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MANUAL

FOR

PACKAGED DRINKING WATER

(***First Issue***)

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SECTION 1

FOREWORD

BIS has published two Indian Standards for Packaged Drinking Water namely IS 13428 for Packaged Natural Mineral Water and IS 14543 for Packaged Drinking Water (Other Than Packaged Natural Mineral Water). Both the products are under mandatory certification.

Both the Standards were reviewed extensively and a number of amendments were issued to them. The latest change is the revision of standard for Packaged Drinking Water (Other Than Packaged Natural Mineral Water) as IS 14543 : 2004 and Amendment No 1 of July 2004 also issued to the same.

In the early stages, different procedures were adopted by many ROs/BOs. Even the scope of the licences were covered differently. The variations were as wide as "Open Licence" to "Packing/Quantity Specific" licences. While processing applications, some BOs were waiting for report of the processed water upto the declared Shelf-life period whereas others were not.

In view of different approaches followed by different BOs, a strong need was felt for formulation of a Sector Specific Manual for ensuring uniform operation of certification of Packaged Drinking Water.

This Manual is primarily meant for packaged drinking water, however, a separate section has been incorporated to give additional specific guidelines/clarification related to issues pertaining to Packaged Natural Mineral Water due to similarity of the products.

This Manual provides GENERAL GUIDELINES for various aspect related to certification of the above product. Efforts have been made to provide suitable explanatory notes, wherever necessary, to the hygienic requirements prescribed in the Standard, to take care of subjective interpretations. It also includes specific proformae for submission of reports of preliminary & periodic inspections so as to facilitate uniform reporting by IOs, covering all essential parameters required to be reported as per ISS and STI.

The Standard provides sufficient freedom to the firms for adopting any process for manufacturing and therefore, the required manufacturing machinery for the purpose are not specified. The Manual gives illustrative examples of the various typical process flow diagrams of manufacturing, plant and machinery, cleaning and disinfection of containers as well as production pipelines.

IS 14543 prescribes a large no. of requirements to be tested as per the methods of tests given in the various cross referred standards. Further, many requirements have options for selection of test method to be followed. This had made the task of the BIS Officer difficult and time consuming for complete assessment of adequacy of the test facilities. This manual provides a ready reckoner for the IOs to check facilities for each of the requirements against the method given under the IS and the method chosen by the firm.

Various guidelines have been issued from time to time regarding Indian Standard/STI and related certification operational issues. Efforts have been made to incorporate major decisions in this manual, however, the provision of ISS, STI and policy guidelines would prevail over the manual, incase of any difference in interpretation.

This Manual is to be used along with IS 14543 and STI Amended/revised from time to time.

This document is intended for internal use by BIS officers only.

Suggestions for any improvement in the manual may be sent to CMD for consideration.

SECTION 2

PRODUCT DESCRIPTION

Packaged drinking water means water derived from any source of potable water which may be subjected to treatments such as, decantation, filtration, combination of filtrations, aeration, filtration with membrane filter, depth filter, cartridge filter, activated carbon filtration, demineralization, remineralization, reverse osmosis or any other method to meet the prescribed standard and packed. It may be disinfected to a level that will not lead to harmful contamination in the drinking water.

The potable water used for production of packaged drinking water is water derived from any source (such as ground water like Borewell, public drinking water systems such as Municipality Supply or Supplies from other sources) received on regular basis. Supplies of such water through pipelines or tankers would be acceptable provided the source remains the same.

As indicated above, the packaged drinking water can be produced by way remineralization. This process involves addition of ingredients. In case remineralization is carried out by any manufacturer, ingredients used for the purpose shall be of food grade quality conforming to the requirements of the PFA Act, 1954 and the Rules framed thereunder.

Processed water may be disinfected by means of chemical agents and/or physical methods to control the micro-organisms to a level that does not compromise food safety or suitability for consumption. Various means adopted for disinfection include ozonization, ultraviolet treatment, silver ionization, etc. and/or combination thereof.

The processed water shall be filled in sealed containers of various types/sizes/shapes made from the plastic materials permitted under ISS, suitable for direct consumption without further treatment. The filling & packing of the processed water shall be in containers which are tamperproof, tight and impervious. The containers with features like Cool Jugs, Jugs with built-in taps, Jars with threaded (reusable) caps etc. which are not tamperproof and leak proof shall not be permitted.

There are many terminologies presently adopted by the industry & consumer for describing the processed water as packed in different packaging. For the purpose of uniformity in describing the various types of containers, the following definitions are suggested:

TYPE OF CONTAINER	DESCRIPTION
Jars	Reusable plastic containers
Bottles	One time use plastic containers, to be crushed after use
Cup	One time use plastic container in the shape of cup or glass/tumbler, to be crushed after use.
Glass Bottle	Containers made of glass material (to be used after sterilization)

SECTION 3

SPECIFICATIONS & HYGIENE REQUIREMENTS

The Indian Standard specification for packaged drinking water IS 14543:2004 prescribes following four types of requirements for processed water:

1. Physical requirements (six parameters as per Clause 5.2 & Table 1)
2. Chemical requirements:
   a) General chemical substances (24 parameters as per Table 2)
   b) Toxic substances (9 parameters as per Table 3)
   c) Pesticides residues (16 group of pesticides including their isomers/analogues as per Annex. D)
3. Microbiological requirements (9 parameter as per Cl. 5.1)
4. Radioactive residues (2 parameters as per Table 4)

Besides above, the standard also prescribes requirements for packaging i.e. containers and material used for manufacturing the containers shall conform to the requirements of IS 15410 and Cl. 6 of IS 14543 respectively. The guidelines and criteria of acceptance of packaging materials and containers by the applicant/licensee/BOs are given in **Annex 1.**

A detailed list of test equipments, apparatus and chemicals required for physical, chemical (except pesticides residues) and microbiological requirements (except three pathogens) as prescribed in IS 14543:2004 and its referred Standards is enclosed at **Annex 11.**

Note : All efforts have been made to compile the list as per the respective standards exhaustively covering all the required test equipments, apparatus and chemicals. However, in case any omission or incorrectness is noticed while reffering, the same may be conveyed to CMD immediately for suitable actions

The standard prescribes use of **colourless and transparent** containers. However it has been noticed that blue tinted containers are also being used by the manufacturers. A detailed study is being conducted on the various aspects related to blue tinted containers at IIP. Meanwhile PFA has permitted use of blue tinted containers up to 31 January 2005 and further decision will be intimated as and when taken by PFA.

The standard also prescribes **hygienic conditions**, which are required to be followed during collection, processing, handling, packing and marketing of processed water

which are detailed in Annex B of ISS. For guidance of IOs, **explanatory notes** have been provided **against each of the requirement of respective clause of Annex B of the standard in Annex 2 of this manual**. The IOs are expected to assess the hygienic conditions of a manufacturer in totality against the requirements of Annex B.

The standard also prescribes labeling prohibitions under clause 7.2. While permitting the labels, compliance to all clauses of labeling prohibitions shall be examined. Further, as per the guidelines provided by PFA and circulated by CMD vide circular dated 13 12 2004, **no claim** is permitted to be made by the manufacturer on packaged drinking water.

The standard also prescribes that the **Shelf Life** of the product shall be declared and marked on the product by the manufacturer based on in-house studies. The decision of the durability of product shelf life lies with the manufacturer. The studies are to be conducted by each manufacturer for the processed water packed in each type/material/capacity of container and, it is the responsibility of the manufacturer to declare the same based on results of in-house studies made. IOs may therefore, verify the records of such studies during visits.

SECTION 4

MANUFACTURING PROCESS & CONTROLS

IS 14543 does not prescribe any specific process for manufacturing of the processed water. However, the definitions given under the standard provide information regarding steps that may be involved in the acual practice. In fact, the manufacturing process of the processed water is essentially a purification process of raw water through different treatments, for conformance to the requirements of IS 14543.

There are various established processes commercially available and being practicesd by different manufacturers. The sector is supported by a core "supplier" group which supplies technologies as well as readymade plant machinery for water treatment.

The manufacturing of the processed water mainly involves the following process;

a) Collection of Raw Water
b) Removal of suspended & colloidal impurities by filtration such as sand, carbon, micron filter etc
c) Removal of dissolved solids by Reverse Osmosis, Ion Exchange etc
d) Disinfection by different means such as ozonization, U.V., Silver Ionization etc
e) Filling & Packing

Different combinations of processes are being adopted by the industry in different sequences. Typical examples of Plant Machinery, Manufacturing Process and Flow diagram are given at **Annex 3**

As the product is sensitive to contamination, the entire process of manufacturing, right from the collection of raw water to the storage of packed material and transportation needs to be carried out under controlled hygienic condition. The requirements given under Annex B & the Check List given under Annex C of the standard provide detailed guidelines for preventive measures to take care of all types of contaminations. Sources of contaminations may be related to equipment & pipeleines used for various processes, product containers, holding tanks, environmental conditions, surroundings, personnel hygiene etc.

Before starting and after completion of production, all the equipment & pipelines need to be cleaned and disinfected so as to minimize the chances of contamination due to susceptibility of the material of equipment & pipelines. One of the ways to ensure sanitization of equipment & pipelines is to follow Cleaning-In-Pipe norms (commonly known as CIP practices). Typical CIP process is given as part of Annex 3.

Special care is required to be taken for cleaning of reusable jars because of increased chances of contamination at different points of handling including transportation and usage by the customers. A typical cleaning and washing system used for reusable jars is also included in Annex 3.

SECTION 5

CERTIFICATION CRITERIA

Packaged Drinking Water (Other Than Packaged Natural Mineral Water) has been made mandatory through gazette notification, GSR No. 760 under the PFA Act effective from 29 March 2001. The mandatory certification came into being against IS 14543 : 1998. A total of seven amendments were issued to this standard. It has since been revised as IS 14543 : 2004 and an Amendment No.1 has also been issued in July 2004. As on date there are over 1100 licences for this product

For the purpose of certification of Packaged Drinking Water (Other Than Packaged Natural Mineral Water), the operational guidelines as given under Operational Manual for Product Certification, November 2004 are to be followed. However, specific details as relevant for IS 14543 are given below;

Scheme of Testing & Inspection

The latest STI is Doc. STI/14543/5 June 2004 with its one amendment issued in August 2004. This STI with its amendment is attached at **Annex 4** for ready reference.

The other related documents such as Marking Fees, Testing Charges, List of BIS & Outside Approved Labs. , Sample Size and Policy guidelines for the product are available by circulation of hard copies as well posted on BIS Intranet. A list of policy guidelines issued so far is enclosed at **Annex 5.**

CHECK LIST FOR SCRUTINY OF APPLICATION & RED FORM

Presently, general Check-lists are being used for scrutiny of application and Red Form. In order to ensure that incomplete applications are not accepted and to maintain uniformity in practices while processing for grant of licence, specific check lists for Water for Scrutiny of Application & Processing of Red Form are enclosed at **Annex 6 & Annex 7** respectively.

PRELIMINARY & PERIODIC INSPECTIONS

Specific proformae for Preliminary Inspection Report and Periodic Inspection Report are given at **Annex 8 & Annex 9** respectively.

USEFUL TIPS FOR IOs

1. To verify the actual factory layout. The layout should clearly indicate the different locations preferably including the following:

    a) Bore well or entry point for the source of raw water, pipeline etc.
    b) Raw water storage facility
    c) Plant for the manufacture of the product (with various stages)
    d) Filling/packing areas, change room, toilet(s), loading/unloading points
    e) Entry/exit with indications of double door/door closures/Air curtains wherever provided
    f) Stores for packaging material and finished product
    g) Laboratory
    h) Actual boundary/perimeter of the establishment
    i) If the premises are also used for residential quarters/other purposes, then specific mention of the same be made with identified locations.

2. As product is under mandatory certification, it is unlike to be in "production" during PI. It is therefore essential to get some production & filling/packing done during the visit and then comments of the firm's capability for the same.

3. It should be clearly reported in the PIR as to whether the filling/packaging adopted are manually operated or automatic. It may be noted that the plastic cups are required to be filled only through automatic machine.

4. Sample be got tested in factory for some requirements possible to be tested, with purpose of verifying manufacturing capability (process controls), competence of the QC personnel and working conditions of test equipment.

5. For sample drawn for independent testing, requirement of Description, Odour & Taste should be tested and reported in PIR, as these are subjective tests.

6. Shelf-Life ("Best Before") Period should be clearly indicated on the test request.

7. STI requires holding material till such time the test result for Each Control Unit are known. Therefore it is important to assess the firm's capability to "store" the product and accordingly the storage facility need to be reported

8. Hygienic conditions need to be assessed as per every clause of Annex B of ISS. Declarations made by the firm with respect to medical examination, Pest Control, Hygiene Schedule, Supervisor designated for Hygiene maintenance, Overall Supervision, Criteria deviced for assessing product durability etc. be verified and reported. All aspects related to recyclable containers, arrangements for cleaning & disinfection be also verified and reported.

Calibration of Instruments

A record for calibration of Lab. equipment need to be maintained by the firm. Although the list of instruments would depend upon the selection of method of test by the firm, the following instruments are considered necessary for calibration.

a) Analytical Balance (To be calibrated once in a year).
b) Temp. recorders of all Incubators (To be calibrated once in a year)

Other instruments, such as spectrophotometer, turbidity meter, pH meter etc. are to be standardized as per the standard operating procedure, normally associated with such instruments.

Drawal of Sample(s) for Independent Testing for considering Grant of Licence

1. **Finished Product (Water)** – Only one sample of processed water is to be drawn, irrespective of the different type/material/capacity of the containers used by the applicant.

   Note 1: In case the applicant is adopting more than one type of processes/source of raw water, separate sample need to be drawn for the processed water resulting from each of such process/source water. Illustration below would require drawal of samples from a) as well as b), even if followed by the same applicant.

   a) Filtration – R.O. – Ozonization and/or U.V. – Filling/Packaging
   b) Filtration – R.O. – Ozonization and/or U.V. – Remineralization – Filling/Packaging

   Note 2: Samples packed in original containers be only sent for testing and shall not be transferred from once container to the other.

2. **Packaging Material** –

   i) In case, test certificate of containers with respect to conformity to IS 15410 is available, sample of each type/ size/ material shall be drawn only for requirement for overall migration and colour migration as per IS 14543 and also for Potability Test as per IS 15410.

   ii) In case, test certificate of containers with respect to conformity to IS 15410 is not available, sample shall be drawn for complete testing to establish conformity of container to IS 15410 and its overall migration and colour migration as per IS 14543.

   Note:- In case, the applicant submits certificate for conformity to Water Potability Test from an outside lab, the case for grant of licence may be considered without waiting for test report of independent sample, subject to review of the case on receipt of the same. The applicant should submit an undertaking that in case of failure of sample in independent testing, he shall abide by the instructions of BIS for stop marking/ withdrawal of permission to use a particular type of container/ cancellation of licence, as the case may be.

3. **Shelf-life Sample** – Sample is **not** to be drawn for "Shelf-life" assessment.

4. **Raw Water –** Sample is **not** to be drawn**.**

5. **Masking of sample** – As far as possible, samples should be sent without the firm's identification markings. The labels from the bottles/Jars, if applied, shall be removed.

6. **Selection of Laboratory for Testing** – Policy Guidelines circulated for the purpose of selection of Lab has to be followed. As far as possible and as praticable, processed water sample should not be sent to such Lab with whom applicant is having arrangement for testing for requirements with frequencies of tests as Monthly & above as per STI.

Scope for the licence to be granted for Packaged Drinking Water

Licence shall **not** be granted with "**open scope**" i.e., without specifying the type, material and capacity of the containers. The grant of licence letter and the subsequent Licence Document shall clearly indicate the following:

a) Material of packaging container (PC/PET/PP/PS etc.)
b) Type of container (Jar, Bottle, Cup, Glass)
c) Capacity of container

(see Guidelines for above classification under Section 2)

Extension of Scope (inclusion of variety) in the licence

There are many instances when licensees request for considering permitting additional types of packaging materials/filling capacities, although basically the product may remain the same (i.e., other than those related to remineralization). These may be considered based on the following:

a) Packing/filling/cleaning and disinfection (of reusable containers) arrangements related to proposed inclusion are verified and recorded on PF305
b) Associated hygienic conditions are verified, if applicable
c) Packaged water shall **not** to be tested for IS 14543
d) Sample for shelf-life test shall not be drawn. Only declaration in this regard shall be obtained, which should be based on in-house studies conducted by the firm.
e) **Sampling for independent testing from Packaging Container should be done as follows:**

In case, test certificate of containers with respect to conformity to IS 15410 is available, sample of each type/ size/ material shall be drawn only for requirement for overall migration and colour migration as per IS 14543 and also for Potability Test as per IS 15410.

In case, test certificate of containers with respect to conformity to IS 15410 is not available, sample shall be drawn for complete testing to establish conformity of container to IS 15410 and its overall migration and colour migration as per IS 14543.

Note:- In case, the licensee submits certificate for conformity to Water Potability Test from an outside lab, the case for inclusion may be considered without waiting for test report of independent sample, subject to review of the case on receipt of the same. The licensee should submit an undertaking that in case of failure of sample in independent testing, he shall abide by the instructions of BIS for stop marking/ withdrawal of permission to use a particular type of container/ cancellation of licence, as the case may be.

Periodic Inspection

a) Reporting on variations of results recorded by the licensee

The IOs are expected to verify and report on parameters tested by the licensees. In order to have uniform practice and ensuring that nothing is missed out, separate provision has been made in periodic inspection report proforma for IS 14543.

b) Reporting on compliance to other requirements of STI

It shall be verified that the formats used by the licensee are in accordance with the guidelines given in the STI. It may be possible to ascertain the quantities manufactured by the firm on Each Control Unit from the records maintained for BIS and not to rely only on the figures provided by the firm separately either from their production books or dispatch documents.

c) Hygienic Conditions

For assessing Hygienic Conditions, all aspects as per Annex B of the ISS be critically assessed and reported in the prescribed proforma for periodic assessment. Overall assessment shall be reported as **Satisfactory** or **Unsatisfactory** keeping in view the following:

i) Whether significant requirements of Annex B of ISS are complied
ii) Whether there is critical flaw in the operation leading to contamination.
iii) Occasional unintentional lapse, such as sudden leakage from a Valve, Leaking Tap or a door closure not working observed during visit may not be considered critical unless it has a direct bearing on the quality of the product.

d) Evidence of Testing

i) STI prescribes many requirements involving long duration tests. It is likely that during surprise inspection some tests (chemical & microbiological) may be in progress which may be verified and suitably reported to substantiate that the STI is being complied with.

ii) However, as the material is to be dispatched only after complete testing, in case some tests are not reported/done due to any reason, it may not be viewed as serious provided records are maintained for the production and that material is not dispatched till complete results are known.

Handling Complaints on Packaged Drinking Water

As the product is meant for mass consumption and also related directly to the health and safety of the consumers, it is quite likely that complaints may arise for the same. The product is not expensive and therefore as per the OMPC 2004 a replacement can straight away be arranged to the complainant. However, the aspect related to the following need to be addressed suitably:

i) Redressal to the complainant may be arranged either from the existing stock (if declared to be conforming) or from the fresh production after resumption of marking is permitted to the licensee.

ii) If is not possible to establish the complaint by visual examination, due to the nature of complaint, it would be necessary to draw sample for independent testing. However the material which has already been opened shall not be drawn for such purpose and the unopened (intact packing) container pertaining to the same lot/batch/Mfg. date shall be drawn.

SECTION 6

ISSUES RELATED TO CERTIFICATION OF NATURAL MINERAL WATER

The basic differences between the Packaged Drinking Water and Packaged Natural Mineral Water have been amply given under the definition clauses of the respective standards. As compared to Packaged Drinking Water, only 8 licences are operative for Packaged Natural Mineral Water. Further, the IS 13428 have 5 Amendments issued of the which the Amendment No. 4 is not under implementation. Presently there is no requirement for plastic containers. However, as both the product are similar in their end –use, the guidelines laid down for IS 14543 through the preceding sections would be applicable. Here also a number policy circulars have been issued. Certain clarifications and guidelines are given herewith and guidelines for IS 14543 may also be applied where applicable.

Natural Mineral Water is obtained directly from natural or drilled sources from underground water-bearing strata for which all possible precautions are taken within the protected perimeters to avoid any pollution of, or external influence on the chemical and physical qualities. Its source is characterized by its content of certain mineral salts and their relative proportions and the presence of trace elements or of other constituents; of the constancy of its composition and the stability of its discharge and its temperature, due account being taken of the cycles of minor natural fluctuations.

The water is collected under conditions which guarantee the original microbiological purity and chemical composition of essential components. It is packaged close to the point of emergence of the source with particular hygienic precautions and it is not subjected to any treatment other than those permitted,

Evidences for constancy of source water composition on account of cycles of minor natural fluctuations during different seasons in a year shall comprise of the following :

a) Test report (in-house and/or from any outside Laboratory) of all the major seasons covering major physico-chemical parameters including temperature of discharge

b) The reports of all the seasons shall be reasonably comparable.

c) Report from the Hydro-geologist covering Genesis of Natural Mineral Water; Period of its residence in the ground; Chemical, Physical & Radiological qualities; and the Risk of pollution.

d) Protective steps taken to prevent deterioration of the source water quality.

e) Approval of Local Health Authority or any other Agency having jurisdiction for the region for the source water.

Treatments permitted include separation from unstable constituents, such as compounds containing iron, manganese, sulphur or arsenic, by decantation and/or filtration, if necessary, accelerated by previous aeration.

The permitted treatments may only be carried out on condition that the mineral content of the water is not modified in its essential constituents, which give the water its properties.

Only simple mechanical filtrations which do not change the composition of the source water are permitted. Processes like Reverse Osmosis, Active Carbon Bed etc. are not permitted.

