BOILER COMMISSIONING

BOILER AND AUX. COMMISSIONING

COMMISSIONING :It is the later stage of erection and starting stage of operation.

It includes 14 days of continuous operation with 72 hrs of full load operation.

INTRODUCTION TO COMMISSIONING

- Commissioning – Activities before taking over a plant.
- Purpose
  - To check that plant is supplied as per design
  - Quality of erection and commissioning
  - Plant operates reliably, safety & design performance.
  - Finding out reason for any failure to achieve the design performance.

INTRODUCTION TO COMMISSIONING

- Organization
  - Steering committee – Policy and priorites. Ensures adequate resource. Approval of documents. – Headed by G.M.
  - Commissioning panel – Control & progress of day to day activities. Coordination between Test teams and Working groups. Erection & O&M dept.
  - Working groups – Looks after requirement of Test team.
  - Test Team – Conducting testing & commissioning.

INTRODUCTION TO COMMISSIONING

- Documentation
  1. Papers of principle – Prepared jointly by Erection and corporate O.S.
     - To set out principles & objectives
     - Established design data to compare plant.
     - Define documentation requirement

INTRODUCTION TO COMMISSIONING

- Documentation

2. Testing & commissioning Schedule
    - To meet the requirement of the paper of principle
    - Plant under cover
    - Detail test method & programme
    - Safety
    - Emergencies
    - Individual responsibility
    - Results

INTRODUCTION TO COMMISSIONING

- Documentation

3. Standard checklist
    - Ensuring completion of erection
    - Limited extent operation
    - Test conductance in consistent manner
    - Instrument providing Schedule with range & resolution and calibration validation.

INTRODUCTION TO COMMISSIONING

- **Documentation**

4. Design change notification
5. Test reports
   - Recording of result
   - Omission report
   - Analysis
6. Safety procedure
7. Plant certification
   - Safety clearance certificate
   - Record of initial operation
   - Clearance for station operation certificate
   - Initial taking over certificate
   - Final internal contract clearance – completion of guarantee period
8. Plant completion report. – PG test evaluation and acceptance

MECHANICAL

STATION **STANDARD CHECK LIST** **SHEET 1 OF2**

PLANT ITEM **PIPEWORK-CONSTANT LOAD SUPPORT**

PLANT NOMENCLATURE

SYSTEM ----------

MANUFACTURER---------- SRL. NO.----------

LOCATION----------

NO	ACTIVITY	WITNESSED		Date
		NTPC	CONTR	

1.General conditions satisfy the Site standing Instructions as listed In the "Plant Item Commissioning Essential Pre –requisites"(SCL MS1/1)
2.The name plate legend agrees with the approved NTPC plant Nomenclature is clearly visible securely fixed, durable and correlates with remote labels.
3.The installation is complete and correct in accordance with the latest drawing and specification and support attachments to building Steel work and pipework are secure and satisfactory.
4.Access for adjustments maintenance and repairs is a satisfactory,
5.Check that support-setting details can be easily read.

REMARKS

SCL REF: M/4/6

CONTROL & INSTRUMENTATION

STATION **TEST PROCEDURE** **SHEET 1 OF 2**

INSTRUMENTS: PRESSURE GUAGE

TP REF: 1.5.1.

NTPC TAG NO **UNIT**

No.	Activity	Remarks

1.Test Equipments Required.
1.1Portable Dead Weight Tester, Comparator. Or other similar sure of the vacuum source.
1.2Standard Test gauge if not using a dead weight tester, other standard pressure vacuum gauge, dependent on the range of the instrument being tested.
2.Check calibration of the test Equipment.
3.Check the gauge calibration over its entire range 20% steps, increasing and decreasing, Allow for head correction where necessary, Note the results on Standard Calibration sheet 1.15.1.
4.Recheck the calibration of the test equipment.
5.Acceptable errors for pressure gauges, unless otherwise specified in the contract specification are:- Standard of Test gauges +_ 0.25% FSD.

DEFECTS & OMISSIONS CONTINUATION OVERLEAF

REMARKS

NTPC SIGNATURE

CONTRACTORS SIGNATURE **DATE**

BOILER AND ITS AUXILIARIES

- Steps
  - Pre-commissioning checks
  - Trial run of equipments

    e.g. Fans and APH commissioning
  - Hydraulic Test
  - Chemical cleaning
  - Gas Tightness Test
  - ESP commng.
  - Fuel Oil System
  - Preparation for first light-up
  - Steam blowing
  - Safety v/v settings
  - Other boiler Aux. commissioning

BOILER AND ITS AUXILIARIES

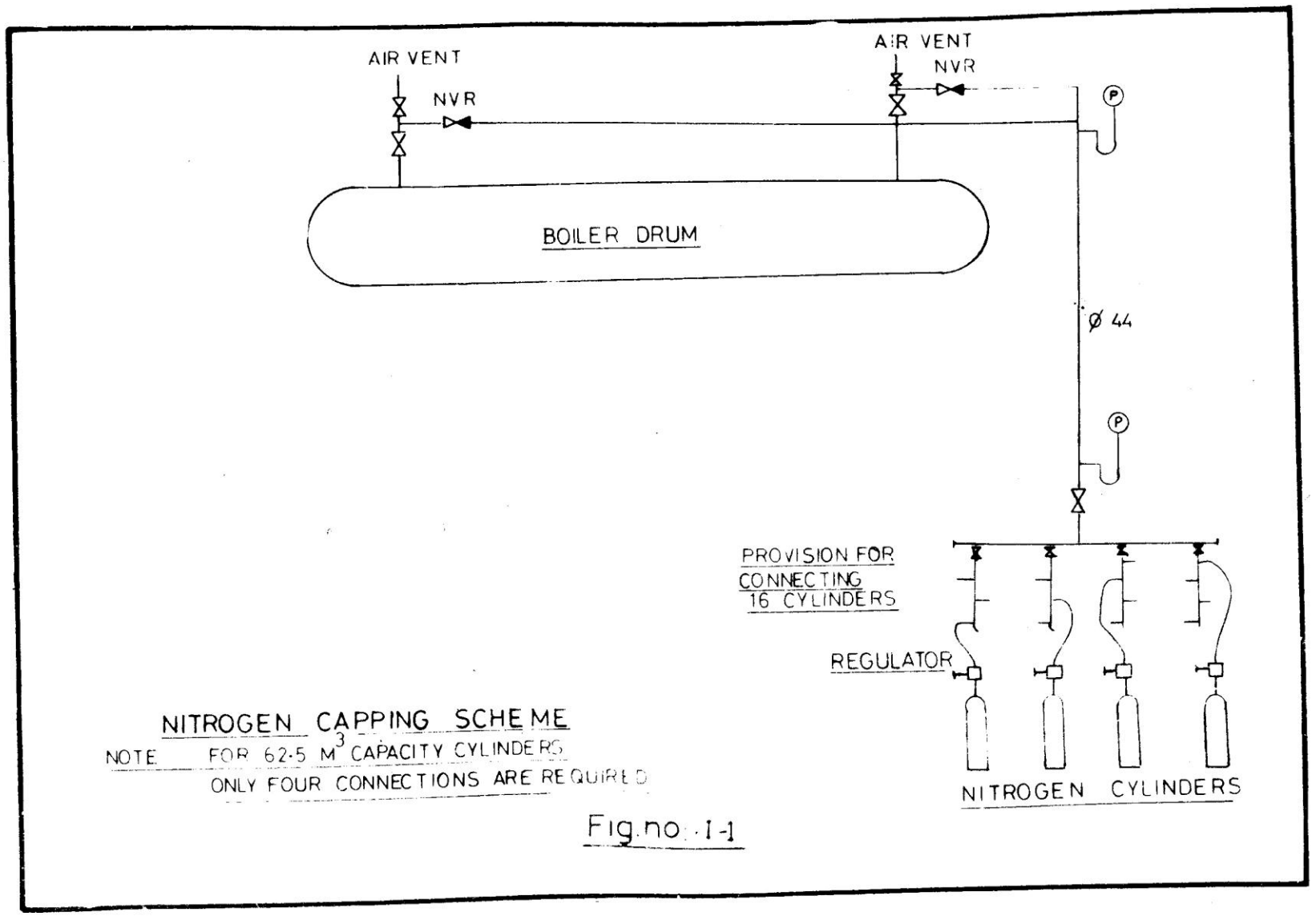
- Pre commissioning checks
  - Physical inspection
  - Ensuring tightness
  - Lubrication check
  - Setting of relief v/v
  - Operation test on v/vs and fittings
  - Insulation test on cable/ motor
  - Rotation checks
  - Flushing out the oil system
- Trial run of motor with all protection for 8 hrs
- Coupling of fan with motor

BOILER AND ITS AUXILIARIES

- Trial run of equipments
  - Commissioning checks
    - Checking of IGV/ pitch control mechanism
    - Operation of lub oil pump system
    - Operation of Discharge damper
    - Starting the fan as recommended by mfd.
    - 8 hrs trial run conductance
    - Logging parameters.

BOILER AND ITS AUXILIARIES

- Pre commissioning checks for boiler
  - Hydraulic test
    - For both drainable and non drainable portions
    - Filled with DM water. Add 10 ppm ammonia and 200 ppm hydrazine
    - All drainable and non drainable parts to be filled through their bottom drains.
    - High pressure positive displacement pump is used.
    - Test pressure as per IBR recommendation.
    - Pressure should be raised gradually.
    - After pressurization hold and inspect.
    - Wet preservation done after draining



NITROGEN CAPPING SCHEME

NOTE FOR 62·5 M^3 CAPACITY CYLINDERS ONLY FOUR CONNECTIONS ARE REQUIRED

Fig.no.:1-1

BOILER HYDRAULIC TEST

OBJECTIVE

To ensure healthiness of pressure parts.

