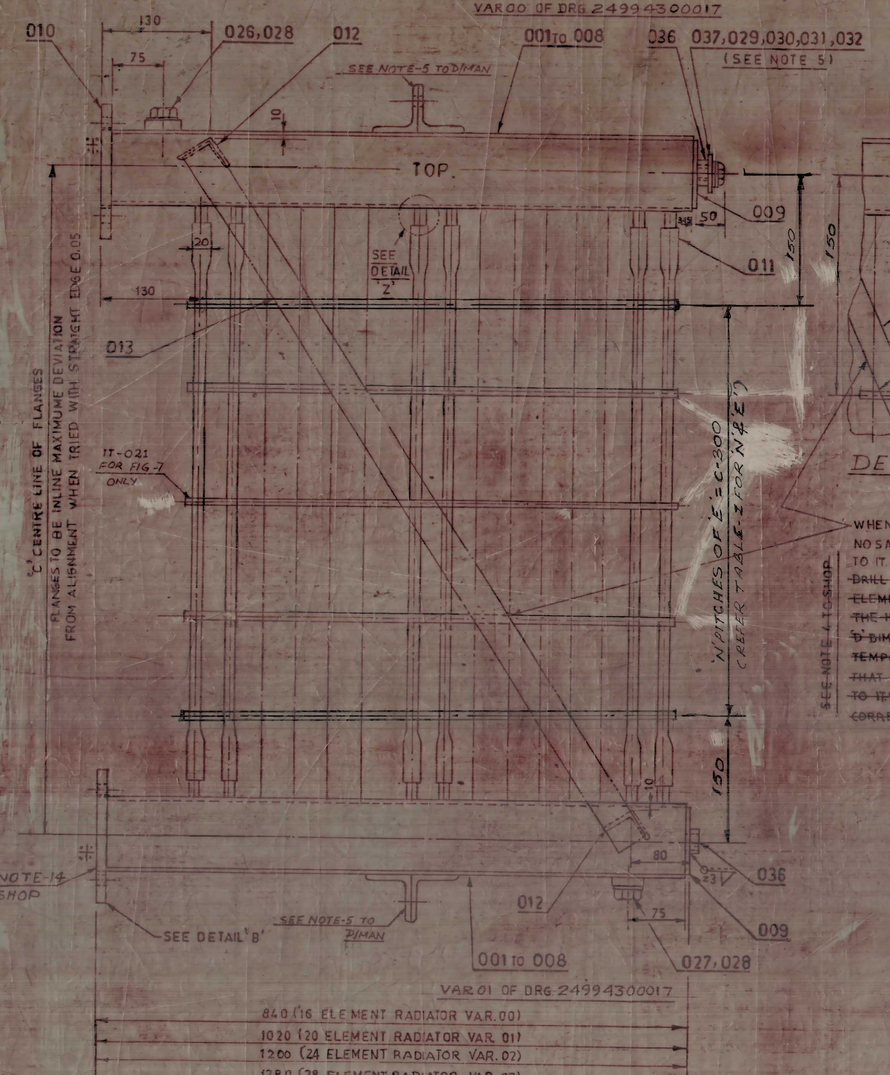
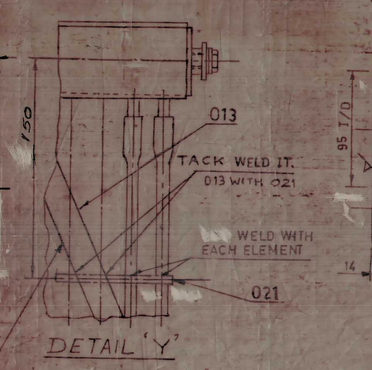
FIRST ANGLE PROJECTION

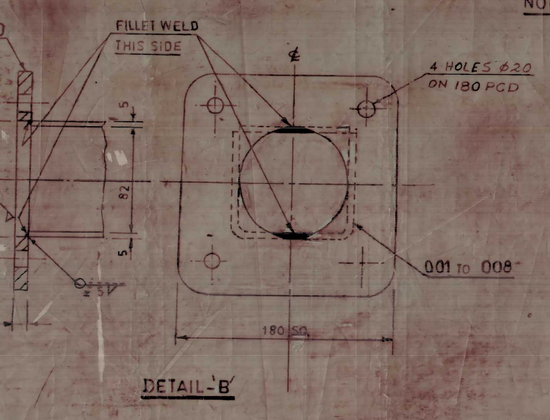
(ALL DIMENSIONS ARE IN mm.)

