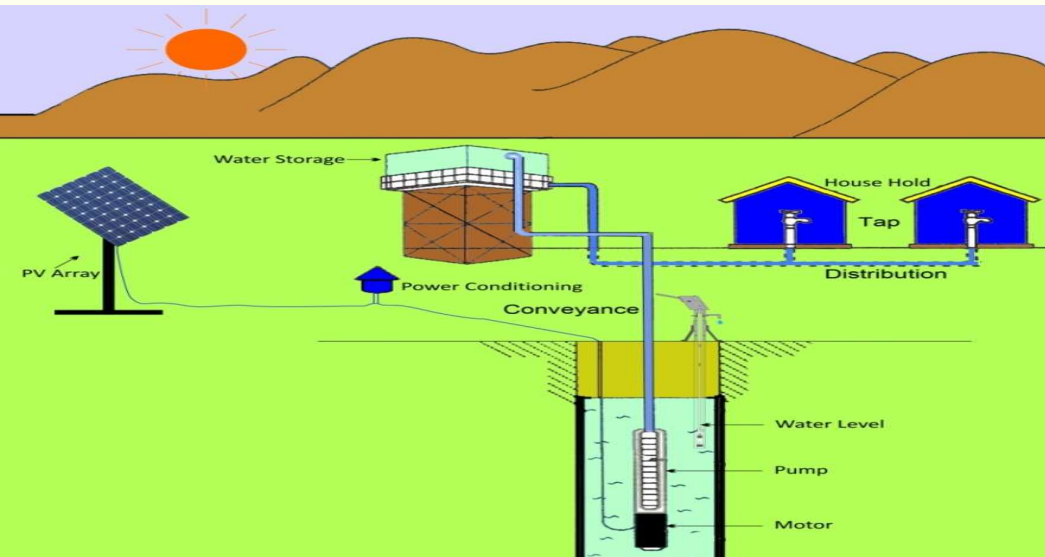




# Quality Assurance & Quality Control During Implementation of Rural Water Supply scheme Using Digital Instruments (Under Jal Jeevan Mission)



Date : 11<sup>th</sup> May 2023

Public Health Engineering Department, Govt. of Chhattisgarh



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## ISSUES WITH THE RURAL WATER SUPPLY SCHEMES

- Almost 80% cost of the water supply system owes to materials like pumping machinery, electro-mechanical equipment's in water treatment plants, pipes and fittings etc. Due to lack of knowledge regarding an appropriate quality control process / methods which results in heavy O&M expenditure as well as reduction in life of the system.

Bad workmanship & quality of construction is one of the major challenge while implementation of rural water supply schemes which leads to under / non functioning of water supply schemes.



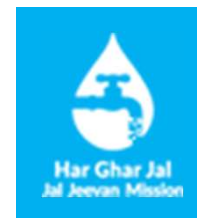
# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## NEED AND SOLUTION



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## NEED

- Water supply system main infrastructure components consist of source, intake systems, pumping machinery, piping system, storage and treatment system etc.
- Quality assurance (QA) is the totality of features and characteristics of a services that bear on its ability to satisfy a given needs. QA goal can be made possible only by ensuring the quality during planning & implementation at stages of all components in confirmation with norms, guidelines & prevailing standards.



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## NEED

- Effective quality assurance and quality control (QA/QC) measures play most important role to achieve the goal of Jal Jeevan Mission Programme.
- Quality Assurance is carried out through executing an appropriate quality activities during planning & implementation of the project that help the project team to keep checking the deliverables in the light of predefined requirements.



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## PROCESS





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments

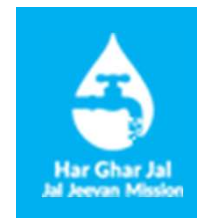


## INSIGHT OF JJM

Para 5.6 of JJM guidelines emphasize that it is important to note that although PRIs are the owners and managers of the in-village infrastructure, the preparation of design, estimates, tendering, technical handholding and ensuring the quality of drinking water sources & work execution will be the responsibility of the Department to ensure the ultimate goal of Jal Jeevan Mission to provide safe & potable at every household over the planning & design period.



