TOMBO™ BRAND

NA BELLOW-Q™

Non-metallic flexible expansion joint

NICHIAS

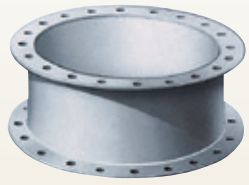
For many types of plants and equipment

TOMBO™ No.9999-NA NA BELLOW-Q™ is a non-metallic expansion joint which absorbs expansion and contraction movement due to heat expansion, vibration and land subsidence in the flue ducts of plants and equipments such as thermal power plants, steelworks, industrial incinerators, oil refineries and so on.

Features

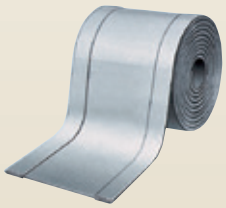
NA BELLOW-Q has been developed as a flexible joint to absorb the heat expansion, vibration and pressure of large size flue ducts.
It features outstanding corrosion and heat resistance.

1. Easy duct designing because of the small reaction.
2. Round shape, a corner can prepare it.
3. Light in weight and handling is easy.
4. Excellent in corrosion and heat resistance.
5. Low flow resistance.
6. Excellent weather resistance.
7. Short production lead time.



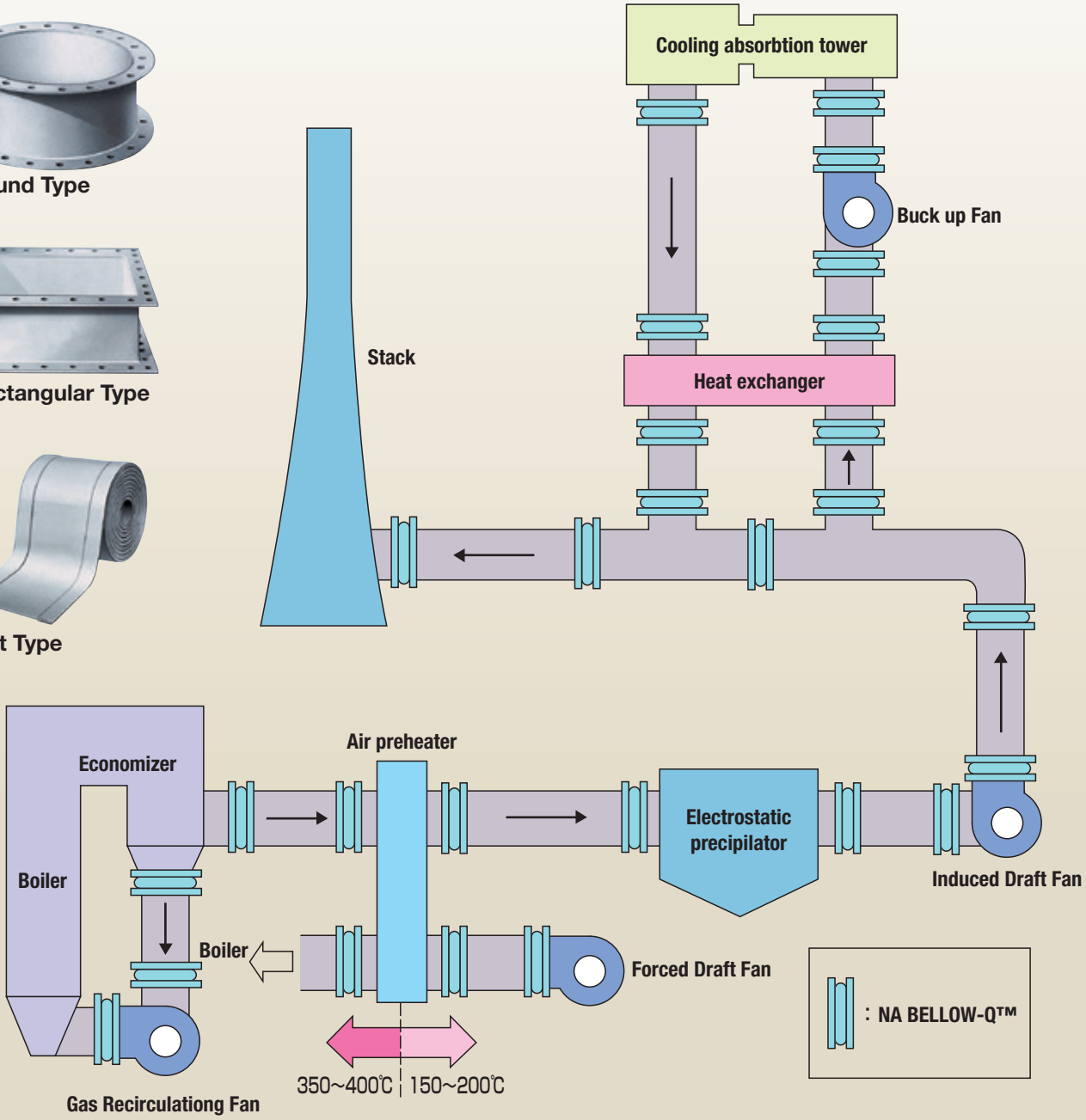
▲Round Type

▲Rectangular Type



▲Belt Type

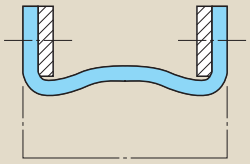
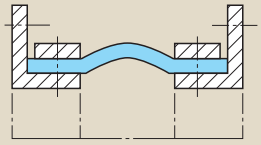
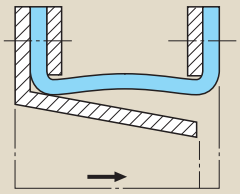
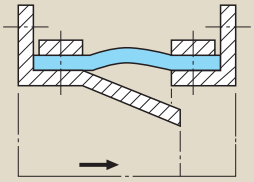
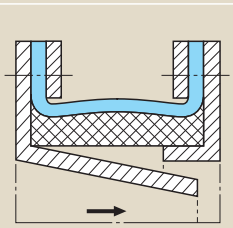
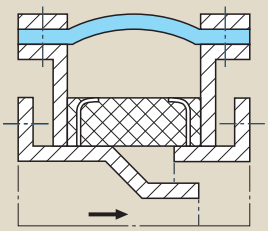
Examples of the use of NA BELLOW-Q in a power station



Basic Structure

The structures of the NA BELLOW-Q are shown in the diagram below.
It is made up of the flexible bellows, the backup bar securing the bellows to the duct, the set bolts and nuts for face to face adjustments and the sleeve to prevent friction.
