

**RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:**

**Bid Receiving - PWGSC / Réception des
soumissions - TPSGC**

**11 Laurier St./ 11, rue Laurier
Place du Portage, Phase III
Core 0A1 / Noyau 0A1
Gatineau, Québec K1A 0S5
Bid Fax: (819) 997-9776**

**REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaires

Title - Sujet BALLISTIC PLATES	
Solicitation No. - N° de l'invitation W8486-129671/A	Date 2012-05-14
Client Reference No. - N° de référence du client W8486-129671	
GETS Reference No. - N° de référence de SEAG PW-\$\$PR-707-60467	
File No. - N° de dossier pr707.W8486-129671	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2012-06-29	Time Zone Fuseau horaire Eastern Standard Time EST
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Elder, Sylvie	Buyer Id - Id de l'acheteur pr707
Telephone No. - N° de téléphone (819) 956-3830 ()	FAX No. - N° de FAX (819) 956-5454
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: See herein	

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address

**Raison sociale et adresse du
fournisseur/de l'entrepreneur**

Issuing Office - Bureau de distribution

Clothing and Textiles Division / Division des vêtements et des textiles

11 Laurier St./ 11, rue Laurier
6B1, Place du Portage
Gatineau, Québec K1A 0S5

Delivery Required - Livraison exigée See Herein	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

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PART 1 - GENERAL INFORMATION

1. SECURITY REQUIREMENT

There is no security requirement associated with the requirement.

2. REQUIREMENT

The Request for Proposal is for the provision of Bullet Resistant Plates (BRP) for the Department of National Defence. Twenty plates and tests results will be required with the bid at Phase 1. This procurement will be conducted in multiple phases.

Phase 1 - The written proposal will be evaluated and twenty (20) Pre-Award samples will be assessed for ballistics effective coverage ratio, weight and material requirements in accordance with Table F2 (Phase 1) of Annex F. As a result of this stage of the procurement, up to three contracts for the supply of 25 Bullet Resistant Plates will be awarded.

Phase II - Up to three contracts will be awarded for the supply of 25 Bullet Resistant Plates samples under each contract. The plates samples must be from the same production lot as the original bid samples. These plates will be assessed for ballistic, environmental and durability requirements at Table F2 (Phase II) of Annex F. If no compliant bidder is found after the technical evaluation of the 25 plates, the next 3 compliant bidders from Phase 1 will be given contracts to supply 25 plates.

Following the testing of the Phase II samples, the Main Contract (one contract) will be awarded for the supply 5,000 bullet resistant plates operational kits, 6,000 bullet resistant plates, 4,000 training aid plate kits, 2,000 training aid plates, no ballistic protection and 1,000 webbing carriers to be delivered to Montreal, Qc and Edmonton, Alb.

The Main Contract will also include series of annual options that may or may not be exercised to purchase additional quantities of all firm deliverable items (1- 5) listed in Annex A. These options will be available for a five year period commencing after the last delivery of the firm quantities. If exercised, the minimum order quantity of the option year will be 2,500 single Operational plates to an estimated maximum of 2,500 Operational Plate kits. The option may also be comprised of a combination of items (eg) 2,500 units of Operational plates, plus quantity X of Training Plate Kits plus quantity X of plate carriers.

The requirement for the samples at Phase II of the procurement process is detailed under Annex A-1 of the resulting Contract for samples clauses

The requirement for the Main Contract is detailed under Annex A of the resulting Main Contract clauses.

3. DEBRIEFINGS

After contract award, bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days of receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

PART 2 - BIDDER INSTRUCTIONS

1. STANDARD INSTRUCTIONS, CLAUSES AND CONDITIONS

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the Standard Acquisition Clauses and Conditions (<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>) Manual issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and

accept the clauses and conditions of the resulting contract.

The 2003 (2012-03-02) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of 2003, Standard Instructions- Goods and Services- Competitive Requirements, is amended as follows:

Delete: sixty (60) calendar days

Insert: one hundred and eighty (180) calendar days

1.1 SACC Manual clauses

A9130T 2011/05/16 Controlled Goods Program

2. SUBMISSION OF BIDS

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

3. ENQUIRIES - BID SOLICITATION

All enquiries must be submitted in writing to the Contracting Authority no later than fifteen (15) working days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary " will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that the Bidder do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

4. APPLICABLE LAWS

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the bidders.

5. SEALED SAMPLES (PLATE CARRIER)

The sealed samples may not meet the technical requirement in all respects and should be used for guidance and pricing only. Samples may be viewed (by appointment only) at the following offices:

Public Works & Government Services Canada
Supply Directorate
1150 D'Estimauville, 6th floor
Quebec, Que. G1J 0C7
TEL: 418-649-2831
FAX: 418-648-2209

Public Works & Government Services Canada
Place Bonaventure, South-East Portal

800 de La Gauchetière Street West, 7th Floor
Montreal, Quebec H5A 1L6
TEL: 514-496-3404
FAX: 514-496-3822

Public Works & Government Services Canada
Suite 480, 33 City Centre Drive
Mississauga, Ont. L5B 2N5
TEL: 905-615-2070
FAX 905-615-2060

Public Works & Government Services Canada
Suite 100, 167 Lombard Avenue
P.O. Box 1408
Winnipeg, Manitoba R3C 2Z1
TEL: 204-983-3774
FAX: 204-983-7796

Public Works & Government Services Canada
Telus Plaza North
10025 Jasper Avenue, 5th Floor
Edmonton, AB T5J 1S6
TEL: (780) 497-3649
FAX: (780) 497-3510

Public Works & Government Services Canada
Pacific Region, SOSB, Industrial & Commercial Products
12th Floor, 800 Burrard Street
Vancouver, B.C V6Z 2V8
TEL: 604-775-7630
FAX: 604-775-7526

Department of National Defence
National Defence Headquarters
Printing Bureau
45 Sacré-Coeur Blvd.
Gatineau, Quebec
K1A 0K2
ATTN: DSCO 4-7-4
TEL: 819-997-2672
FAX: 819-994-9561

6. SPECIFICATIONS AND STANDARDS

6.1 United States Military Specifications and Standards

The Bidder is responsible for obtaining copies of all United States (US) military specifications and standards which may be applicable to the requirement. These specifications and standards are available commercially, or may be obtained by visiting the US Department of Defense Website, at the following address: <http://dodssp.daps.dla.mil/> .

6.2 Canadian General Standards Board (CGSB) - Standards

A copy of the CGSB Standards referred to in the bid solicitation is available and may be purchased from:

Canadian General Standards Board

Place du Portage III, 6B1

11 Laurier Street

Gatineau, Québec

Telephone: (819) 956-0425 or 1-800-665-CGSB (Canada only)

Fax: (819) 956-5740

E-mail: ncr.cgsb-ongc@pwgsc-tpsgc.gc.ca

CGSB Website: <http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html>

7. TRANSPORTATION COSTS INFORMATION

The Bidder is requested to provide the following information concerning transportation costs for the delivery of the units to destination:

- (a) shipping weight by unit _____;
- (b) number of items by unit _____;
- (c) cubic measurement by unit _____;
- (d) number of units per shipment _____;
- (e) name of shipping point _____;
- (f) recommended method of shipment and carrier _____;
- (g) Unit cost per Destination WB941: \$_____ W248A: \$_____; and
- (h) Total cost \$_____.

PART 3 - BID PREPARATION INSTRUCTIONS

1. BID PREPARATION INSTRUCTIONS

Canada requests that bidders provide their bid in separately bound sections as follows:

Section I - Technical Bid (3 hard copies)

Section II - Financial Bid (1 hard copy)

Section III - Certifications (1 hard copy)

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of their bid:

- a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- b) use a numbering system that corresponds to the bid solicitation

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process Policy on Green Procurement

<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>.

To assist Canada in reaching its objectives, bidders are encouraged to:

- 1) use paper containing fibre certified as originating from a sustainably-managed forest and/or containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

3) Green Initiatives (for PWGSC information only)

Bidders are requested to provide details of their policies and practices in relation to the following initiatives:

- environmentally responsible manufacturing;
- environmentally responsible waste disposal;
- waste reduction;
- packaging;
- re-use strategies;
- recycling.

Section I: Technical Bid

In their technical bid, bidders must explain and demonstrate how they propose to meet the requirements and how they will carry out the Work. Refer to Annex F for additional details.

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Basis of Payment. The total amount of Goods and Services Tax (GST) or Harmonized Sales Tax (HST) is to be shown separately, if applicable.

1.1 SACC Manual Clause

C3011T	2010/01/11	Exchange Rate Fluctuation
A0222T	2010/01/11	Price evaluation

Section III: Certifications

Bidders must submit the certifications required under Part 5.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

1. EVALUATION PROCEDURES

(a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical, management and financial evaluation criteria.

(b) An evaluation team composed of representatives of Canada will evaluate the bids.

1.1 TECHNICAL EVALUATION (PHASE 1)

1.1.1 MANDATORY TECHNICAL CRITERIA

The bid must meet the mandatory technical criteria specified below. The Bidder must provide the necessary documentation to support compliance with this requirement. Bids that fail to meet the mandatory technical criteria will be declared non-responsive. Each mandatory technical criterion should be addressed separately.

- a) Certifications as outlined in the Request for Proposal , Part 5 paragraph 1.2;
- b) Test records in accordance with the Canadian Test Protocol (Annex C) as outlined in Annex F, Table F1;
- c) Written Technical Bid as outlined in Annex F, paragraph 3; and
- d) Pre-award samples in accordance with Annex F.

PRE-AWARD SAMPLES AND SUPPORTING DOCUMENTATION

As part of the technical evaluation, to confirm a Bidder's capability of meeting the technical requirements in accordance with Annexes C and F the following must be included with the bid:

a) 20 Pre-Award samples with one of the Pre-Award samples broken down into components (external cover, spall liner, edging/surface materials where applicable, main ballistic component and backing component if separable from main component) (see Annex F);

b) Technical Administration and managerial overview consisting of :

- A Project Management Plan
- A Manufacturing Experience and Test Facilities Summary,
- A Post -Contract Support Proposal;
- Complementary Items as per Annex F , Paragraph 3.2

c) Tests records for requirements outlined in Table F1 and paragraph 3.2 of Annex F;

d) A detailed Quality System description or a draft Quality Assurance Plan for Production.

The Bidder must ensure that the required Pre-Award samples are manufactured in accordance with the technical requirement and are fully representative of the bid submitted. Rejection of the pre-award samples will result in the bid being declared non-responsive.

All Pre-Award samples submitted by the Bidder will remain the property of Canada.

Testing can be performed at internal test facilities or by an independent laboratory (where Government access is granted) . All tests will be conducted in accordance with Annex C. Protocols and tests results must be current as specified at Annex F section 2.1.

Pre-Award samples will be evaluated for quality of workmanship and conformance to specified materials and measurements.

1.1.2 POINT RATED EVALUATION CRITERIA

A point rated evaluation will be completed on bids for technical performance, technical administrative and managerial. The total combined score of 70% for the technical , 5% for Canadian Content and 30% for the price will be used to determine the winning bids.

1. Technical Administration and Managerial: Bidders are requested to present these elements in their own format and will be rated as outlined in Table F3 of Annex F. Bidders should cover the elements outlined in Paragraph 3 of Annex F. This portion of the evaluation is weighted at 20 out of the 70 points available for the technical points. Ratings are described in the Table titled Evaluation grid on page 9 of the RFP.

A bidder must obtain a minimum of 35 points out of the 70 points available to be found compliant.

a) Project Management Plan. Bidders must demonstrate the proposed project management structure and the degree of requisite capability offered by covering the topics outlined in Annex F, paragraph 3.1.1 as a minimum.

b) Manufacturing Experience and Facilities Summary. The proposal must demonstrate proven experience in the manufacture of bullet resistant plates and access to suitable tests facilities for production by covering the topics outlined in Annex F, paragraph 3.1.2 as a minimum.

c) Post Contract Support Proposal. The Proposal must demonstrate the details of the system support that will be available after initial contract deliveries as described in Paragraph 3.1.3 of Annex F.

d) Complementary Items. The Proposal must give a detailed illustration of proposed production control gauges and a comprehensive description of the training plates construction as described in Paragraph 3.2 of Annex F.

EVALUATION GRID -PROJECT MANAGEMENT, MANUFACTURING EXPERIENCE, POST CONTRACT SUPPORT AND PRODUCTION GAUGES AND TRAINING PLATES

MINIMUM NUMBER OF POINT REQUIRED: 35 POINTS

Project Management _____ / 27 Annex F 3.1.1

Structure

Organization chart of key company positions with your <u>Project Manager (PM)</u> authority within the company clearly delineated - 2 points	1 point each	___/2			
<u>Experience and qualifications</u> of key technical and managerial personnel assigned to this project in summary or CV format (PM, QC Manager, Ballistic Engineer or Technologist, and Production Manager) - 4 points	1 point each position	___/4			
Describe <u>previous project management experience</u> of a comparable nature in the design or the customization of military or police armour protection product(s) by your company - 5 points	Points awarded for project <u>complexity</u> , <u>variety</u> of products customized, and scale of <u>magnitude</u> of example project(s) described.	___/5			
Provide a <u>Work Breakdown Structure (WBS)</u> . The WBS can be in any format (descriptive or point form) and will be awarded points for each of the primary elements it covers. 16 points -plate optimization = 2 -production = 3 -sub-contractor lead times/control = 2 -FAT/lot testing/reporting = 3 -delivery plans = 2 -configuration data control = 2 -data item deliverables = 2	Points awarded to <u>each element</u> based on the amount of detail provided to evaluators	Not discussed	inadequate or Incomplete	complete but limited detail	comprehensive
		0	.5	1	2
		0	1	1.5	3
		0	.5	1	2
		0	1	1.5	3
		0	.5	1	2
		0	.5	1	2
		0	.5	1	2

Manufacturing Experience and Infrastructure Annex F 3.1.2

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Experience - 8 points			
<u>Years</u> in armour product manufacturing business		Max 2 points	-years in business $\geq 3 = 2$, ≥ 2 and $< 3 = 1$, $< 2 = 0$
<u>Average annual sales</u> of hard armour products in the last 2 years.		Max 2 points	$< \$100K = 0.5$ $\$100K - \$1M = 1$ $> \$1M = 2$
Describe <u>variety</u> of armour protective products your company manufactures.		Max 2 points	$1 = 1$, $\geq 2 = 2$

Describe company or consortium <u>size, profile, and expertise</u> being assembled or assigned to this project.	Max 2 points	Limited details = 1 max Comprehensive description = 2 max
Contract History - 7 points		
Provide hard armour <u>quantities</u> sold in the last two years	Max 2 points	<25,000 units = 1 25,000 - 100,000 units = 1.5 >100,000 units = 2
Provide <u>current standards</u> that the various armour products that you manufacture, including hard armour, are certified to.	Max 2 points	High protection and/or high quality military products with unique mil specs = 2 OR protection to NIJ levels = 1 0 = 0, 1 = 1, ≥ 3 = 3
Customer <u>references</u> for military <u>sales</u> of armour protection products (maximum 3)	Max 3 points	
Provide an overview of the manufacturing and assembly <u>facilities and major tooling and equipment</u> that would be involved in this project. - 5 points	Points awarded based on the <u>amount of detail</u> provided to evaluators	-comprehensive coverage of plant, tooling and sub-contractors capabilities = 5 max -detailed overview of internal facilities = 3 max -inadequate overview of facilities = 1 max
Provide an overview of the <u>ballistic facilities</u> that would be used for production lot testing on this project and whether they are in-house capability or third party contracted.	Max 3 points	-in-house ballistic capability and lab = 3 -external test facility = 2
Provide an overview of the manufacturing and assembly <u>processes and sub-contractors for key components</u> or assembly that would be involved in this project. - 4 points	Points awarded based on the <u>amount of detail</u> provided to evaluators	-comprehensive description of all manufacturing and assembly processes used = 4 max -brief description of processes = 2 max
Provide an overview of the <u>lot control</u> techniques that would be used during production to assure lot traceability of product by serial number. - 3 points	Points awarded based on the <u>amount of detail</u> provided to evaluators	-comprehensive description of controls and plate markings used = 3 max -brief description of controls = 1 max

Post-Contract Support**Annex F 3.1.3**

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Specify the number of years that the company would be willing to provide support and options to DND after deliveries are complete.	Mx 5 points	- ≤ 2 years = 1 - 3-5 years = 3 - 6-10 years = 5
Specify to what degree the company would be willing to provide support and options to DND after deliveries are complete.	Mx 3 points	Engineering & Technical Support = 3 Basic Product Support = 2 Lab Testing = 1

Production Gauges and Training Plates**Annex F 3.2**

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Provide a written proposal to describe the gauges that would be designed and produced to <u>verify critical plate dimensions</u> (Annex C section 4.5.1.1) during production.	Points awarded based on the <u>amount of detail</u> provided to evaluators	-detailed illustration of production gauges and description of training plate construction = 5 points -limited coverage of subjects = 3 points
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Provide a written proposal to describe the training plate materials and construction that would be designed and produced (Annex C section 3.5) to achieve field usage durability at an economic price.	Points awarded based on the amount of detail provided to evaluators	
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2. Technical Performance : The Technical Performance will be evaluated by calculating points received for the tests results listed at Annex F section 1 and 2 and is weighted at 50 of the 70 points available for the technical points.

1.1.3 QUALITY PLAN - SOLICITATION

The Bidder must submit a draft Quality Plan with the bid. The Quality Plan must be in the same format that will be used after award of contract.

The Quality Plan may reference other documents. Where referenced documents do not already exist, but are required by the Quality Plan, the plan must identify them and also identify when, how and by whom they will be prepared and approved. The documents referenced in the Quality Plan must be made available when requested by Public Works and Government Services Canada or the Department of National Defence.

1.2 TECHNICAL EVALUATION (PHASE II)

1.2.1 MANDATORY TECHNICAL CRITERIA

EVALUATION OF SAMPLES

As a result of the award of the contract, at Phase I, up to three contractors must supply 25 plates within 14 calendar days from the effective date of the contract for samples. The plates will be evaluated against pass/fail criteria for ballistic, environmental and durability requirements. Failure to submit the 25 plates within the specified time frame will result in the bid for the main contract being declared non-responsive. Samples must be taken from the same production lot as the first 20 samples that were supplied with the bid as specified at Annex F. If no compliant bid is found the next three compliant bids from Phase 1 will be given a contract for 25 plates. This process will continue until a compliant bid is found.

Details of the evaluation of the 25 samples are included at Annex F, table F2.

1.3 FINANCIAL EVALUATION (CONTRACT FOR SAMPLES)

1.3.1 MANDATORY FINANCIAL CRITERIA

- a. The Bidder must submit firm unit price in Canadian dollars, GST extra, DDP (Gatineau, Qc.) Incoterms 2000 transportation costs included, all applicable Customs Duties and Excise taxes included.
- b. The Bidder must submit firm unit pricing for the item.

1.4 FINANCIAL EVALUATION (MAIN CONTRACT)

1.4.1 MANDATORY FINANCIAL CRITERIA

- a. The Bidder must submit firm unit price in Canadian dollars, GST extra, DDP (Montreal, Qc and Edmonton Alb.) Incoterms 2000, transportation costs included, all applicable Customs Duties and Excise taxes included.

- b. The Bidder must submit firm unit pricing for all items and all destinations including option year 1.
- c. The Bidder must submit the Government-supplied Material (GSM) usage for each item in Part 4 under Article 3.
- d. The Bid price must not exceed the average bid value of all bids by 50% or more (Goods and Services Tax or Harmonized Sales Tax extra, as appropriate) or it will be set aside and given no further review.
- e. The Bidder must submit a list of the major components used in the manufacture of their Bullet Resistant Plate kits that are manufactured in Canada. They can also include components that are bought outside of Canada and explain how they will be incorporated into the final product by a Canadian supplier. Five percent (5%) of the rating will be given for Canadian Content

Prices will be evaluated in Canadian funds, including any applicable Excise Taxes and Canadian Customs Duty and excluding Goods and Services (GST). Bids received in foreign currency will be converted to Canadian currency for evaluation purposes. The rate given by the Bank of Canada in effect on the bid solicitation closing date will be applied as a conversion factor to the bids submitted in foreign currency.

1.4.2 SACC MANUAL CLAUSE

A9033T 2011/05/16 Financial Capability

2. BASIS OF SELECTION-HIGHEST COMBINED RATING OF TECHNICAL AND PRICE

1. To be declared responsive, a bid must:

- a. comply with all the requirements of the bid solicitation; and
- b. meet all mandatory criteria.

The rating is performed on a scale of 70 points.

2. Bids not meeting (a) and (b) will be declared non-responsive.
3. The selection will be based on the highest responsive combined rating of technical merit and price. The ratio will be 70 % for the technical merit and 30 % for the price.
4. To establish the technical merit score, the overall technical score for each responsive bid will be determined as follows : total number of points obtained / maximum number of points available multiplied by the ratio of 70%.
5. To establish the pricing score, each responsive bid will be prorated against the lowest evaluated price and the ratio of 30 %. For the purpose of the evaluation the unit cost will be assessed using the quantity for each item (1 to 10) at both destinations and multiplied by the firm unit price quoted .
6. For each responsive bid, the technical merit score and the pricing score will be added to determine its combined rating.
7. Neither the responsive bid obtaining the highest technical score nor the one with the lowest evaluated price will necessarily be accepted. The responsive bid with the highest combined rating of technical merit and

price will be recommended for award of a contract.

The table below illustrates an example where all three bids are responsive and the selection of the contractor is determined by a 70/25 ratio of technical merit and price, respectively. The total available points equals 100 and the lowest evaluated price is \$45,000 (45). A maximum of 5% of the points is given for Canadian Content.

Basis of Selection - Highest Combined Rating Technical Merit (70%), Canadian Content (5%) and Price (25%)

		Bidder 1	Bidder 2	Bidder 3
Overall Technical Score		92/100	79/100	81/100
Bid Evaluated Price		55,000	50,000	45,000
Calculations Technical Merit Score		$92/100 \times 70 = 64.4$	$79/100 \times 70 = 55.3$	$81/100 \times 70 = 56.7$
	Pricing Score	$45/55 \times 25 = 20.5$	$45/50 \times 25 = 22.5$	$45/45 \times 25 = 25.0$
	Canadian Content Score	$4/5 \times 5 = 4$	$1/5 \times 5 = 1$	$5/5 \times 5 = 5$
Combined Rating		88.9	78.8	86.7
Overall Rating		1st	3 rd	2 nd

2.1 CONTRACTS FOR SAMPLES

The three bids that offer the best value will be recommended for contract award. Best value will be achieved by the responsive bid that obtains the highest score in accordance with the Best Value/Performance Determination . The Best Value/Performance Determination is based on 70% technical, 5% Canadian Content and 25% cost.

If the three selected bidders fail to yield a compliant bid, the next three bidders will be asked to submit samples. If there is a tie in points, the contract will be given to the bidder with the lowest cost proposal.

2.2 MAIN CONTRACT

The responsive bid from Phase II with the highest combined score established at Phase 1 will be recommended for award of a contract (1 contract only).

3. USAGE OF GOVERNMENT SUPPLY MATERIAL

1. Government-supplied material (GSM) must be used in the manufacture of the webbing carriers, items 1,3,5,6,8 and 10 detailed in Annex A. The Bidder must state in its bid the following GSM information for each item:

- Cloth, Coated, Plain Weave, Textured High Tenacity Nylon, 500 Denier, 235 g/m2, Polyurethane coated one side; CADPAT™ (TW) pattern on nylon side, coating clear, water resistant; infrared reflective;
- Minimum width 152.0 cm;
- Used for items 5 and 10;

d. Quantity per unit _____m/ea. (To be completed by Bidder);

e. Unit price \$24.50 meter (Goods and Services Tax or Harmonized Sales Tax extra, as applicable).

Material usage must be accurately estimated, as material required in addition to that estimated above must be purchased from Canada at the price indicated in the Contract. Usage of GSM is a component of the bid price and will be a factor in the bid evaluation. Failure to indicate the GSM required for each item will render the bid non-responsive.

2. Canada will provide to the successful Bidder the GSM specified in the bid free of charge, including transportation to the following address: _____.

PART 5 - CERTIFICATIONS

Bidders must provide the required certifications to be awarded a contract. Canada will declare a bid non-responsive if the required certifications are not completed and submitted as requested.

Compliance with the certifications bidders provide to Canada is subject to verification by Canada during the bid evaluation period (before award of a contract) and after award of a contract. The Contracting Authority will have the right to ask for additional information to verify the bidders' compliance with the certifications before award of a contract. The bid will be declared non-responsive if any certification made by the Bidder is untrue, whether made knowingly or unknowingly. Failure to comply with the certifications or to comply with the request of the Contracting Authority for additional information will also render the bid non-responsive.

1. Certifications Precedent to Contract award and Certification Required with the Bid

Bidders must submit the following duly complete certifications as provided below:

1.1 Certifications Precedent to Contract Award

The certifications listed below should be completed and submitted with the bid, but may be submitted afterwards. If any of these required certifications is not completed and submitted as requested, the Contracting Authority will so inform the Bidder and provide the Bidder with a time frame within which to meet the requirement. Failure to comply with the request of the Contracting Authority and meet the requirement within that time period will render the bid non-responsive.

1.1.1 FEDERAL CONTRACTORS PROGRAM - \$200,000 OR MORE

1. The Federal Contractors Program (FCP) requires that some suppliers, including a supplier who is a member of a joint venture, bidding for federal government contracts, valued at \$200,000 or more (including all applicable taxes), make a formal commitment to implement employment equity. This is a condition precedent to contract award. If the Bidder, or, if the Bidder is a joint venture and if any member of the joint venture, is subject to the FCP, evidence of its commitment must be provided before the award of the Contract.

Suppliers who have been declared ineligible contractors by Human Resources and Skills Development Canada (HRSDC) are no longer eligible to receive government contracts over the threshold for solicitation of bids as set out in the *Government Contract Regulations*. Suppliers may be declared ineligible contractors either as a result of a finding of non-compliance by HRSDC, or following their voluntary withdrawal from the FCP for a reason other than the reduction of their workforce to less than 100 employees. Any bids from ineligible contractors, including a bid from a joint venture that has a member who is an ineligible contractor, will be declared non-responsive.

2. If the Bidder does not fall within the exceptions enumerated in 3.(a) or (b) below, or does not have a valid certificate number confirming its adherence to the FCP, the Bidder must fax (819-953-8768) a copy of the signed form LAB 1168, Certificate of Commitment to Implement Employment Equity,

<http://www.servicecanada.gc.ca/cgi-bin/search/eforms/index.cgi?app=profile&form=lab1168&dept=sc&lang=e> to the Labour Branch of HRSDC.

3. The Bidder, or, if the Bidder is a joint venture the member of the joint venture, certifies its status with the FCP, as follows:

The Bidder or the member of the joint venture

- (a) () is not subject to the FCP, having a workforce of less than 100 full time or part-time permanent employees, and/or temporary employees having worked 12 weeks or more in Canada;
- (b) () is not subject to the FCP, being a regulated employer under the *Employment Equity Act*, S.C. 1995, c. 44;
- (c) () is subject to the requirements of the FCP, having a workforce of 100 or more full time or part-time permanent employees, and/or temporary employees having worked 12 weeks or more in Canada, but has not previously obtained a certificate number from HRSDC, (having not bid on requirements of \$200,000 or more), in which case a duly signed certificate of commitment is attached;
- (d) () is subject to the FCP, and has a valid certificate number as follows: _____ (e.g. has not been declared an ineligible contractor by HRSDC).

Further information on the FCP is available on the following HRSDC Website:

<http://www.hrsdc.gc.ca/en/labour/equality/fcp/index.shtml>

1.1.2 SAMPLES AND PRODUCTION CERTIFICATION

The bidder certifies that :

() the manufacturer who produced the pre-award samples will remain unchanged for the pre-production samples and full production of the contract quantity.

1.2 Certifications Required with the Bid

Bidders must submit the following duly completed certifications with their bid.

1.2.1 LOT TRACEABILITY

The bidder certifies that:

All pre-award BRP samples provided for Phase 1 and Phase II test program come from a single manufactured lot and that the traceability of all production BRP under contract will be controlled in accordance with the Bidder's lot traceability system described in section _____ of the Bidder's proposal.

Signed by _____

1.2.2 BALLISTIC TEST FACILITY

The bidder certifies that either:

() It possesses the necessary ballistic test facilities (in-house) to undertake production testing for this solicitation and that the facilities are accessible to authorised Government representatives for verification testing during the contract period.

OR (check appropriate certification)

() It has access to the necessary ballistic test facilities (independent third party) to undertake production testing and that the Bidder has secured written consent for authorised Government representatives to attend and witness verification testing during the contract period.

PART 6 - RESULTING CONTRACT CLAUSES

A-SAMPLE CONTRACT

1. SECURITY REQUIREMENT

There is no security requirement associated with the requirement.

2. REQUIREMENT

The Contractor must provide 25 of the plates to the following address:

Louis-St-Laurent Building
555 Boulevard de la Carrière
Gatineau, Québec
J8Y 6V7
Attn : (to be advised at contract)

3. STANDARD CLAUSES AND CONDITIONS

All clauses and conditions identified in the Contract by number, date and title are set out in the Standard Acquisition Clauses and Conditions (<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>) Manual issued by Public Works and Government Services Canada.

