded.

### Programmer Settings

<table>
<thead>
<tr>
<th>Weld Level I</th>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<td>5 to 199 Amps</td>
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<th>Level I Time 1-299 Sec</th>
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<th>Level III Time 1-299 Sec</th>
<th>Level IV Time 1-299 Sec</th>
<th>Finish Slope</th>
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<tr>
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<td>016</td>
<td>017</td>
<td>9.9</td>
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</table>

<table>
<thead>
<tr>
<th>Pulse High .1 to 9.9 Sec</th>
<th>Pulse Low .1 to 9.9 Sec</th>
<th>Rotation Delay .1 to 9.9 Sec</th>
<th>Head Speed RPM</th>
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</thead>
<tbody>
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<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td>1.00</td>
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### Qualification Positions

- Horizontal
- Vertical

### Welders Name

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### Machine

<table>
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<td>328</td>
<td>1328</td>
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### Electrode

- Sketch
- A 80°
- B .010
- C 1.073
- D .020

### Approvals

- MFG. D/821 Date
- Q.E. D/814 Date
- ENGR. D/830 Date

### Quality Control

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### Visual Acceptance

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DATA SHEET
3/4" Increasing RPM

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

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<th>REVISION LETTER</th>
<th>WPS No.</th>
<th>PAGE</th>
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**SPECIFICATION NO. REVISION. DATE**

| TPS A/A 328-001 | Sample #46 +5% |

**BACK-UP PURGE GAS**

| X-Ray Results: Accept |

**INTERNAL GAS**

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<th>ARG</th>
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<th>O.D.</th>
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<td></td>
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<td>0.750</td>
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**FLOW CFH**

<table>
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<tr>
<th>5+2</th>
<th>15+5</th>
<th>WALL</th>
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<tbody>
<tr>
<td></td>
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<td>0.109</td>
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**PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN)**

<table>
<thead>
<tr>
<th>ALLOY</th>
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**POST-PURGE TIME 1 MIN(MIN)**

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<th>POST-PURGE TIME 1 MIN(MIN) FTG. P/N</th>
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<tbody>
<tr>
<td>(1) Add 1 min (min) for each additional ft. O Time between the gas inlet and the joint to be welded.</td>
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**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<td>017</td>
<td>016</td>
<td>.017</td>
<td>9.9</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tr>
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**QUALIFICATION POSITIONS**

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| MACHINE E-200T4 S/N | 328 |
| HEAD S/N | 1328 |

<table>
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<tr>
<th>ELECTRODE (Sketch)</th>
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<tbody>
<tr>
<td>A 80°</td>
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<tr>
<td>B .010</td>
</tr>
<tr>
<td>C 1.073</td>
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<tr>
<td>D .020</td>
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<td>ENGR. D/830</td>
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<th>STAMP</th>
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| RADIOGRAPH ACCEPTANCE |
| TENSILE TEST ACCEPTANCE |
| REPORT NUMBER |

| VISUAL ACCEPT | STAMP |

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DATA SHEET
3/4" Increasing RPM

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

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<th>PURGE GAS</th>
<th>X-Ray Results: Accept</th>
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<tr>
<td>INTERNAL GAS</td>
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</tr>
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(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

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<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
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<td>5 to 199 Amps</td>
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<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<td>A 80°</td>
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<td>B .010</td>
</tr>
<tr>
<td>C 1.073</td>
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<tr>
<td>D .020</td>
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DATA SHEET
3/4" Increasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

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| MPP-L0-0001 | | |

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<td>INTERNAL GAS</td>
<td>ARG</td>
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<td>FLOW CFH</td>
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<td>2 MIN(MIN)(1)</td>
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<td>POST-PURGE TIME</td>
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PURGE GAS

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RPM

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<td>LEVEL I</td>
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<td>LEVEL III</td>
<td>LEVEL IV</td>
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<td>Time 1-299 Sec</td>
<td>1.0 to 9.9 Sec</td>
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<td>017</td>
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<td>PULSE HIGH</td>
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<td>ROTATION DELAY</td>
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<tr>
<td>1.0 to 9.9 Sec</td>
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<td>1.0 to 9.9 Sec</td>
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MACHINE E-200T4 S/N 328 HEAD S/N 328

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<th>ELECTRODE (Sketch)</th>
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<td>MFG. D/821</td>
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<td>B</td>
<td>Q.E. D/814</td>
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<tr>
<td>C</td>
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<td>D</td>
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WELDERS NAME STAMP

RADIOPH ORAPH ACCEPTANCE TENSILE TEST ACCEPTANCE REPORT NUMBER

QUALITY CONTROL STAMP

VISUAL ACCEPT

80
**ORIGINAL PAGE IS OF POOR QUALITY**

**DATA SHEET**

**3/4" Increasing RPM**

**AUTOMATIC BUTT WELD WELDING PROCEDURE SPECIFICATION (WPS)**

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**SPECIFICATION NO.**

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**DATE**

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**X-Ray Results:**

- Accept

**PURGE GAS**

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<tbody>
<tr>
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<tr>
<td>FLOW CFH: 5+2</td>
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<tr>
<td>WALL: 0.109</td>
<td>WALL: 0.109</td>
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</table>

**PRE-PURGE TIME:**

1. MIN (MIN)

**POST-PURGE TIME:**

1. MIN (MIN)

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>074</td>
<td>073</td>
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<td>042</td>
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**LEVEL I TIME:**

1. Sec

**LEVEL II TIME:**

1. Sec

**LEVEL III TIME:**

1. Sec

**LEVEL IV TIME:**

1. Sec

**FINISH SLOPE:**

0.1 to 9.9 Sec

**PULSE HIGH**

0.2

**PULSE LOW**

0.1

**ROTATION DELAY**

3.6

**HEAD SPEED RPM**

1.20

**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

**WELDERS NAME:**

- STAMP

**RADIOGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**APPROVALS:**

- MFG. D/821 
- Q.E. D/814 
- ENGR.D/830 
- QUALITY CONTROL 

**VISUAL ACCEPT**

**MACHINE E-200T4 S/N:**

328

**HEAD S/N:**

1328

**ELECTRODE (Sketch):**

A. 80°

B. .010

C. 1.073

D. .020

**STAMP**

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DATA SHEET
3/4" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

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PRE-PURGE TIME 2 MIN(MIN): (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY:
POST-PURGE TIME 1 MIN(MIN): POST-PURGE TIME 1 MIN(MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. or inch between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

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<th>WELD LEVEL I</th>
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<th>LEVEL IV</th>
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<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>0.1 to 9.9 Sec</td>
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DATA SHEET
3/4" Increasing RPM

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OF POOR QUALITY

AUTOMATIC DUTY-CYCLE
WELDING PROCEDURE SPECIFICATION (WPS)

MPS No.

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<td>ARG</td>
<td>HEAD GAS</td>
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<tr>
<td>FLOW CFH</td>
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<td>FLOW CFH</td>
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PROGRAMMER SETTINGS

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<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time</td>
<td>Time</td>
<td>Time</td>
<td>Time</td>
<td>1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
<td>HEAD SPEED</td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td>0.1</td>
<td>1 to 9.9 Sec</td>
<td>RPM</td>
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<tr>
<td>3.6</td>
<td>1.30</td>
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QUALIFICATION POSITIONS

<table>
<thead>
<tr>
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<th>VERTICAL</th>
</tr>
</thead>
</table>

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

A 80°
B .010
C 1.073
D .020

WELDERS NAME STAMP
RADIOGRAPE ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER
APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL STAMP DATE

VISUAL ACCEPT
DATA SHEET
3/4" Increasing RPM

AUTOMATIC BUTT WELDING
WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #52 +35%

BACK-UP PURGE GAS X-Ray Results: Accept
INTERNAL GAS: ARG HEAD GAS ARG O.D. 0.750
FLOW CFH 5+2 FLOW CFH 15+5 WALL 0.109
PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps

| 074 | 073 | 073 | 072 | 042 |

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec

| 018 | 017 | 016 | 017 | 9.9 |

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED RPM
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec

| 0.2 | 0.1 | 3.6 | 1.36 |

QUALIFICATION POSITIONS

WELDERS NAME STAMP
HORIZONTAL VERTICAL
RADIOPHGRAPHC ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL STAMP DATE

MACHINE E-20074 S/N 328 HEAD S/N 1328

ELECTRODE (Sketch)
A 80°
B 0.010
C 1.073
D 0.020
DATA SHEET

3/4" Increasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
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SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #53 +45%

X-Ray Results: Accept

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<th>TUBE DATA</th>
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</thead>
<tbody>
<tr>
<td>INTERVAL GAS. ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D. 0.750</td>
<td></td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.109</td>
<td></td>
</tr>
</tbody>
</table>

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. o' time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

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<thead>
<tr>
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<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
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<tbody>
<tr>
<td>074</td>
<td>073</td>
<td>073</td>
<td>072</td>
<td>042</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.40</td>
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QUALIFICATION POSITIONS

[ ] HORIZONTAL [ ] VERTICAL

WELDERS NAME [ ] STAMP

MACHINE E-200T4 S/N 328
HEAD S/N 1228

[ ] RADIOGRAPH ACCEPTANCE

[ ] TENSILE TEST ACCEPTANCE

REPORT NUMBER

[ ] APPROVALS:

MFG. 0/821 [ ] DATE
Q.E. 0/814 [ ] DATE
ENGR. 0/830 [ ] DATE

QUALITY CONTROL [ ] STAMP

REJECT LOP [ ] STAMP

85
DATA SHEET
3/4" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<td>HEAD</td>
<td>TUBE</td>
<td>DATA</td>
<td>X-Ray Results: Accept</td>
</tr>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
<td>O.D.</td>
<td>0.750</td>
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<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
<td>WALL</td>
<td>0.109</td>
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<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN(MIN)</td>
<td>PRE-PURGE TIME</td>
<td>15 SEC(MIN)</td>
<td>ALLOY</td>
<td></td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
<td>FTG. P/N</td>
<td></td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. or line between the gas inlet and the joint to be welded.</td>
<td></td>
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PROGRAMMER SETTINGS

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<tr>
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<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
<td>073</td>
<td>073</td>
<td>072</td>
<td>042</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I Time</th>
<th>LEVEL II Time</th>
<th>LEVEL III Time</th>
<th>LEVEL IV Time</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 299 Sec</td>
<td>1 to 299 Sec</td>
<td>1 to 299 Sec</td>
<td>1 to 299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1.33</td>
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<tr>
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QUALIFICATION POSITIONS

<table>
<thead>
<tr>
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<th>VERTICAL</th>
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<tr>
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<td>✔</td>
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WELDERS NAME STAMP

RADIOPHAGE ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE

Q.E. D/814 DATE

ENGR.D/830 DATE

QUALITY CONTROL STAMP DATE

REJECT LOP
**DATA SHEET**

3/4" Increasing RPM

**AUTOMATIC BUTTWEELD**

**WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
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<th>PAGE</th>
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</thead>
<tbody>
<tr>
<td>MPP-LO-0001</td>
<td></td>
<td>14 of 14</td>
</tr>
</tbody>
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**SPECIFICATION NO. REVISION. DATE** TPS A/A 328-001 Sample #55 +29%

**X-Ray Results:** Accept

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<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
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</thead>
<tbody>
<tr>
<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D. 0.750</td>
<td></td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.109</td>
<td></td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>ALLOY</td>
<td></td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. o' line between the gas inlet and the joint to be welded.</td>
<td></td>
<td></td>
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</table>

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>074</td>
<td>073</td>
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<td>072</td>
<td>042</td>
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<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
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<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<tr>
<td>016</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
<td>HEAD SPEED</td>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
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<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
<td>1.29</td>
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</table>

**QUALIFICATION POSITIONS**

- [ ] HORIZONTAL  [ ] VERTICAL

**WELDERS NAME______________ STAMP________**

**MACHINE E-200T4 S/N 328**

**HEAD S/N 1328**

**ELECTRODE (Sketch)**

A. 80°

B. .010

C. 1.073

D. .020

**APPROVALS:**

- MFG. D/821 ______________ DATE ______________
- Q.E. D/814 ______________ DATE ______________
- ENGR.D/830 ______________ DATE ______________

**QUALITY CONTROL STAMP**

**ACCEPT**
DATA SHEET
3/4" Decreasing RPM

AUTOMATIC BUTT WELDING
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
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<th>DATE</th>
<th>TPS A/A 328-001 Sample #56 -5%</th>
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<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS ARG:</td>
<td>O.D. 0.750</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.109</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 1 min (min) for each additional ft. or Time between the gas inlet and the joint to be welded</td>
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PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
<td>073</td>
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<td>072</td>
<td>042</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
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<td>PULSE HIGH</td>
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<td>ROTATION DELAY</td>
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QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME STAMP

MACHINE E-20074 S/N 328
HEAD S/N 1328

QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME STAMP

MACHINE E-20074 S/N 328
HEAD S/N 1328

APPROVALS:

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE
- QUALITY CONTROL DATE

REJ. LOW CONCAVITY STAMP
Data Sheet
3/4" Decreasing RPM

Automatic Butt Welding Procedure Specification (WPS)

<table>
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<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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**Specification No. Revision:**
X-Ray Results: Reject L.O.P.

