

**DEFENCE BIOENGINEERING AND ELECTROMEDICAL LABORATORY
DRDO, MIN. OF DEFENCE, GOI, BANGALORE 560093.**

INVITATION FOR EXPRESSION OF INTEREST (EoI) FOR PARTICIPATION IN THE DEVELOPMENT OF REQUIREMENTS FOR NEW GENERATION PROTECTIVE ENSEMBLE FOR CHEMICAL AND BIOLOGICAL (CB) PROTECTION

EoI Reference No.: DEB/EOI/NGPE/01/2015-2016 dated 11th December 2015

I. Expression of Interest:

The Director, Defence Bioengineering and Electromedical Laboratory (DEBEL), Min. of Defence, Government of India, Bangalore 560093, on behalf of The President of India, invites Expression of Interest (EoI) for the following from professionally competent, reputed Indian Industries, preferably from Textiles and Polymer/Rubber sector.

Description	Due Date
Development of Requirements for New Generation Protective Ensemble (NGPE) for Chemical and Biological Protection	25 December 2015, by 1500hrs.

Expression of Interest (EoI) is invited from Indian Industries who are meeting the various requirements enumerated in the 'Detailed Information on the Invitation for Expression of Interest (EoI) for 'Development of Requirements for New Generation Protective Ensemble (NGPE) for Chemical and Biological Protection' given in DRDO website: www.drdo.org for development of requirements for a wearable protective ensemble capability that will enable the personnel to operate in a CB environment with no or minimal degradation in performance.

Expression of Interest

Selection of Industry Partners

for

‘Development of Requirements for New Generation Protective Ensemble (NGPE) for Chemical and Biological Protection’

Eoi Reference No.: DEB/EOI/NGPE/01/2015-2016 dated 11th December 2015



**DEFENCE BIOENGINEERING AND ELECTROMEDICAL LABORATORY
(DEBEL)**

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1 Introduction & Brief of the Organisation

1.1 Introduction

Defence Bioengineering and Electromedical Laboratory (DEBEL), Min. of Defence, Government of India, Bangalore 560093, on behalf of The President of India, invites Expression of Interest (Eoi) for participation in the 'Development of Requirements for New Generation Protective Ensemble (NGPE) for Chemical and Biological Protection' from professionally competent, reputed Indian Industries, preferably from Textiles and Polymer/Rubber sector.

1.2 Brief of the Organisation issuing the Eoi:

DEBEL, located in Bangalore is one of the 52 laboratories under Defence Research and Development Organisation (DRDO). DEBEL engages itself in the design and development of specific solutions to the Indian Armed Forces operating in a wide variety of severe inhospitable conditions. In the last three decades, DEBEL has made significant contributions in the complex and inter-disciplinary areas of Life Support systems, Protective equipment, tele-medicine and Chemical & Biological (CB) warfare protective equipment. By employing the recent technological developments in varied fields and the collaborations with academia, industry at the National and International level, DEBEL is in a constant endeavour to upgrade the systems and products used by the Armed Forces to provide them with the affordable, appropriate and elegant solutions. For more details on the activities of DEBEL, please log onto www.drdo.gov.in

2 Background information:

The protective ensemble, present or new generation for that matter, will employ predominantly the textile materials with exclusive finishing treatments and polymeric materials including the specially developed rubbers for use in the Respirators, Over-boots and Gloves. The currently employed protective ensemble is shown in Fig. 1 of Enclosure-I. While the suit permeable provides dermal protection, Respirator provides respiratory protection by ensuring the filtering of the harmful agents.

Suit permeable is primarily made of a multi-functional outer shell made out of commercial/technical textile and a filter layer for the adsorption of harmful agents. Fabric material of the Outer shell is flame retardant; anti-static; water repellent and oil repellent. Protection against the chemical warfare (CW) agents is from the filter layer. The development of the filter layer that started with the application of resin oil moved onto the usage of charcoal impregnated clothing after the World War II. Subsequent improvements saw the introduction of the activated charcoal that had considerable surface area with increased adsorption efficiency. The surface area of activated charcoal is as high as 1000m²/g. The recent improvements include the introduction of activated carbon sphere (ACS) coated fabric and the activated carbon fabric (ACF). Activated carbon, even today, is the gold standard for use in the chemical protective clothing and the filters. Conventional charcoal impregnated/coated fabrics that are semi-permeable have been used the world over for protection against the chemical warfare agents.

