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M	LINES			VALVE, INSTRUMENT AND LINE SYMBOLS						INSTRUMENTATION SYMBOLS				GENERAL NOTES: 1. FLUSHING AND DRAIN CONNECTION TO BE PROVIDED AS CLOSE AS POSSIBLE TO ISOLATION VALVES IN THE PROCESS LINE. 2. ALL INSTRUMENT TAG NUMBERS TO BE PREFIXED BY UNIT NUMBER. 3. UNDESIGNATED PIPING AND VALVING ON EQUIPMENT SHALL FOLLOW THE CLASS AND INSULATION OF ASSOCIATED PIPING OR THE EQUIPMENT UNLESS STATED OTHERWISE. 4. ALL HYDROCARBON VENTS TO ATMOSPHERE SHOULD BE VENTED AT MIN. THREE METERS ABOVE THE NEAREST OPERATING PLATFORM EXISTING WITHIN A RADIUS OF 12 METERS. A 6mm DIAMETER WEEP HOLE IN THE TAIL PIPE SHALL BE PROVIDED FOR DRAINAGE TO SAFE LOCATION AT LOW POINT OF LINE. 5. ALL STEAM VENTS TO ATMOSPHERE SHOULD BE VENTED AT MIN. THREE METERS ABOVE THE NEAREST OPERATING PLATFORM EXISTING WITHIN A RADIUS OF 8 METERS. A 6mm DIAMETER WEEP HOLE IN THE TAIL A 6mm DIAMETER WEEP HOLE FOR LOW POINT OF LINE SHALL BE PROVIDED. 6. CBD/OWS DRAIN FOR EQUIPMENT LOCATED AT ELEVATED PLATFORMS CAN BE CLUSTERED AND ROUTED TO RESPECTIVE HEADERS. 7. IF EXISTING UNIT IS HAVING TRACING ONLY WRITTEN IN LINE BO WITHOUT ACTUAL TRACING SHOWN ON THE LINES, SAME PHILOSOPHY WILL BE FOLLOWED FOR NEW LINES FOR THAT PARTICULAR UNIT. 8. ALL INSTRUMENT LINES SYMBOL WITH RED/BLUE COLOR ARE CONSIDERED AS NEW/MODIFIED/REPLACED. 9. AT SOME EXISTING PLACES "CL" FLUID CODE IS USED FOR CHLORINE AS WELL AS LOW PRESSURE CONDENSATE, HOWEVER AT NEW PLACES, FLUID CODE FOR CHLORINE WILL BE "CN"		
L	LINES IDENTIFICATION			OTHERS						GENERAL ABBREVIATIONS						
K	3"- P-XX-XXYY-A1A - IH INSULATION SPECIFICATION PIPE MATERIAL SPECIFICATION LINE NUMBER UNIT NUMBER FLUID CODE LINE SIZE (IN INCHES) LINE LEGEND PRIMARY / PROCESS LINE SECONDARY PROCESS / UTILITY LINE TRACED LINE (NOTE - 7) VENDOR LIMIT LINE EXISTING DISMANTLED EXISTING REPLACED / MODIFIED / NEW INSTRUMENT LINE SYMBOLS ELECTRICAL SIGNAL CAPILLARY TUBING (FILLED SYSTEM) SOFTWARE SIGNAL PNEUMATIC SIGNAL HYDRAULIC SIGNAL ELECTROMAGNETIC / SONIC SIGNAL INSTRUMENT SUPPLY OR CONNECT TO PROCESS FOUNDATION FIELD BUS SIGNAL LINE LEGEND DESIGNATION SERVICE PROCESS LINE P PROCESS WATER LINES WCS COOLING WATER SUPPLY WCR COOLING WATER RETURN WDM DEMINERALIZED WATER WS SERVICE WATER (ISBL) WB BOILED FEED WATER WF FIRE WATER WR RAW WATER/SERVICE WATER (OSBL) FIRE WATER (OSBL) WT TEMPERED WATER/TREATED WATER WDK DRINKING WATER STEAM AND CONDENSATE LINES CH HIGH PRESSURE CONDENSATE CL LOW PRESSURE CONDENSATE (NOTE 9) CM MEDIUM PRESSURE CONDENSATE SH HIGH PRESSURE STEAM SM MEDIUM PRESSURE STEAM SL LOW PRESSURE STEAM AIR LINES AB BREATHING AIR AI INSTRUMENT AIR AP PLANT AIR PA PROCESS AIR VENT LINES ATM VENT TO ATMOSPHERE SV SAFETY VALVE OUTLET (OTHER THAN FLARE ROUTING) FLARE LINES FL FLARE BLOW DOWN LINES BD BLOW DOWN CBD CLOSED BLOW DOWN UTILITY OIL LINES FO FUEL OIL FLO FLUSHING OIL UTILITY GAS LINES FG FUEL GAS IG INERT GAS/NITROGEN NG NATURAL GAS DRAIN LINES CRWS CONTAMINATED RAIN WATER SERVICE CS CHEMICAL SEWER OWS OILY WATER SEWER (OPEN SYSTEM) SS STORM SEWER			GATE VALVE NORMALLY OPEN GATE VALVE NORMALLY CLOSED (OPTIONAL DESIGNATION) GLOBE VALVE NORMALLY OPEN GLOBE VALVE NORMALLY CLOSED CHECK VALVE BUTTERFLY VALVE PLUG VALVE NORMALLY OPEN PLUG VALVE NORMALLY CLOSED BALL VALVE NORMALLY OPEN BALL VALVE NORMALLY CLOSED DIAPHRAGM VALVE 3 WAY VALVE CONTROL VALVE (BUTTERFLY) CONTROL VALVE (GENERAL/GLOBE) CONTROL VALVE (DOWNSTREAM SELF ACTUATING) CONTROL VALVE (UPSTREAM SELF ACTUATING) PILOT OPERATED VALVE CONTROL VALVE WITH POSITIONER ON-OFF VALVE SOLENOID VALVE (2 WAY) SOLENOID VALVE (3 WAY) DRAIN WITH BLIND FLANGE DRAIN WITH THREADED CAP FLOW ELEMENT (ORIFICE PLATE) VORTEX METER THERMAL MASS FLOW METER GLOBE VALVE NORMALLY OPEN (WITH HANDWHEEL) GLOBE VALVE NORMALLY CLOSED (WITH HANDWHEEL) ROTAMETER VENTURI METER IN LINE INSTRUMENT (SIGHT GLASS, MASS FLOW METER ETC.) CORIOLIS METER INLET SIZE: INCHES ORIFICE CODE: LETTER OUTLET SIZE: INCHES SET PRESS: kg/cm2 g RELIEF VALVE SAFETY VALVE NUMBER PRESSURE VACUUM RELIEF VALVE CRITICAL FLOW NOZZLE T'- TYPE STRAINER Y'- TYPE STRAINER FILTER SPECTACLE BLIND (NORMALLY CLOSE/OPEN) SPACER OPEN DRAIN FUNNEL CLOSE DRAIN FUNNEL CONCENTRIC EXPANDER/REDUCER ECCENTRIC EXPANDER/REDUCER BELLOWS STEAM TRAP AIR TRAP UNION COUPLING BLIND FLANGE CAP THREADED CAP WELDED ADAPTOR REMOVABLE SPOOL BIRD SCREEN VENT COVER / HOOD SLOPE FREE DRAINING / GRAVITY FLOW UTILITY IN/OUT PULSATION DAMPNER, AIR / NITROGEN RESERVE VORTEX BREAKER FLEXIBLE LINE/HOSE SPECIALITY ITEM SC - SAMPLE CONNECTION AP - AIR PURGE SP - STEAM PURGE DA - AERATION AIR DS - AERATION STEAM DG - AERATION GAS NP - NITROGEN PURGE OP - OIL PURGE TIE-IN POINT VENT TO ATM PIPE CLASS / INSULATION / UNIT CHANGE RESTRICTION ORIFICE SWING ELEBOW REACTOR NOZZLE FLOW DIRECTION ARROW DIMENSION ARROW CONTINUITY ARROW (PIPING) CONTINUITY ARROW (SIGNAL) BI-DIRECTIONAL CONTINUITY ARROW (PIPING) CONTINUITY ARROW, TO AND FROM BATTERY LIMIT CONTINUITY ARROW (SIGNAL) ACROSS UNIT BATTERY LIMIT BI-DIRECTIONAL CONTINUITY ARROW (PIPING) ACROSS UNIT BATTERY LIMIT XXX-UNIT NUMBER YYY-P&ID NUMBER						AG ABOVE GROUND ATM ATMOSPHERE BL BATTERY LIMIT CMR CONTROL ROOM MANUAL RESET (FOR SOV) CSC CAR SEAL CLOSED CSO CAR SEAL OPEN FB FULL BORE FC FAIL CLOSED FL FAIL LOCK FO FAIL OPEN FLC FAIL LOCK, DRIFT TO CLOSED POSITION ON AIR FAILURE FLO FAIL LOCK, DRIFT TO OPEN POSITION ON AIR FAILURE FF FEED FORWARD SIGNAL FMR FEED MANUAL RESET (FOR SOV) HLL HIGH LIQUID LEVEL HS HOSE STATION ISBL INSIDE BATTERY LIMIT LC LOCK CLOSE LL LOW LIQUID LEVEL LO LOCK OPEN MOV MOTOR OPERATED VALVE ROV REMOTE OPERATED VALVE MW MANWAY NMF NORMALLY NO FLOW NLL NORMAL LIQUID LEVEL NO NORMALLY OPEN NC NORMALLY CLOSED OSBL OUTSIDE BATTERY LIMIT PB PUSH BUTTON PSO POSITIVE SHUT OFF (CL VI) RTD RESISTANCE TYPE TEMP DETECTOR SP SPECIAL PIPING TL TANGENT LINE TSO TIGHT SHUT OFF (CL.IV&V) UC UTILITY CONNECTION UG UNDER GROUND VAC VACUUM VF VENDOR FURNISHED VFD VENDOR FREQUENCY DRIVE VSD VARIABLE SPEED DRIVE AR AUTO RESET D DRAIN VT VIBRATION TRANSMITTER				AE ANALYSER ELEMENT AF FLAME ARRESTOR AI ANALYSER INDICATOR AR ANALYSER RECORDER ARC ANALYSER RECORDING CONTROLLER AT ANALYSER TRANSMITTER AV ANALYSER VALVE BE FLAME SCANNER DI DENSITY INDICATOR DR SP GRAVITY RECORDER DT DENSITY TRANSMITTER F&G FIRE & GAS FF FOUNDATION FIELD BUS FO RESTRICTION ORIFICE GD GAS DETECTOR HIC MANUAL LOADING STATION HS HAND SWITCH HV HAND OPERATED VALVE HSS HIGH SIGNAL SELECTOR I CURRENT INDICATOR IA CURRENT ALARM IR CURRENT RECORDER LSS LOW SIGNAL SELECTOR MOV MOTOR OPERATED VALVE PB PUSH BUTTON pHi pH INDICATOR pHiC pH INDICATOR CONTROLLER pHR pH RECORDER PSV PRESSURE SAFETY VALVE RD RUPTURE DISK SDV SHUT DOWN VALVE SI SPEED INDICATOR SK SKIN TYPE TEMPERATURE ELEMENT SOV SOLENOID OPERATED VALVE SR SPEED RECORDER SS SELECTOR SWITCH ST SPEED TRANSMITTER TSV TEMPERATURE SAFETY VALVE UC MULTI FUNCTIONAL CONTROLLER VAH VIBRATION ALARM HIGH VSH VIBRATION SWITCH HIGH XL INDICATION LAMP XV ON/OFF VALVE ZE POSITION ELEMENT ZLH POSITION LIGHT HIGH ZLL POSITION LIGHT LOW ZSH POSITION SWITCH HIGH ZSL POSITION SWITCH LOW P.V PROCESS VARIABLE S.P SET POINT		
J										TEMPERATURE INSTRUMENTS				NOTE:- H- FOR HIGH ALARM L- FOR LOW ALARM		
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G										PRESSURE INSTRUMENTS				INSULATION / TRACING TYPE		
F										DG DRAFT GAUGE PDG DIFFERENTIAL PRESSURE GAUGE PDI DIFFERENTIAL PRESSURE INDICATOR PDIC DIFFERENTIAL PRESSURE INDICATING CONTROLLER PDR DIFFERENTIAL PRESSURE RECORDER PDT DIFFERENTIAL PRESSURE TRANSMITTER PDV DIFFERENTIAL PRESSURE CONTROL VALVE PA PRESSURE ALARM PCV SELF ACTUATED PRESSURE REGULATOR PG PRESSURE GAUGE PI PRESSURE INDICATOR PIC PRESSURE INDICATOR CONTROLLER PR PRESSURE RECORDER PT PRESSURE TRANSMITTER PV PRESSURE CONTROL VALVE				IH HOT INSULATION IC COLD INSULATION IS SAFETY INSULATION IE ELECTRICAL TRACED IJ STEAM JACKETED / HOT FLUID JACKET IT STEAM TRACED IA ACOUSTIC CONTROL INSULATION		
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THIS DRAWING HAS BEEN REGENERATED BASED ON APPLICABLE SYMBOLS FROM CLIENT P&ID (REF. DOC. NO. 214227C-00-PID-0090-003)

0	19-08-2025	ISSUED FOR REVIEW	VN	NS	SB
Rev	Date	Status - Description of Issue	Written by	Checked by	Approved by
	DD-MM-YYYY				

DOCUMENT CATEGORY (USE "X" MARK)	DOCUMENT REVIEW STATUS (BY CLIENT)
☐ APPROVAL	
☐ REVIEW	
☒ INFORMATION	

PROJECT : DR 1.0 EXPANSION PROJECT
IOCL DIGBOI REFINERY

OWNER :
 INDIAN OIL CORPORATION LTD. 

EPCM :
 TECHNIP ENERGIES

EPC CONTRACTOR :
 BHARAT HEAVY ELECTRICALS LTD.,
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT :
 UNITBIRWELCO IISP
THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

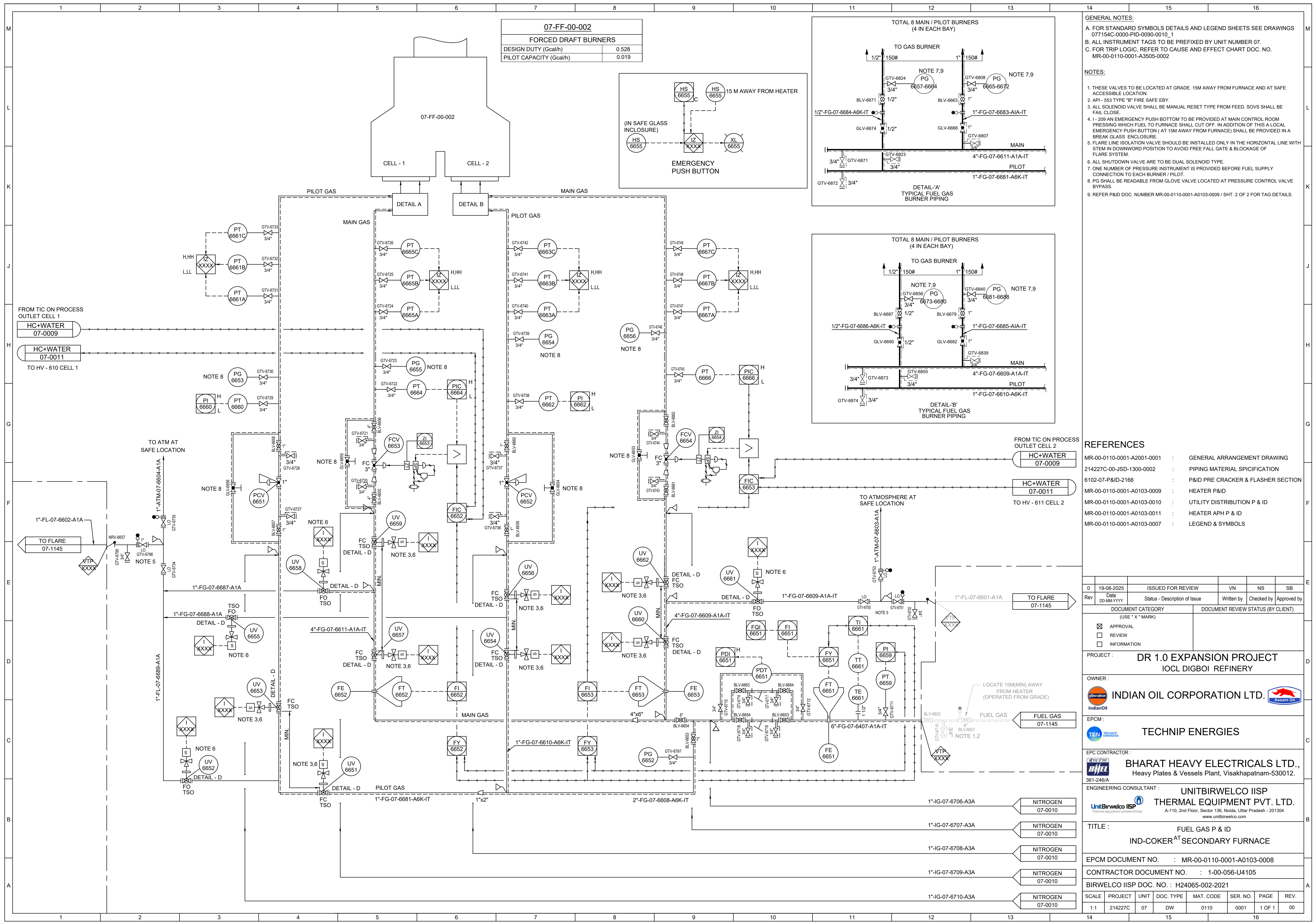
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IND-COKER^{AT} SECONDARY FURNACE

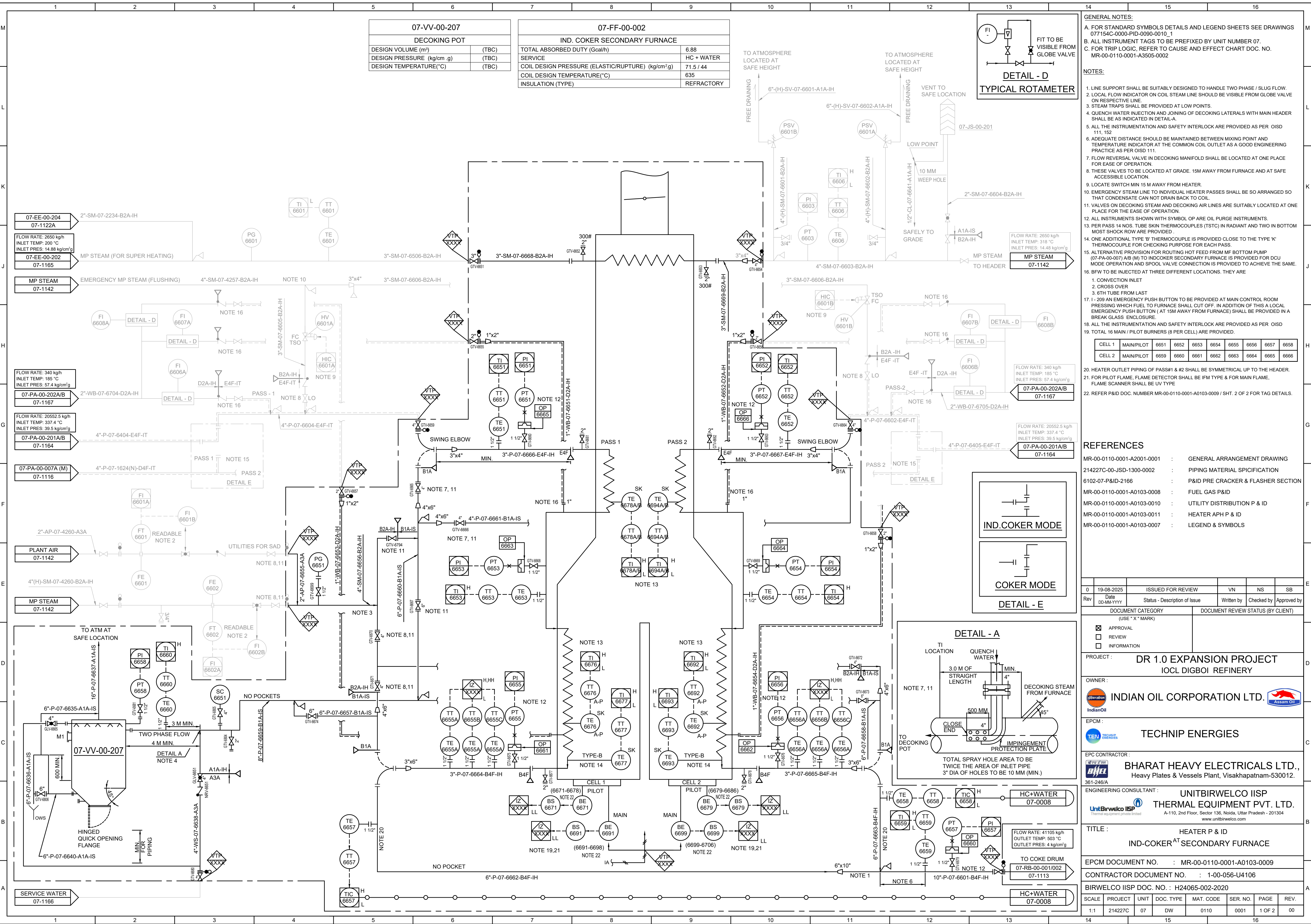
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CONTRACTOR DOCUMENT NO. : 1-00-056-U4112

