

दूरभाष :
TELEPHONE : 2559 0069
फेक्स संख्या : +91-22-2550 5150/51/52
FAX NUMBER
Email:anupamks@barc.gov.in



ट्रॉम्बे,
मुंबई-४०० ०८५,
TROMBAY,
MUMBAI -400 085

भारत सरकार
GOVERNMENT OF INDIA
भाभा परमाणु अनुसंधान केन्द्र
BHABHA ATOMIC RESEARCH CENTRE
Centre for Design and Manufacture
Design of Special Purpose Equipment Section

Ref: CDM/DSPS/ANKS/18/ OPA/210923

02/11/2018

विषय: तकनीकी विनिर्देश संख्या: टीएसपी / सीडीएम / 2018/001 दिनांक 02-05-18 Rev.1

के अनुसार हायड्रोफोर्मड धौंकनी की फैब्रिकेशन और आपूर्ति

**Sub: Fabrication & Supply of Hydro-formed Bellows as per Technical specification no.:
TSP/CDM/2018/001 Dated 02-05-18 Rev.1 (Annexure -I)**

महोदय,

Dear Sir,

1. संलग्न तकनीकी विनिर्देश संख्या: टीएसपी / सीडीएम / 2018/001 दिनांक 02-05-18 Rev.1 के अनुसार मामूली फैब्रिकेशन कार्य के लिए कोटेशन आमंत्रित किया गया है।
Quotation is invited for the minor fabrication job as per enclosed technical specification no.: TSP/CDM/2018/001 Dated 02-05-18 Rev.1.
2. बोलीकर्ता (बिडर) सामग्री के साथ वस्तु के निर्माण के लिए मूल्य बतायेगा। करों को अलग से उद्धृत किया जाए।
Bidder shall quote for fabrication of the item with material. Taxes shall be quoted separately.
3. कोटेशन दिनांक 07.12.18 तक अध्यक्ष, सीडीएम के पास पहुंच जाना चाहिए और केवल स्पीड पोस्ट / पंजीकृत पोस्ट द्वारा दी गई नियत तिथि और उपरोक्त संदर्भ संख्या ऊपर लिखकर मुहरबंद लिफाफा में भेजा जाना चाहिए।
The quotation must reach Head, CDM by 07.12.18 and must be sent in a sealed envelope super scribed with the above reference no. and due date given above by Speed Post/ Registered Post only.
4. लिफाफे पर पता लिखा होना चाहिए: अध्यक्ष, अभिकल्पन और विनिर्माण केंद्र (CDM) (Attn: श्री अनुपम कुमार सिन्हा), भाभा परमाणु अनुसंधान केंद्र, ट्रॉम्बे, मुंबई -400085।
The address on the envelope should read: HEAD, CENTRE FOR DESIGN AND MANUFACTURE (Attn: Shri Anupam Kumar Sinha), BHABHA ATOMIC RESEARCH CENTRE, TROMBAY, MUMBAI-400085.
5. तकनीकी विनिर्देश संख्या टीएसपी/सीडीएम/2018/001 दिनांक 02-05-18 Rev.1 के अनुसार हायड्रोफोर्मड धौंकनी की आपूर्ति की जानी है। आपूर्ति बोलीकर्ता (बिडर) के स्थल पर हमारे अभियन्ता द्वारा निरीक्षण के उपरांत देनी होगी।

Hydro-formed bellows as per Technical specification no.: TSP/CDM/2018/001 Dated 02-05-18 Rev.1 is to be supplied. Supply shall be subject to inspection by our engineer at bidder's site.

6. अंतिम क्रय आदेश जारी होने के 8 सप्ताह के भीतर तथा हमारे अभियन्ता की स्वीकृति के पश्चात् बोलीकर्ता को तैयार सामान (आइटम) पहुँचाना होगा। तैयार सामान (आइटम) स्टोर ऑफिसर, सेंटर फॉर डिज़ाइन और मैनुफैक्चरिंग ज़ोनल स्टोर, बीएआरसी, ट्रॉम्बे, मुंबई -85 को पहुँचाना होगा।
The bidder shall deliver the items after approval by our engineer **within 8 weeks** from the date the firm purchase order is issued to the bidder. The finished items shall be delivered to **Store Officer, Centre for Design and Manufacture Zonal Store, B.A.R.C, Trombay, Mumbai-85.**

संलग्न: तकनीकी विनिर्देश संख्या: टीएसपी / सीडीएम / 2018/001 दिनांक 02-05-18 Rev.1

Encl: Technical specification no. TSP/CDM/2018/001 Dated 02-05-18 Rev.1.