The transport of natural mineral waters in bulk containers for packaging or for any other process before packaging is prohibited

Disinfection through any means is not permitted for Natural mineral water.

Although both the products are for drinking water their specifications differ in the limits of chemical & microbiological composition. A comparative list indicating the specific difference is given in the **Annex 10** for reference purpose.

ANNEX 1

Subject: Guidelines on ensuring conformity of containers used for Packaged Drinking Water

Packing clause of IS 14543:2004 for Packaged Drinking Water, prescribes that 'Plastic containers shall be conforming to IS 15410 and material used for manufacturing such containers to the migration requirements. In order to uniformly implement the above requirement, following guidelines are issued:

a) GUIDELINES FOR LICENSEE

In order to ensure conformity of containers used for Packaged Drinking Water to IS 15410:2003 by the licensee, following guidelines shall be followed:

Type of container	Parameters	Options for mode of conformity	Frequency to be followed by licensee
a) Plastic Jars	i) Overall migration and colour migration as per Clause 6 of IS 14543:2004 & ii) Conformity to IS 15410:2003	i) 'ISI' marked ii) Test certificate of conformity by the manufacturer of jars iii) In-house Test Reports of licensee, if facilities exist iv) Outside laboratory Test Report of the samples got tested by licensee v) Combination of the above.	**Each consignment** of a specific size/ material of jars received by the licensee

b) Plastic Bottles, Glass/ cups	i) Overall migration and colour migration as per Clause 6 of IS 14543:2004 & ii) Conformity to IS 15410:2003	i) 'ISI' marked ii) Test certificate of conformity by the manufacturer of plastic bottles, glasses/ cups iii) In-house Test Reports of licensee, if facilities exist iv) Outside laboratory Test Report of the samples got tested by licensee v) Combination of the above.	**a) In case bottles, glasses/ cups are received from outside source options as given at i) to v) as given in Column 3 may be followed for any one consignment received during a period of every three months for each capacity, shape and material** **b) In case bottles, glasses/ cups are manufactured from preforms in licensee's own premises, licensee to ensure conformity of container through in-house or outside lab testing or combination thereof, for each type/ capacity/ shape/ material, once in 3 a period of 3 months.**
c) Plastic cap (closures) of containers	i) Overall migration and colour migration as per Clause 6 of IS 14543:2004 & ii) Conformity to IS 15410:2003	i) Declaration/ certificate w.r.t. food grade quality, as permitted under IS 14543 ii) Test certificate from manufacturer for overall migration and colour migration.	**Once in a year** for each type/ shape/ size/ material of closure received from each manufacturer.
d) Foil (for sealing of plastic cups/ glasses)	i) Overall migration and colour migration as per Clause 6 of IS 14543:2004 & ii) Conformity to IS 15410:2003	Declaration/ certificate w.r.t. food grade quality of the material used for the plastic film.	**Once in a year** for each type of material received from each manufacturer.

Note: Licensee to keep records for all types of containers and closures received along with the corresponding test certificate/ reports and to be verified by BIS during periodic inspections for adequacy of the system being followed by licensee to control quality of packaging material received, accepted, rejected and method of disposal.

b) GUIDELINES FOR APPLICANTS

iii) In case, test certificate of containers with respect to conformity to IS 15410 is available, sample of each type/ size/ material shall be drawn only for requirement for overall migration and colour migration as per IS 14543 and also for Potability Test as per IS 15410.

iv) In case, test certificate of containers with respect to conformity to IS 15410 is not available, sample shall be drawn for complete testing to establish conformity of container to IS 15410 and its overall migration and colour migration as per IS 14543.

Note:- In case, the applicant submits certificate for conformity to Water Potability Test from an outside lab, the case for grant of licence may be considered without waiting for test report of independent sample, subject to review of the case on receipt of the same. The applicant should submit an undertaking that in case of failure of sample in independent testing, he shall abide by the instructions of BIS for stop marking/ withdrawal of permission to use a particular type of container/ cancellation of licence, as the case may be.

c) GUIDELINES FOR DRAWAL OF SAMPLES DURING OPERATION OF LICENCE

BO's shall draw minimum one sample of any type/ size/ material once in a year to establish conformity of containers to IS 15410 and in such a way that all types/ sizes/ material of containers are tested in rotation over a period of time.

d) GUIDELINES FOR REUSED CONTAINERS

Licensees are required to ensure use of only such jars whose transparency continues to meet the minimum requirements of 85% as per IS 15410 even after its repeated use. BO may draw sample of reusable container for ascertaining continued suitability over a period of time by getting the same tested for transparency requirement. Every market sample of processed water filled in reusable jar shall be got tested for transparency requirement also as per IS 15410. Jars which get deshaped and mutilated during the course of use shall not be permitted. Licensees may be advised in this regard strictly. Further action may be taken as per Operation Manual for Product Certification.

ANNEX - 2

GUIDELINES FOR ASSESSMENT OF HYGIENIC CONDITIONS

REQUIREMENT OF INDIAN STANDARD	EXPLANATORY NOTES FOR GUIDANCE
B-1 FIELD OF APPLICATION The hygienic practices cover the appropriate general techniques for collecting drinking water, its treatment, bottling, packaging, storage, transport, distribution and sale for direct consumption, so as to guarantee a safe healthy and whole some product.	
B-2 HYGIENE PRESCRIPTIONS FOR COLLECTION OF DRINKING WATER	
B-2.1 Extraction or Collection In the case of extraction or collection of water intended for packaging from ground water sources, it should be ensured that it is safe from pollution, whether caused by natural occurrence or actions or neglect or ill-will.	It may be ensured that the ground water source is reasonably away from any polluting source like drain/ sewer/ septic tank. Clear declaration from the manufacturer for ensuring that the ground water source is safe from pollution either by natural occurrence or because of action/ neglect/ ill-will shall be taken.
B-2.2 If water to be processed for packing is obtained from any other potable source it should be protected from its being contaminated.	The tanker should be rust free, properly covered, well maintained and without leakage.
B-2.3 The firms using waters from drinking water systems intended for packaging, should ensure that it meets the requirements of the standard.	
B-2.4 Materials The pipes, pumps or other possible devices coming into contact with water and used for its collection should be made of such material that they do not change the quality of water.	The material should preferably be of stainless steel. However, GI or plastic material may also be used. In case of plastic materials, it should be supported with certificate for its foodgrade quality. Rubber pipe shall not be permitted.
B-3 PROTECTIVE MEASURES	
B-3.1 All possible precautions should be taken within the protected perimeter to avoid any pollution of, or external influence on, the quality of the ground or surface water. Preventive measures should be taken for disposal of liquid, solid or gaseous waste that could pollute the ground or surface water. Drinking water resources should not be in the path of potential source of underground contamination.	The surrounding of the source water outlet should be completely covered with pucca construction to avoid contamination due to ingress of external causes. If it is at ground level then it should be covered with a boundary wall upto an adequate height.
B-3.2 Protection of the Area of Origin	
The immediate surroundings of the extraction or	Outlets of bore well/ well heads should be

collection area should be protected by limiting access to authorized persons only. Wellheads and spring outflows should be protected by a suitable structure to prevent entry by unauthorized individuals, pests and other sources of extraneous matter.	covered and locked. Units should prevent entries of individuals, pests and other sources of extraneous matter to the immediate surroundings of source of water.
B-4 TRANSPORT OF DRINKING WATER	
B-4.1 Means of Transport, Piping and Reservoirs Any vehicle, piping or reservoir used in the processing of water from its source to the bottling facilities, should be made of inert material such as ceramic and stainless steel which prevent any deterioration, be it by water, handling, servicing or by disinfection; it should allow easy cleaning.	Water from the source to processing unit may be transported either by vehicular tankers or through pipes. The inside layer of tankers may be made of material such as stainless steel, food grade plastic, GI etc. M.S. is not recommended. Piping used should preferably be of SS. However, food grade plastics or GI may also be permitted. Rubber pipe should not be permitted. Reservoir should preferably be of SS. In case of plastic reservoir, inside layer should be of food grade plastic (certificate may be collected). Cemented (underground/ overground) reservoir should be properly tiled from inside.
B-4.2 Maintenance of Vehicles and Reservoirs Any vehicle or reservoir should be properly cleaned and, if necessary, disinfected and kept in good repair so as not to present any danger of contamination to drinking water and of deterioration of its quality.	The design of vehicle/ reservoir should be such as to enable easy cleaning or disinfection and it should be properly maintained throughout the operation of licence.
B-5 ESTABLISHMENT FOR PROCESSING OF DRINKING WATER – DESIGN AND FACILITIES	
B-5.1 Location Establishments should be located in areas which are free from objectionable odours, smoke, dust or other contaminants and are not subject to flooding.	The unit should not be in low lying area such as basement. Factories in open area/ field should have its proper boundaries with controlled access.
B-5.2 Roadways and Areas Used by Wheeled Traffic Such roadways and areas serving the establishment which are within its boundaries or in its immediate vicinity should have a hard paved surface suitable for wheeled traffic. There should be adequate	Areas in front of main entry to the unit and immediate surroundings should be paved (pucca) or properly grassed to prevent dust contamination due to vehicular traffic.

drainage and provision should be made for protection of the extraction area.	
B-5.3 Buildings and Facilities	
B-5.3.1 Type of construction Buildings and facilities should be of sound construction and maintained in good repair.	Buildings should be sound pucca construction, preferably plastered and properly painted/ white washed. Internal partitions made of plastic may be accepted.
B-5.3.2 Disposition of Holding Facilities Rooms for recreation, for storing or packaging of water and areas for cleaning of containers to be reused should be apart from the bottling areas to prevent the end products from being contaminated. Raw materials and packaging materials and any other materials which come into contact with drinking water should be stored apart from other material.	The manufacturing area should not be permitted for general residence purposes. In case of any duty quarters for workers/ residential area, the same should be reasonably away from the plant and clearly demarcated and maintained. Area for cleaning of reusable containers, packaging material and storage of finished water should be separate from processing/ filling area. All types of packaging materials should be stored in a separate room/ area.
B-5.3.3 Adequate working space should be provided to allow for satisfactory performance of all operations.	Sufficient space should be available for easy movement in different operations of manufacturing.
B-5.3.4 The design should be such as to permit easy and adequate cleaning and to facilitate proper supervision of hygiene for drinking water.	
B-5.3.5 The buildings and facilities should be designed to provide separation by partition, location or other effective means between those operations which may cause cross-contamination.	There should not be any other activity except production and packing of water. In case similar products like cold drink/ beverages/ soda are also manufactured in the same premises, these activities should be clearly and entirely separated from water manufacturing and packing facilities. However, for such food items manufacturing, use of processed water through a separate pipe line and plant and machinery may be permitted. There should be proper separation between different processing activities like blowing of bottles/ storage of containers : cleaning of reusable containers: raw water storage tank: filtration (ROs/Micron) disinfection and filling. Exhaust of laboratory should not open in processing/ filling area.
B-5.3.6 Buildings and facilities should be designed to facilitate hygienic operations by means of a	As far as possible the flow of air should be from filling room to the outer area and not the

regulated flow in the process from the arrival of the drinking water at the premises to the finished product, and should provide for appropriate conditions for the process and the product.	other way round.
B-5.3.7 Drinking Water Handling, Storing and Bottling Areas	
B-5.3.7.1 Floors Where appropriate, should be of water-proof, non-absorbent, washable, non-slip and non-toxic materials, without crevices, and should be easy to clean and disinfect. Where appropriate, floors should have sufficient slope for liquids to drain to trapped outlet.	The flooring should be smooth, without any cracks/ broken surfaces. Joints shall be properly filled and smooth. Drains should always be in clean condition and provided with traps to prevent the entries of rats/ pests.
B-5.3.7.2 Walls Where appropriate, should be of water proof, non-absorbent, washable and non-toxic materials and should be light coloured. Up to a height appropriate for the operation they should be smooth and without crevices, and should be easy to clean and disinfect. Where appropriate, angles between walls, between walls and floors and between walls and ceilings should be sealed and smoothen to facilitate cleaning.	In case of cemented walls, tiles upto height of about 5 to 8 feet from floor level should be provided. Wall made of smooth plastic material may be accepted.
B-5.3.7.3 Ceilings Should be so designed, constructed and finished as to prevent the accumulation of dirt and minimize, condensation, mould growth and flaking, and should be easy to clean.	Ceiling should preferably be pucca cemented and smooth. However, factories with tin shed should have proper smooth false ceiling made of non absorbent material. Wood or similar material should not be used as it may attract fungal/ mould growth.
B-5.3.7.4 Windows Windows and other openings should be so constructed as to avoid accumulation of dirt and those which open should be fitted with screens. Screens should be easily movable and cleaning and kept in good repair. Internal window sills should be sloped to prevent use as shelves.	Open windows should not be permitted. Windows shall be provided with net screens which are easily cleanable and moveable. Fittings shall be so intact as to prevent entry of mosquitoes/ flies.
B-5.3.7.5 Doors Should have smooth, non-absorbent surfaces and, where appropriate, be self-closing and close fitting type.	Each door should have door closure. Air curtains should preferably be provided at different entries including all inlets and outlets of filling room. The surface of doors should be of non absorbent material.

B-5.3.7.6 Stairs, lift cages and auxiliary structures Platforms, ladders, chutes, should be so situated and constructed as not to cause contamination to drinking water. Chutes should be constructed with provision of inspection and cleaning hatches.	All stairs, lifts, chutes and ladders should be of sound construction and properly painted.
B-5.3.7.7 Piping Piping for drinking water lines should be independent of non-potable water.	Different colour coding should be provided so as to easily distinguish between different pipe lines. The pipe line meant for potable water should preferably be green in colour. The entire pipe line for production water including joints after RO, shall be made of stainless steel. The joints should preferably be of dairy fitting type.
B-5.3.8 In drinking water handling areas all overhead structures and fittings should be installed in such a manner as to avoid contamination directly or indirectly of drinking water and raw materials by condensation and drip and should not hamper cleaning operations. They should be insulated where appropriate and be so designed and finished as to prevent the accumulation of dirt and to minimize condensation, mould growth and flaking. They should be easy to clean.	In case fall ceiling is provided, care should be taken to periodically clean the same and it should be ensured that ceiling is perfect (without any breakage/ seepage) at all times.
B-5.3.9 Living quarters, toilets and areas where animals are kept should be completely separated and should not open directly on to drinking water handling areas.	
5.3.10 Where appropriate, establishments should be so designed that access can be controlled.	Entry to different water processing area should be controlled in such a way that only the assigned persons have the access.
5.3.11 The use of material which cannot be adequately cleaned and disinfected, such as, wood, should be avoided unless its use would not be a source of contamination.	Wood in any form should not be used in processing and filling area.
5.3.12 Canalization, Drainage Lines Canalization and drainage and used water lines should be built and maintained in such a manner as not to present any risk whatsoever of polluting the underground water source. .	The drainage line of plant should have proper slope and should be made of material which facilitate easy cleaning. There should not be any stagnation of water/ effluent. The main drainage line of the plant should be of sound structure, fully covered and should open outside the plant only, away from underground water source.

5.3.13 Fuel Storage Area Any storage area for the storing of fuels, such as, coal or hydrocarbons should be designed, protected, controlled and maintained in such a manner as not to present a risk of pollution during the storage and manipulation of these fuels.	
B-5.4 Hygienic Facilities	
B-5.4.1 Water Supply	
B-5.4.1.1 Ample supply of potable water under adequate pressure and of suitable temperature should be available with adequate facilities for its storage, where necessary, and distribution with adequate protection against contamination. The potable water should conform to IS 10500.	Conformity of raw water is for guidance only. It should be ensured that the source of raw water (potable) remains uniform. The use of raw water from different sources should not be done. However in case of change of source, provisions of STI shall be followed. In order to monitor the uniform supply of raw water, testing of the same should be carried out as per the frequency prescribed in STI and records be maintained.
B-5.4.1.2 Potable water, non-potable water for steam production or for refrigeration or for any other use should be carried in separate lines with no cross connection between them and without any chance of back siphonage. It would be desirable that these lines be identified by different colours.	**See** Explanatory notes against Cl. B-5.3.7.7
B-5.4.2 Effluent and Waste Disposal Establishments should have an efficient effluent and waste disposal system which should at all times be maintained in good order and repair. All effluent lines (including sewer system) should be large enough to carry the full loads and should be so constructed as to avoid contamination of potable water supplies.	Pipe line carrying the effluent and waste should preferably be of red in colour.
B-5.4.3 Changing Facilities and Toilets Adequate, suitable and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be so designed as to ensure hygienic removal of waste matter. These areas should be well lighted, ventilated and should not open directly on to drinking water handling areas. Hand washing facilities with warm or hot and cold water, a suitable hand-cleaning preparation, and with suitable hygienic means of drying hands, should be provided adjacent to toilets and in such a	Entrance to the production unit should be through change room. Change room should have hand washing facilities (with hot and cold water) wash basin, foot cleaning and drying facilities. Protective clothing, footwear and head gear should be changed inside the change room only. The protective clothings. should be

position that the employee will have to use them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided near each washing facility. Care should be taken that these receptacles for used paper towels are regularly emptied. Taps of a non-hand operatable type are desirable. Notices should be posted directing personnel to wash their hands after using the toilets.	taken out as and when workers go out of the production hall. So as to prevent any contamination of the same. Toilets should be provided for workers and should always be kept clean. These should be properly separated from water handling areas. Toilets should be made of pucca structured preferably tiled with proper doors and water facilities. Hand and foot washing facilities should be provided adjacent to toilets. Notices giving instructions for hand and food washing after using toilets (in local languages) should be pasted at proper places.
B-5.4.4 Hand Washing Facilities in Processing Area Adequate and conveniently located facilities for hand washing and drying should ;be provided wherever the process demands. Where appropriate facilities for hand disinfection should also be provided. Warm or hot and cold water should be available and taps for mixing the two should be provided. There should be suitable hygienic means of drying hands. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided adjacent to each washing facility. Taps of a non-hand operatable type are desirable. The facilities should be furnished with properly trapped waste pipes leading to drains.	**See** explanatory notes against Cl. No. B-5.4.3
B-5.4.5 Disinfection Facilities Where appropriate, adequate facilities for cleaning and disinfection of equipment should be provided. These facilities should be constructed of corrosion resistant materials, capable of being easily cleaned, and should be fitted with suitable means of supplying hot and cold water in sufficient quantities.	Disinfection of pipe lines and process equipments should preferably be done before commencement of production.
B-5.4.6 Lighting Adequate lighting should be provided throughout the establishment. Where appropriate, the lighting should not alter colours and the intensity should not be less than: a) 540 lux (50 foot candles) at all inspection points, b) 220 lux (20 foot candles) in work rooms, and c) 110 lux (10 foot candles) in other areas.	Intensity of light is given only for guidance. However the IO should judge the adequacy of light intensity required for carrying out various activities. Suspended light bulbs and fixtures should be protected by providing suitable covers.

