



दक्षिण पूर्व मध्य रेलवे  
**SOUTH EAST CENTRAL RAILWAY**

कार्यालय  
प्रमुख मुख्य इंजीनियर  
Office of the  
Principal Chief Engineer.

**REVISED PCE'S CIRCULAR NO. 31**

**Subject: Quality control at work sites and maintenance of records.**

1. The original circular was issued on 18.08.11 and a need was felt for reviewing the same following requests from field units to make it more simple and effective. Accordingly, this revised and improved version of the circular is issued considering practical difficulties of field engineers with emphasis on quality assurance during construction stage itself. For ensuring uniformity in quality management at all work sites, the records in the format prescribed are to be maintained by the Field supervisors (SSE/JE) at site duly ensuring their safe custody till handing over the same to Estimator at the time of technical check of final bill.

2. The following records are to be maintained for the works as detailed in this circular. In addition, Engineer-in-charge is free to maintain any additional records as deemed necessary due to specific requirement of site.

3. The records in the prescribed format can also be maintained in **one or two thick registers** named **Work Registers** by allotting sufficient pages for each item to cover all the relevant quality aspects depending on the magnitude of work and site requirements as decided by the Engineer. Each page of the registers should be serially machine numbered. Registers should be issued by the Sr.DEN/DEN to the SSE/JE through ADEN along with copy of acceptance letter of the work for each contract agreement duly certified by concerned Sr.DEN/DEN.

**3.1 Page-1 of Work Register**

First page of the Work Register shall contain the following details of the work including page certification under signature of concerned Sr.DEN/DEN, ADEN & In-charge supervisor.

- (a) Name of work:
- (b) Acceptance Letter No.:
- (c) Contract Agreement No.:
- (d) Agency:

*ADEN*  
ADEN/PLD



- (e) Total cost of the work:  
 (f) Date of award of the work:  
 (g) Period of completion:  
 (h) Stipulated date of completion of the work:  
 (i) Date of commencement of the work:  
 (j) Details of extension of time sanctioned:

*"Certified that this register contains .....pages serially numbered from ... to ... and issued as **Work Register** for the above work"*

Dy.CE/XEN/Sr.DEN/DEN

AXEN/ADEN

SSE/JE

### 3.2 Page- 2 of Work Register

Second page of the Work Register should be used for **INDEX** at right side. Copy of acceptance letter of the work is to be pasted on left side of the index page. A sample of index is shown below:

| SN | NAME OF RECORDS/REGISTERS | PAGE NO. |    |
|----|---------------------------|----------|----|
|    |                           | FROM     | TO |
|    |                           |          |    |
|    |                           |          |    |
|    |                           |          |    |
|    |                           |          |    |
|    |                           |          |    |
|    |                           |          |    |
|    |                           |          |    |

In subsequent pages of Work Register, formats of various types of specified records, mentioned below, are to be appeared.

**3.3** One agreement file containing the copy of Contract Documents / Work Orders, Drawings, Laboratory Reports, correspondences etc., should also be maintained separately for each work. Page numbering of the files should invariably be done serially.

**3.4** Field tests are to be conducted on materials frequently in addition to periodical laboratory testing to verify conformity with codal requirements. Laboratory tests should be got conducted from a government approved laboratory or as specified in the contract. Water proposed to be used in concrete should be got tested (as per IS: 456) whenever the source changes or more frequently when changes in the quality are perceived due to climatic or seasonal changes. Field laboratory should be established with adequate facilities to carryout day to day field testing of materials and works and as stipulated in the contract.

*[Signature]*



**3.5 LIST OF RECORDS TO BE MAINTAINED FOR VARIOUS TYPES OF WORKS**

| S.NO. | NAME OF THE RECORD                         | TO BE MAINTAINED FOR   |
|-------|--|--|
| 1     | SITE ORDER BOOK                            | All works.   |
| 2     | DAILY PROGRESS REGISTER                    |  |
| 3     | HINDRANCE REGISTER                         |  |
| 5     | MATERIAL PASSING REGISTER                  |  |
| 6     | CEMENT CONSUMPTION REGISTER                | All cement involving works.  |
| 7     | REINFORCEMENT STEEL ACCOUNTAL REGISTER     | (i) All RCC/PSC works and  |
| 8     | REINFORCEMENT STEEL CONSUMPTION REGISTER   | (ii) Mass Cement Concrete works with temperature reinforcement.                    |
| 9     | FIELD TESTS FOR SAND                       | All cement involving works.  |
| 10    | FIELD TESTS FOR C.A                        | All concrete involving works   |
| 11    | FIELD TEST FOR CEMENT                      | All cement involving works   |
| 12    | FIELD TEST FOR STEEL                       | All steel involving works  |
| 13    | SLUMP TEST                                 | All concrete involving works   |
| 14    | CONCRETE CUBE TESTING REGISTER             | All concrete involving works   |
| 15    | PILE PASSING REGISTER                      | For buildings and structures with pile foundation.                                 |
| 16    | PERMEABILITY OF CONCRETE                   | Major Bridges & RCC Water tanks.   |
| 17    | STRESSING RECORD OF PSC GIRDER             | PSC Girder Bridges   |
| 18    | RECORD OF GROUTING OF CABLE DUCTS          | PSC Girder Bridges   |
| 19    | LEVEL BOOKS                                | Earth work in formation/projects   |
| 20    | SOIL TEST REPORTS FOR FILL MATERIALS       |  |
| 21    | SOIL TEST REPORTS FOR BLANKETING MATERIALS |  |
| 22    | EARTH WORK COMPACTION REGISTER             |  |
| 23    | CBR TEST REPORTS                           | Earth work in formation (for 25t+ axle load only) and road works as per agreement. |



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**4. Formats** with brief importance of the records in regard to provisions in Engineering Code & GCC etc. are as under.

