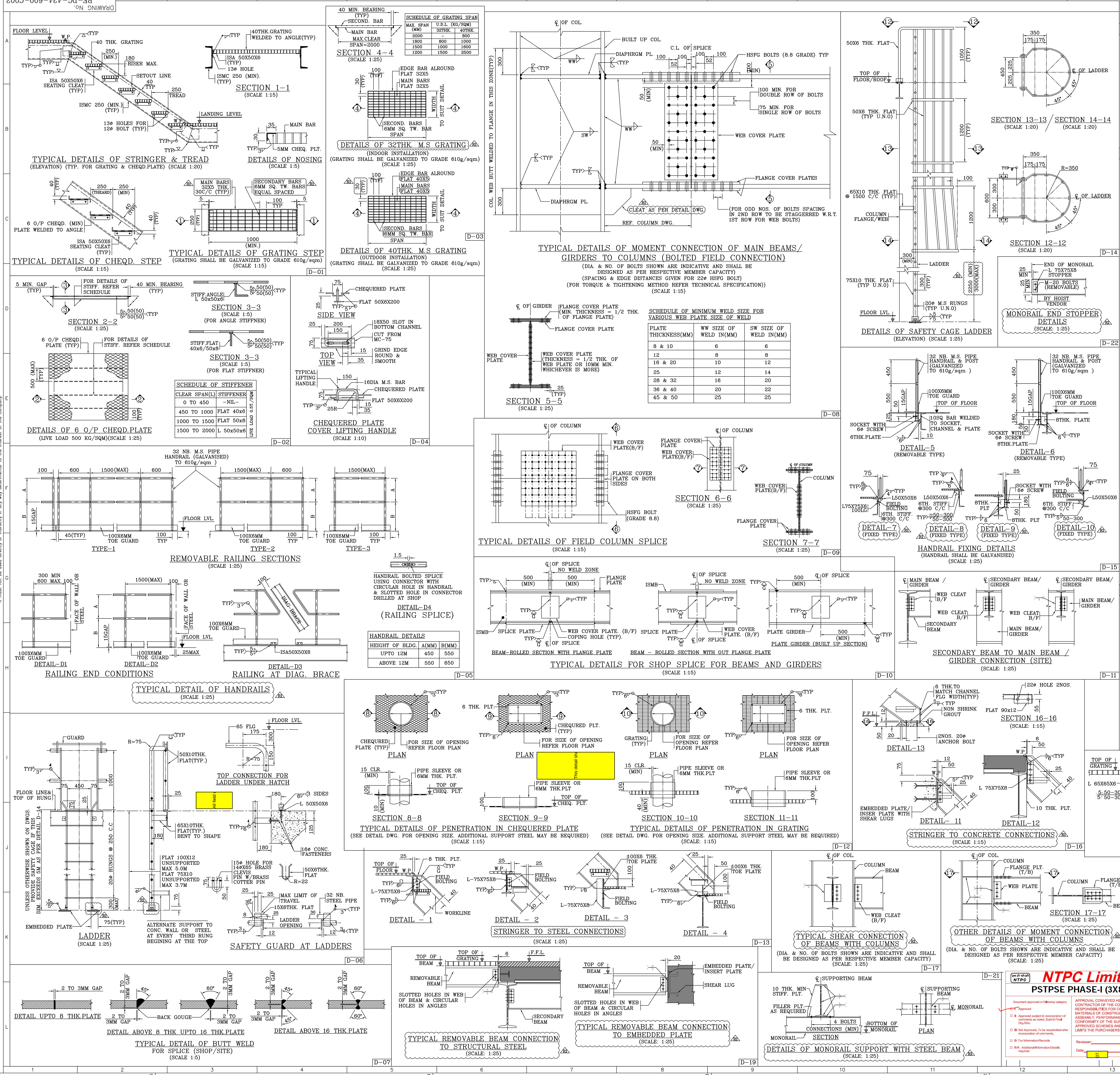
FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

DRAWING No. PE-DG-434-600-C002



SCHEDULE OF GRATING SPAN

MAX. SPAN (MM)	U.D.L. (KG/SQM) 32THK.	40THK.
2000	–	800
1800	800	1000
1500	1000	1600
1200	1500	2500

SCHEDULE OF STIFFENER

CLEAR SPAN(L)	STIFFENER	
0 TO 450	–NIL–	LIVE LOAD 0.5T./SQM
450 TO 1000	FLAT 40x6	
1000 TO 1500	FLAT 50x8	
1500 TO 2000	L 50x50x6	

