FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 1-38142-13159

SHT. 01OF 01

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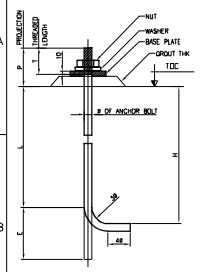
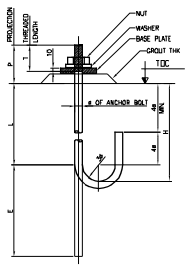
GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

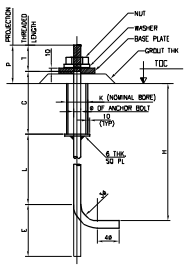
INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME



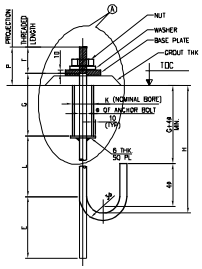
BOLT DETAIL TYPE-I



BOLT DETAIL TYPE-II



BOLT DETAIL TYPE-III



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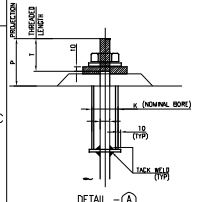
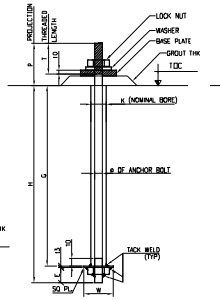
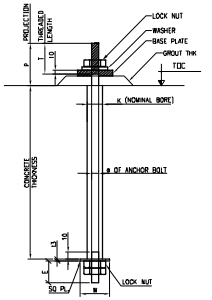


DETAIL – A (TYP)



BOLT DETAIL TYPE-V



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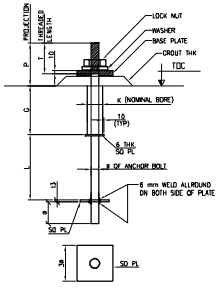
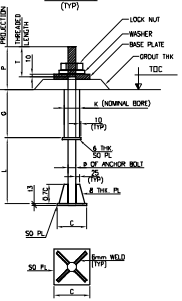


BOLT DETAIL TYPE-VII



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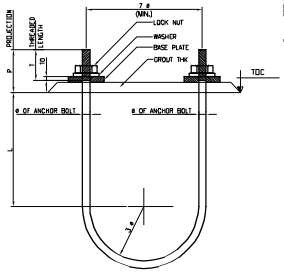
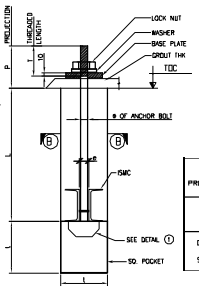
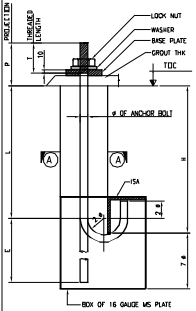
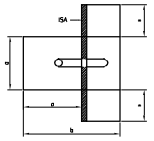


BOLT DETAIL TYPE-IX



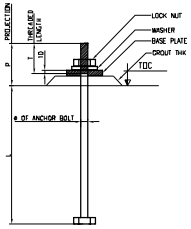




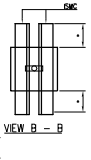
VIEW A – A

BOLT DETAIL TYPE-X

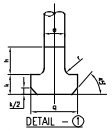
(* AS PER DESIGN REQUIREMENT)



BOLT DETAIL TYPE-XII



VIEW B – B



DETAIL – 1 (FOR FORGED BOLT HEAD)