#### **4.1 SITE ORDER BOOK**

In terms of **Para 1123 of Indian Railways Code for the Engineering Department**-For all important works a Site Order Book should be opened and all instructions issued to the executive subordinate or the contractor, as the case may be should be duly entered therein with the replies opposite.

As per IREC para: 1117-**"Responsibility of Executive Engineers.**-The Executive Engineer in charge of the work is responsible for the proper execution of a work by whatever agency it may be carried out. He should, therefore, make inspections as frequently as necessary or possible, supply his assistants and subordinates with such detailed instructions as may, from time to time, be necessary and see to it the instructions are complied with".

As per **Para 20(1) of GCC**, "The Engineer shall direct the order in which the several parts of the works shall be executed and the contractor shall execute without delay all orders given by the Engineer from time to time but the contractor shall not be relieved thereby from responsibility for the due performance of the works in all respects."

Therefore, **Site Order Book**, which is a vital record, serves as a means of official communication between Railway and the Contractor and shall be in the prescribed format given below.

| SITE ORDER BOOK |   |   |            |   |                  |
|-----------------|---|---|------------|---|------------------|
| DATE            | SITE ORDER OF INSPECTING OFFICIAL<br>( WITH SIGN AND DESIGNATION) | NOTING BY CONTRACTOR & RAILWAY OFFICIAL<br>( WITH SIGN AND DESIGNATION) | COMPLIANCE | SIGNATURE OF                                |                  |
|                 |   |   |            | CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | RAILWAY OFFICIAL |
| 1               | 2   | 3   | 4          | 5   | 6                |
|                 |   |   |            |   |                  |

**Note:** Engineer's representative should ensure that instructions are immediately noted and compliance recorded promptly.

#### **4.2 DAILY PROGRESS REGISTER**

| DATE                              | WEATHER  | DESCRIPTION OF WORK EXECUTED  | LABOUR ENGAGED |           | MACHINERY MOBILIZED |
|-----------------------------------|--|-------------------------------|----------------|-----------|---------------------|
|                                   |  |                               | SKILLED        | UNSKILLED |                     |
| 1                                 | 2  | 3                             | 4              | 5         | 6                   |
|                                   |  |                               |                |           |                     |
| APPROXIMATE QUANTITY OF WORK DONE | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL | REMARKS        |           |                     |
| 7                                 | 8  | 9                             | 10             |           |                     |
|                                   |  |                               |                |           |                     |



#### 4.3 HINDRANCE REGISTER

| SL. NO.  | DATE OF OCCURRENCE            | DESCRIPTION OF HINDRANCE | ACTION TAKEN | DATE OF CLEARANCE | AFFECTED DURATION |
|--|-------------------------------|--------------------------|--------------|-------------------|-------------------|
| 1  | 2                             | 3                        | 4            | 5                 | 6                 |
| SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL | REMARKS                  |              |                   |                   |
| 8  | 9                             | 10                       |              |                   |                   |

#### 4.4 TECHNICAL REGISTER

**4.4.1** This register is to be maintained as a field record for a particular work in which all the miscellaneous technical details from below GL to roof level viz., initial ground levels, foundation levels, bore log, sketches, hidden details, calculations, any other site specific details etc., to be noted for reference at a later date. (IREC Para: 1122 & 1124)

**4.4.2** No standard proforma is required for this register.

#### 4.5 MATERIAL PASSING REGISTER

**4.5.1** As per **Para 27(1) of GCC**, "The whole of the works and/or supply of materials specified and provided in the contract or that may be necessary to be done in order to form and complete any part thereof shall be executed in the best and most substantial workman like manner with materials of the best and most approved quality of their respective kinds, agreeable to the particulars contained in or implied by the specifications and as referred to in and represented by the drawings or in such other additional particulars, instructions and drawings may be found requisite to be given during the carrying on of the works and to the entire satisfaction of the Engineer according to the instructions and directions which the Contractors may from time to time receive from the Engineer. The materials may be subjected to tests by means of such machines, instruments and appliances as the Engineer may direct and wholly at the expense of the Contractor."

**4.5.2** As per **IR Engineering Code Para-133** "Executive Engineers are responsible for the good quality of all work done under their orders, and cannot without proper authority, transfer to any one else the executive charge of works entrusted to them for construction".

**4.5.3** To ensure compliance to the above Paras of GCC & IREC and to preempt the use of sub-standard material, "**MATERIAL PASSING REGISTER**" shall be maintained at each site of work.

**4.5.4** Materials/Products used in the work shall be of approved make/brand, out of the list of manufacturers/brands/makes given in the tender documents.



**4.5.5** In case, no make or brand is specified in the tender documents, the materials having ISI mark should be accepted. It is the responsibility of the executive to verify the genuineness of the Brand/ISI marks.

