

FORT WILLIAM



*Expert in
Sealing
technology*

FLEXIBLES.

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- Components of Non Metallic & Metallic
- Standard Product Range / Application
- Testing Equipment and Laboratory Facilities
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EXPANSION JOINTS



Growing with Customer Satisfaction

Introduction

We Fort William Flexibles are the leading manufacturer of Metallic and Non-metallic expansion joints, spare fabric, Insulation bolster, Kiln Lamella Seal, Spares for Alu. Smelter, High temperature gaskets up to 1260°C (Flat & Rope type).

We have successfully developed the spare for supply made from China. We have the technical supports of production, Design and Marketing person, who has worked for more than 25 years with two major players in this field and absorbed the technology with further improvement considering the practical situation prevailing in India.

We are following the latest norms of product quality as per EJMA, ASME, ESA and FSA, the four international bodies responsible for setting the standard for metallic & nonmetallic expansion joints. Our product range suitable up to 1260°C operating temperature. We have latest manufacturing and testing machinery set up at our Raipur & Somani works.

Manufacturer Of

1.1 Fabric expansion joints

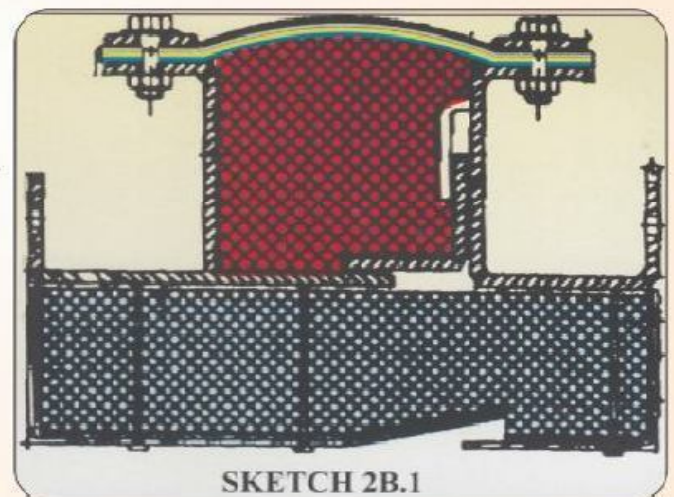
Fabric bellows are extremely flexible and can be made from a variety of special woven fabrics coated or laminated with selected elastomers or fluoro polymers. Fabric expansion joints are used to insulate, to avoid mechanical loads and to protect against abrasion. They offer advantages for the pipe work designer as they can absorb movements simultaneously in several directions. Further, they have almost no reactive forces and require little space. Fabric expansion joints are easy to customize to suit existing operating conditions and are easy to transport and install. In comparison to metallic expansion joints fabric offers almost unlimited flexibility, giving the pipe work designer more options. Nonmetallic expansion joints have to be designed according to ESA & FSA guideline. Fabric expansion joints are installed in systems operating with low pressure and dry media.

Different Components Fabric Expansion Joint

WHY FABRIC EXPANSION JOINTS?

- Larger movement accommodation capabilities.
- Ability to absorb multi planer movements in one bellow.
- Cost efficient for large & critical duct layout.
- More working life than metal bellow
- Negligible spring force on support, resulting in cost economy of ducting system /structure.
- Isolation of Vibration.
- Easy replacement/repair ability.
- Light weight, low transportation cost