Suspended light bulbs and fixtures in any stage of production should be of a safer type and protected to prevent contamination of drinking water in case of breakage.	
B-5.4.7 Ventilation Adequate ventilation should be provided to prevent excessive heat, steam condensation and dust and to remove contaminated air. The direction of the air flow should never be from a dirty area to a clean area. Ventilation openings should be provided with a screen or other protecting enclosure of non-corrodible material. Screens should be easily removable for cleaning.	Exhaust openings should be covered with wiremesh or with suitable flaps. Air curtains should be fitted in such a way that air should not flow towards water filling room/ area.
B-5.4.8 Facilities for Storage of Waste and Inedible Material Facilities should be provided for the storage of waste and inedible material prior to removal from the establishment. These facilities should be designed to prevent access to waste or inedible material by pests and to avoid contamination of drinking water; equipment, buildings or roadways on the premises.	Facilities for storage of water and edible material should be outside the processing plant and finished product storage area.
B-5.5 Equipments and Utensils	
B-5.5.1 Materials All equipment and utensils used in drinking water handling areas and which may contact the drinking water should be made of material which does not transmit toxic substances, odour or taste, is non-absorbent, is resistant to corrosion and is capable of withstanding repeated cleaning and disinfection. Surfaces should be smooth and free from pits and crevices. The use of wood and other materials which cannot be adequately cleaned and disinfected should be avoided except when their use would not be a source of contamination.	
B-5.5.2. Hygienic Design, Construction and Installation	
B-5.5.2.1 All equipment and utensils should be so designed and constructed as to prevent hazards and permit easy and thorough cleaning and disinfection.	
B-6 ESTABLISHMENT	
B-6.1 Maintenance The buildings, equipments, utensils and all other physical facilities of the establishment, including drains, should be maintained in good repair and in an	

orderly condition.	
B-6.2 Cleaning and Disinfection	
B-6.2.1 To prevent contamination of drinking water, all equipment and utensils should be cleaned as frequently as necessary and disinfected whenever circumstances demand.	All equipments and utensils should be cleaned and disinfected every day before commencement of production.
B-6.2.2 Adequate precautions should be taken to prevent drinking water from being contaminated during cleaning or disinfection of rooms, equipment or utensils, by wash water and detergents or by disinfectants and their solutions. Detergents and disinfectants should be suitable for the purpose intended. Any residues of these agents on a surface which with may come in contact with drinking water should be removed by thorough rinsing with water, before the area or equipment is again used for handling drinking water.	**See** explanatory note as given in B-5.4.5
B-6.2.3 Either immediately after cessation of work for the day or at such other times as may be appropriate, floors, including drains, auxiliary structures and walls of water handling areas should be thoroughly cleaned.	
B-6.2.4 Changing facilities and toilets should be kept clean at all times	Changing facilities like aprons, headgears, mask etc. should be available in sufficient numbers to meet daily and contingency requirement.
B-6.2.5 Roadways and yards in the immediate vicinity of and serving the premises should be kept clean.	The area surrounding the unit may be grassed to prevent entry of dirt and dust in the plant.
B-6.3 Hygiene Control Programme	
A permanent cleaning and disinfection should be drawn up for establishment to ensure that all areas are appropriately cleaned and that critical areas, equipment and material are designated for special attention. An individual, who should preferably be a permanent member of the staff of the establishment and whose duties should be independent of production, should be appointed to be responsible for the cleanliness of the establishment. He should have a thorough understanding of the significance of contamination and the hazards involved. All cleaning personnel should be well-trained in cleaning techniques.	The hygiene control programme should cover all aspects. An elaborate hygiene control plan should be drawn for monitoring the hygienic conditions of the plant and personnel. The plan should invariably include the following: 1) Hygiene requirement 2) Frequency 3) Name of the person directly responsible for supervision The above plan should be monitored by a designated person who has thorough understanding of significance of contaminants and hazards. The hygiene control schedule should be properly displayed at different points like

	processing/ filling/ storage.
B-6.4 Storage and Disposal of Waste	
Waste material should be handled in such a manner as to avoid contamination of drinking water. Care should be taken to prevent access to waste by pests. Waste should be removed from the water handling and other working areas as often as necessary and at least daily. Immediately after disposal of the waste, receptacles used for storage and any equipment which has come into contact with the waste should be cleaned and disinfected. The waste storage area should also be cleaned and disinfected.	**See** explanatory notes as given in Cl. B-5.4.2
B-6.5 Exclusion of Animals	
Animals that are uncontrolled or that could be a hazard to health should be excluded from establishments.	No animal or pest should be allowed inside the plant area.
B-6.6 Pest Control	
B-6.6.1 There should be an effective and continuous programme for the control of pests. Establishments and surrounding area should be regularly examined for evidence of infestation.	Pest control measures should preferably be got done through professional agencies with clear indication of validity period, through a certificate for the same.
B-6.6.2 If pests gain entrance to the establishment, eradication measures should be instituted. Control measures involving treatment with chemical, physical or biological agents should only be undertaken by or under direct supervision of personnel who have a thorough understanding of the potential hazards to health resulting from the use of these agents, including those hazards which may arise from residues retained in the drinking water.	Pesticides designated safe for use in food industry should only be used under direct supervision of trained personnel.
B-6.6.3 Pesticides should only be used if other precautionary measures cannot be used effectively. Before pesticides are applied, care should be taken to safeguard drinking water, equipment and utensils from contamination. After application, contaminated equipment and utensils should be thoroughly cleaned to remove residues prior to be used again.	**See** explanatory note as given in Cl. B—6.6.2
B-6.7 Storage of Hazardous Substances	
B-6.7.1 Pesticides or other substances which may present a hazard to health should be suitably labeled with a warning about their toxicity and use. They should be stored in locked rooms or cabinets, and dispersed and handled only by authorized and properly trained personnel or by persons under strict supervision of trained personnel. Extreme care should be taken to avoid contamination.	

B-6.7.2 Except when necessary for hygienic or processing purposes, no substance which could contaminate drinking water should be used or stored in drinking water handling areas.	
B-6.8 Personal Effects and Clothing	
Personal effects and clothing should not be deposited in drinking water handling areas.	Protective clothing should not be permitted to be taken out beyond change room. Separate cabinets for storage of personal belongings should preferably be provided.
B-7 Personnel; Hygiene and Health Requirements.	
B-7.1 Hygiene Training	
Managers of establishments should arrange for adequate and continuing training of all water handlers in hygienic handling of water and in personal hygiene so that they understand the precautions necessary to prevent contamination of drinking water.	
B-7.2 Medical Examination	
Persons who come into contact with drinking water in the course of their work should have a medical examination prior to employment, if the official agency having jurisdiction acting on medical advice, considers that this is necessary, whether because of epidemiological considerations or the medical history of the prospective water handler. Medical examination of water handlers should be periodically carried out and when clinically or epidemiologically indicated.	Medical examination of all workers should be got done atleast once in a year or as and when required. In case of any new worker joins, his fitness with respect to freedom from communicable diseases should be first medically examined before permitting work in water processing area.
B-7.3 Communicable Diseases	
The management should take care to ensure that no person, whether known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted or afflicted with infected wounds, skin infections, sores or diarrhea, is permitted to work in any drinking water handling area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating drinking water with pathogenic micro-organisms. Any person so affected should immediately report to the management.	Medical examination report should clearly indicate that the workers are free from any communicable diseases.
B-7.4 Injuries	
Any person who has a cut or wound should not continue to handle drinking water or contact surfaces until the injury is completely protected with a waterproof covering which is firmly secured and which is conspicuous in colour. Adequate first-aid facilities should be provided for this purpose.	Availability of first aid box should be ensured.
B-7.5 Washing of Hands	

Every person, while on duty in a drinking water handling area, should wash the hands frequently and thoroughly with a suitable hand cleaning preparation under running warm water. Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material and whenever else necessary. After handling any material which might be capable of transmitting disease, hands should be washed and disinfected immediately. Notices requiring hand-washing should be displayed. There should be adequate supervision to ensure compliance with this requirement.	Foot operated or photo sensitive taps may preferably be used.
B-7.6 Personal Cleanliness	
Every person engaged in a drinking water handling area should maintain a high degree of personal cleanliness while on duty and should, at all times while so engaged, wear suitable protective clothing including head covering and footwear, all of which should be cleanable, unless designed to be disposed off and should be maintained in a clean condition consistent with the nature of the work in which the person is engaged. Aprons and similar items should not be washed on the floor. When drinking water is manipulated by hand, any jewellery that cannot be adequately disinfected should be removed from the hands. Personnel should not wear any insecure jewellery when engaged in handling drinking water.	Wearing of protective clothing should be ensured when the plant is in operation.
B-7.7 Personal Behaviour	
Any behaviour which could result in contamination of drinking water, such as eating, use of tobacco, chewing (for example, gum, sticks, betel nuts, etc.) or unhygienic practices, such as, spitting, should be prohibited in drinking water handling areas.	Proper notices in this regard should be displayed in local languages at appropriate places.
B-7.8 Visitors	
Precautions should be taken to prevent visitors as far as possible from visiting the drinking water handling areas. If unavoidable, the visitors should observe the provisions of B-6.8 and B-7.3	General visitors should be prohibited for entering into processing area.
B-7.9 Supervision	
Responsible for ensuring compliance by all personnel with the requirements of B-6.1 to B-6.8 and the responsibility should be specifically allocated to competent supervisory personnel.	Hygiene supervisor should be other than the one responsible for production. However, the overall supervision for requirements of B-6.1 to B6.8 may be done by a senior person irrespective of actual work area.
B-8 ESTABLISHMENT: HYGIENIC PROCESSING REQUIREMENTS	
B-8.1 Raw material Requirements	

To guarantee a good and stable quality of drinking water, the quality criteria should be monitored regularly.	**See** explanatory note given in Cl. B-5.4.1.1
B-8.2 Should there be a perceptible lacking in meeting the requirements, necessary corrective measures are immediately to be taken.	
B-8.3 Treatment	
The treatment may include decantation, filtration, combination filtration (for example, membrane filters, depth filters, cartridge filters, activated carbon), demineralization, reverse osmosis, aeration, and disinfection.	IO should specifically report the type of processes adopted by the firm for production and disinfection.. Any subsequent change in the process should be positively informed to BIS.
B-8.3.1 Processing should be supervised by technically competent personnel.	
B-8.3.2 All steps in the production process, including packaging, should be performed without unnecessary delay and under conditions which will prevent the possibility of contamination, deterioration, or the growth of pathogenic and spoilage micro-organisms.	The water processed in a day should be filled/ packed on the same day. The left out processed water should be either reprocessed or drained on the subsequent day.
B-8.3.3 Rough treatment of containers should be avoided to prevent the possibility of contamination of the processed product.	Reusable containers where transparency or shape is impaired because of repeated use, should be rejected.
B-8.3.4 Treatment are necessary controls and should be such as to protect against contamination or development of a public health hazard and against deterioration within the limits of good commercial practice.	
H-8.4 Packaging Material and Containers	
B-8.4.1 All packaging materials should be stored in a clean and hygienic manner. The material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits specified. The packaging material should be sound and should provide appropriate protection from contamination. Only packaging material required for immediate use should be kept in the packing or filling area.	Separate stores should be available for packaging material, finished products and other items. Containers/ bottles received or blown by the firm should be stored with closed caps to avoid any contamination.
B-8.4.2 Product containers should not have been used for any purpose that may lead to contamination of the product. In case of new containers if there is a possibility that they have been contaminated, should be cleaned and disinfected. When chemicals are used for these purposes, the container should be rinsed. Containers should be well drained after rinsing. Used and, when necessary; unused	The reusable containers and caps should be cleaned, disinfected, washed and rinsed (with processed water) before filling. Various options are available for disinfection like use of chlorinated water (using hypochloride), food grade detergents like Ranocide etc. However, use of disinfectants

containers should be inspected immediately before filling.	(one or a combination) should be left with the manufacturer. Due care should be taken that no residue of disinfectant is left in the pipeline/ container.
B-8.5 Filling and Sealing of Containers	
B-8.5.1 Packaging should be done under conditions that preclude the introduction of contaminants in the product.	Filling room should be regularly disinfected. For this purpose, various options may be assessed such as use of UV light, filling under sterile positive pressure etc. However, selection of disinfectant should be left at the discretion of manufacturer.
B-8.5.2 The methods, equipment and material used for sealing should guarantee a tight and impervious sealing and should not damage the containers nor deteriorate the physical, chemical, microbiological and organoleptic qualities of drinking water.	To ensure tight and impervious sealing, the shrinkable sleeve may be used on caps and the container may be held upside down to check for any leakage. The container may be visually inspected for any suspended particle etc. against an illuminated screen. The above method is suggestive. However, any other suitable method may be used.
B-8.6 Packaging of Containers	
The packaging of containers should protect the latter from contamination and damage and allow appropriate handling and storing.	The reusable containers may preferably be wrapped in a plastic (polyethylene) film/ bag to avoid any damage/ transparency to the container. Every time new polyethylene cover should be used.
B-8.7 Lot Identification	
Each container shall be permanently marked with code to identify the producing factory and the lot. A lot is quantity of drinking water produced under identical conditions, all packages of which should bear a lot number that identifies the production during a particular time, interval and usually from a particular 'processing line' or other processing unit.	The date of manufacturing should be clearly indicated on the container itself, in one straight line instead of any other combination which may not be consumer friendly. Writing of batch No. in place of manufacturing date should not be practiced unless it is declared that batch number and manufacturing date are the same.
B-8.8 Processing and Production Records	
Permanent, legible and dated records of pertinent processing and production details should be kept concerning each lot. These records should be retained for a period that exceeds the shelf life of the product or longer if required. Records should also be kept of the initial distribution by lot.	Batch wise records of production and dispatch for each type of container should be maintained separately.
B-8.9 Product Durability	
Product durability shall be declared on the container as per 7.1 (g). It shall be based on in-house self life study and proper checks and records be maintained for the conformity of the declared product durability.	Product durability should not be less than one month. Each type of container should be subjected for durability assessment and based on the study conducted by the manufacturer, the shelf life should be declared. Records of

	the same should be maintained and may be verified by IO. Decision about the type of study should be left with the manufacturer. Durability study should be reassessed by the licensee atleast once in a year for each type of container.
B-8.10 Storage and Transport of the End-Product	
The end-product should be stored and transported under such conditions as will preclude contamination with and/or proliferation of micro-organisms and protect against deterioration of the product or damage to the container. During storage, periodic inspection of the end-product should take place to ensure that only drinking water which is fit for human consumption is dispatched and that the end-product specifications are complied with.	The finished product should not be stored under direct sun light. Manufacturer should invariably exercise to inspect the end product available in distribution chain to ensure its compliance to the specification. This may be done either directly or to proper arrangements with their dealer/ distributor. Manufacturer should provide proper training to the distributor/ marketer for its proper storage and distribution. Manufacturer is liable for the product quality till it reaches the consumer.

ANNEX 3

A TYPICAL MANUFACTURING PROCESS

Following treatment steps are involved in the manufacturing process:

Raw Water →Raw Water Storage Tank→ Raw Water Feed Pump→ dosing system 1 & 2→ Pressure Sand Filter→ Activated Carbon Filter → Micron Cartridge Filter High Pressure Pump→ Reverse Osmosis→ Ozone generator and re circulation → Finished Water Storage → U.V System → Filling and Packing → Visual Examination →Storage for testing → Forwarding.

1) DOSING SYSTEM 1 & 2

The water is drawn from Bore Well line. The water is then collected to storage tank. It then goes to dosing system through raw water feed pump. In the dosing system, antiscalent is used for the softening of the water.

2) PRESSURE SAND FILTER

From dosing system water goes to pressure sand filter, where the impurities of raw water are removed.

3) ACTIVATED CARBON FILTER

From pressure sand filter water goes to activated carbon filter where organic impurities are removed.

4) MICRON CARTRIDGE FILTER (MCF)

Water is then passed through micron filter. This filter removes the micron particles from the water.

5) DEMINERALISATION BY REVERSE OSMOSIS SYSTEM (R.O.)

Water from MCF goes to R.O. System through High Pressure Pump. R.O. removes 90-95% of dissolved solids. The finished water is passed into Storage Tank.

6) OZONE GENERATOR WITH RE-CIRCUALTION

Finished water from R.O. system is stored in S.S made storage tank. The tank is provided with the Man Hole so that the tank can be cleaned. This tank is used as ozone circulation tank. The ozone is passed to this tank for disinfections.

7) U.V. SYSTEM

Water from S.S. tank is passed through MCF to U.V. disinfection system, where the bacteria are inactivated.

8) FILLING AND PACKING

Water is then filled in cleaned and rinsed containers.

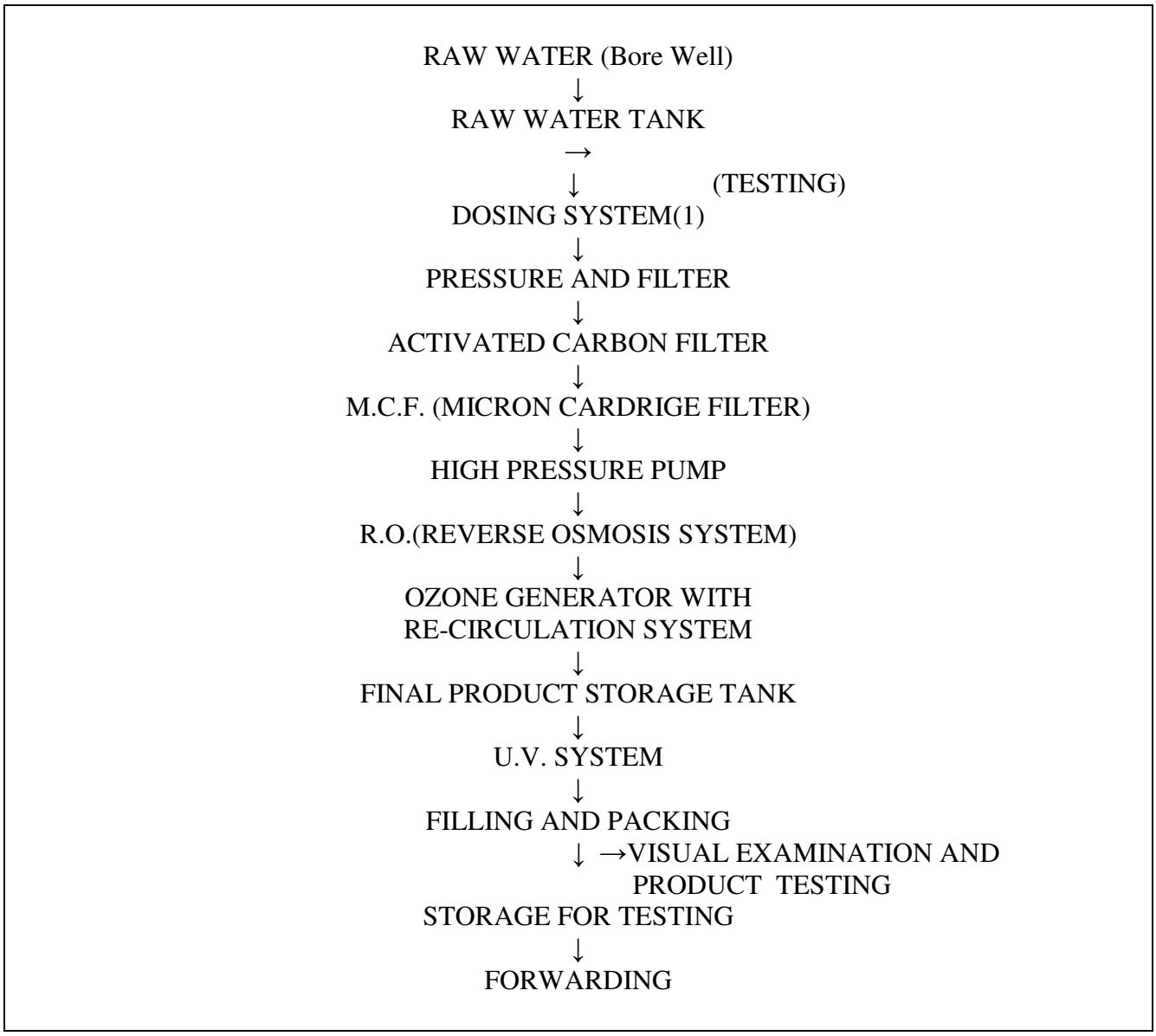
9) VISUAL EXAMINATION

Containers are visually inspected for any leakage and suspended matter against illuminated screen.

10) TESTING

The raw water is tested two times in a month. Finished water is tested as per scheme of testing prescribed by BIS.

A TYPICAL PROCESS FLOW CHART



A TYPICAL CIP PROCESS

Sanitization and Sterilization is done daily before resuming production

SANITIZATION

1. Take sufficient quantity of soft water in CIP tank.
2. Add required quantity sod. Hypo. Chloride solution in CIP tank containing soft water.
3. Now start CIP pump.
4. Let the chlorine solution go into both tank through CIP line.
5. Solution will go from top through CIP volume which distributes solution in entire tank.
6. Check the available chlorine.
7. Chlorine (free) should be 10-15 PPM.
8. If %age of chlorine is less then add more hypo chloride solution till required strength of chlorine is achieved in water.
9. Start feed pump and pass solution through sand filter, all micron filters, Ozone contact column etc.. and then filling machine.
10. Hold this solution at least for 30 minutes and can be extended to overnight.
11. Drain out the solution from the whole system.
12. Take fresh water and remove the chlorine of storage tank.
13. After removing chlorine traces from storage tank, fill with fresh bore well water.
14. Remove the chlorine traces from each points upto filling machine by flushing with fresh water.
15. To check the residual chlorine use chlorotex reagent.

STERLIZATION

1. Steam is generated by boiler.
2. Soft water which is produced by softner is used in boiler to generate steam.
3. This, steam is supplied in both storage tank, break tank, bore well line and pipe lines upto filling machine.
4. Continue the steam supply in tanks till attains required temp. (un-bearable when touched).
5. Continue the steam supply to filling machine till steam comes out from all rinsing and filling nozzle of machine.
6. Stop steam supply and disconnect the hose pipe.
7. Rinse the whole system with fresh water.

TYPICAL CLEANING AND WASHING SYSTEM OF RE-USABLE JARS

The process of cleaning and washing of re-usable jars is as follows:-

1. The jars are checked for crack, contamination and foul odors. The jars not fit for re-use are rejected.
2. The Jars are capped with cap and washing of outside surface is done thoroughly with Detergent solution and normal water.
3. After outer cleaning, jars are internally washed with food grade detergents (like iodine based) and then thoroughly washed till free from the last traces of detergent.
4. Then clean jars are sent to filling station.
5. At filling station, jars are rinsed internally with product water.

Annex 4 **DOC:STI/14543/5**
June 2004

SCHEME OF TESTING AND INSPECTION
FOR CERTIFICATION OFPACKAGED DRINKING WATER
(OTHER THAN PACKAGED NATURAL MINERAL WATER)
ACCORDING TO IS 14543:2004

1.0 **LABORATORY–** A laboratory shall be maintained, which shall be suitably equipped and staffed, where different tests given in the specification shall be carried out in accordance with the method given in the specification.

1.1 All the testing apparatus shall be periodically checked and calibrated and records of such checks/calibration maintained.

2.0 **TEST RECORDS**– All records of tests and inspection shall be kept in suitable forms approved by the Bureau of Indian Standards.

2.1 Copies of any records and other connected papers that may be required by Bureau shall be made available at any time on request.

3.0 **QUALITY CONTROL–** It is recommended that, as far as possible, Statistical Quality Control (SQC) methods may be used for controlling the quality of the product during production as envisaged in this Scheme[See IS 397(Part 1):2003, IS 397 (Part 2):2003 and IS 397 (Part 3):2003].

3.1 In addition, efforts should be made to gradually introduce a a quality management system in accordance with the quality system modules as per IS/ISO 9001.

4.0 **STANDARD MARK** – The Standard Mark(s), as given in column (1)of the First Schedule of the licence shall be clearly marked legibly and indelibly on the label of the bottle/container, as the case may be provided always that the material in each bottle/container to which this mark is applied conforms to every requirement of the specification. The dimension of standard mark shall be in accordance with preferred specified design.

5.0 **PACKING –** The packaged drinking water shall be packed as per clause 3.2, clause 6 and Annex B of IS 14543:2004. The plastic container shall be conforming to IS 15410:2003. Licensee may either use BIS Certified plastic container or get the test certificate from outside approved lab of BIS. Manufacturer test certificate in this regard may also be accepted.

