Weld Spatter Hoods
2022

© All images are the Copyright of Mike Shemeld
MRK Engineering team can design, manufacture and install, supplying globally from various locations

Our specialist team can select the right materials for the application for all corrosive/non-corrosive environments

- Saves on costly consumables including sensors, hoses and cylinder shafts and flexible shunts
- Make significant cost savings in overhaul labour, downtime and cleaning costs
- Enhance meantime between failure by up to 40% (MTBF)
- Reduce exposure to manufacturing with lead time issues in ordering gun spares
- Allow personnel to focus on other areas of maintenance
- Necessary gun maintenance can be completed quicker
- Additional protection for peripheral equipment mounted to gun
- Anti-static protection
Technical Specification

- High impact resilient materials
- Unique Nomex materials offering flexibility
- 93% fine fibre / 5% Kevlar fibre / 2% P140 antistatic properties
- Breathable allowing good heat dissipation to prevent transformer over heating
- Carbonsies only above 380°C
- Outstanding heat and flame resistance
- Self-extinguishing, does not melt or drip
- Dissipates static electricity
- Elasticity, lightness and durable
- Flame retardant webbing, buckles and cords
- Silicone free
Technical Specification

ISO 4674-1:2016 METHOD A2: TEAR STRENGTH
Gives an indication of the fabric's ability to withstand further tearing.

REQUIREMENTS
• Tear strength of outermost layer > 25N Warp and Weft

ISO 13934-1:2013 - TENSILE STRENGTH
Gives an indication of the fabric's stability under high tension: it is a measure of the force required to break a fabric into two pieces.

REQUIREMENTS
• Tensile strength of outermost layer > 450N Warp and Weft

<table>
<thead>
<tr>
<th>TENACITY (N)</th>
<th>Warp</th>
<th>Weft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aramid/FR Viscose 250g/m²</td>
<td>1206</td>
<td>704</td>
</tr>
<tr>
<td>G-Stretch 195g/m²</td>
<td>1230</td>
<td>1300</td>
</tr>
<tr>
<td>Cotton 375g/m²</td>
<td>700</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEAR STRENGTH (N)</th>
<th>Warp</th>
<th>Weft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aramid/FR Viscose 250g/m²</td>
<td>46</td>
<td>41</td>
</tr>
<tr>
<td>G-Stretch 195g/m²</td>
<td>54</td>
<td>64</td>
</tr>
<tr>
<td>Cotton 375g/m²</td>
<td>35</td>
<td>40</td>
</tr>
</tbody>
</table>

A Technical Specification...
BS EN ISO 15025: 2016 – Limited Frame Spread
Measures the flammability of the material: the surface ignition lasts 10 seconds

Requirements
• After flame < 2 seconds
• After glow time < 2 seconds
• No flaming to top side or side edge of specimen
• No hole formation
• No flaming or molten debris

BS EN ISO 6942:2002 – Method B Heat Transfer (Radiation)
Measure the rate at which materials transmit radiant heat from one side of the material to the other, by evaluating the time for temperature to rise to level of pain (T1) and 2nd degree burns (T2)

Requirements
• T2 > 22 seconds
• (T1 – T2) > 6 seconds

BS EN ISO 9151:2016 – Heat Transfer (Flame)
Measures the rate at which materials transmit convective heat from one side of the material to the other, by evaluating the time for temperature to rise to level of pain (HTI12) and 2nd degree burns (HTI24)

Requirements
• HTI24 > 13 seconds
• (HTI24 – HTI12) > 4 seconds


A procedure used to evaluate the potential resistance of materials to tearing, after exposing to radiant heat

The incident heat flux is 10kW/m.

Requirements
• Tensile strength of outermost layer > 450N
• See ISO 13934-1:2013 procedure to determine the maximum force and elongation at maximum force of textile fabrics
Temperature Testing

Spatter hoods protect welding equipment against the ingress of dust, weld spatter and other harsh chemicals and abrasives. This reduces maintenance and service costs by limiting wear and tear on weld gun components.

Thermocouples were placed in eleven locations on an X Type Gun and one monitored the ambient room temperature. The locations of the thermocouples are shown below in figure 1, next to figure 2 showing the installed spatter hood.

The tests were conducted under the following four conditions:

- Without weld force, without spatter hood
- Without weld force, with spatter hood
- With weld force, without spatter hood
- With weld force, with spatter hood
Temperature Testing

Each test was conducted until the weld gun reached temperature situation, and then maximum temperatures were extracted from the collected data.

Please note data highlighted in green as these thermocouples were dislodged during weld gun installation resulting in skewed data. These areas were deemed non-critical and the tests did not have the requirement to be repeated. The data sets were removed when averages were calculated.

