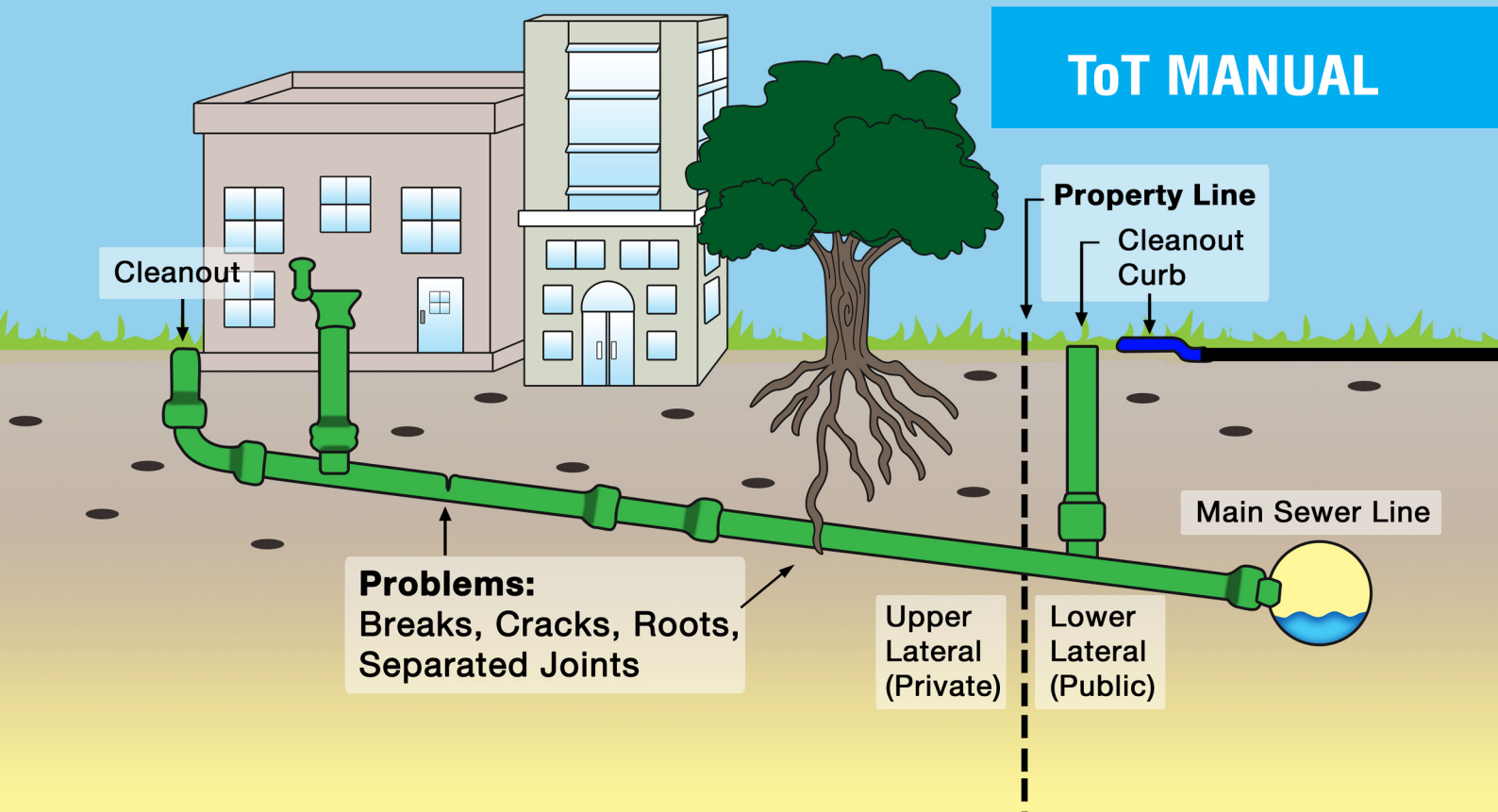


REFRESHER COURSE FOR PLUMBERS ON HOUSEHOLD CONNECTIVITY



Conceptualised by

GIZ programme “Support to National Urban Sanitation Policy”

Developed by

Asia Society for Social Improvement & Sustainable Transformation (ASSIST)

No- 9, Desika Road, Mylapore,

Chennai, India – 600004

Tel No: (+91) 44- 4554 8438

Website: www.assistasia.org

Contact

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

2nd Floor, B-5/2; Safdarjung Enclave

New Delhi-110029-INDIA

Tel: +91 (0)11 4949 5353 Fax: +91 (0)11 4949 5391

GIZ Programme – Support to National Urban Sanitation Policy

Dr. Regina Dube, Programme Director

Dirk Walther, Senior Advisor

Jitendra Yadav, Technical Expert

Rahul Sharma, Technical Expert

Terms of Use

GIZ poses no restriction to reproduction/translation of materials. We just kindly ask that GIZ programme – SNUSP is made reference of, and that the representatives are informed. In case you wish to change or further develop the materials, please also contact the working group.

The graphs and many pictures has been sourced from various sources which have been mentioned and acknowledged in the book.

November 2013

The mission of this programme is to educate plumbers on Connections Between Household and Public Sewerage Systems. This Training of Trainers manual is meant for trainers, in order to equip them with the skills to become expert trainers in this field. This manual is meant to be used in conjunction with the Plumber's Training Manual and the Recommended Presentations (PPTs) to execute a successful training programme.

FOREWORD

India is urbanizing and very soon every second Indian will live in cities. There is an urgent need to build livable cities, providing adequate opportunities and services for all, as clearly stated in the National Urban Sanitation Policy issued by Ministry of Urban Development, Government of India in 2008. The enormous urban growth and transformation requires skills on all levels. Besides of urban planners, managers and engineers there is also a need to strengthen the practical implementation on the ground.



This specifically applies to plumbing, as the rapid transition has put forth serious pressure on civic infrastructure systems for sanitation. Provision of water supply services, household level connectivity to septic tanks and to sewerage systems, improper disposal of wastewater are becoming critical to maintaining health and environment in Indian cities. It is crucial that plumbers understand the concept and design of a city's water supply and sewerage system which will enable them to guide and install proper household connections in the city.

This publication is a training manual for trainers who will train the plumbers. The manual covers the plumbing aspects for connecting households to the septic tanks or sewerage systems. I hope this manual helps to improve the capacities of the plumbers, whose impacts on overall sanitation in the city is most important.

I would like to thank our partners and my SNUSP team for the efforts undertaken in addressing this important issue.

Dr. Regina Dube
Programme Director – SNUSP
GIZ - India

TABLE OF CONTENTS

INTRODUCTION	6
WHAT DOES THE MANUAL COVER?	7
PART 1: BACKGROUND INFORMATION	8
1.1 Who is this Manual For?	8
1.2 Objectives of the Training Programme	8
1.3 Expected Outcomes of the Training	9
1.4 Training Approach Adopted: Participatory Training	9
Value Enhancement of Participatory Training over Conventional Training	9
Suitability for Adult Learners	9
PART 2: PRE-TRAINING PREPARATION	10
2.1 Pre-Training Preparation	10
Selecting Participants	10
Preparing for Individual Chapters	10
Preparing for Field Visits	11
Preparation for Assessing Training Impact	11
Annexure 1: Registration of Trainees / Participants, Information Forms	12
Annexure 2: Format for Self-Assessment Tests	13
Annexure 3: Feedback Form	18
2.2 Agenda of the Programme With Timelines	19
Day 1	19
Day 2	19
Day 3	19
2.3 Training Methodologies	20
PART 3: CONDUCTING THE TRAINING PROGRAMME	22
3.1 Introduction, Ice Breakers & Pre-Training Self-Assessment Test	22
Objective	22
Duration	22
Agenda	22
Section 1: Introduction	22
Section 2: Ice Breakers	23
Section 3: Self-Assessment	23
Outcomes	23
3.2 CHAPTER 1: BASIC CONCEPTS OF PLUMBING	24
Chapter Objective	24
Chapter Training Duration	24
Chapter Training Agenda	24
Case Studies	24
Section 1: Importance of Plumbing	25
Section 2: Introduction to Sewerage System	26
Section 3: Cross Connections	26
Section 4: Water Saving / Conservation Techniques in Plumbing	27
Section 5: Green Plumbing Practices	28
End of Chapter: Revision Test	28
Learning Outcomes	28
Further Reading Material	29
3.3 CHAPTER 2: OVERVIEW TO PUBLIC SANITATION SYSTEMS AND PROCESSES	30
Chapter Objective	30
Chapter Training Duration	30
Chapter Training Agenda	30
Case Studies	30
Section 1: Building Sewerage and its Components	31
Section 2: Connecting Building Drain to Public Sewer	32

TABLE OF CONTENTS

Section 3: Simplified Sewer and Small Bore Systems	33
End of Chapter: Revision Test	34
Learning Outcomes	35
Further Reading Material	35
3.4 CHAPTER 3: SEWERAGE CONNECTIONS - WHEN NEW PUBLIC SEWERAGE NETWORK IS COMMISSIONED	36
Chapter Objective	36
Chapter Training Duration	36
Chapter Training Agenda	36
Section 1: New PSS Network	36
Section 2: Alteration of building drain to PSS (bypassing the septic tank) and alteration via septic tank to PSS	37
End of Chapter: Revision Test	37
Learning Outcomes	38
Further Reading Material	38
3.5 CHAPTER 4: CONNECTING BUILDING DRAINAGE TO SEPTIC TANK AND OTHER DECENTRALIZED SYSTEMS	39
Chapter Objective	39
Chapter Training Duration	39
Chapter Training Agenda	39
Case Studies	39
Section 1: Septic Tanks - Basic Definitions and Workings	40
Section 2: Connecting Building Drain to a Septic Tank	41
Section 3: Construction / Connections in Septic Tanks - Plumbers Point of View	42
Section 4: Effluent Disposal	43
End of Chapter: Revision Test	44
Learning Outcomes	44
Further Reading Material	44
3.6 CHAPTER 5: SEWERAGE CONNECTIONS - HIGH ALTITUDE AND HIGH WATER TABLE TERRAIN	45
Chapter Objective	45
Chapter Training Duration	45
Chapter Training Agenda	45
Case Studies	45
Section 1: Terrain Conditions	46
Section 2: High Altitude / Sub Zero Regions	47
Section 3: High Water Table Area	47
End of Chapter: Revision Test	48
Learning Outcomes	48
Further Reading Material	48
3.7 CHAPTER 6: MANUAL SCAVENGING AND OCCUPATIONAL HEALTH AND SAFETY	49
Chapter Objective	49
Chapter Training Duration	49
Chapter Training Agenda	49
Section 1, 2 & 3: Manual Scavenging, The Bill & Salient Features of the Bill	49
Section 4: Occupational Health & Safety During Plumbing	50
End of Chapter: Revision Test	50
Learning Outcomes	50
Further Reading Material	50
3.8 Guidelines for Field Visits	51
Purpose / Objective	51
Guidelines for the Field Visit	51
Exercise	51
Site No. 1	51
Points to check for getting familiarized for Plain Terrain	51

TABLE OF CONTENTS

Site No. 2	52
Points to check for getting familiarized for Plain Terrain	52
Points to check for getting familiarized for Hilly / Sub Zero Terrain	53
Points to check for getting familiarized for High Water Table Terrain	53
3.9 GUIDELINES FOR PRACTICAL SESSIONS	55
Purpose / Objective	55
Time Allotted	55
Recommended Group Size	55
Tools and Materials Required for each set of Trainees	55
Instructions to be shared with Trainees / Participants	55
Pictorial Model of Septic Tank that is to be created	56
Activity 1: Outer Shell of the Septic Tank	56
Activity 2: Outlet Dip Pipe	57
Activity 3: Inlet Dip Pipe	57
Activity 4: Vent Pipe & Access Entry	58
Discussion	58
3.10 FINAL CLOSING SESSION	58
Objective	58
Duration	58
Agenda	58
Section 1: Q & A	59
Section 2: Post Training Self Assessment Test & Discussion	59
Section 3: Feedback Forms	59
Section 4: Closing Ceremony	59
Outcomes	60

Introduction

NUSP reiterates the process of sanitation-related utility management and encourages Urban Local Bodies (ULBs) to regain ownership of the same. However, lack of human resources and capacities to handle problems hamper this process. Therefore, the role of capacity development is crucial in achieving and sustaining 100% sanitation. This can be addressed through training, recruitment of manpower, organisational restructuring and establishment of Standard Operating Procedures.

During the preparation of City Sanitation Plans (CSPs) it was observed that issues relating to household level connectivity to septic tanks and to sewage systems, improper disposal of wastewater, etc. are affecting overall city sanitation. One of the main reasons for the above mentioned issues is weak capacities of human resources engaged in these activities. It has been realized that the aspect of household level connectivity to sewerage systems or septic tanks is neglected by residents and workforce involved in these activities due to lack of knowledge/capacities. The ground reality, therefore, calls for strengthening of the capacities of stakeholders engaged in plumbing at municipal level. It is crucial that plumbers understand the concept and design of a city's water supply and sewerage system which will enable them to install proper household connections and understand its impacts on overall sanitation in city.

To address the issue of weak capacities in this sector and to bridge the institutional gap GIZ has developed a training module for municipal plumbers focusing on household level connectivity.

Objective

The overall goal is improvement of citywide sanitation, health and environment through introduction of good practices for household level wastewater discharge. The objective of the training module is to help plumbers improve their skills on household level connectivity. The module will also be integrated into existing plumbing training courses.

Approach

The focus was to develop a training module on specific plumbing aspects for connecting households to the septic tanks or sewerage systems. A desk review of existing training manuals and technical specifications was done that includes Indian Standard Codes (IS code), Uniform Plumbing Code India 2011, CPHEEO manual, existing plumbing courses etc. The desk review was followed by an appraisal study in four GIZ supported cities to understand on the ground problems in connectivity issues and incorporate the lessons learned into the training module. Partner training institutes such as Maharashtra Environmental Engineering Research and Training Academy (MEETRA) in Nashik, Maharashtra, Industrial Training Institute, Shimla, Himachal Pradesh, Training division of Kerala Water Authority, Thiruvananthapuram, Kerala, PHED training Division, Raipur, Chhattisgarh were identified for technical support and for review of the content of newly developed plumber training module on time to time.