5.1 *The conformity to overall migration limit & colour migration limit shall be ensured for all the packaging material of plastic origin before use as per IS 9845. Each consignment of packaging material shall be tested either in-house or got tested from BIS approved lab or test certificate of supplier shall be obtained.*

6.0 **MARKING** – In addition to the standard mark as per clause 7.3 of IS 14543 the following information shall be given legibly & indelibly on each bottle/container or its label or directly printed on the bottle/container:

a) Name of the product (i.e. Packaged Drinking Water)
b) Name and full address of the processor;
c) Brand Name, if any;
d) Batch or Code Number/Control Unit No.;
e) Date of processing/packing;
f) Treatment of disinfection, if any;
g) Best for consumption upto – (date/month/year in capital letters); or Best for consumption within……days or months from the date of packing;
h) Net volume;
i) Direction for storage; and
j) Any other marking required under the Standards of Weights and Measures (Packaged Commodities) Rules, 1977 and the Prevention of Food Adulteration Act, 1954 and the Rules framed thereunder.

6.1 The label shall not contain any claim prohibited as per clause 7.2 of IS 14543:2004.

7.0 **LEVELS OF CONTROL–** The tests as indicated in Table 1 and at the levels of control specified therein, shall be carried out on the whole production of the factory covered by this Scheme and appropriate records and charts maintained in accordance with clause 2 of this scheme. All the production which conforms to the Indian Standard and covered by the licence shall be marked with Certification Mark of the Bureau.

7.1 **CONTROL UNIT** – For the purpose of this scheme, the quantity of packaged drinking water treated/processed, filled/packed from the same raw water source in one day shall constitute a control unit.

7.1.1 On the basis of tests and analysis results the decision regarding conformity or otherwise of a control unit to the given requirement shall be made.

7.2 In respect of all other clauses of the standard (other than those mentioned under levels of control – Table 1) the factory shall maintain appropriate controls and checks to ensure that their product conforms to the various requirements of the standard.

8.0 **RAW MATERAIAL**–The source water shall be tested once in three months for requirements like, odour, colour, pH, total dissolved solids, microbiological requirements, toxic elements & any other substance of table 2 of IS 14543 which may be present in source water in higher amount. The records for the same shall be maintained.

8.1 The raw material collected from the source shall be treated as per clause 3.2 of IS 14543:2004. It shall be properly and adequately protected to prevent any possible pollution/contamination from external sources. The intermediate storage facilities for the raw water shall also be adequately and suitably protected from external pollution/contamination. The filters & storage tanks used for this purpose shall be cleaned periodically and suitable records as per the cleaning schedule and procedure fixed by the licensee shall be maintained. The means of transport used for carrying raw material shall be supervised on daily routine basis and licensee shall be responsible for its day to day maintenance.

Note: In case the licensee carries out remineralisation as part of treatment process, the ingredients used shall conform to the requirements of PFA Act 1954 Act & the rules framed there under.

8.2 The licensee besides testing the requirements given in Table 4 every two years after grant of licence, will get the packaged drinking water tested for all the requirements of the specification in a laboratory recognized by the BIS, as and when there is change in source of water, under intimation to BIS, at his own cost. Sample will be drawn jointly with BIS.

9.0 **HYGIENIC CONDITIONS–** The packaged drinking water shall be collected, processed, handled, stored, packed and marketed in accordance with the hygienic practices given in Annex B of IS 14543:2004. Other clauses shall also be complied in day to day production and quality control activities. Schedule for each activity for this purpose shall be displayed prominently in the factory premises and records of compliance shall be maintained for scrutiny by the Bureau. The hygienic conditions shall also be maintained at the site of raw water source. A check list for good hygienic practices and food safety system for packaged water processing units is given in Annex C of IS 14543:2004.

10.0 **REJECTION–** A separate record providing the detailed information regarding the rejected control units and mode of their disposal shall be maintained. Such material shall in no case be stored together with that conforming to the specification.

11.0 **SAMPLES**– The licensee shall supply, free of charge, the sample(s) required in accordance with the Bureau of Indian Standards(Certification) Regulations, 1988, as subsequently amended, from his factory or godowns. The BIS shall pay for the samples taken by it from the open market.

12.0 **REPLACEMENT**– Whenever a complaint is received soon after the goods with Standard Mark have been purchased and used, and if there is adequate evidence that the goods have not been misused, defective goods are replaced free of cost by the licensee, in case the complaint is proved to be genuine and the warranty period (where applicable) has not expired. The final authority to judge the conformity of the product to the Indian Standard shall be with BIS.

12.1 In the event of any damages caused by the goods bearing the standard mark, or claim being filed by the consumer against BIS Standard Mark and not "conforming to" the relevant Indian Standards, entire liability arising out of such non conforming products shall be of licensee and BIS shall not in any way be responsible in such cases.

13.0 **STOP MARKING**– The marking of the product shall be stopped under intimation to the Bureau if, at any time, there is some difficulty in maintaining the conformity of the product to the specification, or the testing equipment goes out of order. The marking may be resumed as soon as the defects are removed under intimation to BIS.

The marking of the product shall be stopped immediately if directed to do so by BIS for any reason. The marking may then be resumed only after permission is given by the BIS. The information regarding resumption of markings shall also be sent to the Bureau.

14.0 **PRODUCTION DATA**– The licensee shall send to BIS, as per the enclosed proforma, a statement of the quantity produced, marked and exported by him and the trade value thereof during the half year ending 30 June and 31 December. This statement is required to be forwarded to BIS on or before the 31st day of July and January for the proceeding half-year.

TABLE……1

IS 14543:2004
PACKAGED DRINKING WATER
(OTHER THAN PACKAGED NATURAL MINERAL WATER)
Table 1 LEVELS OF CONTROL
(Para 7 of the Scheme of Testing and Inspection)

TEST DETAILS				**LEVELS OF CONTROL**		**REMARKS**
Cl.	**Requirement**	Test Method		**No. of Sample**	**Frequency**	
		Clause	**Reference**			
5.1	Microbiological Requirement					
5.1.1	Escherichia coli	-	IS 5887 (Pt 1)**or IS 15185	One	Each control unit	
5.1.2	Coliform Bacteria	-	IS 5401(Pt 1)**or IS 15185	One	-do-	
5.1.3	Faecal streptococci and Staphylococus aureus	-	IS 5887 (Part 2)** or IS 15186	One	Once in a month*	
5.1.4	Sulphite Reducing anaerobes	-	Annex C IS 13428	One	Each control unit	
5.1.5	Pseudomonas aeruginosa	-	Annex D IS 13428	One	-do-	
5.1.6	Aerobic Microbial Count	-	IS 5402	One	-do-	
5.1.7	Yeast and Mould count	-	IS 5403	One	-do-	
5..1.8	Salmonella and Shigella	-	IS 5887(Part 3)**, IS 5887 (Pt 7) or IS 15187	One	Once in a month*	
5.1.9	Vibrio cholera and V parahaemolyticus	-	IS 5887 (Part 5)	One	-do-*	

* shall be got tested from outside approved laboratory

** In case of dispute the method indicated by ** in 5.1.1 to 5.1.3 & 5.1.8 shall be the referee method.

TEST DETAILS				LEVELS OF CONTROL		REMARKS
Clause	**Requirement**	Test Method		**No. of Sample**	**Frequency**	
		Clause	**Reference**			
5.2 and Table 1	i) Colour	-	IS 3025 (Part 4)	One	Every hour	
-do-	ii) Odour	-	IS 3025 (Part 5)	One	-do-	
-do-	iii) Taste	-	IS 3025 (Part 8)	One	-do-	
-do-	iv) Turbidity	-	IS 3025 (Part 10)	One	-do-	
-do-	v) Total dissolved solids	-	IS 3025 (Part 16)	One	Every 4 hour	
-do-	vi) pH	-	IS 3025 (Part 11)	One	Every hour	
5.2. and Table 2	i) Barium (as Ba)	-	Annex F of IS 13428** or IS 15302	One	Each control unit	
-do-	ii) Copper (as Cu)	-	IS 3025 (Pt. 42)	One	-do-	
-do-	iii) Iron (as Fe)		IS 3025(Pt 53)** or IS 15303	One	-do-	
-do-	iv) Manganese (as Mn)	-	35 of IS 3025	One	-do-	
-do-	v) Nitrate (as NO_3)	-	IS 3025 (Pt. 34)	One	-do-	
-do-	vi) Nitrite (as NO_2)	-	IS 3025 (Pt. 34)	One	-do-	
-do-	vii) Fluoride (as F)	-	23 of IS 3025	One	Once in a month	
-do-	viii) Zinc (as Zn)	-	IS 3025 (Pt.49)	One	Each control unit	
-do-	ix) Silver (as Ag)	-	Annex J of IS 13428	One	Once in a month	
-do-	x) Aluminium (as Al)	-	IS 3025 (Pt 55) or IS 15302**	One	Each control unit	

TEST DETAILS				LEVELS OF CONTROL		REMARKS
Clause	Requirement	Test Method		No. of Sample	Frequency	
		Clause	Reference			
5.2 & Table 2	xi) Chloride (as Cl)	-	IS 3025 (Pt 32)	One	Each control unit	
-do-	xii) Selenium((as Se)		IS 3025 (Pt 56) or IS 15303**	One	Once in a month	
-do-	xiii) Sulphate (as SO_4)	-	IS 3025 (Pt. 24)	One	Each control unit	
-do-	xiv) Alkalinity as (HCO_3)	-	IS 3025 (Pt. 23)	One	Each control unit	
-do-	xv) Calcium (as Ca)	-	IS 3025 (Pt. 40)	One	Each control unit	
-do-	xvi) Magnesium (as Mg)	-	IS 3025 (Pt. 46)	One	Each control unit	
-do-	xvii) Sodium (as Na)	-	IS 3025 (Pt. 45)	One	Once in a month	
-do-	Xviii) Residual free chlorine	-	IS 3025 (Pt. 26)	One	Each control unit	
-do-	xix) Phenolic compounds (asC_6 H_5 OH)	-	IS 3025 (Pt. 43)	One	Each control unit	
-do-	xx) Mineral Oil	-	IS 3025 (Pt. 39)	One	Each control unit	
-do-	xxi) Anionic surface active agents (as MBAS)	--	Annex K of IS 13428	One	Each control unit	
-do-	xxii) Sulphide (as H_2 S)	-	IS 3025 (Pt 29)	One	-do-	
-do-	xxiii) Antimony (as Sb)	-	Annex G of IS 13428** or IS 15303	One	Once in a week	
-do-	xxiv) Borate (as B)	-	Annex H of IS 13428	One	-do-	

TEST DETAILS				**LEVELS OF CONTROL**		**REMARKS**
Clause	**Requirement**	Test Method		**No. of Sample**	**Frequency**	
		Clause	**Reference**			
5.2 and Table 3	i) Mercury (as Hg)	-	IS 3025 (Part 48)	One	Once in three months	
-do-	ii) Cadmium (as Cd)	-	IS 3025 (Pt 41)	One	-do-	
	iii) Arsenic (as As)	-	IS 3025 (Pt 37)	One	-do-	
-do-	iv) Cyanide (as CN)	-	IS 3025 (Pt 27)	One	-do-	
-do-	v) Lead (as Pb)	-	IS 3025 (Part 47)	One	-do-	
-do-	vi) Chromium (as Cr)	-	Annex J IS 13428	One	-do-	
-do-	vii) Nickel (as Ni)	-	Annex L IS 13428	One	-do-	
-do-	viii)Polychlorinated biphenyle (PCB)	-	Annex M of IS 13428	One	-do-	
-do-	ix) Polynuclear aromatic hydrocarbons	-	APHA 6440	One	-do-	
5.2. & Table 4	i) Alpha emitters	-	IS 14194 (Pt.2)	One	Once in two years	
	ii) Beta emitters	-	IS 14194 (Pt.1)	One	-do-	
5..3	Pesticide residues i) Individually ii) Total	- 5.3.1 -	Annex D of IS 14543 - -	One -	Once in six months*** -do-	- To be calculated on the basis of individual Pesticides residues

*** Shall be got tested from recognized laboratory using internationally established test method as specified

Amendment No. 1 July 2004
To
Scheme of Testing and Inspection
Doc: STI/14543/5 June 2004
For
Packaged Drinking Water
As per IS 14543:2004

Page 1, Clause 2.0, Test Records	i) Add after the sentence: "(See Form 1 to 6)" ii) Forms 1 to 6 to be added after Page No. 9 of STI.
Page 3, Clause 7.2, Levels of Control	Add the following new clauses after Clause 7.2 "7.3 The material shall be dispatched only when the test results for the requirements to be tested up to the frequency of every hour/four hourly/each control unit (including microbiological parameters) as per Table 1 of STI are available".
Page 7, Table 1, Levels of control	Add the following:

"

Clause	Requirement	Test method Reference	No. of samples	Frequency	Remarks
5.2 Table 1	Cl.5.2-As per Amendment 1 to ISS (PDW – clear, without sediments suspended particles and extraneous matter).	-	All containers to be examined. However records to be made on hourly basis.		

FORM 1

REPORT FOR HOURLY AND FOUR HOURLY TESTING

Date of Production	Batch Number/ control unit number	Quantity packed in each type of packing			Total quantity packed in kl	Time of production	Colour	Odour	Taste	Turbidity	pH	TDS	Remarks
		Type of packing	Capacity of pack	Quantity			Every hour	Every hour	Every hour	Every hour	Every hour	Every four hour	

FORM 2

REPORT FOR DAILY/ EACH CONTROL UNIT TESTING

Date of Production	Batch Number/ control unit number	Barium	Copper	Iron	Manganese	Nitrate	Nitrite	Zinc	Aluminium	Chloride	Sulphate	Calcium	Sulphide	Alkalinity
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Phenolic Compounds	Mineral Oil	Magnesium	Residual free chlorine	Anionic surface active agent	E.coli	Coliform Bacteria	Sulphite reducing anaerobes	Pseudomonas Aeruginosa	Aerobic microbial count		Yeast & Mould	Remarks
									20-22C	37C		
16	17	18	19	20	21	22	23	24	25	26	27	28

FORM 3

REPORT FOR WEEKLY/ MONTHLY/ 3 MONTHLY/ 6 MONTHLY AND TWO YEARLY TESTING

A) REPORT FOR WEEKLY TEST

Date of Production	Batch No.	Antimony	Borate	Remarks
1	2	3	4	5

B)REPORT FOR MONTHLY TEST
1. Microbiological Tests (Faecal streptococci and S.aureus, Salmonella and Shigella, V. cholera and V. parahaemolyticus

2. Chemical Test (Selenium, Sodium, Fluoride, Silver)

C)REPORT FOR THREE MONTHLY TEST
1.Toxic Material Tests (Mercury, Cadmium, Arsenic, Cyanide, Lead, Chromium, Nickel, PCB, Polynuclear Aromatic Hydrocarbon)

D)REPORT FOR SIX MONTHLY TEST
1.Pesticide Residues as per Annex D of IS 14543: 2004 (Individually and total)

E)REPORT FOR TWO YEARLY TEST
1. Radio Active Residues (Alpha and Beta Emitters)

Fortmat for the reports of 3 (B) to 3(E):

Month & Year	Batch No./ DOM	Type of packing	Dates on which sample sent	Lab to which sample sent	Test report number and date	Results	Remarks

FORM 4

RAW WATER TESTING(3 MONTHLY TESTS)

Month & Year	Source of Raw water	Inhouse testing (if done)	Outside testing (if done)			Record of inhouse testing/ outside TR	Results	Remarks
		Date of testing	Name of lab	Sample sent on	TR number & date			

FORM 5

RECORD FOR PLASTIC CONTAINERS USED FOR PACKING WATER

Date of receipt	Type of packing material	Name of supplier	Quantity received	Whether ISI mark	Suppliers TC number and date	Details of outside testing/ suppliers TC		Results			Remarks
						Name of lab	Date of sending samples	Overall migration	Colour migration	Remaining parameters as per IS 15410	

FORM 6

RECORDS FOR SHELF LIFE ASSESSMENT (SEPARATE FOR EACH TYPE OF CONTAINER BEING USED)

Date on which sample kept	Batch No./DOM	Type of packing whose sample kept	Declared shelf life	Periodicity of testing (like Monthly)	Date of Testing	Requirements Tested	Results	Remarks

Annex – 5

MAJOR POLICY GUIDELINES ON CERTIFICATION OF PACKAGED DRINKING WATER/ PACKAGED NATURAL MINERAL WATER ISSUED UPTO MAY 2004

Sl. No.	Subject	Date
1.	Guidelines for processing and registration of application for IS 13428	12.10.1999
2.	Guidelines for checking constancy of water composition for IS 13428	8.02.2001
3.	Policy guidelines on constancy of raw water composition on account of cycles of minor natural functions for IS 13428	12.2.2001
4.	Report of hygienic condition in water processing visits	2.3.2001
5.	Minutes of the meeting held on 25 April 2001	30.4.2001
6.	Guidelines for use of words Pure/ crisp/ refreshing **and** letter of Ministry of Health	14.5.2001
7.	Guidelines on labelling prohibitions	29.6.2001
8.	Reporting of hygienic conditions	22.8.2001
9.	Guidelines for packing in cups and labelling prohibitions	25.9.2001
10.	Guidelines for no. of periodic inspections/ hygienic conditions/ drawal of market samples	21.11.2001
11.	Guidelines for use of word "Pure"	20.12.2001
12.	Guidelines for use of word "Purified"	1.2.2002
13.	Grant of licence for Packaged drinking water	1.4.2002
14.	Guidelines for drawl of second sample of Packaged drinking water in case first sample fails in any of the requirement but reported passing in the requirement of radio active residues	29.4.2002
15.	Clarifications regarding ROM	31.5.2002
16.	Permitted packing sizes by legal metrology	22.7.2002
17.	GOL for domestic industry	7.10.2002
18.	Phasing out of polycarbonate and HDPE bottles for bulk packing	1.4.2003
19.	Guidelines regarding dispatch of finished product and drawl of packaging material for I/T	30.4.2003

20.	Drawl of market samples	4.7.2003
21.	Sale of non ISI Packaged Bottles Water	9.7.2003
22.	Packaging material for Packaged drinking water in bulk containers **and** letter of Ministry of Health.	1.8.2003
23.	Packaging material for packaged drinking water in bulk containers.	1.10.2003
24	Use of aluminum foil for sealing Packaged drinking water in cups and glasses	10.12.2003
25	Amendment of PFA rules 1955-Notification GSR 831(E) dated 21.10.2003 regarding packaged drinking water and mineral water	24.12.2003
26.	Guidelines for marking of batch No./ DOM on container and keeping Amendment No. 4 to IS 13428 in abeyance	6.1.2004
27	Quality of packaging materials for filling Packaged drinking water	22.3.2004
28	Review of tall claims w.r.t. labeling prohibition requirement	2.4.2004
29	Utilization of services of outside approved laboratories	28.4.2004
30.	Drawl of samples of Packaged drinking water for testing in independent lab	21.5.2004

MAJOR POLICY GUIDELINES ON CERTIFICATION OF PACKAGED DRINKING WATER/ PACKAGED NATURAL MINERAL WATER ISSUED FROM JUNE 2004 ONWARDS

Circular No.	Subject	Date
1.	Implementation of revised Indian Standard Specification for Packaged drinking water as per IS 14543:2004 and revised STI, Doc: STI/14543/5, June 2004	4.6.2004
2.	Information regarding date of expiry/ shelf life of Packaged drinking water/ mineral water in the test request.	8.6.2004
3.	Proforma for hygienic conditions verification during periodic inspection of Packaged drinking water/ Packaged natural mineral water.	6.7.2004
4.	Implementation of revised Indian Standard Specification for Packaged drinking water as per IS 14543:2004 and revised STI, Doc: STI/14543/5, June 2004	9.7.2004
5.	List of BIS approved lab for Packaged drinking water	14.7.2004
6.	Sample size for complete testing of Packaged drinking water	21.7.2004
7.	Use of blue tinted plastic containers for Packaged drinking water, in bulk packing of more than 5 litre which are refilled **and** letter received from Ministry of Health regarding blue tinted plastic containers.	9.8.2004
8.	Submission of data with respect to Packaged drinking water on monthly basis.	12.8.2004
9.	List of laboratories for testing of Plastic containers	16.8.2004
10.	Clarification on implementation of revised STI, Doc: STI/14543/5 June 2004	18.8.2004
11.	Implementation of Amendment No. 1 to STI, Doc: STI/14543/5	29.9.2004
12.	Guidelines for Certification of flexible Pouches for Packaged drinking water	7/8.10.2004

13.	Guidelines for Packaged drinking water - manufacturing units are required to maintain various hygienic conditions as stipulated in Annex B of IS 14543:2004.	2.12.2004
14.	During the meeting DADG (PFA) informed that based on the legal opinion sought by their office, following claims are not permitted:	13 12 2004

ANNEX 6

CHECK LIST FOR SCRUTINYOF APPLICATION FOR PACKAGED DRINKING WATER AS PER IS 14543

Indicate Compliance or deficiency

1. Application proforma is signed by the Management or duly authorized signatory and sealed/rubber stamped in original

2. Application is submitted with the required Fees

3. Complete Office address & Manufacturing addresses & Manufacturing addresses in various documents are same

4. Clear indication of the Type, Material and Capacity for which licence is sought

5. Composition of Top Management is indicated and tallying with other documents submitted with application (see 6 below etc.)

6. Copy of Partnership Deeds, List of Director etc. as applicable

7. Copy of Registration as SSI, NSIS etc.

8. Brand Name Declaration (see CM/PF 307) and copies of agreements with owners of Brands, wherever applicable

9. Declaration of available Plant Machinery (see CM/PF 305) covering aspects of source water & containers handling and processed water production, disinfection, packing & storing

10. Declaration of available Test Equipment (see CM/PF 306), duly filled-in with in-house testing facilities by methods opted (where options are available) with details of Make, Sl.No., Least Count, Range etc. wherever applicable & required to assess suitability.