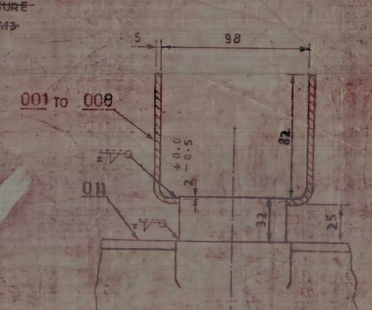




WHEN ITEM 13 IS FITTED, IT IS IMPORTANT THAT NO SAG OCCURS IN THE TIE BAR BEFORE WELDING TO IT 12 IS DONE. ASSEMBLE AS FOLLOWS:- DRILL 2 HOLES MARKED 'Y' 10 DIA. ON ASSY IN TIE BAR & ELEMENT STIFFENER ON EACH SIDE OF RADIATOR LOCATING THE HOLES MIDWAY BETWEEN TWO ELEMENTS & ADJUSTING 'D' DIM. TO SUIT IF NECESSARY. FIT IT 33 AND PACK OF TIE BAR TEMPORARILY WITH WASHER IF NECESSARY TO ENSURE THAT IT IS ENTIRELY FREE FROM SAG, THEN WELD ITEM 13 TO IT 12. FINALLY ENSURE THAT IT 33 IS ASSEMBLED CORRECTLY.

SEE NOTE-13 SHOP.





840 (16 ELEMENT RADIATOR VAR.00)
1020 (20 ELEMENT RADIATOR VAR.01)
1200 (24 ELEMENT RADIATOR VAR.02)
1380 (28 ELEMENT RADIATOR VAR.03)
1560 (32 ELEMENT RADIATOR VAR.04)
1740 (36 ELEMENT RADIATOR VAR.05)
1920 (40 ELEMENT RADIATOR VAR.06)
2100 (44 ELEMENT RADIATOR VAR.07)

WELDING DETAIL

NOTES TO D/MAN:-

THE FOLLOWING PARTICULARS ARE TO BE STATED ON W.O.

1. VAR. & FIG. NO REQD (VAR. IS FIXED BY THE NO OF ELEMENTS PER RADIATOR & FIG IS FIXED BY THE DIM 'C' VALVE CENTRES BETWEEN FLANGES)
2. GIVE DIM. 'A' FOR ELEMENTS IT. 011 (REFER TABLE-I)
3. GIVE DIM. 'F' FOR IT. 013 (REFER TABLE II)
4. RADIATORS ON TANK OR ON HEADER ASSY. TO BE STRAPPED TOGETHER AT OUTER ENDS SHOWN ON DRG 24994300019. ITEM 029 IS FOR MTG. PITCH 'B' 450 & ITEM 025 IS FOR VARIABLE PITCH 'B'. STATE QTY OF ITS 025/029 & IT-037 AND DIMENSIONS A & B AS PER DRG 24994300019.
5. FOR VC-2630 VAR-06, VC-2935 VARS-05 & 06, VC-3500 VARS-03 TO 06 OMIT VARS-00 & 01 OF DRG 24994300017 & CALL VAR-02 & 03 ON W.O./M.D.

