

ISO 9001: 2008	Document No. SIQ- <del>0701</del> <u>0701</u>	Version No. <del>2</del> <u>3</u>	Date Effective: <del>29<sup>th</sup>-10-11-XX</del> <u>2012</u> <del>2014</del>
Document Title: STR for Railway Signalling Cable			



Government of India  
Ministry of Railways  
Signal Directorate  
Schedule of Technical Requirement (STR)  
For  
Railway Signalling Cable  
SI Q - 0701 ( Ver.~~2~~3)  
Research Designs and Standards  
Organisation  
Manak Nagar,  
Lucknow – 226011

~~29<sup>th</sup>-XX~~ October ~~December~~ November ~~2012~~ 2014

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 1 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011xx.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

### 1.0 Scope:

The schedule of technical requirements covers the norms for manufacture of different types of signalling cables for Railway applications, as follows:-

S.No.	Item Description	Specification
1.	PVC insulated armoured, unscreened, underground cable	IRS- S:63/2007
2.	PVC Insulated armoured, unscreened underground power cable	IRS-S:63/2007& IS:1554
3.	PVC Insulated Railway Signalling Indoor Single Core Cable	IRS-S:76/89
4.	PVC Insulated Railway Signalling Indoor Multi Core Cable	IRS-S:76/89
5.	PVC insulated DST armoured, aluminium screened, underground cable	IRS-S:35/93

### 2.0 REQUIREMENTS:

Vendors seeking approval for manufacture and supply of above cables shall procure the specification for the concerned item and go through the detailed technical stipulations. They shall comply the requirements given below:-

#### 2.1 GENERAL INFRASTRUCTURE FACILITY:

The factory/manufacturing unit shall be located in an approved industrial area and shall have proper access road. The infrastructure should be adequate for manufacture of the cable (applied for) as per concerned specification and to ensure adherence to quality assurance plan. The manufacturing, testing, storage facilities etc. shall be close by and adjacent to each other. It should have a proper shed/ manufacturing hall, factory area with minimum area break up for manufacturing, testing, storage etc. given below.

#### Covered area break up - minimum requirement

- |                                                             |                |
|-------------------------------------------------------------|----------------|
| I. Manufacturing floor area                                 |                |
| (a) for signaling, power & indoor cable                     | : 15000sq.ft.  |
| (b) for signaling cable                                     | : 10000sq. ft. |
| (c) for power cable                                         | : 10000sq. ft. |
| (d) for indoor cable                                        | : 6000sq. ft.  |
| II. Laboratory area:                                        |                |
| a) Air conditioned Lab area for carrying out physical tests | : 600sq.ft.    |
| b) Cage for high voltage test with Interlocking facility    | : 1000sq.ft.   |
| c) Electrical Laboratory adjacent to high voltage cage      | : 500sq.ft.    |

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 2 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

- III. Godown area for keeping the finished product : 7500 sq.ft.
- IV. Separate godown with interlocking and sealing facility for the offered lot : 1000 sq.ft.
- V.      Stores for keeping raw material : 1800sq.ft.
- VI. Office area inside the factory premises : 500 sq.ft.
- VII. Proper approach road for reaching the transport in the factory at loading site.

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VIII. Road map for existing vendors for complying to new STR's clause 2.1 & 3.3 shall be of one year and for compliance of other clauses the road map shall be of 6 months from the date of issue of this STR.

(Only for information of compliance.)

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As far as possible the space for conducting physical tests and electrical tests should be adjacent to each other. It can be combined also. The laboratories should be arranged in such a fashion that the equipments requiring air conditioning like tensile testing machine, computerized test setup/ electrical test equipments etc. are kept in air conditioned area while equipments generating excessive heat like water baths are kept outside the air conditioned area. There should be a clear view of the cable drums kept in the cage for electrical testing from the electrical lab.