The hydrotest pressure shall be 1.5 times the design pressure.

Water volume of different sections (approximate quantity) are liste below:

System	Water Volume (Approx m^3)
Drum	60
Circulating System	175
Economiser	110
Superheaters	160
Reheater	115

CHEMICALS REQUIREMENT

DM WATER

DM water of quality specified below containing 200 PPM of hydrazene and having pH between 9.5 and 10.0 by addition of adequate quantity of ammonia shall be used for Hydraulic test.

pH at 25 °C	:	7 ± 0.2
Conductivity	:	< 0.2 μ mho/cm
Total hardness	:	Nil
Total Silica	:	< 0.02 ppm
Chloride	:	Nil
Sodium	:	0.003 ppm

AIR TESTING OF THE PRESSURE PARTS

Before filling the boiler with water, an air tightness test is to be performed to detect leakages due to valve left in open condition, X-ray plug forgotten, any cuts etc. not observed by visual inspection. This will reduce the DM water consumption and time as well.

Boiler is pressurised with air upto 2 Kg/cm^2.

Recommended Hydrostatic Test Pressures are

Stage – IA & IB	:	310.5 Kg/cm^2
Stage – II	:	78.6 Kg/cm^2

After completion of Stage IA Hydrotest the Boiler shall be drained and after completion of Stage IB Hydrotest the Boiler shall be kept under wet preservation.

Stage IA - Hydraulic Test of the drainable portion only may be conducted at a pressure 1.5 times the design pressure. Suitable dummies shall be provided at LTSH outlet link pipes. After completing the hydrotest for drainable portion, the system will be drained and vented for drying and released for subsequent work.

Stage IB – Later Hydraulic test for the entire system comprising both drainable and non-drainable portions upto Boiler Stop valves is conducted at a pressure 1.5 times the design pressure.

Stage II - This covers the Reheater section i.e., Cold reheat lines from Isolator, Reheater and Hot reheat lines upto Isolator.

All safety valves are installed and hydrostatic plugs assembled.

All vents necessary to allow venting of entrapped air during filling operation such as superheater link vents, economiser link vents, drum vents etc. are open.

All the hangers in Boiler & piping system are set / locked as per recommendation.

Installation of the rotating elements of CC pumps should be deferred until the hydraulic test of the Boiler has been completed. The pump casings must be blanked off during the test.

Boiler Fill pump, Pressurising pump, other temporary pumps and tanks of required capacity are ready with their respective pipe connections to Boiler.

FILLING OF THE SYSTEM FOR HYDROTEST

Stage IA & IB

The Boiler water circulation system, economizer and Superheaters are filled through filling lines connected to the boiler drain header. At the same time chemical dosing is done by temporary dosing pump via the spreader arrangement Economiser recirculation line valves should be in wide open position.

PRESSURISING THE SYSTEMS

Pressure is raised with the help of pressurising pump.

The pressure is raised upto 25 Kg/cm^2 and a thorough inspection of the Boiler is done. For Stages IA & IB the pressure is raised in steps and held for 10 minutes at 100 & 200 Kg/cm^2. The rate of rise of pressure should not be more than 10 Kg/cm^2 per minute upto approximately 80% of the test pressure and should be 1 to 2 Kg/cm^2 per minute beyond that value.

After reaching the test pressure the pressurising pump is stopped immediately and power supply to the pump is cut off.

DEPRESSURISATION OF PRESSURE PARTS

The pressure parts shall be depressurised at the rate of 1 Kg/cm^2 per minute.

While releasing the pressure the vents should be opened when the system pressure falls to around 2 Kg/cm^2 to prevent creation of vacuum in the system.

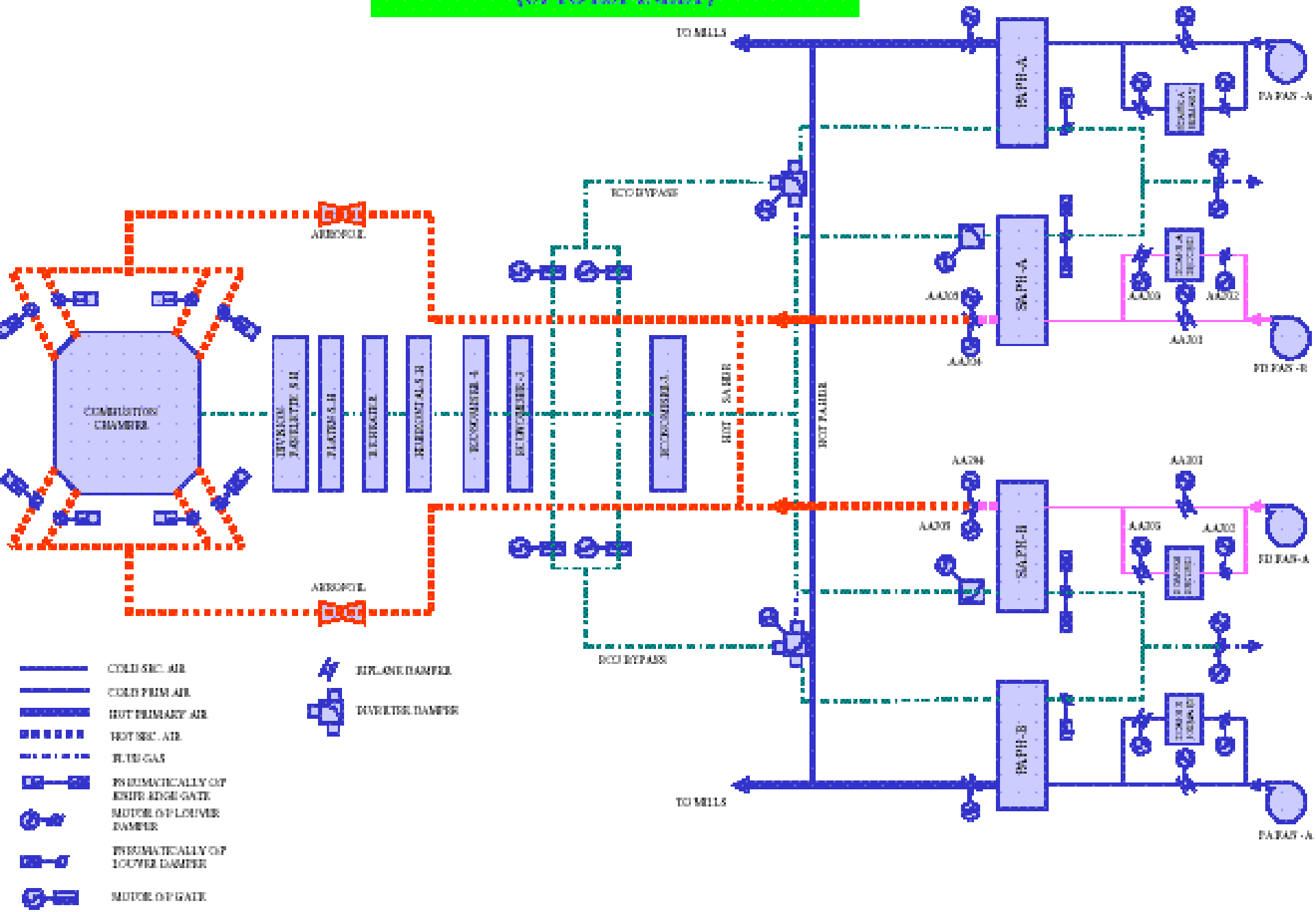
COMPLETION CRITERIA

The Test Pressure in the official pressure gauge (Calibrated standard test pressure gauge) is held for 30 (Thirty) consecutive minutes in presence of Inspection Authority. The Boiler shall satisfactorily withstand such pressure without leakage or undue deflection or distortion of its pressure parts. The average pressure drop during the first 10 (Ten) minutes of stopping the pressurizing pump should be less than 1Kg/cm^2/minute (One kg per square centimetre per minute).