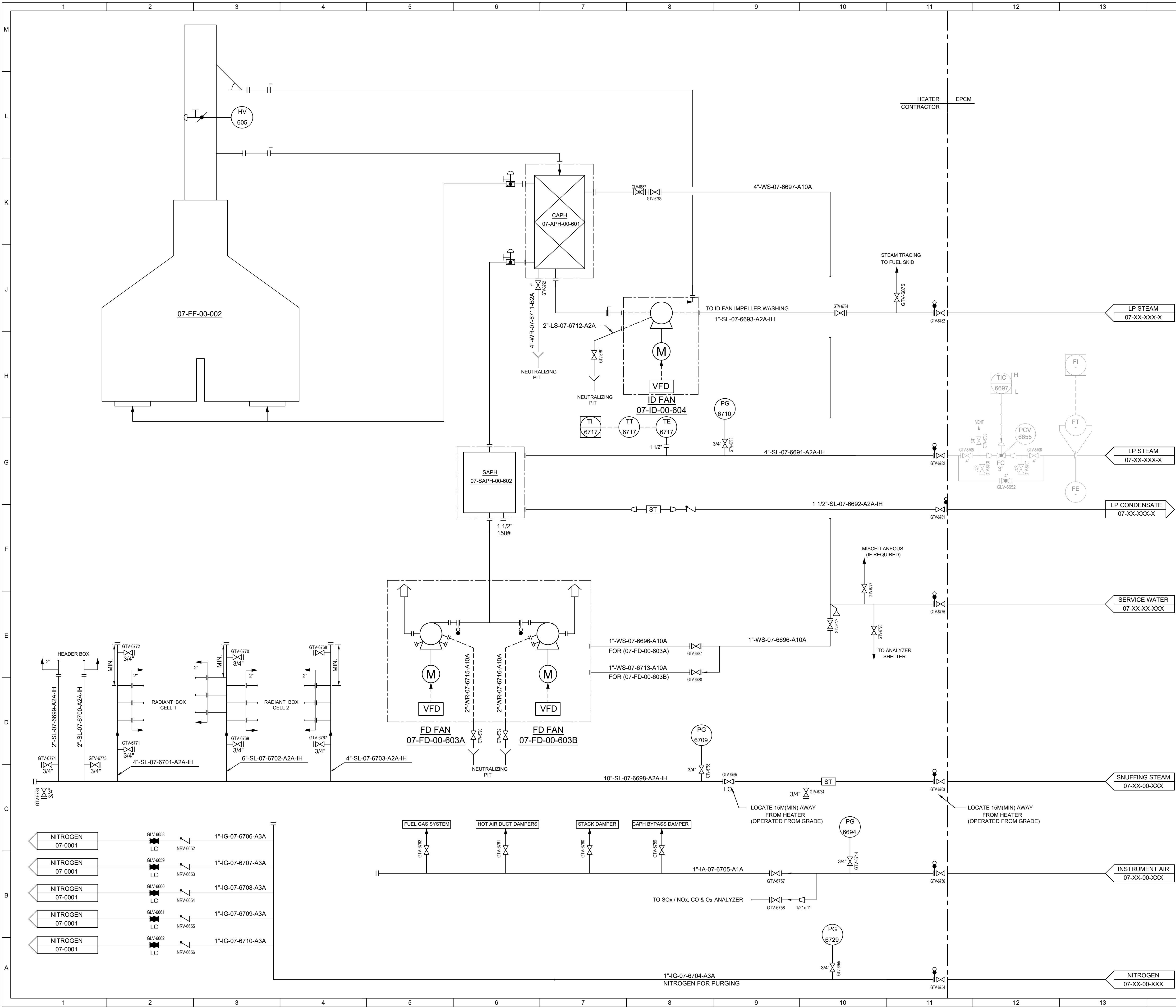
BIRWELCO IISP DOC. NO. : H24065-002-2021

SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
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A									EPCM :  TECHNIP ENERGIES																																																																																											
									EPC CONTRACTOR :  BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012. 381-246/A																																																																																											
									ENGINEERING CONSULTANT :  UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD. A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com																																																																																											
									TITLE : HEATER P & ID IND-COKER^{AT} SECONDARY FURNACE																																																																																											
									EPCM DOCUMENT NO. : MR-00-0110-0001-A0103-0009																																																																																											
									CONTRACTOR DOCUMENT NO. : 1-00-056-U4113																																																																																											
									BIRWELCO IISP DOC. NO. : H24065-002-2020																																																																																											
	SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.																																																																																												
	1:1	214227C	07	DW	0110	0001	2 OF 2	00																																																																																												
	1		2		3		4		5		6		7		8																																																																																					



GENERAL NOTES:
A. FOR STANDARD SYMBOLS DETAILS AND LEGEND SHEETS SEE DRAWINGS 077154C-0000-PID-0090-0010.1
B. ALL INSTRUMENT TAGS TO BE PREFIXED BY UNIT NUMBER 07.
C. FOR TRIP LOGIC, REFER TO CAUSE AND EFFECT CHART DOC. NO. MR-00-0110-0001-A3505-0002

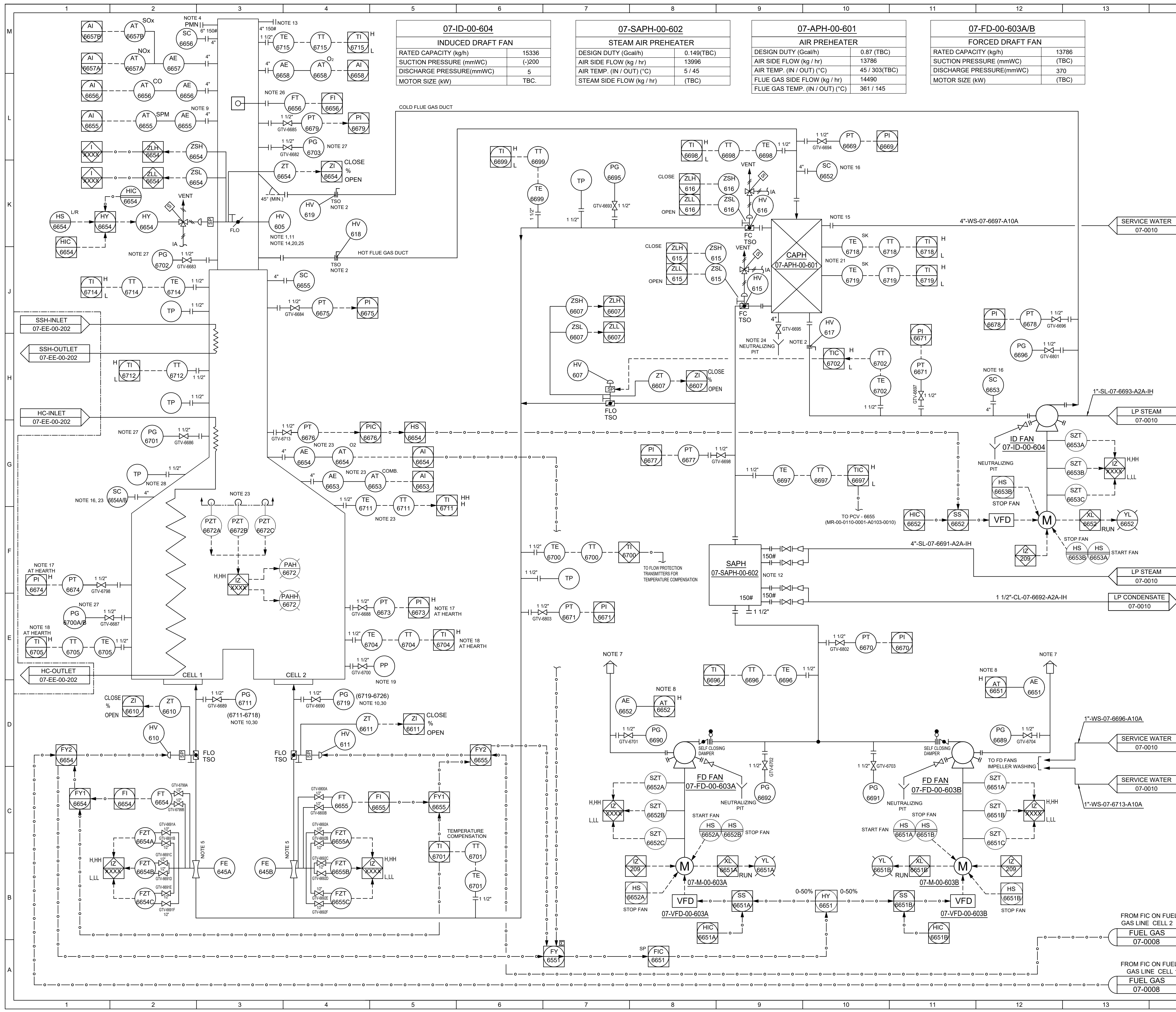
NOTES:
1. THESE VALVES SHALL BE LOCATED AT 15M(MIN.) AWAY FORM HEATER WHICH CAN BE OPERATED FROM GRADE.
2. PURGING LINE MANUAL ISOLATION VALVE MOUNTING SHALL BE STEM FACING DOWNWARD OR HORIZONTAL POSITION AS PER OISD 111.
3. REFER P&ID DOC. NUMBER MR-00-0110-0001-A0103-0009 / SHT. 2 OF 2 FOR TAG DETAILS.

**FOR UTILITY LINE SIZE VENDOR INFORMATION IS PENDING.

REFERENCES

MR-00-0110-0001-A2001-0001	:	GENERAL ARRANGEMENT DRAWING
214227C-00-JSD-1300-0002	:	PIPING MATERIAL SPECIFICATION
6102-07-P&ID-2166	:	P&ID PRE CRACKER & FLASHER SECTION
MR-00-0110-0001-A0103-0008	:	FUEL GAS P&ID
MR-00-0110-0001-A0103-0009	:	HEATER P & ID
MR-00-0110-0001-A0103-0011	:	HEATER APH P & ID
MR-00-0110-0001-A0103-0007	:	LEGEND & SYMBOLS

0	19-08-2025	ISSUED FOR REVIEW		VN	NS	SB	
Rev	Date DD-MM-YYYY	Status - Description of Issue		Written by	Checked by	Approved by	
DOCUMENT CATEGORY (USE "X" MARK)				DOCUMENT REVIEW STATUS (BY CLIENT)			
☒ APPROVAL ☐ REVIEW ☐ INFORMATION							
PROJECT : DR 1.0 EXPANSION PROJECT IOCL DIGBOI REFINERY							
OWNER :  Indian Oil INDIAN OIL CORPORATION LTD.  Assam Oil							
EPCM :  Technip Energies TECHNIP ENERGIES							
EPC CONTRACTOR :  BHEL BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012.							
ENGINEERING CONSULTANT :  Unit Birwelco IISP Thermal equipments private limited UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD. A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com							
TITLE : UTILITY DISTRIBUTION P & ID IND-COKER ^{AT} SECONDARY FURNACE							
EPCM DOCUMENT NO. : MR-00-0110-0001-A0103-0010							
CONTRACTOR DOCUMENT NO. 1-00-056-U4107							
BIRWELCO IISP DOC. NO. : H24065-002-2023							
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:1	214227C	07	DW	0110	0001	1 OF 1	00



GENERAL NOTES:

A. FOR STANDARD SYMBOLS DETAILS AND LEGEND SHEETS SEE DRAWINGS 077154C-0000-PID-0090-0010.

B. ALL INSTRUMENT TAGS TO BE PREFIXED BY UNIT NUMBER 07.

C. FOR TRIP LOGIC, REFER TO CAUSE AND EFFECT CHART DOC. NO. MR-00-0110-0001-A3505-0002

NOTES:

- STACK DAMPER SHALL ALSO BE OPERABLE FROM GRADE WITH WINCH & CABLE ARRANGEMENT.
- GUILLOTINE (SOB) LOCATED AT HORIZONTAL RUN.
- CAPACITY OF THE FD / ID FAN SHALL BE REGULATED & CONTROLLED BY VARIABLE FREQUENCY DRIVE.
- 2 NOS OF NOZZLES FOR POLLUTION MONITORING SAMPLE CONNECTIONS AS PER POLLUTION CONTROL BOARD REQUIREMENTS ARE PROVIDED.
- STRAIGHT LENGTH SHALL BE IN ACCORDANCE WITH ISO 5167-4.
- ONE TEMPERATURE TRANSMITTER IS PROVIDED AT ARCH.
- INLET STACK SHALL BE EQUIPPED WITH BIRD SCREEN & RAIN CANOPY.
- ONE HYDROCARBON DETECTOR TO BE MOUNTED ON THE STRUCTURE NEAR BY BIRD SCREEN AREA AT THE FD FAN SUCTION STACK.
- TWO NOZZLE ARE PROVIDED 180° APART FOR SPM ANALYZER CONNECTION.
- ONE NUMBER OF PRESSURE INSTRUMENT IS PROVIDED AT THE END OF INDIVIDUAL HOT AIR DISTRIBUTION TO EACH BURNER.
- STACK DAMPER SHALL NOT BE CLOSED UNTIL & UNLESS ID FAN IS IN RUNNING CONDITION.
- MINIMUM TWO SEPARATE TUBE BUNDLES SHALL BE PROVIDED IN SAPH. THIS SHALL ALLOW 50% (APPROXIMATELY) OF THE EXCHANGER SURFACE SHALL BE TAKEN OUT OF THE SERVICE.
- ONE NUMBER ISOKINETIC NOZZLE AT 500 mm ABOVE AND 90 DEGREE TO SPM ANALYZER SHALL BE PROVIDED AS PER CPCB NORMS.
- STACK DAMPER VALVE SHALL ALSO BE ABLE TO OPERATE MANUALLY, IF TAKEN IN MANUAL MODE.
- WATER WASH ARRANGEMENT TO BE PROVIDED.
- SAMPLE POINT IS EXTENDED UP TO GRADE.
- TWO NOS. OF PT (ONE NO. PER EACH CELL) PROVIDED ON HEARTH.
- TWO NOS. TT (ONE NO. PER EACH CELL) PROVIDED AT HEARTH.
- TWO CONNECTION FOR PRESSURE INSTRUMENT IS PROVIDED IN EACH RADIANT SECTION LOCATED 300 MM TO 600 MM ABOVE THE TOP OF THE FLOOR REFRACTORY.
- TRIPPING/STOPPING ID FAN SHALL HAVE PROVISION TO AUTOMATICALLY OPEN THE STACK DAMPER.
- TWO NOS OF SKIN THERMOCOUPLE ARE PROVIDED AT COLD END OF APH WHERE MIN. TMT IS EXPECTED.
- ALL SOB ARE PROVIDED EXTERNAL OPEN/CLOSE INDICATION AND INSTALLED IN HORIZONTAL PORTION OF DUCT.
- INSTRUMENTS / CONNECTIONS LOCATED AT ARCH LEVEL SHALL BE PLACED BELOW SHOCK ZONE.
- APH DRAIN IS PROVIDED AT LOWEST POINT. DRAIN NOZZLE SHALL BE 4" NB IN FLUE GAS OUTLET DUCT HOPPER.
- STACK DAMPER SHALL BE PROVIDED WITH MECHANICAL STOPPER (10% OPEN).
- THERMAL MASS FLOW METER IS PROVIDED IN STACK.
- LOCAL DRAFT GAUGE FOR FIRE BOX AT HEARTH LEVEL, ARCH LEVEL, AFTER CONVECTION AND AFTER STACK DAMPER ARE PROVIDED.
- INSTRUMENTS / CONNECTIONS LOCATED AT TOP OF RADIANT SECTION.
- REFER P&ID DOC. NUMBER MR-00-0110-0001-A0103-0009 / SHT. 2 OF 2 FOR TAG DETAILS.

UTILITY LINE / CONTROL VALVE SIZE FOR APH, SAPH, ID, AND FD FAN SHALL BE CONFIRMED AFTER RECEIVING DATA FROM VENDOR.

REFERENCES

MR-00-0110-0001-A2001-0001 : GENERAL ARRANGEMENT DRAWING

214227C-00-JSD-1300-0002 : PIPING MATERIAL SPECIFICATION

6102-07-P&ID-2166 : P&ID PRE CRACKER & FLASHER SECTION

MR-00-0110-0001-A0103-0008 : FUEL GAS P&ID

MR-00-0110-0001-A0103-0009 : HEATER P & ID

MR-00-0110-0001-A0103-0007 : LEGEND & SYMBOLS

0	19-08-2025	ISSUED FOR REVIEW	VN	NS	SB
Rev	Date	Status - Description of Issue	Written by	Checked by	Approved by
	DD-MM-YYYY				

DOCUMENT CATEGORY (USE "X" MARK)

☒ APPROVAL

☐ REVIEW

☐ INFORMATION

DOCUMENT REVIEW STATUS (BY CLIENT)

PROJECT: **DR 1.0 EXPANSION PROJECT**
IOCL DIGBOI REFINERY

OWNER: **INDIAN OIL CORPORATION LTD.**

EPCM: **TECHNIP ENERGIES**

EPC CONTRACTOR: **BHARAT HEAVY ELECTRICALS LTD.,**
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT: **UNITBIRWELCO IISP**
THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

