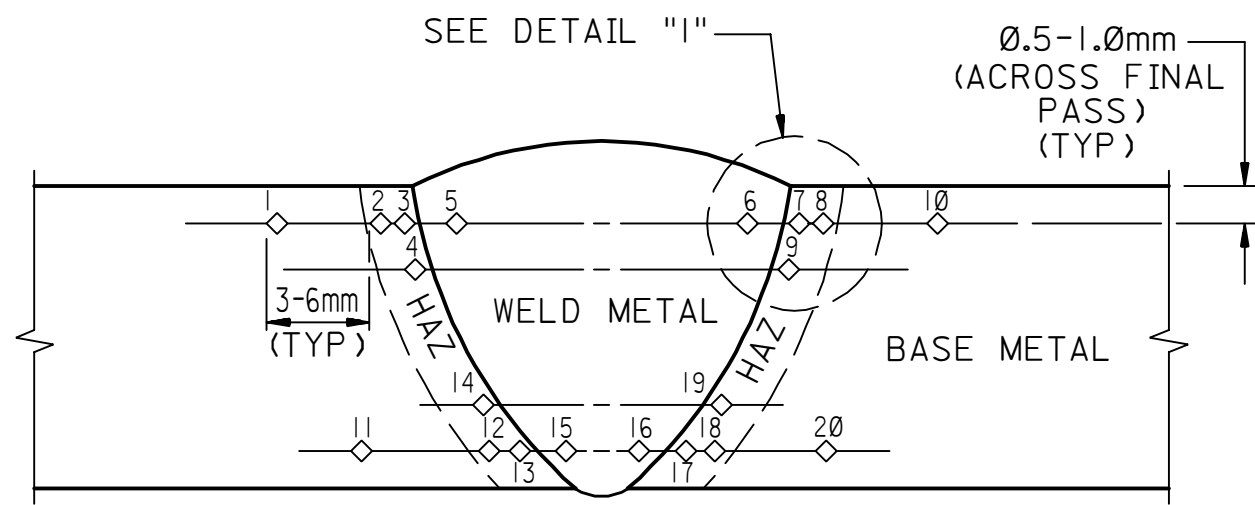
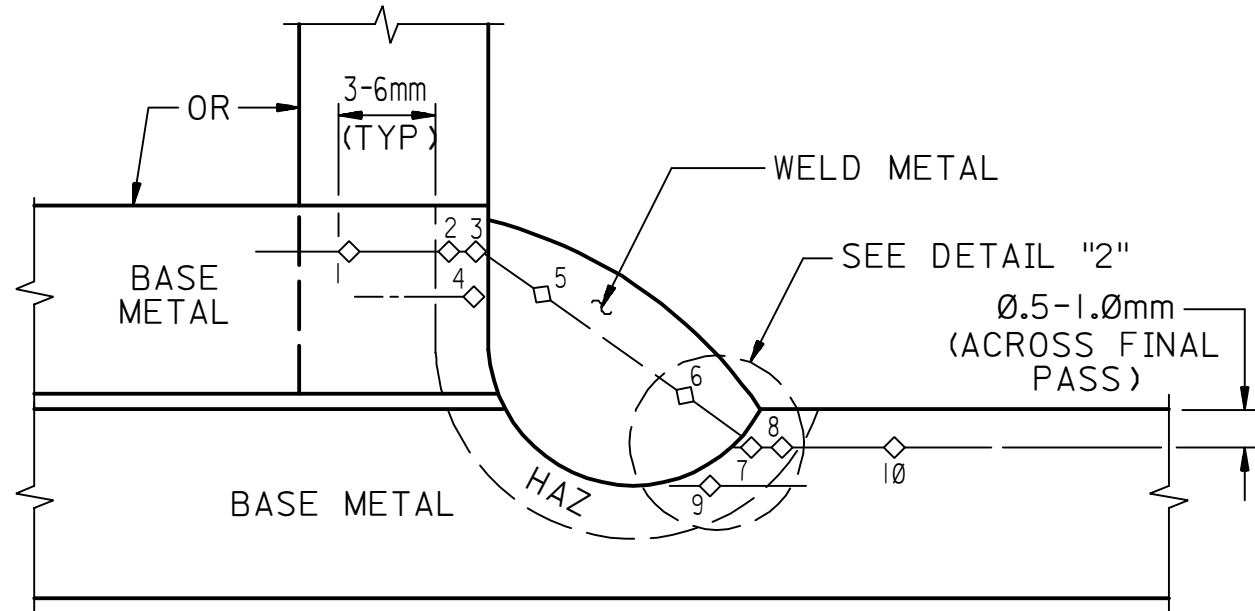