**4.5.6** In the case of items, for which neither brands are specified nor conforms to BIS stipulations, the sample shall be got approved from Engineer-in-charge.

**4.5.7** In the "MATERIAL PASSING REGISTER" one page is to be allotted for each material. In-charge JE/SSE/ADEN/Sr.ADEN/AXEN/XEN shall perform the requisite tests on the materials before allowing to use on work. DEN/Sr.DEN/Dy.CE shall also carryout necessary tests and may also approve/reject the materials. Proforma of "MATERIAL PASSING REGISTER" shall be as under:

### MATERIAL PASSING REGISTER

#### NAME OF THE MATERIAL:

| SRL NO.  | DATE OF RECEIPT | VOUCHER NO. & DATE   | SOURCE OF RECEIPT              | QUANTITY RECEIVED  | NAME OF BRAND/MANUFACTURER    | BATCH NO.   |
|--|-----------------|--|--------------------------------|--|-------------------------------|---|
| 1  | 2               | 3  | 4                              | 5  | 6                             | 7   |
| MANUFACTURER'S TEST CERTIFICATE WITH DATE, FOLIO NO. IN FILE & RESULTS THERE OF. | DATE OF TESTING | THEORETICAL PROPERTIES AS PER RELEVANT DRG./SPECIFICATION/IS CODE. | PROPERTIES FOUND AFTER TESTING | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL | INITIAL OF RAILWAY ENGINEER-IN-CHARGE IN TOKEN OF APPROVAL/REJECTION OF THE MATERIAL. |
| 8  | 9               | 10   | 11                             | 12   | 13                            | 14  |

### 4.6 CEMENT CONSUMPTION REGISTER

**4.6.1** Unless otherwise specified for a particular item, cement required for the works will be arranged by the contractor at his own cost.

**4.6.2** Cement will be procured by contractor from the producers/their authorized dealers/authorized stock holders or from the source specified in the contract.

**4.6.3** Cement should conform to relevant ISI Specifications indicated below duly approved by the Engineer-in-charge or his authorized representative.

- (a) Portland Pozzolana Cement conforming to IS-1489.
- (b) Portland Slag Cement conforming to IS-455-1989.
- (c) 43 Grade Ordinary Portland Cement conforming to IS-8112:1989.
- (d) 53 Grade Ordinary Portland Cement conforming to IS-12269:1989.

Cement bags should be examined for the standard markings on them viz., Brand Name, Manufacturer's name, type of cement with conforming IS code, date of manufacture and weight of each bag etc., The condition of packaging and any signs of tampering with the stitches should be given due attention.

*[Signature]*



**Note1** Date of manufacturing is generally marked as week of the year of manufacture, i.e 15/11 means 15<sup>th</sup> week of 2011.

**Note2** For each lot of cement at site, the contractor will be required to produce test certificate from manufacturer, firm/institute/lab (as directed by Engineer-in-charge and the same shall conform to relevant ISI specifications).

**4.6.4** Wherever, item "Bag" is used in context of consumption of cement, it shall be deemed as 50 kg quantity of cement.

**4.6.5** Railway may also take samples of cement during the course of execution of work and get the same tested to ascertain the conformity to relevant ISI specifications. The cost of the sample and charges for the testing will have to be borne by the contractor.

**4.6.6** The actual quantity of cement used in the work or the theoretical requirement for the work whichever is less - only qualifies for payment. No payment should be made for the wastage, excess consumption over the quantity specified per unit of work or for the un-utilized (leftover quantity) cement at site.

**4.6.7** The payment for cement consumed for the work will be made to the contractor for the work successfully executed and certified by the Engineer-in-Charge.

**4.6.8** The supply and consumption of the cement should be so regulated that no cement becomes older than 3 months.

**4.6.9** Proper accountal of cement supplied and consumed is required to be in. Separate cement register and separate file should be kept in which all receipts of the cement supplied by the contractor, brand of cement, test reports etc. should be chronologically serial numbered and index of all the correspondences be made.

**4.6.10** The proforma of **CEMENT CONSUMPTION REGISTER** should be as under:

| DATE   | DETAILS OF RECEIPT OF CEMENT |   |                                    |                          |                    |
|--|------------------------------|---|------------------------------------|--------------------------|--------------------|
|  | QUANTITY RECEIVED<br>IN BAGS | SOURCE OF<br>RECEIPT  | CHALLAN<br>NO. &<br>INVOICE<br>NO. | BRAND<br>NAME &<br>GRADE | BATCH NO.          |
| 1  | 2                            | 3   | 4                                  | 5                        | 6                  |
| MANUFACTURER'S TEST<br>CERTIFICATE WITH DATE, FOLIO<br>NO. IN FILE & TEST RESULTS<br>THERE OF. |                              | OPENING<br>BALANCE  | CONSUMPTION OF<br>CEMENT           |                          | CLOSING<br>BALANCE |
|  |                              |   | DAILY                              | CUMULATIVE               |                    |
| 7  | 8                            | 9   | 10                                 | 11                       |                    |
| DESCRIPTION OF WORK DONE   |                              | SIGNATURE OF<br>CONTRACTOR OR<br>HIS AUTHORIZED<br>REPRESENTATIVE | SIGNATURE OF<br>RAILWAY OFFICIAL   |                          | REMARKS            |
| 12   | 13                           | 14  | 15                                 |                          |                    |