अनुपम कुमार सिन्हा
(Anupam Kumar Sinha)
वैज्ञानिक अधिकारी-डी
(Scientific Officer D)

Fabrication & Supply of Hydro-formed Bellows

Technical specification no.: TSP/CDM/2018/001 Dated 02-05-18 Rev.1

1.0 Scope: This specification is for fabrication and supply of Hydro-formed Bellows as per enclosed drawings. Bellows are to be designed as per drawing parameter, fabricated and supplied. The enclosed drawings are procurement drawings. The detailed fabrication drawings shall be prepared by the supplier. Same will be approved by purchaser. Approval of drawings does not relieve supplier from responsibility of meeting drawing requirements.

2.0 Purpose: Hydro-formed Bellows are required to connect subassemblies inside vacuum system which transfers Electrical Signals in Radio Frequency range. In addition it also ensures leak tightness against ultra-high vacuum environment with positional adjustment of components.

3.0 Deliverables:

S.N.	Description	Qty.	Applicable Drgs.	Material
1	Bellows, Tangent ID:75.2mm, Length: 40 mm	8	Figure 1	SS 304L/316L
2	Bellows, Tangent ID: 23.4 mm, length: 20 mm	8	Figure 2	SS 304L/316L

4.0 General Requirements:

- a) All the items should be buffed to have good aesthetic appearance and UHV compatibility. Surface roughness should be Ra 0.4 or lower.
- b) All surfaces should be chemically clean, free of dirt, grease, oil and chips and look aesthetically good. Surfaces shall be visibly inspected and wiped down with a white cloth. In order to be considered free of contamination, no discoloration should appear on the white cloth.
- c) The component should be free of water/moisture and all manufacturing, storage and testing procedures should be such that the final component/assembly is completely dry and free of any trapped water/moisture.
- d) Welding procedure should be qualified in accordance with latest revision of ASME Section-IX and ASME/AISI B 31.3 for Ultra High vacuum application. All welding should be done by the Gas Tungsten Arc Welding (GTAW) process (unless otherwise specified or agreed by user), using welding quality argon gas for the inert shield during welding and post welding treatment.
- e) Hydrostatic test is not permitted. Pneumatic pressure testing should be done with dry inert gas for internal as well as external pressure as per above mentioned codes.
- f) Design, fabrication, testing and shipment shall comply with ASTM, ASME B 31.3, ASME BPVC, EJMA and other applicable codes.
- g) Packaging and shipment should be such that final component does not undergo shocks, deformations, surface damages, moisture or anything having negative effects on its design and operation intent.