<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>Arg</td>
<td>Arg</td>
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<td></td>
<td></td>
<td>D.O. 0.750</td>
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</table>

<table>
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<th>Flow CFH</th>
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<th>Wall</th>
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</thead>
<tbody>
<tr>
<td>5+2</td>
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<td>0.109</td>
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</tbody>
</table>

Pre-Purge Time 2 Min (Min) (1) Pre-Purge Time 15 Sec (Min) Alloy
Post-Purge Time 1 Min (Min) Post-Purge Time 1 Min (Min) FTG. P/N
(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**Programmer Settings**

<table>
<thead>
<tr>
<th>Weld Level I</th>
<th>Weld Level II</th>
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<th>Pulse Low</th>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<td>074</td>
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<table>
<thead>
<tr>
<th>Level I Time</th>
<th>Level II Time</th>
<th>Level III Time</th>
<th>Level IV Time</th>
<th>Finish Slope</th>
</tr>
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<tbody>
<tr>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>.1 to .99 Sec</td>
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<table>
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<th>Pulse High</th>
<th>Pulse Low</th>
<th>Rotation Delay</th>
<th>Head Speed</th>
<th>RPM</th>
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</table>

**Qualification Positions**

- [ ] Horizontal
- [✓] Vertical

**Welders Name:**

**Welders Stamp:**

**Machine E-200T4 S/N:**

**Head S/N:**

**Electrode (Sketch):**

- A: 80°
- B: .010
- C: 1.073
- D: .020

**RadioGraph Acceptance:**

**Tensile Test Acceptance:**

**Report Number:**

**Approvals:**

- MFG. D/821: Date
- Q.E. D/814: Date
- ENGR. D/830: Date

**Quality Control:**

**reject Concavity:**

**Stamp:**
DATA SHEET
3/4" Decreasing RPM

AUTOMATIC GUTTIFIELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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<th>DATE</th>
<th>TP[A/A 328-001 Sample #58</th>
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<tr>
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<tr>
<td>BACK-UP</td>
<td>HEAD</td>
<td>TUBE DATA</td>
<td></td>
</tr>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
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<td>PRE-PURGE TIME:</td>
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<tr>
<td>POST-PURGE TIME:</td>
<td>1 MIN (MIN)</td>
<td>POST-PURGE TIME:</td>
<td>1 MIN (MIN)</td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. of Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
<td>073</td>
<td>073</td>
<td>072</td>
<td>042</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>.017</td>
<td>9.9</td>
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</tbody>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
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<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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</thead>
<tbody>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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<td>0.2</td>
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</table>

QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [X] VERTICAL

WELDERS NAME ___________________ STAMP ___________________

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

- A 80°
- B .010
- C 1.073
- D .002

APPROVALS:
- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR. D/830 DATE
- QUALITY CONTROL DATE

REJECT CONCAVITY STAMP ___________________
DATA SHEET
3/4" Decreasing RPM

AUTOMATIC BUTT WELDING
WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #59 -1%

X-Ray Results: Accept

BACK-UP PURGE GAS HEAD TUBE DATA
INTERNAL GAS ARG HEAD GAS ARG O.D. 0.750
FLOW CFH 5+2 FLOW CFH 15+5 WALL 0.109

PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 15 SEC(MIN) ALLOY
(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
<td>073</td>
<td>073</td>
<td>072</td>
<td>042</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
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<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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</table>

QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME

MACHINE E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

- A 80°
- B .010
- C 1.073
- D .020

APPROVALS:

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE
- QUALITY CONTROL DATE

ACCEPT

MFG. 0/821 DATE
Q.E. 0/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL DATE

WELDERS STAMP

REPORT NUMBER
## DATA SHEET
### 3/4" Increasing Shielding Gas

**AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>WPS NUMBER</th>
<th>MPP-LD-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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### SPECIFICATION NO. REVISION.

**WPS No.**

<table>
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<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-001 Sample #111 +5%</th>
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**BACK-UP PURGE GAS**

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<th>HEAD PURGE GAS</th>
<th>ARG</th>
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<table>
<thead>
<tr>
<th>TUBE DATA</th>
<th>O.D.</th>
<th>WALL</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>2 MIN(MIN)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>POST-PURGE TIME</th>
<th>1 MIN(MIN)</th>
</tr>
</thead>
</table>

*(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.*

### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>LEVEL I</th>
<th>PULSE HIGH</th>
<th>5 to 199 Amps</th>
<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>074</td>
<td>018</td>
<td>0.2</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>WELD LEVEL II</th>
<th>LEVEL II</th>
<th>PULSE LOW</th>
<th>5 to 199 Amps</th>
<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>0.1</th>
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</thead>
<tbody>
<tr>
<td>073</td>
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<td>0.1</td>
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<table>
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<th>LEVEL III</th>
<th>DELAY</th>
<th>5 to 199 Amps</th>
<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>3.6</th>
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</thead>
<tbody>
<tr>
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<table>
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<th>HEAD SPEED</th>
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<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>RPM</th>
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<tr>
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### QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

**MACHINE**

<table>
<thead>
<tr>
<th>E-200T4 S/N</th>
<th>328</th>
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</table>

**HEAD S/N**

| 1328 |

**ELECTRODE (Sketch)**

- A: 80°
- B: .010
- C: 1.073
- D: .020

**APPROVALS:**

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE
- QUALITY CONTROL DATE

**ACCEPT:**
# AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
<th>14 of 14</th>
</tr>
</thead>
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### SPECIFICATION NO. REVISION:
- BACK-UP PURGE GAS X-Ray Results: Accept HEAD TUBE DATA
- INTERNAL GAS ARG HEAD GAS ARG O.D. .750 FLOW CFH 5+2 FLOW CFH 17 WALL .109
- PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) ALLOY
- PRE-PURGE TIME 15 SEC(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

### PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>5 to 199 Amps</th>
<th>074</th>
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</thead>
<tbody>
<tr>
<td>WELD LEVEL II</td>
<td>5 to 199 Amps</td>
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<tr>
<td>WELD LEVEL III</td>
<td>5 to 199 Amps</td>
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<tr>
<td>WELD LEVEL IV</td>
<td>5 to 199 Amps</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>Time 1-299 Sec</th>
<th>018</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVEL II</td>
<td>Time 1-299 Sec</td>
<td>017</td>
</tr>
<tr>
<td>LEVEL III</td>
<td>Time 1-299 Sec</td>
<td>016</td>
</tr>
<tr>
<td>LEVEL IV</td>
<td>Time 1-299 Sec</td>
<td>017</td>
</tr>
</tbody>
</table>

| PULSE HIGH | .1 to 9.9 Sec | 0.2 |
| PULSE LOW | .1 to 9.9 Sec | 0.1 |
| ROTATION DELAY | .1 to 9.9 Sec | 3.6 |
| HEAD SPEED | RPM | 1.00 |

### QUALIFICATION POSITIONS

- **HORIZONTAL**
- **VERTICAL**

### MACHINE
- E-20074 S/N: 328
- HEAD S/N: 1328

### WELDERS NAME STAMP

### ELECTRODE APPROVALS:
- A 80° MFG. D/821 D/821 DATE
- B .010 Q.E. D/814 D/814 DATE
- C 1.073 ENGR.D/830 D/830 DATE
- D .020 QUALITY CONTROL D/830 DATE

### RADIOPHGRAPH ACCEPTANCE TENSILE TEST ACCEPTANCE

### REPORT NUMBER

### APPROVALS:

![Sketch of electrode with angle and dimensions]
DATA SHEET
3/4" Increasing Shielding Gas

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
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<tr>
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<th>REVISION</th>
<th>DATE</th>
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<tbody>
<tr>
<td>Sample #113 +15%</td>
<td>TPS A/A 328-001</td>
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</table>

X-Ray Results: Accept

<table>
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<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
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<tbody>
<tr>
<td>PURGE GAS</td>
<td>X-Ray Results: Accept</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>HEAD GAS</th>
<th>O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARG</td>
<td>ARG</td>
<td>0.750</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOW CFH</th>
<th>FLOW CFH</th>
<th>WALL</th>
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</thead>
<tbody>
<tr>
<td>5+2</td>
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<td>0.109</td>
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</table>

<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>POST-PURGE TIME</th>
<th>ALLOY</th>
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<tbody>
<tr>
<td>2 MIN(MIN)(1)</td>
<td>1 MIN(MIN)</td>
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<tr>
<td>PRE-PURGE TIME</td>
<td>POST-PURGE TIME</td>
<td>FTG. P/N</td>
</tr>
<tr>
<td>15 SEC(MIN)</td>
<td>1 MIN(MIN)</td>
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</table>

(1) Add 1 min (min) for each additional ft. on bolt line between the gas inlet and the joint to be welded.

<table>
<thead>
<tr>
<th>PROGRAMMER SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELD LEVEL I</td>
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<tr>
<td>5 to 199 Amps</td>
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<tr>
<td>018</td>
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</tbody>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>1.1 to 9.9 Sec</td>
</tr>
<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.00</td>
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<tr>
<td>0.2</td>
<td>0.1</td>
<td>3.6</td>
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<table>
<thead>
<tr>
<th>QUALIFICATION POSITIONS</th>
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</thead>
<tbody>
<tr>
<td>HORIZONTAL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WELDERS NAME</th>
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<tr>
<th>MACHINE</th>
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<tr>
<th>ELECTRODE</th>
<th>(Sketch)</th>
<th>APPROVALS</th>
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<tbody>
<tr>
<td>A</td>
<td>180°</td>
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<tr>
<td>B</td>
<td>.010</td>
<td>Q.E. D/814</td>
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<tr>
<td>C</td>
<td>1.073</td>
<td>ENGR.D/830</td>
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<td>D</td>
<td>.020</td>
<td>QUALITY CONTROL</td>
</tr>
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</table>

ACCEPT | STAMP

FORM MPP-L1 REV. 5-73

94
DATA SHEET

3/4" Increasing Shielding Gas

AUTOMATIC BUTT/WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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WPS No.

<table>
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<th>DATE</th>
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<tr>
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X-Ray Results: Accept

BACK-UP
HEAD
TUBE DATA
PURGE GAS
INTERNAL GAS: ARG
HEAD GAS ARG
O.D. 0.750

FLOW CFH 5+2
FLOW CFH 20
WALL .109

PRE-PURGE TIME 2 MIN (MIN) (1)
PRE-PURGE TIME 15 SEC (MIN)

POST-PURGE TIME 1 MIN (MIN)
POST-PURGE TIME 1 MIN (MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
<td>073</td>
<td></td>
<td>072</td>
<td>042</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<tr>
<td>018</td>
<td>017</td>
<td>016</td>
<td>017</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>3.6 RPM</td>
</tr>
<tr>
<td>0.2</td>
<td>0.1</td>
<td></td>
<td>1.00</td>
</tr>
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</table>

QUALIFICATION POSITIONS

HORIZONTAL | VERTICAL

WELDERS NAME ___________________ STAMP ___________________

MACHINE E-200T S/N 328
HEAD S/N 1328

ELECTRODE

(Sketch)

A 80°
B .010
C .073
D .020

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE

QUALITY CONTROL DATE

REJECT CONCAVITY STAMP

95
DATA SHEET
3/4" Increasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-L0-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
<th>WPS No.</th>
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</thead>
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SPECIFICATION NO. REVISION DATE TPS A/A 328-001 Sample #115 +20%

PURGE GAS X-Ray Results: Reject L.O.P.

BACK-UP HEAD TUBE DATA

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>ARG</th>
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<th>ARG</th>
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<th>0.750</th>
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</thead>
<tbody>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>18</td>
<td>WALL</td>
<td>.109</td>
</tr>
</tbody>
</table>

PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tr>
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LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

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<th>Time 1-299 Sec</th>
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<td>018</td>
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PULSE HIGH PULSE LOW DELAY

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<th>.1 to 9.9 Sec</th>
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<tbody>
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QUALIFICATION POSITIONS WELDERS NAME STAMP

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<th>RADIOGRAPH ACCEPTANCE</th>
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MACHINE E-200T4 S/N HEAD S/N

| 328         | 1328 |

ELECTRODE (Sketch)

A 80°
B .010
C 1.073
D .020

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/630 DATE

QUALITY CONTROL STAMP

REJECT CONCAVITY

FORM MPP-S-1 REV. 6.73
DATA SHEET
3/4" Increasing Shielding Gas

ORIGINAL PAGE IS OF POOR QUALITY

AUTOMATIC BUTT WELD WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION. DATE WPS No.