BOLT DETAIL TYPE-XI

GRADE OF CONC.	BOLT TYPE		DIMENSIONS mm	BOLT DIA (ø) IN mm.											
				10	12	16	18	20	22	24	27	30	33	36	39
M20	I & III		L	250	300	450	450	550	600	650	750	850	950	1000	1100
			E	95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	280	336	498	504	610	668	722	831	940	1049	1108	1217
			TYPE-II	430	486	648	654	910	966	1022	1281	1390	1499	1558	1667
	II & IV		L	200	200	300	350	400	450	450	550	600	700	700	800
			E	150	180	240	270	300	330	380	405	450	495	540	585
		H	TYPE-II	230	236	348	404	460	516	522	631	690	799	808	917
			TYPE-IV	380	386	490	554	760	816	822	1081	1140	1249	1258	1367
M25	I & III		L	200	250	400	400	450	550	550	650	700	800	850	950
			E	95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	230	286	448	454	510	616	622	731	790	899	958	1067
			TYPE-II	380	436	598	604	810	916	922	1181	1240	1349	1408	1517
	II & IV		L	150	150	250	250	300	350	350	450	500	550	600	650
			E	150	180	240	270	300	330	380	405	450	495	540	585
		H	TYPE-II	180	186	290	304	360	416	422	531	590	649	708	767
			TYPE-IV	330	336	440	454	660	716	722	981	1040	1099	1158	1217
M30	I & III		L	180	220	315	335	390	445	470	550	600	680	735	815
			E	95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	210	260	365	390	450	515	545	635	690	780	845	935
			TYPE-II	360	410	515	540	750	815	845	1085	1140	1230	1295	1385
	II & IV		L	150	150	200	200	250	275	300	350	375	425	450	500
			E	150	180	240	270	300	330	380	405	450	495	540	585
		H	TYPE-II	180	190	250	256	310	346	376	435	465	525	560	620
			TYPE-IV	330	340	400	405	610	645	675	885	915	975	1010	1070

GRADE OF CONC.	BOLT TYPE		DIMENSIONS mm	BOLT DIA (ø) IN mm.											
				10	12	16	18	20	22	24	27	30	33	36	39
M35	I & III		L	160	190	275	295	340	390	410	480	525	595	640	710
			E	95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	190	230	325	350	400	480	485	565	615	695	750	850
			TYPE-II	340	380	475	500	700	780	785	1015	1065	1145	1200	1280
	II & IV		L	150	150	150	150	180	225	225	275	300	350	350	400
			E	150	180	240	270	300	330	380	405	450	495	540	585
		H	TYPE-II	180	190	200	205	240	290	300	360	390	450	460	520
			TYPE-IV	330	340	350	355	540	590	600	810	840	900	910	970
M40	I & III		L	150	170	240	255	300	340	360	425	460	525	565	625
			E	95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	180	210	290	310	360	410	435	510	550	625	675	745
			TYPE-II	330	360	440	460	660	710	735	960	1000	1075	1125	1195
	II & IV		L	150	150	150	150	175	200	200	225	250	275	300	325
			E	150	180	240	270	300	330	380	405	450	495	540	585
		H	TYPE-II	180	190	200	205	230	270	275	310	340	375	410	445
			TYPE-IV	330	340	350	355	535	570	575	780	790	825	860	895

GRADE OF CONC.	BOLT TYPE	DIMENSIONS mm		BOLT DIA (ø) IN mm.															
				10	12	16	18	20	22	24	27	30	33	36	39	42	45	48	52	56	60	64	68	72
M20, M25, M30, M35 & M40	III & IV	SLEEVE	C	150	150	150	150	300	300	300	450	450	450	450	450									
			K	50	50	50	50	50	80	80	80	80	80	80	100									
	I TO IV IX & XII	THREADED (T) LENGTH	SINGLE NUT	40	45	55	60	60	65	70	75	80	90	95	100									
			DOUBLE NUT	50	60	70	75	80	90	95	105	110	120	130	140									
M20 & M25	V		G	150	150	150	200	300	300	300	450	450	450	450	550	600	650	700	750	800	900	900	1000	1050
			H	210	222	234	291	398	410	417	580	585	598	608	722	786	841	905	975	1035	1150	1171	1281	1350
	V & VI		W	80	80	90	100	100	130	130	140	150	170	180	200	210	220	230	260	270	290	320	330	350
			L3	10	12	16	16	20	20	25	25	25	28	32	36	36	36	40	45	45	50	56	56	63
	VII		L					350	400	400	500	550	600	750	950	1050	1200	1100	1350	1500	1750	1900	2100	2300
	VIII		L											350	400	450	500	550	600	650	700	750	800	900
			C											160	200	200	200	240	240	360	280	280	280	280
M30	V		G	150	150	150	200	300	300	300	450	450	450	450	500	500	550	600	650	750	800	800	900	1000
			H	210	223	235	290	400	410	415	580	585	600	610	675	690	745	805	875	985	1050	1075	1185	1300
	V & VI		W	80	80	90	100	100	100	100	110	110	140	160	200	210	220	230	260	270	290	320	330	350
			L3	10	12	16	16	20	20	20	25	25	28	32	36	36	36	40	45	45	50	56	56	63
	VII		L					275	325	325	375	425	500	600	750	850	975	1000	1075	1225	1375	1525	1675	1850
	VIII		L											300	350	400	450	500	550	600	650	700	750	800
			C											125	160	160	160	185	185	200	240	240	240	240

