



Industry & Facilities Division
Procurement Services
Inspection Report

INSPECTION REPORT N° 12355-01
<input checked="" type="checkbox"/> Initial <input type="checkbox"/> Interim <input checked="" type="checkbox"/> Final <input type="checkbox"/> Resident <input type="checkbox"/> Remote
Inspection requested by: Delta GmbH
BV Job Nr: 20412767

Project: Refrigeration Compressor 2 Sets 160S Model	IPO Ref (If applicable): 20392985-1002 (BV internal P/o)
BV Client: Delta GmbH	P/o nr: (client to BV)
Manufacturer/Vendor: MAYEKAWA Europe	P/o nr: DELTA-PE-2023-PO-200-1 (client to Manufacturer)
Sub-Vendor (If applicable): -	
Inspection Location (Address): Mayekawa Europe BV, Belgium	Previous Inspection (If applicable): NONE
Inspection Location (GPS coordinates):	Next Inspection (If applicable): NONE (Date)
Inspection performed on: Oct. 02, 2024 (Date(s))	Total No. of Inspection Days: 1

MATERIAL / SUBJECT OF INSPECTION	ITEM / TAG Nr	QTY As per P/O	QTY Offered for inspection
<input type="checkbox"/> Refer to attachment section J instead (Indicate if separate material list is provided in attachment)			
Screw Compressor Visual Inspection	RU-0001 A/B	2	2

A – INSPECTION RESULT		
<input checked="" type="checkbox"/> Satisfactory (Without comments)	<input type="checkbox"/> Satisfactory with comments (Any of trailing Punch or Non Conformity items is still open)	<input type="checkbox"/> Not Satisfactory (NCR raised during the inspection)
Inspection Summary: (for details refer to section E)		
I visited MAYEKAWA on Oct. 02, 2024 to witness Compressor Visual Inspection Model 160S two sets for Screw compressor. The result was Satisfactory without comment.		
Open Non Conformities:	<input type="checkbox"/> Yes, details in section G	<input checked="" type="checkbox"/> No
Open Punch List Items:	<input type="checkbox"/> Yes, details in section H	<input checked="" type="checkbox"/> No
Release Note Issued:	<input type="checkbox"/> Yes, number(s): (Release Note number)	<input checked="" type="checkbox"/> No

BV Inspector: Atsuo IMAI (Name and Signature)	BV Coordinator: Chika KIOI (Name and Signature)
BV Office: Yokohama Japan	Inspection Report Date: Nov. 03, 2023
Distribution: <input checked="" type="checkbox"/> CLIENT <input checked="" type="checkbox"/> BV <input type="checkbox"/> OTHER :	Attachments Report: <input checked="" type="checkbox"/> Yes, details in section J <input type="checkbox"/> No

B - REFERENCE DOCUMENTATION:					
<input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate document list is provided in attachment)</i>					
Title	Reference n°	Rev.	Approval status	Approved by	Date
INSPECTION AND TEST PLAN FOR COMPRESSOR	2513293	0	Approved	Delta GmbH	-
Screw Compressor Standard Inspection Procedures Performance Test, Mechanical Running Test, Noise and Vibration Test	SCSD-010-13	13	Approved	Delta GmbH	2023/01/17

C – ATTENDEES		
Name	Position	Representing
Mr. TETSUO KAZASA	General Manager	MAYEKAWA
Mr. Toshiyuki Sakaguchi	QA Gr.	MAYEKAWA
Ms. Tomoko Kanazawa	QA Gr.	MAYEKAWA
Mr. Frank IMAI	On Behalf of Delta GmbH (BV Inspector)	BV Belgium

D - MEASURING & TESTING EQUIPMENT USED			
<input checked="" type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate equipment list is provided in attachment)</i>			
Equipment Type	Equipment Identity n°	Last Calibration Date	Expiry Date
-			

E - INSPECTION DETAILS
E – General
The following Test was carried out accordance with “Reference documents” above-mentioned. The result was Satisfactory without comment.
E1 – Details of Witness (W) & Hold (H) Inspection Points
1. Witness of Compressor Skids 160S used for Propane Refrigeration Package Air Cooled Unit with Compressor Serial Numbers 1656466 and 1656467. The Inspection was including Compressor Block, Oil Pump, and other parts assembled on Compressor skid and inspection included of Visual and Scope Check of both skids on behalf of DELTA GmbH.

E2 – Details of Monitoring and Surveillance Patrols	<input type="checkbox"/> Tick if conducted during the visit
NONE	
E3 – Details of Certificates Review	<input type="checkbox"/> Tick if conducted during the visit
NONE	
F – HEALTH, SAFETY & ENVIRONMENT COMMENTS	
<i>(Comment on Observations and Actions Taken During the Inspection)</i>	
No health and safety concerns or violations were observed before or during conducting the inspection activity.	

G- NON CONFORMITIES							
<input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate punch list is provided in attachment)</i>							
Item	Description	Status	Raised on	Report #	Closed on	Report #	Comments
	NONE						

H – PUNCH LIST							
<input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate punch list is provided in attachment)</i>							
Item	Description	Status	Raised on	Report #	Closed on	Report #	Comments
	NONE						

I - DIGITAL PICTURES



Description: Compressor Skid A
(Model No. P160S / Sr. No. 1656466)

Description: Compressor Skid A
(Model No. P160S / Sr. No. 1656466)



Description: Compressor Skid A
(Model No. P160S / Sr. No. 1656466)

Description: Compressor Skid A
(Model No. P160S / Sr. No. 1656466)

I - DIGITAL PICTURES



Description: Compressor Skid B
(Model No. P160S / Sr. No. 1656467)

Description: Compressor Skid B
(Model No. P160S / Sr. No. 1656467)



Description: Compressor Skid B
(Model No. P160S / Sr. No. 1656467)

Description: Compressor Skid B
(Model No. P160S / Sr. No. 1656467)

J – ATTACHMENTS

Item	Attachment Name	Total Pages	Description
	Inspection & Test Record	44	(Mechanical running test and Performance inspection)
	Compressor Package DSH	7	EI027-HSE-VD – ME– DSH– 001
	Compressor Package DWG	3	EI027-HSE-VD – ME– DWG– 002

END OF REPORT

INSPECTION & TEST RECORD

Item No.	: -
Order No.	: ME24-11MMEPO240063
Report No.	: 2024323A
Type of Compressor	: Screw Compressor
Name of Manufacturer	: MAYEKAWA MFG. CO., LTD.
Model	: P160VSD-M
Serial No.	: 1656466

(Remarks)

This inspection and test record is complete together with the following test records attached herewith :

- 1 .Material Identification List
- 2 .Hydrostatic and Gas Leak Tests Report
- 3 .Screw Compressor Test Results
- 4 .Outer Dimensions Report
- 5 .Rotor Balancing Test Report

Date of Issue : July 3, 2024

Approved by : 

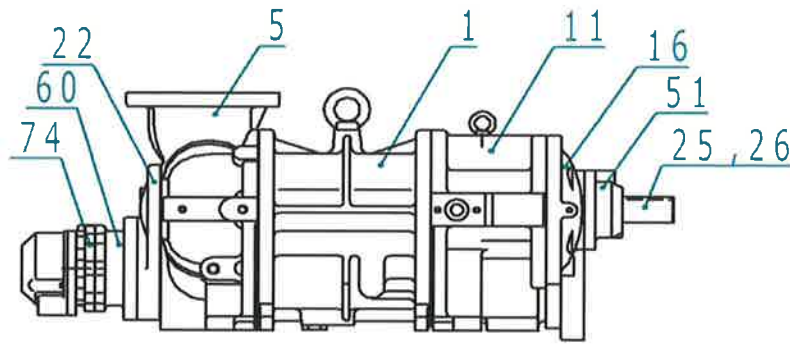
Checked by : 

Material identification list

* General information :

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Model	: P160VSD-M
Serial No.	: 1656466
Date	: July 3, 2024

SURVEYOR



Parts No.	Name of Part	Material	Identification No.	Page	Remarks
1	Main Rotor Casing	FC300	S23Z13	P 1	
5	Suction Cover	FC300	K3Z15	P 2	
11	Bearing Head	FC300	K3Z13	P 3	
16	Bearing Cover	FC300	K4213	P 4	
22	Balance Piston Cover	FC300	C23X15	P 5	
51	Seal Cover	FC300	1Y30	P 6	
60	Unloader Cylinder	FC300	3419	P 7	
74	Unloader Cover	FC300	3Y16	P 8	
25	Male Rotor	FCD600	C24305	P 9	
26	Female Rotor	FCD600	C24228	P 10	

Approved by :

A. Higuchi

Checked by :

K. Watanabe

材料試験証明書

MATERIAL TEST CERTIFICATE

(株)前川製作所 MAYEKAWA MFG. CO. LTD 様

(EN10204 3.1)

発行日 2024年7月1日

No855

Date of Issue: 1-Jul-2024

オーダー Order	品名 Product	ローターケーシング Rotor Casing	材質 Material	FC-300	個数 Quantity	1			
注文番号 Order No.		160VS	鑄込年月日 Cast Date	2023年12月13日					
機械試験	試験項目 Test Items	引張試験 Tensile Test		抗折試験 Transverse Test		試験結果 Decision			
		試験片寸法 Size of Specimen	引張強さ Tensile Strength	ブリネル Brinell	荷重 Load		タワミ Deflect		
	規格 Spec	直径 Dia	断面積 Area	引張荷重 Bresking Load	Hb	mm			
	JIS Z 2241 JIS Z 2243	mm	mm ²	N	N/mm ²	Hb	mm		
試験片番号 Specimen No.	20	314	MIN.	300	MAX.				
溶解番号 Charge No.	20	314	312	312	262				
S23Z13					218	11400	8.4	良	
化学分析	項目・規格 Items. Spec.	化学成分 Chemical Composition (%)					材料規格 Standard of Material	JIS G 5501-1995	
	溶解番号 Charge No.	C	Si	Mn	P	S	Cu	Sn	備考 Remarks
S23Z13	3.25	2.1	0.40	0.03	0.02	0.5	0.05		Reviewed by: <i>X. Goto</i> MAYEKAWA, MFG. CO., LTD

本製品は、ご指定の規格または仕様によって製造され、その要求事項を満たしていることを証明します。

We hereby certify that material described has been manufactured and inspected satisfactory with the requirement of the above specification.