Even though the semi-permeable fabrics allow the perspiration to escape, the suits impose thermal stress leading to performance decrement when worn for longer periods. Improvements in the form of enhancement of surface area of the carbon, activation of the carbon and hence the adsorption capacity have been introduced. ACFs have emerged in the recent years as the most preferable materials for the adsorption of toxic vapours/chemical warfare agents due to their high surface area (1500 – 2000m²/g as compared to 800 – 1200m²/g for the granular activated carbon) and ease of handling. Parallel to the development of the permeable activated charcoal coated fabrics was the development of the impermeable fabrics based on either the fabric coated with the polymeric sheet or the polymeric sheet itself. Though the protection capability of the permeable and impermeable garments is high, the comfort level is far from desirable levels as the evaporative heat transfer is impeded from the microclimate of the wearer to the ambient. Mere adsorption of the chemical agents by the activated charcoal /ACF forms another significant limitation as the garments pose a contamination threat thus requiring careful handling and costly disposal. Thus, the current chemical warfare protective garments are far from ideal. The limitations of the current chemical warfare protective garments call for the usage of the novel fabric ensembles with or without the use of ACS/ACF to achieve maximum protection with low thermal burden or reasonably acceptable level of comfort.

3 Objective

The objective is to collect, test, analyse and compare Chemical Biological (CB) protection technologies in order to facilitate development of requirements for a wearable protective ensemble capability that will enable the warfighters to operate in a CB environment with no or minimal degradation in performance.

4 Requirements for participation & General Instructions:

4.1 The current EoI is for collection of information and short-listing of the potential vendors and shall not be construed as an Invitation for Bid (IFB) or a Request For Proposal (RFP). The EoI is by no means a commitment of DEBEL or any other Government agency either for the placement of order at present & in the future or for the payment in response to the information submitted. DEBEL or any other Government agency shall not be liable for, or suffer any consequential damages for any technical information (ex., limited and/or restricted rights) submitted in response to the current EoI.

4.1 As can be seen from the above at Para 2, CB protective ensemble predominantly consists of textiles, polymeric materials including rubber and hence any textile mill/industry can express interest towards participation in the development of requirements.

4.2 The textile mill shall be preferably a composite mill having Spinning; Weaving and Fabric Processing under one roof to ensure the strict quality control that the CB protective garments demand. A copy of composite mill certificate issued by the Govt. of India, Ministry of Textiles showing Spinning, Weaving & Fabric Processing under one company name and having one legal entity shall be submitted along with the EoI. Such a certificate shall be valid at the time of submission.

4.3 It is desirable that the textile mill shall have in-house coating facility for coating of activated carbon spheres (ACS) or alternately the mill shall have an arrangement with the industry (small or medium scale) that has the coating facility and a certificate to this effect shall be furnished by the mill along with the EoI.

4.4 In the event of any industry (small or medium scale) having the coating facility intends to express the interest, such an industry shall produce a certificate to the effect that there exists an arrangement between a textile composite mill and the industry.

4.5 Any industry involved in the moulding of rubber components and preferably in the moulding of masks, gloves and boots can express interest towards participation in the development of requirements.

4.6 Any textile mill/industry already involved in the development of CB protective ensemble either fully or in parts, or any protective ensemble against toxic industrial chemicals can also express interest towards participation in the development of requirements.

4.7 The textile mill/industry shall oblige to supply free of cost any material/ensemble along with its details, on request from DEBEL for further evaluation of the critical parameters relating to CB protection.

4.8 The Indian Textile Mills/industries desirous of taking part in the development of requirements may submit EoI with documentary evidence in support of their technical & financial capability giving Company Profile, Certificate of registration as a manufacturing unit, balance sheet for last 3 years, Financial status, Man Power details, Details of Works, Performance Certificates, POs executed, List of machines of manufacturing units, List of Testing equipments, List of Clients / Customers, Technical literature, Production Capacity, Quality Control and Manufacturing Process, Tests being carried out, ISO/ISI certificate, Income Tax clearance Certificates etc.

4.9 Director, DEBEL, on behalf of The President of India, reserves the right to accept/reject EoI or stop the process at any stage, at his sole discretion without assigning any reason and shall bear no liability whatsoever consequent upon such decision. Mere submission of EoI will not confer any right for participation in the development of requirements.

4.10 Dealers, agents and distributors of textile mill/industry are barred from expressing their interest towards the development of requirements.

4.11 Point of Contact information (name, Phone number, Fax number, E-mail ID, Postal Address and any other info) shall be provided.

5 Respondents are encouraged to submit the following:

5.1 Details of the fabrics developed – Outer Shell, filter fabric and any advanced material for use in CB warfare environment. Maturity level of the development may please be indicated on a scale of 1 to 10 with

1 representing the concept stage; 2-4 representing the proof of concept stage; 5-7 representing the proto development; 8-10 representing the complete development.

5.2 Details of the tests carried out on the developed materials and the test results. Test reports to support the results.

5.3 Details of any specialised testing that needs to be carried out particularly with reference to the intended use in the CB warfare environment.