11. Availability of Q.C. personnel for Chemical & Microbiological Test

12. Arrangement with Outside Lab. For testing of requirements for which Facilities are not available, supported with Consent Letter from Lab.

13. Details regarding source of raw water

14. Details regarding plastic containers used covering suppliers' name,

testing carried out/test certificates from supplier/outside Lab.

15. Details of Manufacturing Process with Treatment for Disinfection And Process Flow Chart

16. Factory Layout Plan indicating locations of important sites, Location and Route Map to factory

17. Production Figures for previous/current periods, as applicable

18. Installed Capacity is clearly indicated

19. Copies of internal STI/sampling criteria adopted, if available and acceptance to follow STI of BIS is indicated in Application Form

20. Acceptance to pay Marking Fees is indicated in Application Form

21. Copies of Test Report of Raw Water, Processed water & Containers and whether these are adequate to take decision regarding process of application keeping in view the sampling criteria for I/T

22. Details of samples being offered for inspection by BIS for the product Water & Plastic Container and whether it is adequate for sampling

23. Whether date for preliminary inspection is proposed

24. Details of arrangements for ensuring required hygienic condition.
    a) Report on Annex C (or even Annex B) of IS 14543
    b) Copies of Medical examination Reports of concerned staff
    c) Copy of Pest Control Treatment, if got done from outside source

25. Declaration regarding Shelf-Life of product packed in all containers (if Varying for different containers)

26. Whether relevant details provided, as applicable, for firms earlier closed application or whose previous licence was cancelled/expired (either due to failure/unsatisfactory performance/Violation of BIS Act, Rules etc) for deciding about recording of fresh application

27. Any other details/comments

Recommendations of Dealing Officer

(Dealing Officer)
Date

Decision of Group Leader

ANNEX 7

CHECK LIST FOR RED FORM OF PACKAGED DRINKING WATER

ITEM	CHECH POINT	DOC. No	REMARKS
		Tick Mark	
Address	Addresses given in Application Form, PIR, RF and Other Documents are same	1 1 (a) etc.	Copy of application. Plot purchase/ rent agreement or lease agreement etc.
Authorized Person	Authority Letter, if application form & other documents are not signed by member of the management of applicant (Proprietor/ Partner/Director	2	
Status of Unit	Manufacturing status is clearly stated as large/small scale in order to give concession in marking fee.	3	SSI Certificate/Chartered Accountant/ Certificate from or any other agency.
STI	Acceptance of STI is for the latest version	4	
Marking fee	Acceptance of latest marking fee with complete details (i.e. not signed on blank proforma)	5	
Brand Name(s)	Proforma CM/PF 307	6 6 (a) 6 (b) etc.	Copies of agreements with owners of Regd. Brands/ trade marks to be submitted for each brand.
Test Reports	Processed water reports cover all the requirements covering the following: • Physical/ Chemical Tests • Microbiological Test • Pesticides Residues • Radio Active Residues Packaging material report enclosed for Each type, material and capacity (as submitted by the applicant) Independent testing reports i) for overall migration, colour migration and potability for each type/ material/ capacity OR ii) for complete testing as per IS 15410 and overall migration and colour migration as per IS 14543 for each type/ material/ capacity. Dealing officer to record pass/ fail on all reports received from independent lab for samples drawn by BIS. Code numbers and details of samples in TR and IR tally.	7 7 (a) 7(b) 7 (c) etc.	Reports of all the samples to be attached, i.e., including those of failures, if any. Attach copies of test request for all samples.

Approval of Testing **Factory Testing in lieu of I/T**	Fresh sample is tested in same lab where earlier sample was tested. Approval of Competent Authority for change of lab, if any. Permission of Competent Authority Factory test report is as per CL proforma,	8(a) 8 (b) 8 (c)	
Manufacturing facilities	Plant machinery declaration to include details of source and storage of raw water, facilities for handling empty containers, processed water filling, packing storing etc.	9 (a)	Enclose CMPF 305 duly signed by applicant and the IO on all pages.
Testing facilities	Details of all the available testing facilities to be reported clearly indicating methods of tests adopted by the firm, wherever options available	9(b)	Enclose CMPF 306 duly signed by applicant and the IO on all pages.
Calibration of instrumnts	Analytical Balance & All the Incubators are calibrated	9 (c)	Copies of calibration certificates to be enclosed
Quality Control Personnel	Competence of Q.C personnel is clearly reported in the PIR and/or subsequent reports	10	Enclose firm's declaration regarding availability of regular full-time testing personnel
Consent Letter for testing in Outside Lab	Firm's request for permitting OSL testing to be considered only for tests having frequencies Monthly & above	11(a) 11(b) 11(c)	Enclose firm's request, consent letter from OSL and permission of the C.A.
Preliminary Inspection Report	Preliminary Inspection Report Raw Material receipt details Manufacturing Process – clearly indicating complete process, treatment for disinfection (for each type of packing, if different) Process Flow Diagram Layout Plan of Factory – clearly indicating locations of raw water source & storage, process equipment, plant machinery, Packing & Storage Area, Change Room, Toilet etc. Report of testing of raw water Firm's own testing of processed water indicating conformity of to ISS for requirements tested Reports of plastic containers submitted by firm Any other document such as : Test Results of samples tested in factory (if not reported in PIR) Sample Labels, if available	12(a) 12(b) 12(c) 12(d) 12(e) 12(f) 12(g) 12(h)	To be attached along with the D/V report issued, if any

Hygienic Conditions	Complete assessment of hygienic conditions to be reported Annex B – as verified by BIS Medical Examination of employees Pest Control treatment is clearly indicated	 13(a) 13(b) 13(c) 13(d)	Copies of medical examination and Pest Control treatment reports may be enclosed
Contact Report	Copies of all inspection reports other than preliminary inspection to be enclosed	14(a) 14(b)	
Declaration by firm	Undertaking to intimate BIS regarding taking out Plant Machinery/Test Equipment Ownership of Plant Machinery/Test Equipment Affidavit on stamp paper regarding material offered for inspection (for sample drawn from stock)	15 16 17	
Other Documents	Other documents, as relevant to the application	18 onwards	
Red Form	Should be complete with clear recommendations for scope w.r.t Type, Material & Capacity of containers		

Recommendations of dealing officer (Dealing Officer)
Date

GL
Head

ANNEX 8

CM/PF/PDW
Jan 2005

BUREAU OF INDIAN STANDARDS

(BRANCH OFFICE/ DEPTT.)

REPORT OF PRELIMINARY INSPECTION

Application No. CM/A- IR No.

IS 14543:2004 **Date of writing IR:**

Product: Packaged Drinking Water (Other Than Packaged Natural Mineral Water)

Type, Material & Capacity of containers applied for :

1. GENERAL INFORMATION

(b) Applicant's name :

(c) Address (i) Factory :

(ii) Regd. Office :

(d) Date of Inspection :

(e) Situation of factory :

(f) Telephone/Fax Number (i) Factory :
(ii) Office :
(iii) Mobile :
(of Authorized Representarive dealing with BIS)

(g) Management Staff :

(h) Person(s) contacted :

1.1 BIS Licences, if any, held by the applicant :

REMARKS OF THE REVIEW OFFICER

1.
2.
3.

Signature:
Review Officer's name & Designation :
Date of review :

CM/A-

2. RAW MATERIAL

(a) Raw Water

i) Source — Own Borewell/Municipality/Other Supply (specify)

ii) Mode of Receipt — Pipeline/Tanker/Others

iii) Storage (as applicable) — Type of Storage arrangement & Capacity

(b) Packaging Material

Container Type	Material	Capacity	Name of the Supplier	Whether BIS certified	Whether Recd. with Test Certificate	Nature of packing
Jar/ Bottle/ Cup/ Glass/						
Caps/ Closures						
Preforms						

(c) Arrangement for testing & Acceptance criteria

j) Raw Water
ii) Packaging Material (Containers & cap)

(d) Methods of disposal of substandard Packaging Materials

(e) Whether record of raw material testing maintained

i) Yes/No
ii) If yes, whether these are in line with the requirements of STI

3. MANUFACTURE

(a) Description of process from Raw Water to finished product (enclose Manufacturing Process and Flow Diagram)

(b) Whether all activities of manufacturing & Packing in progress during visit

(c) Treatment for Disinfection

(d) Lay out plan of the factory indicating locations of source of raw water, process equipment, washing & storing of containers, filling of product water & storing of finished product storage areas etc. to be enclosed

(e) Comments on Intermediate Checks exercised for controlling the quality

(f) Details of records maintained for (e) above

(g) Method(s) of disposal of water not conforming to IS

(i) Production per day or per shift

(j) Details of manufacturing machinery (enclose Proforma PF 305 duly verified & signed)

(j) Technical comments on manufacturing capabilities and in-process controls

(k) Comment on arrangement for filling of each Type/Capacity of containers

4. PACKING AND MARKING

(a) Nature of packing & Capacity

(b) Markings on article

(c) Method of marking (Printing, stenciling, Embossing, etc)

(d) Form of label(s), if any.

(e) Batch or code numbering for identification

(f) Location of marking of Batch/Lot No.

(g) Declaration regarding Shelf-Life for each type/ Capacity of containers

(j) Compliance to labeling requirements

(k) In what manner it differs from IS/STI

5. STORAGE FACILITIES

(a) Conditions of storage

(b) Adequacy of storage for holding material upto the period of results of testing as per STI keeping in view firm's production capacity

CM/A-

6. LABORATORY AND INSPECTION

(a) Details of staff

Sl No.	Name of Person	Qualification	Experience	Designation
i)				
ii)				

(b) Competency of testing personnel to carry out physico-chemical and microbiological requirements

(c) Equipment & other test facilities for requirements having frequencies of test as less than one Month in STI — (enclose Proforma PF 305 duly verified & signed)

(d) Test equipments/chemicals not available from (c) above

(e) Whether facilities available for tests with frequencies Monthly & Above — Yes/No

i) If Yes, verification as per (c) above

ii) If No, details of arrangement with OSL along with consent letter

(d) Whether facilities available for testing of Plastic Containers as per IS 15410 — Yes/No

i) If Yes, verification as per (c) above

i) If No, give details of alternate arrangement made

(e) Accuracy of available instruments

(f) Arrangements for calibration of instruments
- i) Analytical Balance
- ii) Temp. indicators of each Incubator

(g) Records maintained for in-house and Outside laboratory tests

(h) Stage of processing where in-house test reports are made available

(j) Sampling and testing of product

7. TESTING OF SAMPLE IN FACTORY

(a) Sample drawn from Stock/Production Line
(also indicate Batch No./Manufacturing Date)

(b) Test result on sample tested

Sl.No.	Requirements Tested	Value Obtained	Value recorded	Remark

(c) Comment on the testing capabilities

8. SAMPLE FOR INDEPENDENT TESTING

(a) Sampling of Processed water

i) Source of drawal (Stock/production)

ii) Size of lot from which sample is drawn with details of type/material/Capacity in which available

(b) Sampling of Packaging Container(s)

i) Type, Material and Capacity of container(s)

ii) Size(s) of lot(s) from which sample(s) drawn

(c) Codes assigned for each of the above samples

(d) Details of counter samples left with the firm pertaining to (a) & (b) above

(e) Manner of packing., labeling and coding of above samples

(f) How sealed? Give impression of seal

(g) Laboratory to which to be forwarded and manner of dispatch (for each sample)

(h) Any further information regarding sample drawn (such as shelf-life)

(j) Information regarding sample of other Type/ Material/Capacity applied for

CM/A-

9. HYGIENIC CONDITIONS

Compliance to Annex B of the IS 14543 (Enclose detailed Report) Satisfactory/Unsatisfactory

10. OTHER INFORMATION

(a) Acceptance of STI & MF

(b) Manner of putting the Standard Mark

(c) Manner of manufacture and dispatches without Standard Mark in case of stoppage of marking

(d) Special Inspection Charges

(e) Testing charges of sample drawn

11. CONCLUSION (Regarding manufacturing & testing arrangements and Hygienic Conditions)

12. RECOMMENDATIONS (w.r.t Scope for Type, Material & Capacity of containers)

13. POINTS FOR ACTION

a) By Applicant

b) BIS

Encl:

Station:

Signature :
Inspected by:
Designation :
Date :

ANNEX 9

CM/PF/PDW
JAN 2005

BUREAU OF INDIAN STANDARDS
REPORT OF PERIODIC INSPECTION
(Put √ mark on the appropriate nature of inspection)
(. .. . . . . inspection since grant of licence/Renewal)

CM/L -
IR No.. . . . . ..
Valid upto:
Date of writing IR . . . . . .

1. a) Licensee

b) **IS 14543:2004 Packaged Drinking Water (Other Than Packaged Natural Mineral Water)**

Type, Material & Capacity of containers covered under licence

b) Other license(s) held CM/L . . . . IS Product

2. Special inspection charges, if applicable, with details of realization

3. Date of inspection

4. Person(s) contacted

5. Change in Management, if any

6. Previous inspection details

a) Date & Conducted by

b) Conclusions and recommendations

c) Details of last two factory samples

Sl. No.	Date of drawl of sample	Mode & Date of dispatch	Status of Sample (Whether report recd.)	Pass/Fail (if applicable)
i)				
ii)				

7. ACTION ON ADVICE RENDERED IN PREVIOUS INSPECTION OR OTHERWISE ASKED FOR WHILE GRANTING LICENCE/RENEWAL OF THE LICENCE

==========

REMARKS OF REVIEWING OFFICER ON PERFORMANCE OF LICENSEE KEEPING IN VIEW THE PAST PERFORMANCE (ON IRS, TRS , GENERAL ETC) WITH SIGNATURE & DATE

8. Source of Raw Water

a) Own Bore well/Municipality/Other Supply (specify)
b) Whether source changed from declared earlier
c) If yes, compliance to STI
d) Whether records of testing maintained as per STI

9. Packaging Material

a) Details of Receipt

Container			Name of the Supplier	Whether BIS Certified	Whether Recd. with test certificate	Whether tested in - house
Type	Material	Capacity				
Jar/ Bottle/ Cup/ Glass						
Caps/ Closures						

b) Manner of disposal of the sub standard packaging material

c) Whether packing is done in approved container(s)?
If not, give details

d) Whether records being maintained in accordance with STI

10. PRODUCTION DETAILS

a) Whether Water being produced/packed
at the time of inspection

b) Whether any change in the Process of Manufacturing
& Disinfection from that declared earlier? If yes, give details

c) Production Controls (Satisfactory/Unsatisfactory)

d) Production & supply since last periodic inspection (enclose details for completed month)
   i) Quantity produced
   ii) Quantity marked
   iii) Quantity unmarked and manner of disposal
   iv) Reasons for not marking
   v) Parties supplied to (Give complete address):

11. Storing, Packing and marking of BIS certified material

a) Material held in stock

b) Packing and marking on packages

c) At what stage marking is done
(After or before test results are known)

d) Any change in the marking
procedure from approved one

e) Compliance to Labeling Prohibitions

13. TESTING ARRANGEMENTS & TESTING

a) Details of change(s) in Testing Personnel, if any since previous inspection.

b) Competence of new Testing Personnel

c) Are the frequencies of tests and records testing being maintained satisfactorily vis-à-vis the STI

d) Variation in test result — Enclose Report in Annex 1

e) Details of failure reported, if any and corrective actions taken for the same

g) Are all required instruments available and in working order? If No, give details

h) Change/addition in testing facilities

j) Details of calibration of Balance & Incubators

14 Testing in factory

Description of the sample (Type, Material, Capacity of container and B.No./Mfg. Date):

Sl.No.	Requirements Tested	Value Obtained	Value recorded	Remark

15. Samples for Independent Tests

a) From where sampled (Stock/Production line)?

b) Details of sample (Batch/Lot No., Date of Mfg. Shelf-Life and Type, Material and Capacity

c) Test record of the batch from which drawn — Report in Annex 1

d) Details of packing, labeling, coding and sealing of the sample

e) Details of the counter sample left with the firm

f) Mode of dispatch and Laboratory to which sample forwarded

g) Details of the counter sample left with the firm

16. HYGIENIC CONDITIONS

Overall compliance to Annex B of the IS 14543 (Enclose Report in the prescribed proforma) — Satisfactory/Unsatisfactory

17. CONCLUSION AND RECOMMENDATIONS

a) Assessment of performance since last inspection — Satisfactory/ Unsatisfactory

b) If operated unsatisfactory, give reasons (Also indicate whether the reasons were conveyed to the licensee through D/V Report, if so enclose copy)

d) Any discussion with the firm for difficulties in production, testing, operation of Scheme and actions proposed, if any for the discrepancies observed

e) Recommendation for action to be taken

f) Any other observation/comments for better appraisal of the report

Signature:
No. of Encl.: Inspected by:
Designation:
Station: Date:

Annex 1

ASSESSMENT OF COMPLIANCE TO IS 14543 & STI FOR PACKAGED DRINKING WATER

	REQUIREMENT	LIMIT	VARIATIONS RECORDS	BATCH DRAWN FOR I/T
EVERY HOUR TESTS				
1.	DESCRIPTION	To comply		
2.	COLOUR	2 Max.		
3.	ODOUR	Agreeable		
4.	TASTE	Agreeable		
5.	TURBIDITY	2 Max.		
6.	pH	6.5 to 8.5		
FOUR HOURLY TEST				
1.	**TOTAL DISSOLVED SOLID**	500 ppm Max		
EACH CONTROL UNIT TESTS				
1.	BARIUM	1 ppm, Max.		
2.	COPPER	0.05 ppm, Max		
3.	IRON	0.1 ppm, Max		
4.	MANGANESE	0.1 ppm, Max		
5.	NITRATE	45 ppm, Max		
6.	NITRITE	0.02 ppm, Max		
7.	ZINC	5 ppm, Max		
8.	ALUMINIUM	0.03 ppm, Max		
9.	CHLORIDES	200 ppm, Max		
10.	SULPHATE	200 ppm, Max		
11.	CALCIUM	75 ppm, Max		
12.	SULPHIDE	0.05 ppm, Max		
13.	ALKALINITY	200 ppm, Max		
14.	PHENOLIC COMPOUNDS	Absent		
15.	MINERAL OIL	Absent		
16.	MAGNESIUM	30 ppm, Max		
17.	RESIDUAL FREE CHLORIDE	0.2 ppm, Max		
18.	ANION.SURF.ACT. AGENTS	0.2 ppm, Max.		
19.	ESCHERCHIA COLI	Absent		
20.	COLIFORM BACTERIA	Absent		
21.	Sulphite Reducing Bacteria	Absent		
22.	Pseudomonas Aeruginosa	Absent		
23.	Aerobic Microbial Count	20, Max at 37C &		
a.		Max at 20-22C		
24.	YEAST & MOULD	Absent		
WEEKLY TESTS				
2.	ANTIMONY	0.005 ppm, Max.		
27.	BORATE	5 ppm, Max.		

Contd…..

(6)

CM/L-

DETAILS OF TESTING GOT DONE FROM OUTSIDE LABORATORY

(PROGRESS SINCE LAST PERIODIC INSPECTION)

1.

MONTH YEAR	MONTHLY (SENT/RESULT)	3 MONTHLY (SENT/ RESULT)	6 MONTHLY (SENT/RESULT)
JAN			
FEB			
MAR			
APR			
MAY			
JUN			
JUL			
AUG			
SEP			
OCT			
NOV			
DEC			

2. TWO YEARLY TEST:

Annex 10

COMPARITIVE LIST OF REQUIREMENTS OF PACKAGED DRINKING WATER AND PACKAGED NATURAL MINERAL WATER

REQUIREMENT BASED ON STI FREQUENCY	LIMITS IS 14543	LIMITS IS 13428
EVERY HOUR TESTS		
1. DESCRIPTION	To comply	-
2. COLOUR	2 Max.	2 Max.
3. ODOUR	Agreeable	Agreeable
4. TASTE	Agreeable	Agreeable
5. TURBIDITY	2 NTU Max.	2 NTU Max.
6. pH	6.5 to 8.5	6.5 to 8.5
FOUR HOURLY TEST		
1. TOTAL DISSOLVED SOLID	500 ppm Max	150 TO 700 ppm Max
EACH CONTROL UNIT TESTS		
1. BARIUM.	1 ppm, Max.	1.0 ppm, Max.
2. COPPER	0.05 ppm, Max	1.0 ppm, Max
3. IRON	0.1 ppm, Max	-
4. MANGANESE	0.1 ppm, Max	2.0 ppm, Max
5. NITRATE	45 ppm, Max	50 ppm, Max
6. NITRITE	0.02 ppm, Max	0.02 ppm, Max
7. ZINC	5 ppm, Max	5 ppm, Max
8. ALUMINIUM	0.03 ppm, Max	-
9. CHLORIDES	200 ppm, Max	200 ppm, Max
10. SULPHATE	200 ppm, Max	200 ppm, Max
11. CALCIUM	75 ppm, Max	100 ppm, Max
12. SULPHIDE	0.05 ppm, Max	0.05 ppm, Max
13. ALKALINITY	200 ppm, Max	75 to 400 ppm, Max
14. PHENOLIC COMPOUNDS	Absent	Absent
15. MINERAL OIL	Absent	Absent
16. MAGNESIUM	30 ppm, Max	50 ppm, Max
17.RESIDUAL FREE CHLORIDE	0.2 ppm, Max	-
18.ANION.SURF.ACT. AGENTS	0.2 ppm, Max.	Not detectable
19. ESCHERCHIA COLI	Absent	Absent
20. COLIFORM BACTERIA	Absent	Absent
21. SULPHITE REDUCING BACTERIA	Absent	Absent
22.PSEUDOMONAS AERUGINOSA	Absent	Absent
23.AEROBIC MICROBIAL COUNT	20, Max at 37C & Max at 20-22C	-
24.YEAST & MOULD	Absent	- Absent
WEEKLY TESTS		
1. ANTIMONY	0.005 ppm, Max.	0.005 ppm, Max.
2. BORATE	5 ppm, Max.	5 ppm, Max.