承認 Approval	作成者 Implementer
盛多 MORITA	高山 TAKAYAMA

三共鑄鉄株式会社
〒726-0013 広島県府中市高木町213-1
SANKYO CAST STEEL CO.,LTD
213-1 TAKAGI-CHO FUCHU-SHI HIROSIMA
726-0013 JAPAN

材料試験証明書 Material Test Certificate

EN10204 3.1

1071

発行日 令和 6 年 4 月 19 日
 DATE of Issue 19 - APR - 2024
 株式会社 協和製作所
 〒933-0351 富山県高岡市四日市1-33-1-2
 KYOWA SEI SAKUSHO Co., Ltd
 133-12 YOKKAICHI TAKAOKA TOYAMA 933-0351 JAPAN

御得意様名 株式会社 前川製作所様
 TO Messrs MAYEKAWA MFG CO., LTD.

材質 Material	JIS G 5501 FC300		試験片の形状 Test Piece Size		JIS Z 2241 NO. 8C		Brinell hardness test		JIS Z 2243				
							Tensile test		JIS Z 2241				
規格 Standard			引張試験 Tensile Test		硬さ試験		金属材料衝撃試験 JIS Z 2242 (FC材、FCD材は無)						
品名 Product	機種 Model	チャージNo. ChargeNo.	試験月日 Date of Inspection	直径 Diameter mm	引張荷重 Maximum Load N	引張強さ Tensile Strength N/mm ²	硬度数 Hardness HBW	化学成分 Chemical Composition					
								TC	Si	Mn	P	S	Sn
サクションカバー SUCTION COVER	160V	K3Z15	2023/12/22	20.0	98,213	312.8	217	3.15	1.60	0.809	0.024	0.058	0.016
ベアリングヘッド BEARING HEAD	160VD	K3Y29	2023/12/6	20.0	103,934	331.0	223	3.07	1.45	0.845	0.022	0.053	0.043
ベアリングカバー BEARING COVER	160VD	K4209	2024/2/16	20.0	97,937	311.9	207	3.28	1.85	0.648	0.022	0.063	0.014
備考 Remarks								品質責任者					
								Reviewed by: <i>A. Substantia</i> MAYEKAWA MFG, CO., LTD					

本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.

Checked by S. Havashi (林) Tested by M. Omote (表)

材料試験証明書 Material Test Certificate

EN10204 3.1

1079

発行日 令和 6 年 6 月 10 日
 DATE of Issue 10 JUN 2024
 株式会社 協和製作所
 〒933-0351 富山県高岡市四日市1-33-112
 KYOWA SEISAKUSHO Co., Ltd
 133-12 YOKKAICHI TAKAOKA TOYAMA 933-0351 JAPAN

御得意様名 株式会社 前川製作所様
 TO Messrs MAYEKAWA MFG CO., LTD.

材質 Material	JIS G 5501 FC300		試験片の形状 Test Piece Size	JIS Z 2241 NO. 8C		Brinell hardness test	JIS Z 2243						
	規格	標準	引張試験	Tensile Test	硬さ試験	金属材料衝撃試験	JIS Z 2242 (FC材、FCD材は無)						
品名 Product	機種 Model	チャージNo. ChargeNo.	試験月日 Date of Inspection	直径 Diameter mm	引張荷重 Maximum Load N	引張強さ Tensile Strength N/mm ²	硬度数 Hardness HBW	化学成分 Chemical Composition					
								TC	Si	Mn	P	S	Sn
ローターカasing (2) ROTOR CASING (2)	1612C	K1414	2021/4/21	20.0	96,115	306.1	217	3.18	1.65	0.616	0.024	0.071	0.029
サクションカバー (1) SUCTION COVER (1)	1612C	K4205	2024/2/12	20.0	97,591	310.8	212	3.24	1.79	0.630	0.021	0.065	0.034
ベアリングヘッド (1) BEARING HEAD (1)	1612C	K4131	2024/2/7	20.0	96,995	308.9	212	3.21	1.71	0.641	0.021	0.075	0.035
ベアリングヘッド (2) BEARING HEAD (2)	1612C	K4226	2024/3/6	20.0	98,533	313.8	212	3.24	1.72	0.638	0.022	0.063	0.034
ベアリングヘッド BEARING HEAD	160VD	K3Z13	2023/12/20	20.0	101,419	323.0	223	3.12	1.46	0.860	0.021	0.069	0.037

備考 Remarks

品質責任者

本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.

Checked by S. Hayashi 林 Tested by M. OMOTE 表

Reviewed by: K. Yamamoto

MAYEKAWA MFG, CO., LTD

材料試験証明書 Material Test Certificate

発行日: 2024年4月26日
 Date of Issue: 26-Apr-24
 株式会社 前川製作所 東広島工場 圧縮機製造部門 品質保証グループ
 〒739-2117 広島県東広島市高屋台2-3-40
 MAYEKAWA MFG. CO., LTD. HIGASHI HIROSHIMA PLANT
 QUALITY-ASSURANCE GROUP
 2-3-40, Takayadai, Higashihiroshima-City Hiroshima-Pref. 739-2117, Japan

得意先名: 株式会社 前川製作所 守谷工場 圧縮機製造部門
 TO Messrs: MAYEKAWA MFG. CO., LTD. MORIYA PLANT
 発注日(Charge Date) 2023/10/11
 管理番号(Control-Number)

Name of Articles 製品名	Product Type 機種	Grey iron castings JIS G 5501(1985)	Material 材質	Test piece 試験片	JIS Z 2241(2011) No.8C Φ20mm	Quality Responsibility Person 品質責任者	Checked by K.Tsuruta
BALANCE PISTON COVER バランスピストンカバー	160S/L	ねずみ鋳鉄品	材質	試験片	JIS Z 2241(2011) No.8C Φ20mm	品質責任者	K.Tsuruta
Serial Number 製造番号	Date of Inspection 試験日	Maximum Load 引張荷重 N	Tensile Strength 引張強さ ≥300(N/mm ²)	Hardness 硬度 ≤262[HB]	Chemical Composition 化学成分	Quality Responsibility Person 品質責任者	Checked by K.Tsuruta
C23 X13	2023/10/16	105841	339	229	C[%] 2.947 Si[%] 1.517 Mn[%] 0.672 P[%] 0.018 S[%] 0.013 Sn[%] 0.023	品質責任者	Y.Sakamori
C23 X14							
C23 X15							
C23 X16							
C23 X17							
C23 X18							

Remarks 備考

Material mill test report shall be in compliance with EN10204 3.1.

Reviewed by: *K. Uatanaka*
 MA YEKAWA MFG. CO., LTD.

HIGASHIHIROSHIMA PLANT MAYEKAWA MFG. CO., LTD
 (前川製作所 東広島工場)

材料試験証明書

Material Test Certificate

EN10204 3.1

番号 Number	顧客名 to Messrs	品番 Part Number	品名 Part Name	型式 Type					
No.5851	(株)前川製作所 殿	161a0029	SEAL COVER	160S/L					
		試験片の形状 Testpiece Size	材質 Material						
		No.8C JIS Z2241	FC300 JIS G5501						
試験項目 Kind of Test	引張試験 Tensile Test JIS Z 2241			硬さ試験 Hardness JIS Z 2243 HB					
	引張強さ Tensile Strength N/mm ²	耐力 Yield Strength N/mm ²	伸び Elongation %						
規格 記号 Mark	≥ 300	—	—	≤ 262					
1Y30	312	—	—	229					
化学分析試験 Chemical Analysis Test (%)									
成分記号	C	Si	Mn	P	S	Cu	Cr		
1Y30	3.15	1.70	0.98	0.044	0.084	—	—		
顕微鏡写真 Micro-Photograph									
倍率 Magnify	× 100								
腐食 Etching	4%ピクリン酸 4%Picric acid								
					Reviewed by: <i>K. Watanabe</i> MAYEKAWA. MFG, CO.,LTD				
備考 Remark									
<p>本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.</p>									
※試験日 (Date of Test) : 2021/12/1									
試験の結果は、上記の通りであります。 We certify that the result of the material test has been as described above.					(株)シグマ製作所花泉工場 HANAIZUMI FACTORY SIGUMA MFG.CO.,LTD				
発行日 : 2022年4月19日 Date of Issue : 19-Apr-22					〒029-3207 岩手県一関市花泉町油島字南沢97-156 97-156 MINAMIZAWA YUSIMA HANAIZUMI ICHINOSEKI IWATE 029-3207				
TEL:0191(82)5481 FAX:0191(82)5496					承認		作成		

2024年1月23日

Date of issue Jan. 23. 2024

材料試験証明書 Material Test Certificate

EN 10204 3.1

得意先名 (株) 前川製作所 様

To Messers MAYEKAWA MFG CO., LTD.



新潟県長岡市宮下町

株式会社 キヤス

436-1 Miyashitamati Nagaoka-shi Niigata-ken Japan

CAST ANDOH CO.