HANDRAIL DETAILS

HEIGHT OF BLDG.	A(MM)	B(MM)
UPTO 12M	450	550
ABOVE 12M	550	650

SCHEDULE OF MINIMUM WELD SIZE FOR VARIOUS WEB PLATE SIZE OF WELD

PLATE THICKNESS(MM)	WW SIZE OF WELD IN(MM)	SW SIZE OF WELD IN(MM)
8 & 10	6	6
12	8	8
16 & 20	10	12
25	12	14
28 & 32	16	20
36 & 40	20	22
45 & 50	25	25

GENERAL NOTES FOR STRUCTURAL STEEL AND MISCELLANEOUS STEEL WORKS

1.0 GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETERS EXCEPT FLOOR ELEVATIONS AND PLANT GRID WHICH ARE IN METERS, UNLESS STATED OTHERWISE.
2. EL(±)0.000 REFERS TO FINISHED FLOOR LEVEL OF POWER HOUSE BUILDING WHICH CORRESPONDS TO RL(+)375.500 M.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECTURAL, CIVIL AND STRUCTURAL DRAWINGS, SPECIFICATIONS & SCHEDULE OF ITEMS.
4. ALL CONSTRUCTION WORKS SHALL CONFORM TO THE REQUIREMENTS OF RELATED SPECIFICATIONS AND DRAWINGS BEFORE START OF WORK.
5. ALL BIS CODES REFERED IN THIS DRAWING SHALL BE THE LATEST ISSUE INCLUSIVE OF ALL OFFICIAL AMENDMENTS.
6. THE FABRICATION & ERECTION OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH IS 800 : 1984 CODE OF PRACTICE FOR GENERAL CONSTRUCTION IN STEEL AND AS SPECIFIED IN THE CONTRACT TECHNICAL SPECIFICATIONS.

2.0 MATERIAL SPECIFICATION

1. ALL STRUCTURAL STEEL SHALL BE STRAIGHT, SOUND, FREE FROM TWISTS, CRACKS, FLAWS AND ALL OTHER DEFECTS BEFORE ERECTION.
2. ALL STRUCTURAL STEEL AND PLATES SHALL CONFORM TO IS: 2062:2006. DIFFERENT GRADES AS PER SPECIFICATION SHALL BE USED APPROPRIATELY.
3. ALL MILD STEEL BOLTS SHALL BE OF PROPERTY CLASS 4.6 GRADE-C CONFIRMING TO IS: 1367.
4. ALL HIGH STRENGTH STRUCTURAL BOLTS SHALL BE OF PROPERTY CLASS 8.8 CONFIRMING TO IS: 1367 AND SHALL BE SUPPLIED CONFORMING TO IS: 3757: 1985.
5. ALL NUTS SHALL BE OF HEAVY DUTY HEXAGONAL TYPE AND SHALL BE COMPATIBLE WITH THE BOLTS. MS NUTS SHALL BE OF CARBON STEEL PRODUCT GRADE-C OF IS: 1363 AND OF PROPERTY CLASS 5 OF IS: 1367.
6. ALL NUTS & WASHERS FOR HIGH STRENGTH BOLTS (H.S.F.G.) SHALL CONFORM TO IS: 6623 & IS: 6649 RESPECTIVELY.
7. WASHERS FOR MILD STEEL BOLTS SHALL BE OF MILD STEEL CONFORMING TO IS: 5369 / IS: 5372 / IS: 5374 OR IS; 2016 AS THE CASE MAY BE.
8. ALL ANCHOR BOLTS SHALL BE OF MILD STEEL OF GARDE 4.6 CONFORMING TO IS: 5624.
9. UNLESS NOTED OTHERWISE IN DRAWINGS ALL SHOP FABRICATED STRUCTURAL AND MISCELLANEOUS STEEL WORK (EXCEPT BUNKER & CHIMNEY FLUE CONE) SHALL CONFORM TO FOLLOWING GRADE & INDIAN STANDARDS.

