

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 0B2 / Noyau 0B2
Gatineau, Québec K1A 0S5
Bid Fax: (819) 997-9776

SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

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
6A2, Place du Portage
Gatineau, Québec K1A 0S5

Title - Sujet FRAGMENTATION PROTECTIVE VESTS		
Solicitation No. - N° de l'invitation W8486-149840/A		Amendment No. - N° modif. 001
Client Reference No. - N° de référence du client W8486-149840		Date 2015-07-09
GETS Reference No. - N° de référence de SEAG PW-\$\$PR-707-67615		
File No. - N° de dossier pr707.W8486-149840		CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2015-10-05		Time Zone Fuseau horaire Eastern Daylight Saving Time EDT
F.O.B. - F.A.B. Specified Herein - Précisé dans les présentes Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input checked="" 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:		

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	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

Solicitation No. - N° de l'invitation

W8486-149840/A

Amd. No. - N° de la modif.

001

Buyer ID - Id de l'acheteur

pr707

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

W8486-149840

File No. - N° du dossier

pr707W8486-149840

CCC No./N° CCC - FMS No/ N° VME

AMENDMENT 001

This amendment raised to delete and replace the entire Request for Proposal package.

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001
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PART 1 - GENERAL INFORMATION

1.1 Security Requirement

There is no security requirement associated with this bid solicitation.

1.2 Requirement

The Requirement is detailed under Annex A of the resulting contract clauses.

1.3 Debriefings

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 from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

1.4 Trade Agreements

The requirement is subject to the provision of the Agreement on Internal trade and is limited to Canadian goods.

PART 2 - BIDDER INSTRUCTIONS

2.1 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 Manual* (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-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 (2015/07/03) 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 or Services - Competitive Requirements, is amended as follows:

Delete: 60 days

Insert: 180 days

2.1.1 SACC Manual clauses

A9130T 2014/11/27	Controlled Goods Program
B1000T 2014/06/26	Materiel

2.2 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.

2.3 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than seven (7) calendar 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 question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

If any technical information/documentations are missing, not submitted with the bid, the Contracting Authority will inform the Bidder in writing and provide the Bidder with two (2) working days from the request to submit the missing information/documentations. Failure to comply with the request within the specified timeframe will result in the bid being declared non-responsive.

2.4 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.

2.5 Technical Data and Samples

Technical data and samples (if applicable) may be viewed (by appointment only) at the following offices:

Public Works & Government Services Canada
Supply Directorate
6th floor
1550 ave D'Estimauville
Quebec, Que. G1J 0C7
TEL: 418-649-2714
FAX: 418-648-2209
Attention: Micheline Naud (micheline.naud@tpsgc-pwgsc.gc.ca)

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
Attention: Viviane Rouhault (viviane.rouhault@tpsgc-pwgsc.gc.ca)

Public Works & Government Services Canada
Suite 480, 33 City Centre Drive
Mississauga, Ont. L5B 2N5
TEL: 905-615-2070
FAX 905-615-2023
Attention: Jana Posavec (jana.posavec@tpsgc-pwgsc.gc.ca)

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
Attention: Bev Laurin (bev.laurin@tpsgc-pwgsc.gc.ca)

2.6 Technical Data

In order to receive Technical Data Packages against this solicitation, bidders must provide the following details with their request:

- Company Name
- Complete mailing & physical address (P.O. Box numbers not acceptable)
- Area code and telephone number
- Contact name
- E-mail address
- Solicitation Number & Closing Date

and send their request (by facsimile message or e-mail) to the following:

E-mail : Sylvie.elder@tpsgc-pwgsc.gc.ca

OR

Facsimile Number: 819-956-5454

It is imperative that the request be done as soon as possible to ensure timely receipt. Notwithstanding Canada must not be held responsible for untimely release of the technical data.

Bidder committed to submit a proposal will request an alpha character from the contracting Authority any time before bid closure. At the same time 1 meter of non slip mesh, a copy of the in-service User Manual and a disposable tape measure sample will be sent to the bidder (Annex F, paragraph 6).

2.7 Specifications and Standards

2.7.1 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://assistdocs.com/search/search_basic.cfm

2.7.2 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>

2.8 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: \$ _____
- (h) Total cost \$ _____

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 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 and one (1) soft copy on CD (R) or DVD (R)
Section III: Certifications (1 hard copy)

If there is a discrepancy between the wording of the soft copy and the hard copy, the wording of the hard copy will have priority over the wording of the soft 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) (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, bidders should:

1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and 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, duo tangs 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 should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work (reference Part 4, Technical Evaluation, 4.1.1 (Technical Evaluation))

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Basis of Payment. The total amount of Applicable Taxes must be shown separately.

3.1.1 Exchange Rate Fluctuation

C3011T 2013/11/06 Exchange Rate Fluctuation

Section III: Certifications

Bidders must submit the certifications required under Part 5.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION**4.1 Evaluation Procedures**

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada and a consultant from AMTEK Engineering will evaluate the bids.

4.1.1 TECHNICAL EVALUATION**4.1.1.1 Technical Requirements**

Technical proposals must include six (6) complete Fragmentation Protective Vests (FPV) assemblies, six (6) ballistic shoot-packs, bidder ballistic data, non-ballistic material samples with specified test data, a written manufacturing plan and a QA Plan Preliminary draft as requested in Annex F.

Phase I: Written Manufacturing Plan

The manufacturing plan is worth 15 out of 70 maximum points for technical merit. The scoring matrix is provided at enclosure 2 to Annex F and a minimum of 50% must be achieved to be responsive (refer to scaling graph on page 8).

Phase II: Pre- Award Samples and Supporting Documentation

As part of the technical evaluation, to confirm a Bidder's capability of meeting the technical requirements, pre-award samples and supporting documentation outlined in Annex F-Technical evaluation requirements guidance to bidder must be included with the bid.

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.

The Bidder must deliver the required pre-award samples, test results and certificates of compliance at no charge to Canada and must ensure that they are received with the bid at time and place of bid closing. Failure to submit the required pre-award samples, test results and certificates of compliance within the specified time frame will result in the bid being declared non-responsive. The samples submitted by the Bidder will remain the property of Canada.

Laboratory analysis of the product offered showing test results for specific tests listed in Annex F, Table F1 must be provided with the pre-award samples. Testing must be performed by an independent accredited laboratory establishment and must be in accordance with the test methods detailed in the Requirement. The laboratory report and test results must be dated after Request for Proposal posting date.

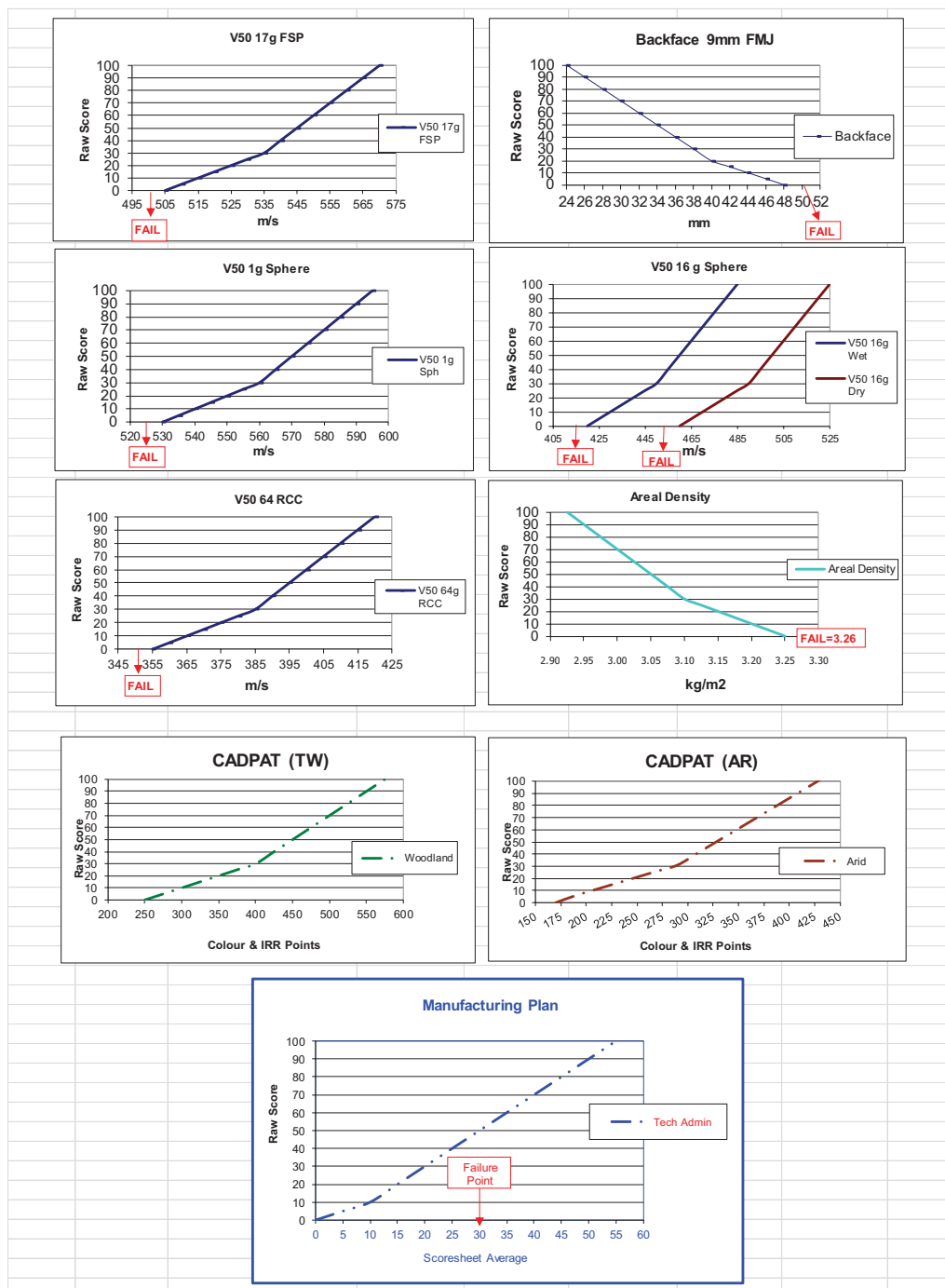
In addition, Certificates of Compliance listed in Annex F are required as defined herein.

