

FOR HEAT EXCHANGER

# EXPANSION JOINTS

TECHNICAL DESIGN CATALOG





## Mega-Axial Compensators Safety Standard For Heat Exchangers

*For more than 36 years, Megaflexon Co., Ltd. has been supplying compensators all over the world for extreme operating conditions. The know-how resulting from this makes us one of the leading manufactures and suppliers of compensators for all industrial applications, e.g.*

- *Machine And Plant Constuction*
- *Chemical Systems*
- *Power Stations*
- *District Heating Systems*
- *Tank Farms*
- *Fcc Systems*
- *General Pipeline Systems*





## Global References

Megaflexon expansion joint for heat exchangers are in operation all over the world with excellent results and satisfied customers including following.

- DOOSAN HEAVY IND CO., LTD. (KOREA)
- IHI (JAPAN)
- MITSUI (JAPAN)
- HITACHI (JAPAN)
- BASF KOREA (KOREA)
- SAMSUNG HEAVY INDUSTRIES (KOREA)
- SK CORP. (KOREA)
- UOP (USA)

OVERSEAS			DOMESTIC		
 A Honeywell Company		 Discover Reliable			
 دولفين للطاقة		 أدنوك			
					
		 البنزونية المتكاملة			
					
		 الشركة السعودية للكهرباء			
					
					



## Certifications

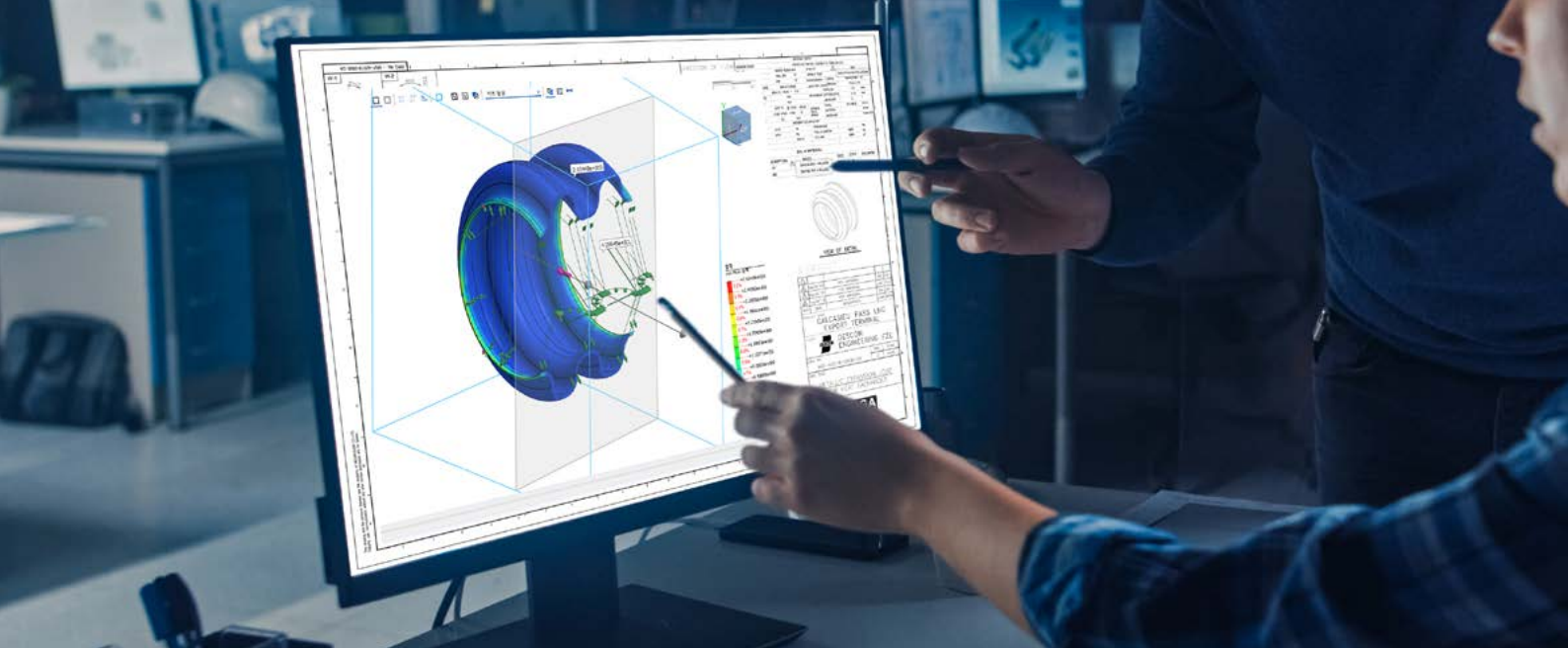
Megaflexon declares that Quality and Service are our most TOP priority. We always put quality and service on our most top priority and will make sure to deliver zero-defect products and service on time to our customers.