There are two types of fixture structures, the flare type and the belt type.

The flare type is marked F and the belt type is marked B.
The flare type is lighter than the belt type.
The belt type is recommended for high temperature service.
Thermal insulation mat type is also available.

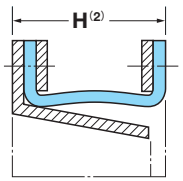
Type	Attachment Cross-section Structure		Pressure (kPa)	Velocity (m/s)	Temperature (°C)	NA BELLOW-Q	
	F (Flare Type)	B (Belt Type)				General Gas	Corrosive Gas
Q-1000			±9.8	25 under	250	NAQ-025 NAQ-025P	NAQ-025 NAQ-025P
Q-1100			−29.4 ∿ +9.8	25 above 40 under	250		NAQ-025 NAQ-025P
					300		NAQ-025-300
					350		NAQ-025-350
			−29.4 ∿ +9.8	40 above	350		NAQ-025P-350
					450		NAQ-025P-450
					600		NAQ-025P-600

∗The individual design product is possible, too. (NAQ-099)
∗Please refer to the next page for the production type.

■Configuration and dimensions (Standard H Dimension 300㎜)

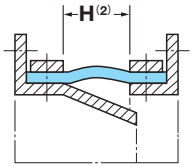
(Flare Type)

Configuration (Standard)	Size(1)	H(2)
Rectangular Type	500mm & above	200mm 300mm 400mm 500mm
Round Type	500mm diameter & above	



(Belt Type)

Configuration (Standard)	Size(1)	H(2)
Rectangular Type	300mm & above	200mm 300mm 400mm 500mm
Round Type	300mm diameter & above	



Note: (1) There are no limits on the maximum size.
• Irregular shapes are also available.
Note: (2) Face to face length (H) means possible expansion displacement absorption range.
• Please consult us for small size bellows and irregular shapes.

■Structure code display method

NA BELLOW-Q structure display is shown as follows.