Test run trainings were organized for municipal plumbers in Shimla, Nashik, Kochi and Raipur for ground testing of the manual and for getting feedback from plumbers working on field. The target group for the test trainings were plumbers registered with Municipal Corporations. Training of trainers programmes were also conducted to train the instructors from various institutes in Himachal Pradesh and Maharashtra.

The training module developed by GIZ-SNUSP is expected to help in reducing the capacity gaps and to be part of on-going plumbing courses or refresher trainings for already certified plumbers.

WHAT DOES THE MANUAL COVER?

Part	Details	Objective	Content
PART 1	Background Information	To provide background information on the need for the ToT Programme and define its objectives.	<ol style="list-style-type: none"> 1. Background of the programme 2. Objective and Expected Outcomes of the ToT programme
PART 2	Pre-Training Preparation	To guide the trainer in completing all the basic preparation before commencement of the Plumber's Training Programme.	<ol style="list-style-type: none"> 1. Selecting and registering participants for the training 2. Preparing for individual chapters 3. Preparing for field visits 4. Preparation for Self-assessment Tests and Feedback Forms 5. Measuring the impact of the training
PART 3	Conducting the Training Programme	To provide a guide and specific instructions on utilizing the best teaching practices to teach each chapter of the Plumber's Training Manual.	<ol style="list-style-type: none"> 1. Chapter Objective, Duration and Learning Outcome 2. Teaching Methodology and Training Process 3. Case Studies / Revision Tests 4. Further Reading Material

HOW TO USE THIS MANUAL?

1. Peruse and understand Training Guidance and Information to establish the purpose of the programme.
2. Complete the Pre-Training Preparation to understand your role as a trainer and how to prepare yourself for conducting the training sessions.
3. Use Conducting the Training Programme along with Plumber's Training Manual to equip yourself with a clear and detailed understanding of the subject matter and the best ways to teach the same.
4. Use the Further Reading Material to augment your knowledge of the subject matter.
5. Ensure that all the forms, tests, materials and other preparations required for the training sessions are complete.

PART 1

BACKGROUND INFORMATION

1.1 WHO IS THIS MANUAL FOR?

This manual targets trainers from organisations that offer training to plumbers and /or employs them. The technical scope of this training programme is limited to “Connections between Household and Public Sewerage Systems”.

Some of the organisations for whom this could be useful include:

- Technical Vocational Education Training Institutions (TVETs)
- Government Water and Sewerage Treatment Agencies (Corporations, Municipalities & Panchayats)
- Private Skill Building Organisations
- Construction and Infrastructure Companies

1.2 OBJECTIVES OF THE TRAINING PROGRAMME

The **Overall Objective** of the training module is to build the capacity of the master trainer(s) to transfer knowledge and best practices with respect to “Connections between Household and Septic Tanks / Sewerage Systems” to plumbers.

Specific Objectives:

1. To ensure that the trainers / instructors have a clear understanding of the necessity for change in current plumbing practices in the country.
2. To ensure that the trainers / instructors have a clear understanding of the principles and best practices of “Con-

nections between Household and Septic Tanks /Sewerage Systems” in India.

3. To equip the trainer with the most effective training approaches and teaching methodologies to ensure efficient transfer of knowledge to plumbers.

1.3 EXPECTED OUTCOMES OF THE TRAINING

1. The participants of the ToT programme understand the current status of “Connections between Household and Septic Tanks / Sewerage Systems” in the country and the necessity and nature of change required.
2. The participants are equipped with the capacity, skills and knowledge to conduct successful training programmes, effectively changing the plumbing practices in the target cities.
3. A group of trainers / instructors is created to conduct the Training Programmes to equip plumbers on “Connections between Household and Septic Tanks / Sewerage Systems” in their respective cities / regions and provide recommendations for future action.

1.4 TRAINING APPROACH ADOPTED: Participatory Training

A training model, especially one that focuses on adult learning has to be an inclusive training model that draws on the existing knowledge and experience of participants / trainees. Owing to this, this training programme has been designed to adopt a participatory training approach. Here, the role of the trainer is less dictatorial and more facilitating. Such a model promotes a learning process for the trainees as well as the trainer that is based on a mutual sharing of knowledge, experiences and ideas.

Value Enhancement of Participatory Training over Conventional Training:

In conventional training models, the roles of learners and teachers are distinct and defined. The trainer is viewed as an authority figure and has complete control over the content of the training session as well as the process of learning / teaching. The learner takes on a passive role, with minimum participation in the learning process. Sharing of information and ideas by the learners is not encouraged. This can make the process stifling, with minimum scope for effective communication and a thinking-based model.

Participatory training models address and eliminate these shortcomings by blurring the boundaries between roles of learners and teachers. The trainer’s role is that of a facilitator. The content of the training is learner-centered and based on the needs of the participants. The trainer is inclusive and seeks the participation of the learners in sharing their knowledge and experiences. This makes the learners an active part of the training process, encouraging thought and idea generation. This also opens effective communication channels between the learners and trainers.

Suitability for Adult Learners:

Participatory training is especially suited for adult learning since adults voluntarily participate in training sessions out of personal interest. In these cases, discussion-based and practical learning works better than theoretical learning. The learning process is enhanced when adults are able to relate to the subject matter through a connection to their own experiences. This promotes active involvement and sharing of ideas.

It is very important that the trainer / facilitator is comfortable and confident with the subject matter and is able to bring out connections with the experiences of each group of participants. To do this successfully, the facilitator needs to perceive and understand individual members of the group of participants, and the group dynamic as a whole. Also, a positive attitude with honesty, respect, openness, sensitivity and fairness is paramount. Constant learning and hard work is the key to being a successful facilitator in the long-term.

PART 2

PRE-TRAINING PREPARATION

2.1 PRE-TRAINING PREPARATION

Selecting Participants:

In order to successfully execute a training programme, it is important that the participants of the programme are actively involved in the training process. Some key points to consider while inviting and accepting registrations include:

- The participant's level of understanding of, and interest in the training programme.
- The ability and willingness of the participant to attend all training sessions and field visits.
- The participant's current understanding of plumbing concepts and practical experience in plumbing.
- The participant's willingness to adapt to changes in plumbing technology and practices and employ the training's lessons in future projects.
- Reasonable training group size of 25 to 30 participants to ensure participation, effective transfer of knowledge and direct interaction between trainer and each participant.

Preparing for Individual Chapters:

Each chapter is divided into sections. Instructions on how to conduct the training for each chapter is given in Part 3 of the manual, under the following headings:

- Chapter Objective
- Chapter Training Duration
- Chapter Training Agenda

- Name of Methodology Used
- Material Used
- Training Process
- Case Studies: Aim of the Case
- Case Studies: Time Allotted
- Case Studies: Key points to be covered
- Why this method?: Justification of training method used
- Learning Outcomes
- Further Reading Material

These instructions provide guidance to the trainer. Based on the preferences, interests and enthusiasm of the group of participants, the trainer is encouraged to adapt the teaching methods to suit the learners.

Preparing for Field Visits:

- It is important for the trainer to select appropriate sites for field visits well in advance of the training programme.
- Verify whether the sites are suitable for explaining the concepts set out to be explained.
- Short-list at least 3 options for Site No. 1 and 3 options for Site No. 2 (As given in "Guidelines for Field Visits").
- Ensure availability and obtain permission to visit each of these sites.
- After this, if there is more than 1 option available for both or either of the site visits, select the most suitable option and maintain a back-up option.
- Arrange for necessary transportation and refreshments for the site visits.
- If a Guide is necessary, ask the site owners / managers to recommend a suitable Guide.
- Arrange for all stationery and other materials required for the site visits.

Preparation for Assessing Training Impact

The trainer should organize the following before commencement of the training session:

- Self-Assessment Tests
- Registration and Information Forms
- Feedback forms

Process of Assessing Training Impact:

- The trainer must collect all self assessment tests completed by the participants at the beginning as well as end of the programme.
- A quantitative and qualitative comparison of each participant's performances in both the training tests must be done.
- Any correlations between a participant's performance and his background must be brought out.
- The information of the group as a whole should be studied by the trainer to understand areas of maximum impact and relevance of, and knowledge gained from each chapter.
- The information should be presented in a comprehensive report that will be used to design future training sessions.

Annexure 1: Registration of trainees / participants, Information forms:

This is the prescribed form to collect information about the participants.

REGISTRATION AND INFORMATION FORM REFRESHER COURSE FOR PLUMBERS ON HOUSEHOLD CONNECTIVITY	
Name:	
Date of Birth:	
Gender:	
Address:	
Contact Number:	
Do you have prior experience in plumbing? Yes / No	
If yes, how long have you been in the plumbing industry?	
Please give a brief description of your experience, if any.	
Have you attended other training programmes in this field? Yes / No	
If yes, please give the following details	
Name of the training:	
Organizers of the training:	
Year of training:	
Duration of training:	
Scope / Subject Matter of training:	

Annexure 2: Format for Self-Assessment Tests

To be conducted at the beginning AND at the end of the Training Programme

Mark all the correct answers with a ✓. There may be multiple correct answers for a single question.

<p>1. Mention few problems to be faced in the absence of quality plumbing in any building.</p> <p><input type="checkbox"/> a. Lack of sanitation <input type="checkbox"/> b. Cross connection <input type="checkbox"/> c. Noise pollution <input type="checkbox"/> d. Over loading PSS <input type="checkbox"/> e. Health problems</p>	<p>2. What is Sewerage System?</p> <p><input type="checkbox"/> a. Household waste <input type="checkbox"/> b. Septic tank <input type="checkbox"/> c. Municipal sewage <input type="checkbox"/> d. Waste water generated in any house <input type="checkbox"/> e. Closed system of pipes which collect waste water (Black or Grey) from the waste receptacle of any establishment to the final disposal point.</p>
<p>3. What is Black water</p> <p><input type="checkbox"/> a. Water which is black in color <input type="checkbox"/> b. Discharges from urinals <input type="checkbox"/> c. Discharges from water closets <input type="checkbox"/> d. Discharges from water closets and urinals containing human excreta <input type="checkbox"/> e. Discharges from kitchen</p>	<p>4. Which code regulate/govern Cross connections?</p> <p><input type="checkbox"/> a. Codes from Bureau of Indian Standards <input type="checkbox"/> b. Codes from British Standards <input type="checkbox"/> c. Indian Plumbing code <input type="checkbox"/> d. Codes from CPHEEO</p>
<p>5. For what purposes is the recycled water generally used?</p> <p><input type="checkbox"/> a. Drinking & Cooking <input type="checkbox"/> b. Gardening <input type="checkbox"/> c. Toilet flushing <input type="checkbox"/> d. Cooling towers <input type="checkbox"/> e. Car washing</p>	<p>6. What is the TDS limit in the potable water?</p> <p><input type="checkbox"/> a. 300 PPM <input type="checkbox"/> b. 500 PPM <input type="checkbox"/> c. 750 PPM <input type="checkbox"/> d. 1000 PPM</p>
<p>7. What is certification programme developed by Green Building Council?</p> <p><input type="checkbox"/> a. Green Code <input type="checkbox"/> b. LEED <input type="checkbox"/> c. GRIHA <input type="checkbox"/> d. Green Rating</p>	<p>8. In a two pipe system:</p> <p><input type="checkbox"/> a. There is a soil pipe, a waste water pipe and one ventilating pipe <input type="checkbox"/> b. There is a soil pipe, a waste water pipe and two ventilating pipe <input type="checkbox"/> c. There is a soil pipe, a waste water pipe <input type="checkbox"/> d. There is one soil cum waste pipe and one ventilating pipe</p>

9. In any piping system, what is invert?	10. In a partially separate sewer system,
<input type="checkbox"/> a. The lowest point of the lowest inside surface of a channel, conduit, pipe. <input type="checkbox"/> b. The lowest point of the lowest outside surface of a channel, conduit, pipe. <input type="checkbox"/> c. The highest point of the highest inside surface of a channel, conduit, pipe. <input type="checkbox"/> d. The highest point of the highest outside surface of a channel, conduit, pipe	<input type="checkbox"/> a. Sewage and storm water /surface water run-off are drained through the same pipe in a single pipe. <input type="checkbox"/> b. Sewage and storm water /surface water run-off are drained through two different pipes. <input type="checkbox"/> c. Part of storm water is mixed with sewage and drained through one pipe and the rest of the storm water is collected using another pipe <input type="checkbox"/> d. Sewage is collected in a single pipe.
11. The size of manhole cover should be at least:	12. An anti Flood Valve is:
<input type="checkbox"/> a. 300 mm <input type="checkbox"/> b. 400 mm <input type="checkbox"/> c. 500 mm <input type="checkbox"/> d. 600 mm	<input type="checkbox"/> a. A Sluice Valve <input type="checkbox"/> b. An Air Valve <input type="checkbox"/> c. A Non Return Valve <input type="checkbox"/> d. A Butterfly Valve
13. Vacuum sewers:	14. Simplified sewers can be adopted where
<input type="checkbox"/> a. Require a septic tank at each waste water source <input type="checkbox"/> b. Require an interceptor tank <input type="checkbox"/> c. Require a septic tank and an interceptor tank <input type="checkbox"/> d. Do not require a septic tank or an interceptor tank at each waste water source	<input type="checkbox"/> a. Traffic load is high <input type="checkbox"/> b. No Traffic <input type="checkbox"/> c. Low traffic load <input type="checkbox"/> d. High density settlements with low traffic load
15. In a two pipe system waste water pipe from any building should be connected to the building drain through:	16. Material of the building sewer connection to the Municipal Manhole is:
<input type="checkbox"/> a. Floor trap <input type="checkbox"/> b. Gulley trap <input type="checkbox"/> c. Bottle trap <input type="checkbox"/> d. Nahani trap	<input type="checkbox"/> a. Conventional Salt Glazed pipe <input type="checkbox"/> b. uPVC rigid straight pipe of 6 kg pressure rating as per IS: 15328 with solvent cement joints <input type="checkbox"/> c. uPVC rigid straight pipe of 6 kg pressure rating as per IS: 4985 with solvent cement joints <input type="checkbox"/> d. SWR pipe Type A or B as per IS: 13592 with rubber ring joints