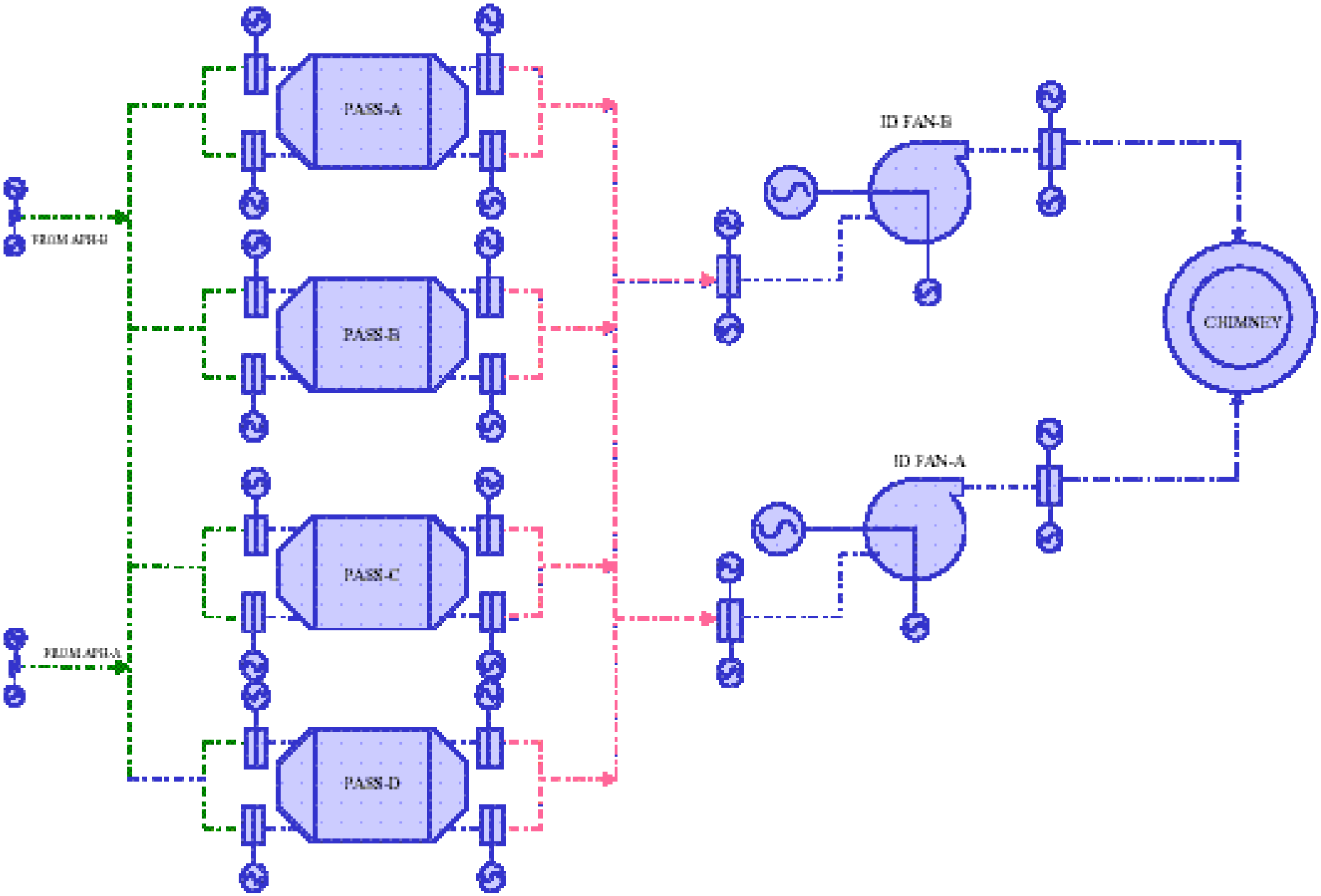
BOILER AND ITS AUXILIARIES

- Pre commissioning checks for boiler
  - Gas tightness check
    - Through smoke generator. 24 MKS,40 IBS wt. from defance store.
    - Run FD and ID.

AIR AND FLUE GAS PATH PART-1
(UPTO ESP INLET)



AIR AND FLUE GAS PATH PART-2
(FROM ESP I/L UPTO CHIMNEY)



AIR AND GAS TIGHTNESS TEST OF FURNACE AND DUCTS

- ✓STAGE 1 : FD fan to air inlet damper of APH – 300 mmWC
- ✓STAGE II : APH inlet damper to wind box. - 300 mmWC
- ✓STAGE III : Wind box to APH gas O/L damper. - 75 mmWC
- ✓STAGE IV : APH O/L damper to ESP I/L gate. - 300 mmWC

AIR AND GAS TIGHTNESS TEST OF FURNACE AND DUCTS

STAGE V : ESP O/L damper to ID fan I/L damper - 300 mmWC

STAGE VI : ID fan I/L damper to stack. – kerosene test.

STAGE VII : PA fan to PAPH I/L damper. (SCAPH bypass, cold air duct and seal air pipes. - 500 mmWC

STAGE VIII : PAPH air I./L to hot air gates – 500 mmWC

ESP is tested by air in leak test.

AIR AND GAS TIGHTNESS TEST OF

FURNACE AND DUCTS

- ALL DAMPERS ARE TO BE SEALED.
- NMEJ's ARE TO BE ERECTED.
- NO INSULATION OVER THE DUCT.
- ALL AIR LEAKS ARE TO BE CHECKED BY SOAP SOLUTION.
- BAH GATES AND SEAL TROUGH ARE TO BE CLOSED.
- MANOMETERS ARE TO BE PROVIDED TO NOTE THE PRESSURE.

PROTOCOL ON SMOKE GENERATOR TEST OF THE BOILER

Name of the site:

Unit NO:

The smoke generator test was carried out on the procedure to detect and rectify the leaking portions in the systems. The leakage found has been rectified. Details of the No. of smoke generators used indifferent sections are given below.

Date	Section	No. Of Smoke Generators used	Remarks
	Cold Air duct Hot Air		
	Second Pass Furnace		
	EP LEFT EP RIGHT		

Leakages found during the test were rectified and wherever necessary a repeat test was done.

CUSTOMER **CONSULTNT**

BOILER AND ITS AUXILIARIES

- ESP commissioning
  - Physical inspection.
  - Electrical inspection
  - Gas distribution test
  - Air load test

BOILER AND ITS AUXILIARIES

- Fuel oil system
  - Physical inspection.
  - Flushing of lines.
  - Trial of pumps.
  - Ignitor and burner housing check.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Alkali boil-out
  - Purpose: Chemical cleaning of boiler water & steam system to remove loose foreign material, oil, grease etc.
  - **Water Washing** – Temporary water filled arrangement. It continues till conductivity of inlet/ outlet water equals.
  - Process continued nos. of time till conductivity of washing water matches with fresh filtered water.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Alkali boil-out
  - **Alkali boil out** – Fill water with DM water. Add Trisodium phosphate (1000 PPM 0.1%), Do Decca Hydrate & Hydrazine Hydrate (200 PPM 0.02 %)
  - Filling upto 180 mm.
  - Boiler light up with AB elevation
  - Pressure raised to 40 Kg/ Cm2.
  - Hourly blow down given to remove impurities and feeding maintain to keep drum level.
  - Oil gun to cut out during blowing
  - Boiler expansion noted
  - At the end boiler will be boxed up and hot draining done when pr.is 1.5 Kg./Cm2.

COMMISSIONING PROTOCOL FOR ALKALI BOIL OUT

PROJECT---------- CONTRACT NO ----------

UNIT NO ---------- RATING ---------- MW. CUSTOMER----

Alkali Boil Out Boiler was carried out from----------(date)

To----------(Date).

The following chemicals were changed:

TRISODIUM PHOSPHATE -------- Kgs (-------- ppm).

The boil out was carried out at 40-kg/cm2 pressures for a period of ----------

Hence and the process was declared completed---------- ------at ----------

---------- Hrs----------(date).

The end point values are as follows:

Ph	po4 ppm	Oil ppm

REMARKS:

Manufacturer **Customer Engineer**

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Acid cleaning

  Covering steam and water ckt., economiser, waterwall, Boiler Drum excluding super heaters, reheater & associated piping.

  Stage I – Acid washing

  II – DM water rinsing

  III Citric acid water rinsing

  IV DM water rising

  V Neutralising with sodium carbonate.

  VI Passivation 1st stage.

  VII Inspection

  VIII Passivation 2nd stage.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Acid cleaning

  HCL 4-6 % conc.

  Ammonia Bifluoride 1%

  Rodine 213 special 0.1 % inhibitor.

  Lime

  Nitrogen Gas capping arrangement.

  Removal of Drum internals

  Down comer fitted with orifice. Sup heater steam opening at drum to be plugged by rubber stamp.

  S/H to be kept pressurised at 5 Kg/Cm2 with hydrazine.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Acid cleaning procedure
  - Fill boiler with water and a circulation flow of 400 t/Hr is maintained.
  - Heat water to 65 deg cen. With steam.
  - Inhibitor charged and half quantity of ammonia bifluoride.
  - When the above mixture get dissolved, start acid dosing.
  - Concentration should not exceed 6 %.
  - Temp. is maintained below 70 Deg.
  - HCL and Iron Conc. Intially goes high then comes down and became steady.
  - Constant value of HCL and iron conc. Denote completion of acid washing.
  - Cleaning soln. drained through neutralising pit.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Rinsing with water.
  - System filled with water
  - Temp. raised to 65 Deg.
  - Water circulation continue.
  - Water is dump under nitrogen capping.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Citric acid rinsing.
  - System filled with water
  - Temp. raised to 65 Deg.
  - Citric acid 0.2 % by weight.
  - Water is recirculated
  - When inlet outlet sample matches then declare over
  - Water is dump under nitrogen capping.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Neutralisation.
  - System filled with water
  - Temp. raised to 80 Deg.
  - Sodium Carbonate 1 %..
  - Water is recirculated
  - When inlet outlet sample matches then declare over
  - Water is dump under nitrogen capping.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Passivation 1st stage.
  - Purpose – building uniform layer of Magnetite on bare surface obtained after acid cleaning.
  - System filled with water
  - Temp. raised to 85 Deg.
  - 300 ppm Hydrazine (9.6 pH)
  - Water is recirculated
  - Maintain hydrazine concentration to 150 ppm.
  - When inlet outlet sample matches then declare over
  - Water is dump under atmospheric capping.

BOILER AND ITS AUXILIARIES (Chemical Cleaning)

- Passivation 2nd stage.
  - Purpose – building uniform layer of Magnetite on bare surface obtained after acid cleaning.
  - System filled with water
  - Temp. raised to 85 Deg.
  - 300 ppm Hydrazine (9.6 pH)
  - Boiler lighted up. 40 Kg pr. Raised. Maintain for 20 Hrs.
  - Maintain hydrazine concentration to 150 ppm.
  - Hot drain at 90 deg.
  - Water is dump under atmospheric capping.

