TITLE	STEAM TURBINE INSPETION & TEST RECORD	DOC.No. LGTPR-8121-2034-2	REV. 0
CUSTOMER	LG Engineering & Construction Corp.	COMPLETE IN WITH COVER 80	SHEETS
FINAL USER	Turkish Petroleum Refineries Corp.		
PROJECT	Tuprus Izmmur Refinery DHP Project	SERVICE	Recycle Compressor
JOB No.	7020	EBARA SER.No	R021570803
ITEM No.	TC-9901	MODEL/EQUIP	SRV-5DF SET 1

TO	SET
CUS.	1C

ISSUED BY QUALITY ASSURANCE DEPT.
OF SODEGAURA PLANT

APPROVED BY Nov. 6, '03

CHECKED BY

PREPARED BY Nov.-6-2003

REV.	PAGE	DATE	APP'D	BY
5				
4				
3				
2				
1				

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

STEAM TURBINE INSPECTION REPORT

ITEM NO. : TC-9901

EBR JOB NO,: R021570803

EBR MODEL : SRV-5DF

CONTENTS

材料試験成績表
MATERIAL TEST REPORT

客先 Messrs. Elliott Ebara Turbomachinery Corporation

Report No. F03-0488

Date 2003- 4-14

納入先 Client

材質 Material ASTM A217M-01 WC6

溶解番号 Charge No. 3A062

仕様書番号 Spec. No. 〔EBARA STD.〕 SMPS-EC-E07 Rev. 6

工事番号 Works No.	注文番号 P/O No.	品名 Article	数量 Quantity	照合番号 Ident. No.	単重 S. Weight kgs	図番 Dwg. No.	製造番号 Manuf. No.
R021570803	CD79657	JSRV-5DF STM END CASING (UPPER)	1	3A062	2000	ES-8621714-1	H322-329

引張試験 Tension Test　試験片 Test piece ASTM A370　Dia. 12.5mm　G.L. 50mm

	耐力 Yield St.	降伏点 Yield Pt.	引張強度 Tensile St.	伸び Elongation	絞り Reduction of Area
	Mpa			%	
規格 Spec.	min 275	-	485 min 655	20 min	35 min
実績 Result.	398	-	541	30	70

衝撃試験 Impact Test　試験片 Test piece –　温度 Temp. –

Ave.	Each		
J			
–	–	–	–
–	–	–	–
–	–	–	–

硬度試験 Hardness Test

HB
–
–
–

熱処理 Heat Treatment

Nor.
950～960℃ X 6.0h A.C
Tem.
715～725℃ X 6.0h A.C

R021570803
SRV-5
Item No.; CT-9901
Casing
Part Name; Steam end casing (Upper)

備考 Remarks

DT : Acceptable
VT : Acceptable

化学成分 Chemical Composition %

	C	Si	Mn	P	S	Cr	Mo	–	–	–
規格 Spec.	0.05 0.20	max 0.60	0.50 0.80	max 0.040	max 0.045	1.00 1.50	0.45 0.65	– –	– –	– –
実績 Result.	0.14	0.44	0.65	0.016	0.006	1.14	0.48	–	–	–

不純物元素 Impurities %

Cu	Ni	W	–	Total
max 0.50	max 0.50	max 0.10	– –	max 1.00
0.03	0.19	0.01	–	0.23

試験機 Testing Machine No. T-79 OS 106
I-79 OS 52
H-2556

上記の通り検査の結果、指定の規格に合格している事を証明致します。
It is hereby certified that the above results are true and correct in every details.

コマツメタル株式会社 KOMATSU METAL LTD.

Witnessed by _____ Date _____

Witnessed by INSPECTION-TEAM ☐WITNESSED ☒REVIEWED LG E&C Y. Tsutsumi Aug 6, '03 Date _____

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept.

Certified by _____
Manager of Quality Assurance Dep.

KOMATSU METAL LTD. TESTING INSPECTION

NON-DESTRUCTIVE EXAMINATION RECORD
非 破 壊 試 験 記 録

Record No. 記録No. KNF－329

Time of Exam. 試験時期 Final 最終

Issued Date 発行日 2003－4－14

Customer 客 先: Ebara Corporation	P.O. No. 注文番号: CD79657
	Spec. No 仕様書番号: 〔EBARA STD.〕 SMPS－EC－C07 Rev. 6
Customer's Project No. 客先工番: R021570803	KOMATSU work No 製 番: H322－329
Part Name 部品名: JSRV－5DF STM END CASING (UPPER)	Identification No 識別番号: 3A062
Drawing No. 図 番: ES－8621714－1	Charge No. 溶解番号: 3A062
Material 材 質: ASTM A217M WC6	Surface Condition 表面状態: Casted, Ground, Machined

MT記録

Procedure No. 要領書番号: 〔EBARA STD.〕 SPS－1002－20	Prod Spacing プロッド間隔: 150mm
Direction of Magnetizing 磁化方向: Two Direction at Right Angle	Current 磁化電流: 800A Time 通電時間: Continuous sec 秒
Magnetic Particle 磁粉 (タイプ及び色): Marktec LY－1500 (Wet) ☐ Grey 灰色 ■ Fluorescent	Area to be examined 探傷箇所: All Surface
Ref. Test Piece 試 験 片: JIS A1－30／100	Acceptance std. 合格基準: SPS－1002－20 Sec. 5 (FES－P－10178 Table 5)
Control No. 機器No.: NT－22 Calibration 有効日: 2003－7－23	Judgement 判 定: ■ Acceptable 合格 ☐ Not Acceptable 不合格
Magnetizing Method 磁化方法: Prod	

PT記録

Procedure No. 要領書番号: JIS Z 2343 (1992)	Drying Method 乾燥法: Dried Naturally Time 時間: 15 min. 分
Applying Method of Penetrant Penet. Time 浸透液の適用法: Spray 20 min. 分	Testing Temp. 試験温度: 15 ℃ Developing Time 現像時間: 7～30 min. 分
PT Medium 材 料 / Trade Name 商品名 / Lot No. ロットNo.	Area to be examined 探傷箇所: Impossible Zone of MT
Penetrant 浸透液: Marktec UP－GⅢ －	Acceptance std. 合格基準: SPS－1002－20 Sec. 5 (FES－P－10178 Table 6)
Solvent 洗浄液: Water Sray －	Judgement 判 定: ■ Acceptable 合格 ☐ Not Acceptable 不合格
Developer 現像液: Marktec UD－ST －	

VT記録

Procedure No. 要領書番号	Sketch スケッチ: R021570803 SRV-5 Item No.: CT-9901 Casing Part Name: Steam end casing (Upper)
Area to be examined 探傷箇所	
Acceptance std. 合格基準	
Judgement 判 定: Acceptable ☐ 合格 Not Acceptable ☐ 不合格	

CUSTOMER 客 先	コマツメタル株式会社 Komatsu Metal Ltd
Approved by 承 認: INSPECTION TEAM ☐WITNESSED ☒REVIEWED LG E&C Date: Aug. 6, '07	Approved by 承 認 H. KITAGAWA (NDI－II) Date: 2003－4－10
Approved by 承 認 Date	Judged by 判 定 R. HASHIMOTO (NDI－II) Date: 2003－4－10
Approved by 承 認: ELLIOTT ☐Witnessed ☑Reviewed EETC Q.C Dept.	Examined by 試 験 R. HASHIMOTO (NDI－II) Date: 2003－4－10

材料試験成績表
MATERIAL TEST REPORT

客先 Messrs. Elliott Ebara Turbomachinery Corporation

Report No. F03-0489

Date 2003- 4-14

納入先 Client

材質 Material ASTM A217M-01 WC6

溶解番号 Charge No. 3K045

仕様書番号 Spec. No. 〔EBARA STD.〕 SMPS-EC-E07 Rev. 6

工事番号 Works No.	注文番号 P/O No.	品名 Article	数量 Quantity	照合番号 Ident. No.	単重 S. Weight kgs	図番 Dwg. No.	製造番号 Manuf. No.
R021570803	CD79658	JSRV-5DF STM END CASING (LOWER)	1	3K045	880	ES-8621714-2	H322-330

引張試験 Tension Test　試験片 Test piece ASTM A370　Dia. 12.5mm　G.L. 50mm

	耐力 Yield St.	降伏点 Yield Pt.	引張強度 Tensile St.	伸び Elongation	絞り Reduction of Area
	Mpa			%	
規格 Spec.	min 275	-	485 min 655	20 min	35 min
実績 Result.	359	-	522	32	66

衝撃試験 Impact Test　試験片 Test piece –　温度 Temp. –

Ave.	Each		
J			
–	–	–	–
–	–	–	–
–	–	–	–

硬度試験 Hardness Test

HB
–
–
–

熱処理 Heat Treatment

Nor.
950～960℃ X 6.0h A.C
Tem.
715～725℃ X 6.0h A.C

R021570803
SRV-5
Item No.; CT-9901
Casing
Part Name: Steam end casing (Lower)

備考 Remarks

DT : Acceptable
VT : Acceptable

化学成分 Chemical Composition %

	C	Si	Mn	P	S	Cr	Mo	–	–	–
規格 Spec.	0.05 0.20	max 0.60	0.50 0.80	max 0.040	max 0.045	1.00 1.50	0.45 0.65	– –	– –	– –
実績 Result.	0.16	0.45	0.57	0.019	0.004	1.13	0.47	–	–	–

不純物元素 Impurities %

	Cu	Ni	W	–	Total
規格 Spec.	max 0.50	max 0.50	max 0.10	– –	max 1.00
実績 Result.	0.03	0.22	0.01	–	0.26

試験機 Testing Machine No. T-79 OS 106
I-79 OS 52
II-8566

上記の通り検査の結果、指定の規格に合格している事を証明致します。
It is hereby certified that the above results are true and correct in every details.

Witnessed by LG E&C INSPECTION TEAM ☐WITNESSED ☒REVIEWED Y. Tsutsumi Aug. 6. '03 Date

Witnessed by ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed Date

EETC Q.C Dept. T. Tak

コマツメタル株式会社 KOMATSU METAL LTD.

Certified by Manager of Quality Assurance Dep.

CT

NON-DESTRUCTIVE EXAMINATION RECORD
非 破 壊 試 験 記 録

Record No. 記録No. KNF−330

Time of Exam. 試験時期 Final 最終

Issued Date 発行日 2003−4−14

Customer 客 先: Ebara Corporation	P.O. No. 注文番号: CD79658
	Spec. No 仕様書番号: 〔EBARA STD.〕 SMPS−EC−C07 Rev. 6
Customer's Project No. 客先工番: R021570803	KOMATSU work No 製 番: H322−330
Part Name 部品名: JSRV−5DF STM END CASING (LOWER)	Identification No 識別番号: 3K045
Drawing No. 図 番: ES−8621714−2	Charge No. 溶解番号: 3K045
Material 材 質: ASTM A217M WC6	Surface Condition 表面状態: Casted, Ground, Machined

MT記録

Procedure No. 要領書番号: 〔EBARA STD.〕 SPS−1002−20	Prod Spacing プロッド間隔: 150mm
Direction of Magnetizing 磁化方向: Two Direction at Right Angle	Current 磁化電流: 800A Time 通電時間: Continuous sec 秒
Magnetic Particle 磁粉 (タイプ及び色): Marktec LY−1500 (Wet) ☐ Grey 灰色 ■ Fluorescent	Area to be examined 探傷箇所: All Surface
Ref. Test Piece 試 験 片: JIS A1−30/100	Acceptance std. 合格基準: SPS−1002−20 Sec. 5 (FES−P−10178 Table 5)
Control No. 機器No.: NT−22 Calibration 有効日: 2003−7−23	Judgement 判 定: Acceptable ■ 合格 Not Acceptable ☐ 不合格
Magnetizing Method 磁化方法: Prod	

PT記録

Procedure No. 要領書番号: JIS Z 2343 (1992)	Drying Method 乾燥法: Dried Naturally Time 時間: 15 min. 分
Applying Method of Penetrant Penet. Time 浸透液の適用法: Spray 20 min. 分	Testing Temp. 試験温度: 15 ℃ Developing Time 現像時間: 7〜30 min. 分
PT Medium 材 料 / Trade Name 商品名 / Lot No. ロットNo.	Area to be examined 探傷箇所: Impossible Zone of MT
Penetrant 浸透液: Marktec UP−GIII / −	Acceptance std. 合格基準: SPS−1002−20 Sec. 5 (FES−P−10178 Table 6)
Solvent 洗浄液: Water Sray / −	Judgement 判 定: Acceptable ■ 合格 Not Acceptable ☐ 不合格
Developer 現像液: Marktec UD−ST / −	

VT記録

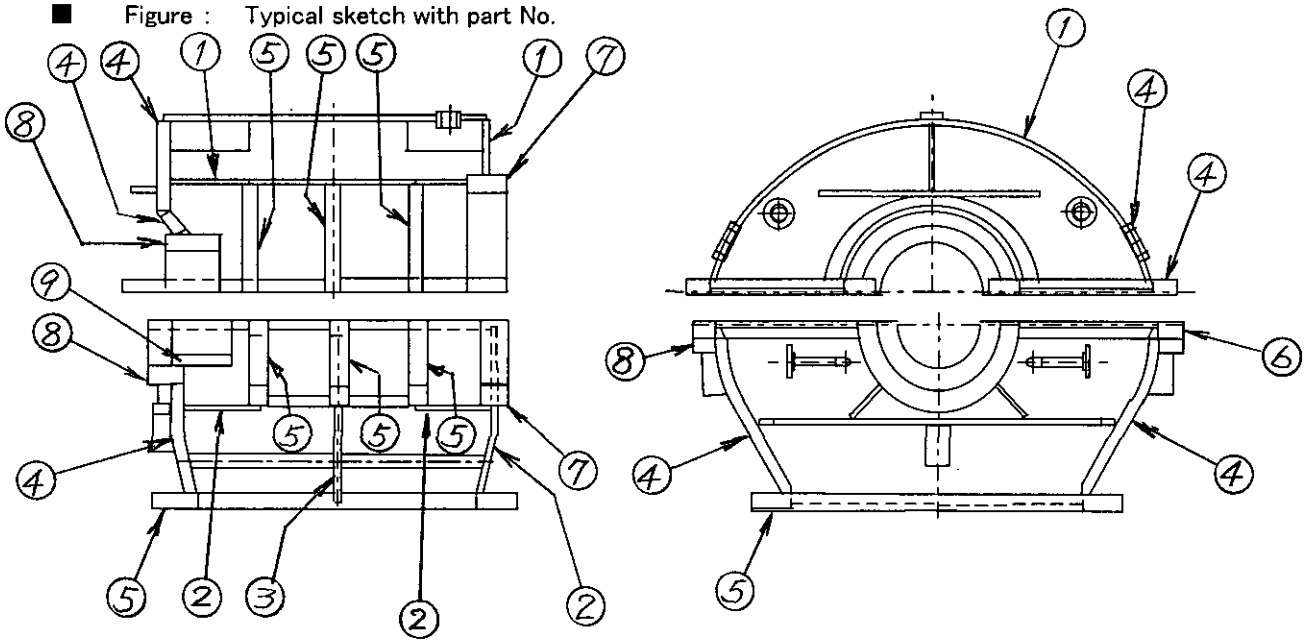
Procedure No. 要領書番号	Sketch スケッチ: R021570803 SRV-5 Item No.: CT-9901 Casing Part Name: Steam end casing (Lower)
Area to be examined 探傷箇所	
Acceptance std. 合格基準	
Judgement 判 定: Acceptable ☐ 合格 Not Acceptable ☐ 不合格	

CUSTOMER 客 先	コマツメタル株式会社 Komatsu Metal Ltd
Approved by 承 認: INSPECTION TEAM ☐WITNESSED ☒REVIEWED Date	Approved by 承 認: H. KITAGAWA Date (NDI−II) 2003−4−10
Approved by 承 認: LG E&C Y. Butsumi Aug. 6, '03 Date	Judged by 判 定: R. HASHIMOTO Date (NDI−II) 2003−4−10
Approved by 承 認: ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed Date	Examined by 試 験: R. HASHIMOTO Date (NDI−II) 2003−4−10

EETC Q.C Dept.

SUBJECT	STEAM TURBINE CASING / TABULATION OF MATERIALS		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACHINE No.	–	Exhaust end casing	

■ Figure : Typical sketch with part No.



■ Table : Material List

Part No.	Q'ty	Material	Charge or Plate No.	Mill Maker	Ebara I.D. No.	Remarks
①	1	ASTM A516 Gr. 60	636090302	NIPPON STEEL CORP.	062A	t=19
②	↑	↑	827430-3	↑	152A	t=19
③			105987-1		001B	t=38
④			169856-1		459B	t=50
⑤			024908-1		460B	t=75
⑥			428632-1		096A	t=100
⑦			167151-1		461B	t=130
⑧	↓	↓	021732-1	↓	073B	t=178
⑨	1	ASTM A516 Gr. 60	022149-1	NIPPON STEEL CORP.	058B	t=229
⑩						

■ Note Reference item number of quality plan : A04

TO	SET

Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by Date Jul. 16 '03	–	T. Tokuda Jul.-16-2003	IGF&C INSPECTION TEAM ☐WITNESSED ☒REVIEWED Y. Tsutsumi Aug. 6. '03

新日本製鐵株式會社
Nippon Steel Corporation

鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE : 〒100-8071 東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO 100-8071, JAPAN
君津製鐵所 KIMITSU WORKS : 〒299-1141 千葉県君津市君津1番地 1, KIMITSU, KIMITSU-CITY, CHIBA-PREF, 299-1141 JAPAN

注文者 SHIPPER : ITOCHU
注文者照合番号 REFERENCE No. : 303-1181F005
契約番号 CONTRACT No. : 1-106-H1-1-7-1539
商品名 COMMODITY : STEEL PLATE
規格 SPECIFICATION : ASTM A516-86 GRADE 60-SR
文書番号 DOCUMENT No. :
需要家 CUSTOMER : EBARA CORP.

証明書番号 CERTIFICATE No. : P-65492 頁 PAGE : 1E
発行年月日 DATE OF ISSUE : 2001-08-30
1001 24M**B3***
*****T****
需要家管理番号 CUSTOMER'S CONTROL No. : R001367101 E2041P06Q1 E04

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1	GL ※2	引張試験 TENSILE TEST 耐力降伏点 YS YP 0.2% N/MM2 KSI	引張強さ TS	伸び EL %	% ※3	BEND TEST ※4	LOCATION ORIENTATION ※1	SUB SIZE ※5	衝撃試験 IMPACT TEST 平均値 AVG	個々値 EACH	C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Cu ×100	Ni ×100	Cr ×100	Mo ×100	Nb ×100	V ×100	TAl ×100	Ceq 1 ×100	CONDITION OF SUPPLY ※7
~~01~~			~~G6308~~	TESTED PL			~~361~~	~~482~~																					
~~9X1000X3000 060A~~	~~1~~	~~212~~	~~69753~~	~~63609010~~	~~TC~~	~~1~~	~~52~~	~~67~~	~~28~~																				
~~02~~			~~G7308~~	TESTED PL			~~378~~	~~474~~																					
~~19X1220X4800 061A~~	~~1~~	~~837~~	~~78418~~	~~63609020~~	~~1~~	~~TC~~	~~55~~	~~69~~	~~26~~																				
03			G3208				317	445								15	20	102	19	4	1	2	2	0	1	031			
19X2000X6000 062A	1	1790	78587	63609030	2	TC	46	65	31										2	5									
~~05~~			~~G3208~~				~~317~~	~~445~~								15	20	102	19	4	1	2	2	0	1	031			
~~19X1600X8000 064A~~	~~1~~	~~1343~~	~~76587~~	~~63609050~~	~~1~~	~~TC~~	~~46~~	~~65~~	~~31~~										~~2~~	~~5~~									
TOTAL	4	4182																											

HEAT TREATMENT.
TEST SPECIMEN SR: 625CX360MIN.
LADLE TE1 = CR+MO
LADLE TE2 = CU+NI+CR+MO
VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE

SER. NO.	R021570803
ITEM NO.	CT-9901
PARTNO.	①
TYPE :	SRV-5DF

ELLIOTT. EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept. Y. Yoshida

注釈 NOTES
※1 Location Orientation 位置・方向, T:頂部 Top, B:底部 Bottom, L:圧延方向 Longitudinal, C:直角方向 Transverse, Z:板厚方向 Through Thickness, R:45° 方向 45Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A:50mm 平形試験片 Rectangular, B:50mm 丸形試験片 Round, C:70mm 平形試験片 Rectangular, D:70mm 丸形試験片 Round, E:80mm 平形試験片 Rectangular, F:80mm 丸形試験片 Round, G:200mm, H:2", I:8", J:5.65√So, K:4√So
※3 RA:絞り Reduction of Area, YR:降伏比 Yield Ratio,
※4 A:合格 Acceptable,
※5 2:2.5mm, 3:3.3mm, 4:3.33mm, 5:5.0mm, 6:6.67mm, 7:7.5mm, 8:6.7mm, 9:製品板厚 PlateThickness,
※6 P:製品分析 Product Analysis
※7 N:焼準 Normalized, Q:焼入れ Quenched, T:焼戻し Tempered, CR:Controlled Rolled, NIC:NIC Process/TMC Process, CLC:CLC Process/TMC Process, AR:As Rolled, TMR:TMR Process/TMC Process
SH:延性破面率 Shear Fracture, CF:~~060A~~ Brittle Fracture, LE:横膨出 Lateral Expansion, AGS:オーステナイト粒度 Austenite Grain Size, FGS:フェライト粒度 Ferrite Grain Size, SR:Stress Relieved/Post Weld Heat Treatment
温度 Temperature C: °C F: °F

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

EBARA ~~061A~~ 062A ~~061A~~ ~~065A~~

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C G. Tsutsumi Aug 6, '03

01.9.10 野崎

Y. Yoshida
君津製鐵所厚板管理グループリーダー
MANAGER, INSPECTION
KIMITSU WORKS

用紙区分：厚板

8

新日本製鐵株式會社
NIPPON STEEL CORPORATION

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

本　　社：〒100-8071　東京都千代田区大手町二丁目６番３号
HEAD OFFICE　2-6-3, OTEMACHI, CHIYODA-KU, TOKYO 100-8071, JAPAN
君津製鐵所：〒299-1141　千葉県君津市君津１番地
KIMITSU WORKS　1, KIMITSU, KIMITSU-CITY, CHIBA-PREF, JAPAN

証明書番号 CERTIFICATE No.: 866- 1
発行年月日 DATE OF ISSUE: 2001-08-30

需要家 CUSTOMER: EBARA CORP.
注文者 SHIPPER: ITOCHU
契約番号 CONTRACT No.: 1-106-H1-1-7-1539
規格 SPECIFICATION: ASTM A516-86 GRADE 60-SR
文書番号 DOCUMENT No.:

探傷器 FLAW DETECTOR: TOKIMEC SM90
試験方法 TESTING METHOD: DIRECT CONTACT METHOD
接触媒質 COUPLANT: WATER
周波数 FREQUENCY: 5MHZ
探傷感度 SENSITIVITY: ASTM A435
探傷箇所 SCANNING: AS PER CUSTOMER'S SPECIFICATION

探触子 PROBE: 5Q30N
判定基準 CRITERIA: AS PER ASTM A435
技術者及びレベル EVALUATOR & LEVEL: S. SAITOH LEVEL Ⅰ Ⅱ

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT	備考 REMARKS
~~9X1000X3000~~	~~G6308~~	~~636090101~~	~~ACCEPTABLE~~	~~060A~~
~~19X1220X4600~~	~~G7368~~	~~636090201~~	~~ACCEPTABLE~~	~~061A~~
19X2000X6000	G3208	636090302	ACCEPTABLE	062A
~~19X1500X6000~~	~~G3208~~	~~636090501~~	~~ACCEPTABLE~~	~~064A~~
	TOTAL	4		

備考欄に＊印がある場合は、別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK(*) IS DENOTED IN THE REMARKS COLUMN PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

060A
061A
062A
064A
~~065A~~

EBARA ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

SER. NO.	ROZ1570803
ITEM NO.	CT-9901
PART NO.	①
TYPE :	SRV-5DF

01.9.10 野崎

検査員：SURVEYOR TO
LG E&C
INSPECTION TEAM
☐WITNESSED ☒REVIEWED
T. Tsutsumi Aug 6, '03

上記注文品は超音波探傷検査を実施した結果、御指定の基準に合格したことを証明します。
WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

Y. Yoshida
君津製鐵所　厚板管理グループリーダー
MANAGER, INSPECTION
KIMITSU WORKS

用紙区分：厚板

注文者 SHIPPER : ITOCHU MARUBENI
注文者照合番号 REFERENCE No. : 002-1181J0A0
契約番号 CONTRACT No. : 1-106-H1-1-0-1539
商品名 COMMODITY : STEEL PLATE
規格 SPECIFICATION : ASTM A516-90 GRADE 60
文書番号 DOCUMENT No. :
需要家 CUSTOMER : EBARA CORP.

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE : 〒100-8071 東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS : 〒476-8686 愛知県東海市東海町五丁目3番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No. : M117749 頁 PAGE : 1E
発行年月日 DATE OF ISSUE : 2001-11-14
E2041P06Q2 T....
01 D AE04 ....
需要家管理番号 CUSTOMER'S CONTROL No. : R001600302 24M..B3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1 ※2	引張試験 TENSILE TEST 耐力 降伏点 YS or 0.2% KSI N/MM2	引張強さ TS	伸び EL %	% ※3	BEND TEST ※4	LOCATION ※1	SUB SIZE ※5	衝撃試験 IMPACT TEST 平均値 AVG	個々値 EACH	化学成分 CHEMICAL COMPOSITION % C	Si	Mn	P	S	Cu	Ni	Cr	Mo	Nb	V	T.Al	Ceq 1	供給状態 CONDITION OF SUPPLY
															※6 X1000	X1000	X1000	TE1 X100	X100	TE2 X100	X10000	X10000	X100	Ceq 3 X100	Sol. Al X1000	Ceq 2 X100	※7
SMPS-EC-R06	~~02~~		~~NK0320~~			~~39.3~~	~~61.1~~								~~16~~	21	95	~~17~~	~~5~~	~~1~~	~~3~~	~~3~~	~~0~~	~~0~~	~~02~~	~~133~~	
~~19X1220X4800~~ ~~150A~~	~~1~~	~~837~~	~~91519~~	~~427818-2~~	~~BCI~~	~~271~~	~~421~~	~~33~~										~~3~~		~~7~~							
SMPS-EC-R06	~~03~~		~~NK9822 TESTED-PL~~			~~40.6~~	~~63.2~~								~~16~~	21	95	~~16~~	~~4~~	~~4~~	~~2~~	~~2~~	~~0~~	~~0~~	~~03~~	~~833~~	
~~19X2000X6000~~ ~~151A~~	~~1~~	~~1790~~	~~91362~~	~~827430-1~~	~~BCI~~	~~280~~	~~436~~	~~30~~										~~2~~		~~8~~							
SMPS-EC-R06	04		NK9822			40.6	63.2								16	21	95	16	4	4	2	2	0	0	03	833	
19X1500X4400 152A	1	985	91362	827430-3	BCI	280	436	30										2		8							
SMPS-EC-R06	~~05~~		~~NK9822~~			~~40.6~~	~~63.2~~								~~16~~	21	95	~~16~~	~~4~~	~~4~~	~~2~~	~~2~~	~~0~~	~~0~~	~~03~~	~~833~~	
~~19X1500X6000~~ ~~153A~~	~~1~~	~~1343~~	~~91362~~	~~827430-2~~	~~BCI~~	~~280~~	~~436~~	~~30~~										~~2~~		~~8~~							
TOTAL	4	4955																								

HEAT TREATMENT
TEST SPECIMEN SR : 1157F (625C) X 360MIN.
VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE
CAST CEQ1 = C+MN/6+ (NI+CU) /15+ (CR+MO+V) /5
CAST TE1 = CR + MO
CAST TE2 = CU + NI + CR + MO

SER. NO.	R021570803
ITEM NO.	CT-9901
PART NO.	②
TYPE	SRV-5DF

ELLIOTT ECARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C Y. Tantawi Aug. 6 '03

注釈 NOTES
※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45Deg. to the Longitudinal Axis
※2 GL 標点間距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm平形試験片 Rectangular, D: 70mm丸形試験片 Round, E: 80mm平形試験片 Rectangular, F: 80mm丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio. ※4 A: 合格 Acceptable. ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness. ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Exoansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature □□□C: □□□°C □□□F: □□□°F

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

EBARA I.D.No ~~150A~~ ~~151A~~ 152A ~~153A~~

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

'01.12.11

M. Tanaka
名古屋製鐵所 厚板商品管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1 (2) Rev. 9

新日本製鐵株式會社
Nippon Steel Corporation

本　社：〒100-8071 東京都千代田区大手町二丁目６番３号
HEAD OFFICE: 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所：〒476-8686 愛知県東海市東海町五丁目３番地
NAGOYA WORKS: 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

証明書番号 CERTIFICATE No.: PAGE 1E / M117749
発行年月日 DATE OF ISSUE: 2001-11-14

需要家 CUSTOMER: EBARA CORP.
注文者 SHIPPER: ITOCHU MARUBENI
契約番号 CONTRACT No.: R001600302 / 1-106-H1-1-0-1539
規格 SPECIFICATION: ASTM A516-90 GRADE 60
文書番号 DOCUMENT No.:

探傷器 FLAW DETECTOR: TOKIMEC SM90D
試験方法 TESTING METHOD: LOCAL IMMERSION METHOD
接触媒質 COUPLANT: WATER
周波数 FREQUENCY: 5 MHZ
探傷感度 SENSITIVITY: BG : 75%
探傷箇所 SCANNING: AS PER ASTM A435

探触子 PROBE: 5C25I
判定基準 CRITERIA: AS PER ASTM A435
技術者及びレベル EVALUATOR & LEVEL: O. SUDA, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT	EBARA I.D.No.
~~SMPS-EC-R06 19.00 X 1220 X 4600~~	~~NK0320~~	~~427818-2~~	~~ACCEPTABLE~~	~~151A~~
~~SMPS-EC-R06 19.00 X 2000 X 6000~~	~~NK9822~~	~~827430-1~~	~~ACCEPTABLE~~	~~151A~~
SMPS-EC-R06 19.00 X 1500 X 4400	NK9822	827430-3	ACCEPTABLE	152A
~~SMPS-EC-R06 19.00 X 1500 X 6000~~	~~NK9822~~	~~827430-2~~	~~ACCEPTABLE~~	~~153A~~

備考 REMARKS

備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

SER. NO.	R021570803
ITEM NO.	CT-9901
PARTNO.	②
TYPE :	SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

'01. 12. 11

検査員 SURVEYOR TO: LG E&C
INSPECTION TEAM ☐WITNESSED ☒REVIEWED
F. Furutsumi Aug. 6, '03

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板商品管理グループ長
MANAGER, INSPECTION
NAGOYA WORKS

N16-1 (3) Rev. 7

注文者 SHIPPER: ITOCHU MARUBENI
注文者照合番号 REFERENCE No.: 002-1181A090
契約番号 CONTRACT No.: 2-106-H1-1-2-1539
商品名 COMMODITY: STEEL PLATE
規格 SPECIFICATION: ASTM A516-90 GRADE 60
文書番号 DOCUMENT No.:
需要家 CUSTOMER: EBARA CORP.

