SPECIFICATIONS

TECHNICAL SPECIFICATIONS FOR SEMI-AUTOMATIC COILING MACHINE, AUTOMATIC WIRE BENDING MACHINE AND AUTOMATIC HOOK FORMING MACHINE

1.0 SCOPE :

DESIGN, MANUFACTURING, INSPECTION, TESTING, ERECTION AND COMMISSIONING of SEMI-AUTOMATIC COILING MACHINE, AUTOMATIC WIRE BENDING MACHINE AND AUTOMATIC HOOK FORMING MACHINE FOR THE SPRING GIVEN IN THE DRAWING AS PER THE FOLLOWING SPECIFICATIONS AND ANNEXURE.

2.0 SPECIFICATIONS OF THE SPRING:

Both sides hooked helical tension spring with following dimensions:

As per the attached drawing NFC/ZFP/RMA/GS/001 and as per the description given below:

Input wire for coiling : Rectangular cross-section 1.7 x 1.0 mm.

Outer diameter of the spring : 5.5 to 5.6 mm.

Outer diameter variation of the spring across the entire length : 0.05mm maximum

Length of the spring : 360 +/-1 mm (including hook dimensions).

Hook dimensional details : as per attached drawing.

Material : Zirconium alloy.

Outer surface of the spring will be ground after coiling to specified final diameter and around 80 microns is removed to ensure uniform surface. This grinding of the spring is not in the scope of supply.

3.0 EQUIPMENT DESCRIPTION :

The individual machines shall perform its intended functions and shall generally consist of the following elements. However the manufacturer may propose their own
system alternatively subjected to the performance conditions to carry out the functions detailed here.

Rectangular wire of 1.7 x 1.0 mm cross section is supplied to the semi-automatic coiling machine. The semi-automatic coiling machine can be supplied as per Annexure-1 which shall coil the rectangular wire into the spring. The details are given in annexure-1. After this operation, fine pitch correction of the spring is carried out by suitably tightening the spring in the axial direction and subjected to heat treatment process. The spring is ground to the dimension to achieve the required diametrical tolerances. These operations of pitch correction, heat treatment and grinding are not in the scope of supply.

The spring edges are trimmed and shall be suitably de-coiled for accurate length and hook formation. The de-coiling is done in such a way that the free wire is extended tangentially (perpendicular to the axis) at both ends. This de-coiling operation is presently being done manually and is not in the scope of supply. However the party can quote separately as an optional item for mechanized de-coiling operation.

The ground de-coiled spring is supplied to the Automatic wire bending machine.

A automatic wire bending machine shall be supplied as per Annexure-2 which shall bend the de-coiled wire parallel to the axis of the spring. Another Automatic hook forming machine as per Annexure-3 shall form the hooks as per the given drawing NFC/ZFP/RMA/GS/001.

4.0 SEQUENCE OF OPERATION :
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The schematic flow of hook making operation is described in the figure NFC/ZFP/RMA/GS/002. The rectangular wire is coiled in the semi-automatic coiling machine. Then coiled spring is de-coiled. The de-coiled spring has to be loaded on to the Automatic wire bending machine and the wire bending is carried out on both ends as shown in the spring drawing NFC/ZFP/RMA/GS/001. Then, hook forming is carried out on both sides in Automatic hook forming machine.

4.2 SPECIAL REQUIREMENTS :
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The equipment requires usage of simple systems, high quality fittings, reputed make bought out items, very good workmanship and extreme rigidity in the equipment to give consistent quality. Any other requirements for the smooth functioning shall be fabricated and shall be discussed in detail during detailed engineering stage.

5.0 SERVICES AVAILABLE AT STATION :
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The following services shall be provided by the purchaser.

Power Supply : 230 V, 50 Hz or 415 V, 3 phase 4 wire 50 Hz solidly earthed power supply.

Pneumatic Line : 6 bar Pressure.

6.0 GENERAL REQUIREMENTS :
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The following are the general requirement of the specification:

It is not the intent of this indent to state completely herein all details of design and construction of equipment. However, the equipment and all works shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in continuous commercial operation up to the supplier’s guarantee in a manner acceptable to purchaser who will interpret the meaning of drawings and specification and shall be entitled to reject any work or materials which in purchaser’s judgment are not in full accordance therewith.

6.1 The concept described above is indicative of general design requirements. The supplier may also propose modifications or alternative schemes to carry out the process described in an optimum manner. In his offer supplier shall furnish general arrangement drawings indicating by sectional views the intent of design feature proposed, description of equipment etc.

6.2 It is found at any stage that the equipment is not meeting the requirements of specification; any changes/rectification required shall be done at no extra cost to purchaser.

6.3 (a) All motors shall be capable of giving rated output without reduction in the expected life when operated
continuously under above conditions.

(b) The control panel (if required in the equipment) shall be sheet steel enclosed and shall be dust, weather and vermin proof. Sheet steel used shall be rolled and at least 2.0mm thick.

(c) All live parts shall be provided with at least phase to phase and phase to earth clearances in air of 25mm and 20mm respectively.