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>REVISION LETTER</th>
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</thead>
<tbody>
<tr>
<td>MPP-LQ-0001</td>
<td></td>
<td>14 of 14</td>
</tr>
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BACK-UP PURGE GAS X-Ray Results: Accept

INTERNAL GAS ARG HEAD GAS ARG O.D. TUBE WALL 0.0 0.750 0.109

FLOW CFH 5+2 FLOW CFH 17

PRE-PURGE TIME 2 MIN (MIN) (1) POST-PURGE TIME 15 SEC (MIN) ALLOY

POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

<table>
<thead>
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<th>1-299 Sec</th>
<th>1-299 Sec</th>
<th>1 to 9.9 Sec</th>
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PULSE HIGH PULSE LOW ROTATION HEAD SPEED

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QUALIFICATION POSITIONS

\[ \text{HORIZONTAL} \checkmark \text{VERTICAL} \]

MACHINE E-20074 S/N 328 HEAD S/N 1328

WELDERS NAME _______ STAMP _______

RADIOPHGRAPH ACCEPTANCE _______

TENSILE TEST ACCEPTANCE _______

REPORT NUMBER _______

APPROVALS:

MFG. D/821 _______ DATE _______

Q.E. D/814 _______ DATE _______

ENGR. D/830 _______ DATE _______

QUALITY CONTROL _______ STAMP _______

REJECT CONCAVITY _______
DATA SHEET
3/4" Increasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP-LO-0001

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #117 +5%

X-Ray Results: Accept

BACK-UP PURGE GAS HEAD TUBE DATA
INTERNAL GAS: ARG HEAD GAS: ARG O.D. 0.750
FLOW CFH: 5+2 FLOW CFH: 16 WALL: .109
PRE-PURGE TIME: 2 MIN(MIN) POST-PURGE TIME: 15 SEC(MIN) ALLOY
PRE-PURGE TIME: 1 MIN(MIN) POST-PURGE TIME: 1 MIN(MIN) FG. P/N
(1) Add 1 min (min) for each additional ft. 3: Time between the gas inlet
and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps
074 073 073 072 042
LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec
018 017 016 017 9.9
PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec RPM
0.2 0.1 3.6 1.00

QUALIFICATION POSITIONS

☑ HORIZONTAL ☑ VERTICAL

MACHINE E-20074 S/N 328
HEAD S/N 1228

WELDERS NAME STAMP

QUALIFICATION POSITIONS

☑ HORIZONTAL ☑ VERTICAL

MACHINE E-20074 S/N 328
HEAD S/N 1228

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE
QUALITY CONTROL DATE

ACCEPT STAMP
DATA SHEET
3/4" Decreasing Shielding Gas

ORIGINAL PAGE IS OF POOR QUALITY

AUTOMATIC BUTTFIELD
WELDING PROCEDURE SPECIFICATION (WPS)

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SPECIFICATION NO. REVISION: DATE: TPS A/A 328-001 Sample #108 -5%

X-Ray Result: Accept

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<th>PURGE GAS</th>
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<th>TUBE DATA</th>
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<tr>
<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS: ARG</td>
<td>O.D.: 0.750</td>
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<tr>
<td>FLOW CFH: 5+2</td>
<td>FLOW CFH: 14</td>
<td>WALL: 0.109</td>
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</table>

PRE-PURGE TIME: 2 MIN(MIN)(1) PRE-PURGE TIME: 15 SEC(MIN) ALLOY:

POST-PURGE TIME: 1 MIN(MIN) POST-PURGE TIME: 15 MIN(MIN) FTG. P/N:

(1) Add 1 min (min) for each additional ft. "in" time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
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<th>WELD LEVEL III</th>
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<th>PULSE LOW</th>
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<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<table>
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<th>LEVEL III</th>
<th>Time: 1-299 Sec</th>
<th>LEVEL IV</th>
<th>Time: 1-299 Sec</th>
<th>FINISH SLOPE</th>
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<td>.1 to 9.9 Sec</td>
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QUALIFICATION POSITIONS

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WELDERS NAME________________ STAMP___________

MACHINE: E-200T4 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch): A 80° B .010 C 1.073 D .020

REPORT NUMBER______________

APPROVALS:

MFG. D/821_________________ DATE_________
Q.E. D/814_________________ DATE_________
ENGR.D/830_________________ DATE_________

QUALITY CONTROL STAMP DATE

REJECT LOW CONCAVITY
DATA SHEET
3/4" Decreasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<tr>
<td>HEAD INTERNAL GAS ARG</td>
<td>HEAD GAS ARG 0.0. 0.750</td>
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<tr>
<td>FLOW CFH 5-2</td>
<td>FLOW CFH 13 WALL 0.109</td>
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<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)</td>
<td>PRE-PURGE TIME 15 SEC(MIN) ALLOY</td>
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<tr>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN) FTG. P/I</td>
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<tr>
<td>(1) Add 1 min (min) for each additional ft. or line between the gas inlet and the joint to be welded.</td>
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<th>PROGRAMMER SETTINGS</th>
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<td>LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE</td>
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<td>PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED RPM</td>
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<td>ENGR.D/830 DATE</td>
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100
DATA SHEET
3/4" Decreasing Shielding Gas

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
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<td>PRE-PURGE TIME 2 MIN(MIN)(1)</td>
<td>PRE-PURGE TIME 15 SEC(MIN) ALLOY</td>
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<tr>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN) FTG, P/N</td>
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<tr>
<td>Add 1 min (min) for each additional ft.</td>
<td>Time between the gas inlet and the joint to be welded.</td>
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PROGRAMMER SETTINGS

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<tr>
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<td>LEVEL I Time 1-299 Sec</td>
<td>LEVEL II Time 1-299 Sec</td>
<td>LEVEL III Time 1-299 Sec</td>
<td>LEVEL IV Time 1-299 Sec</td>
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<td>Pulse High .1 to 9.9 Sec</td>
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<td>Rotation Delay .1 to 9.9 Sec</td>
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QUALIFICATION POSITIONS

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WELDERS NAME __________ STAMP ______

MACHINE E-20074 S/N 328
HEAD S/N 1328

ELECTRODE (Sketch)

A. B. C. D.

MFG. D/821 __________ DATE
Q.E. D/814 __________ DATE
ENGR. D/830 __________ DATE

ACCEPT MINIMAL CONCAVITY
DATA SHEET
1 1/2" Increasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.

<table>
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PROGRAMMER SETTINGS

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<td>LEVEL IV Time</td>
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<tr>
<td>1-299 Sec</td>
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<td>1-299 Sec</td>
<td>1.1 to 9.9 Sec</td>
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<td>PULSE HIGH</td>
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<td>ROTATION DELAY</td>
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QUALIFICATION POSITIONS

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WELDERS NAME STAMP

MACHINE E-200T4 S/N 328
HEAD S/N

ELECTRODE (Sketch)
A 80°
B = .015
C 1.270
D .020

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL STAMP

REPORT NUMBER

RADIOGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE

STAMP

102
DATA SHEET
1 1/2" Increasing Amps

AUTOMATIC BUTHHELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
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**SPECIFICATION NO. REVISION. DATE**

<table>
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<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>X-Ray Results: Accept</th>
<th>TUBE DATA</th>
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<tbody>
<tr>
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<th>FLOW CFH</th>
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<td>5+2</td>
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**PRE-PURGE TIME: 2 MIN(MIN) | PRE-PURGE TIME: 15 SEC(MIN) | ALLOY |

**POST-PURGE TIME: 1 MIN(MIN) | POST-PURGE TIME: 1 MIN(MIN) | FTG. P/N**

(1) Add 1 min (min) for each additional ft. of length between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
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<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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**LEVEL I: Time 1-299 Sec | LEVEL II: Time 1-299 Sec | LEVEL III: Time 1-299 Sec | LEVEL IV: Time 1-299 Sec | FINISH SLOPE**

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<tr>
<th>LEVEL I</th>
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<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

**PULSE HIGH: .1 to 9.9 Sec | PULSE LOW: .1 to 9.9 Sec | ROTATION DELAY: .1 to 9.9 Sec | HEAD SPEED:**

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.60</td>
</tr>
</tbody>
</table>

**QUALIFICATION POSITIONS**

- [ ] HORIZONTAL
- [✓] VERTICAL

**WELDERS NAME: STAMP:**

- RADIOPHOTGRAPH ACCEPTANCE:
- TENSILE TEST ACCEPTANCE:
- REPORT NUMBER:
- APPROVALS:
  - MFG. D/821
  - Q.E. D/814
  - ENGR. D/830

**QUALITY CONTROL: STAMP:**

**VISUAL ACCEPT**
DATA SHEET

1 1/2" Increasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No. MPP-L0-0001

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-L0-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFICATION NO.</td>
<td>REVISION</td>
<td>DATE</td>
<td></td>
</tr>
</tbody>
</table>

BACK-UP PURGE GAS X-Ray Results: Accept

INTERNAL GAS ARG HEAD GAS ARG O.D. 1.500

FLOW CFH 5+2 FLOW CFH 15+5 WALL 0.049

PRE-PURGE TIME 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY

POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/N

(1) Add 1 min (MIN) for each additional ft. of Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>100</td>
<td>099</td>
<td>96</td>
<td>94</td>
<td>038</td>
</tr>
</tbody>
</table>

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

<table>
<thead>
<tr>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.2</td>
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</tbody>
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PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED RPM

<table>
<thead>
<tr>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>1.0</th>
<th>1.60</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
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<td></td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

HORIZONTAL VERTICAL

MACHINE E-200T4 S/N 328 HEAD S/N 1262

ELECTRODE (Sketch)

A 080°

B .015

C 1.270

D .020

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE

Q.E. D/814 DATE

ENGR. D/830 DATE

QUALITY CONTROL STAMP DATE

* -2 AMPS BELOW SAMPLE #24
DATA SHEET
1 1/2" Increasing Amps

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

X-Ray Results: Accept

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
</tr>
<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN(MIN)</td>
<td>PRE-PURGE TIME</td>
<td>15 SEC(MIN)</td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>107</td>
<td>106</td>
<td>102</td>
<td>100</td>
<td>038</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
<td>HEAD SPEED</td>
<td></td>
</tr>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.60</td>
<td></td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [X] VERTICAL

WELDERS NAME _______________ STAMP _______________

MACHINE E-2007 S/N _______________ 328
HEAD S/N _______________ T252

ELECTRODE (Sketch)

A 80°
B .015
C 1.270
D .020

APPROVALS:

- MFG. D/821 _______________ DATE _______________
- Q.E. D/814 _______________ DATE _______________
- ENGR.D/830 _______________ DATE _______________
- QUALITY CONTROL _______________ STAMP _______________

VISUAL ACCEPT

105
DATA SHEET
1 1/2" Increasing Amps

AUTOMATIC BUTTFIELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>WPS No.</th>
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</thead>
<tbody>
<tr>
<td>SPECIFICATION NO.</td>
<td>DATE</td>
<td>TPS A/A 328-001 Sample #28 +20%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>BACK-UP PURGE GAS</th>
<th>HEAD TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG 0.D. 1.500</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5 WALL .049</td>
</tr>
</tbody>
</table>

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. o' Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>.010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.60</td>
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</tbody>
</table>

QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
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</thead>
</table>

WELDERS NAME STAMP

RADIOPHraph ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/827 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL DATE

VISUAL ACCEPT STAMP

ELECTRODE (Sketch)

A 80°
B .015
C 1.270
D .020

MACHINE E-20074 S/N 328
HEAD S/N 1282

REPORT NUMBER

VISUAL ACCEPT STAMP
### Automatic Butt Weld

**Welding Procedure Specification (WPS)**

<table>
<thead>
<tr>
<th>MPP No.</th>
<th>MPP-LO-0001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WPS No.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Specification No.</strong></td>
<td>TPS A/A 328-001</td>
</tr>
<tr>
<td><strong>Revision Letter</strong></td>
<td>Sample #29 +25%</td>
</tr>
<tr>
<td><strong>Page</strong></td>
<td>14 of 14</td>
</tr>
</tbody>
</table>

**X-Ray Results:** Accept

**Internal Gas:** Arg

**Flow CFH:** 5+2

**Pre-Purge Time:** 2 Min (Min)

**Post-Purge Time:** 1 Min (Min)

**Weld Level I**
- **Welding Current:** 5 to 199 Amps
- **Time:** 1-299 Sec
- **Pulse High:** .1 to 9.9 Sec
- **Pulse Low:** .1 to 9.9 Sec
- **Delay:** 0.1
- **Head Speed:** 1.0

**Weld Level II**
- **Welding Current:** 5 to 199 Amps
- **Time:** 1-299 Sec
- **Pulse High:** .1 to 9.9 Sec
- **Pulse Low:** .1 to 9.9 Sec
- **Delay:** 0.1
- **Head Speed:** 1.0

**Weld Level III**
- **Welding Current:** 5 to 199 Amps
- **Time:** 1-299 Sec
- **Pulse High:** .1 to 9.9 Sec
- **Pulse Low:** .1 to 9.9 Sec
- **Delay:** 0.1
- **Head Speed:** 1.0

**Weld Level IV**
- **Welding Current:** 5 to 199 Amps
- **Time:** 1-299 Sec
- **Pulse High:** .1 to 9.9 Sec
- **Pulse Low:** .1 to 9.9 Sec
- **Delay:** 0.1
- **Head Speed:** 1.0

**Finish Slope:** 1 to 9.9 Sec

**Rotation Delay:**

**Head Speed:** RPM

**Qualification Positions**
- **Horizontal**
- **Vertical**

**Welders Name:** __________

**Stamp:** __________

**Radiographic Acceptance:** __________

**Tensile Test Acceptance:** __________

**Report Number:** __________

**Approvals:**
- **MFG. D/821**
- **Q.E. D/814**
- **ENGR. D/830**
- **Quality Control**

**Visual Accept:** __________

**Electrode:** (Sketch)

A: .080
B: .015
C: 1.270
D: .020

**Machine:** E-200T4

**Head S/N:** 328 1262
# DATA SHEET

## 1 1/2" Increasing Amps

### AUTOMATIC BUTTWELD

### WELDING PROCEDURE SPECIFICATION (WPS)

**MPP-LO-0001**

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-2001</th>
<th>Sample %30 +30%</th>
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</thead>
</table>