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE: 〒100-8071 東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS: 〒476-8686 愛知県東海市東海町五丁目3番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No.: M203596 頁 PAGE: 1E
発行年月日 DATE OF ISSUE: 2002-03-22
需要家管理番号 CUSTOMER'S CONTROL No.: R010633702
E2041P06Q2 T....
01 D AE04 ....
24M..B3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1	GL ※2	引張試験 TENSILE TEST: 耐力 YS 降伏点 0.2% KSI N/MM2	引張強さ TS KSI N/MM2	伸び EL %	% ※3	BEND TEST ※4	LOCATION ※1	SUB SIZE ※5	衝撃試験 IMPACT TEST: 平均値 AVG	個々値 EACH	化学成分 CHEMICAL COMPOSITION %: C X100	Si X100	Mn X100	P X1000	S X1000	Cu X100	Ni X100	Cr X100	Mo X100	Nb X100	V X100	T. Al X100	Ceq.1 X100	供給状態 CONDITION OF SUPPLY
						※6										※6 X1000	X1000	X1000	TE1 X100	X100	TE2 X100	X10000	X10000	X100	Ceq.3 X100	Sol.Al X1000	Ceq.2 X100	※7
SMPS-EC-R06 38X1600X6000	01		NP0304 09784	TESTED-PL 105987-1	BCI		41.2 284	61.4 423	36							15	19	96	12 4	4	1 7	2	4	0	0	0	38	32	
	1	2864																										
				HEAT TREATMENT																								
				TEST SPECIMEN SR : 1157F (625C) X 360MIN.																								
				VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE																								
				CAST CEQ1 = C+MN/6+(NI+CU)/15+(CR+MO+V)/5																								
				CAST TE1 = CR + MO																								
				CAST TE2 = CU + NI + CR + MO																								
TOTAL	1	2864																										

SER. NO.	R02L570803
ITEM NO.	CT-9901
PARTNO.	③
TYPE :	SRV-50F

ELLIOTT GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

注釈 NOTES
※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm平形試験片 Rectangular, D: 70mm丸形試験片 Round, E: 80mm平形試験片 Rectangular, F: 80mm丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio, ※4 A: 合格 Acceptable, ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness, ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Expansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature □□□C: □□□°C □□□F: □□□°F

INSPECTION TEAM ☐WITNESSED ☒REVIEWED LG E&C Y. Tsutsumi Aug 6 '03
EBARA ID.No 001B

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

検原品受 '02.4.2 野崎

M. Tanaka
名古屋製鐵所 厚板商品管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1(2) Rev. 9

12

新日本製鐵株式會社
Nippon Steel Corporation

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

本　社：〒100-8071東京都千代田区大手町二丁目６番３号
HEAD OFFICE 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所：〒476-8686愛知県東海市東海町五丁目３番地
NAGOYA WORKS 5-3,TOKAI-MACHI,TOKAI-CITY,AICHI-PREF.,476-8686,JAPAN

証明書番号：PAGE 1E
CERTIFICATE No. M203596
発行年月日：
DATE OF ISSUE 2002-03-22

需要家：CUSTOMER EBARA CORP.
注文者：SHIPPER ITOCHU MARUBENI
契約番号：CONTRACT No. R010633702 2-106-H1-1-2-1539
規格：SPECIFICATION ASTM A516-90 GRADE 60
文書番号：DOCUMENT No.

探傷器：FLAW DETECTOR TOKIMEC SM90D
試験方法：TESTING METHOD LOCAL IMMERSION METHOD
接触媒質：COUPLANT WATER
周波数：FREQUENCY 2.25 MHZ
探傷感度：SENSITIVITY BG : 75%
探傷箇所：SCANNING AS PER ASTM A435

探触子：PROBE 2.25C28I
判定基準：CRITERIA AS PER ASTM A435
技術者及びレベル：EVALUATOR & LEVEL M. WATANABE, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT		備考 REMARKS
SMPS-EC-R06 38.00 X 1600 X 6000	NP0304	105987-1	ACCEPTABLE	001B	

備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

SER. NO.	R0Z157080
ITEM NO.	CT-9901
PARTNO.	③
TYPE :	SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept

検査員：SURVEYOR TO
INSPECTION TEAM ☐WITNESSED ☒REVIEWED
LG E&C J. Fujitsuki Aug 6, '03

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板商品管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1(3) Rev. 7

13

注文者 SHIPPER: ITOCHU MARUBENI
注文者照合番号 REFERENCE No.: 002-1181K08F
契約番号 CONTRACT No.: 2-106-H1-1-Y-1539
商品名 COMMODITY: STEEL PLATE
規格 SPECIFICATION: ASTM A516-01 GRADE 60
文書番号 DOCUMENT No.:
需要家 CUSTOMER: ELLIOTT EBARA TURBOMACHINERY CORP.
需要家管理番号 CUSTOMER'S CONTROL No.: R021570803

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE: 〒100-8071東京都千代田区大手町二丁目６番３号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS: 〒476-8686愛知県東海市東海町五丁目３番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No.: M302424 頁 PAGE: 1E
発行年月日 DATE OF ISSUE: 2003-02-17

E2041P06Q2 T....
01 D AE04 ....
24MDMB3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1 ※2	引張試験 TENSILE TEST 耐力 降伏点 YS 0.2% KSI N/MM2	引張強さ TS	伸び EL %	RA % ※3	BEND TEST ※4	LOCATION ORIENTATION ※1	SUB SIZE ※5	衝撃試験 IMPACT TEST 平均値 AVG	個々値 EACH	化学成分 CHEMICAL COMPOSITION % C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Cu ×100	Ni ×100	Cr ×100	Mo ×100	Nb ×100	V ×100+1000	T. Al ×100+1000	Ceq 1 ×100	供給状態 CONDITION OF SUPPLY ※7
SMPS-EC-R06 ④ 459B 01 50X2100X4000	1	3297	NA1037 46272	TESTED-PL 169856-1	BCH	40 276	63 436	40							16	20	95	18 0	4	1 3	2	3	0 6	0	0	33	33	
SMPS-EC-R06 ⑤ 460B 02 75X1600X3000	1	2826	NA6133 46397	TESTED-PL 024908-1	BCH	37 256	61 424	41							16	21	96	14 0	4	1 2	2	2	0 5	0	0	35	33	
				HEAT TREATMENT PLATE NORMALIZING: 1670F (910C) X 10MIN. TEST SPECIMEN SR : 1157F (625C) X 360MIN.																							
50T				VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE CAST CEQ1 = C+MN/6+ (NI+CU) /15+ (CR+MO+V) /5																							
EBARA I.D.No 459B				CAST TE1 = CR + MO CAST TE2 = CU + NI + CR + MO																							
75T																											
EBARA I.D.No 460B																											
TOTAL	2	6123																									

SER. NO. R021570803
ITEM NO. CT-9901
PART NO. ④, ⑤
TYPE : SRV-5DF

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C G. Kuntsuan Aug 6, '03

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept. T. Tak

注釈 NOTES
※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm平形試験片 Rectangular, D: 70mm丸形試験片 Round, E: 80mm平形試験片 Rectangular, F: 80mm丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio, ※4 A: 合格 Acceptable, ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness, ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Expansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature ☐☐☐C: ☐☐☐°C ☐☐☐F: ☐☐☐°F

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

R021570803
SRV-5DF
略NO.453①②
ANO.8001-8002
CD74593 CD74594

M. Tanaka
名古屋製鐵所 厚板管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1(2) Rev.10

14

新日本製鐵株式會社
Nippon Steel Corporation
本社：〒100-8071東京都千代田区大手町二丁目６番３号
HEAD OFFICE 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所：〒476-8686愛知県東海市東海町五丁目３番地
NAGOYA WORKS 5-3,TOKAI-MACHI,TOKAI-CITY,AICHI-PREF.,476-8686,JAPAN

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

証明書番号 CERTIFICATE No.: PAGE 1E / M302424
発行年月日 DATE OF ISSUE: 2003-02-17

需要家 CUSTOMER: ELLIOTT EBARA TURBOMACHINERY CORP.
注文者 SHIPPER: ITOCHU MARUBENI
契約番号 CONTRACT No.: R021570803 / 2-106-H1-1-Y-1539
規格 SPECIFICATION: ASTM A516-01 GRADE 60
文書番号 DOCUMENT No.:

探傷器 FLAW DETECTOR: TOKIMEC SM90D
試験方法 TESTING METHOD: LOCAL IMMERSION METHOD
接触媒質 COUPLANT: WATER
周波数 FREQUENCY: 2.25 MHZ
探傷感度 SENSITIVITY: BG : 75%
探傷箇所 SCANNING: AS PER ASTM A435

探触子 PROBE: 2.25C28I
判定基準 CRITERIA: AS PER ASTM A435
技術者及びレベル EVALUATOR & LEVEL: O. SUDA, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT	備考 REMARKS
SMPS-EC-R06 50.00 X 2100 X 4000	NA1037	169856-1	ACCEPTABLE	459B ④
SMPS-EC-R06 75.00 X 1600 X 3000	NA6133	024908-1	ACCEPTABLE	460B ⑤

備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

SER. NO.	R021570803
ITEM NO.	CT-9901
PART NO.	④, ⑤
TYPE :	SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

検査員 SURVEYOR TO: INSPECTION TEAM ☐WITNESSED ☒REVIEWED LG E&C J. Tsuitsumi Aug 6, '03

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板管理グループ 主幹
MANAGER, INSPECTION NAGOYA WORKS

N16-1 (3) Rev. 8

注文者 SHIPPER: ITOCHU
注文者照合番号 REFERENCE No.: 002-1181H05B
契約番号 CONTRACT No.: 1-106-H1-1-9-1541
商品名 COMMODITY: STEEL PLATE
規格 SPECIFICATION: ASTM A516-90 GRADE 60
文書番号 DOCUMENT No.:
需要家 CUSTOMER: EBARA CORP.

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE: 〒100-8071東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS: 〒476-8686愛知県東海市東海町五丁目3番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No.: M118168 頁 PAGE: 1E
発行年月日 DATE OF ISSUE: 2001-11-21
需要家管理番号 CUSTOMER'S CONTROL No.: R001500104
E2041P06Q1 T....
01 D AE04 ....
24MDMB3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1	GL ※2	引張試験 TENSILE TEST 耐力 降伏点 YS 0.2% KSI N/MM2	引張強さ TS	伸び EL %	% ※3	BEND TEST ※4	LOCATION ※1	SIZE ※5	衝撃試験 IMPACT TEST 平均値 AVG	個々値 EACH	化学成分 CHEMICAL COMPOSITION % C X100	Si X100	Mn X100	P X1000	S X1000	Cu X100	Ni X100	Cr X100	Mo X100	Nb X100	V X100	T. Al X1000	Ceq.1 X100	供給状態 CONDITION OF SUPPLY ※7
SMPS-EC-R06 05			NJ5248	TESTED-PL			38.7	63.1								16	21	95	13	4	1	2	3	1	0	0	35	
100X1000X3000	1	2355	91828	428632-1	BCH		267	435	40										4		7							
				HEAT TREATMENT															TE1		TE2							
				PLATE NORMALIZING:1670F (910C) X 10MIN.																					Ceq.3	Sol.Al	Ceq.2		
				TEST SPECIMEN SR :1157F (625C) X 360MIN.																								
				VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE																								
				CAST TE1 = CR + MO																								
				CAST TE2 = CU + NI + CR + MO																								
TOTAL	1	2355																										

SER. NO. R021570803
ITEM NO. CT-9901
PARTNO. ⑥
TYPE : SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
HG E&C Aug 6, '03

注釈 NOTES ※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45 Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm 平形試験片 Rectangular, D: 70mm 丸形試験片 Round, E: 80mm 平形試験片 Rectangular, F: 80mm 丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio, ※4 A: 合格 Acceptable, ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness, ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Expansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature □□□C: □□□°C □□□F: □□□°F

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

EBARA I.D.№
096A

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

'01. 12. 11 封緘

M. Tanaka
名古屋製鐵所 厚板商品管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1(2) Rev. 9

16

新日本製鐵株式會社
Nippon Steel Corporation

社：〒100-8071東京都千代田区大手町二丁目６番３号
HEAD OFFICE 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所：〒476-8686愛知県東海市東海町五丁目３番地
NAGOYA WORKS 5-3,TOKAI-MACHI,TOKAI-CITY,AICHI-PREF.,476-8686,JAPAN

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

証明書番号 CERTIFICATE No.: M118168
発行年月日 DATE OF ISSUE: 2001-11-21

需要家 CUSTOMER: EBARA CORP.
注文者 SHIPPER: ITOCHU
契約番号 CONTRACT No.: R001500104
1-106-H1-1-9-1541
規格 SPECIFICATION: ASTM A516-90 GRADE 60
文書番号 DOCUMENT No.:

探傷器 FLAW DETECTOR: TOKIMEC SM90D
試験方法 TESTING METHOD: LOCAL IMMERSION METHOD
接触媒質 COUPLANT: WATER
周波数 FREQUENCY: 2.25 MHZ
探傷感度 SENSITIVITY: BG : 75%
探傷箇所 SCANNING: AS PER ASTM A435

探触子 PROBE: 2.25C28I
判定基準 CRITERIA: AS PER ASTM A435
技術者及びレベル EVALUATOR & LEVEL: O. SUDA, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT		備考 REMARKS
SMPS-EC-R06 100.00 X 1000 X 3000	NJ5248	428632-1	ACCEPTABLE		備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。 IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.
					EBARA I.D.No 096A

SER. NO.	RDZ1570803
ITEM NO.	CT-9901
PARTNO.	⑥
TYPE	SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tsuchiya

'01. 12. 11 野崎

検査員：SURVEYOR TO
INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C G. Buttitumi Aug 6. '07

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板商品管理グループリーダー
MANAGER, INSPECTION
NAGOYA WORKS

注文者 SHIPPER: ITOCHU MARUBENI
注文者照合番号 REFERENCE No.: 002-1181K08F
契約番号 CONTRACT No.: 2-106-H1-1-Y-1539
商品名 COMMODITY: STEEL PLATE
規格 SPECIFICATION: ASTM A516-01 GRADE 60
文書番号 DOCUMENT No.:

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE: 〒100-8071 東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS: 〒476-8686 愛知県東海市東海町五丁目3番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No.: M302750 頁 PAGE: 1E
発行年月日 DATE OF ISSUE: 2003-02-24
需要家 CUSTOMER: ELLIOTT EBARA TURBOMACHINERY CORP.
需要家管理番号 CUSTOMER'S CONTROL No.: R021570803
E2041P06Q2 T.... 01 D AE04 .... 24MDMB3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1	GL ※2	引張試験 TENSILE TEST 耐力 降伏点 YS YP 0.2% KSI N/MM2	引張強さ TS	伸び EL %	% ※3	※4 BEND TEST 曲げ試験	LOCATION ORIENTATION ※1	※5 SUB SIZE	衝撃試験 IMPACT TEST 平均値 AVG	個々値 EACH	※6	C X100 X1000	Si X100	Mn X100	P X1000 TI	S X1000	Cu X100 TE1	Ni X100	Cr X100	Mo X100 TE2	Nb X100 X1000	V X100 X1000	T. Al X100 Sol. Al X1000	Ceq. X100 Ceq. 3 X100	Ceq. X100 Ceq. 2 X100	供給状態 CONDITION OF SUPPLY ※7
SMPS-EC-R06 03			VZ7597	TESTED-PL			38	61									16	20	95	12	6	2	2	2	0	0	0	42	32		
130X1000X3000	1	3060	44606	167151-1	BCH		259	423	40											0		2			6						
				HEAT TREATMENT																											
				PLATE NORMALIZING : 1670F (910C) X 10MIN.																											
				TEST SPECIMEN SR : 1157F (625C) X 360MIN.																											
				VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE																											
				CAST CEQ1 = C+MN/6+ (NI+CU) /15+ (CR+MO+V) /5																											
				CAST TE1 = CR + MO																											
				CAST TE2 = CU + NI + CR + MO																											
TOTAL	1	3060																											

SER. NO. R021570803
ITEM NO. CT-9901
PARTNO. ⑦
TYPE : SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug 6, '03

注釈 NOTES
※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm 平形試験片 Rectangular, D: 70mm 丸形試験片 Round, E: 80mm平形試験片 Rectangular, F: 80mm丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio, ※4 A: 合格 Acceptable, ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness, ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Expansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature □□□C: □□□°C □□□F: □□□°F

R021570803

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

検収品質 03.3.20 今野

M. Tanaka
名古屋製鐵所 厚板管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

EBARA ID.No 461B

N16-1 (2) Rev. 10

新日本製鐵株式會社
Nippon Steel Corporation

本　社：〒100-8071東京都千代田区大手町二丁目６番３号
HEAD OFFICE：2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所：〒476-8686愛知県東海市東海町五丁目３番地
NAGOYA WORKS：5-3,TOKAI-MACHI,TOKAI-CITY,AICHI-PREF.,476-8686,JAPAN

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

証明書番号：PAGE 1E
CERTIFICATE No. M302750
発行年月日：
DATE OF ISSUE 2003-02-24

需要家：ELLIOTT EBARA TURBOMACHINERY
CUSTOMER CORP.
注文者：
SHIPPER ITOCHU MARUBENI
契約番号：R021570803
CONTRACT No. 2-106-H1-1-Y-1539
規格：
SPECIFICATION ASTM A516-01 GRADE 60
文書番号：
DOCUMENT No.

探傷器：
FLAW DETECTOR TOKIMEC SM90D
試験方法：
TESTING METHOD LOCAL IMMERSION METHOD
接触媒質：
COUPLANT WATER
周波数：
FREQUENCY 2.25 MHZ
探傷感度：
SENSITIVITY BG : 75%
探傷箇所：
SCANNING AS PER ASTM A435

探触子：
PROBE 2.25C28I
判定基準：
CRITERIA AS PER ASTM A435
技術者及びレベル：
EVALUATOR & LEVEL T. SHINOMACHI, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT	備考 REMARKS
SMPS-EC-R06 130.00 X 1000 X 3000	VZ7597	167151-1	ACCEPTABLE	461B

備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

SER. NO.	R021570803
ITEM NO.	CT-9901
PART NO.	①
TYPE :	SRV-5DF

ELLIOTT EBARA GROUP
☐ Witnessed
☑ Reviewed
EETC Q.C Dept.

検査員：
SURVEYOR TO
INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C
J. Tsutsumi Aug. 6, '03

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板管理グループリーダー
MANAGER, INSPECTION NAGOYA WORKS

注文者 SHIPPER: ITOCHU MARUBENI
注文者照合番号 REFERENCE No.: 002-1181C123
契約番号 CONTRACT No.: 2-106-H4-1-4-1544
商品名 COMMODITY: STEEL PLATE
規格 SPECIFICATION: ASTM A516-90 GRADE 60
文書番号 DOCUMENT No.:
需要家 CUSTOMER: EBARA CORP.

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE: 〒100-8071 東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS: 〒476-8686 愛知県東海市東海町五丁目3番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No.: M206881
頁 PAGE: 1E
発行年月日 DATE OF ISSUE: 2002-05-30
需要家管理番号 CUSTOMER'S CONTROL No.: R010945403
E2041543Q1 T....
01 D BE04 ....
24MDMB3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	LOCATION ORIENTATION ※1 ※2	引張試験 TENSILE TEST 耐力 降伏点 YS YP 0.2% KSI N/MM2	引張強さ TS	伸び EL %	※3	BEND TEST 合否 ※4	LOCATION ※1	ORIENTATION ※5 SIZE	衝撃試験 IMPACT TEST 平均値 AVG	個々値 EACH	※6	C X100 X1000	Si X100	Mn X100	P X1000 TE1	S X1000	Cu X100 TE2	Ni X100	Cr X100	Mo X100	Nb X100 X1000	V X100 X1000	T.Al X100 X1000	Ceq.1 X100 Ceq.3 X100	Sol.Al X1000	Ceq.2 X100	供給状態 CONDITION OF SUPPLY ※7
SMPS-EC-R07 01			VQ6670	TESTED-PL		40	65									16	23	110	11	2	1	2	3	0	0	0	27	35		
178X1250X5050	1	8818	13689	021732-1	BCH	279	447	40											3		6									
HEAT TREATMENT																														
PLATE NORMALIZING: 910CX 10MIN. (1670F)																														
TEST SPECIMEN SR: 1157F(625C) X 360MIN.																														
VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE																														
CAST CEQ1 = C+MN/6+ (N1+CU) /15+ (CR+MO+V) /5																														
CAST TE1 = CR + MO																														
CAST TE2 = CU + NI + CR + MO																														
EBARA ID.No 073B																														
TOTAL	1	8818																												

SER. NO. R02L570803
ITEM NO. CT-9901
PARTNO. ⑧
TYPE : SRV-5DF

ELLIOTT EBARA GROUP
☐Witnessed ☑Reviewed
EETC Q.C Dept.

注釈 NOTES
※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm平形試験片 Rectangular, D: 70mm丸形試験片 Round, E: 80mm平形試験片 Rectangular, F: 80mm丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio. ※4 A: 合格 Acceptable. ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness. ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Expansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature ☐☐☐C: ☐☐☐°C ☐☐☐F: ☐☐☐°F

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C
Y. Tsutsumi
6 Aug. '02

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

'02.6.12 野崎

M. Tanaka
名古屋製鐵所 厚板管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1(2) Rev. 10

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新日本製鐵株式會社
Nippon Steel Corporation

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

社：〒100-8071東京都千代田区大手町二丁目６番３号
HEAD OFFICE 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所：〒476-8686愛知県東海市東海町五丁目３番地
NAGOYA WORKS 5-3,TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号：PAGE 1E
CERTIFICATE No. M206881
発行年月日：
DATE OF ISSUE 2002-05-30

需要家 CUSTOMER：EBARA CORP.
注文者 SHIPPER：ITOCHU MARUBENI
契約番号 CONTRACT No.：R010945403
2-106-H4-1-4-1544
規格 SPECIFICATION：ASTM A516-90 GRADE 60
文書番号 DOCUMENT No.：

探傷器 FLAW DETECTOR：TOKIMEC SM90D
試験方法 TESTING METHOD：LOCAL IMMERSION METHOD
接触媒質 COUPLANT：WATER
周波数 FREQUENCY：2.25 MHZ
探傷感度 SENSITIVITY：BG : 75%
探傷箇所 SCANNING：AS PER ASTM A435

探触子 PROBE：2.25C28I
判定基準 CRITERIA：AS PER ASTM A435
技術者及びレベル EVALUATOR & LEVEL：O. SUDA, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT		備考 REMARKS
SMPS-EC-R07 178.00 X 1250 X 5050	VQ6670	021732-1	ACCEPTABLE	073B	

備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

SER. NO.	R0Z1570803
ITEM NO.	CT-9901
PARTNO.	⑧
TYPE :	SRV-5DF

ELLIOTT EBARA GROUP '02.6.12 EETC Q.C Dept.
☐Witnessed ☑Reviewed

検査員：SURVEYOR TO
INSPECTION TEAM ☐WITNESSED ☒REVIEWED
LG E&C F. Tantsumi Aug. 6. '03

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1 (3) Rev. 8

注文者 SHIPPER: ITOCHU MARUBENI
注文者照合番号 REFERENCE No.: 002-1181C121
契約番号 CONTRACT No.: 2-106-H4-1-4-1541
商品名 COMMODITY: STEEL PLATE
規格 SPECIFICATION: ASTM A516-01 GRADE 60
文書番号 DOCUMENT No.:
需要家 CUSTOMER: EBARA CORP.

新日本製鐵株式會社
Nippon Steel Corporation
鋼材検査証明書
INSPECTION CERTIFICATE

本社 HEAD OFFICE: 〒100-8071 東京都千代田区大手町二丁目6番3号 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 NAGOYA WORKS: 〒476-8686 愛知県東海市東海町五丁目3番地 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

証明書番号 CERTIFICATE No.: M207946 頁 PAGE: 1E
発行年月日 DATE OF ISSUE: 2002-06-17
E2041543Q1 FT...
01 D BE04 ....
需要家管理番号 CUSTOMER'S CONTROL No.: R010945402
24MDMC3.....

寸法 DIMENSION MM	員数 QUANTITY	質量 MASS KG	製鋼番号 CAST No. / 試験番号 TEST No.	製品番号 PLATE No.	引張試験 TENSILE TEST: 位置 LOCATION ORIENTATION ※1	試験片 ※2	耐力 降伏点 YS 0.2% KSI N/MM2	引張強さ TS KSI N/MM2	伸び EL %	R A % ※3	ベンド試験 BEND TEST ※4	衝撃試験 IMPACT TEST: 位置 LOCATION ※1	方向 ORIENTATION	試験片寸法 SUB SIZE ※5	平均値 AVG	個々値 EACH	化学成分 CHEMICAL COMPOSITION % ※6: C X100	Si X100	Mn X100	P X1000	S X1000	Cu X100	Ni X100	Cr X100	Mo X100	Nb X100	V X100	T. Al X100	Ceq.1 X100	供給状態 CONDITION OF SUPPLY ※7
SMPS-EC-R07 01			NS9598	TESTED-PL			39	66									16	25	113	13	3	1	2	4	0	0	0	36	36	
229X1350X6500	1	15777	18267	022149-1	BCH		272	454	39											0		4			7					
EBARA ID.No 058B					BZ					74																			
					TZ					73																			
~~SMPS-EC-R07 01~~			~~VS3949~~	~~TESTED-PL~~			~~39~~	~~67~~									~~17~~	~~25~~	~~108~~	~~11~~	~~2~~	~~2~~	~~2~~	~~4~~	~~0~~	~~0~~	~~0~~	~~42~~	~~36~~	
~~229X1350X6500 1~~	~~15777~~	~~18268~~	~~022150-1~~	~~BCH~~		~~271~~	~~460~~	~~37~~												~~9~~		~~4~~			~~8~~					
~~EBARA ID.No 059B~~					~~BZ~~					~~70~~																			
					~~TZ~~					~~69~~																			

SER. NO.	R021570803
ITEM NO.	CT-9901
PARTNO.	⑨
TYPE	SRV-5DF

HEAT TREATMENT
PLATE NORMALIZING: 910CX 10MIN. (1670F)
TEST SPECIMEN SR :1157F (625C) X 360MIN.
VISUAL & DIMENSIONAL INSPECTION : ACCEPTABLE
CAST CEQ1 = C+MN/6+(NI+CU)/15+(CR+MO+V)/5
CAST TE1 = CR + MO
CAST TE2 = CU + NI + CR + MO
THIS PLATE IS MET THE LIMITATION OF ASTM A20 5.3.
LOW HYDROGEN PRACTICE ARE USED VACUUM DEGASSING.
SPECIAL PRACTICE ARE USED HEAVY PASS REDUCTIONS.

TOTAL 2 31554

注釈 NOTES ※1 Location Orientation 位置・方向, T: 頭部 Top, B: 底部 Bottom, L: 圧延方向 Longitudinal, C: 直角方向 Transverse, Z: 板厚方向 Through Thickness, R: 45°方向 45 Deg. to the Longitudinal Axis
※2 GL 標点距離 Gage Length, A: 50mm平形試験片 Rectangular, B: 50mm丸形試験片 Round, C: 70mm平形試験片 Rectangular, D: 70mm丸形試験片 Round, E: 80mm平形試験片 Rectangular, F: 80mm丸形試験片 Round, G: 200mm, H: 2", I: 8", J: 5.65√So, K: 4√So
※3 RA: 絞り Reduction of Area, YR: 降伏比 Yield Ratio. ※4 A: 合格 Acceptable. ※5 2: 2.5mm, 3: 3.3mm, 4: 3.33mm, 5: 5.0mm, 6: 6.67mm, 7: 7.5mm, 8: 6.7mm, 9: 製品板厚 Plate Thickness. ※6 P: 製品分析 Product Analysis
※7 N: 焼準 Normalized, Q: 焼入れ Quenched, T: 焼戻し Tempered, CR: Controlled Rolled, NIC: NIC Process/TMC Process, CLC: CLC Process/TMC Process, L: Intermediate Heat Treatment, AR: As Rolled
SH: 延性破面率 Shear Fracture, CF: 脆性破面率 Crystallinity Fracture, LE: 横膨出 Lateral Expansion, AGS: オーステナイト粒度 Austenite Grain Size, FGS: フェライト粒度 Ferrite Grain Size, SR: Stress Relieved/Post Weld Heat Treatment
温度 Temperature □□□C: □□□°C □□□F: □□□°F

上記注文品は御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C Y. Tsutsumi Aug 6, '03

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept. T. Tabe

M. Tanaka
名古屋製鐵所 厚板管理グループリーダー
MANAGER, INSPECTION
NAGOYA WORKS

N16-1(2) Rev. 10

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新日本製鐵株式會社
Nippon Steel Corporation

社 : 〒100-8071 東京都千代田区大手町二丁目６番３号
HEAD OFFICE : 2-6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100-8071, JAPAN
名古屋製鐵所 : 〒476-8686 愛知県東海市東海町五丁目３番地
NAGOYA WORKS : 5-3, TOKAI-MACHI, TOKAI-CITY, AICHI-PREF., 476-8686, JAPAN

超音波探傷検査証明書
ULTRASONIC EXAMINATION CERTIFICATE

証明書番号 / CERTIFICATE No. : PAGE 1E / M207946
発行年月日 / DATE OF ISSUE : 2002-06-17

需要家 / CUSTOMER : EBARA CORP.
注文者 / SHIPPER : ITOCHU MARUBENI
契約番号 / CONTRACT No. : R010945402 / 2-106-H4-1-4-1541
規格 / SPECIFICATION : ASTM A516-01 GRADE 60
文書番号 / DOCUMENT No. :

探傷器 / FLAW DETECTOR : TOKIMEC SM90D
試験方法 / TESTING METHOD : LOCAL IMMERSION METHOD
接触媒質 / COUPLANT : WATER
周波数 / FREQUENCY : 2.25 MHZ
探傷感度 / SENSITIVITY : BG : 75%
探傷箇所 / SCANNING : AS PER ASTM A435

探触子 / PROBE : 2.25C28I
判定基準 / CRITERIA : AS PER ASTM A435
技術者及びレベル / EVALUATOR & LEVEL : Y. OGATA, LEVEL II

寸法 DIMENSION (MM)	製鋼番号 CAST No.	製品番号 PLATE No.	検査成績 RESULT	備考 REMARKS
SMPS-EC-R07 229.00 X 1350 X 6500	NS9598	022149-1	ACCEPTABLE	058B
~~SMPS-EC-R07 229.00 X 1350 X 6500~~	~~VS3949~~	~~022150-1~~	~~ACCEPTABLE~~	~~059B~~

備考欄に＊印がある場合は，別紙・超音波探傷検査結果を参照下さい。

IN CASE THAT AN ASTERISK (*) IS DENOTED IN THE REMARKS COLUMN, PLEASE REFER TO ULTRASONIC EXAMINATION REPORT ENCLOSED HEREIN.

SER. NO.	R0Z1570803
ITEM NO.	CT-9901
PARTNO.	⑨
TYPE :	SRV-5DF

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept.

検査員 / SURVEYOR TO : INSPECTION TEAM ☐WITNESSED ☒REVIEWED LG E&C Aug. 6, '03

上記注文品は超音波探傷検査を実施した結果，御指定の基準に合格したことを証明します。

WE HEREBY CERTIFY THAT THE PLATES DESCRIBED HEREIN HAVE BEEN ALL ACCEPTABLE ON THE ULTRASONIC EXAMINATION IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

M. Tanaka
名古屋製鐵所 厚板管理グループ
MANAGER, INSPECTION
NAGOYA WORKS

N16-1 (3) Rev. 8

MATERIAL TEST REPORT
材料試験成績表

Date 4 MAR. '03 Report No. 030250

Manufacturer's
Order No. M02-12-040
Purchaser
御注文主 ELLIOTT EBARA TURBOMACHINERY CORPORATION

Name of Article
品 名 SHAFT (For B-ROTOR)
Material
材 質 ASTM A470 CL.4
Witness
立会者
Purchaser's Order No.
注文主番号 CD79967
Specification No.(仕様書No.) SMPS-ES-F15 REV.6 〔EBARA STD.〕
Plant/Project
Drawing No.
図 番 ES/8601600 REV.0
TYPE No. JSRV-5DF
WORK No. R021570803

S. Seo
Chief of Quality Control Section

Testing Machine No. : T-70 NG28,I-76 NG7,920,H-93 NG2

F.R. 1/2.0U 9.1S
Mass 1077 kg

Piece No. 製品番号	Size of Test Specimen Diameter Gauge Length 0.5" × 2" / Test piece No. 試験片番号 Min. Max.	Yield Strength $\sigma_{0.02}$ K.S.I (N/mm²)	Tensile Strength K.S.I (N/mm²)	Elongation %	Reduction of Area %	Test piece No. 試験片番号	Impact Test Notch 2mmV Charpy Test temp. 20 ℃ ft-lb (J)	Hardness Brinell
	Test piece No. 試験片番号 Min.	85 (587)	105 (725)	17	45	Test piece No. 試験片番号	Average Min.	Min.
								Max. 255
11181-204	11181-204L	93.1 (642)	110.5 (762)	25	65			229
	Test piece No. 試験片番号 Min.	85 (587)	105 (725)	16	40	Test piece No. 試験片番号	Average Min. 20 (27)	Min.
								Max. 255
	11181-204T1	94.6 (652)	110.5 (762)	24	60	V-1	37.4 (50.7)	229
	11181-204T2	96.0 (662)	111.1 (766)	24	61	V-3	35.5 (48.2)	229

QUANTITY 1

Heat Treatment
N1. 900 ℃ × 16 h A.C.
T1. 650 ℃ × 16 h A.C.
N2. 850 ℃ × 8 h B.A.C.
T2. 655 ℃ × 12.5 h A.C.
S.R. 615 ℃ × 14 h F.C.