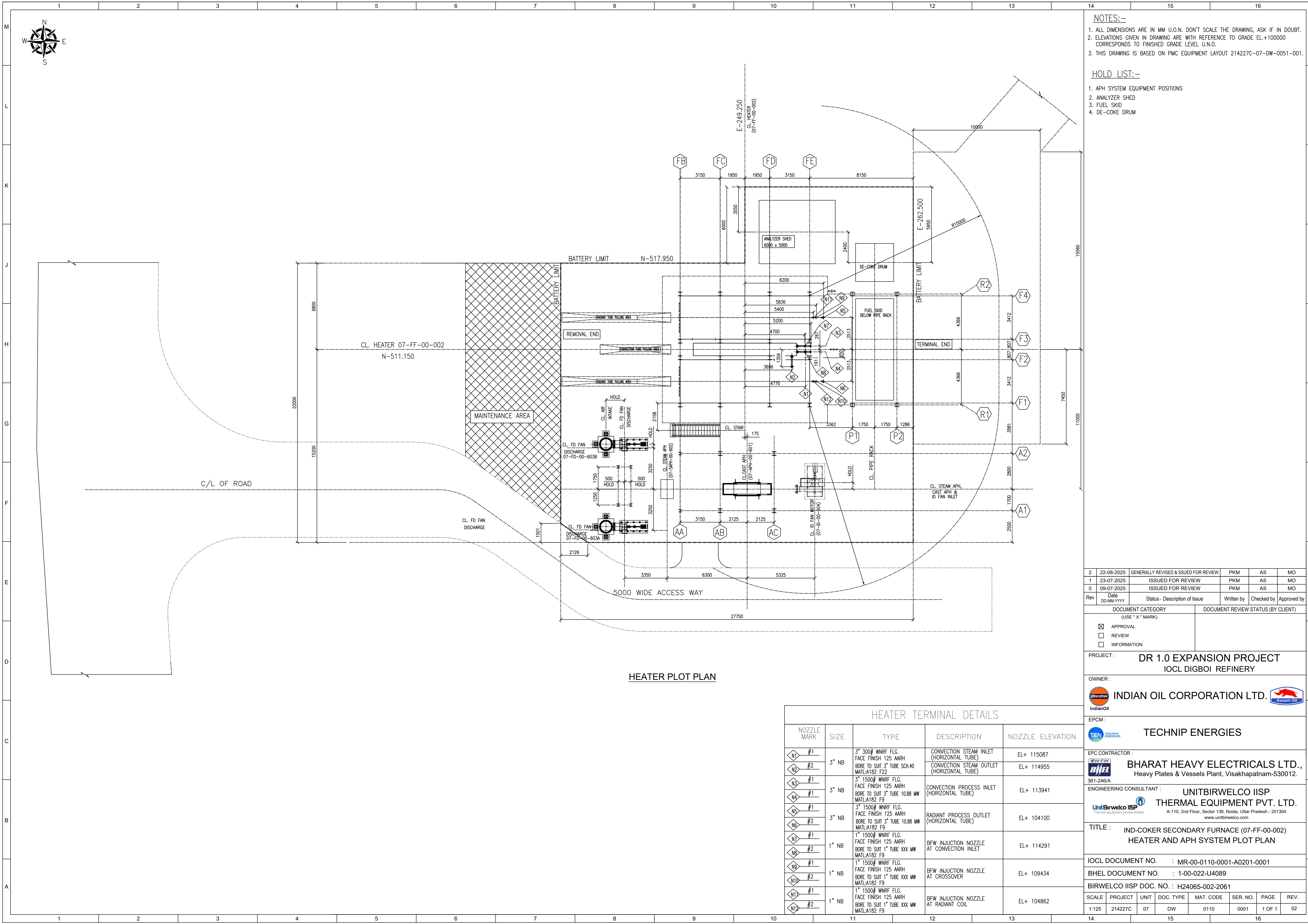
TITLE: **HEATER APH P & ID**
IND-COKER^{AT} SECONDARY FURNACE

EPCM DOCUMENT NO.: MR-00-0110-0001-A0103-0011

CONTRACTOR DOCUMENT NO. 1-00-056-U4108

BIRWELCO IISP DOC. NO.: H24065-002-2022

SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
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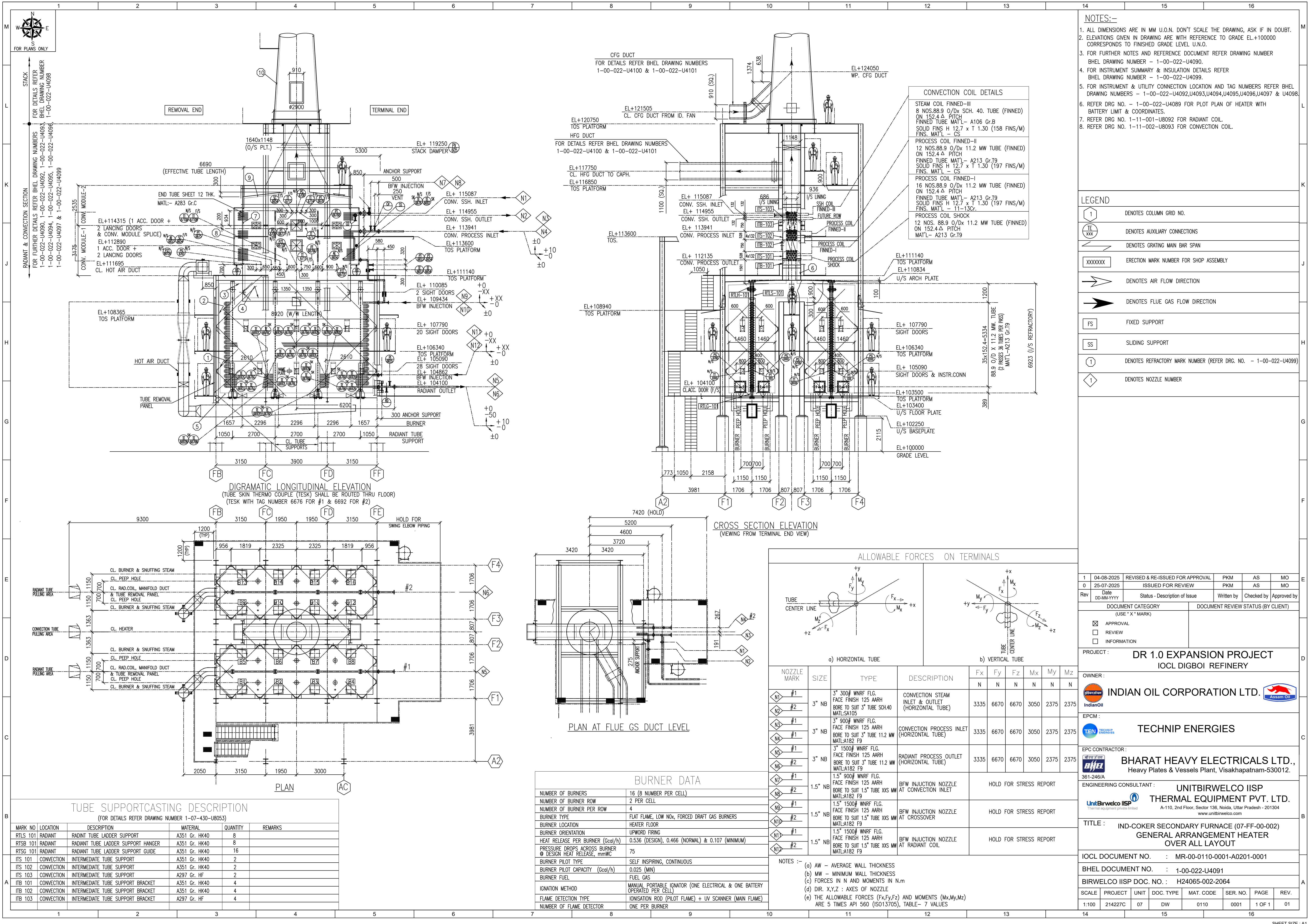
- NOTES:-
1. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
 3. THIS DRAWING IS BASED ON PMC EQUIPMENT LAYOUT 214227C-07-DW-0051-001.

- HOLD LIST:-
1. APH SYSTEM EQUIPMENT POSITIONS
 2. ANALYZER SHED
 3. FUEL SKID
 4. DE-COKE DRUM

HEATER PLOT PLAN

HEATER TERMINAL DETAILS				
NOZZLE MARK	SIZE	TYPE	DESCRIPTION	NOZZLE ELEVATION
#1	3" NB	3" 300# WNRF FLG. FACE FINISH 125 AARH	CONVECTION STEAM INLET (HORIZONTAL TUBE)	EL+ 115087
#2		BORE TO SUIT 3" TUBE SCH40 MATL:A182 F22	CONVECTION STEAM OUTLET (HORIZONTAL TUBE)	EL+ 114955
#1	3" NB	3" 1500# WNRF FLG. FACE FINISH 125 AARH	CONVECTION PROCESS INLET (HORIZONTAL TUBE)	EL+ 113941
#1		BORE TO SUIT 3" TUBE 10.88 MW MATL:A182 F9		
#1	3" NB	3" 1500# WNRF FLG. FACE FINISH 125 AARH	RADIANT PROCESS OUTLET (HORIZONTAL TUBE)	EL+ 104100
#2		BORE TO SUIT 3" TUBE 10.88 MW MATL:A182 F9		
#1	1" NB	1" 1500# WNRF FLG. FACE FINISH 125 AARH	BFW INJECTION NOZZLE AT CONVECTION INLET	EL+ 114291
#2		BORE TO SUIT 1" TUBE XXX MW MATL:A182 F9		
#1	1" NB	1" 1500# WNRF FLG. FACE FINISH 125 AARH	BFW INJECTION NOZZLE AT CROSSOVER	EL+ 109434
#2		BORE TO SUIT 1" TUBE XXX MW MATL:A182 F9		
#1	1" NB	1" 1500# WNRF FLG. FACE FINISH 125 AARH	BFW INJECTION NOZZLE AT RADIANT COIL	EL+ 104862
#2		BORE TO SUIT 1" TUBE XXX MW MATL:A182 F9		

2	22-08-2025	GENERALLY REVISED & ISSUED FOR REVIEW		PKM	AS	MO	
1	23-07-2025	ISSUED FOR REVIEW		PKM	AS	MO	
0	09-07-2025	ISSUED FOR REVIEW		PKM	AS	MO	
Rev	Date DD-MM-YYYY	Status - Description of Issue		Written by	Checked by	Approved by	
DOCUMENT CATEGORY				DOCUMENT REVIEW STATUS (BY CLIENT)			
(USE "X" MARK)							
☒ APPROVAL							
☐ REVIEW							
☐ INFORMATION							
PROJECT : DR 1.0 EXPANSION PROJECT IOCL DIGBOI REFINERY							
OWNER :  INDIAN OIL CORPORATION LTD. 							
EPCM :  TECHNIP ENERGIES							
EPC CONTRACTOR :  BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012.							
361-246/A							
ENGINEERING CONSULTANT :  UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD. A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com							
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002) HEATER AND APH SYSTEM PLOT PLAN							
IOCL DOCUMENT NO. : MR-00-0110-0001-A0201-0001							
BHEL DOCUMENT NO. : 1-00-022-U4089							
BIRWELCO IISP DOC. NO. : H24065-002-2061							
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:125	214227C	07	DW	0110	0001	1 OF 1	02



- NOTES:-**
- ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 - ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE U.O.N.
 - FOR FURTHER NOTES AND REFERENCE DOCUMENT REFER DRAWING NUMBER BHEL DRAWING NUMBER - 1-00-022-U4090.
 - FOR INSTRUMENT SUMMARY & INSULATION DETAILS REFER BHEL DRAWING NUMBER - 1-00-022-U4099.
 - FOR INSTRUMENT & UTILITY CONNECTION LOCATION AND TAG NUMBERS REFER BHEL DRAWING NUMBERS - 1-00-022-U4092,U4093,U4094,U4095,U4096,U4097 & U4098.
 - REFER DRG NO. - 1-00-022-U4089 FOR PLOT PLAN OF HEATER WITH BATTERY LIMIT & COORDINATES.
 - REFER DRG NO. 1-11-001-U8092 FOR RADIANT COIL.
 - REFER DRG NO. 1-11-002-U8093 FOR CONVECTION COIL.

- LEGEND**
- 1 DENOTES COLUMN GRID NO.
 - TE xxx DENOTES AUXILIARY CONNECTIONS
 - DENOTES GRATING MAIN BAR SPAN
 - XXXXXXX DENOTES ERECTION MARK NUMBER FOR SHOP ASSEMBLY
 - DENOTES AIR FLOW DIRECTION
 - DENOTES FLUE GAS FLOW DIRECTION
 - FS FIXED SUPPORT
 - SS SLIDING SUPPORT
 - 1 DENOTES REFRACTORY MARK NUMBER (REFER DRG. NO. - 1-00-022-U4099)
 - 1 DENOTES NOZZLE NUMBER

1	04-08-2025	REVISED & RE-ISSUED FOR APPROVAL	PKM	AS	MO
0	25-07-2025	ISSUED FOR REVIEW	PKM	AS	MO
Rev	Date DD-MM-YYYY	Status - Description of Issue	Written by	Checked by	Approved by
DOCUMENT CATEGORY (USE "X" MARK)			DOCUMENT REVIEW STATUS (BY CLIENT)		
☒ APPROVAL					
☐ REVIEW					
☐ INFORMATION					

PROJECT: **DR 1.0 EXPANSION PROJECT**
IOCL DIGBOI REFINERY

OWNER: **INDIAN OIL CORPORATION LTD.**

EPCM: **TECHNIP ENERGIES**

EPC CONTRACTOR: **BHARAT HEAVY ELECTRICALS LTD.,**
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT: **UNITBIRWELCO IISP**
THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

TITLE: **IND-COKER SECONDARY FURNACE (07-FF-00-002)**
GENERAL ARRANGEMENT HEATER
OVER ALL LAYOUT

IOCL DOCUMENT NO. : **MR-00-0110-0001-A0201-0001**

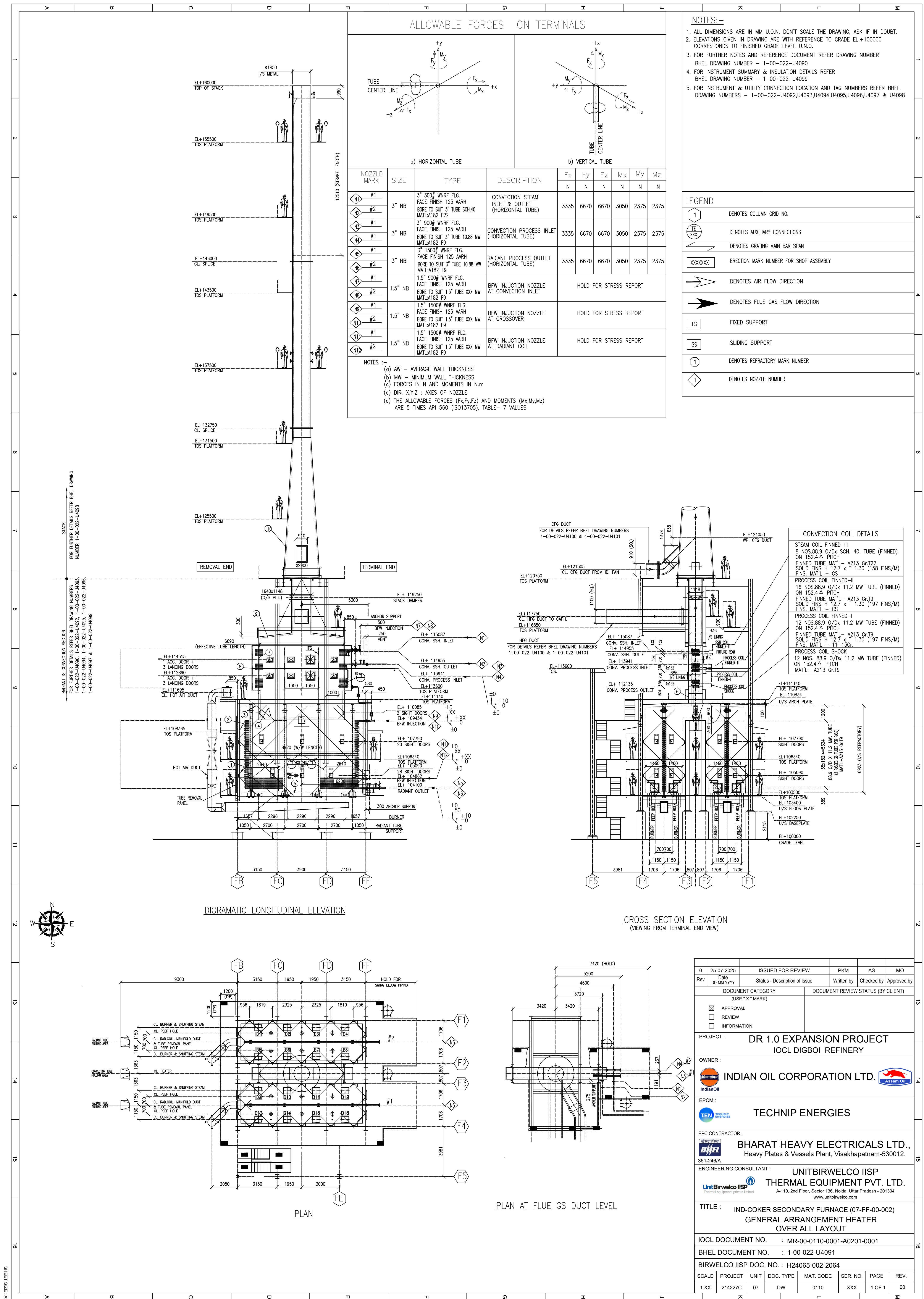
BHEL DOCUMENT NO. : **1-00-022-U4091**

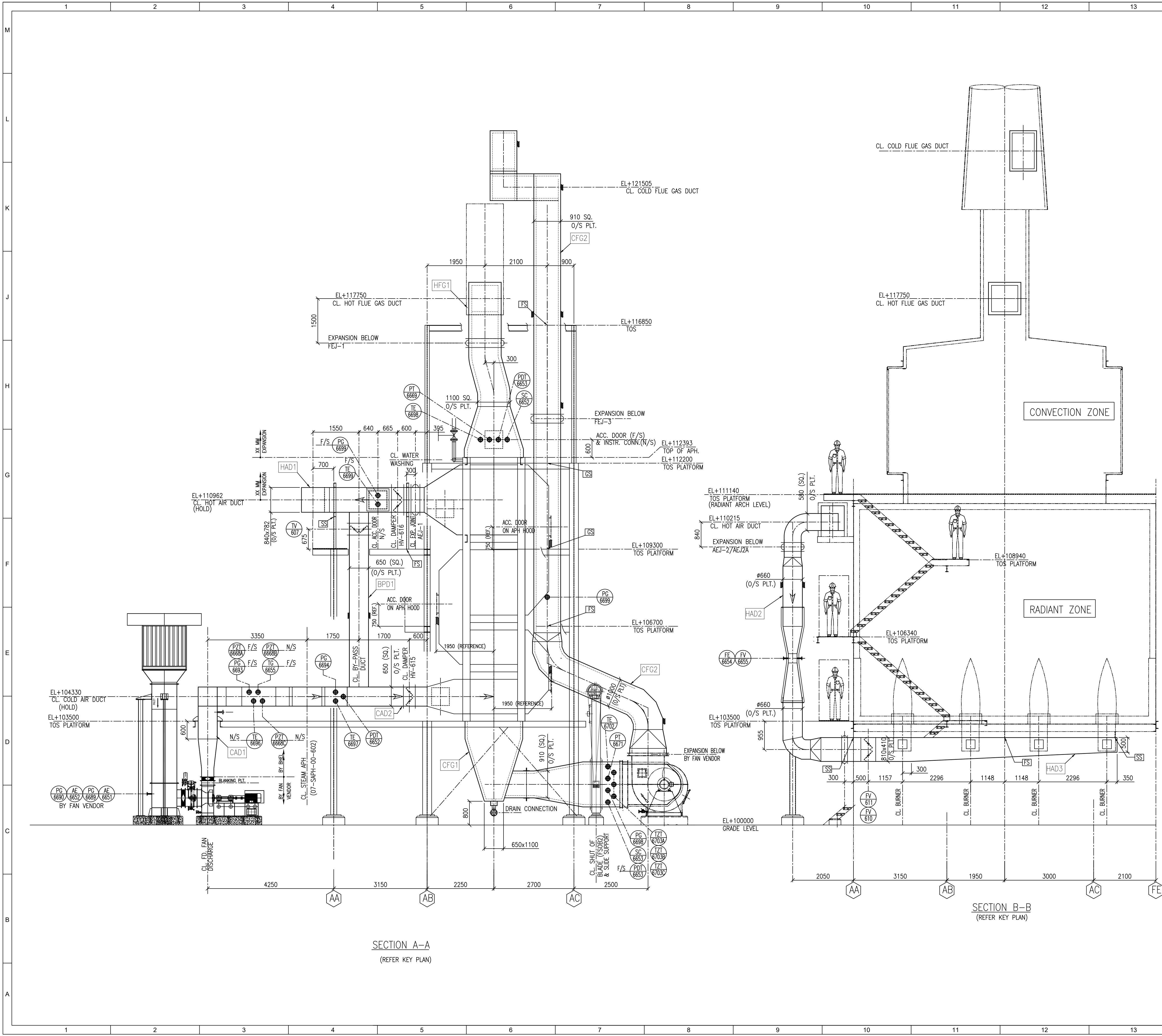
BIRWELCO IISP DOC. NO. : **H24065-002-2064**

SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:100	214227C	07	DW	0110	0001	1 OF 1	01

BURNER DATA	
NUMBER OF BURNERS	16 (8 NUMBER PER CELL)
NUMBER OF BURNER ROW	2 PER CELL
NUMBER OF BURNER PER ROW	4
BURNER TYPE	FLAT FLAME, LOW NOx, FORCED DRAFT GAS BURNERS
BURNER LOCATION	HEATER FLOOR
BURNER ORIENTATION	UPWARD FIRING
HEAT RELEASE PER BURNER (Gcal/h)	0.536 (DESIGN), 0.466 (NORMAL) & 0.107 (MINIMUM)
PRESSURE DROPS ACROSS BURNER @ DESIGN HEAT RELEASE, mmWC	75
BURNER PILOT TYPE	SELF INSPIRING, CONTINUOUS
BURNER PILOT CAPACITY (Gcal/h)	0.025 (MIN)
BURNER FUEL	FUEL GAS
IGNITION METHOD	MANUAL PORTABLE (IGNATOR (ONE ELECTRICAL & ONE BATTERY OPERATED PER CELL))
FLAME DETECTION TYPE	IONISATION ROD (PILOT FLAME) + UV SCANNER (MAIN FLAME)
NUMBER OF FLAME DETECTOR	ONE PER BURNER

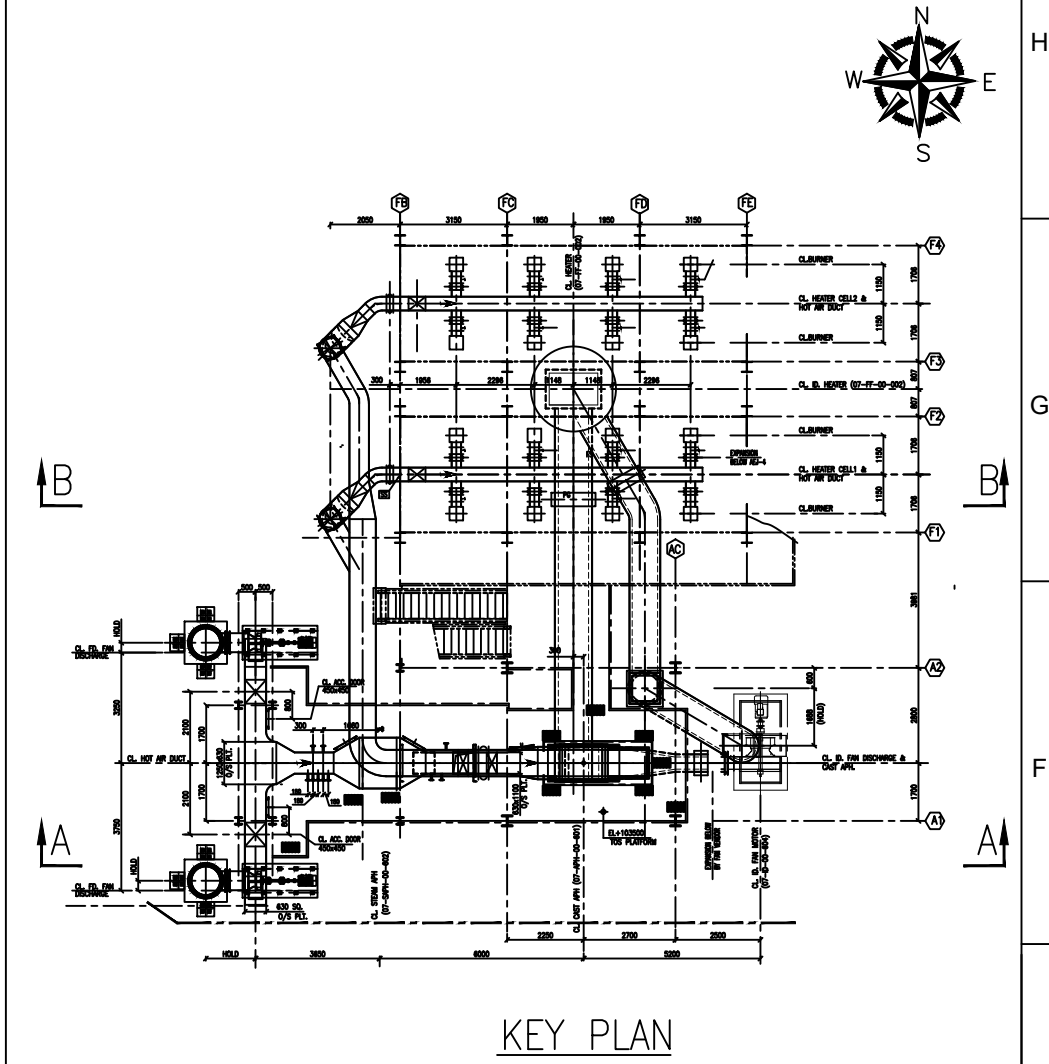
- NOTES :-**
- AW - AVERAGE WALL THICKNESS
 - MW - MINIMUM WALL THICKNESS
 - FORCES IN N AND MOMENTS IN N.m
 - DIR. X,Y,Z : AXES OF NOZZLE
 - THE ALLOWABLE FORCES (Fx,Fy,Fz) AND MOMENTS (Mx,My,Mz) ARE 5 TIMES API 560 (ISO13705), TABLE - 7 VALUES





- NOTES:-
1. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
 3. FOR FURTHER NOTES AND REFERENCE DOCUMENT REFER DRAWING NUMBER BHEL DRAWING NUMBER - 1-00-022-U4090.
 4. FOR INSTRUMENT SUMMARY & INSULATION DETAILS REFER BHEL DRAWING NUMBER - 1-00-022-U4099.
 5. REFER DRG NO. - 1-00-022-U4089 FOR PLOT PLAN OF HEATER WITH BATTERY LIMIT & COORDINATES.