In order to ensure our quality commitment, our degreed quality specialists do strictly carry out all required activities for quality assurance.

- The National Board
- ASME "U" Stamp
- ASME "S" Stamp
- ASME "PP" Stamp
- CE PED
- ISO 9001
- ISO 14001
- ISO 45001







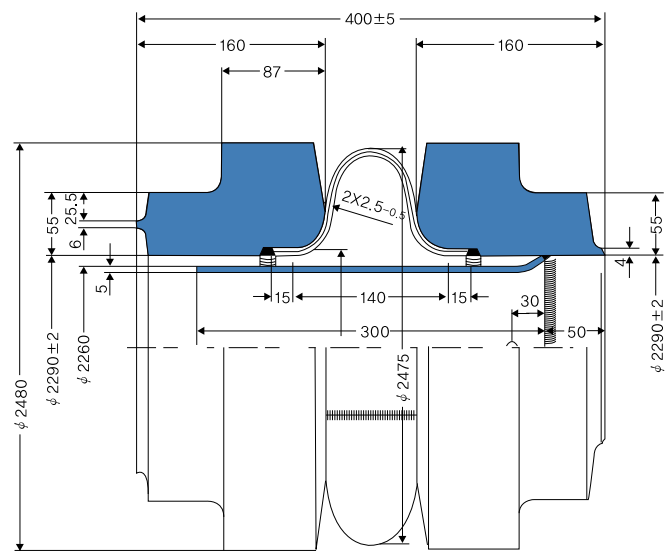
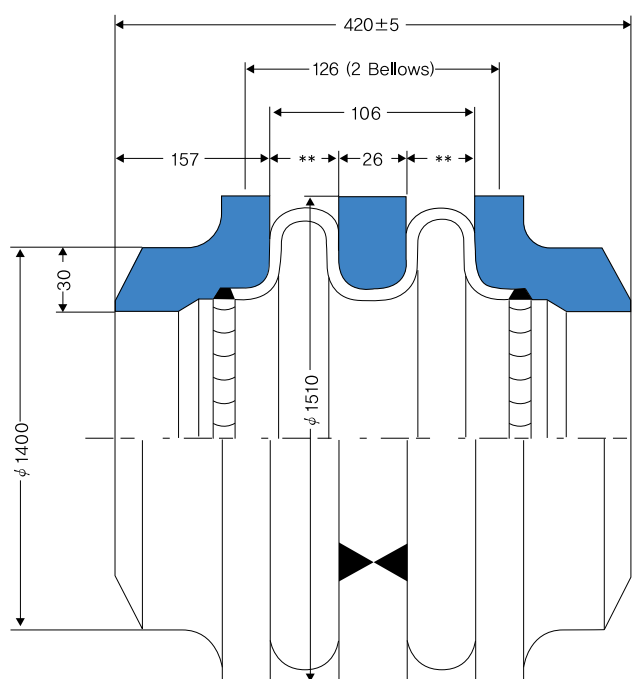
## Extreme Operating Conditions

Mega axial compensators for heat exchangers are manufactured according to the corresponding standards and code regulations, in rated sizes DN 15 to 15,000 and with operating pressures from 0 bar to 200 bar, temperatures excursions from -200°C to 800°C (load alternation 200 to 200,000).