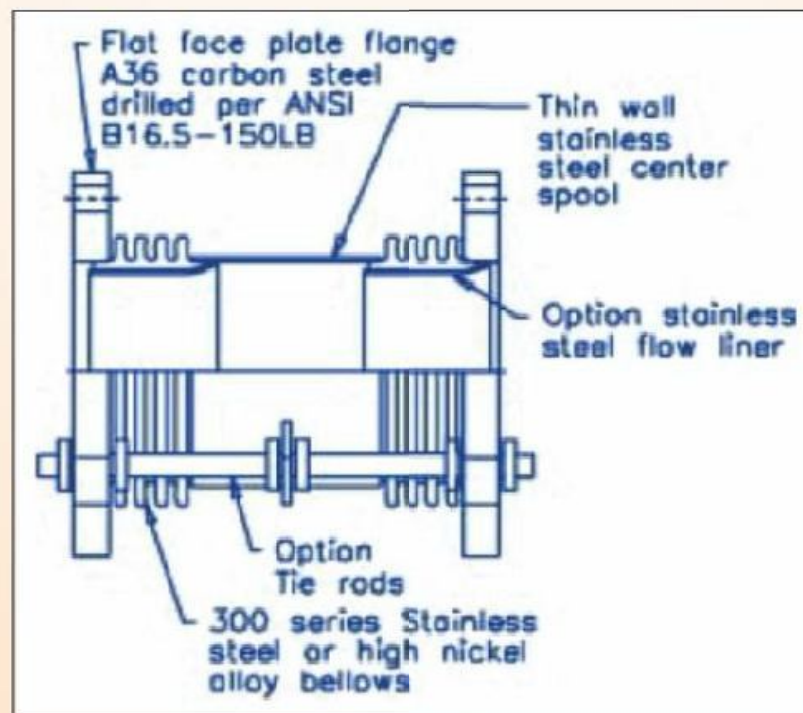
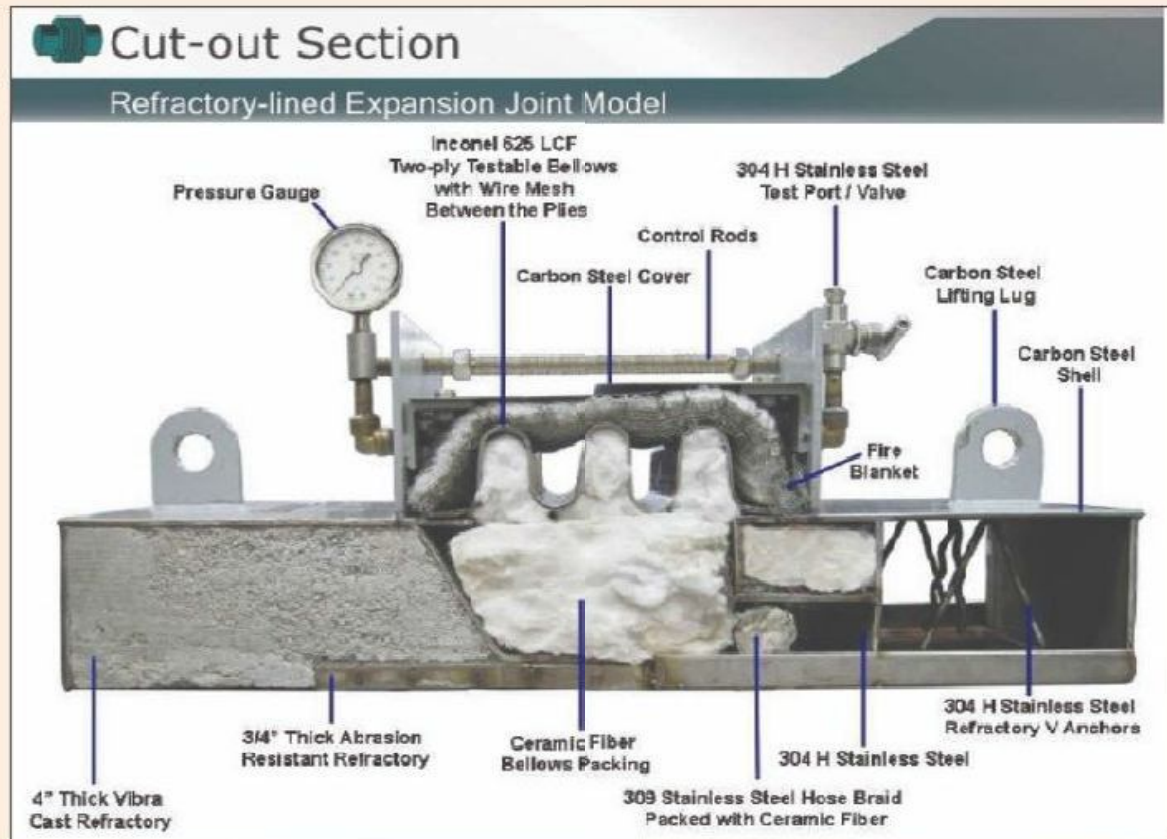
PLEASE REFER SKETCH 2B.1



