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| Doc. No. :<br>PRTD/AR/PF:03 | Issue No.<br>2 | Issue Date<br>30 Sept. 2020 | <b>Report of Action Research</b> |
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|-----|---|---|
| 1.  | <b>Action Research Project No.</b><br>(as assigned by PRTD) | AR/338  |
| 2.  | <b>Title of the Action Research Project</b>                 | Industrial Bag Stitching Machine  |
| 3.  | <b>Name &amp; Designation of Officer</b>                    | Mohammad Aqib (Scientist C)   |
| 4.  | <b>Employee No.</b>   | 66257   |
| 5.  | <b>Deptt./BO/RO &amp; Place of Posting</b>                  | CHBO-II, Chandigarh   |
| 6.  | <b>Date of Approval of the Project</b>                      | 29 April 2021   |
| 7.  | <b>Objective of the Project</b>                             | Review of Indian Standard on Industrial Bag Stitching Machine as per IS 11737:1996                            |
| 8.  | <b>Report of Action Research Activities</b>                 | Attached as Annexure 1  |
| 9.  | <b>Conclusion &amp; Recommendations</b>                     | Attached as Annexure 2  |
| 10. | <b>Any other Relevant Information</b>                       | These machines are also famous at National as well as International level by the name "Bag Closing Machines". |

(Mohammad Aqib)

**Head (CHBO-II)**

**DDG**

**(Certification)**

**DDG(PRT)**

**Annexure-1**  
**(Report of Action Research Activities)**

**Scope of Standard:** The standard covers the bag closer sewing machines/portable bag closer sewing machines consisting of sewing head run through electric motor attached to the body through hinge assembly and run using external pulleys and belt and also supporting structure and control the continuous/intermittent light duty and heavy duty industrial application.

**Referred Standards:**

| Standard (IS No.) | Name of Standard  | Current Status |
|-------------------|---|----------------|
| IS 996:2009       | Single phase a.c. industrial motors for general purpose   | No Change      |
| IS 1068:1993      | Electroplated Coatings of Nickel and Chromium on Iron and Steel                                       | No Change      |
| IS 9152:1979      | Glossary of terms and identification symbols relating to classification of industrial sewing machines | No Change      |

**Relevant BSI Standard:** BS EN 415-10:2014

**Project Work:** Standard has been studied in detail and concerned industry has been contacted. In particular, the machines are for closing bags which were used primarily in Fertilizer and Cement industry apart from other small scale use in Food-grains packaging industry.

The current specifications which could probably be modified in line with latest technological advancements in the field were sorted out and e mails were sent to the representatives of these industries as well as leading manufacturer of Industrial Bag Stitching Machines of the country requesting their participation and suggestions for putting up best possible standard requirements. The details of the suggestions sought are as under:

| Clause of Standard | Current Specification  | Queries/Suggestions   |
|--------------------|--|---|
| <b>3.1</b>         | Portable bag closer sewing machine shall be supplied with a single phase electric motor of 75 W or above (8000 RPM). | Is there any need to modify this requirement in terms of Power Rating or RPM of single phase motor. |
| <b>3.2</b>         | The design of the motor shall take into account up to 1 200 start-stops per hour depending upon the requirement.     | Starts and Stops per hour for continuous operation needs any modification.                          |

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|            | The motor shall conform to IS 996:2009.  |  |
| <b>3.3</b> | <p>Unless otherwise specified, each machine shall have an <b>integrally operated switch for starting and stopping the motor by the pressure of the bag or any other suitable arrangement when the bag is inserted into the machine.</b></p> <p>Alternatively, a foot switch for non-integrated or semi-automatic function may be provided if so specified.</p> | Is there any other arrangement being used in industry that is more efficient or user friendly.   |
| <b>3.4</b> | Drive transmission from the motor to the stitching mechanism shall be either by gears or by V-belts.   | Belt or Gear system which is more suitable and should it have some kind of testing. Any other transmission system may also be informed if required to be incorporated. |
| <b>4.1</b> | <p>Machine shall be of single needle design. equipped with a sewing mechanism for producing C 11 or D 12 stitch formation [C 11 for single threaded chain stitch and D 12 for double threaded double lock stitch (see Fig. 1)] in accordance with IS 9152 : 1979.</p> <p>If so specified by the purchaser, two needle design may be provided.</p>              | C 11 and D12 are included stitch design. Kindly confirm if any other design is also required.  |