STEAM BLOWING
OF
BOILER AND
ASSOCIATED STEAM LINE
INCLUDING
AUXILIARY STEAM LINES

CLICK ON THE STAGE TO SEE THE ANIMATION

- THEORY OF STEAM BLOWING
- SCHEME OF STEAM BLOWING
- STAGE-1 STEAM BLOWING (SH,M.S LINE UP TO ESV)
- STAGE-2A STEAM BLOWING (SH,M.S, CRH LINE)
- STAGE-2B STEAN BLOWING (SH,MS,HRH&CRH UP TO DESH)
- STAGE-3A STEAM BLOWING (SH, MS, CRH, RH, HRH, UP TO IV)
- STAGE-3B STEAM BLOWING (SH, MS, CRH, RH, HRH & LPBP)
- STAGE-4A STEAM BLOWING (EXTRN TO BFPDT-A, FROM CRH)
- STAGE-4B STEAM BLOWING (EXTRN TO BFPDT-B, FROM CRH)

CLICK / ENTER, AFTER EVERY EVENT IN THE SCHEME TO SEE THE SEQUENCE OF EVENTS

STEAM BLOWING

BACK TO INDEX

- **OBJECTIVE:** PURPOSE OF STEAM BLOWING IS TO REMOVE SCALES, LOOSE MATERIAL, IRON CUTTINGS etc. THAT MIGHT HAVE BEEN ENTRAPPED IN S.H, STEAM PIPING, REHEATERS DURING MANUFACTURE.
- **TECHNIQUE:** STEAM BLOWING IS CARRIED OUT BY PUFFING METHOD.THIS TECHNIQUE WILL GIVE A THERMAL SHOCK TO THE CONTOUR BEING PURGED TO DISLODGE THE SCALES etc. WHICH WILL SUBSEQUENTLY BE REMOVED BY EXPANDING STEAM.
- **PROCEDURE:** FOR BLOWING THE STEAM, RAISE THE BOILER DRUM PRESSURE UPTO 40 TO 50 Ksc; SHUT OFF BOILER FIRING AND OPEN THE ELECTRICALLY OPERATED TEMPORARY VALVES (EOTVs) / BOILER M.S. STOP VALVES AS SHOWN IN THE FOLLOWING SCHEMES.
  - DRUM LEVEL SHOULD BE MAINTAINED AT LOWEST PORT (VISIBLE LIMIT) BEFORE THE START OF EACH BLOW TO AVOID WATER DROPLETS CARRYOVER TO THE SATURATED STEAM PIPING.
  - NUMBER OF BLOWS PER DAY ARE LIMITED TO 8 WITH AN INTERVAL OF 1 ½ Hrs.FOR COOLING IN ADDITION TO OVER NIGHT COOLING
- **SCHEME:** STEAM BLOWING IS DONE IN SEVEN STAGES AS DESCRIBED IN THE FOLLOWING SLIDES.

STEAM BLOWING SCHEME

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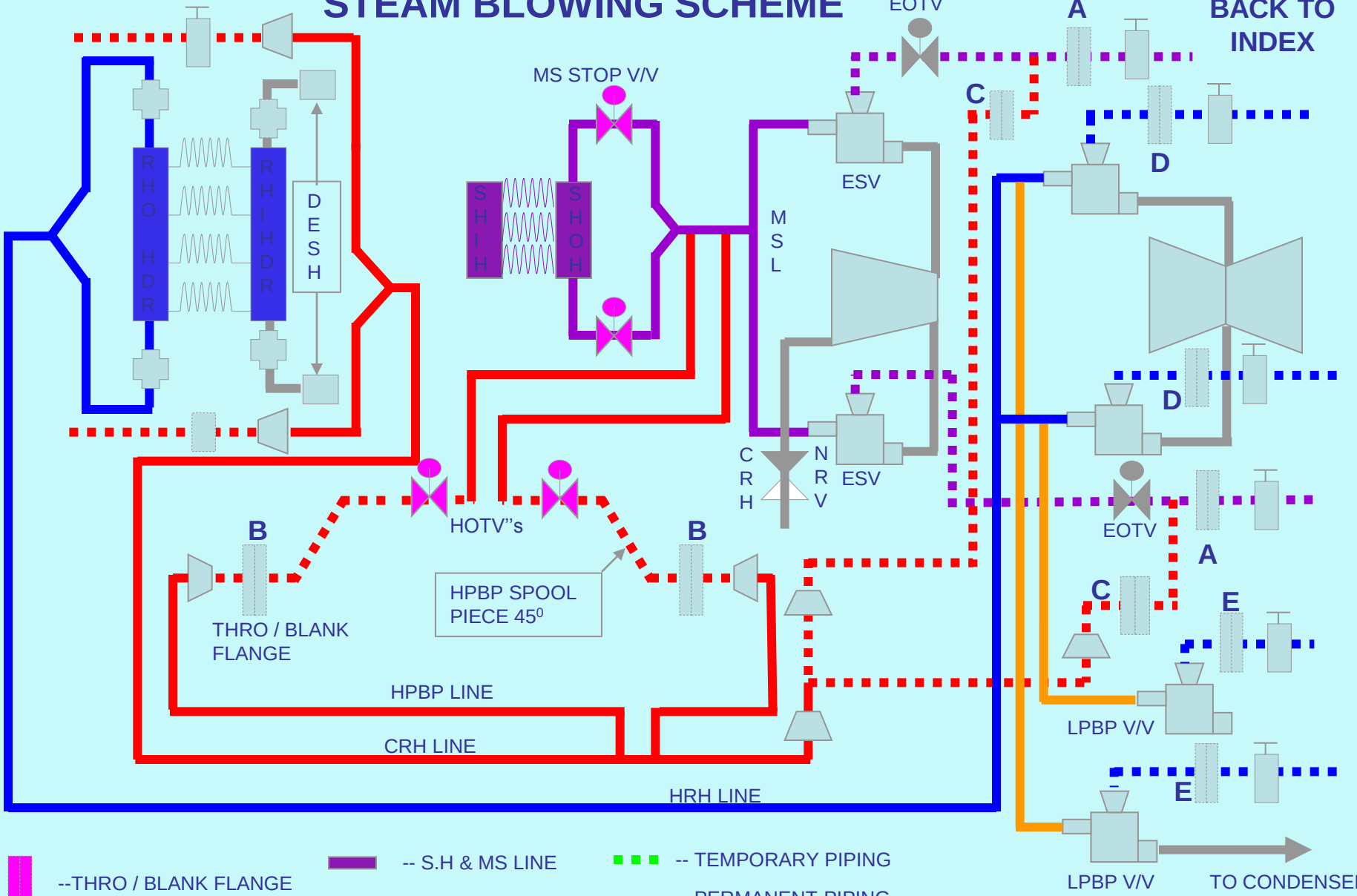