LEGEND	
	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	GUIDE SUPPORT
	DENOTES REFRACTORY MARK NUMBER (REFER DRG. NO. - 1-00-022-U4099)
	DENOTES NOZZLE NUMBER



0	14-08-2025	ISSUED FOR REVIEW		PKM	AS	MO
Rev	Date DD-MM-YYYY	Status - Description of Issue		Written by	Checked by	Approved by
DOCUMENT CATEGORY				DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)						
☒ APPROVAL						
☐ REVIEW						
☐ INFORMATION						

PROJECT : DR 1.0 EXPANSION PROJECT
IOCL DIGBOI REFINERY

OWNER :
 INDIAN OIL CORPORATION LTD.

EPCM :
 TECHNIP ENERGIES

EPC CONTRACTOR :
 BHARAT HEAVY ELECTRICALS LTD.,
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT :
 UNITBIRWELCO IISP
 THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

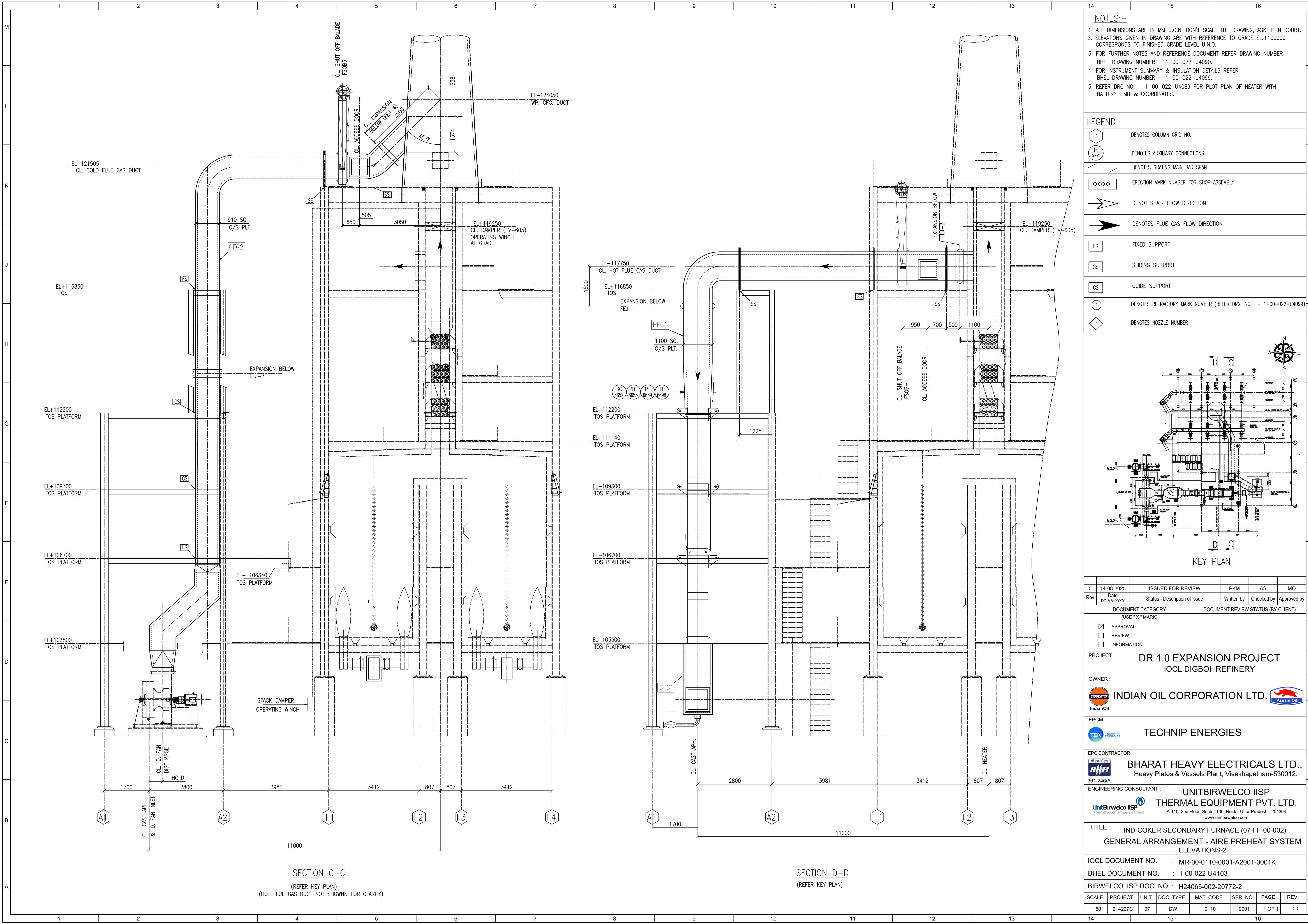
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002)
GENERAL ARRANGEMENT - AIRE PREHEAT SYSTEM
ELEVATIONS-1

IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001J

BHEL DOCUMENT NO. : 1-00-022-U4102

BIRWELCO IISP DOC. NO. : H24065-002-20772-1

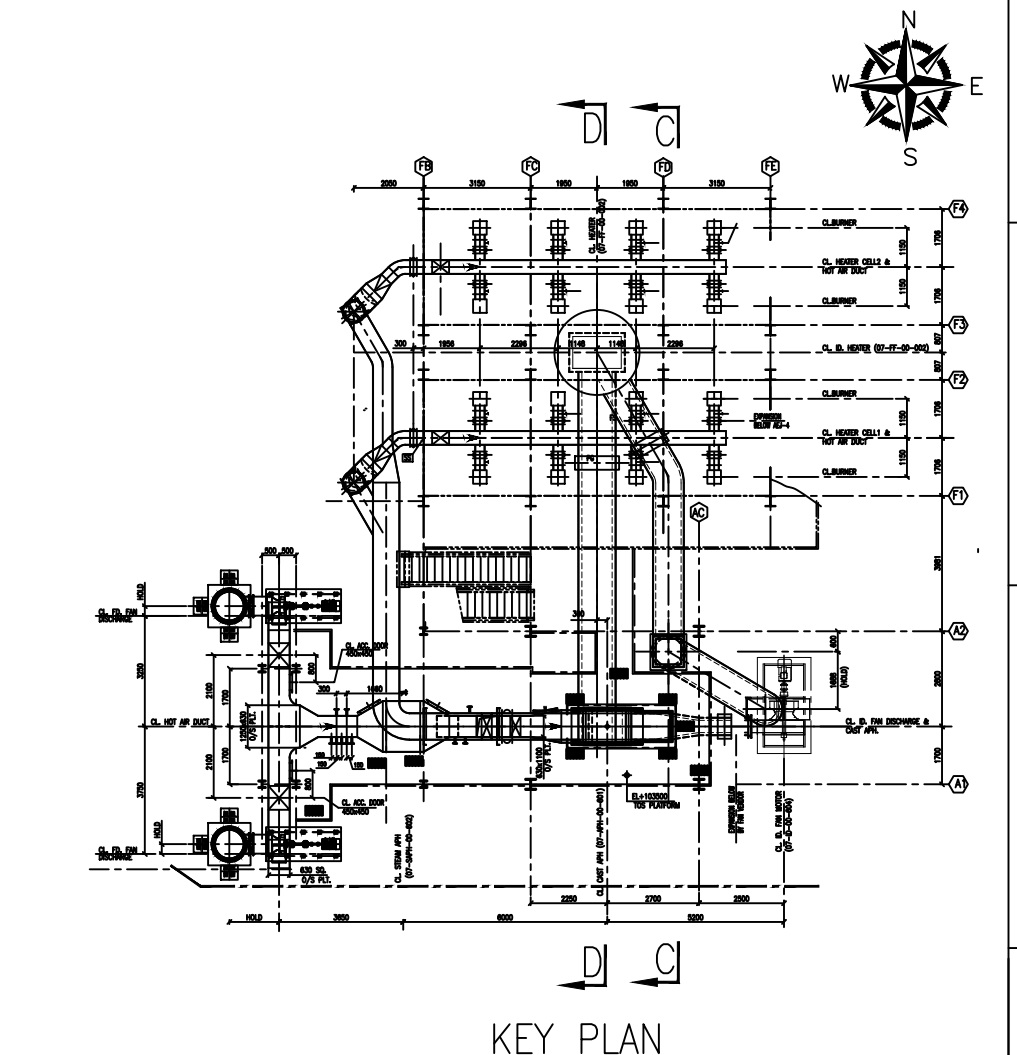
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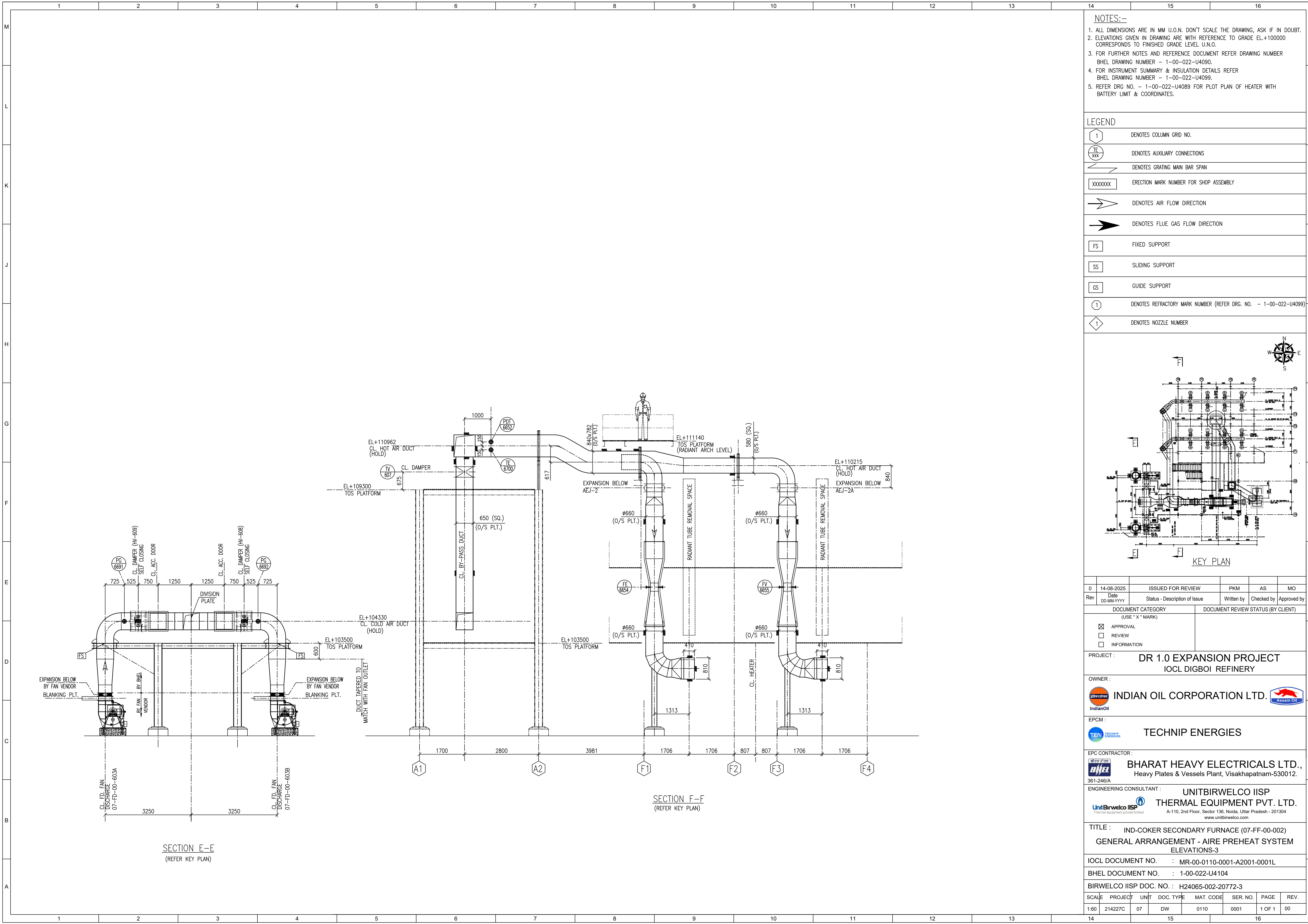
- NOTES:-
1. ALL DIMENSIONS ARE IN MM. U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
 3. FOR FURTHER NOTES AND REFERENCE DOCUMENT REFER DRAWING NUMBER BHEL DRAWING NUMBER - 1-00-022-U4090.
 4. FOR INSTRUMENT SUMMARY & INSULATION DETAILS REFER BHEL DRAWING NUMBER - 1-00-022-U4099.
 5. REFER DRG NO. - 1-00-022-U4089 FOR PLOT PLAN OF HEATER WITH BATTERY LIMIT & COORDINATES.

LEGEND

	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	GUIDE SUPPORT
	DENOTES REFRACTORY MARK NUMBER (REFER DRG. NO. - 1-00-022-U4099)
	DENOTES NOZZLE NUMBER



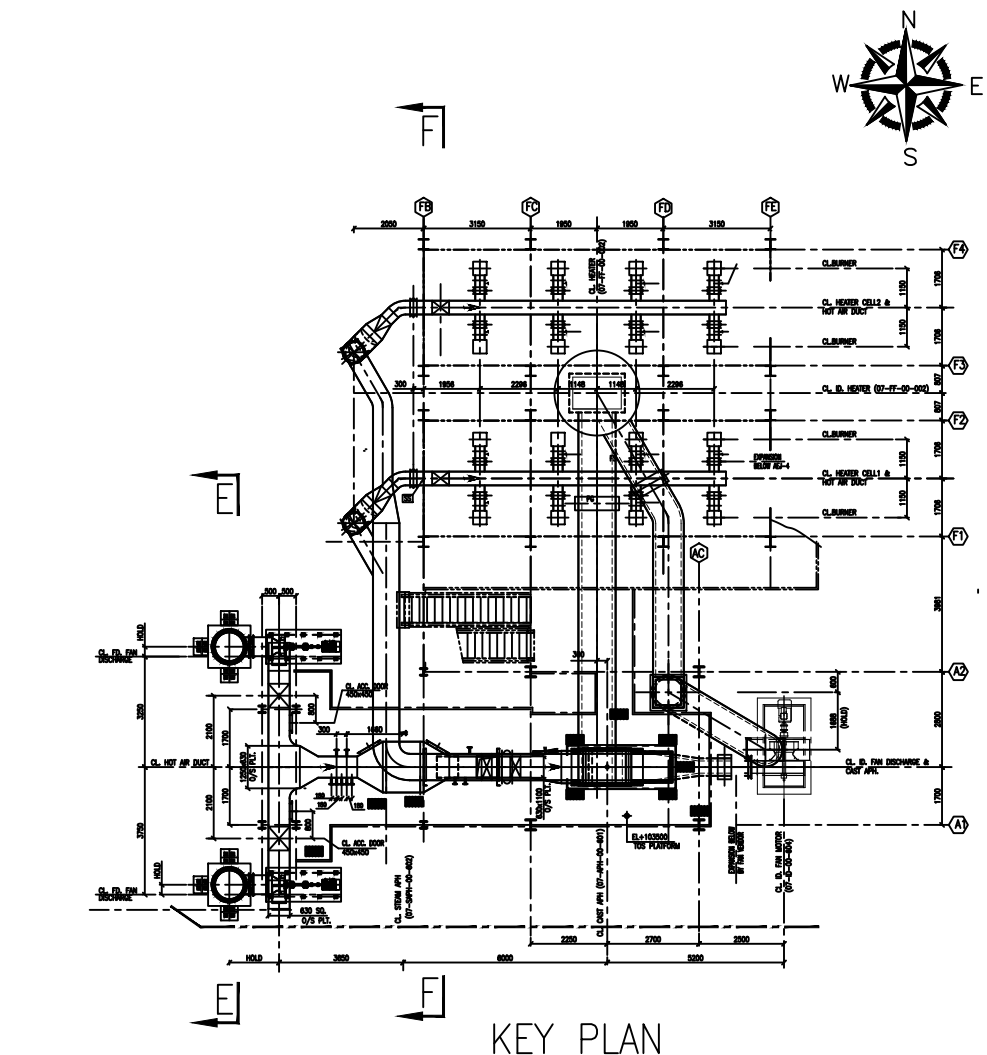
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Rev	Date DD-MM-YYYY	Status - Description of Issue		Written by	Checked by	Approved by	
DOCUMENT CATEGORY				DOCUMENT REVIEW STATUS (BY CLIENT)			
(USE "X" MARK)							
☒ APPROVAL							
☐ REVIEW							
☐ INFORMATION							
PROJECT : DR 1.0 EXPANSION PROJECT IOCL DIGBOI REFINERY							
OWNER :							
		INDIAN OIL CORPORATION LTD.					
EPCM :							
		TECHNIP ENERGIES					
EPC CONTRACTOR :							
		BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012. 361-246/A					
ENGINEERING CONSULTANT :							
		UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD. A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com					
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002) GENERAL ARRANGEMENT - AIRE PREHEAT SYSTEM ELEVATIONS-2							
IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001K							
BHEL DOCUMENT NO. : 1-00-022-U4103							
BIRWELCO IISP DOC. NO. : H24065-002-20772-2							
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00
14		15		16			



- NOTES:-
1. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
 3. FOR FURTHER NOTES AND REFERENCE DOCUMENT REFER DRAWING NUMBER BHEL DRAWING NUMBER - 1-00-022-U4090.
 4. FOR INSTRUMENT SUMMARY & INSULATION DETAILS REFER BHEL DRAWING NUMBER - 1-00-022-U4099.
 5. REFER DRG NO. - 1-00-022-U4089 FOR PLOT PLAN OF HEATER WITH BATTERY LIMIT & COORDINATES.

LEGEND

	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	GUIDE SUPPORT
	DENOTES REFRACTORY MARK NUMBER (REFER DRG. NO. - 1-00-022-U4099)
	DENOTES NOZZLE NUMBER



0	14-08-2025	ISSUED FOR REVIEW	PKM	AS	MO
Rev	Date DD-MM-YYYY	Status - Description of Issue	Written by	Checked by	Approved by
DOCUMENT CATEGORY			DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)					
☒ APPROVAL					
☐ REVIEW					
☐ INFORMATION					

PROJECT : DR 1.0 EXPANSION PROJECT
IOCL DIGBOI REFINERY

OWNER :
 INDIAN OIL CORPORATION LTD.