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## SUSTAINABLE SOLUTION

- The concept of the Digital Transformation, especially in the Water supply systems, includes a broad range of techniques & methods that can be used to allow implementers in the sector to operate with more efficiency and with ease to ensure quality assurance using an appropriate quality control measures at the time of implementation of water supply system under the Jal Jeevan Mission programme.





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## SUSTAINABLE SOLUTION

- Important Parameters - To ensure potability of water through precise on-site measurement of important water quality parameters of drinking water sources in accordance with the provision of BIS10500 using **digital testing instruments** like **pH, TDS, Iron, Fluoride & Free Chlorine** etc to ensure **precise measurement of** water quality parameters on the field.
- To ensure onsite quality of materials like thickness of pipe/s & dia & weight as well as electrical cable sizing etc **using appropriate digital instruments** i.e. **screw gauge, Vernier caliper, spring balance** etc.



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## SUSTAINABLE SOLUTION

- Apart from this non destructive field testing of concrete structures is need to be carried out for maintaining the construction quality using **digital rebound hammer** etc.
- While installation of solar water pumping system key requirement are to ensure **precisely inclination angle (at latitude) as well as and its direction (south facing)**. Onsite fixing of inclination angle & direction digital instruments like **Degree protector and magnetic compass** can be used.



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## SUSTAINABLE SOLUTION

- To ensure the quality of mounting structure **digital zinc coating thickness measuring meter** can be used to measure the thickness of zinc coating in microns.
- For measurement electrical cable sizing **digital screw gauge & wire gauge disc** can be used to ensure quality.



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



**DIGITAL INSTRUMENTS  
REQUIRED FOR ONSITE TESTING  
- QUALITY ASSURANCE & QUALITY CONTROL**



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Hand Hawsack

Hacksaw can be used for onsite cutting the plastic pipes – PVC, HDPE, O-PVC etc. (1 meter length preferably at center of the pipe)

#### Purpose :

To check thickness, diameter (OD/ID), weight of pipe, density of pipe material





# On-site Quality Assurance & Quality Control During Implementation of Water Supply

## Using Digital Instruments



### DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

#### - QUALITY ASSURANCE & QUALITY CONTROL

##### DIGITAL SCREW GAUGE

- A screw gauge is used for measuring small diameter of circular objects mostly wires and pipe thickness etc with an accuracy of 0.001 cm
- A digital micrometer can be used for precise measurements of thickness of various pipe materials (thickness should be in accordance with the norms & BIS standards).



**Digital Screw Gauge**



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### DIGITAL VERNIER CALIPER

- The Digital Caliper (sometimes incorrectly called the Digital Vernier Caliper) is a precision instrument that can be used to measure internal and external distances extremely accurately.
- Digital Vernier caliper can be used for measuring inside and outside pipe diameters precisely (diameters should be in accordance with the norms & BIS standards).



**Digital Vernier Calliper**





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Zinc Coating Thickness Tester

- Digital Zinc coating tester is for measuring the thickness of zinc coating for GI pipes (BIS 4736-1986 – > 28 microns ) and MS structures used in solar system (as per MNRE guidelines 120 micron)



**Coating Thickness  
Tester**





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Coating Thickness Gauge - Epoxy

- Digital Thickness gauge can be used for measurement of epoxy thickness applied on the Internal / external surface on pipe, storage tanks, mounting structure of storage & solar etc.
- For DI pipes epoxy thickness should be not less than 70 microns as per norms & standards