The pre-award samples will be evaluated for quality of workmanship and conformance to specified materials and measurements

The requirement for a pre-award samples, test results and certificates of compliance will not relieve the successful bidder from submitting samples, test results and certificates of compliance as required by the contract terms or from strictly adhering to the technical requirement of this Request for Proposal and any resultant contract.

Technical evaluation process is detailed at Annex F.

Mandatory requirements for the FPV Carrier components and non-ballistic materials are governed by the specifications at Annex C- 1 and the armour components are governed by Annex C-2. Rating of the FPV construction standards and dimensional accuracy are worth 10 out of 70 maximum points for technical merit. The scoring matrix is provided at Enclosure 1 to Annex F. Rating of the CADPAT quality is worth 10 out of 70 maximum points for technical merit. The scoring matrix is provided at Enclosure 3 to Annex F. Rating of the ballistic performance requirements is worth 35 out of 70 maximum points for technical merit. The testing is conducted in accordance with Annex F. Details are specified at Tables F1 and F2. Samples that meet the mandatory specification minimums will be further evaluated using a point –rated scheme (refer to scaling graphs below).



CERTIFICATE OF COMPLIANCE-DEFINITION

A Certificate of Compliance is a written statement from an appropriate official of the component manufacturer attesting the full compliance of the components to the specification. This document must be on official company stationery; it must be dated after the Request for Proposal posting date); it must make reference to the applicable specification and have the original signature of the company's designated representative. Canada reserves the right to verify the statements made in the Certificate of Compliance. Full test results, demonstrating the product's compliance, will be accepted in lieu of a Certificate of Compliance.

4.1.1.2 Canadian Components

The Bidder must submit with their pre-award samples a list of the major components used in the manufacture of their fragmentation protective vests 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 manufacturer. According with that list the Bidder must provide what percentage of the product will be Canadian. The Contracting Authority will have the right to ask for more documentation to support the answer.

4.1.2. Financial Evaluation

4.1.2.1 Mandatory Financial Criteria

- a. The Bidder must submit firm unit prices in Canadian dollars, applicable taxes are excluded, DDP (Montreal, QC and Edmonton, AB) 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 "as and when requested" quantities. The Bidder is requested to quote firm unit pricing at no more than two decimal points.
- c. The bid evaluation price must not exceed the average bid evaluation price of all bids by 50% or more (All applicable taxes extra, as appropriate).

4.1.2.2 SACC MANUAL CLAUSE

A9033T2012/07/16 Financial Capability

4.1.2.3 Financial evaluation methodology

For the purpose of establishing bid evaluation prices, the firm quantity of all items will be multiplied by the Unit Prices by size for each Depot.

4.2 Basis of Selection –highest combined rating of technical and price

1. To be declared responsive, a bid must:

- a. Comply with all requirements of the bid solicitation; and
- b. Meet all mandatory technical and financial evaluation criteria.

2. The responsive bid with the highest combined score of technical merit and price will be recommended for award of a contract (1 contract only). The ratio will be 70% for the technical, 25% for the price and 5% for Canadian Components.

3. To establish the technical merit score, the overall technical score for each responsive bid will be determined as follow: total number of points obtained for each category normalized and weighted Table 1 below.

4. To establish the pricing score each responsive bid will be prorated against the lowest evaluated price and the ratio of 25%.
 5. To establish the Canadian Components score each responsive bid will be prorated against the highest evaluated Canadian Components score and the ratio of 5%.
 6. For each responsive bid, the technical score, the pricing score and the Canadian components score will be added to determine the combine rating.
 7. If there is a tie in points, the tie breaker will be done by choosing the highest ballistic aggregate score.
 8. 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 with four bids and the selection of the contractor is determined by a 70/25/5 ratio of technical merit, price and Canadian Component, respectively.

TABLE 1 -Basis of Selection - Highest Combined Rating Technical Merit (70%), Canadian Component (5%) and Price (25%)

	Point score for scale items	Bid A	Bid B	Bid C	Bid D	Bid E
score/100	Ballistic Aggregate Score	33.6	34.1	35.7	32.9	0.0
score/100	CADPAT Average Score	35.0	35.0	35.0	35.0	35.0
score/100	FPV Construction Score	60.0	75.0	80.0	70.0	FAIL
score/100	Written Proposal Score	90.0	90.0	90.0	70.0	FAIL
	Individual Weighting after Normalization					
35%	Ballistic Weighted	32.9%	30.8%	35.0%	32.2%	0.0%
10%	CADPAT Weighted	10.0%	10.0%	10.0%	10.0%	10.0%
10%	FPV Construction weighted	7.5%	9.4%	10.0%	8.38%	FAIL
15%	Written Proposal weighted	15.0%	15%	15.0%	11.7%	FAIL
	TECHNICAL MERIT SUB-TOTAL	65.4%	65.2%	70.0%	62.6%	FAIL
	Canadian Content %	80%	60.0%	40.0%	100.0%	100%
	Aggregate unit cost \$	\$9,400,000.00	\$8,600,000.00	\$6,900,000.00	12,500,000.00	\$12,500.00
	Category weighting					
70%	Technical Merit	65.4%	65.2%	70.0%	62.6%	FAIL
5%	Canadian Content	4.0%	3.0%	2.0%	5.0%	5.0%
25%	Pricing Proposal	18.4%	20.1%	25.0%	13.8%	13.8%
	TOTAL POINTS	87.8%	88.3%	97.0%	81.4%	FAIL

4.3 Contract financial security

1. If this bid is accepted, the Bidder may be required to provide contract financial security, after the bid closing date and within 10 calendar days from receipt of a written request from the Contracting Authority.
 - (a) a security deposit as defined in clause "Security Deposit Definition" in the amount of up to ten percent (10%) of the contract price.
2. Security deposits in the form of government guaranteed bonds with coupons attached will be accepted only if all coupons that are unmatured, at the time the security deposit is provided, are attached to the bonds. The Contractor must provide written instructions concerning the action to be taken with respect to coupons that will mature while the bonds are pledged as security, when such coupons are in excess of the security deposit requirement.

3. If Canada does not receive the required financial security within the specified period, Canada may, as its discretion, accept another offer, issue a new bid solicitation, award a contract or reject all the bids.

4.4 Security Deposit Definition

1. "security deposit" means
- (a) a bill of exchange that is payable to the Receiver General for Canada, and certified by an approved financial institution or drawn by an approved financial institution on itself; or
 - (b) a Government guaranteed bond; or
 - (c) an irrevocable standby letter of credit, or
 - (d) such other security as may be considered appropriate by the Contracting Authority and approved by Treasury Board;
2. "approved financial institution" means
- (a) any corporation or institution that is a member of the Canadian Payments Association;
 - (b) a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the "Régie de l'assurance-dépôts du Québec" to the maximum permitted by law;
 - (c) a credit union as defined in paragraph 137(6) the *Income Tax Act*;
 - (d) a corporation that accepts deposits from the public, if repayment of the deposits is guaranteed by Canadian province or territory; or
 - (e) the Canada Post Corporation.
3. "government guaranteed bond" means a bond of the Government of Canada or a bond unconditionally guaranteed as to principal and interest by the Government of Canada that is:
- (a) payable to bearer;
 - (b) accompanied by a duly executed instrument of transfer of the bond to the Receiver General for Canada in accordance with the *Domestic Bonds of Canada Regulations*;
 - (c) registered in the name of the Receiver General for Canada.
4. "irrevocable standby letter of credit"
- (a) means any arrangement, however named or described, whereby a financial institution (the "Issuer"), acting at the request and on the instructions of a customer (the "Applicant"), or on its behalf,
 - (i) will make a payment to or to the order of Canada, as the beneficiary;
 - (ii) will accept and pay bills of exchange drawn by Canada;
 - (iii) authorizes another financial institution to effect such payment, or accept and pay such bills of exchange; or
 - (iv) authorizes another financial institution to negotiate, against written demand(s) for payment, provided that the conditions of the letter of credit are complied with.
 - (b) must state the face amount which may be drawn against it;
 - (c) must state its expiry date;
 - (d) must provide for sight payment to the Receiver General for Canada by way of the financial institution's draft against presentation of a written demand for payment signed by the authorized departmental representative identified in the letter of credit by his/her office;
 - (e) must provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face amount of the letter of credit;
 - (f) must provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice (UCP) for Documentary Credits, 2007 Revision, ICC Publication No. 600. Pursuant to the ICC UCP, a credit is irrevocable even if there is no indication to that effect; and
 - (g) must be issued (Issuer) or confirmed (Confirmer), in either official language, by a financial institution that is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.

- (b) a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the "Régie de l'assurance-dépôts du Québec" to the maximum permitted by law;
- (c) a credit union as defined in paragraph 137(6) the *Income Tax Act*;
- (d) a corporation that accepts deposits from the public, if repayment of the deposits is guaranteed by Canadian province or territory; or
- (e) the Canada Post Corporation.

PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue, whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid.

5.1.1 Declaration of Convicted Offences

As applicable, pursuant to subsection Declaration of Convicted Offences of section 01 of the Standard Instructions, the Bidder must provide with its bid, a completed [Declaration Form](http://www.tpsgc-pwgsc.gc.ca/ci-if/formulaire-form-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ci-if/formulaire-form-eng.html>), to be given further consideration in the procurement process.

5.2 Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be submitted with the bid but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame specified will render the bid non-responsive.

5.2.1 Integrity Provisions – List of Names

Bidders who are incorporated, including those bidding as a joint venture, must provide a complete list of names of all individuals who are currently directors of the Bidder.

Bidders bidding as sole proprietorship, as well as those bidding as a joint venture, must provide the name of the owner(s).

Bidders bidding as societies, firms or partnerships do not need to provide lists of names.

5.2.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list (http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml) available from [Employment and Social Development Canada \(ESDC\) - Labour's](#) website.

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list at the time of contract award.

Canada will also have the right to terminate the Contract for default if a Contractor, or any member of the Contractor if the Contractor is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list during the period of the Contract.

The Bidder must provide the Contracting Authority with a completed annex [Federal Contractors Program for Employment Equity - Certification](#), before contract award. If the Bidder is a Joint Venture, the Bidder must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

5.2.3 Canadian Content Certification

5.2.3.1 SACC Manual clause

3050T (2010/01/11) Canadian Content Definition

In addition to the requirement for Canadian cut and sew, the fabric (Aramid fabric and 500 Denier CADPAT (TW), CADPAT (AR) and black) must be considered a Canadian Good as defined in the Modified Rules of Origin for textile.

Rule of Origin - Textiles

Textiles are considered to be Canadian goods if they meet the following definition:

MODIFIED RULE OF ORIGIN FOR TEXTILES: "Textiles and textile articles classified in Chapters 50 to 60 inclusive of the Harmonized System that are woven, knitted or otherwise manufactured from yarns or fibres in Canada, and further processed in Canada by dyeing, finishing, coating or other processes as applicable, will be considered Canadian textiles. Woven fabrics of 100% cotton or of polyester and cotton blends that are dyed and finished in Canada will be considered Canadian."

Canadian Content Certification

This procurement is limited to Canadian goods.

The Bidder certifies that:

() the goods offered are Canadian goods as defined in paragraph 1 of clause A3050T.

Plant Location

Items will be manufactured at: _____

5.2.3.2 Samples and Production Certification

The Bidder certifies that:

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

PART 6 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

6.1 Security Requirements

There is no security requirement applicable to this Contract.

6.2 Requirement

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

6.3 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 Manual* (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

6.3.1 General Conditions

[2030](#) (2015/07/03), General Conditions - Goods (Higher Complexity), apply to and form part of the Contract.

6.4 Term of Contract

6.4.1 Delivery Date

All the deliverables must be received on or before 34 months after contract award.

Delivery - Firm Quantity - Phased

The first delivery must be made within A weeks from the date of approbation of the pre-production samples. The quantity delivered must be B each. The balance must be delivered at the rate of C each weekly after the first delivery until completion of the Contract.

Item	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

6.4.1.1 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, QUE.
514-252-2777, ext. 2363

6.4.1.2 Preparation for Delivery

The Contractor must prepare item for delivery in accordance with the latest issue of the Canadian Forces Packaging Specification D-LM-008-036/SF-000, DND Minimum Requirements for Manufacturer's Standard Pack.

The Contractor must package all items in quantity of up to 100 by package

6.4.1.3 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.

6.4.1.4 SACC Manual Clauses

A9131C 2014/11/27 Controlled Goods Program – Contract
B4060C 2011/05/16 Controlled Goods
D5510C 2012/07/16 Quality Assurance Authority (DND) - Canadian-based Contractor
D5540C 2010/08/16 ISO 9001:2008 - Quality Management Systems - Requirements (QAC Q)
D5606C 2012/07/16 Release Documents (DND) - Canadian-based Contractor
D6010C 2007/11/30 Palletization

6.5 Authorities

6.5.1 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.

6.5.2 Technical Authority

Solicitation No. - N° de l'invitation
W8486-149840/A
Client Ref. No. - N° de réf. du client
W8486-149840

Amd. No. - N° de la modif.
001
File No. - N° du dossier
PR707 W8486-149840

Buyer ID - Id de l'acheteur
pr707
CCC No./N° CCC - FMS No./N° VME

The Technical Authority for this Contract is:

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.

6.5.3 Procurement Authority

The Procurement Authority for the Contract is:

DLP 3-2-3-3
101 Colonel By Drive
Ottawa, Ontario
K1A 0K2
Telephone: ____ - ____ - ____
Facsimile: ____ - ____ - ____
E-mail: _____ (to be advised at contract)

The Procurement Authority is the representative of the department or agency for whom the Work is being carried out under the Contract. The Procurement 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 Procurement Authority however the Procurement 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.

6.5.4 Quality Assurance Representative

The Quality Assurance Representative for the Contract is:

DQA 4
101 Colonel By Drive
Ottawa, Ontario
K1A 0K2
Telephone: ____ - ____ - ____
Facsimile: ____ - ____ - ____
E-mail: _____ (to be advised at contract)

The Quality Assurance Representative is the representative of the department or agency for whom the Work is being carried out under the Contract. The Quality Assurance Representative is responsible for the implementation of tools and processes required for the Quality Assurance of the Contract. The Contractor may discuss Quality Assurance identified in the Contract with the Quality Assurance Representative however the Quality Assurance Representative 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.

6.5.5 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: _____

6.6 Payment

6.6.1 Basis of Payment

In consideration of the Contractor satisfactorily completing all of its obligations under the contract, the Contractor will be paid in firm unit prices, as specified in Appendix 1 to Annex A, for a cost of \$(to be inserted at contract award). Customs duties are included and Applicable Taxes are extra.

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

6.7 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) One (1) copy must be forwarded to the following address:

National Defence Headquarters
MGen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A 0K2
Attn: DLP3-2-3-3 _____
Email: _____ (to be inserted at contract award)

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

(c) The original and one (1) copy must be forwarded to the consignee for certification and payment.

6.7.1 Release Documents - Distribution

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

- (a) One (1) copy mailed to consignee marked: "Attention: Receipts Officer";
- (b) Two (2) copies with shipment (in a waterproof envelope) to the consignee;
- (c) One (1) copy to the Contracting Authority;
- (d) One (1) copy to:

National Defence Headquarters
Mgen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A OK2
Attention: DLP3-2-3-3
Email: _____ (to be inserted at contract award)

- (e) One (1) copy to the Quality Assurance Representative;
- (f) One (1) copy to the Contractor; and
- (g) For all non-Canadian contractors, one (1) copy to:

DQA/Contract Administration
National Defence Headquarters
Mgen George R. Pearkes Building
101 Colonel By Drive
Ottawa, ON K1A OK2
E-mail: ContractAdmin.DQA@forces.gc.ca

6.7.2 SACC Manual Clauses

A3060C 2008/05/12 Canadian Content Certification

6.8 Applicable Laws

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

6.9 Priority of Documents

If there is a discrepancy between the wordings 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 2030 (2015/07/03), General Conditions - Goods (Higher Complexity);
- c) Annex A, Requirement;
- d) Annex B, Statement of Work;
- e) Annex C1, Technical purchase description, outer carrier;
- f) Annex C2, Technical purchase description, ballistic inserts for fragmentation vests;
- g) Annex D, Contract data requirement list;
- h) Annex E, Data Items description;
- i) Drawings;
- j) Sealed Samples;
- k) Annex G, Federal Contractors Program for Employment Equity - Certification (if applicable);
- l) The Contractor's bid dated _____

6.10 Defence Contract

SACC Manual clause A9006C (2012/07/16) Defence Contract

6.11 SACC Manual Clauses

C2611C 2007/11/30 Customs Duties - Contractor Importer
C2801C 2014/11/27 Priority Rating - Canadian-based Contractors

6.12 Materials: Contractor Total Supply


The Contractor will be responsible for obtaining all materials required in the manufacture of the items specified. The delivery stated for the items allows the necessary time to obtain such materials.

6.13 Condition of Material – Department of National Defence

The Contractor must provide material that is new production of current manufacture supplied by the principal manufacturer or its accredited agent. The material must conform to the latest issue of the applicable drawing, specification and part number, as applicable, that was in effect on the bid closing date.

6.14 Procedures for Design Change or Additional Work

These procedures must be followed for any design change or additional work.

1. When Canada requests design change or additional work:
 - a. The Technical Authority will provide the Contracting Authority with a description of the design change or additional work in sufficient detail to allow the Contractor to provide the following information:
 - i. any impact of the design change or additional work on the requirement of the Contract;
 - ii. a price breakdown of the cost (increase or decrease) associated with the implementation of the design change or the performance of the additional work using either the form [PWGSC-TPSGC 1686](#), Quotation for Design Change or Additional Work, or the form [PWGSC-TPSGC 1379](#)  (PDF 56KB) - ([Help on File Formats](#)) Work Arising or New Work.
 - iii. a schedule to implement the design change or to perform the additional work and the impact on the contract delivery schedule.
 - b. The Contracting Authority will then forward this information to the Contractor.
 - c. The Contractor will return the completed form to the Contracting Authority for evaluation and negotiation. Once agreement has been reached, the form must be signed by all parties in the appropriate signature blocks. This constitutes the written authorization for the Contractor to proceed with the work, and the Contract will be amended accordingly.
2. When the Contractor requests design change or additional work:
 - a. The Contractor must provide the Contracting Authority with a request for design change or additional work in sufficient detail for review by Canada.
 - b. The Contracting Authority will forward the request to the Technical Authority for review.
 - c. If Canada agrees that a design change or additional work is required, then the procedures detailed in paragraph 1 are to be followed.
 - d. The Contracting Authority will inform the Contractor in writing if Canada determines that the design change or additional work is not required.