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug. 26 '03

* VACUUM CARBON DEOXIDIZED TREATMENT HAS BEEN MADE

Chemical Composition 化学成分 %

Heat No. 溶解番号	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Sb
Min.			0.20				2.50		0.25	0.03	
Max.	0.28	0.10	0.60	0.012	0.015			0.75			
11181 Ladle	0.22	0.10	0.42	0.004	0.006		2.66	0.53	0.50	0.11	0.001
Product	0.23	0.09	0.42	0.004	0.006		2.67	0.52	0.50	0.11	0.001

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept. J. Tsutsumi

R021570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Shaft

Heat treatment
N. Normalizing
Q. Quenching
S.T. Solution Treatment
A. Annealing
T. Tempering
S.R. Stress Relieving
A.C. Air Cooling
O.C. Oil Cooling
F.C. Furnace Cooling
W.C. Water Cooling
P.H. Precipitation Hardening
B.C. Blast Cooling
W.S.P.C. Water Spray Cooling
B.A.C. Blast Air Cooling

Other
L. Longitudinal
Ta. Tangential
R. Radius
T.S. Top Side
M. Middle
B.S Bottom Side
$\sigma_{0.2}$ 0.2% offset
$\sigma_{0.02}$ 0.02% offset
F.R. Forging Ratio
H.T. Heat Treatment

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

ULTRASONIC INSPECTION REPORT
超音波探傷試験成績表

Date 16 FEB. '03 Report No. 030250

Manufacturer's Order No. M02-12-040

Purchaser 御注文主 ELLIOTT EBARA TURBOMACHINERY CORPORATION

Name of Article 品名 SHAFT (For B-ROTOR)

Material 材質 ASTM A470 CL.4

Purchaser's Order No. 注文主番号 CD79967

Specification No.(仕様書No.) SMPS-ES-F15 REV.6 [EBARA STD.] Witness

Drawing No. 図番 ES/8601600 REV.0

Plant/Project

TYPE No. JSRV-5DF

WORK No. R021570803

Examined	Reviewed	Approved
J. Sakai.	—	K. Shimada
SNT-TC-1A LEVEL II	SNT-TC-1A LEVEL III	SNT-TC-1A LEVEL III

Piece No. 製品番号: 11181-204

QUANTITY 1

Conditions of Ultrasonic Inspection 探傷条件

Defect Detector 探傷器: Kraut Krämer USM 3S

Couplant 接触媒質: Machine oil マシン油

Procedure No. 要領書No.: MIP-T6-90-11B

Applied Code [EBARA STD.] 適用規格: SPS-1002-40

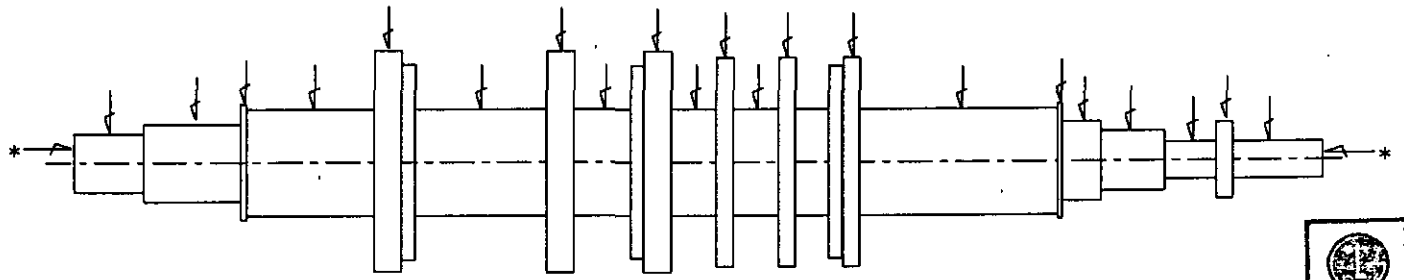
Acceptance: 判定: ACCEPTABLE

Test Method 試験方法	Search Unit 探触子	Specified Sensitivity 探傷感度
Normal Beam Technique 垂直法	24 φmm / 2 MHz	Height of B_1 echo BG : 50 mm
Angle Beam Technique 斜角法	— mm / MHz	—
Double crystal Technique 分割形探触子法	— φmm / MHz	—

Figure & Inspected Area 形状および探傷範囲

Shown by

R021570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Shaft



ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tokui

INSPECTION TEAM ☐WITNESSED ☒REVIEWED LG E&C Y. Tsuchiumi Aug. 26, '03

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

MAGNETIC PARTICLE INSPECTION REPORT
磁粉探傷試験成績表

Date 16 FEB. '03 Report No. 030250

Manufacturer's
Order No. M02-12-040
Purchaser
御注文主 ELLIOTT EBARA TURBOMACHINERY CORPORATION
Name of Article
品 名 SHAFT (For B-ROTOR)
Material
材 質 ASTM A470 CL.4
Purchaser's Order No.
注文主番号 CD79967
Specification No.(仕様書No.) SMPS-ES-F15 REV.6 {EBARA STD.} Witness
Drawing No.
図 番 ES/8601600 REV.0
Plant/Project
TYPE No. JSRV-5DF
WORK No. R021570803

Examined	Reviewed	Approved
J. Sakai.	—	
SNT-TC-1A LEVEL II	SNT-TC-1A LEVEL III	SNT-TC-1A LEVEL III

Piece No. 製品番号: 11181-204

QUANTITY 1

Conditions of Magnetic Particle Inspection 探傷条件

探傷器 Equipment: 電子磁気工業(株)Ez-3S Denshi Jiki Industry Co., Ltd, Ez-3S

Test Method 試験方法	Magnetizing Current 磁化電流	Magnetic Particles 磁粉(マークテック)	Prod Spacing プロッド間隔	Standard Test Piece 標準試験片
Prod Method プロッド法	DC 1000 A	Wet Fluorescent	200 mm	JIS G0565-A1 30/100
Yoke Method 極間法	—	—	—	—
Coil Method コイル法	DC 2100 A	Wet Fluorescent	—	JIS G0565-A1 30/100

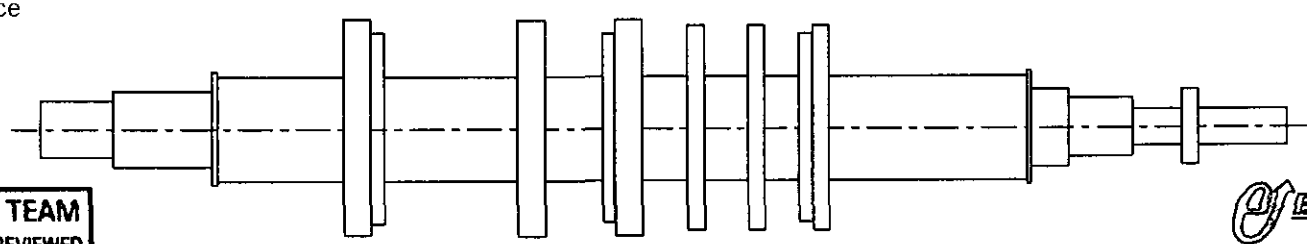
Procedure No. 要領書No.: MIP-T6-90-11B

Applied Code {EBARA STD.} 適用規格: SPS-1002-22

Acceptance: 判定 **ACCEPTABLE**

Figure & Inspected Area
形状および探傷範囲

Entire Surface



ROZ1570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Shaft

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug 26. '03

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept. T. Tokita

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

HEAT STABILITY TEST REPORT
加 熱 振 れ 試 験 成 績 表

Order No. 受注番号 M02-12-040

date 日付 4 MAR. '03

Report No. 成績表番号 030250

Purchaser 御注文主	ELLIOTT EBARA TURBOMACHINERY CORPORATION
Neme of Article 品名	SHAFT
Material 材質	ASTM A470 CL.4
Purchaser'S Order No. 客先注文番号	CD79967
Drawing No. 図番	ES/8601600 REV.0
Name of Project プラント名、プロジェクト名	
TYPE No.	JSRV-5DF
WORK No.	R021570803

Applicable spec. {EBARA STD.}
適用仕様書
SMPS-ES-F15 REV.6
(SPS-1002-80)

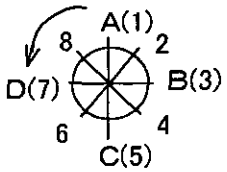
Acceptance Standard
判定基準
(振れ規格) Spec.Deflection 0.050 mm
(軸芯振れ) Spec.Vector 0.025 mm

Piece No. 製品番号 11181-204

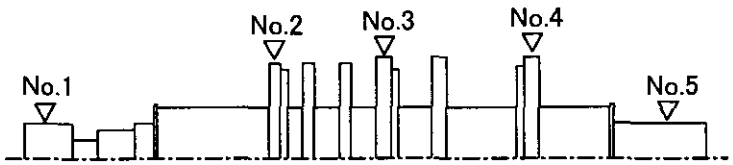
INSPECTION TEAM ☐WITNESSED ☒REVIEWED LG E&C Y. Tanisumi Aug. 26, '03

(試験条件) Test Condition
(昇温速度) Heating Rate 75 ℃/H
(保持温度) Holding 615 ℃
(保持時間) Holding Time 14 H
(降温速度) Cooling Rate Furnace Cooling

(温度と振れの測定器位置)
Measured Position of Temperture & Deflection



R021570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Shaft



第1回 低温測定 1ST COLD MEASUREMENTS UNIT : 1/1000 mm

Position		1				2				3				4				5			
Date	Time	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	-	-	-	-
2/24	15:00	0	0	0	0	0	0	5	5	0	0	0	5	0	0	0	5	0	0	0	0
	16:00	0	0	0	0	0	0	5	5	0	0	0	5	0	0	0	0	0	0	0	0
(A)	17:00	0	0	0	0	0	0	5	5	0	0	0	5	0	0	0	5	0	0	0	0
加熱時最終測定		FINAL HOT MEASUREMENTS																			
2/25	13:00	0	0	0	0	0	-5	-20	-10	0	-10	-20	-15	0	-15	-15	-10	0	0	0	0
	14:00	0	0	0	0	0	-10	-15	-10	0	-10	-20	-15	0	-10	-15	-10	0	0	0	0
(B)	15:00	0	0	0	0	0	-5	-20	-10	0	-10	-20	-15	0	-15	-15	-10	0	0	0	0
第2回 低温測定		2ND COLD MEASUREMENTS																			
2/26	22:00	0	0	0	0	0	-5	-20	-10	0	-10	-25	-15	0	-10	-15	-10	0	0	0	0
	22:30	0	0	0	0	0	-5	-20	-10	0	-10	-25	-15	0	-10	-15	-10	0	0	0	0
(C)	23:00	0	0	0	0	0	-5	-20	-10	0	-10	-20	-15	0	-10	-15	-10	0	0	0	0
(B),(C)の振れ差異		DEFLECTION BETWEEN																			
(B)		0	0	0	0	0	-5	-20	-10	0	-10	-20	-15	0	-15	-15	-10	0	0	0	0
(C)		0	0	0	0	0	-5	-20	-10	0	-10	-20	-15	0	-10	-15	-10	0	0	0	0
(B)−(C)		0	0	0	0	0	0	0	0	0	0	0	0	0	-5	0	0	0	0	0	0
結果	RESULT (Spec.Deflection)																				
		0				0				0				5				0			

ACCEPTANCE 判 定 **ACCEPTABLE**

☐ Witness 立会者 ☐ Reviewer 確認者

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept.

Examined by 試験者 Y. Tanahara

Approved by 承認者 M. Sakiyama

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

Report No. 030250
Unit: 1/1000mm

		DATE	TIME	Temp. (℃)	Position 1 A	1 B	1 C	1 D	2 A	2 B	2 C	2 D	3 A	3 B	3 C	3 D	4 A	4 B	4 C	4 D	5 A	5 B	5 C	5 D	Axie (mm)
1		2/24	15:00	11	0	0	0	0	0	0	5	5	0	0	0	5	0	0	0	5	0	0	0	0	0.0
2	FIRST COLD	2/24	16:00	12	0	0	0	0	0	0	5	5	0	0	0	5	0	0	0	0	0	0	0	0	0.0
3		2/24	17:00	11	0	0	0	0	0	0	5	5	0	0	0	5	0	0	0	5	0	0	0	0	0.0
4		2/24	18:00	76	0	0	0	0	0	5	5	10	0	0	5	15	0	5	5	10	0	0	0	0	0.1
5		2/24	19:00	151	0	0	0	0	0	0	5	10	0	0	5	10	0	0	5	10	0	0	0	0	0.5
6		2/24	20:00	225	0	0	0	0	0	0	10	15	0	0	5	10	0	0	5	10	0	0	0	0	1.6
7	HEATING	2/24	21:00	299	0	0	0	0	0	0	10	20	0	−5	5	15	0	0	5	15	0	0	0	0	3.2
8		2/24	22:00	374	0	0	0	0	0	−5	10	20	0	−5	5	20	0	0	5	15	0	0	0	0	5.5
9		2/24	23:00	449	0	0	0	0	0	0	5	15	0	0	5	10	0	0	5	10	0	0	0	0	8.0
10		2/24	0:00	524	0	0	0	0	0	−10	5	10	0	−5	5	20	0	0	10	15	0	0	0	0	10.0
11		2/25	1:00	600	0	0	0	0	0	−10	5	10	0	−10	5	15	0	0	5	5	0	0	0	0	11.5
12		2/25	2:00	616	0	0	0	0	0	−5	0	0	0	−5	0	0	0	−10	0	0	0	0	0	0	12.6
13		2/25	3:00	615	0	0	0	0	0	0	−5	−5	0	−5	−10	−5	0	−10	−10	−5	0	0	0	0	13.4
14		2/25	4:00	615	0	0	0	0	0	−5	−10	−5	0	−5	−15	−10	0	−15	−10	−10	0	0	0	0	14.0
15		2/25	5:00	616	0	0	0	0	0	−5	−10	−10	0	−10	−15	−10	0	−10	−10	−10	0	0	0	0	14.4
16		2/25	6:00	615	0	0	0	0	0	−5	−10	−10	0	−5	−15	−10	0	−10	−10	−10	0	0	0	0	14.7
17	HOLDING	2/25	7:00	615	0	0	0	0	0	−5	−10	−5	0	−5	−15	−10	0	−10	−15	−10	0	0	0	0	14.9
18		2/25	8:00	615	0	0	0	0	0	−5	−15	−10	0	−5	−15	−10	0	−20	−15	−10	0	0	0	0	15.0
19		2/25	9:00	615	0	0	0	0	0	−5	−15	−10	0	−10	−20	−15	0	−10	−15	−10	0	0	0	0	15.1
20		2/25	10:00	613	0	0	0	0	0	−5	−10	−10	0	−10	−20	−15	0	−10	−15	−10	0	0	0	0	15.1
21		2/25	11:00	613	0	0	0	0	0	−5	−20	−10	0	−10	−20	−10	0	−15	−15	−15	0	0	0	0	15.1
22		2/25	12:00	614	0	0	0	0	0	−5	−20	−10	0	−10	−20	−10	0	−20	−15	−15	0	0	0	0	15.1
23		2/25	13:00	613	0	0	0	0	0	−5	−20	−10	0	−10	−20	−15	0	−15	−15	−10	0	0	0	0	15.1
24	FINAL HOT	2/25	14:00	613	0	0	0	0	0	−10	−15	−10	0	−10	−20	−15	0	−10	−15	−10	0	0	0	0	15.1
25		2/25	15:00	614	0	0	0	0	0	−5	−20	−10	0	−10	−20	−15	0	−15	−15	−10	0	0	0	0	15.1
26		2/25	16:00	564	0	0	0	0	0	−5	−20	−10	0	−10	−25	−15	0	−20	−20	−15	0	0	0	0	14.9
27		2/25	17:00	502	0	0	0	0	0	−10	−20	−10	0	−15	−25	−15	0	−15	−15	−10	0	0	0	0	14.5
28		2/25	18:00	450	0	0	0	0	0	−10	−20	−10	0	−10	−25	−15	0	−20	−15	−10	0	0	0	0	14.0
	COOLING																								
29		2/26	22:00	18	0	0	0	0	0	−5	−20	−10	0	−10	−25	−15	0	−10	−15	−10	0	0	0	0	0.8
30	FINAL COLD	2/26	22:30	18	0	0	0	0	0	−5	−20	−10	0	−10	−25	−15	0	−10	−15	−10	0	0	0	0	0.8
31		2/26	23:00	18	0	0	0	0	0	−5	−20	−10	0	−10	−20	−15	0	−10	−15	−10	0	0	0	0	0.8

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C
Aug. 26, '03

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C T. Tsutsumi Aug. 26 '03

TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer: EBARA CORPORATION, SODEGAURA PLANT

Order No.: CB96375

Spec. No.	Material		Condition	Heat No.	2G222K1	Date	JUL. 04, 2000
SMPS-E1-R02 REV. 6	Size	F19X29X2000L	HEAT TREATED	Number of Pieces	17	Report No.	007-0104-20
(EBARA STD.)				Mass	152 KGS	Our Ref. No.	158-G366-01

JOB. NO. : -

ROZ1570803
SRV-5DF
Item No : CT-9901
B-Rotor
Part Name; Blade (1st. stage)

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	MO %
Spec.	0.09 -0.15	MAX 0.50	MAX 1.00	MAX 0.03	MAX 0.03	MAX 0.50	11.5 -13.0	MAX 0.20
LADLE	0.14	0.29	0.57	0.023	0.001	0.47	11.63	0.16
Elements								
Spec.								
LADLE								

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT		
Spec.	HB 201-248	HB 201-248	–	–	–
Result	229-229	229	TP	–	–
			–	–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength of 0.02%	Tensile Strength	Elongation (4D)	Reduction of Area
			N/MM2	N/MM2	%	%
Spec.	–	L	MIN 483	MIN 690	MIN 20	MIN 60
	–	–	–	–	–	–
Result	–	–	560	778	25.3	67.3
	–	–	–	–	–	–
Specimen	12.50D*50.0GL					

Tensile Test at (-)

HT	TP	Yield Strength of	Tensile Strength	Elongation ( )	Reduction of Area
		–	–	%	%
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
Specimen	–				

HT	Item	IMPACT TEST 2V NOTCH RT

Stress Rupture Test

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation	Reduction of Area
Spec.	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–
	–	–	–	–	–	–	–
	–	–	–	–	–	–	–

Item	Macro Structure				Grain Size		
	HT	–	–	–	–	Spec. TP	–
Spec.	–	–	–	–			
Result	–	–	–	–	–	–	–

Micro Structure

Item	HT	TP		
			–	–
Spec.	–	–	–	–
Result	–	–	GOOD	–

Impact Test

	L	J			
Spec.		MIN41			–
	TP	–	–	–	
Result	–	183	174	177	–
	–	–	–	–	–
	–	–	–	–	–
	–	–	–	–	–

Heat Treatment

Delivered Condition (HTO)
R:Q. 960° CX20MIN. OQ
T. 715° CX1 h - AC

Test Specimen (HT)
–

Attachment ☐ Yes ☒ No

Non-Metallic Inclusion

Item	TP													
		–	–	–	–	–	–	–	–	–	–	–	–	–
Spec.	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Inspection Item	
Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa
QUALITY ASSURANCE DEPARTMENT

PROJECT: -

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed
EETC Q.C Dept. T. Tsutsumi

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
J. Furutsume Aug 26. 03
LG E&C

TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer:EBARA CORPORATION, SODEGAURA PLANT

Order No.:CB96375

Spec. No.	Material	AISI403	Condition	Heat No.	2G222K5	Date	JUL. 04, 2000
SMPS-E1-R02 REV. 6	Size	F19X29X2000L	HEAT TREATED	Number of Pieces	10	Report No.	007-0102-90
{EBARA STD.}				Mass	91 KGS	Our Ref. No.	158-G366-01
	JOB. NO. : -						

ROZ1570893
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Blade (1st. stage)

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	MO %
Spec.	0.09 -0.15	MAX 0.50	MAX 1.00	MAX 0.03	MAX 0.03	MAX 0.50	11.5 -13.0	MAX 0.20
LADLE	0.14	0.29	0.57	0.023	0.001	0.47	11.63	0.16
Elements								
Spec.								
LADLE								

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT		
Spec.	HB 201-248	HB 201-248	–	–	–
Result	241-241	241	TP	–	–
			–	–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength of 0.02% N/MM2	Tensile Strength N/MM2	Elongation (4D) %	Reduction of Area %
Spec.	L		MIN 483	MIN 690	MIN 20	MIN 60
	–	–	–	–	–	–
Result	–	–	572	780	24.7	67.3
	–	–	–	–	–	–
Specimen	12.50D*50.0GL					

Tensile Test at (–)

HT	TP	Yield Strength of	Tensile Strength	Elongation ( ) %	Reduction of Area %
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
Specimen	–				
HT	Item	IMPACT TEST 2V NOTCH	RT		

Stress Rupture Test

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation	Reduction of Area
Spec.	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–
	–	–	–	–	–	–	–
	–	–	–	–	–	–	–

Macro Structure

Item	H	–	–	–	–	Grain Size	Spec.	–	–
Spec.	–	–	–	–	–		TP	–	–
Result	–	–	–	–	–				

Micro Structure

Item	HT	TP		
Spec.	–	–	–	–
Result	–	–	GOOD	–

Impact Test

		J			
Spec.	L	MIN41			–
	TP	–	–	–	
Result	–	177	169	172	–
	–	–	–	–	–
	–	–	–	–	–
	–	–	–	–	–

Heat Treatment

Delivered Condition (HTO)
R:Q. 960° CX20MIN. OQ
T. 715° CX1 h AC

Test Specimen (HT) –

Attachment ☐ Yes ☒ No

Non-Metallic Inclusion

Item	TP													
Spec.	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Inspection Item	
Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa.

QUALITY ASSURANCE DEPARTMENT

PROJECT: –

ELLIOTT EBARA GROUP
☐ Witnessed
☑ Reviewed
EETC Q.C Dept.

30

TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer:EBARA CORPORATION, SODEGAURA PLANT

Order No.:CC74113

Spec. No.	Material	AISI403	Condition	Heat No.	2K375S4	Date	DEC. 26, 2001
SMPS-E1-R02 REV. 6	Size	F23X26X2000L	HEAT TREATED	Number of Pieces	99	Report No.	112-2413-70
(EBARA STD.)				Mass	996 KGS	Our Ref. No.	158-L740-02

JOB. NO. : -

ROZ1570803
SRV-5DF
Item No.: CT-9901
B-Rotor
Part Name; Blade (2nd. stage)

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	MO %
Spec.	0.09 -0.15	MAX 0.50	MAX 1.00	MAX 0.03	MAX 0.03	MAX 0.50	11.5 -13.0	MAX 0.20
LADLE	0.12	0.23	0.56	0.021	0.001	0.48	11.63	0.17
Elements								
Spec.								
LADLE								

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT		
Spec.	HB 201-248	HB 201-248	-	-	-
Result	235-235	235	TP	-	-
			-	-	-

Tensile Test at (RT)

Item	HT	TP	Yield Strength of 0.02%	Tensile Strength	Elongation (4D)	Reduction of Area
			N/MM2	N/MM2	%	%
Spec.	-	L	MIN 483	MIN 690	MIN 20	MIN 60
	-	-	-	-	-	-
Result	-	-	540	749	26.6	71.5
	-	-	-	-	-	-
Specimen	12.50D*50.0GL					

Tensile Test at (-)

HT	TP	Yield Strength of	Tensile Strength	Elongation ( )	Reduction of Area
		-	-	%	%
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
Specimen		-			

Stress Rupture Test

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation	Reduction of Area
Spec.	-	-	-	-	-	-	-
Result	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-

Micro Structure

Item	HT	TP		
Spec.	-	-	-	-
Result	-	-	GOOD	-

Impact Test

		J			
Spec.	L	MIN41			-
	TP	-	-	-	
Result	-	163	162	148	-
	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-

HT Item: IMPACT TEST 2V NOTCH RT

Macro Structure

Item	TP				
Spec.	-	-	-	-	-
Result	-	-	-	-	-

Grain Size: Spec. TP - - - - -

Heat Treatment

Delivered Condition (HTO): R:Q. 960° CX30MIN. OQ
T. 715° CX1 h AC

Test Specimen (HT): -

Attachment ☐ Yes ☒ No

Non-Metallic Inclusion

Item	TP											
		-	-	-	-	-	-	-	-	-	-	-
Spec.	-	-	-	-	-	-	-	-	-	-	-	-
Result	-	-	-	-	-	-	-	-	-	-	-	-

Inspection Item	
Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	-
Material Check	GOOD

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa
QUALITY ASSURANCE DEPARTMENT

PROJECT: -

LG E&C INSPECTION TEAM ☐ WITNESSED ☒ REVIEWED Aug. 26, '03

ELLIOTT ECARA GROUP ☐ Witnessed ☑ Reviewed

EETC Q.C Dept.

ROZ1570803
SRV-5DF
Item No.: CT-9901
B-Rotor
Part Name: Blade (3rd. stage)

試験成績表
TEST CERTIFICATE

御中

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug. 26, '03

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

注文主 Customer: EBARA CORPORATION, SODEGAURA PLANT

注文番号 Order No.: CC89009

スペック番号 Spec.No.	鋼種 Material		納入状態 Condition	溶解番号 Heat No.		発行日 Date	
SMPS-E1-R04 REV.5 【EBARA STD.】	寸法 Size	ASTM A565 GR.616 F23X26X2000L	HEAT TREATED	個数 Number of Pieces	38	成績表番号 Report No.	202-2510-10
				質量 Mass	382 KGS	参照 Our Ref.No.	158-M582-04

製番 (JOB. NO.) : R001600302

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	W %	MO %	V %	CO %	AL %	SN %	TI %
規格 Spec.	0.20 -0.25	0.20 -0.50	0.50 -1.00	MAX 0.025	MAX 0.025	0.50 -1.00	11.00 -12.50	0.90 -1.25	0.90 -1.25	0.20 -0.30	MAX 0.25	MAX 0.05	MAX 0.04	MAX 0.05
LADLE	0.22	0.25	0.80	0.019	0.001	0.81	11.08	0.91	0.91	0.20	0.04	0.003	0.001	0.004

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片	熱処理硬さ Hardness after Heat Treated HT		地疵又は清浄度 Macro-Streak-Flaw or Cleanliness 規格 Spec.			項目 Item H T P		
規格 Spec.	HB 255-331	HB	—	—	段 Step T	—	—	—	規格 Spec. —	—
結果 Result	302-302	302	—	—	結果 Result —	—	—	—	結果 Result —	—

引張試験 Tensile Test at (RT) / HT

項目 Item	H T P	耐力 降伏点 Y.Str at 0.2%	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red.of Area
		N/MM2	N/MM2	%	%
規格 Spec.	L	MIN 690	MIN 863	MIN 15	MIN 45
		—	—	—	—
結果 Result		829	1002	17.0	48.2

試験片 Specimen: 12.50D*50.0GL

衝撃試験 Impact Test.

項目 Item				
規格 Spec.	—	—	—	—
	TP	—	—	—
結果 Result	—	—	—	—

焼入性 Hardenability

	規格 Spec.	H T P	—	—	—
	結果 Result	—	—	—	—

クリープ試験 Stress Rupture

項目 Item	H T	P	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	—	—	—	—	—	—	—
結果 Result	—	—	—	—	—	—	—

熱処理 Heat Treatment: 納入状態 Delivered Condition (HTO) — R:Q. 1038°C X30MIN. OQ / T. 660°C X1 h AC

試験片 Test Specimen (HT) —

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept.

マクロ組織 Macro Structure

項目 Item				
規格 Spec.	—	—	—	—
結果 Result	GOOD	—	—	—

結晶粒度 Grain Size

項目 Item	Spec. TP		
規格 Spec.	—	—	
結果 Result	—	—	—

脱炭又は表面汚染 Decarburization or Surface Contamination

項目 Item		—	—	—
規格 Spec.	H T P	—	—	—
結果 Result	—	—	—	—

検査項目 Inspection Item

寸法検査	Dimensional Test	GOOD
外観検査	Visual Test	GOOD
超音波検査	Ultrasonic Test	GOOD
磁気探傷検査	Magnetic Particle Test	GOOD
浸透探傷検査	Liquid Penetrant Test	—
材質確認	Material Check	GOOD

ミクロ組織 Micro Structure

項目 Item	H T P			
規格 Spec.	—	—	—	—
結果 Result	—	GOOD	—	—

非金属介在物 Non-Metallic Inclusion

					—									
T P	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—

添付資料 Attachment ☒有 Yes ☐無 No

要求図面/仕様書に適合する。
Conforms To All Drawing and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

プラント名 (PROJECT) : 2SNV-8

ROZ1570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name: Blade (3rd. stage)

TEST CERTIFICATE

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug 26'03

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer: EBARA CORPORATION, SODEGAURA PLANT

Order No.: CB77298

Spec. No.	Material	ASTM A565 GR.616	Condition	Heat No.	9J65ISI	Date	MAR. 18, 2000
SMPS-E1-R04 REV. 4	Size	F23X26X2000L	HEAT TREATED	Number of Pieces	7	Report No.	003-1712-00
(EBARA STD.)				Mass	71 KGS	Our Ref. No.	158-F185-01

JOB. NO.: R990430303

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	W %	MO %	V %	CO %	AL %	SN %	TI %
Spec.	0.20 -0.25	0.20 -0.50	0.50 -1.00	MAX 0.025	MAX 0.025	0.50 -1.00	11.00 -12.50	0.90 -1.25	0.90 -1.25	0.20 -0.30	MAX 0.25	MAX 0.05	MAX 0.04	MAX 0.05
LADLE	0.23	0.29	0.79	0.019	0.001	0.79	11.42	0.93	0.94	0.24	0.05	0.008	0.001	0.005

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT	Hardness after Heat Treated TP
Spec.	HB 255-331	HB	–	–
Result	311-311	311	–	–

Item	Macro-Streak-Flaw or Cleanliness			
Spec.		–	–	–
Step	T P	–	–	–
Result	–	–	–	–

Item		–	
Spec.		–	–
Result		–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength or 0.2% N/MM2	Tensile Strength N/MM2	Elongation (4D) %	Reduction of Area %
Spec.	–	L	MIN 690	MIN 863	MIN 15	MIN 45
	–	–	–	–	–	–
Result	–	–	851	1022	18.8	51.0
Specimen	12.50D*50.0GL					

HT Impact Test at

Item	–				
Spec.	–		–		–
	TP	–	–	–	
Result	–	–	–	–	–
Hadenability Spec.	HT TP	–		–	–
Hadenability Result	–	–		–	–

Stress Rupture

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation(%)	Reduction of Area
Spec.	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–

Heat Treatment

Delivered Condition(HTO) Test Specimen (HT)
R:Q. 1038° CX30MIN. OQ
T. 660° CX1 h AC

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tokita

Item	Macro Structure			
Spec.	–	–	–	–
Result	GOOD	–	–	–

Item	HT	Grain Size		
Spec.	Spec. TP	–	–	
Result	–	–	–	

Item	Decarburization or Surface Contamination		
Spec. HT TP	–	–	–
Result	–	–	–

Inspection Item

Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Attachment ☒ Yes ☐ No

Micro Structure

Item	HT	TP			
Spec.	–	–	–	–	–
Result	–	–	–	–	–

Non-Metallic Inclusion

	TP	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Spec.		–	–	–	–	–	–	–	–	–	–	–	–	–	–
Result		–	–	–	–	–	–	–	–	–	–	–	–	–	–

Conforms to All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa.
QUALITY ASSURANCE DEPARTMENT

PROJECT: SBEG-5 DC

R0Z1570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Blade (3rd. stage)

TEST CERTIFICATE

HITACHI
Hitachi Metals, Ltd.
Yasugi Works

INSPECTION TEAM
☐ WITNESSED ☒ REVIEWED
LG E&C
J. Tsutsumi Aug 26, '03

Customer: EBARA CORPORATION, SODEGAURA PLANT
Order No.: CC21394

Spec. No.	Material	ASTM A565 GR. 616	Condition	Heat No.	9M045SI	Date	JAN. 08, 2001
SMPS-EI-R04 REV. 4 (EBARA STD.)	Size	F23X26X2000L	HEAT TREATED	Number of Pieces	13	Report No.	012-2616-20
		JOB. NO.: R991119103		Mass	133 KGS	Our Ref. No.	158-H648-01

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	W %	MO %	V %	CO %	AL %	SN %	TI %
Spec.	0.20 -0.25	0.20 -0.50	0.50 -1.00	MAX 0.025	MAX 0.025	0.50 -1.00	11.00 -12.50	0.90 -1.25	0.90 -1.25	0.20 -0.30	MAX 0.25	MAX 0.05	MAX 0.04	MAX 0.05
LADLE	0.22	0.26	0.78	0.021	0.001	0.81	11.44	0.93	0.95	0.23	0.03	0.009	0.002	0.004

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated		Macro-Streak-Flaw or Cleanliness	–
Spec.	HB 255-331	HB	–	–	–	–
Result	311-311	311	–	–	–	–

Tensile Test at (RT) HT

Item	Yield Strength or 0.2%	Tensile Strength	Elongation (4D)	Reduction of Area
	N/MM2	N/MM2	%	%
Spec.	MIN 690	MIN 863	MIN 15	MIN 45
	–	–	–	–
Result	851	1020	18.2	50.4

Specimen 12.50D*50.0GL

Impact Test at – Item: –; Spec.: –; Result: –

Hadenability: Spec. –; Result: –

Stress Rupture

Item	T P	Temperature	Stress	Life (Hrs)	Elongation(%)	Reduction of Area
Spec.	–	–	–	–	–	–
Result	–	–	–	–	–	–

Heat Treatment
Delivered Condition(HTO) Test Specimen (HT)
R: Q. 1038°CX30MIN. OQ
T. 660°CX1 h AC

ELLIOTT EBARA GROUP ☐ Witnessed ☒ Reviewed
EETC Q.C Dept.