3.1 General Conditions

2010A (2011/05/16), General Conditions - Goods (Medium complexity) apply to and form part of the Contract.

4. TERM OF CONTRACT

4.1 Delivery Date

Delivery Required (Mandatory)

The delivery of the samples must be completed within 14 calendar days from the effective date of the

Contract.

4.1.1 Shipping Instructions - Delivery at Destination

1. Goods must be consigned to the destination specified in the Contract and delivered:

- (a) Delivered Duty Paid (DDP) (Gatineau, Québec) Incoterms 2000 for shipments from commercial contractor.

4.1.2 Packaging - Commercial

Packing must be in accordance with standard commercial practice to ensure safe delivery at destination.

4.2 SACC Manual Clauses

D5545C 2010/08/16 ISO 9001:2008 - Quality Management Systems - Requirements (QAC C)

A9131C 2011/05/16 Controlled Goods Program

B4060C 2011/05/16 Controlled Goods

5. AUTHORITIES

5.1 Contracting Authority

The Contracting Authority for the Contract is:

Sylvie Elder

Public Works and Government Services Canada

Acquisitions Branch

Commercial and Consumer Products Directorate (CCPD)

Clothing & Textiles Division

Place du Portage, Phase III, 6A2

11 Laurier Street

Gatineau, Quebec K1A 0S5

Telephone : 819-956-3830 Facsimile: 819-956-5454

E-mail address: sylvie.elder@tpsgc-pwgsc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

5.2 Technical Authority

The Technical Authority for this Contract is:

Mailing/Shipping Address

Department of National Defence

101 Colonel By Drive

Ottawa, Ontario

K1A 0K2

Attn: DSSPM _____(to be advised at contract)

The Technical Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Technical Authority, however the Technical Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

5.3 Administrative Authority

The Administrative Authority for the Contract is:

Department of National Defence

101 Colonel By Drive

Ottawa, Ontario

K1A 0K2

Attn: DLP _____(to be advised at contract)

The Administrative Authority is the representative of the department or agency for whom the Work is being carried out under the Contract. The Administrative Authority is responsible for the implementation of tools and processes required for the administration of the Contract. The Contractor may discuss administrative matters identified in the Contract with the Administrative Authority however the Administrative Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of Work can only be made through a contract amendment issued by the Contracting Authority.

5.4 Contractor's Representative

The person responsible for :

General enquiries

Name: _____

Telephone No.: _____

Facsimile No.: _____

E-mail address: _____

Delivery follow-up

Name: _____

Telephone No.: _____

Facsimile No.: _____

E-mail address: _____

6. PAYMENT

6.1 Basis of Payment - Firm Unit Price -Samples

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm unit price, as specified in Annex A-1 for a cost of \$_____ (amount to be inserted at contract award). Customs duties are included and Goods and Services Tax is extra, if applicable.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

6.2 SACC Manual Clauses

H1000C 2008/05/12 Single Payment

7. INVOICING INSTRUCTIONS

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.

2. Invoices must be distributed as follows:

(a) The original and one (1) copy must be forwarded to the following address for certification and payment :

National Defence Headquarters
MGen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A 0K2
Attn: DLP _____

(b) One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

(c) One (1) copy must be forwarded to the consignee.

8. CERTIFICATIONS

Compliance with the certifications provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the term of the Contract. If the Contractor does not comply with any certification or it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

9. APPLICABLE LAWS

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

10. PRIORITY OF DOCUMENTS

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- a) the Articles of Agreement;
- b) the general conditions 2010A (2012/03/02), General Conditions - Goods (Medium Complexity);
- c) Annex B, Statement of Work -Bullet Resistant Plates Standard Combat Type for the Land Force dated July 2011;
- d) Annex C Technical Standard -Bullet Resistant Plates Standard Combat Type for the Land Force dated July 2011 ;
- e) Annex D, Contract Data Requirements Lists;
- f) Annex E, Data Item Descriptions; and
- g) The Contractor's bid dated _____

11. DEFENCE CONTRACT

SACC Manual Clause A9006C (2008/05/12) Defence Contract

12. MATERIALS: CONTRACTOR TOTAL SUPPLY

The Contractor will be responsible for obtaining all materials required in the manufacture of the item specified.

The delivery stated for the items allows the necessary time to obtain such materials.

13. PLANT CLOSING

The Contractor's plant closing for Summer holidays are as follows. During this time there will be no shipments.

2012-2013

Summer Holiday FROM _____ TO _____

14. PLANT LOCATION

Items will be manufactured at: _____

15. SUBCONTRACTOR(S)

The following subcontractor(s) will be utilized in the performance of the contract.

Name of Company: _____

Location: _____

Value of subcontract: \$ _____

Nature of subcontracting work performed: _____

Subcontractors, other than those listed above, may not be utilized without the written permission of Canada.

16. SPECIFICATIONS AND STANDARDS**17.1 United States Military Specifications and Standards**

The Contractor is responsible for obtaining copies of all United States (US) military specifications and standards which may be applicable to the requirement. These specifications and standards are available commercially, or may be obtained by visiting the US Department of Defense Website, at the following address: <http://dodssp.daps.dla.mil/>.

17.2 Canadian General Standards Board (CGSB) - Standards

A copy of the CGSB Standards referred to in the Contract is available and may be purchased from:

Canadian General Standards Board

Place du Portage III, 6B1

11 Laurier Street

Gatineau, Québec

Telephone: (819) 956-0425 or 1-800-665-CGSB (Canada only)

Fax: (819) 956-5740

E-mail: ncr.cgsb-ongc@pwgsc-tpsgc.gc.ca

CGSB Website: <http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html>

B. MAIN CONTRACT

1. SECURITY REQUIREMENT

There is no security requirement associated with the requirement.

2. REQUIREMENT

The Contractor must provide the items detailed under the "Requirement" at Annex A.

3. STANDARD CLAUSES AND CONDITIONS

All clauses and conditions identified in the Contract by number, date and title are set out in the Standard Acquisition Clauses and Conditions (<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>) Manual issued by Public Works and Government Services Canada.

3.1 General Conditions

2010A (2011/05/16), General Conditions - Goods (Medium complexity) apply to and form part of the Contract.

4.1 Delivery Date

Delivery Required (Desirable) - Firm Quantity

The first delivery should be made within 30 calendar days from the date of the written notice of approval of the pre-production samples. The quantity delivered must be 200 each. The balance must be delivered at the rate of 200 each weekly after the first delivery until completion of the Contract.

Delivery - Firm Quantity

The first delivery must be made within _____ working days from the date of the written notice of approval of the production samples. The quantity delivered must be _____ each. The balance must be delivered at the rate of _____ each weekly after the first delivery until completion of the Contract.

Delivery - Option Quantity (Desirable)

The delivery of the option quantity should commence within 120 calendar days from receipt of the contract amendment and after final delivery of the contract quantity and the quantity must be 200 each. The balance must be shipped at a rate of 200 each weekly after the first delivery until completion of the option quantity.

Delivery - Option Quantity

The delivery of the option quantity must commence within _____ calendar days from receipt of the contract amendment and after final delivery of the contract quantity and the quantity must be _____ each. The balance must be shipped at a rate of _____ each weekly after the first delivery until completion of the option quantity.

4.1.1 Delivery - Appointments

The Contractor must make deliveries to Canadian Forces (CF) Supply Depots by appointment only. The Contractor or its carrier must arrange delivery appointments by contacting the Depot Traffic Section at the appropriate location shown below. The consignee may refuse shipments when prior arrangements have not been made.

(a) 7 CF Supply Depot Lancaster Park
Edmonton, Alta
780-973-4011, ext. 4524

(b) 25 CF Supply Depot Montreal
Montreal, Qué.
514-252-2777, ext. 2363

4.1.2 Preparation for Delivery

The Contractor must prepare the item for delivery in accordance with Annex D CDRL 6 and DID ILSD-18001 SC in Annex E.

4.1.3 Shipping Instructions - Delivery at Destination

1. Goods must be consigned to the destination specified in the Contract and delivered:

- (a) Delivered Duty Paid (DDP) (Montreal, Qc and Edmonton Alb) Incoterms 2000 for shipments from commercial contractor.

4.2 Optional Goods

The Contractor grants to Canada the irrevocable option to acquire the goods described at Annex A under the same terms and conditions and at the prices stated in the Contract. Any options exercised will be for a Minimum of 2,500 Operational Plates up to a Maximum of 2,500 Operational Kits or combinations of the items (6-10) listed in Annex A and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise the options at any time after contract by sending a written notice to the Contractor. The option will be valid for 84 months from date of award of contract. The pricing which will apply to the option quantities ordered will be determined by the year in which the option is exercised. The method for determining years 2 to 5 pricing is described at "6.1 Basis of Payment" clause.

4.3 SACC Manual Clauses

A9131C	2011/05/16	Controlled Goods Program
B4060C	2011/05/16	Controlled Goods
D5510C	2011/05/16	Quality Assurance Authority (DND) - Canadian-based Contractor
D5515C	2010/01/11	Quality Assurance Authority (DND) - Foreign-based and United States Contractor
D5540C	2010/08/16	ISO 9001:2008 - Quality Management Systems - Requirements (QAC Q)
D5604C	2008/12/12	Release Documents (DND) - Foreign-based Contractor
D5605C	2010/01/11	Release Documents (DND) - United States-based Contractor
D5606C	2007/11/30	Release Documents (DND) - Canadian-based Contractor
D6010C	2007/11/30	Palletization

5. **AUTHORITIES**

5.1 Contracting Authority

The Contracting Authority for the Contract is:

Sylvie Elder
Public Works and Government Services Canada
Acquisitions Branch
Commercial and Consumer Products Directorate (CCPD)
Clothing & Textiles Division
Place du Portage, Phase III, 6A2
11 Laurier Street
Gatineau, Quebec K1A 0S5
Telephone : 819-956-3830 Facsimile: 819-956-5454
E-mail address: sylvie.elder@tpsgc-pwgsc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

5.2 Technical Authority

The Technical Authority for this Contract is:

Mailing/Shipping Address

Department of National Defence
101 Colonel By Drive
Ottawa, Ontario
K1A 0K2
Attn: DSSPM _____(to be advised at contract)

The Technical Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Technical Authority, however the Technical Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

5.3 Administrative Authority

The Administrative Authority for the Contract is:

101 Colonel By Drive
Ottawa, Ontario
K1A 0K2
Attn: DLP _____(to be advised at contract)

The Administrative Authority is the representative of the department or agency for whom the Work is being

carried out under the Contract. The Administrative Authority is responsible for the implementation of tools and processes required for the administration of the Contract. The Contractor may discuss administrative matters identified in the Contract with the Administrative Authority however the Administrative Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of Work can only be made through a contract amendment issued by the Contracting Authority.

5.4 Contractor's Representative

The person responsible for :

General enquiries

Name: _____

Telephone No.: _____

Facsimile No.: _____

E-mail address: _____

Delivery follow-up

Name: _____

Telephone No.: _____

Facsimile No.: _____

E-mail address: _____

6. PAYMENT

6.1 Basis of Payment - Firm Unit Prices - Initial Contract Quantity

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid firm unit prices for the firm quantities, as specified in Annex A for a cost of \$_____ (amount to be inserted at contract award). Customs duties are included and Goods and Services Tax is extra, if applicable.

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid firm unit prices for the option quantities, as specified in the amendments that will be issued if the option is exercised.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

6.2 Option Quantities

The price for the option will be adjusted as follows:

a) For year one the prices will be the ones quoted at Annex A under Option year 1.

b) For years two to five of the option quantities, the firm unit price, DDP, Transportation costs included, GST extra, for all items will be determined and adjusted up or down using the firm unit price, DDP, Transportation costs included, GST extra of the previous year in accordance with Statistic Canada's average Consumer Price Index (CPI), publication CANSIM Table 326-0020 for the municipality closest to the Contractor's plant. The adjustment(s) will be made annually in accordance with the average of the CPI of the most recent published twelve months. Year 2 pricing will apply starting 36 months after date of contract award, year 3 pricing will apply

starting 48 months from date of contract award, year 4 pricing will apply starting 60 months from date of contract award, year 5 pricing will apply starting 72 months from date of contract award.

6.2 SACC Manual Clauses

H1001C 2008/05/12 Multiple Payments

7. INVOICING INSTRUCTIONS

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.

2. Invoices must be distributed as follows:

(a) The original and one (1) copy must be forwarded to the following address for certification and payment :

National Defence Headquarters
MGen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A 0K2
Attn: DLP _____

(b) One (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

(c) One (1) copy must be forwarded to the consignee.

7.1 Release Documents - Distribution

The Contractor must prepare the release documents in a current electronic format and distribute them as follows:

(a) **Copy 1:** mail to consignee marked: "Attention: Receipts Officer";

(b) **Copies 2 and 3:** with shipment (in a waterproof envelope) to the consignee;

(c) **Copy 4:** to the Contracting Authority;

(d) **Copy 5:** to:

National Defence Headquarters
Mgen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A 0K2
Attention: DLP _____

(e) **Copy 6:** to the Quality Assurance Representative;

(f) **Copy 7:** to the Contractor;

(g) **Copy 8:** all non-Canadian contractors to:

DQA/Contract Administration
 National Defence Headquarters
 Mgen George R. Pearkes Building
 101 Colonel By Drive
 Ottawa, ON K1A 0K2
 E-mail: ContractAdmin.DQA@forces.gc.ca

8. CERTIFICATIONS

Compliance with the certifications provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the term of the Contract. If the Contractor does not comply with any certification or it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

9. APPLICABLE LAWS

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Ontario.

10. PRIORITY OF DOCUMENTS

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- a) the Articles of Agreement;
- b) the general conditions 2010A (2011/05/16), General Conditions - Goods (Medium Complexity);
- c) Annex A, Requirement;
- d) Annex B, Statement of Work - Bullet Resistant Plates Standard Combat Type for the Land Force dated July 2011;
- e) Annex C, Technical Standard -Bullet Resistant Plates Standard Combat Type for the Land Force dated July 2011;
- f) Annex D, Contract Data Requirement Lists;
- g) Annex E, Data Item Description;
- h) Sealed Samples;
- i) The Contractor's bid dated _____

11. DEFENCE CONTRACT

SACC Manual Clause A9006C (2008/05/12) Defence Contract

12. SACC MANUAL CLAUSES

C2611C	2007-11-30	Customs Duties - Contractor Importer
B7003C	2008-05-12	Clothing - Government -supplied Material
C2800C	2011-05-16	Priority Rating
C2801C	2011-05-16	Priority Rating - Canadian-based Contractors
C2000C	2007-11-30	Taxes-Foreign based contractor

13. MATERIALS: CONTRACTOR'S SUPPLY AND GOVERNMENT SUPPLIED MATERIAL

The Contractor will be responsible for obtaining all materials required in the manufacture of the items specified

except those materials specified as being Government Supplied Materials used for items 5 and 10. The delivery stated allows the necessary time to obtain such materials.

14. PROCEDURES FOR DESIGN CHANGE/DEVIATIONS

The Contractor must follow these procedures for any proposed design change/deviation to contract specifications.

The Contractor must complete Part 1 of the Design Change/Deviation form DND 672 and forward one (1) copy to the Technical Authority and one (1) copy to the Contracting Authority.

The Contractor will be authorized to proceed upon receipt of the design change/deviation form signed by the Contracting Authority. A contract amendment will be issued to incorporate the design change/deviation in the Contract.

15. PLANT CLOSING

The Contractor's plant closing for Christmas and Summer holidays are as follows. During this time there will be no shipments.

2012-2013

Summer Holiday FROM _____ TO _____

Christmas Holiday FROM _____ TO _____

2013-2014

Summer Holiday FROM _____ TO _____

Christmas Holiday FROM _____ TO _____

2014-2015

Summer Holiday FROM _____ TO _____

Christmas Holiday FROM _____ TO _____

2015-2016

Summer Holiday FROM _____ TO _____

Christmas Holiday FROM _____ TO _____

2016-2017

Summer Holiday FROM _____ TO _____

Christmas Holiday FROM _____ TO _____

16. PLANT LOCATION

Items will be manufactured at: _____

17. SUBCONTRACTOR(S)

The following subcontractor(s) will be utilized in the performance of the contract.

Name of Company: _____

Solicitation No. - N° de l'invitation

W8486-129671/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pr707

Client Ref. No. - N° de réf. du client

W8486-129671

File No. - N° du dossier

pr707W8486-129671

CCC No./N° CCC - FMS No/ N° VME

Location: _____

Value of subcontract: \$ _____

Nature of subcontracting work performed: _____

Subcontractors, other than those listed above, may not be utilized without the written permission of Canada.

18. OWNERSHIP OF PRODUCT - CADPAT™

All products and materials provided to perform the Work and any modifications made by the Contractor are the property of Canada.

Patterns and technical data are patented and copyrighted to Her Majesty the Queen of Canada.

The printed textile and any garments made are for the sole end use of DND. The Contractor acknowledges that it must not manufacture, sell or offer for sale goods incorporating the CADPAT™ pattern and colours to any person or entity other than Canada without the Minister's prior written authorization.

It is an explicit condition of the Contract that any second quality garments or goods produced pursuant to the contract will not be released, sold or offered to be sold, directly or indirectly to any person or corporation other than Canada without the Minister's prior written authorization.

19. QUALITY PLAN

No later than 60 days after the effective date of the Contract, the Contractor must submit for acceptance by the Department of National Defence (DND) a Quality Plan prepared according to the latest issue (at contract date) of ISO 10005:2005 "Quality management systems - Guidelines for quality plans". The Quality Plan must describe how the Contractor will conform to the specified quality requirements of the Contract and specify how the required quality activities are to be carried out, including quality assurance of subcontractors. The Contractor must include a traceability matrix from the elements of the specified quality requirements to the corresponding paragraphs in the Quality Plan.

The documents referenced in the Quality Plan must be made available when requested by Public Works and Government Services Canada or DND.

If the Quality Plan was submitted as part of the bidding process, the Contractor must review and, where appropriate, revise the submitted plan to reflect any changes in requirements or planning which may have occurred as a result of pre-contract negotiations.

Upon acceptance of the Quality Plan by DND, the Contractor must implement the Quality Plan. The Contractor must make appropriate amendments to the Quality Plan throughout the term of the contract to reflect current and planned quality activities. Amendments to the Quality Plan must be acceptable to DND.

20. POST CONTRACT AWARD MEETING

The Technical Authority or his delegated representatives at National Defence Headquarters and the applicable DND Quality Assurance Representative (DNDQAR) must be afforded access to the Contractor's plant and all other premises where pertinent processes are being performed, on the same basis as afforded the representative of National Defence Headquarters, DGQA.

A post contract award meeting may be convened by Canada within twenty (20) calendar days after award of contract. Participants may include representatives of the Contractor, Technical Authority, DNDQAR, Contracting Authority

and the Administrative Authority.

The Contractor is responsible for the recording and distribution of the minutes for all contract related meeting. The minutes must be sent to the Contracting Authority for acceptance prior to the distribution to all participants or as otherwise directed in the contract within ten (10) calendar days of the subject meeting. The minutes must be used only as a record of proceedings.

Technical meetings will be in accordance with CDRL 002.

21. PRODUCTION SAMPLES

1. The Contractor must provide production samples of the following items: 6 bullet resistant plates, 4 training aid plates and 5 webbing carriers, accompanied by the sealed samples if applicable, to the Technical Authority for acceptance within 60 calendar days from acceptance of the first plate coming off the line.
2. The Contractor must provide a copy of test reports specified at Table 1 of Annex B and the production samples, to the Technical Authority, transportation charges prepaid, and without charge to Canada. The samples submitted by the Contractor will remain the property of Canada.

21.1 Sealed Samples - Guidance Only

The sealed samples are representative of the required item but are not part of the technical requirement. The sealed samples may not meet the technical requirement in all respects and must be used for guidance only during production. Manufacture must be in accordance with the Contract, the specifications and the drawings, in that order of precedence.

21.2 Sealed Samples - Return to Sender

The sealed sample which may have been sent to the Contractor, are to be returned to the sender upon completion of Contract.

The sealed samples is not to be mutilated or cut, but returned in the same condition as sent to the Contractor.

22. SPECIFICATIONS AND STANDARDS

22.1 United States Military Specifications and Standards

The Contractor is responsible for obtaining copies of all United States (US) military specifications and standards which may be applicable to the requirement. These specifications and standards are available commercially, or may be obtained by visiting the US Department of Defense Website, at the following address: <http://dodssp.daps.dla.mil/>.

22.2 Canadian General Standards Board (CGSB) - Standards

A copy of the CGSB Standards referred to in the Contract is available and may be purchased from:

Canadian General Standards Board

Place du Portage III, 6B1

11 Laurier Street

Gatineau, Québec

Telephone: (819) 956-0425 or 1-800-665-CGSB (Canada only)

Solicitation No. - N° de l'invitation

W8486-129671/A

Amd. No. - N° de la modif.

File No. - N° du dossier

pr707W8486-129671

Buyer ID - Id de l'acheteur

pr707

Client Ref. No. - N° de réf. du client

CCC No./N° CCC - FMS No/ N° VME

W8486-129671

Fax: (819) 956-5740

E-mail: ncr.cgsb-ongc@pwgsc-tpsgc.gc.ca

CGSB Website: <http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html>

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ANNEX A-1

REQUIREMENT- CONTRACT FOR SAMPLES

1. TECHNICAL REQUIREMENT

The Contractor is required to provide the Department of National Defence with bullet resistant plates, in accordance with the Statement of Work , Annex B, the technical standards, Annex C, the Contract Data Requirements Lists (CDRL), Annex D, the Data Item Descriptions (DID), Annex E and sealed samples.

2. ADDRESSES

Destination Address	Invoicing Address
W8486 Department of National Defence 555 de la Carriere Gatineau, Qc K1A 0K2 Attn : Ian Craigie	W8486 Department of National Defence Mgen R. Pearkes Bldg. 101 Colonel By Drive Ottawa, Ontario K1A 0K2

3. DELIVERABLES

Item	Description	NSN	Firm Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST/HST extra
1	Bullet Resistant Plates	TBD	25	each	\$_____

Price quoted for this item must be the same as the price quoted for item 2 of Annex A with delivery to Montreal.

ANNEX A REQUIREMENT- MAIN CONTRACT

1. TECHNICAL REQUIREMENT

The Contractor is required to provide the Department of National Defence with Bullet Resistant Plates kit, bullet resistant plates (BRP), training plate kits, training aid inserts, webbing carriers in accordance with the Statement of Work , Annex B, the technical standards, Annex C, the Contract Data Requirements Lists (CDRL), Annex D, the Data Item Descriptions (DID), Annex E and sealed samples.

2. ADDRESSES

Destination Address	Invoicing Address
WB941 Department of National Defence 25 CFSD Montreal 6363 Notre Dame St. E. Montreal, Quebec H1N 1V9	W8486 Department of National Defence Mgen George R. Pearkes Bldg. 101 Colonel By Drive Ottawa, Ontario K1A 0K2
W248A Department of National Defence 7 CF Supply Depot 195 Ave. & 82nd St., Bldg. 236 Edmonton, Alberta T5J 4J5	W8486 Department of National Defence Mgen George R. Pearkes Bldg. 101 Colonel By Drive Ottawa, Ontario K1A 0K2

3. DELIVERABLES

CONTRACT QUANTITY

The quantities will be distributed between Montreal and Edmonton in a 75% -25% split.

Firm Contract Quantity

Item	Description	NSN	Estimated Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
1	Bullet Resistant Plate (BRP) Operational Kit. Set consists of : 2 Bullet Resistant Plates Standard Combat Type (SC), webbing carrier and user instruction	TBD	5,000	Set	Montreal \$ _____ Edmonton \$ _____

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CCC No./N° CCC - FMS No/ N° VME

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Item	Description	NSN	Estimated Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
2	Bullet Resistant Plate (BRP), Standard Combat Type (SC)	TBD	6,000	Each	Montreal \$ _____ Edmonton \$ _____

Item	Description	NSN	Estimated Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
3	Training plate kit, set consists of : 2 training aid inserts, no ballistic protection, webbing carrier and user instruction	6910-20-002-0545	4,000	Set	Montreal \$ _____ Edmonton \$ _____

Item	Description	NSN	Estimated Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
4	Training aid insert no ballistic protection	6910-21-921-3264	2,000	Each	Montreal \$ _____ Edmonton \$ _____

Item	Description	NSN	Estimated Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
5	Webbing carrier for BRP	8470-21-921-3223	1,000	Each	Montreal \$ _____ Edmonton \$ _____

4. OPTION QUANTITIES- YEAR 1-The quantities given are estimates only .

Item	Description	NSN	Estimated Quantity per year	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
6	BRP Operational Kit. Set consists of: 2 Bullet Resistant Plates type Standard Combat Type, webbing carrier and user instruction	TBD	2,500	Set	Montreal \$ _____ Edmonton \$ _____

Item	Description	NSN	Estimated Quantity per year	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
7	Bullet Resistant Plate, Type SC	TBD	7,500	Each	Montreal \$ _____ Edmonton \$ _____

Item	Description	NSN	Estimated Quantity per year	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
8	Training plate kit, set consists of: 2 training inserts, no ballistic protection, webbing carrier and user instruction	6910-20-002-0545	6,000	Set	Montreal \$ _____ Edmonton \$ _____

Solicitation No. - N° de l'invitation

W8486-129671/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

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Client Ref. No. - N° de réf. du client

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

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Item	Description	NSN	Estimated Quantity per year	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
9	training aid insert no ballistic protection	6910-21-921-3264	3,000	Each	Montreal \$ _____ Edmonton \$ _____

Item	Description	NSN	Estimated Quantity per year	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra
10	Webbing carrier for BRP	8470-21-921-3223	3,000	Each	Montreal \$ _____ Edmonton \$ _____

Note:

TBD = to be determined



National Défense
Defence nationale

2184DE-18470-05
July 2011



NOTICE

This documentation has been reviewed by the technical authority and does not contain controlled goods. Disclosure notices and handling instructions originally received with the document shall continue to apply.

**STATEMENT OF WORK
BULLET RESISTANT PLATES
STANDARD COMBAT TYPE
FOR THE LAND FORCE**



OPI : DSSPM
BPR: DAPES

Canada

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© Sa Majesté la Reine du chef du Canada représentée par le ministre de la Défense nationale

STATEMENT OF WORK

BULLET RESISTANT PLATES STANDARD COMBAT (SC) TYPE FOR THE LAND FORCE

1.0 SCOPE

1.1 **Purpose.** This Statement of Work (SOW) defines the work to be performed by the Contractor to provide the Land Force (LF) with Bullet Resistant Plates (BRP), Standard Combat (SC) type and a training surrogate, that satisfy the requirements specified in the Technical Standard.

1.2 **Background.** The Land Force Body Armour system is comprised of two sub-systems: (1) the Fragmentation Protective Vest (FPV); and (2) a Bullet Resistant Plate (BRP) set that integrates to the FPV front and rear pockets. The BRP performance requirements for this procurement are specified in accordance with the classification scheme at 3.10 and defined in Annex C (Technical Standard 2184DE-18470-05 section 6). This SOW covers the standard combat type SC-M/BR3/DL2/MH0 or better as specified in the contract and its equivalent training surrogate.

1.3 Terminology.

1.3.1 **GFE.** This acronym is used as the abbreviation for Government Furnished Equipment provided to the Contractor for purposes of system component stowage, compatibility assessment or packaging of the final kit.

1.3.2 **GSM.** This acronym is used as the abbreviation for Government Sourced Material provided either directly by DND, or available through a qualified source to the Contractor for component inspection, assembly, or system integration.

1.3.3 **RFP.** This acronym is used as the abbreviation for the Request for Proposal and represents the complete contractual requirement for bid evaluation, production, and delivery. This document takes precedence over technical documentation in the event of a conflict in the text.

1.3.4 TDP. This acronym is used as the abbreviation for the Technical Data Package and represents the compilation of the engineering drawings, pattern drawings, product specifications and test records for the project.

1.3.5 CDRL. This acronym is used as the abbreviation for the Contract Data Requirements List, which is used to cross reference to data item deliverables that are authorized for acquisition.

1.3.6 DID. This acronym is used as the abbreviation for the Data Item Description that specifies the required format, content, preparation details and intended use of data items.

1.3.7 CTS. This acronym is used as the abbreviation for Canadian Technical Standard and is used in conjunction with labeling operational plate levels in order to differentiate them from other international specifications and standards.

1.3.8 CEIL. This acronym is used as the abbreviation for the Contract End Items Lists, which is used to cross reference contract deliverables that are authorized for acquisition.

2.0 DOCUMENTS The following documentation is relevant to the performance of the work called up in this SOW:

2184DE-18470-05	Technical Standard Bullet Resistant Plates, for the Land Forces Directorate of Soldier Systems Program Management July 2011
D-02-006-008/SG-001	Design Change, Deviation and Waiver Procedure
D-02-002-001/SG-001	Identification Marking of Canadian Military Property
D-LM-008-036/SF-000	Manufacturer's Standard Pack
D-01-400-001/SG-000	Engineering Drawing Practices
C-01-100-100/AG-005	Adoption of Commercial and Foreign Government Publications

Copies of the above document(s) will be distributed automatically by the Department of National Defence

3.0 REQUIREMENTS

3.1 **General.** The Contractor shall perform all the work required to deliver the BRP systems in accordance with this SOW, the Technical Standard, and the Contract Data Requirements List.