## Design / Calculation

Mega compensators are designed using specially developed programs, which will take account of all applicable standards and code regulation, e.g.

- EJMA latest edition
- ASME Section VIII
- ASME Section IX
- ASME B31.1 (Power Piping)
- ASME B31.3 (Process Piping)
- TEMA latest edition
- FEA Finite Element Analysis
- CPSA Caesar Pipe Stress Analysis





## Materials of Construction

Bellows are manufactured from austenitic stainless steel and non-standard materials e.g. Ni, Ti, Hastelloy, Inconel, etc.. In addition ferritic materials e.g. carbon steel, CrMo are used for the end fitting materials.

## Bellows Materials

Selection of the bellows material is the single most important factor to be considered in the design of an expansion joint.

### ■ STAINLESS STEEL-TYPE 300 AUSTENITIC SERIES

304 / 304L / 304H / 316 / 316L / 316H / 321 / 321H 310S Others  
Super Duplex Stainless Steel  
(UNS S31803, 32750 & etc.)

### ■ NICKEL ALLOYS

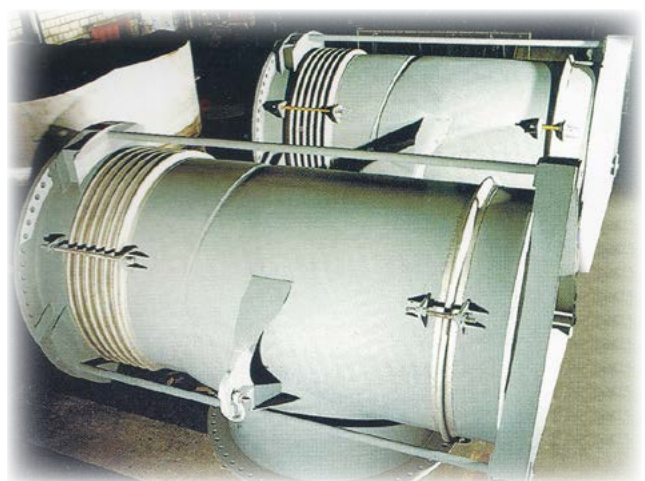
Alloy 600 / 625 / 625LCF / 800 / 800H / 825 / Monel-400 /  
HASTELLOY-C (C-276)

### ■ OTHERS

TITANIUM, HAYNESS 230 & etc.



▲ Flanged and Fluted Type



▲ Bellows Type





# Flanged and Flued Type Expansion Joint

for CALCASIEU PASS LNG EXPORT TERMINAL, USA



▲ Bellows Thickness Measuring



*Calcasieu Pass LNG is a ten million tonnes per annum (Mtpa) LNG export terminal to be developed by Venture Global Calcasieu Pass, a subsidiary of Venture Global LNG, in Louisiana, US.*



- Main Contractor : UOP A Honeywell Company
- Year : 2019
- Owner : VENTURE GLOBAL LNG (Client)
- Total Q'ty : 6 sets
- Size : I.D. 1448mm x O.D. 2000mm x 1340mmL, t35
- Material : ASTM A516 Gr 70