Product No.	Base Materrial		Sleeve structure	Bellow Type		Insulation material (Applicable temperature)	Fixture structure
Example TOMBO No.9999-NA	NAQ	—	1 1	2 5 P	—	6 0 0	— F (Flare Type) B (Belt Type)

P (With protective cloth)

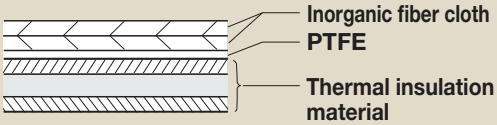
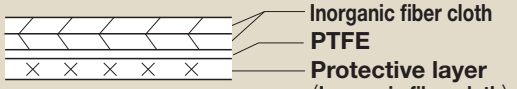
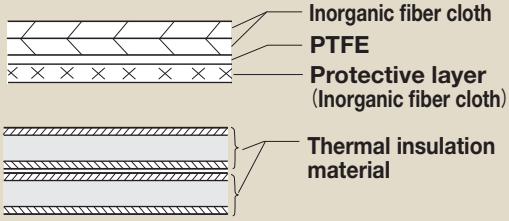
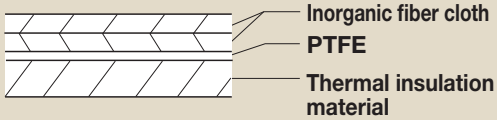
9999-NA

11 (With Sleeve)
10 (Without Sleeve)

Compositon of Main body

There are several composition type of the NA BELLOW-Q body as shown below.
Inorganic fiber cloth, used for the main body of the bellow, is bulky cloth made from special inorganic fiber yarn.

NAQ-025 is the basic type which features a sealed layer of PTFE film.
NAQ-025P type has protective cloth on the inside of the sealed layer.

NA BELLO-Q			
Bellow Type	Body Structure	Bellow Type	Body Structure
NAQ-025	 Inorganic fiber cloth PTFE	NAQ -025-350	 Inorganic fiber cloth PTFE Thermal insulation material
NAQ -025P	 Inorganic fiber cloth PTFE Protective layer (Inorganic fiber cloth)	NAQ -025P-350 -450 -600	 Inorganic fiber cloth PTFE Protective layer (Inorganic fiber cloth) Thermal insulation material
NAQ -025-300	 Inorganic fiber cloth PTFE Thermal insulation material	NAQ-099	Specially designed structure (Designed based on application conditions)

NAQ-025 (Standard Structure)

The basic composition is made of inorganic fiber cloth fused to PTFE sealing material which features excellent heat resistance, corrosion resistance and bending strength.
The outside is fused to reinforcing inorganic fiber cloth.
Service temperature limit:250˚C

NAQ-025P

NAQ-025P is same as NAQ-025 except additional layer of inorganic fiber cloth.
Service temperature limit:250˚C

NAQ-025-350

NAQ-025-350 is same as NAQ-025 except for an additional layer of thermal insulation.
Service temperature limit:350˚C

NAQ-025P-350
NAQ-025P-450
NAQ-025P-600

These three types are same as NAQ-025P except additional layer of insulation.
These are mainly used as belNAt typs.
Service temperature limit:350˚C (NAQ-025P-350)
Service temperature limit:450˚C (NAQ-025P-450)
Service temperature limit:600˚C (NAQ-025P-600)

NAQ-099

NAQ-099 is a code number signifying bellow structures other than the standard type.
Materials shown below are available.

Chloroprene, Butyl rubber, EPDM, Chloro sulfonated polyethylene, Silicon rubber, Fluoro rubber, Fluoro resin, Nylon, Aramid fiber, Glass cloth, Silica cloth, Glass wool mat, FINEFLEX BIO blanket.

Backup bar

The backup bar is used to fix the bellow to the duct flange.
As the bar does not come into contact with the interior flow, it does not corrode.
Standard material:Carbon steel.

Sleeve

The sleeve is used as protection of bellow from dust and tul-bulence.
standard material:Carbon steel.
Depending on a condition, it is necessary to choose different materials.