材質 Material	1995年改正 JIS. G5501 FC300	試験の形状 Test Piece Size	2011年改正 JIS. Z2241 NO. 8C	部品名 Name of parts		試験日 Date of test										
				アンローダーシリンダー Unloader Cylinder												
規格 Standard	直径 Diameter mm	引張荷重 Maximum Load N	引張強さ Tensile Stlength N/mm ²	耐力 Yield Stlength N/mm ²	伸び Elogation %	たわみ Deflection mm	硬度試験 Hardness 1998年改定 JIS. Z2243	化学成分 Chemical Composition								
								最大荷重 Maximum Load N	直径 Diameter mm	硬度数 Brinell	T C	Si	M n	P	S	
試験記号 T. P. NO.	20±0.7		≥300				HB	%	%	%	%	%	%	%	%	*
3419	20.0	104900	334				224	3.28	1.69	0.85	0.052	0.054				*
																*
																*
																*

備考・Remarks 本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected and inspected satisfactory with requirement of the above specification

品質管理者

Checked by



Tested by

Reviewed by: *K. Suetsugu*

MAYEKAWA. MFG. CO., LTD

SI単位換算値
Conversion of Unit
1kgf=9.80665N
1kgf/mm²=9.80665N/mm²
1kgf m=9.80665J

材料試験証明書

Material Test Certificate

EN10204 3.1

番号 Number	顧客名 to Messrs	品番 Part Number	品名 Part Name	型式 Type					
No.6704	(株)前川製作所 殿	161a0032	UNLOADER COVER	160S/L					
		試験片の形状 Testpiece Size	材質 Material						
		No.8C JIS Z2241	FC300 JIS G5501						
試験項目 Kind of Test	引張試験 Tensile Test JIS Z 2241			硬さ試験 Hardness JIS Z 2243 HB					
	引張強さ Tensile Strength N/mm ²	耐力 Yield Strength N/mm ²	伸び Elongation %						
規格 記号 Mark	≥ 300			≤ 262					
3Y16	333	—	—	259					
化学分析試験 Chemical Analysis Test (%)									
成分記号	C	Si	Mn	P	S	Cu	Cr		
3Y16	3.11	1.68	1.28	0.050	0.091	—	—		
顕微鏡写真 Micro-Photograph									
倍率 Magnify	× 100								
腐食 Etching	4%ピクリン酸 4%Picric acid								
Reviewed by : <i>K. Watanabe</i> MAYEKAWA, MFG, CO.,LTD									
備考 Remark									
<p>本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.</p>									
※試験日 (Date of Test) : 2023/11/17									
試験の結果は、上記の通りであります。 We certify that the result of the material test has been as described above.			(株)シグマ製作所花泉工場 HANAIZUMI FACTORY SIGUMA MFG.CO.,LTD						
発行日 : 2024年2月9日 Date of Issue 9-Feb-24	〒029-3207 岩手県一関市花泉町油島字南沢97-156 97-156 MINAMIZAWA YUSIMA HANAIZUMI ICHINOSEKI IWATE 029-3207			承認	作成				
	TEL:0191(82)5481 FAX:0191(82)5496								

材料試験証明書 Material Test Certificate

発行日: 2024年6月25日
 Date of Issue: 25-Jun-24
 株式会社 前川製作所 東広島工場 圧縮機製造部門 品質保証グループ
 〒739-2117 広島県東広島市高屋台2-3-40
 MAYEKAWA MFG. CO., LTD. HIGASHI HIROSHIMA PLANT
 QUALITY-ASSURANCE GROUP
 2-3-40, Takayada, Higashihiroshima-City Hiroshima-Pref. 739-2117, Japan

得意先名: 株式会社 前川製作所 守谷工場 圧縮機製造部門 殿
 TO Messrs: MAYEKAWA MFG. CO., LTD. MORIYA PLANT

溶解日(Charge Date) 2024/3/19
 管理番号(Control-Number)

Name of Articles 製品名	Product Type 機種	Spheroidal graphite iron castings JIS G 5502(2022)	Material	Test piece	Quality Responsibility Person	Checked by
Male Rotor Mロータ	160S	球状黒鉛鑄鉄品	材質	試験片	JIS Z 2241(2011) No.4 Φ 14mm	品質責任者 K.Tsuruta Y.Sakamori
Charge No. /TP-No. チャージ No./ テスト-ス No.	Date of Inspection 試験日	Tensile Test Inspection Yield stress 耐力	Elongation 伸び	Hardness test Hardness 硬度	Chemical Composition 検査規格	Ratio Of Graphite Spheroidizing 黒鉛球状比率
TP-1	2024/3/21	≥ 600[N/mm ²] 827	≥ 3[%] 4.7	170~270[HB] 244	C[%] ≥ 2.5 Si[%] - Mn[%] - P[%] - S[%] ≤ 0.02 Mg[%] ≤ 0.09	Flask Number 枠番号
C24 305 C24 306 C24 307 C24 308					3.434 2.336 0.167 0.015 0.015 0.046	93.0 2-1
Heat Treatment 熱処理	Condition / Temp. 種類 / 温度	Remarks 備考 Material mill test report shall be in compliance with EN10204 3.1.				

Reviewed by: *K. Guotamal*
 MA YEKA WA MFG. CO., LTD.

HIGASHIHIROSHIMA PLANT MAYEKAWA MFG. CO., LTD
 株式会社 前川製作所 東広島工場

2023.4.19/第3版

材料試験証明書 Material Test Certificate

得意先名: ㈱前川製作所 守谷工場 圧縮機製造部門
 TO Messrs: MAYEKAWA MFG. CO., LTD. MORIYA PLANT

殿

発行日: 2024年5月27日

Date of Issue: 27-May-24

㈱前川製作所 東広島工場 圧縮機製造部門 品質保証グループ
 〒739-2117 広島県東広島市高屋台2-3-40

MAYEKAWA MFG. CO., LTD. HIGASHI HIROSHIMA PLANT
 QUALITY-ASSURANCE GROUP

2-3-40, Takayadai, Higashihiroshima-City Hiroshima-Pref. 739-2117, Japan

発注日(Charge Date) 2024/2/19

管理番号(Control-Number)

Name of Articles 製品名		Product Type 機種	Spheroidal graphite iron castings JIS G 5502(2022)	Material	Test piece	JIS Z 2241(2011) No.4 Φ14mm	Quality Responsibility Person	Checked by					
Female Rotor Fロータ		160S	球状黒鉛鋳鉄品	材質	試験片		品質責任者	Tested by					
Serial Number 製造番号	Charge No. /TP-No. チャージ No./ テスト-ス No.	Date of Inspection 試験日	Tensile Test Inspection		Elongation 伸び	Chemical Composition			Ratio Of Graphite Spheroidizing 黒鉛球状化率 ≥80[%]	Flask Number 枠番号			
			Tensile Strength 引張強さ	Yield stress 耐力		Inspection S[%]	Standard Mn[%]	規格 P[%]			成分 S[%]	検査規格 Mg[%]	
C24 217	TP-1	2024/2/21	798	465	6.4	C[%] ≥2.5	3.437	2.279	0.187	0.007	0.036	91.3	1-2
C24 218						Hardness test Hardness 硬度							
C24 219						170~270[HB]							1-4
C24 220													
C24 221													
C24 222													
C24 223													
C24 224													
C24 225													
C24 226													
C24 227													
C24 228													1-6
Heat Treatment 熱処理		Condition / Temp. 種類 / 温度		Remarks 備考		Material mill test report shall be in compliance with EN10204 3.1.							

Reviewed by: *K. Guatanade*
 MAYEKAWA MFG. CO., LTD.

HIGASHIHIROSHIMA PLANT MAYEKAWA MFG. CO., LTD
 ㈱前川製作所 東広島工場

2023.4.19/第3版

Hydrostatic & Gas Leak Tests Report

* General information :

Item No. : -
 Report No. : 2024323A
 Type of compressor : Screw compressor
 Model : P160VSD-M
 Serial No. : 1656466
 Inspection items : Internal test
 Plant location : MAYEKAWA MFG. CO.,LTD.
 MORIYA PLANT
 2000, Tatsuzawa Moriya-city,
 Ibaraki-pref., 302-0118, Japan

SURVEYOR

* Test record :

Item	Design pressure	Test pressure	Used fluid	Hold time	Tested date	Judgment
Hydrostatic test	25.0 [barG]	37.5 [barG]	Oil	30 [min]	June 20, 2024	Accepted
	2.5 [MPaG]	3.8 [MPaG]				
Gas leak test	25.0 [barG]	25.0 [barG]	Air	30 [min]	June 20, 2024	Accepted
	2.5 [MPaG]	2.5 [MPaG]				

* Used pressure gauges :

Item	Dia × Max. Pres. [MPaG]	Manufacturer	Class(JIS)	Pressure gauge No.
Hydrostatic test	φ100 × 7.0	NAGANO KEIKI CO., LTD.	1.5	1 , 2
Gas leak test	φ100 × 5.0	NAGANO KEIKI CO., LTD.	1.5	1 , 2

* Pressure gauge information :

<u>Hydrostatic test</u>	<u>Pressure gauge No.</u>	<u>Registration No.</u>	<u>Terms of validity</u>
	1	AA-70114	End of July,2024
	2	AA-70115	End of July,2024
<u>Gas leak test</u>	<u>Pressure gauge No.</u>	<u>Registration No.</u>	<u>Terms of validity</u>
	1	AA-50011	End of July,2024
	2	AA-50012	End of July,2024

Approved by: 

Checked by: 

Performance inspection record table for screw compressor

* General information :

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656466
Test fluid	: Air
Orifice No.	: 8
Time	: 9:40
Inspection items	: Internal test
Load capacity	: 100%

