STRESS REPORT
FOR
WESTINGHOUSE CLASS I NUCLEAR VALVES

6-INCH AND LARGER GATE VALVES
FOR WESTINGHOUSE PWRSD

ENGINEERING MEMORANDUM NO. 5158

DECEMBER 16, 1977

VOLUMES I AND II

STRESS REPORT
FOR
WESTINGHOUSE CLASS I NUCLEAR VALVES

6-INCH AND LARGER GATE VALVES
FOR WESTINGHOUSE PWRSD

ENGINEERING MEMORANDUM NO. 5158

DECEMBER 16, 1977

VOLUME I

STRESS REPORT
FOR
WESTINGHOUSE ELECTRO-MECHANICAL DIVISION CLASS I NUCLEAR VALVES
6-INCH AND LARGER GATE VALVES

BASE PURCHASE ORDERS:

546-ACJ-214210-XN	Motor Operated Gate Valves
546-ACJ-214160-XN	Manually Operated Gate Valves

ENGINEERING MEMORANDUM
NUMBER 5158

REPORT REVISION 0 DATED December 16, 1977

ASME APPLICABILITY 1974 THROUGH WINTER, 1975 ADDENDA with specific provisions NB-3550 of the Summer 1976 Addenda.

This Stress Report is certified to meet the requirements of ASME Boiler and Pressure Vessel Code, Section III, paragraphs NA-3350 and NB-3500, and the requirements of Design Specifications G952850 and G952851.

Harry E. Eminger P.E.

12/16/77

REGISTERED PROFESSIONAL ENGINEER HARRY E. EMINGER No. 10729-E COMMONWEALTH OF PENNSYLVANIA

Portions of this report are reconstructed for publication. Additions will be included by later revision.

A. H. Campbell, Valve Engr. Mgr.

Gary L. Echbower June 28, 1979

REGISTERED PROFESSIONAL ENGINEER GARY LYNN ECHBOWER COMMONWEALTH OF PENNSYLVANIA

Westinghouse Electric Corporation Electro Mechanical Division	SUBJECT:

TABLE OF CONTENTS

VOLUME I

This stress report presents the analysis performed to insure compliance with the Equipment Specification and Section III of the ASME Boiler and Pressure Vessel Code. These gate valves are built in accordance with the 1974 edition of the code through the Winter 1975 addenda.

All the valves covered by this report have been designed and analyzed in accordance with the NB-3500 rules for Class 1 valves regardless of their actual service application. Throughout this report the specific valve models are identified by the short form of the Westinghouse Electro-Mechanical Division model number. These short form model numbers are related to the full Westinghouse EMD model number and the Westinghouse PWR valve ID number by the cross-reference that follows this introduction.

The report is certified to comply with the requirements of NB-3350 and the equipment specification. The "Certification of Compliance" section of this report provides added detail in that area.

Each section of the report is divided into two parts. The first part is a series of tables that list the applicable valves, dimensions, output stresses, and compliance to code. The second part is a generalized format that describes the analysis to be performed. All equations are developed and the allowable stresses are established in these formats.

The tables list more valves than are actually covered by this report. The reader should simply disregard the model numbers that are not applicable.

Specific provisions NB-3550 (transient analysis) of the Summer 1976 Addenda are used in this report.

VALVE CROSS REFERENCE

STRESS (3) REPORT I.D.	COMPLETE EMD (1) MODEL NUMBER	WESTINGHOUSE (2) TYPICAL VALVE I.D.
6GH82	06000GH820000D008W75	6G52, 6G72
6GH84	06000GH840000D005W75	6G74
6GM82	06000GM82FBB0D008W75	6GM72FBA
6GM87	06002GM87FHB2D000W75	6GM77FHA
6GM88	06002GM88FNB0D000W75	6GM78FNA
6GM88	06002GM88FNH0D000W75	6GM78FNB
6GW88*, 6GM88*	06000GW880000D005W75	6G78
8GH82	08000GH820000D005W75	8G52
8GH84	08000GH840000D005W75	8G74
8GM82	08000GM82FBB0D008W75	8GM72FBA
8GM84	08000GM84FEB0D005W75	8GM74FCA, 8GM74FEA
8GM84	08000GM84FEB0E005W75	8GM74FEC
8GM84	08000GM84FEB0F005W75	8GM74FEE
8GM82, 8GM82-2	08002GM82FBA0D000W75	8GM72FBA
8GM84, 8GM84-2	08002GM84FEA0E000W75	8GM74FEC
8GM88FN	08002GM88FNH0D000W75	8GM78FNB
8GM88SE	08002GM88SEH0D000W75	8GM88SEB
8GM88SE	08002GM88SEH0E000W75	8GM88SED
8GM88SN	08002GM88SNB0D000W75	8GM78SNA
10GM84	10000GM84FEB0D005W75	10GM74FEA
10GW82	10000GW820000D005W75	10G52, 10G72
10GW84	10000GW840000D005W75	10G74
10GM88	10000GM88FNB0D005W75	10GM78FNA
10GM88	10000GM88FNH0E005W75	10GM78FND
12GM84	12002GM84FEB0D000W75	12GM74FEA
12GM84	12002GM84FEH0D000W75	12GM74FEB
12GM88	12000GM88FNH0E005W75	12GM78FND
12GM88SE	12000GM88SEH0D005W75	12GM88SEB
12GM88SE	12002GM88SEH0D000W75	12GM88SEB