5.4 Developed fabric samples and the proto suit.

5.5 Price of the developed fabric materials and the proto suit.

5.6 Import component in the developed fabric materials and the ease of availability of the import component.

5.7 Details of the critical manufacturing facility for the development of fabrics/proto suits.

5.8 Developed samples/proto suits at no cost to DEBEL on non-returnable basis.

6 Submission Instructions:

6.1 EoI submissions shall be in Microsoft Office Format and shall be sent to dirdebel@debel.drdo.in. Hard copy of the submission may please be posted to the 'Director, DEBEL, DRDO, Min. of Defence, PB No. 9326, C V Raman Nagar, Bangalore- 560093'.

6.2 For any clarification prior to the submission of EoI, the following may be contacted:

Dr U K Singh, Director, DEBEL (080-25058576; 09449733715), e-mail: dirdebel@debel.drdo.in

DRDO HQ : Sri Devkanta Pahad Singh, Director (PM & SQR), O/o DS & DGLS (011-23007309; 09560450144), e-mail : pahadsingh@hqr.drdo.in

Dr T M Kotresh, DEBEL, Principal Investigator (080-25058649; 09845326267), e-mail: tm.kotresh@debel.drdo.in

Dr N S Kumar, DEBEL, Lead Analyst (080-25058648; 09448974915), e-mail: ns.kumar@debel.drdo.in

6.3 The above may also be contacted for any details on the 'National Interactive Meet' planned at DEBEL, Bangalore on 8 & 9th January 2015.

7. Note: Those Textile Industries, who have already responded by expressing their interest against DEBEL's RFI need not respond for this EoI.

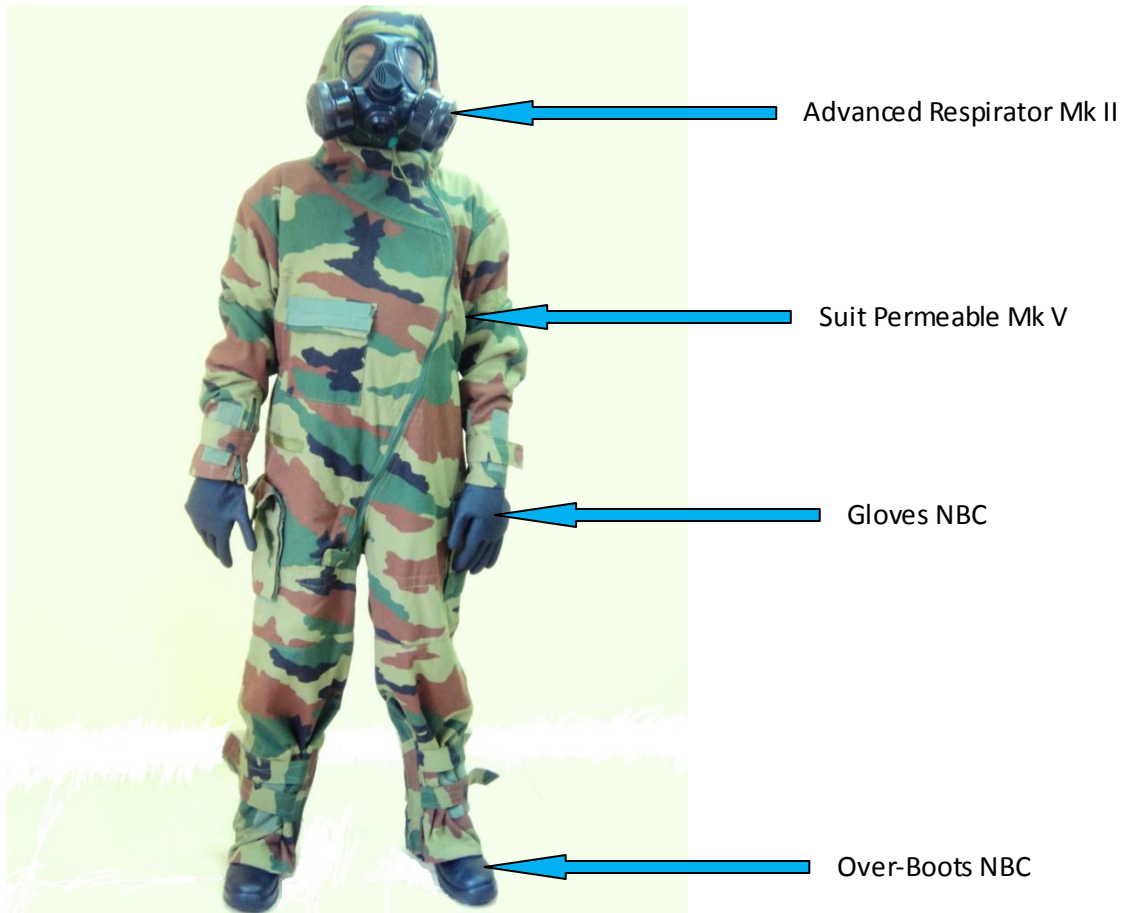


Figure 1: PERMEABLE SUIT