ATTACHMENT 3

WESTINGHOUSE DOCUMENT LTR-ME-02-15
MNSA-2 BELLEVILLE WASHER DATA

NEA02 801

WESTINGHOUSE **Document Distribution/Approval**

Project Number: 109722 / ENG	**Originator:** Attila Z. Szabo	**Initials:** A.Z.S.
Project Name: MNSA2		
Document Number: LTR-ME-02-15 Rev. 00	**Quality Record?** ☐ No ☒ Yes (See note below)	
Document Title: MNSA2 BELLEVILLE WASHER DATA	**Quality Record Retention Period (see QP 17.1):** ☒ Lifetime ☐ 3 years ☐ 10 years	
Transmittal Reason: Review/Approval/Distribution		
Reference:		

Name	Title	CEP Code	Approval Requested	Signature	Date
J. Dunford	File	12-6105-0403	☐ Yes ☒ No		
E.M. Weisel	Ind. Reviewer	12-6105-0403	☒ Yes ☐ No	Eric M. Weisel	2/1/02
J.M. Burger	Project Manager	12-6105-0403	☒ Yes ☐ No	J.M. Burger	2/1/02
	Documentum		☐ Yes ☒ No		
B.F. Allen	—	12-6105-0403	☐ Yes ☒ No		
K.H. Harlinger	—	12-6105-0403	☐ Yes ☒ No		

Comments:

* checklist attached.

Note: This form must include the attached document when designated a Quality Record.

Westinghouse

Westinghouse Electric Company
Nuclear Services
Engineering Services
2000 Day Hill Road
P.O. Box 500
Windsor, Connecticut 06095
USA

To:	SEE BELOW	**Date:**	February 1, 2002
		Total Pages:	21
From:	**Attila Z. Szabo**	**Your ref:**	N/A
Ext:	6558 **Fax:** 6540	**Our ref:**	LTR-ME-02-15
Subject:	**MNSA 2 BELLEVILLE WASHER DATA**		

Distribution:
J.M.Burger B.F.Allen K.H Haslinger E.M Weisel File

VERIFICATION STATUS: COMPLETE

The design information contained in this document has been verified to be correct by means of Design Review.

Name: Eric M. Weisel Signature: Eric M. Weisel Date: 2/1/02
Independent Reviewer

The following information is to be used to create the Belleville stack arrangements on the MNSA2 Assemblies. Attached is the Belleville information for each Belleville Type.

MNSA Description (Type)	Belleville Washers Used (Qty)	Dedication Report
MNSA 2 Type 1 (Side Pressurizer)	Stiff Bellevilles (SAI-115159), (32 Total) 8 washers per stack (2// x 2 series x 2)	For Stiff Bellevilles: (DR# 9481-99-140-1A) Attached
	Belleville Washer (SAM-321608STX) (160 Total) 40 washers per stack (20// x 2 series)	FOR Belleville Info see Attached Documents (8 pages)
MNSA 2 Type 2 (Level Nozzle, 1.062)	Stiff Bellevilles (SAI-115159), (32 Total) 8 washers per stack (2// x 2 series x 2)	For Stiff Bellevilles: (DR# 9481-99-140-1A) Attached
	Belleville Washer (SAM-321608STX) (160 Total) 40 washers per stack (20// x 2 series)	FOR Belleville Info see Attached Documents (8 pages)
MNSA 2 Type 3 (Large Dia Heater Sleeve)	Stiff Bellevilles (SAI-115159), (32 Total) 8 washers per stack (2// x 2 series x 2)	For Stiff Bellevilles: (DR# 9481-99-140-1A) Attached
	Belleville Washer (SAM-321608STX) (160 Total) 40 washers per stack (20// x 2 series)	FOR Belleville Info see Attached Documents (8 pages)
MNSA 2 Type 4 (Small Dia Heater Sleeve)	Stiff Bellevilles (SAI-115159), (32 Total) 8 washers per stack (2// x 2 series x 2)	For Stiff Bellevilles: (DR# 9481-99-140-1A) Attached
	Belleville Washer (SAM-321608STX) (160 Total) 40 washers per stack (20// x 2 series)	FOR Belleville Info see Attached Documents (8 pages)

JAN 1 8 2002

1 of 8

LTR-ME-02-15

AEC ROLEX

CERTIFICATE OF COMPLIANCE

We certify the products listed below have been inspected and meet recuirements as stated in the following purchase order or any mutually agreed upon corditions prior to delivery. Where applicable, we certify that approved suppliers were used for those processes requiring such application.

TO: WESTINGHOUSE ELECTRIC COMPANY 20 INDUSTRIAL DRIVE WINDSOR CT 06095 USA	**DATE:** 1/9/02 **PO:** 4500078170 **PART #:** SAM-321608STX **DWG. #:**

- ROLEX INFORMATION -

SALES #: 59809	**JOB/LOT #:** M084150	**QUANTITY:** 2400
PART #: SAM-321608	**MATERIAL:** 17/7	**CERT. ID #:** 3562
SUPPLIER ULBRICH	**HEAT #:** 889479	**MATERIAL P.O. #:** 14456

- PROCESS CERTIFICATION LIST -

PROCESS ID	SPECIFICATION	REV	COMMENT	CERT.
1. 60 STACKS: EACH STACK				
2. CONSISTS OF 40 SPRINGS:				
3. (20) IN // X (2) SERIES				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Equipment containing mercury or mercury compounds, have not been used in or for the fabrication, packaging, examination or testing of parts, assemblies or material supplied on this order.