17. List out few advantages of PSS.	18. When there is a PSS in a Municipal Town:
<input type="checkbox"/> a. The property is free from pollution <input type="checkbox"/> b. The owner need not bother about disposal of sludge and effluent <input type="checkbox"/> c. Aesthetic look in the absence of septic tank and its vent pipe <input type="checkbox"/> d. A sizable land area is saved. <input type="checkbox"/> e. In the absence of effluent disposal, free from health problems	<input type="checkbox"/> a. The defaulters to avail the facility can be punished as per the Municipal byelaws <input type="checkbox"/> b. The defaulters to avail the facility cannot be punished as per the Municipal byelaws <input type="checkbox"/> c. It is not obligatory on the part of the owner to discharge the waste water to PSS <input type="checkbox"/> d. It is obligatory on the part of the owner to discharge the waste water to PSS
19. List out the options available to a building owner when a new PSS is commissioned in the town.	20. Septic tanks are recommended only for small communities and institutions whose contributory population does not exceed:
<input type="checkbox"/> a. De link the building drain leading to the septic tank and connect to the PSS <input type="checkbox"/> b. Retain the septic tank as an interceptor tank and the effluent disposed to the PSS or to the SBS as the case may be.	<input type="checkbox"/> a. 200 <input type="checkbox"/> b. 300 <input type="checkbox"/> c. 400 <input type="checkbox"/> d. 500
21. The inlet of a septic tank is T shaped dip pipe:	22. Minimum free board required in a septic tank is
<input type="checkbox"/> a. To create turbulence in the tank <input type="checkbox"/> b. To avoid turbulence in the tank <input type="checkbox"/> c. To control the flow <input type="checkbox"/> d. To accelerate the flow	<input type="checkbox"/> a. 300mm <input type="checkbox"/> b. 400mm <input type="checkbox"/> c. 500mm <input type="checkbox"/> d. 600mm
23. Duplicate septic tank is required for populations more than:	24. For rectangular septic tanks, the length shall be:
<input type="checkbox"/> a. 50 User <input type="checkbox"/> b. 100 User <input type="checkbox"/> c. 150 User <input type="checkbox"/> d. 200 User	<input type="checkbox"/> a. 1-2 times the width <input type="checkbox"/> b. 1-3 times the width <input type="checkbox"/> c. 2-4 times the width <input type="checkbox"/> d. 2-5 times the width

<p>25. The construction of septic tank is governed by:</p> <p><input type="checkbox"/> a. IS: 2470 Part I <input type="checkbox"/> b. IS: 2470 Part II <input type="checkbox"/> c. IS:5329 <input type="checkbox"/> d. IS:1742</p>	<p>26. Why is a percolation test conducted?</p> <p><input type="checkbox"/> a. To ascertain the suitability of the site for the construction of septic tank <input type="checkbox"/> b. To ascertain the depth of a septic tank <input type="checkbox"/> c. To decide on the details of soil absorption system <input type="checkbox"/> d. To decide the slope of the incoming drain.</p>
<p>27. Maximum length of a dispersion trench is:</p> <p><input type="checkbox"/> a. 20 m <input type="checkbox"/> b. 30 m <input type="checkbox"/> c. 35 m <input type="checkbox"/> d. 40 m</p>	<p>28. What is an improved septic tank?</p> <p><input type="checkbox"/> a. Up flow anaerobic filter <input type="checkbox"/> b. Biological filter <input type="checkbox"/> c. Anaerobic Baffled Reactor <input type="checkbox"/> d. Constructed wet land</p>
<p>29. What is a Frost line?</p> <p><input type="checkbox"/> a. The line joining points of greatest depths below ground level from which hard rock commences <input type="checkbox"/> b. The line joining points of greatest depths below ground level from which clay formation commences. <input type="checkbox"/> c. The line joining points of greatest depths below ground level up to which the moisture in the soil freezes <input type="checkbox"/> d. The line joining points of greatest depths below ground level where static water level commences.</p>	<p>30. In high altitude area for every 10°C fall in temperature, the biological activities of microbes reduce by:</p> <p><input type="checkbox"/> a. 20% <input type="checkbox"/> b. 30% <input type="checkbox"/> c. 50% <input type="checkbox"/> d. 55%</p>
<p>31. In high altitude area all sewers should be laid below the frost line at least:</p> <p><input type="checkbox"/> a. 2 m below the ground level <input type="checkbox"/> b. 1.5 m below the ground level <input type="checkbox"/> c. 1.2 m below the ground level <input type="checkbox"/> d. 1 m below the ground level</p>	<p>32. Water supply and drainage in high altitudes/sub zero temperature regions are governed by:</p> <p><input type="checkbox"/> a. IS:1742 <input type="checkbox"/> b. IS:1172 <input type="checkbox"/> c. IS:6295 <input type="checkbox"/> d. IS:2065</p>

<p>33. Manual scavenging refers to:</p> <p><input type="checkbox"/> a. Removal of human excreta by modern means <input type="checkbox"/> b. Removal of human excreta by machines <input type="checkbox"/> c. Removal of human excreta by human being using brooms and tin plates from dry latrine. <input type="checkbox"/> d. Removal of human excreta by washing</p>	<p>34. The prohibition of employment as Manual scavengers and their Rehabilitation Bill 2012 was passed by the Parliament on:</p> <p><input type="checkbox"/> a. 06.08.2013 <input type="checkbox"/> b. 07.08.2013 <input type="checkbox"/> c. 07.09.2013 <input type="checkbox"/> d. 08.09.2013</p>
<p>35. While entering a manhole or sewer line for repair, which are all the Manholes that should be kept open for ventilation?</p> <p><input type="checkbox"/> a. The first Manhole on the stretch <input type="checkbox"/> b. The last Manhole on the stretch <input type="checkbox"/> c. The working Manhole <input type="checkbox"/> d. The working Manhole, next Manhole on the up-stream and the next Manhole on the down-stream</p>	

Answer Key:

1. a, b, c, d, e	8. b	15. b	22. a	29. c
2. e	9. a	16. a, b	23. b	30. c
3. d	10. c	17. a, b, c, d, e	24. c	31. c
4. c	11. c	18. a, d	25. a	32. c
5. b, c, d, e	12. c	19. a, b	26. c	33. c
6. b	13. d	20. b	27. b	34. c
7. b	14. d	21. b	28. c	35. d

Annexure 3: Feedback forms

Use this form to collect feedback on the Training Programme from the participants.

TRAINING FEEDBACK FORM						
Trainee Name		Training	Refresher Course for Plumbers on Household Connectivity			
Venue		Date				
Training Evaluation -						
Mark (X) to answer the following on a scale of 1 – 5, where 1 is poor and 5 is excellent.						
		1	2	3	4	5
1	Will you be able to apply what you have learned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Were the objectives related to your actual work situation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Did you absorb the skills and information that were taught in the course?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Did the training program / course achieve its objectives?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	What other suggestion can you give in order to improve the course content?	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>				
Training Methodology						
		1	2	3	4	5
1	Was the methodology adopted by trainer appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Were the learning methods used appropriate to the requirements of all?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	How do you rate the training venue and physical accommodations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	How would you rate the usefulness of the field trips?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	How would you rate the appropriateness of case studies used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	What other suggestion can you give in order to improve the different training methodologies?	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>				
Training Material						
		1	2	3	4	5
1	How would you rate the completeness of the reference manual provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	How will you rate the presentation used in the training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	What other suggestion can you give in order to improve the training material?	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>				

2.2 AGENDA OF THE PROGRAMME WITH TIMELINES

DAY 1

Session	Time Slot	Duration	Details
1	09:30 - 10:10	40mins	Introduction, Ice Breakers & Pre-Training Self-Assessment Test
	10:10 - 10:50	40 mins	Chapter 1: Basic Concepts of Plumbing
-	10:50 - 11:05	15 mins	BREAK
2	11:05 - 12:30	85mins	Chapter 1: Basic Concepts of Plumbing
-	12:30 - 13:30	60 mins	LUNCH BREAK
3	13:30 - 15:00	90 mins	Chapter 2: Overview to Public Sanitation Systems and Processes
-	15:00 - 15:15	15 mins	BREAK
4	15:15 - 16:45	90 mins	Chapter 2: Overview to Public Sanitation Systems and Processes

DAY 2

Session	Time Slot	Duration	Details
5	09:30 - 10:50	80 mins	Chapter 3: Sewerage Connections - When New PSS is Commissioned
-	10:50 - 11:05	15 mins	BREAK
6	11:05 - 12:35	90mins	Chapter 4: Connecting Building Drainage to Septic Tank and Other Decentralized Systems
-	12:35 - 13:35	60 mins	LUNCH BREAK
7	13:35 - 15:05	90 mins	Chapter 4: Connecting Building Drainage to Septic Tank and Other Decentralized Systems
-	15:05 - 15:20	15 mins	BREAK
8	15:20 - 16:05*	45 mins*	Chapter 5: Sewerage Connections High altitude and High water table Terrain*
	16:05 - 16:45 [#]	40 mins	Chapter 6: Manual Scavenging & Occupational Health and Safety

*Time allocated for training of plumbers in hilly terrain / high water table areas. It will be used to cover special approaches to be adopted by the plumbers.

[#]When the training is organized in a region with a plain terrain (Chapter 5 not required), the training will end at 16:00 hours.

DAY 3

Session	Time Slot	Duration	Details
9 & 10	09:30 - 12:30	180 mins	FIELD VISIT
-	12:30 - 13:30	60 mins	LUNCH BREAK
11	13:30 - 14:30	60mins	Practical Activity Sessions
	14:30 - 15:00	30 mins	Q & A
-	15:00 - 15:15	15 mins	BREAK
12	15:15 - 16:00	45mins	Post Training Self-Assessment Tests & Discussion
	16:00 - 16:15	15 mins	Feedback Forms
	16:15 - 16:45	30 mins	Closing Ceremony

2.3 TRAINING METHODOLOGIES

S.No	Training Instruments	Chapter 1					Chapter 2			Chapter 3	
		Importance of Plumbing	Introduction to Sewerage System	Cross connections	Water Saving / Conservation Techniques	Green Plumbing Practices	Building Sewerage & its Components	Connecting Building Drain to Public Sewerage	Shallow Sewers & SBS	New PSS Network	Alteration of Building Drain to PSS & Alteration via Septic Tank to PSS
1	Case Studies										
2	Animation Video										
	Factual Video										
3	Picture Analysis										
4	Physical Display										
5	My Experience										
6	What is my Gradient?										
7	Group Work										
8	TrueMan & Falseguy										
9	DrainMain & MainDrain										
10	Bullz Eye										
11	Art Scape (Drawing)										
12	Brainstorming										
13	Pictures & Newspaper Cutouts										
14	Role Play										
15	We Learnt (Multiple Choice)										

S.No	Training Instruments	Chapter 4				Chapter 5			Chapter 6		
		Septic Tank - Basic Definitions & Workings	Connecting Building Drain to Septic Tank	Construction / Connections in Septic Tanks	Effluent Disposal	Terrain Conditions	High Altitudes / Sub Zero Regions	High Water Table Area	Manual Scavenging	The Bill	Saleint Features of the Bill
1	Case Studies										
2	Animation Video										
	Factual Video										
3	Picture Analysis										
4	Physical Display										
5	My Experience										
6	What is my Gradient?										
7	Group Work										
8	TrueMan & Falseguy										
9	DrainMain & MainDrain										
10	Bullz Eye										
11	Art Scape (Drawing)										
12	Brainstorming										
13	Pictures & Newspaper Cutouts										
14	Role Play										
15	We Learnt (Multiple Choice)										

PART 3

CONDUCTING THE TRAINING PROGRAMME

3.1 INTRODUCTION, ICE BREAKERS & PRE-TRAINING SELF ASSESSMENT

Objective

This Chapter will help the participating plumbers to

- Get to know each other
- Engage with the trainer without any hesitation
- Know their knowledge level in the subject being discussed.
- Set the pace for training by the trainer

Duration

40 Minutes

Agenda

Section	Description	Teaching Methodology	Duration*
1	Introduction	Self introduction	10 minutes
2	Ice Breakers	Group exercise	10 minutes
3	Self Assessment	Questionnaire	20 minutes

* Suggested duration

SECTION 1: INTRODUCTION

Name of the methodology to be adopted:

Self Introduction

Process:

- Ask the participants to talk about themselves.
- They are to give their names, location from where they are coming, education qualification and how many years of plumbing experience they have.
- The trainer then introduces himself, his qualification and his training experience.
- Why this Method?:
- This gives an opportunity for the trainees to speak about themselves and others to know about them

SECTION 2: ICE BREAKERS

Name of the methodology to be adopted:

Group activity



Why this Method?:

This will help the participants to interact with each other at the start of the programme & shed their inhibitions if any for participation & communication



Training Process:

- Make the trainees stand in a line
- Ask them to call out numbers, first in the line to call one, second to call two etc., until all are called.
- Group the person called one to the person who called the last ; person called two with the person called the last but one number etc., until all groups each containing two members are formed.
- Give the groups 4 minutes to know about each other in the group such as his interest , hobby and the games he plays
- Call out the persons from each group & ask the members to talk about what he gathered about the other member in the group

SECTION 3: SELF-ASSESSMENT

Name of the methodology to be adopted:

Questionnaire



Why this Method?:

Administration of a predetermined questionnaire will help the trainer to understand the knowledge level of the trainees -plumbers



Training Process:

- Distribute the self assessment questionnaire
- Provide 20 minutes to fill them up
- Collect the filled up questionnaire
- Check individual score
- Calculate the group measure

Outcomes

The participants:

- Know more about each other
- Know more about the trainer
- Are ready to participate in the training

The trainer:

- Knows about the knowledge level of the participants - the plumbers
- Can decide the pace of the training & areas of emphasis while training the group

3.2 CHAPTER 1: BASIC CONCEPTS OF PLUMBING

Chapter Objective

This Chapter will help refresh a plumber's understanding of:

- Importance of plumbing
- Key plumbing concepts
- Various types of plumbing systems inside a building
- Good plumbing practices, viz.
 - How to avoid cross connections
 - Water conservation techniques
 - General principles of green plumbing

A plumber needs to be aware of these principles while connecting house / building piping systems with public systems (water supply / sewerage). This knowledge will help plumbers adopt right approaches and techniques in connecting house sewerage systems to septic tanks or public sewers.