3. Approval

The Contractor must not proceed with any design change or additional work without the written authorization of the Contracting Authority. Any work performed without the Contracting Authority's written authorization will be considered outside the scope of the Contract and no payment will be made for such work.

6.15 Plant Closing

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

2015-2016

Christmas Holiday	FROM _____	TO _____
Summer Holiday	FROM _____	TO _____

2016-2017

Christmas Holiday	FROM _____	TO _____
Summer Holiday	FROM _____	TO _____

2017-2018

Holiday	FROM _____	TO _____
Summer Holiday	FROM _____	TO _____

2018-2019

Christmas Holiday	FROM _____	TO _____
Summer Holiday	FROM _____	TO _____

2019-2020

Christmas Holiday	FROM _____	TO _____
Summer Holiday	FROM _____	TO _____

6.16 Plant Location

Items will be manufactured at: _____

6.17 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.

6.18 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 the Department of National Defence. 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 this agreement 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.

6. 19 Quality Plan

No later than 30 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.

6. 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 within twenty (20) calendar days after award of contract. Participants may include representatives of the Contractor, DND Design Authority, DNDQAR, DND project Authority, Contracting Authority and the Procurement 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.

The Contractor will provide meeting facilities and conduct periodic technical reviews, commencing after the post- contract award meeting. Technical meeting will be chaired jointly by the Contractor PM and DND Technical Authority. Meetings will be in accordance with 001

6. 21 Pre-Production Samples

1. The Contractor must provide pre-production samples listed in Annex B, C1 and C2 accompanied by the sealed samples if applicable, to the Technical Authority for acceptance within 90 calendar days from date of contract award.

2. If the pre-production samples are rejected, the Contractor must submit second pre-production samples within 30 calendar days of notification of rejection from the Technical Authority.

3. If the pre-production samples are accepted by either full acceptance or conditional acceptance, the Contractor must proceed with production as per the Contract requirements.

4. Rejection by the Technical Authority of the second pre-production samples submitted by the Contractor for failing to meet the contract requirements will be grounds for termination of the Contract for default.
5. The Contractor must carry out all required inspection and tests to verify conformance to the technical requirements of the Contract.
6. In addition to providing the pre-production samples, the Contractor must provide a copy of the inspection reports, laboratory test reports and Certificates of compliance, as applicable, to the Contracting Authority and Technical Authority, transportation charges prepaid, and without charge to Canada.
7. The pre-production samples submitted by the Contractor will remain the property of Canada.
8. The Technical Authority will notify the Contractor, in writing, of the full acceptance, conditional acceptance, or rejection of the pre-production samples. A copy of this notification will also be provided by the Technical Authority to the Contracting Authority. The notice of the full acceptance or conditional acceptance does not relieve the Contractor from complying with all requirements and conditions of the Contract.
9. The Contractor must not commence or continue with production of the items and must not make any deliveries until the Contractor has received a written notification from the Technical Authority that the pre-production samples are fully acceptable or conditionally acceptable. Any production of items before pre-production sample acceptance will be at the sole risk of the Contractor.
10. The pre-production samples may not be required if the Contractor is currently in production. The request for waiver of pre-production samples must be made by the Contractor in writing to the Contracting Authority. The waiving of this requirement will be at the sole discretion of the Technical Authority and will be evidenced through a contract amendment.

6. 21.1 Production Samples

In addition to the pre-production samples, production samples will be taken from a production lot when determined by the Technical Authority, to be retained by DND as sealed samples. Sealed samples are to act as representative items for workmanship and construction.

CERTIFICATE OF COMPLIANCE-DEFINITION

A Certificate of Compliance is a written statement from an appropriate official of the component manufacturer attesting the full compliance of the components to the specification. This document must be on official company stationery; it must be dated after the Request for Proposal posting date it must make reference to the applicable specification and have the original signature of the company's designated representative. Canada reserves the right to verify the statements made in the Certificate of Compliance. Full test results, demonstrating the product's compliance, will be accepted in lieu of a Certificate of Compliance.

Laboratory Analysis - Definition

Laboratory analysis of the product offered showing test results for specific tests listed hereunder of physical properties detailed in the technical requirement must be provided with the pre-production OR production samples. Testing must be performed by an independent accredited laboratory establishment and must be in accordance with the test methods detailed in the technical requirement. The laboratory report and test results must be dated after request for proposal posting date.

6. 21.2 Sealed Samples - Return to Sender

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

The sealed samples are not to be mutilated or cut, and must be returned in the same condition as sent to the Contractor.

6. 22 Specifications and Standards

6. 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://assistdocs.com/search/search_basic.cfm

6. 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)
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>

6. 23 NATO Standardization agreement

The aim of this agreement is to set forth the process, procedures, terms and conditions under which Mutual Government Quality Assurance of defence products is to be performed by the appropriate National Authority of one NATO member nation, at the request of another NATO member nation or NATO Organization.

Participating nations agree that the appropriate National Authority in a supplying country, upon request by the appropriate National Authority in a purchasing country or NATO organization, a government Quality Assurance (GQA) service to orders in all areas of defence products.

Note: If the items are sub-contracted to a contractor that is located in a non-NATO country:

It is the responsibility of the Prime Contractor to have the item tested at an accredited laboratory in a NATO country.

Government Quality Assurance (GQA) is required at the Prime contractor location for release and shipment of the items by CF1280.

6. 24 Financial Security

1. Canada may convert the security deposit to the use of Canada if any circumstance exists which would entitle Canada to terminate the Contract for default, but any such conversion will not constitute termination of the Contract.

2. Where Canada so converts the security deposit:

(a) the proceeds will be used by Canada to complete the Work according to the conditions of the Contract, to the nearest extent that it is feasible to do so and any balance left will be returned to the Contractor on completion of the warranty period; and

-
- (b) if Canada enters into a Contract to have the Work completed, the Contractor will:
- (i) be considered to have irrevocably abandoned the Work; and
 - (ii) remain liable for the excess cost of completing the Work if the amount of the security deposit is not sufficient for such purpose. "Excess cost" means any amount over and above the amount of the Contract Price remaining unpaid together with the amount of the security deposit.
3. If Canada does not convert the security deposit to the use of Canada before completion of the contract period, Canada will return the security deposit to the Contractor within a reasonable time after such date.
4. If Canada converts the security deposit for reasons other than bankruptcy, the financial security must be reestablished to the level of the amount stated above so that this amount is continued and available until completion of the contract period.

ANNEX A

REQUIREMENT

1. REQUIREMENT

The Contractor is required to provide Canada for the Department of National Defence (DND) with Fragmentations protective vests (FPV) in accordance with Annex B, Statement of Work , Annex C1, Technical Purchase Description outer carrier, Annex C2, Technical Purchase Description for ballistic inserts for fragmentation protective vests, Annex D, Contract Data Requirements List , Annex E, Data Item Descriptions, dated March and October 2014, patterns, drawings, sealed patterns and sealed sample.

2. ADDRESSES

Destination Address	Invoicing Address
WB941 Department of National Defence 25 CFSD Montreal 6363 Notre Dame St. E. Montreal, Quebec H1N 1V9	W1941 Department of National Defence CFSD Montreal P.O. Box 4000 Stn K Montreal, Quebec H1N 3R9 Attn Accounts payable
W248A Department of National Defence 7 CF Supply Depot 195 Ave. & 82 nd St. Bldg.236 Edmonton, Alberta T5J 4J5	W2481 Department of National Defence 7 CF Supply Depot Stn Forces, P.O. Box 10500 Edmonton, Alberta T5J 4J5 Attn: Accounts payable

3. DELIVERABLES (items 1-16)

The deliverables and the firm quantities are listed in Appendix 1 to Annex A.

Complete FPV system must include a User Manual and tape measure in the unit price. A complete FPV system consists of one front carrier, one rear carrier, two shoulder carriers, one front ballistic insert, one rear ballistic insert, two collar ballistics inserts and two shoulder ballistic inserts assembled as one unit. Complete FPV will be procured either in CADPAT TW or Black as defined in Appendix 1 of Annex A. Spare carriers in CADPAT TW, CADPAT AR and Navy Black along with spare ballistic inserts will also be procured in firm quantities as defined in Appendix 1 of Annex A.

4. "AS AND WHEN REQUESTED" QUANTITIES – SPECIAL SIZES - Identified as Item 16

Under this Contract, the Contractor is required to provide certain goods to Canada on an "as and when requested" basis. Except as expressly provided in this Contract, Canada is not obliged to request any such goods under this Contract and this Contract does not represent a commitment to purchase such goods exclusively from the Contractor.

DND may issue orders for "as and when requested" quantity directly to the Contractor detailing the exact quantities of goods being ordered and the delivery date during the effective period and in accordance with the predetermined conditions.

The quantity of "as and when requested" goods specified under item 16 is only an approximation of requirements.

Solicitation No. - N° de l'invitation
W8486-149840/A
Client Ref. No. - N° de réf. du client
W8486-149840

Amd. No. - N° de la modif.
001
File No. - N° du dossier
PR707 W8486-149840

Buyer ID - Id de l'acheteur
pr707
CCC No./N° CCC - FMS No./N° VME

Order for "as and when requested" quantities will be made on Form 942.