James D. Croke

James D. Croke
Assistant Manager, Quality Assurance

JAN 18 2002

LTR-ME-02-15 2 of 8

AEC ROLEX

FINAL INSPECTION REPORT

Part No:	SAM-321608	MAPICS No:	M084150	Test Date:	12/18/00
Material:	17/7	Lot Size:	10000	Heat No:	889479
Samples:	20	Visual:	GOOD	Finish:	PLAIN

PART SPECIFICATIONS

DIMENSIONAL	Outside Dia.	Inside Dia.	Thickness	Overall Ht.
Nom.:	1.2400	0.6420	0.0310	0.0730
+:	0.0000	0.0100	0.0020	0.0040
-:	0.0100	0.0000	0.0020	0.0020

TEST	Hardness	Load
Scale:	HRc	@:
Nom.:	40.0	
+:	5.0	
-:	0.0	

SAMPLE READINGS

	Outside Dia.	Inside Dia.	Thickness	Overall Ht.	Hardness	Load
1:	1.2340	0.6500	0.0318	0.0726	44.0	
2:	1.2350	0.6505	0.0312	0.0736	43.0	
3:	1.2355	0.6500	0.0318	0.0732	43.0	
4:	1.2360	0.6510	0.0312	0.0735	44.0	
5:	1.2350	0.6510	0.0318	0.0736	43.0	
6:	1.2350	0.6500	0.0315	0.0729	43.0	
7:	1.2355	0.6505	0.0316	0.0730	44.0	
8:	1.2350	0.6505	0.0312	0.0728	45.0	
9:	1.2350	0.6510	0.0314	0.0742	44.0	
10:	1.2350	0.6510	0.0314	0.0730	44.0	
11:	1.2350	0.6500	0.0312	0.0731	45.0	
12:	1.2360	0.6490	0.0313	0.0733	43.0	
13:	1.2350	0.6490	0.0318	0.0734	44.0	
14:	1.2350	0.6490	0.0314	0.0724	44.0	
15:	1.2360	0.6500	0.0314	0.0731	43.0	
16:	1.2355	0.6510	0.0319	0.0734	43.0	
17:	1.2350	0.6510	0.0316	0.0762	45.0	
18:	1.2355	0.6510	0.0315	0.0731	44.0	
19:	1.2360	0.6510	0.0317	0.0729	44.0	
20:	1.2350	0.6515	0.0314	0.0731	44.0	

TOOLS USED

Die No: 691 Caliper: V-236 Depth Mic: D-105 Thk. Mic: M-204 Hard. M/C: H-101/10

Load M/C: TINIUS Other:

REMARKS

SEE ATTACHED SHEETS OF (5) STACKS TESTED AS PER NOTES 7,2 ON P/O #4500078170

CUSTOMER: WESTINGHOUSE ELECTRIC COMPANY

ID: 4235

SIGN: James D. Croke

NAME: James D. Croke

TITLE: Asst. Mgr. Quality Assurance

MATERIAL CERTIFICATION

Ulbrich
57 DODGE AVE.
NO. HAVEN, CT. 06473
AREA CODE 203 239-4481
FAX 203-239-7479
TELEX 160110

JAN 18 2002

LTR-ME-02-15 3 of 8

CUSTOMER NO.	DATE CHG		ORDER NO.	CUST PO NO.
2375551-02	10/23/00	ULBRICH OF NEW ENGLAND	181318	14456

SOLD TO: ROLEX DIVISION OF AMERICAN
ENGINEERED COMPONENTS INC
385 HILLSIDE AVE
HILLSIDE NJ 07205

SHIP TO: ROLEX DIVISION OF AMERICAN
ENGINEERED COMPONENTS INC
385 HILLSIDE AVE
HILLSIDE NJ 07205

COL	PPD	EQ
X		

SHIP VIA: NEW PENN

#	GAUGE	TEMPER	FINISH	WIDTH	LENGTH	EDGE	QTY ORDERED	U/M
177PH	.03200	AN	#2	1.5000	0.000	3S	250.00	LB
TOL +	.00100		TOL +	0.0050	.00000	CAMBER	FLATNESS	
−	.00100		−	0.0050	+ −	.25" IN 8'	NO	

Part #SAM-321608
Lot #MO 84150

CUST. P/N: MO# 84150 SAM321608

CUST. SPEC.: AMS5528/MIL-S-25043ILS

CHEMICAL ANALYSIS

HEAT NO. 889479

CARBON	: .080	NICKEL	: 7.29
MANGANESE	: .75	ALUMINUM	: 1.03
SILICON	: .49		
PHOSPHORUS	: .014		
SULPHUR	: .001		
CHROMIUM	: 16.75		

ROLEX QUALITY REVIEW

MECHANICAL PROPERTIES AT ROOM TEMPERATURE

TENSILE (PSI): 131800	HARDNESS : B 79	BEND TEST:
YIELD (PSI): 43900	GRAIN SIZE:	ACCEPTABLE
ELONG (%): 42	HARDNBLTY :	EMBRITTLE:

MECHANICAL PROPERTIES AFTER HEAT TREATMENT

TENSILE (PSI): 183500	HARDNESS : C 43
YIELD (PSI): 155000	
ELONG (%): 8	HARDNBLTY :
STRESS RUPTURE TEST:	

MECHANICAL PROPERTIES AT DEG. F

TENSILE (PSI):	HARDNESS :
YIELD (PSI):	
ELONG (%):	HARDNBLTY :

OTHER PROPERTIES

THIS MATERIAL IS FREE FROM MERCURY CONTAMINATION

COMMENTS

MATERIAL CONFORMS TO AMS 5528F, MIL-S-25043C
ECHO TEST PER ASTM E290

SIGNED: Patrick Robb
PATRICK ROBB
TITLE: GENERAL PROCESS/PRODUCT ASSURANCE MANAGER
DATE: 10/31/00

MA-001 9/91

SUBJECTED TO ULBRICH QUALITY PROCEDURES.
CERTIFICATION CAN NOT BE COPIED EXCEPT IN FULL

WEIGHT SHIPPED 218.00 TG

ABB
ASEA BROWN BOVERI

ABB-CENP DOCUMENT DISTRIBUTION/APPROVAL

CONTRACT (No. & NAME)/TASK	ATTACHED DOCUMENT No.	ORIGINATOR	INITIAL
9481-99-140 FSME	9481-99-140-1A Rev. 0	T.S. BERNARD	TSB