STRUCTURAL MEMBER TYPE	CODE / GRADE
ROLLED STEEL MEMBERS (SEMI KILLED / KILLED)	IS: 2062 - (GRADE E-250 , QUALITY A)
PLATES UPTO 20 MM THICK (FULLY KILLED / NORMALIZED ROLLED) (TESTED FOR IMPACT RESISTANCE AT ROOM TEMPERATURE)	IS: 2062 - (GRADE E-250 , QUALITY BR)
PLATES ABOVE 20 MM THICK & BELOW 40MM THICK (FULLY KILLED / NORMALIZED ROLLED)	IS: 2062 - (GRADE E-350 , QUALITY B0)
PLATES BEYOND 40 MM THICK (FULLY KILLED / FURNACE NORMALIZED / VACUUM DEGASSED / UST TESTED	IS: 2062 - (GRADE E-350 , QUALITY B0)
STRUCTURAL HOLLOW SECTIONS (SQUARE/ RECTANGLE)	IS: 4923 - (GRADE Yst 240)
CHEQUERED PLATE (MIN. 6 MM THK.)	CONFORM TO IS: 3502 IS: 2062 - (GRADE 250A-SEMI KILLED)
PIPES FOR HAND RAIL	IS: 1161 (GALVANIZED MEDIUM CLASS MILD STEEL PIPES)
RAIN WATER DOWN TAKE PIPES	IS: 1239 / IS 3589 (GALVANIZED MEDIUM CLASS MILD STEEL PIPES)

10. UNLESS NOTED OTHERWISE IN DRAWINGS ALL SITE FABRICATED STRUCTURAL STEEL WORK (BUNKER, CHIMNEY FLUE & MISCELLANEOUS STRUCTURES NOT COVERED IN NOTE NO. 9) SHALL CONFORM TO FOLLOWING GRADE & INDIAN STANDARDS.

STRUCTURAL MEMBER TYPE	CODE / GRADE
PLATES UPTO 20 MM THICK (FULLY KILLED / NORMALIZED ROLLED)	IS: 2062 - (GRADE E-250 , QUALITY BR)
PLATES ABOVE 20 MM THICK & BELOW 40MM THICK (FULLY KILLED / NORMALIZED ROLLED)	IS: 2062 - (GRADE E-350 , QUALITY B0)
PLATES BEYOND 40 MM THICK (FULLY KILLED / FURNACE NORMALIZED / VACUUM DEGASSED / UST TESTED	IS: 2062 - (GRADE E-350 , QUALITY B0)
STAINLESS STEEL LINER (4MM THK.)	ASTM A240 S304 (TYPE 304)

3.0 JOINTS & CONNECTIONS

1. ALL CONNECTIONS SHALL BE DEVELOPED IN LINE WITH GOOD ENGINEERING PRACTICE AND SHALL BE SUBJECT TO THE APPROVAL OF ENGINEER.
2. ALL SHOP CONNECTIONS SHALL BE WELDED, UNLESS OTHERWISE NOTED.
3. ALL FIELD CONNECTIONS SHALL BE BOLTED WITH HIGH STRENGTH FRICTION GRIP (H.S.F.G.) BOLTS OF GRADE 8.8 CONFORMING TO IS:1367 FOR ALL MAJOR CONNECTIONS. ALL NOMINAL CONNECTIONS IN THE FIELD LIKE PURLINS, STAIRS, WALL BEAMS ETC. SHALL BE DONE USING M.S. BLACK BOLTS OF GRADE 4.6 CONFORMING TO IS:1367.
4. FOR BOLTED CONNECTIONS, IS:4000, IS:3757, IS:6623 & IS:6649 SHALL BE FOLLOWED AND FOR WELDING OF STRUCTURES IS:814, IS:816, IS:1024, IS:4353 & IS:9595 SHALL BE FOLLOWED
5. THE BOLTED JOINTS SHALL BE DESIGNED FOR THE FRICTION GRIP OR BEARING TYPE. FOR FRICTION GRIP TYPE CONNECTIONS, BOLTS SHALL BE TIGHTENED TO DEVELOP THE REQUIRED PRETENSION DURING THEIR INSTALLATION.
6. ALL BOLTED CONNECTIONS SHALL HAVE MINIMUM TWO BOLTS AND SHALL HAVE BOLTS OF MINIMUM 16 MM DIA.
7. THE HIGH STRENGTH FRICTION GRIP BOLTS SHALL NOT BE LESS THAN 20 MM DIA. AND M.S. BOLTS SHALL NOT BE LESS THAN 16MM DIA.UNLESS NOTED OTHERWISE.