6.4 During the cycle of operation the springs shall not get damaged or scratched.

6.5 Pneumatic supply lines (if required for the equipment) shall be provided with lubricators, filters, adequate pressure and flow controls, pressure gauges etc.

6.6 Supplier shall make his own arrangement for the welfare of his personnel and their stay during the erection and commissioning period.

6.10 In the event of placement of order the supplier should meet the following requirements.

(a) He should submit 1 set of general arrangement drawings and detail drawings giving the full details of equipment, machine, and sub systems for approval. Fabrication can be started only after obtaining approval.

(b) Supplier shall provide his quality control plan for manufacturing indicating different tests/inspections to be carried out. Inspection will be carried out by purchaser / purchaser’s representative.

(c) Supplier shall submit 4 sets of Operation / Maintenance manuals containing description of the system, operating procedures, maintenance procedures along with catalogues of major bought out items, general arrangement and detailed mechanical drawings, electrical circuits, pneumatic circuits.

7.0 All the items in the annexure-1,2,3 will be evaluated as one set and will be ordered to one party only:

SPECIFICATIONS FOR ITEM NO.(1):

[Signature]
10/7/2013
1. Semi-automatic coiling machine:

The machine shall consist of a chuck driven by a variable speed drive or variable speed up to 120 rpm shall be achieved.

A cam/lever/screw system or other suitable system shall be provided to adjust the pitch that is to be maintained by the spring. A system shall feed the wire and guide on to the mandrel that is held in the chuck. A suitable cutting of wire shall be arranged at the completion of coiling of the spring length. Suitable arrangements shall be made to fine tune/adjust alignments of various systems.

Wire shall be coiled along higher dimension (1.7 mm) as per the drawing NFC/ZFP/RMA/GS/001.

Maximum length of the spring that can be coiled shall be 440mm and variation in outer diameter shall be within 0.05 mm.

Performance requirements At manufacturer's works, the machine shall be tested for the following conditions:

a) Machine will be tested for 10 springs and outer diameter variation of spring across the length of 440 mm shall not exceed 0.05 mm in coiling of rectangular wire. The rectangular wire required for trials will be supplied by the purchaser. Continuous idle running of the machine shall be ensured for 12 Hrs.

b) Coiled wire cross section shall be perpendicular to the axis of the spring.

c) Dents, peeling marks, cuts shall not be generated on the spring during the operation.

d) Coiled spring should not have waviness in the spring.

At purchaser's site, the machine shall be tested for the following conditions:

a) Machine will be tested for 100 consecutive springs and diameter variation across the length of 440 mm shall not exceed 0.05 mm in coiling of rectangular wire. The spring is tested for its diameter, pitch and consistency as per the drawing NFC/ZFP/RMA/ GS/001.

2. SPECIFICATIONS FOR ITEM NO. (2) :
Automatic wire bending machine:

The spring is kept in the bending machine which shall bend the free wire to axial direction as shown in the drawing NFC/ZFP/RMA/GS/002. This is achieved through a series of interpolated operations of holding the spring, pushing and retracting an oscillating lever pin to a known angle to bend the wire and allowance time to replace the spring with a new spring in a cyclic mode. Adjustments shall be possible to change the angle of pushing and to accommodate the spring back of the bent wire. The contacting points of the wire and bending gadget shall be made frictionless by introducing suitable balls/rollers at the contact point. The mechanisms/cams to do such interpolations shall be accommodated below the table and above the table shall be free for operator's hands movements for quickly replacing the springs according to the rhythm of machine. The system shall consist of a push button to start and emergency button to stop. The prime mover shall be a motor and movements can be achieved with suitable drives. The spring is kept in gadget and the wire would be bent by the mechanical movements. Other end of the spring wire bending also is carried out similarly. This bent wire will be suitably trimmed manually to get the proper hook length.

Performance requirements: At manufacturer's works, the machine shall be tested for the following conditions:

a) Machine will be tested for 10 springs for which the bend wire of rectangular cross section shall be parallel to the axis and should not produce any defects during bending.

b) The bent wire shall be within the outer diameter of the spring.

At purchasers site, the machine shall be tested for the following conditions:

i) Machine will be tested for 100 springs for which the bend wire of rectangular cross section shall be parallel to the axis and should not produce any defects during bending.

3. SPECIFICATIONS FOR ITEM NO. (3) :

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16/11/2013
Automatic hook forming machine:

The bent wire is placed in a gadget and a small lever bends the wire around the gadget to form the hook. The contacting points of the wire and bending gadget shall be made frictionless by introducing suitable balls/rollers at the contact point.

Performance criteria At manufacturer's site:

The machine shall be tested for the following conditions:

a) Machine will be tested for 10 springs (bent wire) and the hooked portion of the spring shall meet the requirements as per the drawing NFC/ZFP/RMA/GS/001 attached.

At purchaser's site:

The machine shall be qualified for 100 springs for hook forming. The total length of the spring and the hook lengths and dimensions shall meet the requirements as per drawing NFC/ZFP/RMA/GS/001.