MONTHLY TESTS		
1. FLUORIDE	1.0 ppm, Max.	1.0 ppm, Max.
2. SILVER	0.01 ppm, Max.	0.01 ppm, Max.
3. SODIUM	200 ppm, Max.	150 ppm, Max.
4. SELENIUM	0.01 ppm, Max.	0.05 ppm, Max.
5. FAECAL STRETOCOCCI & S. AUREUS	Absent	Absent
6. SALMONELLA AND SHIGELLA	Absent	Absent
7. V. CHOLERA AND V. PARAHAEMOLYTICUS	Absent	Absent
THREE MONTHLY		
1. MURCURY	0.001 ppm, Max.	0.001 ppm, Max.
2. CADMIUM	0.01 ppm, Max.	0.003 ppm, Max.
3. ARSENIC	0.05 ppm, Max.	0.05 ppm, Max.
4. CYANIDE	Absent	Absent
5. LEAD	0.01 ppm, Max.	0.01 ppm, Max.
6. CHROMIUM	0.05 ppm, Max.	0.05 ppm, Max.
7.NICKEL	0.02 ppm, Max.	0.02 ppm, Max.
8.POLYCHLORINATED BIPHENYLE(PCB)	Not detectable	Not detectable
9. POLYNUCLEAR AROMATIC HYDROCARBON(PAH)	Not detectable	Not detectable **(kept in abeyance)**
SIX MONTHLY		
1. PESTICIDE RESIDUES		Below detectable limit
a) INDIVIDUALLY	0.1 ppb, Max.	
b) TOTAL	0.5 ppb, Max.	
TWO YEARLY		
1. ALPHA EMITTERS	0.1Bq/l, Max.	0.1Bq/l, Max.
2. BETA EMITTERS	1 Bq/l, Max.	1 Bq/l, Max.
PACKING		
1. PACKAGING MATERIAL		
a) OVERALL MIGRATION	60 mg/l, Max.	60 mg/l, Max.
b) COLOUR MIGRATION	10 mg/l, Max.	10 mg/l, Max.
2. CONTAINER	Conformity to IS 15410	-

ANNEX - 11

LIST OF TEST FACILITIES FOR CHEMICAL TESTS OF PACKAGED DRINKING WATER AS PER IS 14543:2004

Sl. No.	Tests	Clause Ref. of IS 14543:2004	Referred Method of Test/ Refer to IS	Test Equipment/Apparatus*	Chemicals	Remarks
1.	**Colour**	Clause 5.2 & Sl. No. i) of Table 1	IS 3025 (part 4):1983 i) Platinum cobalt (Visual comparison) method	• Nessler cylinders (50 ml) • Centrifuge or filter assembly (functional pore size 0.45µm)	• Potassium Chloroplatinate • Cobaltous Chloride, Crystalline • Conc. Hydrochloric acid • Distt. Water	-
			ii) Spectrophotometric Method	• Spetrophotometer (400 to 700 (nm) with 10 mm absorption cell • Filteration system consisting of filteration flask with side tubes; crucible holder; Micrometallic filter Crucible (pore size 40 (µm); Calcined filter aid (celite 505 or equivalent) and Vacuum system • Refrigerator (recommended) • pH meter • Centrifuge	• Conc. Sulphuric acid • Sodium hydroxide	-

*Note: Besides listed Equipments/Apparatus/Chemicals, following accessories are essential part of a chemical lab:

i) General glass wares like Pipettes Burette, Conical flasks, Beakers, Measuring cylinders, Volumetric flasks, (of different volumes)

ii) Provision for distilled/double distilled water

iii) Fuming Hood and sink with tap in the lab

The list does not cover the requirements of Pesticide Residues and Radio Active Residues as these requirements are got to be tested from outside approved lab.

2.	**Odour**	Clause 5.2 and Sr. No. ii) of Table 1	IS 3025 (Pt 5):1983	• Wide mouth glass stoppered bottles (approx. 1 lit. capacity)	• Odour free distilled water (or distilled water and column of granulated activated carbon) • Hydrochloric acid	-
3.	**Taste**	Clause 5.2 and Sr. No. iii) of Table 1	IS 3025 (Pt 8):1984	• Breaker (50 ml) • Water bath • Thermometer	• Taste and Odour free water • 2000 mg/l solution of sodium chloride	-
4.	**Turbidity**	Clause 5.2 and Sl. No. iv) of Table 1	IS 3025 (Pt 10):1984	• Sample tubes • Turbidity meter • Volumetric flasks (100 ml) • Membrane filter with pore size not more than 0.45 µm	• Distilled water • Hexamethylene Tetramine • Hydrazine sulphate	-
5.	**Total dissolved solids**	Clause 5.2 and Sr. No. v) of Table 1	IS 3025 (Pt 16):1984	• Filter: Glass fibre filter Disc (whatman GF/C or equivalent) 2.1 to 5.5 cm in diameter, pore size 1.2 µm **OR** Ashless Filter Paper- pore size 2 to 2.5 µm equivalent to whatman filter No. 542 **OR** Gooch crucible (whatman or equivalent) **OR** Sintered Disc (G-5 or equivalent) Pore size 1 to 2 µm		-

				OR Membrane filter (0.45 µm membrane) ▪ Filtering Assembly (suitable for type of filter selected) • Drying oven (180 ± 2˚C) • Desiccator • Analytical balance (200 g capacity and l.c. 0.1 mg) • Pipettes • Evaporating dish • Magnetic stirrer (recommended)		
6.	**pH**	Clause 5.2 and Sr. No. vi) of Table 1	IS 3025 (Part 11):1983 1. Electrometric method	• pH meter • Magnetic stirrer • Thermometer (l.c. 0.5°C) • Beakers	• Standard pH Buffer solutions/tablets (Minimum two different values) **OR** Distilled water Borax (for Borax buffer) Potassium dihydrogen phosphate and Disodium hydrogen phosphate (for phosphate buffer) Potassium hydrogen tartrate (for Tartrate buffer)	-

					Potassium hydrogen phthalate (for Phthalate buffer) Potassium tetraoxalate dihydrate (for Tetraoxalate buffer) Calcium Carbonate Platinum dish, Muffle furnace, Hot Plate, Fritted glass filter of medium porosity, polyethylene bottle, Suction pump & fritted glass funnel (for Tetra oxalate buffer)	
			2. Colorimetric Method	• Hard glass tubes	• Methyl orange, methyl red, bromothymol blue, phenolphthalein and alcohol (66%) (for universal indicator) • Thymol blue indicator (acid range) • Bromophenol blue indicator • Bromocresol green indicator • Methyl red indicator • Bromocresol purple	-

					indicator • Bromothymol blue indicator • Phenol Red indicator • Cresol Red indicator • Thymol Blue (alkali range) indicator • Thymolphthalein indicator • Thymol violet indicator • Different buffer solutions of known pH	
7.	**Barium**	Clause 5.2, Sl. No i) of Table 2	i) Annex F of IS 13428:1998	• Filter paper and filtration assembly • Hot plate/gas burner	• Ammonium Dichromate • Ammonium Acetate • Ammonium Hydroxide • Potassium Iodide • Sodium Thiosulphate(0.1N) • Hydrochloric Acid • Ammonium Chloride • Starch indicator	-
			ii) IS 15302:2003	• Atomic Absorption Spectrophotometer and Associated equipment	• Metal free water • Hydrochloric Acid	-

				(Burner, Readout mechanism, lamp for Barium, Pressure Reducing valves and vents) • Nitrous oxide burner head • T-junction valve or other switching valve • Air (compressor or commercially bottled gas) • Acetylene Gas, Standard Commercial grade • Nitrous oxide gas	• Nitric Acid • Sulphuric Acid • Hydroflouric Acid • Potassium Chloride • Aluminium Nitrate • Standard barium solution	
8.	**Copper**	Clause 5.2, Sr. No. ii) of Table 2	IS 3025 (Part 42):1992 i) Neocuproine Method	• Spectrophotometer • Hot plate • Separating funnels (125 ml) • Conical flasks	• Ammonium Hydroxide • Chloroform, AR Grade • Hydrochloric acid, Conc. • Hydroxylamine Hydrochloride • Isopropyl Alcohol • Neocuproine • Double Distilled water • Nitric Acid, Conc. • Sulphuric Acid, Conc. • Hydrated Sodium Citrate • Pure Copper Metal • Hydrogen Peroxide	Detection range 0.05 to 5.0mg/l

			ii) Atomic Absorption Method (Direct)	• Atomic Absroption Spectrophotometer with air-acetylene flame • Copper Hollow Cathode lamp	• Hydrochloric Acid, Conc. • Nitric Acid, Conc. • Dilute Sulphuric Acid • Pure Copper metal	Detection range 0.02 to 5.0mg/l
			iii) Atomic Absorption Method (Chelation (Extraction)	• **Atomic Absorption Spectrophotometer with air-acetylene flame** • **Copper Hollow Cathode Lamp** • **Separating Funnel** • **Volumetric Flasks**	• **Hydrochloric Acid, Conc.** • **Nitric Acid, Conc.** • **Pyrrolicine** • **Methyl Isobutyl Ketone - Reagent grade (MIBK)** • **Carbon Disulphide** • **Sodium Hydroxide** • **Distilled water** • **Water Standard MIBK** • **Bromophenol Blue** • **Ethanol or Isopropanol** • **Pure Copper Metal** • **Sulphuric Acid**	Detection range 0.002 to 0.5 mg/l
			iv) Differential Pulse Anodic Stripping Voltametry	• **Polarograph capable of performing differential pulse work** • **Hanging Mercury Drop Electrode** • **Platinum Counter**	• **Hydrochloric Acid Conc. (Spectro Grade)** • **Nitric Acid-Conc. (Spectro Grade)**	Detection range 0.0001 to 0.1mg/l

				Electrode • **Saturated Calomel Reference Electrode** • **Magnetic Stirrer Control unit with Stirring Bar** • **Scrubber** • **Whatman Filter Paper No. 40** • **Purified Nitrogen Gas**	• **Sulphuric Acid Conc.** • **Pure Copper Metal** • **Amalgamated Zinc** **OR** **Granular Zinc and Mercury** • **Ammonium Meta Vanadate**	
9.	**Iron**	**Clause 5.2 and Sr. No iii) of Table 2**	**IS 3025 (Pt. 53) Referee Method** **(1) 1,10 Phenanthroline Method**	• **Spectrophotometer** • **Std. volumetric Glass wares** • **Hot Plate** • **Beakers** • **Volumetric Flasks** • **Pipettes** • **Conical flasks** • **Separating Funnel** • **Fuming Hood** • **0.45µ m Membrane Filter with Filtration Assembly**	• **Distilled water** • **Hydrochloric Acid-Conc. (Containing less than 0.00005% iron)** • **Hydroxylamine Hydrochloride** • **Ammonium Acetate** • **Glacial Acetic Acid** • **Sodium Acetate** • **1,10 Phenanthroline Monohydrate** • **Stock Iron Solution 1ml=200µg of Fe (Conc. Sulphuric Acid, Ferrous**	i)Detection range 0.075 to 0.5mg/l ii) This requirement is **not applicable** for Packaged Natural Mineral Water

					Ammonium Sulphate, Potasssium Permanganate) • **Std. Iron Solution (1.0 ml=10.0µg of Iron)** • **Di-isopropyl Ether**	
			(2) Atomic Absorption Method (DIRECT)	• **Atomic Absorption Spectrophotometer** • **Air Acetylene Flame** • **Iron Hollow Cathode Lamp or Electrodeless discharge lamp for use at 248.3nm** • **Volumetric Flasks**	• **Distilled water** • **Hydrochloric Acid – Conc.** • **Nitric Acid – Conc.** • **Sulphuric Acid – Conc.** • **Calcium Chloride Solution (Calcium Carbonate, Hydrochloric acid)** • **Stock Iron Solution (1.0 ml=100µg of fe) (Pure iron wire, Hydrochloric acid Nitric Acid)**	Detection range 0.1 to 10 mg/l
			<u>IS 15303:2003</u> **3. Electrothermal Atomic Absorption Spectrometric Method**	• **Atomic Absorption Spectrometer** • **Hollow Cathode lamp for Iron** • **Graphite Furnace** • **Readout Mechanism** • **Sample Dispenser** • **Vent for fumes**	• **Metal free water** • **Hydrochloric Acid Conc.** • **Nitric Acid, Conc.** • **Matrix Modifier stock solutions (Magnesium Nitrate, Nickel**	Minimum detection limit 0.001mg/l

				• **Cooling device** • **Membrane Filter Apparatus**	**Nitrate, Phosphoric Acid, Palladium Nitrate & Citric Acid)** • **Stock Metal Solutions (Iron wire)** • **Chelating resin**	
10.	**Manganese**	**Clause 5.2, Sl. No. iv), Table 2**	**Clause 35 of IS 3025:964**	• **Nessler's Tubes** • **Beakers** • **Hot Plate** • **Volumetric flask** • **Pipettes** • **Conical Flasks** • **Burette**	• **Sulphuric Acid** • **Hydrogen Peroxide (30%)** • **Nitric Acid, Conc.** • **Stabilized Distilled Water** **OR** **Distillation Assembly, Distilled water, Potassium Permanganate and Dil. Sulphuric Acid** • **Phosphoric Acid (sp. Gr. 1.75)** • **Potassium Periodate** • **Std. Manganese Solution (1ml=0.02 mg of Mn) (Standard 0.1 N Potassium Permanganate solution, saturated solution of sulphur dioxide)**	Detection limit up to 0.1mg/l

11.	**Nitrate (as NO3)**	**Clause 5.2, Sl. No. (v) of Table 2**	**IS 3025 (Part 34)** **i) Cadmium Reduction Method**	• **Reduction Column** • **Colorimeter** - **Spectrophotometer OR Filter photometer** • **Glass wool** • **0.45 µ m pore diameter membrane filter**	• **Distilled water** • **Nitrate free water** • **Cadmium granules** • **Hydrochloric Acid (6N)** • **Copper Sulphate Solution** • **Sulphanilamide** • **Conc. Hydrochloric Acid** • **N-(1-napthyl))-Ethylenediamine dihydrochloride (NED) Dihydrochloride)** • **Ammonium Chloride** • **Disodium Ethylene diamine tetra acetate** • **Ammonia Solution** • **Copper sulphate Solution – 2%** • **Potassium Nitrate** • **Chloroform** • **Potassium Nitrite** • **Nitrite free water**	Detection limit maximum 0.1 mg/l
			ii) Chromotropic Acid Method	• **Spectrophotometer OR Photometer**	• **Nitrate free water** • **Stock Nitrate Solution**	Detection range 0.1 to

				• **Pipettes** • **Volumetric flasks**	**Solution (Potassium Nitrate, Chloroform)** • **Standard Nitrate solution** • **Sulphite Urea Reagent (Urea & Anhydrous sodium Sulphite)** • **Antimony reagent (Antimony metal, Conc. Sulphuric acid)** • **Chromotropic Acid Reagent (Purified chromotropic Acid crystals, Conc. Sulphuric Acid)** • **Sulphuric Acid, Conc. Nitrate free**	5.0mg/l
			3) Devarda's Alloy Reduction Method	• **Distillation Assembly (Kjeldahl Assembly)** • **Measuring Scoop** • **Spectrophotometer OR Photometer** • **Volumetric Flasks**	• **Ammonia Free Water** • **Borate Buffer Solution (0.1N Sodium Hydroxide, 0.025M Sodium Tetraborate)** • **Sodium Hydroxide**	Detection limit minimum 2mg/l

					– 6 N • **Devarda's Alloy – 20 mesh with less than 0.005 percent Nitrogen** • **Mixed indicator Solution (Methyl Red indicator, Ethyl Alcohol/Isopropyl Alcohol, Methylene Blue)** • **Indicating Boric Acid Solution (Hydroboric Acid, mixed indicator solution)** • **Std. Sulphuric Acid Titrant - 0.02 N** • **Nessler's Reagent (Mercuric Iodide, Potassium Iodine. Sodium Hydroxide)** • **Stock Ammonia Solution (Anhydrous Ammonium Chloride)** • **Standard Ammonia Solution**	

12.	**Nitrite**	**Clause 5.2 and Sr. No. vi) of Table 2**	**IS 3025(Part 34) :1988**	• **Spectrophotometer / Photometer** **OR** **Nessler's cylinders method** • **Nessler's Tubes** • **0.45 µm Membrane Filter**	• **Nitrite Free water (Distilled water, Potassium Permanganate, Barium Hydroxide/Calcium Hydroxide Conc. Sulphuric Acid, Manganese Sulphate)** • **Sulphanilamide Reagent** • **NED Dihydrochloride** • **Hydrochloric Acid** • **Sodium Oxalate – 0.05 N.** • **Ferrous Ammonium Sulphate – 0.05N (Ferrous Ammonium Sulphate, Conc. Sulphuric Acid, Std. Dichromate solution)** • **Stock Nitrite Solution (Sodium Nitrite, Chloroform, Sodium Oxalate, Std., Potassium**	**-**

					Permanganate solution) • **Intermediate Nitrite Solution** • **Standard Nitrite Solution**	
13.	**Flouride**	Clause 5.2; Sr.No. vii) of Table 2	Clause 23 of IS 3025:1964	• Nessler Tubes (100ml) • Distillation Apparatus • Refrigerator (Recommended)	• Sodium Thiosulphate Solution (0.1 N) • Standard Sodium Fluoride Solution (1ml = 0.01 mg F) • Zirconium Oxychloride OR Zirconium Oxynitrate • Alizarin Sodium Monosulphonate (Alizarin S) • Conc. Hydrochloric Acid • Conc. Sulphuric Acid • Silver Sulphate • Perchloric Acid • Phenolphthalein Indicator • Sodium Hydroxide Solution	-
14.	**Zinc**	Clause 5.2; Sr.No. viii) of Table 2	IS 3025 (Part 49): 94 i) Zincon Method	• Spectrophotometer (620nm with 1cm cells)	• Sodium Hydroxide • Potassium Cyanide • Chlorohexanone • Distt. Water • Zincon	Detection range 0.02 to 5 mg/l

					• Methanol • Sodium Ascorbate • Borate Buffer Solution (Sodium Hydroxide, Potassium Chloride, Boric Acid) • Hydrochloric Acid, Conc. • Zinc Sulphate	
			ii) Atomic Absorption Method (Direct)	• Atomic Absorption Spectrophotometer with Air-Acetylene Flame • Hollow Cathode Lamp	• Hydrochloric Acid, Conc. • Nitric Zinc Solution (Zinc Granules/Zinc Oxide)	Detection range 0.01 to 2.0mg/l
			iii)Atomic Absorption Method (Chelation – Extraction)	• Atomic Absorption Spectrophotometer with Air-Acetylene Flame • Hollow Cathode Lamp	• Hydrochloric Acid, Conc. • Nitric Acid, Conc. • Pyrrolidine Dithio Carbamic Acid - Chloroform Reagent (Pyrrolidine, Chloroform, Carbon disulphide) • Sodium Hydroxide • Chloroform • Bromophenol Blue Indicator (Bromophenol Blue, Ethanol or Isopropanol)	Detection range 0.001 to 0.2mg/l

			iv) Differential Pulse Anodic Stripping Voltammetry (DPASV) Method	• Polarographic Instrumentation Capable of Performing Differential Pulse Work • Hanging Mercury Drop Electrode • Platinum Counter Electrode • Saturated Calomel Reference Electrode • Magnetic Stirrer	• Stock Zinc Solution (Zinc Granules or Zinc Oxide, Nitric Acid) • Hydrichloric Acid, Conc. • Nitric Acid, Conc • Zinc Solutions • Amalgamated Zinc (Granular Zinc, Conc. Hydrochloric Acid, Mercury) • Purified Nitrogen (Ammonium Meta Vanadate, Scrubber, Amalgamated Zinc, Nitrogen Gas)	Detection range 0.001 to 0.1mg/l
15.	**Silver**	Clause 5.2; Sr.No. ix) of Table 2	Annex J of IS 13428:1998	• Atomic Absorption Spectrophotometer with Oxidizing Air Acetylene Flame	• Deionised Distilled Water (Ion Exchange Column & Distilled Water) • Nitric Acid – Redistilled • Hydrochloric Acid – Redistilled • Silver Std. Solution (Silver Nitrate) • Lanthanum Chloride • Lanthanum Stock Solution (Lanthanum Oxide, Hydrochloric Acid) • Ammonium Pyrrolidine Dithiocarbamate	-

					solution)	
16.	**Aluminium**	Clause 5.2; Sr.No. x) of Table 2	i) IS 3025(Part 55):2003 a) Eriochrome Cyanine R Method	• Spectrophotometer (535 nm with 1cm Cells) • pH Meter • Standard Volumetric Glasswares	• Sulphuric Acid – 0.02 N and 6 N • Ascorbic Acid Solution • Buffer Solution (Sodium Acetate & 1 N Acetic Acid) • Acetic Acid Solution – 1:1 and 1 N • Sodium Hydroxide Solution – 0.1 N and 1N • Stock Eriochrome Cyanine R Dye Solution • Stock Aluminium Solution (Aluminium Potassium Sulphate) • Methyl Orange Indicator Solution	i)Detection range 0.02 to 0.3mg/l ii) This requirement is **not applicable** for Packaged Natural Mineral Water
			b) Atomic Absorption Method (Direct)	• Atomic Absorption Spectrophotometer with Nitrous Oxide – Acetylene Flame and Hollow-Cathode Lamp • Standard Volumetric Glasswares	• Hydrochloric Acid, Conc. • Nitric Acid, Conc. • Potassium Chloride Solution • Stock Aluminium Solution (Aluminium Potassium Sulphate)	Detection range 5 to 100mg/l
			ii) IS 15302:2003 Direct Nitrous Oxide – Acetylene Flame Atomic Absorption Spectrometry	• Atomic Absorption Spectrometer • Burner • Read Out Mechanism • Lamp (Hollow Cathode or EDL)	• Air (Compressor or Bottled Gas) • Acetylene, Standard Commercial Grade • Metal Free Meter • Hydrochloric Acid – 1 N	Detection limit 0.1mg/l