Chapter Training Duration

125 minutes

Chapter Training Agenda

Section	Description	Teaching Methodology	Duration*
-	Introduction	Case Studies	40 minutes
1	Importance of Plumbing	Animation Video + PPT	10 minutes
2	Introduction to Sewerage System	My Experience + PPT	15 minutes
3	Cross Connections	My Experience + PPT	10 minutes
4	Water Saving / Conservation Techniques in Plumbing	Factual Video, Physical display + PPT	20 minutes
5	Green Plumbing Practices	Group Work + PPT	20 minutes
	Recap	-	10 minutes
		Field Visits	

* Suggested duration

CASE STUDIES



Why this Method?

Starting the chapter with case studies has multiple benefits. Involving them in the teaching process encourages them to communicate. It also offers an opportunity to gauge the knowledge level of the participants. The points missed by the participants in the case studies will show them that they have opportunities to improve the scope of their knowledge and make them more receptive and interactive during the training session.

Aim of the Cases:

The aim of the 2 cases listed below is to highlight the various standards established for sanitary plumbing in a building. These cases will highlight the violations made by plumbers in layout of sanitary pipes and the corresponding impact that they will have on sewerage disposal and the surrounding environment.



Time Allotted:

20 minutes / Case



Material Required:

- Case Study photos
- Flip Chart / Board



Training Process:

- Discuss the cases at the beginning of the training session of Chapter 1.
- Show the photographs to the trainees and invite them to describe the various components visible in the photograph.
- Open the case for discussion for 10 minutes.
- Use the flip chart or board to capture key points of discussion.
- Review the points made by the trainees and cover all the key points mentioned in the case(s) from the plumber's manual.
- Summarize the discussion and explain the impact of wrong connections depicted in the photos.
- Use this to generate interest among trainees to move into the next part of the training process which covers specific sections of the chapter.



Tip: Throughout the training process of this chapter, make references to observations made in the case studies. Since the participants have been provided a visual image and have discussed the case, this connection will help them understand and retain information better.

Key points to be covered during the discussion:

- Soil pipes shall not be permitted on a wall abutting a street unless the authority is satisfied that it is unavoidable.
- If inevitable, metallic pipes should be used preferably CI.
- In the bottom long radius bend preferably 135(R) (1/8) bend should be provided to allow soil waste to pass smoothly without blockage.
- A common header pipe would have been thought of.
- No slope / gradient are provided in the horizontal portion for the smooth flow without any blockage.
- The ventilating pipe should be taken to the roof top, above level of terrace parapet. It should be provided with a cowl and covered with a mosquito mesh.

SECTION 1: IMPORTANCE OF PLUMBING

Name of the methodology to be adopted:

Animation Video



Why this Method?

In the beginning of a training program, it is important for the trainer to build a rapport with trainees / participants and get them to participate in the training. This activity will act as an ice breaker and help the trainer in this regard. It will help build participants' interest in the training.



Time allotted

10 minutes



Materials required:

- Projector and Laptop / Computer system
- Speaker
- Animation videos downloaded from YouTube. E.g. <http://www.youtube.com/watch?v=p-2rHq0IVKE>



Training Process:

- Show a funny animated video which depicts the importance of good plumbing practices and an efficient plumber.

- Ask the trainees to comment on the video and give their views on the importance of plumbing.
- Discuss and explain the “Importance of Plumbing” using the Plumber Training PPT.
- Refer to the character/ activity from the video during the discussions of the session.
- Recap the key points before moving into the next session.

SECTION 2: INTRODUCTION TO SEWERAGE SYSTEMS

Name of the methodology to be adopted:

My Experience



Why this Method?

The participating plumbers may have some practical experience in the area, due to their involvement in the profession. This methodology will help the trainer acknowledge this experience and build good communication among the participants. It will also bring out the ‘gaps’ in participants’ knowledge that can be addressed by the trainer.



Time allotted

15 minutes



Material required:

- A Microphone and a Speaker, if necessary
- Flip Chart / Board
- Pictures of types of pipes, piping systems and traps



Training Process:

- Display the pictures of different types of pipes, piping systems and traps.
- Invite participants to call out descriptions of the pictures that they recognize.
- Ask them to share their knowledge of the items displayed in the pictures along with relevant experience, if any.
- Note down important points that are put forth by the participants on a flip chart or board.
- Use these points along with the recommended PPT to explain good plumbing practices using IS standards.
- Cover all points and complete content of the given section.
- Note the additional points covered on the flip chart or board.
- Recap the important points.



Tip: During the video, and while discussing the video, let the participants laugh out loud and ensure you laugh with them.

SECTION 3: CROSS CONNECTIONS

Name of the methodology to be adopted:

My Experience



Why this Method?

Most of the participating plumbers will have some practical experience with working in the profession. This methodology will help the trainer acknowledge this experience and build good communication among the participants. It will also bring out the ‘gaps’ in participants’ knowledge that can be addressed by the trainer.



Time allotted

10 minutes



Material required:

- A Microphone and a Speaker
- Flip Chart / Board



Training Process:

- Explain cross connections (types of cross connections, times to avoid cross connections and how to avoid cross connections) for this section.
- Invite participants to share their experience and knowledge in the subject of cross connections with the group.
- Note down important points that are put forth by the participants on a flip chart or board.
- Refer to these points through the rest of the training session.
- Direct the discussion to cover all points and complete content of the given section, using the relevant PPT.
- Note the additional points covered on the flip chart or board.
- Recap the important points.



Tip: Make sure to refer to any good practice shared by the participants at a later stage to boost their confidence and in turn make them more interactive.

SECTION 4: WATER SAVING / CONSERVATION TECHNIQUES IN PLUMBING

Name of the methodology to be adopted:

Factual Video & Physical Display



Why this Method?

A factual video on global water depletion and its ill effects will be a very useful tool to sensitize the participants on the importance of water conservation techniques in plumbing. Displaying water conservation devices during the theoretical sessions will improve understanding and retention among the trainees.



Time allotted

20 minutes



Material required:

- Projector and Laptop/ computer system
- Speaker
- Topic related videos downloaded from YouTube like, <http://www.youtube.com/watch?v=USUCHHdmlIc> and / or <http://www.youtube.com/watch?v=N65vgAf5ITA>
- Flip chart or Board
- Sample Measurement and Flow Control Devices



Training Process:

- Show the participants a video depicting the current water scarcity and impact of depleting water resources.
- Ask them to give their views on the issue.
- Build on their views and discuss key points of the session using the flip chart or board.
- Showcase the water conservation devices such as sample Measurement and Flow Control Devices and explain their appropriate applications.
- Refer plumber training PPT to highlight and summarize key points.



Tip: Make sure to refer to any good practice shared by the participants at a later stage to boost their confidence and in turn make them more interactive.

SECTION 5: GREEN PLUMBING PRACTICES

Name of the methodology to be adopted:

Group Work



Why this Method?

This method allows the participants to communicate with each other and share their ideas and knowledge. When their existing ideas and knowledge is used to explain concepts in further detail, it becomes easier for them to understand the subject matter.



Time allotted

20 minutes



Material required:

- A Microphone and a Speaker
- Chart Paper
- Pens
- Flip Chart / Board

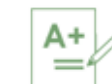


Training Process:

- Divide the participants into 3 groups.
- Give them 10 minutes to discuss the importance of green plumbing practices and green plumbing practices that they are aware of.
- Ask them to note their discussion points on a chart paper.
- Display the chart papers in the front of the room and build on the points given by the participants.
- Use plumbers training PPT to cover all important points in this section.
- Recap the important points.



Tip: Make sure to refer to any good points put forward by the participants and address "mistakes" without singling out any individual participant or group.



End of Chapter: Revision Test

	True	False
Plumbing system does not include storm water, roof drainage or exterior system components		
Environmental impacts of improper plumbing includes air pollution, water pollution, emission of foul smell etc.		
There are two types of sanitary pipe systems: One pipe system and Two pipe system		
Water conservation products include automatic taps, flush meters, pint flush urinals, high efficiency toilets and water saving shower heads		
To ensure green plumbing practices, grey water should not be recycled		



Learning Outcomes

By the end of this chapter, participants will be able to understand

- the importance of household plumbing and sanitation
- the impact that plumbing has on the city environment and health
- black water, grey water, storm water and its constituents
- the different types of piping system and use of traps

- the best plumbing practices as referred by IS Standards
- the types of cross connection and methods to avoid them
- sewerage systems
- the various water conservation techniques
- green plumbing practices



Further Reading Material

- IAPMO – Uniform Plumbing code India – 2011
- Practical guide book on Plumbing and pipeline work by Railway Engineering Technical Society – Pune.
- Plumber's and Pipe Fitter's calculation Manual – MCGRAW – HILL
- American Society of Plumbing Engineers – Fundamentals of Plumbing Engineering- Volume 1
- Cross connection Rules Manual- Michigan Department of Environmental Quality
- Health Aspects of Plumbing – Publication by WHO & World Plumbing Council.

3.3 CHAPTER 2: OVERVIEW TO PUBLIC SANITATION SYSTEMS AND PROCESSES

Chapter Objective

- Provide a step by step approach for plumbers to follow in the process of connecting building drainage system to public sewerage system.
- Highlight the role of a manhole; precautions plumbers have to take for certain types of traps; right ways to connect various types of pipes and recommendations as prescribed in the national plumbing standards.
- Provide a brief description of Simplified sewers, vacuum sewers and Small Bore System.

Chapter Training Duration

180 minutes

Chapter Training Agenda

Section	Description	Teaching Methodology	Duration*
-	Introduction	Case Studies	60 minutes
1	Building Sewerage and its Components	Pictorial Analysis	30 minutes
2	Connecting Building Drain to Public Sewer	My Experience What is my Gradient?	40 minutes
3	Simplified Sewers and Small Bore Systems	Picture Analysis	20 minutes
3	Simplified Sewers and Small Bore Systems	TrueMan and FalseGuy	20 minutes
-	Recap	-	10 minutes
		Field Visits	

* Suggested duration

CASE STUDIES



Why this Method?

Starting the chapter with case studies has multiple benefits. Involving them in the teaching process encourages them to communicate. It also offers an opportunity to gauge the knowledge level of the participants. The points missed by the participants in the case studies will show them that they have opportunities to improve the scope of their knowledge and make them more receptive and interactive during the training session.

Aim of the Cases:

Case Studies 1 & 2

The aim of the 2 cases is to highlight the various standards established for connecting a building drainage to PSS. Cases will highlight the violations made by plumbers in connecting building drainage to PSS and the corresponding impact that it will have on sewerage disposal / surrounding environment.

Case Study 3

The aim of the case study is to highlight the concept of simplified sewer - small bore system. The schematic diagram will be used to highlight key concepts to the plumbers.

Time Allotted:

20 minutes / Case



Materials Required:



- Case Study photos
- Flip Chart / Board
- Projector to project the image



Training Process:

- Discuss the cases at the beginning of the training session of Chapter 2.
- Show the photographs to the trainees and invite them to describe the various components visible in the photograph.
- Open the case for discussion for 10 minutes.
- Use the flip chart or board to capture key points identified by the trainees
- Review the points made by the trainees and ensure all the key points mentioned in the case(s) from the plumber's manual are covered.
- Summarize the discussion and explain the impact of wrong connections depicted in the photos.
- Use this to generate interest among trainees to move into the next part of the training process which covers specific sections of the chapter.

Key points to be covered during the discussion:

Case Study 1

- Rain water pipes should not be connected to the building drain and in turn to the street sewer without approval of the authority, as this action will overload the street sewer and the chances of street sewers getting flooded becomes very high. The rain water pipe should be normally connected to the storm water drain.
- The septic tank should be provided with a ventilating pipe.
- The septic tank acts like an interceptor tank. This has to be cleaned periodically.

Case Study 2

- The septic tank should be provided with a ventilating pipe and effluent disposed.
- The vent pipe should be of the same diameter as the soil pipe.

Case Study 3

- This is a small bore sewer system, also known as Settled sewerage system or Septic Tank Effluent Disposal Scheme (STEDS) or Sewered Inceptor Tank Systems (SITS)
- Area suitable for adoption:
 1. To convey the effluent from septic tanks where the soil cannot cope or absorb the effluent. This usually occurs when the groundwater table is high, or where the soil permeability is low, or where there are rock outcrops.
 2. Where new sewerage network is introduced the septic could be linked to the network with small bore pipes without much expense.
 3. In places where per capita water supply is limited to 25 lpcd. Since the sewers are not required to carry solids, large quantities of water are not needed for solids transport. Thus, unlike conventional sewers, small bore sewers can be used without fear of blockage. Lower gradients can be used.
- Special Components involved:
 - Inspection Chambers
 - Compact Sewage Treatment Plant
- Limitations - The septic tank or the interceptor tank, as the case may be, should be cleaned or de-sludged periodically.

SECTION 1: BUILDING SEWERAGE & ITS COMPONENTS

Name of the methodology to be adopted:

Pictorial Analysis



Why this Method?

In order to encourage the trainees participate in the session, it is good to do picture analysis. As the qualification level of the participants is expected to be low, it would be more beneficial to use a Picture analysis. This also makes the participants interact with each other within their group and they can learn to work as a group. This engages the participants and trainer in a process of proper learning.



Time allotted

30 minutes



Material required:

- Pictures of Building Drain, Building Sewer, Types of Public Sewerage System(PSS) and Manhole
- Flip charts/Board
- Colour Pens



Training Process:

- Show pictures of Building Drain, Building Sewer, Types of Public Sewerage System (PSS) and Manhole.
- Explain the components of the picture. Encourage the trainees to share their views during the discussion.
- Review the points discussed using the plumbers training PPT. Ensure that all content of the subject matter is covered.



Tip: Throughout the training process of this chapter, make references to observations made in the case studies. Since the participants have been provided a visual image and have discussed the case, this connection will help them understand and retain information better.

SECTION 2: CONNECTING BUILDING DRAIN TO PUBLIC SEWER

Name of the methodology to be adopted:

My Experience

What is my Gradient?



Why the above Methods?