## Design Data (Example)

NO.	ITEM		DESCRIPTION			
1	APPLICATION CODE		EJMA (Standard of the Expansion Joint Manufacturer's Association. Inc.) 10th Edition.			
			ASME B31.3 PROCESS PIPING - 2018 ED.			
2	MATERIALS	BELLOWS	A240-316L			
		PIPE	A312-316L			
		COLLAR	N/A			
		REINFORCE RING	N/A			
3	FLUID NAME		LNG			
4	DESIGN	POSITIVE PRESSURE	DP	10	kg/cm <sup>2</sup>	
		NEGATIVE PRESSURE	DEP	1.05	kg/cm <sup>2</sup>	
		TEMPERATURE	DT	125.0	°C	
5	OPERATING	PRESSURE (Max.)	OP	8.00	kg/cm <sup>2</sup>	
		TEMPERATURE	OT	Max. 125	°C	
6	Max. ALLOWANCE WORKING PRESSURE		MAWP	4.30	kg/cm <sup>2</sup>	
7	Min. DESIGN METAL TEMPERATURE		MDMT	-195.0	°C	
8	BELLOWS SIZE ( ROLL : 1 / HYDRO :2 / PUNCH : 2 )		I.D(Db)	609.6 mm	TH'K(t)	1.0 mm X 1 Ply(n)
			Pitch(q)	40 mm	HEL.(W)	40 mm
			TAN(Lt)	10 mm	TOTAL(Lb)	200 mm
9	INTER PIPE SIZE		I.D(De)	603.50 mm	TH'K(ti)	3.05 mm
			LENGTH		Li	0 mm
10	END PIPE SIZE		I.D(De)	603.50 mm	TH'K(te)	3.05 mm
			LENGTH		Le	0 mm
11	TOTAL LENGTH OF EXPANSION JOINT		Lb + Li + 2 X Le		Lu	200 mm
12	CORR. ALLOWANCE(BELLOWS / END PIPE)		B	0.0 mm	E	0.0 mm
13	NUMBER OF CONVOLUTION		N	5	Corr.	
14	MOVEMENT		AXIAL COMPRESION		(-)	13.5 mm
			AXIAL EXTENSION		(+)	13.5 mm
			LATERAL		(Y)	0.0 mm
					(Z)	0.0 mm
					SUM	0.00 mm
			ANGULAR ROTATION		(o)	0.0 Deg
					SUM	0.00 Rad.
15	PRESET		AXIAL COMPRESION		(-)	0.0 mm
			AXIAL EXTENSION		(+)	0.0 mm
			LATERAL		(Y)	0.0 mm
					(Z)	0.0 mm
16	COLLAR SIZE		tc	0.0 mm	Lc	0.0 mm
17	REIN. RING SIZE		RID	0.0 mm	ROD	0.0 mm
18	REIN. RING SECTION SIZE		ID	0.0 mm	OD	0.0 mm
19	REIN. RING Eff. AREA (ROOT:1, BAR:2, PIPE:3)		1	0.00	mm <sup>2</sup>	
20	REIN. RING NUMBER		ng	0	EA	
21	REQUIRED FATIGUE LIFE CYCLE		8000			Cycles
22	RADIOGARPHY	BELLOWS	Cwb	Full (Longitudinal Seam)		100 %
		PIPE	Cwb	Full (Longitudinal Seam)		100 %
23	PENETRATION	BELLOWS	LONGITUDINAL SEAM BEFORE AND AFTER FORMING			100 %
		END PIPE	LONGITUDINAL SEAM AFTER WELDING			100 %
24	TEST PRESSURE	HYDRO.	12.50			kg/cm <sup>2</sup>
		PNEUMATIC	N/A			kg/cm <sup>2</sup>
25	INSULLATION		N/A			mm





## MEGAFLEXON has Specially Engaged in Expansion Joint Industry Since 1986

Since its founding in 1986 we have devoted ourselves to research, development and manufacture of high level of expansion joints in quality and reliability.

Based on our accumulated experience and know-how, all of our staff has an in-depth understanding of each industrial application and has done our best to meet customers' specialized needs.

As an expert in expansion joint industry, we will never stop exploring new solutions for expansion joint applications and will continuously provide high quality products and on-site service to our customers.





ISO 9001  
ISO 14001  
ISO 45001

# MEGA FLEXON

EXPANSION JOINT & FLEXIBLE PRODUCTS

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