**Coating Thickness  
Gauge**



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments

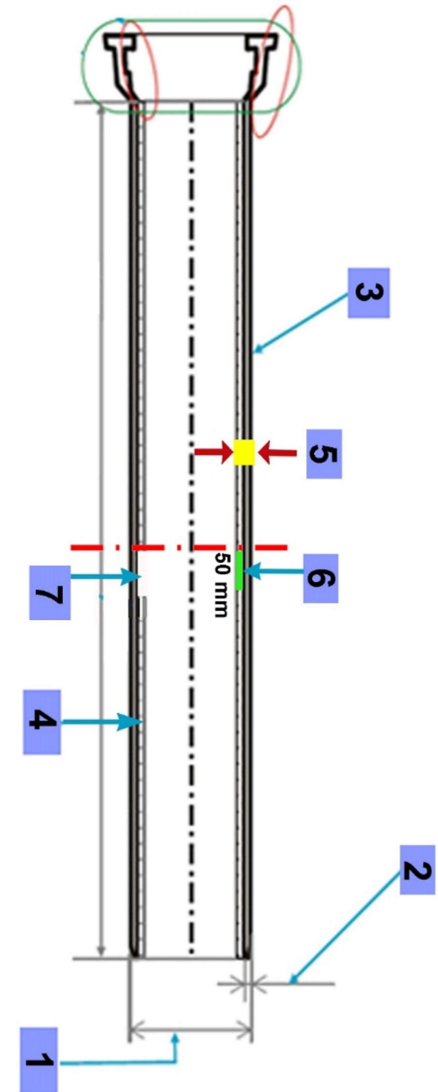


## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Thickness of Internal Lining – DI pipe

- DI pipe showing following details
  1. External Diameter of D I Pipe
  2. Wall Thickness (Class K7 & K9)
  3. External Coating (Zinc / Bitumen / Epoxy)
  4. Internal Cement Mortar Lining (CML) Thickness
- Cut the DI pipe at center point
- Measure the Total Thickness (5)
- Remove the lining upto 50 mm (6)
- Rub the internal surface and clean it
- Measure thickness of pipe wall (which includes external coating (zinc/ bitumen / Epoxy) (7)





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Thickness of Internal Lining – DI pipe

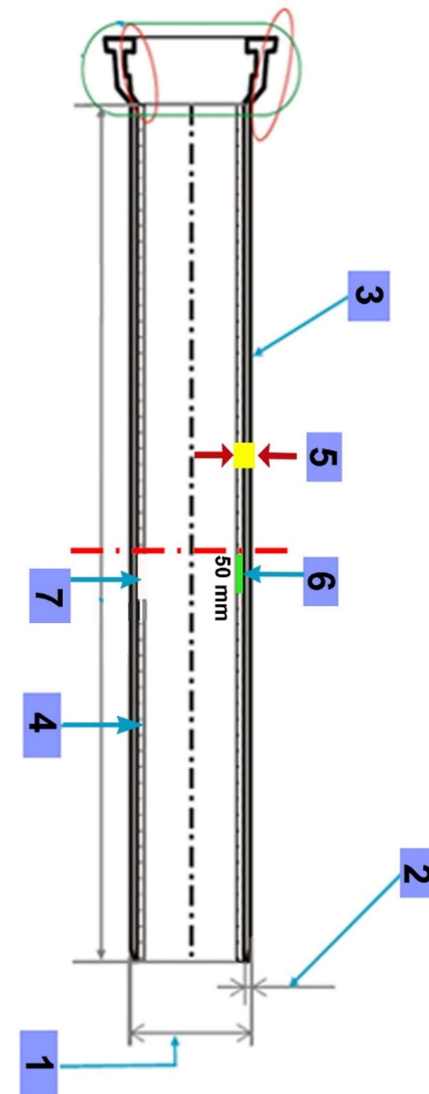
- Internal CML lining thickness (5) – (7)
- Pipe material thickness (7) - (zinc/ bitumen / Epoxy coating thickness) – 130 micron (0.13 mm) – Annexure A page 15 of BIS 8329 + 70 micron (0.07 mm)
- Example : 100 mm DI pipe K-9 – BIS 8329

External coating – Zinc & Epoxy 0.2 mm

Wall Thickness – 6 mm (Table no. 2 page 7) of BIS 8329

CML lining thickness – 3 mm Annexure – B Table :15 page

17 of BIS 8329





# On-site Quality Assurance & Quality Control During Implementation of Water Supply

## Using Digital Instruments



### DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

#### - QUALITY ASSURANCE & QUALITY CONTROL

**Digital Portable Spring Balance to measure the weight**

- Digital Portable spring balance can be used for measuring onsite weight of various pipe materials