Footnotes: See next page

VALVE CROSS REFERENCE
(continued)

STRESS (3) REPORT I.D.	COMPLETE EMD (1) MODEL NUMBER	WESTINGHOUSE (2) TYPICAL VALVE I.D.
12GM88SE	12002GM88SEH0F000W75	12GM88SEF
14GM84	14000GM84FEB0E005W75	14GM74FEC
14GM84	14000GM84FEH0E005W75	14GM74FED
14GM84, 14GM84-2	14002GM84FEA0D000W75	14GM74FEA
14GM84, 14GM84-2	14002GM84FEA0E000W75	14GM74FEC
14GM84, 14GM84-2	14002GM84FEV0D000W75	14GM74FEB
16GM82	16002GM82FBB0D000W75	16GM72FBA
16GM82	16002GM82FBH0E000W75	16GM72FBD
14GW82*, 14GM84*	14000GW820000D005W75	14G52, 14G72
6GH92	06001GH920000D000W75	6G52, 6G72
6GH95	06001GH950000D000W75	6G54, 6G74
6GM92	06001GM92FBA0D000W75	6GM72FBA
6GM92	06001GM92FBB0D000W75	6GM72FBA
6GM95	06001GM95FEA0D000W75	6GM74FEA, 6GM74FBA
6GM95	06001GM95FEA0E000W75	6GM74FEC
6GM95	06001GM95FEA0F000W75	6GM74FEE
6GM95	06001GM95FEB0D000W75	6GM74FEA
6GM95	06001GM95FEB0E000W75	6GM74FEC
6GM95	06001GM95FEB0F000W75	6GM74FEE

(1) This report is valid for additional model numbers which do not change results.
DIGIT 12: Characters A,B,H and V are equivalent.
DIGIT 14: Characters D,E, and F are equivalent.

(2) All valves are analyzed as Code Class 1 so that the report applies equally for 6G54, 6G74, 6G84, etc.

(3) Where noted by an asterisk(*), the first I.D. listed for a valve may be used to identify Section 5 only; the remaining sections of the analysis may be based on more severe loadings and are identified by the second I.D. listed.