- 2.2 All the statutory approvals by local, state & Central Government authorities for running the factory at the given premises, manufacture & sale of the product by the firm shall be available & submitted.
- 2.3 The plant & machinery shall be suitably laid out process wise and each line duly labelled. It shall be so arranged as to facilitate smooth flow of product from one stage to the next stage & avoid unnecessary blockages or to & fro movement.
- 2.4 Sanctioned Power Load should be adequate for meeting the load requirements for the plant. Diesel generator set back up with adequate facility for storage of diesel oil shall also be available. It is preferable to run the sheathing line on diesel generating set so that there are no interruptions and continuity in the finished cable is maintained.
- 2.5 **Essential Plant & Machinery:**  
The minimum essential plant and machinery shall be available for the concerned type of cable as stipulated in clause 5.0 of this document. The plant and machinery should be in good working condition. The complete details of each plant and machinery like make, rating, date of installation, serial number etc. shall be duly maintained and submitted. Suitable arrangements for maintenance and upkeep of the plant and machinery by way of AMC or in-house maintenance shall be ensured. For equipments requiring calibration, valid calibration shall be ensured.
- 2.6 **Test and measuring facilities :**  
The testing and measuring equipments shall be available as stipulated in clause 6.0 of this document. All the equipments shall be calibrated at regular interval specified by calibrating agency ( Govt. test house or other agency having trace-ability to National standards ). For details regarding the test requirement/set up, the concerned cable IRS specification shall be referred. The

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 3 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

complete detail of each testing and measuring equipment like Sl. No. , make, rating, date of installation etc. shall be duly maintained and submitted along with the application for registration.

**2.7** The firm shall not withdraw any machinery and plants or testing equipments, which have been indicated at the time of capacity-cum-capability assessment except for repairs/renewals.

**3.0 QUALITY CONTROL REQUIREMENTS:**

**3.1** The Quality Assurance Plan for the product should detail various parameters and to ensure control over them.

Process Flow Chart for broad guideline is given at Annexure-I to this document. The quality assurance plan & flow chart shall cover the complete process from the testing of raw material, stage by stage in process testing to final product testing i.e. complete process. This shall positively implement the process flow chart given at Annexure-I. Guideline for preparing of QAP is given at Annexure-II.

**3.2** There should be a system to ensure the traceability of the product from raw material stage to finished product stage. This system should also facilitate to identify the raw material composition from the finished product stage.

**3.3** Ensure that the system of First in -First out is followed for raw material and the intermediate stage product.

3.3.1. Inward Raw material sources should be approved and their testing facility should be verified at the time of approvals and renewals.

3.3.2. Inward goods Inspection report should be maintained by firm and verified by Inspecting Official (I/O)

3.3.3. In process testing should be verified by various high level /competent Officials of firm.

**3.4** Adequate qualified and trained technical manpower shall be available.

**3.5** The responsibilities for quality control person shall be separately laid out. He should be actively responsible for day to day inspection, quality inspection, compliance of QAP etc. Quality In charge shall be free from day to day production, and should be responsible for testing and quality control of the product right from raw material stage till the finished goods stage. He shall be technically qualified and have adequate experience and shall be actively involved with day to day inspection, quality inspection and compliance of QAP.

**3.6** The firm should have acquired ISO – 9001/2008 series certification and the product for which the approval is sought, should be broadly covered in the scope of the certification for manufacture & supply.

**3.7** The Quality manual of the firm for ISO- 9001/2008 should clearly indicate at any stage the control over manufacturing and testing of the said railway product.

**3.8** It should be ensured that proper analysis is being done on monthly basis to study the rejection at various internal stages and it is documented.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 4 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

**3.9** All the relevant specification, IS standards should be available and properly documented with the firm.

**4.0** CHECK LIST

Local, state & central authorities & other commercial documents/certificates required to be ensured & submitted with the application along with the summary/checklist.