*[Signature]*

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#### 4.7 REINFORCEMENT STEEL ACCOUNTAL REGISTER

| DATE  | DETAILS OF RECEIPT OF STEEL REINFORCEMENT |                   |   |                                |           |
|---|---|-------------------|---|--------------------------------|-----------|
|   | QUANTITY RECEIVED                         | SOURCE OF RECEIPT | CHALLAN NO. & INVOICE NO.                                     | BRAND NAME & GRADE             | BATCH NO. |
| 1   | 2   | 3                 | 4   | 5                              | 6         |
| MANUFACTURER'S TEST CERTIFICATE WITH DATE, FOLIO NO. IN FILE & TEST RESULTS THERE OF. |   |                   | CUMULATIVE QUANTITY OF STEEL REINFORCEMENT RECEIVED UPTO DATE | TOTAL STEEL CONSUMED UPTO DATE | BALANCE   |
| 7   |   |                   | 8   | 9                              | 10        |
| SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE                              |   |                   | SIGNATURE OF RAILWAY OFFICIAL                                 | REMARKS                        |           |
| 11  |   |                   | 12  | 13                             |           |
|   |   |                   |   |                                |           |

#### 4.8 REINFORCEMENT STEEL CONSUMPTION REGISTER

| DATE                                   | LOCATION | DESCRIPTION & DIAGRAM OF BAR INCLUDING BAR INDICATION | DIA. OF BAR (IN MM)               | SPACING (IN MM) | NUMBERS PROVIDED   | EACH LENGTH (IN M) | NO. OF LAPS                   | EACH LAP LENGTH (IN M) |
|--|----------|---|-----------------------------------|-----------------|--|--------------------|-------------------------------|------------------------|
| 1                                      | 2        | 3   | 4                                 | 5               | 6  | 7                  | 8                             | 9                      |
| TOTAL LENGTH (IN M)<br>{(6x7) + (8x9)} |          | UNIT WT. (IN KG/M)                                    | TOTAL WEIGHT (IN KG)<br>{10 x 11} |                 | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE |                    | SIGNATURE OF RAILWAY OFFICIAL |                        |
| 10                                     |          | 11  | 12                                |                 | 13   |                    | 14                            |                        |

**4.8.1** If laps are not to be paid as per contract conditions, the relevant field should be drawn blank. The reinforcement steel required for work will have to be procured by the contractor from the main producers/authorized dealers/authorized stock holders and the same should conform relevant IS specifications indicated below and within the permitted tolerances:-

**4.8.2** TMT-415 or 500 STEEL BAR CONFORMING TO IS 1786-1985

**4.8.3** Contractor will have to be required to submit test certificate, for each lot of reinforcement steel brought at site, from the manufacturer/reputed firm/Institute/Lab as directed by Engineer-in-charge.

**4.8.4** Railway will have liberty to take samples during the course of execution of work and get the same tested to ascertain the quality of steel conforming to relevant specification. The cost of sample and the charges for the testing will have to be borne by the contractor.

*[Signature]*



**4.8.5** For the purpose of calculating weight of reinforcement steel consumed for the work, standard weight of reinforcement bar or the actual weight whichever is less will be multiplied by the total length of the bar used for the work.

**4.8.6** It shall have to be noted that for the purpose of payment, only authorized overlaps will have to be accounted. Unauthorized overlaps, wastage, excess consumption etc. will not to be paid to the contractor.

**4.8.7** The payment for the reinforcement steel should be made only for the quantity actually consumed in the work and otherwise qualifies for payment. No payment will be paid to the contractor for the reinforcement steel brought at site but not consumed.

#### 4.9 FIELD TEST OF SAND

| Date | Location of Work | % MOISTURE CONTENT |                |                       | SEIVE ANALYSIS AS PER IS:383 |                      |                     |              |                  | Sign of contractor or his authorized representative | Sign of Railway official |
|------|------------------|--------------------|----------------|-----------------------|------------------------------|----------------------|---------------------|--------------|------------------|---|--------------------------|
|      |                  | Wet Wt (In gm)     | Dry Wt (In gm) | Water Content (In gm) | % IS SEIVE                   | Wt. retained (In gm) | Wt. passing (In gm) | % Wt passing | Conforms to Zone |   |                          |
| 1    | 2                | 3                  | 4              | 5                     | 6                            | 7                    | 8                   | 9            | 10               | 11  | 12                       |
|      |                  |                    |                |                       |                              | 10 MM                |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 4.75MM               |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 2.36MM               |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 1.18MM               |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 600 $\mu$            |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 300 $\mu$            |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 150 $\mu$            |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | 75 $\mu$             |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | < 75 $\mu$           |                     |              |                  |   |                          |
|      |                  |                    |                |                       |                              | TOTAL                |                     |              |                  | % SILT CONTENT (PASSING 75 $\mu$ )                  |                          |

(In addition to above, sand should be examined by rubbing in the palm for any visual contamination with mud, mica or any other organic or inorganic impurities in which case washing should be resorted to.)

Moisture content and Zone of sand are required to make adjustments in proportion of sand in the mortar/concrete.