My Experience - Most of the participating plumbers will have some practical experience with working in the profession. This methodology will help the trainer acknowledge this experience and build good communication among the participants. It will also bring out the 'gaps' in participants' knowledge that can be addressed by the trainer.

What is my Gradient - This exercise will help the participants learn the importance of underlying mathematics in a simple activity like laying a pipe.



Time allotted

40 minutes



Material required:

- A Microphone and a Speaker
- Flip Chart / Board
- Paper
- Pen



Training Process:

- Explain the key steps in connecting the building drain to the PSS.
- Invite participants to share their experience and knowledge in the subject of connecting the building drain to

the PSS with the group.

- Note down important points that are put forth by the participants on a flip chart or board.
- Refer to these points through the rest of the training session.
- Direct the discussion to cover all points and complete content of the given section, using the plumbers training PPT.
- Introduce the group activity - "What is my gradient" to help the trainees learn about calculation of slope which is important in laying down the pipes and connecting it to the PSS.

What is my Gradient?

- Discuss the formulae / tips to measure gradient / slope while laying a pipe.
- Write the formula "Fall = Gradient * distance" on the board and ask them the following question:
If your drainage pipe length (L) is 15 metre, what is fall (F) required to attain gradient of 1:60?
- Let them calculate the answers.
- Ask one of them to present it on the board.
- The answer to the question is:
Slope of 1:60 means the slope will fall 1 meter for 60 metre length of pipe.
Our Pipe length (L) = 15 metre
*So Fall = Gradient * distance*
*Fall = 1/ 60 * 15 = 0.25 metre*
Fall should be 0.25metre
- Ensure that the content of the section has been completely covered.
- Recap the important points of the section.



Tip-You can ask one group to make their presentation for only one picture, this will save time. The other groups can be asked to give in any additional points from their respective seats.

SECTION 3: SIMPLIFIED SEWERS AND SMALL BORE SYSTEMS

Part 1

Name of the methodology to be adopted:

Picture Analysis



Why this Method?

In order to encourage the trainees participate in the session, it is good to do picture analysis. As the qualification level of the participants is expected to be low, it would be more beneficial to use a Picture analysis. This also makes the participants interact with each other within their group and they can learn to work as a group. This engages the participants and trainer in a process of proper learning. A small picture analysis that highlights the common mistakes done by plumbers will help the participants introspect and improve.



Time allotted

20 minutes



Material required:

Pictures on a power point presentation or print out



Training Process:

- The pictures selected for the picture analysis should be comprehensive and cover a substantial portion of the section content.

- Show the pictures to the participants and ask them to comment on it.
- Write the comments on the board and summarize.
- Ensure that the content of the section, in addition to the concepts covered in the pictures, is covered, using the plumbers training PPT.
- Recap the important points of the section.

Part 2

Name of the methodology to be adopted:

TrueMan and FalseGuy



Why this Method?

In order to emphasize on the significant technical points discussed in this Chapter, you can conduct a true-false test. To make this test more lively and participative, it can be played as a game named - **TrueMan** and **FalseGuy**.



Time allotted

20 minutes



Material required:

- Two chairs with 'TrueMan' and 'FalseGuy' slips
- Yellow sticky slips
- Colour pens



Training Process:

- Select 10 important points from the topic and make either true or false statements out of them.
- Divide the participants into 3 groups.
- Take two chairs and personify them as 'TrueMan' and 'FalseGuy' by putting these name slips on each of them. Place them away from the groups of participants in two different directions.
- Show all the statements together on a PPT to the participants.
- Give them yellow sticky slips (Post-its) and colour pens
- Ask each group to identify the true and false statements and write them separately on yellow slips (one statement per slip). You can also ask them to write the true statements in Green colour and false statements in Red colour.
- Now ask the groups to segregate their yellow slips as true or false and give them either to TrueMan or to the FalseGuy. Only one person (Leader) from each group should be standing at any given moment to place the slips at the correct chair. First group to complete this with the highest correct answers gets a prize (E.g. Candies).
- At the end, ask someone to collect all the slips from TrueMan and FalseGuy and discuss the answers with the participants. If they went wrong somewhere, ask the reason. Whichever group gets the highest correct answers gets a prize.



End of Chapter: Revision Test

	True	False
The discharge from water closet and urinal is called grey water.		
The two pipe system contains one soil pipe, one waste pipe and one ventilating pipe.		
In plumbing, the highest point or the highest inside surface of a channel, conduit, drain, pipe or sewer pipe is the invert level.		
In the case of bends in the bottom-most pipes, they should necessarily be of long radius and should preferably be made of 90 degree bends.		
When the elevation of the incoming sewer exceeds 600mm of the outgoing sewer, dropdown manhole is necessary		



Learning Outcomes

By the end of this chapter, participants will be able to understand

- A clear understanding of the process involved in connecting a building drainage system to a public sewer system.
- The need for and workings of manholes, simplified sewers / small bore systems.
- Calculations for laying a pipe.



Further Reading Material

- Manual on sewerage and Sewage Treatment – MoUD, New Delhi- December 1993 & Final Draft May 2012.
- Sewerage and Waste Water Treatment: Design Practices – 14 th June 2012. – Publication by MoE&F
- Recent trends in Technologies in Sewerage System – March 2012 - Publication by MoUD
- Low cost sewerage – Duncan Mara.
- Technology options for Urban Sanitation in India – 2008 – A guide by MoUD
- Vacuum Sewer System-Fact Sheets from Water Environment Research Foundation.
- PC based Simplified Sewer Design- January 2001 – Published by School of Civil Engineering, University of LEEDS, England.
- The Design of Shallow Sewer Systems – United Nations Centre for Human Settlements, Nairobi 1986.

3.4 CHAPTER 3: SEWERAGE CONNECTIONS - WHEN NEW PUBLIC SEWERAGE NETWORK IS COMMISSIONED

Chapter Objective

This Chapter highlights the additional details that a plumber should know in connecting building sewage to the new public sewerage system.

It briefs about the delinking of the existing septic tank and connecting the building drainage to the PSS directly. Secondly, the septic tank being connected to the PSS through the small bore system.

Chapter Training Duration

80 minutes

Chapter Training Agenda

Section	Description	Teaching Methodology	Duration*
1	New PSS Network	My Experience	30 minutes
2	Alteration of building drain to PSS (bypassing the septic tank) and alteration via septic tank to PSS	DrainMain and MainDrain	40 minutes
-	Recap	-	10 minutes

* Suggested duration

SECTION 1: NEW PSS NETWORK

Name of the methodology to be adopted:

My Experience

Why this Method? Most of the participating plumbers will have some practical experience with working in the profession. This methodology will help the trainer acknowledge this experience and build good communication among the participants. It will also bring out the 'gaps' in participants' knowledge that can be addressed by the trainer.

Time allotted
30 minutes

Material Required:

- A Microphone and a Speaker
- Flip Chart / Board

Training Instructions:

- Explain laws governing connections to public sewerage networks, advantages of PSS and suitable disposal of building drainage for this section.
- Invite participants to share their experience and knowledge in this subject with the group.
- Note down important points that are put forth by the participants on a flip chart or board.
- Make sure to refer to these points through the rest of the training session.
- Direct the discussion to cover all points and complete content of the given section, using the plumbers training PPT.
- Recap the important points.

Tip: Make sure to refer to any good practice shared by the participants at a later stage to boost their confidence and in turn make them more interactive.

SECTION 2: ALTERATION OF BUILDING DRAIN TO PSS (BYPASSING THE SEPTIC TANK) AND ALTERATION VIA SEPTIC TANK TO PSS

Name of the methodology to be adopted:

DrainMain and MainDrain

Why this Method? It is an innovative methodology towards discovery-based learning in which questions are used to encourage participants to find answers and evoke learning. The idea is to promote learning by discovery and to lead the groups (and eventually, individuals) towards their own analysis.

Time allotted
40 minutes

Material Required:

- Chart Papers
- Colour Pens
- The Plumbers Training Manual

Training Process:

- Give an introduction to the subject matter covered in this section.
- Divide the participants into 2 groups.
- Name one group 'DrainMain' and the other group 'MainDrain'. This adds to the bonding and team spirit in the group.
- Explain the main options for building sewerage connections to PSS and ask each of the groups to thoroughly go through these options.
- Next, ask the 'MainDrain' group to question the 'DrainMain' group on the first option and vice versa for the second option for building sewerage connection to PSS.
- Facilitate the process and add comments to the answers that the groups provide. Try to engage the groups in a healthy discussion on the topic and ask them to share their ideas.
- In the process of the discussion, use the plumbers training PPT and cover any points that may have been missed out.
- Summarize the discussion and recap the highlights of the section.

End of Chapter: Revision Test

	True	False
The presence of PSS increases the area occupied by septic tanks and effluent disposal		
Recently, vacuum tankers are used for de-sludging septic tanks		
Municipal byelaws provide for proper disposal of wastewater by the owner		
During de-sludging, sludge should be withdrawn using a dip pipe of not more than 150 mm with hydrostatic pressure of 450 mm		
There are four options of connecting to the PSS available to the owner when a new sewerage network is commissioned		



Learning Outcomes

By the end of this chapter, participants will be able to understand

- Options available to connect building drain/sewer to a new public sewerage system established
- Procedures to decommission a septic tank



Further Reading Material

- Manual on sewerage and Sewage Treatment – MoUD, New Delhi- December 1993 & Final Draft **May 2012.**

3.5 CHAPTER 4: CONNECTING BUILDING DRAINAGE TO SEPTIC TANK AND OTHER DECENTRALIZED SYSTEMS

Chapter Objective

This Chapter provides the step by step approach to be followed by a plumber in connecting building drainage systems to individual disposal systems.

It highlights the various types of septic tanks, precautions a plumber has to consider in connecting building drain to septic tank, septic tanks suitable for various terrains and soil conditions, need for certain types of traps, design specification a plumber has to adhere to in a septic tank, right ways to connect various types of pipes and recommendations as prescribed in the national plumbing standards.

A brief description about various other decentralized effluent disposal systems such as soak pits dispersion trench, biological filters and mound is also provided.

Chapter Training Duration

180 minutes

Chapter Training Agenda

Section	Description	Teaching Methodology	Duration*
-	Introduction	Case Studies	40 minutes
1	Septic Tanks - Basic Definitions and Workings	Factual Video	20 minutes
2	Connecting Building Drain to a Septic Tank	My Experience	30 minutes
3	Construction / Connections in Septic Tanks - Plumbers Point of View	Bullz Eye	30 minutes
3	Construction / Connections in Septic Tanks - Plumbers Point of View	We Learnt	15 minutes
4	Effluent Disposal	My Experience	35 minutes
-	Recap	-	10 minutes
		Field Visits	

* Suggested duration

CASE STUDIES



Why this Method?

Starting the chapter with case studies has multiple benefits. Involving them in the teaching process encourages them to communicate. It also offers an opportunity to gauge the knowledge level of the participants. The points missed by the participants in the case studies will show them that they have opportunities to improve the scope of their knowledge and make them more receptive and interactive during the training session.

Aim of the Cases:

The aim of the 2 cases listed below is to highlight the various standards / procedures established for connecting households to septic tank and connecting the septic tank to individual disposal system plumbing in a building.

In Case Study 1, a schematic diagram of the cross-section of septic tank is to be used to elicit the trainees to identify various standards / parameters set for septic tanks and to highlight what are common areas of violations by plumbers.

In Case Study 2, a schematic diagram of an individual disposal system is used to highlight the environmental impact the set up could have if it is not planned correctly.



Time Allotted:

20 minutes / Case



Material Required:

- Case Study Photos

- Laptop and Projector to project the image
- Flip Chart / Board



Training Process:

- Discuss the cases at the beginning of the training session of Chapter 4.
- Show the photographs to the trainees and invite them to describe the various components visible in the photograph.
- Open the case for discussion for 10 minutes.
- Use the flip chart or board to capture key points identified by the trainees
- Review the points made by the trainees and ensure all the key points mentioned in the case(s) from the plumber's manual are covered.
- Summarize the discussion and explain the impact of wrong connections depicted in the photos.
- Use this to generate interest among trainees to move into the next part of the training process which covers specific sections of the chapter.

Tip: Throughout the training process of this chapter, make references to observations made in the case studies. Since the participants have been provided a visual image and have discussed the case, this connection will help them understand and retain information better.

Key Points to be covered in the discussion:

For Case Study 1

- It is mandatory to have a vent pipe.
- The invert level of outlet pipe must be 50 mm lower than the invert of inlet pipe.
- Only the liquid effluent from the septic tank is discharged through the outlet pipe.
- The bottom limb of inlet pipe should be extended up to 300 mm below the top water level.
- The bottom limb of outlet dip pipe should be 1/3rd of liquid depth below top water level.
- Floor - A minimum slope of 1:10 should be provided towards the sludge outlet to facilitate de-sludging.
- A free board of 300 mm should be provided.

For Case Study 2

- Understand the possibility of drinking water getting polluted by the proximity of dispersion trench.
- Explain the health impact it could have on people.

SECTION 1: SEPTIC TANKS - BASIC DEFINITIONS AND WORKINGS

Name of the methodology to be adopted:

Factual Video



Why this Method?

A factual video on septic tank, capacity & selection and installation steps to be followed will be a very useful tool to sensitize the participants on the importance of proper installation of septic tanks and its usage.



Time allotted

20 minutes



Material required:

- Projector and Laptop/ computer system

- Speaker
- Topic related videos downloaded from Youtube. E.g. http://www.youtube.com/watch?v=bLO_UDGW-Ho
- Flip Chart or Board



Training Process:

- At the start of this section, show the participants a video (referred video can be edited out to facilitate screening within the stipulated time or a similar but shorter video can be searched) showing the basic workings of a septic tank and septic tank installation.
- Encourage them to share their knowledge and understanding of septic tanks. Note down any important points on a flip chart or board.
- Build on their views and use the recommended PPT to complete the key discussion points of the session.
- Note down these additional points on the flip chart or board.
- Summarize key points of the session.



Tip: Cut the video if it is longer than 8 mins. A longer video will not have the expected impact as participants may get bored or distracted.

SECTION 2: CONNECTING BUILDING DRAIN TO A SEPTIC TANK

Name of the methodology to be adopted:

My Experience



Why this Method?