--THRO / BLANK FLANGE

--TARGET PLATE

--UN TREATED PIPE

-- S.H & MS LINE

-- CRH & HPBP

-- R.H & HRH LINE

-- LPBP LINE

-- TEMPORARY PIPING

-- PERMANENT PIPING

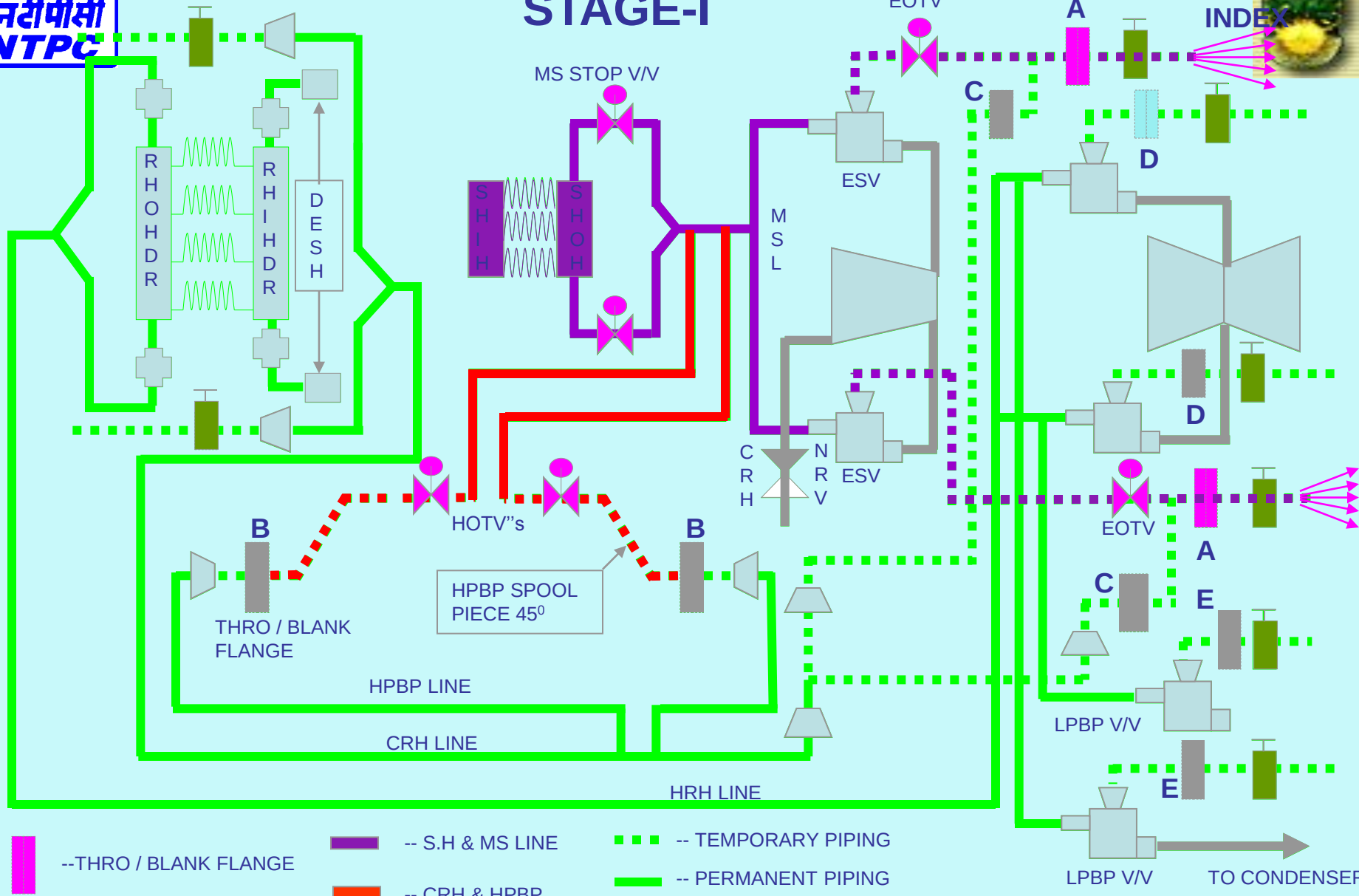
-- OPEN INDICATION

-- CLOSE INDICATION

HOTV–-HAND OPERATED .....TEMPORARY VALVE

EOTV– ELECTRICALLY OPERATED .....TEMPORARY VALVE

STAGE-I


EOTV
A
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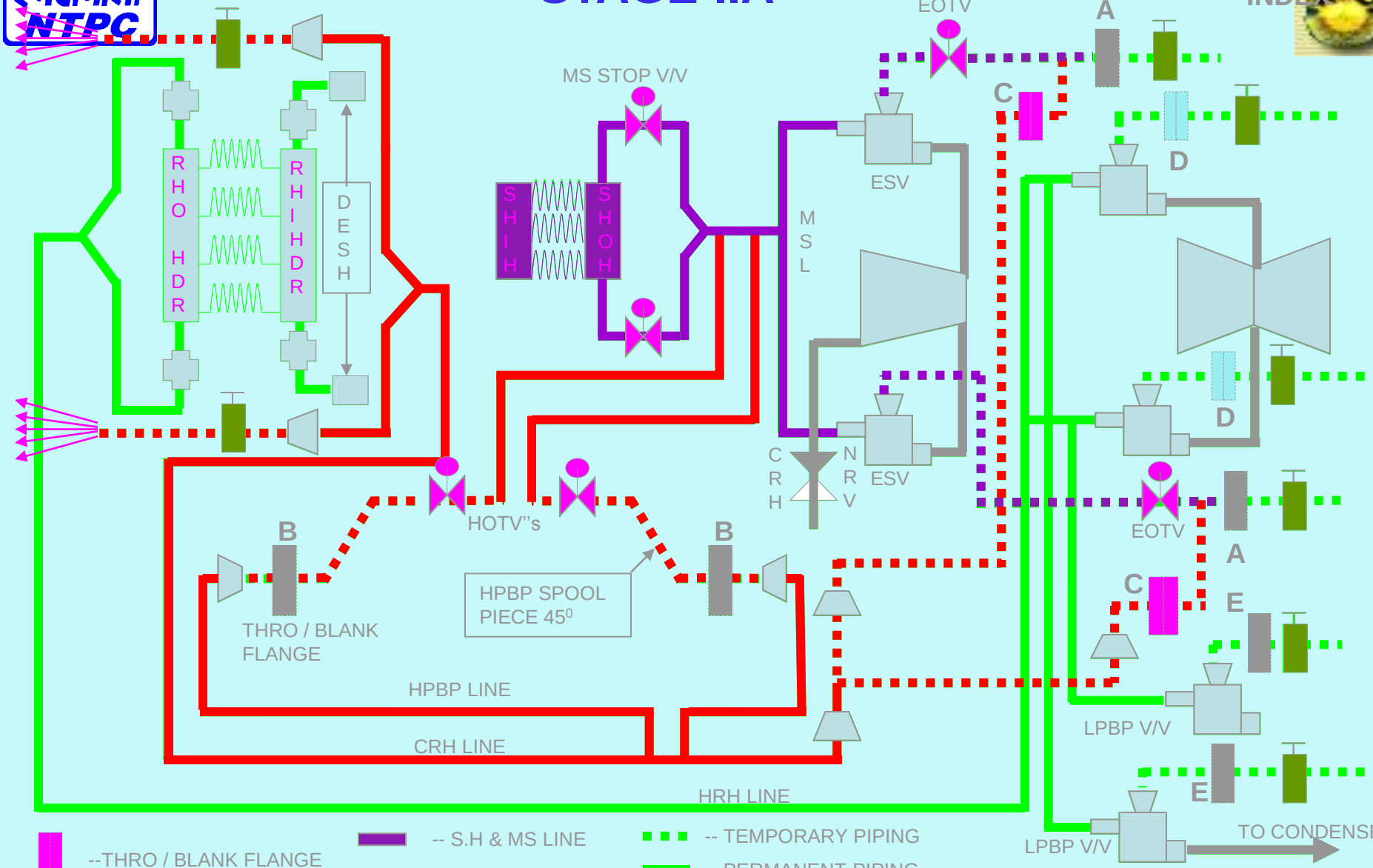
MS STOP V/V
C
D
RHOHDR
RHIHDR
DESH
SHIH
SHOH
ESV
MSL
CRH
NRV
ESV
D
B
HOTV"s
B
HPBP SPOOL PIECE 45⁰
THRO / BLANK FLANGE
EOTV
A
C
E
HPBP LINE
LPBP V/V
CRH LINE
E
HRH LINE
LPBP V/V
TO CONDENSER
--THRO / BLANK FLANGE
--TARGET PLATE
--UN TREATED PIPE
-- S.H & MS LINE
-- CRH & HPBP
-- R.H & HRH
-- LPBP
-- TEMPORARY PIPING
-- PERMANENT PIPING
-- OPEN
-- CLOSE

STAGE-IIA



--THRO / BLANK FLANGE

--TARGET PLATE

--UN TREATED PIPE

-- S.H & MS LINE

-- CRH & HPBP

-- R.H & HRH

-- LPBP

-- TEMPORARY PIPING

-- PERMANENT PIPING

-- CLOSE

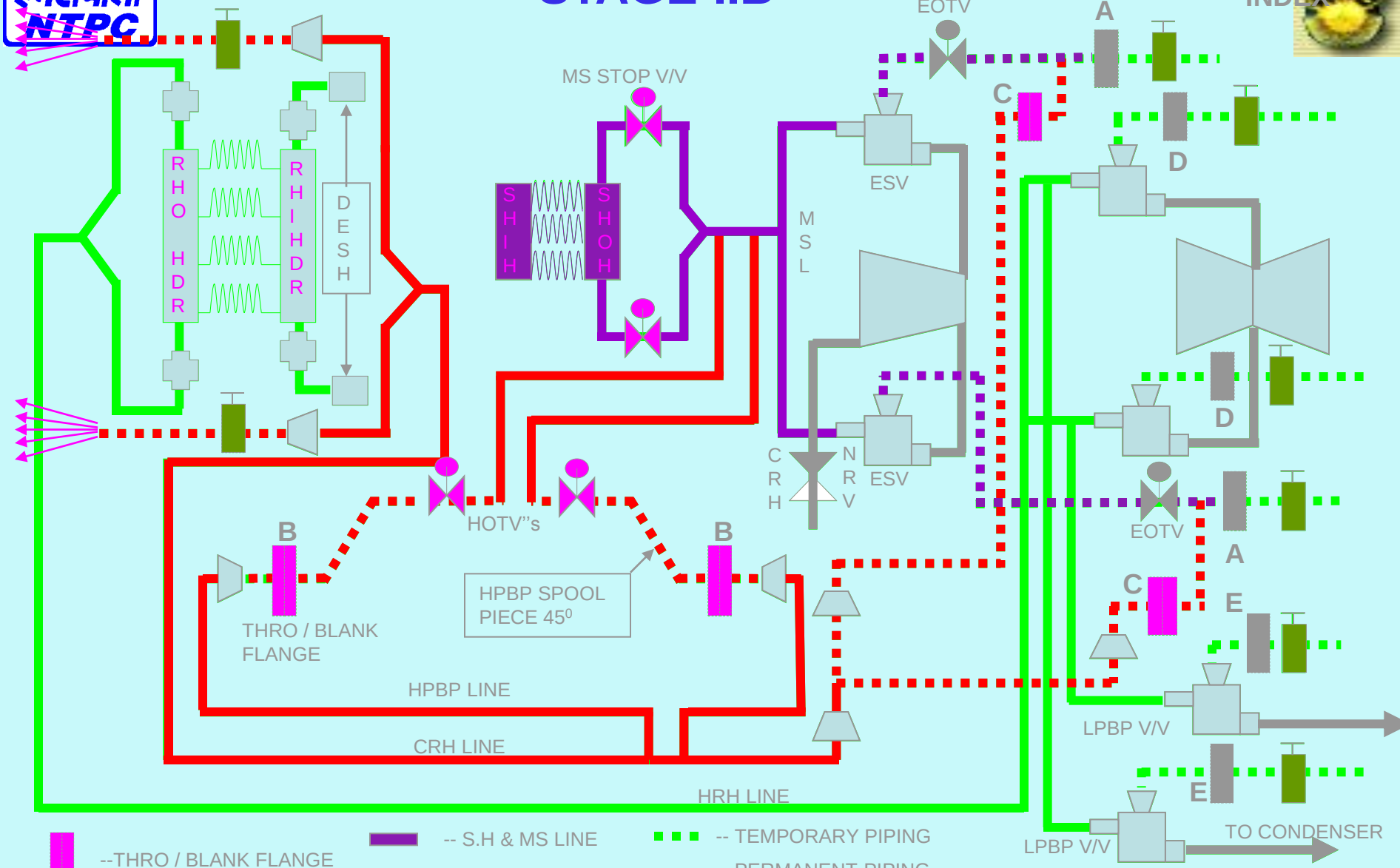
IS

STAGE-1

4 May 2012

PM - Revision 00

STAGE-IIB


RHO HDR
RHI HDR
DESH
SHIH
SHOH
MS STOP V/V
EOTV
ESV
MSL
CRH
NRV
ESV
HOTV"s
B
B
THRO / BLANK FLANGE
HPBP SPOOL PIECE 45⁰
HPBP LINE
CRH LINE
HRH LINE
A
C
D
D
EOTV
A
C
E
E
LPBP V/V
LPBP V/V
TO CONDENSER
--THRO / BLANK FLANGE
--TARGET PLATE
--UN TREATED PIPE
-- S.H & MS LINE
-- CRH & HPBP
-- R.H & HRH
-- LPBP
-- TEMPORARY PIPING
-- PERMANENT PIPING
-- CLOSE