#### BACK-UP

<table>
<thead>
<tr>
<th>INTERNAL GAS</th>
<th>PURGE GAS</th>
<th>HEAD GAS</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARG</td>
<td></td>
<td></td>
<td>WALL</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td></td>
<td></td>
<td>.049</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PURGE GAS

<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>POST-PURGE TIME</th>
<th>ALLOY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MIN</td>
<td>15 SEC</td>
<td></td>
</tr>
</tbody>
</table>

**X-Ray Results:** Accept

**BACK-UP HEAD TUBE DATA**

- INTERNAL GAS: ARG
- HEAD GAS: ARG
- O.D.: 1.500
- FLOW CFH: 542
- FLOW CFH: 15+5
- WALL: .049
- PRE-PURGE TIME: 2 MIN
- POST-PURGE TIME: 15 SEC

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

### PROGRAMMER SETTINGS

**WELD LEVEL I**

- Time: 1-299 Sec
- LEVEL I: 009
- LEVEL II: 012
- LEVEL III: 009
- LEVEL IV: 010
- PULSE HIGH: .1 to 9.9 Sec
- PULSE LOW: .1 to 9.9 Sec
- ROTATION DELAY: .1 to 9.9 Sec
- HEAD SPEED: 1.60 RPM
- FINISH SLOPE: .1 to 9.9 Sec

**WELD LEVEL II**

- Time: 1-299 Sec
- LEVEL I: 009
- LEVEL II: 012
- LEVEL III: 009
- LEVEL IV: 010
- PULSE HIGH: .1 to 9.9 Sec
- PULSE LOW: .1 to 9.9 Sec
- ROTATION DELAY: .1 to 9.9 Sec
- HEAD SPEED: 1.60 RPM
- FINISH SLOPE: .1 to 9.9 Sec

**WELD LEVEL III**

- Time: 1-299 Sec
- LEVEL I: 009
- LEVEL II: 012
- LEVEL III: 009
- LEVEL IV: 010
- PULSE HIGH: .1 to 9.9 Sec
- PULSE LOW: .1 to 9.9 Sec
- ROTATION DELAY: .1 to 9.9 Sec
- HEAD SPEED: 1.60 RPM
- FINISH SLOPE: .1 to 9.9 Sec

**WELD LEVEL IV**

- Time: 1-299 Sec
- LEVEL I: 009
- LEVEL II: 012
- LEVEL III: 009
- LEVEL IV: 010
- PULSE HIGH: .1 to 9.9 Sec
- PULSE LOW: .1 to 9.9 Sec
- ROTATION DELAY: .1 to 9.9 Sec
- HEAD SPEED: 1.60 RPM
- FINISH SLOPE: .1 to 9.9 Sec

**PULSE LOW**

- 009
- 012
- 009
- 010
- 0.1
- 0.1
- 0.1
- 1.0
- 1.60

### QUALIFICATION POSITIONS

- **HORIZONTAL**
- **VERTICAL**

<table>
<thead>
<tr>
<th>MACHINE E-220T4 S/N</th>
<th>328</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEAD S/N</td>
<td>1262</td>
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</table>

**WELDERS NAME**

**STAMP**

**RADIONTHER PH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**APPROVALS:**

- MFG. D/821
- Q.E. D/814
- ENGR.D/830

**QUALITY CONTROL**

**STAMP**

**REJECT CONCAVITY**

---

Diagram:

- Electrode
- Angle 80°
- B = .015
- C = 1.270
- D = .020
DATA SHEET
1 1/2" Increasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

SPECIFICATION NO. REVISION. DATE TIPS A/A 328-001 Sample #31 -2 Amps

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>X-Ray Results: Accept</th>
<th>Below +30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
</tr>
<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN(MIN)(1)</td>
<td>PRE-PURGE TIME</td>
<td>15 SEC(MIN)</td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>118</td>
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<td>114</td>
<td>113</td>
<td>038</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>1.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 to 9.9 Sec</td>
<td>1.1 to 9.9 Sec</td>
<td>1.1 to 9.9 Sec</td>
<td>1.60</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

| HORIZONTAL | VERTICAL |

MACHINE E-200T4 S/N 328 HEAD S/N 1262

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE

Q.E. D/814 DATE

ENGR. D/830 DATE

QUALITY CONTROL STAMP

REJECT LOW CONCAVITY
DATA SHEET

1 1/2" Increasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>WPS NO.</th>
<th>SPECIFICATION NO. REVISION.</th>
<th>TPS A/A 328-001 Sample #32 -4 Amps of +30%</th>
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</table>

<table>
<thead>
<tr>
<th>PURGE GAS</th>
<th>BACK-UP</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS: ARG</td>
<td>O.D.</td>
<td>WALL</td>
<td></td>
</tr>
<tr>
<td>FLOW CFH: 5+2</td>
<td>15+5</td>
<td>0.049</td>
<td></td>
</tr>
</tbody>
</table>

PRE-PURGE TIME: 2 MIN (MIN) (1) PRE-PURGE TIME: 15 SEC (MIN) ALLOY

POST-PURGE TIME: 1 MIN (MIN) POST-PURGE TIME: 1 MIN (MIN) FTG. P/W

(1) Add 1 min (min) for each additional ft. or line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS:

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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</tr>
<tr>
<td>116</td>
<td>116</td>
<td>112</td>
<td>111</td>
<td>038</td>
</tr>
</tbody>
</table>

LEVEL I: Time 1-299 Sec
| 009 |

LEVEL II: Time 1-299 Sec
| 012 |

LEVEL III: Time 1-299 Sec
| 009 |

LEVEL IV: Time 1-299 Sec
| 010 |

FINISH SLOPE: 0.1 to 9.9 Sec
| 9.9 |

PULSE HIGH: 0.1 to 9.9 Sec
| 0.1 |

PULSE LOW: 0.1 to 9.9 Sec
| 0.1 |

ROTATION DELAY: 0.1 to 9.9 Sec
| 1.0 |

HEAD SPEED: 0.1 to 9.9 Sec
| 1.60 |

QUALIFICATION POSITIONS

[ ] HORIZONTAL [ ] VERTICAL

MACHINE: E-200T4 S/N: 328
HEAD S/N: 1282

WELDERS NAME: ____________________ STAMP: ________________

RADIOPHGRAPh ACCEPTANCE: ____________________
TENSILE TEST ACCEPTANCE: ____________________
REPORT NUMBER: ____________________

APPROVALS:
MFG. D/821: ____________________ DATE: ________________
Q.E. D/814: ____________________ DATE: ________________
ENGR.D/830: ____________________ DATE: ________________
QUALITY CONTROL: ____________________ DATE: ________________

VISUAL ACCEPT: STAMP: ________________

FORM 26165-1 REV. 5-73
DATA SHEET
1 1/2" Increasing Amps

AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)

**SPECIFICATION NO. REVISION.**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>114</td>
<td>114</td>
<td>110</td>
<td>109</td>
<td>038</td>
</tr>
</tbody>
</table>

**LEVEL I**

Time 1-299 Sec

099

**LEVEL II**

Time 1-299 Sec

012

**LEVEL III**

Time 1-299 Sec

009

**LEVEL IV**

Time 1-299 Sec

010

**FINISH SLOPE**

.1 to 9.9 Sec

9.9

**PULSE HIGH**

.1 to 9.9 Sec

0.1

**PULSE LOW**

.1 to 9.9 Sec

0.1

**ROTATION DELAY**

.1 to 9.9 Sec

1.0

**HEAD SPEED**

RPM

1.60

**QUALIFICATION POSITIONS**

- **HORIZONTAL**
- **VERTICAL**

**WELDERS NAME**

**STAMP**

**MACHINE**

E-20074 S/N 328

HEAD S/N 1262

**ELECTRODE (Sketch)**

- **A** 80°
- **B** .015
- **C** 1.270
- **D** .020

**APPROVALS:**

- MFG. D/821 __________ DATE __________
- Q.E. D/814 __________ DATE __________
- ENGR. D/830 __________ DATE __________
- QUALITY CONTROL __________ DATE __________

**REPORT NUMBER**

**STAMP**
DATA SHEET
1 1/2" Decreasing Amps

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-L0-0001</th>
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<tbody>
<tr>
<td>SPECIFICATION NO.</td>
<td>REV.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>BACK-UP INTERNAL GAS</th>
<th>ARG</th>
<th>HEAD INTERNAL GAS</th>
<th>ARG</th>
<th>TUBE O.D.</th>
<th>TUBE WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW CFH 5x2</td>
<td>FLON CFH 15x5</td>
<td>WALL 0.049</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PRE-PURGE TIME 2 MIN (MIN) | POST-PURGE TIME 1 MIN (MIN) | ALLOY 304 L

POST-PURGE TIME 1 MIN (MIN) | POST-PURGE TIME 1 MIN (MIN) | PRT. P/H
(1) Add 1 min (min) for each additional ft. or time between the gas inlet and the joint to be welded.

PROGRAMME SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>088</td>
<td>087</td>
<td>085</td>
<td>083</td>
<td>038</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
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<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.60 RPM</td>
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</table>

QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
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| MACHINE E-200T4 S/N | 328 |
| REPORT NUMBER |

<table>
<thead>
<tr>
<th>ELECTRODE (Sketch)</th>
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<tbody>
<tr>
<td>A 80°</td>
</tr>
<tr>
<td>B .015</td>
</tr>
<tr>
<td>C 1.270</td>
</tr>
<tr>
<td>D .020</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>QUALITY CONTROL</th>
<th>DATE</th>
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</thead>
</table>

<table>
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<tr>
<th>WELDERS NAME</th>
<th>STAMP</th>
</tr>
</thead>
</table>

| RADIOPHIL ACCEPTANCE |
| TENSILE TEST ACCEPTANCE |

| APPROVALS: |
| MFG. D/821 | DATE |
| Q.E. D/814 | DATE |
| ENGR. D/830 | DATE |

<table>
<thead>
<tr>
<th>VISUAL ACCEPT 1 1/2&quot;</th>
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</thead>
</table>

FORM 2016.51 HFV 8.13
### Automatic Butt Weld

**Welding Procedure Specification (WPS)**

**WPS No.**

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPP-LO-0001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**X-Ray Results:** Accept

**Purge Gas**
- BACK-UP TUBE: ARG
- HEAD TUBE: ARG
- INTERNAL GAS: ARG
- WALL: 0.049
- O.D.: 1.500

**Flow CFH**
- PRE-PURGE: 5±2
- POST-PURGE: 15±5

**Pre-Purge Time**
- 2 MIN (MIN) (1)
- 15 SEC (MIN) ALLOY 304L

**Post-Purge Time**
- 1 MIN (MIN)

(1) Add 1 min (MIN) for each additional ft. of line between the gas inlet and the joint to be welded.

**Programmer Settings**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>084</td>
<td>083</td>
<td>080</td>
<td>079</td>
<td>038</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>FINISH SLOPE</td>
</tr>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION</td>
<td>HEAD SPEED</td>
<td></td>
</tr>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
<td></td>
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<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.60</td>
<td></td>
</tr>
</tbody>
</table>

**Qualification Positions**

- HORIZONTAL
- VERTICAL

**Welders Name Stamp**

**Radiograph Acceptance**

**Tensile Test Acceptance**

**Report Number**

**Approvals:**
- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE
- Quality Control DATE

**Visual Accept 1 1/2”**

**Electrode (Sketch)**
- A 80°
- B .015
- C 1.270
- D .020

**Form 30156-1 REV. 8-73**
DATA SHEET
1 1/2" Decreasing Amps

AUTOMATIC BUTTWEED WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
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<th>REVISION NO.</th>
<th>DATE</th>
<th>WPS A/A 328-001 Sample #3 -15%</th>
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</thead>
<tbody>
<tr>
<td>NO.</td>
<td>MPP-LO-0001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PURGE GAS

- BACK-UP
- PRE-PURGE TIME 2 MIN(MIN)
- PRE-PURGE TIME 15 SEC(MIN)
- POST-PURGE TIME 1 MIN(MIN)
- POST-PURGE TIME 1 MIN(MIN)

INTERNAL GAS(ARG)
- FLOW CFH 5+2

HEAD GAS(ARG)
- FLOW CFH 15+5

TUBE DATA
- O.D. 1.500
- WALL 0.049

ALLOY 304L

X-Ray Results: Accept

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>079</td>
<td>078</td>
<td>076</td>
<td>074</td>
<td>038</td>
</tr>
</tbody>
</table>

LEVEL I
- Time 1-299 Sec
- LEVEL II
- Time 1-299 Sec
- LEVEL III
- Time 1-299 Sec
- LEVEL IV
- Time 1-299 Sec

FINISH SLOPE
- .1 to 9.9 Sec

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.60 RPM</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>1.60</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

MACHINE E-200T4 S/N 328
- HEAD S/N 1262

ELECTRODE (Sketch)

- A 80°
- B .015
- C 1.270
- D .020

WELDERS NAME [Signature]

STAMP [Stamp]