CERTIFICATION OF COMPLIANCE

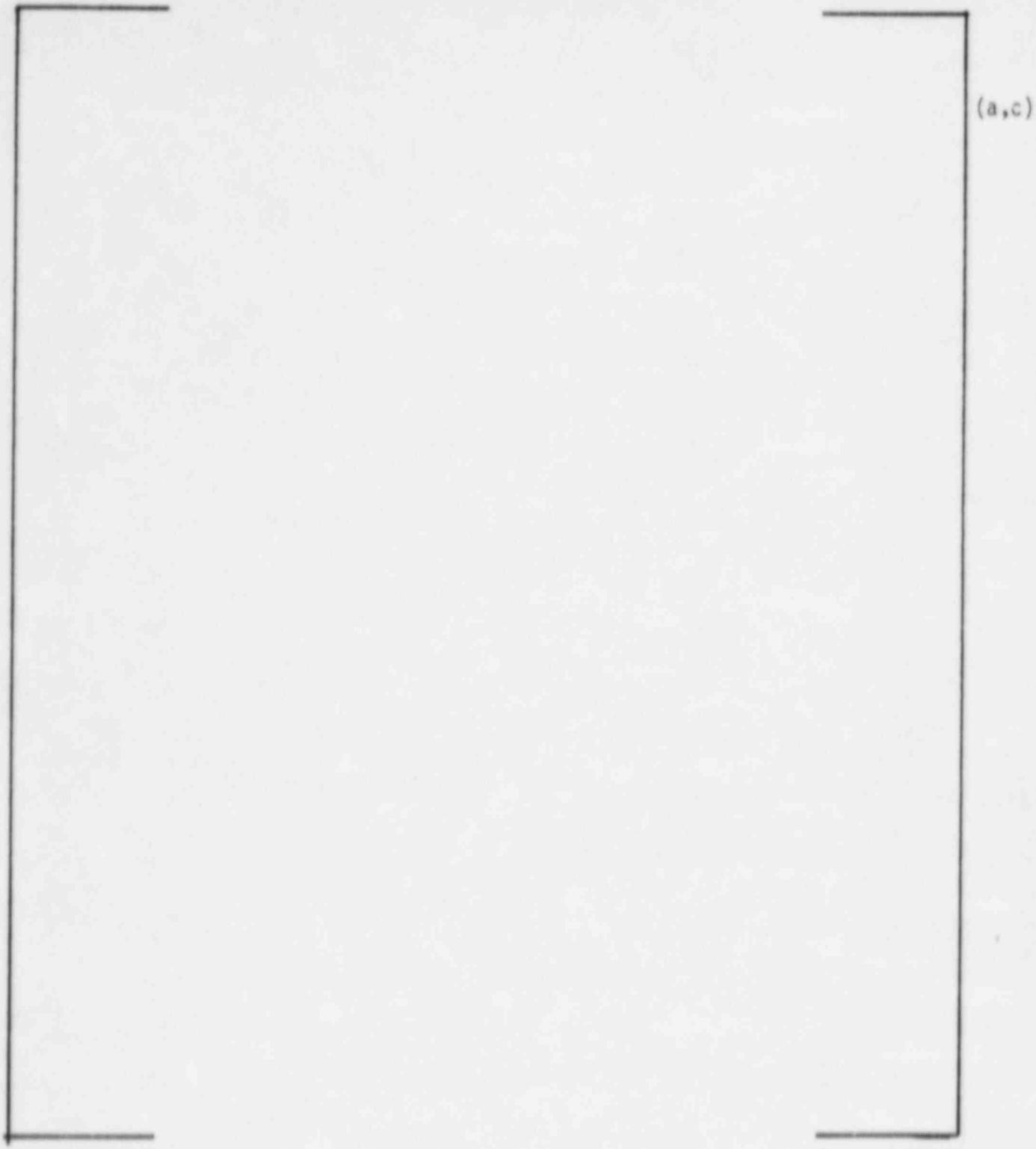
This stress report is certified to meet the requirements of the ASME Boiler and Pressure Vessel Code, Section III, paragraphs NA-3350 and NB-3500, and the requirements of Design Specification G-952850, Revision 0, and G-952851-0. Three specific equipment specification certification requirements are certified based on the information that follows:

The valves covered by this report are certified capable of sustaining the system transients defined in the equipment specification. Section 7 of this report details the calculations performed to show that valves of six-inch nominal size or larger are capable of sustaining the system transients as defined in Appendix B of the equipment specification.

The operability of the valves covered by this report will be maintained when the system piping satisfies the requirements of equipment specification. This conclusion is based on three pieces of information developed in this stress report. First, the valves satisfy the secondary-stress-due-to-pipe-reaction requirements of Section III. Second, the valve body crotch cross sectional area and bending modulus are substantially larger than the corresponding pipe valves. Therefore, the equipment specifications nozzle loads which produce a maximum cobined stress of S_y of the connected pipe, would produce much smaller stresses and deflections in the valve. Third and finally, the stress calculations of Sections 8, 9, and 10 clearly show that the valve bonnet, disc, and main flange bolting meet code and equipment specification allowable stresses for faulted loading conditions.

CERTIFICATION OF COMPLIANCE
(continued)

This report certified that nozzle (piping) end loads will not affect the structural integrity of the valves covered by this report based on three points. First, the valves satisfy the secondary stress due to pipe reaction requirements of NB-3545.2 (b). Section 6 of this report details those calculations. Second, the SA-182, Type 316 body and 304 body forging materials have a yield stress at 500°F of 19,900 psi and 19,400 psi respectively, while the connected SA-376, Type 316 pipe has a yield stress at 500°F of 19,900 psi. These numbers clearly show the material strengths are comparable. Third and finally, the valve crotch cross sectional area and section modulus are larger than 110 percent (Type 316 body) and 114 percent (Type 304 body) than the connected piping. Table I is a tabulation of the applicable section properties as taken from Section 6 of this report. Since the valve and pipe have comparable material strengths and the valve has much larger section properties, the pipe loads will cause only small deflections and stresses in the valve and will not adversely affect the valve's structural integrity.



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E.M. 5158

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Harry E. Eminger P.E.

12/16/77

REGISTERED PROFESSIONAL ENGINEER HARRY E. EMINGER No. 10720-E PENNSYLVANIA

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Additions will be included by later revision.