SURVEYOR

1. Revolution speed		2993	[min-1]
2. Running torque	Measured value	1.070	[V]
	Converted value	107.0	[Nm]
3. Room temperature		22	[°C]
4. Atmospheric pressure		1007	[hPa]
5. Discharge pressure		0.5	[MPaG]
6. Suction pressure	L (7.00)	0.00	[kPa]
	R (7.00)		
7. Pressure before orifice	L (9.06)	4.04	[kPa]
	R (5.02)		
8. Pressure difference at orifice	L (9.74)	5.74	[kPa]
	R (4.00)		
9. Oil pressure		0.7	[MPaG]
10. Suction temperature		21	[°C]
11. Temperature before orifice		20	[°C]
12. Oil temperature		32	[°C]
13. Discharge temperature		46	[°C]
Noise		80.3	[dB]
Background noise		66.0	[dB]

* Mechanical running test :

Temp. of rotor casing	P 1	39	[°C]
Temp. of bearing head	P 2	40	[°C]
Temp. of shaft seal	P 3	31	[°C]

* Vibration

Displacement [0-P]	V	1	[μm]
	H	2	[μm]
	A	1	[μm]

Approved by: 

Checked by: 

Performance inspection report for screw compressor

*** General information :**

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656466
Test fluid	: Air
Orifice No.	: 8
Time	: 9:40
Inspection items	: Internal test
Load capacity	: 100%

SURVEYOR

*** Performance test :**

	Standard	Actual measurement value	Judgment	Criteria
Volume flow rate of suction gas [m ³ /h]	361.2	376.2 (104.2 %)	Accepted	95 % and more
Kilowatts [kW]	34.3	33.5 (97.7 %)	Accepted	105 % or less

*** Mechanical running test :**

		Allowable Maximum	Measured value	Judgment
Temp. of rotor casing	[°C] P 1	67	≥ 39	Accepted
Temp. of bearing head	[°C] P 2	67	≥ 40	Accepted
Temp. of shaft seal	[°C] P 3	52	≥ 31	Accepted

*** Vibration and Noise tests :**

Noise	[dB](A)	84.0	≥	80.3	Accepted
-------	---------	------	---	------	----------

Vibration ;

(Frequency range : 10 - 1000Hz)(0-P)

Displacement [0-P]	[μm]	V	20	≥	1	Accepted
		H			2	Accepted
		A			1	Accepted

Approved by :

Checked by :

Performance inspection record table for screw compressor

* General information :

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656466
Test fluid	: Air
Orifice No.	: 8
Time	: 12:30
Inspection items	: Internal test
Load capacity	: 90%

SURVEYOR

Reference

1. Revolution speed		2998	[min-1]
2. Running torque	Measured value	0.900	[V]
	Converted value	90.0	[Nm]
3. Room temperature		22	[°C]
4. Atmospheric pressure		1007	[hPa]
5. Discharge pressure		0.5	[MPaG]
6. Suction pressure	L (7.00)	0.00	[kPa]
	R (7.00)		
7. Pressure before orifice	L (8.26)	2.48	[kPa]
	R (5.78)		
8. Pressure difference at orifice	L (8.66)	3.50	[kPa]
	R (5.16)		
9. Oil pressure		0.7	[MPaG]
10. Suction temperature		23	[°C]
11. Temperature before orifice		22	[°C]
12. Oil temperature		30	[°C]
13. Discharge temperature		44	[°C]
Noise		78.7	[dB]
Background noise		64.7	[dB]

* Mechanical running test :

Temp. of rotor casing	P 1	38	[°C]
Temp. of bearing head	P 2	41	[°C]
Temp. of shaft seal	P 3	35	[°C]

* Vibration

Displacement [0-P]	V	1	[μm]
	H	2	[μm]
	A	1	[μm]

Approved by: 

Checked by: 

Performance inspection report for screw compressor

* General information :

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656466
Test fluid	: Air
Orifice No.	: 8
Time	: 12:30
Inspection items	: Internal test
Load capacity	: 90%

SURVEYOR

Reference

* Performance test :

	Standard	Actual measurement value
Volume flow rate of suction gas [m ³ /h]	361.8	294.5
Kilowatts [kW]	34.3	28.2

* Mechanical running test :

		Allowable Maximum	Measured value	Judgment
Temp. of rotor casing	[°C] P 1	65	≥ 38	Accepted
Temp. of bearing head	[°C] P 2	65	≥ 41	Accepted
Temp. of shaft seal	[°C] P 3	50	≥ 35	Accepted

* Vibration and Noise tests :

Noise	[dB](A)	84.0	≥	78.7	Accepted
-------	---------	------	---	------	----------

Vibration ;

(Frequency range : 10 - 1000Hz)(0-P)

Displacement [0-P]	[μm]	V	20	≥	1	Accepted
		H			2	Accepted
		A			1	Accepted

Approved by: 

Checked by: 

Compressor shop mechanical running test report

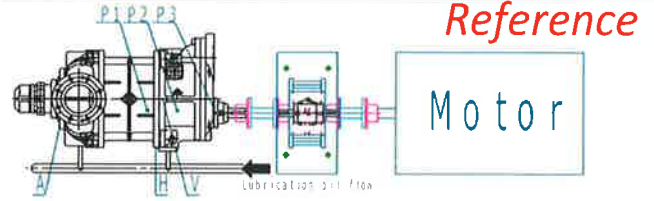
*** General information :**

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656466
Inspection items	: Internal test

SURVEYOR

*** Running test condition :**

Suction pressure	: 0.0 [kPa]
Discharge pressure	: 0.5 [MPaG]
Test fluid	: Air
Revolution speed	: max. 3000 [min-1]
Load capacity	: 90 [%]
Start-up time	10:00



Seal leakage 0.0 [cc] / 2.5 hrs

Item	Unit	Time							
		10:15	10:30	11:00	11:30	12:00	12:30		
Suction Press. Ps	[kPa]	0	0	0	0	0	0		
Suction Temp. Ts	[°C]	22	22	23	23	23	23		
Before orifice ΔH	L [kPa]	8.30	8.28	8.26	8.26	8.26	8.26		
	R [kPa]	5.74	5.76	5.78	5.78	5.78	5.78		
Temp. Before Orifice	[°C]	21	21	22	22	22	22		
Differential Pressue ΔH	L [kPa]	8.70	8.68	8.66	8.66	8.66	8.66		
	R [kPa]	5.10	5.14	5.16	5.16	5.16	5.16		
Discharge Press. Pd	[MPaG]	0.5	0.5	0.5	0.5	0.5	0.5		
Discharge Temp. Td	[°C]	40	43	44	44	44	44		
Oil Press. Poil	[MPaG]	0.7	0.7	0.7	0.7	0.7	0.7		
Oil Temp. Toil	[°C]	28	30	30	30	30	30		
Room Temp. Ta	[°C]	22	22	22	22	22	22		
Atmospheric Pressure	[hPa]	1007	1007	1007	1007	1007	1007		
Point 1	[°C]	34	37	38	38	38	38		
Point 2	[°C]	37	40	41	41	41	41		
Point 3	[°C]	29	33	34	35	35	35		
Displacement:Vertical	[μm]	1	1	1	1	1	1		
Displacement:Horizontal	[μm]	2	2	2	2	2	2		
Displacement:Axial	[μm]	1	1	1	1	1	1		
Noise	[dB](A)	79.0	78.8	79.2	78.5	78.6	78.7		
Rotation Speed	[min-1]	2999	3000	2997	2998	2996	2998		
Running Torque	[V]	0.920	0.910	0.900	0.900	0.900	0.900		
Oil Flow(Journal)	[l/min]	18.0	19.0	20.0	20.0	20.0	20.0		
Oil Flow(Injection)	[l/min]	20.0	21.0	22.0	22.0	22.0	22.0		
Oil Flow(F Side)	[l/min]	6.4	6.7	6.9	7.0	7.0	7.0		
Judgment		Accepted							

Approved by: *A. Kojima*

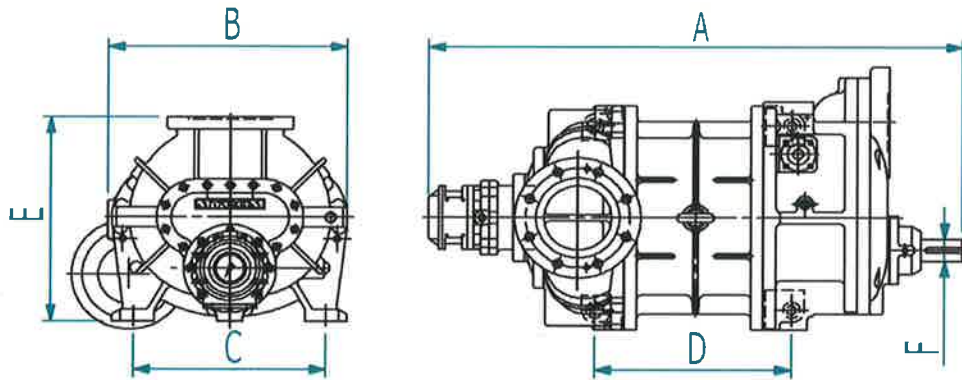
Checked by: *K. Uatomabe*

Outer dimensions report

*** General information :**

Item No.	: -
Report No.	: 2024323A
Type of compressor	: Screw compressor
Model	: P160VSD-M
Serial No.	: 1656466
Date of measurement	: June 20, 2024
Inspection items	: Internal test
Plant location	: MAYEKAWA MFG. CO.,LTD. MORIYA PLANT 2000, Tatsuzawa Moriya-city, Ibaraki-pref., 302-0118, Japan

SURVEYOR



Measurement points	Drawing dimensions [mm]	Dimensional tolerance [mm]	Dimensional range [mm]	Measured value [mm]	Judgment
A	1029.0	8.0 -8.0	1037.0 1021.0	1029.0	Accepted
B	470.0	5.0 -5.0	475.0 465.0	470.0	Accepted
C	370.0	1.0 -1.0	371.0 369.0	370.0	Accepted
D	280.0	1.0 -1.0	281.0 279.0	280.0	Accepted
E	410.0	5.0 -5.0	415.0 405.0	410.0	Accepted
F	45.0	0.011 -0.005	45.011 44.995	45.010	Accepted

Appearance inspection : Accepted

Criteria : There must be no defects in appearance and the compressor appearance must conform to the customer's authorized drawing.