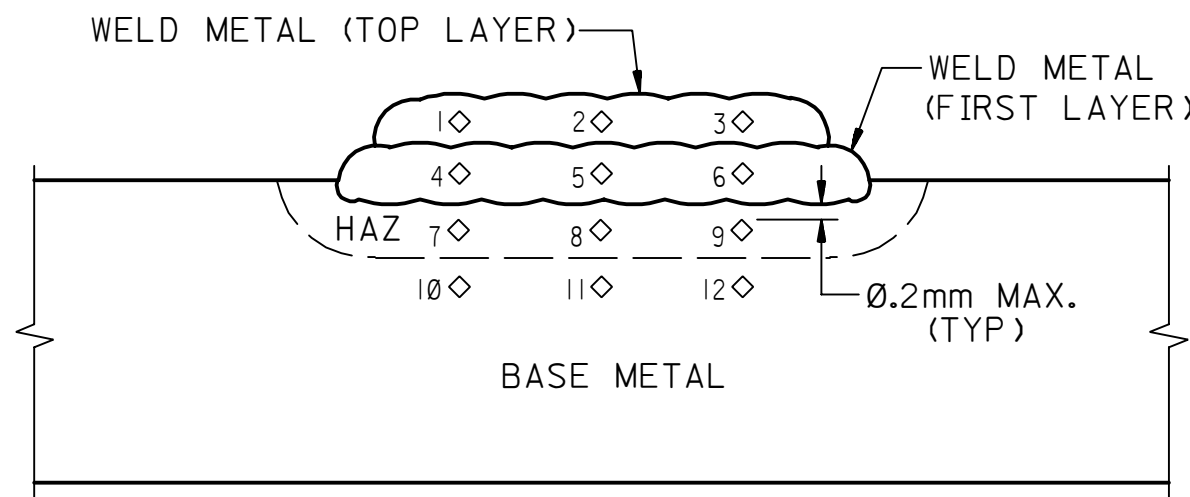
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REV. NO.	SHT. NO.	DRAWING NO.	INDEX	PLANT NO.