The period for placing "as and when requested" orders will be 96 months from contract award date.

The delivery of the "as and when requested" quantities must be made within _____ calendar days after receipt of the order document.

Deliveries made against orders of the "as and when requested" quantities will be inspected by the Consignee at destination.

Order Limitation

"As and when requested" orders must not exceed \$ 1,000.00.

Financial Limitation

The total cost to Canada resulting from orders of "as and when requested" quantities must not exceed the sum of \$ (to be established at contract), applicable taxes extra, unless otherwise authorized in writing by the Contracting Authority. The Contractor must not be obligated to perform any work or services or supply any articles in response to orders which would cause the total cost to Canada to exceed the said sum, unless an increase is so authorized.

5. OPTION QUANTITIES

The Contractor grants to Canada the irrevocable option to acquire additional goods under the same terms and conditions and at the prices stated in the Contract. The option may only be exercised by the Contracting Authority for a minimum of 1500 units per item, distributed amongst the destinations and will be evidenced through a contract amendment.

The Contracting Authority may exercise the option within 96 months after contract award date by sending a written notice to the Contractor.

Delivery times of the option quantities will be negotiated at the time that the option is exercised and will not exceed 6 months from the date that the contract amendment is issued by the Contracting Authority to exercise the option.

Financial Limitation

The total cost to Canada resulting from exercising option quantities must not exceed the sum of \$(to be established at contract), applicable taxes extra, unless otherwise authorized in writing by the Contracting Authority. The Contractor must not be obligated to perform any work or services or supply any articles in response to orders which would cause the total cost to Canada to exceed the said sum, unless an increase is so authorized.

Multiple amendments may result.

A size roll will be provided if and when the option is exercised.

APPENDIX 1 TO ANNEX A

BASIS OF PAYMENT

The Contractor will be paid in accordance with the following:

1. Firm unit prices-Firm quantity

The Contractor will be paid firm unit prices for each item, in Canadian funds for the firm quantity, Delivered Duty Paid (Incoterms 2000), transportation costs included, Goods and Services Tax, Harmonized Sales Tax and Quebec Sales Tax are extra. Canadian Customs Duties, where applicable, sales, excise and other and similar taxes levied, assessed or imposed under any legal jurisdictions in respect of anything to be furnished, sold or delivered by the Contractor pursuant to the Contract; all export and import licenses, permits where applicable; and any other related costs must be included in the firm unit prices.

1.1 Firm unit prices – As and when and option quantities

If exercised (ordered) in year 1, firm unit prices for the firm quantity will be used. For years two to eight after contract award, the Contractor agrees that the firm unit prices (increases or decreases) will be adjusted in accordance with Statistics Canada's average Consumer Price Index (CPI) (all items), for municipalities in Canada for the municipality closest to the Contractor's facility. The adjustment will be made annually, based on the average of the CPI of the most recently reported twelve-month period using the firm unit prices of the previous year.

Year 1: if exercised (ordered) within 12 months from contract award date.
Year 2: if exercised (ordered) within 24 months from contract award date.
Year 3: if exercised (ordered) within 36 months from contract award date.
Year 4: if exercised (ordered) within 48 months from contract award date.
Year 5: if exercised (ordered) within 60 months from contract award date.
Year 6: if exercised (ordered) within 72 months from contract award date.
Year 7: if exercised (ordered) within 84 months from contract award date.
Year 8: if exercised (ordered) within 96 months from contract award date.

Appendix 1 to Annex A
Appendice 1 à l'annexe A

CADPAT(TW)/DCamC(RBT)										
SIZE TAILLE	ITEM 1 -ARTICLE 1 FPV /VAF quantity/quantité 10,000 including user manual and tape manuel/incluant l'utilisateur et ruban à mesurer	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/prix unitaire	Item 2 -article 2 Front Carrier Enveloppe- quantity/quantité 1,000- enveloppe extérieure devant	quantity per size/quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size/quantité par grandeur	Edmonton Unit price/prix unitaire
XSS/TPC	8470-20-008-0580	42 \$	42 \$	28 \$	28 \$	8470-20-008-0615	4 \$	4 \$	3 \$	3 \$
XSR/TPR	8470-20-008-0581	48 \$	48 \$	32 \$	32 \$	8470-20-008-0616	4 \$	4 \$	3 \$	3 \$
SS/PC	8470-20-008-0582	216 \$	216 \$	144 \$	144 \$	8470-20-008-0617	22 \$	22 \$	14 \$	14 \$
SR/PR	8470-20-008-0583	366 \$	366 \$	244 \$	244 \$	8470-20-008-0618	37 \$	37 \$	24 \$	24 \$
ST/PG	8470-20-008-0584	270 \$	270 \$	180 \$	180 \$	8470-20-008-0619	27 \$	27 \$	18 \$	18 \$
MS/MC	8470-20-008-0585	492 \$	492 \$	328 \$	328 \$	8470-20-008-0620	49 \$	49 \$	33 \$	33 \$
MR/MR	8470-20-008-0586	1260 \$	1260 \$	840 \$	840 \$	8470-20-008-0621	126 \$	126 \$	84 \$	84 \$
MT/MG	8470-20-008-0587	936 \$	936 \$	624 \$	624 \$	8470-20-008-0622	94 \$	94 \$	62 \$	62 \$
LS/GC	8470-20-008-0588	366 \$	366 \$	244 \$	244 \$	8470-20-008-0623	37 \$	37 \$	24 \$	24 \$
LR/GR	8470-20-008-0589	828 \$	828 \$	552 \$	552 \$	8470-20-008-0624	83 \$	83 \$	55 \$	55 \$
LT/GG	8470-20-008-0590	552 \$	552 \$	368 \$	368 \$	8470-20-008-0625	55 \$	55 \$	40 \$	40 \$
XLS/TGC	8470-20-008-0591	126 \$	126 \$	84 \$	84 \$	8470-20-008-0626	13 \$	13 \$	8 \$	8 \$
XLR/TGR	8470-20-008-0592	234 \$	234 \$	156 \$	156 \$	8470-20-008-0627	23 \$	23 \$	16 \$	16 \$
XLT/TGG	8470-20-008-0593	150 \$	150 \$	100 \$	100 \$	8470-20-008-0628	15 \$	15 \$	10 \$	10 \$
XXLR/TTGR	8470-20-008-0594	54 \$	54 \$	36 \$	36 \$	8470-20-008-0629	5 \$	5 \$	4 \$	4 \$
XXLT/TTGG	8470-20-008-0595	36 \$	36 \$	24 \$	24 \$	8470-20-008-0630	3 \$	3 \$	1 \$	1 \$
XXXLR/TTTGR	8470-20-008-0596	24 \$	24 \$	16 \$	16 \$	8470-20-008-0631	3 \$	3 \$	1 \$	1 \$

Appendix 1 to Annex A
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CADPAT(TW)/DCamC(RBT)													
SIZE TAILLE	Item 3 - article 3 rear carrier enveloppe- extérieure partie dos - quantité/quantité 1,000	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/prix unitaire		Item 4 - Article 4 Shoulder protector Cover- quantity/quantité 2,000- Piece de protection d'épaule	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/prix unitaire		
XSS/TPC	8470-20-008-0649	4	\$	3	\$		8470-21-921-3211	188	\$	126	\$		
XSR/TPR	8470-20-008-0650	4	\$	3	\$		XS-S/TP-P						
SS/PC	8470-20-008-0651	22	\$	14	\$								
SR/PR	8470-20-008-0652	37	\$	24	\$								
ST/PG	8470-20-008-0653	27	\$	18	\$								
MS/MC	8470-20-008-0654	49	\$	33	\$		8470-21-921-3212	538	\$	358	\$		
MR/MR	8470-20-008-0655	126	\$	84	\$		M/M						
MT/MG	8470-20-008-0656	94	\$	62	\$								
LS/GC	8470-20-008-0657	37	\$	24	\$		8470-21-921-3213	402	\$	250	\$		
LR/GR	8470-20-008-0658	83	\$	55	\$		L-XL/G-TG						
LT/GG	8470-20-008-0659	55	\$	40	\$								
XLS/TGC	8470-20-008-0660	13	\$	8	\$								
XLR/TGR	8470-20-008-0661	23	\$	16	\$								
XLT/TGG	8470-20-008-0662	15	\$	10	\$								
XXLR/TTGR	8470-20-008-0663	5	\$	4	\$		8470-21-921-3214	72	\$	66	\$		
XXLT/TTGG	8470-20-008-0664	3	\$	1	\$		XXL-XXXL/TTG-TTTG						
XXXLR/TTTGR	8470-20-008-0665	3	\$	1	\$								