Performance

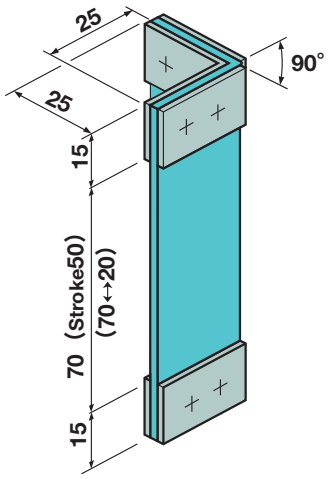
Inorganic fiber cloth used for NA BELLOW-Q is made of high strength and flexible glass fiber fabrics. Chart 1 shows a physical properties of inorganic fiber cloth. PTFE film is fused to inorganic fiber cloth as corrosion resistant layer of NA BELLOW-Q. It has a outstanding performance for resistance to flexure and buckling fatigue which are essential factors for bellows.
Then, chart 2 shows performance of NA BELLOW-Q body（NAQ-025 type）. We also conducted the flexing fatigue test under heat for 20,000 cycles（at a rate of one cycle per day and equal to 50 years of use.）and no abnormality was found.

■Performanse of body material

(PTFE fused inorganic fiber cloth) (Chart1)

			PTFE fused inoroganic fiber Cloth
Thickness（mm）			1.8
Tensile Strength（N/25mm）			
	Ambient Temp.	Warp	1304
		Weft	784
	260℃（24hrs）	Warp	1245
		Weft	706
Resistance to flexure-Tensile strength after 50,000 cycles （N/25mm） (1)			
	Ambient Temp.	Warp	745
		Weft	637
	260° C（24hrs）	Warp	755
		Weft	588
Buckling Fatigue Test (2) (Stroke 50mm, 50,000times)			No abnormality

Note: (1) Resistance to flexure is shown in terms of tensile strength after 50,000 flexures on a JIS K6260 dematcher bending tester.
Note: (2) In the buckling fatigue test, the material is placed as shown in the diagram, bent to 90 degree angle and attached to the test machine.
Test piece: 50mm × 100mm
Stroke: 50mm
Speed: 60times per minute
Number of backlings: 50,000times
*Above figures are test resule and shall not be used for specification purpose.
*Measurement organization:NICHIAS Corporation



■Perfomanse of NA BELLOW-Q body

(Chart2)

			NAQ-025
Tensile Strength（N/25mm）			
	Ambient Temp.	Warp	2525
		Weft	2010
	260℃（24hrs）	Warp	2182
		Weft	1667
Heat Resistance（℃）			250
Flow Resistance（m/sec）			25max.（1）
Flexing Fatigue Test under heat（60mm flexure, 20,000cycles） (2)			No abnormality

Note: (1) In case of in excess of 25m/sec, a sleeve is fitted.
Note: (2) Flexing fatigue under heat, test conditions
Bellows:NAQ-1125P, with insulation blanket of 50mm.
Dimensions:660mmID×300mmH
Conditions:
Flow: Hot Air
Temperature: 450C
Pressure: 7.4KPa
Flexure volume: 60mm
Flexure speed: 6times per minute
*Above figures are test resule and shall not be used for specification purpose.
*Measurement organization:NICHIAS Corporation

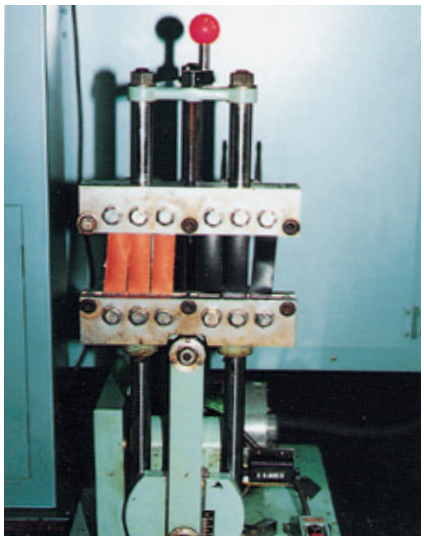
■Instructions of the use

If there is gas flow turbulence (Apparatus placement and a duct layout before and after NA BELLOW-Q), insulation material may not demonstrate sufficient performance.

*Manhole gasket is used as standarsd for the joint part of the duct flange and NA BELLOW-Q.
Gasket except Manhole gasket doesn't have sufficient air tightness, so it can't seal perfectly.
*Bolt will be loose when it tightened only once, so please additional tightening as necessary.
*Please contact us in advance if severe sealing is required.