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| <p><b>4.2</b></p>      | <p>The stitch regulator shall be conveniently located in the machine. It shall preferably be capable of adjusting the pitch of the stitch within a range of 6 mm to 12 mm as specified by the purchaser.</p> | <p>Pitch of stitch requirements are to be modified or not from 6mm to 12mm existing range.</p>   |
| <p><b>4.4</b></p>      | <p>Normal stitching speed of the machine shall be as agreed to between the purchaser and the manufacturer but shall not be less than 5 m/min or exceed 20 m/min.</p>   | <p>Stitching speed is to be modified or not depending upon latest advancements in the field.</p>   |
| <p><b>8.2</b></p>      | <p>The mass of the stitching head shall be kept to a minimum for the purpose of convenience in handling the unit.</p>  | <p>Is there a need to incorporate mass requirement for stitching head.</p>   |
| <p><b>8.3</b></p>      | <p>Main body of the stitching machine shall be made of aluminium/aluminium alloy or other metals without impairing the strength and rigidity.</p>  | <p>Minimum strength and rigidity of material of stitching machine shall be specified or not?<br/><br/>If yes, then suitable requirements may kindly be informed.</p> |
| <p><b>10.3.1b)</b></p> | <p>Pitch of all the stitches shall be uniform. There shall not be a variation of more than 1 mm from the specified pitch.</p>  | <p>Is there any need to modify the existing allowed Pitch variation.</p>   |
| <p><b>10.4</b></p>     | <p>The stitching machine shall have smooth movement without any abnormal sound.</p>  | <p>Sound requirements in terms of decibel may be added. This can be taken up, if noise pollution issue is encountered in practical application.</p>                  |

## Major Findings & Industry Feedback:

1. **Cement Industry** has confirmed that these machines are obsolete and are not being used from past many years. The Bag stitching process has been replaced by Sealing method. The details of sealing process in vogue was discussed with representative of Aditya Birla Group.

2. **Fertiliser Industry** has confirmed that they are currently using these Bag stitching machines which are of automatic nature, Brand Name- Gabbar, supplier being from Gujarat. These machines have been informed by Rashtriya Chemicals & Fertilisers (PSU) as durable and efficient. During a video conference discussion was held with their representative wherein **they have suggested an incorporation of sound limit of 45 decibels** which is considered a health safety parameter.

3. **Director General Factory Advice Services & Labour Institutes, Ministry of Labour & Employment, GoI** specifies the Noise level limit of 80dBA per day in case of more than 6 hours exposure. Same is also 81db(A) in machine by German leading manufacturer and according to ISO 10821-CB-M1 at 1400 RPM and 50 % duty cycle. Moreover, there are also guidelines for maximum hand arm vibration which are encountered in Portable bag stitching machines in our case. The maximum permissible limit is  $5\text{m/s}^2\text{A}$ .



### 4. Market Study:

- Stitching bags shall be upto minimum 800 bags per hour. Gabbar Engineering Co., Ahmedabad machines are used in many industries which have stitching capability from 800 to 900 bags per hour.
- Sewing capacity on paper shall be upto 32mm plies minimum as per latest trend.
- Protection class I, II and III are included in Union Special GmbH, Germany make machines. Class I being grounded by wire, Class II being insulated and Class III being protected for extra low voltage. We may incorporate similar safety requirements in our standard.