RADIOPHOTh ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR. D/830 DATE

QUALITY CONTROL DATE

VISUAL ACCEPT STAMP

114
DATA SHEET
1 1/2" Decreasing Amps

AUTOMATIC OUTSIDE
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>WPS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFICATION NO.</td>
<td>REVISION</td>
<td>DATE</td>
</tr>
<tr>
<td>BACK-UP PURGE GAS</td>
<td>X-Ray Results: Reject L.O.P.</td>
<td></td>
</tr>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>.</td>
<td>FLOW CFH 15+5</td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)</td>
<td>PRE-PURGE TIME</td>
<td>ALLOY 304L</td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>POST-PURGE TIME</td>
<td>FTG. P/N</td>
</tr>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LCD</th>
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<tr>
<td>5 to 199 Amps</td>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
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<td>071</td>
<td>070</td>
<td>038</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✔</td>
</tr>
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</table>

WELDERS NAME STAMP

MACHINE E-20074 S/N 328 HEAD S/N 1262

ELECTRODE (Sketch)

A 90° B .015 C .270 D .020

APPROVALS:

MFG. D/821 DATE
O.E. D/814 DATE
ENGR.D/830 DATE
QUALITY CONTROL STAMP

VISUAL ACCEPT

ORIGINAL PAGE IS OF POOR QUALITY

115
### Data Sheet

#### 1 1/2" Decreasing Amps

**Automatic Butt Weld**

**Welding Procedure Specification (WPS)**

<table>
<thead>
<tr>
<th>MPP Number</th>
<th>MPP-LO-0001</th>
</tr>
</thead>
</table>

**Specification No. Revision**

<table>
<thead>
<tr>
<th>Date</th>
<th>TPS A/A 328-001 Sample #5 -25%</th>
</tr>
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</table>

**Back-Up**

<table>
<thead>
<tr>
<th>Purge Gas</th>
<th>Head</th>
<th>Tube Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Gas</td>
<td>Arg</td>
<td>Head Gas, Arg</td>
</tr>
<tr>
<td>Flow CFH</td>
<td>5+2</td>
<td>Flow CFH</td>
</tr>
</tbody>
</table>

**Pre-Purge Time**

<table>
<thead>
<tr>
<th>Pre-Purge Time</th>
<th>Min (MIN) (1) Pre-Purge time 15 Sec (MIN) Alloy</th>
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</thead>
</table>

**Post-Purge Time**

<table>
<thead>
<tr>
<th>Post-Purge Time</th>
<th>1 Min (MIN)</th>
<th>Post-Purge Time</th>
<th>1 Min (MIN)</th>
<th>FG. P/H</th>
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</thead>
<tbody>
<tr>
<td>(1) Add 1 min (min) for each additional ft. of time between the gas inert and the joint to be welded.</td>
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**Programmer Settings**

<table>
<thead>
<tr>
<th>Weld Level I</th>
<th>Weld Level II</th>
<th>Weld Level III</th>
<th>Weld Level IV</th>
<th>Pulse Low</th>
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<tbody>
<tr>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>070</td>
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<td>067</td>
<td>065</td>
<td>038</td>
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</table>

**Level I**

<table>
<thead>
<tr>
<th>Level I</th>
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<th>Level III</th>
<th>Level IV</th>
<th>Finish Slope</th>
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<tbody>
<tr>
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<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
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</table>

**Pulse High**

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<thead>
<tr>
<th>Pulse Low</th>
<th>Rotation Delay</th>
<th>Head Speed</th>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
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<td>0.1</td>
<td>1.0</td>
</tr>
<tr>
<td>1.60</td>
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</tbody>
</table>

**Qualification Positions**

- Horizontal
- Vertical

**Welders Name**

<table>
<thead>
<tr>
<th>Radiograph Acceptance</th>
</tr>
</thead>
</table>

**Tensile Test Acceptance**

**Report Number**

**Approvals**

- MFG. D/821
- Q.E. D/814
- ENGR. D/830

**Quality Control**

**Visual Reject**

---

---
DATA SHEET
1 1/2" Decreasing Amps

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AUTOMATIC DUITVEUOD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-LO-0001</th>
<th>MPP-LO-0001</th>
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</thead>
</table>

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #6 -25% Repeat

X-Ray Results: Reject LOP

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERIAL GAS ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D.</td>
<td>TUBE DATA</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>FLOW CFH</td>
<td>WALL</td>
<td></td>
</tr>
<tr>
<td>5+2</td>
<td>15+5</td>
<td>0.049</td>
<td></td>
</tr>
</tbody>
</table>

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LGH</th>
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<tbody>
<tr>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
<td>070</td>
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<td>067</td>
<td>065</td>
<td>038</td>
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</table>

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE

<table>
<thead>
<tr>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>Time 1-299 Sec</th>
<th>.1 to 9.9 Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

PULSE HIGH PULSE LOW ROTATION DELAY HEAD SPEED

<table>
<thead>
<tr>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>.1 to 9.9 Sec</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.60</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

WELDERS NAME STAMP
HORIZONTAL VERTICAL

MACHINE E-200T4 S/N 328 HEAD S/N 1262

ELECTRODE (Sketch)

APPROVALS:
MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/030 DATE
QUALITY CONTROL DATE

VISUAL REJECT
## 1 1/2" Decreasing Amps

### Automatic Buttweld

#### Welding Procedure Specification (WPS)

<table>
<thead>
<tr>
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<tr>
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<td>TSP</td>
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<td>WPS No.</td>
<td>Sample #7</td>
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<tr>
<td>Page</td>
<td>14 of 14</td>
</tr>
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</table>

#### Purge Gas

<table>
<thead>
<tr>
<th>Back-up</th>
<th>Internal Gas</th>
<th>Arg</th>
<th>Flow CFH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Head Gas</td>
<td>Arg</td>
<td>Flow CFH</td>
</tr>
<tr>
<td>Tube</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre-Purge Time</th>
<th>Post-Purge Time</th>
<th>Pulse</th>
<th>Finish Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Min(Min)</td>
<td>1 Min(Min)</td>
<td></td>
<td>1 to 9.9 Sec</td>
</tr>
</tbody>
</table>

Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

### Programmer Settings

<table>
<thead>
<tr>
<th>Weld Level I</th>
<th>Weld Level II</th>
<th>Weld Level III</th>
<th>Weld Level IV</th>
<th>Pulse Low</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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</tbody>
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<table>
<thead>
<tr>
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<th>Level II</th>
<th>Level III</th>
<th>Level IV</th>
<th>Finish Slope</th>
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</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>1 to 9.9 Sec</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Pulse High</th>
<th>Pulse Low</th>
<th>Rotation Delay</th>
<th>Head Speed</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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### Welders Name

<table>
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### Radiograph Acceptance

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<th>Tensile Test Acceptance</th>
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### Report Number

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</tr>
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<td>Q.E. D/814</td>
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<tr>
<td>ENGR.D/830</td>
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### Quality Control

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### Machine

<table>
<thead>
<tr>
<th>E-20074 S/N</th>
<th>328</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head S/N</td>
<td>1262</td>
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</tbody>
</table>

### Electrode

<table>
<thead>
<tr>
<th>A</th>
<th>80°</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>.015</td>
</tr>
<tr>
<td>C</td>
<td>1.270</td>
</tr>
<tr>
<td>D</td>
<td>.020</td>
</tr>
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</table>

---

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DATA SHEET
1 1/2" Decreasing Amps

**AUTOMATIC BUTTWELD**
**WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>WPP-LO-0001</th>
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</thead>
<tbody>
<tr>
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<td>TPS A/A 328-001 Sample #8</td>
</tr>
<tr>
<td>BACK-UP</td>
<td>PURGE GAS</td>
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<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
</tr>
<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN(MIN)</td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>074</td>
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<td>071</td>
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<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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<tr>
<td>009</td>
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<td>010</td>
<td>9.3</td>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
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<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tr>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
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</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.60</td>
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**QUALIFICATION POSITIONS**

- [ ] HORIZONTAL
- [ ] VERTICAL

**WELDERS NAME**

**STAMP**

**MACHINE E-200T4 S/N**

**328**

**HEAD S/N**

**1262**

**ELECTRODE (Sketch)**

A. 80°

B. .015

C. 1.270

D. .020

**APPROVALS:**

- MFG. D/821 __________ DATE ________
- Q.E. D/814 __________ DATE ________
- ENGR. D/830 __________ DATE ________

**NOTE:** QUALITY CONTROL DATE

**VISUAL INDICATES MINUTE STAMP**

**AREA NO DROP THRU. WELD IS FUSED.**
DATA SHEET
1 1/2" Decreasing Amps

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
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<td>REVISION</td>
<td>Sample #9</td>
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<td>TPS A/A</td>
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**PURGE GAS**
- BACK-UP HEAD GAS ARG
- WALL O.D. 1.500

**FLOW CFH**
- 5+2
- 15+5

**PURGE TIME**
- 2 MIN (MIN)
- 15 SEC (MIN)

**PRE-PURGE TIME**
- 1 MIN (MIN)

**POST-PURGE TIME**
- 1 MIN (MIN)

**FLUID P/N**
- FTG

**X-Ray Results**
- Reject LOP

**BACK-UP HEAD TUBE DATA**
- PURGE GAS
- ARG
- WALL O.D.
- 1.500

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<tr>
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<td>073</td>
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<table>
<thead>
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<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
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<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1.60 RPM</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
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**QUALIFICATION POSITIONS**
- WELDERS NAME __________ WELDERS STAMP __________
- WELDERS NAME __________ WELDERS STAMP __________
- WELDERS NAME __________ WELDERS STAMP __________
- WELDERS NAME __________ WELDERS STAMP __________

**MACHINE**
- E-200T4
- S/N 328
- HEAD S/N 1262

**ELECTRODE (Sketch)**
- A 80°
- B 0.15
- C 1.270
- D 0.020

**APPROVALS**
- MFG. D/821 __________ DATE __________
- Q.E. D/814 __________ DATE __________
- ENGR.D/830 __________ DATE __________
- QUALITY CONTROL __________ DATE __________

**VISUAL ACCEPT**
- STAMP __________

**FORM 3016-S-1 REV. 5-73**

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**DATA SHEET**

1 1/2" Decreasing Amps

**AUTOMATIC BUTT WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>WELD LEVEL</th>
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</thead>
<tbody>
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<td>Time</td>
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</tr>
<tr>
<td>PULSE HIGH</td>
<td>.1 to 9.9 Sec</td>
<td>0.1</td>
</tr>
<tr>
<td>HEAD SPEED</td>
<td>RPM</td>
<td>1.60</td>
</tr>
</tbody>
</table>

**QUALIFICATION POSITIONS**

- VERTICAL
- ELECTRODE (Sketch)
  - A: 80°
  - B: .015
  - C: 1.270
  - D: .020

**WELDERS NAME**

**STAMP**

**MACHINE**

E-200T4 S/N 328

**HEAD S/N**

1262

**REPORT NUMBER**

**APPROVALS:**

- MFG. D/821
- Q.E. D/814
- ENGR. D/830
- QUALITY CONTROL

**RADIONGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**QUALITY CONTROL**

**VISUAL ACCEPT**

*BORDERLINE ON POROSITY*
DATA SHEET
1 1/2" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP NUMBER: MPP-LO-0001

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #43 +5% RPM

BACK-UP PURGE GAS TUBE DATA
INTERNAL GAS ARG HEAD GAS ARG O.D. 1.500
FLOW CFH 5+2 FLOW CFH 15+5 WALL 0.049
PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. 0° time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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</thead>
<tbody>
<tr>
<td>Pulse High</td>
<td>Pulse Low</td>
<td>Rotation Delay</td>
<td>Head Speed</td>
<td></td>
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<tr>
<td>093</td>
<td>092</td>
<td>099</td>
<td>1.0</td>
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<tr>
<td>089</td>
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QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME STAMP

RADIOPHANT ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830
- QUALITY CONTROL DATE

VISUAL ACCEPT
DATA SHEET

1 1/2" Increasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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<tr>
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<tr>
<td>PAGE</td>
<td>14 of 14</td>
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SPECIFICATION NO. REVISION. DATE: TPS A/A 328-001 Sample #44 +10%

<table>
<thead>
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<td>INTERVAL GAS ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D. 1.500</td>
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<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL 0.049</td>
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X-Ray Results: Accept

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FG, P/H

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
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<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
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<tr>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
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<td>038</td>
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<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
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<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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QUALIFICATION POSITIONS

HORIZONTAL

VERTICAL

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE

Q.E. D/814 DATE

ENGR.D/830 DATE

QUALITY CONTROL DATE

VISUAL ACCEPT STAMP

MACHINE E-200T4 S/N 328

HEAD S/N 1262

ELECTRODE (Sketch)

A 80°

B .015

C 1.270

D .020

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# DATA SHEET

## 1 1/2" Increasing RPM

### AUTOMATIC BUTTFIELD

**WELDING PROCEDURE SPECIFICATION (WPS)**

**WPS No.**

### SPECIFICATION NO. REVISION. DATE

**MPP-LO-0001**

**Revision Letter**

**Page 1 of 14**

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**BACK-UP PURGE GAS X-RAY RESULTS:** Accept

**HEAD TUBE DATA**

- **INTERNAL GAS:** ARG
- **HEAD GAS:** ARG
- **O.D.:** 1.500
- **FLOW CFH:** 5+2
- **FLOW CFH:** 15+5
- **WALL:** 0.049
- **PRE-PURGE TIME:** 2 MIN (MIN) (1)
- **PRE-PURGE TIME:** 15 SEC (MIN)
- **ALLOY:**

---

**PROGRAMMER SETTINGs**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tr>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
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</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
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**QUALIFICATION POSITIONS**