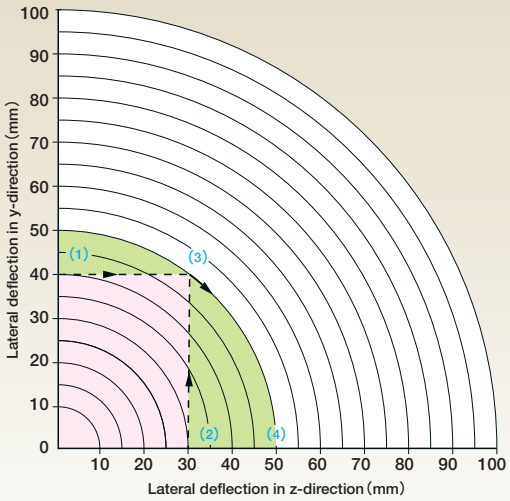
■Various Test Equipment

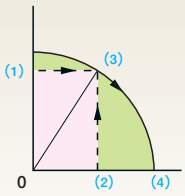
●Dematcher bending tester



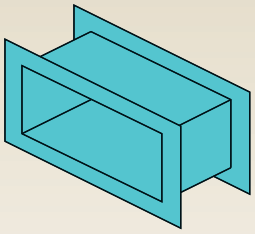
Flexural Perfomance

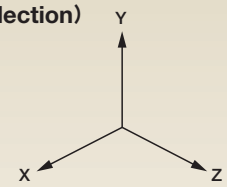
■Vector sum of lateral deflection (Graph 1)





(Direction of deflection)





Direction of deflection

X:Axial movement
Y:Axis vartical right angle direction movement
Z:Axis level right angle direction movement

● How to read the graph

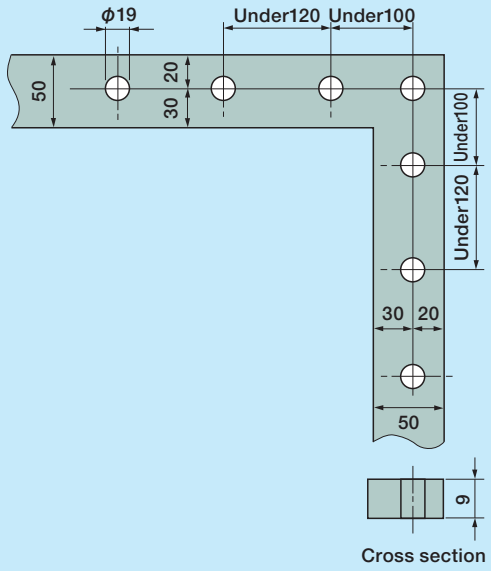
(Example) To determine the vector sum of lateral deflection in Y and Z directions, read the value of the arc. From the coordinates (3) of 40mm lateral deflection in Y-direction (1) and 30mm lateral deflection in Z-directon (2), the real lateral deflection can be read as 50mm (4)

※This diagram shows the deflection vector of NAQ-1000 type without sleeve.
When sleeve is used, this diagram will not be applied. For details, please consult us.

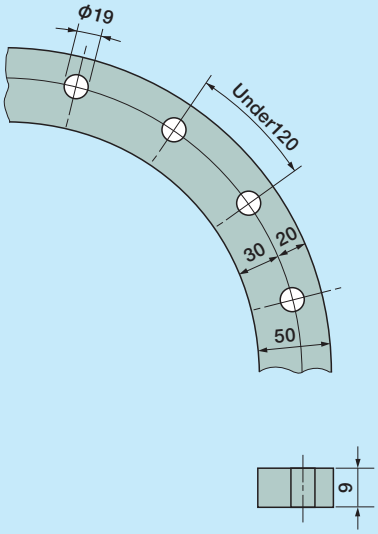
Design standards

Flanges etc. for use with NA BELLOW-Q™ are as follows.