				• Pressure Reducing Valves • Vent • Nitrous Oxide Burner Head • T-Junction Valve or Other Switching Valve	• Nitric Acid, Conc. • Sulphuric Acid • Hydrofluoric Acid – 1 N • Nitrous Oxide • Potassium Chloride • Aluminium Nitrate • Standard Aluminium Solution (Aluminium Metal)	
17.	**Chloride**	Clause 5.2; Sl.No.xi) of Table 2	IS 3025 (Part 32):1988 i) Argentometric Method	• Erlenmeyer Flask (250ml) • Burette	• Potassium Chromate Indicator Solution (Potassium Chromate, Silver Nitrate) • Standard Silver Nitrate Solution – 0.01 N • Standard Sodium Chloride Solution – 0.01 N • Aluminium Hydroxide Suspension (Aluminium Potassium Sulphate or Aluminium Ammonium Sulphate, Conc Ammonium Hydroxide) • Phenolphthalein Indicator Solution • Sodium Hydroxide – 1N • Sulphuric Acid – 1N • Hydrogen Peroxide – 30%	-

			ii) Mercuric Nitrate Method	• Erlenmeyer Flask (250 ml) • Microburette (5 ml with l.c. 0.01ml)	• Standard Sodium Chloride Solution – 0.01N • Nitric Acid – 0.1N • Sodium Hydroxide – 0.1N • Indicator – Acidifier Reagent (S-Diphenylcarbazone, Conc. Nitric Acid, Xylene Cyanol FF, Ethyl Alcohol or Isopropyl Alcohol) • Standard Mercuric Nitrate Solution – 0.01N (Mercuric Nitrate, Conc. Nitric Acid, Sodium Bicarbonate, Std. Sodium Chloride Solution) • Mixed Indicator Reagent (Diphenylcarbazone, Bromo Phenol Blue, Ethyl Alcohol or Isopropyl Alcohol) • Standard Mercuric Nitrate Solution – 0.1N	-

			iii) Potentiometric Method	• Glass and Silver- Silver Chloride Electrodes • Electronic Voltmeter • Mechanical Stirrer	• Standard Sodium Chloride Solution (0.01N) • Nitric Acid-Conc • Standard Silver Nitrate Solution (0.01N) • Pretreatment Reagent (Sulphuric Acid, Hydrogen Peroxide, Sodium Hydroxide – 1N)	-
			iv) Automated Ferricyanide Method	• Automated Analytical Equipment • Filters (480nm)	• Stock Mercuric Thiocyanate Solution (Mercuric Thiocynate, Methanol) • Stock Ferric Nitrate Solution (Ferric Nitrate, Conc. Nitric Acid) • Colour Reagent (Poly oxy Ethylene 23 Lauryl Ether) • Sodium Chloride	-
18	**Selenium**	Clause 5.2; Sr.No. xii) of Table 2	i) IS 3025 (Part 56):2003 a)Spectrophotometric Method	• Spectrophotometer (480nm) • Volumetric Glasswares • Separating Funnel (250ml) Preferably Flourocarbon Stopcock	• Stock Selenium Solution (Sodium Selenite, Hydrochloric Acid) • Hydrochloric Acid – 0.1N	Detection limit minimum 0.01mg/l

				• Water Bath – Thermostatically Controlled • pH Meter • Centrifuge • Centrifuge Bottles with Flourocarbon Screw Cap	• Ammonium Hydroxide • Cyclohexane • 2,3 – Diaminonaphthalene (DAN) • Hydroxylamine Hydrochloride • Sodium Salt of EDTA • Amberlite XAD -8 or Equivalent Resin • Hydrochloric Acid, Conc • Potassium Hydroxide	
			b) Atomic Absorption Spectrometric Method (Hydride Technique)	• Atomic Absorption Spectrometer Fitted with Hydride System and Hollow Cathode Lamp/Electrodeless Discharge Lamp • Gas (Argon or Nitrogen) • Glasswares • Decomposition Apparatus (Round Bottom Flask, Reflux Condenser, Condensate Reservoir)	• Nitric Acid • Sulphuric Acid • Hydrochloric Acid • Hydrogen Peroxide • Sodium Hydroxide • Sodium Tetraborate • Selenium Stock Solution (1mg/ml) (Selenium Dioxide)	-

			ii) IS 15303:2003 Electrothermal Atomic Absorption Spectrometric Method	• Atomic Absorption Spectrometer • Hollow Cathode Lamp or Electrodeless Discharge Lamp • Graphite Furnace • Readout Mechanism • Sample Dispenser • Vent for Fumes • Cooling Device • Membrane Filter Apparatus (0.45 µ m)	• Metal Free Water • Hydrochloric Acid, Conc • Nitric Acid, Conc • Matrix modifier Stock Solutions (Magnesium Nitrate, Nickel Nitrate, Phosphoric Acid, Palladium Nitrate, Citric Acid) • Stock Metal Solution – 1mg/ml (Sodium Selenite) • Chelating Resin	Detection limit minimum 0.002mg/l
19	**Sulphate**	Clause 5.2; Sr.No. xiii) of Table 2	IS 3025 (Part 24):1986 i)Gravimetric Method	• Steam Bath • Drying Oven • Muffle Furnace • Desiccator • Analytical Balance (l.c.0.1mg) • Filter Paper (Preferably Whatman No.42) • Silica or Porcelain Crucible • Ion Exchange Column • Filter (0.45 µ m) • Platinum Dish	• Methyl Red Indicator • Hydrochloric Acid • Barium Chloride • Silver Nitrate • Nitric Acid • Ion Exchange Resin (Amberlite IR-120 or Equivalent)	Detection limit more than 1.0mg/l
			ii) Thorin Method	• White Porcelain Basin • Burette	• Ethyl Alcohol • Ammonium Hydroxide (Ammonia-Conc	Detection range 5 to

				• Ion Exchange Column • Filter – 0.45µm	and Distilled Water) • Hydrochloric Acid • Thorin (2,2 – Hydroxy – 3,6 – Disulpho – 1 – Naphthylazo Benzene Arsenic Acid) • Ion Exchange Resin (Amberlite IR-120 or Equivalent) • Anhydrous Sodium Sulphate • Standard Sulphate Solution • Barium Chloride – Standard Solution	5 to 150mg/l
			iii)Turbidity Method	• Turbidity Meter or Spectrophotometer • Glass Apparatus • Hot Plate • Refrigerator (recommended)	• Barium Chloride • Gelatin Powder • Glycerol • Hydrochlorc Acid, Conc • Sodium Chloride • Ethyl or Isopropyl Alcohol • Anhydrous Sodium Sulphate	Detection limit 1 to 40mg/l
20	**Alkalinity**	Clause 5.2; Sr. No.xiv) of	IS 3025 (Part 23):1986	• pH Meter • Burette	• Distilled Water • Sulphuric Acid, Conc	Detection range

		Table 2	i) Indicator Method ii)Potentiometric Method	• Magnetic Stirrer Assembly • Potentiometer • Glasswares	• Standard Solution of Sulphuric Acid – 0.02 N • Phenolphthalein Indicator • Mixed Indicator Solution (Methyl Red, Bromocresol Green, Ethyl or Isoprophyl Alcohol) • Standard Sulphuric Acid – 0.02N	0.5 to 500mg/l Detection range 0.5 to 500mg/l
21	**Calcium**	Clause 5.2; Sr. No.xv) of Table 2	IS 3025 (Part 40):1991 i)EDTA Titrimetric Method	• Hot Plate • Glasswares • Polyethylene Bottle	• Sodium Hydroxide Solution – 1N • Hydrochloric Acid – 0.1N • Indicator Solution:Murexide (Ammonium Purpurate) Indicator, Absolute Ethylene Glycol Sodium Chloride OR Patton and Reeder's Indicator (Eriochrome Blue Black R), Sodium Sulphate/Potassium Sulphate • Standard EDTA Solution – 0.01M	-

					(Disodium Ethylene Diamine Tetra – Acetate, Standard Zinc Solution, (Or Standard Calcium Solution) Buffer Solution, Eriochrome Black T Indicator Solution • Stock Calcium Solution (Calcium Carbonate, Hydrochloric Acid – 0.1N) • Nitric Acid, Conc	
			ii)Atomic Absorption Spectrometric Method	• Atomic Absorption Spectrometer with Air/Acetylene or Nitrous Oxide/Acetylene Flame and Hollow Cathode Lamp (Calcium)	• Hydrochloric Acid – 1N and 0.1N • Lanthanum Chloride • Cesium Chloride • Standard Calcium Solution	Detection limit maximum 50mg/l
			iii) Permanganate Titration Method	• Beakers, Cover Glass, and Glass Rod • Filtration Set up (Gooch Crucible with Suction)	• Hydrochloric Acid – 1N • Methyl Red Indicator Solution • Ammonium Oxalate Solution • Urea • Dilute Sulphuric Acid – 1N	-

					• Sodium Oxalate • Standard Potassium Permanganate Solution	
22	**Magnesium**	Clause 5.2; Sr.No.xvi) of Table 2	IS 3025 (Part 46):1994 i)Gravimetric Method ii) Volumetric Method (EDTA)	• Vacuum Pump • Filter Flasks • Filter Crucibles • Muffle Furnace • Hot Plate • Volumetric Flasks • Glasswares	• Methyl Red Indicator • Hydrochloric Acid • Ammonium Oxalate • Ammonium Hydroxide • Nitric Acid, Conc • Diammonium Hydrogen Phosphate • Urea • Indicator Solutions i)Patton and Reeder Reagent, Sodium Chloride/Potassium Chloride ii)Murexide (Ammonium Purpurate), Absolute Ethylene Glycol, Sodium Chloride iii)Eriochrome Black T Indicator (EBT Indicator), Hydroxylamine Hydrochloride, Ethanol/Methanol • Standard Zinc Solution – 0.01M (Pure Zinc Dust/Granules – 99.9% Pure; Hydrochloric Acid)	Detection limit more than 1 mg/l -

			iii)Atomic Absorption Spectrophotometric Method	• Atomic Absorption Spectrophotometer with Air-Acetylene Flame or Nitrous Oxide-Acetylene Flame and Hollow Cathode Lamp (Magnesium) • Polyethylene Bottles	• Buffer Solution (Ammonium Chloride, Ammonia, Sodium Hydroxide-1N) • Standard Ethylene Diamine Tetra Acetic Acid (EDTA) Solution – 0.001N (Disodium Ethylene Diamine Tetra Acetate Dihydrate, Standard Zinc Solution) • Triethanolamine Solution – 10% • Potassium Cyanide • Hydroxlamine Hydrochloride • Hydrochloric Acid – 1N and 0.1N • Lanhanum Chloride (Lathanum Oxide, Hydrochloric Acid, Conc) • Cesium Chloride • Standard Magnesium Solution (1000mg/l) (Magnesium Oxide, Hydrochloric Acid)	Detection limit less than 1 mg/l

23	**Sodium**	Clause 5.2; Sr.No.xvii) of Table 2	IS 3025 (Part 45):1993 i) Flame Emission Photometric Method	• Flame Photometer (Direct Reading OR Internal Standard Type) OR Atomic Absorption Spectrophotometer (In Flame Emission Mode) • Glasswares	• Deionized Distilled Water • Stock Sodium Solution – 1mg/ml (Sodium Chloride) • Standard Lithium Solution – 1mg/ml	-
			ii) Atomic Absorption Spectrometry Method	• Atomic Absorption Spectrophotometer with Air-Acetylene Flame and Hollow Cathode Lamp for Sodium • Glasswares	• Sodium Chloride • Potassium Chloride • Stock Sodium Solution – 1mg/ml • Stock Potassium Solution – 1mg/ml	Detection range 0.20 to 4.0mg/l
			iii)Gravimetric Method	• Beakers (20ml, Borosilicate) • Fritted Glass Crucible or Porous Porcelain Crucibles • Vacuum Pump or Aspirator	• Zinc Uranyl Acetate Reagent (Glacial Conc. Acetic Acid, Uranyl Acetate Dihydrate, Zinc Acetate Dihydrate, Sodium Chloride) Ethyl Alcohol Wash Solution (Ethyl Alcohol, Pure Sodium Zinc Uranyl Acetate, Sodium Chloride Acetic Acid, Diethyl Ether)	-

24	**Residual Free Chlorine**	Clause 5.2; Sr.No.xviii) of Table 2	IS 3025 (Part 26):1986 i)Iodometric Method	• Glasswares	• Acetic Acid, Glacial • Potassium Iodide – Crystals • Standard Sodium Thiosulphate – 0.01N • Standard Potassium Dichromate – 0.1N • Starch Indicator Solution	i)Detection limit more than 1mg/l ii) This requirement is **not applicable** for PNMW
			ii) Stabilized Neutral Ortho-Toluidine Method	• Spectrophotometer • Magnetic Stirrer Assembly • Brown Glass Stoppered Bottles • Refrigerator (Recommended)	• Distilled Water – Chlorine Demand Free (Distilled Water, Chlorine) • Neutral Ortho-Toluidine Reagent (Hydrochloric Acid – Conc, Mercuric Chloride, Disodium Salt of EDTA – Dehydrated, Ortho-Toluidine Dihydrochloride • Buffer Stabilizer Reagent (Dipotassium Hydrogen Phosphate, Potassium Dihydrogen Phosphate, Di (2-Ethyl Hexyl) Sulphosuccinate,	Detection range 0.005 to 0.01mg/l

					Diethylene Glycol Monobutyl ether • Potassium Iodide Solution (Potassium Iodide • Sulphuric Acid Conc. • Sodium Carbonate • Sodium Arsenite • Standard Chlorine Solution (Chlorine Gas & Distilled Water OR Hypochlorite Solution) • Sodium Thiosulphate Solution – 0.025N)	
25	**Phenolic Compounds**	Clause 5.2;Sr.No.xix) of Table 2	IS 3025 (Part 43):1992 i) 4-Aminoantipyrine Method without Chloroform Extraction	• Spectrophotometer • pH Meter • Distillation Assembly (All Borosilicate Glass) with Graham Condenser	• Stock Phenol Solution (Phenol, Bromate – Bromide Solution – 0.1N, Hydrochloric Acid (Conc), Potassium Iodide, Sodium Thiosulphate – 0.025N, Starch Indicator) • Standard Phenol Solution (1µg/ml) • Ammonium Hydroxide-0.5N • Phosphate Buffer Solution (Potassium Hydrogen Phosphate, Potassium Dihydrogen Phosphate) • 4 – Aminoantipyrine • Potassium Ferricyanide	Detection limit minimum 1 mg/l

			ii) 4-Aminoantipyrine Method with Chloroform Extraction	• Spectrophotometer • Filter Funnel (Buchner Type with Fritted Disc) OR Filter Paper (Whatman No40) • pH Meter • Separating Funnel; • Distillation Assembly (All Borosilicate Glass) with Graham Codenser	• Sodium Sulphate, Anydrous • Phosphoric Acid • Phenol Stock Solution(Phenol) • Standard Phenol Solution (1µg/ml) • Ammonium Hydroxide – 0.5N • Phosphate Buffer Solution (Potassium Hydrogen Phosphate, Potassium Dihydrogen Phosphate) • 4-Aminoantipyrine • Potassium Ferricyanide • Chloroform • Sodium Sulphate Anhydrous	Detection limit 0.001mg/l
26	**Mineral Oil**	Clause 5.2, Sr.No.xx) of Table 2	IS 3025 (Part 39):1991 i) Partition Gravimetric Method	• Separating Funnel (1lit) with Teflon or Equivalent Stopcock • Distillation Flask • Water Bath • Filter Paper (Whatman No.40 or Equivalent), 11cm Diameter • Desiccator • Analytical Balance	• Hydrochloric Acid • TrichlorotrifluoroEthane • Sodium Sulphate, Anhydrous	-

			ii) Partition Infra-Red Method	• Separating Funnel (1lit) with Teflon or Equivalent Stopcock • Infra-Red Spectrophotometer – Double Beam, Recording type • Cells – Infra-Red, Silica • Filter Paper – Whatman No.40 or Equivalent, 11cm Diameter • Analytical Balance	• Hydrochloric Acid • Trichlori Trifluoroethane • Sodium Sulphate, Anhydrous • Reference Oil (Iso-Octane, Hexadecane, Benzene)	-
			iii)Soxhlet Extraction Method	• Soxhlet Apparatus • Vacuum Pump' • Buchner Funnel (12cm Diameter) • Electric Heating Device • Paper Extraction Thimble • Filter Paper-Whatman No.40 or Equivalent, 11cm Diameter • Muslin Cloth Discs – 11 cm Diameter • Oven • Water Bath • Desiccator	• Hydrochloric Acid • Trichloro Trifluoroethane • Diatomaeous Silica Filter Aid Suspension (10g/l)	-

				• Analytical Balance		
27	**Anionic Surface Active Agents (as MBAS)**	Clause 5.2; Sr.No.xxi) of Table 2	Annex K of IS 13428:1998	• pH Meter • Spectrometer • Gas Stripping Apparatus (1 lit Capacity) • Nitrogen or Air • Reflux Condenser	• Sodium Chloride • Ethyl Acetate • Chloroform • Ethanol • Methanol • Sulphuric Acid • Ethanolic Sodium Hydroxide-0.1mol/lit (Sodium Hydroxide, Ethanol) • Methylene Blue, Neutral Solution • Methylene Blue, Acidic Solution • Bufer Solution, pH 10 (Sodium Hydrogen Carbonate, Anhydrous Sodium Carbonate) • Phenolphthalein Indicator, Ethanol • Dodecyl Benzene Sulphonic Acid Methyl Ester (Tetrapropylene Type), Stock Standard Solution	Detection limit about 0.05 mg/l
28.	**Sulphide**	**Clasue 5.2, Sl. No. xxii) of Table 2**	**IS 3025 (Part 29):1986** **i) Iodometric Method**	• **Reaction Flask (1 lit capacity)** • **Absorption flasks (250ml Capacity)** • **Nitrogen/Carbon dioxide gas cylinder** **Or**	• **Zinc acetate solution – 2N** • **Sulphuric Acid, Conc.** • **Standard Iodine solution – 0.025 N (Potassium Iodide,**	**Above 1 mg/l**

				Carbon dioxide gas generator	**Iodine)** • **Hydrochloric Acid, Conc.** • **Standard Thiosulphate Solution - 0.025 N (Sodium thiosulphate, Sodium Hydroxide/Chloroform)** • **Starch indicator solution (Starch, salicylic acid, toluene)** • **Aluminium Chloride solution – 6N** • **Sodium hydroxide – 6N**	
			ii) Methylene blue method	• **Spectrophotometer (664 nm)** • **Matched test tubes** • **Droppers**	• **N, N – dimethyl – p- Phenylene Diamine oxalate** • **Sulphuric Acid, Conc. & 1:1 solution** • **Ferric Chloride** • **Diammonium Hydrogen Phosphate** • **Methylene Blue** • **Standard Sulphide Solution**	Detection limit upto 20 mg/l

29.	**Antimony**	**Clause 5.2 Sl. No. xxiii) of Table 2**	**i) Annex G of IS 13428:1998 Spectrophotometric Method**	• **Spectrophotometer** • **Erlenmeyer Flask** • **Seperating Funnels (125 ml) with Teflon Stopcocks** • **Refrigerator** • **Ice Bath** • **Test Tubes**	• **Hydrochloric Acid – 6 N** • **Phosphoric Acid – 3N** • **Rhodamine B** • **Antimony Standard Solution (100 µg/ml and 1 µg/ml** • **Benzene** • **Sulphuric Acid** • **Perchloric Acid**	**-**
			ii) IS 15303:2003 Electrothermal Atomic Absorption Spectrometric Method	• **Atomic Absorption Spectrometer with** **i) Hollow Cathode Lamp** **OR** **Electrodeless discharge lamp** **ii) Graphite Furnace** **iii) Readout Mechanism** • **Sample Dispenser** • **Vent for Fumes** • **Cooling Device** • **Membrane Filter Apparatus (0.45µm)**	• **Metal free Water** • **Hydrochloric Acid, Conc.** • **Nitric Acid, Conc.** • **Matrix Modifier Stock Solutions (Magnesium Nitrate, Nickel Nitrate, Phosphoric Acid, Palladium Nitrate, Citric Acid)** • **Stock Antimony Solution (100 µg/ml)** • **Chelating Resin**	Detection limit minimum0.003 mg/l
30.	**Borates**	**Clause 5.2 & Sl. No. xxiv) of Table 2**	**Annex H of IS 13428:1998**	• **Spectrometer (410 – 420nm)** • **Lab Apparatus made of Polypropylene/Polyethylene/Polytetrafluoro**	• **Azomethine – H, Sodium Salt** • **L + - Ascorbic Acid** • **Buffer Solution**	**-**