- A) Outer cover layer-Protect fabric layers from weathering, act as additional gas barrier.
- B) Gas seal barrier-Act as sealing layer impermeable and have chemical resistant properties.
- C) Insulating layers-Protect abovementioned layers from high temp. / Give required temp. Drop.
- D) Holding layers-Maintains the integrity of insulating layers.
- E) Flange reinforcement Hold all fabric layers together in between cuff.
- F) Insulation bolster-To avoids deposition of fly ash in expansion joint cavity.
- G) Fabric fixing plate-Platform for fabric fixing.
- H) Back up plate-To give necessary clamping pressure by tightening the bolts.
- D) Fasteners - For tightening the back up plates.
- J) Matching and counter flanges-To fix the expansion joint unit on the ducting system.
- K) Glass cord gasket- Glass/ceramic cord gasket to minimize the leakages from flange area.
- L) Cladding bolster-To replace the refractory lines in expansion joint area and act as temperature & dust barrier and it is the best alternative over the conventional arrangement.

1.2 Metal Expansion Joints

Pipe expansion joints are necessary in systems that convey high temperature substances such as steam or exhaust gases, or to absorb movement and vibration. A typical joint is a bellows of metal (most commonly stainless steel). A bellows is made up of a series of convolutions, with the shape of the convolution designed to withstand the internal pressures of the pipe, but flexible enough to accept axial, lateral, and angular deflections. Metal expansion joints have to be designed according to rules laid out by EJMA. Pipe expansion joints are also known as "compensators," as they compensate for the thermal movement.



STANDARD PRODUCT RANGE FABRIC EXPANSION JOINTS

FORT-WILLIAM Flexibles is able to deliver fabric expansion joints for various (Corrosive/Non Corrosive)Flow media for following range and process parameters
Pressure-+/-2000mm WC

Temperature- up to 1,260 degree c

Size and Shape-Any size in various shapes like square, rectangular, circular, conical, corrugated bellow etc

Our standard product Range with detail fabric layers are tabulated as below.