EPCM :
 TECHNIP ENERGIES

EPC CONTRACTOR :
 BHARAT HEAVY ELECTRICALS LTD.,
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT :
 UNITBIRWELCO IISP
THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

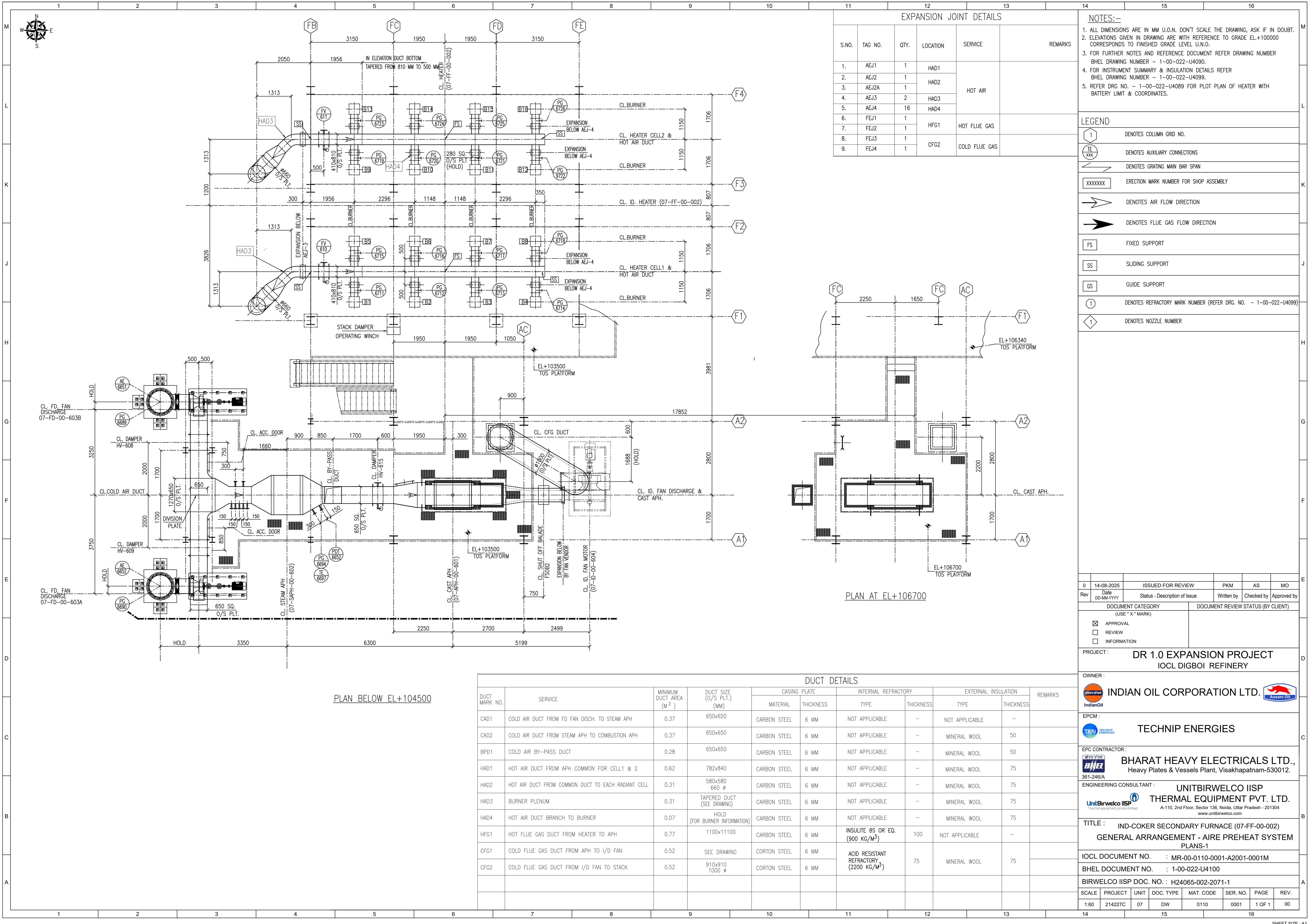
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002)
GENERAL ARRANGEMENT - AIRE PREHEAT SYSTEM
ELEVATIONS-3

IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001L

BHEL DOCUMENT NO. : 1-00-022-U4104

BIRWELCO IISP DOC. NO. : H24065-002-20772-3

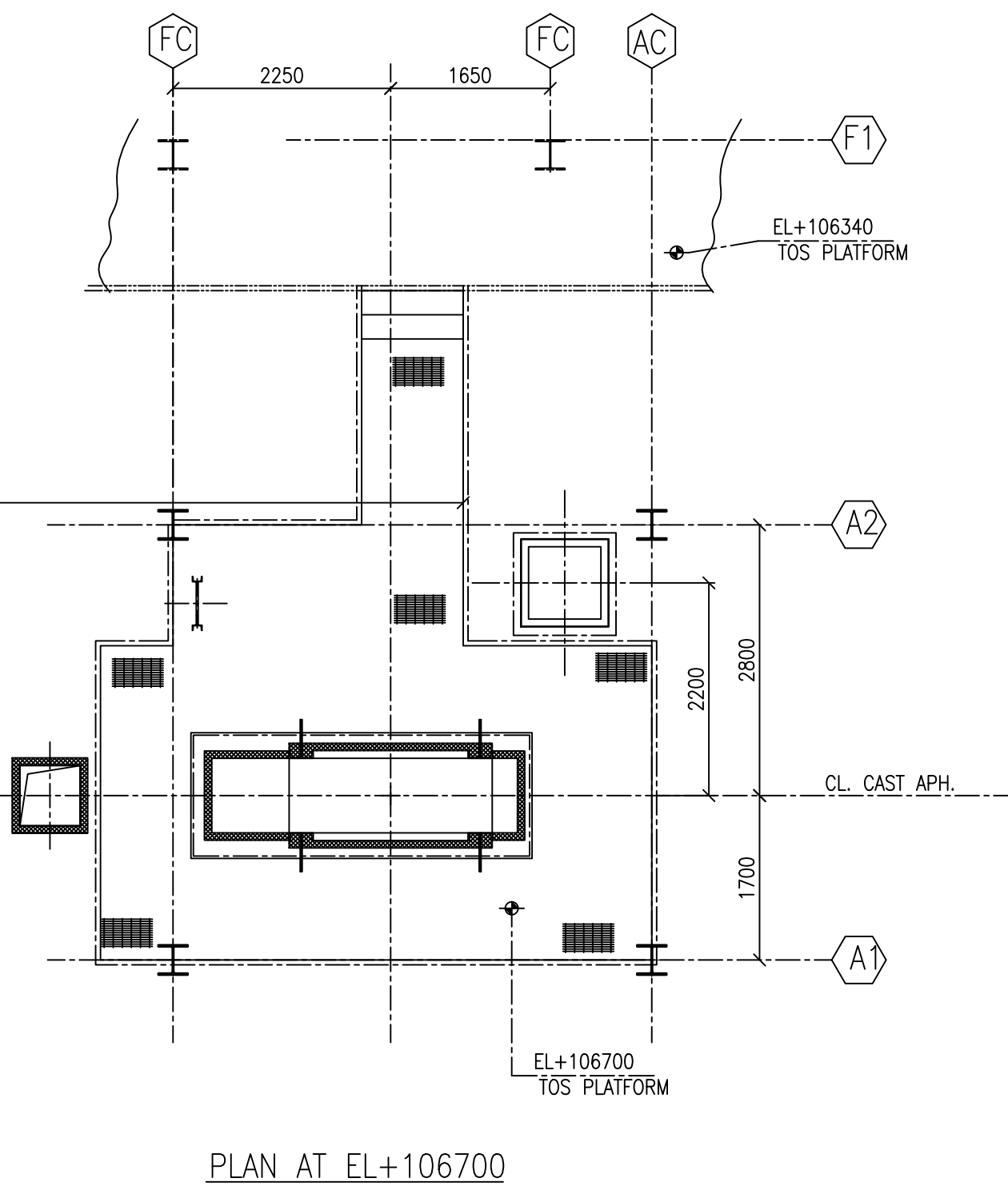
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
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EXPANSION JOINT DETAILS					
S.NO.	TAG NO.	QTY.	LOCATION	SERVICE	REMARKS
1.	AEJ1	1	HAD1	HOT AIR	
2.	AEJ2	1	HAD2		
3.	AEJ2A	1	HAD2		
4.	AEJ3	2	HAD3		
5.	AEJ4	16	HAD4	HOT FLUE GAS	
6.	FEJ1	1	HFG1		
7.	FEJ2	1		COLD FLUE GAS	
8.	FEJ3	1			
9.	FEJ4	1	CFG2		

- NOTES:-
1. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
 3. FOR FURTHER NOTES AND REFERENCE DOCUMENT REFER DRAWING NUMBER BHEL DRAWING NUMBER - 1-00-022-U4090.
 4. FOR INSTRUMENT SUMMARY & INSULATION DETAILS REFER BHEL DRAWING NUMBER - 1-00-022-U4099.
 5. REFER DRG NO. - 1-00-022-U4089 FOR PLOT PLAN OF HEATER WITH BATTERY LIMIT & COORDINATES.

LEGEND	
	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
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	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
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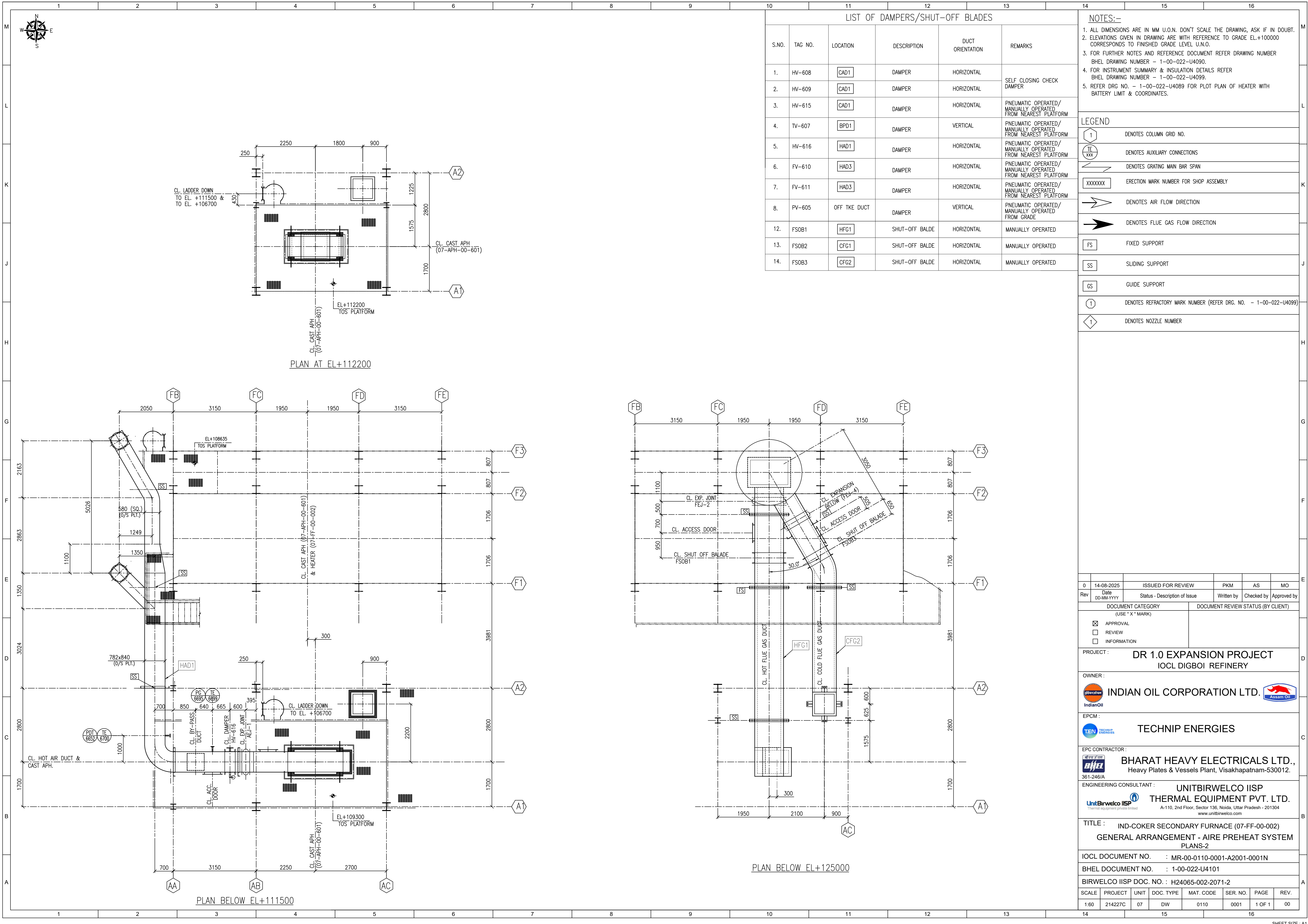


PLAN AT EL+106700

PLAN BELOW EL+104500

DUCT DETAILS										
DUCT MARK NO.	SERVICE	MINIMUM DUCT AREA (M ²)	DUCT SIZE (O/S PLT.) (MM)	CASING PLATE		INTERNAL REFRACTORY		EXTERNAL INSULATION		REMARKS
				MATERIAL	THICKNESS	TYPE	THICKNESS	TYPE	THICKNESS	
CAD1	COLD AIR DUCT FROM FD FAN DISCH. TO STEAM APH	0.37	650x650	CARBON STEEL	6 MM	NOT APPLICABLE	–	NOT APPLICABLE	–	
CAD2	COLD AIR DUCT FROM STEAM APH TO COMBUSTION APH	0.37	650x650	CARBON STEEL	6 MM	NOT APPLICABLE	–	MINERAL WOOL	50	
BPD1	COLD AIR BY-PASS DUCT	0.28	650x650	CARBON STEEL	6 MM	NOT APPLICABLE	–	MINERAL WOOL	50	
HAD1	HOT AIR DUCT FROM APH COMMON FOR CELL1 & 2	0.62	782x840	CARBON STEEL	6 MM	NOT APPLICABLE	–	MINERAL WOOL	75	
HAD2	HOT AIR DUCT FROM COMMON DUCT TO EACH RADIANT CELL	0.31	580x580 660 ø	CARBON STEEL	6 MM	NOT APPLICABLE	–	MINERAL WOOL	75	
HAD3	BURNER PLENUM	0.31	TAPERED DUCT (SEE DRAWING)	CARBON STEEL	6 MM	NOT APPLICABLE	–	MINERAL WOOL	75	
HAD4	HOT AIR DUCT BRANCH TO BURNER	0.07	HOLD (FOR BURNER INFORMATION)	CARBON STEEL	6 MM	NOT APPLICABLE	–	MINERAL WOOL	75	
HFG1	HOT FLUE GAS DUCT FROM HEATER TO APH	0.77	1100x11100	CARBON STEEL	6 MM	INSULITE 85 OR EQ. (900 KG/M ³)	100	NOT APPLICABLE	–	
CFG1	COLD FLUE GAS DUCT FROM APH TO I/D FAN	0.52	SEE DRAWING	CORTON STEEL	6 MM	ACID RESISTANT REFRACTORY (2200 KG/M ³)	75	MINERAL WOOL	75	
CFG2	COLD FLUE GAS DUCT FROM I/D FAN TO STACK	0.52	910x910 1000 ø	CORTON STEEL	6 MM					

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☒ APPROVAL ☐ REVIEW ☐ INFORMATION							
PROJECT : DR 1.0 EXPANSION PROJECT IOCL DIGBOI REFINERY							
OWNER : INDIAN OIL CORPORATION LTD. 							
EPCM : TECHNIP ENERGIES 							
EPC CONTRACTOR : BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012. 							
ENGINEERING CONSULTANT : UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD.  A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com							
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002) GENERAL ARRANGEMENT - AIRE PREHEAT SYSTEM PLANS-1							
IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001M							
BHEL DOCUMENT NO. : 1-00-022-U4100							
BIRWELCO IISP DOC. NO. : H24065-002-2071-1							
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00

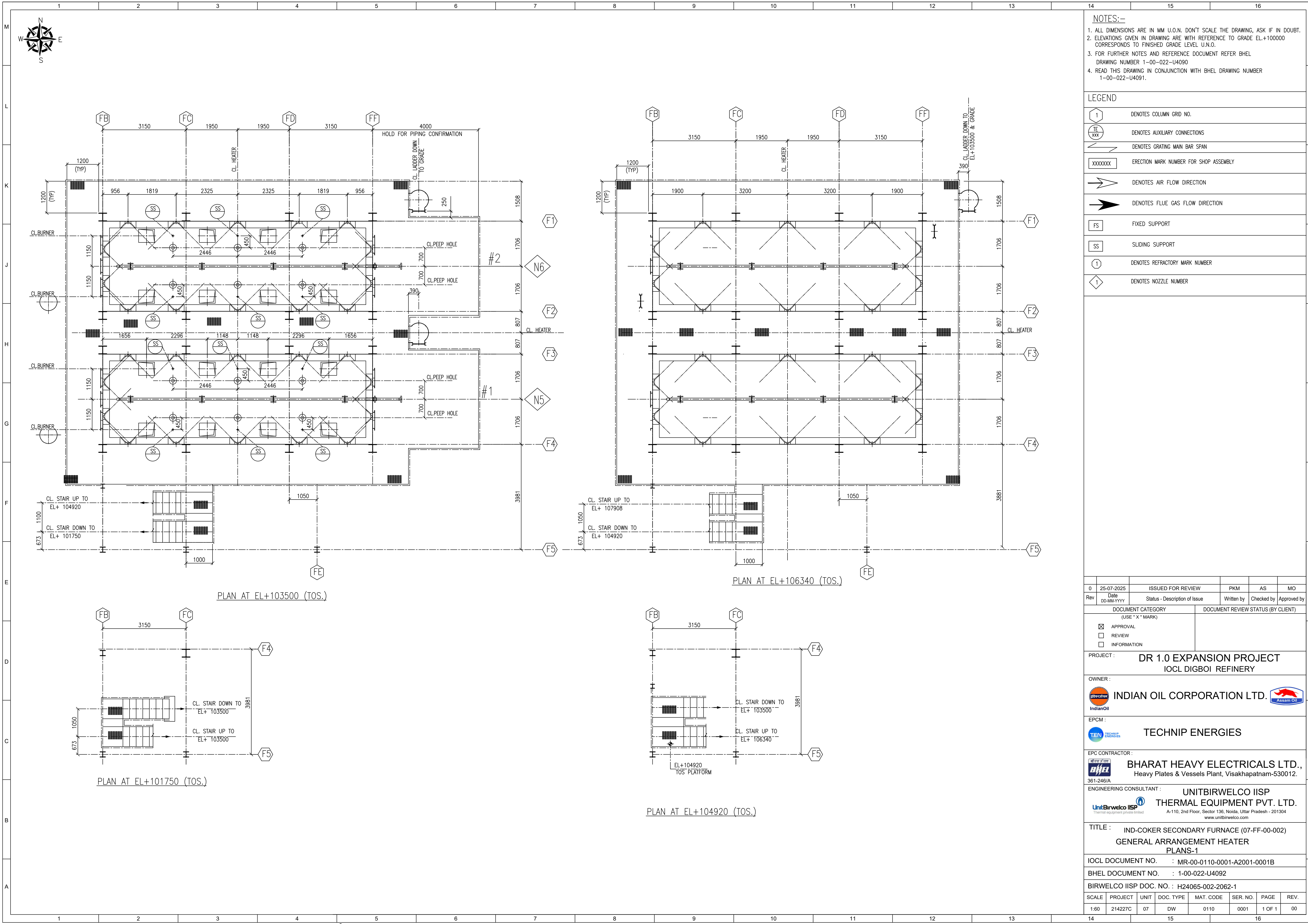


IND. COKER SECONDARY FURNACE (07-FF-00-002) FOR DR 1.0 EXPANSION PROJECT

Document Identification Attributes				
Document Number		xxx	Revision Object: 0	
Document Title		APH SYSTEM GENERAL ARRANGEMENT		
Contractor Name		BHEL	Contractor response date:	
S. No.	DRAWING NUMBER	Comments from BHEL	Status Open / Close	Vendor Response
1	1-00-022-U4100	Change duct size to 650 Sq instead of 630 sq.	CLOSED	Noted & Updated
2		Change duct casing plate thickness to 6 mm	CLOSED	Noted & Updated
3		Mention duct sizes in drawing	CLOSED	Noted & Updated
4		Provide all relevant dimensions	CLOSED	Noted & Updated
5		Provide correct representation of damper	CLOSED	Noted & Updated
6		Reduce Aph support structre grid to grid dimension to 3900 instead of 4950 provided in drawing.	OPEN	Aph hood, insulation/ Nozzles may foul with APH support structure. Also refer PMC spec 214227C 00 sp 0131 001 Para 8.2 (During the finalization of steel framework of air preheater supporting structure, ease of removal/replacement of APH modules / individual glass tubes shall be ensured)
7				
8				
1	1-00-022-U4101	Provide all duct sizes	CLOSED	Noted & Updated
2		Provide all relevant dimensions	CLOSED	Noted & Updated
3		Show access door & Expansion Below in hot and cold flue gas duct	CLOSED	Noted & Updated
4		Hot air duct center line to Grid FB shall be 700mm instead of 1100mm provided in drawing	CLOSED	Noted & Updated
5		correct dimensions after straightening by pas duct	CLOSED	Noted & Updated (By-pass duct straightened)
6		Show stack damper wing location at Pedestal of heater column FC-F1	CLOSED	Noted & Updated
7				
8				
1	1-00-022-U4102	Mark damper tag number on FD fan outlet & Provide access door	CLOSED	May note that No damper is at fan outlet only blanking plate required & Blanking plate mentioned in drawing.
2		Provide all relevant dimensions	CLOSED	Noted & Updated
3		Show access door & Expansion Below in hot and cold flue gas duct	CLOSED	Noted & Updated
4		Provide damper tag number	CLOSED	Noted & Updated
5		straighten By- pass duct	CLOSED	Noted & Updated
6		Provide Access door near damper	CLOSED	Noted & Updated
7		Remove access door on transition duct near APH outlet	OPEN	May Refer Client SPEC. 214227C 00 sp 0131 001 Para 8.2 (Air inlet and outlet ducts shall have a 600 x 600 each (one manway for outlet duct and two manways for inlet piece opposite to each other) near the APH end for inspection of internal bolting / tubes /gaskets. If required, cut outs (600 x 600) shall also be provided on the guide vanes to facilitate inspection of entire cross-section of APH modules).
		Annotate Radiant & Convection Zone in Elevation	CLOSED	Noted & Updated
		HFG duct to make straight	OPEN	Aph hood, insulation/ Nozzles may foul with APH support structure. Also refer PMC spec 214227C 00 sp 0131 001 Para 8.2 (During the finalization of steel framework of air preheater supporting structure, ease of removal/replacement of APH modules / individual glass tubes shall be ensured)
		Mak Arch platform Level & All relevant platform elevations	CLOSED	Noted & Updated
		Show correct representation of burner	CLOSED	Noted & Updated