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NAVY BLACK/MARINE NOIR		quantity per size /quantité par grandeur		Montreal Unit price/prix unitaire	quantity size /quantité par grandeur	Edmonton Unit price/Prix unitaire	Item 6 -article 6 Front Carrier Enveloppe-quantity/quantité 300- enveloppe extérieure devant	quantity per size/quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size/quantité par grandeur	Edmonton Unit price/Prix unitaire
Item 5 - article 5 FPV/ VAF-quantity 2,200/quantité 2,200 including user manual and tape measure/incluant manuel de l'utilisateur et ruban à mesurer	SIZE TAILLE										
	XSS/TPC	8470-20-008-0598	4 \$		3 \$		8470-20-008-0683	2 \$		1 \$	
	XSR/TPR	8470-20-008-0599	5 \$		3 \$		8470-20-008-0684	2 \$		1 \$	
	SS/PC	8470-20-008-0600	22 \$		14 \$		8470-20-008-0685	7 \$		5 \$	
	SR/PR	8470-20-008-0601	37 \$		24 \$		8470-20-008-0686	11 \$		7 \$	
	ST/PG	8470-20-008-0602	27 \$		18 \$		8470-20-008-0687	7 \$		5 \$	
	MS/MC	8470-20-008-0603	49 \$		33 \$		8470-20-008-0688	14 \$		10 \$	
	MR/MR	8470-20-008-0604	126 \$		84 \$		8470-20-008-0689	38 \$		25 \$	
	MT/MG	8470-20-008-0605	94 \$		62 \$		8470-20-008-0690	27 \$		18 \$	
	LS/GC	8470-20-008-0606	37 \$		24 \$		8470-20-008-0691	11 \$		7 \$	
	LR/GR	8470-20-008-0607	83 \$		55 \$		8470-20-008-0692	23 \$		16 \$	
	LT/GG	8470-20-008-0608	55 \$		40 \$		8470-20-008-0693	16 \$		11 \$	
	XLS/TGC	8470-20-008-0609	13 \$		8 \$		8470-20-008-0694	4 \$		2 \$	
	XLR/TGR	8470-20-008-0610	23 \$		16 \$		8470-20-008-0695	7 \$		5 \$	
	XLT/TGG	8470-20-008-0611	15 \$		10 \$		8470-20-008-0696	4 \$		2 \$	
XXXLR/TTTGR	XXLR/TTGR	8470-20-008-0612	5 \$		4 \$		8470-20-008-0697	2 \$		1 \$	
	XXLT/TTGG	8470-20-008-0613	4 \$		2 \$		8470-20-008-0698	4 \$		2 \$	
		8470-20-008-0614	3 \$		1 \$		8470-20-008-0699	2 \$		1 \$	

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NAVY BLACK/MARINE NOIR															
	Item 7-article 7 rear carrier enveloppe- enveloppe extérieure partie dos - quantity/quantité 300	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/Prix unitaire				Item 8 -article 8 Shoulder protector Cover- quantity/quantité 600 -Pièce de protection d'épaule	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire			Edmonton Unit price/Prix unitaire	
SIZE TAILLE															
XSS/TPC	8470-20-008-0700	2	2 \$	1	1 \$				8470-20-008-0725	84	84 \$			53	53 \$
XSR/TPR	8470-20-008-0701	2	2 \$	1	1 \$				XS-S/TP-P						
SS/PC	8470-20-008-0702	7	7 \$	5	5 \$										
SR/PR	8470-20-008-0703	11	11 \$	7	7 \$										
ST/PG	8470-20-008-0704	7	7 \$	5	5 \$										
MS/MC	8470-20-008-0705	14	14 \$	10	10 \$				8470-20-008-0726	164	164 \$			89	89 \$
MR/MR	8470-20-008-0706	38	38 \$	25	25 \$				M/M						
MT/MG	8470-20-008-0707	27	27 \$	18	18 \$										
LS/GC	8470-20-008-0708	11	11 \$	7	7 \$				8470-20-008-0727	130	130 \$			60	60 \$
LR/GR	8470-20-008-0709	23	23 \$	16	16 \$				L-XL/G-TG						
LT/GG	8470-20-008-0710	16	16 \$	11	11 \$										
XLS/TGC	8470-20-008-0711	4	4 \$	2	2 \$										
XLR/TGR	8470-20-008-0712	7	7 \$	5	5 \$										
XLT/TGG	8470-20-008-0713	4	4 \$	2	2 \$										
XXLR/TTGR	8470-20-008-0714	2	2 \$	1	1 \$				8470-20-008-0728	12	12 \$			8	8 \$
XXLT/TTGG	8470-20-008-0715	4	4 \$	2	2 \$				XXL-XXXL/TTG-TTIG						
XXXLR/TTTGR	8470-20-008-0716	2	2 \$	1	1 \$										

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CADPAT(AR) DCamC(RA)											
	Item 9 -article 9 Front Carrier Enveloppe- enveloppe extérieure partie devant- quantity/quantité 10,000	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/Prix unitaire	Item 10 -Article 10 rear carrier enveloppe- enveloppe extérieure partie dos quantity/quantité 10,000	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/Prix unitaire	
SIZE TAILLE											
XSS/TPC	8470-20-008-0632	42	\$	28	\$	8470-20-008-0666		42	\$	28	\$
XSR/TPR	8470-20-008-0633	48	\$	32	\$	8470-20-008-0667		48	\$	32	\$
SS/PC	8470-20-008-0634	216	\$	144	\$	8470-20-008-0668		216	\$	144	\$
SR/PR	8470-20-008-0635	366	\$	244	\$	8470-20-008-0669		366	\$	244	\$
ST/PG	8470-20-008-0636	270	\$	180	\$	8470-20-008-0670		270	\$	180	\$
MS/MC	8470-20-008-0637	492	\$	328	\$	8470-20-008-0671		492	\$	328	\$
MR/MR	8470-20-008-0638	1260	\$	840	\$	8470-20-008-0672		1260	\$	840	\$
MT/MG	8470-20-008-0639	936	\$	624	\$	8470-20-008-0673		936	\$	624	\$
LS/GC	8470-20-008-0640	366	\$	244	\$	8470-20-008-0674		366	\$	244	\$
LR/GR	8470-20-008-0641	828	\$	552	\$	8470-20-008-0675		828	\$	552	\$
LT/GG	8470-20-008-0642	552	\$	368	\$	8470-20-008-0676		552	\$	368	\$
XLS/TGC	8470-20-008-0643	126	\$	84	\$	8470-20-008-0677		126	\$	84	\$
XLR/TGR	8470-20-008-0644	234	\$	156	\$	8470-20-008-0678		234	\$	156	\$
XLT/TGG	8470-20-008-0645	150	\$	100	\$	8470-20-008-0679		150	\$	100	\$
XXLR/TTGR	8470-20-008-0646	54	\$	36	\$	8470-20-008-0680		54	\$	36	\$
XXLT/TTGG	8470-20-008-0647	36	\$	24	\$	8470-20-008-0681		36	\$	24	\$
XXXLR/TTTGR	8470-20-008-0648	24	\$	16	\$	8470-20-008-0682		24	\$	16	\$

CADPAT(AR) DCamC(RA)						
	Item 11 -Article 11 Shoulder protector Cover - quantity/quantité 20,000 Piece de protection d'épaule	quantity per size/quantité par grandeur	Montreal Unit price/prix unitaire		Edmonton Unit price/prix unitaire	
SIZE TAILLE	8470-20-001-6084	1880	\$	1260	\$	
XSS/TPC	XS-S/TP-P					
XSR/TPR						
SS/PC						
SR/PR						
ST/PG						
MS/MC	8470-20-001-6088	4880	\$	3080	\$	
MR/MR	M/M					
MT/MG						
LS/GC	8470-20-001-6091	4520	\$	3000	\$	
LR/GR	L-XL/G-TG					
LT/GG						
XLS/TGC						
XLR/TGR						
XL/TGG						
XXLR/TTGR	8470-20-001-6093	720	\$	660	\$	
XXLT/TTGG	XXL-XXXL/TTG-TTTG					
XXXLR/TTTGR						

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BALLISTIC INSERTS/COMPONENTS DE PROTECTION BALISTIQUE										
	Item 12 - article 12 Shoulder protector insert - quantity/quantité 2,000 Composant protection balistique épaule 8470-20-001-5869	quantity per size /quantité par grandeur	Edmonton Unit price/Prix unitaire	Item 13 - article 13 Collar insert quantity/quantité 2,000 Composant protection balistique-col 8470-21-921-3199	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/Prix unitaire		
SIZE TAILLE										
XSS/TPC	8470-20-001-5869	188 \$	126 \$	8470-21-921-3199	48 \$	42 \$				
XSR/TPR	XS-S/TP-P									
SS/PC				8470-21-921-3201	170 \$	114 \$				
SR/PR										
ST/PG										
MS/MC	8470-20-001-5846	538 \$	358 \$	8470-21-921-3202	508 \$	327 \$				
MR/MR	M/M									
MT/MG										
LS/GC	8470-20-001-5853	402 \$	250 \$	8470-21-921-3204	402 \$	260 \$				
LR/GR	L-XL/G-TG									
LT/GG										
XLS/TGC										
XLR/TGR										
XLT/TGG										
XXLR/TTGR	8470-20-001-5854	72 \$	66 \$	8470-21-921-3206	49 \$	32 \$				
XXLT/TTGG	XXL-XXXL/									
XXXLR/TTTGR	TTG-TTTG			5470-21-921-3207	26 \$	22 \$				