Approved by : *A. Fujimura*

Checked by : *K. Uatomake*

Rotor balancing test report

*** General information :**

Item No. : -
 Report No. : 2024323A
 Model : P160VSD-M
 Serial No. : 1656466
 Inspection items : Internal test

SURVEYOR

Rotor size	Material	Test speed [min-1]	Correction radius [cm]
160S	FCD600	1265	7.3

* Balancing class : G 2.5 [JIS B 0905]

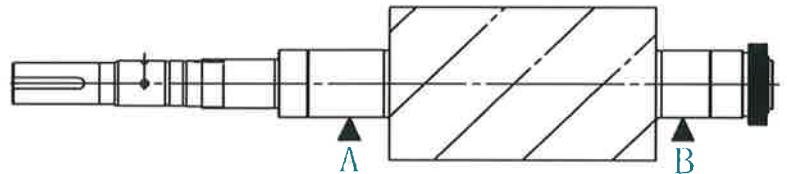
- Male rotor allowable residual unbalance
 $= (2.5 \times 9550 / 4500) \times (M / 2) \times (1 / 10)$
- Female rotor allowable residual unbalance
 $= (2.5 \times 9550 / 3000) \times (M / 2) \times (1 / 10)$
- Male rotor weight (M) : 28.6 [kg]
- Female rotor weight (M) : 22.2 [kg]

* Testing device : NAGAHAMA SEISAKUSHO LTD.,

Model : H20NB
 Serial No. : 56-0366
 Term of validity : End of July,2024

MALE ROTOR

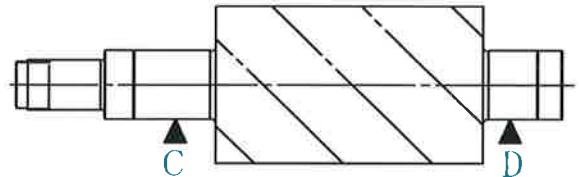
Rotor No. : C24305
 Date of test : June 15, 2024



	Unbalanced value at the left side (A)			Unbalanced value at the right side (B)		
	[g]	Angle [°]	Value [g cm]	[g]	Angle [°]	Value [g cm]
Allowable residual unbalance	---	---	7.6	---	---	7.6
After adjustment	0.456	226	3.3	0.717	23	5.2

FEMALE ROTOR

Rotor No. : C24228
 Date of test : June 15, 2024



	Unbalanced value at the left side (C)			Unbalanced value at the right side (D)		
	[g]	Angle [°]	Value [g cm]	[g]	Angle [°]	Value [g cm]
Allowable residual unbalance	---	---	8.8	---	---	8.8
After adjustment	0.593	324	4.3	0.377	105	2.8

Criteria judgment : Accepted

Approved by : *A. Fujimori*

Checked by : *K. Uatanabe*

INSPECTION & TEST RECORD

Item No.	: -
Order No.	: ME24-11MMEPO240063
Report No.	: 2024323B
Type of Compressor	: Screw Compressor
Name of Manufacturer	: MAYEKAWA MFG. CO., LTD.
Model	: P160VSD-M
Serial No.	: 1656467

(Remarks)

This inspection and test record is complete together with the following test records attached herewith :

- 1 .Material Identification List
- 2 .Hydrostatic and Gas Leak Tests Report
- 3 .Screw Compressor Test Results
- 4 .Outer Dimensions Report
- 5 .Rotor Balancing Test Report

Date of Issue : July 3, 2024

Approved by : 

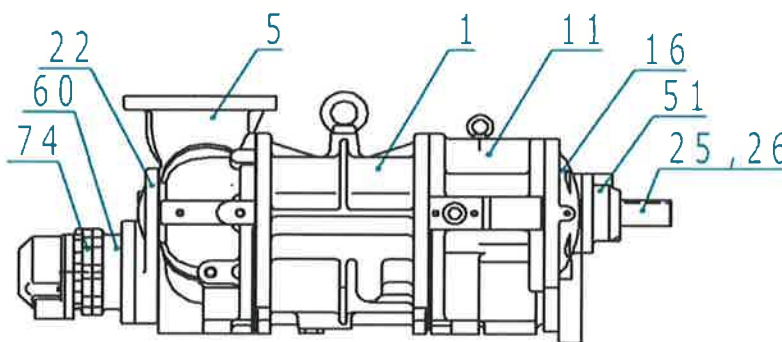
Checked by : 

Material identification list

* General information :

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Model	: P160VSD-M
Serial No.	: 1656467
Date	: July 3, 2024

SURVEYOR



Parts No.	Name of Part	Material	Identification No.	Page	Remarks
1	Main Rotor Casing	FC300	S23Z13	P 1	
5	Suction Cover	FC300	K3Z15	P 2	
11	Bearing Head	FC300	K3Z13	P 3	
16	Bearing Cover	FC300	K4213	P 4	
22	Balance Piston Cover	FC300	C23X33	P 5	
51	Seal Cover	FC300	1Y30	P 6	
60	Unloader Cylinder	FC300	3419	P 7	
74	Unloader Cover	FC300	3Y27	P 8	
25	Male Rotor	FCD600	C24306	P 9	
26	Female Rotor	FCD600	C24226	P 10	

Approved by : A. Ogura

Checked by : K. Watanabe

材料試験証明書

MATERIAL TEST CERTIFICATE

(株)前川製作所 MAYEKAWA MFG. CO. LTD 様

(EN10204 3.1)

発行日 2024年7月1日

No855

Date of Issue: 1-Jul-2024

オーダー Order	品名 Product	ローターケーシング Rotor Casing	材質 Material	FC-300	個数 Quantity				
注文番号 Order No.		160VS	鑄込年月日 Cast Date	2023年 12月 13日	1				
機械試験	試験項目 Test Items	引張試験 Tensile Test	カタサ試験 Hardness	抗折試験 Transverse Test	試験結果 Decision				
	規格 Spec	引張強度 Tensile Strength	ブリネル Brinell	荷重 Load					
	試験片寸法 Size of Specimen	引張荷重 Bresking Load	H _b	タワミ Deflect					
	直径 Dia	断面積 Area	MAX.	mm					
試験片番号 Specimen No.	mm	N/mm ²	H _b	N					
溶解番号 Charge No.	20	MIN.	MAX.						
	20	300	262	11400	良				
	S23Z13	312	218						
化学分析	項目・規格 Items. Spec.	化学成分 Chemical Composition (%)			材料規格 Standard of Material				
	溶解番号 Charge No.	C	Si	Mn	P	S	Cu	Sn	JIS G 5501-1995
	S23Z13	3.25	2.1	0.40	0.03	0.02	0.5	0.05	備考 Remarks
									Reviewed by: <i>R. Uwatama</i>
									MAYEKAWA, MFG. CO., LTD

本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.

承認 Approval	作成者 Implementer
盛多 MORITA	高山 TAKAYAMA

三共鑄鉄株式会社

〒726-0013 広島県府中市高木町213-1

SANKYO CAST STEEL CO.,LTD

213-1 TAKAGI-CHO FUCHU-SHI HIROSIMA

726-0013 JAPAN

材料試験証明書 Material Test Certificate

EN10204 3.1

1071

発行日 令和 6 年 4 月 19 日
 DATE of Issue 19 - APR - 2024
 株式会社 協和製作所
 〒933-0351 富山県高岡市四日市1-3-1-2
 KYOWA SEISAKUSHO Co., Ltd.
 133-12 YOKKAICHI TAKAOKA TOYAMA 933-0351 JAPAN

御得意様名 株式会社 前川製作所様
 TO Messrs MAYEKAWA MFG CO., LTD.

材質 Material	JIS G 5501 FC300		試験片の形状 Test Piece Size		JIS Z 2241 NO. 8C		Brinell hardness test		JIS Z 2243				
							Tensile test		JIS Z 2241				
規格 Standard		引張試験 Tensile Test		硬さ試験		金属材料衝撃試験 JIS Z 2242 (FC材、FCD材は無)							
品名 Product	機種 Model	チャージNo. ChargeNo.	試験月日 Date of Inspection	直径 Diameter mm	引張荷重 Maximum Load N	引張強さ Tensile Strength N/mm ²	硬度 Hardness HBW	TC	化学成分 Chemical Composition				
									Si	Mn	P	S	Sn
サクションカバー SUCTION COVER	160V	K3Z15	2023/12/22	20.0	98,213	312.8	217	3.15	1.60	0.809	0.024	0.058	0.016
ベアリングヘッド BEARING HEAD	160VD	K3Y29	2023/12/6	20.0	103,934	331.0	223	3.07	1.45	0.845	0.022	0.053	0.043
ベアリングカバー BEARING COVER	160VD	K4209	2024/2/16	20.0	97,937	311.9	207	3.28	1.85	0.648	0.022	0.063	0.014
備考 Remarks										Reviewed by: <i>X. Sustainale</i>		MAYEKAWA MFG, CO., LTD	

品質責任者

本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.

Checked by S. Havasi (林) Tested by M. Omote (表)

材料試験証明書 Material Test Certificate

ENI0204 3.1

1079

発行日 令和 6 年 6 月 10 日
 DATE of Issue 10 JUN 2024
 株式会社 協和製作所
 〒933-0351 富山県高岡市四日市1-3-12
 KYOWA SEI SAKUSHO Co., Ltd
 133-12 YOKKAICHI TAKAOKA TOYAMA 933-0351 JAPAN

御得意様名 株式会社 前川製作所様
 TO Messrs MAYEKAWA MFG CO., LTD.