TITLE OF ATTACHED DOCUMENT: DEDICATION REPORT

QUALITY RECORD: YES (NOTE A) / NO

REASON FOR TRANSMITTAL: APPROVAL

DISTRIBUTION

NAME	TITLE	CEP CODE			APPROVAL REQUESTED	SIGNATURE	DATE
P.A. HELLANDBRAND	IR	9426/1930			☒	[illegible]	1-25-00
M.W. STEWART	QC	"		X	☐		
					☐		
					☐		
XC: J.T. McGARRY	PM	9481-1934		X	☐		
A.Z. SZABO	Cog Eng	"		X	☐		
					☐		
					☐		
ORIGINAL: 9903791					☐		
					☐		
					☐		
					☐		
					☐		
					☐		
					☐		
					☐		
					☐		

Special Comments

Note A: This form must be included with the attached document when designated as a quality record.

Form # 0090239 (Rev. 3/91)

ABB Combustion Engineering Nuclear Operations
Nuclear Spare Parts (NSP)

DEDICATION REPORT

DR #: 9481-99-140-1A REV: 0
DR PAGE: 1 OF 11

CUSTOMER: FSME

DEDICATED ITEM		APPLICABLE PROCESSING INFORMATION	
ITEM PART NUMBER:	SAI-115159	~~NSP P.O.~~ REQ. NO.:	9481-99-140
PART DESCRIPTION:	WASHER, BELLEVILLE	~~NSP~~ ITEM NO.:	1
DEDICATED QUANTITY:	1048	XNRN #:	N/A
PART APPLICATION:	MNSA	CUSTOMER P.O. NO.:	N/A

IDENTIFICATIONS (i.e. SERIAL NUMBERS, ETC.):

COMMENTS / NOTES:

DOCUMENTS ATTACHED WITHIN THIS REPORT:

DWO & APP
ROLEX DOC'S
ULBRICH MAT'L CERT.

This document attests that the requirements of NSP's Dedication Work Order # 2476 ,revision 0 have been satisfactorily completed and that the part(s) has/have been validated as a suitable spare part for the safety-related system/component designated.

NSP COGNIZANT ENGINEER	DATE	NSP INDEPENDENT REVIEWER	DATE
[signature]	1/25/00	[signature]	1-25-00

DR

ABB

ABB Combustion Engineering Nuclear Power
Nuclear Spare Parts (NSP)

DEDICATION WORK ORDER
(DWO)

DR PAGE 2 OF 11

DR # 9581-99-140-1A REV. 0

DWO# 2476 REV. 00	P.O.#Requisition 9481-99-140	ITEM NO. 1	QTY. 1000 1048	DWO PAGE 1 OF 2
P/N: SAI-115159	DESC. Washer, Belleville Style		XNRN# n/a	

OP#	FUNCT.	VERIFICATION ACTIONS	INITIAL AND DATE FOR COMPLETED OP.
		Critical Characteristics: Dimensions (OD, ID, Thickness, OAH) and material.	
		Nominal Dimensions: 1.100"OD x .512 ID x .059" Thk. x .087" OAH;	
		Material: 17/7ph Stainless Steel.	
1	WH	Perform standard receipt inspection to verify quantity, freedom from shipping damage	MWS 1/24/00
		and part identification.	
		RECEIVED 1,048 PLUS 24 TEST SAMPLES	
2	QC	Verify that correct parts were received based upon the part number and description	MWS 1/24/00
		shown above. Review documentation furnished with the washers.	
3	QC	Perform a material check using the Alloy Type Sorter in accordance with ASTM E977	MWS 1/24/00
		to determine lot consistency.	
4	QC	Check dimensions for OD, ID, Thickness and OAH to catalog data furnished by Rolex	MWS 1/24/00
		Company-National Disc Spring Division. (ref: ABB PO 9901994 and DWO #2431).	
5	QC	Check hardness of five washers from the lot to be in the range of Rockwell C 40-45.	MWS 1/24/00
		EIGHT WASHERS DONE — SEE APPENDIX	
6	QC	Record results and measuring and test equipment used.	MWS 1/24/00
		SEE APPENDIX	

ENG. [signature] DATE: 10/8/99 Q.C. Mark W. Stewart [signature] DATE: 10/8/99

DWO 12/96 FUNCTIONS: ENG=ENGINEERING QC=QUALITY CONTROL WH=MATERIALS MANAGEMENT (WAREHOUSING)

DEDICATION WORK ORDER CONTINUATION

DR PAGE 3 OF 11
DR# 9481-99-140-1A REV. 0

DWO# 2476	P.O. NO. Requisition #8481-99-140	DWO PAGE 2 OF 2

VERIFICATION EQUIPMENT IDENTIFICATION(S)

NSP-006
NSP-070
NSP-019
EL-1984

IF APPLICABLE, NONCONFORMANCE DISPOSITION REPORT (NDR) SECTION

NDR#	APPLICABLE OP.	EFFECTED QUANTITY	ISSUE DATE	ISSUER (INITIALS)		CLOSEOUT VERIFIED (INT.)