3.2 **BRP System.** The Contractor shall deliver the BRP, operational type SC, the training plate surrogate, and the plate carrier in the quantities and component breakdown as specified in the CEIL, inclusive of associated administrative, technical, and logistics support data outlined within. The weight level and the multi-hit level MH* are established during bid evaluation in accordance with the classification scheme and are specified in the contract.

3.3 **Project Management.** The Contractor shall effectively manage all the work under the contract through a single Point of Contact (POC).

3.3.1 Project Manager. The Contractor shall appoint a Project Manager (PM), by name and position, to act as the contract POC with the Government. The Contractor PM shall be empowered by the Contractor to make design, production, and contractual decisions and communicate to the Government the planning and coordination of Contractor activities in all disciplines as related to this contract.

3.3.2 Progress Reports. The Contractor shall produce and distribute Progress Reports as required in CDRL 001 and DID MGTD-18001SC.

3.3.3 Technical Reviews. The Contractor shall provide meeting facilities and conduct periodic technical reviews, commencing after the post-contract award meeting. Technical reviews will normally be attended by three government representatives. These meetings will be chaired jointly by the Contractor PM and the DND Technical Authority.

3.3.4 Agenda and Minutes of Reviews. The Contractor shall produce and distribute agenda and minutes for technical reviews as required in CDRL 002 and DID ADMD-18001SC.

3.4 **Design and Configuration Control.** The Contractor shall effectively manage the configuration control of the Government selected BRP system.

3.4.1 Technical Data Summary. The Contractor shall produce and deliver the technical data summary as required in CDRL 003 and DID CMGT-18001SC.

3.5 **Quality Control and Testing.** The BRP system components provided by the Contractor shall comply with technical and performance requirements in the Technical Standard. Production testing and test records shall be controlled by the Contractor, employing the best practices as outlined in the contract. The Contractor shall provide details of their Quality Plan for the production as required in the Request for Proposal.

3.5.1 **Test Records.** The Contractor shall provide notification and test records to the Government of any test series as defined in CDRL004 and DID ENGD-18001SC. Routine test data and inspection records during production shall be recorded and maintained in accordance with the Contractor's QA Plan.

3.6 **User Instructions.** The Contractor shall produce and distribute, with each BRP kit, user instructions as required in CDRL 005 and DID TMPB-18001SC.

3.7 **Packaging Specification.** The Contractor shall produce and deliver a packaging specification as required in CDRL006 and DID ILSD-18001SC.

3.8 **Technical Authority** (Point of Contact **TBD** at Contract award).

3.9.3 **Location.** Unless otherwise stated in the contract, technical documentation, ILS records, Test and Evaluation (T&E) records, and pre-production samples shall be delivered to the Technical Authority for review and disposition at the following locations.

Courier Address

National Defence Headquarters
Attn: **TBD**
Louis St-Laurent Building
555 Blvd de la Carrière
Gatineau, Quebec
J8Y 6R5

Mailing Address

National Defence Headquarters
Attention: **TBD**
Ottawa, Ontario
K1A 0K2

3.10 **Classification Scheme.** Refer to definitions at Annex C.

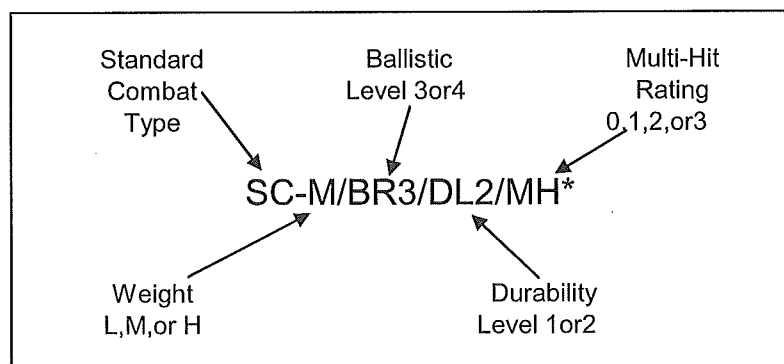


Table 1 – Test Sample Requirements - Production

	Technical Standard SECTION	TEST REQUIREMENT	Preproduction First Article & Failed Lot	Production Lots
1a	Operational Plates	DESTRUCTIVE TESTS	<i>26 samples (Note 1)</i>	<i>16 samples (Note 2)</i>
	3.3.2.1	Ballistic Limit V50 <u>As New</u> 7.62mm AP P80	10	10
	3.3.2.1	Ballistic Limit V50 ID <u>Impact Damage</u> 7.62mm AP P80	10	N/A
	3.3.2.2a	Proof Vo 7.62mm Ball C21	3	3 samples/lot
	3.3.2.3	Backface Deformation	Same 3	Same 3
	3.3.2.4	Spall Resistance	Same 3	Same 3
	3.3.2.2b	Proof Vo 5.56mm Ball C77	3	3 samples/lot
1b	OTHER REQUIREMENTS			
	3.3.1.1	Critical Dimensions	100%	100%
	3.3.1.2	Weight	100%	100%
	3.3.1.3	Finish	100%	QC sampling
	3.3.1.4	Colour and Markings	100%	QC sampling
1c	MULTI-HIT TESTS			
	3.3.2.2a	Proof Vo 7.62mm Ball C21 (As required for MH level)	Same samples as above	Same samples as above
2	Training Plates			
	3.5.1	Critical Dimensions & Weight	100%	100%
	3.5.2	Impact	3	N/A
	3.5.2	Water Immersion	1	N/A
	3.5.3	Finish	100%	QC sampling
	3.5.3	Flame Resistance	1 (Note 4)	N/A
	3.5.4	Colour and Markings	100%	QC sampling

Notes: 1. Selected from random lot sampling and radiography of 30 samples.
2. Selected from random lot sampling and radiography of 20 samples.
3. Applies **ONLY** to bidders who chose to supply MH levels above 0 for Bonus Award. Tests must be conducted throughout production once Bonus points are awarded and qualification is certified.
4. Test is waived if the same material as the Operational Plate is used.

4.0 DELIVERABLES

Table 2 – Deliverable Samples and Data

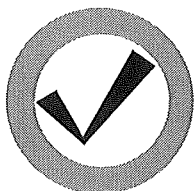
<i>BULLET RESISTANT PLATE SAMPLES CONTRACT END ITEMS LIST (CEIL)</i>	Quantity
Pre-Award Requirements	Refer to Annex F of RFP
Phase 1	20 samples
Phase 2	25 samples
Winning Bid Only	Refer to RFP/Contract
Production samples (Note 1)	6 Operational Plates 4 Training Plates 5 Carriers
NSN -TBD Operational BRP Kit	Min 5,000 Max 7,000
NSN -TBD Insert, Small Arms Protective	Min 6,000 Max 8,000
6910-20-002-0545 Training Plate Kit	Min 4,000 Max 6,000
6910-21-921-3264 Insert, Training Aid	Min 2,000 Max 3,000
8470-21-921-3223 BRP Carrier, Webbing	Min 1,000 Max 3,000
DATA REQUIREMENTS	
Data Item Description (DID)	CRDL # DID #
Progress Reports	001 MGTD-18001SC
Technical Review Records	002 ADMD-18001SC
Technical Data Summary	003 CMGT-18001SC
Test Records	004 ENGD-18001SC
User Instruction	005 TMPB-18001SC
Packaging Specification	006 ILSD-18001SC

Notes: 1. Delivery to NDHQ Technical Authority



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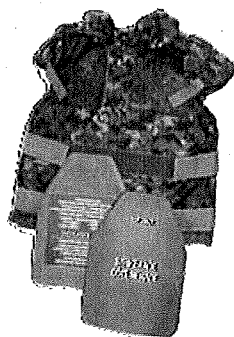
2184DE-18470-05
July 2011



NOTICE

This documentation has been reviewed by the technical authority and does not contain controlled goods. Disclosure notices and handling instructions originally received with the document shall continue to apply.

TECHNICAL STANDARD BULLET RESISTANT PLATES FOR THE LAND FORCES



OPI : DSSPM 2
BPR: DAPES 2

Canada

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© Sa Majesté la Reine du chef du Canada représentée par le ministre de la Défense nationale

TECHNICAL STANDARD
BULLET RESISTANT PLATES, BODY ARMOUR SYSTEM
FOR THE LAND FORCES

1. SCOPE AND CLASSIFICATION

1.1 Scope. This document details the design, technical, and performance requirements for Bullet Resistant plates for Land Force (LF) soldiers and other members of the CF conducting land operations. The plates are designed to protect a limited part of the torso against penetration and severe blunt trauma effects generated by small calibre ball and armour piercing projectiles.

1.2 Intended Use. The Land Force Body Armour system is comprised of two components:

- the Fragmentation Protective Vest (FPV); and
- the Bullet Resistant Plate (BRP) set.

The FPV is modular in design and provides ballistic protection from fragmenting munitions and debris resulting from high explosive detonation or other explosive devices. BRP of specified performance, dimension, and profile are added to the FPV front and rear pockets to enhance the protection level of vital organs against more lethal threats, as specified within this document. Plate sets include a standard combat [SC] type, a special missions [SM] type (see BRP classification definition section 6.0), and a training surrogate.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in Section 3 and 4 of this standard. Abbreviations and acronyms are defined in Section 6. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements in documents cited in this standard, whether or not they are listed below.

2.2 Government Specifications and Standards. The following specifications and standards form part of this standard to the extent specified herein. The issue or amendment of documents effective for a specific solicitation shall be that in effect on the

METRIC unless otherwise specified

date of the applicable design data list, released with the Request for Proposal.

STANDARDS

MIL-STD-810E Standard for Environmental Engineering Considerations

2.2 Other Government documents and drawings. The following other Government documents form a part of this standard to the extent specified herein.

PUBLICATIONS

User Instruction DND to Provide Bilingual Electronic File

DRAWINGS

Control Drawing - Operational Plate	0078819
Control Drawing - Training Plate	0975169
Operational Plate Assembly-In service	0375000
Training Plate Assembly-In service	0375001
Plate Carrier Assembly-In service	0375002

Copies of the above document(s) will be distributed automatically by the Department of National Defence upon request. In service assembly drawings are for information only.

2.3 Other Specifications and Standards. The documents listed in section 2.3 form a part of this standard to the extent specified herein. The effective dates shall be those in effect on the date of the request for proposal. They are not provided by the Government and may be purchased from the sources shown below.

International Standards Organization, (available from Member Nation Standards Organizations)

ISO 14876-1 Body Armour – Part 1: Bullet-resistant vests

American Society for Testing and Materials (ASTM),
100 Barr Harbor Drive
West Conshohocken, PA, USA 19428-2959

D543 Military Specifications for Liquids Encountered in Military Service

METRIC unless otherwise specified

D1230	Standard Test Method for Flammability of Apparel Textiles
G21	Practise for Determining Resistance of Synthetic Polymeric Materials to Fungi
E94	Guide for Radiographic Testing
E142	Method for Controlling Quality of Radiographic Testing
E308	Standard Practice for Computing Colors of Objects by Using the CIE System

ANSI PUBLICATIONS

11 West 42nd Street,
New York, NY 10036

ASQC Z1.4 Sampling

2.4 Sealed Patterns. Sealed patterns are made available to a contractor as a guide to production. The sealed pattern numbers are:

DSSPM 259-01	Canadian Disruptive Pattern (CADPAT™) Temperate Woodland - Sealed for pattern, motif size, colour distribution and guidance.
DSSPM 253-02	Canadian Disruptive Pattern (CADPAT™) Arid Regions - Sealed for pattern, motif size, colour distribution and guidance.

2.5 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

METRIC unless otherwise specified

3. REQUIREMENTS

3.1 Environmental Protection Requirements. It is the responsibility of the Contractor to ensure compliance to any existing environmental laws and regulations in force in the country that apply to the development, testing, and manufacturing of the product.

3.1.1 HEALTH AND SAFETY. The materials used in manufacturing the plates must be such that when used properly and as directed (in-service use or during transportation, storage and disposal) will not cause harm to humans or the environment and that the relevant Canadian health/safety laws and regulations apply. The evaluation of the Contractor's product against the specifications contained herein may require the use of materials and equipment that could be hazardous. Contractors using this specification have the responsibility to establish the necessary health and safety practices with the appropriate regulatory bodies prior to its use.

3.2 First Article. First article samples shall be completely representative of the final product, being made from the same components and materials and by the same tools and processes that will be used in quantity production. Samples shall be subjected to first article inspection in accordance with 4.3.

3.3 System Requirements. The BRP form a component of the LF Body Armour System (refer to section 1.2) and the design shall conform to the requirements specified herein. The sub-system elements consist of the following:

- a. operational sets consisting of identical front and rear plates;
- b. a plate carrier with user instructions; and
- c. a training aid set.

3.3.1 DESIGN. The operational plate sets are of one size, fully interchangeable in the front and rear FPV plate pockets and across the full range of FPV sizes available. The training aid set shall meet the same dimensional, weight, and interchangeability requirements as the operational plate type SC.

3.3.1.1 Dimensions - Operational Types. Dimensions of a BRP set submitted for qualification shall be governed by the control dimensions specified in drawing 0078819. The thickness dimension should be less than 18mm and shall be no greater than 25mm. The thickness dimension will form part of the **RATED** selection process as specified in the RFP. Each finished BRP manufactured during production shall meet the control dimensions and the thickness tolerances certified at contract award. Critical interface dimensions (as defined in section 6.1.1) shall be verified as

METRIC unless otherwise specified

~~specified in section 4.5.1.1 to ensure interchangeability and shall apply to all plate types.~~

3.3.1.2 Effective Ballistic Coverage and Weight. The weight of the BRP shall be in accordance with the assigned classification scheme in the SOW after application of the Effective Coverage Ratio (ECR). The effective ballistic coverage area shall be maximised (>95%) for each plate type called up. Effective areal density and effective ballistic coverage (see definitions in section 6.1) shall form part of the **RATED** selection process. In production each BRP shall meet or improve on the effective areal density requirement and ECR established at bid stage. No BRP shall exceed the upper weight tolerance value determined at contract award after application of the ratio to the Canadian 3D surface area. Measurements shall be verified as specified in section 4.5.1.2. Weight limits and scales for qualification and assessment are detailed in the RFP.

3.3.1.3 Construction - Operational Types. Materials and processes used in the manufacture of operational plate types shall be such that a structurally rigid plate of uniform areal density and ballistic performance (section 3.3.2) is achieved over the effective ballistic coverage area. Finished plates used in ballistic testing shall be selected from a distinct batch/lot and radiographically examined as specified in section 4.5.1.3.

3.3.1.3.1 Moulding. If moulding is required in the manufacture of plates, there shall be no patching performed after the material has been moulded.

3.3.1.3.2 Protective Coverings. Armour material coverings can be used to reduce spall or increase multi-hit capability and durability requirements. They shall be configured and applied as to encompass the entire strike face and edges in a continuous and uniform manner. There shall be no visible peeling of the tab formed on the covering to the plate joining area. Protective edging to mitigate impact damage to the plate edge shall not exceed any provided during bid assessment.

3.3.1.3.3 External Finish. Each BRP shall be finished as to facilitate the insertion and removal of plate sets from the FPV pockets. No obtrusive or abrasive external coverings are permitted. The external covering shall be replaceable and removable for R&O inspections and surveillance testing. Any bonded closure components shall be prepared to assure a permanent and uniform application and no excess bonding agent shall be visible at seams or exposed surfaces of the finished plates. Finished plates shall be inspected as specified in section 4.5.1.3.3.

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~~3.3.1.4~~ Colour and Markings. The external surface area of the production plates shall be a blended matte brown finish to ensure compatibility with the brown incorporated in the Temperate Woodland and Arid Region patterns. A suggested match is Pantone for Textiles colour brown # 19-1020TC. Permanent labels/markings shall be applied to each BRP as specified in section 4.5.1.5. and should not degrade during environmental testing as specified at Appendix 5. All production plates shall incorporate a sequential serial number that correlates directly with the manufacturing sequence of the ballistic protective components (ceramic or other materials) and that is traceable to any radiographic films that apply to a sample or lot.

3.3.2 BALLISTIC PROTECTION. Ballistic qualification is defined in phases in terms of V_{50} Ballistic Limit and V_0 Proof. Projectiles used for pre-qualification requirements and additional threat rounds for general requirements are as specified within. Custom or classified threats identified for type SM plates are specified under separate cover. All ballistic test results are sealed *Company Confidential* by the Government.

3.3.2.1 Ballistic Limit V_{50} . The average MV_{50} (as defined at Section 6.1.2) shall meet or exceed the values specified in Table 3.1 and will form part of the **RATED** selection process as specified in the RFP. Each Shot V_{50} shall be determined as specified in section 4.5.2. The absolute value of the difference between individual Shot V_{50} and the average shall be less than 50m/s. The ballistic limit test shall also be conducted in conjunction with Environmental Qualification (EQ) for durability level 1 (basic) and level 2 (enhanced) and the Impact Damage (ID) validation for durability level 2 (enhanced) only. The average MV_{50} (EQ) shall be no less than 95% of the standard value and the average MV_{50} (ID) shall be no less than 90% of the standard value.

3.3.2.2 Proof V_0 . The BRP with surrogate pack shall stop a minimum of three (3) shots against 7.62mm threats and five (5) shots against 5.56mm threats specified in Table 3.1. Plates shall be tested as specified in section 4.5.2. For full qualification, the additional threat rounds for general and custom requirements shall also be validated.

3.3.2.3 Backface Deformation. The average backface deformation of the BRP should be less than 40 mm for the Type SC and SM plates when tested as specified in section 4.5.2. In addition, any single indentation shall not exceed 44mm, and no complete penetration of the armour test sample shall occur. Backface deformation shall form part of the **RATED** selection process as specified in the RFP. The tests are conducted simultaneously on the same plate as 7.62mm Proof V_0 tests.

3.3.2.4 Spall Resistance. The BRP shall be designed to mitigate personal injury to the wearer or surrounding individuals from frontal spall, projectile and/or armour

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debris ejecta. The ballistic front spall resistance of the BRP should be such that there is a maximum of three (3) perforations for each of the three (3) shots on the plate and shall not exceed thirty (30) perforations for the test sample. Testing shall be conducted as specified in section 4.5.2. Spall resistance shall form part of the **RATED** selection process as specified in the RFP. The tests are conducted simultaneously on the same plates as 7.62mm Proof V_0 tests.

3.3.2.5 Multi-Hit. Multi-hit assessment greater than three (3) shots against 7.62mm threats (as defined in section 6.1.2), will be **RATED** for bonus points. Multi-hit categorization of a particular BRP product is at the discretion of the Contractor and must be supported by data at time of Bid Evaluation. Performance will be verified in a Government sanctioned test lab.

Table 3.1 – Ballistic Protection Summary

TEST ID Appendix 1	PROJECTILE DESCRIPTION	TYPE SC LEVEL BR3	TYPE SM LEVEL BR4
[1] Ballistic Limit MV_{50}	7.62mm AP P80 7.62mm AP M993	$\geq 850\text{m/s}$ N/A	(see 2a below) $\geq 900\text{m/s}$
[2a] Proof V_0	7.62mm AP P80	N/A	$\geq 900\text{m/s}$
[2a] Proof V_0	7.62mm Ball C21	$\geq 875\text{m/s}$	$\geq 900\text{m/s}$
[2b] Proof V_0	5.56mm Ball C77	$\geq 975\text{m/s}$	$\geq 1000\text{m/s}$
[6]	Custom and Classified	N/A	Issued Under Separate Cover

Notes: Tests [3] and [4] are done in conjunction with 7.62mm Proof V_0 tests.

3.3.3 DURABILITY. The type SC plate shall meet level 2 Enhanced Durability requirements and the type SM plate shall meet level 1 or 2 Durability requirements as defined in section 6.1.1 BRP classification and specified in the RFP. The ballistic limit test (section 3.3.2.1) shall be conducted in conjunction with Environmental Qualification (EQ) for durability level 1 and level 2 and the Impact Damage (ID) validation for durability level 2 only.

3.3.3.1 Impact Damage (ID) Validation. BRP designs requiring enhanced durability shall be submitted for sequential conditioning as specified in 4.5.3.1. The specified conditions are used to simulate extreme mechanical and thermal shocks encountered in-service, impact damage resistance, and immersion into water. Although

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~~these conditions may not produce any visible damage, they may still degrade the~~
ballistic performance of a BRP sample. On completion of each individual test, the specimens shall be examined visually for signs of bonding flaws, component delamination, cracking, or other deterioration. On completion of the corner drops, the impact series, the water immersion, and the thermal shock cycling series, the specimens shall be radiographed for information and submitted for the ballistic limit V_{50} (ID) test (refer to section 3.3.2.1). This conditioning series is only done for full design and production qualification and will normally be conducted by DND for Bid Evaluation.

3.3.3.2 Environmental Qualification (EQ). BRP designs of both operational types shall be submitted for sequential environmental conditioning as specified in 4.5.3.2. On completion of each individual test, the specimens shall be returned to ambient conditions and examined visually for signs of bond delamination, cracking, or other deterioration. On completion of the solar radiation, vibration, temperature/humidity cycling and rough handling series, the specimens shall be radiographically inspected to determine weak areas and submitted for the ballistic limit V_{50} (EQ) test (refer to section 3.3.2.1). This conditioning series is only done for full design qualification and will be conducted by DND.

3.3.3.3 Material Qualification. Material Qualification will form part of the **RATED** selection process as specified in the RFP.

3.3.3.3.1 Chemical Resistance. The materials used in the BRP must be resistant to damage from common battlefield fluids. These include but are not limited to lubricants, greases, fuels, cleaning agents, and insect repellents. ASTM D543 will be used for guidance in assessing this requirement. The outer protective covering should have an Evaluation Grade of no greater than "2" when tested as specified in 4.5.3.3.1.

3.3.3.3.2 Flammability Resistance. The materials used in the BR plates shall not combust, explode or drip melted materials when impacted by the defined ballistic threats specified within. The outer protective covering should be made of flame-resistant material. ASTM D1230 will be used for guidance in classifying the flame-resistant properties. It will be tested in accordance with 4.5.3.3.2.

3.3.3.3.3 Water Absorption. The weight gain should not exceed 3% after immersion of the BRP as specified in section 4.5.3.3.3 or after the humidity cycling of the BRP samples as specified in section 17.4. In addition, the external surface shall show no evidence of softening, peeling, or blistering after immersion.

3.3.3.3.4 Fungus Resistance. The materials used in the system and its components shall be non-nutrients for fungi. Only inherently fungus resistant grades of materials

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shall be employed in the manufacturing process. ASTM G21-90 or equivalent shall be used as guidance in providing evidence for this requirement.

3.4 Plate Carrier. The plate carrier shall meet the requirements specified in Appendix 4.

3.5 Training Aid Set. The training aid set shall be a representative plate set for field training only. The training aid plates are intended for use in non-operational scenarios where plate damage from novice and inexperienced users is more probabilistic and where ballistic threats do not exist. These plates can be designed much more resilient against severe impact threats and misuse. The training plates shall meet the requirements specified below.

3.5.1 Dimensions and Weight - Training Plate. Dimensions of a training plate submitted for qualification shall be governed by the RFP. Each finished training plate manufactured during production shall meet the control dimensions specified in drawing 0975169. The weight of the training plate shall be $2.40 \text{ kg} \pm 0.10 \text{ kg}$.

3.5.2 Construction – Training Plate. The construction and materials shall be such that the plate set is economical (price should be less than 10% of the operational type SC, but shall be no more than 15%) and will withstand repeated rough handling (at least two impact damage test sequences as specified in section 4.5.3.1) The plate shall also be thoroughly water-resistant. The weight gain should not exceed 2% after immersion as specified in section 4.5.3.3.3. Additionally, the external surface shall show no evidence of softening, peeling, or blistering after immersion. Only inherently fungus resistant grades of materials shall be employed in the manufacturing process. ASTM G21-90 or equivalent shall be used as guidance in providing evidence for this requirement.

3.5.3 External Finish. Each plate shall be finished as to facilitate the insertion and removal of plate sets from the FPV pockets during training. No obtrusive or abrasive external coverings are permitted. The exposed surface material or outer protective covering shall be resistant to standard battlefield chemicals (Appendix 3) found during combat training. It shall be made of flame-resistant material. ASTM D1230 will be used for guidance in classifying the flame-resistant properties. It will be tested in accordance with 4.5.3.3.2.

3.5.4 Colour and Markings. The external surface area of the training plates shall be a close visual match to International Orange (colour 12197 in accordance with FED-STD-595) to differentiate it from the operational types. It should be a general colour

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~~match in accordance with ASTM D1729 using an average daylight illumination source (CIE Illuminant D₆₅). The plate must be permanently labelled or marked in as specified in Appendix 6. Design proposals for the plate materials are at the discretion of the Contractor and will be evaluated for impact damage resistance, chemical resistance, and for durability as specified above.~~

3.6 Workmanship. The finished product shall reflect high standards of workmanship and shall be free from all defects that would affect quality, appearance, safety or proper functioning in service.

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Table 3.2 – Requirements Summary

CATEGORY	REQUIREMENT(S)	REQUIREMENT PARAGRAPH	METHODOLOGY PARAGRAPH(S)
DESIGN	Dimensions	3.3.1.1	4.5.1.1
	Weight/Coverage	3.3.1.2	4.5.1.2
	Construction	3.3.1.3	4.5.1.3
	Colour and Markings	3.3.1.4	4.5.1.4-5
PROTECTION	[1] 7.62 mm Ballistic Limit V_{50}	3.3.2.1	4.5.2
	[2]a 7.62 mm Proof V_0	3.3.2.2	4.5.2
	[2]b 5.56 mm Proof V_0	3.3.2.2	4.5.2
	[3] Backface Deformation	3.3.2.3	4.5.2
	[4] Spall Mitigation	3.3.2.4	4.5.2
	[5] Multi-Hit	3.3.2.5	4.5.2
DURABILITY	Impact Damage (ID) Qualification	3.3.3.1	4.5.3.1
	Environmental (EQ) Qualification	3.3.3.2	4.5.3.2
	Materials Qualification	3.3.3.3	4.5.3.3
PLATE CARRIER	General Specification	3.4	Appendix 4
TRAINING AID SET	General Specification	3.5	As Above

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4. QUALITY ASSURANCE PROVISIONS

4.1 Classification of Inspection. The inspection requirements specified herein are classified as follows:

- a. Pre-award inspection;
- b. First Article inspection; and
- c. Production inspection.

4.2 Pre-award Inspection. Pre-award inspection shall comprise all requirements defined in the Request for Proposal (RFP) and conducted as specified in the Instructions to Bidders. Testing of technical performance requirements is the responsibility of the bidders except as specified and must be supported by original test data and supplied as part of a bid proposal. DND will validate all of the results supplied by bidders. Qualification will be based on the written technical proposals, a review of the bidder test results, and DND verification of pre-award samples against selected technical requirements. Product testing will normally be broken down into several progressive test phases.

4.3 First Article Inspection. First article lot size shall be a minimum of 150 and a maximum of 500 plates. The presence of any defect (see Table 4.1) or failure to pass specified technical requirements shall be cause for rejection of the first article (refer to Statement of Work).

4.4 Production Inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with ANSI/ASQC Z1.4 or an equivalent sampling plan approved by the DND Quality Assurance Authority. The presence of any defect (see Table 4.1) or failure to pass specified technical requirements shall be cause for review and assessment of the production lot (refer to Statement of Work).

4.4.1 COMPONENT AND MATERIAL INSPECTION. During production the contractor shall provide certification that the components and materials have been inspected in accordance with all the requirements of the referenced documents.

4.4.2 PRODUCTION LOT SIZE. The lot or batch size from which samples are drawn shall be defined by the Contractor and submitted to the DND Quality Assurance Authority for review and acceptance. No lot shall exceed 500 units during production.

4.4.3 QUALITY CONTROL INSPECTION. Unless otherwise specified in the contract or Request for Proposal, the Contractor shall be responsible for the performance of all inspection requirements as specified herein. Contractors may utilize their own or any

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other inspection facility acceptable to the Government or its designated representative. The Government reserves the right to perform any of the inspections specified herein. The contractor shall be responsible for ensuring that all materiel or services submitted to the Government for acceptance comply with all requirements of the contract or Request for Proposal.

4.4.4 **SUBCONTRACTOR OBLIGATION.** If the prime contractor is not the manufacturer of the ballistic components, then the subcontractor must comply with all requirements herein. The prime contractor is required to provide all specifications and associated documents required for the manufacture of these items. The quality of workmanship and conformance to the requirements are the responsibility of the prime contractor. The prime contractor is required to provide all necessary data, specifications and inspection documents to DND Quality Assurance Authority when required.

Table 4.1 – End Item Examination

Visual Examination	Defect
Operational Plates	Any incorrectly dimensioned or malformed profile [100%Inspection of critical interface dimensions] Any incorrect colour, labelling or markings. Any incorrectly finished edges, joints or seams. Any surface creases, delamination, blistering, cracking or fractures. Discontinuities or overlap bulges in protective edging (if applicable). Any grease, oil or adhesives on finished covering. Any cuts, holes or tears in finished covering. Any mended or patched areas on finished covering.
Training Plates	Any incorrectly dimensioned or malformed profile [100%Inspection of critical interface dimensions] Any incorrect colour, labelling or markings. Any unfinished edges or seams.
Plate Carrier	Any incorrect colour, labelling or markings. Any unfinished edges or seams. Inability to insert plate set or securely close carrier after insertion.
Instruction Pamphlet	Any missing instructions. Any tears, holes, cuts, or other defects in pamphlet material. Any ink, format or alignment defects in printed material.