STAGE-IIIA

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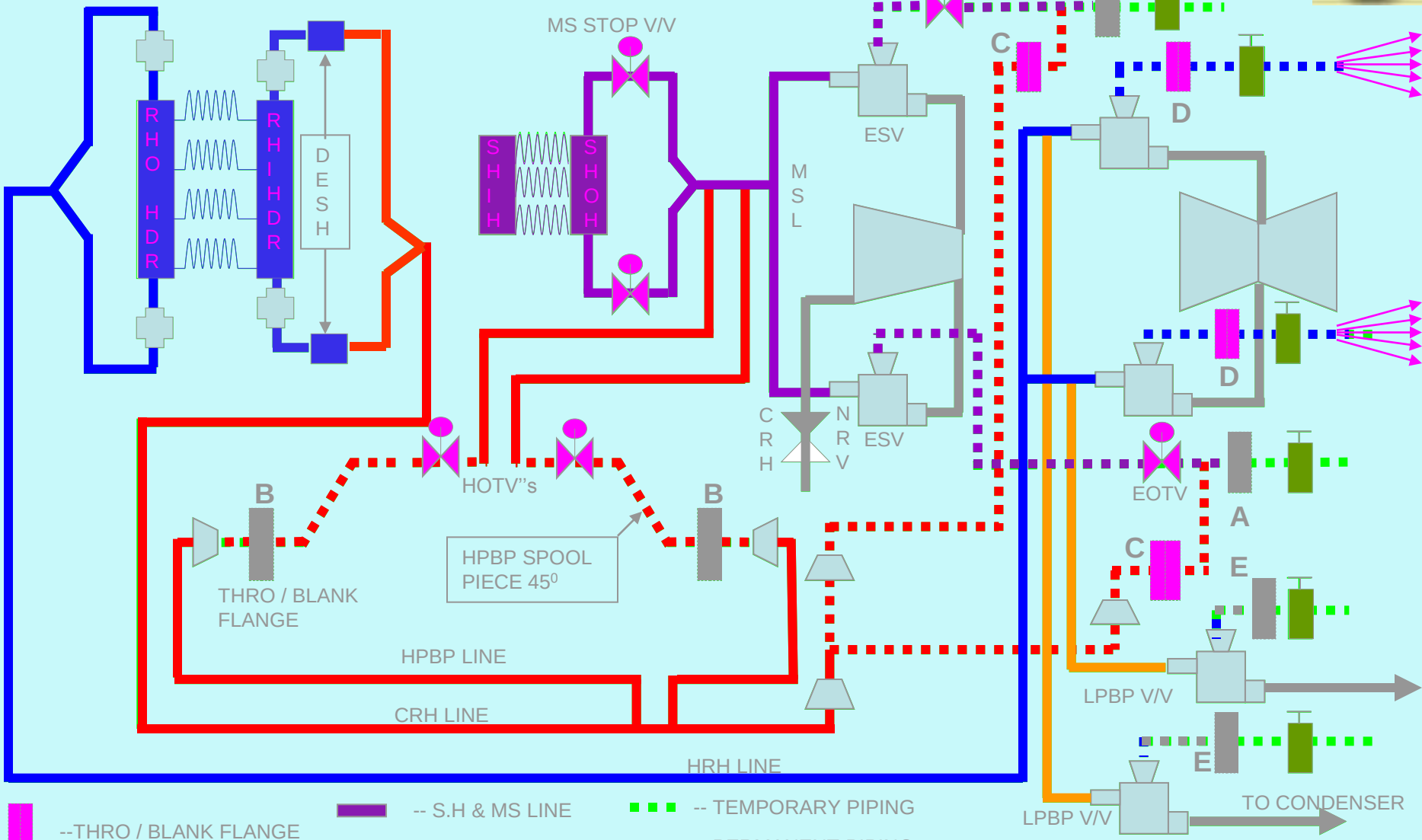

--THRO / BLANK FLANGE

-- TARGET PLATE

--UN TREATED PIPE

-- S.H & MS LINE

-- CRH & HPBP

-- R.H & HRH

-- LPBP

-- TEMPORARY PIPING

-- PERMANENT PIPING

-- CLOSE

STAGE-IIIB

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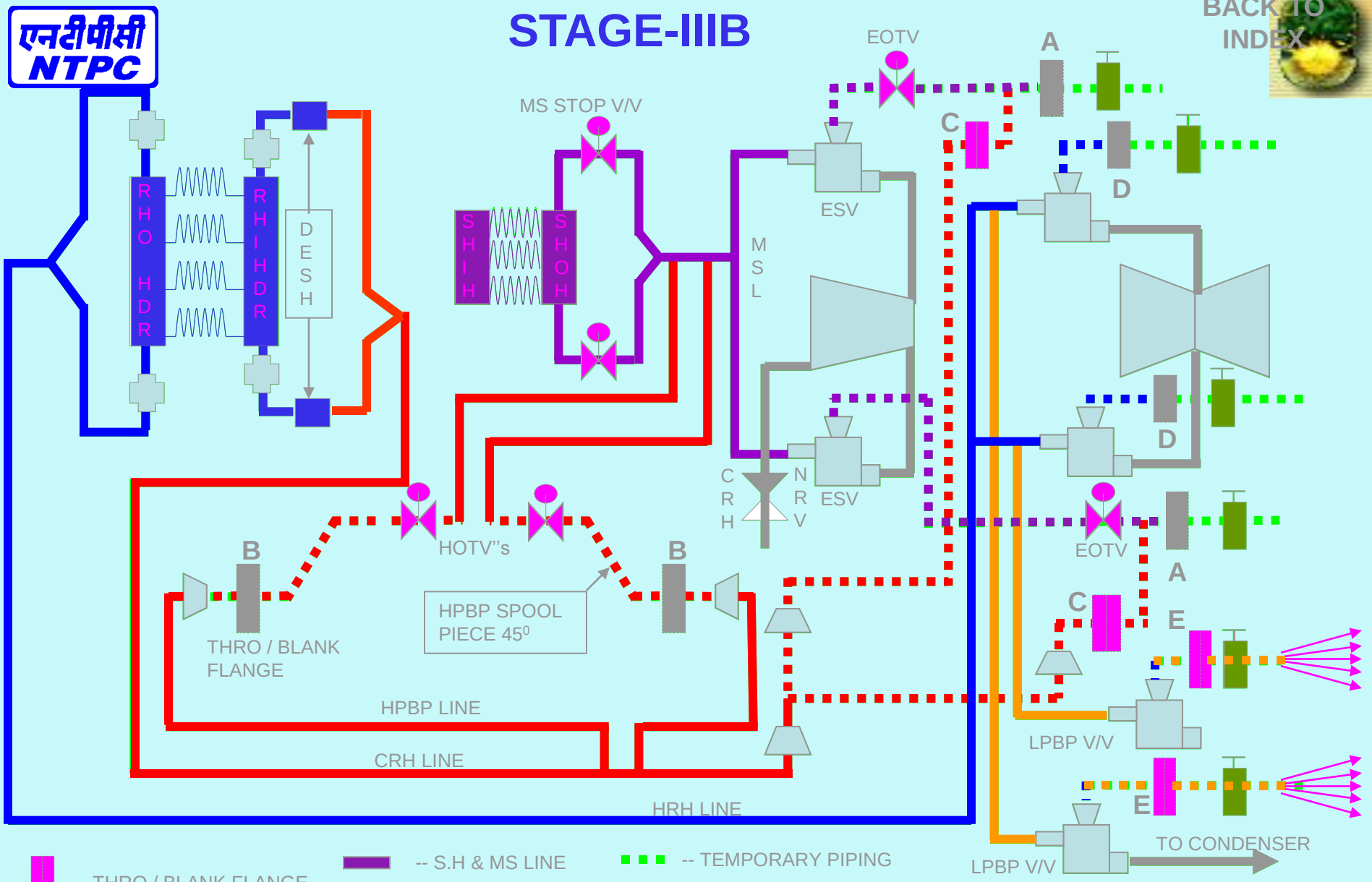