OP#	NOTES	
4	THE FOLLOWING SPECIFICATIONS WERE PROVIDED BY ROLEX:	MWA

PART SPECIFICATIONS

	Outside Dia.		Inside Dia.		Thickness		Overall Ht.		Hardness		Load
											@ : .021" F
OD:	1.1000	✓	ID: 0.5120	✓	TH: 0.0590	✓	OH: 0.0870	✓	HRc: 40.0	✓	Load: 693
+:	0.0000	X	+: 0.0070	✓	+: 0.0020	X	+: 0.0040	✓	+: 5.0	X	+: 104
-:	0.0080	✓	-: 0.0000	✓	-: 0.0020	X	-: 0.0020	✓	-: 0.0	✓	-: 52

	PO # 9903791	
4	NOTE REVISED TOLERANCING AS SHOWN IN ROLEX FINAL INSPECTION REPORT DATED 1/18/2000	MWA

DWOCONT2

Pick list 44030

12/09/99 12:42:23 STUART Page 1
Original S1024946 MM

Company . . : 1 ROLEX DIV.
Customer . . : 10492500 ABB COMBUSTION ENGINEERING NUCLEAR
Order no. . : CO 46054 PO no. . : 9903791

		Request	Schedule	Order
Accepts backorders? . :	Yes			
Accepts partial ship? :	Yes	12/05/99	12/05/99	10/22/99
Accepts substitute? . :	Yes			
Advance ship notice? . :	No			

Ship to . . : (Override) Trns Terms :
Instructions . : UPS PPD & ADD

Address
ABB CE NUCLEAR POWER, INC.
NUCLEAR SPARE PARTS WRHS
800 PROSPECT HILL ROAD
WINDSOR CT 06095-0500
UNITED STATES OF AMERICA

Warehouse . : 1 FINISHED GOODS WAREHOUSE

Item number/ Location	Description/ Serial#	Pack code	Line item Ship date	Rls/ U/M	Pick qty/ Qty picked
SAI-115159 SS3-1	1.100 X .512 X .059 X .087 S/S N		100 12/05/99	00001 EA	1,000.000 ✓

STAINLESS STEEL 17/7 PH
TO BE LOAD TESTING OF 3
STACKS (2 IN PARALELL X
4 IN SERIES)
C OF C REQUIRED
MATERIAL CERT REQUIRED
FINAL INSPECTION REPORT
(WITH LOAD/DEFLECTION
TEST REPORT)

DR# 9481-99-140-1A REV: 0
DR PAGE 4 OF 11

MO-73370

MERCHANDISE MAY NOT BE RETURNED WITHOUT PRIOR AUTHORIZATION FROM HOME OFFICE. NON CATALOG ITEMS CANNOT BE RETURNED. RETURNABLE ITEMS SUBJECT TO 25% RESTOCKING CHARGE.

ROLEX COMPANY

CERTIFICATE OF COMPLIANCE

We certify the products listed below have been inspected and meet requirements as stated in the following purchase order or any mutually agreed upon conditions prior to delivery. Where applicable, we certify that approved suppliers were used for those processes requiring such application.

TO: ABB CE NUCLEAR POWER, INC.	**DATE:** 1/20/2000 **PO:** 9903791
	PART #: SAI-115159
	DWG. #:

- ROLEX INFORMATION -

SALES #:	46054	**JOB/LOT #:**	M073370	**QUANTITY:**	1000
PART #:	SAI-115159	**MATERIAL:**	17/7 PH SS	**CERT. ID #:**	2207
SUPPLIER:	ULBRICH	**HEAT #:**	885060	**MATERIAL P.O. #:**	12094

- PROCESS CERTIFICATION LIST -

PROCESS ID	SPECIFICATION	REV	COMMENT	CERT.
1. NOTE: LOAD vs			AS PER PURCHASE	
2. DEFLECTION DATA FROM			ORDER.	
3. STARTING HT TO SOLID				
4. FOR 3 STACKS ✓ ✓				
5. CONSISTING OF 2 IN // X 4			DR# 9481-99-140-1A REV: 0	
6. IN SERIES			DR PAGE 5 OF 11	
7. (8 SPRINGS TOTAL) IS				
8. ENCLOSED.				
9.				
10.				

Equipment containing mercury or mercury compounds, have not been used in or for the fabrication, packaging, examination or testing of parts, assemblies or material supplied on this order.

James D. Croke

James D. Croke
Assistant Manager, Quality Assurance

ROLEX COMPANY FINAL INSPECTION REPORT

Part No:	SAI-115159	MAPICS No:	M073370	Test Date:	1/18/2000
Material:	17/7	Lot Size:	2500	Heat No:	885060 8 MWA 1/25/00
Samples:	13/8	Visual:	GOOD	Finish:	PLAIN

PART SPECIFICATIONS

	Outside Dia.		Inside Dia.		Thickness		Overall Ht.		Hardness		Load
										⊕:	
OD:	1.1000	ID:	0.5120	TH:	0.0590	OH:	0.0870	HRc:	40.0	Load:	
+:	0.0050	+:	0.0070	+:	0.0030	+:	0.0040	+:	4.0	+:	
-:	0.0080	-:	0.0000	-:	0.0030	-:	0.0020	-:	0.0	-:	