Most of the participating plumbers will have some practical experience with working in the profession. This methodology will help the trainer acknowledge this experience and build good communication among the participants. It will also bring out the 'gaps' in participants' knowledge that can be addressed by the trainer.



Time allotted

30 minutes



Material required:

- A Microphone and a Speaker
- Flip Chart / Board



Training Process:

- Explain the steps involved in connecting a building drain to a septic tank.
- Invite participants to share their experience and knowledge in this subject with the group.
- Use the flip chart or board to note down the important points. Create different sections for each step of the process and note down the points in their respective sections.
- Refer to these points through the rest of the training session.
- Make sure all points and complete content of the given section are covered. Use the plumbers training PPT for this.
- Note the additional points covered on the flip chart or board.
- Recap the important points.



Tip: Make sure to refer to any good practice shared by the participants at a later stage to boost their confidence and in turn make them more interactive.

SECTION 3: CONSTRUCTION / CONNECTIONS IN SEPTIC TANKS - PLUMBERS' POINT OF VIEW

Part 1

Name of the methodology to be adopted:

Bullz Eye



Why this Method?

Training on the type and size of a Septic Tank may become a little tiresome and uninteresting at the time scheduled on the second day afternoon. To make it more interactive, it is a good idea to introduce a game in this section. This will make the participants more attentive during the session and help them learn the various factors to be kept in mind while designing and selecting the size of a septic tank.



Time allotted

30 minutes



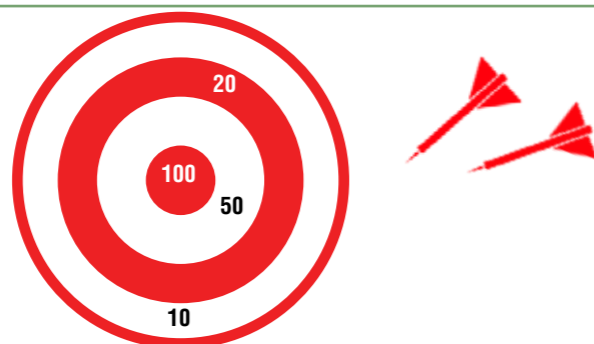
Material Required:

- Few pieces of chalk
- 4 to 6 small pebbles
- Chart Papers
- Pens



Training Process:

- Give an introduction to the subject matter covered in this section.
- Draw a Bullz eye (Dart-game) with 4 concentric circles on the floor with chalk. (As shown in the picture below)
- Number each circle as 10, 20, 50 and 100 respectively as per the sizes of Septic tanks for study.
- Divide the participants into 4 groups.
- Ask one participant from the first group to throw a pebble in one of the circles, like in the game of darts.
- Allocate the circle to the group.
- Ask the participant from the next group to throw a pebble to select an unassigned circle; Repeat throwing the pebble until the third group is also assigned a circle; Assign the left over circle to the fourth group.
- The groups are assigned a septic tank of the size marked on the circle selected by them
- Ask the groups to attentively take notes of the following session of the trainer, on the chart papers provided. They have to observe and take notes for the 'Septic tank Size' assigned to them.
- Present the section content when you do the training.
- At the end of the session, ask each group to talk about all the specifications of the size of septic tank selected by them.
- Along with the other teams, point out mistakes and add to the presentations done by each team. The team that makes the most comprehensive presentation with minimal errors will receive a prize (E.g. Candies)



- Use the plumbers training PPT to cover all important points of the section (in addition to points covered during the game).

Part 2

Name of the methodology to be adopted:

We Learnt



Why this Method?

This will be a re-cap test to be conducted after completing the session, to judge the impact of the training and learning by the participants.



Time allotted

15 minutes



Material required:

- Print outs of the questionnaire for individual participants
- Pens



Training Process:

- Further to the points covered during the game of 'Bullz Eye', ensure that the participants have understood the subject matter.
- Select a few significant points from the chapter and prepare 10 multiple choice question for the participants.
- Give the questions to the participants and give them 5 minutes to mark the correct answers.
- Discuss the answers and ask the participants to self-assess their papers.
- Let them mark +1 for each correct answer and -0.5 for each incorrect answer.
- Ask the participants to share their marks not individually, but as a group. You could request all those who got more than 8 marks to raise their hands.
- This will motivate others to be more attentive and do better in the later chapters.
- Recap the important points of this section.

SECTION 4: EFFLUENT DISPOSAL

Name of the methodology to be adopted:

My Experience



Why this Method?

Most of the participating plumbers will have some practical experience with working in the profession. This methodology will help the trainer acknowledge this experience and build good communication among the participants. It will also bring out the 'gaps' in participants' knowledge that can be addressed by the trainer.



Time allocated

35 minutes



Material required:

- A Microphone and a Speaker
- Flip Chart / Board



Training Process:

- Explain methods of treatment and disposal of effluent, horizontal wetland systems etc.

- Display relevant pictures for the participants.
- Invite participants to explain their understanding of the images.
- Ask them to share any other knowledge or experience in this subject with the group.
- Use the flip chart or board to note down the important points.
- Refer to these points through the rest of the training session.
- Use the Plumbers training PPT to make sure all points and complete content of the given section are covered.
- Recap the important points.

Tip: Make sure to refer to any good practice shared by the participants at a later stage to boost their confidence and in turn make them more interactive.



End of Chapter: Revision Test

	True	False
In case of a rectangular tank, the length shall be 2 to 4 times the width		
In a two chamber septic tank, the capacity of the first chamber is thrice that of the second chamber		
Horizontal subsurface flow wetlands are more sensitive to low temperature conditions		
In areas of dense soil condition, high water table and limited availability of open land, up flow type of filters operating under submerged conditions are used		
The final outlet for tanks should be at least 100 mm nominal bore T shaped dip pipe fixed outside the tank		



Learning Outcomes

By the end of this chapter, participants will be able to understand

- the complete process of connecting building drainage systems to individual disposal systems in the absence of PSS.
- the theory of septic tanks in detail and are equipped with the knowledge of correct installation of septic tanks in line with the national plumbing standards.



Further Reading Material

- Septic Tanks – Publication by Oklahoma Department of Environmental Quality
- Sanitation Decision support tool – Publication by WASTE – Advisers on Urban Environment and Development.
- Constructed Treatment Wetlands – Publication by EPA (United states Environment Protection Agency)
- DEWATS – Decentralized Sustainable Approach to Sewage and Waste Water Treatment for Urban India – Publication by Consortium for DEWATS Dissemination

3.6 CHAPTER 5: SEWERAGE CONNECTIONS - HIGH ALTITUDE AND HIGH WATER TABLE TERRAIN

Chapter Objective

This Chapter highlights the additional details that a plumber should know in connecting building sewage to public sewerage system or septic tank in areas of high altitudes and areas of high water table.

Chapter Training Duration

120 minutes*

*-This chapter will be covered only when the training session is conducted either in high altitude area or in high water table region. Relevant portions will only need to be covered depending on the terrain conditions. For instance, section 2 will be covered in high altitude area and section 3 in high water table area.

Chapter Training Agenda

Section	Description	Teaching Methodology	Duration*
-	Introduction	Case Studies	40 minutes
1	Terrain Conditions	Art Scape	20 minutes
2	High Altitude / Sub Zero Regions	Brainstorming session	25 minutes
3	High Water Table Area	Brainstorming session	25 minutes
-	Recap	-	10 minutes

* Suggested duration

CASE STUDIES



Why this Method?

Starting the chapter with case studies has multiple benefits. Involving them in the teaching process encourages them to communicate. It also offers an opportunity to gauge the knowledge level of the participants. The points missed by the participants in the case studies will show them that they have opportunities to improve the scope of their knowledge and make them more receptive and interactive during the training session.

Aim of the Cases:

The aim of the 2 cases listed below is to highlight the special instructions a plumber has to consider while laying out septic tanks in high altitude and high water table terrain.

In Case Study 1 - photo will be used to highlight the violations made by plumbers in connecting building drainage to Septic tanks and the key points that needs to be considered in this special terrain.

In Case Study 2 - the schematic diagram will be used to highlight key concepts of a sand mound disposal system.



Time Allotted:

20 minutes / Case



Training Process:

- These cases are to be discussed at the beginning of the training session of Chapter 5.
- Show the photographs to the trainees and invite them to describe the various components visible in the photograph.
- Then the case is open for discussion for 10 minutes.
- Use the flip chart or board to capture key points of discussion.
- Review the points made by the trainees and ensure all the key points mentioned in the case(s) from the plumber's manual are covered.
- Summarize the discussion and explain the impact of wrong connections depicted in the photos.

- Use this to move into the next part of the training process which covers specific sections of the chapter.

Tip: Throughout the training process of this chapter, make references to observations made in the case studies. Since the participants have been provided a visual image and have discussed the case, this connection will help them understand and retain information better.

Key Points to be covered in the discussion:

Case Study 1

- In this high altitude area (1500 m above the MSL), the septic tank should be constructed below the frost line.
- The location of the manhole openings shall be marked by staves.
- Manholes should be airtight to prevent cold air entering.
- Fencing around the septic tank will be provided for discouraging traffic over it.
- If the inlet pipes are steep (coming from an elevation), the last section at least 12 m in length should not be laid at a gradient not steeper than 1 in 50 in order to minimize turbulence in the tank.

Case Study 2

- This is a sand mound system for the disposal of effluent from a septic tank.
- Suitable where the soil percolation rate is poor, soil with high clay content, ground is already saturated with water etc.
- Special components:
 - A pumping chamber with a pump adjacent to the septic tank.
 - A pipe line to convey the effluent to the mound.
 - A sand mound constructed with a pile of sand and gravel above ground.

SECTION 1: TERRAIN CONDITIONS

Name of the methodology to be adopted:

Art Scape



Why this Method?

The trainer should begin the chapter with a group activity which will help bring out the current knowledge level of the participants. This activity helps the participants apply their existing knowledge and bring practical solutions to the table.



Time allotted

20 minutes



Material Required:

- Chart Paper
- Colour Pens + Red Colour Pens (equal to the number of groups formed)
- Picture Print Outs



Training Process:

- Explain the subject matter of this section using the plumbers training PPT.
- Encourage participants to communicate and be a part of the training process.
- After covering the important points of the section, divide the participants into 2 groups.

- Give them a picture of a septic tank / septic tank connected to the drain field etc., with some mistakes / missing points in them.
- Ask the group members to draw the pictures with one colour and mark out the mistakes with a red colour pen.
- Ask one member from each group to present their points.
- Recap the section highlights.

SECTION 2: HIGH ALTITUDE / SUB ZERO REGIONS

Name of the methodology to be adopted:

Brainstorming session



Why this Method?

Brainstorming generates ideas with respect to the topic without any restraint. Trainer can use this effectively by encouraging the participants to come up with an idea each until the group could no more generate any idea.

The trainer should divide the participants into two groups and ask each group to generate as many ideas as possible. The so called ideas should bring about similarities and the variations expected by the group members in carrying out connections between building drain to septic tank/PSS in high altitude areas.



Time allotted

25 minutes



Material Required:

- Chart Papers
- Colour Pens



Training Process:

- Divide the group into 2 teams.
- Ask the participants from each group to generate ideas about possible similarities and variations in carrying out connection between building drain to septic tank/PSS.
- Ask the groups to note down the ideas on the chart papers provided.
- Invite each group to present one ideas one after the other
- Repeat the above until all ideas are shared
- The trainer will present the section content using theplumbers training PPT and cover all points.
- The team that made the most relevant ideas will receive a prize (E.g. Candies)

SECTION 3: HIGH WATER TABLE AREA

Name of the methodology to be adopted:

Brainstorming session



Why this Method?

Brainstorming generates ideas with respect to the topic without any restraint. Trainer can use this effectively by encouraging the participants to come up with an idea each until the group could no more generate any idea.

The trainer should divide the participants into two groups and ask each group to generate as many ideas as possible. The so called ideas should bring about similarities and the variations expected by the group members in carrying out connections between building drain to septic tank/PSS in high water table areas.



Time allotted

25 minutes



Material Required:

- Chart Papers
- Colour Pens



Training Process:

- Divide the group into 2 teams.
- Ask the participants from each group to generate ideas about possible similarities and variations in carrying out connection between building drain to septic tank/PSS.
- Ask the groups to note down the ideas on the chart papers provided.
- Invite each group to present one ideas one after the other
- Repeat the above until all ideas are shared
- The trainer will present the section content using theplumbers training PPT and cover all points.
- The team that made the most relevant ideas will receive a prize (E.g. Candies)



End of Chapter: Revision Test

	True	False
High Altitudes are elevations higher than 500 m above mean sea level		
Lavatories and bath rooms shall be kept cool to avoid freezing of water inside the traps and flushing cisterns		
Materials for insulation of pipes - surround the pipe with straw, grass, hessian cloth / strip or jute rapped over with gunny and painting with bitumen		
In high altitude area, the septic tank capacity shall be increased by 50% for operation at 10 degree C over that for operation at 20 degree C		
Frost Line - The line joining the points of greatest depths below ground level up to which the moisture in the soil freezes		



Learning Outcomes

By the end of this chapter, participants will be able to understand

- the steps to connect building sewerage to PSS in areas of high altitudes and high water table.
- the precautions and special materials to be used in the above mentioned terrains



Further Reading Material

- Practical Hand Book on Public Health engineering – 2003 by Er. G.S.Bajwa.

3.7 CHAPTER 6: MANUAL SCAVENGING AND OCCUPATIONAL HEALTH AND SAFETY

Chapter Objective

This chapter discusses the practice of manual scavenging, the recently passed parliamentary act against manual scavenging, and the health hazards associated with manual scavenging and what plumbers should do to discourage manual scavenging.

Chapter Training Duration

40 minutes

Chapter Training Agenda

Section	Description	Teaching Methodology	Duration*
1	Manual Scavenging	Pictures & Newspaper Cutouts	5 minutes
2	The Bill	Pictures & Newspaper Cutouts	5 minutes
3	Salient Features of the Bill	Pictures & Newspaper Cutouts	5 minutes
4	Occupational Health and Safety During Plumbing	Role Play	20 minutes
-	Recap	-	5 minutes

* Suggested duration

SECTION 1, 2 & 3: MANUAL SCAVENGING, THE BILL & SALIENT FEATURES OF THE BILL

Name of the methodology to be adopted:

Pictures and Newspaper Cut-outs



Why this Method?