A - SINGLE-SIDED BUTT WELD

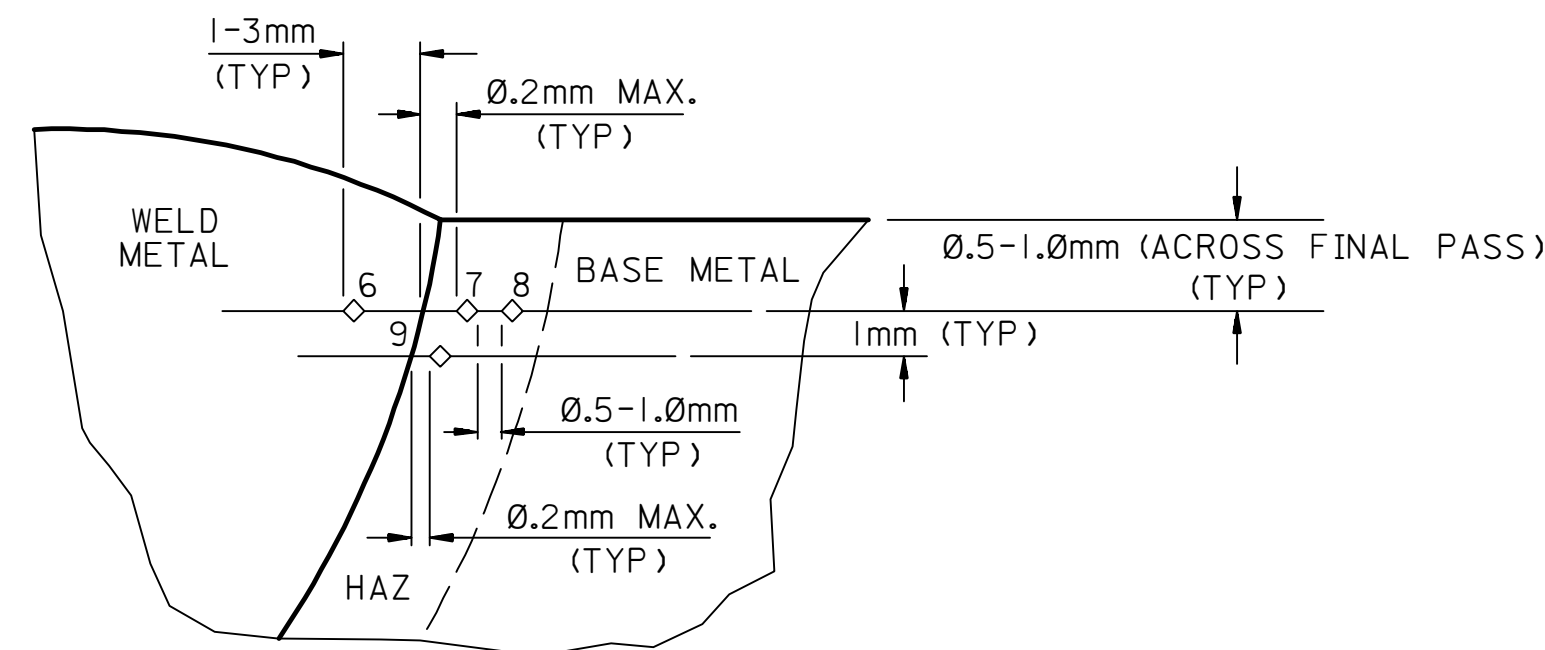


C - FILLET WELD

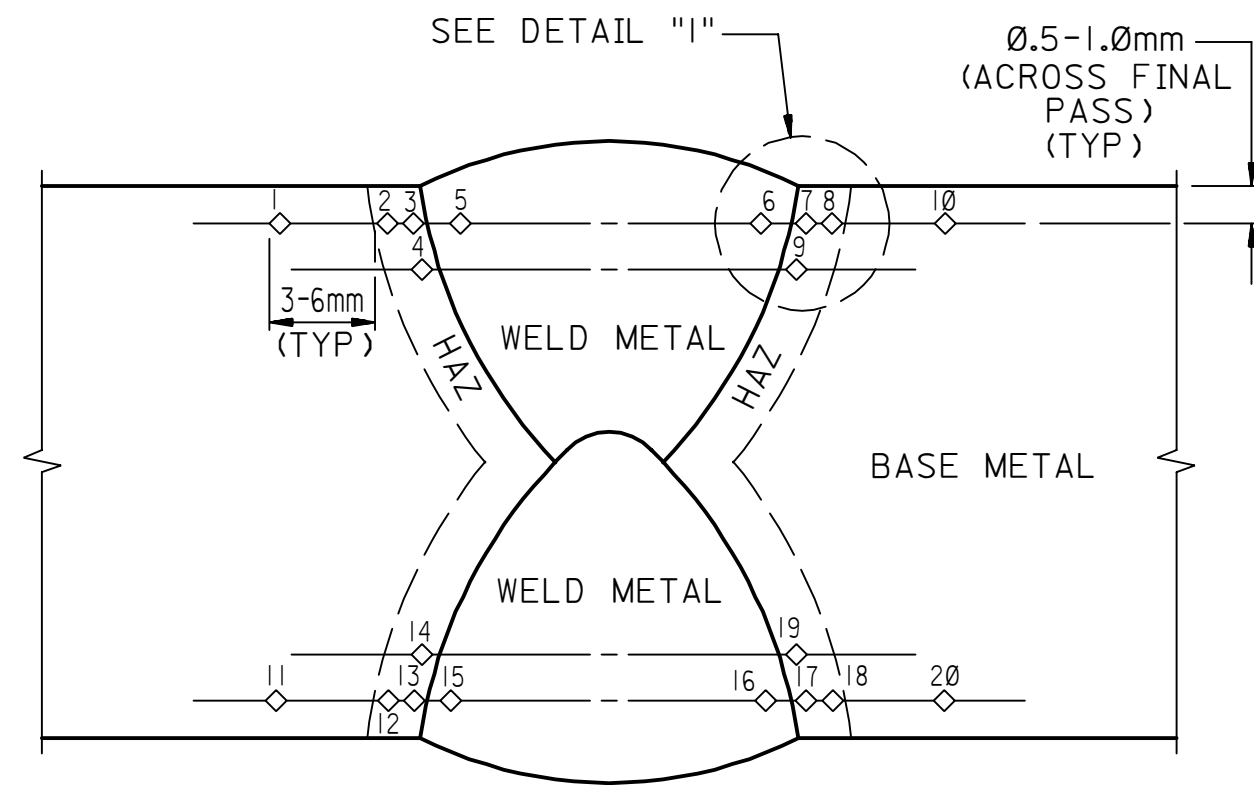