- **WELDERS NAME:**
- **STAMP:**
- **RADIOPHAPH ACCEPTANCE:**
- **TENSILE TEST ACCEPTANCE:**
- **REPORT NUMBER:**
- **APPROVALS:**
  - **MFG. D/821**
  - **Q.E. D/814**
  - **ENGR.D/830**
- **QUALITY CONTROL**
- **VISUAL ACCEPT**

**MACHINE E-200T4 S/N:**

**HEAD S/N:**

**ELECTRODE (Sketch):**

- **A:** 80°
- **B:** .015
- **C:** 1.270
- **D:** .020

**VISUAL ACCEPT STAMP:**

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DATA SHEET
1 1/2" Increasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-L0-0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>REVISION</td>
<td></td>
</tr>
<tr>
<td>DATE</td>
<td></td>
</tr>
</tbody>
</table>

SPECIFICATION NO. REVISION. DATE____ TPS A/A 328-001 Sample #06 +20%

X-Ray Results: Accept

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D.</td>
<td>1.500</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
</tr>
</tbody>
</table>

PRE-PURGE TIME .2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY

POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM 1.08</td>
</tr>
</tbody>
</table>

QUALIFICATION POSITIONS

WELDERS NAME __________ STAMP __________

MACHINE E-200T4 S/N __________
HEAD S/N __________

ELECTRODE (Sketch)
A 80°
B .015
C 1.270
D .020

APPROVALS:
MFG. D/821 __________ DATE __________
Q.E. D/814 __________ DATE __________
ENGR. D/830 __________ DATE __________
QUALITY CONTROL __________ DATE __________

VISUAL ACCEPT
**DATA SHEET**

1 1/2" Increasing RPM

**AUTOMATIC BUTTWELD**

WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>WPS No.</th>
</tr>
</thead>
<tbody>
<tr>
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**SPECIFICATION NO. REVISION. DATE**

TPS A/A 328-001 Sample #61 +25%

**BACK-UP**

<table>
<thead>
<tr>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
</tr>
</tbody>
</table>

**PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY**

**POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H**

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>2.00</td>
</tr>
</tbody>
</table>

**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

**WELDER'S NAME**

**STAMP**

**MACHINE**

E-200T4 S/N 328

**HEAD S/N**

328

**ELECTRODE APPROVALS:**

- A 80° MFG. 0/821 DATE
- B .015 Q.E. D/814 DATE
- C .020 ENGR.D/830 DATE

**QUALITY CONTROL**

STAMP DATE

**REJECT LOP**
**DATA SHEET**

1 1/2" Increasing RPM

**AUTOMATIC BUTTFIELD**

**WELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-L0-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-001 Samples #2 ±30%</th>
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<table>
<thead>
<tr>
<th>BACK-UP PURGE GAS</th>
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<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>POST-PURGE TIME</th>
<th>X-Ray Results: X-Ray Results: Reject L.O.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MIN(MIN)</td>
<td>1 MIN(MIN)</td>
<td></td>
</tr>
</tbody>
</table>

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>1 to 9.9 Sec</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>2.08 RPM</td>
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</tbody>
</table>

**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

**WELDERS NAME**

**STAMP**

**MACHINE**

E-200T 4 S/N 328
HEAD S/N 1262

**ELECTRODE**

- Sketch
- Electrode A 80°
- Electrode B 0.015
- Electrode C 1.270
- Electrode D 0.020

**审批**

- APPROVALS:
  - MFG. D/821 DATE
  - Q.E. D/814 DATE
  - ENGR.D/830 DATE
  - QUALITY CONTROL DATE

**REJECT L.O.P & WELD TOO HIGH**
DATA SHEET

1 1/2" Increasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

X-Ray Results: Reject for L.O.P

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
</tr>
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<tbody>
<tr>
<td>MPP-L0-0001</td>
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<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>PRE-PURGE TIME</th>
<th>BACK-UP PURGE GAS</th>
<th>HEAD PURGE GAS</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MIN (MIN)</td>
<td>5+2</td>
<td>15+5</td>
<td>0.049</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POST-PURGE TIME</th>
<th>HEAD WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MIN (MIN)</td>
<td>0.049</td>
</tr>
</tbody>
</table>

(1) Add 1 min (MIN) for each additional ft. of line between the gas inlet and the joint to be welded.

<table>
<thead>
<tr>
<th>PROGRAMMER SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELD LEVEL I</td>
</tr>
<tr>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
<th>RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.0</td>
<td>1.25</td>
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</tbody>
</table>

QUALIFICATION POSITIONS

| HORIZONTAL | VERTICAL |

MACHINE E-200T4 S/N 328 TENSILE TEST ACCEPTANCE
HEAD S/N 1262 REPORT NUMBER

WELDERS NAME STAMP
RADIOPHAGH ACCEPTANCE

QUALITY CONTROL STAMP

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE

REJECT LOP & COLD WELD ON INSPECTION.
### Automatic Butt Welding Procedure Specification (WPS)

**WPS No.:** MPP-12-0001

**Specification No.:** TPS A/A 328-001 Sample 

**Revision.:** Sample 64 +20%

**Date:**

**Purge Gas:**
- **Internal Gas:** ARG
- **Head Gas:** ARG
- **O.D.:** 1.500
- **Flow CFH:** 5+2
- **Flow CFH:** 15+5
- **Wall:** 0.049
- **Pre-Purge Time:** 2 Min (MIN) (1)
- **Pre-Purge Time is Sec (MIN) **
- **Post-Purge Time:** 1 Min (MIN) (1)
- **Post-Purge Time is Min (MIN) **

**Gas Type:** Head Arg

**Flow CFH:** 5+2

**Tube Data:**
- **Flow CFH:** 15+5
- **Wall:** 0.049

**X-Ray Results:** Accept

**Back-Up Head Data:**
- **Flow CFH:** 5+2
- **Wall:** 0.049

**Programmer Settings:**

<table>
<thead>
<tr>
<th>Weld Level I</th>
<th>Weld Level II</th>
<th>Weld Level III</th>
<th>Weld Level IV</th>
<th>Pulse Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
</tr>
</tbody>
</table>

**Welding Program Settings:**

<table>
<thead>
<tr>
<th>Weld Level I</th>
<th>Weld Level II</th>
<th>Weld Level III</th>
<th>Weld Level IV</th>
<th>Pulse Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
</tr>
</tbody>
</table>

**Qualification Positions:**

- **Horizontal**
- **Vertical**

**Welders Name:**

**Stamp:**

**Machne E-200T4 S/N:** 328

**Head S/N:** 1262

**Electrode (Sketch):**
- **A:** 80°
- **B:** .015
- **C:** 1.270
- **D:** .020

**Approvals:**
- **MFG. D/821:**
- **Q.E. D/814:**
- **ENGR. D/830:**

**S/N:**

**Date:**

**Accept:**

**Quality Control Stamp:**
# Data Sheet

**1 1/2" Decreasing RPM**

**Automatic Butt Weld**

**Welding Procedure Specification (WPS)**

## Specification No. Revision

<table>
<thead>
<tr>
<th>X-Ray Results: Accept</th>
</tr>
</thead>
</table>

### Back-Up

<table>
<thead>
<tr>
<th>Internal Gas</th>
<th>Purge Gas</th>
</tr>
</thead>
</table>

### Head Gas

<table>
<thead>
<tr>
<th>Flow CFH</th>
<th>O.D.</th>
</tr>
</thead>
</table>

### Tube Data

<table>
<thead>
<tr>
<th>Flow CFH</th>
<th>Wall</th>
</tr>
</thead>
</table>

### Pre-Purge Time

- **2 MIN(MIN)**
- **PRE-PURGE TIME 15 SEC(MIN)**
- **ALLOY**

### Post-Purge Time

- **1 MIN(MIN)**
- **POST-PURGE TIME 1 MIN(MIN)**
- **FTG. P/N**

1. Add 1 min (MIN) for each additional ft. of line between the gas inlet and the joint to be welded.

### Programmer Settings

#### Weld Level I

- **5 to 199 Amps**
- **WELD LEVEL II**
- **5 to 199 Amps**
- **WELD LEVEL III**
- **5 to 199 Amps**
- **WELD LEVEL IV**
- **5 to 199 Amps**
- **PULSE LOW**

<table>
<thead>
<tr>
<th>093</th>
<th>092</th>
<th>089</th>
<th>087</th>
<th>038</th>
</tr>
</thead>
</table>

#### Level I

- **Time 1-299 Sec**
- **LEVEL II**
- **Time 1-299 Sec**
- **LEVEL III**
- **Time 1-299 Sec**
- **LEVEL IV**
- **Time 1-299 Sec**
- **FINISH SLOPE**

<table>
<thead>
<tr>
<th>009</th>
<th>012</th>
<th>009</th>
<th>010</th>
<th>9.9</th>
</tr>
</thead>
</table>

#### Pulse High

- **.1 to 9.9 Sec**
- **Pulse Low**
- **.1 to 9.9 Sec**
- **Rotation Delay**
- **.1 to 9.9 Sec**
- **Head Speed RPM**

<table>
<thead>
<tr>
<th>0.1</th>
<th>0.1</th>
<th>1.0</th>
<th>1.52</th>
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</thead>
</table>

#### Qualification Positions

- **Horizontal**
- **Vertical**

### Welders Name

<table>
<thead>
<tr>
<th>Welders Name</th>
<th>Stamp</th>
</tr>
</thead>
</table>

### Machine

- **E-200T4 S/N**
- **328**
- **Head S/N**
- **1252**

### Electrode (Sketch)

- **A**
- **B**
- **C**
- **D**

### Approvals

- **MFG. D/821 Date**
- **Q.E. D/814 Date**
- **Engr.D/830 Date**
- **Quality Control Date**

### Report Number

- **Visual Accept**

---

**Form 39163:1 Rev. 5.73**

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DATA SHEET
1 1/2" Decreasing RPM

AUTOMATIC BUTT WELD
HELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-001 Sample #55 -10% RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACK-UP PURGE GAS</td>
<td>HEAD TUBE DATA</td>
<td>X-Ray Results: Accept</td>
<td></td>
</tr>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D. 1.500</td>
<td></td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL .049</td>
<td></td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)</td>
<td>PRE-PURGE TIME 15 SEC(MIN)</td>
<td>ALLOY</td>
<td></td>
</tr>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>FTG. P/H</td>
<td></td>
</tr>
<tr>
<td>Add 1 min (min) for each additional ft. of the gas inlet and the joint to be welded.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>093</td>
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<td>089</td>
<td>087</td>
<td>038</td>
</tr>
<tr>
<td>LEVEL I Time 1-299 Sec</td>
<td>LEVEL II Time 1-299 Sec</td>
<td>LEVEL III Time 1-299 Sec</td>
<td>LEVEL IV Time 1-299 Sec</td>
<td>FINISH SLOPE .1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
<tr>
<td>PULSE HIGH .1 to 9.9 Sec</td>
<td>PULSE LOW .1 to 9.9 Sec</td>
<td>ROTATION DELAY .1 to 9.9 Sec</td>
<td>HEAD SPEED RPM</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
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<td>1.0</td>
<td>1.44</td>
<td></td>
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QUALIFICATION POSITIONS

- HORIZONTAL
- VERTICAL

WELDERS NAME
RADIOPH APPR.
TENSILE APPR.
REPORT NUMBER

APPRAISAL:
- MFG. D/821
- Q.E. D/814
- ENGR. D/830
- QUALITY CONTROL

VISUAL ACCEPT

ELECTRODE (Sketch)

- A 80°
- B .015
- C 1.270
- D .020

MACHINE E-200T4 S/N 328
HEAD S/N 1262
DATA SHEET
1 1/2" Decreasing RPM

AUTOMATIC BUTTFIELD
WELDING PROCEDURE SPECIFICATION (WPS)

X-Ray Results: Reject L.O.P.

<table>
<thead>
<tr>
<th>BACK-UP PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
<td>O.D. 1.500</td>
</tr>
<tr>
<td>FLOW CFH 5±2</td>
<td>FLOW CFH 15±5</td>
<td>WALL 0.049</td>
</tr>
</tbody>
</table>

PRE-PURGE TIME 2 MIN(MIN) (1) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/N
(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
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<table>
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<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>1 to 9.9 Sec</td>
<td>RPM 1.36</td>
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<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>1.36</td>
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QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [ ] VERTICAL

WELDERS NAME _____ STAMP _____

MACHINE E-200T4 S/N 228
HEAD S/N 1262

ELECTRODE (Sketch)

A 80°
B 0.15
C 1.270
D 0.20

ACCEPT STAMP
DATA SHEET
1 1/2" Decreasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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<tbody>
<tr>
<td>MPP-LO-0001</td>
<td></td>
<td>14 of 14</td>
</tr>
</tbody>
</table>

SPECIFICATION NO. REVISION. DATE_ TPS A/A 328-001 Sample #68 -20%

BACK-UP

INTERNAL GAS ARG HEAD GAS ARG O.D.: 1.500

FLOW CFH 5+2 FLOW CFH 15+5 WALL .049

PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

WELD LEVEL I LEVEL II LEVEL III LEVEL IV PULSE LOW

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
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<tr>
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</tr>
</tbody>
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PULSE HIGH .1 to 9.9 Sec PULSE LOW .1 to 9.9 Sec ROTATION DELAY .1 to 9.9 Sec HEAD SPEED RPM

QUALIFICATION POSITIONS

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
</table>

WELDERS NAME STAMP

MACHINE E-200T4 S/N 328 HEAD S/N 1262

ELECTRODE (Sketch)

| ELECTRODE | A 80° | B .015 | C 1.270 | D .020 |

QUALITY CONTROL STAMP

VISUAL REJECT L.O.P. & TRAIL OFF NO GOOD
DATA SHEET
1 1/2" Decreasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
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SPECIFICATION NO. REVISION. DATE 
TPS A/A 328-001 Sample #69 -17%

X-Ray Results: Reject L.O.P.