**5.0** ESSENTIAL PLANT AND MACHINERY REQUIRED FOR PRODUCTION

All manufacturing process stages should be automatic to the maximum extent with in process feedback arrangement for dia. Correction, minimal human intervention and synchronisation between pay off and take-up. Vendors should specify make, model and details of machines used and get it approved from R.D.S.O.

**5.1** POWER:Contract demand of 400KVA.

- i. Total load of DG set of 750 KVA (In a Single unit, D. G. Set 200 KVA (minimum) in covered room/enclosure to minimize noise pollution.
- ii. On line UPS 100KVA minimum suitable for 100 mm insulation line in redundant mode with minimum 15 minutes back up for extruder operation of inner sheath & unarmoured outer sheathed cable

**5.2** DRAWING/ANNEALING

The process involves drawing of copper /aluminium rods , then doing annealing using following machines/set up which should be automated –

- 5.2.1 Drawing and annealing of Copper/Aluminium (of high conductivity Electric grade as per IS:8130) with following machine
- a) RBD [Rod break down machine]machine
  - b) Wire drawing (Medium/Fine)
  - c) Annealing (on line/~~T~~andom line/~~Tube~~)
  - d) Copper purity test set up by electrolysis supported by resistivity test having supplier's certificate
  - e) Tinning Machine(Electro/Hot Dip) [Optional for Indoor signaling cable]

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**5.3** INSULATION EXTRUSION LINE

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 5 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011xx.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

This process involves insulating the drawn bare/ annealed or tinned copper/Aluminium conductors using automated Insulation extrusion line for PVC to insulate conductor, producing high quality signalling wire equipped with :-

- 5.3.1 Pay off should be pneumatic/Electrical/Mechanical brakes ~~and DC Motor and drive~~ (controlled through Brakes/Clutch) in tension control mode. If AC motor and drives are used then these drives must be synchronized for the line.
- 5.3.2 Wire straightened with wiper.
- 5.3.3 Conductor preheated with Current control.
- 5.3.4 65/80mm extruder with proper (24:1) L/D ratio of screw and barrel with automatic feeding of PVC, master batch & preheating facility (with on line dia controller & PID control for temperature). The head has to be self centering. The blowers to be used for temperature control for PVC cores.
- 5.3.5 PVC conveying / drying unit with air circulation.
- 5.3.6 Self centering head.
- 5.3.7 P.I.D. (Proportional Integral Differential) type pyrometer controlled heating system with display for each zone of barrel and cross head of extruder.
- 5.3.8 Gradient water cooling arrangement followed by stainless steel cooling trough of length 60/80ft.(20/27meters) with air sponger at the end.
- 5.3.9 On line automatic dia controller ( Dual axis ) one each for 65 mm /80 mm extruder.
- 5.3.10 On line AC spark tester 0-10 KV with numeric fault counter meter and with audio visual alarm.
- 5.3.11 Counter meter.
- 5.3.12 Dancer with speed control for proper spread out winding of cable on drum.
- 5.3.13 Suitable capstan Synchronized with AC(VFD)/DC control drive.
- 5.3.14 (i) Dual take up with Dancer controlled  
(ii) AC(VFD)/DC control drive  
(iii) Proper tension control  
(iv) traverse arrangement  
(v) Slip clutch  
(vi) Synchronized with the line.
- 5.3.15 Core marking machine with inkjet printing arrangement [Indoor cable].

#### 5.4 LAYING UP

This process involves laying up of insulated conductor wires to obtain desired cable core sequence using the following :

- 5.4.1 Laying up with minimum 36 bobbins and extendable arrangement with alternate direction & variable lay up arrangement.
- 5.4.2 Taping head for polyester tape.
- 5.4.3 Pay off should essentially motorized operation for lowering and lifting of cable drums. For other operation pay off may have ~~suitable drives either DC motor and drive or AC motor and drive~~ in tension control mode. ~~alternatively it~~ It should may have clutch or a brake to ensure appropriate tension between laying machine and pay off.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 6 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

- 5.4.4 Take up should essentially motorized operation for lowering and lifting of cable drums. For other operation take up may have either DC motor drive or AC motor and drive in tension control mode alternatively it may have clutch or a brake with mechanically coupled drive between take up and capstan/caterpillar.
- 5.4.5 Capstan/caterpillar synchronized with laying machine. It can have DC/AC drive or Mechanical coupling with laying machine.

