JOHN CARDWELL LTD

FLEXION DIVISION

INDUSTRIAL

EXPANSION

JOINT

MANUFACTURERS

SOLVING INDUSTRIAL THERI

INTRODUCTION

We hope this leaflet will give prospective clients some indication of the wide range of bellows expansion joints engineered by JOHN CARDWELL LTD FLEXION DIVISION.
The continual demand for higher efficiencies in energy conversion plant requires higher pressures and temperatures in the transporting pipework must be absorbed in a controlled manner.
Plant items, particularly vessels, turbines, pumps, compressors, boiler connections and heat exchangers need to be protected from unacceptable forces and movements. JOHN CARDWELL LTD FLEXION DIVISION engineers are well qualified to deal with these problems.
Both in the UK and overseas our ability to provide expansion joints quickly and at a sensible price has been recognised by many major organisations. Our policy of stocking units for standard applications, frees our engineers to concentrate on the more demanding applications for which we have built an enviable reputation.

NUCLEAR AND CONVENTIONAL POWER PLANTS

Whilst every effort is made by the station designer to route pipework using natural flexibility, certain locations, typically turbine stop valve, turbine crossovers and superheater outlets, require strict limits on imposed loadings. Pressure restrained bellows are essential, typically pressure balanced, hinged and gimbal assemblies. These serve to restrict loading. At the other extreme FD and ID ducting employ unrestrained axial/lateral bellows of significant rectangular section frequently with carbon steel convolutions.

The illustration shows a 14" double hinged unit for turbine exhaust application.

OFFSHORE EXPLORATION

From the drilling rig diesel driver to the flare stack general services, all bellows must recognise the aggressive environment in which they operate. Corrosion resistance is of prime importance. In fire sensitive areas, where metal temperatures are restricted, use is made of the jacketed bellows which allows hot gases to pass through the main bore bellows around which is an annular section through which cooling water is passed to limit the metal temperature of the outer bellows. (This type of bellows can also be used to aid the flow of low viscosity media).

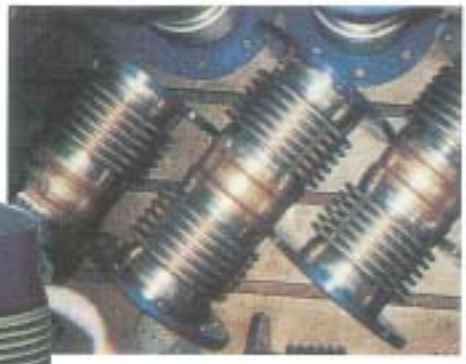
An illustration of jacketed bellows is shown on the front cover.

PETROCHEMICAL AND PROCESS

The wide range of oils and chemicals being transported, their temperatures and pressures provide a wide range of bellows applications. Resistance to corrosion/erosion is essential as is prediction of cyclic life to ensure satisfactory operation.

Illustrated are air bellows for an energy recovering plant at a UK refinery.

MAL EXPANSION PROBLEMS



MARINE, ROAD AND RAIL TRANSPORT

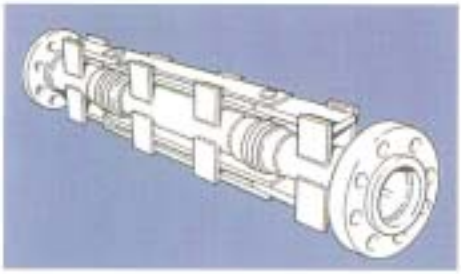
Locomotive power for the above is largely supplied by diesel engines, from the relatively small units for road transport up to the enormous engines used for combat and commercial marine vessels. Bellows vary in size from 50mm to 1500mm N.S. "On-Engine" bellows are usually multiply to give good fatigue life being subject to exhaust gas pulsing pressures at high temperature. Turbocharger outlet bellows must recognise the sensitive equipment to which they are connected.

The illustration shows part of an order for 5" N.B. double bellows unit in 3 ply construction for UK rail locomotive application.

BUILDING SERVICES

All major buildings require steam, hot water, condensate, gas and oil services for heating and ventilation. The majority of bellows are small bore (15mm to 40mm) axials with a relatively small number of pressure restrained units in the larger sizes normally 250mm N.B. Maximum. We always recommend the use of a restrained bellows where possible as the initial higher cost of the bellows is amply offset by the reduction in guiding/anchoring required by the unrestrained axial type.
Rubber bellows are used extensively at pump suction/discharge connections to isolate pipe loading, noise and vibration.

Illustrated are a range of single and double axial units 32mm N.B. to 300mm for a University complex in the Middle East.



AEROSPACE RESEARCH

Military and commercial test facilities can place stringent demands on bellows design. Combinations of temperature, pressure, movement and life are unique. The classified nature of the work restricts the details of the applications.

Illustrated are 3" double hinged units complete in 321 SS with nickel alloy convolutions for air at 600 PSIG/600°C and 40mm lateral movement.

FIRE PROTECTION

Whether in an airport hanger, at a fuel oil unloading jetty or protecting a 600 mm boiler installation: Bellows are required to absorb structural movement with minor thermal movement due to ambient temperature changes. Usually operating at up to 25 Bar g, the bellows are invariably pressure restrained. Where sea water is used for fire service bellows convolutions are usually of nickel copper alloy construction.

The 10" NB double tied bellows illustrated is to absorb jetty movement during tanker berthing.

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CLIENT LIST

- A.E.R.E. Harwell
- Associated British Ports Ltd.
- Babcock Energy
- Babcock Construction
- B.P. Chemicals International Ltd.
- British Aerospace plc
- British Gas
- B.N.F.L.
- British Rail Engineering
- British Steel Corporation
- British Sugar
- British Telecom Research Laborotaries
- British Telecom Power Maintenance
- Forest City Ltd.
- Govan Shipbuilders
- Haarman & Reimer
- Haden Young Ltd
- Heat Transfer Ltd.
- Hick Hargreaves
- Jaguar Motors
- John Laing Construction Ltd.
- ICI plc
- Kellog Co. of Great Britain Ltd
- The Lummus Company
- Marathon Oil (UK) Ltd.
- M.o.D.
- Mitchell Mott Chemicals plc
- Mowlem Engineering
- NEI - GEC Turbine Generators
- Overseas Containers Ltd.
- Powergen/National Power
- Ricardo Consultants
- Senior Thermal
- Sevalco Ltd.
- Shell (UK) Ltd.
- Shell Thornton Research
- SLP Engineering
- Steels Engineering
- Stein Atkinson Stordy Ltd
- Tate & Lyle
- Unichema
- Wormald Fire Systems Ltd.

Metal Bellows range - 15mm N.B. to 4000mm N.S.
Rubber Bellows range - 20mm N.B. to 3000mm N.S.

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