SAMPLE READINGS

	Outside Dia.		Inside Dia.		Thickness		Overall Ht.		Hardness		Load
1:	1.1020	1:	0.5140	1:	0.0584	1:	0.0881	1:	41.0	1:	
2:	1.1020	2:	0.5140	2:	0.0583	2:	0.0905	2:	40.0	2:	
3:	1.1020	3:	0.5150	3:	0.0584	3:	0.0889	3:	42.0	3:	
4:	1.1020	4:	0.5150	4:	0.0586	4:	0.0909	4:	41.0	4:	
5:	1.1010	5:	0.5140	5:	0.0582	5:	0.0903	5:	41.0	5:	
6:	1.1025	6:	0.5140	6:	0.0584	6:	0.0899	6:	42.0	6:	
7:	1.1020	7:	0.5140	7:	0.0586	7:	0.0886	7:	40.0	7:	
8:	1.1020	8:	0.5150	8:	0.0586	8:	0.0901	8:	41.0	8:	
9:	1.1020	9:	0.5140	9:	0.0584	9:	0.0904	9:		9:	
10:	1.1015	10:	0.5140	10:	0.0584	10:	0.0889	10:		10:	
11:	1.1020	11:	0.5150	11:	0.0583	11:	0.0890	11:		11:	
12:	1.1020	12:	0.5140	12:	0.0582	12:	0.0891	12:		12:	
13:	1.1020	13:	0.5140	13:	0.0583	13:	0.0884	13:		13:	
14:		14:		14:		14:		14:		14:	
15:		15:		15:		15:		15:		15:	
16:		16:		16:		16:		16:		16:	
17:		17:		17:		17:		17:		17:	
18:		18:		18:		18:		18:		18:	
19:		19:		19:		19:		19:		19:	
20:		20:		20:		20:		20:		20:	

TOOLS USED

Die No: 55 Caliper: V-236 Depth Mic: D-105 Thk. Mic: M-204 Hard. M/C: H-101/102

Load M/C: CARLSON Other: NOTE: LOAD TEST: SEE ATTATCHED CHARTS

REMARKS

NOTE: LOAD TESTS FOR 3 STACKS OF 2 IN // X 4 IN SERIES

DR# 9481-99-140-1A REV: 0

DR PAGE 6 OF 11

CUSTOMER: ABB CE NUCLEAR POWER, INC.

PASS: Yes

SIGN: James D. Croke

NAME: James D. Croke

TITLE: Asst. Mgr. Quality Assurance

MATERIAL CERTIFICATION

Ulbrich
57 DODGE AVE.
NO. HAVEN, CT. 06473
AREA CODE 203 239-4481
FAX 203-239-7479
TELEX 180110

INSPECTION NO.	DATE ORD.		JOB NO.	CUST. P.O. NO.
75551-02	11/23/99	ULBRICH OF NEW ENGLAND	175668	12094

SOLD TO: ROLEX DIVISION OF AMERICAN
ENGINEERED COMPONENTS INC
385 HILLSIDE AVE
HILLSIDE NJ 07205

SHIP TO: ROLEX DIVISION OF AMERICAN
ENGINEERED COMPONENTS INC
385 HILLSIDE AVE
HILLSIDE NJ 07205

COL. X | PPO. | EC

SHIP VIA: NEW PENN

TYPE	GAUGE	TEMPER	FINISH	WIDTH	LENGTH	EDGE	QTY ORDERED U/M
177PH	.05900	AN	#2	1.3120	0.000	3S	100.00 LB

TOL + / −		TOL + / −		CAMBER	FLATNESS
.00200 / .00200		0.0050 / 0.0050	+ .00000 / −	.50" IN 8'	NO

Part #SAI-115159
Lot #M073370

CUST. P/N: MO# 073370

CUST. SPEC.: AMS5528MILS25043ILS

CHEMICAL ANALYSIS

HEAT NO. 885060

CARBON	: .08	NICKEL	: 7.05
MANGANESE	: .75	ALUMINUM	: 1.1
SILICON	: .26		
PHOSPHORUS	: .019		
SULPHUR	: .001		
CHROMIUM	: 16.76		

ROLEX QUALITY REVIEW

MECHANICAL PROPERTIES AT ROOM TEMPERATURE

TENSILE (PSI): 131900
YIELD (PSI): 53300
ELONG (%): 36

HARDNESS : B 88
GRAIN SIZE:
HARDNBLTY :

BEND TEST:
OK
EMBRITTLE:

MECHANICAL PROPERTIES AFTER HEAT TREATMENT

TENSILE (PSI): 228300
YIELD (PSI): 212300
ELONG (%): 8.5
STRESS RUPTURE TEST:

HARDNESS : C 49
HARDNBLTY :

MECHANICAL PROPERTIES AT 0000 DEG. F

TENSILE (PSI): 196600
YIELD (PSI): 180000
ELONG (%): 8

HARDNESS : C 45
HARDNBLTY :

OTHER PROPERTIES

DR# 9481-99-140-1A REV: 0

THIS MATERIAL IS FREE FROM MERCURY CONTAMINATION

DR PAGE 7 OF 11

COMMENTS

MATERIAL CONFORMS TO AMS 5528F, MIL-S-25043C

TESTED TO ULBRICH QUALITY PROCEDURES
CERTIFICATION CAN NOT BE COPIED EXCEPT IN FULL

SIGNED: Theresa Goral Theresa Goral
TITLE: Q. A. Analyst
DATE: 12/07/99

NET WEIGHT SHIPPED 152.00

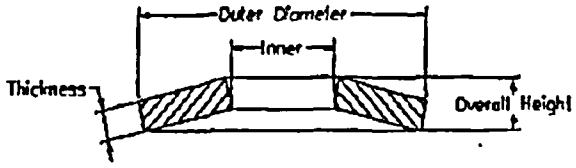
MA-001 9/91

ABB COM ENG NUCLEAR

ACTUAL Vs. THEORETICAL
STACKING Load Vs. Deflection
January 19, 2000

Rolex Part# SAI-115159

Lot # M073370



Part Number: SAI-115159

Sample No.: 1

Dimensional Characteristics

Outer Diameter	(OD)	1.100	Material Type: 17/7
Inner Diameter	(ID)	0.512	Brg. Flat: 0.00
Thickness	(th)	0.059	Radius All Corners: 0.01
Overall Height	(OH)	0.087	h/t ratio: 0.48

Stacking arrangement

Number of Springs in PARALLEL 2

Number of Groups in SERIES 4

Tolerances are in accordance with the Rolex Company catalog printed during the year of this forms approval or unless otherwise noted.