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4.4.5 VISUAL EXAMINATION. The lot size shall be expressed in individual units of plates. The end items shall be visually examined for the defects listed in Table 4.1 using the DND approved sampling plan or as otherwise specified.

4.5 Methods of Test

4.5.1 DESIGN

4.5.1.1 Dimensions. Plate critical interface dimensions (as defined at section 6.1.1.) shall be verified to ensure fit with the FPV pockets using government approved production gauge(s) as detailed in the Request for Proposal. All other dimensions of finished BRP shall be verified and recorded in accordance with the contractor's QA and sampling plans.

4.5.1.2 Weight. Finished BRP shall be verified by actual measurement to the nearest 0.01 kilograms. Equipment used for measurement shall be calibrated for accuracy and should be capable of weighing with a precision of ± 1 gram.

4.5.1.3 Construction. Randomly selected samples, in the quantities specified, shall be radiographically examined to locate weak areas as defined in section 6 and outlined below in Table 4.2. Radiography shall be completed prior to sample selection for ballistic testing. Samples selected for either Impact Damage (ID) and Environmental Qualification (EQ), as applicable, shall also be re-examined upon completion of the conditioning series and prior to ballistic limit V_{50} testing for information.

TABLE 4.2 Radiography – Weak Areas and Critical Defects New Plates

Weak Areas	Minor flaws including small cracks, voids, inclusions or dark surface areas.	Delamination of reinforcement plies from each other in backing material .	Any mosaic tile joint/seam within tolerance.
Critical Defects (REJECT LOT)	Refer to text below	Delamination of backing material from ballistic protective component.	Any missing tile or mosaic tile joint/seam out of specified tolerance.

Critical Defect. Items listed in Table 4.2 above or any other known defect that degrades ballistic minimum performance in excess of 15 %. Critical defects shall result in the rejection of the lot and the immediate production re-qualification as specified in the Statement of Work.

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4.5.1.3.1 Sample Marking. Based on the examination of the radiographic film, a maximum of six (6) shot locations shall be clearly identified and marked on all ballistic test samples. The selected locations shall comply with the priorities established in Table 4.3

TABLE 4.3 Shot Location Selection Priorities Vproof

Monolithic Design 7.62mm threats & NO multi-hit claims-MH level 0	Select the maximum number of weak areas possible up to three (3) that also meet the geometric criteria in Figure 11.7.	If three flawed areas are not present that overlay the geometric pattern, select remaining areas in accordance with geometric criteria only.
Mosaic Design 5.56mm threat or Multi-hit claim MH level ≥ 1	Select up to three (3) weak areas that are <u>minor flaws</u> that also meet the geometric criteria in Figure 11.7.	Select the remaining weak areas (for a maximum of 6) that are both <u>joint areas</u> (Mosaic ONLY) and that also meet the geometric criteria in Figure 11.8.

4.5.1.3.2 Radiographic Procedure. The radiographic equipment and procedures shall be in accordance with those specified in ASTM Standards E94 and E142. Radiographic films shall be made available to the Technical Authority or the Quality Assurance Authority upon request.

4.5.1.3.3 External Finishing. Plates of all types shall be assessed randomly for ease of insertion and removal from the government approved FPV pocket and visually examined for defects listed in Table 4.1.

4.5.1.4 Colour. Colour measurements shall be made in accordance with CIE publication 15.2 and ASTM E308.95 using CIE Illuminant C and a 2-degree observer, specular component included.

4.5.1.5 Markings. Labels or markings shall be applied to the front and rear of each finished BRP as specified at Appendix 6.

4.5.2 PROTECTION. The DND approved ballistic test methodology is detailed at Appendix 1. The specific procedures and sequences for each individual test are covered in sections 11.6 and 11.7 and the complete ballistic series is summarised in Table 11.4.

4.5.3 SHELF-LIFE. The depot storage life of the operational plate sets should have a minimum fifteen year (15) shelf-life. Contractors should provide evidence of any claims made in this regard within their technical proposal. The service life of the plates under normal operating conditions should exceed five (5) years continuous use. The plates

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must maintain the minimum specified ballistic performance levels after exposure to the operational rigours and climatic extremes of military service.

4.5.3.1 Impact Damage (ID) Conditioning. Damage conditioning is done by submitting the plate samples to drop testing in guided vertical free fall onto a rigid surface on the two top corners and the two bottom corners (edge impacts). The four drops shall be done using the same BRP sample. The drop height (selected point of plate to top of anvil) shall be adjusted to 1500 ± 5 mm.

For drop testing, the plate sample shall be guided vertically with two steel wires through 4 brackets attached on its edge (or equivalent device). The brackets shall be oriented before each drop such that the plate will strike the corners with an angle of approximately 45 degrees. A device such as an electromagnet shall be used to hold the plate before it is dropped. The support plate shall be released without any impetus being given to it, i.e. it shall accelerate only due to gravity. The anvil shall be a flat circular anvil made of hardened steel (minimum hardness of 45 Rockwell "C") and have a minimum diameter of 100 mm. It shall be mounted upon a steel base plate having a minimum thickness of 25 mm. The base plate shall be supported on a rigid concrete surface having a thickness of at least 50 mm. For safety, the anvil shall be surrounded by an enclosure of sufficient height to contain the rebounding plate sample during testing.

Once the four corner drops are completed, the edge surfaces of the plate samples shall be examined and any visible evidence of permanent deformation, dent, delamination, softening, or cracking shall be recorded.

The BRP shall then be placed horizontally on a flat rigid concrete surface with 12-mm thick rubber band (65-70 Shore A) under its edges and submitted to three 50 joule (nominal) impacts. A standard $3 \frac{1}{4}$ inch (82.55mm) steel sphere weighing 2270 ± 15 grams shall be dropped without a guide tube from a nominal height of 2250mm as measured from the BRP specimen impact point and the lower surface of the ball. Steel ball reference KG-82.55 from FAG has been found satisfactory, although any steel sphere meeting the mass and diameter requirements is acceptable. The impacts should be uniformly located on the front face of the BRP at a minimum distance of 50 mm from the edge and 100 mm from each other. The three impacts need not be done at normal angle. The impact points shall be identified with a permanent and legible marker since they will be used for ballistic performance testing. There shall be no visible damage, and the plate shall maintain its structural integrity, i.e., there shall be no cracks, or plate mass loss.

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After impact testing the specimens shall be subjected to the water immersion test as specified in section 4.5.3.3.3. Immediately following the water immersion test, the plate specimen shall be placed in a cold chamber at $-40^{\circ}\pm 2^{\circ}\text{C}$ for 16 ± 0.5 hours. All test specimens shall be conditioned at ambient ($23^{\circ}\pm 2^{\circ}\text{C}$ and $50\pm 5\%$ relative humidity) for at least 12 hours prior to the series and re-conditioned at ambient for a minimum of 4 hours following the series. The outside surface of the plate shall be examined and any evidence of visual damage shall be recorded.

4.5.3.2 Environmental Conditioning. Environmental conditioning is done by subjecting the plate samples to the sequential test series outlined at Appendix 5. All test specimens shall be conditioned at ambient ($23^{\circ}\pm 2^{\circ}\text{C}$ and $50\pm 5\%$ relative humidity) for at least 12 hours prior to the series and re-conditioned at ambient for a minimum of 8 hours following the series. The outside surface of the plate shall be examined and any evidence of visual damage shall be recorded.

4.5.3.3 Material Qualification.

4.5.3.3.1 Chemical Resistance. The chemical resistance shall be tested using the method described in Appendix 2. Substances shall be applied on the rear face of the plate and cover any overlap area of the tab formed on the covering to the plate joining area (where applicable).

4.5.3.3.2 Flame Resistance. The flame resistance shall be tested using the method described in Appendix 3. Test specimens shall be cut from the outer covering material on the strike face of the plate.

4.5.3.3.3 Water Immersion. The BRP samples shall be placed in a plastic bag and weighed in the dry condition. The balance shall be calibrated and capable of measuring to a precision of 0.1 gram. After weighing, the samples shall be removed from the plastic bag and immersed vertically (using a clamp system) for a period of sixty (60) minutes. The samples shall rest on the bottom of a holding tank filled to a minimum depth of 50 cm with water. The water shall be conditioned at $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$. After removal, the samples shall be held vertically for five minutes to allow for draining. The samples shall then be re-inserted in their respective plastic bag so that no remaining water is lost. The samples shall be re-weighed and the percentage increase in weight shall be calculated based on the original dry condition of the BRP samples. All specimens shall be used to compute the average static water absorption.

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5.0 PACKAGING AND LABELLING

5.1 Transportation Packaging. As specified in the contract or Request for Proposal.

5.2 Transportation Labelling. As specified in the contract or Request for Proposal.

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6.0 NOTES

6.1 Definitions

6.1.1 REFERENCE DEFINITIONS. Reference definitions shall apply generally to all areas of the technical standard.

Critical Interface Dimensions: Plate thickness, overall width, and overall length are subject to 100% inspection as specified in section 4.5.1.1 and Table 4.1 in order to assure optimum fit with the fragmentation vest pockets.

Technical Authority: the Technical Authority is the Government agency responsible for the technical, performance, and design aspects of the product. The Technical Authority for this procurement requirement is the Directorate Soldier Systems Program Management (DSSPM), Department of National Defence.

Bullet Resistant Plate (BRP): a rigid or semi-rigid armour plate worn by the user in conjunction with the Fragmentation Protective Vest (FPV) and covering the vital organ area. It provides protection at given probability and confidence levels against specified projectiles from small arms weapons at typical velocities corresponding to realistic firing ranges.

BRP Classification: a system for grouping and ranking the BRP by mission type, bullet resistant level, weight (after application of the ECR), durability, and multi-hit capacity in conjunction with linkages to other recognized ballistic standards.

Table 6.1 – BRP Classification Scheme

TYPE	SC (Standard Combat/Ruggedized)		CLASSIFICATION SCHEME	SM (Special Mission/High Performance)		
	L (Light-weight) <2.0 Kg	M (Medium-weight) 2.0 to 2.5 Kg		H (Heavy-weight) 3.0-3.5 Kg	M (Medium-weight) 2.5 to 3.0 Kg	L (Light-weight) <2.5 Kg
Weight Range			SC-L/BR3/DL2/MH* SC-M/BR3/DL2/MH* SM-L/BR4-C*/DL1/MH* SM-L/BR4-C*/DL2/MH* SM-M/BR4-C*/DL1/MH* SM-M/BR4-C*/DL2/MH* SM-H/BR4-C*/DL2/MH* C* custom level or classified threats MH*=0,1,2, or 3			
Bullet Resistance Levels 3/4/C	BR3	BR3		BR4 & C	BR4 & C	BR4 & C
Durability Levels 1/2	DL2	DL2		DL2	DL1 or 2	DL1 or 2
Multi-Hit Rating 0 or 1, 2, 3	Vp(C21)	Vp(C21)		Vp(C21) + Vp(P80)	Vp(C21) + Vp(P80)	Vp(C21) + Vp(P80)

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Fragmentation Protective Vest (FPV): the battlefield FPV forms the primary component of coverage in the Land Forces Body Armour System. The FPV is designed to provide ballistic protection from fragmenting munitions and debris resulting from high explosive detonation or other explosive devices. Combined with a BRP product, this vest will optimise the protection levels to defeat multiple ballistic hazards across the battlefield continuum.

Essential Requirements. An essential requirement is a criterion that must be met. Performance thus designated is deemed to be so important that even if a contender's product meets all other essential criteria and all desirable criteria, but fails to meet one essential criterion, that product will be rejected. The words "**shall**" and "**must**" are to be considered synonymous with essential and result in a Pass/Fail determination.

Desirable Requirements. Desirable requirements are used to promote more sensitive evaluation of contending items which meet all essential or minimum requirements. A desirable criterion describes a requirement where performance better than the stated essential level is deemed to have value and is awarded points accordingly in a rating scale. The word "**should**" is to be considered synonymous with desirable and RATED.

6.1.2 BALLISTIC DEFINITIONS. Ballistic definitions shall apply only to those sections related to ballistic performance evaluation of the armour plates. Definitions are listed alphabetically.

Accepted impacts: accepted impacts include all fair hits; also includes any unfair hit for which the test conditions are more severe than specified (velocity too high and/or hit separation distance too short), but the performance criteria are met. It also includes any unfair hit for which the test conditions are less severe (velocity too low or impact or yaw angle too high), and the performance criteria are not met, this will then constitute a failure.

Angle of impact: the angle in degrees between the line of flight of the projectile and the perpendicular to the plane tangent to the point of impact on the test sample (see Fig. 11.1). In some documents, angle of obliquity is used with the same meaning.

Areal density: a measure of the weight of the complete ballistic protective plate per unit area. It is expressed in kg/ m².

AP: Armour Piercing.

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Backface: the surface of a bullet resistant plate designed to be positioned towards the body.

Backface deformation: the maximum transient displacement of the rear surface of a test sample caused by a non-perforating projectile impact. This corresponds to the maximum depth of the depression made in the backing material measured from the undistorted surface of this material.

Backing material: a block of tissue-simulating material placed next to the rear face of the test sample and used to support the sample during testing. Oil-based non-hardening modelling clay is used to capture the indentation resulting from the impact during backface deformation testing (Vproof with 7.62-mm threat rounds). For the Vproof test with the 5.56-mm projectile (shot and edge closeness) and the V_{50} tests, a synthetic gelatine and Mini-cell foam can be used as a backing material since measurement of indentation are not required for these tests.

Ballistic resistance: a measure of the capability of a protective material to stop or reduce the impact velocity of a striking projectile; in this document ballistic resistance is measured using ballistic limit tests (V_{50}), and proof tests (V_0).

Complete penetration (CP): a complete penetration has occurred when the projectile or a piece of the projectile or any part of the ballistic protective material has passed completely through the test sample and is captured by or has passed through the backing material (refer to figure 6.1). If the projectile remains lodged in the test sample and part of it is visible from the back face of the sample this will also be considered as a complete penetration. Paint or fibrous material that is emitted from the back of the test sample and rests on the outer surface of the gelatine or clay cavity are not considered a complete penetration. Complete delamination of a test sample shall also constitute a complete penetration.

Complete Delamination: the separation of the plate into its constituent layers preventing the plate from being adequately tested. The V_{50} and V_0 test sequences will be stopped whenever a complete delamination occurs.

Effective Areal Density: a rated parameter to discount the non-ballistic portion of the plate surface area. It is calculated by dividing the areal density by the effective ballistic coverage ratio below. Used in Bid Evaluations to determine the true BRP weight with 100% effective coverage in the Canadian 3D surface area.

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Effective Coverage Ratio (ECR): the actual 3D surface area of the full-ballistic protective component (ceramic or other material) as a ratio or percentage of the total 3D surface area of the plate strike face.

Fair hit: a zero degree obliquity (± 3 degrees) impact using the specified weight and type of unyawed projectile (± 3 degrees) within the specified velocity range and at the specified location on the target sample. A shot shall still be considered fair if the shot pattern is respected and there is overlap of armour material damage between the shots.

FMJ: Full Metal Jacket.

HPP: highest partial penetration velocity

Indentation diameter or size: the indentation diameter of the depression made in the backing material measured from the undistorted front surface (see Fig.11.3). For non-symmetric cavity, both the smallest diameter (width) and the largest diameter (length) shall be measured and recorded.

Instrumentation velocity, V_m : the velocity measured at a given distance in front of the test sample (see Fig.11.4) by a suitable device providing the required accuracy. When using a pair of detectors, measure to the middle of the two detectors.

Internal flaw: cracks, inclusions, voids, or measurable collections of porosity.

LCP: lowest complete penetration velocity

Multi-Hit Level: for purposes of this standard multi-hit level begins with the fourth shot on a plate sample as identified in Figure 11.8. Multi-hit is not mandatory and is only assessed if it is specifically designated and claimed by a contractor providing the product for evaluation and procurement. Bonus points are assigned in accordance with the RFP. Multi-hit category 1 is assigned to a plate design capable of consistently meeting **all 7.62 mm V_0 proof requirements** against 4 shots versus 3. Category 2 is for 5 shots and category 3 is for 6 shots and is the highest bonus level that can be assigned to a product during a bid evaluation.

Partial penetration (PP): any fair shot which is not identified as a complete penetration using the definition within, is to be recorded as a partial penetration; that is, the projectile rebounded, or remained embedded in the test sample and no debris of the plate was found in the backing material.

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Plate damage: deformation, cracking, delamination, or discoloration of a plate sample due to ballistic impact, environmental exposure, or impact damage testing.

Rejected hit (invalid impact): impacts are rejected and must be repeated if they are unfair and do not meet the special exceptions for accepted hits; a fair hit can also be rejected if it resulted in a test specimen not meeting the pass criteria and it came after an unfair but accepted hit having more severe test conditions.

Separation distance: the distance between the centres of any two hits or the centre of any one hit and the edge of the test sample.

Spall: the detachment or delamination of a layer of armour material or the ejection of thin sharp-edged pieces or debris from the front or rear surface of the armour material or from the projectile in the area surrounding the location of impact. Produced by the non-perforating impact of a projectile.

Spall angle: the angle between the point of impact on the plate and the highest penetration hole on the spall witness tube using a plane normal to the line of flight as the reference.

Standoff distance: the distance between the backface of the armour material and the witness sheet.

Strike face: the surface of a test specimen designed to face the attack of a ballistic threat.

Striking velocity (V_s): the velocity of the projectile when impacting the test sample as measured 2.5 m in front of the target.

Surrogate Pack: A pack used in the Vproof system tests to simulate the FPV soft armour inserts (21 layers of KM2 600 Denier 28x28 WRT). DND packs are manufactured for economical disposal and optimum shot exposure. The shoot packs measure 15 in x 25 in and are diamond pattern stitched to accommodate a maximum of 22 shots per pack. Refer to Figure 11.9.

Test range: the distance between the muzzle of the launcher and the strike face of the test sample (see Fig. 11.4).

Unfair hit: a shot that does not conform to the criteria specified (see Table 11.2), that is, the yaw and obliquity exceeds the requirements or the velocity is above or below that specified for the projectile or the shot does not respect the shot pattern and sequence,

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i.e., too close to the edge of the specimen or to another shot. For the Vproof tests, impact for which the velocity is outside the range specified.

V₅₀ ballistic limit: the striking velocity at which 50% of the impacts of a particular projectile threat are expected to result in complete penetration of a test sample (Plate Stand-alone) with a given shot order (see Figure 11.7), at a specified angle of impact, in a limited statistical test. The method involves sequentially numbered shots in 10 plate samples (minimum) using the modified up-and-down firing technique. The process is repeated for each shot V₅₀. The V₅₀ is computed using the maximum likelihood method (DRDC Probit) and the arithmetic mean. It is used as a quantitative measure of armour capability (ranking).

MV₅₀: the average of three (3) shot V₅₀ values comprising the Shot 1 V₅₀, Shot 2 V₅₀, and Shot 3 V₅₀, as defined within for each specified threat.

V₀ proof: the minimum velocity specified for a particular projectile for a pass/fail test including spall resistance and the backface deformation resistance test where a specified number of projectiles are fired at a test sample and where no complete penetration of a test sample (Plate and Surrogate) is allowed. In a statistical sense, this corresponds with a minimum defined confidence level. (Probability tables available on request from DRDC Valcartier).

Velocity spread: the difference between the highest velocity and the lowest velocity of a group comprising an equal number of partial and complete penetrations.

Weak Areas: internal plate locations, identified by radiographic examination (or other suitable NDT method) that indicate potentially weak ballistic points. These points may be either (1) a weak design point (as in the case of mosaic joints/seams) or (2) a minor structural anomaly such as a small crack, a backing material delamination, or other minor internal flaw in the ceramic component. Weak areas are differentiated from critical defects; these are unacceptable under all circumstances and shall be cause for plate/lot rejection. Weak areas are summarised in Table 4.2.

Yaw: the 'total compound' angle between the main axis of the projectile and its trajectory (velocity vector - see Fig. 11.1). It should be measured as close to the target as possible. Projectile yaw at impact can noticeably alter the extent of penetration. Projectiles having discarding sabot are more susceptible to yaw.

Yaw card: a stiff paper-type material placed in the projectile's line of flight as close to the target as possible (1m), and used to determine the projectile yaw. The yaw card can

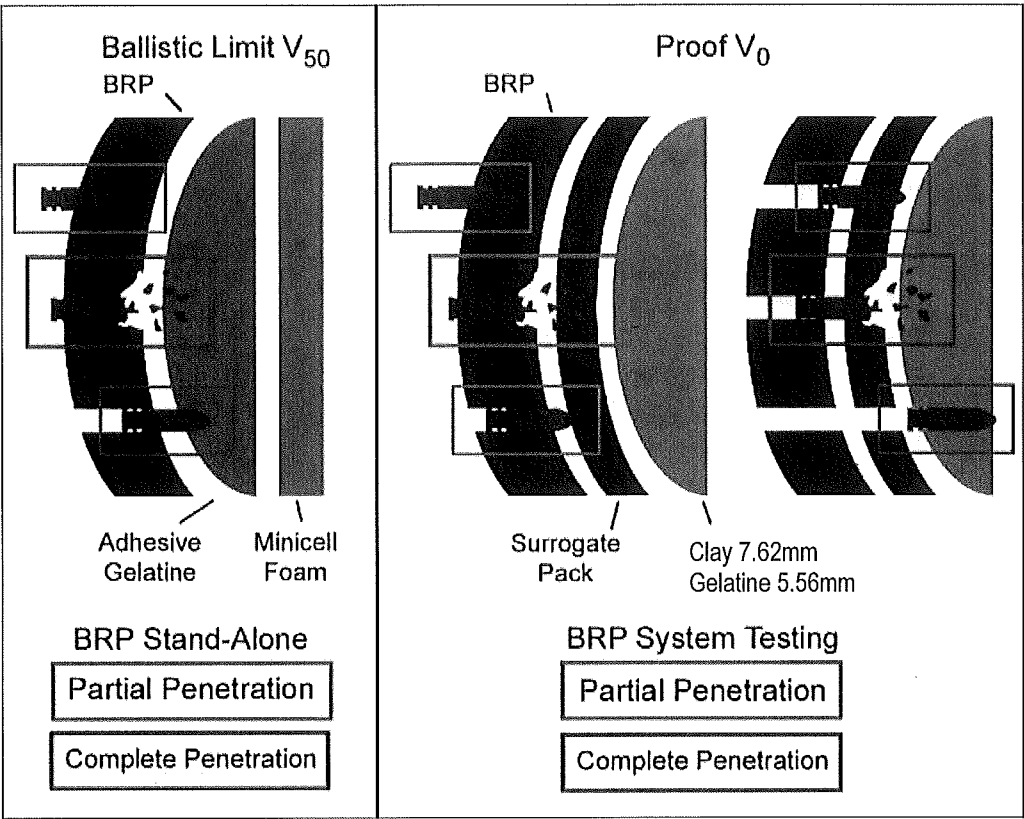
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also be used to find the exact hit location (see Fig. 11.6) of the projectile after firing in order to assess hit fairness.

Zone of Mixed Results (ZMR): the difference in velocities between the highest partial penetration and the lowest complete penetration actually obtained during a V_{50} test (HPP-LCP).

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Figure 6.1 – Complete/Partial Penetration



11.0 BALLISTIC TEST PROCEDURES DRAFT

11.1 Scope. This appendix describes reproducible test procedures defined for the ballistic performance evaluation of Bullet Resistant Plate (BRP) solutions. The following test methods are defined:

<u>Test #</u>	<u>Test Description</u>
[1]	the Ballistic Limit V_{50} test (7.62mm);
[2]a/b	the Proof V_0 tests (7.62mm and 5.56mm);
[3]	the Backface Deformation test;
[4]	the Spall Mitigation test;
[5]	the Multi-hit tests; and
[6]	the supplementary Proof V_0 tests (various threats).

11.2 Test Equipment

11.2.1 Projectiles. Details on the projectile types, calibre and the respective properties to be used for the ballistic tests specified herein are summarised in Table 11.1. Sources of acceptable projectiles for this standard are specified in the table. A precise description (mass, diameter, lot number, etc.) of all projectiles used must be included in test reports.

11.2.2 Launching System. The launching device (launcher and propellant) shall consist of any device capable of propelling reproducibly the specified projectiles at an acceptable impact angle (± 3 deg) and at the specified velocity range for V_0 or V_{50} , as applicable. It may be an actual powder rifle or a test barrel. Launching devices known to have velocity stability problems should not be used. When a rifled barrel is used, the rifling twist length shall be recorded and the maximum allowed values are as specified in Table 11.1. The projectiles shall be single launched to obtain the number of fair hits required on each sample.

11.2.3 Launcher Calibration. To obtain the specified velocity for powder guns, hand loading of the ammunition is usually done. A control of projectile velocity with a precision of ± 10 m/s of the desired velocity is required for the V_{50} and V_0 tests based on a series of 10 shots. A projectile velocity/propellant mass curve for the launcher system used shall be determined before any testing is performed. This curve is required to

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provide a basis for selecting the propellant charge to achieve a desired velocity. When firing with reduced charges, the yaw of the projectile may be greater than the yaw likely to be experienced with full charge firings.

The test weapon shall be firmly mounted at a distance of 6 to 10 m (see Fig. 11.4) from the muzzle to the plate sample and in such a manner that its alignment does not change upon firing. It shall be aimed to produce a zero degree obliquity to the plate sample at the impact location. When a new barrel is used, a minimum of 25 shots should be fired to break in the barrel.

TABLE 11.1 Projectile and Launcher Summary Qualification

PROJECTILES	7.62x51mm AP P80	7.62x51mm AP M993	7.62x51mm FMJ Ball Round	5.56x45mm FMJ Ball Round
Ballistic Test	Section 11.1 Test [1], [2a], [3], [4], & [5]	Section 11.1 Test [1]	Section 11.1 Test [2]a, [3], [4], & [5]	Section 11.1 Test [2]b
BRP Type	SC/SM	SM ONLY	SC/SM	SC/SM
Projectile mass g (grain)	9.75±0.05 (150)	8.3±0.10 (127)	9.53±0.05 (147)	4.01±0.05 (62)
Core Material	AP, Hard Steel with Lead filler at back	AP, Tungsten Carbide (WC)	FMJ Copper Jacket, Lead Core	FMJ Copper Jacket, Steel & Lead Core
Core Hardness	55 RC	72 RC	10-15 RC	54 RC
Core mass g	3.76	5.96	8	2.72
Acceptable Source	FN Herstal (P80) or NATO Equivalent(M61)	Nammo	SNC Canada C21 or NATO Equivalent	SNC Canada C77 or NATO Equivalent
LAUNCHER				
Barrel Twist Length (mm)	Max 356	Max 356	Max 356	Max 178

NOTE: NATO Equivalents must be certified as such by the supplier.

11.3 Witness Systems

11.3.1 Spall Witness. A tube used to capture spall trajectories from debris ejecta that have sufficient momentum to be detected. The tube type that has been qualified by the government is composed of 0.6-mm thick Aluminum 2024T3. It is formed into a nominal diameter of 30 cm (12 inches) placed normal to the target surface and centred at the impact point.

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11.3.2 Backface Deformation Witness. Two procedural methods are approved for this purpose. The standard clay witness is limited to measuring the maximum backface deformation of the target sample regardless of the tendency of the ballistic material to recover to its original shape. The Torso-Rig is used to measure the dynamic response over time and also captures the maximum backface deformation.

11.3.2.1 Clay-back Method. The clay material that has been qualified by the government is Roma Plastilina No. 1 modelling clay (oil-base, and non-hardening soft clay). It is available from Sculpture House, 38 East 30th St., New York, NY 10016, tel.: (718)-386-1354, Fax: (718)-386-3292 or from other artist supply centres. It must be calibrated to confirm that it is homogeneous and has the right consistency. If the calibration method damages the backing material then the damaged area(s) must be avoided during the ballistic testing. Alternative modelling clays should not be used. Research has shown that correct consistency from other products with the ball drop tests does not guarantee same backface deformation at ballistic velocity impact.

11.3.2.2 Torso-Rig Method. An alternative witness system for measuring backface deformation can be approved for use during production, once calibration has been completed in accordance with Appendix 7.

11.3.3 Penetration Witness. Any suitable backing material used to capture and provide evidence of complete penetrations recorded during ballistic testing. Both types described in these procedures (the non-hardening, oil-based modelling clay) or the Swift Adhesive synthetic gelatin (13031 from Reichhold) in combination with Minicell foam (100-mm thick block). The gelatin is used to fill the plate back curvature. The Swift Adhesive synthetic gelatin can be acquired from Les Adhésifs Forbo, 108 Hymus Blvd., Pointe-Claire, Quebec, H9K 1E4, Customer service: Tel: 1-800-711-2405, Plant Tel: (514) 697-5920, Plant Fax: 514-697-8803.

11.3.4 Shot Location Witness. A suitable method to provide evidence of the exact impact point against the intended hit location (see Fig. 11.6) of the projectile, after firing, in order to assess hit fairness.