NOTES TO SHOP:-

1. RADIATORS TO BE FITTED WITH BLANKING PLATES, GASKETS, NYLON WASHER, PLUGS ETC. (IT. 26 TO 28 & 38) BEFORE STORAGE & TO BE CHECKED BEFORE FINAL SHIPMENT.
2. RADIATORS BEFORE PAINTING SHALL BE AIR OR OIL PRESSURE TESTED AS PER INSTRUCTIONS TR 10086R.
3. RADIATOR IS TO BE PAINTED IN LINE WITH INSTRUCTIONS ON DIVISIONAL STD. SHEET TR 10005 P SL NO-7 UNLESS OTHERWISE STATED ON W.O. PARTICULAR CARE TO BE TAKEN AT JOINTS (NIPPLE WITH HEADER) DURING OUTSIDE PAINTING. THE WORD 'TOP' TO BE PAINTED IN WHITE LETTERS OF 50mm HEIGHT ON TOP HEADER BEFORE FINAL SHIPMENT.
4. ~~OMIT ASSY. OF STIFFENER STUD IT 101 OF DRG. D 6279016, WHEN IT. POSITION COMES BEHIND TIE BAR IT 013 THEN ASSEMBLE AS PER INSTRUCTIONS MARKED THUS ⊕.~~
5. ~~RADIATORS TO BE STRAPPED TOGETHER AT OUTER ENDS AS SHOWN ON DRG 24994300019.~~
6. FOR HANDLING & STORAGE OF RADIATORS REFER DRG TR-10010S. ITEMS USED FOR RADIATOR STORAGE ARE NOT REQUIRED FOR SHIPPING AND THESE MUST BE RETURNED BY TFX/TRM TO FTM RADIATOR SHOP.
7. FOR SHIPMENT OF RADIATORS TO CUSTOMER REFER TYPICAL PACKING ARRANGEMENT DRG. 24994300007/24994300023.
8. SQUARENESS OF THE RADIATOR ASSY. TO BE MAINTAINED WITHIN 2.5 AND THIS SHOULD BE CHECKED WITH A PLUMB LINE BY KEEPING HEADERS VERTICAL.
9. ~~ALTERNATELY WELD 8mm DIA. ROD IT. 021 - 2 ELEMENT STIFFENER BY OMITTING IT. 016 TO 020 AND 033 TO 035 AS SHOWN. FOR QTY. & LENGTH OF IT. 021 SEE TABLE I & II.~~
10. RADIATORS SHALL BE TOUCHED USING SELF ETCH PRIMER TO AA56103 AT NIPPLE TO HEADER WELDING, HEADER COVER WELDING & PLACES WHERE RADIATORS HAVE BEEN REPAIRED ETC. AFTER AIR PRESSURE TESTING
11. 2PP TO BE DONE AS PER STD. SHEET TR10012P.
12. FOR GENERAL TOLERANCES REFER TR101001 WHERE NOT SPECIFIED.
13. ~~ALTERNATELY USE 6 X 25 WIDE FLAT TO AA10108 (AA 101030848B) 5X25 TO AA10108 HOWEVER ELEMENT STIFFENER TO BE USED IN ONE WORK ORDER.~~
14. FINALLY FLANGE SURFACES MARKED ⊞ THUS TO BE PAINTED WITH OIL RESISTANT FULL GLOSSY WHITE PAINT AS PER SL NO-4 OF TR10005P (INSIDE PAINTING).