### 5.5 INNER SHEATHING LINE

This process involves sheathing of the laid up core conductors using automated inner sheathing line for PVC, producing high quality sheathing of the signaling cable, equipped with

- 5.5.1 Pay off should be pneumatic/Electrical/Mechanical brakes and ~~DC Motor and~~ drive in tension control mode (controlled through Brakes/Clutch). If AC motor and drives are used then these drives must be synchronized for the line.
- 5.5.2 Extruder of 65 mm or higher size with proper (24:1) L/D ratio of screw and barrel with automatic feeding of PVC, Master Batch mixing & preheating facility (with online dia controller & PID control for temperature).
- 5.5.3 P.I.D.(Proportional Integral Differential) controlled heating system with display for each zone of barrel/cross head of extruder.
- 5.5.4 Gradient water cooling arrangement followed by stainless steel cooling trough of length 60 ft. with air sponger at the end.
- 5.5.5 Double wheel capstan/belt caterpillar with AC(VFD)/DC drive and synchronised with the line.
- 5.5.6 (i)AC(VFD)/DC control drive  
(ii)Proper tension control  
(iii) Traverse arrangement  
~~(iv)Slip clutch~~  
(iv) Synchronized for the line .
- 5.5.7 Take up (dancer/tension controlled) AC (VFD)/DC controlled synchronized with the line ..
- 5.5.8 On line spark tester( 0 - 10 KV AC rms with counter and alarm) .
- 5.5.9 PVC conveying / drying unit.
- 5.5.10 Counter meter for length

### 5.6 STRANDING CUM ARMOURING MACHINE for steel wire /strip of 30 bobbins

This process involves armouring/stranding of the inner sheathed cable using automated stranding cum armouring machines and line for producing high quality of the stranding/armouring of the signaling cable, equipped with

- 5.6.1 Pay off suitable for 2.2 Mtr. Steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation pay off may have suitable either DC motor drive or AC motor and drive (through Brakes/Clutch) in tension control mode. Alternatively It should may have clutch or a brake to ensure appropriate tension between Stranding/Armouring machine laying machine and pay off with tension control for 2.2 M dia reel.
- 5.6.2 Lay changing arrangement.
- 5.6.3 Fine arrangement for adjustment of gap and overlap.
- 5.6.4 Take upsuitable for 2.2 M steel drum.Essentially motorized operation for lowering and lifting of cable drums. For other operation take up may have either DC motor drive or AC motorand drive in tension control mode.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 7 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

- 5.6.5 Machine should be equipped for compacting and shaping of rounded conductor
- 5.6.6 Butt / brazing welding machine.
- 5.6.7 Double wheel Capstan/Belt caterpillar with AC(VFD)/DC drive and synchronised with the line.

**5.7 STEEL TAPE ARMOURING MACHINE with :-**

This process involves steel tape armouring of the signaling/power cable using automated steel tape armouring machines and line for producing high quality of the armoured signaling/power cable, equipped with.

- 5.7.1 Pay off suitable for 2.2 Mtr. Steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation pay off may have ~~suitable either DC motor drive or AC motor and drive (controlled through Brakes/clutch)~~ in tension control mode. ~~Alternatively It should may~~ have clutch or a brake to ensure appropriate tension between ~~Steel tape armouring machine laying machine~~ and pay off with tension control for 2.2 M dia reel.
- 5.7.2 Fine arrangement for adjustment of gap & overlap.
- 5.7.3 Take up suitable for 2.2 M steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation take up may have either DC motor drive or AC motor and drive in tension control mode.
- 5.7.4 Spot/brazing welding machine.
- 5.7.5 Double wheel Capstan/Belt caterpillar with AC(VFD)/DC drive and synchronised with the line
- 5.7.6 Double Tapping head for bedding tape(for screened cable).
- 5.7.7 Double Tapping head for steel tape.
- 5.7.8 Hoist.