Sn	Product description/rangellayer details	Application area
1.	FWF-ELASTOFLEX- Single layer reinforcing fabric with coating of Elastomer like EPDM,IIR etc. on both the side Pressure-*/-2000mm WC Temperature- Up to 150 degree c Non aggressive/non corrosive dry flow media	Cement Industry-Raw mill, cement mill, coal mill circuit General Appln. fanconnectios, vibration isolators, hopper appln., noise suppression elements, ACVS.
2.	FWF-SILICOFLEX- Multilayer fabric with silicon coated glass fabric, needled glass felt, glass fabric etc. Pressure.+/-2000mm WC Temperature-Up to 550 degree Non aggressive/non corrosive dry flow media Excellent resistant to weathering	Cement plant-Raw mill, kiln ,cooler circuit. Coal based Power plant-Primary and secondary hot air circuit. Gas turbine Cold Air circuit.
3.	FWF-SILICOFLEX-T Multilayer fabric with silicon coated glass fabric, PTFE sheet, needled glass fabric etc. Pressure.+/-2-2000mm WC Temperature- Up to 550 dregree c For corrosive dry flow media, flue gases etc. Excellent - resistant to weathering, gas sealing, tear Strength, burst strength.	Cement plant-Raw mill, kiln, cooler circuit. Coal based Power plant- Flue gas circuit Gas turbine GT exhaust ducting, HRSG etc. Steel plant-SMS, Converter, Sinter plant, GCP
4.	FWF-FLUROFLEX- T Multilayer fabric PTFE/TFF/FFP Laminated / coated / dispersed glass fabric, PTEE sheet (Not necessary), needled glass felt, glass fabric/high silica etc. Pressure.+/- 2000mm WC Temperature - Up to 700 degree c for corrosive dry flow media, flue gases et Excellent - resistant to weatering, gas sealing, tear Strength, burst strength.	Cement plant-Raw mill, kiln, cooler circuit. Coal based Power plant- Flue gas fabric circulation, with sulfur content Gas turbine GT exhaust ducting, HRSG etc. Steel plant-SMS, Converter, Sinter plant, GCP Smelter- Copper and Aluminium smelter exhaust ducting
5.	FWF-FLUROFLEX-V Fluroelastomer are reinforced with acid resistant glass fabric or stainless steel cloth Pressure.+/-3500mm WC Temperature- 40 to 200 drgree c For corrosive dry flow media, flue gases etc Excellent -resistant to weathering, gas sealing, tear Strength, burst strength	Sulphuric acid plants. Scrubber, desuperising unit, flue gas appln. with moisture and sulpher content and extemely corrosive atmosphere/surroundings.
6.	FWF-SPECIAL All application above 700 degree c. High temperature corrugated bellow. Moulded rubber bellow. High extension expansion joint.	Sponge Iron, kiln exhaust, blast furnace, copper furnace,HRSG, Aluminium industry, carbon plant

Metal Expansion Joints



Axial Expansion Joint.

Simplest form of flexible joints- Used for axial movement in straight pipe-run. With end connection as flanges or pipe end. It absorbs deflection in any direction or plane.

Universal Expansion Joint.

Universal expansion joint is generally used where lateral movement is to be absorbed which is beyond to the capacity of single Axial Expansion Joint.



Hinged Expansion Joint.

Hinged Expansion Joints are used to absorb angular movement when it occurs in only one plane. This is also known as Hinged Bellow or Angular Expansion Joints.

Gimbal Expansion Joints.

Gimbal Expansion Joints are used to absorb angular movement in any plane by the pair of two hinges & pivot whose axis are perpendicular to each other connected to a floating gimbaled ring. Advantage of absorbing pressure thrust, supporting the dead weight of the system, transmitting loads through the gimbaled structure, preventing torsion & reduce forces on system. Applied to complex piping system where proper anchoring & guiding may not be feasible.



In-line pressure Balanced Expansion Joints.

In-Line Pressure Balanced Expansion Joints are designed to absorb externally imposed axial movement without imposing pressure loading on the system. This is accomplished by using Two bellows both at line pressure tied together and acting in opposite directions. It is used where pressure loading on the piping or equipment is not acceptable.





Elbow pressure Balanced Expansion Joints.

Elbow pressure balanced expansion joints or corner relief expansion joints are the types of pressure balanced expansion joints which are used where pressure thrust forces on equipment or piping is unacceptable and the direction of the pipe system also changes.

Externally Pressurised Expansion Joints.

Externally pressurized expansion joints are the perfect solutions when the expansion joints must absorb very large axial movements under high pressure. In externally pressurized expansion joints, the bellows element(s) is arranged so that the media flow is on the external side of the bellows, while the inside part of the bellows is only subjected to atmospheric pressure with this side being in direct connection with the atmosphere. External pressurizing of the bellows eliminates pressure instability as a design limitation and permits the absorption of large axial compression. Where an internally pressurized bellows will become unstable and buckle due to internal pressure, the pressure around an externally pressurized bellows will have a stabilizing effect on the bellow. As the convolutions are well protected under a cover, transport damage to the convolutions is unlikely to occur but most importantly, the cover offers maximum protection against leaking bellows or bellows failure.



Rectangular Expansion Joints.