01	01	01	001	01	01	01	01			038	BLANKING ARRANGEMENT	24998300004	00										
—			SEE W.O				—	SEE NOTE 4 TO D/MAN		037	SPACER	24994300019	002 00	IST 603446									
02	02	02	02	02	02	02	02	WELD TO IT.3		036	BOSS M12	TR20014B		ST604000							0.09		
—	~~04~~	~~04~~	~~04~~	~~04~~	~~04~~	—	—			~~035~~	~~MACHINED WASHER 5.45TL~~	~~C.P.P.~~		~~AA716A001056~~ ~~AA7161001~~									
—	~~04~~	~~04~~	~~04~~	~~04~~	~~04~~	—	—			~~034~~	~~HEX. NUT M8 P.4 STEEL~~	~~C.P.P.~~		~~AA7151M5024~~ ~~AA7151115~~									
—	~~02~~	~~02~~	~~02~~	~~02~~	~~02~~	—	—			~~033~~	~~TIE BAR STUD M8X390 LG~~	~~D6279016~~		~~ST600363~~									
02	02	02	02	02	02	02	02			032	SPRING WASHER B 16			AA7166002088									
02	02	02	02	02	02	02	02			031	MACHINED WASHER 17 STEEL	C.P.P./2PP		AA7161001000									
02	02	02	02	02	02	02	02			030	SCREWHEX. HD. M16 X 30LG	C.P.P./2PP		AA7161001 AA7121135 AA7121123									
—			SEE	W.O			—	SEE NOTE 4 TO D/MAN		029	RADIATOR FIXING BAR	24994300019	003 00	ST603557									
02	02	02	02	02	02	02	02			028	NYLON WASHER 1/4" BSP	TR20082W		ST603479									
01	01	02	02	02	02	01	01	FOR BOTTOM HEADER		027	DRAIN PLUG 3/4" BSP STEEL	TR20066P	003	ST603550							0.2		
01	01	01	01	01	01	01	01	HEADER		026	AIR RELEASE PLUG 3/4 BSP STEEL	TR20066P	002	ST604279							0.21		
—			SEE	W.O			—	SEE NOTE 4 TO D/MAN		025	RADIATOR FIXING BAR	24994300019	001 00										
										024													
										023													
										022													
—	SEE	TABLE	I & II	FOR	QTY.		—	SEE NOTE TO SHOP NO. 13		021	ELEMENT STIFFENER 8 Ø X L ROD BAR			AA10102080M7 AA10108									
—	SEE TABLE									020	ELEMENT STIFFENER	~~E6204532 IT-23 COL 7~~											
—		SEE TABLE								019	ELEMENT STIFFENER	~~E6204593 IT-16 COL 6~~											
—			SEE TABLE							018	ELEMENT STIFFENER	~~E6204593 IT 5 COL 5~~											
—				SEE TABLE						017	ELEMENT STIFFENER	~~E6204593 IT 46 COL 4~~											
—					SEE TABLE					016	ELEMENT STIFFENER	~~E6204593 IT 34 COL 3~~											
—						SEE TABLE				015	~~ELEMENT STIFFENER~~	~~E6204593 IT 24 COL 2~~											
—							SEE TABLE			014	~~ELEMENT STIFFENER~~	~~E6204593 IT 1 COL 1~~											
02	02	02	02	02	02			FOR DIM. 'F' SEE TABLE II		013	TIE BAR 6TK X 40X 'F' LG BLK SIL. FLAT			BP10103038B38 AA10108									
04	04	04	04	04	04					012	ANGLE IRON BRACKET 4.5 X 4.5 X 5TK X 125LG. B.S. ANGLE	ST604277		AA10125080S6 AA10103									
44	40	36	32	28	24	20	16	SEE NOTE 2 TO D/MAN WELD TO IT. 001 OR 008		011	ELEMENT 5 FLUTE	1-24994300011	00										
02	02	02	02	02	02	02	02			010	FLANGE	TR20015F	011	ST604276							2.7		
02	02	02	02	02	02	02	02	WELD TO IT. 001 OR 008		009	END COVER 315TK X 86 X 102 BLK.S.SHT.	ST604649		AA10117131S4 AA10113							0.278		
01										008	HEADERS & COVERS ARRGT. 8	24994300017	00 01										
—	01									007	HEADERS & COVERS ARRGT. 7	24994300017	00 01										
—		01								006	HEADERS & COVERS ARRGT. 6	24994300017	00 01										
—			01							005	HEADERS & COVERS ARRGT. 5	24994300017	00 01										
—				01						004	HEADERS & COVERS ARRGT. 4	24994300017	00 01										
—					01					003	HEADERS & COVERS ARRGT. 3	24994300017	00 01										
—						01				002	HEADERS & COVER ARRGT. 2	24994300017	00 01										
							01			001	HEADERS & COVERS ARRGT. 1	24994300017	00 01										
VAR 07	VAR 06	VAR 05	VAR 04	VAR 03	VAR 02	VAR 01	VAR 00	REMARKS			DESCRIPTION	DRAW INTE NO		MATL. CODE							UNIT WT.		
44	40	36	32	28	24	20	16	CARD TYPE 3						MATL SPECN							QTY.		
NUMBER OF ELEMENTS																							

TABLE-II

VAR. NO.	—	VAR 03	VAR.04	VAR.05	VAR.06	VAR.02	VAR 07	VAR 01	VAR 00
NO. OF ELEMENTS		28	32	36	40	24	44	20	16
FIG. NO.	VALVE CENTRES C	LENGTH 'F' FOR ITEM 013							
1	2020	2375	2470	2574	2686	2290			
2	2325	2642	2728	2823	2926	2567			
3	2630	2916	2986	3082	3177	2850			
4	2935	3200	3270	3350	3438	3137	3490		
5	1300	1788	1914	~~2047~~	~~2188~~	1674			
6	1600	2022	2133	~~2253~~	~~2391~~	1922			
7	3500	3732	3793	3862	3937	3679			
LENGTH 'L' FOR ITEM-021		1225	1405	1585	1765	1045	1945	865	685

TOOL LIST

SL. NO	FIG. NO.	VALVE CENTRES 'C'	SETTING FIXTURE FOR RIB. FLANGE WITH TAPPED HOLES (IN PAD ON HEADER) & ALSO WITH CLEAR HOLES (IN FLANGE WITH PIPE ON TANK)	TOOL NO. FOR FIXTURE FOR ASSY OF ELEMENTS WITH TOP & BOTTOM HEADERS
1	1	2020	1460067	1464479
2	2	2325	1460250	"
3	3	2630	1464185	"
4	4	2935	1464180	"
5	5	1300	1462931	"
5	6	1600	1461845	"
7	7	3500	1464478	1464480