GRADE OF CONC.	BOLT TYPE	DIMENSIONS mm		BOLT DIA (ø) IN mm.															
				10	12	16	18	20	22	24	27	30	33	36	39	42	45	48	52	56	60	64	68	72
M35 & M40	V		G	150	150	150	200	300	300	300	450	450	450	450	450	500	550	600	600	700	750	750	850	900
			H	210	225	235	290	400	410	415	580	585	600	610	625	690	745	805	825	935	1000	1025	1135	1200
	V & VI		W	80	80	90	100	100	100	100	110	110	140	160	200	210	220	230	280	270	290	320	330	350
			L3	10	12	16	16	20	20	20	25	25	28	32	36	36	36	40	45	45	50	56	56	63
	VII		L					250	275	300	350	400	450	550	675	775	875	900	975	1100	1250	1375	1525	1675
	VIII		L											300	350	400	450	500	550	600	650	700	750	800
			C											125	160	160	160	185	185	200	240	240	240	240
M20, M25, M30, M35, & M40	V & VI		E	50	60	70	75	80	90	95	105	110	120	130	140	150	155	165	180	190	200	215	225	240
	V , VI , VII & VIII		K	50	50	50	50	50	80	80	80	80	80	80	100	100	100	100	125	125	125	150	150	150
		THREADED (T) LENGTH	SINGLE NUT	40	45	55	60	60	65	70	75	80	90	95	100	105	110	120	125	135	140	150	160	165
			DOUBLE NUT	50	60	70	75	80	90	95	105	110	120	130	140	150	155	165	180	190	200	215	225	240
	VII		L3					16	16	16	16	16	16	16	16	16	16	20	20	20	20	20	20	20
	VIII		L3											16	20	20	20	25	25	25	28	32	32	32
	VII & VIII		C	150	150	150	150	300	300	300	450	450	450	450	450	450	450	450	450	450	450	600	600	600
	IX		L	80	100	150	170	200																
M20&M25	XII		L	185	220	310	335	385	435	460	535	590	660	720										
M30			L	150	150	200	225	250	275	300	350	375	425	450										
M35&M40			L	150	150	175	200	225	250	275	300	350	375	400										

GRADE OF CONC.	BOLT TYPE	DIMENSIONS mm		BOLT DIA (ø) IN mm.															
				20	22	24	27	30	33	36	39	42	45	48	52	56	60	64	68	72
M20, M25, M30, M35 & M40	X		a	150	160	180	200	220	240	260	280	300								
			b	250	290	310	330	370	390	460	480	500								
			L	600	700	800	900	1000	1100	1200	1300	1400								
			E	220	220	240	270	300	330	360	390	420								
			H	640	744	848	954	1060	1166	1272	1378	1484								
			ISA	100X100 x10		130x130x10		150x150x12		200x200x16										
		THREADED (T) LENGTH	SINGLE NUT	60	65	70	75	80	90	95	100	105								
			DOUBLE NUT	80	90	95	105	110	120	130	140	150								
	XI		h			18		20		25		30		30		30		30		
			k			18		22		25		30		35		40		50		55
			c			24		30		36		42		48		56		64		72
			q			65		75		85		95		110		125		140		155
			r			1.6		1.6		2.0		2.0		2.0		3.0		3.0		4.0
			f			140		150		170		190		210		220		240		260
			e			30		35		42		50		58		65		75		85
			L			800		1000		1200		1400		1600		1800		2000		2200
			ISMC					75x40		75x40		100x50		125x65		150x75		150x75		175x75
		THREADED (T) LENGTH	SINGLE NUT			70		80		95		105		120		135		150		165
			DOUBLE NUT			95		110		130		150		165		190		215		240