<table>
<thead>
<tr>
<th>No Pressure Temperature Testing</th>
<th>#0</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
<th>#8</th>
<th>#9</th>
<th>#10</th>
<th>#11</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Bag</td>
<td>32.9</td>
<td>43.0</td>
<td>43.1</td>
<td>38.1</td>
<td>21.9</td>
<td>36.5</td>
<td>23.6</td>
<td>22.9</td>
<td>20.3</td>
<td>22.7</td>
<td>21.8</td>
<td>20.2</td>
</tr>
<tr>
<td>With Bag</td>
<td>36.4</td>
<td>47.4</td>
<td>47.7</td>
<td>42.5</td>
<td>22.1</td>
<td>20.2</td>
<td>26.8</td>
<td>27.0</td>
<td>22.1</td>
<td>26.4</td>
<td>24.9</td>
<td>20.9</td>
</tr>
<tr>
<td>T° Increase</td>
<td>3.5</td>
<td>4.5</td>
<td>4.6</td>
<td>4.4</td>
<td>0.2</td>
<td>3.7</td>
<td>3.2</td>
<td>4.1</td>
<td>1.8</td>
<td>3.7</td>
<td>3.1</td>
<td>0.7</td>
</tr>
<tr>
<td>% Increase</td>
<td>10.5</td>
<td>10.4</td>
<td>10.7</td>
<td>11.5</td>
<td>0.9</td>
<td>13.9</td>
<td>13.6</td>
<td>18.0</td>
<td>8.8</td>
<td>16.1</td>
<td>14.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Avg T° Increase</td>
<td>3.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg % Increase</td>
<td>11.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Temperature Testing</th>
<th>#0</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
<th>#8</th>
<th>#9</th>
<th>#10</th>
<th>#11</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Bag</td>
<td>49.8</td>
<td>79.2</td>
<td>94.1</td>
<td>64.5</td>
<td>26.8</td>
<td>39.9</td>
<td>31.3</td>
<td>28.5</td>
<td>27.4</td>
<td>27.6</td>
<td>26.9</td>
<td>21.2</td>
</tr>
<tr>
<td>With Bag</td>
<td>52.9</td>
<td>86.2</td>
<td>90.9</td>
<td>72.7</td>
<td>21.7</td>
<td>45.0</td>
<td>35.5</td>
<td>35.5</td>
<td>21.6</td>
<td>33.7</td>
<td>30.1</td>
<td>20.4</td>
</tr>
<tr>
<td>T° Increase</td>
<td>3.1</td>
<td>7.0</td>
<td>6.8</td>
<td>8.2</td>
<td>-5.6</td>
<td>6.0</td>
<td>4.3</td>
<td>7.0</td>
<td>5.7</td>
<td>6.3</td>
<td>3.2</td>
<td>-0.8</td>
</tr>
<tr>
<td>% Increase</td>
<td>6.3</td>
<td>8.8</td>
<td>8.0</td>
<td>12.7</td>
<td>-20.8</td>
<td>15.3</td>
<td>13.8</td>
<td>24.7</td>
<td>20.9</td>
<td>22.8</td>
<td>11.9</td>
<td>-3.9</td>
</tr>
<tr>
<td>Avg T° Increase</td>
<td>5.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg % Increase</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results from the test with no weld force show an average temperature increase of 3.3°C, which was an 11.7% increase. Results from tests conducted with weld force show an average temperature increase of 5.8°C and an associated increase of 7.5%.

The data clearly indicated the welding covers temperature dissipation becomes greater at higher operating temperatures creating a relative heat percentage increase compared to the no weld force setting.

Based on this evidence, our R&D facilities opinion is that the welding covers are suitable for use under most circumstances.

Looming at the graph below, the area shaded in green highlights welding conditions that produce motor surface temperatures below 80°C without the use of a welding cover.

Figure 3: Motor operating area curve, area highlighted in green represents welding conditions where gun bags can be used.
Cost Saving Analysis

Servo Gun Repair – 2016
• 163 Total repairs
• 74 Weld Gun bodies cleaned
• Replaced broken and consumable parts

Total - $222,000.00

Servo Gun Repair - 2017
• 119 Total Repairs
• 21 Weld Gun Bodies were cleaned
• Replaced broken and consumable parts

Total - $63,000.00

Cost Savings per plant

A four-person team was used for protective maintenance tasks. They attend approx. 50 servo gun robots.

They average between 3-10 weld guns per night, depending on the repair type this could take on average up to 4 hours. The entire process takes about 3 months to complete and then this is repeated.

Costs (all correct at time of analysis)

• Plant operators - $98 per hour
• 1 weld gun - $392 per hour repair
• Replace any broken items, chip slag, clean and other preventative maintenance

Total cost 50 SG4 Weld Guns per year - $79,600.00
(Resource hours only)
Protect, Prevent, Preserve