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BALLISTIC INSERTS/COMPASANTS DE PROTECTION BALISTIQUE												
	Item 14 -Article 14 Front insert - quantity/quantité 1,000		quantity per size /quantité par grandeur	Edmonton Unit price/prix unitaire				Item 15 -article 15 Rear insert - quantity/quantité 1,000 CPB-parties dos	quantity per size /quantité par grandeur	Montreal Unit price/prix unitaire	quantity per size /quantité par grandeur	Edmonton Unit price/Prix unitaire
SIZE TAILLE	Composant protection balistique-partie devant											
XSS/TPC	8470-21-921-3154	4 \$						8470-21-921-3173		4 \$		3 \$
XSR/TPR	8470-21-921-3155	5 \$						8470-21-921-3174		5 \$		3 \$
SS/PC	8470-21-921-3156	22 \$						8470-21-921-3175	22 \$			14 \$
SR/PR	8470-21-921-3157	37 \$						8470-21-921-3176	37 \$			24 \$
ST/PG	8470-21-921-3158	27 \$						8470-21-921-3177	27 \$			18 \$
MS/MC	8470-21-921-3159	49 \$						8470-21-921-3178	49 \$			33 \$
MR/MR	8470-21-921-3160	126 \$						8470-21-921-3179	126 \$			84 \$
MT/MG	8470-21-921-3161	94 \$						8470-21-921-3180	94 \$			62 \$
LS/GC	8470-21-921-3162	37 \$						8470-21-921-3181	37 \$			24 \$
LR/GR	8470-21-921-3164	83 \$						8470-21-921-3183	83 \$			55 \$
LT/GG	8470-21-921-3165	55 \$						8470-21-921-3184	55 \$			40 \$
XLS/TGC	8470-21-921-3166	13 \$						8470-21-921-3185	13 \$			8 \$
XLR/TGR	8470-21-921-3167	23 \$						8470-21-921-3187	23 \$			16 \$
XLT/TGG	8470-21-921-3168	15 \$						8470-21-921-3189	15 \$			10 \$
XXLR/TTGR	8470-21-921-3169	5 \$						8470-21-921-3191	5 \$			4 \$
XXLT/TTGG	8470-21-921-3171	4 \$						8470-21-921-3192	4 \$			2 \$
XXXLR/TTTGR	8470-21-921-3172	3 \$						8470-21-921-3194	3 \$			1 \$

CADPAT(TW)/DCamC(RBT)			
Special size	Qty	ITEM 16 - ARTICLE 16 FPV VAF	Edmonton Prix unitaire
			\$
	2 per year		



National
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nationale

2184D-18470-200
March 2014



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



MODIFIED FRAGMENTATION PROTECTIVE VEST FOR THE CANADIAN ARMY

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

1.0 SCOPE

1.1 **Purpose.** This Statement of Work (SOW) defines the work to be performed by the Contractor to provide the Canadian Army with fragmentation protective vests (FPV) or components of the FPV system as defined within. Deliverable items shall satisfy the requirements specified in the FPV Outer Shell and the FPV Ballistic Inserts Technical Purchase Descriptions (TPD).

1.2 **Background.** The FPV is designed to provide, primarily, ballistic protection from fragmenting munitions and debris resulting from high explosive detonation or other explosive devices. The FPV is modular and each sub-assembly is comprised of environmental camouflage shells (temperate woodland and arid regions) and removable ballistic inserts. The outer carrier consists of front and rear sub-assemblies with detachable shoulder protector covers, and separately demandable accessory items for extended throat, groin, and arm protection.

1.3 Terminology.

1.3.1 **FPV.** This acronym is used as the abbreviation for the fragmentation protective vest system or the components delivered under this SOW and the contract deliverables.

1.3.2 **BRP.** This acronym is used as the abbreviation for the bullet resistant plates to be housed in the front and rear plate pockets of the FPV.

1.3.3 **TPD.** This acronym is used as the abbreviation for the technical purchase description and represents the complete set of technical and performance requirements that must be met during qualification of the FPV system and its components.

1.3.4 **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.

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

1.3.6 **DSSPM.** This acronym is used as the abbreviation for the Directorate Soldier Systems Program Management. The Government Technical Authority as defined in the TPD is found in this directorate.

1.3.7 GSM. This acronym is used as the abbreviation for Government Supplied Material and represents the black non-slip mesh that is used for assembly on the shoulder extension closures of the rear carrier.

1.3.8 GFE. This acronym is used as the abbreviation for Government Furnished Equipment. It represents any ancillary equipment items supplied to the Contractor and the production gauges built and used for dimensional verification and interchangeability of the FPV modular components.

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

2184DE-18470-200(OS)
Technical Purchase Description (TPD)
Fragmentation Protective Vest, Outer Shell
Directorate of Soldier Systems Program Management
October 2014

2184DE-18470-200(BI)
Technical Purchase Description (TPD)
Fragmentation Protective Vest, Ballistic Inserts
Directorate of Soldier Systems Program Management
October 2014

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

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

3.0 REQUIREMENTS AND TASKS

3.1 **General.** The Contractor shall perform all the work required to deliver the FPV system and its components in accordance with this SOW, the technical purchase descriptions (annexes C-1 and C-2), and the data deliverables (CDRLs and DIDs annexes D and E). Planned milestones are as follows:

- Milestone A – Contract Award Meeting
- Milestone B – Production Readiness Review 10 weeks after Milestone A
- Milestone C – First Article Approval 2 weeks after Milestone B
- Milestone D – Initial Production Delivery 4 weeks after Milestone C
- Milestone E – Final Delivery 120 weeks after Milestone D
- Milestone F – Option 1 Deliverables within 52 weeks of Milestone E (if exercised). For subsequent options add additional 52 week windows.

3.2 FPV System Components. The material qualification and construction verification of the system components will take place during a Bid Evaluation as outlined in the Instructions to Bidders (Annex F). The Contractor shall deliver the FPV components and/or complete systems, in the quantities and sizes specified in the contract, inclusive of associated administrative, technical, and logistics support items outlined within this SOW.

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 contract decisions and communicate to the government the planning and coordination of Contractor activities in all disciplines as related to this work.

3.3.2 Technical Reviews. The Contractor shall provide facilities and conduct scheduled reviews, commencing with the contract award meeting. Technical reviews will normally be attended by three government representatives, but may occasionally require additional representatives or may be called at an alternate location as mutually agreed.

3.3.3 Agenda and Minutes of Reviews. The Contractor shall produce and distribute agenda and minutes for technical reviews or progress meetings as required in CDRL 001 and DID ADMD-17001.

3.4 Design and Configuration Control. The Contractor shall effectively manage configuration control of the Government authorized design specified in the documentation.

3.4.1 Gauges. The Contractor shall develop, produce, and deliver a component gauge set for Government approval and shall utilize this set to verify finished carrier and insert dimensions during production of each lot as specified in the TPDs (Annexes C-1 and C-2). Included with the gauge set, the contractor shall also build two sets of Go/No-Go Bullet Resistant Plate (BRP) gauges to verify the Gen II in-service BRP fit in the FPV carrier pockets. The gauges shall be ready for presentation at the Production Readiness Review meeting.

3.5 Quality Control and Testing. The vests provided by the Contractor shall comply with all technical and performance requirements in the TPDs. Testing and records shall be controlled by the Contractor employing the best practices as outlined in ISO 10005 and test sample requirements shall be governed by Tables 1 and 2. As such the Contractor shall ensure access to the production facilities to authorized government representatives to witness Contractor testing if required.

3.5.1 QA Plan. The Contractor shall provide details of their Quality Plan for the FPV production as required in the RFP. The final plan shall be delivered for approval by the QAR at the Production Readiness Review meeting.

3.5.2 Test Records and Data. The Contractor shall provide comprehensive test records/materials to the government for any test series being undertaken during implementation as defined in CDRL C002 and DID ENGD-17001. Routine test data and inspection records during production shall be recorded and maintained in accordance with the QA Plan.

3.6 Packaging Specification. The Contractor shall produce and deliver a packaging specification as required in CDRL003 and DID ILSD-17001.

3.7 User Aids. The Contractor shall produce and deliver a User Manual and a disposable tape measure with each complete FPV system as required in CDRL004 and DID TMPB-17001.

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

3.9 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
K1A 0K2

Mailing Address

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

3.10 Test Samples

Table 1 – FPV Outer Carrier Sample Requirements

2184DE-18470-200(OS) TPD (Annex C-1) Section	INSPECTION & TEST REQUIREMENTS	Preproduction Approval	Quality Control Lot Acceptance
		FIRST ARTICLE (Note 1)	PRODUCTION
3.3.1	Carrier Construction	100%	QA Sampling Plan
3.3.2	Sizing and Scale of Measurement	100%	100%
3.3.3	Carrier Labels and Markings	100%	QA Sampling Plan
3.3.4	BRP Interface Verification	100%	100%
3.3.5	Material Properties and Finishes	(Note 2)	(Note 2)

Table 2 – FPV Ballistic Insert Sample Requirements

2184DE-18470-200(BI) TPD (Annex C-2) Section	INSPECTION & TEST REQUIREMENTS	Preproduction Approval	Quality Control Lot Acceptance
		FIRST ARTICLE (Note 1)	PRODUCTION
3.3.1	Insert Construction	100%	QA Sampling Plan
3.3.2	Sizing and Scale of Measurement	100%	100%
3.3.3	Insert Labels and Markings	100%	QA Sampling Plan
3.4	Ballistic Material Characteristics	10 armour packs	10 armour packs per/lot
3.5	Ballistic Panel Performance	19 shoot-packs (Note 3)	14 shoot-packs/lot (Note 4)

- Notes:**
1. First Article lot size shall be a minimum of 18 and a maximum of 27 carrier sets and ballistic inserts, equally divided in the following sizes: XSmall-Reg.; Small-Reg.; Medium-Short; Medium-Reg.; Medium-Tall; Large-Reg.; X/Large-Reg.; XX/Large-Reg.; and XXX/Large-Reg.
 2. Refer to details specified at Annex C-1 section 4.5.1.3.
 3. Refer to details specified at Annex C-2 Table 11.4.a and b.
 4. Refer to details specified at Annex C-2 Table 11.5.