A. N. Campbell, Valve Engr. Mgr.

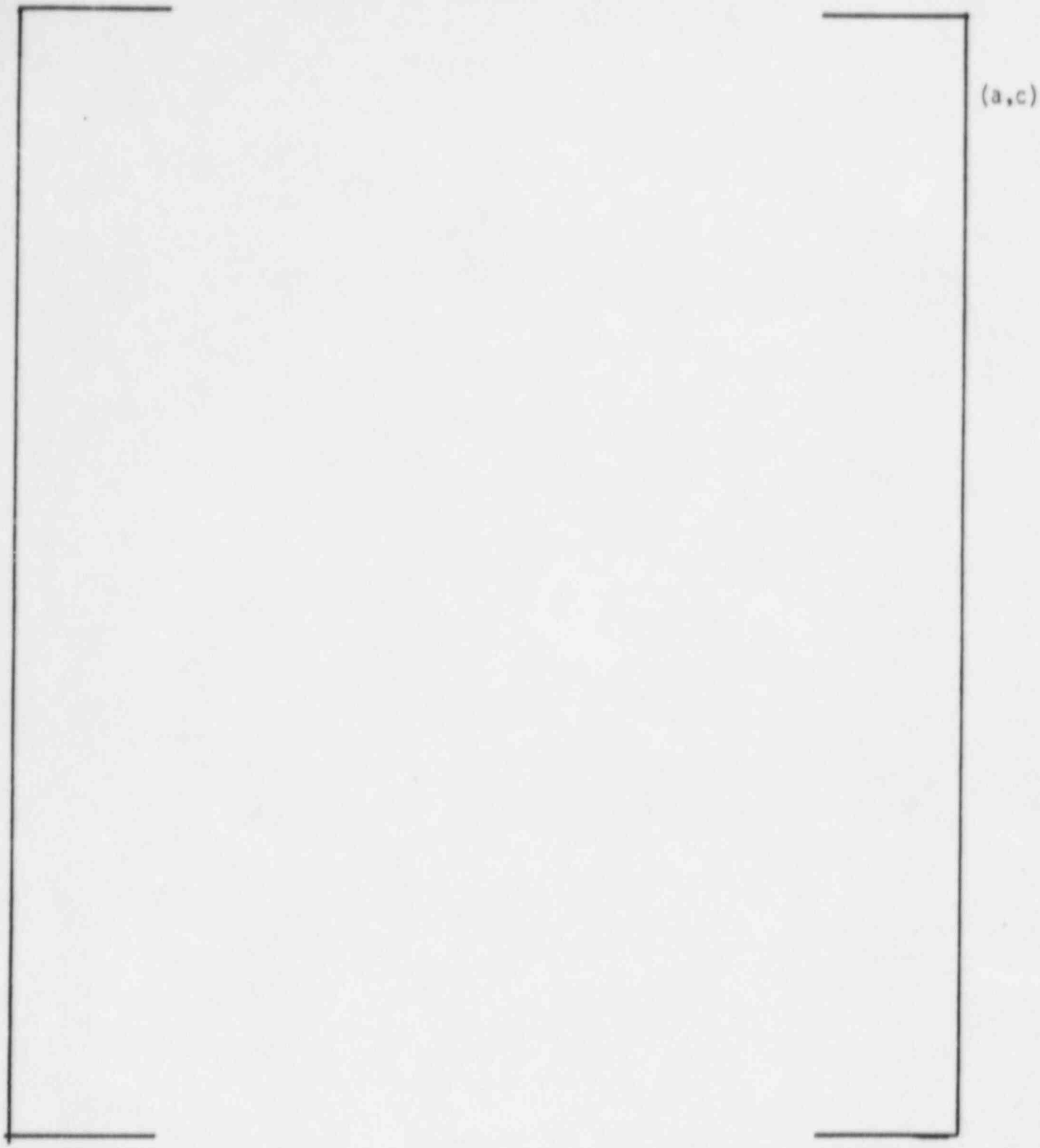
Gary L. Eilbracht June 28, 1979

REGISTERED PROFESSIONAL ENGINEER GARY LYNN EILBRACHT

Westinghouse Electric Corporation Electro Mechanical Division	SUBJECT:

TABLE OF CONTENTS

VOLUME I



(a,c)

(a,c)

DFTM NEWHOUSE	DATE 12-15-76	Westinghouse Electric Corporation	
CHKR COVERT	12-15-76	ELECTRO MECHANICAL DIV. – CHESWICK, PA. U.S.A.	
DES ENGR Zeltman	12-15-76	MOTOR OP GATE VALVE	
MFG APPL N/A		MOD 08000GM84FEB000	
DES SUPT	12/11/76	8-316 ASME CL.1 GPO ASSY	
		SIZE D	CODE IDENT NO. 04808
		DWG NO. 8373D81	
		SCALE N.T.S.	WEIGHT EST ACT LBS
		SHEET	