8		Sho refractory step on end wall	CLOSED	Noted & Updated
1	1-00-022-U4103	Provide Vertical ladder instead of stair casse provided	CLOSED	Noted & Updated
2		Provide all relevant dimensions	CLOSED	Noted & Updated
3		Show access door & Expansion Below in hot and cold flue gas duct	CLOSED	Noted & Updated
4		Hot air duct center line to Grid FB shall be 700mm instead of 1100mm provided in drawing	CLOSED	Noted & Updated
5		correct dimensions after straightening by pas duct	CLOSED	Noted & Updated (By-pass duct straightened)
6		Show stack damper wing location at Pedestal of heater column FC-F1	CLOSED	Noted & Updated
7		Provide elevation & Tag number for damper at off-take duct	CLOSED	Noted & Updated
8		Delete access door on HFG duct at APH inlet	OPEN	May refer Refer client SPEC 214227C 00 sp 0131 001 page 13:- Flue gas inlet duct shall have two manways (opposite each other) of 600 x 600 mm with centerline approx. 800 mm above the APH top flange, including water wash frame, also considering platforming for approach/entry.
1	1-00-022-U4104	Provide all duct dimensions & elevations	CLOSED	Noted & Updated
2		Provide fan scope demarkation btween BHEL & Fan vendor	CLOSED	Noted & Updated
3		Show correct representation of damper	CLOSED	Noted & Updated
4		Hot air duct center line to Grid FB shall be 700mm instead of 1100mm provided in drawing	CLOSED	Noted & Updated
5		No inclination requred on hot air duct required maintain bottom of duct	CLOSED	May Note that This inclination provided to avoid fouling of duct with Rdaiant Arch level platform. Also refer Attached updated drawing.
6				
7				
8				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
M	PMC/LICENSOR REFERENCE DOCUMENT			GENERAL NOTES:--				28. SEAL WELDING REQUIREMENTS :-								M
	PMC (TEN) DOCUMENT NO:	TITLE		1. THESE NOTES TO BE READ IN CONJUNCTION WITH STANDARD DRAWING OF GENERAL NOTES FOR STEEL WORKS, DOC. NO. 214227C-00-DW-1802-0001. (PMC DOCUMENT).				SEAL WELDING, GASKETS AND SEALANTS FOR PLATEWORK BOLTED JOINTS (AT FIELD) TO ENSURE ALL CONNECTIONS IN FURNACE WALLS, RADIANT BOXES, CONVECTION SECTIONS, FLUE GAS DUCTING AND STACKS ARE AIR TIGHT; FOLLOWING SHALL BE APPLIED FOR FOR FIELD SPLICE JOINTS.								
	214227C-07-MR-0110-0001	MATERIAL REQUISITION		2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.				a) RADIANT FLOOR, WALL AND PANELS - INTERNAL AND EXTERNAL SEAL WELD.								L
	214227C-07-SP-0110-001	API DATA SHEET FOR IND COKER SECONDARY FURNACE 07-FF-00-002		3. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.				b) ARCH TO CONVECTION & CONVECTION TO CONVECTION MODULE SPLICE JOINTS - EXTERNAL SEAL WELD + CF BLANKET AT REFRACTORY JOINTS.								
L	214227C-00-SP-0110-0002	STANDARD SPECIFICATION OF MODULARIZATION OF FIRED HEATERS		4. ALL STEEL WORK ELEVATIONS ARE GIVEN TO TOP OF STEEL (T.O.S), PLATFORM ELEVATIONS TO U/S GRATING AND COIL/SLEEVE ELEVATIONS TO CENTERLINE OF TUBE/SLEEVE.				c) DUCTS & STACKS- EXTERNAL SEAL WELD + CF BLANKET AT REFRACTORY JOINTS.								K
	214227C-00-SP-0125-0001	STANDARD SPECIFICATION FOR TUBE SUPPORT CASTINGS		5. ALL GRATINGS SHALL BE (ELECTROFORGED TYPE) PANELS AND HOT DIP GALVANISED. GALVANISING SHALL BE IN ACCORDANCE WITH IS:4759 & TESTED AS PER IS2623 & IS 6745. QUANTITY OF ZINC COATING SHALL BE MINIMUM 900 GRAM/SQ.M. (120 MICRON Min. THICKNESS). ALL GRATING CLAMPS SHALL ALSO BE HOT DIP GALVANISED.				d) CERAMIC FIBRE LADDER TAPE IS USED FOR; REMOVABLE WALL SECTIONS/ DOORS/ BURNERS/ DAMPERS/ BELLOW/ VENTURI/ HEADERBOXES/ CONNECTIONS TO FANS.								
	214227C-00-SP-0126-0001	STANDARD SPECIFICATION FOR FINNED TUBES		GRATING SHALL BE 25 THICK (500 KG/M ²) CAPACITY. (SEE GRATING DETAILS 214227C-00-STC-1890-0001 FOR MORE INFO.												
	214227C-00-SP-0127-0001	STANDARD SPECIFICATION FOR PIPES, FITTINGS & FORGINGS		6. GRATING SHALL BE CLAMPED TO SUPPORTING STEEL WORK. EACH GRATING PANNEL SHALL HAVE MINIMUM OF (4) CLAMPS AT A MAXIMUM SPACING OF 850 MM.				DRAWING LIST								
	214227C-00-SP-0127-0002	STANDARD SPECIFICATION FOR HEATER COIL FABRICATION		7. END OF ANGLE, CHANNEL, BEAM ETC. ARE TO BE NOTCHED TO SUIT THE PROFILE OF CONNECTING MEMBERS FOR WELDED CONSTRUCTION.				CLIENT DRAWING NUMBER	BHEL DRAWING NUMBER	Unit Birwelco DRAWING NUMBER	TITLE					
	214227C-00-SP-0131-0001	STANDARD SPECIFICATION FOR FABRICATION & ERECTION OF FIRED HEATERS & APH SYSTEM		8. ALL OVERLAPS ON PLATES TO BE 25 MM UNLESS OTHERWISE NOTED.				MR-00-0110-0001-A2001-0001	1-00-022-U4089	H24065-002-2061	HEATER PLOT PLAN					
K	214227C-00-SP-0131-0002	STANDARD SPECIFICATION FOR STEEL WORK OF FIRED HEATERS		9. FOR MATCHING PARTS,BOLT HOLE SHALL BE MATCH MARKED AND HOLES DRILLED.				MR-00-0110-0001-A2001-0001A	1-00-022-U4090	H24065-002-2069	GENERAL NOTES AND ABBREVIATIONS					
	214227C-00-SP-0132-0001	STANDARD SPECIFICATION FOR CASTABLE REFRACTORY		10. ALL ERECTION BOLTS SHALL BE LEFT IN POSITION.				MR-00-0110-0001-A2001-0001	1-00-022-U4091	H24065-002-2064	GENERAL ARRANGEMENT HEATER - OVERALL LAYOUT					
	214227C-00-SP-0132-0002	STANDARD SPECIFICATION FOR CERAMIC FIBRE PRODUCTS		11. WATER POCKETS ON THE ROOF AND OTHER HORIZONTAL SURFACES TO BE PROVIDED WITH SUFFICIENT DRAIN HOLES IN THE STIFFENERS.				MR-00-0110-0001-A2001-0001B	1-00-022-U4092	H24065-002-2062-1	GENERAL ARRANGEMENT HEATER - PLANS-1					
	214227C-00-SP-0132-0003	STANDARD SPECIFICATION FOR REFRACTORY FIRE BRICKS		12. ALL FLANGE BOLTS TO STRADDLE VERTICAL AND HORIZONTAL CENTERLINES.				MR-00-0110-0001-A2001-0001C	1-00-022-U4093	H24065-002-2062-2	GENERAL ARRANGEMENT HEATER - PLANS-2					
	214227C-00-SP-0132-0004	STANDARD SPECIFICATION FOR MISC. REFRACTORY ITEMS		13. ALL FABRICATION SHALL BE OF RIGID CONSTRUCTION AND CARE SHALL BE TAKEN AGAINST WELDING DEFORMATION.				MR-00-0110-0001-A2001-0001D	1-00-022-U4094	H24065-002-2063-1	GENERAL ARRANGEMENT HEATER - ELEVATIONS-1					J
J	214227C-00-SP-0132-0005	STANDARD SPECIFICATION FOR WORKMANSHIP OF REFRACTORY LINING		14. INSIDE PLATE DIMENSIONS ARE CRITICAL AND SHALL BE MAINTAINED MORE OR LESS NEAR TO ACTUALLY SPECIFIED ON DRAWINGS.				MR-00-0110-0001-A2001-0001E	1-00-022-U4095	H24065-002-2063-2	GENERAL ARRANGEMENT HEATER - ELEVATIONS-2					
	214227C-00-SP-0132-0006	STANDARD SPECIFICATION FOR CASTABLE REFRACTORY APPLICATION		15. ALL STEEL SURFACES IN CONTACT WITH REFRACTORY SHALL BE MECHANICALLY CLEANED BY WIRE BRUSH OR SAND BLASTING (AS REQD.) TO REMOVE DIRT, DUST ETC. PRIOR TO LINING.				MR-00-0110-0001-A2001-0001F	1-00-022-U4096	H24065-002-2063-3	GENERAL ARRANGEMENT HEATER - ELEVATIONS-3					
	214227C-00-SP-0135-0001	STANDARD SPECIFICATION FOR FABRIC EXPANSION BELLOW		16. ALL CONNECTIONS SHALL BE FULL STRENGTH CONNECTIONS.SHOP CONNECTIONS SHALL BE OF WELDED TYPE AND FIELD CONNECTIONS MAY BE EITHER WELDED OR BOLTED.				MR-00-0110-0001-A2001-0001G	1-00-022-U4097	H24065-002-2063-4	GENERAL ARRANGEMENT HEATER - ELEVATIONS-4					
	214227C-00-SP-0136-0001	STANDARD SPECIFICATION FOR DAMPERS AND SHUTOFF BLADES		17. ALL BEAMS SHALL HAVE END SHEAR CONNECTIONS EQUAL TO CAPACITY TO FULL MEMBER STRENGTH, UNLESS ACTUAL LOADS ARE SHOWN ON THE DRAWING.				MR-00-0110-0001-A2001-0001H	1-00-022-U4098	H24065-002-2065	GENERAL ARRANGEMENT - STACK					
	214227C-00-SP-0191-0001	STANDARD SPECIFICATION FOR BURNERS		18. IN CASE OF BUILT-UP SECTION, EACH INDIVIDUAL COMPONENT SHALL BE SPLICED AT DIFFERENT LOCATION. ALSO SPLICING FOR ADJACENT COLUMNS IN THE SAME STRUCTURE SHALL NOT BE AT SAME ELEVATION BUT STAGGERED BY MINIMUM 1.0-METER EACH OTHER.				MR-00-0110-0001-A2001-0001I	1-00-022-U4099	H24065-002-2070	GENERAL ARRANGEMENT HEATER - INSTRUMENT & INSULATION SUMMARY					H
H	214227C-00-SP-0195-0001	STANDARD SPECIFICATION FOR AIR PREHEATERS		19. VERTICAL & HORIZONTAL BRACING				MR-00-0110-0001-A2001-0001M	1-00-022-U4100	H24065-002-2071-1	GENERAL ARRANGEMENT - AIR PREHEAT SYSTEM PLANS-1					
	214227C-00-SP-1040-0001	STANDARD SPECIFICATION FOR FD/ID FANS		a. BRACING CONNECTIONS SHALL BE PROVIDED FOR FULL MEMBER STRENGTH OF THE BRACING MEMBERS.WHERE ACTUAL BRACING LOADS ARE GIVEN ON DRAWINGS, THE CONNECTIONS MAY BE DESIGNED ACCORDINGLY.				MR-00-0110-0001-A2001-0001N	1-00-022-U4101	H24065-002-2071-2	GENERAL ARRANGEMENT - AIR PREHEAT SYSTEM PLANS-2					
	214227C-00-STC-1801-0001	SPECIFICATION FOR STRUCTURAL STEEL WORK		b. ALL DIMENSIONS SHALL BE ROUNDED OFF TO THE NEAREST MM.				MR-00-0110-0001-A2001-0001J	1-00-022-U4102	H24065-002-2072-1	GENERAL ARRANGEMENT - AIR PREHEAT SYSTEM ELEVATIONS-1					
	214227C-00-STC-1801-0002	SPECIFICATION FOR GROUTING		c. WELDS IN GUSSETS SHALL BE ARRANGED TO ELIMINATE ECCENTRICITY.THE MINIMUM THICKNESS OF GUSSET SHALL BE 8MM.GUSSET PLATES OF DIFFERENT THICKNESS SHALL NOT BE USED IN THE SAME TRUSS OR GIRDER.				MR-00-0110-0001-A2001-0001K	1-00-022-U4103	H24065-002-2072-2	GENERAL ARRANGEMENT - AIR PREHEAT SYSTEM ELEVATIONS-2					
	214227C-00-JSS-1801-0005	SPECIFICATION FOR PAINTING OF STEEL STRUCTURES		d. CONNECTIONS SHALL BE ARRANGED WITH DUE REGARD TO ECCENTRICITY OF WELDS OR BOLTS.				MR-00-0110-0001-A2001-0001L	1-00-022-U4104	H24065-002-2072-3	GENERAL ARRANGEMENT - AIR PREHEAT SYSTEM ELEVATIONS-3					
G	214227C-00-JSS-0131-0010	SPECIFICATION FOR GRATING		20. PLATFORMS AND LADDERS							RADIANT COIL DETAILS					G
	214227C-00-STC-1790-0001	CONCRETE WORKS STANDARD (FOR FIRE PROOFING		a. UNLESS SHOWN IN PREFABRICATED SECTIONS ON DRAWINGS, TOP RAIL, MIDDLE BAR AND TOE PLATES SHALL BE SUPPLIED IN RANDOM LENGTH FOR FIELD WELDING TO HANDRAIL POSTS. BENT SECTION AND POSTS SHALL BE SHOP FABRICATED.REMOVABLE SECTIONS OF HANDRAILS SHALL BE FURNISHED WITH POSTS AT EACH END OF THE REMOVABLE SECTIONS FOR BOLTING TO SUPPORTING CLIPS.							CONVECTION PROCESS COIL DETAILS					
	214227C-00-STC-1890-0001	STRUCTURAL STEEL WORK STANDARD		b. TOE PLATES SHALL BE PROVIDED ON WALKWAYS AND PLATFORMS ALONG WITH ALL EDGES PROTECTED BY RAILING, AROUND OPENINGS IN PLATFORMS UNDER EQUIPMENT WHERE NO RAILING IS PROVIDED; UNDER THE BOTTOM TREADS OF ALL STAIRWAYS WHICH RISE FROM LANDINGS; ACROSS LADDER ACCESS OPENINGS AND AROUND ALL OPENINGS WHERE THE NORMAL CLEARANCE BETWEEN THE EDGE OF THE FLOOR PLATE AND THE EQUIPMENT OR PIPING IS 50MM OR MORE.							COVECTION TO RADIANT CROSS OVER DETAILS					
	214227C-00-DW-1802-0001	GENERAL NOTES STEEL WORK		21. STRUCTURAL SPECIFICATION :							CONVECTION STEAM COIL DETAILS					
F	214227C-00-DW-1802-0001	JOB SPECIFICATION FOR HOT INSULATION OF VESSELS, PIPING & EQUIPMENT		STRUCTURAL STEEL AND PLATEWORK MATERIAL SPECIFICATION SHALL BE AS FOLLOWS:							DETAIL OF RADIANT COIL LADDER SUPPORT					
				STRUCTURAL SHAPES - IS:2062 E250 GRADE A/BR							DETAIL OF CONVECTION COIL INTERMEDIATE TUBE SHEETS					F
				PLATES - IS:2062 Gr.A/B												
				PIPES FOR HANDRAILS - IS:1239 CLASS MEDIUM (ERW).												
				22. BOLTED CONNECTIONS SHALL BE AS FOLLOWS:												
				ALL BOLT HOLES SHALL BE DRILLED.												
				ALL BOLT HOLES SHALL BE 2 mm LARGER THAN THE BOLT DIAMETER FOR BOLTS UP TO M24.												
				AND 3 mm LARGER THAN THE BOLT DIAMETER OF BOLTS ABOVE M24 FOR STEEL TO STEEL CONNECTION UNLESS NOTED UTHWISE. SIZE OF OVER SIZE & SLOTTED HOLES SHALL BE AS PER TABLE 19 OF IS:800-2007.												
				CONNECTION BOLTS :-												
E	ABBREVIATIONS			ORDINARY BOLTS (GRADE 4.6) SHALL BE OF 16 mm DIAMETER (MAXIMUM).												E
	APPROX	APPROXIMATE	REQD	REQUIRED												
	BCD	BOLT (PITCH) CIRCLE DIA	SEC	SECTION												
	BOS	BOTTOM OF STEEL	STD	STANDARD												
	BP	BASE PLATE	STIF PL	STIFFENER (RIB) PLATE												
	BOB	BOTTOM OF BASE PLATE	SYM	SYMMETRICAL												
	CL	CENTER LINE	SQ	SQUARE												
	CLR	CLEARANCE	THK	THICKNESS												
	COL	COLUMN	THRU	THROUGH												
	CONN	CONNECTION	TOS	TOP OF STEEL												
	COV PL	COVER PLATE	TOPL	TOP OF PLATE												
D	CTC	CENTER TO CENTER	T WASHER	TAPER WASHER												
	D	DEPTH	T/W	TIED WITH												
	DEG	DEGREE	TYP	TYPICAL												
	DET	DETAIL	U/S	UNDER SIDE												
	DIA	DIAMETER	VBR	DIAGONAL BRACING IN VERTICAL PLANE												
	DO	DITTO	W	WIDTH												
	DN	DOWN	W/O	WITH OUT												
	DWG	DRAWING	WP	WORKING POINT												
	EL	ELEVATION (LEVEL)	I	DENOTES COLUMN GRID NO.												



- NOTES:-
1. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
 3. FOR FURTHER NOTES AND REFERENCE DOCUMENT REFER BHEL DRAWING NUMBER 1-00-022-U4090
 4. READ THIS DRAWING IN CONJUNCTION WITH BHEL DRAWING NUMBER 1-00-022-U4091.

LEGEND	
	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	DENOTES REFRACTORY MARK NUMBER
	DENOTES NOZZLE NUMBER

0	25-07-2025	ISSUED FOR REVIEW	PKM	AS	MO
Rev	Date	Status - Description of Issue	Written by	Checked by	Approved by
DOCUMENT CATEGORY			DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)					
☒ APPROVAL					
☐ REVIEW					
☐ INFORMATION					

PROJECT : DR 1.0 EXPANSION PROJECT
IOCL DIGBOI REFINERY

OWNER :
 INDIAN OIL CORPORATION LTD.