Deflection Inches	Height mm	Load Theory Pounds	Load (Actual) Compression Pounds	Load (Actual) Relaxation Pounds
0.000	0.584	0	0	0
0.006	0.578	109	95	23
0.011	0.573	218	174	79
0.017	0.567	318	272	155
0.023	0.561	419	378	237
0.028	0.556	517	463	309
0.034	0.550	613	561	395
0.040	0.544	706	661	481
0.045	0.539	798	741	552
0.051	0.533	888	836	642
0.057	0.527	976	924	732
[illegible]	[illegible]	1,044	1,003	794
0.068	0.516	1,147	1,092	880
0.074	0.510	1,231	1,178	964
0.079	0.505	1,314	1,252	1,036
0.085	0.499	1,396	1,334	1,126
0.091	0.493	1,477	1,434	1,220
0.096	0.488	1,557	1,510	1,296
0.102	0.482	1,637	1,602	1,396
0.108	0.476	1,717	1,692	1,502
0.113	0.471	1,797	1,775	1,600

Chart Loads are in Pounds (lbs) and Deflection is in Inchs (in).

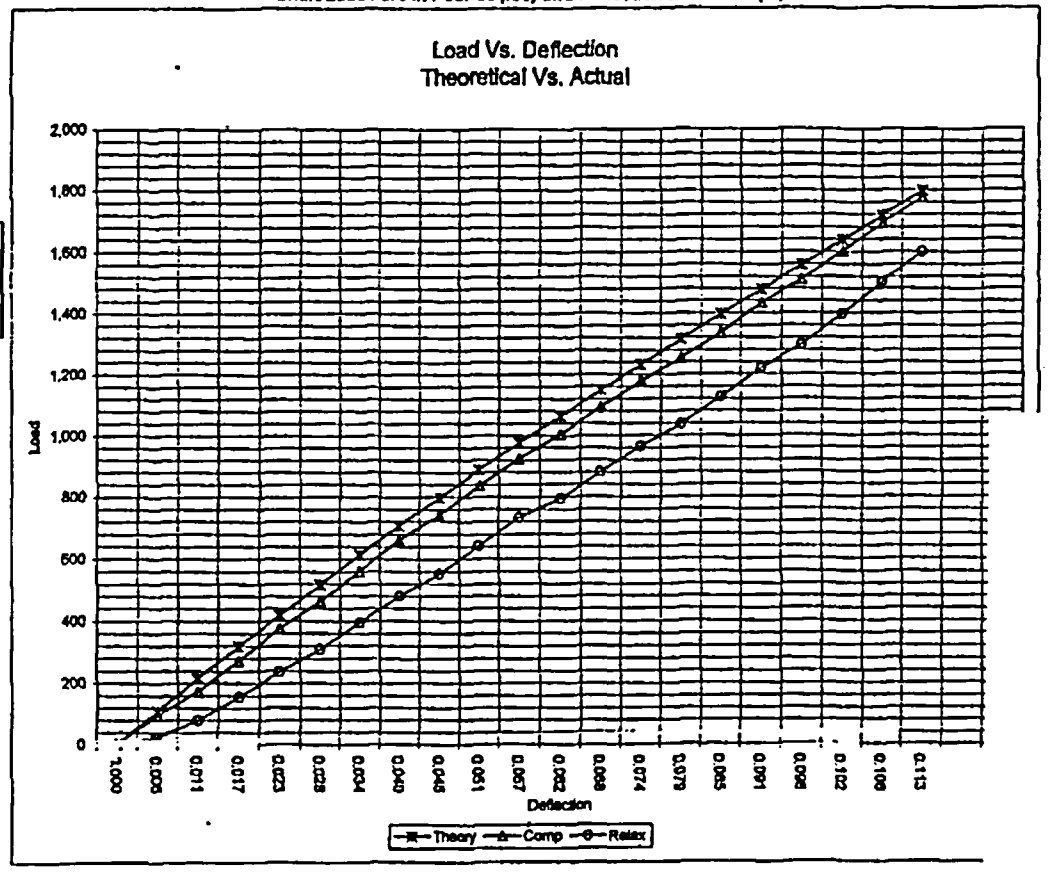


Chart Loads are in Pounds (lbs) and Deflection is in Inchs (in).

Avg. Spring Rate
15,874
lbs/in

Rolex Company
Division of AEC
385 Hillside Avenue Phone: 973 926 0900
Hillside, NJ 07205 Fax: 973 926 5426
ISO 9001/QS-9000:ISO 9002
Quality System Certified

Form Number QAP-F-E8
Developed by DEL 01/96
Modified 1/2000

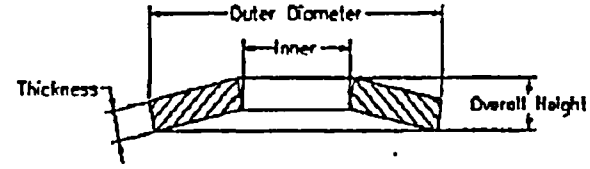
DR# 9481-99-140-18 REV: 0
DR PAGE 8 OF 11

ABB COM ENG NUCLEAR

ACTUAL Vs. THEORETICAL
STACKING Load Vs. Deflection
January 19, 2000

Rolex Part# SAI-115159

Lot # M073370



Part Number: SAI-115159

Sample No.: 2

Dimensional Characteristics

Outer Diameter	(OD)	1.100	Material Type:	17/7
Inner Diameter	(ID)	0.512	Brg. Flat:	0.00
Thickness	(th)	0.059	Radius All Corners:	0.01
Overall Height	(OH)	0.087	h/t ratio:	0.48

Stacking arrangement

Number of Springs in PARALLEL 2

Number of Groups in SERIES 4

Tolerances are in accordance with the Rolex Company catalog printed during the year of this forms approval or unless otherwise noted.