#### 4.10 FIELD TEST OF COARSE AGGREGATES

| Date   | Location of Work | Nominal Size of Aggregate | Type | % water absorption | Specific Weight in gm/cm <sup>3</sup> | IS SEIVE                      | WT. RETAINED (IN GM) | Wt. passing (IN GM) | % Wt passing | Conforms to Zone                   |
|--|------------------|---------------------------|------|--------------------|---------------------------------------|-------------------------------|----------------------|---------------------|--------------|------------------------------------|
| 1  | 2                | 3                         | 4    | 5                  | 6                                     | 7                             | 8                    | 9                   | 10           | 11                                 |
|  |                  |                           |      |                    |                                       | 80 MM                         |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 63 MM                         |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 40 MM                         |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 20 MM                         |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 16 MM                         |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 12.5 MM                       |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 10 MM                         |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 4.75 MM                       |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | 2.36 MM                       |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | < 75 $\mu$                    |                      |                     |              |                                    |
|  |                  |                           |      |                    |                                       | TOTAL                         |                      |                     |              | % SILT CONTENT (PASSING 75 $\mu$ ) |
| Signature of contractor or his authorized representative |                  |                           |      |                    |                                       | Signature of Railway official |                      |                     |              |                                    |
| 12   |                  |                           |      |                    |                                       | 13                            |                      |                     |              |                                    |

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#### 4.11 FIELD TEST OF CEMENT

| DATE                    | LOT NO. | MANUFACTURING DATE  | ACTUAL WT. OF BAG | TYPE OF BAG(JUTE/POLYTHENE) | VISUAL TEST  |                               |
|-------------------------|---------|---------------------|-------------------|-----------------------------|--|-------------------------------|
|                         |         |                     |                   |                             | FOR INTACTNESS OF PACKING                                | FOR COLOUR OF CEMENT          |
| 1                       | 2       | 3                   | 4                 | 5                           | 6  | 7                             |
| TEST FOR                |         |                     | FLOATING TEST     | PASTE TEST                  | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL |
| Temperature (cool/warm) | Lumps   | Fineness/grittiness |                   |                             |  |                               |
| 8                       | 9       | 10                  | 11                | 12                          | 13   | 14                            |

Prior to using, the following field tests on cement to adjudge its purity and quality should be done:-

- 4.11.1 The colour of cement should be uniformly greenish grey.
- 4.11.2 When hand is thrust into a bag of cement it should feel cool and not warm.
- 4.11.3 Any lump found in the cement bag should be powdered by pressing between the thumb and the fore finger. If it does not turn into powder form, the cement is considered to be spoiled by air setting.
- 4.11.4 It should feel smooth when rubbed in between fingers. It should neither feel rough nor gritty. Roughness or grittiness shows some sort of adulteration i.e sand etc.
- 4.11.5 A handful of cement thrown into a bucket of water should float for a while in case the cement is of good quality and it sinks, if it contains some impurities.
- 4.11.6 A pat of cement paste placed on a glass plate when immersed in water should not deform/dissipate by losing its shape and edges. After 24 hours, the pat should show signs of some strength gain.

#### 4.12 FIELD TEST OF STEEL: (IS:1786, Para 9.3 & IS:1599)

| SL. NO.             | LOT NO. | DIA.                  | GRADE & MAKE OF STEEL                                    | WEIGHT PER METRE              | Visible defects if any, (viz., rusting, etc.) |
|---------------------|---------|-----------------------|--|-------------------------------|---|
| 1                   | 2       | 3                     | 4  | 5                             | 6   |
| RESULT OF BEND TEST |         | RESULT OF REBEND TEST | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL | REMARKS                                       |
| 7                   |         | 8                     | 9  | 10                            | 11  |

**Note:** Standard Mandrel should be available at work site for forming required radius and angle. Cracks should not be visible at bent portion with normal eye sight.

*[Signature]*



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#### 4.13 SLUMP TEST

| SL. NO.  | DATE | MIX/ STRENGTH INCLUDING W/C RATIO | DESCRIPTION OF WORK           | SLUMP OBSERVED IN MM | SLUMP REQUIRED IN MM |
|--|------|-----------------------------------|-------------------------------|----------------------|----------------------|
| 1  | 2    | 3                                 | 4                             | 5                    | 6                    |
|  |      |                                   |                               |                      |                      |
|  |      |                                   |                               |                      |                      |
|  |      |                                   |                               |                      |                      |
| SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE |      |                                   | SIGNATURE OF RAILWAY OFFICIAL | REMARKS              |                      |
| 7  |      |                                   | 8                             | 9                    |                      |
|  |      |                                   |                               |                      |                      |
|  |      |                                   |                               |                      |                      |

#### 4.14 CONCRETE CUBE TESTING REGISTER

| SL. NO.  | DATE OF CASTING               | MIX STRENGTH/ GRADE OF CONCRETE | DESCRIPTION OF WORK | 07 DAYS STRENGTH PARTICULAR |                 |                      |         |                           |
|--|-------------------------------|---------------------------------|---------------------|-----------------------------|-----------------|----------------------|---------|---------------------------|
|  |                               |                                 |                     | DUE DATE                    | DATE OF TESTING | TEST RESULTS 07 DAYS |         |                           |
|  |                               |                                 |                     |                             |                 | a                    | b       | c                         |
| 1  | 2                             | 3                               | 4                   | 5                           | 6               | 7                    | 8       | 9                         |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
| 28 DAYS STRENGTH PARTICULAR                              |                               |                                 |                     |                             |                 |                      |         |                           |
| AVERAGE  | MINIMUM STRENGTH REQUIRED     | DUE DATE                        | DATE OF TESTING     | TEST RESULTS 28 DAYS        |                 |                      | AVERAGE | MINIMUM STRENGTH REQUIRED |
|  |                               |                                 |                     | a                           | b               | c                    |         |                           |
| 10   | 11                            | 12                              | 13                  | 14                          | 15              | 16                   | 17      | 18                        |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
| SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL | REMARKS                         |                     |                             |                 |                      |         |                           |
| 19   | 20                            | 21                              |                     |                             |                 |                      |         |                           |
|  |                               |                                 |                     |                             |                 |                      |         |                           |
|  |                               |                                 |                     |                             |                 |                      |         |                           |