<table>
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<th>PURGE GAS</th>
<th>BACK-UP</th>
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<th>TUBE DATA</th>
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</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>15+5</td>
</tr>
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</table>

PRE-PURGE TIME 2 MIN(MIN)(1) PRE-PURGE TIME 15 SEC(MIN) ALLOY

POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 15(MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. of pipe time between the gas inlet and the joint to be welded.

PROGRAMME SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<th>HEAD SPEED</th>
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<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM</td>
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QUALIFICATION POSITIONS

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WELDERS NAME StAMP

RADIOLoGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE

Q.E. D/814 DATE

ENGR.D/830 DATE

QUALITY CONTROL DATE

VISUAL REJECT L.O.P.
DATA SHEET
1 1/2" Decreasing RPM

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

MPP-lo-0001

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE TPS A/A 328-001</th>
<th>Sample #70 -18%</th>
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X-Ray Results: Reject LO.P.

PURGE GAS | HEAD | TUBE DATA
INTERNAL GAS | ARG | HEAD GAS | ARG | O.D. | 1.500 |

FLOW CFH | 54+2 | FLOW CFH | 15+5 | WALL | .049 |

PRE-PURGE TIME 15 MIN | POST-PURGE TIME 15 MIN
1 MIN | 1 MIN

ALLOY

POST-PURGE TIME 1 MIN

LEVEL I | LEVEL II | LEVEL III | LEVEL IV | PULSE LOW
5 to 199 Amps | 5 to 199 Amps | 5 to 199 Amps | 5 to 199 Amps | 5 to 199 Amps
087 | 089 | 092 | 093 | 038 |

LEVEL I | LEVEL II | LEVEL III | LEVEL IV | FINISH SLOPE
Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | .1 to .9 Sec
009 | 012 | 009 | 009 | 010 | .9 |

LEVEL I | LEVEL II | LEVEL III | LEVEL IV |
FINISH SLOPE | .1 to .9 Sec | .1 to .9 Sec | .1 to .9 Sec
0.0 | 0.1 | 0.1 | 0.1 |

HEAD SPEED | RPM
.27 | 1.27 |

QUALIFICATION POSITIONS

HORIZONTAL | VERTICAL

WELDERS NAME | STAMP

MACHINE E-20074 S/N | 328 | 1262

ELECTRODE (Sketch)

A | 80°

B | .015

C | 1.270

D | .020

APPROVALS:
MFG. D/821 | DATE
Q.E. D/814 | DATE
ENGR. D/830 | DATE

QUALITY CONTROL | STAMP

REPORT NUMBER

135
DATA SHEET
1 1/2" Decreasing RPM

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

**MPP NUMBER** MPP-05-0001

| SPECIFICATION NO. | REVISION NO. | DATE | TPS A/A 328-001 | Sample #71 -13%
|-------------------|--------------|------|-----------------|-----------------

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
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<th>TUBE DATA</th>
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</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 15+5</td>
<td>WALL</td>
<td>.049</td>
</tr>
</tbody>
</table>

**PRE-PURGE TIME** 2 MIN (MIN) | **PRE-PURGE TIME** 15 SEC (MIN) | **ALLOY**

**POST-PURGE TIME** 1 MIN (MIN) | **POST-PURGE TIME** 12 MIN (MIN) | **FTG. P/H**

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
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<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
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<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

**LEVEL I** TIME 1-299 Sec | **LEVEL II** TIME 1-299 Sec | **LEVEL III** TIME 1-299 Sec | **LEVEL IV** TIME 1-299 Sec | **FINISH SLOPE** .1 to 9.9 Sec

| 009 | 012 | 009 | 010 | 9.9 |

**PULSE HIGH** .1 to 9.9 Sec | **PULSE LOW** .1 to 9.9 Sec | **ROTATION** .1 to 9.9 Sec | **HEAD SPEED** RPM

| 0.1 | 0.1 | 1.0 | 1.40 |

**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
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</thead>
</table>

**WELDERS NAME** STAMP

**MACHINE** E-200T4 S/N 328 | **HEAD** S/N 1262

**ELECTRODE** (Sketch)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>80°</td>
<td>.015</td>
<td>1.270</td>
<td>.020</td>
</tr>
</tbody>
</table>

**RADIOGRAPH ACCEPTANCE**

**TENSILE TEST ACCEPTANCE**

**REPORT NUMBER**

**APPROVALS:**

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR. D/830 DATE

**QUALITY CONTROL** STAMP

136
**DATA SHEET**

1 1/2" Increasing Shielding Gas

**AUTOMATIC BUTT WELD**

**WELDING PROCEDURE SPECIFICATION (WPS)**

**SPECIFICATION NO. REVISION. DATE**

**TPS A/A 328-001**

**Sample #106 +5%**

**X-Ray Results:** Accept

**PURGE GAS**

**BACK-UP HEAD TUBE DATA**

- **INTERNAL GAS** ARG
- **HEAD GAS** ARG
- **FLOW CFH** 5+2
- **FLOW CFH** 16
- **WALL** 0.049

**PRE-PURGE TIME** 2 MIN (MIN) (1) **PRE-PURGE TIME** 15 SEC (MIN)

**POST-PURGE TIME** 1 MIN (MIN) **POST-PURGE TIME** 1 MIN (MIN)

**FTG. P/H**

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
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<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
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<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

**PULSE HIGH** .1 to 9.9 Sec **PULSE LOW** .1 to 9.9 Sec **ROTATION DELAY** .1 to 9.9 Sec **HEAD SPEED** RPM

- **Pulse High** 0.1
- **Pulse Low** 0.1
- **Rotation Delay** 1.00
- **Head Speed** 1.60

**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

**WELDERS NAME**

**STAMP**

**MACHINE**

- E-20074 S/N 328
- HEAD S/N 1328

**ELECTRODE** (Sketch)

- A 80°
- B .015
- C 1.270
- D .020

**APPROVALS:**

- MFG. D/821
- Q.E. D/814
- ENGR. D/830

**REPORT NUMBER**

**QUALITY CONTROL** STAMP

**VISUAL ACCEPT**

**ORIGINAL PAGE IS OF POOR QUALITY**
DATA SHEET
1 1/2" Increasing Shielding Gas

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS) WPS No.

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-001</th>
<th>Sample #107 +10%</th>
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</thead>
<tbody>
<tr>
<td>BACK-UP</td>
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<td>PURGE GAS</td>
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<tr>
<td>X-Ray Results:</td>
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<tr>
<td>INTERNAL GAS.</td>
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<td>HEAD</td>
<td>ARG</td>
<td>O.D. 1.500</td>
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<tr>
<td>FLOW CFH</td>
<td>6+2</td>
<td>FLOW CFH</td>
<td>17</td>
<td>WALL 0.049</td>
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<tr>
<td>PRE-PURGE TIME</td>
<td>2 MIN(MIN)</td>
<td>PRE-PURGE TIME</td>
<td>15 SEC(MIN)</td>
<td>ALLOY</td>
</tr>
<tr>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
<td>POST-PURGE TIME</td>
<td>1 MIN(MIN)</td>
<td>FTG. P/N</td>
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<tr>
<td>(1) Add 1 min (min) for each additional ft. of Time between the gas inlet and the joint to be welded.</td>
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PROGRAMMER SETTINGS

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</table>

QUALIFICATION POSITIONS

HORIZONTAL   VERTICAL

MACHINE E-200T4 S/N 328
HEAD S/N 1628

ELECTRODE (Sketch)

A 80°
B 0.015
C 1.270
D 0.020

WELDERS NAME STAMP

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE

QUALITY CONTROL DATE

VISUAL ACCEPT STAMP
**DATA SHEET**

1 1/2" Increasing Shielding Gas

**AUTOMATIC BUTTWELDING PROCEDURE SPECIFICATION (WPS)**

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-LO-0001</th>
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<tr>
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**BACK-UP**

<table>
<thead>
<tr>
<th>PURGE GAS</th>
<th>TUBE DATA</th>
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<tbody>
<tr>
<td>INTERNAL GAS: ARG</td>
<td>HEAD GAS: ARG</td>
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<tr>
<td>FLOW CFH: 542</td>
<td>FLOW CFH: 18</td>
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<td>WALL: .049</td>
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</table>

**PRE-PURGE TIME** 2 MIN (MIN) (1) PRE-PURGE TIME 15 SEC (MIN) ALLOY

**POST-PURGE TIME** 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) FTG. P/N

(1) Add 1 min (min) for each additional ft. of gas line between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

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</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.60</td>
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<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.0</td>
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**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️</td>
<td>☐</td>
</tr>
</tbody>
</table>

**WELDERS NAME** [STAMP]

**MACHINE** E-200T4 S/N [HEAD S/N]

| 328 | 1262 |

**ELECTRODE (Sketch)**

A: 80°
B: .015
C: 1.270
D: .020

**APPROvals:**

MFG. D/821 [DATE]
Q.E. D/814 [DATE]
ENGR.D/830 [DATE]
QUALITY CONTROL [DATE]

**ACCEPT** [STAMP]
DATA SHEET
1 1/2" Increasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No.

MWP NUMBER MWP-LO-0001

SPECIFICATION NO. REV. DATE TPS A/A 328-001 Sample #119 +30%

BACK-UP PURGE GAS X-Ray Results: Accept
HEAD TUBE DATA

INTERNAL GAS ARG HEAD GAS ARG O.D. 1.500
FLOW CFH 5+2 FLOW CFH 20 WALL 0.049
PRE-PURGE TIME 2 MIN(MIN) PRE-PURGE TIME 15 SEC(MIN) ALLOY
POST-PURGE TIME 1 MIN(MIN) POST-PURGE TIME 1 MIN(MIN) FTG. P/H
(1) Add 1 min (min) for each additional ft. of time between the gas inlet
and the joint to be welded.

PROGRAMMER SETTINGS

WELD LEVEL I WELD LEVEL II WELD LEVEL III WELD LEVEL IV PULSE LOW
5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps 5 to 199 Amps

LEVEL I LEVEL II LEVEL III LEVEL IV FINISH SLOPE
Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec Time 1-299 Sec .1 to 9.9 Sec

PULSE HIGH PULSE LOW ROTATION DELAY
.1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec .1 to 9.9 Sec

HEAD SPEED RPM
0.1 0.1 1.0 1.60

QUALIFICATION POSITIONS

WELDERS NAME STAMP

MACHINE E-200T4 5/N 328
HEAD S/N 1

ELECTRODE (Sketch)

A 80°
B .016
C 1.270
D .020

ACCEPT

QUALITY CONTROL STAMP

REPORT NUMBER

APPROVALS:

MFG. D/821 DATE
Q.E. D/814 DATE
ENGR.D/830 DATE

ACCEPT

RADIOGRAPH ACCEPTANCE

TENSILE TEST ACCEPTANCE

STAMP
DATA SHEET
1 1/2" Increasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-LO-0001</th>
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SPECIFICATION NO. REVISION DATE TPS A/A 328-001 Sample #120 +40%

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>PURGE GAS</th>
<th>HEAD</th>
<th>TUBE DATA</th>
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</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>FLOW CFH</td>
<td>5+2</td>
<td>FLOW CFH</td>
<td>22</td>
</tr>
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</table>

PRE-PURGE TIME 2 MIN (MIN) (1) POST-PURGE TIME 15 SEC (MIN) ALLOY

POST-PURGE TIME 1 MIN (MIN) POST-PURGE TIME 1 MIN (MIN) Ftg. P/N
(1) Add 1 min (min) for each additional ft. of length between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
</tbody>
</table>

LEVEL I
Time 1-299 Sec | LEVEL II
Time 1-299 Sec | LEVEL III
Time 1-299 Sec | LEVEL IV
Time 1-299 Sec

| 009 | 012 | 009 | 010 | 9.9 |

PULSE HIGH .1 to 9.9 Sec PULSE LOW .1 to 9.9 Sec

| 0.1 | 0.1 | 1.0 | 1.60 |

QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [✓] VERTICAL

WELDERS NAME STAMP
RADIOPH ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER

APPROVALS:
MFG, D/821 DATE
Q.E, D/814 DATE
ENGR.D/630 DATE

QUALITY CONTROL STAMP
ACCEPT

MACHINE E-200T4 S/N 328 HEAD S/N 1262

ELECTRODE

A 80° B 0.015 C 1.270 D 0.020

(Attachment)
DATA SHEET
1 1/2" Decreasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>WPS No.</th>
<th>MPP-0001</th>
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</table>