5. **Study of BSI Standard:** The British Standard **BS EN 415-10:2014** has been studied and the relevant clauses are as below:

| Clause   | Content   |
|----------|---|
| 5.2.1.2a | Moving parts shall be safeguarded by fixed or interlocking movable guards.  |
| 5.2.2.1  | <b>Measures to minimize slip hazards</b><br><br>The design of the machine shall minimize the risk of liquids or solids spilling onto traffic routes, work stations or means of access around the machine. Where spills cannot be prevented the manufacturer shall supply a means of containment for the spill e.g. drip trays and describe the most appropriate method for removing the spillage in the instructions. |
| 5.2.3    | <b>Stability of machines</b><br><br><b>5.2.3.1 Stability during operation</b>   |

|   |  |                      |       |   |       |
|---|--|----------------------|-------|---|-------|
|   | <p>The manufacturer shall provide information in the instructions on how to move the machine as well as moveable parts and special equipment delivered with the machine safely.</p> <p>On machines fitted with wheels, at least two wheels shall be fitted with locking devices to ensure that the machine does not move unexpectedly when it is in use.</p> <p><b>5.2.3.2 Stability while being moved</b></p> <p>The manufacturer shall provide information in the instructions on how to move the machine safely.</p> <p>Machines fitted with wheels shall be designed so that they do not move or tilt in a static test while they are placed on a 10° slope independent of its orientation.</p>  |                      |       |   |       |
| <p><b>5.3</b></p>                                     | <p><b>Supply disconnecting (isolating) device</b></p> <p>The machine shall be equipped with a readily identifiable and accessible supply disconnection device for each type of energy. Isolation switches shall be clearly labelled to indicate the method of operation of the switch and shall have the facility to be locked in the off position.</p> <p><b>**The on position shall display green color indicator and off position shall display red color indicator.</b></p>  |                      |       |   |       |
| <p><b>5.5.2</b></p>                                   | <p><b>Protection against electric shock</b></p> <p>Electric shock by direct contact shall be prevented.</p> <p><b>**The applicable test parameters may be discussed with stakeholders as there may be some change from international parameters referred therein.</b></p>  |                      |       |   |       |
| <p><b>5.5.3</b></p>                                   | <p><b>Degree of protection</b></p> <p>The protection level for electrical enclosures shall be selected on the basis of the environment in which the machine will be used and the anticipated cleaning method for the machine and its environment. <b>The required degree of protection is given Table 2 and 3 respectively.</b></p> <p><b>Table 2 —Degree of protection for dusty environments</b><br/> <b>Dusty Environment Required degree of protection</b><br/> (EN 60529)</p> <table> <tr> <td>Non conducting dusts</td> <td>IP 5X</td> </tr> <tr> <td>Conducting dusts e.g. carbon powder, aluminium Powder</td> <td>IP 6X</td> </tr> </table> <p>NOTE: Other measures will be required if the equipment is expected to be working in a potentially explosive atmosphere.</p> | Non conducting dusts | IP 5X | Conducting dusts e.g. carbon powder, aluminium Powder | IP 6X |
| Non conducting dusts                                  | IP 5X  |                      |       |   |       |
| Conducting dusts e.g. carbon powder, aluminium Powder | IP 6X  |                      |       |   |       |

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|                      | <p><b>Table 3 —Degree of protection for different cleaning methods using water</b><br/> <b>Method of cleaning Required degree of protection</b><br/> (EN 60529)<br/> Cleaning without water IP X3<br/> Cleaning with damp cloth IP X4</p>  |
| <p><b>5.20.5</b></p> | <p><b>Handles and hand-wheels</b></p> <p>Handles or hand-wheels shall not be spoked, shall have no projections and be smooth.</p>  |
| <p><b>7.3</b></p>    | <p><b>Signals and warning signs</b></p> <p>Warning signs shall be fitted to the machine permanently and in such a way that the related hazard is clearly identifiable.</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p><b>No access for unauthorized persons</b></p> </div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 20px;">  <div style="margin-left: 10px;"> <p><b>Hot Surface</b></p> </div> </div> |