材質 Material	JIS G 5501 FC300		試験片の形状 Test Piece Size		JIS Z 2241 NO. 8C		Brinell hardness test		JIS Z 2243				
	規格 Standard		引張試験 Tensile Test		硬さ試験 Hardness Test		Tensile Test		Tensile test				
品名 Product	機種 Model	チャージNo. ChargeNo.	試験月日 Date of Inspection	直径 Diameter mm	引張荷重 Maximum Load N	引張強さ Tensile Strength N/mm ²	硬度 Hardness HBW	TC	Si	Mn	P	S	Sn
ローターケーシング(2) ROTOR CASING(2)	1612C	K1414	2021/4/21	20.0	96,115	306.1	217	3.18	1.65	0.616	0.024	0.071	0.029
サクションカバー(1) SUCTION COVER(1)	1612C	K4205	2024/2/12	20.0	97,591	310.8	212	3.24	1.79	0.630	0.021	0.065	0.034
ベアリングヘッド(1) BEARING HEAD(1)	1612C	K4131	2024/2/7	20.0	96,995	308.9	212	3.21	1.71	0.641	0.021	0.075	0.035
ベアリングヘッド(2) BEARING HEAD(2)	1612C	K4226	2024/3/6	20.0	98,533	313.8	212	3.24	1.72	0.638	0.022	0.063	0.034
ベアリングヘッド BEARING HEAD	160VD	K3713	2023/12/20	20.0	101,419	323.0	223	3.12	1.46	0.860	0.021	0.069	0.037

備考 Remarks

品質責任者

本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.

Checked by S. Havashi 林 Test by M. Omoie 表
 Reviewed by: K. Suetama
 MAYEKAWA MFG. CO., LTD

材料試験証明書 Material Test Certificate

得意先名: ㈱前川製作所 守谷工場 圧縮機製造部門
 TO Messrs: MAYEKAWA MFG. CO., LTD. MORIYA PLANT

発行日: 2024年6月27日
 Date of Issue: 27-Jun-24
 ㈱前川製作所 東広島工場 圧縮機製造部門 品質保証グループ
 〒739-2117 広島県東広島市高屋台2-3-40
 MAYEKAWA MFG. CO., LTD. HIGASHI HIROSHIMA PLANT
 QUALITY-ASSURANCE GROUP
 2-3-40, Takayedai, Higashihiroshima-City Hiroshima-Pref. 739-2117, Japan

溶解日(Charge Date) 2023/10/17
 管理番号(Control-Number)

Name of Articles 製品名	Product Type 機種	Grey iron castings JIS G 5501(1995)	Material	Test piece	JIS Z 2241(2011) No.8C Φ20mm	Quality Responsibility Person		Checked by
						品質責任者	検査規格	
BALANCE PISTON COVER バランスピストンカバー	160S/L	ねずみ錆鉄品	材質	試験片		品質責任者	検査規格	Checked by Y. Sakamori
Charge No. /TP-No. チャージ No./ テストース No.	Date of Inspection 試験日	Tensile Test Inspection Maximum Load 引張荷重 N	引張試験 Tensile Strength 引張強さ	Hardness Test Hardness 硬度	Chemical Composition Inspection Standard	化学成分	検査規格	Form Number 枠番号
C23 X31 C23 X32 C23 X33 C23 X34 C23 X35 C23 X36	2023/10/20	105104	≥300[N/mm ²] 333	≤262[HB] 229	C[%] Si[%] Mn[%] P[%] S[%] Sn[%]	2.901 - - - - -	0.672 0.017 0.008 0.023	4-5
Remarks 備考	Material mill test report shall be in compliance with EN10204 3.1.							


Reviewed by: *K. Uetani*
 MAYEKAWA MFG. CO., LTD.

HIGASHIHIROSHIMA PLANT MAYEKAWA MFG. CO., LTD
 ㈱前川製作所 東広島工場

材料試験証明書

Material Test Certificate

EN10204 3.1

番号 Number	顧客名 to Messrs	品番 Part Number	品名 Part Name	型式 Type									
No.5851	(株)前川製作所 殿	161a0029	SEAL COVER	160S/L									
		試験片の形状 Testpiece Size	材質 Material										
		No.8C JIS Z2241	FC300 JIS G5501										
試験項目 Kind of Test	引張試験 Tensile Test JIS Z 2241			硬さ試験 Hardness JIS Z 2243 HB									
	引張強さ Tensile Strength N/mm ²	耐力 Yield Strength N/mm ²	伸び Elongation %										
規格 記号 Mark	≥300	—	—	≤262									
1Y30	312	—	—	229									
化学分析試験 Chemical Analysis Test (%)													
成分記号	C	Si	Mn	P	S	Cu	Cr						
1Y30	3.15	1.70	0.98	0.044	0.084	—	—						
<p>顕微鏡写真 Micro-Photograph</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">倍率 Magnify</td> <td style="text-align: center;">×100</td> </tr> <tr> <td>腐食 Etching</td> <td>4%ピクリン酸 4%Picric acid</td> </tr> </table>										倍率 Magnify	×100	腐食 Etching	4%ピクリン酸 4%Picric acid
倍率 Magnify	×100												
腐食 Etching	4%ピクリン酸 4%Picric acid												
Reviewed by : <u>K. Gustonake</u> MAYEKAWA, MFG, CO.,LTD													
<p>備考 Remark</p> <p>本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.</p>													
※試験日 (Date of Test) : 2021/12/1													
試験の結果は、上記の通りであります。 We certify that the result of the material test has been as described above.			(株)シグマ製作所花泉工場 HANAIZUMI FACTORY SIGUMA MFG.CO.,LTD										
発行日 : 2022年4月19日 Date of Issue : 19-Apr-22			〒029-3207 岩手県一関市花泉町油島字南沢97-156 97-156 MINAMIZAWA YUSIMA HANAIZUMI ICHINOSEKI IWATE 029-3207 TEL:0191(82)5481 FAX:0191(82)5496										
			承認	作成									
													

2024年1月23日

Date of issue Jan. 23. 2024

材料試験証明書 Material Test Certificate

EN 10204 3.1

得意先名 (株) 前川製作所 様

To Messers MAYEKAWA MFG CO., LTD.



新潟県長岡市宮下町神楽
株式会社 キヤス
436-1 Miyashitamati Nagaoka-shi Niigata-ken Japan
CAST ANDOH CO.

材質 Material	1995年改正 JIS. G5501 FC300	試験の形状 Test Piece Size	2011年改正 JIS. Z2241 NO. 8C	部品名 Name of parts		試験日 Date of test										
	機名 Machine	160V	図番 DFT. No.	アンローダーシリンダー Unloader Cylinder		2023年5月17日										
規格 Standard	直径 Diameter	引張強度 Maximum Load	引張強さ Tensile Strength	耐力 Yield Strength	伸び Elongation	直径 Diameter	最大荷重 Maximum Load	たわみ Deflection	硬度数 Brinell	硬度試験 Hardness	化学成分 Chemical Composition					
	mm	N	N/mm ²	N/mm ²	%	mm	N	mm	HB	1998年改定 JIS. Z2243	T C	S i	M n	P	S	*
試験記号 T. P. NO.	20±0.7	—	≥300	—	—	—	—	—	≤262	—	—	—	—	—	—	*
3419	20.0	104900	334	—	—	—	—	—	224	—	3.28	1.69	0.85	0.052	0.054	*
																*
																*
																*

備考・Remarks 本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected and inspected satisfactory with requirement of the above specification

品質管理者

Checked by



Tested by



Reviewed by: *K. Watanabe*

MAYEKAWA. MFG. CO.,LTD

SI単位換算値
Conversion of Unit
1kgf=9. 80665N
1kgf/mm²=9. 80665N/mm²
1kgf m=9. 80665J

材料試験証明書

Material Test Certificate

EN10204 3.1

番号 Number	顧客名 to Messrs	品番 Part Number	品名 Part Name	型式 Type					
No.6694	(株)前川製作所 殿	161a0032	UNLOADER COVER	160S/L					
		試験片の形状 Testpiece Size	材質 Material						
		No.8C JIS Z2241	FC300 JIS G5501						
試験項目 Kind of Test	引張試験 Tensile Test JIS Z 2241			硬さ試験 Hardness JIS Z 2243 HB					
	引張強さ Tensile Strength N/mm ²	耐力 Yield Strength N/mm ²	伸び Elongation %						
規格 記号 Mark	≥ 300	—	—	≤ 262					
3Y27	301	—	—	241					
化学分析試験 Chemical Analysis Test (%)									
成分記号	C	Si	Mn	P	S	Cu	Cr		
3Y27	3.06	1.63	1.19	0.048	0.091	—	—		
顕微鏡写真 Micro-Photograph									
倍率 Magnify	× 100								
腐食 Etching	4%ピクリン酸 4%Picric acid								
Reviewed by : <i>K. Gwatanabe</i>									
MAYEKAWA. MFG. CO.,LTD									
備考 Remark									
本製品は、ご指定の規格または仕様によって製造され、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 material described has been manufactured and inspected satisfactory with the requirement of the above specification.									
※試験日 (Date of Test) : 2023/11/28									
試験の結果は、上記の通りであります。 We certify that the result of the material test has been as described above.					(株)シグマ製作所花泉工場 HANAIZUMI FACTORY SIGUMA MFG.CO.,LTD				
発行日 : 2024年2月2日 Date of Issue : 2-Feb-24					〒029-3207 岩手県一関市花泉町油島字南沢97-156 97-156 MINAMIZAWA YUSIMA HANAIZUMI ICHINOSEKI IWATE 029-3207				
TEL: 0191(82)5481 FAX: 0191(82)5496					承認		作成		