Deflection Inches	Height mm	Load Theory Pounds	Load (Actual) Compression Pounds	Load (Actual) Relaxation Pounds
0.000	0.584	0	0	0
0.006	0.578	109	77	17
0.011	0.573	215	152	63
0.017	0.567	318	247	139
0.023	0.561	419	352	222
0.028	0.556	517	435	292
0.034	0.550	613	533	376
0.040	0.544	706	630	460
0.045	0.539	798	712	531
0.051	0.533	888	802	615
[illegible]	[illegible]	[illegible]	492	100
[illegible]	[illegible]	1,062	968	770
0.068	0.516	1,147	1,057	857
0.074	0.510	1,231	1,145	943
0.079	0.505	1,314	1,222	1,017
0.085	0.499	1,396	1,316	1,109
0.091	0.493	1,477	1,408	1,206
0.096	0.488	1,557	1,485	1,283
0.102	0.482	1,637	1,598	1,382
0.108	0.476	1,717	1,665	1,488
0.113	0.471	1,797	1,734	1,579

Chart Loads are in Pounds (lbs) and Deflection is in Inchs (in).

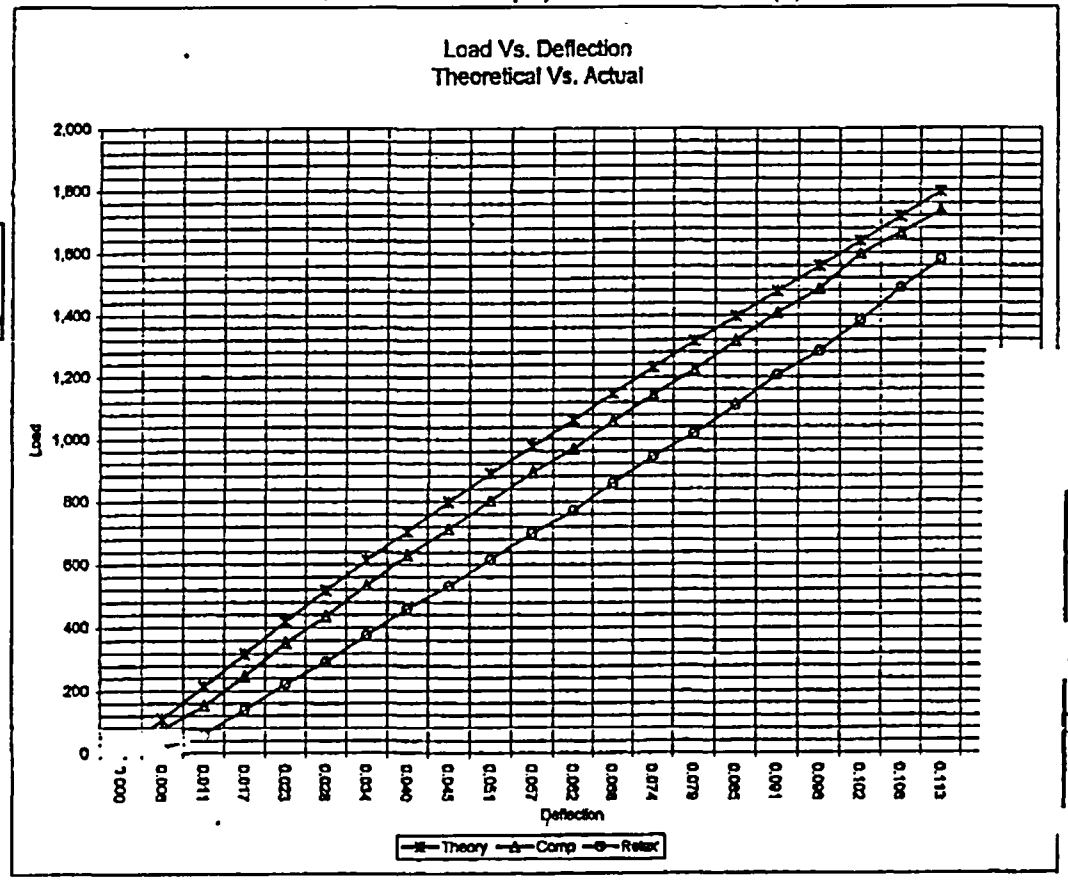


Chart Loads are in Pounds (lbs) and Deflection is in Inchs (in).

Avg. Spring Rate
15,874
lbs/in

Rolex Company
Division of AEC
325 Hillside Avenue Phone: 973 926 0900
Hillside, NJ 07205 Fax: 973 926 5426
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Developed by DEL 91/96
Modified 1/2000

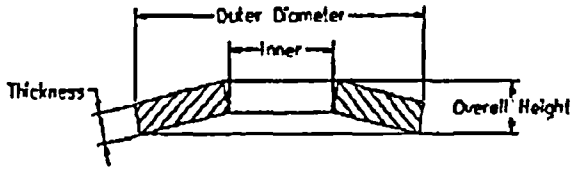
DR# 9481-99-190-1A REV: 0
DR PAGE 9 OF 11

ABB COM ENG NUCLEAR

ACTUAL Vs. THEORETICAL
STACKING Load Vs. Deflection
January 19, 2000

Rolex Part# SAI-115159

Lot # M073370



Part Number: SAI-115159

Sample No.: 3

Dimensional Characteristics

Outer Diameter	(OD)	1.100	Material Type: 17/7
Inner Diameter	(ID)	0.812	Brg. Flat: 0.00
Thickness	(th)	0.059	Radius All Corners: 0.01
Overall Height	(OH)	0.087	h/t ratio: 0.48

Stacking arrangement

Number of Springs in PARALLEL 2

Number of Groups in SERIES 4

Tolerances are in accordance with the Rolex Company catalog printed during the year of this forms approval or unless otherwise noted.