Rectangular Metal expansion joints are designed to absorb movements in all three directions i.e. axial, lateral and angular. The rectangular bellows are mostly designed for very low pressure applications such as ducts, exhaust systems, ventilation systems etc. It comes with four different corner arrangement as single miter, double miter, camera corner, round corner

Fabricated Expansion joints.

These types of expansion joint are used in low pressure systems and these are a cost effective substitute for such systems. These can be made in large diameters and from various types of metals. Moreover, "fabricated" bellows can be made of various shapes viz. polygon, rectangular, etc.



TEST AND LABORATORY FACILITIES (FABRIC EXPANSION JOINTS)

FORT - WILLIAM Flexible's experienced staff in engineering, quality assurance, production, R & D, Inspection along with all basic Laboratory facilities (Brief details as mentioned below), makes us a reliable choice.

FLEX DURABILITY TEST

The objective of this test is to ensure the flexibility of various flexible barrier material such as foils, coated fabric and laminated fabric
(Except felt layers)

TEMPERATURE WITHSTAND ABILITY TEST

The objective of the test is to check the temperature resistance of various fabric and felt layer. Composite fabric belt can be tested for desired process temperature.

PINHOLE TEST

The objective of the test is to ascertain the pin hole freeness of the imper-vious barrier of PTFE laminated fabric, PTFE foil.

THICKNESS TEST

To measure the thickness of various fabric and felt layers as per specifications.

TENSILE STRENGTH TEST.

For development of composite materials. To check tensile strength and burst strength of materials.

MICROSCOPE

For surface observation, And product Comparison purpose. To study various microscopic properties of materials.

PERMEABILITY TEST.

The objective of the test is to ascertain the impervious nature of the PTFE Laminated/Elastomer coated glass fabric.

WEIGHT MEASUREMENT

To check weight/Unit area of various materials. For calculating the density/sp. Weight.

LIST OF MANUFACTURING and TESTING MACHINES.

Sl.No.	Description	Qty.
01	PNEUMATIC STAPLING MACHINE	02
02	COMPRESSOR (20 KG)	02
03	POWER DRIVEN SINGLE NEEDLE STITCHING MACHINE	02
04	PTFE WELDING MACHINE.	02
05	AUTOMATIC SPOT WELDING MACHINE.	02
06	POWER DRIVEN INTERLOCKING MACHINE.	02
07	GENERAL-PURPOSE TOOLS AND TACKLES.	LS
08	PIN HOLE TESTING MACHINE	01
09	TENSILE TESTING MACHINE	01
10	FLEXIBILITY TESTING MACHINE	01
11	PERMIABILITY TESTING MACHINE	01
12	TEMPERATURE WITH STANDIBILITY (Furnace)	01
13	ELECTRONIC WEIGHING MACHINE	02
14	VERNIER CALIPER	02
15	OTHER MEASURING EQUIPMENTS	08
16	THICKNESS GAUGE.	1 Set
17	CLOTH SILITING MACHINE	1 Set

METALLIC EXPANSION JOINTS

LIST OF MANUFACTURING MACHINES

- (i) Raw material identification by mechanical / chemical analysis by approved laboratory.
- (ii) Surface defects / well integrity checks by liquid penetrant examination before and after cold work.
- (iii) Radiography examination for welded components if required.
- (iv) Magnetic particle & ultrasonic test by approved third party agency.
- (v) Pressure testing for leakages of components and assembly.
- (vi) Grade verification by Spectro/PMI.
- (vii) Dimensional verification of components/assembly.
- (viii) Performance Evaluation cum destructive (type) tests like cycle life, squirm, yield rupture etc.