11.4 Sample Retention

11.4.1 Plate Retention Method. The plate sample shall be mounted on a rigid box or frame of the following minimum internal dimensions (340 x 340 x 100 mm) filled with the specified backing material for each test or to the Torso-Rig as applicable. The plate sample shall be attached to the appropriate device by means of elastic straps or similar means to ensure a good contact between the sample and the backing. No individual shot should fall within 45 mm of any retaining strap or band.

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11.4.2 Holding Fixture. The backing material frame or rig shall be mounted on a rigid support so that it remains firmly in place before, during and after projectile impact. The holding fixture shall be capable of adjustment for moving the plate sample so that the impact points can be located anywhere on the plate surface so that the prescribed shot pattern can be followed, and that zero degree obliquity can be achieved anywhere on the plate sample.

11.5 Measurements

11.5.1 Spall Measurement. The spall witness system must extend over a specified length (minimum 30cm) such that frontal/lateral spall debris with sufficient momentum can be detected. The number of perforations of the tube will be counted after each shot. The spall debris cone is calculated by measuring the nearest perforation location on the witness tube closest to the sample strike face. The spall cone angle is measured for information.

11.5.2 Velocity Measurement. The velocity of the projectile before impact and after impact (if required) should be measured with any suitable measurement system that provides an accuracy of $\pm 0.3\%$, (e.g. a true velocity of 1000 m/s should be recorded within an accuracy of ± 3 m/s). The measurement system used must be calibrated and certified for accuracy according to the manufacturer instructions on an annual basis. The calibration procedures and records shall be kept and made available upon request. If accuracy is not certified, two independent measurement systems shall be used. The difference between the two velocities measured with these two independent systems shall be less than 0.5%. When chronographs are used they shall have a precision of $1\mu\text{s}$.

The detectors can either be photoelectric screens, radar systems, conductive screens, laser ribbons, acoustic, inductance or capacitance type. Doppler radar systems are the preferred primary measuring device. When detectors are used, they shall be oriented perpendicular to the projectile trajectory. All distances must be kept constant for the whole duration of a test. The separation distance between the triggering planes of the detectors shall be measured and recorded with an accuracy of 1 mm and maintained to a tolerance of ± 1 mm. The position of the gun, the velocity detectors and the target must be kept constant for the duration of a test sequence.

Before commencing a test sequence, three pre-test rounds shall be fired to verify that the required velocity for the test is obtained. Additional rounds shall be fired as required until a stable striking velocity is achieved.

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Each impact velocity shall be measured and recorded and if not within accuracy required, that impact shall be disregarded. When two independent sets of instrumentation are used, velocities from each set will be recorded and the mean average of the two velocities shall be calculated.

11.5.3 Yaw Measurement. The yaw angle of the projectile at impact may be measured by any suitable method (e.g. yaw card, flash radiograph, photography) that does not in itself cause projectile instability and which is accurate within ± 0.5 degrees. Yaw cards are simple and inexpensive and they should be used unless they prove unsatisfactory. Yaw cards are usually made using a stiff material from which the projectile will punch a clean hole showing its presented area at impact. Processed photographic paper, single weight, 200 by 200 mm in size, may be used for the yaw card. They should be placed perpendicular to the line of flight and positioned as near the target surface as possible (desirably within 150 mm of the BR plate sample).

The yaw card should be inspected following each test firing as to indication of yawed or unstable projectiles. The maximum acceptable yaw (θ) must not exceed 3 degrees (as defined in section 6.1.2), and should not exceed 2 degrees. Any round for which the measured yaw exceeds 3 degrees shall be rejected for excessive yaw, and a further round fired under the same test conditions. If three out of five rounds exhibit unacceptable yaw, the gun barrel should be replaced. In case of dispute, yaw shall be measured using either an orthogonal photographic or flash X-ray system to an accuracy of ± 0.25 degrees.

When using photography or flash radiographs, two orthogonal measurement planes are necessary to allow visualization of yaw in both the horizontal "X" and vertical "Y" directions combined (A_v and A_h). With photography systems, the use of a 45 degrees inclined mirror allow for the capture of the two orthogonal images (actual side view and reflected top view) on a single picture. The mirror and camera jig system should be aligned to the flight of the bullet with a bore laser using two pin hole screens to ensure proper alignment with the launcher axis. The pictures taken should also include a zero degree reference line from which each yaw component will be measured. The total compound yaw (θ) angle can then be computed by applying the following formula:

$$\theta = \arctan \sqrt{\tan^2 A_v + \tan^2 A_h}$$

11.5.4 Measurements on Plate and Backing Material. The identification of shots as penetrating or non-penetrating shall be made after separating the target from the backing material and inspecting the impact point. In cases where penetrations are caused by fragments of the target, this shall be specified in the test report by describing

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the state of damage to the plate sample and the characteristics of the plate fragments.
The test report shall also describe the state of damage to the projectile.

The depth of the depression or cavity in the backing material and any other relevant information (e.g., length, width) should be recorded. The recommended set-up used to measure the backface deformation shall be similar to the one shown in Fig. 11.3.

11.6 Test Procedures

11.6.1 Test Range. The set-up used to conduct the ballistic tests should be similar to the one shown in Fig. 11.4. When the launcher used is a powder gun in conjunction with light detectors, the following guidelines apply. The plate sample shall be placed at a distance from the launching device for which the projectile is stable (impact angle less than 3 degrees). The recommended target distance is 6 to 10 meters. The velocity must be measured at a distance 2.5 meters ahead of the target. The separation between the pair of detectors shall be at least 0.5 meters, and shall not exceed 2 meters. The plate sample shall be at least 1.0 meter ahead of the second detector to avoid any damage from spall/debris ejecta. The exact distances used shall be recorded in the test report.

11.6.2 Test Range Ambient Conditions. The ballistic testing shall be carried out in a test facility having the standard ambient conditions, i.e. a temperature of $20^{\circ}\pm 5^{\circ}\text{C}$ and a relative humidity of $65\pm 10\%$, or within a maximum time of forty five minutes after the completion of sample pre-conditioning. The temperature and humidity measurements may be made with any equipment having a minimum accuracy of 1°C for temperature, and 3% for humidity. If any variations to these conditions are made then the conditions used must be recorded in the final report.

11.6.3 Test Specimen Selection and Quantity. The test specimens for all the ballistic tests shall only be new BRP samples as offered for bid or sale. The specified quantity of specimens (refer to SOW or RFP), selected at random from a distinct lot/batch, shall constitute a valid test series for qualification or lot testing. Prior to testing, each test specimen shall be measured for critical dimensions, weighed, radiographed, and examined for weak areas (as defined in section 6) or other anomalies. A full description of each specimen tested shall be recorded in the test report as specified in section 11.8 and matched up with the radiographic records. Each plate sample shall be tested against only one type of projectile. The projectiles shall be fired only on the **strike face surface** of the plate sample.

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11.6.4 Pre-Conditioning of Test Specimens. Prior to ballistic testing, each test specimen shall be pre-conditioned to a temperature of $20^{\circ}\pm 1^{\circ}\text{C}$ and a relative humidity of $65\pm 5\%$ for at least twelve hours. If conditions different from these are used, they should be clearly identified and recorded in the test report. For test conditions where the temperature of the test specimen is not the same as the range conditions, the temperature for each test specimen shall be measured in degrees Celsius before and after completion of the test. The temperature and %RH of the test laboratory shall be recorded at the beginning and completion of a test sequence.

11.6.5 Test Specimen Positioning and Impact Angle. Each BRP specimen shall be mounted as specified in section 11.4.1 with the area to be impacted perpendicular to the line of fire. The test specimen and the support fixture can be aligned using a laser sighting and mirror system so that the barrel axis coincides with a line normal to the surface of the test specimen at the intended impact location. This procedure is used to ensure the obliquity angle of the test specimen at the projectile impact point is as close as possible to zero.

11.6.6 Test Specimen Impact Location and Number. The impact locations, spacing, and sequences that will be used for the V_{50} and V_0 tests are defined in Figures 11.7 and the Multi-Hit tests and additional 5.56mm shots are defined in 11.8. Minimum edge distance for all V_{50} testing is $1\frac{1}{2}$ in (38mm). Minimum edge distance for V_0 testing during pre-award is $1\frac{1}{2}$ in (38mm) and is reduced to $\frac{3}{4}$ in (19mm) for preproduction qualification and production testing.

TABLE 11.2 Geometric Criteria for Fair/Unfair Hits

Test Sequence	Ballistic Limit V_{50}	Proof V_0	Multi-Hit Various	Other Proof Tests
Max Impact Angle	$\pm 3^{\circ}$	$\pm 3^{\circ}$	$\pm 3^{\circ}$	$\pm 3^{\circ}$
Max YAW Angle	$\pm 3^{\circ}$	$\pm 3^{\circ}$	$\pm 3^{\circ}$	$\pm 3^{\circ}$
Location Priority	IAW Table 4.3 and Figure 11.7	IAW Table 4.3 and Figure 11.7	IAW Table 4.3 and Figure 11.8	IAW Table 4.3 and Figure 11.7/8

The angle of impact and the hit locations must conform to the previously defined values for a fair hit. All unfair hits will not count and must be repeated and reported. For the backface deformation test, there are circumstances in which the unfair hit can be accepted as a valid hit. These are defined and summarised in Table 11.3.

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TABLE 11.3 Criteria for Accepted/Rejected Hits (V_0 / Backface Tests)

Condition	Impact Velocity	Shot/Edge Separation Distance	Impact Angle	Hit Fairness	Partial Penetration or Backface <Maximum	Complete Penetration or Backface >Maximum
Normal	OK	OK	OK	Fair	Accepted Continue	Accepted Failure & stop
More severe	OK but previous hit too high	OK	OK	Fair	Accepted Continue	Rejected Retest
More severe	Too high or OK	OK or too short	OK	Unfair	Accepted Continue	Rejected Retest
Less severe	Too low	OK	OK	Unfair	Rejected Retest	Accepted Failure & stop
Less severe	OK	OK	Too high	Unfair	Rejected Retest	Accepted Failure & stop

If the test conditions are more severe than specified (velocity too high and/or hit separation distance too short), but the performance requirements are met, this will be considered as a valid or accepted hit and count as a pass. If the test conditions are less severe (velocity too low or impact angle too high), and the performance requirements are not met, this will also be considered as a valid hit, but this will constitute a specimen failure.

The intended impact locations shall be permanently and clearly marked directly on the test specimens. The exact hit location and sequence used shall be described in the test report and related to the radiographic records as specified in section 4.5.1.3.

11.6.7 Spall Witness Tube. For the front spall mitigation test, ensure that the witness tube material is mounted in the appropriate position in front of the test specimen. After each shot, the corresponding holes in the witness tube should be identified and numbered with a permanent marker. The witness tube shall then be re-positioned or replaced with a new tube.

11.6.8 Calibration of Measurement Devices. Before the test procedure begins, all measuring devices shall be calibrated to an accuracy that permits them to meet the tolerances described in the relevant sections of this document.

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11.6.9 Control of the Gelatin/Foam Backing. The recommended backing material for the Stand Alone shot V_{50} tests is Swift Adhesive (13031 from Reichhold) Synthetic Gelatine (20-25 Shore 00) used to fill the plate back curvature and a 100-mm thick Mini-cell foam block (55-65 Shore 00). The synthetic gelatine fill may be reused for a maximum of five plate tests. The foam backing block must be replaced after three plate tests.

11.6.10 Preparation and Control of the Clay Backing Material. The forming of the clay shall be made using slow pressing in a rigid frame box (metallic or 19 mm thick wood). The minimum inside dimensions of the box shall be 100 x 340 x 340 mm, i.e., large enough to sufficiently back the sample to be tested. The clay block should be work thoroughly to eliminate any voids or imperfections, i.e., to make it as homogeneous as possible. The rigid frame shall be closed on the back side (removable plate allowed). Filling by slow melting of the clay is also allowed as long as no damage occurs.

The amount of clay used should be approximately 24 Kg. Since the specified plate shape is contoured to fit a human torso, the back face of the plate must come in contact with the surface of the backing material. To achieve full contact between these two elements, the front surface of the backing material shall be built up and formed as required to achieve curvature compliance with the sample.

The clay blocks should then be conditioned between 25°C and 50°C for at least three hours prior to testing such as to obtain the desired consistency. Once calibrated to the desired consistency the required temperature shall be maintained constant ($\pm 2^\circ\text{C}$) during testing. Additional clay, conditioned along with the rigid frame fixture, shall be used to fill voids and restore the front surface as needed.

The clay block used as backing material shall be changed at least on an annual basis to ensure consistency of the clay. The replacement date shall be recorded on the backing material fixture. Complete penetration of target with projectiles will contaminate the clay over time. In order to keep the clay block as clean and pure as possible, the surrounding area around the cavity channel should be removed and the cavity should be re-packed after each complete penetration. The clay block should also be replaced after every 50 complete penetrations.

11.6.11 Calibration of the Clay Backing Material. Since clay consistency varies with age and date of manufacture, it shall be calibrated by the drop-weight technique using a sufficient number of samples at the beginning of each test series and at each four hours time interval. The consistency of the clay in the block during the test shall be such that when a 1041 ± 5 g steel ball with a diameter of 63.50 ± 0.05 mm is dropped

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in free fall without a guide tube from a height of 2000 +/- 5 mm, as measured from the surface of the backing material and the lower surface of the ball, the depth of the indentations from three such drops shall each be 20 +/- 3 mm (see Fig. 11.4). This condition shall apply throughout the duration of the testing procedure. Steel ball reference RB-63.5 from SKF has been found satisfactory, although any steel sphere meeting the mass and diameter requirements is acceptable. The separation distance between any indentation centre shall be greater than or equal to 90 mm. The distance from the centre of any indentation to any edge shall be greater than or equal to 60 mm. This procedure is illustrated in Fig. 11.5.

11.6.12 Alternate TORSO Rig Fixture- Refer to Appendix 7

11.7 Test Sequence

11.7.1 V₅₀ Test Sequence (modified up-and-down method). The Standard V₅₀, Impact Damage (ID) V₅₀, and the Environmental Qualification (EQ) V₅₀ ballistic limit tests shall be done using a random sample of 10 plates per test. A maximum of three shots will be fired in each plate (stand-alone). The identification of shots as complete or partial penetration shall be made after each impact by inspecting the plate and backing material. The V₅₀ test shall be repeated as specified in Table 11.4 and the Statement of Work. Each individual Shot V₅₀ test value shall be reported and the average (MV₅₀) of the three combined V₅₀ values shall be calculated.

Due to the interaction of armour piercing projectiles and ceramic plates uncertainties exist regarding the size of the zone of mixed results (ZMR). For this reason, the recommended firing procedure is the modified up and down or Bruceton method. The Bruceton method forces greater exploration of the zone of mixed results as well as the velocity regions above and below the zone of mixed results thus, it provides a better estimate of the variance. When a different firing procedure is used, it shall be clearly indicated in the test report by referencing to the test standard followed. The velocity of each shot shall be adjusted using the most appropriate technique using the recommended modified up and down sequence as follow:

- Shot no 1 to **N_T-2** done using modified up-and-down procedure
- Shot no **N_T-1** done at the lowest complete penetration (**LCP**) velocity
- Shot no **N_T** done at the highest partial penetration (**HPP**) velocity

V₁ = **estimated** V₅₀ -50 m/s

V_i = V_{i-1} + ΔV, where **V_i** = **intended** velocities, i = 2-10;

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and where ΔV is the fixed velocity increment or decrement to use.

For the Shot one V_{50} evaluation (V_{50})₁, ΔV shall be:

$\Delta V = +25$ (if previous shot is partial as per examination of paper witness plate)

$\Delta V = -25$ (if previous shot is complete)

for the subsequent V_{50} evaluations (V_{50})₂₋₃, ΔV shall be:

$\Delta V = +20$ (if previous shot is partial)

$\Delta V = -20$ (if previous shot is complete)

As described previously, the modified up and down method is based on the use of a fixed velocity increment for each V_{50} . The intended velocity is also used to specify the next firing velocity instead of the actual velocity obtained. These two modifications make the test less sensitive to cases where the control of velocity may not be as precise as needed.

The firings for a V_{50} test sequence shall continue until the ten (10) samples each have an impact in the designated shot position. The firings for V_{50} shall have a maximum velocity spread of 70 m/s. A zone of mixed results (ZMR) occurs when a partial penetration occurs at a higher velocity than at least one complete penetration. The ZMR is then the difference between the lowest complete penetration velocity (LCP) and the highest partial penetration velocity (HPP) that is actually obtained. The ZMR for each V_{50} shall be less than 70 m/s. If the ZMR is greater than 70 m/s, and that the difference between the HPP and the second highest partial penetration velocity is more than 20 m/s, the HPP shot could be considered as an outlier round and it could be rejected. This may allow the ZMR to be below 70 m/s. This is a conservative approach since it will effectively reduce the V_{50} measured. If one of these two conditions is not achieved, up to three (3) additional samples can be selected for testing.

It is also necessary that the following additional conditions be met in order for the Probit analysis to work adequately:

- the shot with the lowest impact velocity should be a partial penetration.
- the shot with the highest impact velocity should be a complete penetration.

If anomalous results occur, extra rounds should be fired to provide further information or the testing should be repeated using a new set of test specimens. The V_{50} test shall

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terminate whenever a complete delamination occurs and a new sample will be selected to complete the series.

11.7.2 Calculation of the V_{50} . The V_{50} and standard deviation for each test shall be computed by applying a maximum likelihood statistical analysis (DRDC Probit) based on the cumulative normal distribution using all fair shots. The arithmetic V_{50} shall be also computed for reference use by taking the arithmetic average of eight (8) fair impact velocities consisting of the 4 highest velocities for partial penetration and the 4 lowest velocities for complete penetration within a velocity spread of 70 m/s. If a different method is used to compute the V_{50} , it shall be clearly indicated in the test report by referencing to the standard followed.

11.7.3 V_{50} Compliance Verification. The BRP test series shall be declared as being in compliance with the V_{50} performance requirements if the average (MV_{50}) of the three individual V_{50} test series exceeds the minimum requirement value specified in Table 3.1 and all other requirements are met. The three individual shot V_{50} values should also exceed the minimum specified requirements and will be used to assess designs for resilience and variability between shot locations.

11.7.4 V_0 Proof Test Sequences. A sufficient quantity of pre-test rounds shall be fired to have a reasonable assurance that the first test round will have a striking velocity no more than 20m/s above the minimum required test round velocity. The test specimen consists of the plate and the surrogate pack. They shall be placed on the backing material or fixture using elastic bands to restrict its movement from the original position. Care shall be taken to centrally-align the diamonds on the DND surrogate pack with the plate sample aim point for each shot. The DND 15"x 25" surrogate pack incorporates a maximum of 22 impact points, is designed to ensure a minimum of 90mm between shots and at least 60mm of pack material extends in all directions beyond the intended impact point. The placement of the elastic bands will be such that they do not interfere with the impact point (at least 60mm from the aim point) on the sample and they do not introduce significant stresses in the target material. In the case where a failure occurs in a qualification sequence an additional series of samples shall be fired and shall meet the specified requirements. The test series shall be declared as being in compliance with the V_0 performance requirements if (1) all shots are partial penetrations, (2) backface deformation is met, (3) spall mitigation is met, and (4) no complete delamination of the specimen occurs.

11.7.5 Backface Deformation and Spall Mitigation Sequence. Backface deformation and spall mitigation tests are conducted simultaneously on the same plate

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as the 7.62mm V_0 Proof tests.

NOTE: If multi-hit capacity over and above the minimum required 3 fair hits/plate is scheduled for assessment (maximum 6 total/plate) the rounds in this category will not be used to rate backface or spall mitigation performance.

11.7.5.1 Backface Deformation. The required number of plate samples shall be fired at the three impact locations, as specified in section 11.6.6, to evaluate backface deformation. Penetration by any fair hit or penetration by a projectile at a velocity lower than the minimum required impact velocity shall constitute a failure to meet the required protection level. The firings shall continue until the required number of non-penetrating fair hits or a single penetrating fair hit is (are) obtained whichever occurs first. Unfair impacts may require additional samples. At least three (3) accepted hits on one specimen must be obtained to make a valid test sample. Otherwise, the test specimen shall be rejected and replaced by a new one from the same lot and the test repeated.

After each of the impacts, the inside surface of the test specimen shall be examined and any visible evidence of a complete penetration (as defined in section 6.1.2) shall be recorded. When using the clay backing material, the backface deformation will be measured from the original curved surface of the prepared clay media using an appropriate depth gauge measurement tool (see Figure 11.3 for a typical set-up). The cavity in the plastilina block shall be measured and could then be filled in, and restored to its initial shape to avoid overlaps in cavity with the area reserved for the next impact. A new block of plasticina could also be used. The specimen shall be restored as closely as practical to its original state. After every 30 min., consistency of the clay backing material should be measured using the pocket penetrometer to ensure that the required conditions are maintained since cooling of the clay from its initial conditions will harden its surface. Temperature of the clay during the test can also be monitored as safety measure to ensure adequate consistency.

Table 11.4 provides the additional plate quantities required in the case where one penetration occurs in the initial qualification sequence.

11.7.5.2 Spall Mitigation. This test is conducted simultaneously on the same specimens as for backface deformation. For measuring spall and debris ejecta with potential injuries to the wearer, an Aluminum witness tube (Alloy 2024T3) shall be used in conjunction with the backface deformation test. The tube should have a minimum length of 30cm and shall rest on the plate at normal angle so that all potential debris is captured. The witness tube shall also be positioned so that its centre line coincides with the weapon axis (line of fire). The same tube shall be used for the three impacts on each plate sample, but it shall be re-aligned between the shots.

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11.8 Test Report

11.8.1 A ballistic test report shall be prepared to present at least the following information:

- a) Date(s) of test series and name and location of facility.
- b) Full description of each BRP sample tested including: measured weight, critical dimensions, ballistic material types, manufacturer and lot/batch description.
- c) For each test sequence, barrel calibre, length, and twist length if applicable, the test specimen mounting configuration, and the precise projectile description.
- d) For each test sample, identify the corresponding radiography film used to select shot locations for weak areas.
- e) Temperature and humidity at the test facility, and sample pre-conditioned temperature if different from test facility.
- f) For each V_{50} test, provide firing sequence used, V_{50} computed using the maximum likelihood method, LCP, HPP, ZMR, and velocity spread for the eight values considered.
- g) For the combination of all V_{50} test values, calculate the velocity spread of the group.
- h) For each V_0 test, the recorded location of impact, intended and actual striking velocities obtained, partial or complete penetration, fair or unfair hit, accepted or rejected impact. Graphical sketch is recommended.
- i) For the backface deformation test using the clay method, record each individual indentation depth, and the average indentation depth for the 3 accepted impacts. When using the Torso-Rig fixture record data specified at appendix 7.
- j) For the front spall mitigation test, record the perforation and imprint numbers per shot and the total for the test. Measure the height of lowest perforation and calculate the estimated spall cone angle.
- k) For each test sequence, indicate compliance with the minimum specified ballistic performance requirements.

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- ~~l) Provide any supplementary information or remarks pertinent to the conduct of the test, or behaviour of the material.~~
- m) Provide names of the testing personnel, and any witnesses present.
- n) Provide certification that weak area shots were selected based on examination of radiographic films and that films are available on request.

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TABLE 11.4 Qualification and Quality Control - Ballistic Performance

1		2		3		4		5	
Test Sequence		Test [1] Ballistic Limit V_{50}		Test [2a],[3],[4] V_{proof} (7.62mm) Deformation & Spall		Test [2b] V_{proof} (5.56mm)		Test [5] Multi-Hit V_{proof}	
Quantity of Tests		SOW		SOW		SOW		SOW	
# of plates per test		10		3		3		Same BRP as Sequence 2	
Minimum # of Fair Shots per Plate		3 Shots Refer to Figure 11.7		3 Shots Refer to Figure 11.7		5 Shots Refer to Figures 11.7/11.8		maximum 3 additional Shots Refer to Figure 11.8	
Sample Preparation		Radiography, Impact Identification, Conditioning <u>Impact Damage & Environmental Qualification tests</u>		Radiography, Impact Identification, Conditioning		Radiography, Impact Identification, Ambient Conditioning		Radiography, Impact Identification, Ambient Conditioning	
Pass/Fail		Refer to Table 3.1		Vp Refer to Table 3.1 Backface Individual hits ≤ 44 mm Average ≤ 40 mm		Vp Refer to Table 3.1		Same as Test Sequence 2 *ONLY for Multi-Hit Performance Claim >3 hits	
Other		Shot V_{50} - MV_{50} ≤ 50 m/s		Spall Perforations \leq Contracted Value					
Penetrations Permitted		N/A		0		0		0	
Repeat Procedure									
Additional Plates		Up to three (3) for valid V_{50}		Section 11.7.4		Section 11.7.4		Section 11.7.4	

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- Figure 11.1 - Angle of Impact and Yaw
- Figure 11.2 - Typical Minicell/Gelatin Set-up
- Figure 11.3 - Typical Clay Block Set-Up and Cavity Measurement
- Figure 11.4 - Test Range Set-Up
- Figure 11.5 - Clay Backing-Material Calibration
- Figure 11.6 - Impact Location Witness Using Yaw Card
- Figure 11.7 - BRP Standard Impact Location Template
- Figure 11.8 - BRP Multi-Hit and 5.56mm Impact Location Template
- Figure 11.9 - DND Surrogate Pack Construction

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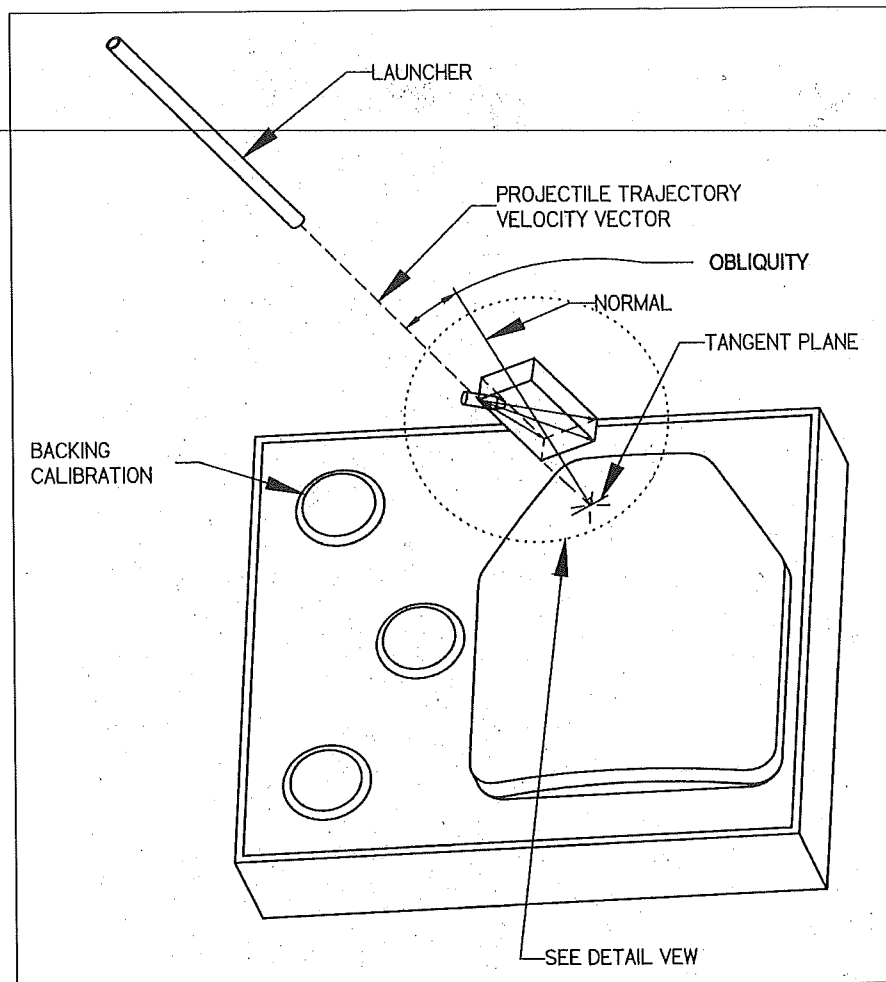
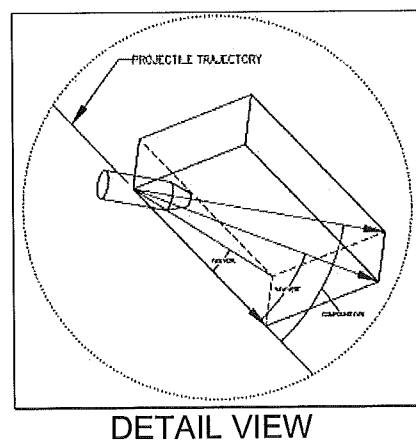