材料試験証明書 Material Test Certificate

得意先名: 株式会社 守谷工場 圧縮機製造部門
TO Messrs: MAYEKAWA MFG. CO., LTD. MORIYA PLANT

殿

株式会社 東広島工場 圧縮機製造部門 品質保証グループ
〒739-2117 広島県東広島市高屋台2-3-40

MAYEKAWA MFG. CO., LTD. HIGASHI HIROSHIMA PLANT
QUALITY-ASSURANCE GROUP

発行日: 2024年6月25日

Date of Issue: 25-Jun-24

溶解日(Charge Date) 2024/3/19
管理番号(Control-Number)

Name of Articles 製品名	Product Type 機種	Spheroidal graphite iron castings JIS G 5502(2022)	Material	Test piece	JIS Z 2241(2011) No.4 Φ14mm	Quality Responsibility Person	Checked by	Chemical Composition		Ratio Of Graphite Spheroidizing 黒鉛球状比率 ≥80[%]			
								引張試験	化学成分				
Male Rotor Mロータ	160S	球状黒鉛鑄鉄品	材質	試験片		品質責任者	Tested by	C[%]	P[%]	S[%]	Mg[%]	Flask Number 枠番号	
Charge No. /TP-No. チャージ No./ テストピース No.	Date of Inspection 試験日	Tensile Test 引張強さ ≥600[N/mm ²]	Yield stress 耐力 ≥370[N/mm ²]	Hardness test Hardness 硬度 170~270[HB]	Inspection Si[%]	Mn[%]		2024/3/21	827	485	4.7	244	2-1
C24 305 C24 306 C24 307 C24 308	TP-1	≥600[N/mm ²]	827	244	3.434	2.336	0.167	0.019	0.015	0.046	93.0		
Heat Treatment 熱処理	Condition / Temp. 種類 / 温度	Remarks 備査 Material mill test report shall be in compliance with EN10204 3.1.											

Reviewed by: *X. Suatanabe*
MA YEKAWA MFG. CO., LTD.

HIGASHIHIROSHIMA PLANT MAYEKAWA MFG. CO., LTD
株式会社 東広島工場

2023.4.19/第3版

材料試験証明書 Material Test Certificate

得意先名: ㈱前川製作所 守谷工場 圧縮機製造部門
TO Messrs: MAYEKAWA MFG. CO., LTD. MORIYA PLANT

殿

発行日: 2024年5月27日
Date of Issue: 27-May-24
㈱前川製作所 東広島工場 圧縮機製造部門 品質保証グループ
〒739-2117 広島県東広島市高屋台2-3-40
MAYEKAWA MFG. CO., LTD. HIGASHI HIROSHIMA PLANT
QUALITY-ASSURANCE GROUP
2-3-40, Takayadai, Higashihiroshima-City Hiroshima-Pref. 739-2117, Japan

溶解日(Charge Date) 2024/2/19
管理番号(Control-Number)

Name of Articles 製品名	Product Type 機種	Spheroidal graphite iron castings JIS G 5502(2022)	Material	Test piece	JIS Z 2241(2011) No.4 ϕ 14mm	Quality Responsibility Person	Checked by	Flask Number 枠番号	Chemical Composition			
									検査規格			
Serial Number 製造番号	Charge No. /TP-No. チヤージ No./ テスト-No.	Tensile Test 引張強さ ≥ 600 [N/mm ²]	Yield stress 耐力 ≥ 370 [N/mm ²]	Elongation 伸び ≥ 3 [%]	Inspection C[%] ≥ 2.5	Si[%] -	P[%] -	Mn[%] -	Ratio Of Graphite Spheroidizing 球状化比率 ≥ 80 [%]	Flask Number 枠番号		
C24 217	TP-1	798	465	6.4	3.437	2.279	0.018	0.007	0.036	91.3	1-2	
C24 218												
C24 219												
C24 220												
C24 221											1-4	
C24 222												
C24 223												
C24 224												
C24 225												
C24 226												
C24 227												
C24 228											1-6	
Heat Treatment 熱処理	Condition / Temp. 種類 / 温度	Remarks 備考 Material mill test report shall be in compliance with EN10204 3.1.										

Reviewed by: *K. Iwamoto*
MAYEKAWA MFG. CO., LTD.

HIGASHIHIROSHIMA PLANT MAYEKAWA MFG. CO., LTD
㈱前川製作所 東広島工場

2023.4.19/第3版

Hydrostatic & Gas Leak Tests Report

* General information :

Item No. : -
 Report No. : 2024323B
 Type of compressor : Screw compressor
 Model : P160VSD-M
 Serial No. : 1656467
 Inspection items : Internal test
 Plant location : MAYEKAWA MFG. CO.,LTD.
 MORIYA PLANT
 2000, Tatsuzawa Moriya-city,
 Ibaraki-pref., 302-0118, Japan

SURVEYOR

* Test record :

Item	Design pressure	Test pressure	Used fluid	Hold time	Tested date	Judgment
Hydrostatic test	25.0 [barG]	37.5 [barG]	Oil	30 [min]	June 20, 2024	Accepted
	2.5 [MPaG]	3.8 [MPaG]				
Gas leak test	25.0 [barG]	25.0 [barG]	Air	30 [min]	June 20, 2024	Accepted
	2.5 [MPaG]	2.5 [MPaG]				

* Used pressure gauges :

Item	Dia × Max. Pres. [MPaG]	Manufacturer	Class(JIS)	Pressure gauge No.
Hydrostatic test	φ100 × 7.0	NAGANO KEIKI CO., LTD.	1.5	1 , 2
Gas leak test	φ100 × 5.0	NAGANO KEIKI CO., LTD.	1.5	1 , 2

* Pressure gauge information :

<u>Hydrostatic test</u>	<u>Pressure gauge No.</u>	<u>Registration No.</u>	<u>Terms of validity</u>
	1	AA-70114	End of July,2024
	2	AA-70115	End of July,2024
<u>Gas leak test</u>	<u>Pressure gauge No.</u>	<u>Registration No.</u>	<u>Terms of validity</u>
	1	AA-50011	End of July,2024
	2	AA-50012	End of July,2024

Approved by : 

Checked by : 

Performance inspection record table for screw compressor

* General information ;

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656467
Test fluid	: Air
Orifice No.	: 8
Time	: 14:00
Inspection items	: Internal test
Load capacity	: 100%

SURVEYOR

1. Revolution speed		2992	[min-1]
2. Running torque	Measured value	1.070	[V]
	Converted value	107.0	[Nm]
3. Room temperature		23	[°C]
4. Atmospheric pressure		1007	[hPa]
5. Discharge pressure		0.5	[MPaG]
6. Suction pressure	L (7.00)	0.00	[kPa]
	R (7.00)		
7. Pressure before orifice	L (9.06)	4.06	[kPa]
	R (5.00)		
8. Pressure difference at orifice	L (9.72)	5.70	[kPa]
	R (4.02)		
9. Oil pressure		0.7	[MPaG]
10. Suction temperature		22	[°C]
11. Temperature before orifice		21	[°C]
12. Oil temperature		34	[°C]
13. Discharge temperature		46	[°C]
Noise		80.5	[dB]
Background noise		66.2	[dB]

* Mechanical running test ;

Temp. of rotor casing	P 1	40	[°C]
Temp. of bearing head	P 2	42	[°C]
Temp. of shaft seal	P 3	35	[°C]

* Vibration

Displacement [0-P]	V	1	[μm]
	H	2	[μm]
	A	1	[μm]

Approved by : *A. Wajima*

Checked by : *K. Watanabe*

Performance inspection report for screw compressor

* General information :

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656467
Test fluid	: Air
Orifice No.	: 8
Time	: 14:00
Inspection items	: Internal test
Load capacity	: 100%

SURVEYOR

* Performance test :

	Standard	Actual measurement value	Judgment	Criteria
Volume flow rate of suction gas [m ³ /h]	361.1	375.6 (104.0 %)	Accepted	95 % and more
Kilowatts [kW]	34.3	33.5 (97.7 %)	Accepted	105 % or less

* Mechanical running test :

		Allowable Maximum	Measured value	Judgment
Temp. of rotor casing	[°C] P 1	69	≧ 40	Accepted
Temp. of bearing head	[°C] P 2	69	≧ 42	Accepted
Temp. of shaft seal	[°C] P 3	54	≧ 35	Accepted

* Vibration and Noise tests :

Noise	[dB](A)	84.0	≧ 80.5	Accepted
-------	---------	------	--------	----------

Vibration ;

(Frequency range : 10 - 1000Hz)(0-P)

Displacement [0-P]	[μm]	V	20	≧	1	Accepted
		H			2	Accepted
		A			1	Accepted

Approved by: 

Checked by: 

Performance inspection record table for screw compressor

* General information :

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656467
Test fluid	: Air
Orifice No.	: 8
Time	: 17:00
Inspection items	: Internal test
Load capacity	: 90%

SURVEYOR

Reference

1. Revolution speed		2999	[min-1]
2. Running torque	Measured value	0.898	[V]
	Converted value	89.8	[Nm]
3. Room temperature		23	[°C]
4. Atmospheric pressure		1007	[hPa]
5. Discharge pressure		0.5	[MPaG]
6. Suction pressure	L (7.00)	0.00	[kPa]
	R (7.00)		
7. Pressure before orifice	L (8.24)	2.44	[kPa]
	R (5.80)		
8. Pressure difference at orifice	L (8.66)	3.50	[kPa]
	R (5.16)		
9. Oil pressure		0.7	[MPaG]
10. Suction temperature		23	[°C]
11. Temperature before orifice		22	[°C]
12. Oil temperature		31	[°C]
13. Discharge temperature		45	[°C]
Noise		79.0	[dB]
Background noise		66.0	[dB]

* Mechanical running test :