EPCM :
 TECHNIP ENERGIES

EPC CONTRACTOR :
 BHARAT HEAVY ELECTRICALS LTD.,
Heavy Plates & Vessels Plant, Visakhapatnam-530012.
361-246/A

ENGINEERING CONSULTANT :
 UNITBIRWELCO IISP
THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

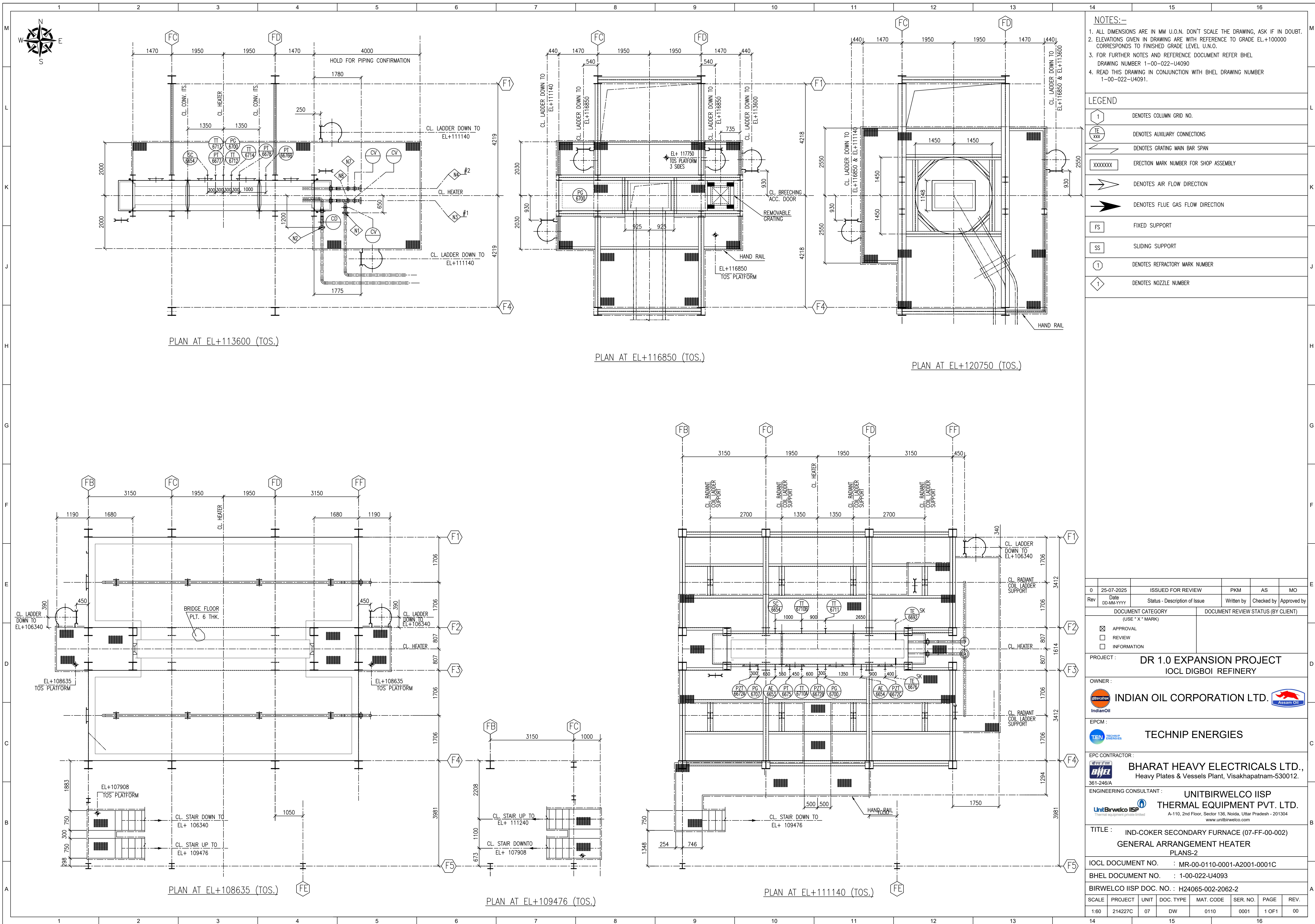
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002)
GENERAL ARRANGEMENT HEATER
PLANS-1

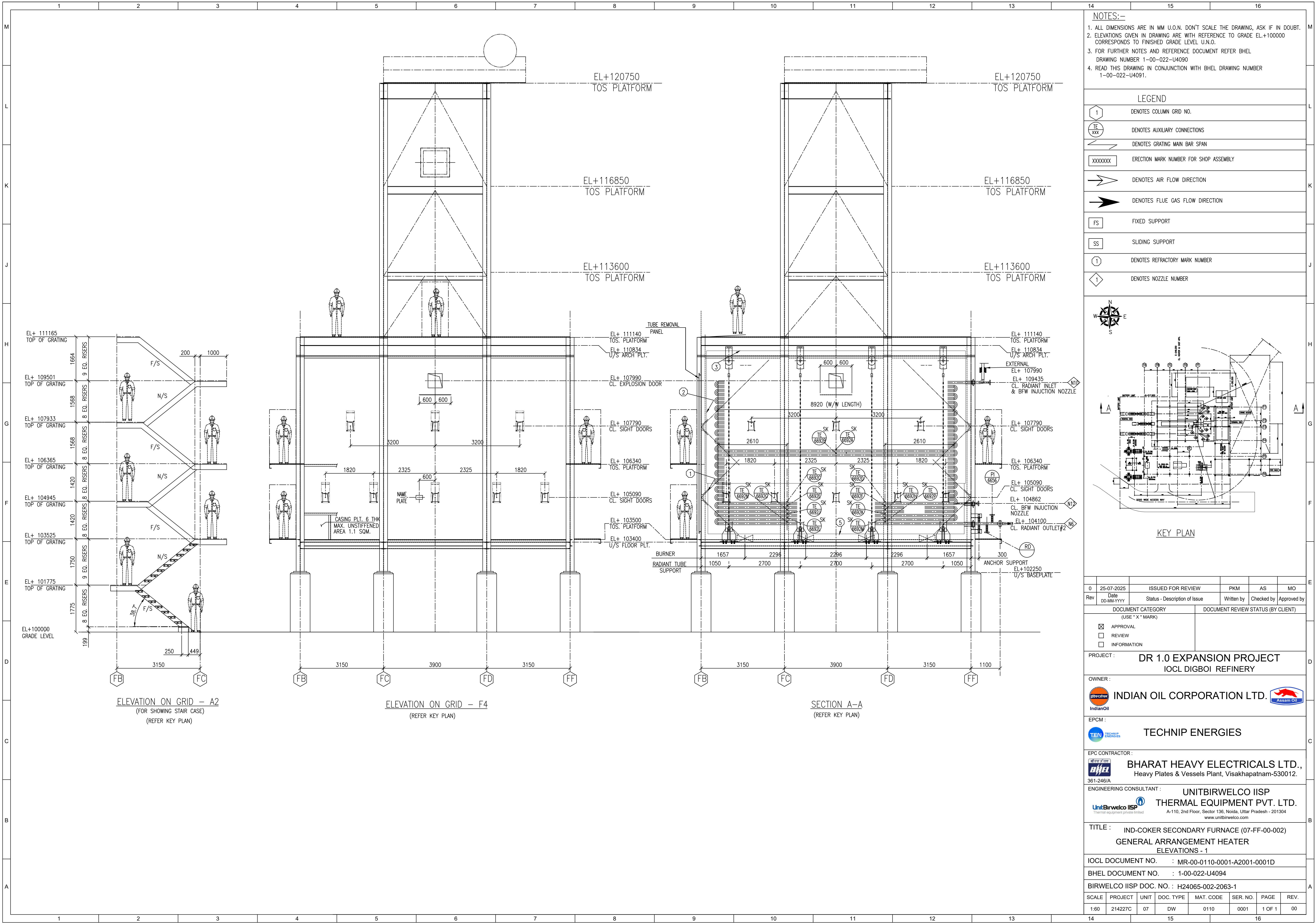
IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001B

BHEL DOCUMENT NO. : 1-00-022-U4092

BIRWELCO IISP DOC. NO. : H24065-002-2062-1

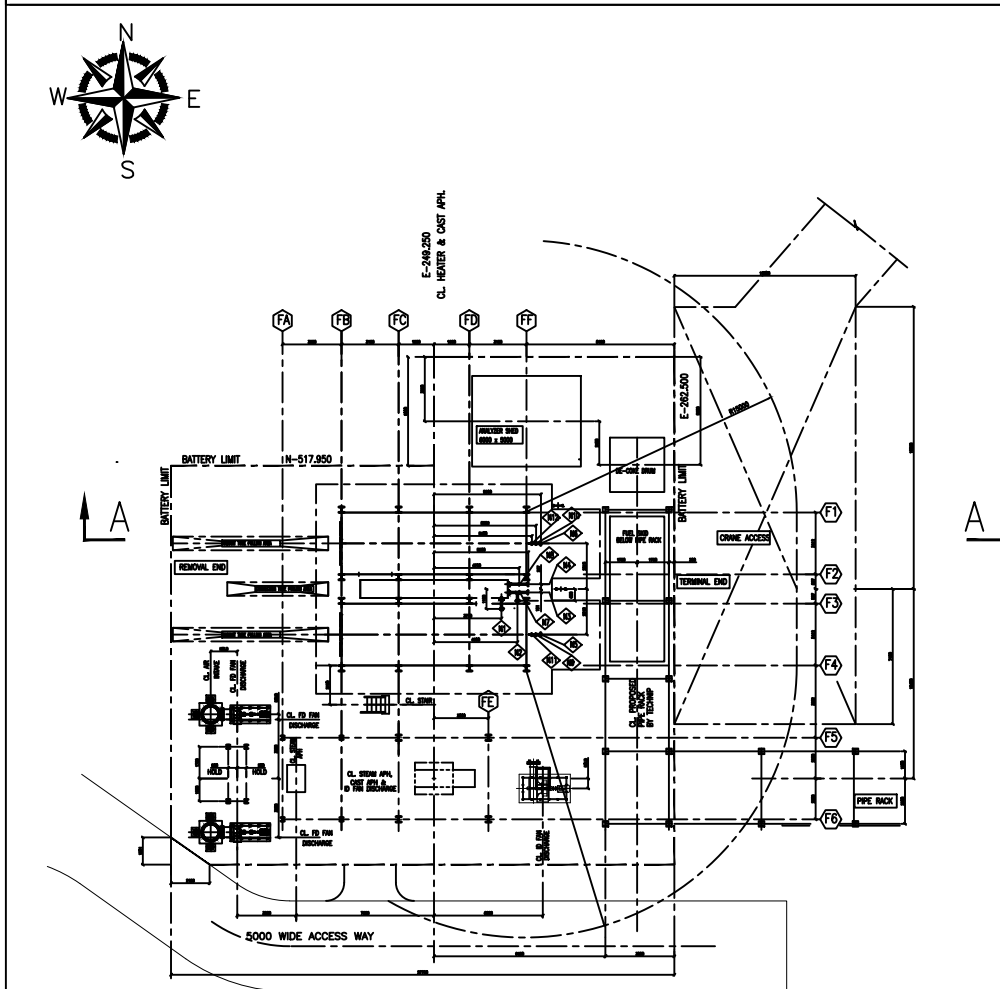
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00





- NOTES:-
1. ALL DIMENSIONS ARE IN MM U.O.N. DON'T SCALE THE DRAWING, ASK IF IN DOUBT.
 2. ELEVATIONS GIVEN IN DRAWING ARE WITH REFERENCE TO GRADE EL.+100000 CORRESPONDS TO FINISHED GRADE LEVEL U.N.O.
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 4. READ THIS DRAWING IN CONJUNCTION WITH BHEL DRAWING NUMBER 1-00-022-U4091.

LEGEND	
	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	DENOTES ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	DENOTES REFRACTORY MARK NUMBER
	DENOTES NOZZLE NUMBER



DOCUMENT CATEGORY		DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)		☒ APPROVAL		
		☐ REVIEW		
		☐ INFORMATION		

PROJECT: **DR 1.0 EXPANSION PROJECT**
IOCL DIGBOI REFINERY

OWNER: **INDIAN OIL CORPORATION LTD.**

EPCM: **TECHNIP ENERGIES**

EPC CONTRACTOR: **BHARAT HEAVY ELECTRICALS LTD.,**
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT: **UNITBIRWELCO IISP**
THERMAL EQUIPMENT PVT. LTD.
A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

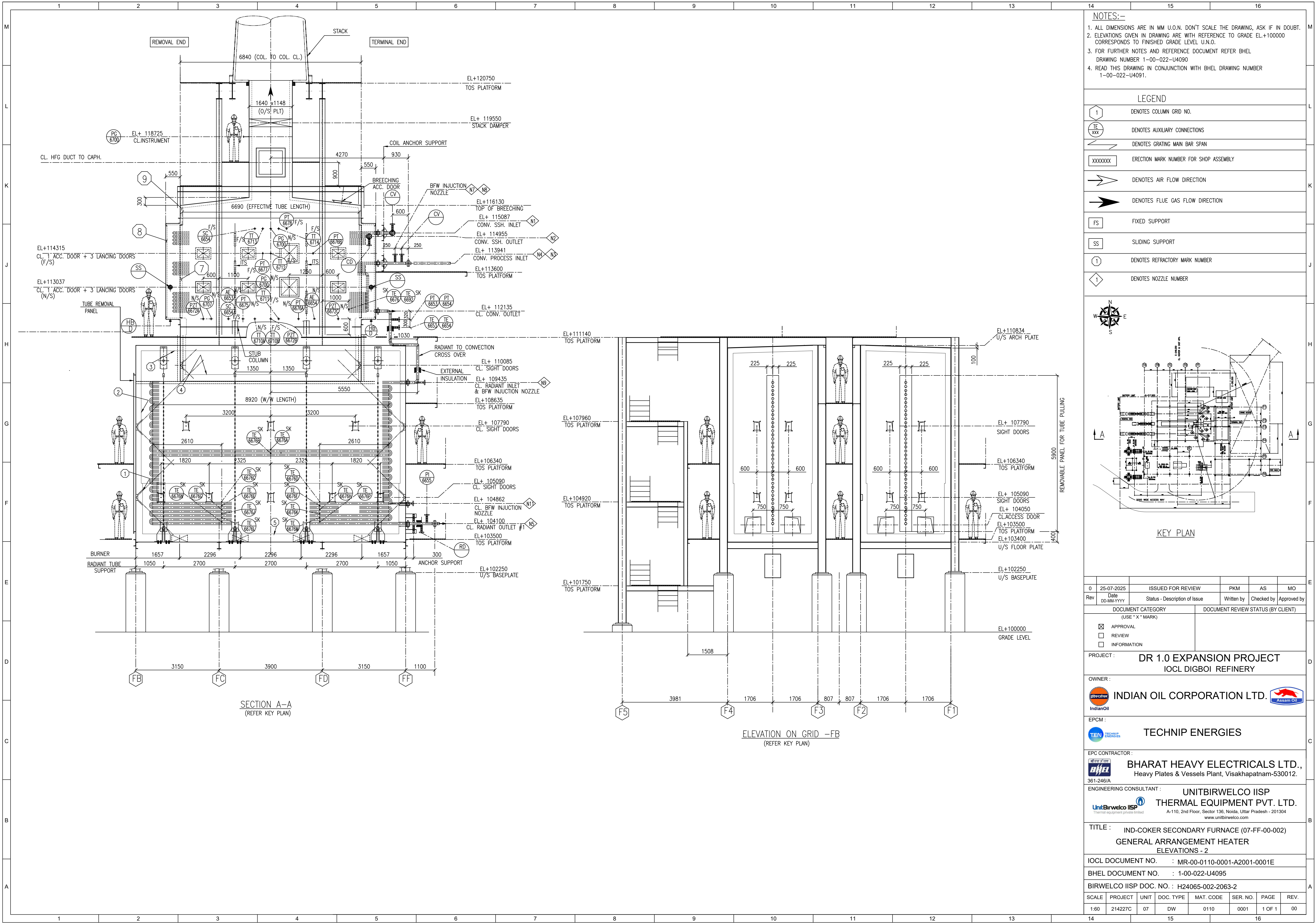
TITLE: **IND-COKER SECONDARY FURNACE (07-FF-00-002)**
GENERAL ARRANGEMENT HEATER
ELEVATIONS - 1

IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001D

BHEL DOCUMENT NO. : 1-00-022-U4094

BIRWELCO IISP DOC. NO. : H24065-002-2063-1

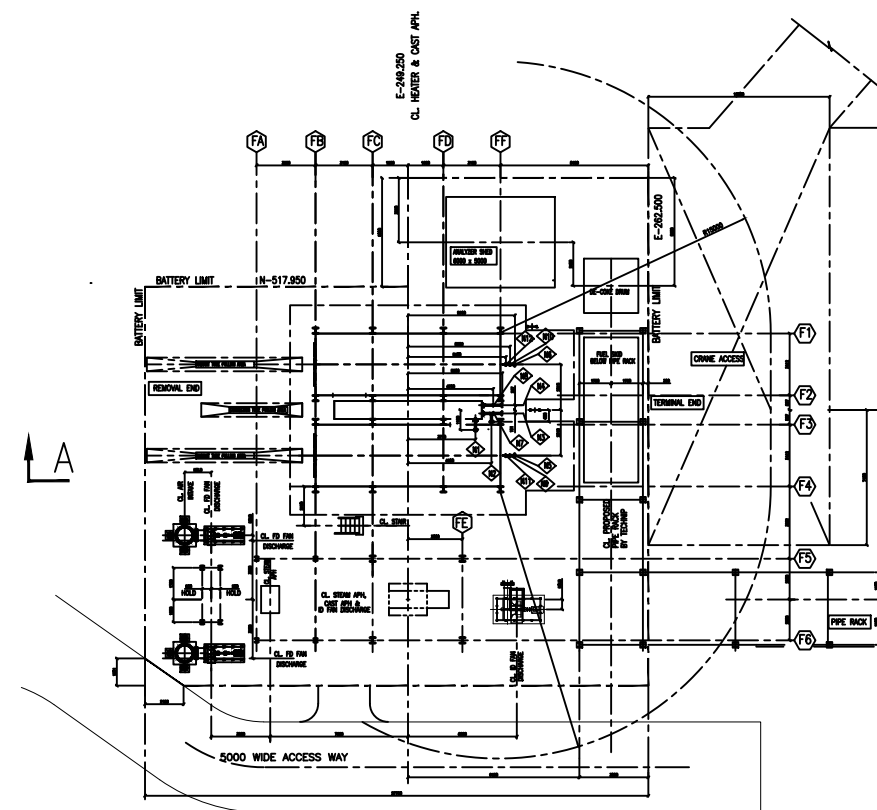
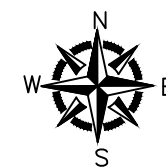
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00



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LEGEND

- 1 DENOTES COLUMN GRID NO.
- TE XXX DENOTES AUXILIARY CONNECTIONS
- XXXXXXX DENOTES GRATING MAIN BAR SPAN
- XXXXXXX DENOTES AIR FLOW DIRECTION
- XXXXXXX DENOTES FLUE GAS FLOW DIRECTION
- FS FIXED SUPPORT
- SS SLIDING SUPPORT
- 1 DENOTES REFRACTORY MARK NUMBER
- 1 DENOTES NOZZLE NUMBER



KEY PLAN

0	25-07-2025	ISSUED FOR REVIEW	PKM	AS	MO
Rev	Date	Status - Description of Issue	Written by	Checked by	Approved by

DOCUMENT CATEGORY		DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)				
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☐ REVIEW				
☐ INFORMATION				

PROJECT : DR 1.0 EXPANSION PROJECT
IOCL DIGBOI REFINERY

OWNER :
 INDIAN OIL CORPORATION LTD.