Figure 11.1 – Angle of Impact and Yaw



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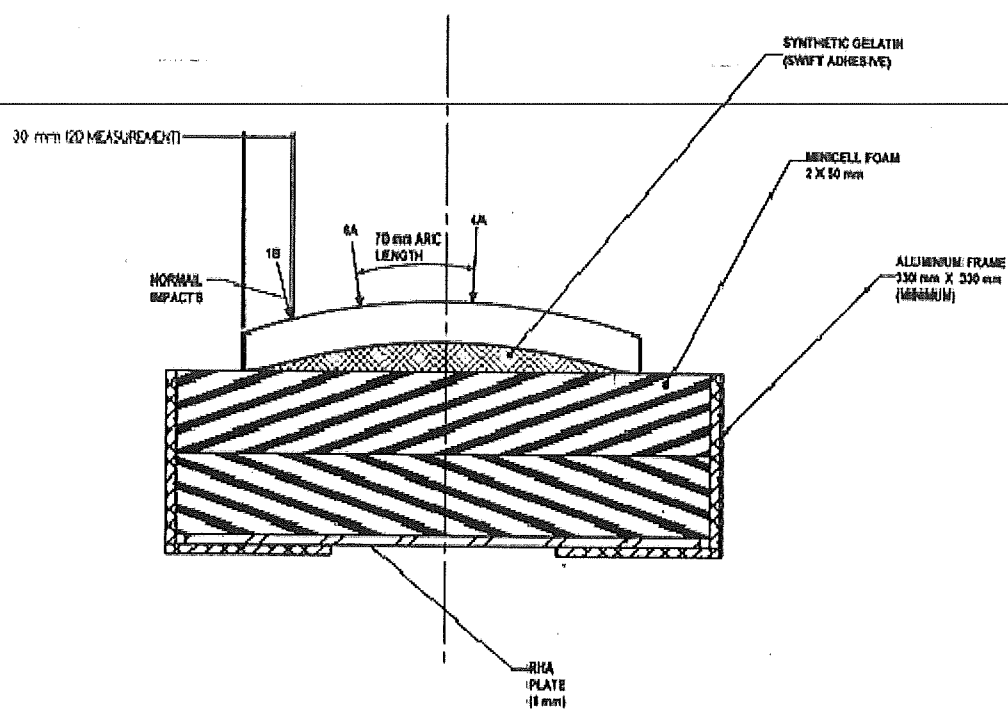


Figure 11.2 - Typical Synthetic Gelatine and Mini-cell Foam Set-Up V₅₀

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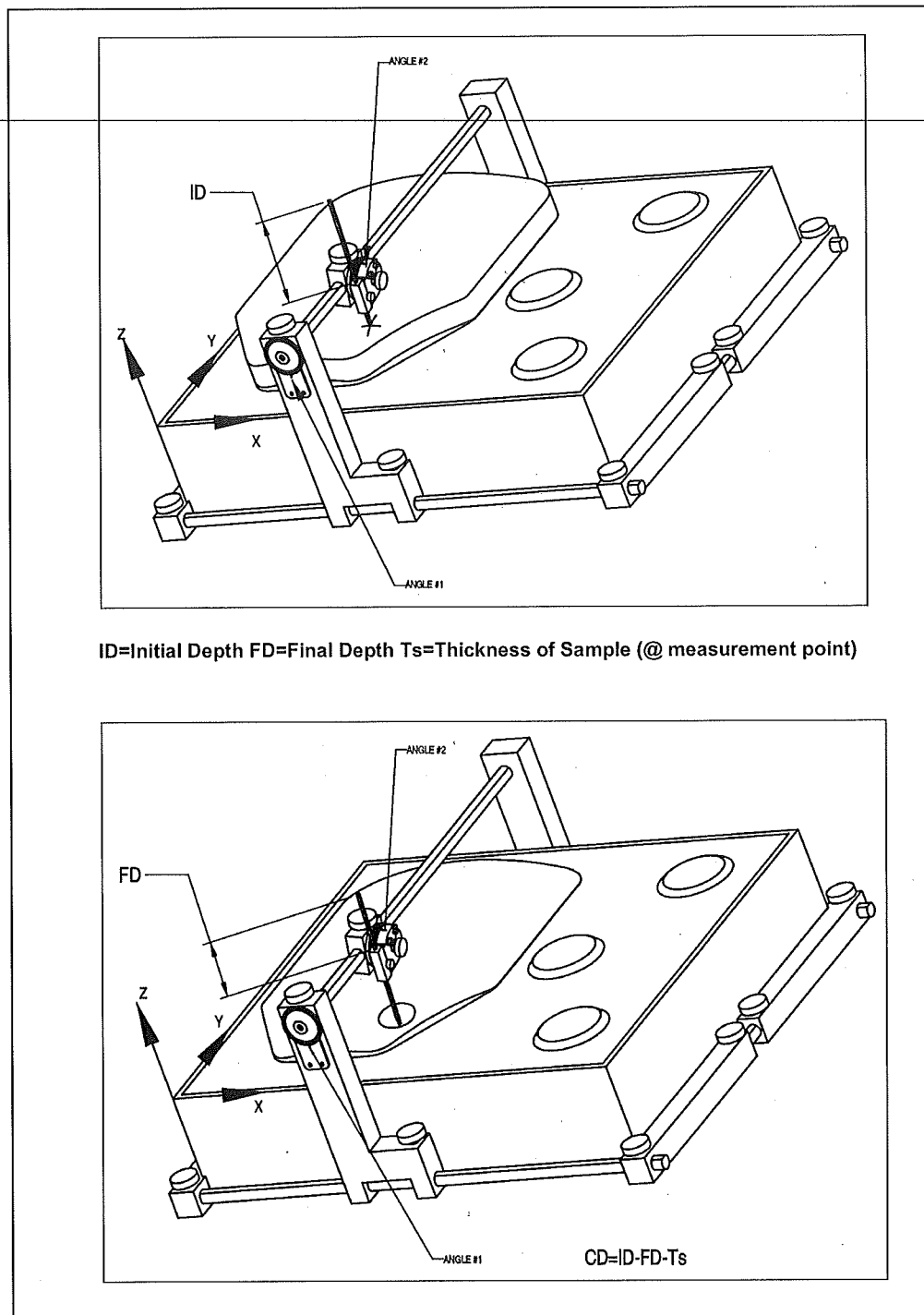


Figure 11.3 – Typical Clay Block Set-Up and Cavity Measurement (CD)

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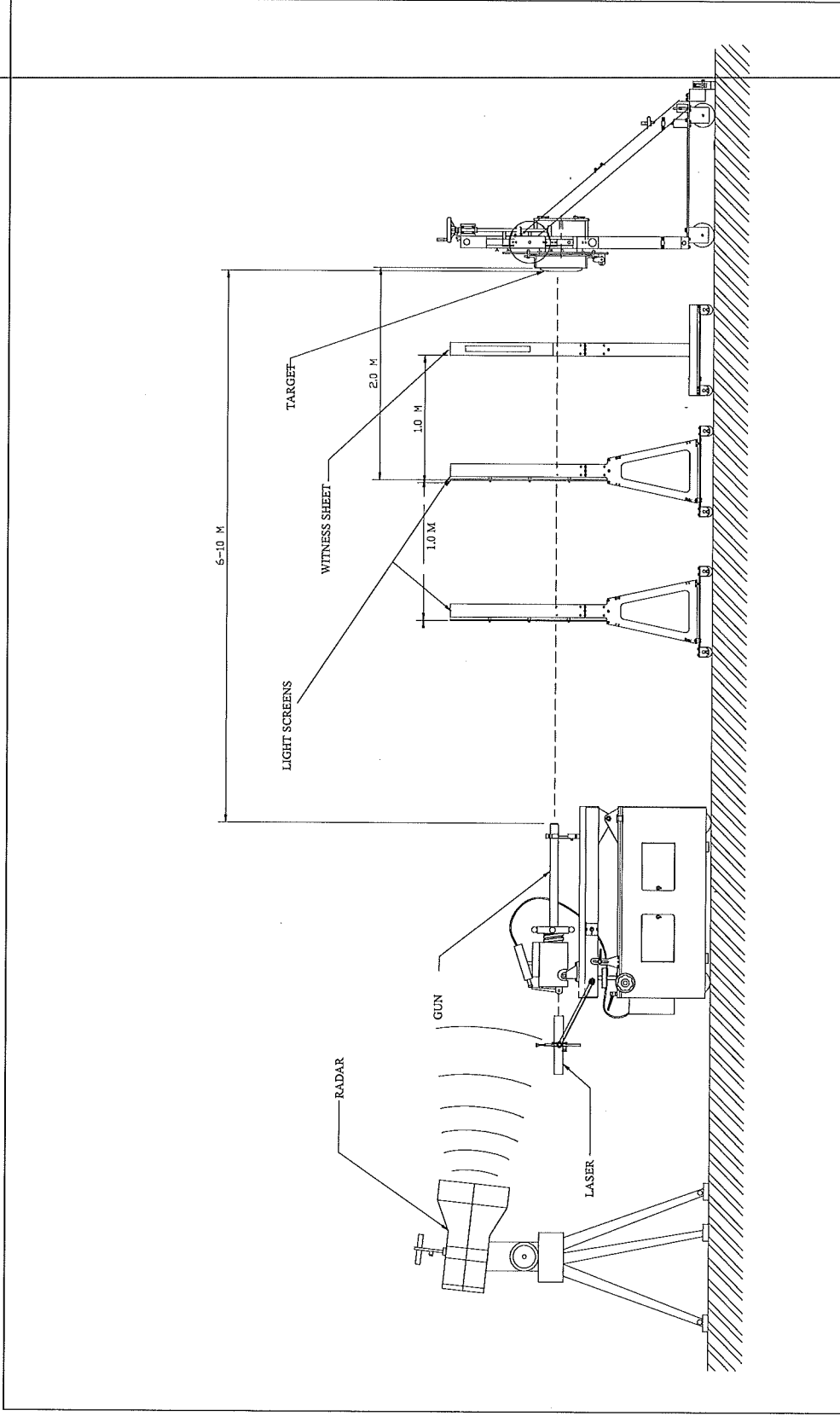


Figure 11.4 Typical Set-Up for Ballistic Testing

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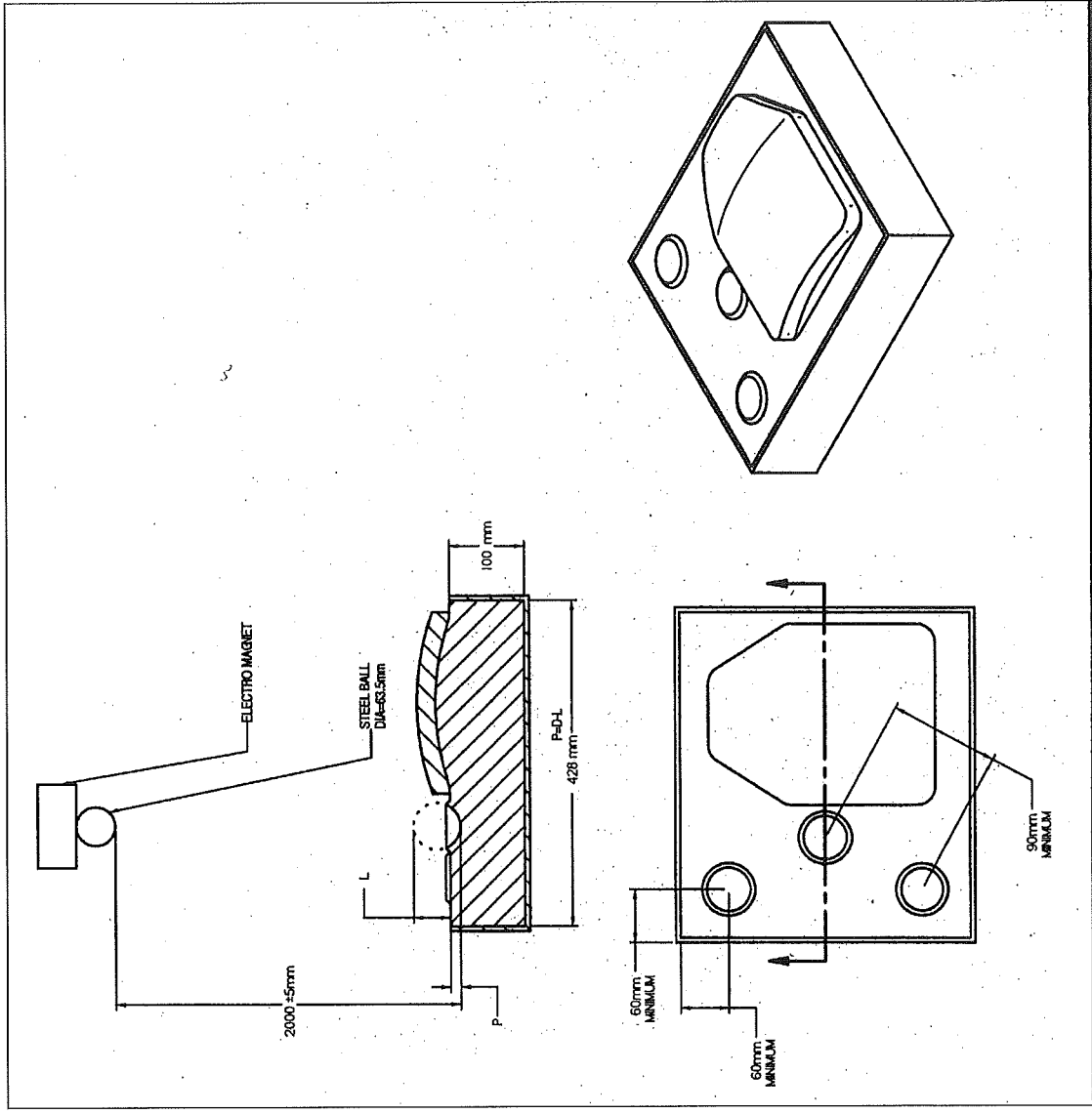


Figure 11.5 – Clay Block Calibration

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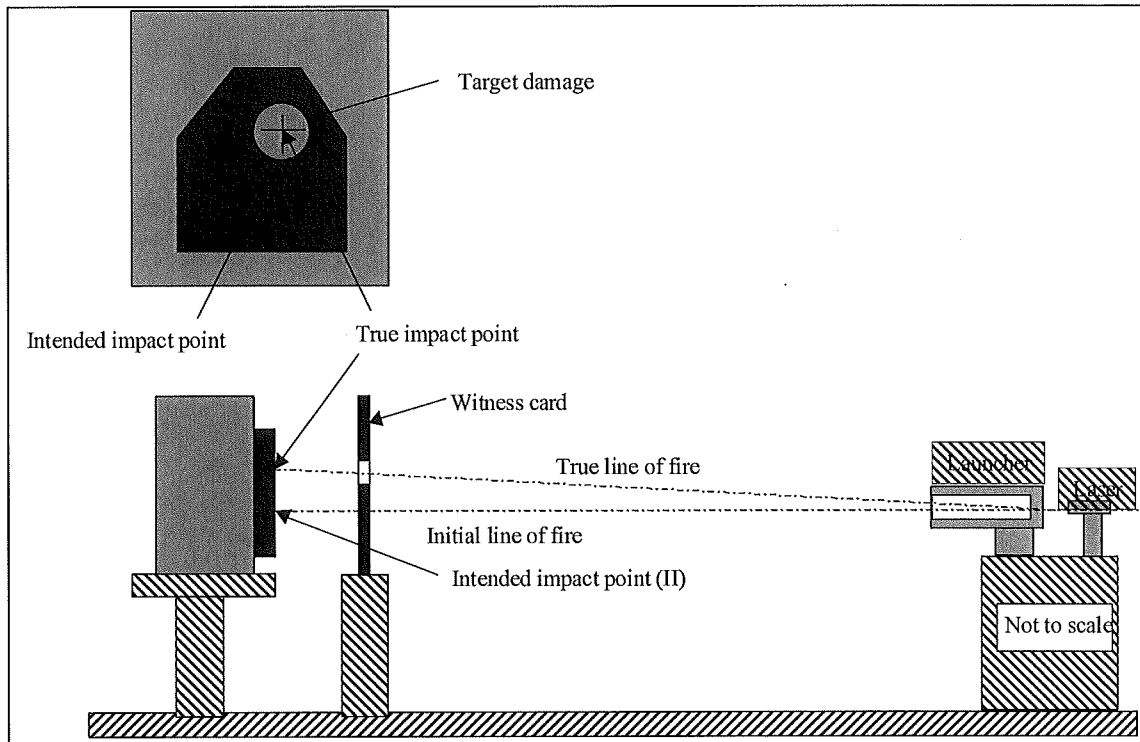


Figure 11.6 - Shot Location Witness Using Yaw Card

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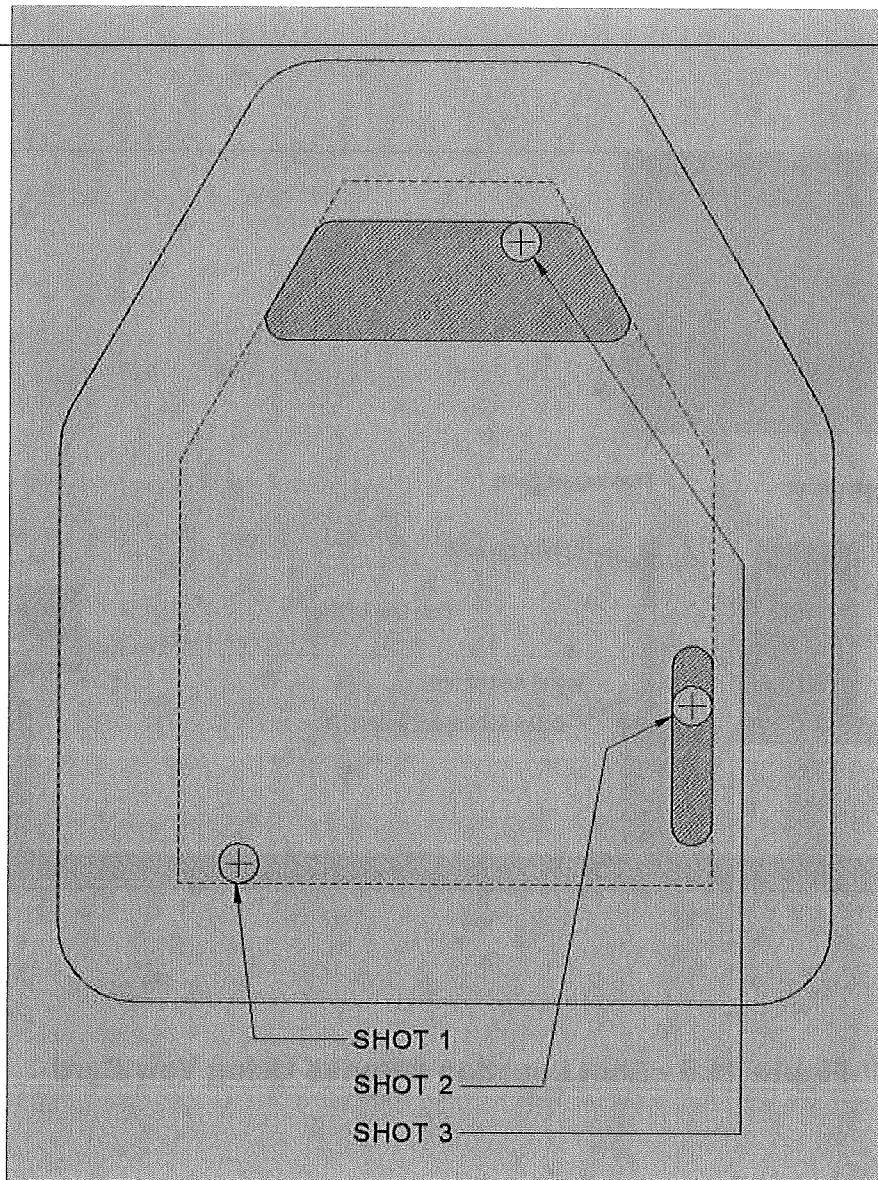


Figure 11.7- Standard Impact Location Template (V_{50} and V_0)

Shot 1 - 38mm-51mm ($1\frac{3}{4}'' \pm \frac{1}{4}''$) from bottom edge and at least 38mm from left side as shown in figure.

Shot 2 - 38mm-51mm ($1\frac{3}{4}'' \pm \frac{1}{4}''$) from right side and 51mm-102mm (2"-4") from bottom.

Shot 3 - 45mm-76mm ($1\frac{3}{4}'' - 3''$) from top edge in zone indicated and at least 150mm from shot 1 and 2.

****NOTE:** For Full Qualification V_0 tests, minimum edge distance is reduced to 19mm ($\frac{3}{4}$ in).

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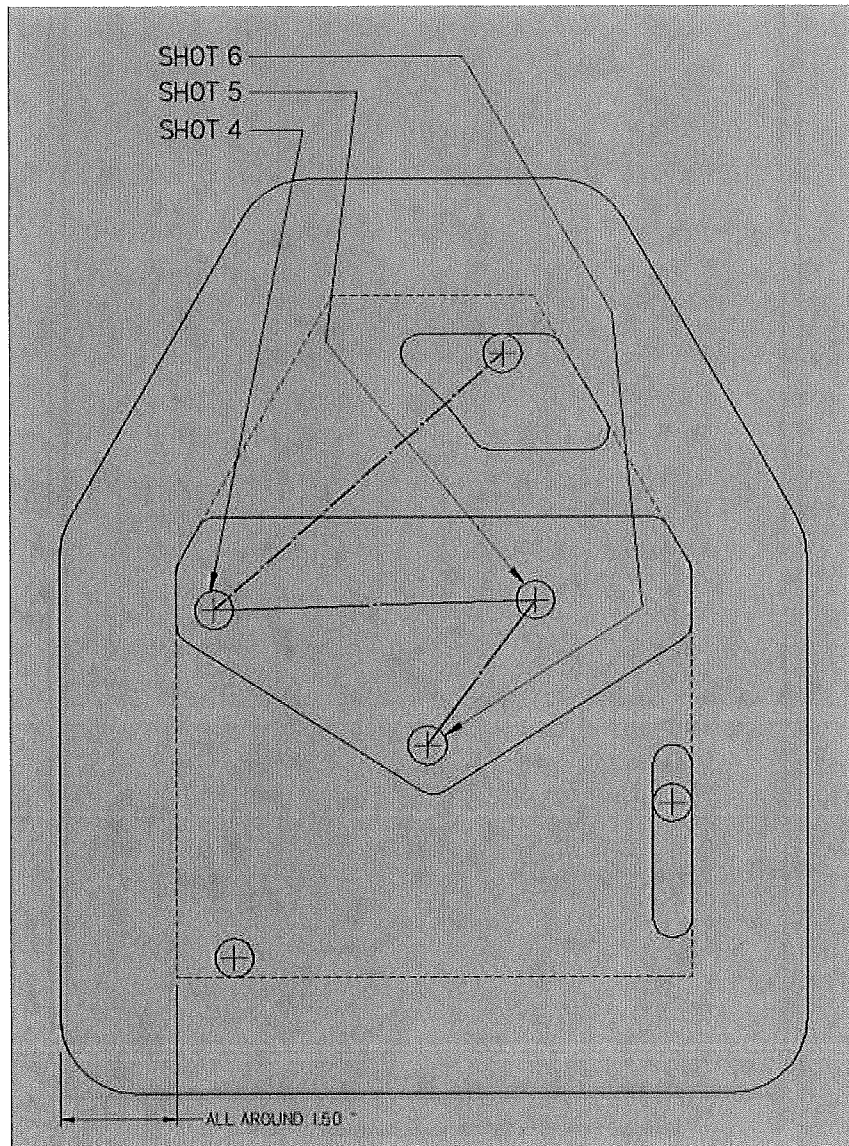


Figure 11.8- Multi-Hit and 5.56 mm Impact Location Template Pre-Award

Shot 4 At least 100mm (4") from first 3 shots in central plate area.

Shot 5 75mm±6mm (3"±¼") from shot 4 and at least 75mm (3") from other 3 shots.

Shot 6 50mm±6mm (2"±¼") from shot 5 and at least 50mm (2") from other 4 shots.

****NOTE:** For Full Qualification V_0 tests, minimum edge distance is reduced to 19 mm (¾ in).

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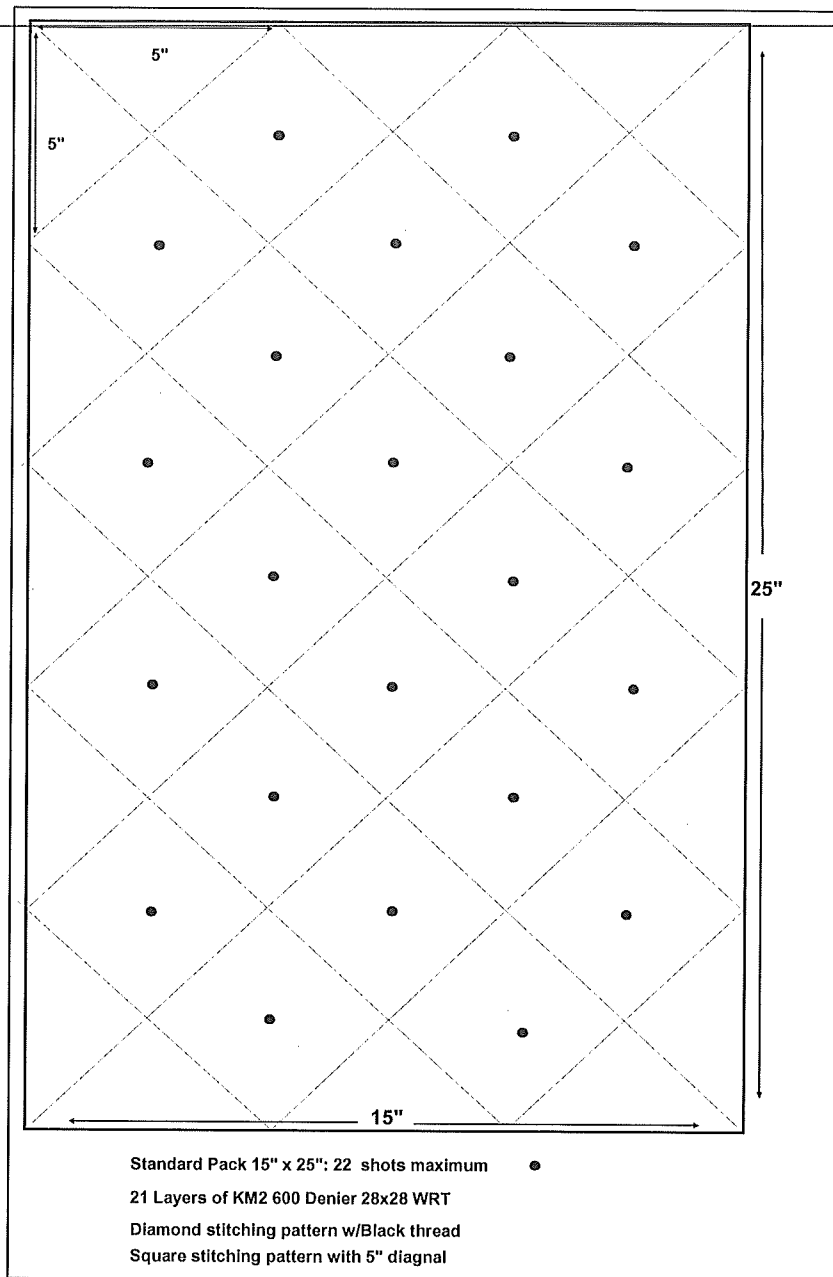


Figure 11.9 -

Surrogate Pack Construction

DND

APPENDIX 2

12.0 CHEMICAL RESISTANCE TEST PROCEDURES

12.1 Scope. This method is intended to investigate the resistance of the external surface to a short exposure to fluids that are found in the field. The list of fluids can be found in Table 12.2 of this appendix.

12.2 Test Procedure. The specimen shall be new and shall NOT be cleaned using any liquid media prior to exposure. Dust may be removed by means of a soft brush. The rear-face of the plate shall be used for the test and the exposure areas shall cover the overlap area of any tab formed on the covering to the plate joining area (if applicable).

12.2.1 Each exposure area shall be appropriately identified by means of a pressure-sensitive label showing the test agent used. The test pad shall consist of a glass microfibre filter, 2.1 cm in diameter, such as Whatman's 934-AH (catalogue number 1827 021). The cover glass shall consist of a microscope slide cover glass of sufficient area to cover the pad, such as a No. 2 (18 mm sq.) cover glass by Corning Glass Works.

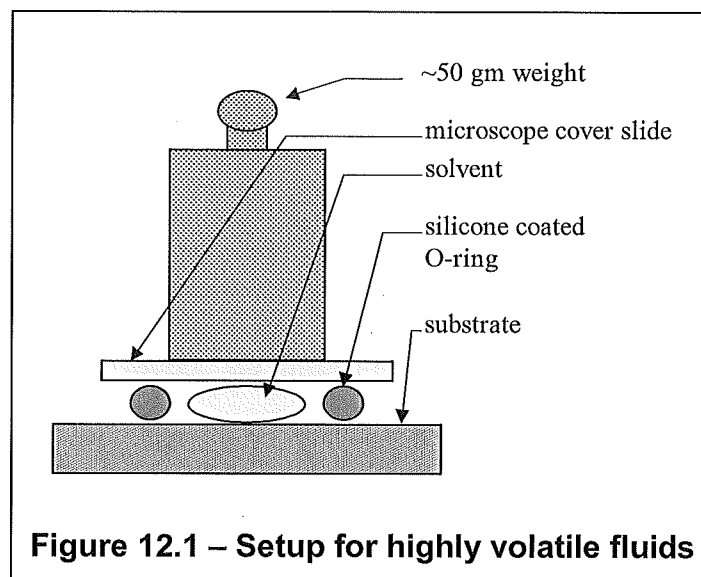
12.2.2 For highly volatile solvents, an O-ring shall be used, preferably made of Viton® rubber. It shall have an inside diameter of approximately 12.7 mm (0.5 inch), and have an outside diameter of approximately 19 mm (0.75 inch). The O-ring shall be thoroughly coated with a thick silicone grease (such as Dow Corning®'s high vacuum silicone grease) to protect the O-ring against the harsher solvents and to ensure a proper seal by thoroughly coating the O-ring. A small weight should be used to help seal the O-ring assembly.