E - OVERLAY

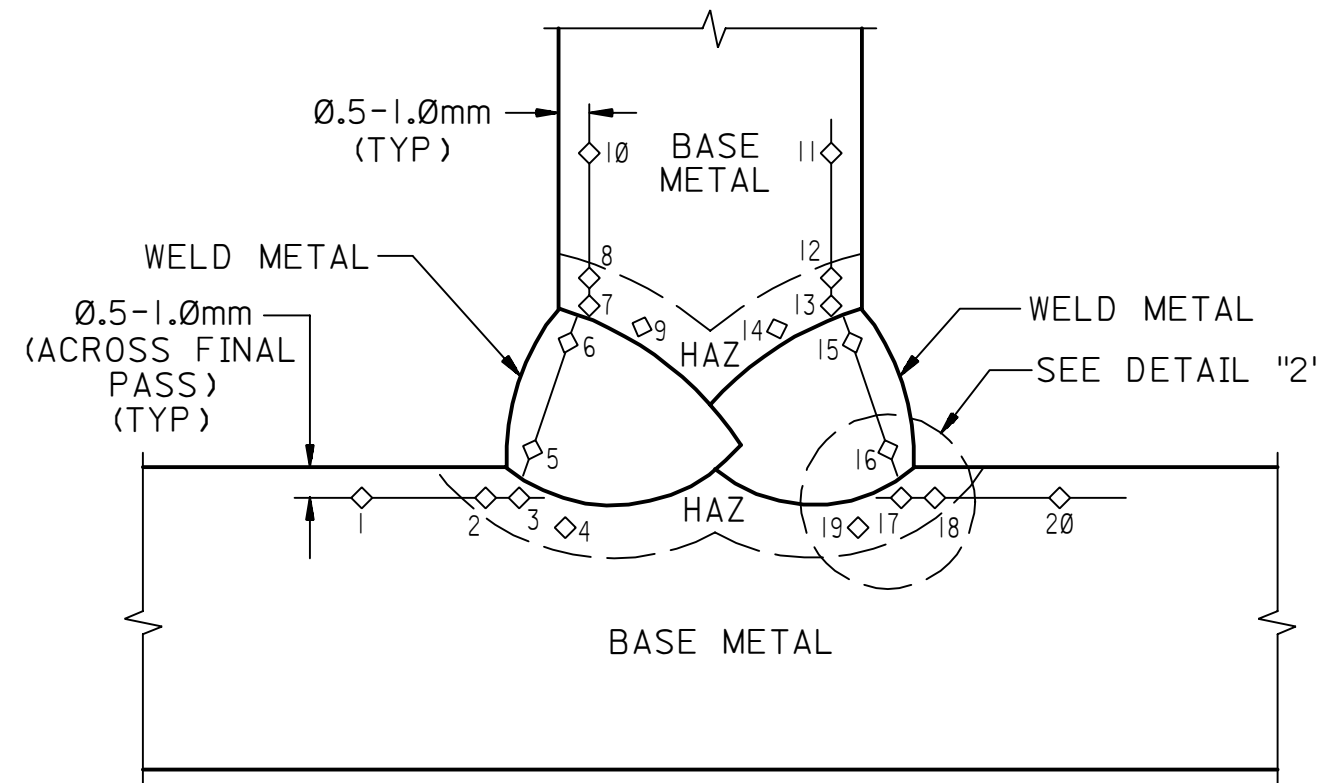
GENERAL ORIENTATION AND LOCATION OF HARDNESS INDENTATIONS