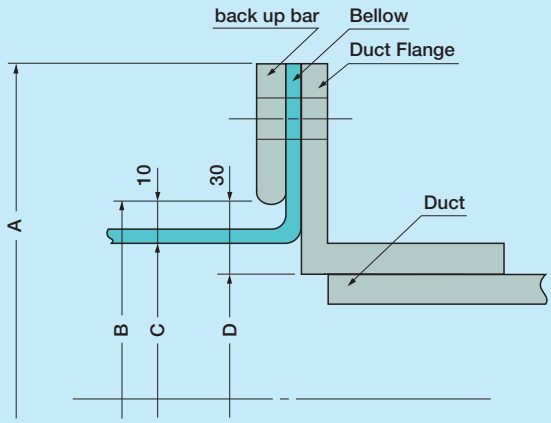
Dimensions of Backup Bar



Cross section

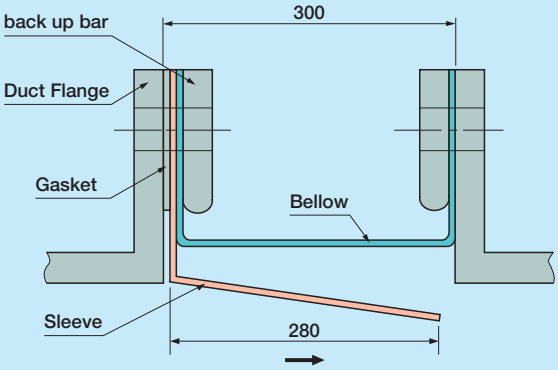


Dimensions of NA BELLOW-Q™ Duct Flange

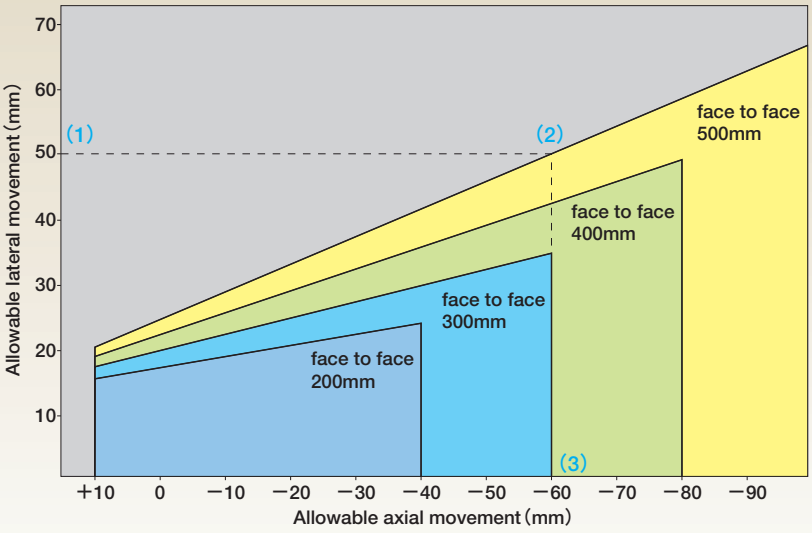


A. External dia, of backup bar, bellow, duct flange
B. Internal dia, of backup bar
C. Internal dia, of bellow
D. Internal dia of duct flange

Dimensions of Sleeve



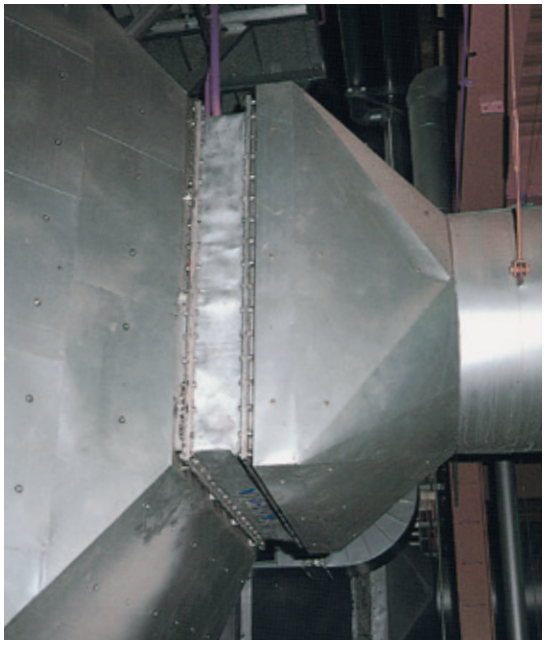
■Allowable axial and lateral movement (Graph 2)