Item	Macro Structure			
Spec.	–	–	–	–
Result	GOOD	–	–	–

Grain Size: –
Decarburization or Surface Contamination: –

Inspection Item	
Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Perticle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Attachment ☒ Yes ☐ No

Micro Structure: Spec. –; Result: –
Non-Metallic Inclusion: –

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa
QUALITY ASSURANCE DEPARTMENT

PROJECT: SBEG-4

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Bautista Aug 26, '03

試験成績表
TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

御注文主: (株) 荏原エリオット
Customer 本社

御中

御注文番号:CD20033
Order No.

スペック番号 Spec.No.	鋼種 Material	12CR-0.12CB-MOD	納入状態 Condition	溶解番号 Heat No.	9K447K1	発行日 Date	2002-08-07
SMPS-EI-R06 REV.4	寸法 Size	F24X35X2000L	HEAT TREATED	個数 Number of Pieces	16	成績表番号 Report No.	207-3104-70
[EBARA STD.]				質量 Mass	222 KGS	参照 Our Ref.No.	151-NA7P-01

製番 (JOB. NO.) :R010871403

R021570803
SRV-5
Item No.; CT-9901
B-Rotor
Part Name: Blade (4th. stage)

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	NB %
規格 Spec.	0.13 -0.18	MAX 0.50	0.40 -0.60	MAX 0.025	MAX 0.010	MAX 0.50	11.50 -13.00	0.15 -0.25
LADLE	0.14	0.36	0.48	0.021	0.002	0.41	12.17	0.20

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片	熱処理硬さ Hardness after Heat Treated			地疵又は清浄度 Macro-Streak-Flaw or Cleanliness			
規格 Spec.	HB 255-302	HB 255-302	HT –	–	–	規格 Spec.	–	–	–
結果 Result	269-269	269	TP –	–	–	段 Step T / P	–	–	–
						結果 Result –	–	–	–

項目 Item	T	P	–	–
規格 Spec.	–		–	–
結果 Result	–		–	–

引張試験 Tensile Test at (RT)

項目 Item	HT TP	耐力 降伏点 0.2% Str.	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red.of Area
		N/MM2	N/MM2	%	%
規格 Spec.	L	MIN 690	MIN 828	MIN 17	MIN 55
	–	–	–	–	–
結果 Result	–	764	892	20.9	66.2

試験片 Specimen 12.50D*50.0GL

HT 衝撃試験 Impact Test

項目 Item	衝撃試験 2V NOTCH				RT
規格 Spec.	L	J MIN54			–
	TP	–	–	–	
結果 Result	–	127	109	106	–

焼入性 Hardenability: 規格 Spec. HT TP – – –; 結果 Result – – – –

クリープ試験 Stress Rupture

項目 Item	HT	TP	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	–	–	–	–	–	–	–
結果 Result	–	–	–	–	–	–	–

熱処理 Heat Treatment

納入状態 Delivered Condition(HTO) 試験片 Test Specimen (HT)

R:Q.960°CX30MIN. OQ
T.610°CX1 h AC

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tashi

マクロ組織 Macro Structure

項目 Item	T	–	–	–	–
規格 Spec.	–	–	–	–	–
結果 Result	–	–	–	–	–

結晶粒度 Grain Size

項目 Item	Spec. TP		
規格 Spec.		–	–
結果 Result	–	–	–

脱炭又は表面汚染 Decarburization or Surface Contamination

項目 Item		–	–	–
規格 Spec.	HT TP	–	–	–
結果 Result		–	–	–

検査項目 Inspection Item

寸法検査	:Dimensional Test	GOOD
外観検査	:Visual Test	GOOD
超音波検査	:Ultrasonic Test	GOOD
磁気探傷検査	:Magnetic Particle Test	GOOD
浸透探傷検査	:Liquid Penetrant Test	–
材質確認	:Material Check	GOOD

ミクロ組織 Micro Structure

項目 Item	HT T	TP	–	–	–
規格 Spec.	–		–	–	–
結果 Result	–		GOOD	–	–

非金属介在物 Non-Metallic Inclusion

					–									
TP	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–

添付資料 Attachment ☒有 Yes ☐無 No

要求図面/仕様書に適合する。
Conforms To All Drawing and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

02.8.21 03982

プラント名 (PROJECT) :SBEG-4

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug 26, '03

試験成績表
TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

御中

注文主: (株) 荏原エリオット
Customer 本社

注文番号:CD80935
Order No.

スペック番号 Spec.No.	鋼種 Material	12CR-0.12CB-MOD	納入状態 Condition	溶解番号 Heat No.	9S018K1	発行日 Date	2003-03-25
SMPS-EI-R06 REV.4 (EBARA STD.)	寸法 Size	F40X45X2000L	HEAT TREATED	個数 Number of Pieces	14	成績表番号 Report No.	303-1411-90
				質量 Mass	414 KGS	参照 Our Ref.No.	151-PSWF-01

製番 (JOB. NO.) :R021570803

R021570803
SRV-5DF
Item No.: CT-9901
B-Rotor
Part Name; Blade (5th, 5DFth. Stage)

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	NB %
規格 Spec.	0.13 -0.18	MAX 0.50	0.40 -0.60	MAX 0.025	MAX 0.010	MAX 0.50	11.50 -13.00	0.15 -0.25
LADLE	0.15	0.27	0.51	0.019	0.003	0.38	12.04	0.20

納入硬さ Hardness (as Shipped)

項目 Item	製品	試験片
規格 Spec.	HB 255-302	HB 255-302
結果 Result	277-277	277

熱処理硬さ Hardness after Heat Treated: HT –, TP –

地疵又は清浄度 Macro-Streak-Flaw or Cleanliness: 規格 Spec. –, 段 Step T –, P –, 結果 Result –

引張試験 Tensile Test at (RT)

項目 Item	HT TP	耐力 Pr.Str at 0.2%	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red.of Area
		N/MM2	N/MM2	%	%
規格 Spec.	L	MIN 690	MIN 828	MIN 17	MIN 55
結果 Result		747	878	21.2	65.9

試験片 Specimen 12.50D*50.0GL

衝撃試験 Impact Test

HT 衝撃試験 2V NOTCH RT

項目 Item		J
規格 Spec.	L	MIN54
	TP	–
結果 Result	–	119 117 116

焼入性 Hardenability: 規格 Spec. HT TP –, 結果 Result –

クリープ試験 Stress Rupture

項目 Item	HT	TP	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	–	–	–	–	–	–	–
結果 Result	–	–	–	–	–	–	–

熱処理 Heat Treatment

納入状態 Delivered Condition (HTO) 試験片 Test Specimen (HT)

R:Q.960° CX30MIN. OQ
T.610° CX2 h AC

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tokk

マクロ組織 Macro Structure

項目 Item	TP			
規格 Spec.	–	–	–	–
結果 Result	–	–	–	–

HT 項目 Item 規格 Spec. TP –, 結果 Result –

結晶粒度 Grain Size –

脱炭又は表面汚染 Decarburization or Surface Contamination: 項目 Item –, 規格 Spec. HT TP –, 結果 Result –

ミクロ組織 Micro Structure

項目 Item	HT	TP			
規格 Spec.	–	–	–	–	–
結果 Result	–	–	GOOD	–	–

非金属介在物 Non-Metallic Inclusion

					–			–						
T					–			–						
P	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

検査項目 Inspection Item

寸法検査 :Dimensional Test	GOOD
外観検査 :Visual Test	GOOD
超音波検査 :Ultrasonic Test	GOOD
磁気探傷検査 :Magnetic Particle Test	GOOD
浸透探傷検査 :Liquid Penetrant Test	–
材質確認 :Material Check	GOOD

添付資料 Attachment ☒有 Yes ☐無 No

要求図面/仕様書に適合する。
Conforms To All Draving and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

プラント名 (PROJECT) :SRV-5DF (ヨビローター)

INSPECTION TEAM
☐WITNESSED ☒REVIEWED
LG E&C J. Tsutsumi Aug.26'03

試験成績表
TEST CERTIFICATE

御中

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

注文主: (株) 荏原エリオット
Customer 本社

注文番号:CD80935
Order No.

スペック番号 Spec.No.	鋼種 Material	12CR-0.12CB-MOD	納入状態 Condition	溶解番号 Heat No.	9P828N1	発行日 Date	2003-03-25
SMPS-EI-R06 REV.4 {EBARA STD.}	寸法 Size	F40X45X2000L	HEAT TREATED	個数 Number of Pieces	16	成績表番号 Report No.	303-1834-30
				質量 Mass	470 KGS	参照 Our Ref.No.	151-PSWF-01

製番 (JOB. NO.) :R021570803

R021570803
SRV-5DF
Item No.; CT-9901
B-Rotor
Part Name; Blade(5th., 5DFth. stage)

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	NB %
規格 Spec.	0.13 -0.18	MAX 0.50	0.40 -0.60	MAX 0.025	MAX 0.010	MAX 0.50	11.50 -13.00	0.15 -0.25
LADLE	0.15	0.34	0.50	0.019	0.001	0.39	12.04	0.20

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片	熱処理硬さ Hardness after Heat Treated HT		地疵又は清浄度 Macro-Streak-Flaw or Cleanliness 規格 Spec.			項目 Item T P		
規格 Spec.	HB 255-302	HB 255-302	—	—	度 Step	T	—	規格 Spec.	—	—
結果 Result	277-277	277	TP —	—		P	—	結果 Result	—	—
	—	—	—	—	結果 Result	—	—			

引張試験 Tensile Test at (RT) HT

項目 Item	H T / T P	耐力 Proof Str. at 0.2%	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red.of Area
		N/MM2	N/MM2	%	%
規格 Spec.	L	MIN 690	MIN 828	MIN 17	MIN 55
	—	—	—	—	—
結果 Result	— —	757	892	21.6	61.1

試験片 Specimen 12.50D*50.0GL

衝撃試験 Impact Test

項目 Item	衝撃試験 2V NOTCH RT				
規格 Spec.	L	J MIN54			—
	TP	—	—	—	
結果 Result	—	86	91	76	—

焼入性 Hardenability

規格 Spec.	H T / T P	—	—	—
結果 Result	— —	—	—	—

応力試験 Stress Rupture

項目 Item	H T / T P	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	—	—	—	—	—	—
結果 Result	—	—	—	—	—	—

熱処理 Heat Treatment
納入状態 Delivered Condition (HTO)
R:Q. 960° CX30MIN. OQ
T. 610° CX2 h AC

試験片 Test Specimen (HT)

ELLIOTT EBARA GROUP
☐Witnessed
☑Reviewed
EETC Q.C Dept.

マクロ組織 Macro Structure

項目 Item	H T / T P				
規格 Spec.	—	—	—	—	—
結果 Result	—	—	—	—	—

結晶粒度 Grain Size

項目 Item	Spec / TP		
規格 Spec.	—	—	—
結果 Result	—	—	—

脱炭又は表面汚染 Decarburization or Surface Contamination

項目 Item			
規格 Spec.	H T / T P	—	—
結果 Result	— —	—	—

検査項目 Inspection Item

寸法検査	:Dimensional Test	GOOD
外観検査	:Visual Test	GOOD
超音波検査	:Ultrasonic Test	GOOD
磁気探傷検査	:Magnetic Particle Test	GOOD
浸透探傷検査	:Liquid Penetrant Test	—
材質確認	:Material Check	GOOD

ミクロ組織 Micro Structure

項目 Item	H T / T P			
規格 Spec.	—	—	—	—
結果 Result	—	GOOD	—	—

非金属介在物 Non-Metallic Inclusion

					—				—					
T P	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—

添付資料 Attachment ☒有 Yes ☐無 No

要求図面/仕様書に適合する。
Conforms To All Drawing and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

プラント名 (PROJECT) :SRV-5DF(ヨビロータ-)

SUBJECT	STEAM TURBINE / MAGNETIC PARTICLE EXAMINATION RECORD		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACHINE No.	-		

Part Name	Exhaust end casing
Part No.	-
Quantity	1

■ Table : Condition

Joint No.	As per comp. welding procedure (Doc. No. LGTPR-8121-2041)			F.S. No.	-
Proc.No.	LGTPR-8121-2005 (Main turb. Inspection & Test proc.)			Acceptance criteria	ASME Sec.VIII Div.1 App. 6
Equipment	☒ A-6 (Eishin-Kagaku) ☐ ES-1S (Eishin-Kagaku)			Method	☐ Residual method ☒ Continuous method
Current	☒ AC ÷ A ☐ DC 3600 AT			Reference piece	ASTM field indicator
				Prod distance	- mm
Magnetized time	2 sec. 2 times			Surface condition	Sand blast
Magnetizing method	☐ Prod	☐ Coil	☒ Yoke	☐ Direct	☐ Through conductor
Powder	☒ Wet method ☐ Dry method	☐ Black		☐ White	☐ Brown ☒ Fluorescence
Powder type	Wet	☒ SY-8000 (Eishin-kagaku)			
	Dry	☐ Magnatron MA-100 (Red)		☐ Magnatron (White) (Eishin-kagaku)	

■ Other information

Location : Welding joints.

Stage of inspection : After PWHT.

Lifting power : 10 ft-lb (4.5Kgf) / Only for yoke method.

■ Result

☒ Acceptable ☐ Not acceptable

■ Examiner / Certified No.

Y. ISHIWATA / 57817

■ Note Reference item number of quality plan : D03

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by				INSPECTION TEAM ☐WITNESSED ☒REVIEWED
Date	Apr. 16 '03	Apr.-16-2003	APR. 16. '03	LG E&C Aug. 6, '03

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

P

SUBJECT	STEAM TURBINE / LIQUID PENETRANT EXAMINATION RECORD				
EBARA SER. No.	R021570803	MODEL	SRV-5DF	ITEM No.	CT-9901
MACH. No.					

Part Name	Exhaust end casing
Part No.	-
Quantity	1

■ Table : Condition

Joint No.	As per comp. welding procedure (Doc. No. LGTPR-8121-2041)	F.S. No.	-
Proc.No.	LGTPR-8121-2005 (Main turb. Inspection & Test proc.)	Acceptance criteria	ASME Sec.VIII Div.1 App. 8
Penetrant	R-1A (NT) / Eishin-Kagaku	Penetration time	15 Minutes
Developer	R-1S (NT) / Eishin-Kagaku	Temperature	18 ℃
Solvent	R-1M (NT) / eishin-Kagaku	Surface condition	Sand blast

■ Other information

Location : Weld joints.

Stage of inspection : After PWHT.

■ Result

☒ Acceptable ☐ Not acceptable

■ Examiner / Certified No.

Y. ISHIWATA / 57817

■ Note Reference item number of quality plan : D03

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by				INSPECTION TEAM ☐WITNESSED ☒REVIEWED
Date	Apr-16'03	Apr.-16-2003	APR-16.'03	H.G E&C Aug. 6, '03

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

SUBJECT	STEAM TURBINE CASING / HYDROSTATIC PRESSURE TEST RECORD				
EBARA SER. No.	R021570803	MODEL	SRV-5DF	ITEM No.	CT-9901
MACHINE No.	–				

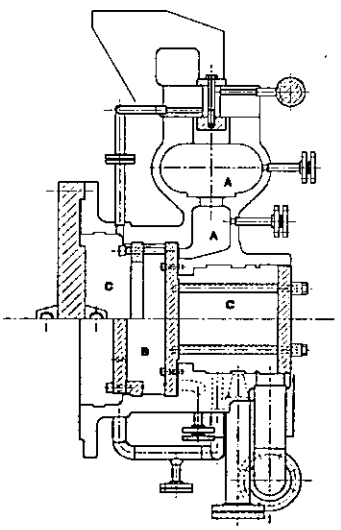
■ Acceptance criteria : No visible leakage during holding time of Min. 30 Minutes.

■ Condition : Using potable water.

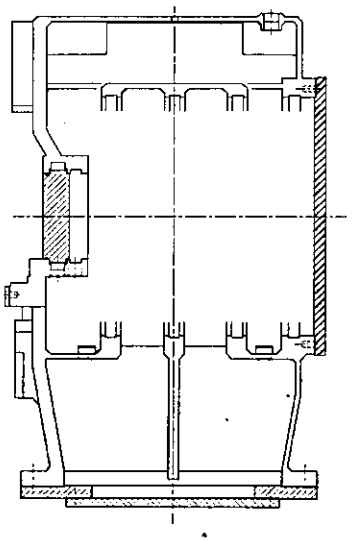
■ Table : Hydrostatic test water pressure of each portion of casing.

No.	Parts Name		Test pressure kgf/cm2G (Mpa G)	Result	Gage No.
1	Steam chest	☑ Steam chest : A	86.0 (8.43)	☑ Acceptable ☐ Not acceptable	15-6 (447819) 15-8 (447821)
2	Steam end casing	☑ Before nozzle : A	86.0 (8.43)	☑ Acceptable ☐ Not acceptable	15-6 (447819) 15-8 (447821)
3		☐ After nozzle : B	17.0 (1.67)	☐ Acceptable ☐ Not acceptable	
4		☐ After nozzle : C	6.0 (0.59)	☐ Acceptable ☐ Not acceptable	
5		☐ After nozzle:		☐ Acceptable ☐ Not acceptable	
6	Exhaust end casing	☑ Exhaust end casing	1.5 (0.15)	☑ Acceptable ☐ Not acceptable	0.3-2 (4191620) 0.3-3 (4678761)

■ Figure :



Steam end casing



Exhaust end casing

■ Note Reference item number of quality plan : D07

TO	SET

Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by Date Jul. 25 '03	July-25-2003	Y. Saito 7-25-2003	INSPECTION TEAM ☐WITNESSED ☒REVIEWED Y. Tsutsumi Aug 6 '03

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

SUBJECT	STEAM TURBINE CASING / HYDROSTATIC PRESSURE TEST RECORD				
EBARA SER. No.	R021570803	MODEL	SRV-5DF	ITEM No.	CT-9901
MACHINE No.	-				

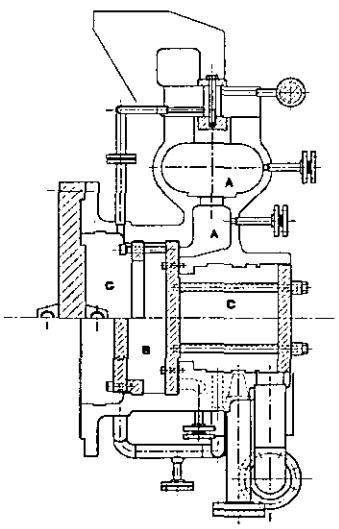
■ Acceptance criteria : No visible leakage during holding time of Min. 30 Minutes.

■ Condition : Using potable water.

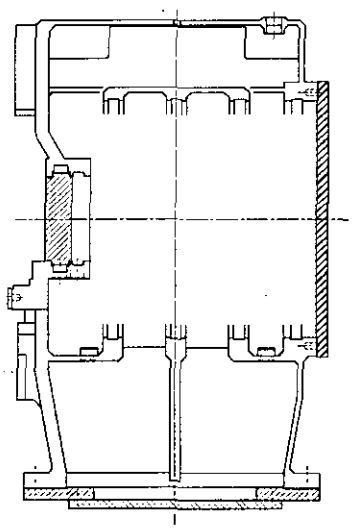
■ Table : Hydrostatic test water pressure of each portion of casing.

No.	Parts Name		Test pressure kgf/cm2G (Mpa G)	Result	Gage No.
1	Steam chest	☐ Steam chest : A	86.0 (8.43)	☐ Acceptable ☐ Not acceptable	
2	Steam end casing	☐ Before nozzle : A	86.0 (8.43)	☐ Acceptable ☐ Not acceptable	
3		☒ After nozzle : B	17.0 (1.67)	☒ Acceptable ☐ Not acceptable	JB11856 3.5-4 JL01839 3.5-2
4		☒ After nozzle : C	6.0 (0.59)	☒ Acceptable ☐ Not acceptable	AA01485 1-6 IL19799 F-1
5		☐ After nozzle:		☐ Acceptable ☐ Not acceptable	
6	Exhaust end casing	☐ Exhaust end casing	1.5 (0.15)	☐ Acceptable ☐ Not acceptable	

■ Figure :



Steam end casing



Exhaust end casing

■ Note Reference item number of quality plan : D07

TO	SET

Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by Date Aug 11, '03	—	Y. Saito 8-11-2003	INSPECTION TEAM ☒WITNESSED ☐REVIEWED LG E&C K. Tsutsumi Aug 11, '03

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

P

SUBJECT	STEAM TURBINE ROTOR / HIGH SPEED BALANCE RECORD		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. B		

■ Condition :

Type of balancing machine ■ Schenk DH4 □ Schenk DH7

Rotor weight 1000 kgf

Test speeds are showm below. Holding time at overspeed is Min. 3 min.

Correction method □ Removed ■ Added

■ Table : Measured shaft vibration amplitude data.

Shaft vibration amplitude		A Plane (PDL 201)		B Plane (PDL 202)		Criteria	Result
Test speed	min-1	X μm p-p	Y μm p-p	X μm p-p	Y μm p-p	μm p-p	
Maximum continuous speed	10828	6.9	7.5	3.5	5.0	25.0	ACCEPTABLE
Trip speed	11911	9.9	10.4	3.7	7.1	*	ACCEPTABLE

* : As per API

■ Table : Residual unbalance (Reference only data)

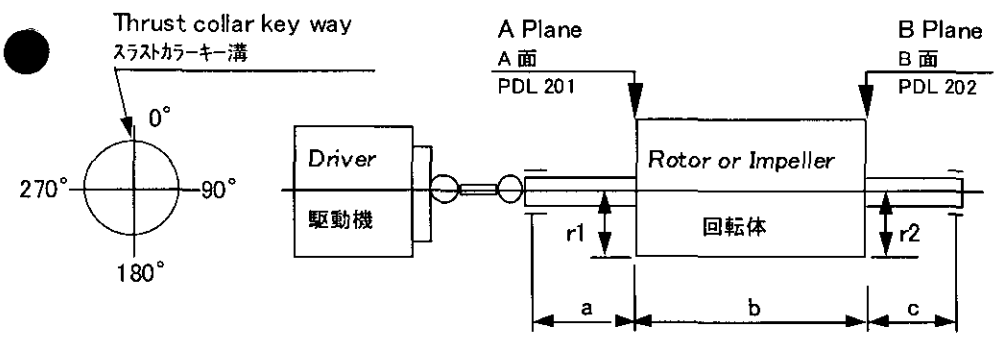
Low speed balance	A Plane (Drive end) (PDL 201)				B Plane (Free end) (PDL 202)			
Test speed 1850 min-1	Phase °	Weight g	r 1 mm	Amount g-mm	Phase °	Weight g	r 2 mm	Amount g-mm
Initial unbalance	358	13.8	176.4	2434.3	357	37	176.4	6526.8
Final unbalance	52	2.53	176.4	446.3	86	4.26	176.4	751.5

■ Figure: Typical sketches

Thrust collar is

□ A plane side

■ B plane side



Unit : mm

a	515
b	920
c	660
r1	176.4
r2	176.4

Zero phase angle is relative to _____

Reading of phase angle is (■ CW, □ CCW) viewing from (□ thrust, ■ non-thrust) end side.

■ Note Reference item number of quality plan : E04

	Approved (Aero equip. eng. dept.)	Checked (Aero equip. eng. dept.)	Prepared (Aero equip. eng. dept.)	Customer / Inspector
by	H. Ishikawa	—	H. Ishikawa	INSPECTION TEAM ☒WITNESSED ☐REVIEWED LG E&C K. Tsutsumi Aug. 26. '03
Date	Aug. 26th '03		Aug. 26th '03	

TO	SET

EBARA Corp.

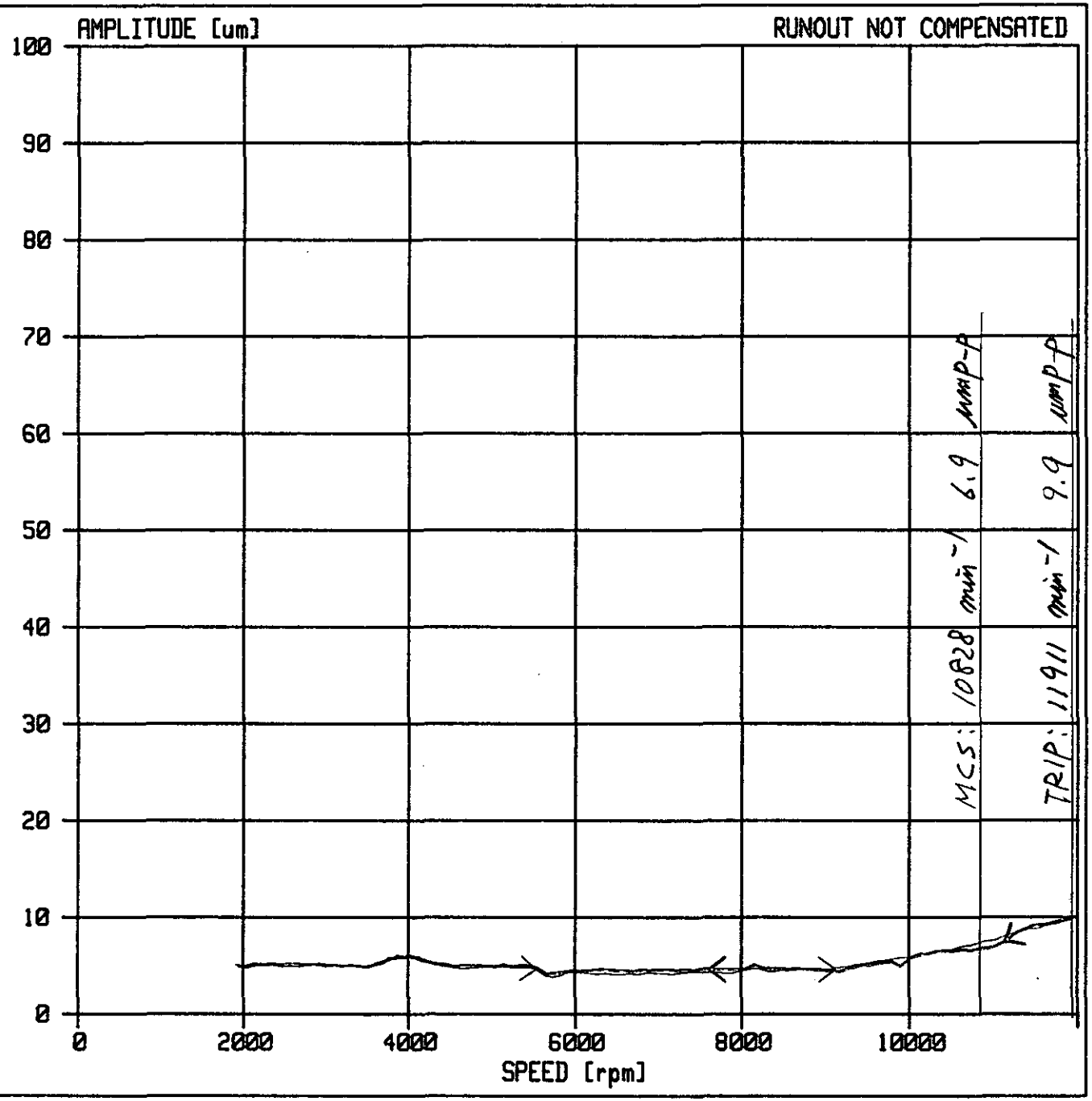
R021570836

26-08-103 09:45

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF B rotor

RUN NO.: 13
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 1
PICK UP:
SV
CPLG END PDL201 X



INSPECTION TEAM
☒WITNESSED ☐REVIEWED
LG E&C
J. Tsutsumi
Aug. 26. '08

EBARA Corp.