--THRO / BLANK FLANGE

--TARGET PLATE

--UN TREATED PIPE

-- S.H & MS LINE

-- CRH & HPBP

-- R.H & HRH

-- LPBP

-- TEMPORARY PIPING

-- PERMANENT PIPING

-- CLOSE

DESIGN CRH LINE,R.H,HRH,LPBP

STAGE-IV A

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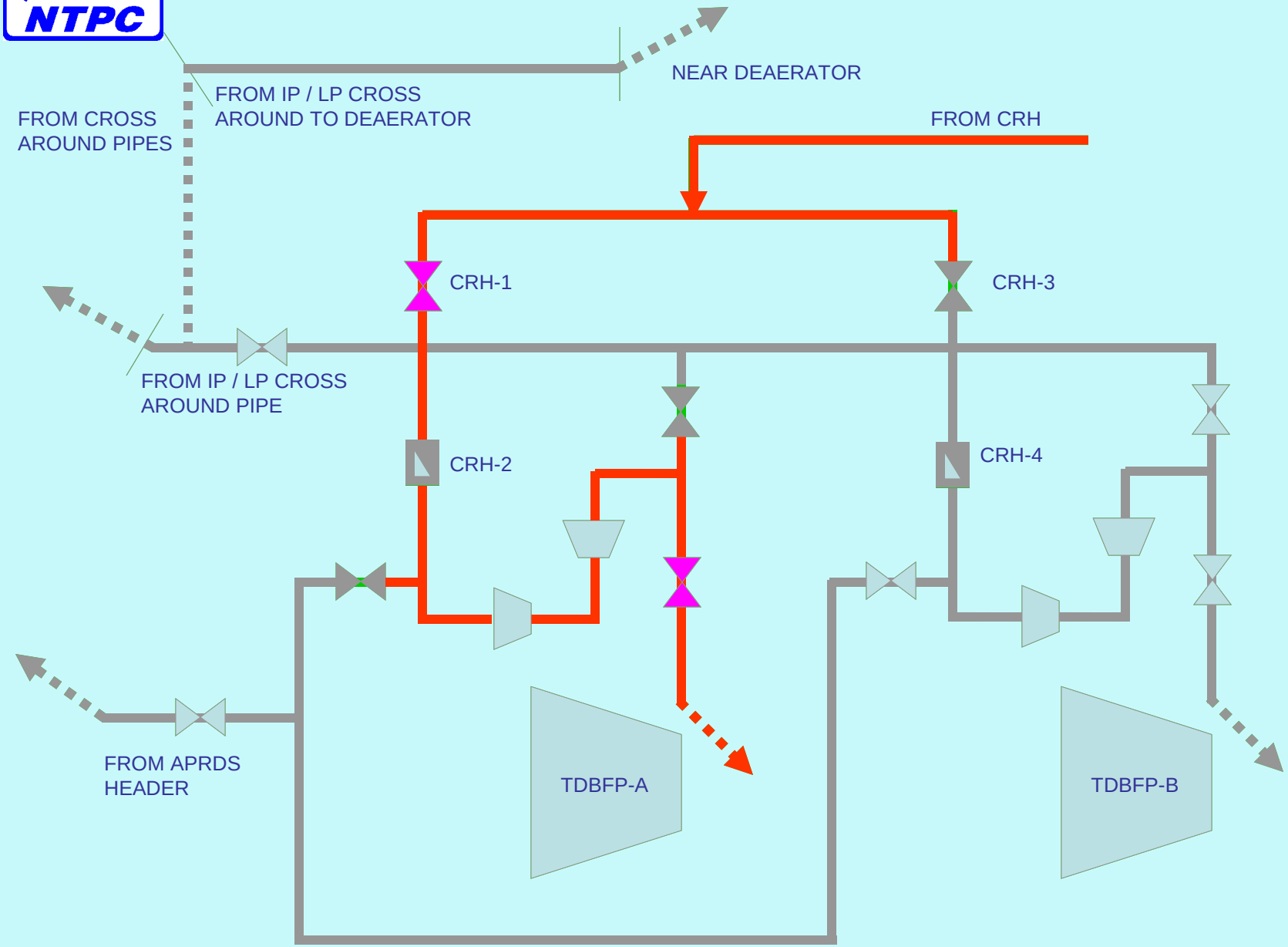

STAGE-IV B

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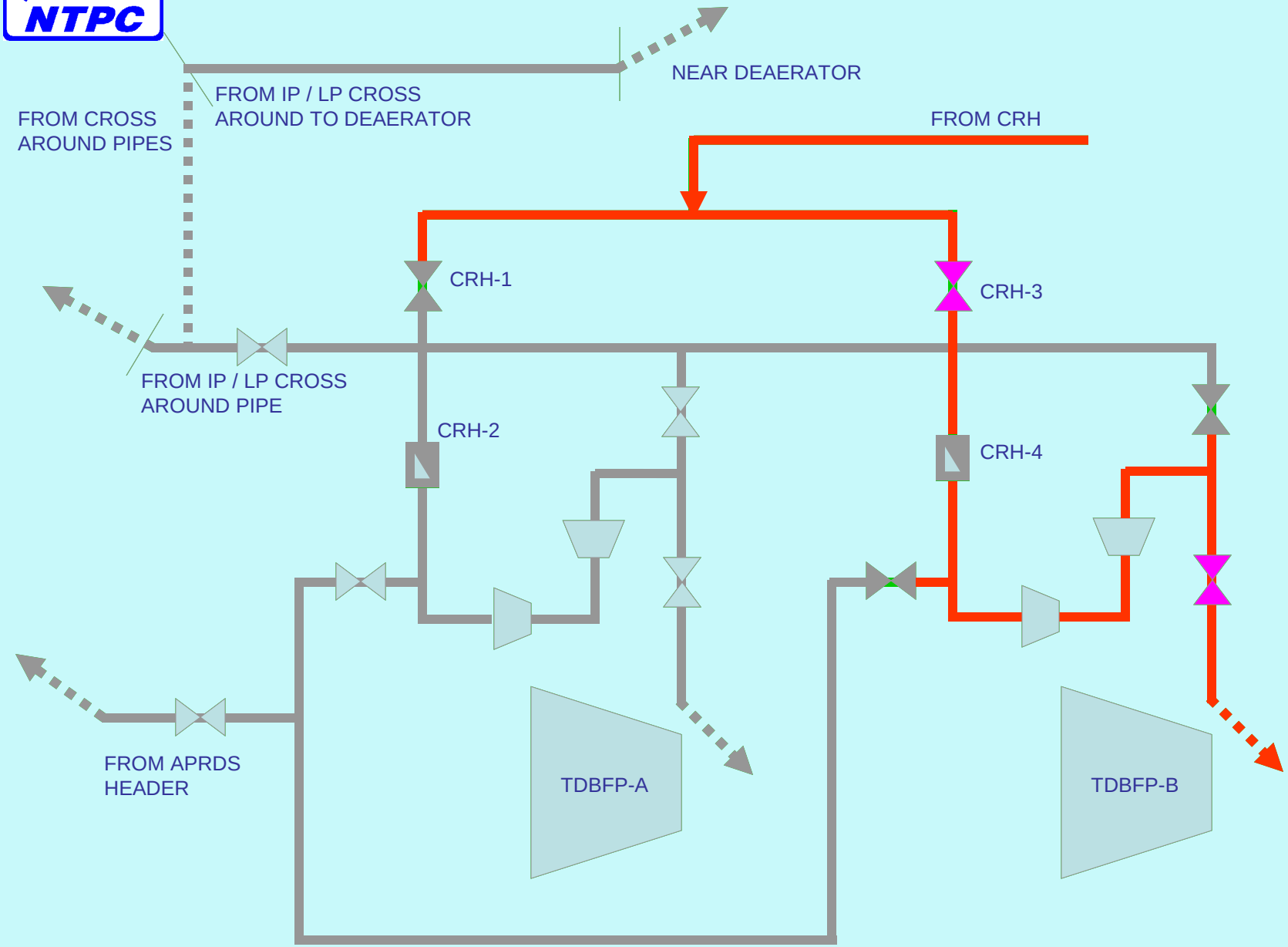

COMMISSIONING OF FANS AIRPREHEATERS

COMMSSIONING OF LUB OIL SYSTEM

- HYDROTEST OF LUB OIL LINES.
- HYDROTEST OF COOLERS.
- ACID CLEANING OF LUB OIL LINES.
- TRIAL RUN LUB OIL MOTORS.
- OIL FILLING
- LUB OIL FLUSHING.
- CONNECTION OF LUB OIL LINES.

ACID CLEANING.

1. DM WATER FLUSHING FOR 10min.
2. SOAKING WITH 5%HCL SOLUTION AND INHIBITOR 0.2% RHODINE 213 SPL.SOAKING TIME-4 HRS.
3. DRAINIG OF ACID SOLUTION AND FLUSHING WITH DM WATER FOR 10MIN.
4. SOAKING WITH SODIUM NITITRITE(2%) AND LIQUOR AMMONIA 5% FOR 30MIN.
5. FLUSHING WITH DM WATER FOR 10MIN.
6. CLEANING OF ALL PIPES BY BLOWING WITH COMPRESSED AIR FOR DRYING PURPOSE.
7. FILLING OF OIL PIPELINE AND ENSURING UNIFORM COATING OF OIL FILM OVER ENTIRE INNER PERIPHERY.

LUB OIL FLUSHING .

- LUB OIL FLUSHING WITH BYPASSING BRGS AND SERVOMOTOR.
- LUB OIL FLUSHING WITH BRGS. AND SERVOMOTOR IN CIRCUIT.
- COOLING WATER GOING TO LUB OIL COOLERS FLUSHING.
- RELIEF VALVE PRESSURE ADJUSTMENT.

MOTOR NO LOAD TRIAL FOR FD/PA FANS.

- CHECK FOR THE CABLING OF MOTOR.
- CHECK FOR PROPER EARTHING OF MOTOR.
- CHECK FOR ROTOR FREENESS.
- CHECK FOR CONTROL ROOM INDICATIONS OF BRG TEMP AND VIBRATIONS.
- CHECK FOR THE LOCATION OF EPB.
- ENSURE GREASING OF MOTOR BRGS.

COMMISSIONING OF FD/PAFANS

- CHECK FOR THE FREENESS OF FAN ROTOR.
- CHECK FOR THE INDICATION OF RTD AND VIBRATION PICKUPS.
- CHECK THE OPERATION BLADE PITCH IN CONTROL ROOM AS WELL AS IN LOCAL.
- CHECK FOR THE OPERATION OF DISCHARGE DAMPER/GATE.

COMMISSIONING OF FD/PA FANS

- CHECK WHETHER ALL PROTECTIONS AND PERMISSIVES ARE IN SERVICE.
- CHECK FOR THE CLEANLINESS OF DISCHARGE DUCT AND ALL OTHER INTERCONNECTION OF DUCTS.
- CHECK FOR THE CLEANLINESS OF SUCTION CHAMBER.
- CHECK FOR BLADE CLEARANCES FROM THE FAN CASING.