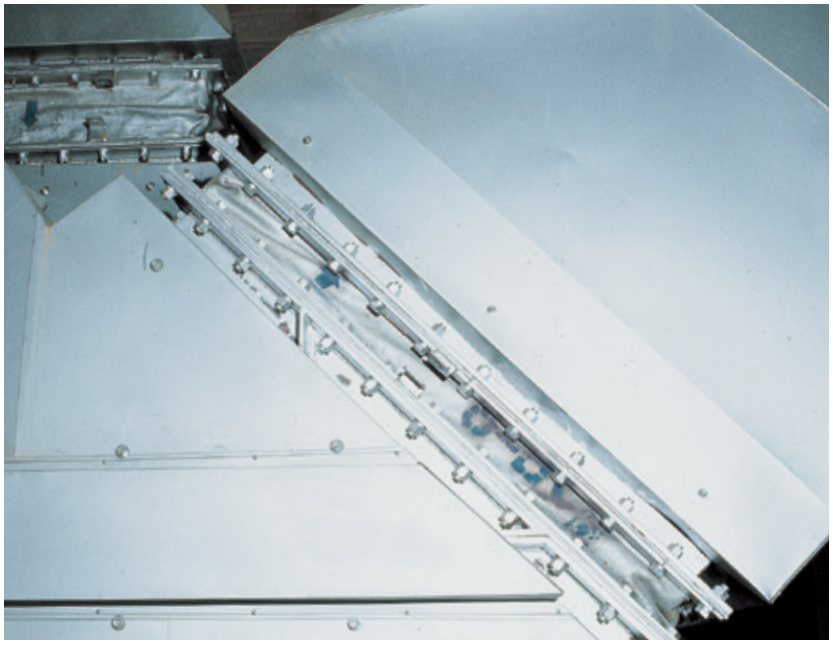


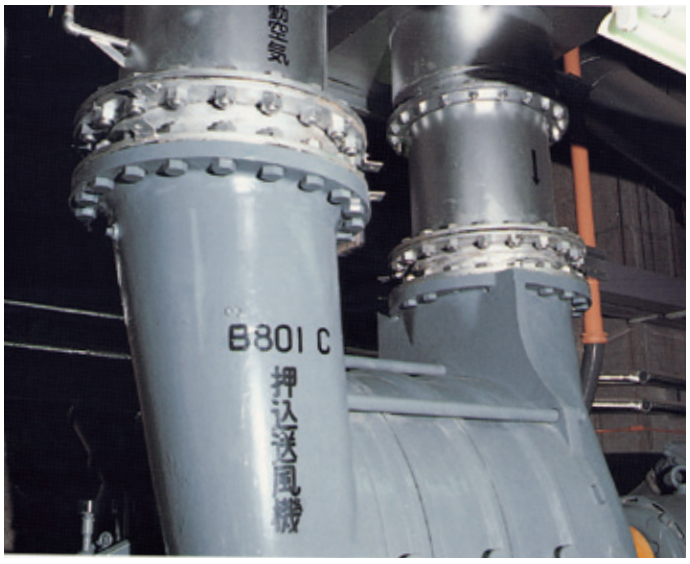
● How to read the graph

(Example) in Graph (1) the lateral movement of the YZ axis found in graph (1) is taken as the vertical axis.
Then move horizontally until the minimum face to face distance is found at the intersection (2).
From (2) move down vertically to the horizontal axis to find the needed axial movement (3).

■Applications -Please refer to handling manual before installation/usage.







E26 Issued in Nov. 2020

NICHIAS Corporation

Head Office

6-1, Hatchobori 1-chome, Chuo-ku, Tokyo 104-8555, Japan
International Marketing and Sales Group
Phone: 81-3-4413-1132 Fax: 81-3-3552-6108
Web Site: https://www.nichias.co.jp/

Overseas Sales Companies

Indonesia

PT. NICHIAS SUNIJAYA
Panin Life Center, 2nd Floor, Room 205, Jl. Letnan Jenderal S. Parman
Kav. 91, Jakarta 11420, Indonesia
Phone: +62-21-56956207 Fax: +62-21-56956208/56956209

Malaysia

NICHIAS SOUTHEAST ASIA SDN. BHD.
Suite A1102, 11th Floor, West Wing, Wisma Consplant 2,
No. 7, Jalan SS 16/1, 47500 Subang Jaya, Selangor Darul Ehsan, Malaysia.
Phone: +60-3-5636-4067 Fax: +60-3-5636-4078