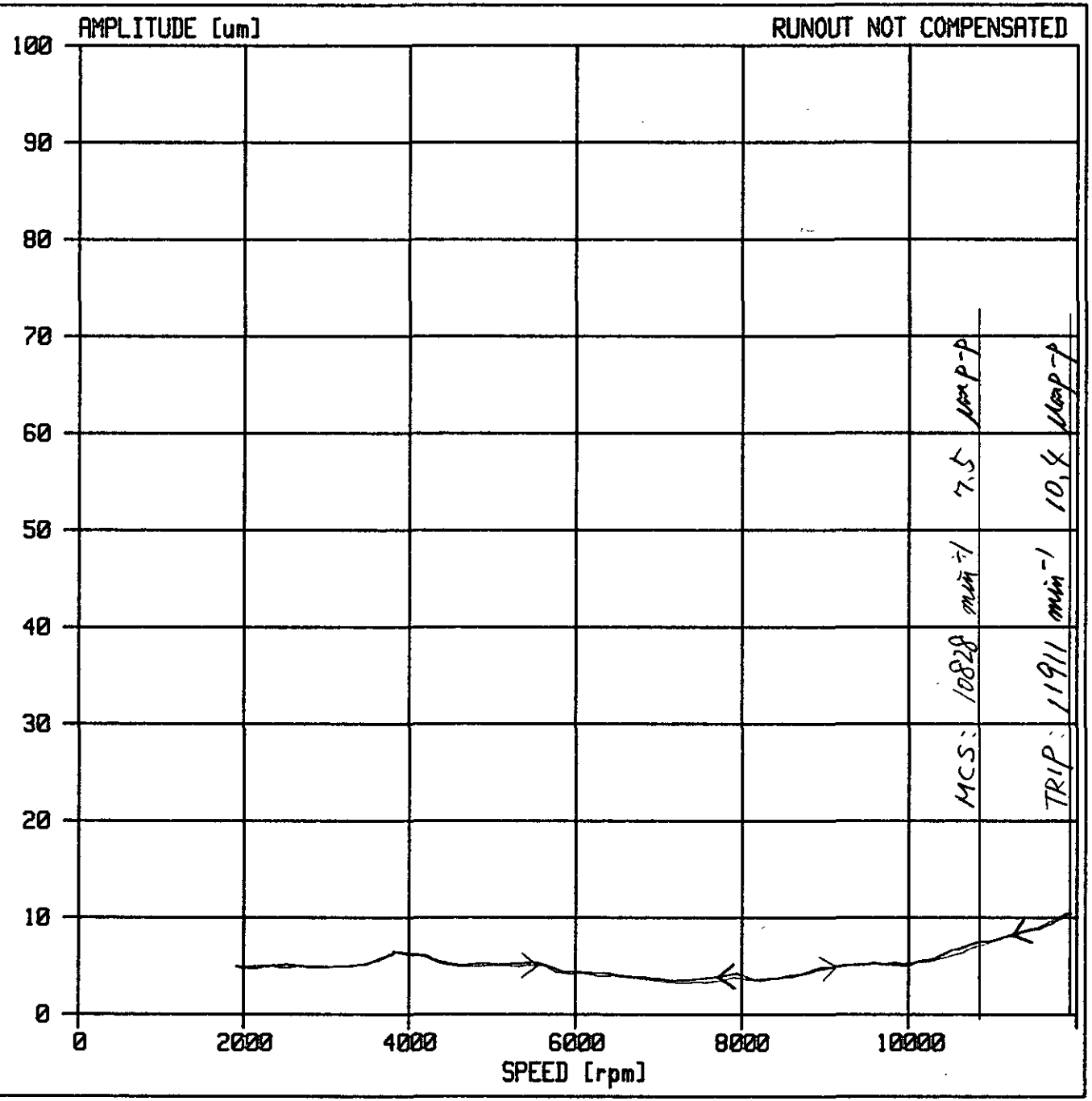
R021570836

26-08-103 09:45

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF B rotor

RUN NO.: 13
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 2
PICK UP:
SV
CPLG END PDL201 Y



INSPECTION TEAM
☒WITNESSED ☐REVIEWED
LG E&C
Aug. 26. '03

EBARA Corp.

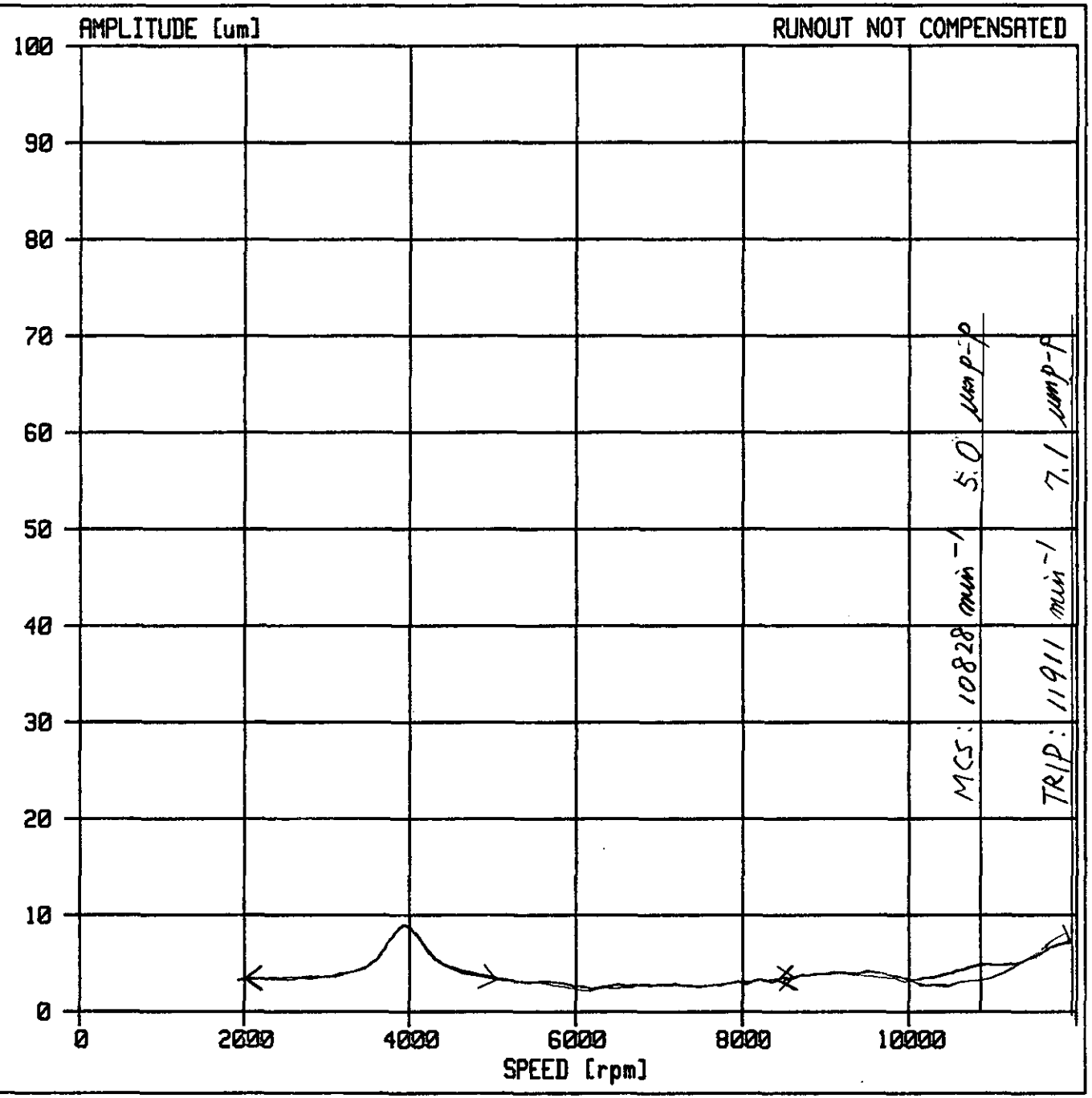
R02157083G

26-08-103 09:45

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF B rotor

RUN NO.: 13
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 7
PICK UP:
SV
FREE END PDL202 X



INSPECTION TEAM
☒WITNESSED ☐REVIEWED
LG E&C
Aug. 26, '03

EBARA Corp.

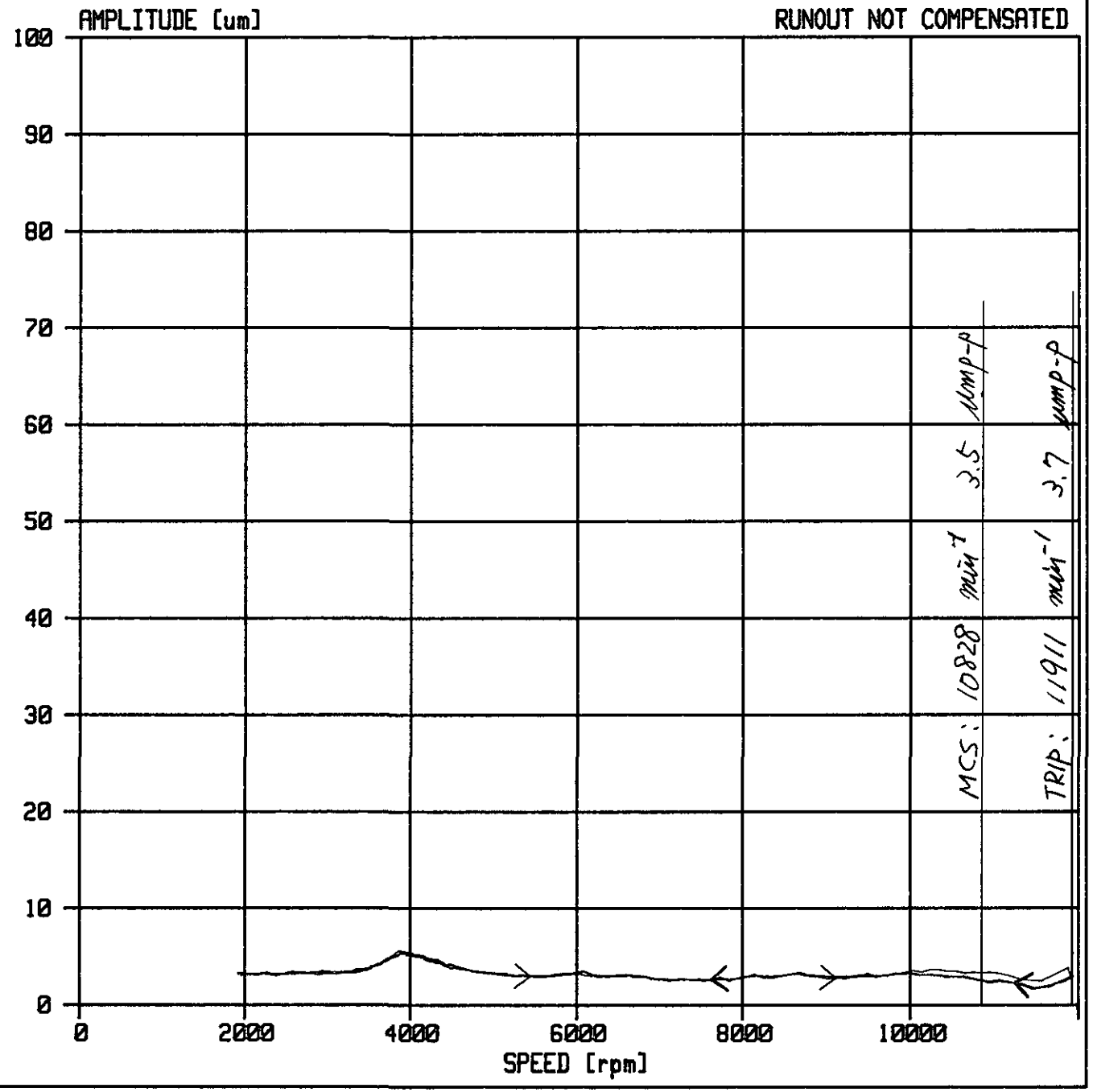
R02157083G

26-08-103 09:45

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF B rotor

RUN NO.: 13
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 8
PICK UP:
SV
FREE END PDL202 Y



INSPECTION TEAM
☒WITNESSED ☐REVIEWED
LG E&C
J. Tsutsumi Aug. 26. '03

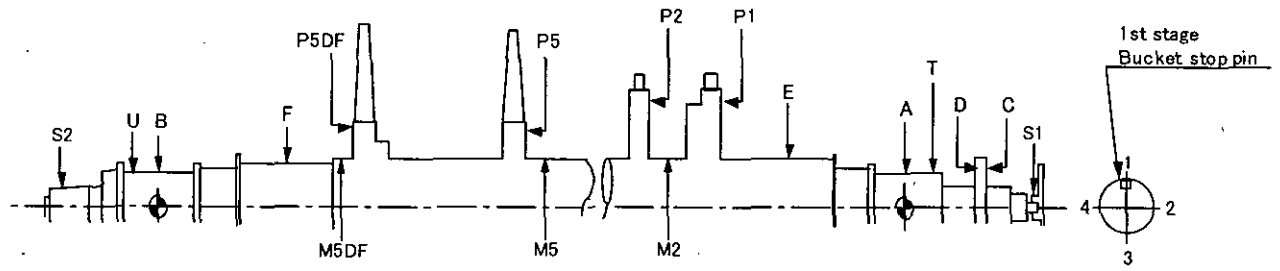
Inspection Activity

Subvendor	Ebara	Customer

P

SUBJECT	STEAM TURBINE ROTOR / MECHANICAL RUNOUT TEST RECORD		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. B		

■ Figure : Typical sketches of compressor rotor



■ Table : Measured data.

Unit : mm

	Location	Allowance	Point 1	Point 2	Point 3	Point 4	Runout	Result
A	Journal Bearing	0.0127	0	0	0.002	0	0.002	Acceptable
B	Journal Bearing	0.0127	0	0.003	0.001	0.001	0.003	
C	Thrust Face	0.0127	0	0.003	0.002	0.001	0.003	
D	Thrust Face	0.0127	0	0.001	0.002	0.002	0.002	
E	Shaft seal surfase	0.025	0	0.002	0.002	0.004	0.004	
F	Shaft seal surfase	0.025	0	0.005	0.003	0.004	0.005	↓
M2	Shaft seal surfase	0.025	0	0.007	0.001	-0.004	0.011	Acceptable
M3	Shaft seal surfase	0.025	0	0.005	0.006	0.001	0.006	
M4	Shaft seal surfase	0.025	0	0.002	0.002	0	0.002	
M5	Shaft seal surfase	0.025	0	0.005	0.003	-0.002	0.007	
M5DF	Shaft seal surfase	0.025	0	0.002	0	-0.002	0.004	↓
P1	Disk fase	0.25	0	-0.001	-0.001	0	0.001	Acceptable
P2	Disk fase	0.25	0	-0.002	-0.002	-0.003	0.003	
P3	Disk fase	0.25	0	0.001	0.001	0	0.001	
P4	Disk fase	0.25	0	0.001	0.004	-0.007	0.011	
P5	Disk fase	0.25	0	-0.004	0.001	0.001	0.005	
P5DF	Disk fase	0.25	0	0	0.001	-0.002	0.003	↓
S1	Shaft	0.025	0	0.006	0.016	0.017	0.017	Acceptable
S2	Shaft	0.025	0	0	0.003	0.005	0.005	
T	Vibration Sensing Area	0.005	0	0	0.001	0.001	0.001	
U	Vibration Sensing Area	0.005	0	0.002	0	0.001	0.002	↓

■ Note Reference item number of quality plan : E08

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			T. KAZUMA	INSPECTION TEAM ☐WITNESSED ☒REVIEWED
Date	AUG. 5 '03	Aug.-5-2003	AUG. 04 '03	LQ E&C Aug 26,'03

ELLIOTT EBARA GROUP

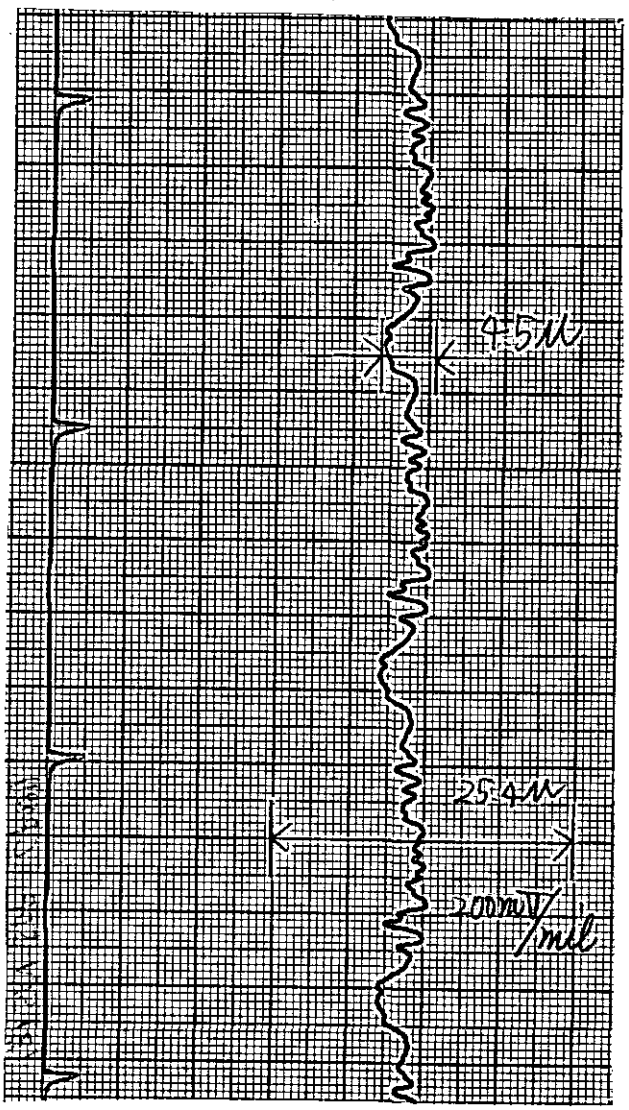
Elliott Ebara Turbomachinery Corporation

P

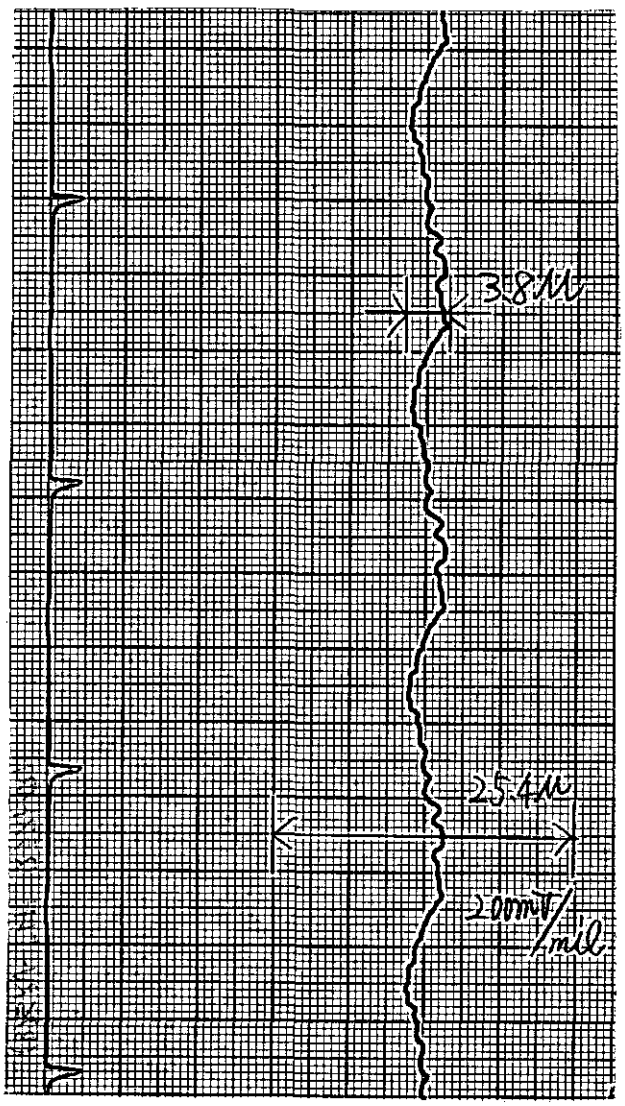
SUBJECT	STEAM TURBINE ROTOR / TOTAL (MECHANICAL & ELECTRICAL) RUN-OUT RECORD (RADIAL)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. -	ROTOR I.D. B		

Vibration probe sensing area

Location ☐ Thrust side ☑ Non thrust side
Criteria Max. 6.4 μm
Result ☑ Acceptable ☐ Not acceptable



Location ☑ Thrust side ☐ Non thrust side
Criteria Max. 6.4 μm
Result ☑ Acceptable ☐ Not acceptable



■ Note Reference item number of quality plan : E09

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			T. KAZUMA	INSPECTION TEAM ☐WITNESSED ☒REVIEWED
Date	Aug. 5 '03	Aug. - 5 - 2003	AUG 04 '03	LG E&C Aug. 26 '03

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

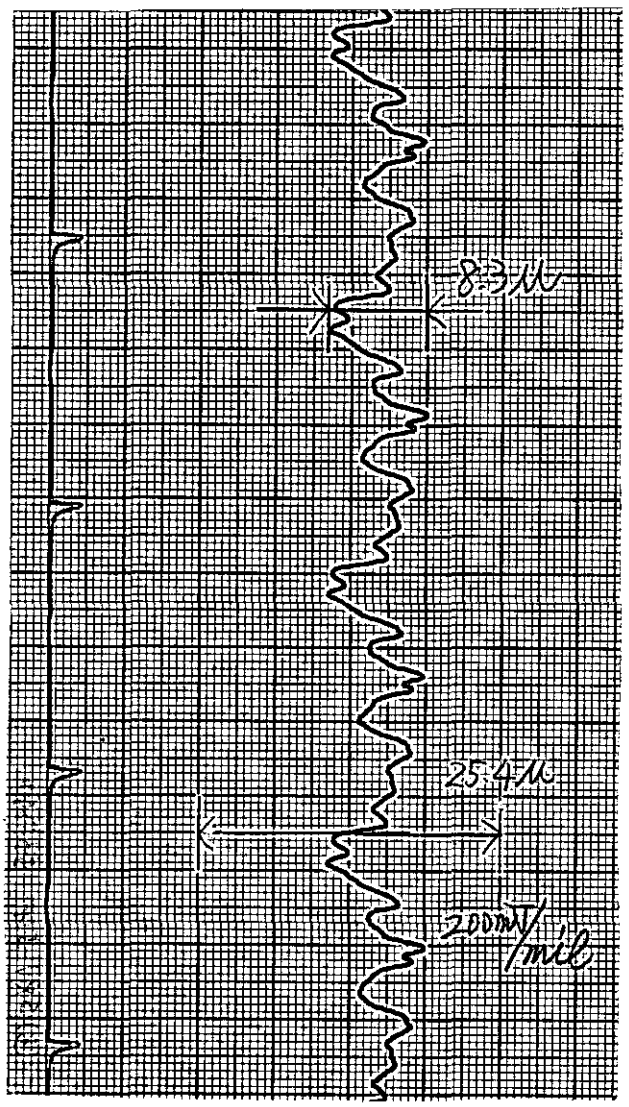
P

SUBJECT	STEAM TURBINE ROTOR / TOTAL (MECHANICAL & ELECTRICAL) RUN-OUT RECORD (AXIAL)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. B		

Axial probe sensing area

Location ☐ Thrust nut ☐ Shaft end
Criteria Max. 12.7 μm
Result ☐ Acceptable ☐ Not acceptable

Location ☐ Thrust nut ☒ Shaft end
Criteria Max. 12.7 μm
Result ☑ Acceptable ☐ Not acceptable



■ Note Reference item number of quality plan : E09

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			T.KAZUMA	INSPECTION TEAM ☐WITNESSED ☒REVIEWED
Date	AUG. 5 '03	Aug.-5-2003	AUG 04 '03	LG E&C Aug. 26, '03

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

Inspection Activity

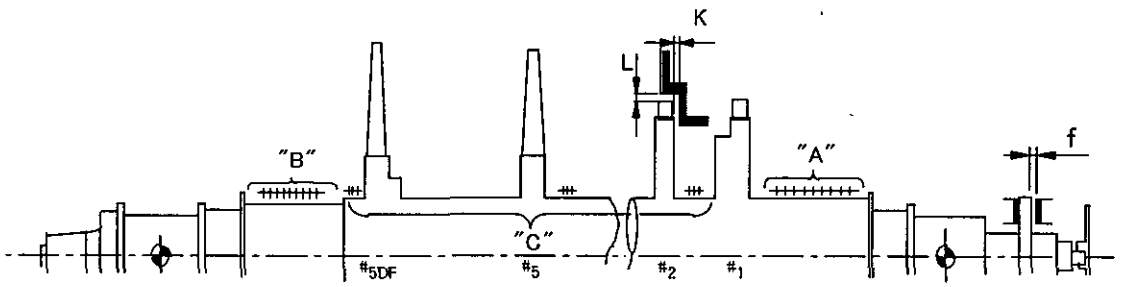
Subvendor	Ebara	Customer

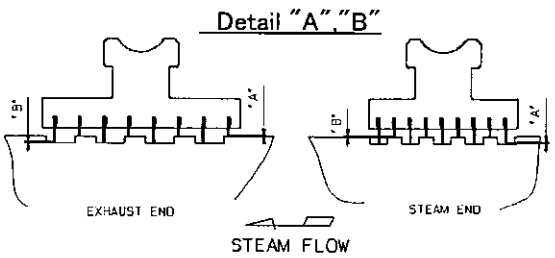
QAR-TU-J01

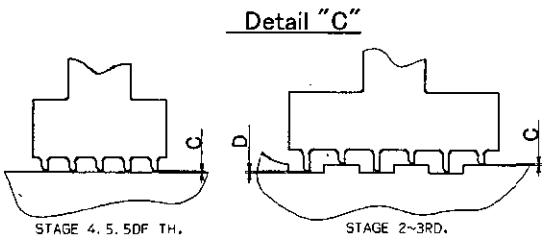
P

SUBJECT	STEAM TURBINE ROTOR / CLEARANCE RECORD (1/2)		
EBARA SER. No. R021570803	MODEL SRV-5DF	ITEM No. CT-9901	
MACH. No. –	ROTOR I.D. B		

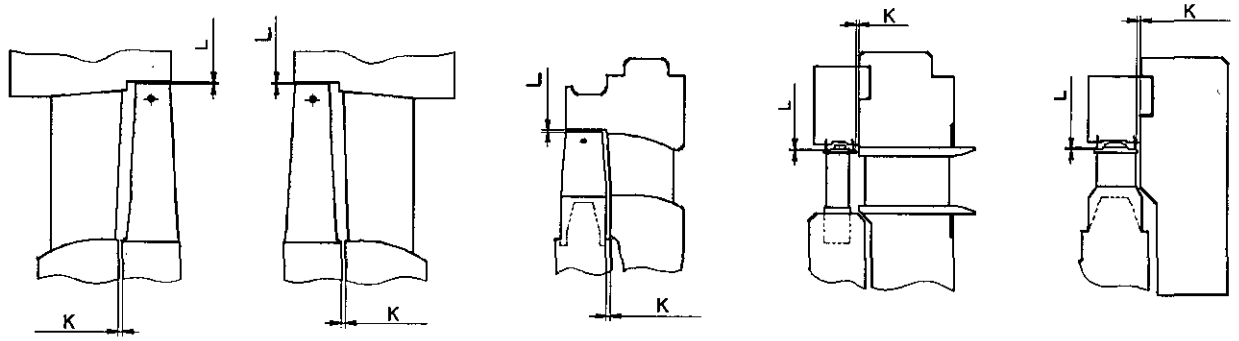
■ Condition : All clearances are shown as radial clearance.







DIAFRAM SEAL CLEARANCE



5DF.TH STAGE CLEARANCE 5TH STAGE CLEARANCE 4TH STAGE CLEARANCE 2ND.,3RD STAGE CLEARANCE 1ST STAGE CLEARANCE

DIAFRAM CLEARANCES

■ Note Reference item number of quality plan : J01

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			K. Yoshida	INSPECTION TEAM ☐WITNESSED ☑REVIEWED
Date	Oct. 14 '03	Oct.-14-2003	Oct. 7. 2003	Oct. 15, 2003

LG E&C

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

Inspection Activity 51

Subvendor	Ebara	Customer

QAR-CO-J01

P

SUBJECT	STEAM TURBINE / CLEARANCE RECORD (2/2)		
EBARA SER. No. R021570803	MODEL SRV-5DF	ITEM No. CT-9901	
MACH. No. –	ROTOR I.D. B		

■ Table : Measured data. Unit: mm

Location		Result	Dwg min.	Dwg max.	Actual data			
Packing clearance (steam end)	A	Acceptable	0.39	0.47	L	0.40 ~0.46	R	0.40 ~0.46
Packing clearance (steam end)	B	↑	0.39	0.47	L	0.40 ~0.46	R	0.40 ~0.46
Packing clearance (exh. end)	A	↓	0.39	0.47	L	0.42 ~0.47	R	0.41 ~0.47
Packing clearance (exh. end)	B	Acceptable	0.39	0.47	L	0.42 ~0.47	R	0.41 ~0.47
Diaphragm seal (2nd. stage)	C	Acceptable	0.39	0.47	L	0.42~0.45	R	0.42~0.45
Diaphragm seal (2nd. stage)	D	↑	0.39	0.47	L	0.42~0.45	R	0.42~0.45
Diaphragm seal (3rd. stage)	C	↓	0.39	0.47	L	0.42~0.44	R	0.42~0.43
Diaphragm seal (3rd. stage)	D		0.39	0.47	L	0.42~0.44	R	0.42~0.43
Diaphragm seal (4th. stage)	C	Acceptable	0.39	0.47	L	0.43~0.44	R	0.43~0.45
–	–	–	–	–	–	–	–	–
Diaphragm seal (5th. stage)	C	Acceptable	0.39	0.47	L	0.42~0.44	R	0.42~0.44
–	–	–	–	–	–	–	–	–
Diaphragm seal (5DF th. stage)	C	Acceptable	0.39	0.47	L	0.42~0.43	R	0.42~0.43
–	–	–	–	–	–	–	–	–
Nozzle ring & diaphragm (1st.stage)	K	Acceptable	1.44	1.70	L	1.59	R	1.58
Nozzle ring & diaphragm (1st.stage)	L	↑	0.63	0.96	L	0.70~0.74	R	0.70~0.74
Nozzle ring & diaphragm (2nd.stage)	K		1.35	2.11	L	1.65	R	1.69
Nozzle ring & diaphragm (2nd.stage)	L		0.63	0.96	L	0.65	R	0.63~0.65
Nozzle ring & diaphragm (3rd.stage)	K		1.35	2.11	L	1.63	R	1.85
Nozzle ring & diaphragm (3rd.stage)	L		0.63	0.96	L	0.63	R	0.64~0.65
Nozzle ring & diaphragm (4th.stage)	K		6.10	6.86	L	6.50	R	6.44
Nozzle ring & diaphragm (4th.stage)	L		1.47	1.72	L	1.47	R	1.47
Nozzle ring & diaphragm (5th.stage)	K		2.93	3.69	L	3.24	R	3.18
Nozzle ring & diaphragm (5th.stage)	L		1.47	1.72	L	1.50	R	1.56
Nozzle ring & diaphragm (5DF th.stag	K	↓	2.93	3.69	L	3.11	R	3.03
Nozzle ring & diaphragm (5DF th.stag	L	Acceptable	1.47	1.72	L	1.53	R	1.50
Rotor float	f	Acceptable	0.23	0.30	–	0.26	–	

LG E&C

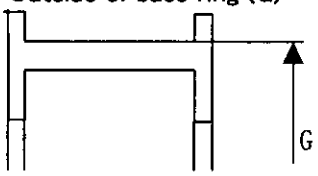
INSPECTION TEAM
☐WITNESSED ☑REVIEWED
Oct. 15, 2002

■ Note Reference item number of quality plan : J01

SUBJECT	STEAM TURBINE / BEARING CLEARANCE RECORD		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No.	ROTOR I.D. B		

Steam end side

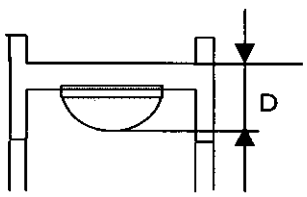
1. Outside of base ring (G)



Unit : mm

Design	158.725 $^{0}_{-0.013}$
Actual φG	158.718

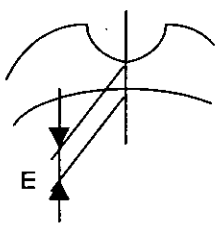
3. Base ring & bearing sheet hight (D)



Unit : mm

Design	10.008 $^{0}_{-0.006}$					
Actual D	10.003	10.006	10.003	10.003	10.004	
D	Ave.	10.004				

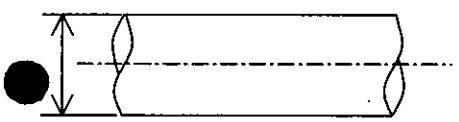
4. Bearing pad thickness



Unit : mm

Design	5.817 $^{0}_{-0.006}$					
Actual E	5.814	5.814	5.815	5.813	5.815	
E	Ave.	5.814				

4. Outside dia of shaft



Unit : mm

Design	126.873 $^{0}_{-0.013}$
Actual φF	126.870

5. Bearing clearance

Unit : mm

Design	0.191 ~ 0.242
Actual	0.212

Exhaust end side

Unit : mm

Design	158.725 $^{0}_{-0.013}$
Actual φG	158.718

Unit : mm

Design	10.008 $^{0}_{-0.006}$					
Actual D	10.004	10.003	10.007	10.007	10.006	
D	Ave.	10.005				

Unit : mm

Design	5.817 $^{0}_{-0.006}$					
Actual E	5.813	5.813	5.813	5.814	5.812	
E	Ave.	5.813				

Unit : mm

Design	126.937 $^{0}_{-0.013}$
Actual φF	126.935

Unit : mm

Design	0.127 ~ 0.178
Actual	0.147

(a) : Bearing clearance = φG−2(D+E)−φF

■ Note : Reference item number of quality plan : J01A

TO	SET

Aproved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by	—		INSPECTION TEAM ☐WITNESSED ☑REVIEWED
Date Oct. 11, '03		Aug.-11-2003	Oct. 15, 2003

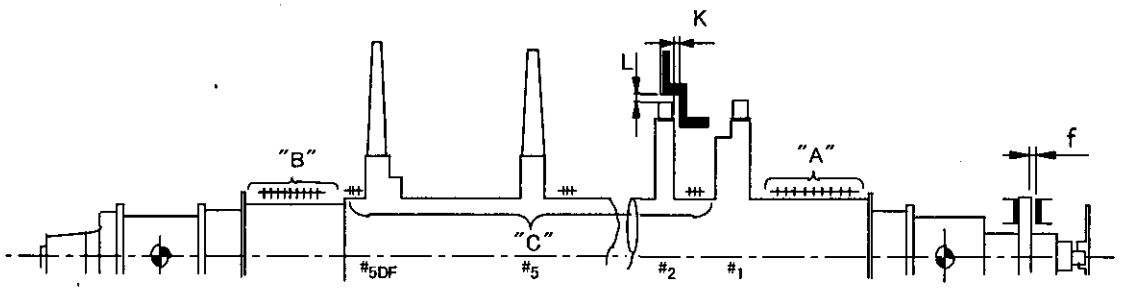
LG E&C

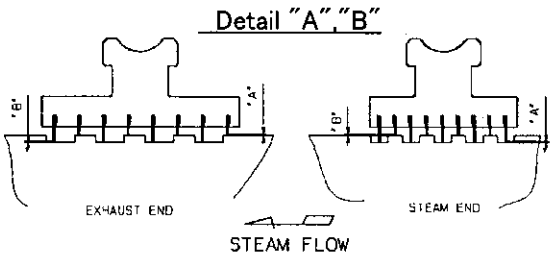
ELLIOTT EBARA GROUP

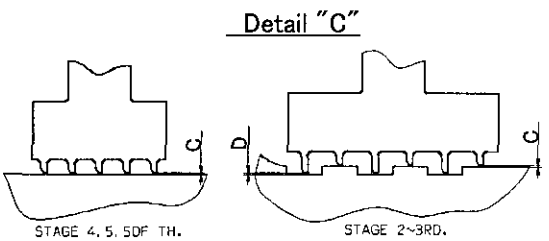
Elliott Ebara Turbomachinery Corporation

SUBJECT	STEAM TURBINE ROTOR / CLEARANCE RECORD (1/2)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. A		

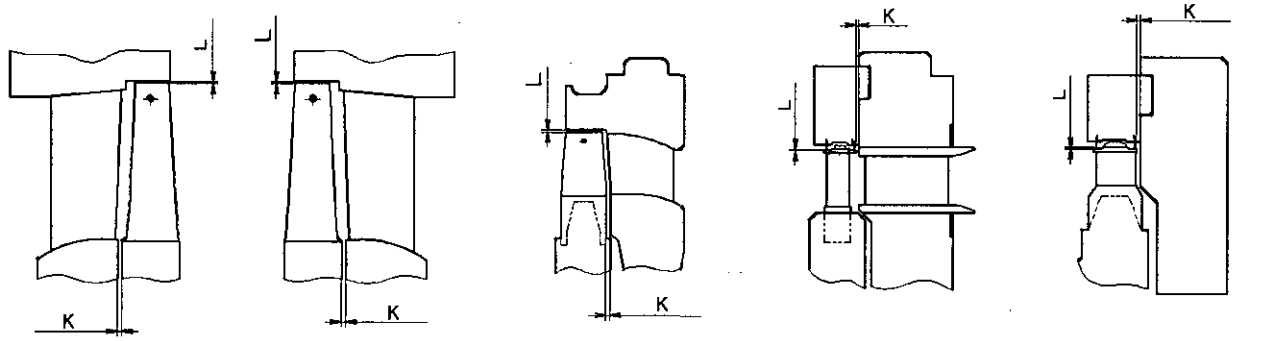
■ Condition : All clearances are shown as radial clearance.