Deflection Inches	Height mm	Load Theory Pounds	Load (Actual) Compression Pounds	Load (Actual) Relaxation Pounds
0.000	0.584	0	0	0
0.006	0.578	109	94	19
0.011	0.573	215	177	74
0.017	0.567	318	278	152
0.023	0.561	419	386	237
0.028	0.556	517	473	309
0.034	0.550	613	573	394
0.040	0.544	708	673	481
0.045	0.539	798	752	552
0.051	0.533	888	846	634
0.057	0.527	978	935	721
0.062	0.522	1,062	1,012	795
0.068	0.516	1,147	1,103	881
0.074	0.510	1,231	1,191	969
0.079	0.505	1,314	1,259	1,041
0.085	0.499	1,396	1,354	1,131
0.091	0.493	1,477	1,446	1,236
0.096	0.488	1,557	1,524	1,303
0.102	0.482	1,637	1,612	1,404
0.108	0.476	1,717	1,700	1,504
0.113	0.471	1,797	1,760	1,603

Chart Loads are in Pounds (lbs) and Deflection is in Inchs (in).

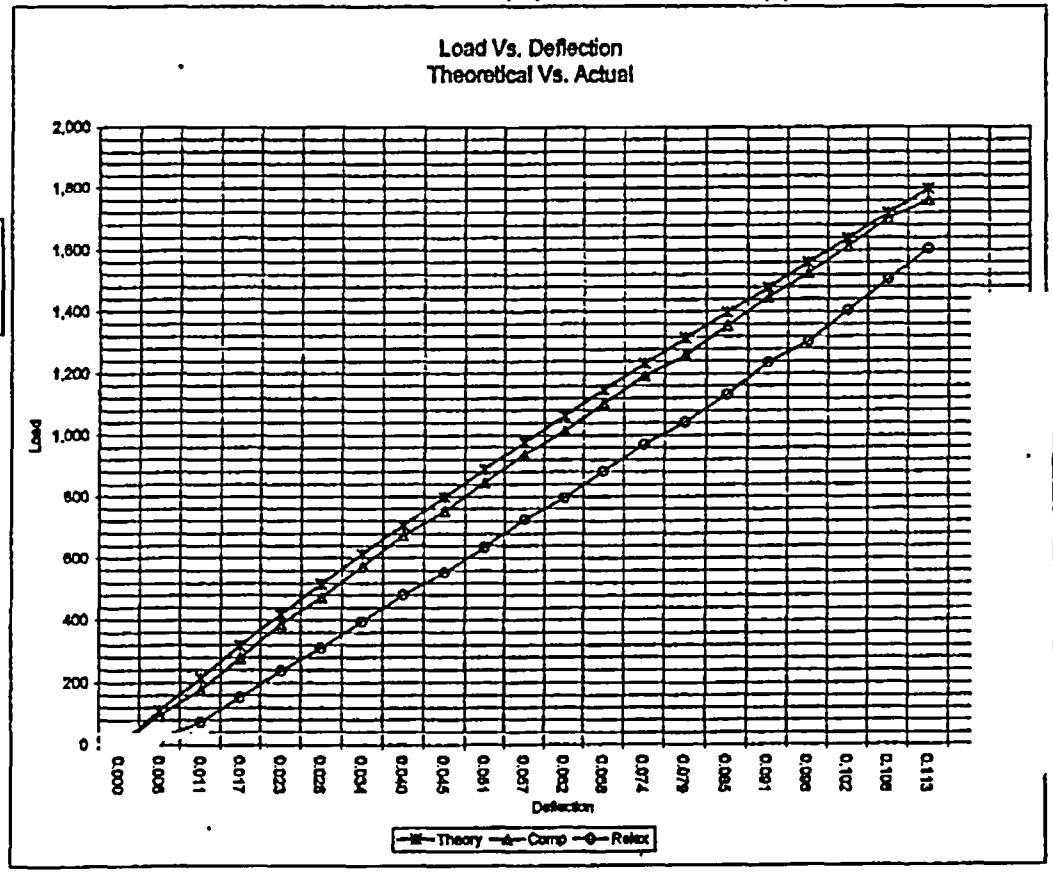


Chart Loads are in Pounds (lbs) and Deflection is in Inchs (in).

Avg. Spring Rate
16,874
lbs/in

Rolex Company
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Modified 1/2000

DR# 9481-99-140-1A REV: 0
DR PAGE 10 OF 11

ABB

ABB COMBUSTION ENGINEERING NUCLEAR POWER

LOT SIZE: 1,000
SAMPLE SIZE: 125

DWO - APPENDIX

DWO NO. 2476 IT. # 1.0
P.O. NO. 9903791
APPENDIX PAGE 1 OF 1

ATTRIBUTE	CRITERIA	ACTUAL RECORDED VALUES												
OD 1.100	1.105 1.092	OK ALL SAMPLES →												
ID .512	.519 .512	OK ALL SAMPLES →												
THICKNESS .059	.062 .056	OK ALL SAMPLES →												
OAH .087	.091 .085	OK ALL SAMPLES →												
17/7 PH	ALLOY SEPARATOR	OK ALL SAMPLES →												
HARDNESS RC	40-44	43	43	43	43	43	43	43	42.5					

VERIFICATION EQUIPMENT IDENTIFICATION(S)

NSP-006
NSP-070
NSP-019
EL-1984

COMMENTS: (1) REFERENCE ROLEX LOT # M073370. (2) ACTUAL NUMBER OF WASHERS RECEIVED WAS 1072 WITH 24 USED FOR LOAD TESTING. FINAL DEDICATED QUANTITY IS 1048.