7. ALL SPLICING WORK SHALL BE FULL STRENGTH. FIELD SPLICING SHALL BE DONE WITH WEB AND FLANGE COVER PLATES FOR FULL STRENGTH. SHOP SPLICING FOR ALL SECTIONS OTHER THAN ROLLED SHALL BE CARRIED OUT BY FULL PENETRATION BUTT WELDS WITH NO COVER PLATES. SPLICING FOR ALL ROLLED SECTIONS SHALL BE CARRIED OUT USING FLANGE AND WEB COVER PLATES.
8. MOMENT CONNECTIONS DESIGNATED AS MC TO BE DESIGNED FOR THE FULL MOMENT CAPACITY OF THE MEMBER OR IN ADDITION TO THE AXIAL FORCE INDICATED.
9. SHEAR CONNECTIONS SHALL BE DESIGNED FOR 60% OF SECTION STRENGTH FOR ROLLED SECTIONS AND 80% OF SECTION STRENGTH FOR BUILT UP SECTIONS OR ROLLED SECTIONS WITH COVER PLATES. IF HIGHER LOADS ARE INDICATED IN DRAWING, CONNECTION SHALL BE DESIGNED FOR ACTUAL LOAD.
10. CONNECTIONS OF VERTICAL BRACING MEMBERS AND DIAGONALS OF TRUSS MEMBERS SHALL BE DESIGNED FOR FULL TENSILE CAPACITY OF THE MEMBERS.
11. THE CONNECTIONS BETWEEN TOP FLANGE AND WEB OF CRANE GIRDER SHALL BE FULL PENETRATION BUTT WELD. BOTTOM FLANGE CONNECTION WITH WEB CAN BE FILLET WELD OR BUTT WELD AS DIRECTED BY ENGINEER.
12. CONNECTION OF BASE PLATE AND ASSOCIATED STIFFENERS WITH THE COLUMNS SHALL BE DESIGNED CONSIDERING THE TOTAL LOAD TRANSFERED THROUGH WELDS. HOWEVER MINIMUM WELD SIZE (DOUBLE FILLET) SHALL NOT BE LESS THAN 0.6 TIMES THE THICKNESS OF STIFFENER.
13. ALL REMOVABLE MEMBERS SHALL HAVE BOLTED CONNECTIONS.
14. WELDING OF STRUCTURAL STEEL SHALL BE DONE BY AN ELECTRIC ARC PROCESS AND SHALL CONFIRM TO IS: 816, IS: 9595, IS: 814, IS: 2014 ETC.
15. ALL BUTT WELDS SHALL BE FULL PENETRATION BUTT WELD AND SHALL BE ADOPTED TO FULL WIDTH OF THE PLATE.
16. SIZE OF FILLET WELD FOR FLANGE TO WEB CONNECTION FOR BUILT UP SECTIONS SHALL BE AS FOLLOWS:
    a) FOR BUILT UP BOX SECTION WELD SIZE SHALL BE DESIGNED FOR FULL SHEAR CAPACITY.
    b) FOR BUILT UP I-SECTION WELD SIZE SHALL BE DESIGNED FOR 80% FULL SHEAR CAPACITY OR ACTUAL SHEAR (IF INDICATED IN DRAWING) WHICHEVER IS MORE. HOWEVER WELD SIZE SHALL NOT BE LESS THAN 0.5 TIMES THE WEB THICKNESS. WELD SHALL BE DOUBLE FILLET
17. GUSSET / END PLATES SHALL BE OF FOLLOWING MINIMUM THICKNESS SUBJECT TO DESIGN REQUIREMENTS UNLESS SPECIFIED OTHERWISE:
    a) FOR BEAMS OF DEPTH LESS THAN 450MM : 8MM
    b) FOR BEAMS OF DEPTH 450MM TO 600MM : 10MM
    c) TRUSS / BRACINGS WITH MEMBER THICKNESS 8MM OR LESS : 8MM
    d) TRUSS / BRACINGS WITH MEMBER THICKNESS 10MM OR MORE : 12MM
18. COLUMN SPLICE SHALL BE DESIGNED FOR FULL CAPACITY PLUS 5% ADDITIONAL CAPACITY OF LOWER SECTIONS.
19. ALL WELDS SHALL BE CONTINUOUS AND THE MINIMUM SIZE OF FILLET WELD SHALL BE 6 MM. UNLESS NOTED OTHERWISE.
20. THE LENGTH OF THE FILLET WELDS SHALL BE NOT BE LESS THAN FOUR TIMES THE NOMINAL SIZE OF THE WELD OR 40 MM. WHICHEVER IS HIGHER.
21. FILLET WELDS TERMINATING AT ENDS OR SIDES OF PARTS OR MEMBERS MUST HAVE RETURNS AROUND CORNERS FOR A DISTANCE NOT LESS THAN TWICE THE SIZE OF THE WELD.
22. WELDING ELECTRODES SHALL BE OF LOW HYDROGEN TYPE CONFORMING TO IS:814.
23. PROPER PRE-HEATING TEMPERATURE SHALL BE MAINTAINED AS PER SPECIFICATIONS DURING WELDING.
24. THE WELDING SEQUENCE / PROCESS SHALL BE SO ADOPTED THAT NO ACCUMULATION OF SECONDARY WELDING STRESSES TAKES PLACE IN THE MEMBERS.
25. THE DIAMETER OF BOLT HOLES SHALL NOT BE 2MM MORE THAN DIAMETER OF BOLT UNLESS NOTED OTHERWISE.
26. THE ERECTION CLEARANCE FOR END OF MEMBERS SHALL NOT BE MORE THAN 5MM AT EACH END UNLESS STATED OTHERWISE.
27. DESIGN CALCULATIONS FOR MAJOR CONNECTIONS (CONNECTIONS OF MAIN FRAMING MEMBERS) SHALL BE FURNISHED BY BHEL FOR APPROVAL IN DETAIL DRAWING.
28. IN ALL CASES THE UNTHREADED PORTION OF THE BOLT SHALL BEAR ON THE MEMBER'S CONNECTED. A WASHER OF ADEQUATE THICKNESS MAY BE PROVIDED TO EXCLUDE THE THREAD FROM THE BEARING THICKNESS IF A LARGER GRIP BOLT HAS TO BE USED FOR THIS PURPOSE.
29. FOR ERECTION & TEMPORARY ASSEMBLY M.S. BOLTS SHALL BE USED WHICH SHALL BE REMOVED AFTER AFTER ERECTION AND ALL ERECTION BOLT HOLES SHALL BE SUITABLY PLUGGED.
30. FOR COLUMN FOUNDATION BOLTS, AT LEAST DOUBLE NUTS SHALL BE PROVIDED
31. GIRDERS & TRUSSES SHALL BE CAMBERED AS NOTED IN DRAWINGS.
32. GRATINGS / CHEQUERD PLATES SHALL BE IMMEDIATELY CONNECTED UPON PLACEMENT (NOT TO LEFT LOOSE) FROM SAFETY CONSIDERATIONS.