DIAFRAM SEAL CLEARANCE



5DF.TH STAGE CLEARANCE 5TH STAGE CLEARANCE 4TH STAGE CLEARANCE 2ND., 3RD STAGE CLEARANCE 1ST STAGE CLEARANCE

DIAFRAM CLEARANCES

■ Note Reference item number of quality plan : J01

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			K. Yoshida	INSPECTION TEAM ☐WITNESSED ☑REVIEWED
Date	Sep-17'2003	Sep.-17-2003	Sep. 2. 2003	Oct. 15. 2003

LG E&C

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

Inspection Activity

Subvendor	Ebara	Customer

QAR-CO-J01

P

SUBJECT	STEAM TURBINE / CLEARANCE RECORD (2/2)		
EBARA SER. No. R021570803	MODEL SRV-5DF	ITEM No. CT-9901	
MACH. No. –	ROTOR I.D. A		

■ Table : Measured data. Unit: mm

Location		Result	Dwg min.	Dwg max.	Actual data			
Packing clearance (steam end)	A	Acceptable	0.39	0.47	L	0.40 ~0.44	R	0.40 ~0.45
Packing clearance (steam end)	B		0.39	0.47	L	0.40 ~0.44	R	0.40 ~0.45
Packing clearance (exh. end)	A		0.39	0.47	L	0.40 ~0.45	R	0.43 ~0.45
Packing clearance (exh. end)	B	Acceptable	0.39	0.47	L	0.40 ~0.45	R	0.43 ~0.45
Diaphragm seal (2nd. stage)	C	Acceptable	0.39	0.47	L	0.41	R	0.39
Diaphragm seal (2nd. stage)	D		0.39	0.47	L	0.41	R	0.39
Diaphragm seal (3rd. stage)	C		0.39	0.47	L	0.42	R	0.39
Diaphragm seal (3rd. stage)	D		0.39	0.47	L	0.42	R	0.39
Diaphragm seal (4th. stage)	C	Acceptable	0.39	0.47	L	0.42	R	0.39
–	–	–	–	–	–	–	–	–
Diaphragm seal (5th. stage)	C	Acceptable	0.39	0.47	L	0.40	R	0.39
–	–	–	–	–	–	–	–	–
Diaphragm seal (5DF th. stage)	C	Acceptable	0.39	0.47	L	0.39	R	0.40
–	–	–	–	–	–	–	–	–
Nozzle ring & diaphragm (1st.stage)	K	Acceptable	1.44	1.70	L	1.59	R	1.58
Nozzle ring & diaphragm (1st.stage)	L		0.63	0.96	L	0.65	R	0.63
Nozzle ring & diaphragm (2nd.stage)	K		1.35	2.11	L	1.65	R	1.69
Nozzle ring & diaphragm (2nd.stage)	L		0.63	0.96	L	0.70	R	0.65
Nozzle ring & diaphragm (3rd.stage)	K		1.35	2.11	L	1.63	R	1.85
Nozzle ring & diaphragm (3rd.stage)	L		0.63	0.96	L	0.69	R	0.66
Nozzle ring & diaphragm (4th.stage)	K		6.10	6.86	L	6.50	R	6.44
Nozzle ring & diaphragm (4th.stage)	L		1.47	1.72	L	1.47	R	1.50
Nozzle ring & diaphragm (5th.stage)	K		2.93	3.69	L	3.24	R	3.18
Nozzle ring & diaphragm (5th.stage)	L		1.47	1.72	L	1.50	R	1.48
Nozzle ring & diaphragm (5DF th.stag	K		2.93	3.69	L	3.11	R	3.03
Nozzle ring & diaphragm (5DF th.stag	L	Acceptable	1.47	1.72	L	1.48	R	1.48
Rotor float	f	Acceptable	0.23	0.30	–	0.26	–	

LG E&C

INSPECTION TEAM
☐WITNESSED ☑REVIEWED
Oct. 15, 2003

■ Note Reference item number of quality plan : J01

Inspection Activity		
Subvendor	Ebara	Customer

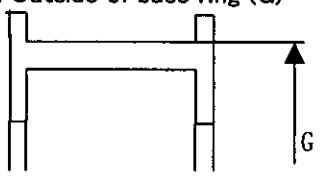
QAR-CO-J01A

P

SUBJECT	STEAM TURBINE / BEARING CLEARANCE RECORD		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No.	ROTOR I.D. A		

Steam end side

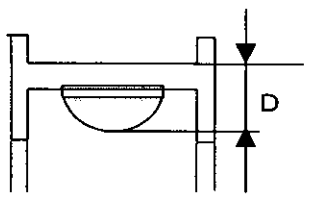
1. Outside of base ring (G)



Unit : mm

Design	158.725 $^{0}_{-0.013}$
Actual φG	158.718

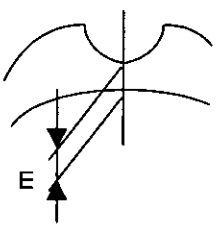
3. Base ring & bearing sheet hight (D)



Unit : mm

Design	10.008 $^{0}_{-0.006}$					
Actual D	10.003	10.006	10.003	10.003	10.004	
D	Ave.	10.004				

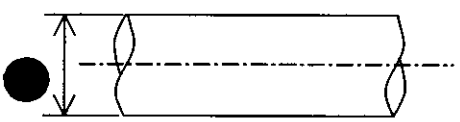
4. Bearing pad thickness



Unit : mm

Design	5.817 $^{0}_{-0.006}$					
Actual E	5.814	5.814	5.815	5.813	5.815	
E	Ave.	5.814				

4. Outside dia of shaft



Unit : mm

Design	126.873 $^{0}_{-0.013}$
Actual φF	126.870

5. Bearing clearance

Unit : mm

Design	0.191 ~ 0.242
Actual	0.212

Exhaust end side

Unit : mm

Design	158.725 $^{0}_{-0.013}$
Actual φG	158.718

Unit : mm

Design	10.008 $^{0}_{-0.006}$					
Actual D	10.004	10.003	10.007	10.007	10.006	
D	Ave.	10.005				

Unit : mm

Design	5.817 $^{0}_{-0.006}$					
Actual E	5.813	5.813	5.813	5.814	5.812	
E	Ave.	5.813				

Unit : mm

Design	126.937 $^{0}_{-0.013}$
Actual φF	126.925

Unit : mm

Design	0.127 ~ 0.178
Actual	0.157

(a) : Bearing clearance = φG−2(D+E)−φF

■ Note : Reference item number of quality plan : J01A

TO	SET

Aproved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by	—		INSPECTION TEAM ☐WITNESSED ☑REVIEWED
Date Jul. 17 '03		Jul.-17-2003	LG E&C Oct. 15, 2003

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

SUBJECT	STEAM TURBINE /DISMANTLE CHECK (AFTER MECHANICAL RUNNING TEST)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. A		

■ Table : Inspection results

Portion	Check points (Surface condtion)	Result	Remarks (if any)
Journal bearing (Steam end side)	Upper bearing pads ① ②	☒ Acceptable ☐ Not acceptable	–
	Lower bearing pads ① ②	☒ Acceptable ☐ Not acceptable	–
	Journal ① ②	☒ Acceptable ☐ Not acceptable	–
Journal bearing (Exhaust end side)	Upper bearing pads ① ②	☒ Acceptable ☐ Not acceptable	–
	Lower bearing pads ① ②	☒ Acceptable ☐ Not acceptable	–
	Journal ① ②	☒ Acceptable ☐ Not acceptable	–
Thrust bearing	Active pads ① ②	☒ Acceptable ☐ Not acceptable	–
	Inactive pads ① ②	☒ Acceptable ☐ Not acceptable	–
	Collar (act. side) ① ②	☒ Acceptable ☐ Not acceptable	–
	Collar (Inact. side) ① ②	☒ Acceptable ☐ Not acceptable	–
Packing seal (Steam end side)	① ②	☒ Acceptable ☐ Not acceptable	–
Packing seal (Exhaust end side)	① ②	☒ Acceptable ☐ Not acceptable	–
Labyrince seal (Steam end side)	① ②	☒ Acceptable ☐ Not acceptable	–
Labyrince seal (Exhaust end side)	① ②	☒ Acceptable ☐ Not acceptable	–
Oil baffles (Steam end side)	① ②	☒ Acceptable ☐ Not acceptable	–
Oil baffles (Exhaust end side)	① ②	☒ Acceptable ☐ Not acceptable	–

① To be free from harmful damage such as heavy dents, scratches, rusts,etc.
② To be free from abnormal rubbing, wearing, cracking, etc.

Note : This dismantle check is after confirmation test.

■ Note Reference item number of quality plan : K03

TO	SET

Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by Date Oct. 3, 03	–	Oct. 3, 03	INSPECTION TEAM ☒WITNESSED ☐REVIEWED LG E&C Oct. 3, 2003

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

Inspection Activity		
Subvendor	Ebara	Customer

P.

SUBJECT	STEAM TURBINE /DISMANTLE CHECK OF CASING INTERIOR (AFTER MECHANICAL RUNNING TEST)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. A		

■ Table : Inspection results

Portion	Check points (Surface condtion)	Result	Remarks (if any)
Casing internal (Steam end side)	①	☑ Acceptable ☐ Not acceptable	–
Casing internal (Exhaust end side)	①	☑ Acceptable ☐ Not acceptable	–
Packing seal (Steam end side)	①②	☑ Acceptable ☐ Not acceptable	–
Packing seal (Exhaust end side)	①②	☑ Acceptable ☐ Not acceptable	–
Diaphragm labyrinth	①②	☑ Acceptable ☐ Not acceptable	–
Seal ring labyrinth	①②	☑ Acceptable ☐ Not acceptable	–
Rotor external	①	☑ Acceptable ☐ Not acceptable	–

① To be free from harmful damage such as heavy dents, scratches, rusts,etc.
② To be free from abnormal rubbing, wearing, cracking, etc.

Note : This dismantle check is after confirmation test.

■ Note Reference item number of quality plan : M02

TO	SET

Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by Date Oct. 3 '03	–	Oct. 3. '03	INSPECTION TEAM ☒WITNESSED ☐REVIEWED LG E&C Oct. 3, 2003

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

MATERIAL TEST REPORT
材料試験成績表

Date 14 MAR. '03 Report No. 030292

Manufacturer's
Order No. M02-12-040
Purchaser
御注文主 ELLIOTT EBARA TURBOMACHINERY CORPORATION

Name of Article
品 名 SHAFT (For A-ROTOR)
Material
材 質 ASTM A470 CL.4
Witness
立会者
Purchaser's Order No.
注文主番号 CD79968
Specification No.(仕様書No.) SMPS-ES-F15 REV.6 (EBARA STD.)
Plant/Project
Drawing No.
図 番 ES/8601600 REV.0
TYPE No. JSRV-5DF
WORK No. R021570803

S. Seo
Chief of Quality Control Section
Testing Machine No. : T-70 NG28,I-76 NG7,920,H-93 NG2

F.R. 1/2.0U 9.1S
Mass 1077 kg

Piece No. 製品番号	Test piece No. 試験片番号	Yield Strength $\sigma_{0.02}$ K.S.I (N/mm²)	Tensile Strength K.S.I (N/mm²)	Elongation %	Reduction of Area %	Test piece No. 試験片番号	Impact Test Notch 2mmV Charpy Test temp. 20 ℃ ft-lb (J)	Hardness Brinell
	Min.	85 (587)	105 (725)	17	45		Average	Min.
	Max.						Min.	Max. 255
11181-203	11181-203L	94.6 (652)	112.3 (774)	24	65			235
	Test piece No. 試験片番号 Min.	85 (587)	105 (725)	16	40	Test piece No. 試験片番号	Average Min. 20 (27)	Min.
	Max.							Max. 255
	11181-203T1	96.0 (662)	113.4 (782)	22	59	V-1	29.3 (39.8)	235
	11181-203T2	94.6 (652)	111.7 (770)	23	62	V-3	32.9 (44.5)	235

QUANTITY 1

Heat Treatment
N1. 900 ℃ × 16 h A.C.
T1. 650 ℃ × 16 h A.C.
N2. 845 ℃ × 9.5 h B.A.C.
T2. 645 ℃ × 12 h A.C.
S.R. 605 ℃ × 14 h F.C.

Chemical Composition 化学成分 %

Heat No. 溶解番号	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Sb
Min.			0.20				2.50		0.25	0.03	
Max.	0.28	0.10	0.60	0.012	0.015			0.75			
11181 Ladle	0.22	0.10	0.42	0.004	0.006		2.66	0.53	0.50	0.11	0.001
Product	0.22	0.10	0.43	0.004	0.006		2.68	0.54	0.51	0.10	0.001

Heat treatment
N. Normalizing
Q. Quenching
S.T. Solution Treatment
A. Annealing
T. Tempering
S.R. Stress Relieving
A.C. Air Cooling
O.C. Oil Cooling
F.C. Furnace Cooling
W.C. Water Cooling
P.H. Precipitation Hardening
B.C. Blast Cooling
W.S.P.C. Water Spray Cooling
B.A.C. Blast Air Cooling

Other
L. Longitudinal
Ta. Tangential
R. Radius
T.S. Top Side
M. Middle
B.S Bottom Side
$\sigma_{0.2}$ 0.2% offset
$\sigma_{0.02}$ 0.02% offset
F.R. Forging Ratio
H.T. Heat Treatment

* VACUUM CARBON DEOXIDIZED TREATMENT HAS BEEN MADE

ELLIOTT EBARA GROUP
☐ Witnessed
☑ Reviewed
EETC Q.C Dept.

R021570803
SRV-5DF
Item No.: CT-9901
A-Rotor
Part Name; Shaft

LGE&C
Y. Tsutsumi
Reviewed on July 22, 2003

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

58

ULTRASONIC INSPECTION REPORT
超音波探傷試験成績表

Date 5 MAR. '03 | Report No. 030292

Manufacturer's Order No. M02-12-040

Purchaser 御注文主: ELLIOTT EBARA TURBOMACHINERY CORPORATION

Name of Article 品名: SHAFT (For A-ROTOR)

Material 材質: ASTM A470 CL.4

Purchaser's Order No. 注文主番号: CD79968

Specification No. (仕様書No.): SMPS-ES-F15 REV.6 (EBARA STD.)

Witness

Plant/Project

Drawing No. 図番: ES/8601600 REV.0

TYPE No.: JSRV-5DF

WORK No.: R021570803

Examined	Reviewed	Approved
J. Sakai.	—	K. Shimada
SNT-TC-1A LEVEL II	SNT-TC-1A LEVEL III	SNT-TC-1A LEVEL III

Piece No. 製品番号: 11181-203

QUANTITY 1

Conditions of Ultrasonic Inspection 探傷条件

Defect Detector 探傷器: Kraut Krämer USM 3S

Couplant 接触媒質: Machine oil マシン油

Test Method 試験方法	Search Unit 探触子	Specified Sensitivity 探傷感度
Normal Beam Technique 垂直法	24 φmm / 2 MHz	Height of B_1 echo BG : 50 mm
Angle Beam Technique 斜角法	— mm / MHz	—
Double crystal Technique 分割形探触子法	— φmm / MHz	—

Procedure No. 要領書No.: MIP-T6-90-11B

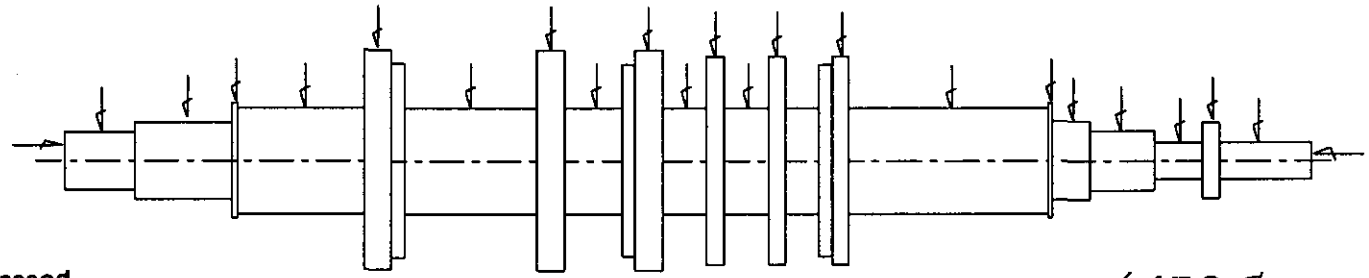
Applied Code (EBARA STD.) 適用規格: SPS-1002-40

Acceptance: 判定: ACCEPTABLE

Figure & Inspected Area 形状および探傷範囲

Shown by

R021570803
SRV-5DF
Item No.; CT-9901
A-Rotor
Part Name; Shaft



ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tokita

LGE&C
Y. Tsutsumi
Reviewed on July 22, 2003

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

MAGNETIC PARTICLE INSPECTION REPORT
磁粉探傷試験成績表

Date 6 MAR. '03 | Report No. 030292

Manufacturer's Order No. M02-12-040

Purchaser 御注文主: ELLIOTT EBARA TURBOMACHINERY CORPORATION

Name of Article 品名: SHAFT (For A-ROTOR)

Material 材質: ASTM A470 CL.4

Purchaser's Order No. 注文主番号: CD79968

Specification No.(仕様書No.): SMPS-ES-F15 REV.6 [EBARA STD.] Witness

Drawing No. 図番: ES/8601600 REV.0

Plant/Project

TYPE No.: JSRV-5DF

WORK No.: R021570803

Examined	Reviewed	Approved
J. Sakai	—	K. Shimato
SNT-TC-1A LEVEL II	SNT-TC-1A LEVEL III	SNT-TC-1A LEVEL III

Piece No. 製品番号: 11181-203

QUANTITY 1

Conditions of Magnetic Particle Inspection 探傷条件

探傷器 Equipment: 電子磁気工業(株) Ez-3S Denshi Jiki Industry Co., Ltd, Ez-3S

Procedure No. 要領書No.: MIP-T6-90-11B

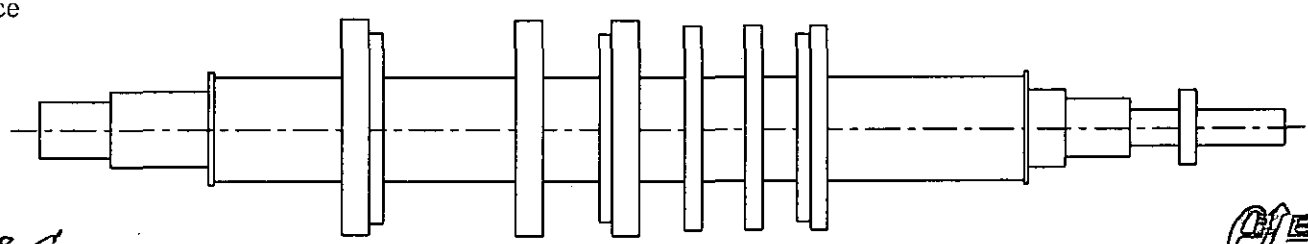
Test Method 試験方法	Magnetizing Current 磁化電流	Magnetic Particles 磁粉(マークテック)	Prod Spacing プロッド間隔	Standard Test Piece 標準試験片
Prod Method プロッド法	DC 1000 A	Wet Fluorescent	200 mm	JIS G0565-A1 30/100
Yoke Method 極間法	—	—	—	—
Coil Method コイル法	DC 2100 A	Wet Fluorescent	—	JIS G0565-A1 30/100

Applied Code 適用規格 [EBARA STD.]: SPS-1002-22

Acceptance: 判定: ACCEPTABLE

Figure & Inspected Area 形状および探傷範囲

Entire Surface



R021570803
SRV-5DF
Item No.; CT-9901
A-Rotor
Part Name; Shaft

ELLIOTT EBARA GROUP ☐Witnessed ☑Reviewed

EETC Q.C Dept. T. Tobe

LGE&C
J. Tsutsumi
Reviewed on July 22, 2003

PACIFIC STEEL MFG. CO., LTD. TOYAMA WORKS
大平洋製鋼株式会社 富山製造所

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HEAT STABILITY TEST REPORT
加 熱 振 れ 試 験 成 績 表

Order No. 受注番号 M02-12-040

date 日付 14 MAR. '03

Report No. 成績表番号 030292

Purchaser 御注文主	ELLIOTT EBARA TURBOMACHINERY CORPORATION
Neme of Article 品名	SHAFT
Material 材質	ASTM A470 CL.4
Purchaser'S Order No. 客先注文番号	CD79968
Drawing No. 図番	ES/8601600 REV.0
Name of Project プラント名、プロジェクト名	
TYPE No.	JSRV-5DF
WORK No.	R021570803

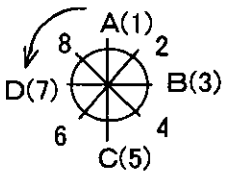
Applicable spec. [EBARA STD.]
適用仕様書
SMPS-ES-F15 REV.6
(SPS-1002-80)

Acceptance Standard
判定基準
(振れ規格) Spec.Deflection 0.050 mm
(軸芯振れ) Spec.Vector 0.025 mm

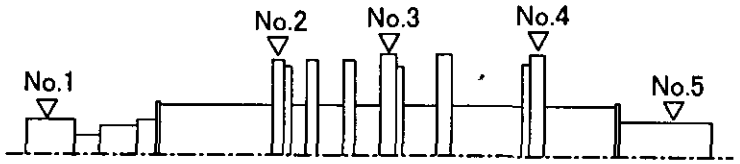
Piece No. 製品番号 11181-203

(試験条件)
Test Condition
(昇温速度)
Heating Rate 75 ℃/H
(保持温度)
Holding 605 ℃
(保持時間)
Holding Time 14 H
(降温速度)
Cooling Rate Furnace Cooling

(温度と振れの測定器位置)
Measured Position of Temperture & Deflection



R021570803
5RV-5DF
Item No.: CT-9901
A-Rotor
Part Name: Shaft



第1回 低温測定 1ST COLD MEASUREMENTS UNIT : 1/1000 mm

Position		1				2				3				4				5			
Date	Time	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	-	-	-	-
3/7	14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(A)	16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
加熱時最終測定		FINAL HOT MEASUREMENTS																			
3/8	12:00	0	0	0	0	0	-10	-5	5	0	-15	-10	0	0	-10	-10	0	0	0	0	0
	13:00	0	0	0	0	0	-10	-5	5	0	-15	-10	0	0	-10	-10	0	0	0	0	0
(B)	14:00	0	0	0	0	0	-10	-5	5	0	-15	-10	0	0	-10	-10	0	0	0	0	0
第2回 低温測定		2ND COLD MEASUREMENTS																			
3/10	8:00	0	0	0	0	0	-10	-5	0	0	-10	-10	0	0	-15	-10	0	0	0	0	0
	8:30	0	0	0	0	0	-10	-5	0	0	-10	-10	0	0	-15	-10	0	0	0	0	0
(C)	9:00	0	0	0	0	0	-10	-5	0	0	-10	-10	0	0	-15	-10	0	0	0	0	0
(B),(C)の振れ差異		DEFLECTION BETWEEN																			
(B)		0	0	0	0	0	-10	-5	5	0	-15	-10	0	0	-10	-10	0	0	0	0	0
(C)		0	0	0	0	0	-10	-5	0	0	-10	-10	0	0	-15	-10	0	0	0	0	0
(B)−(C)		0	0	0	0	0	0	0	5	0	-5	0	0	0	5	0	0	0	0	0	0
結果	RESULT	(Spec.Deflection)																			
		0				5				5				5				0			

ACCEPTANCE 判 定 ACCEPTABLE

☐ Witness 立会者 ☐ Reviewer 確認者 ELLIOTT EBARA GROUP EETC Q.C Dept.

☐ Witnessed ☑ Reviewed

Examined by 試験者 Y. Sunahara

Approved by 承認者 M. Sakiyama

LGE & C
F. Bottsami
Reviewed on July 22, 2003

Report No. 030292
Unit: 1/1000mm

		DATE	TIME	Temp. (℃)	Position																				Axie (mm)
					1				2				3				4				5				
					A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	
1		3/7	14:00	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
2	FIRST COLD	3/7	15:00	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
3		3/7	16:00	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
4		3/7	17:00	88	0	0	0	0	0	0	5	5	0	0	5	5	0	0	0	5	0	0	0	0	0.6
5		3/7	18:00	164	0	0	0	0	0	−5	0	5	0	−5	5	5	0	−5	0	5	0	0	0	0	1.5
6		3/7	19:00	236	0	0	0	0	0	−5	5	10	0	−10	0	10	0	−10	0	10	0	0	0	0	2.5
7	HEATING	3/7	20:00	312	0	0	0	0	0	−10	0	15	0	−15	−5	10	0	−10	0	10	0	0	0	0	3.4
8		3/7	21:00	387	0	0	0	0	0	−10	0	10	0	−15	−10	10	0	−10	−5	10	0	0	0	0	4.7
9		3/7	22:00	462	0	0	0	0	0	−10	−10	5	0	−15	−10	5	0	−10	−10	5	0	0	0	0	6.1
10		3/7	23:00	537	0	0	0	0	0	−10	−5	5	0	−15	−15	5	0	−10	−10	0	0	0	0	0	7.7
11		3/8	0:00	605	0	0	0	0	0	−10	−10	0	0	−15	−15	0	0	−10	−10	0	0	0	0	0	9.5
12		3/8	1:00	605	0	0	0	0	0	−5	−10	0	0	−10	−10	0	0	−10	−10	−5	0	0	0	0	12.0
13		3/8	2:00	605	0	0	0	0	0	−5	−5	0	0	−10	−10	0	0	−5	−5	0	0	0	0	0	13.5
14		3/8	3:00	605	0	0	0	0	0	−5	−5	0	0	−10	−10	−5	0	−5	−5	−5	0	0	0	0	14.1
15		3/8	4:00	605	0	0	0	0	0	−5	−5	0	0	−15	−15	0	0	−5	−5	0	0	0	0	0	14.3
16		3/8	5:00	604	0	0	0	0	0	−10	−10	0	0	−15	−10	0	0	−5	−5	0	0	0	0	0	14.5
17	HOLDING	3/8	6:00	605	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−5	−5	0	0	0	0	0	14.5
18		3/8	7:00	604	0	0	0	0	0	−10	−5	5	0	−10	−10	0	0	−10	−10	5	0	0	0	0	14.6
19		3/8	8:00	606	0	0	0	0	0	−10	−5	5	0	−10	−10	0	0	−10	−10	0	0	0	0	0	14.6
20		3/8	9:00	605	0	0	0	0	0	−5	−5	5	0	−10	−5	0	0	−15	−10	5	0	0	0	0	14.7
21		3/8	10:00	604	0	0	0	0	0	−10	−5	5	0	−10	−10	0	0	−10	−10	0	0	0	0	0	14.8
22		3/8	11:00	605	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−10	−10	0	0	0	0	0	14.8
23		3/8	12:00	605	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−10	−10	0	0	0	0	0	14.8
24	FINAL HOT	3/8	13:00	605	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−10	−10	0	0	0	0	0	14.8
25		3/8	14:00	604	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−10	−10	0	0	0	0	0	14.8
26		3/8	15:00	530	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−15	−10	5	0	0	0	0	13.9
27		3/8	16:00	470	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−10	−10	0	0	0	0	0	13.2
28		3/8	17:00	420	0	0	0	0	0	−10	−5	5	0	−15	−10	0	0	−10	−10	5	0	0	0	0	12.5
	COOLING																								
29		3/10	8:00	16	0	0	0	0	0	−10	−5	0	0	−10	−10	0	0	−15	−10	0	0	0	0	0	0.6
30	FINAL COLD	3/10	8:30	16	0	0	0	0	0	−10	−5	0	0	−10	−10	0	0	−15	−10	0	0	0	0	0	0.6
31		3/10	9:00	16	0	0	0	0	0	−10	−5	0	0	−10	−10	0	0	−15	−10	0	0	0	0	0	0.6

TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer:EBARA CORPORATION, SODEGAURA PLANT

Order No.:CB96375

Spec. No.	Material		Condition	Heat No.	2G222K5	Date	JUL. 04, 2000
SMPS-E1-R02 REV. 6 (EBARA STD.)	Size	F19X29X2000L	HEAT TREATED	Number of Pieces	10	Report No.	007-0102-90
				Mass	91 KGS	Our Ref. No.	158-G366-01

JOB. NO. : -

ROZ1570803
SRV-5DF
Item No. ; CT-9901
A-Rotor
Part Name; Blade (1st. stage)

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	MO %
Spec.	0.09 -0.15	MAX 0.50	MAX 1.00	MAX 0.03	MAX 0.03	MAX 0.50	11.5 -13.0	MAX 0.20
LADLE	0.14	0.29	0.57	0.023	0.001	0.47	11.63	0.16
Elements								
Spec.								
LADLE								

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT		
Spec.	HB 201-248	HB 201-248	–	–	–
Result	241- 241	241	TP –	–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength of 0.02% N/MM2	Tensile Strength N/MM2	Elongation (4D) %	Reduction of Area %
Spec.	–	L	MIN 483	MIN 690	MIN 20	MIN 60
	–	–	–	–	–	–
Result	–	–	572	780	24.7	67.3
	–	–	–	–	–	–
Specimen	12.50D*50.0GL					

Tensile Test at (–)

HT	TP	Yield Strength of –	Tensile Strength –	Elongation ( ) %	Reduction of Area %
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
Specimen	–				
HT	Item	IMPACT TEST 2V NOTCH RT			

Stress Rupture Test

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation	Reduction of Area
Spec.	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–
	–	–	–	–	–	–	–
	–	–	–	–	–	–	–

Macro Structure

Item	TP				Grain Size	Spec. TP		
Spec.	–	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–	–

Micro Structure

Item	HT	TP		
Spec.	–	–	–	–
Result	–	–	GOOD	–

Impact Test

	L	J			
Spec.	TP	–	MIN41		–
Result	–	177	169	172	–
	–	–	–	–	–
	–	–	–	–	–
	–	–	–	–	–

Heat Treatment

Delivered Condition (HTO)
R:Q. 960° CX20MIN. OQ
T. 715° CX1 h AC

Test Specimen (HT)
–

Attachment ☐ Yes ☒ No

Non-Metallic Inclusion

Item	TP													
Spec.	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Inspection Item	
Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa.