**5.8 PVC OUTER SHEATHING**

This process involves final outer sheathing of the laid armoured signaling/power cable using automated outer sheathing line for PVC signaling/power cable, equipped with

On line 100 mm minimum extruder(**with on line Dia controller**) with following arrangements:

- 5.8.1 Pay off suitable for 2.2 Mtr. Steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation pay off may have ~~suitable drive seither DC motor drive or AC motor and drive (controlled through Brakes/clutch)~~ in tension control mode. ~~Alternatively It should may~~ have clutch or a brake to ensure appropriate tension between ~~sheathing laying machine~~ and pay off with tension control for 2.2 M dia reel.
- 5.8.2 PVC conveying / drying unit.
- 5.8.3 P.I.D.(Proportional Integral Differential) controlled heating system with display for each zone of barrel/cross head of extruder
- 5.8.4 Marking and drum no. embossing wheel/Hot stamp.
- 5.8.5 Stainless steel cooling trough having 60 feet/20 meters minimum length and gradual cooling arrangement, air drier at the end of cooling trough.
- 5.8.6 Counter meter for length.
- 5.8.7 Sequential length marking machine of  $\pm 0.2$  % accuracy with auto tape feeding and hot stamping.
- 5.8.8 Double wheel Capstan/Belt caterpillar with AC(VFD)/DC drive and synchronised with the line
- 5.8.9 Take up suitable for 2.2 M steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation take up may have either DC motor drive or AC motor and drive in tension control mode.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 8 of 14
Prepared By	Checked By	Issued By	



ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

5.8.10 Ink jet printing machine for indoor signalling cable only.

**5.9 REWINDING Machine** suitable for 2.2 M steel reel with :-

5.9.1 Pay off suitable for 2.2 Mtr. Steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation pay off may have suitable drives either DC motor and drive or AC motor and drive (controlled through Brakes/Clutch) in tension control mode. Alternatively it should may have clutch or a brake to ensure appropriate tension between rewinding laying machine and pay off with tension control for 2.2 M dia reel.

5.9.2 Roller guide.

5.9.3 -Counter meter for length measurement.

5.9.4 Take up suitable for 2.2 M steel drum. Essentially motorized operation for lowering and lifting of cable drums. For other operation take up may have either DC motor drive or AC motor and drive in tension control mode.

5.9.5 Sufficient space to inspect the cable.

5.9.6 One meter long steel scale.

**5.10 Bunching Machine [Indoor cable]**

5.10.1 High speed double twist bunching machine with 630 mm spool size and 30 wire pay off.

5.11 Coiling machine[ minimum two nos].(For Indoor signaling cable)

5.12 Spooling machine ( min. 2 nos.) for indoor signaling cable.

5.13 Small workshop with minimum one number of lathe, drilling machine, grinding machine and welding machine.

5.14 Drum Twister –Minimum 1250 mm size drum twister with 2 payoffs along with rotating caterpillar and Taping head [for power cable]

5.15 EOT crane or fork lift or hoist for handling of cable drums (minimum 5 ton capacity).

**6.0 ESSENTIAL TESTING EQUIPMENTS REQUIRED FOR QUALITY ASSURANCE**

6.1 Digital micro ohm meter based on Senior Kelvin bridge principle for measurement of specific resistance.

6.2 Million Meg ohmmeter. (min. two numbers) for measurement of insulation resistance.

~~6.3~~ Digital resistance meter (ohmmeter), min two numbers for conductor resistance measurement.