**DIGITAL PORTABLE  
SPRING BALANCE**



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



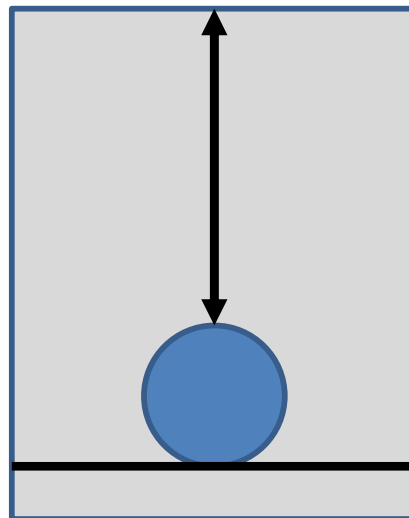
## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### FLEXIBLE STEEL MEASURING TAPE

- Can be used to measure cover depth above the laid pipes in trenches as per norms & specifications

DEPTH  
COVER



BEDDING



Measuring Tape



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Non Destructive Testing Rebound Hammer

- Rebound Hammer test is a Non-destructive testing method of concrete which provide convenient and rapid indication of compressive strength of the concrete.
- BIS 13311-1992 for testing method



Non-Destructive Testing  
Rebound Hammer



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### DIGITAL MAGNETIC COMPASS

- Handheld magnetic compass can be used for fixing / checking the orientation of solar panels installation (should be true south direction).



**Magnetic Compass**





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments

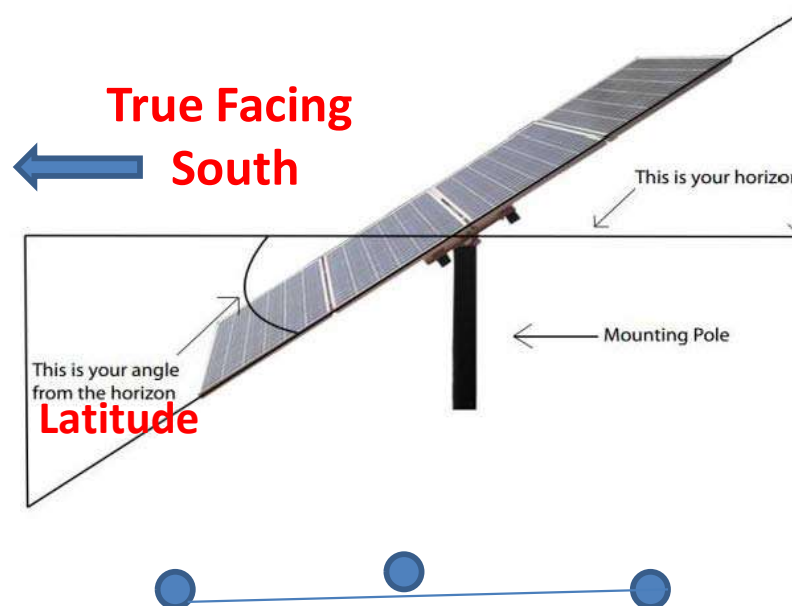


## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### DIGITAL DEGREE PROTECTOR

- Digital Angle Finder Protractor for measuring the tilt angle of solar panel installation as per site specific requirement



Digital Degree Protector





# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## DIGITAL INSTRUMENTS REQUIRED FOR ONSITE TESTING

### - QUALITY ASSURANCE & QUALITY CONTROL

#### Digital Multi meter for measuring electrical parameters

- Digital Multi meter can be used for measuring voltage, amperage of solar & pumping system



**Multi Meter**



# On-site Quality Assurance & Quality Control During Implementation of Water Supply Using Digital Instruments



## INSTRUMENTS REQUIRED FOR ONSITE TESTING

### WIRE GAUGE MEASUREMENT DISC

- Wire Gauge Measurement Disc is used for diameter / gauge of the electrical wires used for solar / pumping system



**Wire Gauge  
Measurement  
Disc**



Thank  
you!