NOTES

1. BOLTS SHALL BE MARKED ON DVGS AS BELOW.

A – B – C – D – P

- P: PROJECTION OF BOLT ABOVE ROUGH CONCRETE
- C: SINGLE NUT(N1) DOUBLE NUT(N2)
- B: DIAMETER OF BOLT
- A: TYPE OF BOLT
- D: NO. OF BOLT e.g. 6-VI-M33-N2-200

2. BOLTS SHALL BE TURNED FROM MS ROUNDS CONFORMING TO IS 2062 GR-A.
3. NUT AND WASHERS SHALL CONFORM TO IS : 1363 AND IS : 3138.
4. THREADING SHALL BE COARSE CONFORMING TO IS : 1367 AND IS : 4218.
5. ANCHOR BOLTS SHALL BE SET ACCURATELY AND HELD IN POSITION BY TEMPLATE BEFORE CONCRETING.
6. 6mm THK SQ PLATE AT THE BOTTOM OF SLEEVE SHALL BE TACK WELDED WITH BOLT AND SLEEVE FOR BOLT TYPE II, IV, VII AND VIII.
7. SLEEVE SHALL BE MS TUBES (MEDIUM) AS PER IS : 1239.
8. REFER DESIGN DRAWINGS FOR PROJECTION (P) OF BOLT ABOVE TOP OF ROUGH CONCRETE AND NUMBER (A) OF BOLTS.
9. ANCHOR BOLTS SHALL BE TEMPERED BEFORE MACHINING IF MADE BY FORGING. THE FORGING TEMPERATURE SHALL BE ABOVE BODY C BUT LOWER THAN SUPER HEATING TEMPERATURE.

B.H.E.L. HYDERABAD– 500032
PROJECT ENGINEERING & SYSTEMS DIVISION

RELEASED FOR CONSTRUCTION

DATE: 28.01.16

SIGN: Kainkun

03

SCHEDULE FOR BOLTS CAPACITY

BOLT DIA	12	16	20	24	27	30	36	39	42	45	48	52	56	60	64
NET SHEAR AREA @ THREADS (mm²)	88.22	156.83	245	352.86	446.6	551.35	794	931.8	1080.6	1240.5	1411.4	1656.5	1921.15	2205.42	2509.25
FULL TENSION CAPACITY (kN)	18.5	32.9	51.4	74.02	93.69	115.6	166.56	195.48	226.71	260.25	296.11	347.52	403.04	462.67	526.42
FULL SHEAR CAPACITY (kN)	12.2	21.73	33.95	48.9	61.88	76.4	110.01	129.11	149.74	171.9	195.8	229.53	266.20	305.59	347.70
ALLOWABLE TENSILE STRESS (N/SQMM)	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64	163.64
ALLOWABLE SHEAR STRESS (N/SQMM)	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08	108.08

REV.	DATE	ALTERED	ZONE
03	15.10.15	KAINKUN CHD/APPD EC	REVISED AS PER CUSTOMER COMMENTS. REVISION IS CLOUDED AND MARKED AS 03
02	24.08.15	KAINKUN CHD/APPD EC	REVISED AS PER CUSTOMER COMMENTS. REVISION IS CLOUDED AND MARKED AS 02
01	08.08.15	KAINKUN CHD/APPD EC	REVISION IS CLOUDED AND MARKED AS 01

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Oct Fri 16 11.21 2015