~~6.4~~ 6.3 H.V Tester 0-10 KV, 30 Amps primary current , 10 KVA capacity with arrangement for measurement of both primary and secondary side voltage and currents.

~~6.5~~ 6.4 H.V Tester 0-10 kV, 100 Amps primary current , 22 KVA capacity with arrangement for measurement of both primary and secondary side voltage and currents.

~~6.6~~ 6.5 Water bath for 50°C± 1°C (with sealing arrangement) of size 120cm X 75cm X 60cm fitted with digital temp. indicator temperature recorder and hour meter.

~~6.7~~ 6.6 Water bath for 60°C±1°C (with sealing arrangement) of size 120cm X 90cm X 60cm with digital temp. Indicator temperature recorder and hour meter.

~~6.8~~ 6.7 D. C. H. V. Tester 0-2 kV, 5 amp primary current capacity.

~~6.9~~ 6.8 Digital multi meter with suitable high voltage probes for measuring 0-10 kV AC

~~6.9~~ 6.9 Automatic cable test set / Digital resistance meter for measurement of conductor resistance. Provision of auto report generation should be available with strict control on software changes / Digital resistance meter (ohmmeter), min two numbers for conductor resistance measurement.

~~6.10~~ .

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SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 9 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> <u>0701</u>	Version No. <del>23</del>	Date Effective: <del>29xx.1011XX.2012</del> <u>2014</u>
Document Title: STR for Railway Signalling Cable			

- ~~6.11~~6.10 Calibration box for C.R. duly calibrated by a Govt. test house or other agencies having traceability to National Standards.
- ~~6.12~~6.11 Calibration box for I.R. duly calibrated by a Govt. test house or other agencies having traceability to National Standards.
- ~~6.13~~6.12 ~~Fully automatic~~ ~~e~~Computerized Tensile testing machine with load cell ~~with and~~ auto report generation/ microprocessor based Mechanical Tensile ~~M~~machine/~~Tensile Machine/M~~achines with following ranges
  - (a) Tensile testing machine 0-50 kgf
  - (b) Tensile testing machine 0-250 kgf
  - (c) Tensile testing machine 0-500 kgf
  - (d) Tensile testing machine 0-1500 kgf. (for screened cables)
  - (e) Tensile testing machine 0-2500 kgf. (for DST)
- ~~6.14~~6.13 Stamping die (for cutting dumbbell).
- ~~6.15~~6.14 Hot rolling milling machine with hydraulic press for testing of PVC compound before extrusion
- ~~6.16~~6.15 Conditioning chamber 27°C.
- ~~6.17~~6.16 Digital vernier.(min. Two numbers)with least count 0.01 mm
- ~~6.18~~6.17 Digital micrometer.(min. Two numbers)with least counter 0.001 mm
- ~~6.19~~6.18 Digital/Analog stop watch.(min. Two numbers)
- ~~6.20~~6.19 Digital / Analog Thermometer (0-100°C, 0-200°C, 0-300°C) minimum two each.
- ~~6.21~~6.20 Travelling microscope/profile projector for thickness measurement.
- ~~6.22~~6.21 Electronic Digital balance [0.1 mg – 200 grams] with accuracy of ± 0.1 mg.
- ~~6.23~~6.22 Apparatus for testing colour fastness to water.
- ~~6.24~~6.23 Torsion testing machine for steel wires (Motor drive with counter arrangement).
- ~~6.25~~6.24 Spark tester 0-15 kV separately for off line testing of cores.
- ~~6.26~~6.25 Multi-~~Ce~~ll ageing oven 0-150°C with temperature accuracy of ± 1°C fitted with digital temp. indicator, temp. recorder, hour meter and air flow meter (Rotameter) as per IS specification.
- ~~6.27~~6.26 Heating oven 0-300°C fitted with digital temp indicator, hour meter temp. recorder, and air flow meter (Rotameter) as per IS specification.
- ~~6.28~~6.27 Small water bath. (for indoor signalling cables).
- ~~6.29~~6.28 Thermal stability test apparatus at 200°C, temp. accuracy ±1°C.
- ~~6.30~~6.29 Flammability/Fire resistance test apparatus.
- ~~6.31~~6.30 Reduction factor measurement set up (for screened cables).
- ~~6.32~~6.31 Hot deformation test apparatus.
- ~~6.33~~6.32 Apparatus for bleeding and blooming test.
- ~~6.34~~6.33 Apparatus for cold bend test.( at -20°C).
- ~~6.35~~6.34 Apparatus for cold impact test.( at -20°C).
- ~~6.36~~6.35 Apparatus for heat shock test.
- ~~6.37~~6.36 Apparatus for winding testing of Armour strips and Tapes.
- ~~6.38~~6.37 5/6 Channel Data logger for Temperature recording.
- ~~6.39~~6.38 Apparatus for specific gravity test.
- ~~6.40~~6.39 Apparatus for colour fastness to daylight exposure.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 10 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011xx.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