QUALITY ASSURANCE DEPARTMENT

PROJECT: –

LGE&C
Y. Tsutsumi
Reviewed on July 22, 2003

ELLIOTT EBARA GROUP ☐ Witnessed ☑ Reviewed

EETC Q.C Dept.

TEST CERTIFICATE

HITACHI
Hitachi Metals, Ltd.
Yasugi Works

Customer: EBARA CORPORATION, SODEGAURA PLANT

Order No.: CB96375

Spec. No.	Material		Condition	Heat No.		Date	
SMPS-E1-R02 REV. 6 (EBARA STD.)	Size	F19X29X2000L	HEAT TREATED	Number of Pieces	17	Report No.	007-0104-20
				Mass	152 KGS	Our Ref. No.	158-G366-01

JOB. NO. : -

R02157080 3
SRV-5DF
Item No. CT-9901
A-Rotor
Part Name ; Blade (1st. stage)

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	MO %
Spec.	0.09 -0.15	MAX 0.50	MAX 1.00	MAX 0.03	MAX 0.03	MAX 0.50	11.5 -13.0	MAX 0.20
LADLE	0.14	0.29	0.57	0.023	0.001	0.47	11.63	0.16
Elements								
Spec.								
LADLE								

Item	Hardness (as Shipped) PRODUCTS	TEST PIECE	Hardness after Heat Treated HT	–	–
Spec.	HB 201-248	HB 201-248	–		
Result	229-229	229	TP	–	–
			–	–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength of 0.02% N/MM2	Tensile Strength N/MM2	Elongation (4D) %	Reduction of Area %
Spec.	–	L	MIN 483	MIN 690	MIN 20	MIN 60
	–	–	–	–	–	–
Result	–	–	560	778	25.3	67.3
	–	–	–	–	–	–
Specimen	12.50D*50.0GL					

Tensile Test at (-)

HT	TP	Yield Strength of	Tensile Strength	Elongation ( ) %	Reduction of Area %
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
Specimen	–				

Stress Rupture Test

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation	Reduction of Area
Spec.	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–
	–	–	–	–	–	–	–
	–	–	–	–	–	–	–

HT	Item	Macro Structure TP				Grain Size		
							Spec.	–
–	Spec.	–	–	–	–	–	TP	–
–	Result	–	–	–	–	–	–	–

HT Item: IMPACT TEST 2V NOTCH RT

Micro Structure

Item	HT	TP		
	–	–	–	–
Spec.	–	–	–	–
Result	–	–	GOOD	–

Impact Test

		L	J			
Spec.		TP	MIN41			–
		–	–	–	–	
Result		–	183	174	177	–
		–	–	–	–	–
		–	–	–	–	–
		–	–	–	–	–

Heat Treatment

Delivered Condition (HTO)
R: Q. 960° CX20MIN. OQ
T. 715° CX1 h AC

Test Specimen (HT) –

Attachment ☐ Yes ☒ No

Non-Metallic Inclusion

Item	TP													
		–	–	–	–	–	–	–	–	–	–	–	–	–
Spec.	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Inspection Item

Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa.

QUALITY ASSURANCE DEPARTMENT

PROJECT: –

LGE&C
J. Pantsumi
Reviewed on July 22, 2003

ELLIOTT EBARA GROUP
☐ Witnessed
☒ Reviewed
EETC Q.C Dept.

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TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer:EBARA CORPORATION, SODEGAURA PLANT

Order No.:CC74113

Spec. No.	Material		Condition	Heat No.	2K375S4	Date	DEC. 26, 2001
SMPS-E1-R02 REV. 6	Size	F23X26X2000L	HEAT TREATED	Number of Pieces	99	Report No.	112-2413-70
{EBARA STD.}				Mass	996 KGS	Our Ref. No.	158-L740-02

JOB. NO. : -

ROZ1570803
SRV-5DF
Item No.: CT-9901
A-Rotor
Part Name: Blade (2nd. stage)

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	MO %
Spec.	0.09 -0.15	MAX 0.50	MAX 1.00	MAX 0.03	MAX 0.03	MAX 0.50	11.5 -13.0	MAX 0.20
LADLE	0.12	0.23	0.56	0.021	0.001	0.48	11.63	0.17
Elements								
Spec.								
LADLE								

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT		
Spec.	HB 201-248	HB 201-248	-		
Result	235-235	235	TP	-	-
			-	-	-

Tensile Test at (RT)

Item	HT	TP	Yield Strength of 0.02% N/MM2	Tensile Strength N/MM2	Elongation (4D) %	Reduction of Area %
Spec.	-	L	MIN 483	MIN 690	MIN 20	MIN 60
	-	-	-	-	-	-
Result	-	-	540	749	26.6	71.5
	-	-	-	-	-	-
Specimen	12.50D*50.0GL					

Tensile Test at (-)

HT	TP	Yield Strength of -	Tensile Strength -	Elongation ( ) %	Reduction of Area %
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
Specimen	-				

Impact Test

HT	Item	IMPACT TEST 2V NOTCH RT
-	Spec.	L: - / J: MIN41
-	Result	TP: - / - / - / -
-		- / 163 / 162 / 148
-		- / - / - / -
-		- / - / - / -

Stress Rupture Test

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation	Reduction of Area
Spec.	-	-	-	-	-	-	-
Result	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-

Macro Structure

Item					
Spec.	-	-	-	-	-
Result	-	-	-	-	-

Grain Size

Spec / TP		
-	-	
-	-	-

Micro Structure

Item	HT	TP		
Spec.	-	-	-	-
Result	-	-	GOOD	-

Heat Treatment

Delivered Condition (HTO)
R:Q. 960° CX30MIN. OQ
T. 715° CX1 h AC

Test Specimen (HT) -

Attachment ☐ Yes ☒ No

Non-Metallic Inclusion

Item	TP			
Spec.	-	-	-	-
Result	-	-	-	-

-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

Inspection Item

Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	-
Material Check	GOOD

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa.

QUALITY ASSURANCE DEPARTMENT

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PROJECT: -

LGE & C
Y. Tsutsumi
Reviewed on July 22, 2003

ELLIOTT. EBARA GROUP ☐ Witnessed ☑ Reviewed

EETC Q.C Dept.

ROZ1570803
SRV-5DF
Item No.: CT-9901
A-Rotor
Part Name: Blade (3rd. stage)

試験成績表
TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

御注文主:EBARA CORPORATION, SODEGAURA PLANT
Customer

御中

御注文番号:CC89009
Order No.

スペック番号 Spec.No.	鋼種 Material	ASTM A565 GR.616	納入状態 Condition	溶解番号 Heat No.	2K806S1	発行日 Date	2002-02-27
SMPS-E1-R04 REV.5 〔EBARA STD.〕	寸法 Size	F23X26X2000L	HEAT TREATED	個数 Number of Pieces	38	成績表番号 Report No.	202-2510-10
				質量 Mass	382 KGS	参照 Our Ref.No.	158-M582-04

製番 (JOB. NO.) :R001600302

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	W %	MO %	V %	CO %	AL %	SN %	TI %
規格 Spec.	0.20 -0.25	0.20 -0.50	0.50 -1.00	MAX 0.025	MAX 0.025	0.50 -1.00	11.00 -12.50	0.90 -1.25	0.90 -1.25	0.20 -0.30	MAX 0.25	MAX 0.05	MAX 0.04	MAX 0.05
LADLE	0.22	0.25	0.80	0.019	0.001	0.81	11.08	0.91	0.91	0.20	0.04	0.003	0.001	0.004

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片	熱処理硬さ Hardness after Heat Treated HT	TP	地疵又は清浄度 Macro-Streak-Flaw or Cleanliness 規格 Spec.	段 Step T	P	項目 Item	T	P
規格 Spec.	HB 255-331	HB	-	-	-	-	-	規格 Spec.	-	-
結果 Result	302-302	302	-	-	-	結果 Result -	-	結果 Result	-	-

引張試験 Tensile Test at (RT)

項目 Item	HT	TP	耐力 Pt.Str at 0.2%	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red.of Area
			N/MM2	N/MM2	%	%
規格 Spec.	-	L	MIN 690	MIN 863	MIN 15	MIN 45
	-	-	-	-	-	-
結果 Result	-	-	829	1002	17.0	48.2

試験片 Specimen 12.50D*50.0GL

HT 衝撃試験 Impact Test

項目 Item					
規格 Spec.	-	TP	-	-	-
結果 Result	-	-	-	-	-

焼入性 Hardenability 規格 Spec. HT TP - - -
結果 Result - - -

クリープ試験 Stress Rupture

項目 Item	HT	TP	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	-	-	-	-	-	-	-
結果 Result	-	-	-	-	-	-	-

熱処理 Heat Treatment

納入状態 Delivered Condition (HTO)
R:Q. 1038°C X30MIN. OQ
T. 660°C X1 h AC

試験片 Test Specimen (HT.)
-

マクロ組織 Macro Structure

項目 Item	TP			
規格 Spec.	-	-	-	-
結果 Result	GOOD	-	-	-

HT 結晶粒度 Grain Size

項目 Item	Spec. TP		
規格 Spec.	-	-	
結果 Result	-	-	-

脱炭又は表面汚染 Decarburization or Surface Contamination

項目 Item			
規格 Spec.	-	-	-
結果 Result	-	-	-

検査項目 Inspection Item

寸法検査 :Dimensional Test	GOOD
外観検査 :Visual Test	GOOD
超音波検査 :Ultrasonic Test	GOOD
磁気探傷検査 :Magnetic Particle Test	GOOD
浸透探傷検査 :Liquid Penetrant Test	-
材質確認 :Material Check	GOOD

ミクロ組織 Micro Structure

項目 Item	HT	TP			
規格 Spec.	-	-	-	-	-
結果 Result	-	GOOD	-	-	-

非金属介在物 Non-Metallic Inclusion

TP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-

添付資料 Attachment ☒ 有 Yes ☐ 無 No

要求図面/仕様書に適合する。
Conforms To All Draning and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

プラント名 (PROJECT) :2SNV-8

LGE&C
Y. Tsutsumi
Reviewed on July 22, 2003

ELLIOTT EBARA GROUP
☐ Witnessed
☑ Reviewed
EETC Q.C Dept.

R0Z1570803
SRV-5DF
Item No.: CT-9901
A-Rotor
Part Name: Blade (3rd. stage)

TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer: EBARA CORPORATION, SODEGAURA PLANT

Order No.: CB77298

Spec. No.	Material	ASTM A565 GR.616	Condition	Heat No.	9J651S1	Date	MAR. 18, 2000
SMPS-E1-R04 REV. 4	Size	F23X26X2000L	HEAT TREATED	Number of Pieces	7	Report No.	003-1712-00
{EBARA STD.}				Mass	71 KGS	Our Ref. No.	158-F185-01

JOB. NO.: R990430303

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	W %	MO %	V %	CO %	AL %	SN %	TI %
Spec.	0.20 -0.25	0.20 -0.50	0.50 -1.00	MAX 0.025	MAX 0.025	0.50 -1.00	11.00 -12.50	0.90 -1.25	0.90 -1.25	0.20 -0.30	MAX 0.25	MAX 0.05	MAX 0.04	MAX 0.05
LADLE	0.23	0.29	0.79	0.019	0.001	0.79	11.42	0.93	0.94	0.24	0.05	0.008	0.001	0.005

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT	Hardness after Heat Treated TP
Spec.	HB 255-331	HB	–	–
Result	311-311	311	–	–

Macro-Streak-Flaw or Cleanliness

	Spec.	Step	T P				
Spec.	–			–	–	–	–
Result	–			–	–	–	–

Item	H T	T P		
Spec.			–	–
Result			–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength or 0.2% N/MM2	Tensile Strength N/MM2	Elongation (4D) %	Reduction of Area %
Spec.	–	L	MIN 690	MIN 863	MIN 15	MIN 45
	–		–	–	–	–
Result			851	1022	18.8	51.0
Specimen	12.50D*50.0GL					

HT Impact Test at

Item					
Spec.	–		–	–	–
	TP	–	–	–	
Result	–	–	–	–	–

Hadenability

	HT	TP			
Spec.			–	–	–
Result			–	–	–

Stress Rupture

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation(%)	Reduction of Area
Spec.	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–

Heat Treatment

Delivered Condition(HTO) Test Specimen (HT)
R:Q. 1038° CX30MIN. OQ
T. 660° CX1 h AC

ELLIOTT EBARA GROUP ☐ Witnessed ☑ Reviewed

EETC Q.C Dept.

Item	Macro Structure			
Spec.	–	–	–	–
Result	GOOD	–	–	–

HT Grain Size

Item	Spec. TP		
Spec.		–	–
Result	–	–	–

Decarburization or Surface Contamination

Item		–	–	–
Spec.		–	–	–
Result		–	–	–

Micro Structure

Item	HT	TP			
Spec.			–	–	–
Result			–	–	–

Non-Metallic Inclusion

	TP													
		–	–	–	–	–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–	–	–	–	–

Inspection Item

Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Particle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Attachment * Yes ☐ No

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa

QUALITY ASSURANCE DEPARTMENT

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PROJECT: SBEG-5 DC

LGE & C
J. Tsutsumi
Reviewed on July 22, 2003

ROZ1570803
SRV-5DF
Item No.; CT-9901
A-Rotor
Part Name: Blade (3rd. stage)

TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

Customer: EBARA CORPORATION, SODEGAURA PLANT

Order No.: CC21394

Spec. No.	Material	ASTM A565 GR.616	Condition	Heat No.	9M045S1	Date	JAN. 08, 2001
SMPS-E1-R04 REV.4 (EBARA STD.)	Size	F23X26X2000L	HEAT TREATED	Number of Pieces	13	Report No.	012-2616-20
				Mass	133 KGS	Our Ref. No.	158-H648-01

JOB. NO.: R991119103

Chemical Composition

Elements	C %	SI %	MN %	P %	S %	NI %	CR %	W %	MO %	V %	CO %	AL %	SN %	TI %
Spec.	0.20 -0.25	0.20 -0.50	0.50 -1.00	MAX 0.025	MAX 0.025	0.50 -1.00	11.00 -12.50	0.90 -1.25	0.90 -1.25	0.20 -0.30	MAX 0.25	MAX 0.05	MAX 0.04	MAX 0.05
LADLE	0.22	0.26	0.78	0.021	0.001	0.81	11.44	0.93	0.95	0.23	0.03	0.009	0.002	0.004

Item	Hardness (as Shipped) PRODUCTS	Hardness (as Shipped) TEST PIECE	Hardness after Heat Treated HT	Hardness after Heat Treated TP
Spec.	HB 255-331	HB	–	–
Result	311-311	311	–	–

Macro-Streak-Flaw or Cleanliness

	Step	T P			
Spec.			–	–	–
Result		–	–	–	–

Item	H T	T P		
Spec.			–	–
Result			–	–

Tensile Test at (RT)

Item	HT	TP	Yield Strength at 0.2%	Tensile Strength	Elongation (4D)	Reduction of Area
			N/MM2	N/MM2	%	%
Spec.	–	L	MIN 690	MIN 863	MIN 15	MIN 45
			–	–	–	–
Result			851	1020	18.2	50.4
Specimen	12.50D*50.0GL					

HT Impact Test at

Item					
Spec.	–		–		–
	TP	–	–	–	
Result	–	–	–	–	–

Hadenability		HT	TP			
	Spec.			–	–	–
	Result	–	–	–	–	–

Stress Rupture

Item	HT	TP	Temperature	Stress	Life (Hrs)	Elongation(%)	Reduction of Area
Spec.	–		–	–	–	–	–
Result	–		–	–	–	–	–

Heat Treatment

Delivered Condition(HTO) Test Specimen (HT)
R:Q. 1038° CX30MIN. OQ
T. 660° CX1 h AC

ELLIOTT ECARA GROUP ☐ Witnessed ☑ Reviewed

EETC Q.C Dept.

Macro Structure

Item	TP				
Spec.		–	–	–	–
Result	–	GOOD	–	–	–

HT Grain Size

Item			
Spec.	Spec. TP	–	–
Result	–	–	–

Decarburization or Surface Contamination

Item				
Spec.	HT TP	–	–	–
Result	–	–	–	–

Inspection Item

Dimensional Test	GOOD
Visual Test	GOOD
Ultrasonic Test	GOOD
Magnetic Perticle Test	GOOD
Liquid Penetrant Test	–
Material Check	–

Micro Structure

Item	HT	TP			
Spec.	–		–	–	–
		TP	–	–	–
Result	–		–	–	–

Non-Metallic Inclusion

					–			–			–			
	TP	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Result	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Attachment * Yes ☐ No

Conforms To All Drawing and/or Specification Requirements.
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

S. Yoshikawa

QUALITY ASSURANCE DEPARTMENT

PROJECT: SBEG-4

LGE & C
J. Tsutsumi
Reviewed on July 22, 2003

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試験成績表
TEST CERTIFICATE

HITACHI
Hitachi Metals. Ltd.
Yasugi Works

御注文主: (株) 荏原エリオット
Customer 本社

御中

御注文番号:CD20033
Order No.

スペック番号 Spec.No.	鋼種 Material	12CR-0.12CB-MOD	納入状態 Condition	溶解番号 Heat No.	9K447K1	発行日 Date	2002-08-07
SMPS-E1-R06 REV.4 {EBARA STD.}	寸法 Size	F24X35X2000L	HEAT TREATED	個数 Number of Pieces	16	成績表番号 Report No.	207-3104-70
				質量 Mass	222 KGS	参照 Our Ref.No.	151-NA7P-01

製番 (JOB. NO.) :R010871403

ROZ1570803
SRV-15DF
Item No.: CT-9901
A-Rotor
Part Name: Blade (4th. stage)

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	NB %
規格 Spec.	0.13 -0.18	MAX 0.50	0.40 -0.60	MAX 0.025	MAX 0.010	MAX 0.50	11.50 -13.00	0.15 -0.25
LADLE	0.14	0.36	0.48	0.021	0.002	0.41	12.17	0.20

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片
規格 Spec.	HB 255-302	HB 255-302
結果 Result	269-269	269

熱処理硬さ Hardness after Heat Treated	HT	TP
	–	–

地疵又は清浄度 Macro-Streak-Flaw or Cleanliness: –

項目 Item	H T	T P
規格 Spec.	–	–
結果 Result	–	–

引張試験 Tensile Test at (RT)

項目 Item	H T / T P	耐力 Pr.St at 0.2% N/MM2	引張強さ Tensile Strength N/MM2	伸び Elong. (4D) %	絞り Red.of Area %
規格 Spec.	L	MIN 690	MIN 828	MIN 17	MIN 55
	–	–	–	–	–
結果 Result	–	764	892	20.9	66.2

試験片 Specimen 12.50D*50.0GL

衝撃試験 Impact Test

項目 Item	衝撃試験 2V NOTCH			RT
規格 Spec.	L	J MIN54		–
	TP	–	–	–
結果 Result	–	127	109	106

焼入性 Hardenability

規格 Spec.	H T / T P			
		–	–	–
結果 Result	–	–	–	–

応力破断試験 Stress Rupture

項目 Item	H T / T P	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	–	–	–	–	–	–
結果 Result	–	–	–	–	–	–

熱処理 Heat Treatment

納入状態 Delivered Condition (HTO) 試験片 Test Specimen (HT)

R:Q.960°CX30MIN. OQ
T.610°CX1 h AC

ELLIOTT EDARA GROUP
☐ Witnessed
☑ Reviewed
EETC Q.C Dept.

マクロ組織 Macro Structure

項目 Item	H T / T P			
規格 Spec.	–	–	–	–
結果 Result	–	–	–	–

結晶粒度 Grain Size: –

規格 Spec.	H T / T P		
	TP	–	–
結果 Result	–	–	–

脱炭又は表面汚染 Decarburization or Surface Contamination: –

規格 Spec.	H T / T P		
		–	–
結果 Result	–	–	–

ミクロ組織 Micro Structure

項目 Item	H T / T P			
規格 Spec.	–	–	–	–
結果 Result	–	GOOD	–	–

非金属介在物 Non-Metallic Inclusion: –

T P	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–

検査項目 Inspection Item

寸法検査 :Dimensional Test	GOOD
外観検査 :Visual Test	GOOD
超音波検査 :Ultrasonic Test	GOOD
磁気探傷検査 :Magnetic Particle Test	GOOD
浸透探傷検査 :Liquid Penetrant Test	–
材質確認 :Material Check	GOOD

添付資料 Attachment ☑ 有 Yes ☐ 無 No

要求図面/仕様書に適合する。
Conforms To All Drawing and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

姫崎 '02.8.21 03982

プラント名 (PROJECT) :SBEG-4

LGE&C
J. Tsutsumi
Reviewed on July 22, 2002

試験成績表
TEST CERTIFICATE

HITACHI
Hitachi Metals, Ltd.
Yasugi Works

御注文主: (株) 荏原エリオット
Customer 本社

御中

御注文番号:CD80935
Order No.

スペック番号 Spec.No.	鋼種 Material	12CR-0.12CB-MOD	納入状態 Condition	溶解番号 Heat No.	9S018K1	発行日 Date	2003-03-25
SMPS-EI-R06 REV.4 (EBARA STD.)	寸法 Size	F40X45X2000L	HEAT TREATED	個数 Number of Pieces	14	成績表番号 Report No.	303-1411-90
				質量 Mass	414 KGS	参照 Our Ref.No.	151-PSWF-01

製番 (JOB. NO.) :R021570803

R021570803
SRV-5DF
Item No.:CT-9901
A-Rotor
Part Name; Blade (5th.5DFth. stage)

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	NB %
規格 Spec.	0.13 -0.18	MAX 0.50	0.40 -0.60	MAX 0.025	MAX 0.010	MAX 0.50	11.50 -13.00	0.15 -0.25
LADLE	0.15	0.27	0.51	0.019	0.003	0.38	12.04	0.20

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片	熱処理硬さ Hardness after Heat Treated HT	TP
規格 Spec.	HB 255-302	HB 255-302	–	–
結果 Result	277- 277	277	–	–

地疵又は清浄度 Macro-Streak-Flaw or Cleanliness

規格 Spec.	段 Step	T	P
結果 Result	–	–	–

項目 Item	HT	TP
規格 Spec.	–	–
結果 Result	–	–

引張試験 Tensile Test at (RT)

項目 Item	HT	TP	耐力 0.2%耐力 Pt.Str at 0.2%	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red.of Area
			N/MM2	N/MM2	%	%
規格 Spec.	L		MIN 690	MIN 828	MIN 17	MIN 55
	–	–	–	–	–	–
結果 Result	–	–	747	878	21.2	65.9

試験片 Specimen 12.50D*50.0GL

衝撃試験 Impact Test

項目 Item	衝撃試験 2V NOTCH RT				
規格 Spec.	L	J MIN54			–
	TP	–	–	–	
結果 Result	–	119	117	116	–

焼入性 Hardenability

規格 Spec.	HT	TP	–	–	–
結果 Result	–	–	–	–	–

クリープ試験 Stress Rupture

項目 Item	HT	TP	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red.of Area
規格 Spec.	–	–	–	–	–	–	–
結果 Result	–	–	–	–	–	–	–

熱処理 Heat Treatment
納入状態 Delivered Condition (HTO)
R:Q.960° CX30MIN. OQ
T.610° CX2 h AC

試験片 Test Specimen (HT)

ELLIOTT EBARA GROUP ☐ Witnessed ☑ Reviewed

EETC Q.C Dept.

マクロ組織 Macro Structure

項目 Item	HT	TP	–	–	–	–
規格 Spec.	–		–	–	–	–
結果 Result	–		–	–	–	–

結晶粒度 Grain Size

項目 Item	Spec. TP	–	–
規格 Spec.			
結果 Result	–	–	–

脱炭又は表面汚染 Decarburization or Surface Contamination

項目 Item	–	–	–
規格 Spec.	HT TP	–	–
結果 Result		–	–

検査項目 Inspection Item

寸法検査	Dimensional Test	GOOD
外観検査	Visual Test	GOOD
超音波検査	Ultrasonic Test	GOOD
磁気探傷検査	Magnetic Particle Test	GOOD
浸透探傷検査	Liquid Penetrant Test	–
材質確認	Material Check	GOOD

ミクロ組織 Micro Structure

項目 Item	HT	TP	–	–	–
規格 Spec.	–		–	–	–
結果 Result	–		GOOD	–	–

非金属介在物 Non-Metallic Inclusion

	–				–									
T					–	–	–	–	–	–	–	–	–	–
P	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–	–	–	–	–	–

添付資料 Attachment ☒ 有 Yes ☐ 無 No

要求図面/仕様書に適合する。
Conforms To All Drawing and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

プラント名 (PROJECT) :SRV-5DF(ヨビロータ)

LGE&C
J. Tantsumi
Reviewed on July 22, 2003

70

試験成績表
TEST CERTIFICATE

HITACHI
Hitachi Metals, Ltd.
Yasugi Works

御注文主: （株）荏原エリオット
Customer 本社

御中

御注文番号:CD80935
Order No.

スペック番号 Spec.No.	鋼種 Material	12CR-0.12CB-MOD	納入状態 Condition	溶解番号 Heat No.	9P828N1	発行日 Date	2003-03-25
SMPS-E1-R06 REV.4 (EBARA STD.)	寸法 Size	F40X45X2000L	HEAT TREATED	個数 Number of Pieces	16	成績表番号 Report No.	303-1834-30
				質量 Mass	470 KGS	参照 Our Ref.No.	151-PSWF-01

製番（JOB. NO.）:R021570803

ROZ1570803
SRV-5DF
Item No.: CT-9901
A-Razor
Part Name: Blade (5th., 5DFth. stage)

化学成分 Chemical Composition

元素名 Elements	C %	SI %	MN %	P %	S %	NI %	CR %	NB %
規格 Spec.	0.13 -0.18	MAX 0.50	0.40 -0.60	MAX 0.025	MAX 0.010	MAX 0.50	11.50 -13.00	0.15 -0.25
LADLE	0.15	0.34	0.50	0.019	0.001	0.39	12.04	0.20

項目 Item	納入硬さ Hardness (as Shipped) 製品	試験片	熱処理硬さ Hardness after Heat Treated HT	TP
規格 Spec.	HB 255-302	HB 255-302	–	–
結果 Result	277-277	277	–	–

地疵又は清浄度 Micro-Streak-Flaw or Cleanliness

規格 Spec.	–	–	–
段 Step T	–	–	–
段 Step P	–	–	–
結果 Result	–	–	–

項目 Item	HT	Yr	–	–
規格 Spec.	–	–	–	–
結果 Result	–	–	–	–

引張試験 Tensile Test at (RT) / HT

項目 Item	HT TP	耐力 Proof Str. at 0.2%	引張強さ Tensile Strength	伸び Elong. (4D)	絞り Red. of Area
		N/MM2	N/MM2	%	%
規格 Spec.	L	MIN 690	MIN 828	MIN 17	MIN 55
	–	–	–	–	–
結果 Result	–	757	892	21.6	61.1

試験片 Specimen 12.50D*50.0GL

衝撃試験 Impact Test

項目 Item	衝撃試験 2V NOTCH			RT
規格 Spec.	L	J MIN54		–
	TP	–	–	–
結果 Result	–	86	91	76

焼入性 Hardenability

規格 Spec.	HT TP	–	–	–
結果 Result	– –	–	–	–

Stress Rupture 試験

項目 Item	HT	T	温度 Temp.	応力 Stress	寿命 Life (Hrs)	伸び El.(%)	絞り (%) Red. of Area
		P					
規格 Spec.	–	–	–	–	–	–	–
結果 Result	–	–	–	–	–	–	–

熱処理 Heat Treatment

納入状態 Delivered Condition (HTO)
R:Q. 960° CX30MIN. OQ
T. 610° CX2 h AC

試験片 Test Specimen (HT) –

ELLIOTT EBARA GROUP
☐ Witnessed
☑ Reviewed
EETC Q.C Dept.

マクロ組織 Macro Structure

項目 Item	T	–	–	–	–
規格 Spec.	–	–	–	–	–
結果 Result	–	–	–	–	–

結晶粒度 Grain Size

項目 Item	Spec.	–	–
規格 Spec.	TP	–	–
結果 Result	–	–	–

脱炭又は表面汚染 Decarburization or Surface Contamination

項目 Item	–	–	–
規格 Spec.	HT TP	–	–
結果 Result	– –	–	–

検査項目 Inspection Item

寸法検査	:Dimensional Test	GOOD
外観検査	:Visual Test	GOOD
超音波検査	:Ultrasonic Test	GOOD
磁気探傷検査	:Magnetic Particle Test	GOOD
浸透探傷検査	:Liquid Penetrant Test	–
材質確認	:Material Check	GOOD

ミクロ組織 Micro Structure

項目 Item	HT TP	T	–	–	–
規格 Spec.	–	–	–	–	–
結果 Result	–	GOOD	–	–	

非金属介在物 Non-Metallic Inclusion

	T	–	–	–	–	–	–	–	–	–	–	–	–	–
	P	–	–	–	–	–	–	–	–	–	–	–	–	–
		–	–	–	–	–	–	–	–	–	–	–	–	–

添付資料 Attachment ☒ 有 Yes ☐ 無 No

要求図面/仕様書に適合する。
Conforms To All Drawing and/or Specification Requirements.
この材料は、注文規格の要求を満足していることを証明します。
We hereby certify that the material described herein has been made and tested in accordance with the requirements of the purchase specification with satisfactory results.

QUALITY ASSURANCE DEPARTMENT

プラント名 (PROJECT) :SRV-5DF(ヨビロータ-)

LGE & C
J. Tsutsumi
Reviewed on July 22, 2003

71

SUBJECT	STEAM TURBINE ROTOR / HIGH SPEED BALANCE RECORD		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. A		

■ Condition :

Type of balancing machine ■ Schenk DH4 □ Schenk DH7

Rotor weight 1000 kgf

Test speeds are showm below. Holding time at overspeed is Min. 3 min.

Correction method □ Removed ■ Added

■ Table : Measured shaft vibration amplitude data.