12.3 Test Sequence. The test agents are listed in Table 12.2 of this appendix. Thoroughly wet the test pad by drenching it in the test agent. Without delay, place the pad on the rear of the plate surface overlapping the cover tab. Cover with the cover glass to minimize evaporation. The test pad shall be kept thoroughly wet during the exposure time. In the case of solvents with high volatility, the use of a covered O-ring shall be made instead of the covered test pad, as shown in Figure 12.1. The exposure time shall be 2 hours, which represents a degree of severity of 01 as referenced in ISO 9022-12 *Optics and optical instruments - Environmental test methods - Part 12: Contamination*.

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12.3.1 Recovery. At the end of the exposure time, remove the test pad (or O-ring), rinse the specimen with demineralized water and dry by means of compressed air. Using filter paper, a soft cloth, or cotton wool, pat dry agents that are not soluble in water.

12.3.2 Evaluation. Evaluate the specimen after drying is complete, and again after 72 hours. With the unaided eye and using appropriate illumination by varying the angle of incidence and view, evaluate the contamination caused by each test agent and determine the evaluation grade in conformity with Table 12.1.



12.4 Reporting. The exposed areas shall have an evaluation grade of no higher than "2". If the evaluation grade is higher than "2", then consideration will have to be made regarding the acceptability of the external protective covering material.

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Table 12.1 - Evaluation Grade

Grade	Criteria
0	No visible degradation
1	Scarcely visible degradation of the brilliance and/or colour of the surface; no visible changes in the surface structure
2	Plainly visible moderate degradation of brilliance and/or colour, and/or just visible structural changes in the surface; first traces of cracking and blistering; no bared parts of the substrate
3	Medium to severe changes in colour and brilliance, also extending beyond the contact area proper, and/or other obvious to severe degradation including also visible changes in the surface structure, such as blisters, cracks, ridging, flaking, etc.; destructive corrosion of not more than approximately 5% to 7% of the contact area, laying bare the substrate
4	Heavy degradation, e.g. substantial discolouring and/or structural changes; and/or destructive corrosion of more than 7% to 10% of the contact area, laying bare the substrate

Table 12.2 - Test Fluids

Specification	Test Fluid
	Insect repellent, 95% DEET
MIL-PRF-372	Cleaning Compound, Solvent (For Bore of Small Arms and Automatic Aircraft Weapons)
CGSB 3.6	Automotive Diesel Fuel
ASTM D-910	Gasolines, Aviation
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missiles, and Ordnance
MIL-PRF-6083	Hydraulic Fluid, Petroleum Base, For Preservation and Operation
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft
MIL-PRF-14107	Lubricating Oil, Weapons, Low Temperature
MIL-L-46000	Lubricant, Semi-Fluid (Automatic Weapons)
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-83133	Turbine Fuel, Aviation, Kerosene Type, Grade JP-8

APPENDIX 3

13.0 FLAME RESISTANCE

13.1 Scope. This method is intended to investigate the resistance of the outer protective covering to flammability and to classify it in accordance with ASTM D1230.

13.2 Test Procedure. Five (5) specimens shall be cut from the outer covering material on the strike-face side of the same plate used for chemical resistance testing. Alternatively, a sample of the outer protective covering of sufficient size to prepare 5 specimens may be provided for this test. Specimens will be prepared in accordance with section 8 and tested as specified at sections 9.1.1 and 10 of the ASTM.

13.3 Reporting. The report shall identify the product as specified on the labelling and record the following information:

- 1) date of testing;
- 2) average time in seconds of flame spread for specimens which ignite. If specimen does not ignite, report DNI;
- 3) the classification of the material in accordance with section 12 of the ASTM.

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APPENDIX 4

14.0 PLATE CARRIER

14.1 The plate carrier must be a simple webbing strap apparatus to ease the physical lifting and movement of a single plate set. The carrier is intended for use when plates are not inserted into the plate pockets of the FPV. It is also designed to facilitate re-packing into standard storage and shipping boxes.

14.2 The construction and materials shall be such that the empty carrier will fold away compactly into a pocket. The webbing shall be thin, lightweight, military type and the plate pouch of a lightweight nylon or equally durable material. The carrier bottom should integrate impact-attenuating material to enhance impact protection during field transportation and against drops caused by mishandling.

14.3 The carrier shall incorporate a simple hook and loop closure method of the central periphery straps just below the tapered portion of the plate and a strap closure at the webbing handles above the plate top. The plate pouch colour shall be CADPAT (TW) and the webbing and hook and loop shall be a close visual match to Canadian Green. Sealed samples will be available at the district offices..

APPENDIX 5

15.0 ENVIRONMENTAL QUALIFICATION

15.1 Solar Radiation. The test samples shall first be weighed. The plate samples shall then be exposed to artificial radiation in accordance with MIL-STD-810E, Method 505, with solar profile (1120 watts/sq. m) for one (1) hour. The chamber temperature shall be maintained at $49^{\circ}\pm 2^{\circ}\text{C}$. A shield between the plates and the chamber air stream shall be used to prevent air-cooling. On completion of the solar radiation test, the outside surface of the plates shall be examined and any evidence of visual damage shall be recorded.

15.2 High Temperature. The same plate samples shall then be exposed to high temperature testing in accordance with MIL-STD-810E, Method 501.3, Procedure 1 for seven (7) days. On completion of the test, the outside surface of the plates shall be examined and any further evidence of visual damage shall be recorded.

15.3 Loose Cargo (hot and cold). The same plate samples shall then be exposed to vibration testing in accordance with MIL-STD-810E, Method 514.4, category 3, for a simulated duration of 1100km (a total of 90 minutes). Initially, the test samples shall be divided into two groups. The first group of samples will be conditioned at $-51^{\circ}\pm 2^{\circ}\text{C}$ and the second group will be conditioned at $+71^{\circ}\pm 2^{\circ}\text{C}$ for at least 8 hours, then subjected to the cargo test. After each 20 minute-test segment, the samples will be returned to the temperature conditioning chambers for at least one hour. On completion of the test cycle, the outside surface of the plates shall be examined and any further evidence of visual damage shall be recorded.

15.4 Humidity Cycling. The same plate samples shall then be exposed to an aggravated humidity environment (95% RH, cycling from 30°C to 60°C) for ten (10) days in accordance with MIL-STD-810E, Method 507.3, Procedure III. On completion of the test cycle, the samples shall be re-weighed and the outside surface of the plates shall be examined and any further evidence of visual damage shall be recorded.

15.5 Cold Temperature. The same plate samples shall then be exposed to low temperature testing in accordance with MIL-STD-810E, Method 502.3, Procedure 1 for 24 hours. On completion of the test, the outside surface of the plate shall be examined and any further evidence of visual damage shall be recorded.

15.6 Rough Handling. The same plate samples will be able to withstand two successive impacts on its strike face from a height of one (1) meter. The sample shall

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be placed horizontally on a flat rigid concrete surface with 12-mm thick rubber band (65-70 Shore A) under its edges and submitted to two (2) 25 joule (nominal) impacts. A standard 3 ¼ inch (82.55mm) steel sphere weighing 2270 ± 15 grams shall be dropped without a guide tube from a nominal height of 1250mm as measured from the BRP specimen impact point and the lower surface of the ball. Steel ball reference KG-82.55 from FAG has been found satisfactory, although any steel sphere meeting the mass and diameter requirements is acceptable. The impacts should be uniformly located on the strike face of the BRP at a minimum distance of 50 mm from the edge and 100mm from each other. The two impacts need not be done at normal angle. There shall be no visible damage, and the plate shall maintain its structural integrity, i.e., there shall be no cracks, or plate mass loss. The specimens shall then be radiographically inspected and submitted for the environmental qualification (EQ) V_{50} test specified at section 3.3.3.2.

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APPENDIX 6

16.0 COLOUR AND MARKINGS

16.1 Colour. The colours used for the external BRP/Training Plate coverings or surfaces are specified in Table 16.1.

Table 16.1 - BRP Colours

Plate Type	Colour – Cover and Safety Label	Colour – Identification and Instructional Label
Type SC	Pantone for Textiles colour brown# 19-1020TC White Lettering	Pantone for Textiles colour brown# 19-1020TC White Lettering
Type SM	Pantone for Textiles colour brown# 19-1020TC White Lettering	Commercial Black White lettering
Training	FED-STD-595 International Orange (colour 12197) Black lettering	FED-STD-595 International Orange (colour 12197) Black lettering

16.2 Markings. Four types of permanent marking shall apply to the operational plate: (1) Safety markings, (2) Identification labelling, (3) Instruction labelling, and (4) Traceability markings.

16.2.1 SAFETY LABEL OR MARKINGS. The front (strike face) of each OPERATIONAL plate shall be clearly marked or labelled with the following information:

STRIKE FACE – CÔTÉ MENACE

The front (strike face) of each TRAINING plate shall be clearly marked or labelled with the following information:

NO BALLISTIC PROTECTION – AUCUNE RÉSISTANCE BALISTIQUE

Additionally the contractor shall propose a simple method of indicating the top orientation of the plate.

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16.2.2 IDENTIFICATION AND INSTRUCTION LABELS. Identification and instruction labels may be applied separately or as a combination label. The labelling data is contained in Table 16.2 and shall be applied to rear (body side) of the plate. Label compliance shall be demonstrated as specified in the Instructions to Bidders.

Table 16.2 Labelling Data

Identification Labelling – Operational type SC

NSN 8470-21-XX-XXXX (and Bar Code)
 INSERT, SMALL ARMS PROTECTIVE BULLET RESISTANT LEVEL 3-CTS
 5.56mm and 7.62mm Ball - Point Blank protection
 7.62mm AP Steel - protection at close range
 PLAQUE, PROTECTION PARE-BALLES/ÉCLATS, ARMES LEGÈRES NIVEAU 3-NTC
 5.56mm et 7.62mm, à balle – protection à bout portant
 7.62mm, perforante (Acier) – protection à courte portée
 CONTRACT -XXXXXXXXXX- CONTRAT
 LOT NUMBER -XXXXXXX- NUMERO DU LOT
 SERIAL NUMBER -XXXXX- NUMERO DE SÉRIE
DND CANADA MDN

Identification Labelling – Operational type SM

NSN 8470-21-XX-XXXX (and Bar Code)
 INSERT, SMALL ARMS PROTECTIVE BULLET RESISTANT LEVEL 4-CTS
 5.56mm, 7.62mm Ball and AP Steel - Point Blank protection
 7.62mm AP (WC) - protection at close range
 PLAQUE, PROTECTION PARE-BALLES/ÉCLATS, ARMES LEGÈRES NIVEAU 4-NTC
 5.56mm et 7.62mm, à balle et perforante (Acier) - protection à bout portant
 7.62mm, perforante (WC) - protection à courte portée
 CONTRACT -XXXXXXXXXX- CONTRAT
 LOT NUMBER -XXXXXXX- NUMERO DU LOT
 SERIAL NUMBER -XXXXX- NUMERO DE SÉRIE
DND CANADA MDN

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Instruction Labelling
<p>HANDLE WITH CARE MANIPULER AVEC SOIN</p> <p>STORE IN CARRIER, PLATE WHEN NOT IN USE LORSQUE IL N'EST PAS UTILISÉ, RANGER DANS LE SAC DE PLAQUE, PROTECTION PARE- BALLES/ÉCLATS</p> <p>CLEAN WITH MILD SOAP SOLUTION NETTOYER AVEC UNE SOLUTION DE SAVON DOUX</p>

16.2.3 TRACEABILITY MARKINGS. The Contractor shall provide a fail-safe system of identifying and linking plate serial/lot numbers to material batches/lots, key production processes such as moulding, and ballistic test records for each lot.

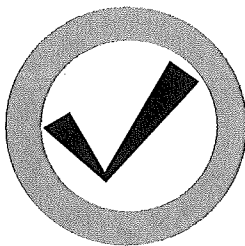
16.2.4 LETTERING SIZE. The character size used in the identification and instruction labels shall be a minimum of 0.5cm. The identification "DND CANADA MND" shall be approximately double that size. The character size used in the safety label shall be a minimum of 1.5cm. Traceability markings shall be as established by the Contractor.

16.3 The labels shall be permanently affixed and markings must be indelible. Labels shall remain affixed and all markings shall remain legible following the environmental test series. Safety markings should be discernible in low light level conditions. Other markings should be unobtrusive but clearly contrasted against the background colour selected. All markings shall be bilingual as specified above.

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17.0 TORSO RIG - CALIBRATION AND TEST PROCEDURES

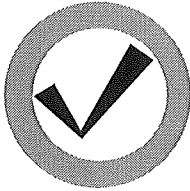
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NOTICE

This documentation has been reviewed by the technical authority and does not contain controlled goods. Disclosure notices and handling instructions originally received with the document shall continue to apply.

Cover Page for the 6 Contract Data Requirements Lists (Annex D)



NOTICE

This documentation has been reviewed by the technical authority and does not contain controlled goods. Disclosure notices and handling instructions originally received with the document shall continue to apply.

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) DND Form 1413							
A. SYSTEM / ITEM Bullet Resistant Plates for Land Forces				B. CONTRACT / RFP NUMBER W8486-129671			
C. SOW IDENTIFIER 2184DE-18470-05		D. DATA CATEGORY Project Management		E. CONTRACTOR N/A			
1. ITEM NUMBER 001		2. TITLE OR DESCRIPTION OF DATA Progress Report		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) MGTD-18001SC		5. CONTRACT REFERENCE SOW paragraph 3.3.2		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ASREQ	12. DATE OF 1 st SUBMISSION Block 16	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUB SUBMISSION Block 16	A. ADDRESS	B. COPIES		
					DRAFT	FINAL	
						REG	REP
16. REMARKS Block12: The initial submission will be delivered as a DRAFT two (2) weeks prior to the first delivery. Refinements will be established jointly between the Government and the Contractor at this time. Block 13: Reports shall be submitted electronically by E_Mail at least one week prior to technical review meetings, commencing AFTER the first production shipment.				DSSPM 3-5	1	1	0
				QAR	1	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2011		APPROVED BY DSSPM 3-5-1			
17. CONTRACT FILE/DOC NUMBER		18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE		15. TOTAL	
						2 2 0	

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) DND Form 1413							
F. SYSTEM / ITEM Bullet Resistant Plates for Land Forces				G. CONTRACT / RFP NUMBER W8486-129671			
H. SOW IDENTIFIER 2184DE-18470-05		I. DATA CATEGORY Project Administration		J. CONTRACTOR N/A			
8. ITEM NUMBER 002		9. TITLE OR DESCRIPTION OF DATA Technical Review Records		10. SUBTITLE N/A			
11. AUTHORITY (Data Item Number) ADMD-18001SC		12. CONTRACT REFERENCE SOW paragraph 3.3.4		13. REQUIRING OFFICE DSSPM 3			
14. INSPECTION N/A	11. INPUT	12. FREQUENCY ASGEN	12. DATE OF 1 st SUBMISSION ASREQ	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		12. AS OF DATE N/A	14. DATE OF SUB SUBMISSION Block 16	A. ADDRESS	B. COPIES		
17. REMARKS Block13: The Agenda shall be distributed no later than one week prior to scheduled technical reviews. Minutes shall be distributed within two weeks of the meeting. Block 14: Additional addressees will be periodically identified by the Technical Authority and/or the Contracting Officer.					DRAFT	FINAL	
						REG	REP
				PWGSC	0	1	0
				DSSPM3-5	0	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2011	APPROVED BY DSSPM 3-5-1				
17. CONTRACT FILE/DOC NUMBER	18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	0	2	0

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) DND Form 1413							
K. SYSTEM / ITEM Bullet-Resistant Plates for Land Forces				L. CONTRACT / RFP NUMBER W8486-129671			
M. SOW IDENTIFIER 2184DE-18470-05		N. DATA CATEGORY Configuration Management		O. CONTRACTOR N/A			
15. ITEM NUMBER 003		16. TITLE OR DESCRIPTION OF DATA Technical Data Summary		17. SUBTITLE N/A			
18. AUTHORITY (Data Item Number) CMGT-18001SC		19. CONTRACT REFERENCE SOW paragraph 3.4.1		20. REQUIRING OFFICE DSSPM 3			
21. INSPECTION N/A	13. INPUT	14. FREQUENCY ONE/R	12. DATE OF 1 st SUBMISSION ASREQ	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		13. AS OF DATE N/A	15. DATE OF SUB SUBMISSION Block 16	A. ADDRESS	B. COPIES		
18. REMARKS The Technical Data Summary shall be delivered within 4 weeks of First Article.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5	2	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2011	APPROVED BY DSSPM 3-5-1				
17. CONTRACT FILE/DOC NUMBER	18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	2	1	0

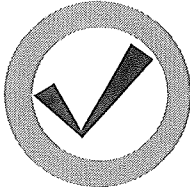
ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) Form 1413

P. SYSTEM / ITEM Bullet Resistant Plates for Land Forces				Q. CONTRACT / RFP NUMBER W8486-129671			
R. SOW IDENTIFIER 2184DE-18470-05		S. DATA CATEGORY System Engineering		T. CONTRACTOR N/A			
22. ITEM NUMBER 004		23. TITLE OR DESCRIPTION OF DATA Test Records		24. SUBTITLE N/A			
25. AUTHORITY (Data Item Number) ENGD-18001SC		26. CONTRACT REFERENCE SOW paragraph 3.5.1		27. REQUIRING OFFICE DSSPM 3			
28. INSPECTION N/A	15. INPUT	16. FREQUENCY ASGEN	12. DATE OF 1 st SUBMISSION Block 16 ASREQ	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		14. AS OF DATE N/A	16. DATE OF SUB SUBMISSION N/A	A. ADDRESS	B. COPIES		
19. REMARKS Block12: Written notification of the First Article test series shall be submitted to the Technical Authority (DSSPM 3-5) and to the DND Quality Assurance staff at least two weeks prior to the test series. Written notification shall also be submitted for any qualification series of accessory items or design options exercised by the Government. Block12: A written summary including test reports for any special test series (as defined within DID ENGD-18001) shall be submitted through the DND Quality Assurance Representative to DSSPM 3-5 and DSSPM 3-5-1/C1 within two weeks of the test series. Production test data shall be recorded and maintained in accordance with the QA Plan and CDRL001.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5	0	1	0
				QAR	0	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2011	APPROVED BY DSSPM 3-5-1				
17. CONTRACT FILE/DOC NUMBER	18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	0	2	0

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) DND Form 1413							
U. SYSTEM / ITEM Bullet Resistant Plates for Land Forces				V. CONTRACT / RFP NUMBER W8486-129671			
W. SOW IDENTIFIER 2184DE-18470-05		X. DATA CATEGORY Publications		Y. CONTRACTOR N/A			
29. ITEM NUMBER 005		30. TITLE OR DESCRIPTION OF DATA User Instructions		31. SUBTITLE N/A			
32. AUTHORITY (Data Item Number) TMPB-18001SC		33. CONTRACT REFERENCE SOW paragraph 3.6		34. REQUIRING OFFICE DSSPM 3			
35. INSPECTION N/A	17. INPUT	18. FREQUENCY ONE/R	12. DATE OF 1 st SUBMISSION Block 16 ASGEN	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		15. AS OF DATE N/A	17. DATE OF SUB SUBMISSION N/A	A. ADDRESS	B. COPIES		
					DRAFT	FINAL	
						REG	REP
20. REMARKS Block12: The DRAFT Instructions shall be delivered four weeks after the first technical review. The final Proof Instructions, incorporating mutually agreed revisions, must be delivered 2 weeks prior to First Article testing in electronic format (WORD and PDF) and in hard copy as specified in Block 14. NOTE: Reproducible copies shall be delivered 1/BRP Kit as outlined in the contract. The final Proof and the reproducible copies shall be on water-resistant paper.				DSSPM3-5	3	3	Note
PREPARED BY DSSPM3-5-1/C1		DATE APR 2011	APPROVED BY DSSPM 3-5-1				
17. CONTRACT FILE/DOC NUMBER		18. ESTIMATED NO OF PAGES	19. ESTIMATED PRICE	15. TOTAL	3	3	Note

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item)							DND Form 1413	
Z. SYSTEM / ITEM Bullet Resistant Plates for Land Forces				AA. CONTRACT / RFP NUMBER W8486-129671				
BB. SOW IDENTIFIER 2184DE-18470-05		CC. DATA CATEGORY Integrated Logistic Support		DD. CONTRACTOR N/A				
36. ITEM NUMBER 006		37. TITLE OR DESCRIPTION OF DATA Packaging Specification			38. SUBTITLE N/A			
39. AUTHORITY (Data Item Number) ILSD-18001SC		40. CONTRACT REFERENCE SOW paragraph 3.7			41. REQUIRING OFFICE DSSPM 3			
42. INSPECTION N/A	19. INPUT	20. FREQUENCY ONE/R	12. DATE OF 1 st SUBMISSION Block 16 ASGEN	14. DISTRIBUTION and ADDRESSEES				
8. APP CODE N/A		16. AS OF DATE N/A	18. DATE OF SUB SUBMISSION N/A	A. ADDRESS	B. COPIES			
21. REMARKS Block12: The DRAFT specification sheets for the packaging specification shall be provided by the Contractor at the completion of preproduction testing. The document will be reviewed by the Technical Authority and the final document incorporating mutually agreed revisions shall be delivered within 4 weeks of First Article acceptance in electronic format (WORD and PDF) and in hard copy as specified in block 14.					DRAFT	FINAL		
						REG	REP	
				DSSPM3-5	1	2	0	
PREPARED BY DSSPM3-5-1/C1		DATE APR 2011	APPROVED BY DSSPM 3-5-1					
17. CONTRACT FILE/DOC NUMBER	18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	1	2	0	

Cover Page for the 6 Data Item Descriptions (Annex E)



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ANNEX E		DATA ITEM DESCRIPTION		Requisition W8486-129671
1. TITLE Progress Report		2. IDENTIFICATION NUMBER MGTD-18001SC		
3. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government to monitor the progress of all significant work activity.				
4. APPROVAL DATE JUN 11	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE		
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the structure, format, and content of the Progress Report for the BRP procurement.				
8. ORIGINATOR DSSPM 3-5-1/C1	9. APPLICABLE FORMS			

10. PREPARATION INSTRUCTIONS

10.1 General. The Progress Report will be used to track the progress of shipments and payments, and the status of significant work activities in manufacturing, Quality Assurance (QA), Logistic Support (ILS) or Configuration Management. It shall be used as a primary tool for collating system control data and preparing DND management documentation for the matrix. These reports constitute information summaries only and in no way preclude or replace other contractually binding reports or documentation.

10.2 Structure and Format. The Progress Report shall be formatted electronically using standard office software (such as Excel or PDF format). It shall contain four (4) sections as follows:

- a. Part 1 - Delivery Summary;
- b. Part 2 - Financial Summary;
- c. Part 3 - Test Summary; and
- d. Part 4 - System Management Summary.

10.3 Content. Each section of the Progress Report shall be governed by the guidelines outlined below. The initial submission shall be in DRAFT form for discussion. The final refinements will be jointly established between the Government and the Contractor during the First Article review.

a. Part 1 - Delivery Summary: This section shall contain a simple graphical plot of planned vs actual deliveries of the BRP systems followed by a tabular spreadsheet of equipment deliveries including replacement components, kits, or accessory items as applicable. The minimum information in the tables must include delivery periods and lot data. The graph and tables shall be with the latest data prior to submission. The contractor may provide any supplementary information that is deemed appropriate.

b. Part 2 - Financial Summary: This section shall contain a tabular recap of deliveries by invoice #, invoice totals, invoice dates and payment dates made by the Government. Entries shall be carried forward until such a time as the delivery payment is received by the Contractor and reported. It shall then be removed from subsequent reports.

c. Part 3 - Test Summary: This section shall provide a running summary of specified production test results. The results shall be provided in tabular format and must include all new results since the previous report as well as an adjusted cumulative average of the specified production test results over the life of the contract as deliveries progress. Data should be broken down by lot number, molding date, test result and test variance. Applicable tests for which a summary is required are V50 ballistic resistance, backface signature data, and a critical dimensions and weight distribution table/graph. Other results may be provided at the discretion of the Contractor.

d. Part 4 - System Management Summary: This section shall contain the status of deliverable documents and/or significant issues concerning (1) Quality Assurance, (2) system configuration data, (3) engineering design changes, deviations or waivers and (4) logistic support. The Contractor may propose any abbreviated format for recording and updating the status information for each sub-section category. As a minimum it shall include a contact point, a status update on significant issues and a status update on any related documentation for each of the four categories identified above. NIL Returns shall be specified in categories for which there is nothing to report.

ANNEX E**DATA ITEM DESCRIPTION**

Requisition W8486-129671

4. TITLE Agenda and Minutes for Technical Reviews		5. IDENTIFICATION NUMBER ADMD-18001SC	
6. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government to assist in the preparation for technical review records.			
11. APPROVAL DATE JUN 2011	12. OFFICE OF PRIMARY INTEREST DSSPM 3	13. GIDEP APPLICABLE	
14. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of the periodic Technical Review agenda and minutes for the Bullet Resistant Plate procurement.			
15. ORIGINATOR DSSPM 3-5-1/C1		16. APPLICABLE FORMS	

17. PREPARATION INSTRUCTIONS

10.1 General. The Contractor shall provide the Agenda and Minutes for the technical reviews.

10.2 Format. The Agenda and Minutes shall be produced in the Contractor's own format.

10.3 Content.

10.3.1 The Agenda shall include the following, as a minimum:

- a. date, time, and location;
- b. topics for discussion/decision organized by discipline
 - (1) Engineering items (design, drawings, specifications, DCRs, waivers, configuration data, etc),
 - (2) Test and Evaluation items (test data, quality plan, quality assurance procedures, etc), and
 - (3) Logistics Support items (publications, support procedures, supplier data, shipping, etc); and
- c. the lead for each agenda item.

10.3.2 The following guidelines and constraints shall apply to the Minutes:

- a. record of discussion must be accurate but should be abbreviated;
- b. decisions must be clearly stated, including due dates, responsibility for completion and status since previous report period;
- c. signature blocks for both the Contractor's Project Manager and the Technical Authority must be signed as acknowledgement that the information recorded is complete and correct; and
- d. no direct changes to the contract, nor direct work that falls outside of the scope of the contract shall result from any decisions recorded during a technical meeting without formal follow-up contract amendment processed through the Project Authority and the Contracting Authority.

ANNEX E		DATA ITEM DESCRIPTION		Requisition W8486-129671
7. TITLE Technical Data Summary		8. IDENTIFICATION NUMBER CMGT-18001SC		
9. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government as a reference for establishing the design configuration of the equipment items, maintaining backwards compatibility with in-service components, and managing the preparation and delivery of system documentation.				
18. APPROVAL DATE JUN 2011	19. OFFICE OF PRIMARY INTEREST DSSPM 3	20. GIDEP APPLICABLE		
21. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of technical and support data for the selected bullet resistant plate design(s).				
22. ORIGINATOR DSSPM 3-5-1/C1	23. APPLICABLE FORMS			
24. PREPARATION INSTRUCTIONS 10.1 General. The Technical Data summary draft shall include for REFERENCE PURPOSES assembly level engineering drawings and interface drawings with dimensional data. The final package will include unrestricted drawings for critical interface dimensions between interchangeable components and a general product specification sheet (or summary). 10.2 Format. The package may be produced in the Contractor's own format. 10.3 Content. The submission of the product specification sheet shall include the following: <ul style="list-style-type: none"> a. an equipment breakdown structure (EBS) for each plate design contracted in graphical format (family tree) or table format; b. a specification form for each sub-assembly/component. Specification forms should include as a minimum a descriptive title, a 3D graphical view, reference to applicable materials specifications and drawing(s), specification test requirements (where applicable), and any special notes. 				

ANNEX E		DATA ITEM DESCRIPTION		Requisition W8486-129671
10. TITLE Test Records		11. IDENTIFICATION NUMBER ENGD-18001SC		
12. DESCRIPTION/PURPOSE This document will be used to notify the Government of any special test activity being conducted by the Contractor, which will affect the qualification and acceptance of the bullet resistant plate(s), as defined in the SOW. Test reports will be used to record and verify compliance with specification requirements.				
25. APPROVAL DATE JUN 2011	26. OFFICE OF PRIMARY INTEREST DSSPM 3	27. GIDEP APPLICABLE		
28. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of the Notification of Testing and for test reports and data for the Bullet Resistant Plate procurement.				
29. ORIGINATOR DSSPM 3-5-1/C1	30. APPLICABLE FORMS			
31. PREPARATION INSTRUCTIONS 10.1 Content. - Test reports must contain all information specified in the applicable test protocols called up in the Technical Standard. 10.2 Format. - Test reports and data may be provided in the Contractor's own format but must as a minimum comply with guidelines outlined below: 10.2.1 Special Test Series (First Article or failed lot Tests) - Statement of Work and Technical Standard. 10.2.2 Routine Production Tests: a. ISO 9002 Quality Systems - Model for quality assurance in production, installation, and servicing; and b. the Contractor's Quality Assurance (QA) Plan. 10.2.3 The Notification of Testing is only applicable to special test series as defined above and should be provided in writing to the Government Technical and QA Authorities at least two weeks prior to the testing. Routine production testing shall be coordinated with the QA Authority or delegated representative.				