- Note:**
1. All the above specified requirements of machinery are the minimum requirements. Vendors can utilize better/higher standards of machines also.
  2. For indoor signalling cable, S. No. 6.45, 6.123(b), 6.123(c), 6.234, 6.304, 6.367 are not required. In addition S. No. 6.134 is not required for single core Indoor signalling cable.

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SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 11 of 14
Prepared By	Checked By	Issued By	



ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011xx.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

## Annexure -II

### Guidelines for Preparing QAP during fresh registration

The QAP to be submitted by the vendor in triplicate (along with the application form for registration) shall cover the following aspects –

- a. Organisation Chart emphasising Quality Control Set-up.
- b. Qualification of key personnel and the officials deployed in Quality Control Cell.
- c. Process Flow Chart indicating process of manufacture for an individual product or for a family of products if the process is same.
- d. Details of vendors -  
The name of components for which it is approved  
Vendor Approving Agency.  
Inspection criteria at vendors' premises.  
In case large no. of bought out items are required, the information shall be given in the format as below :

Sl. No.	Name of Component	Drawing No. / Specn. No.	Name of the vendors	Vendors approving agency RDSO/Self/Open market	Inspection criteria (Write details or check sheet* No.)

The check sheet should be a controlled document of ISO : 9000 quality control systems.

- e. Quality Assurance System – Inspection & Testing Plan. This shall cover the following:  
Incoming material  
  
Process control  
  
Product control  
  
System control  
Gauging scheme – In the format for each operation gauges should be mentioned, if used.
- f. Stage inspection detailing inspection procedure, inspection parameters, method of testing/test procedure including sample sizes for destructive and non-destructive testing etc.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 13 of 14
Prepared By	Checked By	Issued By	

ISO 9001: 2008	Document No. SIQ- <del>0701</del> 0701	Version No. <del>23</del>	Date Effective: <del>29xx.1011xx.2012</del> 2014
Document Title: STR for Railway Signalling Cable			

The generalised format covering the information under e, f, should be as below:

Subject/ Product/ Process g	Sample Size & its Frequency in inspection	Parameters for inspection	Mode of inspection / equip. used	Acceptance limits/Criteria/ Specified Value	Rejection details Reprocessed /Scraped

g. QAP covering all the information as asked above under 'a' to 'f' must be given in the form of single document indicating name of the firm and page no. 'x' of 'y' on each page. Each page should be signed by QC in-charge. The approved QAP must be a controlled document and a quality record of ISO : 9000 quality control system of the vendor. A certificate to this effect shall be provided along with the QAP by the vendor

h. Any other thing decided by R.D.S.O.

i. The QAP shall be approved by R.D.S.O. and this will be subjected to review/upgradation by R.D.S.O. in light of fresh datae and experience/ renewals.

SSE/Signal	ADE/Signal - 7	Director /Signal - 7	Page 14 of 14
Prepared By	Checked By	Issued By	