S.No.	List of Machineries	Details
1.	Forming M/C (Semi Automatic)	Cap. 700 NB to 6000 NB
2.	Forming M/C (Semi Automatic)	Cap. 100 NB to 1000 NB
3.	Forming M/C (Manual)	Cap. 50 NB to 100 NB
4.	Shearing M/C Width 2.5 Mtr.	Cap. Cutting 0.4 to 4mm SS
5.	Welding fixture M/C (Auto)	Cap. 0.3mm X 1300mm Length
6.	Welding fixture M/C (Manual)	Cap. 1300mm
7.	Sizing M/C	Cap. 100 NB to 6 Mtr. (Square & Round)
8.	Hydro Testing (manual)	Cap. 125 Kg./Cm ² g.
9.	Drilling M/C	Cap. 40 Dia.
10.	Broach cutter	Cap. 60 Dia. 2 Nos
11.	Lathe M/C Bed - 10 Ft.	Centre : 16" (2000MM b/t center)
12.	Hydraulic Press	70 Ton
13.	Plate Bending M/C	Width-2000mm, Min. Dia-500mm, Thickness-25mm
14.	Sheet Banding	02 NOS.
15.	Arc Rectifier	04 NOS.
16.	MIG Welding M/C	02 NOS.
17.	TIG Welding M/C	04 NOS.
18.	Plasma Cutting	01 NO. Cap 100 Amps. 25mm
19.	Angle Crinder	10 NOS.
20.	Pug cutting M/C	02 NOS.
21.	Nibbler M/C	500W 2.8 MM- 1 No.

Various layers for Fabric expansion joints and ABF Products

Major components for an expansion joint (Flexible Part)

Outer cover layers	Maximum continuous operating temperature (°C)	Vapour barrier layers	Maximum continuous operating temperature (°C)
EPDM	150	Fluoro-elastomer	205
Fluoro-elastomer	205	Fluoro-plastic	260
Silicone	220	Stainless steel foil	550
Fluoro-plastic	260		
Thermal Insulation layers	Maximum continuous operating temperature (°C)	Supporting layers	Maximum continuous operating temperature (°C)
Needle Glass felt	550	Glass fabric	550
Mineral wool	750	wire cloth - stainless steel	550
High temperature glass felt	800	Wire mesh alloys	850
Ceramic felt	1260	Highsilica fabric	1000
		Graphited glass fabric	1000
		Carbon Fabric	>2000

Aluminium Smelter (Anode Baking Furnace Products)



Vibration Isolator Conical Bellow



Flexibles



Telescopic Chute Bellow



Gasket



Metallie Peephole Cover



Non Metallie Peephole Cover



Composite fabric for ABF covering



Rubber Mat

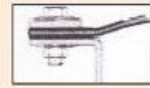
FABRIC EXPANSION JOINT GEOMETRICAL CONFIGURATION

Mainly two basic form of fabric expansion joint construction.

a. Single layer type

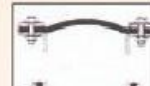


b. Sandwich /Multi layer combination



Fastening/Clamping arrangement
There are mainly three of fastening /clamping arrangement

a. Belt type expansion joint



b. Flanged type Expansion joint

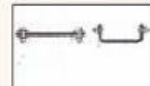


c. Combine type Expansion Joint



Shape of Fabric /flexible components
By Special vulcanizing/Heat sealing process fabric elements can be given following shapes

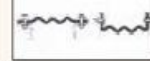
a. Flat



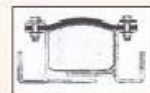
b. Corrugated



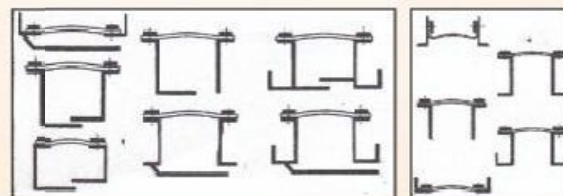
c. Convex



Bolster/Cavity pillow.
Added Mainly for dusty/high temperature area



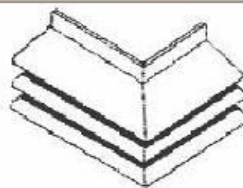
Metal Frame arrangement with/
without baffle plate