Singapore

NICHIAS SINGAPORE PTE. LTD.
25 International Business Park, #01-15/17 German Centre,
Singapore 609916
Phone: +65-6571-0830/0838 Fax: +65-6265-7681

Vietnam

NICHIAS VIETNAM CO., LTD
Room 12-K, 12Floor, Center Building,
Hapulico Complex No1 Nguyen Huy Tuong,
Thanh Xuan Trung, Thanh Xuan, Hanoi, Vietnam
Phone: + 84-4-3791-7194 Fax: + 84-4-3791-6203

Thailand

NICHIAS (THAILAND) CO., LTD.
85 Moo 1, Wellgrow Industrial Estate T. Homsin, A. Bangpakong
Chachoengsao 24180, Thailand
Phone: +66-38-570-600 Fax: +66-38-570-601

THAI NICHIAS INTERNATIONAL CO., LTD.
Unit 1107, 11th Floor, AIA Capital Center
89 Ratchadaphisek Road, Dindaeng, Dindaeng, Bangkok 10400 Thailand
Phone: +66-2-001-2060 Fax: +66-2-001-2062

China

NICHIAS (SHANGHAI) TRADING CO., LTD.
霓佳斯（上海）贸易有限公司
Room 1701, THE PLACE, Tower A, No. 100 Zun Yi Road,
Changning District, Shanghai, P.R.China Postcode 200051
中国上海市长宁区遵义路100号虹桥南丰城A栋1701室 邮编200051
Phone: +86-21-6236-1783 Fax: +86-21-6236-1781

NICHIAS (SHANGHAI) TRADING CO., LTD. Guangzhou Branch
霓佳斯（上海）贸易有限公司 广州分公司
17F-G, Gold Sun Building, No.109 Tiyu West Road, Guangzhou,
Guang Dong Province, 510620, P.R.China
中国广东省广州市天河区体育西路109号高盛大厦17楼G室 邮编 510620
Phone: +86-20-3879-1640 Fax: +86-20-3879-1647

NICHIAS (SHANGHAI) AUTOPARTS TRADING CO., LTD.
霓佳斯（上海）汽车零部 贸易有限公司
Room 1702, THE PLACE, Tower A, No. 100 Zun Yi Road,
Changning District, Shanghai, P.R.China Postcode 200051
中国上海市长宁区遵义路100号虹桥南丰城A栋1702室 邮编200051
Phone: +86-21-6236-2668 Fax: +86-21-6236-2667

Germany

NICHIAS AUTOPARTS EUROPE GmbH
Prinzenallee 7, 40549 Düsseldorf, Germany
Phone: +49 (0)211-52391-058 Fax: +49 (0)211-52391-200

Overseas Construction Companies

Malaysia

NICHIAS SOUTHEAST ASIA SDN. BHD.
Suite A1102, 11th Floor, West Wing, Wisma Consplant 2,
No. 7, Jalan SS 16/1, 47500 Subang Jaya, Selangor Darul Ehsan, Malaysia.
Phone: +60-3-5636-4067 Fax: +60-3-5636-4078

Thailand

THAI-NICHIAS ENGINEERING CO., LTD.
45 Huaypong-Nongbon Road, Huaypong, Muang Rayong,
Rayong Province 21150, Thailand
Phone: +66-38-682-242 Fax: +66-38-691-156

Overseas Factories

Indonesia

PT. NICHIAS ROCKWOOL INDONESIA
PT. NICHIAS METALWORKS INDONESIA

Malaysia

NICHIAS FGS SDN. BHD.
NT RUBBER-SEALS SDN. BHD.

Vietnam

NICHIAS HAIPHONG CO., LTD.

China

SUZHOU NICHIAS INDUSTRIAL PRODUCTS CO., LTD.
(苏州霓佳斯工业制品有限公司)
SUZHOU NICHIAS SEAL MATERIAL CO., LTD.
(苏州霓佳斯密封材料有限公司)
SHANGHAI XINGSHENG GASKET CO., LTD.
(上海兴盛密封垫有限公司)
SUZHOU SHUANGYOU AUTOPARTS CO., LTD.
(蘇州双友汽车零部件有限公司)

India

NICHIAS INDUSTRIAL PRODUCTS PRIVATE LTD.

Czech

NICHIAS AUTOPARTS EUROPE a.s.

Mexico

NAX MFG, S.A.DE C.V.