ANNEX E		DATA ITEM DESCRIPTION		Requisition W8486-129671
13. TITLE User Instructions		14. IDENTIFICATION NUMBER TMPB-18001SC		
15. DESCRIPTION/PURPOSE The User Instructions for the bullet resistant plate kits shall describe in bilingual format (English and French) the pertinent information for using and maintaining the BRP and training plates.				
32. APPROVAL DATE JUN 2011	33. OFFICE OF PRIMARY INTEREST DSSPM 3	34. GIDEP APPLICABLE		
35. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of the information contained in the User Instructions.				
36. ORIGINATOR DSSPM 3-5-1/C1	37. APPLICABLE FORMS			

38. PREPARATION INSTRUCTIONS

10.1 Requirements. The User Instructions shall be provided in accordance with the C-01-100-100/AG-005, Adoption of Commercial and Foreign Government Publications. The DND sample will be submitted during the first technical review and the final proof, incorporating any Contractor revisions, shall be delivered 2 weeks prior to First Article. DND will assist with official translation requirements.

10.2 Format. The User Instructions may be provided in the Contractor's own format however, if feasible every effort must be made to constrain the two instruction sets to single sheet leaflet (tabloid size, colour-printed both sides) as provided in the DND sample. The instructions must remain in clear concise format combined with simple graphic illustrations.

10.3 Content. The User Instructions shall include all necessary information to allow the user to correctly use, clean, and maintain the BRP. As a minimum, the leaflet shall include the following topic structure:

- a. General Description,
- b. Fitting and Adjustment in the FPV,
- c. Care, Cleaning and Maintenance, and
- d. Accessory Items.

ANNEX E		DATA ITEM DESCRIPTION		Requisition W8486-129671
16. TITLE Packaging Specification		17. IDENTIFICATION NUMBER ILSD-18001SC		
18. DESCRIPTION/PURPOSE The Government requires a packaging specification in order to plan for the introduction into service of the system and its components.				
39. APPROVAL DATE JUN 2011	40. OFFICE OF PRIMARY INTEREST DSSPM 3	41. GIDEP APPLICABLE		
42. APPLICATION/INTERRELATIONSHIP This Data Item Description contains general instructions for the format, content, and preparation of the packaging requirements for the complete BRP kits and system components. The final solution and packaging specification will be jointly formalized following approval of the proposal. DND will provide samples of packaging specifications for additional guidance.				
43. ORIGINATOR DSSPM 3-5-1/C1	44. APPLICABLE FORMS			

1. Four (4) BRP kits or (xx) components shall be packaged in a suitable box, in accordance with good commercial practice. The box shall be taped to effect closure. On one end of the box, the following shall be legibly marked (labelled).

NATO Stock Number * - As shown on contract
Nomenclature (incl. size) ** - As shown on contract
Quantity / Unit of Issue - (XX) SE

2. A quantity of packages of the same NATO stock number shall be packed upright into a corrugated fiberboard box conforming to Canadian Government Specifications Board (CGSB) specification CAN/CGSB-43.21-M91. The box size and content quantity shall be uniform for the duration of the contract. Suggestion as follows:

No material handling equipment required - Overall inside dimensions (length, width and depth added) shall not exceed 1.5 metres (59 inches). The maximum weight of the box and contents shall not exceed 18 kilograms (40 pounds).

Material handling equipment required - The box(es) shall be compatible with the requirements of paragraph 7.

3. Closure of the corrugated fiberboard box shall be in accordance with CGSB specification CAN/CGSB-43.21-M91 (Appendix B).

4. On one end of each corrugated fibreboard box, stencilling or labelling in figures as large as practicable in relation to the space available shall legibly mark the following information:

NATO Stock Number * - As specified on contract
Nomenclature (include size)** - As specified on contract
Quantity/Unit of Issue - 1 SE
Gross Weight (nearest kg) - As applicable
Contract Serial Number - As specified on contract

5. On one side of each corrugated fiberboard box, stenciling or labeling in figures as large as practicable in relation to the space available shall legibly mark the following information:

Consignee - As specified on contract
Consignor - Supplier's name or trademark
Case ___ of ___ cases - As applicable within each shipment

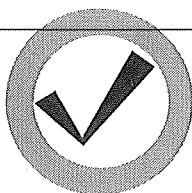
6. In the case of spare part components the side on which the shipping instructions are contained (paragraph 5), an envelope containing the Packing List, Release Note, etc. This water-resistant envelope shall be prominently marked "Packing List Enclosed" and shall be securely affixed to the outside wall of the container.

7. The last shipping container of each shipment shall have affixed to the side on which the shipping instructions are contained (paragraph 5), an envelope containing the Packing List, Release Note, etc. This water-resistant envelope shall be prominently marked "Packing List Enclosed" and shall be securely affixed to the outside wall of the container.

Shipments shall be palletized in uniform loads and strapped/secured on standard 4-way entry, 48-inch by 40-inch wood or fibreboard non-returnable pallets, to be supplied by the contractor. Total height, including pallet, shall not exceed 42 inches.

* Marking shall be applied in Standard Bar Code Symbolology, Code 3 of 9, (code 39) including HRI (in accordance with D-LM-008-002/SF-001)

** Bilingual format - English/French



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GUIDANCE TO BIDDERS

TECHNICAL REQUIREMENTS – BRP BID EVALUATION

For the purposes of the technical portion of the Bid Evaluation, the proposal must include the following for Phase 1 (See Table F-4 Summary):

- 20 plates (including 1 component set as described below) that are representative of the product you propose to supply;
- a Technical Administration and Managerial overview consisting of
 - a Project Management Summary,
 - a Manufacturing and Test Facilities Summary, and
 - a Post Contract Support Proposal;
- test records for requirements outlined in Table 1; and
- a detailed Quality System description or a draft Quality Assurance Plan for production.

1. General. Technical requirements for the Bullet Resistant Plate [BRP] will be evaluated in two phases through a combination of validation tests of the pre-award samples and an assessment of the bidder-provided support documentation. Requirements will be **rated** in accordance with the RFP and the instructions provided below. Any questions regarding specific DND test methodologies or test set-up preparations shall be referred to the Technical Authority through Public Works and Government Services Canada (PWGSC). The weighting for each criteria applied to the BRP performance-value formula are provided in the RFP and summarized in Table F-3. The mandatory requirements of Phase 1 must be met to qualify for Phase 2.

1.1 Phase 1. Phase 1 will be used to confirm mandatory requirements, to determine effective ballistic coverage and weight, to evaluate ballistic performance, and to rate the written proposals. Samples provided with the proposal will be inspected and tested by DND as specified in Table F-2.

1.2 Bid Plate Dimensions. Dimensions for the final Canadian shape in production are specified on drawing 0078819. Bonus points are awarded if bidders provide their plate samples in the Canadian shape configuration for pre-award, however for the bid evaluation

phase, plates are only required to meet the parameters outlined below as a minimum:

<u>REQUIREMENT</u>	<u>Pre-Award Samples</u>	<u>Production Units</u>
a. Length and width	Approx. 300 x 245 mm	Dwg 0078819
b. 3D Surface area of the Strike Face	Should be less than 75,000 sq mm (subject to penalty if larger)	Dwg 0078819
c. Plate Curvature	Double Curve	Dwg 0078819
d. Plate Thickness	25 mm - Maximum Less than 18mm -Desirable rated requirement	As Contracted Thickness must be <u>less than or equal to</u> thickness at bid stage
e. Effective Ballistic Coverage	Refer to section 1.3 and Annex C	Refer to Annex C
f. Lot traceability	Single production lot	Refer to Annex C

1.3 Effective Ballistic Coverage and Weight. Pre-award samples will be weighed and evaluated after discounting any edging materials as described in Annex C. The Effective Areal Density will be calculated using the Effective Coverage Ratio (ECR) and the application to the Canadian 3D strike face. It will form the **rated** requirement for weight and true ballistic coverage.

1.4 Phase 2. For Phase 2, twenty-five (25) additional BRP samples will be purchased for the top three technical proposals that qualify in phase 1. The additional plates will be assessed for ballistic, environmental, and durability requirements (see Table F-2).

2. **Pre-Award Deliverables.**

2.1 Bidder Testing. Bidders are required, as a minimum, to undertake test requirements as specified in Table F-1 below and provide test records with their written proposal. Test records must be current i.e., conducted within the last 12 months and must all be conducted in accordance with DND protocols at Annex C.

Table F-1 – Bidder-Supplied Test Records

Item	Tech Standard (Annex C)	TEST DESCRIPTION
1	3.3.2.1	Ballistic Limit Standard MV50 against 7.62x51mm AP P80 or NATO equivalent
2	3.3.2.2/3/4	Proof Vo, Backface Deformation, and Spall Resistance Against 7.62x51mm FMJ Ball C21 or NATO equivalent
3	3.3.2.2	Proof Vo against 5.56x45mm FMJ Ball C77 or NATO equivalent
4	3.3.2.5	DISCRETIONARY Multi-Hit (Applies ONLY to bidders who choose to supply MH levels > 0 As defined in Annex C section 6)

2.2 DND Testing. DND will conduct a full series of tests and a rating program of the proposed solutions as outlined in Table 2.

Table F-2 - DND Testing Bid Evaluation

	Tech Standard (Annex C)	TEST DESCRIPTION	Pre-Award Samples
Phase 1	20 Samples		
	3.3.2.1	Ballistic Limit Standard MV50 [as new]	10
	3.3.2.2	Proof Vo, 7.62mm	3
	3.3.2.3	Backface Deformation	Same 3
	3.3.2.4	Spall Resistance (Rated requirement only during Bid Evaluation stage)	Same 3
	3.3.2.5	Multi-Hit (Applies ONLY to bidders who choose to supply MH levels > 0)	Same 3
	3.3.1.1	Thickness	All
	3.3.1.2/3 Components	Effective Coverage Ratio (ECR)	3 (Note 1)
	3.3.1.2	ECR-Adjusted Weight	All
	3.3.3.3	Material Requirements	3 (Note 2)
	SPARE		4
Phase 2	25 Samples	Ballistic/Impact	
	3.3.2.1	Ballistic Limit Post-Environmental MV50	10
	3.3.2.1	Ballistic Limit Post-Impact Damage MV50	10
	3.3.2.2	Proof Vo, 5.56mm	3

Notes:

- One (1) sample shall be broken down by component (external cover, spall liner, edging/surface materials where applicable, main ballistic component [ceramic or other], and backing component if separable from main component).
- Chemical resistance conducted on external covers. Flammability resistance conducted on covers and during ballistic tests.

3. Written Proposal Assessment

3.1 Technical Administration, Managerial Capability, and Quality System. A detailed Quality System description or draft QA Plan in accordance with ISO 10005 shall be provided for Phase 1. A comprehensive Technical Administration and Managerial overview shall also be provided and should include a detailed summary of the subject matter outlined below. The Technical Administration overview will be **rated**.

3.1.1 *Project Management Plan - Demonstrate the proposed project management structure and the degree of requisite capability offered by covering the following topics as a minimum.*

- Organization Chart of key positions with the location and authority of the Contractor PM clearly delineated.
- Experience and qualifications in summary or CV format of Project Manager and other key technical and managerial personnel directly involved in the project.
- Description of previous project management experience of a comparable nature in customizing a military or police product for unique customer needs.
- Provision of a work schedule and a Work Breakdown Structure (WBS). The WBS can be in any format (descriptive or point form) and will be awarded points for each of the elements it covers including plate optimization, production set-up, First Article plan, delivery period, tech data deliverables, lot control and testing, production gauge preparation etc.

3.1.2 *Manufacturing Experience and Facilities Summary - Demonstrate proven experience in the manufacture of bullet resistant plates and access to suitable test facilities for production (this may be supplemented with a plant visit by the Design and QA authorities).*

- Company (including key sub-contractors) profile including years in plate business, company size, description of major product lines, and average annual sales.
- Contract history of significant product sales in previous two year period, including value, description and quantity of product, and pertinent details.
- List standards that current products are certified to (NIJ and/or military).
- Customer references concerning products manufactured.
- A description of manufacturing/assembly plant including a review of lab and ballistic test facilities (in-house).
- If external ballistic test facilities are used in production, the identification and accessibility to government authorities of this test agency are required by certification.
- A description of manufacturing processes that would be used under this contract (sub-contractors utilized for any key components or for assembly must also be included in this section)

- A description of control techniques used in the assembly of finished product to assure lot traceability.

3.1.3 Post-Contract Support Proposal - Detail the system support that will be available after initial contract deliveries are complete and the time period that it would cover.

- A description of the degree of support that is offered (product support, technical support, product improvement, or other).
- Time period that post-contract support would be available and any conditions that would apply.

3.2 Complementary Items. A detailed illustration of proposed production control gauges to verify BRP critical dimensions during production and comprehensive description of the training plate construction shall be provided with the proposal. Sealed samples of the in-service training plates and webbing carriers are available for viewing at the regional offices.

4. Qualification and Ratings.

Table F-3 - Scoring Concept

<u>Weighted Component</u>	<u>Rated Criteria</u>	<u>Individual Weight</u>
Technical Performance: X 50%	Weight Determination	-35%
	MV50 Performance	-20%
	Vproof Performance	-20%
	Multi-Hit Level (Discretionary)	-10%
	Dimensions/Shape	-10%
	Material requirements	-5%
		100%
Tech Admin & Managerial: X 20%	Project Management	-35%
	Experience and Infrastructure	-35%
	Post-Contract Support	-15%
	Gauges & Training Plate	-15%
		100%
Cost Proposal (PWGSC only): X 30%	Price proposals averaging	
	(IAW the Request for Proposal)	

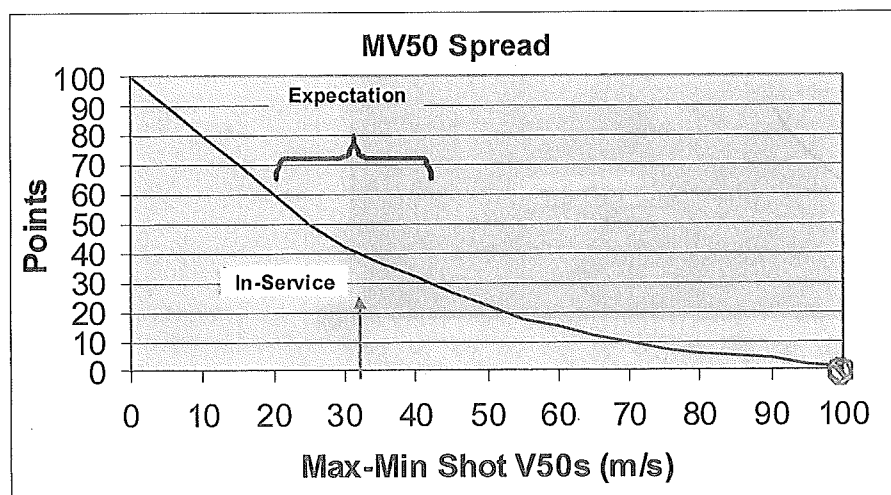
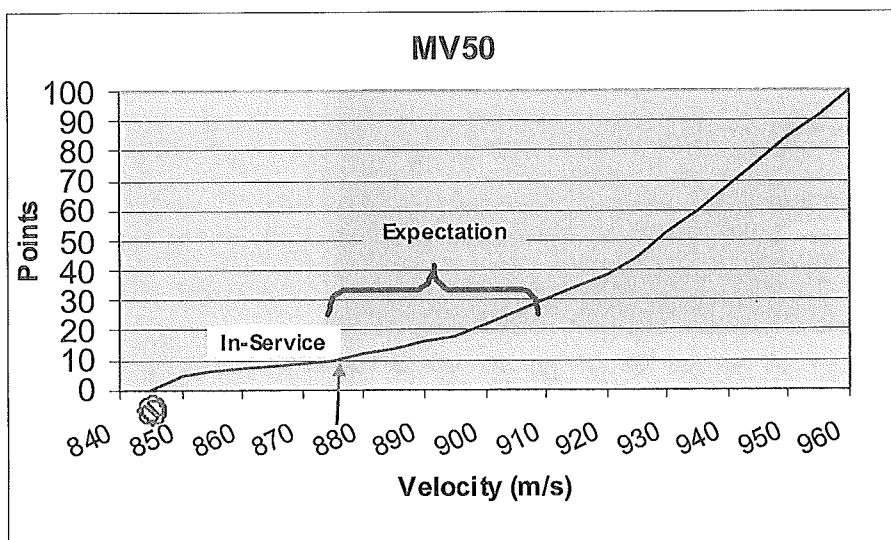
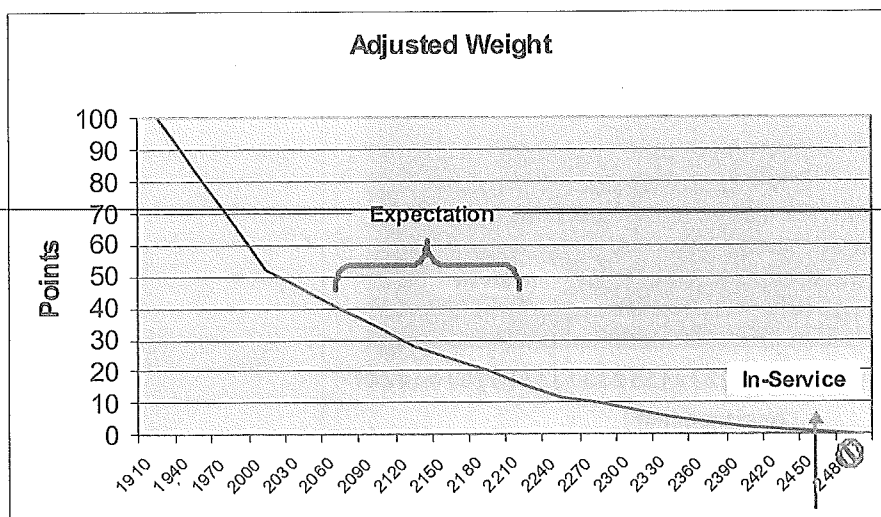
4.1 Qualification Protocol. A progressive testing protocol will be employed for the BRP technical qualification process. All contender plates that achieve minimum mandatory requirements for Phase 1 will be scored and assigned a performance rating. The three (3) proposals with the highest technical merit will be down-selected and DND will purchase an additional 25 samples from these bidders for Phase 2 of the program. The winning bid will be determined by PWGSC through application of the BRP Performance-Value formula in the RFP. **All samples for both phases must come from a single production lot and bidders must certify and show evidence of lot traceability.**

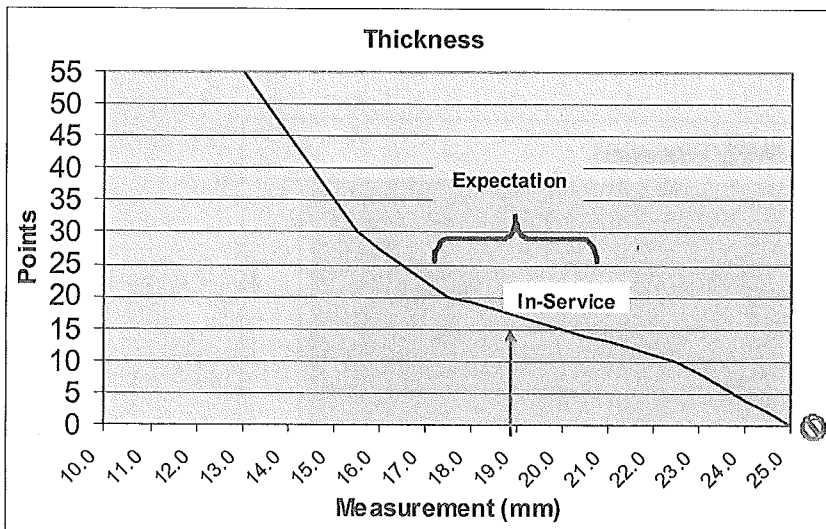
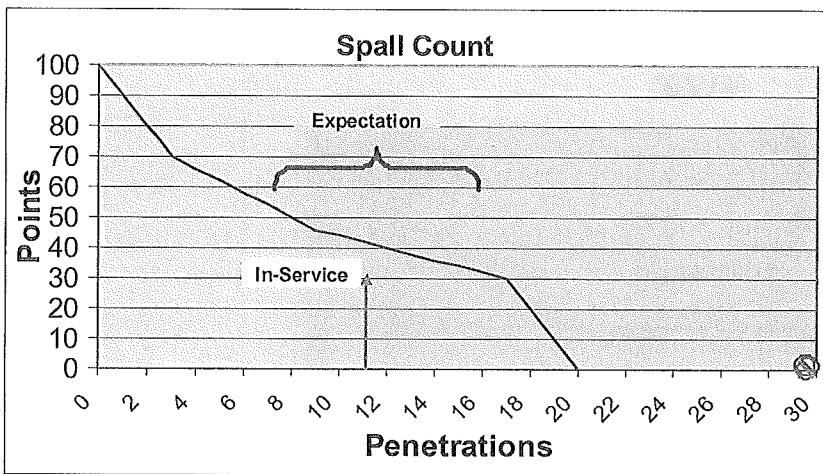
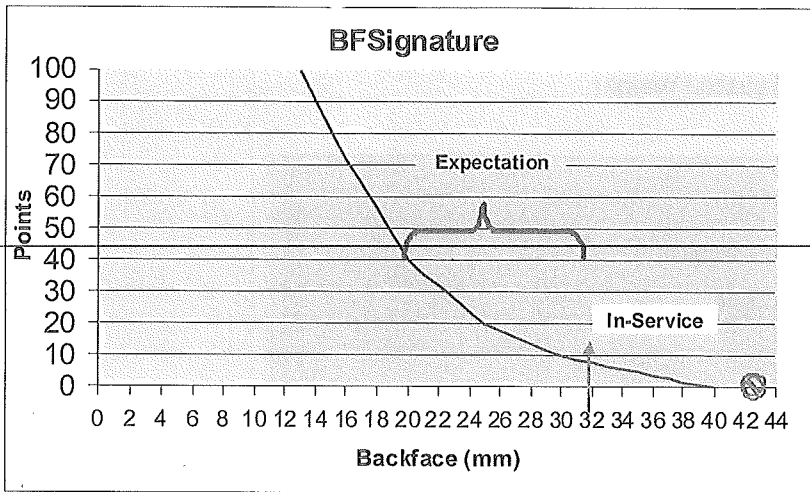
Table F-4 - Pre-Award Delivery Summary

Phase 1	PRODUCT	GENERAL	TECHNICAL PROPOSAL	
	20 BRP Samples (Note 1)	Requirements (Note 2)	Technical Admin & Managerial	Quality System/ Plan
	Tech Authority -Product Assessment of RATED Criteria -Lot Certification	Contract Authority -Terms and Conditions -Cost Data -Financial Information -Pricing Proposal	Tech Authority -Project Management -Manufacturing Experience & Facilities Infrastructure -Post-Contract Support -Bidder Test Records -Test Facility Certification (IF APPLICABLE) - Control Gauge Proposal for Critical Dimensions -Training Plate construction	Tech Authority - IAW ISO 10005
Phase 2	Top three bid solutions			
	25 BRP Samples (Note 3)			
	Tech Authority -Product Assessment of remaining PASS/FAIL Criteria			

NOTES:

1. One (1) of the samples shall be broken down into components.
2. As defined in RFP.
3. DND will purchase from bidders.





Raw Data		Bid A	Bid B	Bid C	Bid D	Bid E	Bid F	Bid G
grams	Plate Average	2065	2449	2150	2373	2375	2425	2400
Ratio	Effective Coverage Ratio (ECR)	0.97	0.96	0.99	0.97	0.98	0.98	0.97
Ratio	Cdn Shape Ratio (CSR-Note 1)	1.00	0.95	0.99	1.00	0.94	1.00	1.15
grams	Adjusted Weight = Average/ECR*CSR	2129	2423	2150	2446	2278	2474	2845
m/s	V50-Shot 1	884	900	880	925	936	905	925
m/s	V50-Shot 2	851	876	870	875	908	837	850
m/s	V50-Shot 3	850	860	850	850	875	807	805
m/s	MV50 Value	861.7	878.7	866.7	883.3	906.3	849.7	860.0
m/s	MV50 Spread	34	40	30	75	61	98	120
mm	Vproof-Backface	35	35	32	49	41	39	22
#	Vproof-Spall Count	12	13	16	35	19	8	24
MH Level	Validated Shots on Plate	3	4	4	3	3	5	3
mm	Average Thickness	18	20	20	19	16	26	21
Point Score to Scaled Items								
score/100	Adjusted Weight Scaled	34	2	24	2	10	1	F
score/100	MV50 Value Scaled	8	12	9	14	30	5	7
Pass/Fail	Absolute V50 _n to MV50≤50m/s	P	P	P	P	P	F	F
score/100	MV50 Spread Scaled	37	32	42	7	15	2	F
score/100	Backface Signature Scaled	5	5	9	F	0	1	32
score/100	Spall Count Scaled	40	40	32	F	10	50	0
score/55	Average Thickness Scaled	19	15	17	17	28	F	13
Point Score to Bonus Items								
score/100	Multi-Hit Bonus (See Note 2)	0	20	0	0	0	60	0
score/45	Canadian Shape Bonus	45	0	0	45	0	45	0
score/100	Material Requirements Bonus	100	100	96	88	100	100	100
Point Score to Written Proposal								
score/27	Project Mgt Structure	25	25	25	25	25	23	25
score/15	Manufacturing Experience	12	12	12	13	14	15	12
score/15	Manufacturing Infrastructure Elements	12	12	12	13	14	15	12
score/10	Post-Contract Support	9	9	8	7	9	9	7
score/10	Gauges and Training Plate	10	9	8	7	8	9	10
Normalized Values								
	Adjusted Weight Normalized	100	6	71	6	29	3	F
	MV50 Normalized	27	40	30	47	100	17	23
	V50 Spread Normalized	88	76	100	17	36	5	F
	Backface Signature Normalized	16	16	28	F	0	3	100
	Spall Count Normalized	80	80	64	F	20	100	0
	Average Thickness Normalized	68	54	61	61	100	F	46
	Multi-Hit Bonus Normalized	0	33	0	0	0	100	0
	Cdn Shape Bonus Normalized	100	0	0	100	0	100	0
	Material Bonus Normalized	100	100	96	88	100	100	100
	Project Mgt Structure Normalized	100	100	100	100	100	92	100
	Manufacturing Experience Normalized	80	80	80	87	93	100	80
	Manufacturing Elements Normalized	80	80	80	87	93	100	80
	Post-Contract Support Normalized	100	100	89	78	100	100	78
	Gauges and Training Plate Normalized	100	90	80	70	80	90	100
	Aggregate unit cost all Items	\$800.00	\$520.00	\$650.00	\$675.00	\$645.00	\$620.00	\$655.00
	Pricing Normalized	65	100	80	77	81	84	79
Individual Weightings								
35%	Adjusted Weight	35.0	2.1	24.7	2.1	10.3	1.0	F
12%	MV50	3.2	4.8	3.6	5.6	12.0	2.0	2.8
8%	MV50 Spread	7.0	6.1	8.0	1.3	2.9	0.4	F
15%	Backface	2.3	2.3	4.2	F	0.0	0.5	15.0
5%	Spall Count	4.0	4.0	3.2	F	1.0	5.0	0.0
10%	Multi-Hit Bonus	0.0	3.3	0.0	0.0	0.0	10.0	0.0
5.5%	Average Thickness	3.7	2.9	3.3	3.3	5.5	F	2.6
4.5%	Cdn Shape Bonus	4.5	0.0	0.0	4.5	0.0	4.5	0.0
5%	Materials	5.0	5.0	4.8	4.4	5.0	5.0	5.0
Product	Sub-Total	64.8	30.6	51.9	FAIL	36.7	FAIL	FAIL
35%	Project Mgt Structure	35.0	35.0	35.0	35.0	35.0	32.2	35.0
10%	Manufacturing Experience	8.0	8.0	8.0	8.7	9.3	10.0	8.0
25%	Manufacturing Infrastructure Elements	20.0	20.0	20.0	21.7	23.3	25.0	20.0
15%	Post-Contract Support	15.0	15.0	13.3	11.7	15.0	15.0	11.7
15%	Gauges and Training Plate	15.0	13.5	12.0	10.5	12.0	13.5	15.0
Proposal	Sub-Total	93.0	91.5	88.3	87.5	94.7	95.7	89.7
Aggregate Weightings								
50%	Technical Performance	32.4	15.3	25.9	FAIL	18.3	FAIL	FAIL
20%	Technical Proposal	18.6	18.3	17.7	17.5	18.9	19.1	17.9
30%	Pricing Proposal	19.5	30.0	24.0	23.1	24.2	25.2	23.8
	TOTAL POINTS	70.5	63.6	67.6	FAIL	61.4	FAIL	FAIL

Note 1. Canadian Shape Ratio (CSR)=Canadian Surface Area/Bid Plate Surface Area

Note 2. Multi-Hit Level 0=3 shots (PASS); Level 1=4 shots (20pts); Level 2=5shots (60pts); Level 3≥6 shots (100pts)