**Note:** (i) Standard Deviation should be worked out as detailed in IS: 456-Para 9.2.4  
(ii) No. of cubes casted should be as per IS: 456- para-15.2.2.

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#### 4.15 PILE PASSING REGISTER

| DATE OF CASTING                 | LOCATION           | PILE NO.               | CHECKING PARAMETERS |                                |  |
|---------------------------------|--------------------|------------------------|---------------------|--------------------------------|--|
|                                 |                    |                        | DIA. OF SHAFT       | DEPTH OF SHAFT FROM GL         | NO. OF BULBS   |
| 1                               | 2                  | 3                      | 4                   | 5                              | 6  |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
| CHECKING PARAMETERS             |                    |                        |                     |                                |  |
| DIA. OF LOWER BULB              | DIA. OF UPPER BULB | HORIZONTAL ALIGNMENT   | VERTICAL ALIGNMENT  | DEVIATION                      | DIRECTION  |
| 7                               | 8                  | 9                      | 10                  | 11                             | 12   |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
| REMARKS (PASSED/ FAILED)        | DEFECTS (IF ANY)   | DATE OF RECTIFICATION  | DATE OF RE-CHECKING | FINAL REMARKS (PASSED/ FAILED) | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE |
| 13                              | 14                 | 15                     | 16                  | 17                             | 18   |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
| SIGNATURE OF RAILWAY SUPERVISOR |                    | SIGNATURE OF ADEN/AXEN |                     | REMARKS                        |  |
| 19                              |                    | 20                     |                     | 21                             |  |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |
|                                 |                    |                        |                     |                                |  |

#### 4.16 PERMEABILITY OF CONCRETE

| SL. NO.                                      | DATE OF CASTING               | MIX | DESCRIPTION OF WORK | DATE & TIME OF APPLICATION OF 1 BAR PRESSURE | DATE & TIME OF APPLICATION OF 3 BAR PRESSURE |  |                               |         |
|--|-------------------------------|-----|---------------------|--|--|--|-------------------------------|---------|
| 1  | 2                             | 3   | 4                   | 5  | 6  |  |                               |         |
|  |                               |     |                     |  |  |  |                               |         |
|  |                               |     |                     |  |  |  |                               |         |
|  |                               |     |                     |  |  |  |                               |         |
| DATE & TIME OF APPLICATION OF 7 BAR PRESSURE | WATER PENETRATION DEPTH IN MM |     |                     |  |  | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL | REMARKS |
|  | a                             | b   | c                   | AVG.   | MAX.   |  |                               |         |
| 7  | 8                             | 9   | 10                  | 11   | 12   | 13   | 14                            | 15      |
|  |                               |     |                     |  |  |  |                               |         |
|  |                               |     |                     |  |  |  |                               |         |
|  |                               |     |                     |  |  |  |                               |         |

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#### 4.17 STRESSING RECORD OF PSC GIRDER

|                             |  |                                   |  |
|-----------------------------|--|-----------------------------------|--|
| GIRDER NO.                  |  | THEORETICAL X-SECTIONAL AREA      |  |
| CABLE NO.                   |  | THEORETICAL MODULUS OF ELASTICITY |  |
| STRESSING SYSTEM            |  | THEORETICAL U.T.S VALUE           |  |
| COIL NO. OF STRAND          |  | ACTUAL X-SECTIONAL AREA           |  |
| ORIGIN OF COIL              |  | ACTUAL MODULUS OF ELASTICITY      |  |
| JACKING FORCE/CABLE         |  | ACTUAL U.T.S VALUE                |  |
| WOBBLE COEFFICIENT          |  | THEORETICAL ELONGATION            |  |
| COEFFICIENT OF FRICTION     |  | THEORETICAL SLIP                  |  |
| LOCKING PRESURE/CABLE       |  | MINIMUM CUBE STRENGTH             |  |
| RAM AREA OF JACK            |  | IDENTIFICATION OF JACK            |  |
| DATE OF CALIBRATION OF JACK |  | NAME OF FIRM                      |  |

| LOAD INCREMENT (KG/CM 2)                                 | ELONGATION(MM) END-A |                               | ELONGATION(MM) END-B |            | TOTAL ELONGATION (MM) |
|--|----------------------|-------------------------------|----------------------|------------|-----------------------|
|  | SCALE READ           | ELONGATION                    | SCALE READ           | ELONGATION |                       |
| 1  | 2                    | 3                             | 4                    | 5          | 6                     |
| SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE |                      | SIGNATURE OF RAILWAY OFFICIAL |                      | REMARKS    |                       |
| 7  |                      | 8                             |                      | 9          |                       |