Displaying real life examples will bring out the importance and relevance of the topic under discussion. It will make the participants take the topic seriously.



Time allotted

15 minutes



Material Required:

- Pictures showing manual scavenging work and effects of manual scavenging.
- Cut-outs of newspaper articles that report the prohibition of manual scavenging like, <http://www.thehindu.com/news/national/stringent-antimanual-scavenging-bill-passed/article5105129.ece>, <http://www.thehindu.com/news/national/tamil-nadu/new-law-no-relief-to-manual-scavengers/article5117512.ece> and http://idsn.org/fileadmin/user_folder/pdf/New_files/Key_Issues/Manual_scavenging/2013/Statement_by_Rash-triya_Garima_Abhiyan_on_new_MS_Legislation.pdf
- Details of the related Act and Bill.



Training Process:

- Explain manual scavenging, environmental and health impacts of manual scavenging and laws prohibiting manual scavenging.
- During this process, show the pictures and newspaper articles to increase the impact of the teaching. This will highlight the reality of the issue and its importance.
- Invite participants to share their views, experiences and ideas related to the topic.
- Use the relevant PPT to ensure that all major points of the sections have been covered.
- Recap the important points.

SECTION 4: OCCUPATIONAL HEALTH AND SAFETY DURING PLUMBING



Name of the methodology to be adopted:

Role Play

Why this Method?

A practical walk through of a real life situation will help equip the trainees with the knowledge of exactly how to adhere to safety measures during the job. This method will make it easier for the trainees to recollect the information.



Time allotted

20 minutes



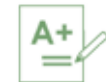
Material Required:

- Chats & Scissors
- Colour pens
- Safety gear that a plumber should use when on the job.



Training Process:

- Make one person from the team of trainers take on the role of a plumber.
- Walk them through the process of maintenance and entering manholes / septic tanks.
- Make sure that at each stage all necessary safety protocols are followed by the actor. Pause the play at each stage to point out the specific safety measures taken.
- At the end of the play, recap the important safety measures that every plumber should follow.



End of Chapter: Revision Test

	True	False
The Employment of Dry Latrines and Construction of Dry Latrines (Prohibition) Act, 1993 focused on the rehabilitation of those engaged in manual scavenging		
The Prohibition of Employment as Manual Scavengers and their Rehabilitation Bill, 2012 prohibits hazardous manual cleaning of septic tanks		
Eye Infections, Diarrhea and Asthma are common constant and some debilitating diseases caused as a result of manual scavenging		
For ventilating a manhole system, first open up the working manhole, then the downstream manhole, followed by the upstream manhole		
The act of manual scavenging reduces caste discrimination in the community		



Learning Outcomes

By the end of this chapter, participants will be able to understand

- the legal aspects and health hazards of manual scavenging.
- the necessity of and best practices to ensure safety on the job.
- the processes need to mitigate occupational hazards



Further Reading Material

- Sewer Cleaning and inspection – EPA Publication September 1999.
- Reduction of Manual Scavenging through the total sanitation – Publication by UNICEF – KCCI 2008- 08

3.8 GUIDELINES FOR FIELD VISITS

Purpose / Objective

The objective of a field visit is the following:

- To reinforce theoretical concepts learnt in the class
- To demonstrate best practices that needs to be followed.
- To demonstrate the common mistakes committed by plumbers
- To familiarize the plumbers with key parameters to consider in a plumbing work – involving connecting household to Public Sewerage system / Septic tank.

Guidelines for the field visit:

The guidelines will assist in choosing the actual sites for the field visits. It will spell out the following:

- Different type of actual sites that needs to be visited.
- The various plumbing practices that needs to be seen
- The key discussion points that the trainer should be covered in field visit.

Exercise

- The Trainees will be divided into 2 groups.
- The trainees will draft a checklist of things that needs to be inspected in the site.
- Each group inspect the site using their checklist and report findings
- All group assemble together and learn from each other report
- Finally the trainer will summarize the findings using his checklist. Trainer will point out to keyparameters that the trainees failed to notice.

SITE NO. 1:

Any building completed or a construction site, preferably multi story building. The building drain to be connected to the PSS. The main sewer should run adjacent to the building / construction site.

Points to check for getting familiarized:

		Check
1	Sewerage system - Combined, Separate or partially separate.	
2	Sanitary pipe work – Two pipe system, One pipe system or Single stack system	
3	Is waste water lead to the sewer manhole through Gully trap?	
4	Manholes outside the building.	
5	Gradient and size of drain pipe.	
6	Whether Pipes of correct specifications are used	
7	Last Manhole inside the building before connecting to the street MH	
8	At junctions of pipes in manholes inside the building , how branch connection is made	
9	Connection to the Street MH	

10	Examine the requirement of Anti Flood Value.	
11	Ventilating pipe with cowl & mesh.	
12	Is vent pipe extended up to the roof top?	
13	Is soil line connected to the MH & then to the drain direct. Is long radius maintained at the bottom bend.	
14	Is there a boundary trap.	
15	Street MH may be kept open for noting the pipe connection.	

SITE NO. 2

Any building completed or a construction site, preferably multi story building. The building drain to be connected to a two compartment Septic tank.

Points to check for getting familiarized for Plain Terrain:

		Check
1	Whether all the drain pipes are connected to a Manhole before the septic tank.	
2	Required slope provided for the inlet pipe of a septic tank	
3	Provision of vent pipe with cowl and mosquito mesh.	
4	Height of the vent pipe.	
5	Inlet and outlet – T shaped dip pipe.	
6	Type of Effluent disposal system provided.	
7	Check the size of septic tank with reference to the users	
8	The septic tank may be kept opened to see the compartments and to see the free board allowed, Depth of inlet & outlet pipe.	
9	Provision of Manhole	
10	How Air Tight the Manhole cover lid is?	
11	Check the provision provided for sludge removal	
12	Are the pumping in septic tank as per specification?	
13	Check the possibility of any SBS (Small Bore System)?	

Points to check for getting familiarized for Hilly / Sub Zero terrain:

		Check
1	Is the septic tank is below the frost line	
2	Required slope provided for the inlet pipe of a septic tank	
3	Provision of vent pipe with cowl and mosquito mesh.	
4	Height of the vent pipe.	
5	Inlet and outlet – T shaped dip pipe.	
6	Effluent disposal – Is it below the frost line?	
7	Check the size of septic tank with reference to the users & high altitude	
8	The septic tank may be kept opened to see the compartments and to see the free board allowed	
9	Depth of inlet & outlet pipe.	
10	Provision of MH	
11	Provision of sludge removal	
12	Check if all plumbing works are as per specifications?	
13	Check the possibility of any SBS (Small Bore System)?	
14	Check if the municipal Sewer is laid below frost line?	
15	Check for Insulation of pipes?	

Points to check for getting familiarized for High water table terrain:

		Check
1	Required slope provided for the inlet pipe of a septic tank	
2	Provision of vent pipe with cowl and mosquito mesh.	
3	Height of the vent pipe.	
4	Inlet and outlet – T shaped dip pipe.	
5	Effluent disposal - Is there any sand mound or Biological Filters?	

6	Check the size with reference to the users	
7	The septic tank may be kept opened to see the compartments and to see the free board allowed, Depth of inlet & outlet pipe.	
8	Provision of Manhole	
9	Check for the provision provided for sludge removal	
10	Check if all plumbing works are as per specification.	
11	Is there any SBS (Small Bore System) possible?	

3.9 GUIDELINES FOR PRACTICAL SESSIONS

Purpose / Objective

This practice will create awareness among the trainees as to what are all the important measurements to be taken care in doing plumbing works in a septic tank.

Time Allotted

60 minutes

Recommended Group Size

Up to 8 people / group. Each activity mentioned below to be attended by 2 people.

Tools and materials required for each set of trainees

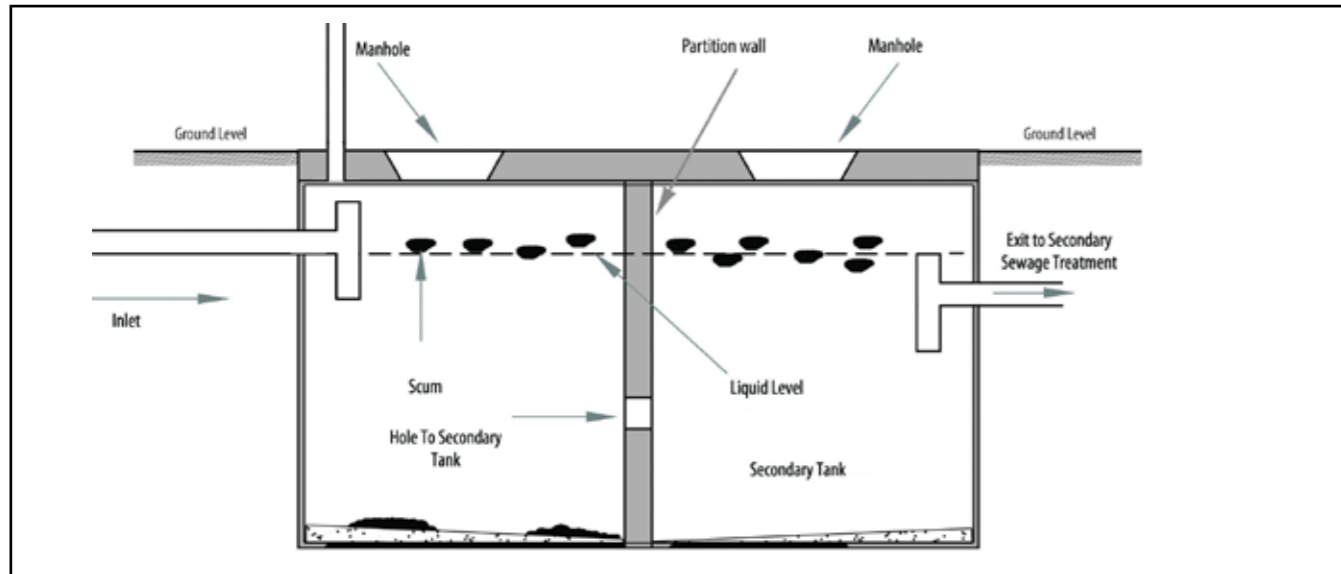
S. No.	Tools	Materials
1	Hand hacksaw – with 3 blades	Thermo coal board 20 mm thick 1 m x 1 m size - 8 pieces.
2	Scissors – big -1	Card board Sheet – 1m x 1m – 1 No.
3	Knife -1	PVC pipe 32 mm OD – 500 mm length – 2 pieces, 300 mm length – 2 pieces
4	Steel foot rule -1 (300 mm)	PVC TEE to suit the above pipe -2 pieces
5	Compass -1	PVC pipe 20 mm OD – 0.5 m length- 1 piece
6	Marking Color pencil – 1	PVC Vent cowl 20 mm – 1 piece
7		Solvent cement – Medium Bodied -100 ml
8		Brush to apply solvent cement on pipe
9		Adhesive tape – 1 Roll
10		Drawing Board pins (for fixing the thermo coal)- 24 nos.

Instruction to be shared with Trainees / participants

- Size of the septic tank: Septic tank for 50 users.
- Size as recommended by IS 2470: 5 m Length x 2 m width x 1.24 m liquid for 2 yr cleaning period.
- The participants may adopt a scale of 1: 5
- Use 32 mm pipe for inlet and outlet
- Use 20 mm pipe for Vent.

Pictorial Model of septic tank that trainees to create

The given task is to make a model of a 2 compartment septic tank taking into consideration the plumbing works involved in it.



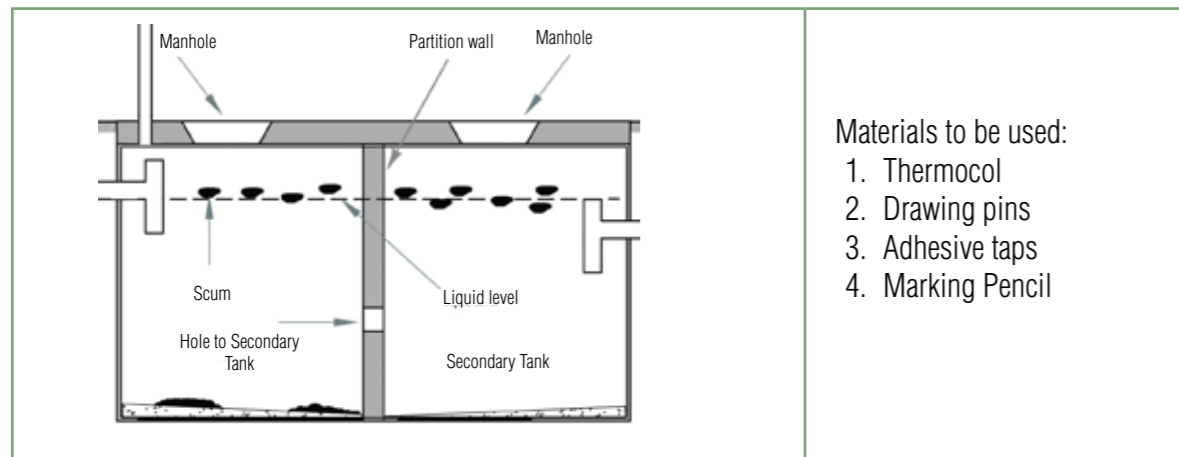
This can be further split into 4 smaller activities which captures the following:

- Plumbing works in the outer shell / inner compartments
- Inlet pipe related plumbing work
- Outlet pipe related plumbing works
- Vent pipe / manhole related plumbing works

ACTIVITY 1 – OUTER SHELL OF THE SEPTIC TANK

Trainees are to construct the outer shell of a Septic tank with clear emphasis on plumbing aspects namely:

- Inlet pipe connection
- Outlet pipe connection
- Connection between the two compartments
- Provision for Man hole
- Provision for Vent pipe



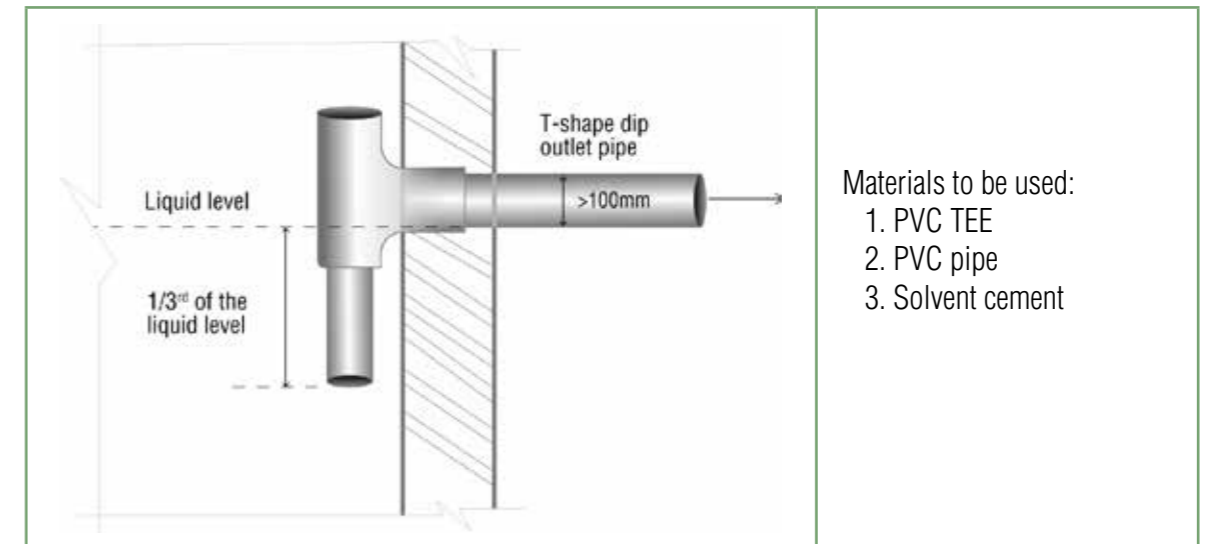
Key Points that the Trainer needs to address in the output are the following:

- Check if the free Board is at least 300 mm
- Check if the depth of out let and inlet pipe are as per specifications
- Check if the length of primary and secondary tanks (2/3,1/3) are as per specifications.