COMMISSIONING OF FD/PA FANS

- CHECK FOR THE AVAILABLITY OF COOLING WATER.
- CHECK WHETHER LUB OIL COOLERS ARE CHARGED FROM WATER SIDE.
- TAKE THE TRIAL RUN OF FAN AFTER GETTING CLEARANCES FROM VERIOUR CONCERNED DEPARTMENTS.
- BRG TEMP,VIBRATION READINGS TO BE RECORDED ON HOURLY BASIS.

MOTOR NO LOAD TRIAL FOR ID FANS.

- CHECK FOR THE CABLING OF MOTOR.
- CHECK FOR PROPER EARTHING OF MOTOR.
- CHECK FOR ROTOR FREENESS.
- CHECK FOR CONTROL ROOM INDICATIONS OF BRG TEMP AND VIBRATIONS.
- CHECK FOR THE LOCATION OF EPB.

MOTOR NO LOAD TRIAL FOR ID FANS.

- CHECK FOR THE AVAILABILITY OF MOTOR COOLING WATER.
- CHECK FOR OIL LEVEL IN BRGS.
- CHECK FOR THE HEALTYNESS OF COOLING WATER FLOW SWITCH.
- ENSURE THE FLUSHING COOLING WATER LINES TO MOTOR.

COMMISSIONING OF ID FANS

- CHECK FOR THE FREENESS OF FAN ROTOR.
- CHECK FOR THE INDICATION OF RTD AND VIBRATION PICKUPS.
- CHECK THE OPERATION OF IGV IN CONTROL ROOM AS WELL AS IN LOCAL.
- CHECK FOR THE OPERATION OF DISCHARGE GATE/INLET AND OUTLET GATES.

COMMISSIONING OF ID FANS

- CHECK WHETHER ALL PROTECTIONS AND PERMISSIVES ARE IN SERVICE.
- CHECK FOR THE CLEANLINESS OF DISCHARGE DUCT AND ALL OTHER INTERCONNECTION OF DUCTS.
- CHECK FOR THE CLEANLINESS OF SUCTION CHAMBER.
- CHECK FOR BLADE CLEARANCES FROM THE FAN CASING.

COMMISSIONING OF ID FANS

- ENSURE THE FLUSHING OF JACKET COOLING WATER DONE BEFORE.
- ENSURE LUB OIL LINE VALVES GOING TO INDIVIDUAL BRGS ARE IN OPEN CONDITION.
- FAN TO BE STARTED AND TRIAL RUN TO BE TAKEN FOR 8HRS.

PRECOMMISSIOING CHECKS OF AIR PREHEATERS

- CHECK FOR RADIAL CLEARANCE OF RADIAL SEALS AS PER DESIGN.
- CHECK FOR AXIAL CLEARANCE OF AXIAL SEALS AS PER DESIGN.
- CHECK FOR PROPER CLEARANCE OF CIRCUMFERENTIAL SEALS.
- CHEACK FOR THE CLEANLINESS OF AIR PREHEATER BASKETS.

PRECOMMISSIOING CHECKS OF AIR PREHEATERS

- ENSURE THE CLEANING OF PROTECTIVE COATING OF AIRPREHEATER.
- CHECK FOR TRAVEL PATH OF AIRPREHEATER SOOTBLOWING.
- ENSURE THAT NO LOOSE PARTS ARE HANGING.
- BEFORE STARTING AIRPREHEATER ALL MANUAL DOORS ARE PROPERLY TIGHTENED.

COMMISSIOING OF AIR PREHEATERS

- ENSURE THE COMPLETION OF MOTOR NO LOAD TRIAL RUN FOR 8HRS.
- ENSURE THE COMPLETION OF LUB OIL FLUSHING OF SUPPORT/GUIDE BRGS.
- FLUSH THE COOLING WATER LINES.
- CHECK FOR THE CLEANLINESS OF AIR RECEIVER TANK.
- FLUSH THE SERVICE AIR LINES GOING TO AIR RECEIVER TANK.

COMMISSIOING OF AIR PREHEATERS

- FLUSH THE OIL CARRYOVER PROBE COOLING LINES.
- FLUSH AIRPREHEATER WATER WASH LINES.
- ENSURE THE CLEANLINESS OF WATER WASH LINE NOZZLES.
- ENSURE THAT FIRE FIGHTING LINES ARE CONNECTED AS PER DRAWING.

COMMISSIOING OF AIR PREHEATERS

- ENSURE FLUSHING OF FIRE WATER LINES.
- ENSURE THE CLEANLINESS OF FIRE FIGHTING NOZZLES.
- CHECK FOR THE PROPER PLACING FIRE SENSING PROBES.
- FLUSH AIR LINE COMING FROM AIR RECEIVER TANK.

COMMISSIOING OF AIR PREHEATERS

- CHECK FOR HEALTHINESS OF SUPPORT BRG/GUIDE BRG RTD'S.
- ROTATE FREELY WITH HAND AND OBSERVE ANY ABNORMAL SOUND.
- START AIR PREHEATER WITH AIRMOTOR AND ROTATE IT FOR SOMETIME.
- START MAIN DRIVE OF AIRPREHEATER.

COMMISSIOING OF AIR PREHEATERS

- CHECK THE AIRPREHEATER MAIN DRIVE TO AIRMOTOR CHANGEOVER INTERLOCK HEALTINESS.
- CHECK FOR VIBRATIONS OF MAIN DRIVE.
- CHECK FOR THE HEALTHYNESS OF AIRMOTOR PRESSURE SWITCHES.

READINESS FOR FIRST BOILER LIGHT UP

1. Ensure the commissioning of the following including their protections, interlocks, measurements, alarms and annunciation:-
   - a One ID fan
   - b One FD fan
   - c One Sec. Air Pre-Heater along with its
     - i. Soot blowing system
     - ii. Fire detection and fire fighting system
     - iii. Rotor stoppage alarm
     - iv. Oil carry over probe
     - v. Air motor

     (proper isolation of the other SAPH , in case it is not available, should be ensured)
   - d Steam coil air pre-heater
   - e Light Diesel Oil firing system
   - f Elevation of LDO firing equipment.

g	FSSS
h	SADC
i	DDCMIS
j	MMIPS
k	Scanner air system
l	HP dozing system & LP dozing system
m	All the CC pumps (Boiler Circulating Water pumps)
n	Measurements, alarms & annunciation pertaining to secondary air system, flue gas system, feed water system, steam & boiler metal temperatures.
o	Boiler bottom hoppers with furnace bottom sealing system and proper make up & over flow arrangements.
p	Completion of gas tightness test of furnace and completion of its insulation.
q	Completion of air tightness test of air and flue gas ducts and completion of their insulation

2. Ensure free expansion of the furnace and ducts and provision of expansion markers, along with punching of initial positions.
3. Blow-down system of boiler.
4. Proper drainage system of boiler area.
5. Readiness of two passes of ESP in all respects including mechanical system, electrical system, EPMS and insulation.
6. Adequate quantity of LDO stock & readiness of LDO handling and pressurizing systems.
9. Completion of pre-boiler system alkali flushing.
10. Readiness of N_2 capping system.
11. Readiness of MD-BFP and feed system.
12. Boiler water sampling system along with sample coolers (as per mutually agreed between NTPC & BHEL site)

13. Availability of auxiliary steam system for SCAPHs and Soot blowing system of SAPHs.
14. DC batteries, chargers and DCDBs.
15. DG set, DG switch-gear, emergency switch gear and availability of emergency supplies for Scanner air fan ,Emergency lighting etc.
16. UPS
17. Fire fighting system of concerned equipment.
18. Air conditioning system of UCB, VFD room and ESP control room
19. Equipment cooling system viz.
    i. DM Cooling Water system along with plate-heat exchangers and alkali dozing system.
    ii. Clarified Cooling Water system.
20. Availability of adequate quantity of DM water.
21. Adequate capacity of instrument air and service air system

22. Emergency operating instructions viz. AC power failure, D.C. power failure, APH fire etc
23. Adequate lighting in the operating areas.
24. Public address system at all operating locations, including telephone & walki-talkies at all affected areas
25. Readiness of staircases, handrailings and platforms.
26. Personal safety equipment.
27. Readiness of drainage system of boiler and turbine zero metre elevations.
28. Easy access and approaches to all the operating equipments.
29. Purge water is available to the CC pumps

SAFETY VALVE FLOATING OF MAIN BOILER

OBJECTIVE:

To test the safety valves by actually floating and ensure that safety valves lift at recommended values.

	Location	Make	No.	Set Pr. Kg/cm^2 g
Safety Valves	Drum	BHEL	2 4	207.0, 209.0 211.1, 211.1 213.2 213.2
	SH Outlet SV ERV	BHEL	2 5	188.5, 188.5 185.5, 185.5, 186.6 186.6, 186.6
	RH Inlet	BHEL	4	52.4, 52.4, 54.0, 54.0
	RH Outlet	BHEL	4 4	49.4, 49.4, 50.9, 50.9 48.4, 48.4, 48.9, 48.9

SAFETY VALVE FLOATING OF MAIN BOILER

Test all the safety valves one by one by actually raising the pressure of the boiler to set values of the valves and also to set the blowdown of the valve within 3% - 5% of the set value.

Safety valve with higher set pressure will be floated first followed by other valves in descending order of set valves. If set pressures are same for few valves, then any valve can be taken for floating.

When the pressure reaches around 180-190 KSC, the safety valves is warmed up by manual popping and for this, the popping arrangement provided is made use off through rope. Once or twice the manual popping done to clear the safety valves path and also to warm up the valve.

THANK YOU