TABLE-I

FIG NO	DIM. 'A'	VALVE CENTRES 'C'	DIM. 'D'	OIL QUANTITY IN LITRES								SURFACE AREA IN SQUARE METRES								WEIGHT OF RADIATOR (WITHOUT OIL) IN Kg.								NO. OF PITCHES 'N'	DIM 'E'	QTY. FOR ITEM 021	QTY. FOR ITEM 0
				16	20	24	28	32	36	40	44	16	20	24	28	32	36	40	44	16	20	24	28	32	36	40	44				
				VAR.00	VAR.01	VAR.02	VAR.03	VAR.04	VAR.05	VAR.06	VAR.07	VAR.00	VAR.01	VAR.02	VAR.03	VAR.04	VAR.05	VAR.06	VAR.07	VAR.00	VAR.01	VAR.02	VAR.03	VAR.04	VAR.05	VAR.06	VAR.07				
1	1898	2020±2	65[illegible]	85	105	125.5	146	166.5	—	—	—	21.34	26.66	31.99	37.31	42.64	—	—	—	253.0	313.0	385.0	446.0	506.0	—	—	—	003	573	008	
2	2187	2325±2	[illegible]	95	118	141	165	188	211	—	—	24.71	30.87	37.04	43.21	49.37	55.54	—	—	288.0	357.0	439.0	509.0	578.0	647.5	—	—	003	675	008	
3	2488	2630±2	86[illegible]	—	131.5	157	183	209	235	261	—	—	35.09	42.09	49.10	56.11	63.12	70.13	—	—	401.5	494.0	572.0	650.5	729.0	801.0	8	004	583	010	
4	2793	2935±2	96[illegible]		—	173	202	230	258.5	287	315	—	39.29	47.14	54.99	62.84	70.69	78.54	86.39	—	446.0	548.0	635.0	722.0	809.0	896.0	983	004	659	010	
5	1158	1300±2	350	57	70.5	85	99	112	—	—	—	13.39	16.73	20.07	23.40	26.74	—	—	—	160.7	208.0	257.5	297.0	327.0	—	—	—	002	500	006	
6	1458	1600±2	300	67	83.5	100	116.5	133	—	—	—	16.70	20.87	25.03	29.20	33.37	—	—	—	204.0	251.5	310.0	359.0	407.0	—	—	—	002	650	006	
7	3358	3500±2	870	—	—	203	237	269	302	335	—	—	47.08	56.49	65.90	75.30	84.71	94.11	—	—	528.4	648	751.7	854.4	957.2	1061	—	005	640	012	

FOR 1.20 mm THICKNESS OF FINS/1.0 mm THICKNESS OF FINS

VAR 0	VAR 00	VAR 01	VAR 02	VAR 03	VAR 04	VAR 05	VAR 06	VAR 07
2020	244/211.2	302/260.8	371/322.4	430/372.9	488/422.5	—	—	—
2325	278/239.2	345/294.8	424/364.4	490/421.9	558/478.5	624/535.5	—	—
2630	—	388/331.5	477/410	552/474	627/538.5	702/603	772/661.1	—
2935	—	431/368	528/454.4	612/525.8	695/597.2	780/668.6	863/740	947/811.4
1300	155/134.6	201/176.2	248/219.3	287/252.5	326/286.1	—	—	—
1600	198/170.7	243/210	295/260.1	347/300.8	393/340.5	—	—	—

REV	DATE	ALT.	CHD.
19A	8/2/06	DIM 'E' WAS NOT ON.	
19	16.09.01	QUANTITY & PITCHES FOR IT. 021 ARE ADDED IN TABLE-I	
18	8.1.97	IN NOTE-7 TO SHOP DRG NO. 24994300023 ADDED AS PER 23/8/97	
17	20.9.94	VAR 07 ADDED FOR 44 ELEMENTS & VALVE CENTRE 2935	
16	5.4.94	NOTE 14 TO SHOP ADDED.	
15	20.7.93	IN SOM IT. 012 WAS 45X45 X6TK, IT. 021 IN REMARK COL NOTE ADDED. AND IN NOTE TO SHOP NOTE NO 13 ADDED.	
14	28.7.84	NOTE-5 TO D/MAN ADDED	
13	5.11.84	FIG. 7 IS NOW ADDED IN TABLE-I & II. SETTING FIXTURE TOOL NO 1464478 ADDED FOR FIG 7. IN TABLE-I, BOM & NOTES UPDATED TO INCORPORATE 1464478 FIXTURE.	
12	11.3.83	WT. OF RADIATOR (WITHOUT OIL) CHANGED STRLY. REFER TABLE-I FOR VALUES.	
11	11.2.83	IN TABLE-I, QTY OF ITS 025 & 029 CHANGED FOR FIG 1 & 2 & DELETED, IN TABLE-I, QTY OF ITS 025 & 029 CHANGED FOR FIG 3 & 4 & DELETED, ABOVE BOM & NOTES ARE ALSO DELETED.	
10		ADDITIONAL INFORMATION ADDED IN TABLE-I, QTY., SURFACE AREA AND WEIGHT OF RADIATOR ADDED.	
09	7.8.80	DRG REPLACED	