4.0 PAINTING

1. ALL STEEL SURFACES SHALL BE PROVIDED WITH TWO COMPONENT MOISTURE COATING ZINC (ETHYL) SILICATE PRIMER COAT (HAVING MINIMUM 80% OF METALLIC ZINC CONTENT IN DRY FILM, SOLID BY VOLUME MINIMUM 60% ± 2%) OF MINIMUM 70 MICRON DFT TO BE APPLIED OVER BLAST CLEANED SURFACE CONFORMING TO Sa 2½ FINISH OF ISO 8501-1 WITH SURFACE PROFILE 40-60 MICRON. THE PRIMER COAT SHALL BE APPLIED IN SHOP IMMEDIATELY AFTER BLAST CLEANING BY AIRLESS SPRAY TECHNIQUE. ZINC DUST COMPOSITION & PROPERTIES SHALL BE TYPE II AS PER ASTM D520-00.
2. PRIMER COAT SHALL BE FOLLOWED WITH THE APPLICATION OF INTERMEDIATE COAT OF TWO COMPONENT POLYAMIDE CURED EPOXY WITH MIO CONTENT (CONTAINING LAMELLAR MIO MINIMUM 30% ON PIGMENT, SOLID BY VOLUME MINIMUM 80% ± 2%) OF MINIMUM 100 MICRON DFT. THIS COAT SHALL BE APPLIED AFTER AN INTERVAL OF MINIMUM 24 HOURS (FROM THE APPLICATION OF PRIMER COAT) BY AIRLESS SPRAY TECHNIQUE.
3. INTERMEDIATE COAT SHALL BE FOLLOWED WITH THE APPLICATION OF FINISH COAT OF TWO-PACK ALIPHATIC ISOCYANATE CURED ACRYLIC FINISH PAINT (SOLID BY VOLUME MINIMUM 55% ± 2%) WITH GLOSS RETENTION (SSPC PAINT SPEC. NO 36, ASTM D 4587, D 2244, D523) OF LEVEL 2 (AFTER MINIMUM 1000 HOURS OF EXPOSURE, GLOSS LOSS LESS THAN 30 AND COLOR CHANGE LESS THAN 2.0 ΔE) AND MINIMUM 70 MICRON DFT. THIS COAT SHALL BE APPLIED IN SHOP AFTER AN INTERVAL OF MINIMUM 10 HOURS AND WITHIN6 MONTHS (FROM THE COMPLETION OF INTERMEDIATE COAT). COLOR AND SHADE OF THE COAT SHALL BE AS APPROVED BY THE EMPLOYER.
4. FOR THE PORTION OF STEEL SURFACES EMBEDDED IN CONCRETE, THE SURFACE SHALL BE PREPARED BY MANUAL CLEANING AND PROVIDED WITH PRIMER COAT OF CHLORINATED RUBBER BASED ZINC PHOSPHATE PRIMER OF MINIMUM 50 MICRON DFT.
5. BEFORE DISPATCHING THE FABRICATED STRUCTURAL MEMBERS TO SITE, IT SHALL BE ENSURED THAT ALL PARTS IN THE ASSEMBLY FIT ACCURATELY TOGETHER BY CARRYING OUT PRE-ASSEMBLY OF FABRICATED STRUCTURAL MEMBERS HAVING BOLTED JOINTS IN THE FACTORY.
6. FOR PARTS TO BE BOLTED, THE SURFACES IN CONTACT SHALL BE PROVIDED WITH ETHYL ZINC SILICATE PRIMER AND SHALL BE FREE OF DEFECTS, WHICH WOULD PREVENT PROPER SEATING OF THE PARTS.
7. SURFACES INACCESSIBLE AFTER SHOP ASSEMBLY SHALL RECEIVE THE FULL-SPECIFIED PROTECTIVE TREATMENT BEFORE ASSEMBLY. HOWEVER, BOX- SECTIONS SHALL BE WELDED THROUGHOUT AND SHALL BE PROVIDED WITH END DIAPHRAGM PLATES FOR PROPER SEALING AGAINST INGRESS OF AIR AND MOISTURE AND SO THE INTERIOR SURFACES OF BOX-SECTIONS NEED NOT BE PAINTED.

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NTPC Limited.
PSTPSE PHASE-I (3X800 MW)

Document approved in following category
- I Approved
- II Approved subject to incorporation of comments as noted. Submit Final Drg./Doc.
- III Not Approved. To be resubmitted after incorporation of comments.
- IV For Information/Records
- IVR Additional Information/Details required.

APPROVAL CONVEYED HEREIN NEITHER RELIEVES THE CONTRACTOR OF THE CONTRACTUAL OBLIGATIONS AND RESPONSIBILITIES FOR CORRECTNESS OF DIMENSIONS, MATERIALS OF CONSTRUCTION, DESIGN DETAILS, ASSEMBLY, PERFORMANCE PARTICULARS AND CONFORMITY OF THE SUPPLIES WITH SPECIFICATIONS AND APPROVED SCHEMES AND STATUTARY LAWS NOR DOES IT LIMITS THE PURCHASERS'S RIGHT UNDER THE CONTRACT.

Reviewer:
Date: 07.

JOB No. 434
STATUS CONTRACT
DISTRIBUTION

REV	DATE	ALTD	CHD	APPD
R1	25.05.18	G.K.S.	A.K.	A.K.S.

REVISED IN LINE WITH NTPC COMMENTS DATED 07.05.18 AND MKD. AS R1

NTPC DWG. NO: 9585-001-315-PVC-C-0089A

CUSTOMER: NTPC LIMITED

3X800 MW PATRATU SUPER THERMAL POWER PLANT

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NEW DELHI

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C	DRN	G.K.SINGH	–sd–	04.04.18
	DESN	G.K.SINGH	–sd–	04.04.18
	CHD	A.KUMAR	–sd–	04.04.18
	APPD	A.K.SINGH	–sd–	04.04.18

TITLE: GENERAL NOTES AND STANDARD DETAILS FOR STRUCTURAL STEEL WORKS

MPL | C&I | MSE | MAUX | ELEC. | CIVIL | DEPT. | SCALE 1:100

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SHEET 1 OF 1 REV R1
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