Temp. of rotor casing	P 1	38	[°C]
Temp. of bearing head	P 2	40	[°C]
Temp. of shaft seal	P 3	34	[°C]

* Vibration

Displacement [0-P]	V	1	[μm]
	H	2	[μm]
	A	1	[μm]

Approved by : *A. Ogumi*

Checked by : *K. Uetani*

Performance inspection report for screw compressor

*** General information :**

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656467
Test fluid	: Air
Orifice No.	: 8
Time	: 17:00
Inspection items	: Internal test
Load capacity	: 90%

SURVEYOR

Reference

*** Performance test :**

	Standard	Actual measurement value
Volume flow rate of suction gas [m ³ /h]	361.9	294.5
Kilowatts [kW]	34.3	28.2

*** Mechanical running test :**

		Allowable Maximum	Measured value	Judgment
Temp. of rotor casing	[°C] P 1	66	≥ 38	Accepted
Temp. of bearing head	[°C] P 2	66	≥ 40	Accepted
Temp. of shaft seal	[°C] P 3	51	≥ 34	Accepted

*** Vibration and Noise tests :**

Noise	[dB](A)	84.0	≥	79.0	Accepted
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Vibration ;

(Frequency range : 10 - 1000Hz)(0-P)

Displacement [0-P]	[μm]	V	20	≥	1	Accepted
		H			2	Accepted
		A			1	Accepted

Approved by: *A. Kojima*

Checked by: *K. Tsutsumi*

Compressor shop mechanical running test report

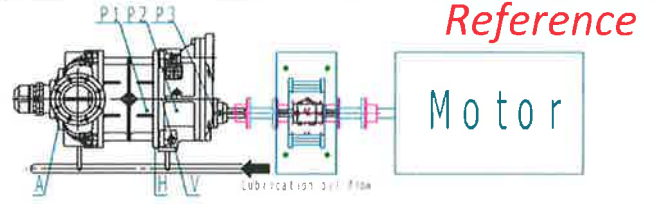
*** General information :**

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Date of test	: June 19, 2024
Model	: P160VSD-M
Serial No.	: 1656467
Inspection items	: Internal test

SURVEYOR

*** Running test condition :**

Suction pressure	: 0.0 [kPa]
Discharge pressure	: 0.5 [MPaG]
Test fluid	: Air
Revolution speed	: max. 3000 [min-1]
Load capacity	: 90 [%]
Start-up time	14:30



Seal leakage 0.0 [cc] / 2.5 hrs

Item	Unit	Time								
		14:45	15:00	15:30	16:00	16:30	17:00			
Suction Press. Ps	[kPa]	0	0	0	0	0	0			
Suction Temp. Ts	[°C]	22	22	23	23	23	23			
Before orifice ΔH	L [kPa]	8.26	8.26	8.24	8.24	8.24	8.24			
	R [kPa]	5.76	5.78	5.80	5.80	5.80	5.80			
Temp. Before Orifice	[°C]	21	21	22	22	22	22			
Differential Pressue ΔH	L [kPa]	8.70	8.68	8.66	8.66	8.66	8.66			
	R [kPa]	5.10	5.12	5.14	5.16	5.16	5.16			
Discharge Press. Pd	[MPaG]	0.5	0.5	0.5	0.5	0.5	0.5			
Discharge Temp. Td	[°C]	42	44	45	45	45	45			
Oil Press. Poil	[MPaG]	0.7	0.7	0.7	0.7	0.7	0.7			
Oil Temp. Toil	[°C]	29	30	31	31	31	31			
Room Temp. Ta	[°C]	22	22	22	23	23	23			
Atmospheric Pressure	[hPa]	1007	1007	1007	1007	1007	1007			
Point 1	[°C]	35	37	38	38	38	38			
Point 2	[°C]	37	39	40	40	40	40			
Point 3	[°C]	31	33	34	34	34	34			
Displacement:Vertical	[μm]	1	1	1	1	1	1			
Displacement:Horizontal	[μm]	2	2	2	2	2	2			
Displacement:Axial	[μm]	1	1	1	1	1	1			
Noise	[dB](A)	79.4	80.0	79.0	79.2	78.9	79.0			
Rotation Speed	[min-1]	2999	2998	2996	2997	2999	2999			
Running Torque	[V]	0.914	0.910	0.900	0.898	0.898	0.898			
Oil Flow(Journal)	[l/min]	17.0	19.0	19.0	20.0	20.0	20.0			
Oil Flow(Injection)	[l/min]	20.0	21.0	22.0	24.0	23.0	24.0			
Oil Flow(F Side)	[l/min]	6.5	6.7	6.9	7.0	7.1	7.0			
Judgment		Accepted								

Approved by : *A. Fujimori*

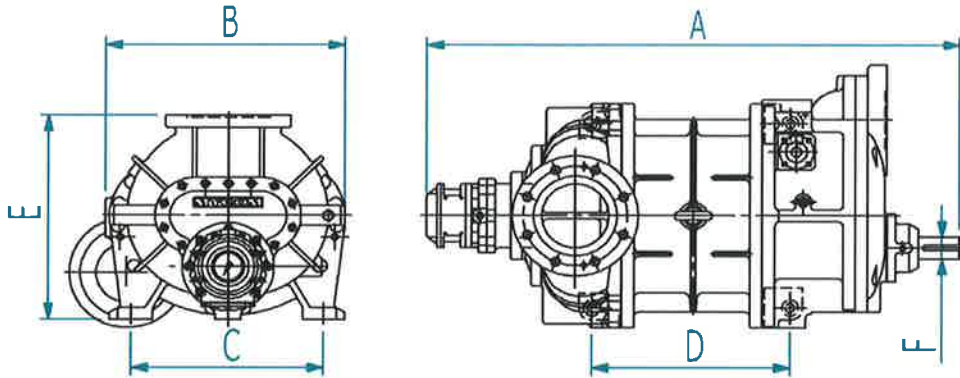
Checked by : *K. Watanabe*

Outer dimensions report

* General information :

Item No.	: -
Report No.	: 2024323B
Type of compressor	: Screw compressor
Model	: P160VSD-M
Serial No.	: 1656467
Date of measurement	: June 20, 2024
Inspection items	: Internal test
Plant location	: MAYEKAWA MFG. CO.,LTD. MORIYA PLANT 2000, Tatsuzawa Moriya-city, Ibaraki-pref., 302-0118, Japan

SURVEYOR



Measurement points	Drawing dimensions [mm]	Dimensional tolerance [mm]	Dimensional range [mm]	Measured value [mm]	Judgment
A	1029.0	8.0 -8.0	1037.0 1021.0	1029.0	Accepted
B	470.0	5.0 -5.0	475.0 465.0	470.0	Accepted
C	370.0	1.0 -1.0	371.0 369.0	370.0	Accepted
D	280.0	1.0 -1.0	281.0 279.0	280.0	Accepted
E	410.0	5.0 -5.0	415.0 405.0	410.0	Accepted
F	45.0	0.011 -0.005	45.011 44.995	45.009	Accepted

Appearance inspection : Accepted

Criteria : There must be no defects in appearance and the compressor appearance must conform to the customer's authorized drawing.

Approved by : *A. Hozumi*

Checked by : *K. Watanabe*

Rotor balancing test report

*** General information :**

Item No. : -
 Report No. : 2024323B
 Model : P160VSD-M
 Serial No. : 1656467
 Inspection items : Internal test

SURVEYOR

Rotor size	Material	Test speed [min-1]	Correction radius [cm]
160S	FCD600	1265	7.3

* Balancing class : G 2.5 [JIS B 0905]

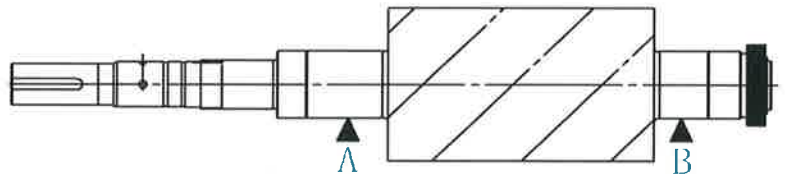
- Male rotor allowable residual unbalance
 $= (2.5 \times 9550 / 4500) \times (M / 2) \times (1 / 10)$
- Female rotor allowable residual unbalance
 $= (2.5 \times 9550 / 3000) \times (M / 2) \times (1 / 10)$
- Male rotor weight (M) : 28.6 [kg]
- Female rotor weight (M) : 22.2 [kg]

* Testing device : NAGAHAMA SEISAKUSHO LTD.,

Model : H20NB
 Serial No. : 56-0366
 Term of validity : End of July,2024

MALE ROTOR

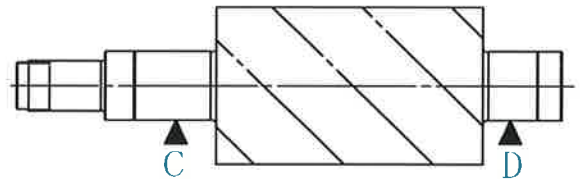
Rotor No. : C24306
 Date of test : June 15, 2024



	Unbalanced value at the left side (A)			Unbalanced value at the right side (B)		
	[g]	Angle [°]	Value [g cm]	[g]	Angle [°]	Value [g cm]
Allowable residual unbalance	---	---	7.6	---	---	7.6
After adjustment	0.687	14	5.0	0.071	259	0.5

FEMALE ROTOR

Rotor No. : C24226
 Date of test : June 15, 2024



	Unbalanced value at the left side (C)			Unbalanced value at the right side (D)		
	[g]	Angle [°]	Value [g cm]	[g]	Angle [°]	Value [g cm]
Allowable residual unbalance	---	---	8.8	---	---	8.8
After adjustment	0.239	0	1.7	0.951	179	6.9

Criteria judgment : Accepted

Approved by : *A. Fujiwara*

Checked by : *X. Matsunabe*