**SPECIFICATION NO. REVISION.**

| Date | TPS A/A 328-001 Sample #100 -5% |

| BACK-UP | PURGE GAS | HEAD | TUBE DATA |

| INTERNAL GAS | ARG | HEAD GAS | ARG | O.D. | 1.50 |

| FLOW CFH | 542 | FLOW CFH | 14 | WALL | .049 |

| PRE-PURGE TIME | 2 MIN(MIN)(1) | PRE-PURGE TIME | 15 SEC(MIN) | ALLOY |

| POST-PURGE TIME | 1 MIN(MIN) | POST-PURGE TIME | 1. MIN(MIN) | FTG. | P/H |

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

| WELD LEVEL I | WELD LEVEL II | WELD LEVEL III | WELD LEVEL IV | PULSE LOW |

| LEVEL I | LEVEL II | LEVEL III | LEVEL IV | FINISH SLOPE |

| Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | Time 1-299 Sec | .1 to 9.9 Sec |

| LEVEL | 009 | 012 | 009 | 010 |

| PULSE HIGH | PULSE LOW | ROTATION | HEAD SPEED |

| .1 to 9.9 Sec | .1 to 9.9 Sec | .1 to 9.9 Sec | RPM |

| 0.1 | 0.1 | 1.0 | 1.60 |

**QUALIFICATION POSITIONS**

- HORIZONTAL
- VERTICAL

| MACHINE | E-200T4 S/N |

| 328 |

| HEAD S/N |

| 1262 |

| WELDERS NAME | STAMP |

| RADIOGRAPH ACCEPTANCE |

| TENSILE TEST ACCEPTANCE |

| REPORT NUMBER |

| APPROVALS: |

| MFG. D/821 | DATE |

| Q.E. D/814 | DATE |

| ENGR.D/830 | DATE |

| QUALITY CONTROL | STAMP |

| VISUAL ACCEPT |

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DATA SHEET
1 1/2" Decreasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

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<tr>
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<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>PAGE</th>
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<tr>
<td>MPP-LO-0001</td>
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<td></td>
<td>14 of 14</td>
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<table>
<thead>
<tr>
<th>BACK-UP PURGE GAS</th>
<th>HEAD TUBE DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG</td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 13+2</td>
</tr>
<tr>
<td>WALL .049</td>
<td>WALL .049</td>
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</tbody>
</table>

X-Ray Results: Accept

PURGE GAS X-Ray Results: Accept

BACK-UP HEAD TUBE DATA

PRE-PURGE TIME 2 MIN(MIN) POST-PURGE TIME 15 SEC(MIN) ALLOY

(1) Add 1 min (min) for each additional ft. of Time between the gas inlet and the joint to be welded.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>1.0 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>016</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED RPM</th>
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</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>1.00</td>
</tr>
<tr>
<td>0.1</td>
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<td>1.00</td>
<td>1.62</td>
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QUALIFICATION POSITIONS

<table>
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<tr>
<td>HORIZONTAL</td>
<td>VERTICAL</td>
</tr>
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MACHINE E-200T4 S/N 328
HEAD S/N 1262

ELECTRODE (Sketch)

<table>
<thead>
<tr>
<th>ELECTRODE</th>
<th>APPROVALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 80°</td>
<td>MFG. D/821</td>
</tr>
<tr>
<td>B .015</td>
<td>Q.E. D/814</td>
</tr>
<tr>
<td>C 1.270</td>
<td>ENGR.D/830</td>
</tr>
<tr>
<td>D .020</td>
<td>QUALITY CONTROL</td>
</tr>
</tbody>
</table>

WELDERS NAME ________ WELDERS NAME ________ WELDERS NAME ________ WELDERS NAME ________
RADIOGRAPH ACCEPTANCE   RADIOGRAPH ACCEPTANCE   RADIOGRAPH ACCEPTANCE   RADIOGRAPH ACCEPTANCE
TENSILE TEST ACCEPTANCE  TENSILE TEST ACCEPTANCE  TENSILE TEST ACCEPTANCE  TENSILE TEST ACCEPTANCE
REPORT NUMBER

QUALITY CONTROL

VISUAL ACCEPT
DATA SHEET
1 1/2" Decreasing Shielding Gas

AUTOMATIC BUTTWELD
WELDING PROCEDURE SPECIFICATION (WPS)

WPS No. MPP-LO-0001

SPECIFICATION NO. REVISION. DATE TPS A/A 328-001 Sample #102 -15%

Back-up Purge Gas X-Ray Results: Accept

<table>
<thead>
<tr>
<th>Back-up</th>
<th>Purge Gas</th>
<th>X-Ray Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Gas</td>
<td>ARG</td>
<td>Accept</td>
</tr>
</tbody>
</table>

Tube Data:

<table>
<thead>
<tr>
<th>Flow CFH</th>
<th>Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>5+2</td>
<td>0.049</td>
</tr>
<tr>
<td>12+2</td>
<td></td>
</tr>
</tbody>
</table>

Pre-Purge Time 2 MIN(MIN)(1) Pre-Purge Time 15 SEC(MIN) Alloy

Post-Purge Time 1 MIN(MIN) Post-Purge Time 1 MIN(MIN) FTG. P/N

(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.

Programmer Settings:

<table>
<thead>
<tr>
<th>Weld Level I</th>
<th>Weld Level II</th>
<th>Weld Level III</th>
<th>Weld Level IV</th>
<th>Pulse Low</th>
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</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Pulse High</th>
<th>Pulse Low</th>
<th>Rotation Delay</th>
<th>Head Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 9.9 Sec</td>
<td>0.1</td>
<td>0.1</td>
<td>1.00</td>
<td>1.60</td>
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</tbody>
</table>

Qualification Positions:

- Horizontal
- Vertical

Welders Name STAMP

MACHINE E-2007 S/N 328
HEAD S/N 1262

Electrode (Sketch):

- A: 80°
- B: 0.015
- C: 1.270
- D: 0.020

Approvals:

- MFG. D/821 DATE
- Q.E. D/814 DATE
- ENGR.D/830 DATE
- QUALITY CONTROL DATE

Visual Accept

Form 326551 REV. 3/73

Page 14 of 14
DATA SHEET
1 1/2" Decreasing Shielding Gas

AUTOMATIC BUTT WELD
WELDING PROCEDURE SPECIFICATION (WPS)

<table>
<thead>
<tr>
<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>WPS No.</th>
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<table>
<thead>
<tr>
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<th>DATE</th>
<th>TPS A/A 328-001 Sample #103 -30%</th>
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<table>
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<tr>
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<th>HEAD TUBE DATA</th>
<th>X-Ray Results: Accept</th>
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</thead>
<tbody>
<tr>
<td>INTERNAL GAS ARG</td>
<td>HEAD GAS ARG :</td>
<td>O.D. 1.500</td>
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<tr>
<td>FLOW CFH 5+2</td>
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<td>WALL .049</td>
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<table>
<thead>
<tr>
<th>PRE-PURGE TIME 2 MIN(MIN)</th>
<th>POST-PURGE TIME 15 SEC(MIN)</th>
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</thead>
<tbody>
<tr>
<td>ALLOY</td>
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</table>

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be weld.

PROGRAMMER SETTINGS

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
</tr>
<tr>
<td>093</td>
<td>092</td>
<td>089</td>
<td>087</td>
<td>038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
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<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>009</td>
<td>012</td>
<td>009</td>
<td>010</td>
<td>9.9</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
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<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>RPM 1.60</td>
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<table>
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<th>QUALIFICATION POSITIONS</th>
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<tbody>
<tr>
<td>HORIZONTAL ✓ VERTICAL</td>
</tr>
</tbody>
</table>

MACHINE E-200T S/N 328
HEAD S/N 1262

ELECTRODE (Sketch)
A 80°
B .015
C 1.270
D .020

WELDERS NAME STAMP
RADIOPHraph ACCEPTANCE
TENSILE TEST ACCEPTANCE
REPORT NUMBER
APPROVALS:
MFG. D/821: DATE
Q.E. D/814: DATE
ENGR. D/830: DATE
QUALITY CONTROL STAMP

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# DATA SHEET

## 1 1/2" Decreasing Shielding Gas

### AUTOMATIC OUTSIDE WELDING PROCEDURE SPECIFICATION (WPS)

#### WPS No.

<table>
<thead>
<tr>
<th>SPECIFICATION NO.</th>
<th>REVISION</th>
<th>DATE</th>
<th>TPS A/A 328-001 Sample #104 -50%</th>
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<tbody>
<tr>
<td>BACK-UP PURGE GAS</td>
<td>X-Ray Results: Accept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTERNAL GAS ARG</td>
<td>O.D. 1.500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEAD PURGE GAS ARG</td>
<td>WALL 0.049</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOW CFH 5+2</td>
<td>FLOW CFH 7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE-PURGE TIME 2 MIN(MIN)</td>
<td>PRE-PURGE TIME 15 SEC(MIN)</td>
<td></td>
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</tr>
<tr>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
<td>POST-PURGE TIME 1 MIN(MIN)</td>
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<td></td>
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<tr>
<td>(1) Add 1 min (min) for each additional ft. of line between the gas inlet and the joint to be welded.</td>
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### PROGRAMMER SETTINGS

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<th>WELD LEVEL</th>
<th>PULSE LOW</th>
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<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>TIME 1-299 Sec</td>
</tr>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>093</td>
</tr>
<tr>
<td>LEVEL I</td>
<td>LEVEL II</td>
<td>LEVEL III</td>
<td>LEVEL IV</td>
<td>TIME 1-299 Sec</td>
</tr>
<tr>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>009</td>
</tr>
<tr>
<td>PULSE HIGH</td>
<td>PULSE LOW</td>
<td>ROTATION DELAY</td>
<td>HEAD SPEED</td>
<td>.1 to 9.9 Sec</td>
</tr>
<tr>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>1-299 Sec</td>
<td>9.9 RPM</td>
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### QUALIFICATION POSITIONS

- [ ] HORIZONTAL
- [x] VERTICAL

<table>
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<tr>
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<th>HEAD</th>
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<tbody>
<tr>
<td>E-200T4 S/N 328</td>
<td>2682</td>
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<table>
<thead>
<tr>
<th>ELECTRODE</th>
<th>APPROVALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 80°</td>
<td>MFG. D/821</td>
</tr>
<tr>
<td>B 015</td>
<td>Q.E. D/814</td>
</tr>
<tr>
<td>C 1.270</td>
<td>ENGR.D/830</td>
</tr>
<tr>
<td>D 020</td>
<td>QUALITY CONTROL</td>
</tr>
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REJECT EXCESSIVE HOT SPOT

---

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**DATA SHEET**

1 1/2" Decreasing Shielding Gas

**AUTOMATIC OUTWELD**

**WELDING PROCEDURE SPECIFICATION (WPS)**

**SPECIFICATION NO. REVISION. DATE**

<table>
<thead>
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<th>MPP NUMBER</th>
<th>MPP-LO-0001</th>
<th>REVISION LETTER</th>
<th>PAGE</th>
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**PURGE GAS**

<table>
<thead>
<tr>
<th>BACK-UP</th>
<th>HEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>HEAD GAS</td>
<td>ARG</td>
</tr>
<tr>
<td>O.D.</td>
<td>1.500</td>
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</tbody>
</table>

**FLOW CFH**

<table>
<thead>
<tr>
<th>WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

**PRE-PURGE TIME**

<table>
<thead>
<tr>
<th>2 MIN(MIN)</th>
<th>PRE-PURGE TIME 15 SEC(MIN)</th>
<th>ALLOY</th>
</tr>
</thead>
</table>

**POST-PURGE TIME**

<table>
<thead>
<tr>
<th>1 MIN(MIN)</th>
<th>POST-PURGE TIME</th>
<th>FG. P/H</th>
</tr>
</thead>
</table>

(1) Add 1 min (min) for each additional ft. of time between the gas inlet and the joint to be welded.

**PROGRAMMER SETTINGS**

<table>
<thead>
<tr>
<th>WELD LEVEL I</th>
<th>WELD LEVEL II</th>
<th>WELD LEVEL III</th>
<th>WELD LEVEL IV</th>
<th>PULSE LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td>5 to 199 Amps</td>
<td></td>
</tr>
<tr>
<td>0.093</td>
<td>0.092</td>
<td>0.089</td>
<td>0.087</td>
<td>0.038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL I</th>
<th>LEVEL II</th>
<th>LEVEL III</th>
<th>LEVEL IV</th>
<th>FINISH SLOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>Time 1-299 Sec</td>
<td>0.1 to 9.9 Sec</td>
</tr>
<tr>
<td>0.009</td>
<td>0.012</td>
<td>0.009</td>
<td>0.010</td>
<td>9.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PULSE HIGH</th>
<th>PULSE LOW</th>
<th>ROTATION DELAY</th>
<th>HEAD SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td>.1 to 9.9 Sec</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>1.00</td>
<td>1.60</td>
</tr>
</tbody>
</table>

**QUALIFICATION POSITIONS**

<table>
<thead>
<tr>
<th>HORIZONTAL</th>
<th>VERTICAL</th>
</tr>
</thead>
</table>

**WELDERS NAME**

**STAMP**

**MACHINE**

<table>
<thead>
<tr>
<th>E-200T4</th>
<th>S/N 328</th>
</tr>
</thead>
</table>

**HEAD S/N**

| 1328 |

**ELECTRODE**

<table>
<thead>
<tr>
<th>(Sketch)</th>
<th>A 80°</th>
<th>B 0.015</th>
<th>C 1.270</th>
<th>D 0.020</th>
</tr>
</thead>
</table>

**QUALITY CONTROL**

**STAMP**

**ORIGINAL PAGE IS OF POOR QUALITY**