(Mohammad Aqib)  
Scientist C

**Annexure-2**  
**(Conclusion & Recommendations)**

1. Project Work, Major findings and Industry feedback as detailed in Annexure1 above indicates that our standard does not specify any specific requirements related to safety.
2. Safety is the prime factor in deciding any standard therefore the Noise limit and Vibration Limit specified by **Director General Factory Advice Services & Labour Institutes, Ministry of Labour & Employment, GoI** has been taken as minimum safety standard in these aspects in the proposed amendment.
3. Performance requirements like Stitching speed and Continuous Operation requirement have been updated as per current industrial needs.
4. Safety requirements as specified in British Standard BS EN 415-10:2014 (Safety of packaging machines Part 10: General Requirements) that are relevant to the product covered under scope of IS 11737:1996 have been incorporated in the proposed amendment.
5. The aspects on which suggestions were sought from industries (Refer Annexure-1) shall also be discussed during sectional committee meeting.
6. The proposed draft amendment to IS 11737:1996 is attached as Annexure-3.

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**Annexure-3**  
**(Proposed Draft Amendment to IS 11737:1996)**

(Page 1, *Clause 3.2, Fourth Sentence, see also Amendment 1*) – Substitute following for the existing:

‘The design of the motor shall take into account up to 1 200 start-stops per hour when run continuously for 24 hours.’.

(Page 2, *Clause 4.4, last line*) - Substitute ‘30 m/min’ for ‘20m/min’

(Page 3, *Clause 8.4*) - Substitute the following for the existing clause:

‘Handles shall not be spoked, shall have no projections and be smooth.’

(Page 3, *Clause 10.4*) - Substitute the following for the existing clause:

**10.4.1 Sound Limit:** The Noise level of the machinery when run on full capacity shall not exceed 80dBA per day when tested with any established National/International method.

**10.4.2 Vibration Limit:** The maximum hand arm vibration encountered in Portable bag stitching machines shall not exceed is  $5\text{m/s}^2\text{A}$  when tested with any established National/International method.’

(Page 3, *Clause 10.4*) - Add the following new clause after **10.4**:

## **10.5 Safety Requirements**

**10.5.1 Guards:** Moving parts shall be safeguarded by fixed or interlocking movable guards.

**10.5.2 Measures to minimize slip hazards:** The design of the machine shall minimize the risk of liquids or solids spilling onto traffic routes, work stations or means of access around the machine. Where spills cannot be prevented the manufacturer shall supply a means of containment for the spill e.g. drip trays and describe the most appropriate method for removing the spillage in the instructions.

### **10.5.3 Stability of machines**

#### **10.5.3.1 Stability during operation**

The manufacturer shall provide information in the instructions on how to move the machine as well as moveable parts and special equipment delivered with the machine safely.

On machines fitted with wheels, at least two wheels shall be fitted with locking devices to ensure that the machine does not move unexpectedly when it is in use.

#### **10.5.3.2 Stability while being moved**

The manufacturer shall provide information in the instructions on how to move the machine safely.

Machines fitted with wheels shall be designed so that they do not move or tilt in a static test while they are placed on a 10° slope independent of its orientation.

#### **10.5.4 Supply disconnecting (isolating) device**

The machine shall be equipped with a readily identifiable and accessible supply disconnection device for each type of energy. Isolation switches shall be clearly labelled to indicate the method of operation of the switch and shall have the facility to be locked in the off position.

#### **10.5.5 Protection against electric shock**

Electric shock by direct contact shall be prevented.

#### **10.5.6 Degree of protection**

The protection level for electrical enclosures shall be selected on the basis of the environment in which the machine will be used. The required degree of protection shall be as given below:

##### **Degree of protection for dusty environments**

| <b>Dusty Environment</b>                              | <b>Required degree of protection</b> |
|---|--------------------------------------|
| (EN 60529)  |                                      |
| Non conducting dusts                                  | IP 5X                                |
| Conducting dusts e.g. carbon powder, aluminium Powder | IP 6X                                |

#### **10.5.7 Safety Signals and warning signs**

Safety/Warning signs shall be fitted to the machine permanently and in such a way that the related hazard is clearly identifiable. The signs given below shall be specially marked on the machine.



**No access for unauthorized persons**



**Hot Surface**

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