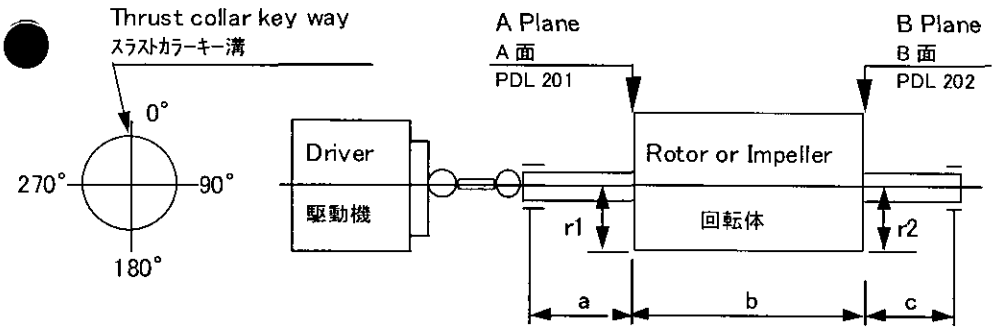
Shaft vibration amplitude		A Plane (PDL 201)		B Plane (PDL 202)		Criteria	Result
Test speed	min-1	X μm p-p	Y μm p-p	X μm p-p	Y μm p-p	μm p-p	
Maximum continuous speed	10828	12.5	12.1	6.2	4.1	25.0	ACCEPTABLE
Trip speed	11911	17.8	15.0	8.6	2.0	*	ACCEPTABLE

* : As per API

■ Table : Residual unbalance (Reference only data)

Low speed balance	A Plane (Drive end) (PDL 201)				B Plane (Free end) (PDL 202)			
Test speed 1850 min-1	Phase °	Weight g	r 1 mm	Amount g-mm	Phase °	Weight g	r 2 mm	Amount g-mm
Initial unbalance	34	39.4	176.4	6950.2	163	12.6	176.4	2222.6
Final unbalance	5	3.96	176.4	698.5	185	3.34	176.4	589.2

■ Figure: Typical sketches



Thrust collar is

□ A plane side

■ B plane side

Unit : mm

a	515
b	920
c	660
r1	176.4
r2	176.4

Zero phase angle is relative to _____

Reading of phase angle is (■ CW, □ CCW) viewing from (□ thrust, ■ non-thrust) end side.

■ Note Reference item number of quality plan : E04

TO	SET

	Approved (Aero equip. eng. dept.)	Checked (Aero equip. eng. dept.)	Prepared (Aero equip. eng. dept.)	Customer / Inspector
by	H. Ishizawa	—	H. Ishizawa	LGE&C Y. Tsutsumi
Date	July 22th '03		July 22th '03	July 22, 2003

EBARA Corp.

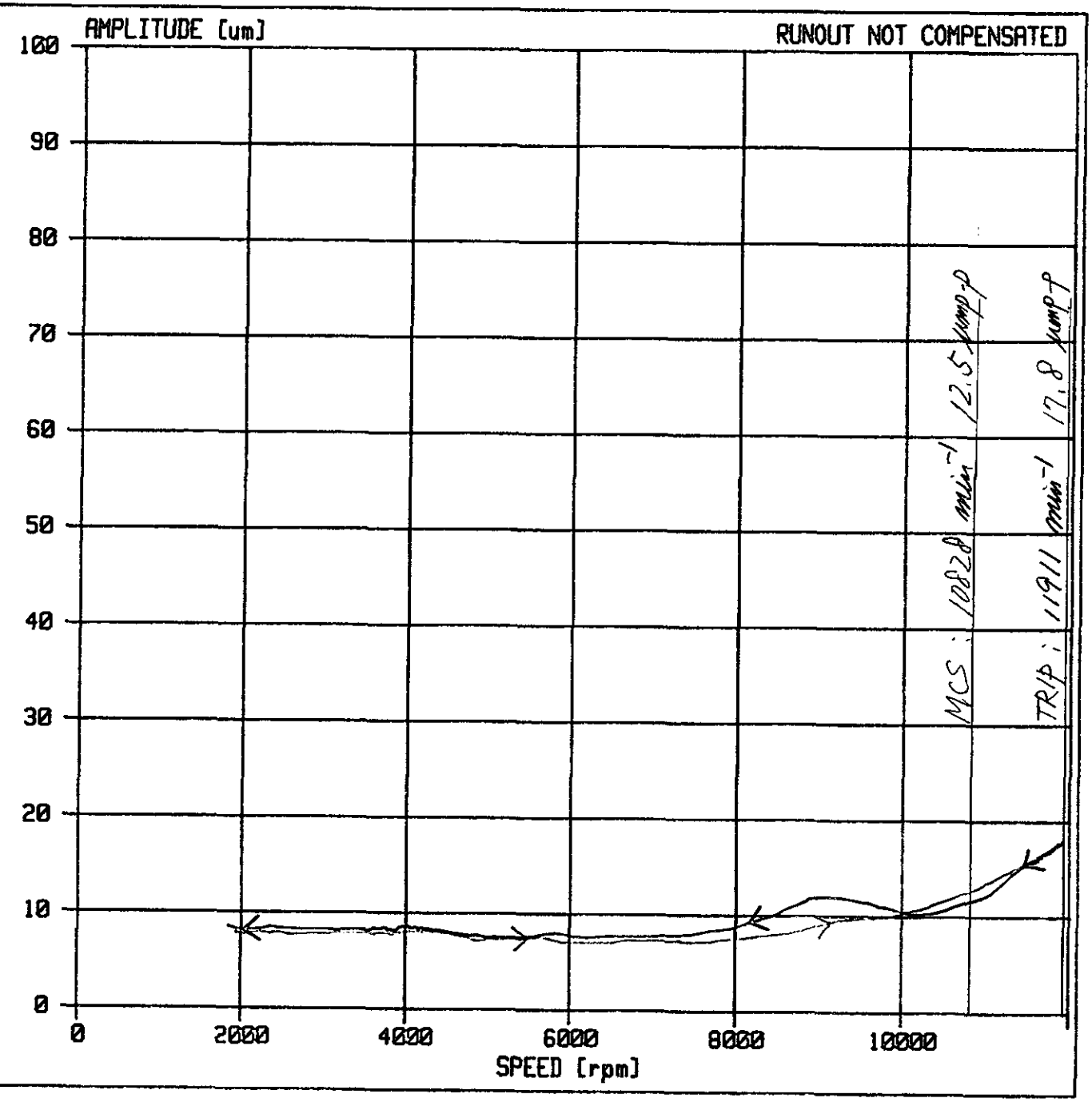
R02157083D

22-07-103 09:51

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF A rotor

RUN NO.: 9
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 1
PICK UP:
SV
CPLG END PDL201 X



LGE&C
Y. Tsutsumi
July 22, 2003

EBARA Corp.

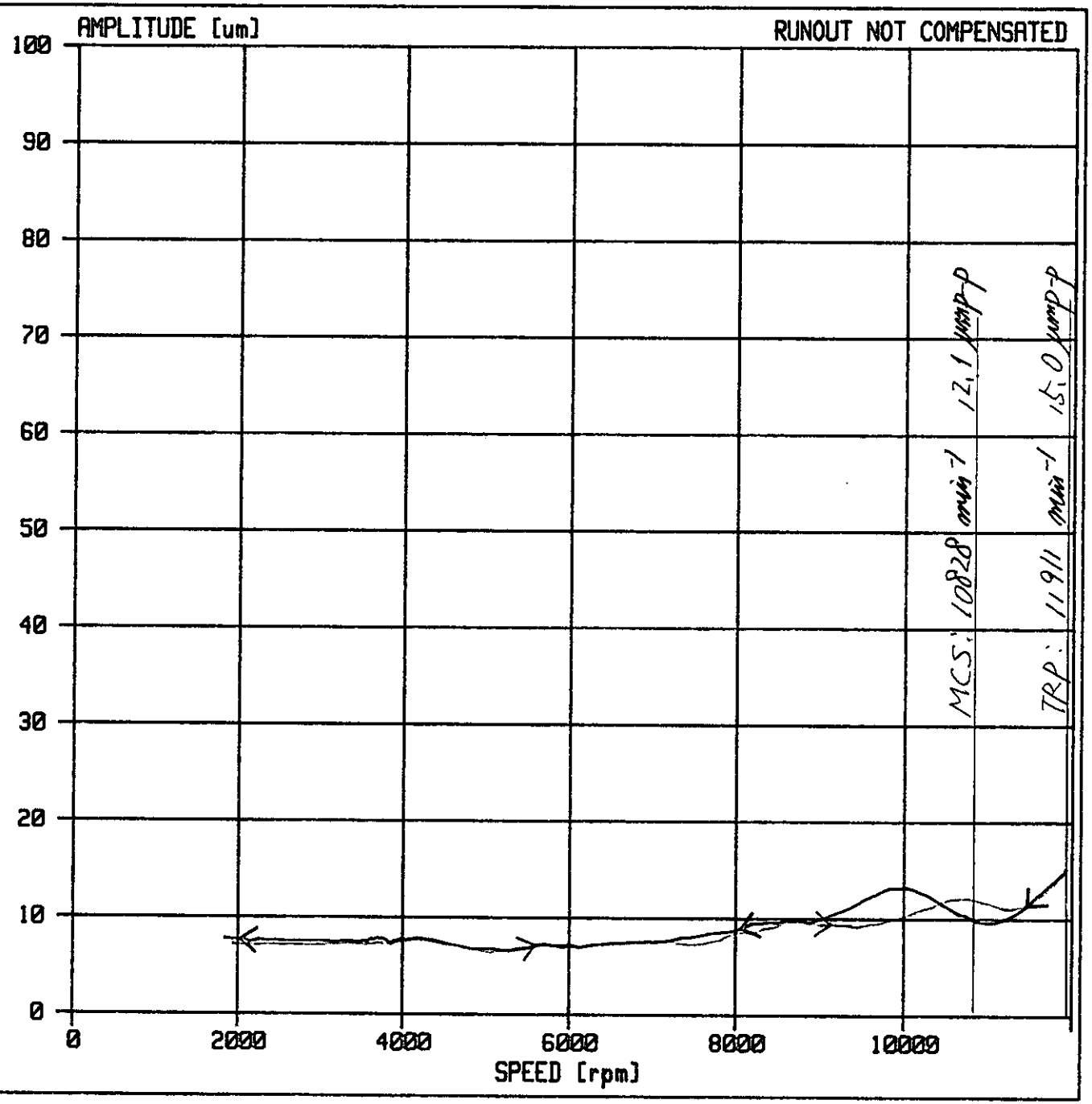
R021570830

22-07-103 09:51

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF A rotor

RUN NO.: 9
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 2
PICK UP:
SV
CPLG END PDL201 Y



LGE&C
J. Gutierrez
July 22, 2003

EBARA Corp.

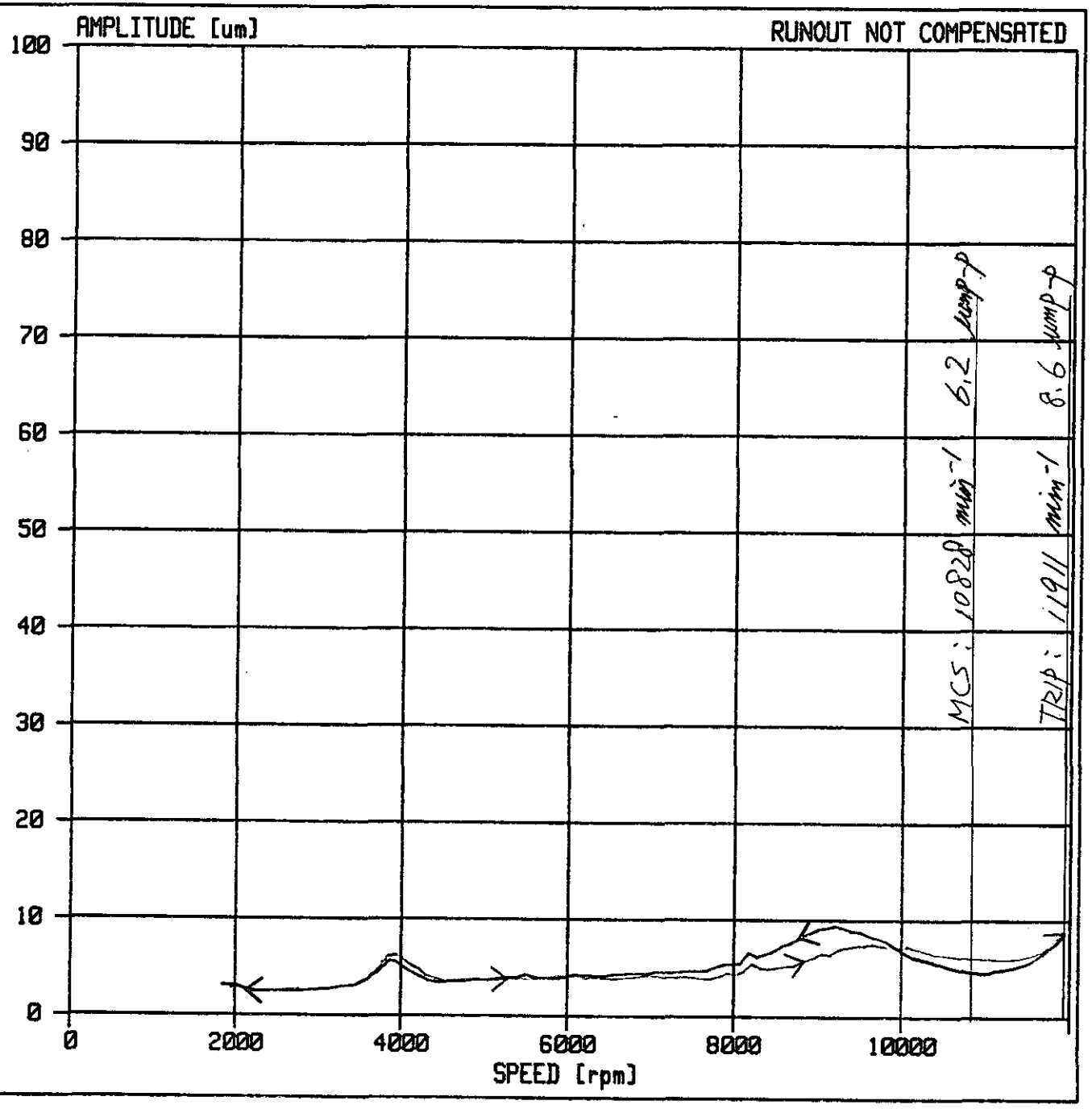
R021570830

22-07-103 09:51

ACCEL. DECEL.

ROTOR ID.:
JSRV-5DF A rotor

RUN NO.: 9
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 7
PICK UP:
SV
FREE END PDL202 X

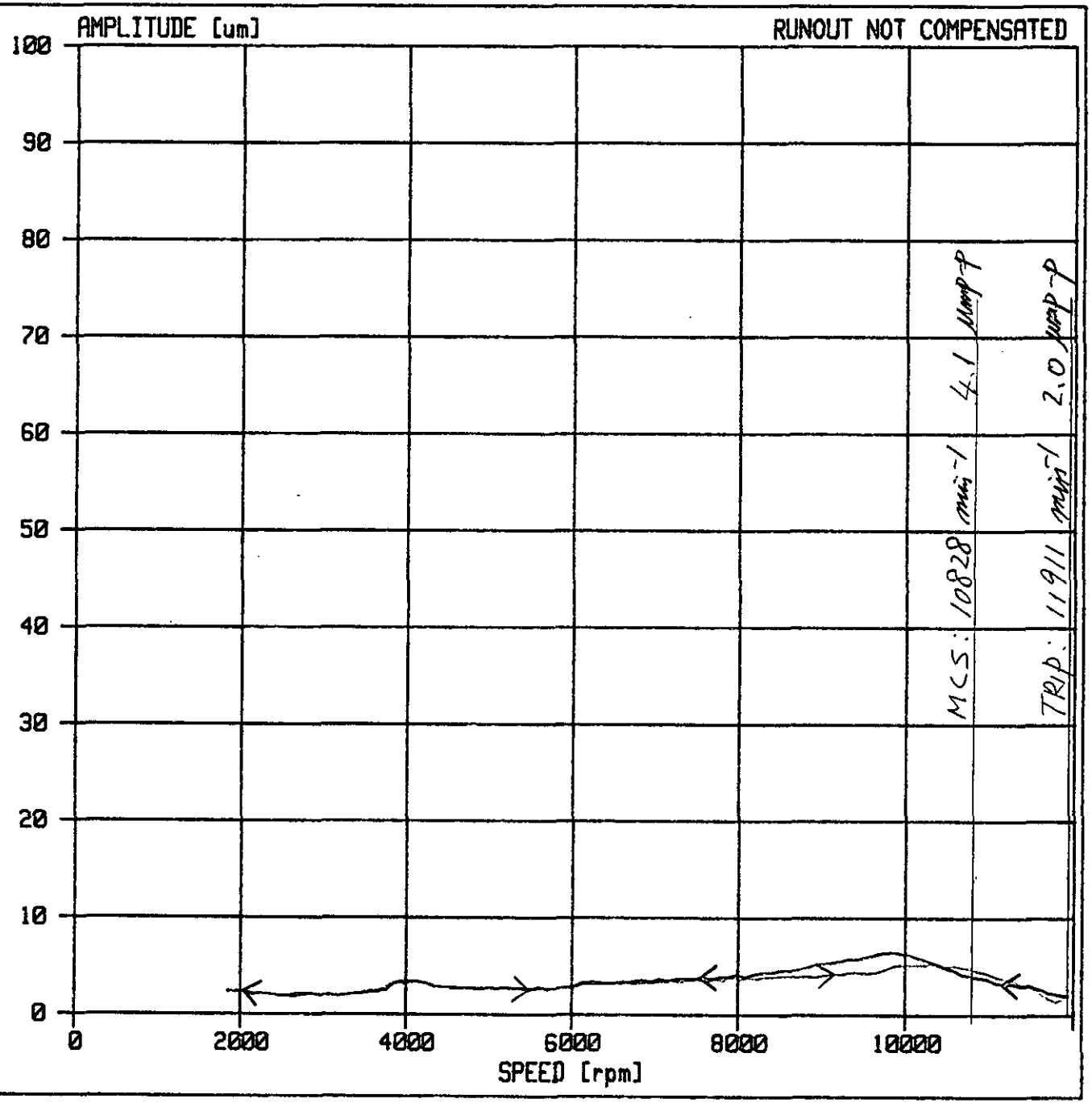


LGE&C
Y. Tsutsumi
July 22, 2003

EBARA Corp.

R02157083D

22-07-103 09:51
ACCEL. DECEL.
ROTOR ID.:
JSRV-5DF A rotor
RUN NO.: 9
WITNESS RUN
DEVICE: VC 2000
CHANNEL: 8
PICK UP:
SV
FREE END PDL202 Y



LGE&C
Y. Tsutsumi
July 22, 2008

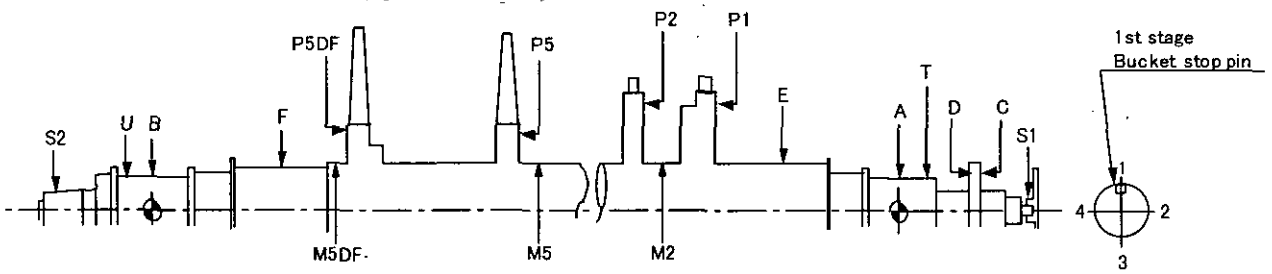
Inspection Activity

Subvendor	Ebara	Customer

P

SUBJECT	STEAM TURBINE ROTOR / MECHANICAL RUNOUT TEST RECORD				
EBARA SER. No.	R021570803	MODEL	SRV-5DF	ITEM No.	CT-9901
MACH. No. –	ROTOR I.D. A				

■ Figure : Typical sketches of main turbine rotor



■ Table : Measured data.

Unit : mm

	Location	Allowance	Point 1	Point 2	Point 3	Point 4	Runout	Result
A	Journal Bearing	0.0127	0	-0.001	-0.001	-0.001	0.001	Acceptable
B	Journal Bearing	0.0127	0	-0.001	-0.001	0	0.001	
C	Thrust Face	0.0127	0	0	-0.001	-0.006	0.006	
D	Thrust Face	0.0127	0	0.001	0.001	0	0.001	
E	Shaft seal surfase	0.025	0	-0.001	-0.005	-0.004	0.005	
F	Shaft seal surfase	0.025	0	-0.010	0.014	0.005	0.014	
M2	Shaft seal surfase	0.025	0	-0.003	-0.004	-0.007	0.007	Acceptable
M3	Shaft seal surfase	0.025	0	0	-0.006	-0.007	0.007	
M4	Shaft seal surfase	0.025	0	0	-0.008	-0.007	0.008	
M5	Shaft seal surfase	0.025	0	0.001	-0.005	-0.007	0.008	
M5DF	Shaft seal surfase	0.025	0	0.003	-0.006	-0.010	0.013	
P1	Disk fase	0.25	0	-0.001	-0.005	-0.007	0.007	Acceptable
P2	Disk fase	0.25	0	0.005	-0.001	-0.002	0.007	
P3	Disk fase	0.25	0	0.003	0.001	-0.003	0.006	
P4	Disk fase	0.25	0	0.004	0.004	-0.003	0.007	
P5	Disk fase	0.25	0	0.002	0.003	0	0.003	
P5DF	Disk fase	0.25	0	-0.002	-0.005	0.001	0.006	
S1	Shaft	0.025	0	0.009	0.017	0.010	0.017	Acceptable
S2	Shaft	0.025	0	-0.004	0.001	-0.001	0.005	
T	Vibration Sensing Area	0.005	0	-0.001	-0.001	0	0.001	
U	Vibration Sensing Area	0.005	0	-0.001	0.001	-0.001	0.002	

LGE&C
J. Tsutsumi
Reviewed on July 22, 2003

■ Note Reference item number of quality plan : E08

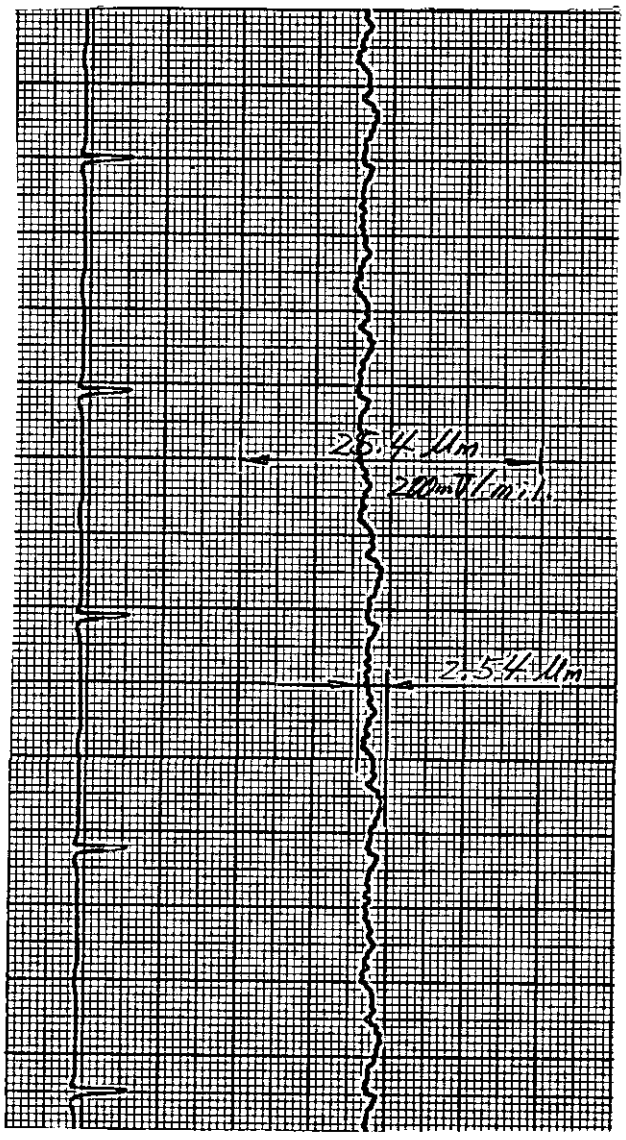
TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			A. Suwa	
Date	Jul.-17'03	Jul.-17-2003	JLY.16.2003	

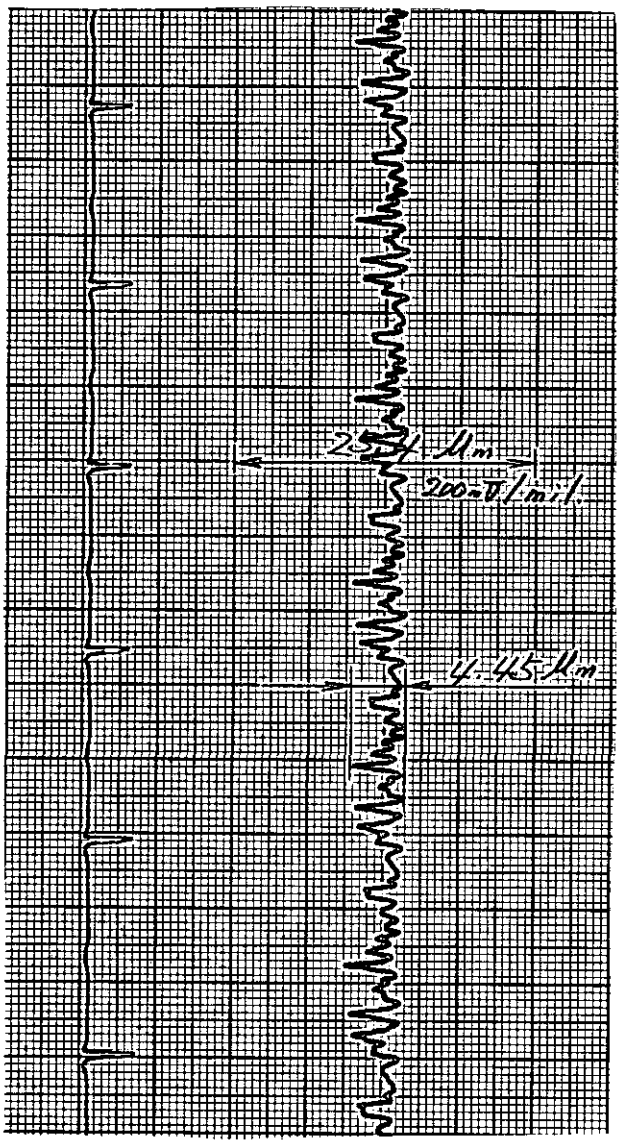
SUBJECT	STEAM TURBINE ROTOR / TOTAL (MECHANICAL & ELECTRICAL) RUN-OUT RECORD (RADIAL)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. A		

Vibration probe sensing area

Location ■ Thrust side ☐ Non thrust side
Criteria Max. 6.4 μm
Result ■ Acceptable ☐ Not acceptable



Location ☐ Thrust side ■ Non thrust side
Criteria Max. 6.4 μm
Result ■ Acceptable ☐ Not acceptable



■ Note Reference item number of quality plan : E09

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			A. Suwa	LGE&C Y. Tsutsumi
Date	Jul. 17 '03	Jul.-17-2003	JLY. 16. 2003	July 22, 2003

ELLIOTT EBARA GROUP

Elliott Ebara Turbomachinery Corporation

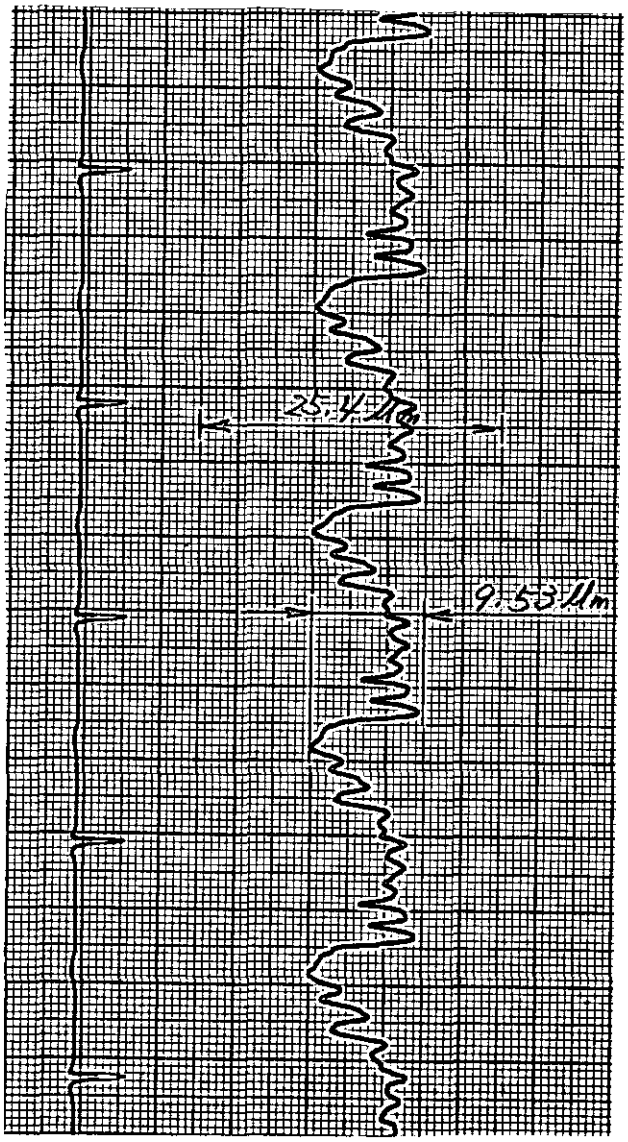
SUBJECT	STEAM TURBINE ROTOR / TOTAL (MECHANICAL & ELECTRICAL) RUN-OUT RECORD (AXIAL)		
EBARA SER. No.	R021570803	MODEL SRV-5DF	ITEM No. CT-9901
MACH. No. –	ROTOR I.D. A		

Axial probe sensing area

Location ☐ Thrust nut ☒ Shaft end

Criteria Max. 12.7 μm

Result ☒ Acceptable ☐ Not acceptable



Location ☐ Thrust nut ☐ Shaft end

Criteria Max. 12.7 μm

Result ☐ Acceptable ☐ Not acceptable

■ Note Reference item number of quality plan : E09

TO	SET

	Approved (QA dept.)	Checked (QA dept.)	Prepared	Customer / Inspector
by			A. Suwa	L&E&C Y. Tsutsumi
Date	Jul. 17 '03	Jul.-17-2003	JLY. 16. 2003	July 22, 2003

ELLIOTT®
EBARA GROUP

STEAM TURBINE

ITEM NO.	TC-9901		ELLIOTT EBARA S.O.NO.	R021570803	
DATE	NOV. 2003		ELLIOTT S.O.NO.	—	
TYPE	SRV-5DF		MAX. OPERATING CONDITIONS		
RATED OUTPUT	5300	kW	SPEED	10828	min^{-1}
RATED SPEED	9591	min^{-1}	INLET PRESS.	41.0	kgf/cm^2G
INLET PRESS.	38.0	kgf/cm^2G	INLET TEMP.	440	°C
INLET TEMP.	390	°C	EXH. PRESS.	81.0	mmHgA
EXHAUST PRESS.	81.0	mmHgA	FIRST CRITICAL	5997	min^{-1}
EXTRACTION PRESS.	—	kgf/cm^2G	SECOND CRITICAL (CALC.)	18000	min^{-1}
TRIP SPEED (ELEC.)	11911	min^{-1}	SENTINEL VALVE PRESS.	—	kgf/cm^2G
(MECH.)	—	min^{-1}			

Elliott Ebara Turbomachinery Corporation CHIBA, JAPAN

MANUFACTURED IN JAPAN UNDER LICENSE OF ELLIOTT TURBOMACHINERY CO., INC. JEANNETTE, PENNSYLVANIA, U.S.A., BY ELLIOTT EBARA TURBOMACHINERY CORPORATION.