#### 4.18 RECORD OF GROUTING OF CABLE DUCTS

- 4.18.1 GIRDER IDENTITY  
 4.18.2 DATE OF STRESSING  
 4.18.3 DATE OF GROUTING  
 4.18.4 QUANTITY OF GROUT PER CABLE  
 4.18.5 MAKE AND GRADE OF CEMENT  
 4.18.6 LOT NO. (W/M/Y)  
 4.18.7 ADMIXTURE USED  
 4.18.8 WATER CEMENT RATIO  
 4.18.9 PASSAGE OF GROUT THROUGH OUTLETS  
 4.18.10. GROUT PRESSURE  
 4.18.11 ANY EQUIPMENT FAILURE  
 4.18.12 CUBE STRENGTH ON 7<sup>TH</sup> DAY  
 4.18.13 NO. OF CUBES TAKEN

| DATE OF GROUTING   | CABLE NO. | TIME                          |    | TEMPERATURE |       | CEMENT CONSUMPTION |        |
|--|-----------|-------------------------------|----|-------------|-------|--------------------|--------|
|  |           | FROM                          | TO | WATER       | GROUT | THEORETICAL        | ACTUAL |
| 1  | 2         | 3                             | 4  | 5           | 6     | 7                  | 8      |
| SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE |           | SIGNATURE OF RAILWAY OFFICIAL |    | REMARKS     |       |                    |        |
| 9  |           | 10                            |    | 11          |       |                    |        |



4

#### 4.19 LEVEL BOOK

Level books should be machine numbered and dealt at par with MB (IREC Para 1317-A)

| DATE    | BACK SIGHT | INTERMEDIATE SIGHT | FORE SIGHT | COLLIMATION LEVEL | REDUCED LEVEL | DISTANCE | TOTAL DISTANCE |
|---------|------------|--------------------|------------|-------------------|---------------|----------|----------------|
| 1       | 2          | 3                  | 4          | 5                 | 6             | 7        | 8              |
|         |            |                    |            |                   |               |          |                |
|         |            |                    |            |                   |               |          |                |
| REMARKS |            |                    |            |                   |               |          |                |
| 9       |            |                    |            |                   |               |          |                |
|         |            |                    |            |                   |               |          |                |

#### 4.20 SOIL TEST REPORT FOR FILL MATERIALS

##### 4.20.1 IN FORMATION UPTO 22.5T AXLE LOADING

[REF: RDSO-GE-G-01 (Annexure -VI)]

- (a) Sample No:  
(b) MDD:  
(c) OMC:

| S.NO.        | DATE          | LOCATION       | SOIL TYPE          |               |                 |  | IS CLASSIFICATION OF SOIL     |
|--------------|---------------|----------------|--------------------|---------------|-----------------|--|-------------------------------|
|              |               |                | %GRAVEL            | %SAND         | %SILT           | %CLAY  |                               |
| 1            | 2             | 3              | 4                  | 5             | 6               | 7  | 8                             |
|              |               |                |                    |               |                 |  |                               |
| LIQUID LIMIT | PLASTIC LIMIT | C <sub>u</sub> | WHETHER DISPERSIVE | WHETHER CH/MH | SUITABLE OR NOT | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL |
| 9            | 10            | 11             | 12                 | 13            | 14              | 15   | 16                            |
|              |               |                |                    |               |                 |  |                               |

##### 4.20.2 IN FORMATION FOR 25T AND ABOVE AXLE LOADING i.e. HDN & FEEDER LINES

[REF:RDSO-GE-G-0014]

- (a) Sample No:  
(b) MDD:  
(c) OMC:

| S.NO.                    | DATE         | LOCATION      | SOIL TYPE      |                    |               |                 | % FINER THAN 75 MICRONS                                  | IS CLASSIFICATION OF SOIL     |
|--------------------------|--------------|---------------|----------------|--------------------|---------------|-----------------|--|-------------------------------|
|                          |              |               | %GRAVEL        | %SAND              | %SILT         | %CLAY           |  |                               |
| 1                        | 2            | 3             | 4              | 5                  | 6             | 7               | 8  | 9                             |
|                          |              |               |                |                    |               |                 |  |                               |
| SOIL TYPE [SQ1/SQ2 /SQ3] | LIQUID LIMIT | PLASTIC LIMIT | C <sub>u</sub> | WHETHER DISPERSIVE | WHETHER CH/MH | SUITABLE OR NOT | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY OFFICIAL |
| 10                       | 11           | 12            | 13             | 14                 | 15            | 16              | 17   | 18                            |
|                          |              |               |                |                    |               |                 |  |                               |

*[Signature]*



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# **TEST REPORT FOR BLANKETING MATERIAL**

## **INFORMATION UPTO 22.5T AXLE LOADING**

[REF: RDSO-GE-G-01]

(a) Sample No:

(b) Date:

(c) Location :

(d) MDD:

(e) OMC:

| S.NO.    | PARAMETER   | REQD. VALUE                         | OBTAINED VALUE |
|----------|---|-------------------------------------|----------------|
| 1        | 2   | 3                                   | 4              |
| 1        | Whether the particle size distribution curve plotted and found to be lying between the guiding enveloping curves? | YES                                 |                |
| 2        | Whether the sieve analysis and % fines determined by wet analysis?  | YES                                 |                |
| 3        | Whether skip graded?  | NO                                  |                |
| 4        | % finer than 75 microns   | 5% if plastic<br>12% if non-plastic |                |
| 5        | $C_u$   | >4 (preferably >7)                  |                |
| 6        | $C_c$   | 1 to 3                              |                |
| REMARKS: |   |                                     |                |

## **4.21.2 IN INFORMATION FOR 25T AND ABOVE AXLE LOADING i.e. HDN & FEEDER LINES [REF: RDSO-GE-G-0014]**

(a) Sample No:

(b) Date:

(c) Location :

(d) MDD:

(e) OMC:

| S.NO.    | PARAMETER                                 | REQD. VALUE            | OBTAINED VALUE |
|----------|---|------------------------|----------------|
| 1        | 2   | 3                      | 4              |
| 1        | <b>GRADATION LIMITS:</b>                  | <b>%PASSING BY WT.</b> |                |
|          | (II) IS SEIVE 40MM                        | 100                    |                |
|          | (II) IS SEIVE 20MM                        | 80-100                 |                |
|          | (II) IS SEIVE 10MM                        | 63-85                  |                |
|          | (II) IS SEIVE 4.75MM                      | 42-68                  |                |
|          | (II) IS SEIVE 2MM                         | 27-52                  |                |
|          | (II) IS SEIVE 600MICRON                   | 13-35                  |                |
|          | (II) IS SEIVE 425MICRON                   | 10-32                  |                |
|          | (II) IS SEIVE 212MICRON                   | 6-22                   |                |
|          | (II) IS SEIVE 75MICRON                    | 3-10                   |                |
| 2        | % FINES PASSING 75 MICRONS                | 3% to 10%              |                |
| 3        | $C_u = D_{80}/D_{10}$                     | >7                     |                |
| 4        | $C_c = D_{30}^2 / (D_{60} \times D_{10})$ | 1 to 3                 |                |
| 5        | LOS ANGELS ABRASION VALUE                 | <35%                   |                |
| 6        | CBR VALUE                                 | ≥25                    |                |
| REMARKS: |   |                        |                |

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## ROADS & RAILWAYS WORK COMPACTION REGISTER

(Format as per RDSO GE-G-01, Annexure-VI)

This format is applicable for both blanketing and sub-grade work for all axle loads.

| DATE                      | LAYER NO.                         | LOCATION COORDINATE FOR CHECK                            | PLACEMENT MOISTURE CONTENT (%)                             | NO. OF PASSES                           | WT. IF CORE CUTTER + WET SOIL (gm)              |
|---------------------------|-----------------------------------|--|--|---|---|
| 1                         | 2                                 | 3  | 4  | 5                                       | 6   |
| WT. OF CORE CUTTER (gm)   | WT. OF WET SOIL (gm)              | VOLUME OF CORE CUTTER (cc)                               | BULK DENSITY (g/cc)<br>(WT OF WET SOIL/VOL OF CORE CUTTER) | MOISTURE CONTENT OF COMPACTED LAYER (%) | DRY DENSITY [BULK DENSITY/(1+MOISTURE CONTENT)] |
| 7                         | 8                                 | 9  | 10   | 11                                      | 12  |
| M.D.D. AS PER TEST REPORT | DEGREE OF COMPACTION [DD/MD] IN % | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY SUPERVISOR                            | SIGNATURE OF ADEN/AXEN                  | REMARKS   |
| 13                        | 14                                | 15   | 16   | 17                                      | 18  |

### 4.23 CBR TEST REPORTS

(FOR SUBGRADE, SUB BASE & BLANKETING):

RDSO GE-0014- Para-13.0 (This test is carried out on soil sample in laboratory as per procedure given in IS: 2720 (Part 16)-1987 & in field as per IS: 2720 (Part 31) - 1969.)

| SL. NO.                                     | SUB GRADE/ SUB BASE COURSE          | DATE OF TEST   | UNIT LOAD FOR 2.5 MM PENETRATION | CBR VALUE AT 2.5 MM PENETRATION (COL.4/70) | UNIT LOAD FOR 5.0 MM PENETRATION |
|---|-------------------------------------|--|----------------------------------|--|----------------------------------|
| 1   | 2                                   | 3  | 4                                | 5  | 6                                |
| CBR VALUE AT 5.0 MM PENETRATION (COL.6/105) | CBR VALUE (HIGHER OF COL.5 & COL.7) | SIGNATURE OF CONTRACTOR OR HIS AUTHORIZED REPRESENTATIVE | SIGNATURE OF RAILWAY SUPERVISOR  | REMARKS                                    |                                  |
| 7   | 8                                   | 9  | 10                               | 11   |                                  |

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3. In supersession of all previous formats, the above formats only shall be maintained. The registers and formats which are not mentioned above will continue to be maintained like before.

4. This supersedes PCE's Circular No. 31 issued vide No. Engg/Ptg./76/CE's Circular/34 dated 19.08.2011 and circulated vide letter no. Engg/Ptg./76/CEC/44 dated 19.08.2011.

*[Signature]*  
24/03/2014  
(वेद पाल)

प्रमुख मुख्य इंजीनियर

Dated: 24-03-2014

No. SECR/HQ/Engg/Ptg./CEC/76/30

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