				Ethylene	**(pH 5.9) [Ammonium Acetate, Sulphuric Acid, Phosphoric Acid, Citric Acid, Disodium Ethylene diamine – Tetraacetic Acid Dihydrate]** • **Borate Stock Solution - (1mg/ml) (Boric Acid)** • **Boron Standard Solution - 1µg/ml** • **Calcium Hydroxide**	

31.	**Mercury**	**Clause 5.2, & Sl. No. i) of Table 3**	**IS 3025 (Part 48):1994** **i) Cold Vapour Atomic Absorption Spectrophotometric Method**	• **Atomic Absorption Spectrometer and Associated Equipment (Cold Vapour Technique)** • **Mercury Vapour Generation Assembly** • **Mercury Hollow Cathode Lamp** • **Recorder/Printer/Display Meter**	• **Sulphuric Acid, conc.** • **Nitric Acid, Conc.** • **Stannous Chloride** • **Hydrochloric Acid, Conc.** • **Sodium Chloride** • **Hydroxylaminesulphate** • **Potassium Permanganate** • **Potassium Persulphate** • **Stock Mercury Solution (1mg/ml)** • **Mercuric Chloride**	Detection limit minimum 0.0002 mg/l

			ii) Colorimetric Dithizone Method	• **Spectrophotometer** • **Separating Funnels (250 and 1000ml with PTFE Stopocks)** • **Glass wares** • **Whatman Filter No. 42**	• **Redistilled or Deionised Distilled Water** • **Stock Mercury Solution – 100 µg/ml (Mercuric Chloride, Nitric Acid – Conc.)** • **Potassium Permanganate** • **Potassium Persulphate** • **Hydroxylamine Hydrochloride** • **Dithiozone Solution – 6 µg/ml (Dithiozone Chloroform, Hydrochloric Acid, Ammonium Hydroxide)** • **Sulphuric Acid – 0.25 N** • **Potassium Bromide** • **Chloroform** • **Disodium Hydrogen Phosphate** • **Anhydrous Potassium Carbonate** • **Sodium Sulphate, Anhydrous**	Detection limit minimum 0.002 mg/l

32.	**Cadmium**	**Clause 5.2 and Sl. No. ii) of Table 3**	**IS 3025 (Part 41):1992 i) Atomic Absorption Method (Direct)**	• **Atomic Absorption Spectrophotometer with Air-Acetylene Flame** • **Cadmium Hollow Cathode Lamp or Multi Element Hollow Cathode Lamp for Use at 228.8nm**	• **Hydrochloric Acid, Conc.** • **Nitric Acid, Conc.** • **Stock Cadmium Solution – 1mg/ml (Pure Cadmium Metal)**	Detection range 0.05 to 2mg/l
			ii) Atomic Absorption Method (Chelation and Extraction)	• **Atomic Absorption Spectrophotometer with Air-Acetylene Flame** • **Cadmium Hollow Cathode Lamp or Multi Element Hollow Cathode Lamp for Use at 228.8nm** • **Separating funnel**	• **Hydrochloric Acid, Conc.** • **Nitric Acid, Conc.** • **Stock Cadmium Solution - 0.5 µg/ml** • **Sodium Hydroxide** • **Methyl Isobutyl Ketone (MIBK)** • **Bromophenol Blue Indicator** • **Ethanol or Isopropanol** • **Pyrrolidine** • **Carbon Disulphide**	Detection range 0.005 to 0.2mg/l
			iii) Differential Pulse Anodic Stripping Voltammetry	• **Polarograph – Capable of Differential Pulse Work** • **Hanging Mercury Drop Electrode** • **Platinum Counter Electrode** • **Saturated calomel Reference Electrode** • **Magnetic Stirrer Control**	• **Hydrochloric Acid, Conc.** • **Nitric Acid, Conc.** • **Hydroxylamine Hydrochloride** • **L-Ascorbic Acid** • **Standard Cadmium Solution - 10**	Detection range 0.0001 to 0.1mg/l

				Unit with Stirring Bar • **Nitrogen Gas (Cylinder)** • **Scrubber Assembly for Nitrogen Purification**	**µg/ml (Pure Cadmium Metal)** • **Granular Zinc** • **Mercury** • **Ammonium Meta Vanadate**	
33.	**Arsenic**	**Cl. 5.2 and Sl.No.iii) of Table 3**	**IS 3025(Part 37)1988 i) Atomic absorption method**	• **Atomic absorption spectrometer with arsenic electrode less discharge lamp** • **Atomizer** • **Hydride generation system** • **Reaction cell for producing arsenic hydride** • **Eye dropper or syringe** • **Refrigerator** • **Argon or nitrogen**	• **Sodium boro hydride** • **Sodium hydroxide** • **Sodium Iodide** • **Sulphuric acid-18N & 2.5 N** • **Potassium persulphate** • **Nitric acid, conc** • **Perchloric acid, conc** • **Hydrochloric acid, conc** • **Standard arsenic (III) solution 0.1 µg/ml. (Arsenic trioxide)** • **Standard arsenic (V) solution 0.1 µg/ml.** **(Arsenic pentaoxide)** • **Standard organic arsenic solution – 0.1 µg/ml. (Dimenthyl**	**-**

					arsenic acid/cacodylic acid)	
			ii) Silver diethyl dithiocarbamate method	• **Arsine generator and absorption assembly** • **Spectrophotometer (535 nm with 1 cm. cells)**	• **Hydrochoric acid, conc** • **Potassium Iodide** • **Stannous chloride, arsenic free** • **Lead acetate** • **Ephedrine** • **Chloroform** • **Silver diethyl dithiocarbamate** • **Zinc – 20 to 30 mesh, arsenic free** • **Standard arsenic solution – 1 µg/ml (Arsenic trioxide, Sodium Hydroxide)**	**Detection limit minimum 0.001 mg/l**
			iii) Mercuric bromide stain method	• **Arsine generator glass assembly**	• **Sulphuric acid** • **Nitric acid, conc** • **Roll cotton** • **Lead acetate** • **Arsenic papers** • **Mercuric bromide** • **Ethyl alcohol/isopropanol** • **Potassium iodide** • **Arsenic free stannous chloride**	Detection limit minimum 0.001mg/l

					• **Zinc-20 to 30 Mesh, arsenic free** • **Standard arsenic solution - 1 µg/ml (Arsenic trioxide, sodium hydroxide)**	
34.	**Cyanide**	**Cl. 5.2 & Sl.No. (iv) of Table 3**	**IS 3025(Pt.27):1986** **i) Total cyanide after distillation method**	• **Distillation apparatus consisting of boiling flask (1lit.), thistle tube, Allihn water cooled condenser, gas dispersion tube, needle valve, suction flask and suction pump** • **Heating mantle** • **Gas absorber** • **Ground glass st joints** • **Spectrophotometer**	• **Sodium hydroxide** • **Lead carbonate-powdered** • **Sulphamic acid** • **Magnesium chloride** • **Sulphuric acid, conc** • **Acetic acid, glacial** • **Standard cyanide solution – 1 µg/ml (potassium cyanide, silver nitrate)** • **Chloramine - T** • **Pyridine** • **Pyrazolone** • **BIS – pyrazolone** • **Standard silver nitrate solution – 1 ml = 1 mg CN (silver nitrate)**	**Detection limit minimum 0.02 ng/l**
			ii) Selective electrode method	• **Expanded – scale pH meter or specific Ion**	• **Standard cyanide solution – 10 µg/ml**	Detection range

				meter • **Cyanide Ion selective electrode** • **Reference electrode, double junction** • **Magnetic mixer with TFE coated stirring Bar**	**(Potassium cyanide, silver nitrate)** • **Sodium hydroxide** • **Potassium nitrate** • **Potassium hydroxide**	0.05 to 10mg/l
35.	**LEAD**	**Cl.5.2 & SL. No.v) of Table 3**	**IS 3025(Pt.47):1994** **i) Atomic absorption method (direct)**	• **Atomic absorption spectrophotometer with air acetylene flame** • **Hollow cathode lamp OR Electrodeless Discharge lamp for use at 283.3 nm**	• **Hydrochloric acid, conc** • **Nitric acid, conc.** • **Standard lead solution – 0.1 mg/ml (Lead nitrate)**	Detection range 1.0 to 10.0mg/l
			ii) Atomic absorption method (chelation-extraction)	• **Atomic absorption spectrophotometer with air acetylene flame** • **Hollow cathode lamp OR Electrodeless Discharge lamp for use at 283.3 nm**	• **Hydrochloric acid, conc** • **Nitric acid, conc.** • **Pyrrolidine** • **Chloroform** • **Carbon disulphide** • **Sodium hydroxide** • **Bromophenol blue** • **Ethanol or isopropanol** • **Standard lead solution – 0.1 mg/ml (lead nitrate)**	Detection range 0.1 to 1.0mg/l (with graphite system 0.001 mg/l)
			iii) Differential pulse anodic stripping voltammetry (DPASV)	• **Polarograph capable of performing differential pulse work** • **Hanging mercury drop**	• **Hydrochloric acid, conc.** • **Nitric acid, conc.** • **Standard lead**	Detection range 0.001 to 0.1mg/l

				electrode • **Platinum counter electrode** • **Saturated calomel reference electrode** • **Magnetic stirrer control unit with stirring bar** • **Scrubber assembly for nitrogen purification** • **Nitrogen gas (cylinder)**	**solution – 0.2 µg/ml (Lead Nitrate).** • **Granular zinc** • **Mercury** • **Ammonium meta vandate**	
36.	**Chromium**	**Cl. 5.2 & Sl. No.vi) of Table 3**	**Annex J of IS 13428:1998**	• **Atomic absorption spectrophotometer with reducing Air – acetylene flame**	• **Deionised distilled water** • **Nitric acid, redistilled** • **Hydrochloric acid, redistilled** • **Standard chromium solution (chromium oxide)** • **Lanthanum chloride** • **Lanthanum oxide** • **Ammonium pyrrolidine ditho carbamate**	**-**
37.	**Nickel**	**Cl. 5.2 & Sl. No. vii) of Table 3**	**Annex. L of IS 13428:1998**	• **Atomic absorption spectrophotometer with nebulizer – burner having air-acetylene flame** • **Nickel hollow cathode lamp/electrodeless discharge lamp**	• **Nitric acid, conc.** • **Nickel standard solution-1mg/ml. (pure nickel metal)** • **Sodium hydroxide** • **Hydrochloric acid, conc.**	**-**

					• **Methyl-isobutyleketone (MIBK)** • **Ammonium 1 – pyrrolidine dithio carbamate (APDC)** • **Bromophenol blue** • **Ethanol**	
38.	**Poly chlorinated biphenyle (PCB)**	**Cl.5.2 & Sl. No.viii) of Table 3**	**Annex. M of IS13428:1998**	• **Gas chromatograph with EC detector and coupled with printer-plotter-cum-integrator** • **Glass chromatographic colum.** • **Kuderna-Danish type, evaporator** • **Snyder columns** • **Syringe (5 µl)** • **Heating oven** • **Desiccator**	• **Silica gel, 60 – 100 mesh** • **N-hexane-redistilled** • **Potassium hydroxide pellets** • **Sodium hydroxide solution – 5N** • **Diethyl ether, chromatography grade** • **Cotton wool** • **Acetic acid, glacial, redistilled** • **Chromium trioxide, re-crystallized.**	**-**
39.	**Polynuclear Aromatic Hydrocarbon**	**Clause 5.2 and Sl. No. ix) of Table 3**	**APHA 6440** **i) High Performance Liquid Chromatographic (HPLC)**	• **High Performance Liquid Chromatograph (HPLC) complete with gradient pumping system, reverse phase column and detectors (UV and**	• **Reagent Water** • **Sodium Thiosulphate, Granular** • **Cyclohexane, methanol, acetone,**	**-**

			ii) Method & Gas Chromatographic (GC) Method	**fluorescence) OR Gas Chromatograph (GC) complete with column and flame ionization detector.** • **Separating funnel (2 l)** • **Evaporative flask** • **Three Ball Synder column** • **K-D Apparatus** • **Water bath (60-65˚C)**	**methylene chloride, pentane – Pesticide quality or equivalent.** • **Acetonitrile – HPLC quality** • **Sodium Sulphate, granular, anhydrous** • **Silica Gel – 100/200 mesh** • **Stock standard solution** • **Std. PAHs Solutions – (a) 100 µg/ml of naphthalene, acenaphthylene, fluorine, phneanthrene and anthracene. (b) 5µg/ml Benzo (k) fluoranthene**	

LIST OF TEST FACILITIES FOR MICROBIOLOGICAL TESTS OF PACKAGED DRINKING WATER AS PER IS 14543:2004 *

Sl. No.	Tests	Clause Ref. of IS 14543:2004	Referred Method of Test/ Refer to IS	Test Equipment/Apparatus*	Chemicals/Medium	Remarks
1.	ESCHERICHIA COLI	Clause 5.1.1	i) IS 5887(Pt.1):1976	• General microbiological Lab equipments: i) Hot air oven (capable of 180˚ C) ii) Autoclave (capable of 15 psi/121˚C) of suitable size depending on need iii) Balance for media preparation (l.c. 0.01 g) iv) pH meter (l.c.0.1) v) Laminar air flow chamber OR inoculation room/cabinet fitted with U.V. tube light vi) U.V. cabinet fitted with U.V. lamp vii) Hot plate for media preparation viii) Membrance filtration assembly (including 0.45µm pore dia with 47-50 mm diameter sterilized filters, vacuum pump and forceps with rounded	• Distilled water • Nutrient broth @ (peptone, meat extract, sodium chloride) • Nutrient Agar medium @ (Nutrient broth, Agar) • Mac Conkey broth (Peptone, sodium taurocholate/Bile salts, sodium chloride, lactose, neutral red, ethanol) • Mac Conkey Agar Medium (Mac Conkey Broth, Agar) • Eosin methylene blue Lactose Agar medium (Peptone, Dipotassium	

				tips) **ix) Inoculating loop** **x) Bunsen burner with LPG cylinder** **xi) Hot plate for media preparation** **xii) Water bath thermostatically controlled** **xiii) Microscope@** **xiv) Air conditioner (recommended)** **xv) Refrigerator** **xvi) Colony counting equipment (recommended)** **xvii) General glasswares including Petri dishes, pipettes, flasks slides, Durham's tubes, test tubes, both side open glass tubes, culture bottles** • **Incubator capable of maintaining 37 ±1˚C** • **Incubator capable of maintaining 44˚C @**	**Dipotassium hydrogen phosphate, Agar, lactose, Eosin methylene blue)** • **Tergitol Agar medium (Proteose peptone, yeast extract, lactose, Agar, tergitol-7, Bromothymol blue)** • **TSI medium for H_2S test @ (Meat extract, yeast extract, peptone, glucose, lactose, sucrose, ferrous sulphate, sodium chloride, sodium thiosulphate, Agar, phenol red)** • **Medium for urease test@ (Peptone, sodium chloride, Agar, potassium dihydrogen phosphate, phenol red, glucose, urea,**	

					Seitz filtration assembly) • **Medium for indole production@ (Peptone, sodium chloride, strain of bacterium known to produce indole)** • **Kovac's reagent @ (p-Dimethyl-aminobenzal dehyde, Amyl alcohol/Iso-amyl alcohol, conc. Hydrochloric acid)** • **Medium for methyl red and Voges-Proskauer tests @ (Peptone, Dipotassium hydrogen phosphate, glucose)** • **α-naphthol, ethanol, potassium hydroxide,@** • **Simmon's citrate Agar @**	

					(Sodium chloride, magnesium sulphate, ammonium dihydrogen phosphate, Dipotassium hydrogen phosphate, sodium citrate, Agar, BroMothymol blue indicator) • **Peptone water medium for carbohydrate fermentation test @ (Peptone, sodium chloride, Andrade's indicator, sugar)** • **Lactose@** • **Gram stain @ (Methyl violet/crystal violet; iodine; potassium iodide; neutral red, acetic acid, ethanol)**	
			ii) IS 15185:2002 Standard Test	• **General microbiological lab equipments**	• **Distilled water** • **Lactose TTC**	**This is a reference**

				(as listed above) • **Water bath and/or incubator thermostatically controlled (36 ±2˚ C and 44.0±0.5˚C)**	**Agar (Lactose; peptone; yeast extract; meat extract; Bromothymol blue; Agar; 2,3,5-Triphenyltetrazolium chloride (TTC); sodium heptadecylsulphate (Tergitol-7); membrane filter – 0.2 µm pore size)** • **Tryptone soy agar (TSA) (Tryptic digest of casein; soy peptone; sodium chloride; Agar)** • **Tryptone broth (Tryptic digest of casein, L-tryptophan, sodium chloride)** • **Oxidase reagent (Tetramethyl-p-phenylene diamine hydrochloride)** • **Kovac's Reagent (p-dimethyl aminobenzal**	**method**

					dehyde, amyl or butyl alcohol, hydrochloric acid)	
			• Rapid Test	• General microbiological lab equipments (as listed above) • Water bath and/or incubator thermostatically controlled (36 ±2°C and 44.0±0.5°C). • Ultra violet lamp wave length 254 nm (Low pressure mercury lamp) • Filter pad, dia (min.) 47mm	• Distilled water • Tryptone soy Agar(TSA) (Tryptic digest of casein; soy peptone; sodium chloride; Agar) • Tryptone bile Agar (TBA) (Tryptone, bile salts, Agar) • Indole reagent (p-Dimethylamino benzaldehyde, hydrochloric acid)	This is optional method
2.	Coliform	Cl. 5.1.2	i) IS 5401(Pt 1):2002	• General microbiological lab equipments; (as listed above) • Incubator (37 ± 1°C)	• Distilled water • Crystal violet neutral red bile lactose (VRBL) Agar (Peptone, yeast extract, lactose, sodium chloride, bile salts, neutral red, crystal violet, Agar)	

			ii) IS 15185:2002 Standard Test	• **General microbiological lab equipments (as listed above)** • **Water bath and/or incubator thermostatically controlled (36 ±2° C and 44.0±0.5°C)**	• **Distilled water** • **Lactose TTC Agar (Lactose; peptone; yeast extract; meat extract; Bromothymol blue; Agar; 2,3,5-Triphenyltetrazolium chloride (TTC); sodium heptadecylsulphate (Tergitol-7); membrane filter – 0.2 µm pore size)** • **Tryptone soy agar (TSA) (Tryptic digest of casein; soy peptone; sodium chloride; Agar)** • **Oxidase reagent (Tetramethyl-p-phenylene diamine hydrochloride)**	
3.	**Sulphite reducing anaerobes**	**Cl. 5.1.4**	**Annex. C of IS 13428:1998**	• **General microbiological lab equipments (as listed above)** • **Volumetric pipettes – 10 ml and 1 ml** • **Iron wire** • **Incurbator (37 ± 1°C)**	• **Differential reinforced clostridial medium (DRCM) (Peptone tryptic digest of meat ,**	

				• Screw cap-bottles/vials and stoppers of boron silicate glass of capacities 200, 100 and 25 ml • Anaerobic Jar assembly (Recommended)	meat extract, yeast extract, starch, hydrated sodium acetate, glucose, L-cysteine hydrochloride, sodium hydroxide) • Sodium sulphite • Iron (III) citrate	
4.	**Pseudomonas aeruginosa**	**Clause 5.1.5**	**Annex D of IS 13428**	• General microbiological Lab equipments (as listed above) • Screw capped bottles • Incubator (37 ± 1˚ C) • Incubator (42 ± 0.5˚ C) @	• Presumptive medium for pseudomonas aeruginosa [DL asparagine, L proline, anhydrous dipotassium hydrogen phosphate, magnesium sulphate heptahydrate, anhydrous potassium sulphate, ethanol and cellulose acetate or nitrate, membrane of pore size 0.22 µm - for alternate sterilization of	

					ethanol)] • **Confirmatory medium @ (Skim milk powder, yeast extract bacteriological, peptone, sodium chloride, Agar hexadecyltrimethyl ammonium bromide/ centrimide)** • **Oxidase and catalase test medium @** • **Gelatin liquification test medium @** • **Acetamide @** • **Starch hydrolysis test medium @**	
5.	**Aerobic microbial count**	**Clause 5.1.6**	**IS 5402:2002**	• **General microbiological lab equipments (As listed above)** • **Incubators (21 ± I˚ C) and 37 ± I˚ C)**	• **Plate count medium (Tryptone, dehydrated yeast extract, anhydrous glucose, Agar)**	**This requirement is not applicable for Packaged natural mineral water**

6.	**Yeast and mould**	**Cl. 5.1.7**	**IS 5403:1999**	• **General microbiological lab equipments** • **Incubator 25 ± I˚ C**	• **Yeast extract-dextrose - chloramphenicol Agar medium (Yeast extract, dextrose, chloramphenicol /ox ytetracycline hydrochloride, Agar)**	

* Note 1- The list does not cover the following requirements, as these parameters are got to be tested from outside approved lab :

i) Faecal streptococci and Staphylococcus aureus.

ii) Salmonella and Shigella.

iii) Vibrio cholera and V. parahaemolyticus.

Note 2 – General Microbiological Lab Equipments as listed, are common for various microbiological tests. Other additional equipments for specific requirements are indicated against each parameter.

Note 3 – For preparation of culture media and reagents ingredients of uniform quality and chemicals of analytical reagent grade should be used. Alternatively, commercially available media and reagents may be used provided their composition comply with those given in Indian Standards.

Note 4 – Disposable apparatus may be accepted as an alternative to re-usable glassware.

@ The marked equipments/ chemicals and media are required for confirmatory tests of respective microbe. The confirmatory test may be dispensed with/omitted, provided the licensee undertakes to start corrective actions based on presumptive presence of microbe .

Note : All efforts have been made to compile the list as per the respective standards exhaustively covering all the required test equipments, apparatus and chemicals. However, in case any omission or incorrectness is noticed while referring, the same may be conveyed to CMD immediately for suitable actions