REV 18 DATE 8.1.97 ALT. NOTE-7 TO SHOP DRG NO. 24994300023 ADDED AS PER 23/8/97 CKD. [illegible]

REV 19 DATE 8/2/06 ALT. REG. CHD. [illegible]

REV 19A DATE 16.09.01 ALT. QTY. CHD. [illegible]

REV 09 DATE 7.8.80 ALTERED DRG REPLACED CHECKED [illegible]

REV 10 DATE 11.2.83 ALTERED IN TABLE-I, QTY OF ITS 025 & 029 CHANGED FOR FIG 1 & 2 & DELETED, IN TABLE-I, QTY OF ITS 025 & 029 CHANGED FOR FIG 3 & 4 & DELETED, ABOVE BOM & NOTES ARE ALSO DELETED. CHECKED [illegible]

REV 11 DATE 11.3.83 ALTERED WT. OF RADIATOR (WITHOUT OIL) CHANGED STRLY. REFER TABLE-I FOR VALUES. CHECKED [illegible]

REV 12 DATE 5.11.84 ALTERED FIG. 7 IS NOW ADDED IN TABLE-I & II. SETTING FIXTURE TOOL NO 1464478 ADDED FOR FIG 7. IN TABLE-I, BOM & NOTES UPDATED TO INCORPORATE 1464478 FIXTURE. CHECKED [illegible]

REV 13 DATE 20.7.93 ALTERED IN SOM IT. 012 WAS 45X45 X6TK, IT. 021 IN REMARK COL NOTE ADDED. AND IN NOTE TO SHOP NOTE NO 13 ADDED. CHECKED [illegible]

REV 14 DATE 28.7.84 ALTERED NOTE-5 TO D/MAN ADDED CHECKED [illegible]

REV 15 DATE 5.4.94 ALTERED NOTE 14 TO SHOP ADDED. CHECKED [illegible]

REV 16 DATE 20.9.94 ALTERED VAR 07 ADDED FOR 44 ELEMENTS & VALVE CENTRE 2935 CHECKED [illegible]

REV 17 DATE 8.1.97 ALTERED IN NOTE-7 TO SHOP DRG NO. 24994300023 ADDED AS PER 23/8/97 CHECKED [illegible]

REV 18 DATE 16.09.01 ALTERED QTY. & PITCHES FOR IT. 021 ARE ADDED IN TABLE-I CHECKED [illegible]

REV 19 DATE 7.2.06 ALTERED DRG REPLACED CHECKED [illegible]

REV 19A DATE 8/2/06 ALTERED DIM 'E' WAS NOT ON. CHECKED [illegible]

TYPE OF PRODUCT: TRANSFORMER

NAME OF CUSTOMER/PROJECT:

STATUS OF DRAWING: U

DRG REVISED TO ADD WEIGHT CHART FOR 1.2mm/1.25 mm THICKNESS OF FINS.

DISTRIBUTION OF PRINTS: TRE TRP BAD BAG

1 1 2 4

BHARAT HEAVY ELECTRICALS LIMITED TIRUNELVELI

DRN. NAME SIGN. DATE

CHD. S.R.R. 27.9.01

APPD. S.B.V.

DEV. STRE | GRADE OF UN TOL DIM. | SCALE NTS | WEIGHT (Kg) SEE TABLE | REF. TO ASSY. DRG.

TITLE: 5-FLUTE RADIATOR SUITABLE FOR BUTTERFLY VALVE

DRAWING NO 0 499 43 00 007

SHEET NO 1 OF 1

AVAILABLE IN EDMS