RECTANGULAR BELLOW METALLIC CORNER ARRANGEMENTS



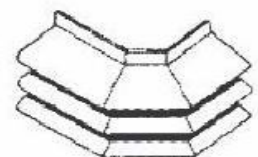
Round Corner



Single Mitre Corner



Camera Corner



Double Mitre Corner

EXPANSION BELLOW SPECIFICATION SHEET

1.	ITEM NO./TAG NO.			
2.	NOMINAL SIZE (NB) / DUCT SIZE			
3.	QUANTITY (Nos.)			
4.	TYPE OF EXPANSION JOINT			
5.	FLUID INFORMATION			
	MEDIUM			
	VELOCITY (ft. sec.)			
6.	WORKING TEMPERATURE (C)			
7.	WORKING PRESSURE (kg/cm ²)			
8.	DESIGN TEMPERATURE (C)			
9.	DESIGN PRESSURE (kg/cm ²)			
10.	TEST PRESSURE (kg/cm ²)			
11.	MOVEMENTS			
	AXIAL EXTENSION (mm)			
	AXIAL COMPRESSION (mm)			
	LATERAL DEFLECTION (mm)			
	ANGULAR ROTATION (deg.)			
12.	DIMENSIONAL LIMITATION (deg)			
	OVERALL LENGTH (mm)			
	OUTSIDE DIAMETER (mm) / DUCT SIZE (mm)			
	INSIDE DIAMETER (deg) / DUCT SIZE (mm)			
13.	INSTALLATION POSITION			
14.	END CONNECTION DETAIL			
	FLANGED			
	FLANGE RATING			
	WELDABLE END			
	PIPE O.D. X THK / (Duct THK)			
15.	MATERIAL OF CONSTRUCTION			
	BELLOWS			
	LINER / INTERNAL SLEEVE			
	WELDAGE END			
	FLANGES			
	EXTERNAL COVER			
	TIE/LIMIT ROD			
16.	SPRING RATE LIMITATIONS (formel)			
	AXIAL (kg/mm)			
	LATERAL (kg/mm)			
	ANGULAR (kg/mm)			
17.	INSPECTION BY			
18.	DESIGN CODE AS PER EJMA			

Infrastructure for Metal Expansion joint

SN.	Name of Company	Fort William Flexibles
1.	Factory Address	Plot No 2/A, Industrial Area, Somni Distt. Rajnandgaon (C.G),Pin Code-49144
2.	Phone	+91 7744220250, +91 93000946563
3.	Weekly Holiday	Sunday
4.	Plot Area	24,000 Sq. Ft.
5.	Factory Area Shaded	10,000 Sq. Ft.
6.	Material Handled	High Alloys 800 / 825 / 600 / 625
7.	Size	S. S. 321 / 316L / 316T1 / 304/ Carbon Steel 1) 100NB to 6000NB Diameter. 2) Square / Rectangular of any Size with any type of Corner arrangement.
8.	Pressure / Temp. / Fluid	Any
9.	Material	1) High Alloys 2) Duplex 3) Low Alloys 4) Carbon Steel



FORT WILLIAM FLEXIBLES.

Head office

305, Maruti Heritage, Opp. MMI Hospital,
Dhamtari Road, Raipur - 492001, Chhattisgarh, India
+919300094656, +91 8818894656

Unit-I

(A Division For Non- Metallic Expansion Joints)

Khadan Road, NavDurga Nagar, Mathpuraina,

Behind Rasoni College

Raipur - 492001, Chhattisgarh, India

E-mail: fortwilliamflexibles@gmail.com

Tele : +91 9300208532, +91 9300921008

Unit-II

(A Division For Metallic Expansion Joints
& Spares for Aluminum Smelter Plant)

Address : Plot No 2/A Industrial Area Somni,

Distt : Rajnandgaon - 491441, Chhattisgarh, India

E-mail:fortwilliam.mej@gmail.com

Tele : +91 7744220250, +91 8818894656