Hydro formed Bellows

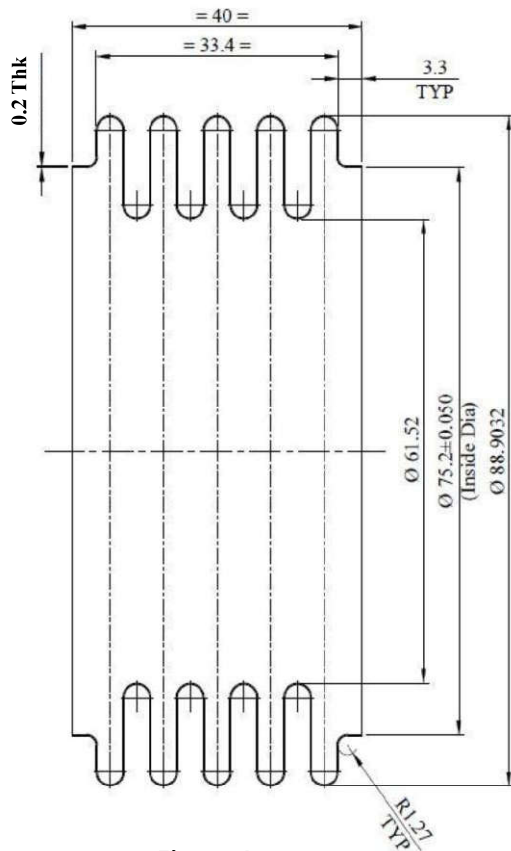


Figure 1

Design Parameters

Medium to handle	: GN2, GHe, Air or Vacuum
Operating Pressure	: 1 Bar Internal or External
Operating Temperature	: 370K
Minimum Life	: 1000 Cycles
Max. Compression	: 4.6 mm
Max. Expansion	: 4.6 mm
Max. Bend Angle	: 5 degrees
Spring rate	: 18.8 N/mm (Axial)
Permissible Leak Rate	: 1×10^{-10} Pa m ³ /s at standard condition.

Following documents are to be submitted to purchaser:

- Design calculation report as per EJMA standard.
- Actual fabrication drawings.
- All necessary material certificates as per ASTM standard.
- Dimensional inspection report.
- Helium Leak Test Report
- Pressure test report for 1.1 Bar or Vacuum.

Requirements:

- Bellows must be hydro-formed.
- Bellow dimensions shown in the drawing are for reference only. These dimensions are to be set by supplier in accordance with ASME B31.3, ASME BPVC & EJMA nearest to that provided in drawing. Design calculation report along with drawings is to be provided by supplier and approved by purchaser before start of manufacturing.
- Purchaser may conduct Pressure/ Vacuum Test, Helium Leak Test, Spring Rate Test on final delivered component at purchaser site. Final acceptance is subject to clearance of above mentioned tests. Purchaser reserves right to reject and return components which doesn't qualify above mentioned tests.

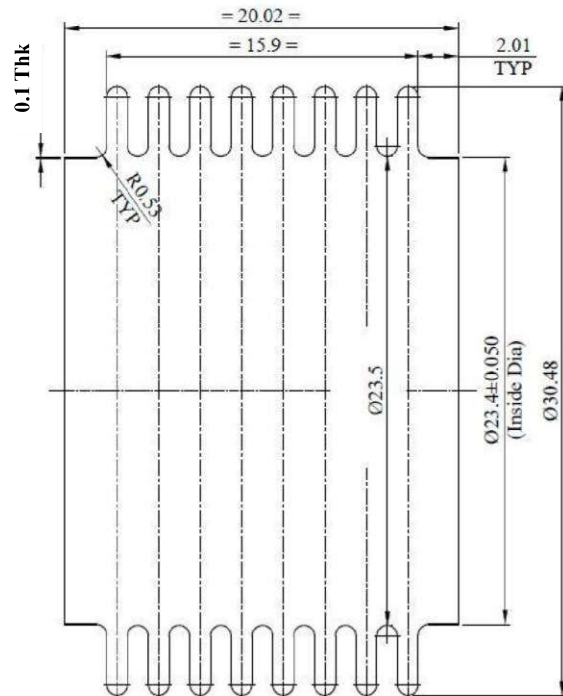


Figure 2

Design Parameters

- Medium to handle:** GN₂, GHe, Air or Vacuum
- Operating Pressure:** 1 Bar Internal or External
- Operating Temperature:** 370K
- Minimum Life:** 1000 Cycles
- Max. Compression:** 3 mm
- Max. Expansion:** 3 mm
- Max. Bend Angle:** 3 degrees
- Spring rate:** 18.8 N/mm (Axial)
- Permissible Leak Rate** : 1×10^{-10} Pa m³/s at standard condition.

Following documents are to be submitted to purchaser:

- a) Design calculation report as per EJMA standard.
- b) Actual fabrication drawings.
- c) All necessary material certificates as per ASTM standard.
- d) Dimensional inspection report.
- e) Helium Leak Test Report
- f) Pressure test report for 1.1 Bar or Vacuum.

Requirements:

- a) Bellows must be hydro-formed.
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- c) Purchaser may conduct Pressure/ Vacuum Test, Helium Leak Test, Spring Rate Test on final delivered component at purchaser site. Final acceptance is subject to clearance of above mentioned tests. Purchaser reserves right to reject and return components which doesn't qualify above mentioned tests.