EPCM :
 TECHNIP ENERGIES

EPC CONTRACTOR :
 BHARAT HEAVY ELECTRICALS LTD.,
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT :
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A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304
www.unitbirwelco.com

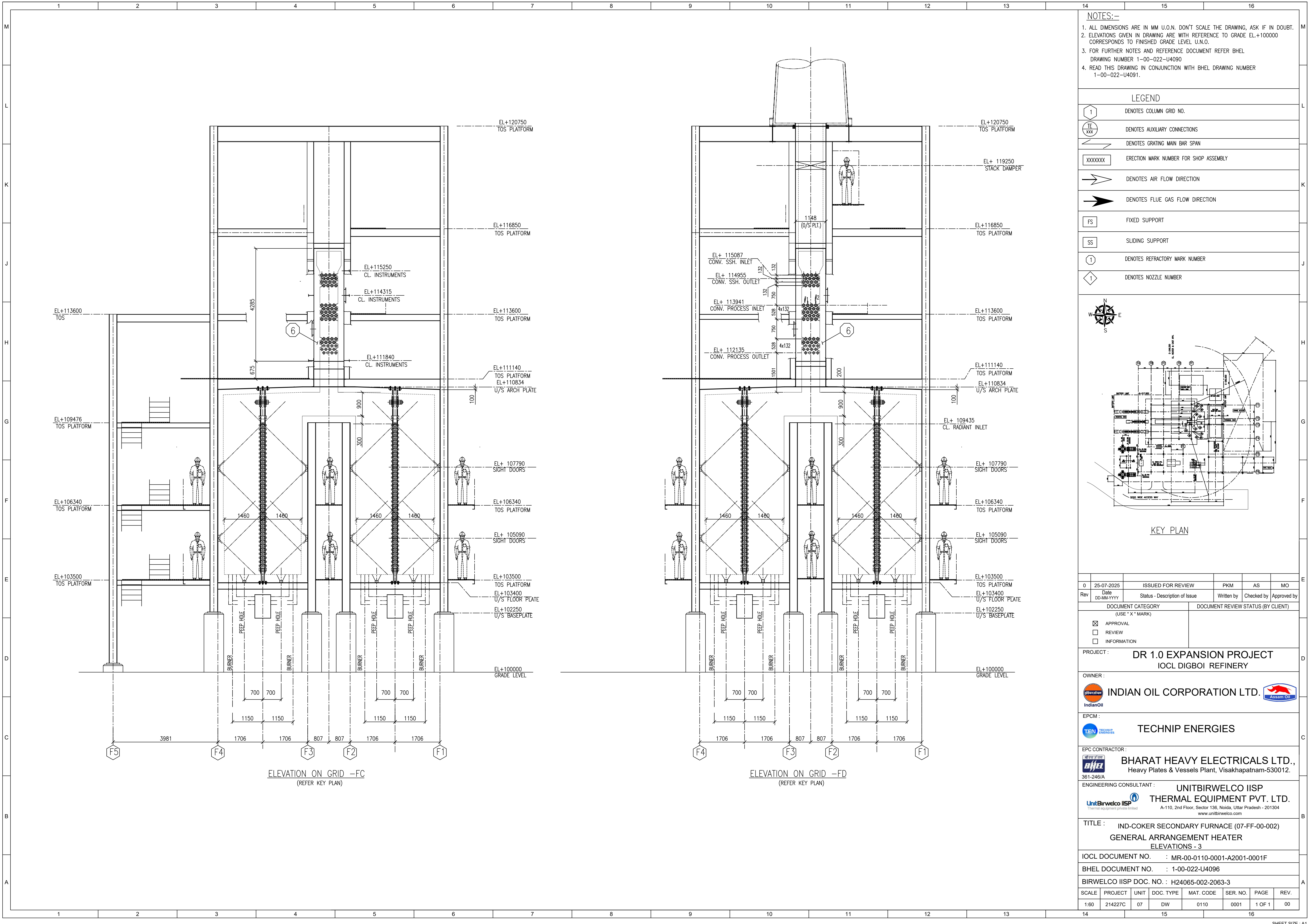
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002)
GENERAL ARRANGEMENT HEATER
ELEVATIONS - 2

IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001E

BHEL DOCUMENT NO. : 1-00-022-U4095

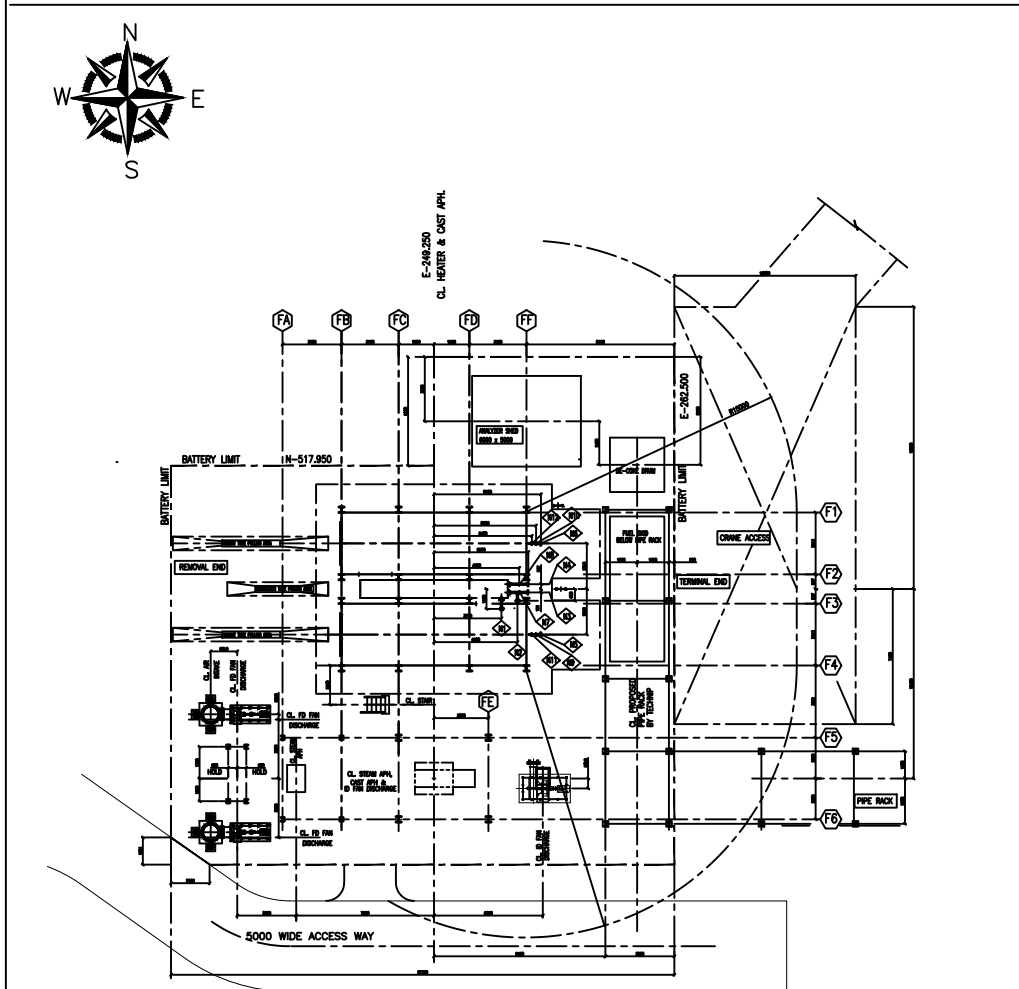
BIRWELCO IISP DOC. NO. : H24065-002-2063-2

SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00



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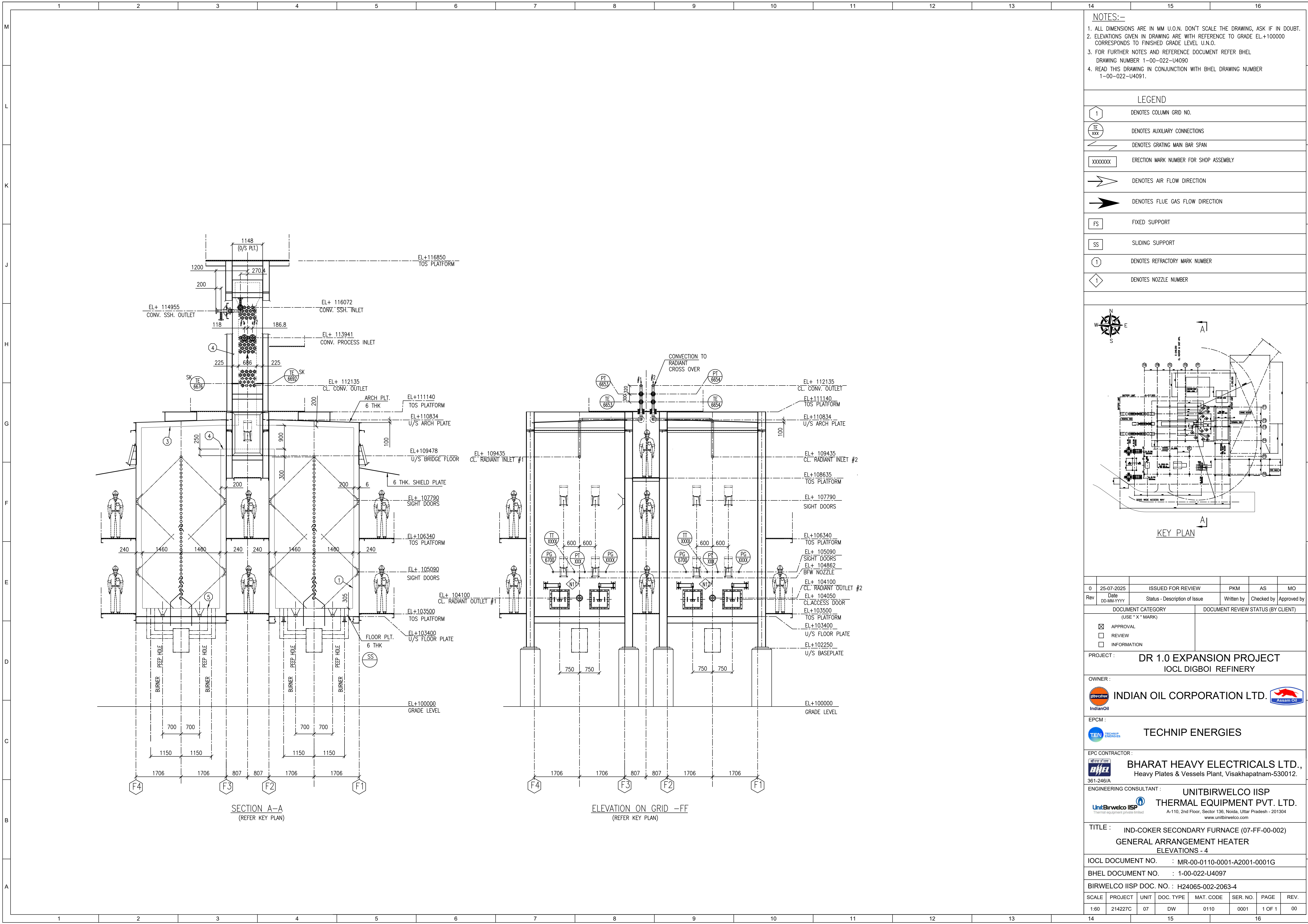
LEGEND	
	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	DENOTES REFRACTORY MARK NUMBER
	DENOTES NOZZLE NUMBER



KEY PLAN

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DOCUMENT CATEGORY			DOCUMENT REVIEW STATUS (BY CLIENT)		
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☐ REVIEW					
☐ INFORMATION					

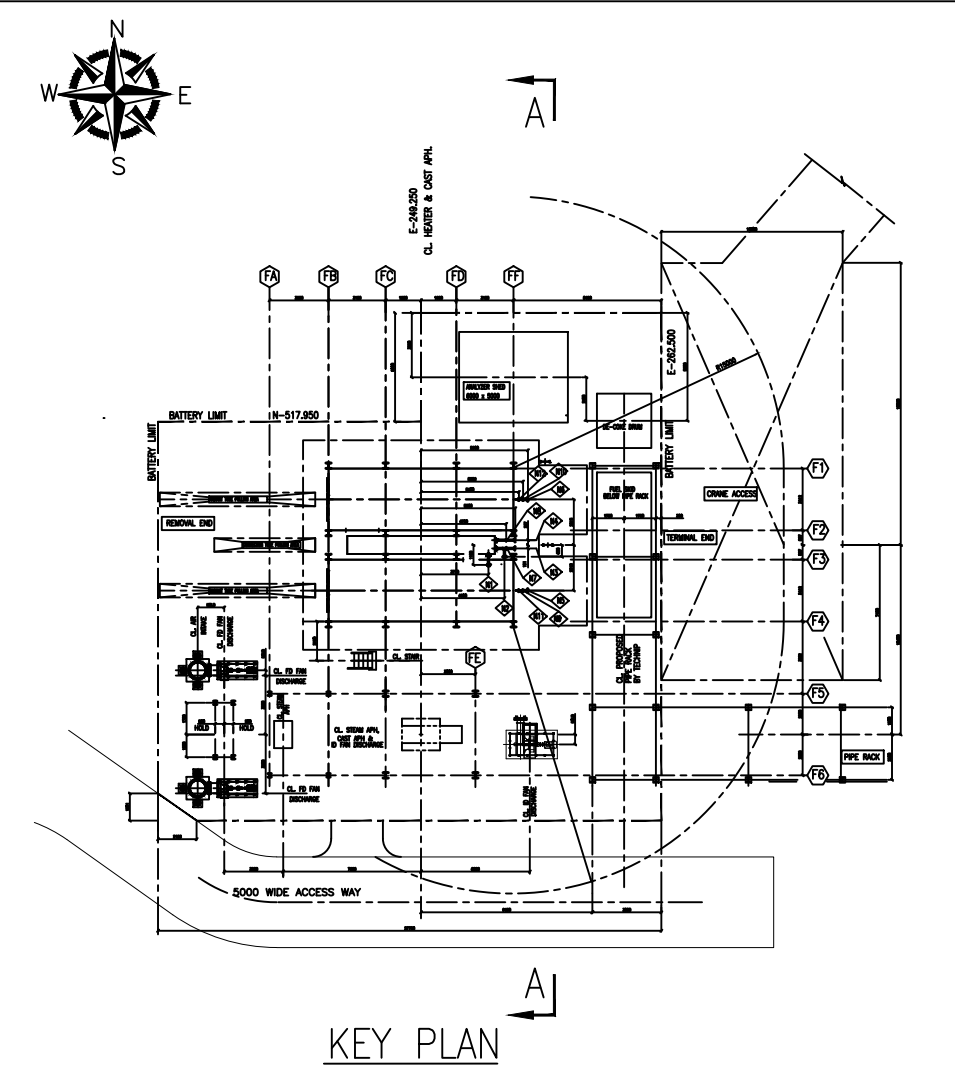
PROJECT : DR 1.0 EXPANSION PROJECT IOCL DIGBOI REFINERY							
OWNER :  INDIAN OIL CORPORATION LTD.  IndianOil							
EPCM :  TECHNIP ENERGIES TECHNIP ENERGIES							
EPC CONTRACTOR :  BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012. 361-246/A							
ENGINEERING CONSULTANT :  UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD. A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com							
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002) GENERAL ARRANGEMENT HEATER ELEVATIONS - 3							
IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001F							
BHEL DOCUMENT NO. : 1-00-022-U4096							
BIRWELCO IISP DOC. NO. : H24065-002-2063-3							
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00
14		15		16			



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LEGEND

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- TE XXX DENOTES AUXILIARY CONNECTIONS
- DENOTES GRATING MAIN BAR SPAN
- XXXXXXXX DENOTES AIR FLOW DIRECTION
- DENOTES FLUE GAS FLOW DIRECTION
- FS FIXED SUPPORT
- SS SLIDING SUPPORT
- 1 DENOTES REFRACTORY MARK NUMBER
- 1 DENOTES NOZZLE NUMBER



0	25-07-2025	ISSUED FOR REVIEW	PKM	AS	MC
Rev	Date DD-MM-YYYY	Status - Description of Issue	Written by	Checked by	Approved by
DOCUMENT CATEGORY			DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)					
☒ APPROVAL					
☐ REVIEW					
☐ INFORMATION					

PROJECT : DR 1.0 EXPANSION PROJECT
IOCL DIGBOI REFINERY

OWNER :
 INDIAN OIL CORPORATION LTD.

EPCM :
 TECHNIP ENERGIES

EPC CONTRACTOR :
 BHARAT HEAVY ELECTRICALS LTD.,
Heavy Plates & Vessels Plant, Visakhapatnam-530012.

ENGINEERING CONSULTANT :
 UNITBIRWELCO IISP
THERMAL EQUIPMENT PVT. LTD.

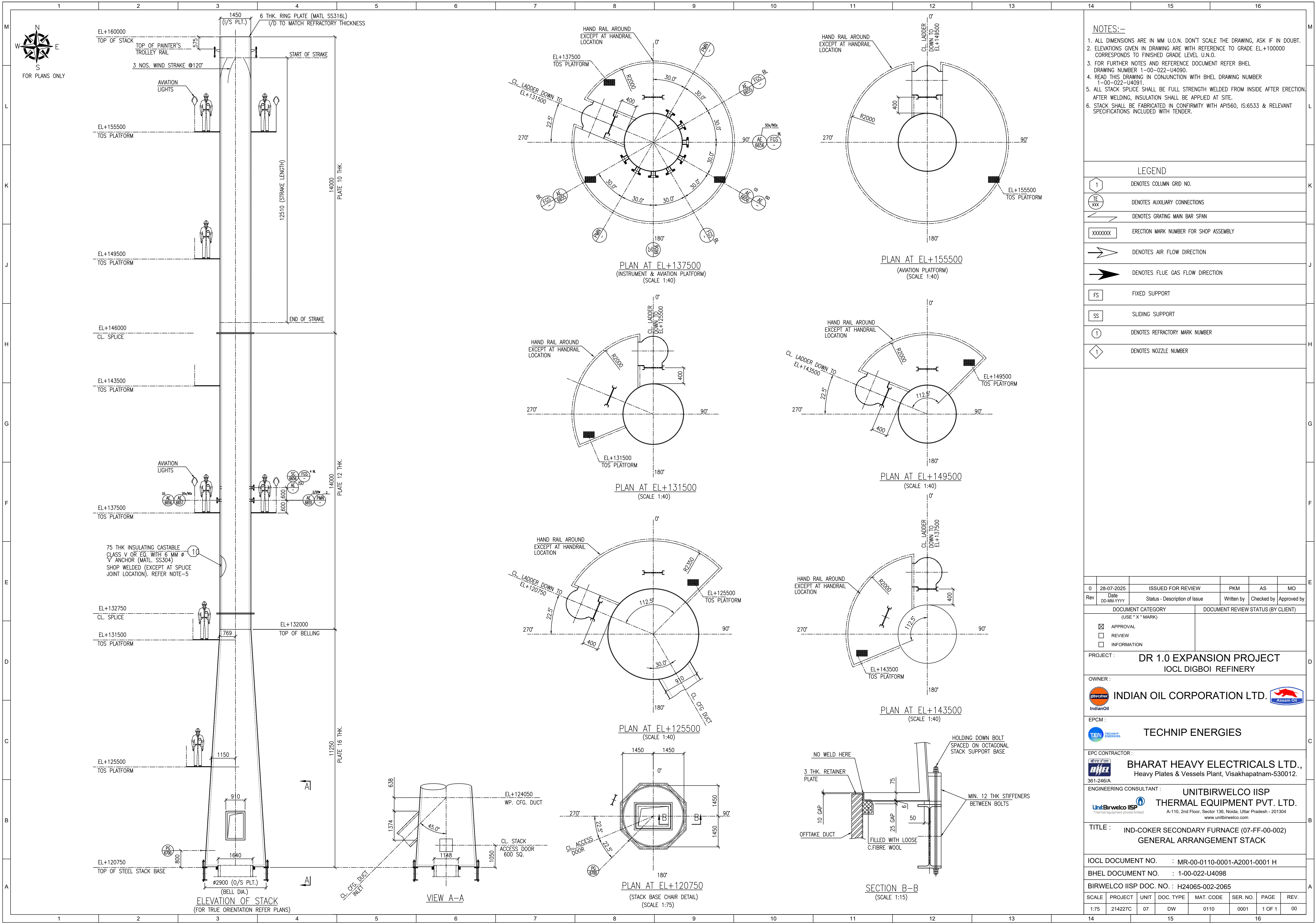
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002)
GENERAL ARRANGEMENT HEATER
ELEVATIONS - 4

IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001G

BHEL DOCUMENT NO. : 1-00-022-U4097

BIRWELCO IISP DOC. NO. : H24065-002-2063-4

SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
1:60	214227C	07	DW	0110	0001	1 OF 1	00



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 4. READ THIS DRAWING IN CONJUNCTION WITH BHEL DRAWING NUMBER 1-00-022-U4091.
 5. ALL STACK SPLICE SHALL BE FULL STRENGTH WELDED FROM INSIDE AFTER ERECTION. AFTER WELDING, INSULATION SHALL BE APPLIED AT SITE.
 6. STACK SHALL BE FABRICATED IN CONFORMITY WITH API560, IS:6533 & RELEVANT SPECIFICATIONS INCLUDED WITH TENDER.

LEGEND

	DENOTES COLUMN GRID NO.
	DENOTES AUXILIARY CONNECTIONS
	DENOTES GRATING MAIN BAR SPAN
	ERECTION MARK NUMBER FOR SHOP ASSEMBLY
	DENOTES AIR FLOW DIRECTION
	DENOTES FLUE GAS FLOW DIRECTION
	FIXED SUPPORT
	SLIDING SUPPORT
	DENOTES REFRACTORY MARK NUMBER
	DENOTES NOZZLE NUMBER

0	28-07-2025	ISSUED FOR REVIEW			PKM	AS	MO
Rev	Date DD-MM-YYYY	Status - Description of Issue			Written by	Checked by	Approved by
DOCUMENT CATEGORY					DOCUMENT REVIEW STATUS (BY CLIENT)		
(USE "X" MARK)							
☒ APPROVAL							
☐ REVIEW							
☐ INFORMATION							
PROJECT : DR 1.0 EXPANSION PROJECT							
IOCL DIGBOI REFINERY							
OWNER :							
 INDIAN OIL CORPORATION LTD. 							
EPCM :							
 TECHNIP ENERGIES							
EPC CONTRACTOR :							
 BHARAT HEAVY ELECTRICALS LTD., Heavy Plates & Vessels Plant, Visakhapatnam-530012.							
361-246/A							
ENGINEERING CONSULTANT :							
 UNITBIRWELCO IISP THERMAL EQUIPMENT PVT. LTD. A-110, 2nd Floor, Sector 136, Noida, Uttar Pradesh - 201304 www.unitbirwelco.com							
TITLE : IND-COKER SECONDARY FURNACE (07-FF-00-002) GENERAL ARRANGEMENT STACK							
IOCL DOCUMENT NO. : MR-00-0110-0001-A2001-0001 H							
BHEL DOCUMENT NO. : 1-00-022-U4098							
BIRWELCO IISP DOC. NO. : H24065-002-2065							
SCALE	PROJECT	UNIT	DOC. TYPE	MAT. CODE	SER. NO.	PAGE	REV.
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