- Check if the hole connecting primary to the secondary tank is at least 100 mm and if it is at least 300 mm below Top Water level.
- Is there a provision for Man hole and Vent pipe.

(Note – that the model is scaled down to 20 % of actual and so trainees can scale their specification to 20 % of required.)

ACTIVITY 2 – OUTLET DIP PIPE

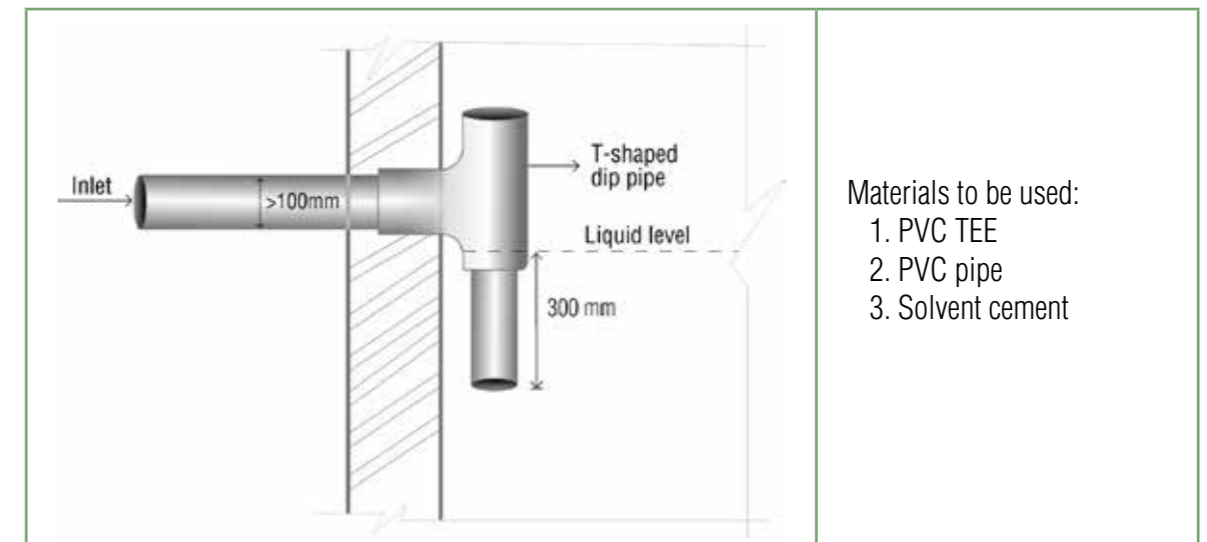


Key Points that Trainer needs to address in the output are:

- Check if the Free Board is at least 300 mm
- Check if the depth of out let pipe is D/3 mm below water level (D- Liquid depth of tank)
- Check if the invert of outlet pipe is at least 50 mm below the invert of in let pipe.

(Note – that the model is scaled down to 20 % of actual and so trainees can scale their specification to 20 % of required.)

ACTIVITY 3 – INLET DIP PIPE

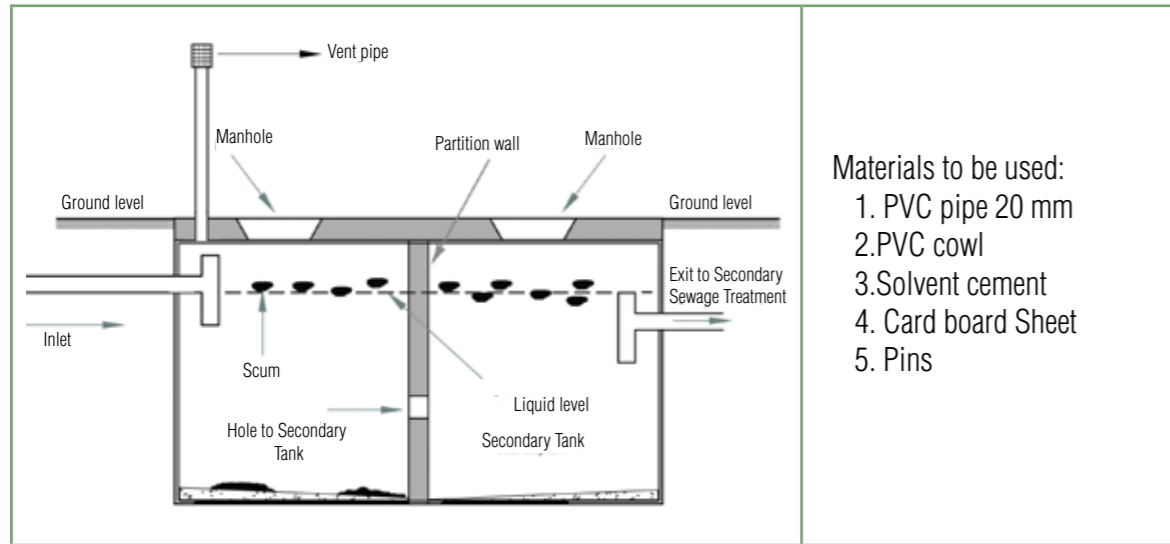


Key Points that Trainer needs to address in the output are:

- Check if the free Board is at least 300 mm
- Check if the depth of inlet pipe – 300 mm below water level
- Check if the invert of outlet pipe is at least be 50 mm below the invert of inlet pipe.

(Note – that the model is scaled down to 20 % of actual and so trainees can scale their specification to 20 % of required.)

ACTIVITY 4 – VENT PIPE & ACCESS ENTRY



Materials to be used:
 1. PVC pipe 20 mm
 2. PVC cowl
 3. Solvent cement
 4. Card board Sheet
 5. Pins

Key Points that Trainer needs to access in the output are:

- Check if the access opening is 455x 610 mm or 500 mm diameter for each compartment.
- Check if the length of vent pipe – 2 m minimum.

(Note – that the model is scaled down to 20 % of actual and so trainees can scale their specification to 20 % of required.)

Discussion:

The Trainer after assessing each model can discuss his finding with class. Other groups can be invited to comment on it.

3.10 FINAL CLOSING SESSION

Objective

- To clarify any pending doubts or questions for the participants.
- To assess the change in knowledge level of the participants at the end of the training.
- To collect information on participants' views of the training programme.
- To conclude the 3 day training programme.

Duration

75 minutes

Agenda

Section	Description	Methodology	Duration*
1	Q & A	Free flow	30 minutes
2	Post Training Self-Assessment Tests & Discussion	Questionnaire	10 minutes
3	Feedback Forms	Questionnaire	15minutes
4	Closing Ceremony	Event	30 minutes

*Suggested duration

SECTION 1: Q& A

Name of the methodology to be adopted:

Free flow



Process:

- Open the class for discussion
- Encourage the plumbers to ask questions about their doubts in what has been taught and anything else they would like to know
- Answer & clarify their doubts
- Invite the organisers of the training to be present during the session



Why this Method?

This gives the plumbers a chance to clarify any remaining doubts and build on their knowledge.

SECTION 2: POST TRAINING SELF-ASSESSMENT TESTS & DISCUSSION

Name of the methodology to be adopted:

Questionnaire



Process:

- Provide the self-assessment questionnaire to the participants. (same as the one provided before commencement of training)
- Ask the plumbers to fill up the test
- Collect the completed tests and compare the pre & post training performance.
- Check the individual performances as well as performance as a group.
- Invite the organisers of the training to be present during the session.



Why this Method?:

This helps to understand the post-training knowledge level of the participants.

SECTION 3: FEEDBACK FORMS

Name of the methodology to be adopted:

Questionnaire



Process:

- Provide the Feedback forms to the participants.
- Ask them to fill up the form.
- Collect the forms and analyse their feedback.
- Store the summary of the feedback.
- Invite the organisers of the training to be present during the session.



Why this Method?:

This helps to understand what the plumbers feel about the programme.

SECTION 4: CLOSING CEREMONY

Name of the methodology to be adopted:

Event- Agenda to be prepared by the organisers

Process:

- Facilitate the conduction of the closing ceremony as per the agenda
- Invite the Municipal Commissioner, Public Authorities, Principal of the Training Institute and trainers, besides others in the agenda
- Educate the gathering on how the plumbers fared, based on the assessment
- Institute principal will address the feedback provided by the plumbers
- Participation certificate will be provided to the plumbers by the Chief Dignitary
- Chief dignitary will make a speech on sanitation & the need for plumbers to maintain sanitation
- Organisers will give closing remarks & vote of thanks.

Why this Method?:

To conclude the event on a high note.

Outcomes

The organisers of the training can understand:

- The impact of the training
- If further improvement is needed in conducting the programme

The programme has created:

- Trained Green Plumbers

Disclaimer:

This publication has been solely compiled as a Training of Trainers Module for a Refresher Course on Household Connectivity for Plumbers. The information contained in this publication does not override any state or central government regulations and standards or manufacturer's installation requirements, all of which must be adhered to at all times.

The technical diagrams in this publication reflect the general principle behind the technology or process and may differ in appearance from the actual products. This publication is only a reference guide and readers should obtain appropriate professional advice relevant to their particular circumstances.

While reasonable efforts have been made to ensure that the contents of this publication are factually correct, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Asia Society for Social Improvement and Sustainable Transformation (ASSIST), do not provide guarantee or warranty that the information contained in this publication are correct, complete or reliable. Users are responsible for making their own assessments and judgement of all information contained here. ASSIST and GIZ does not assume responsibility for any direct, indirect or consequential liability, loss or damage resulting from the use of or reliance on any information, apparatus, method or process given in this publication.

About GIZ

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is a federal enterprise with operations around the globe. It supports the German Government in the fields of international cooperation for sustainable development and international education. GIZ supports people and societies in shaping their own futures and improving their living conditions.

About GIZ -SNUSP

In 2008 Ministry of Urban Development (MoUD) approved the National Urban Sanitation Policy (NUSP) with the aim to improve the sanitation situation in urban areas of India.

The National Urban Sanitation Policy (NUSP) based on the 74th Constitutional Amendment Act (1992), aims to strengthen Urban Local Bodies (ULBs). The overall goal of the policy is to transform urban India into sanitised, healthy and liveable cities and towns. Particular focus is given to improvement of hygienic conditions for the urban poor and women through cost-efficient technologies. The NUSP incorporates a paradigm shift and follows integrated concepts in the design and implementation of sanitation strategies. All cities and states are requested to act at par with the NUSP to develop State Sanitation Strategies (SSS) and City Sanitation Plans (CSPs) respectively. A City Sanitation Plan is a planning document that shall achieve the stepwise implementation of the goals spelt out in NUSP whereas SSS creates enabling environment for the latter.

As part of its programme 'Support to the National Urban Sanitation Policy (SNUSP)', Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH supports the MoUD in the aforementioned implementation of policy guidelines at national, state and city level. The programme also supports the government to improve the management of the sanitation sector in poorer parts of the cities.

Approach

The project is simultaneously working at three levels - national, state and city level. A three-tiered approach has been designed for the achievement of desired outcomes at each tier as well as constant interaction and knowledge sharing to support the "elevator effect".

Central level

The program formed Technical Advisory Committee (TAC), an advisory body to the programme that recommends on specific technical issues and provide guiding directions to the stepwise implementation and improvement of water and sanitation sector with particular focus on two themes; Indian Water & Sanitation Utility 2020 and Integrated Septage Management.

SNUSP supports MoUD in evaluating the City Sanitation Plans (CSP) prepared so far and documenting the best practices and lessons learnt. This was achieved by providing guidelines and through workshops.

State Level

At state level the program supported selected states in improving/preparing their State Sanitation Strategies (SSS). It provided technical inputs concerning capacity enhancement, skill development, and outsourcing of urban services such as public/community toilet complex and sewerage system.

City Level

SNUSP provided handholding support at city level. The program supported preparation of city sanitation planning documents (CSP). The program supports cities in implementing the CSPs by enabling a decision process based on cost-efficient and long-term planning at city level. It supports the cities in developing bankable projects by creating sector-wise financial sustainability while strengthening service delivery.



Contact

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
2nd Floor, B-5/2; Safdarjung Enclave
New Delhi-110029-INDIA

Tel: +91 (0)11 4949 5353 Fax: +91 (0)11 4949 5391