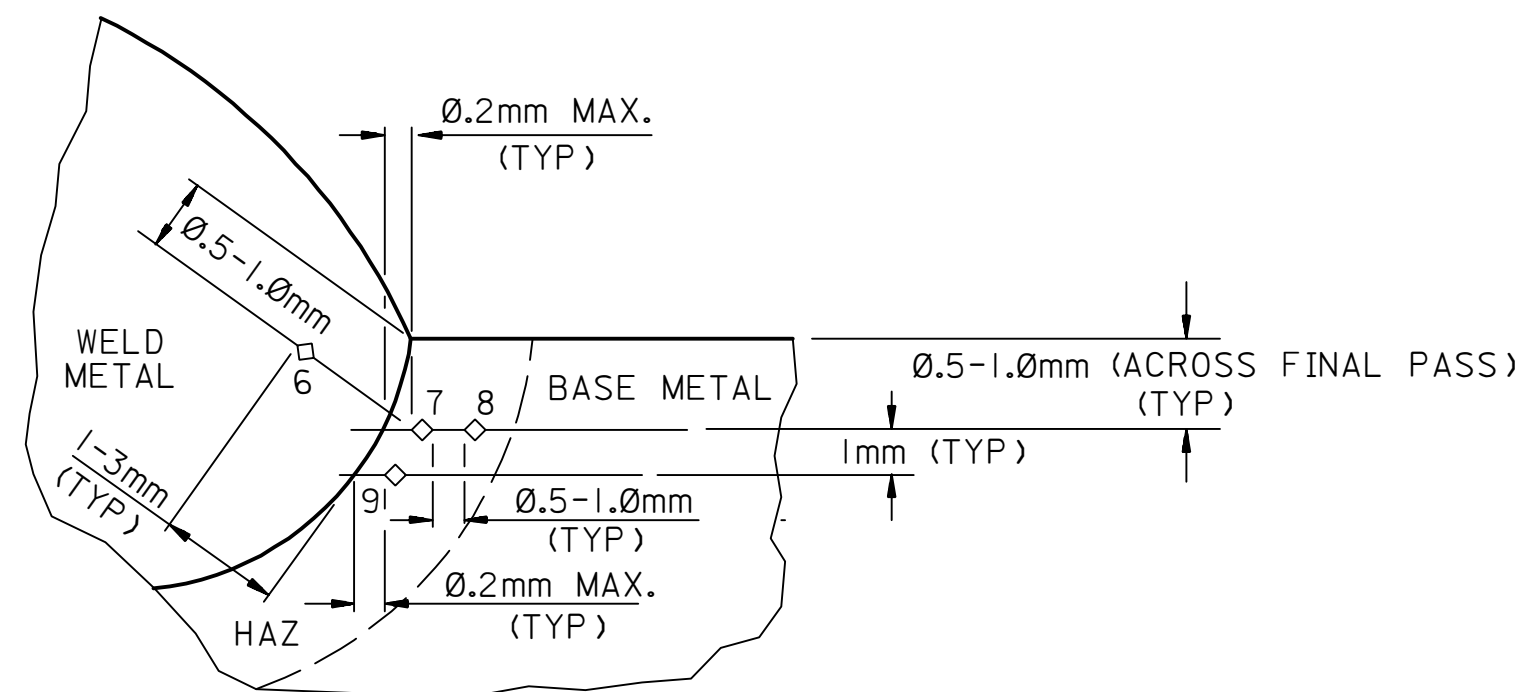
DETAIL "1"



B - DOUBLE-SIDED BUTT WELD OR BACKWELDED JOINT



D - TEE JOINT



DETAIL "2"

NOTES:

1. THE TESTING SHALL BE CONDUCTED USING THE VICKERS METHOD, USING A 5 KG. OR 10 KG. LOAD, IN ACCORDANCE WITH ASTM E92. LIGHTER LOADS MAY BE USED IF APPROVED BY ARAMCO. OTHER HARDNESS TESTING METHODS, SUCH AS ROCKWELL OR BRINELL, ARE NOT ACCEPTABLE.
2. IF THE SPECIFIED HARDNESS IS LISTED USING ANY OTHER SCALE BESIDES VICKERS, THEN THE VICKERS EQUIVALENT OF THE SPECIFIED HARDNESS SHALL BE USED. ASTM E140 SHALL BE USED FOR ANY CONVERSIONS BETWEEN HARDNESS SCALES. IF THE CONVERSION IS NOT DIRECT, THEN THE CONVERSION VALUE SHALL BE SPECIFIED BY CSD.
3. WELDING PROCEDURE QUALIFICATION TESTS SHALL INCLUDE HARDNESS TESTING OF THE BASE METAL, WELD METAL AND THE RELATED HEAT-AFFECTED ZONE (HAZ) ON A CROSS-SECTION AS PART OF THE WELDING PROCEDURE QUALIFICATION AS ILLUSTRATED.
4. HARDNESS TESTING SHALL BE CONDUCTED AS FOLLOWS:
 - a. TESTS SHALL BE CONDUCTED ON WELD CROSS-SECTIONS REMOVED FROM NEAR THE 6 AND 12 O'CLOCK POSITIONS FOR PIPE SPECIMENS OR FROM LOCATIONS 25 mm (1 IN.) FROM THE ENDS OF THE WELD FOR PLATE SPECIMENS.
 - b. THE CROSS-SECTIONS SHALL BE POLISHED TO A FINISH OBTAINED FROM A 600 GRIT OR FINER SILICON CARBIDE PAPER. THE FINISH SHALL PERMIT ACCURATE DETERMINATION OF RELEVANT MICROSTRUCTURES AFTER ETCHING.
 - c. THE CROSS-SECTIONS SHALL BE ETCHED TO REVEAL THE WELD HAZ AND THE FUSION ZONE (WELD METAL DEPOSIT).
 - d. HARDNESS TRAVERSES SHALL BE PERFORMED AS ILLUSTRATED. ALL THE HARDNESS READINGS SHALL BE INCLUDED IN THE WELDING PROCEDURE QUALIFICATION RECORD (PQR) AND SHALL BE IDENTIFIED FOR THE TYPE OF WELD JOINT AND LOCATION OF INDENTATIONS AS SHOWN.
 - e. HARDNESS TRAVERSES SHALL BE MADE APPROXIMATELY 0.5 TO 1.0 mm (0.02 TO 0.04 IN.) BELOW EACH SURFACE. THE TRAVERSE SHALL BE LOCATED TO INCLUDE THE FINAL WELD PASS. IF UNUSUALLY DEEP DECARBURIZATION IS NOTED, INDENTATIONS SHALL BE MADE 0.5-1.0 mm (0.02-0.04 IN.) BEYOND THE DECARBURIZED REGION.
5. IN CASE ANY READING EXCEEDS THE SPECIFIED LIMIT BY NO MORE THAN VHN 10, THEN A MINIMUM OF THREE (3) ADDITIONAL INDENTATIONS SHALL BE MADE NEAR THE ORIGINAL HIGH READING. IF ALL THREE (3) RETESTS ARE BELOW THE SPECIFIED LIMIT, THEN THE JOINT IS ACCEPTABLE. IF ONE OR MORE OF THE RETEST READINGS ARE FOUND TO EXCEED THE SPECIFIED LIMIT, THEN THE WELDING PROCEDURE SHALL BE CONSIDERED UNACCEPTABLE.
6. ANY UNACCEPTABLE READINGS SHALL REQUIRE A NEW PROCEDURE QUALIFICATION TEST JOINT TO BE FABRICATED AND NEW TESTS PERFORMED, INCLUDING ALL OTHER QUALIFICATION TESTS.
7. THE COMPLETED TEST SPECIMENS SHALL BE MADE AVAILABLE TO SAUDI ARAMCO FOR EXAMINATION.

MANDATORY DRAWING

Ø1	JAN90	ASC	NEW DRAWING DIGITIZED INTO CADD DATABASE.			
REV. NO.	DATE	BY	DESCRIPTION	CHKD	CERT.	APPD.

SAUDI ARABIAN OIL COMPANY

DRAWN BY _____ CHECKED BY _____ SCALE: _____ NONE
DATE STARTED _____ DATE COMPLETED _____
OPR'G. DEPT. _____ ENG. DEPT. _____
APP'D. FOR CONSTR. _____

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION OR FOR ORDERING MATERIAL UNTIL CERTIFIED AND DATED
CERTIFIED DATE

HARDNESS TESTING FOR WELDING PROCEDURE QUALIFICATIONS

STD. DWG.				METRIC	
PLANT NO.	INDEX	DRAWING NO.	SHT. NO.	REV. NO.	
990	W	AB-036386	001	01	