4.0 DELIVERABLES

FPV SYSTEM CONTRACT END ITEMS LIST (CEIL)	Quantity	
PREPRODUCTION		
Caliper Gauge Set (Carriers/Inserts)	1 set (Verification 3.4.1)	
BRP pocket GO/NO-GO Gauges	2 sets (Verification 3.4.1)	
First Article - Carrier outer shell components and test records	Refer to Table 1 & notes	
First Article - Ballistic inserts, armour/shoot-packs and test records	Refer to Table 2 & notes	
Outer Shell material samples (Note 1)	1 meter each type/finished lot	
Non-ballistic Sealed Samples (Medium Regular) (Note 1)	12 each outer shell component CADPAT™ Temperate Woodland (TW)	
Ballistic Sealed Samples (Medium Regular) (Note 1)	12 ballistic sets (placebo fill to be used)	
PRODUCTION		
FPV Assemblies and Components	Refer to Annex A	
Outer Shell material samples (Note 1)	1 meter each type/finished lot	
DATA REQUIREMENTS		
Data Item Description (DID)	CRDL	DID #
Technical Review Records	C001	ADMD-17001
Inspection and Test Records	C002	ENGD-17001
Packaging Specification	C003	ILSD-17001
User Manual and Tape Measure	C004	TMPB-17001

Notes: 1. Delivery to DND Technical Authority



National Défense
Defence nationale

2184DE-18470-200 (OS)
October 2014



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 PURCHASE DESCRIPTION
OUTER CARRIER**



**MODIFIED FRAGMENTATION PROTECTIVE VEST
FOR THE CANADIAN ARMY**

OPI : DSSPM
BPR: DAPES

Canada 

© Her majesty the Queen in Right of Canada as represented by the Minister of National Defence
© Sa Majesté la Reine du chef du Canada représentée par le ministre de la Défense nationale

TECHNICAL PURCHASE DESCRIPTION (TPD)

MODIFIED FRAGMENTATION PROTECTIVE VEST, OUTER SHELL

1. SCOPE AND CLASSIFICATION

1.1 Scope. This document details the design, technical, and performance requirements for the outer carrier components of the individual, battlefield Fragmentation Protective Vest (FPV), for soldiers.

1.2 Intended Use. The FPV provides protection on a 24 hour, global, all-weather continuum to the extent practical. The FPV is designed to provide, primarily, ballistic protection from fragmenting munitions and debris resulting from high explosive detonation or other explosive devices. Combined with the Bullet Resistant plates (BRP), this vest will optimise the protection levels to defeat multiple ballistic hazards across the battlefield continuum. The FPV was designed ergonomically for wear over the IECS combat jacket and under the Close Combat Modular Fighting Rig (CCMFR). Each sub-assembly of the FPV is comprised of environmental camouflage shells (temperate woodland and arid regions) and removable ballistic inserts. The outer carrier consists of front and rear sub-assemblies with detachable shoulder protector covers, and separately demandable accessory items extended protection. Dimensional data for ballistic inserts is included for interface requirements, but ballistic performance requirements are not covered by this Technical Purchase Description (TPD).

2. APPLICABLE DOCUMENTS

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

2.2 Government Specifications and Standards. The following specifications and standards form part of this purchase description to the extent specified herein. The issue or amendment of documents effective for a specific solicitation shall be that in effect on the date of the applicable design data list, released with the Request for Proposal.

SPECIFICATIONS

D-80-001-055/SF-001	Label, Clothing and Equipment
MIL-DTL-32439	Cloth, Duck, Textured Nylon
MIL-F-10884	Fasteners, Snap
MIL-W-17337	Webbing, Textile, Woven Nylon
MIL-PRF-5038	Tape, Textile and Webbing, Reinforcing, Nylon
A-A-55126	Fastener Tapes, Hook and Loop, Synthetic
DSSPM2-2-80-210	Cloth, Coated, Nylon/Polyurethane, 235 g/m ²
DSSPM2-2-80-220	Cloth, Nylon, Laminated, 200 g/m ² , Waterproof, Moisture Vapour Permeable
DSSPM2-2-80-500	Specification for CADPAT™ (TW)
DSSPM2-2-80-501	Specification for CADPAT™ (AR)

ENGINEERING DRAWINGS

0078819	Plate Bullet Resistant, Control Drawing
CS-149	Fastener Socket, Brass with Black Oxide Finish
CS-150	Fastener Stud, Brass with Black Oxide Finish
CS-151	Fastener Eyelet, Brass with Black Oxide Finish
CS-153	Fastener Button, Brass with Black Oxide Finish
CS-108	Grommet #00, Plain, Brass with Black Oxide Finish

PATTERN DRAWINGS

Style Code IMPFPV26 FPV MODIFIED PACKAGE

2.3 Other Specifications and Standards. The documents listed in section 2.3 form a part of this purchase description to the extent specified herein. The effective dates shall be those in effect on the date of the applicable design data list, released with the Request for Proposal. They are not provided by the Government and may be purchased from the sources shown below.

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

D3776	Standard Test Method for Mass Per Unit Area (Weight) of Fabric
D3886	Standard Test Method for Abrasion Resistance to Textile Fabrics
F392	Standard Test Method for Flex Durability of Flexible Barrier Materials

ANSI PUBLICATIONS
11 West 42nd Street,
New York, NY 10036

ASQC Z1.4 Sampling

Canadian General Standards Board
Place de Portage Phase 3
11 Laurier Street
Gatineau, Quebec, Canada K1A 1G6

CGSB 4-GP-85Ma	Nylon Thread (Continuous Multifilament)
CAN/CGSB 4.2	Textile Test Methods
CAN/CGSB 54.1-M90	Stitches and Seams Part 1 (ISO 4915-1981)
CAN/CGSB 54.1-M90	Stitches and Seams Part 2 (ISO 4916-1982)

2.4 Sealed Samples. Sealed samples are made available to bidders and the contractor as a guide to production. The sealed pattern numbers are:

DSSPM 259-04	Cloth, nylon, polyurethane coated, 235g/m ² - Sealed for construction, hand, finish, print quality, and coating. Not for CADPAT™ compliance.
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TYPE 1 - Temperate Woodland (TW)

DSSPM 425-14	Fragmentation Protective Vest CADPAT™ (TW) - Front Carrier: Sealed for construction guidance
DSSPM 426-14	Fragmentation Protective Vest CADPAT™ (TW) - Rear Carrier: Sealed for construction guidance
DSSPM 427-14	Fragmentation Protective Vest CADPAT™ (TW) - Shoulder Protector Cover: Sealed for construction guidance
TBD	Fragmentation Protective Vest CADPAT™ (TW) – Groin Protector: Sealed for construction guidance
DSSPM 281-01	Canadian Average Green (Colour Only)
DSSPM 263-02	Light Sand (Colour Only)

2.5 Order of precedence. In the event of a conflict between the text of this purchase description and the references cited herein, the text of this purchase description shall take precedence, followed by the pattern drawings, and the sealed samples in that order.

3. REQUIREMENTS

3.1 Environmental Protection Requirements. It is the responsibility of the Contractor to ensure compliance to Canadian environmental laws and regulations and those in force in the country where the product and its components are developed, tested and manufactured.

3.1.1 HEALTH AND SAFETY. The materials used in manufacturing the system and its components shall be such that when properly used and as directed (during transportation, storage, in-service use and disposal) will not cause harm to humans or the environment and that the relevant environmental and 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 parts 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 section 4.3.

3.3 System Requirements. The FPV forms a component of the Land Forces Body Armour System (refer to definitions section 6) and the FPV outer shell consists of the following modular elements:

- a. front and rear carriers;
- b. a set of shoulder protector covers; and
- c. accessory component covers (ECPE and groin protection).

3.3.1 Construction. Construction requirements are detailed in appendices 1 and 2. The FPV outer shell components shall meet all construction requirements as specified. The FPV outer shell is a product-improved design and is available in two Canadian Disruptive Patterns (CADPAT™) for the army and alternative finishes for other Canadian Force elements.

3.3.1.1 Sealed Patterns. Government-sealed patterns will be supplied to qualified bidders. The sealed patterns shall only constitute guidance in regard to construction requirements and any properties not defined by the pattern drawings and this TPD.

3.3.2 Sizes. The FPV outer shell carriers can be manufactured in seven (7) sizes of varying lengths and are governed by pattern package-DSSPM Style Code IMPFPV26 and the Scale of Measurement tables (appendices 3 and 5). The core

components for procurement are detailed in Table 3.1 below. The FPV shall meet the sizing requirements when inspected as specified at 4.5.1. All modular components of the FPV system shall be fully interchangeable between systems of the same size. Accessory component sizes and Scale of Measurement are detailed in Appendix 5.

Table 3.1 - FPV Core Component Sizing

Chest Measure cm (in) Back Length cm (in)	SIZE		Carrier Front & Rear OUTER SHELL	Shoulder Protector COVER
	NATO (Metric)	Canadian (Imperial)		
X-SMALL < 85 (<34)				XSML/SML ↓
SHORT 41 (16)	6070-7585	6734	X	
REGULAR 43 (17)	7080-7585	7034	X	
SMALL 85-95 (35-38)				↓
SHORT 43 (17)	6070-8595	6738	X	
REGULAR 45 (18)	7080-8595	7038	X	
TALL 48 (19)	8090-8595	7338	X	
MEDIUM 95-105 (39-42)				MED ↓
SHORT 45 (18)	6070-9505	6742	X	
REGULAR 48 (19)	7080-9505	7042	X	
TALL 51 (20)	8090-9505	7342	X	
LARGE 105-115 (43-46)				LGE/XLGE ↓
SHORT 48 (19)	6070-0515	6746	X	
REGULAR 51 (20)	7080-0515	7046	X	
TALL 53 (21)	8090-0515	7346	X	
X-LARGE 115-125 (47-50)				↓
SHORT 51 (20)	6070-1525	6750	X	
REGULAR 53 (21)	7080-1525	7050	X	
TALL 56 (22)	8090-1525	7350	X	
XX-LARGE 125-135 (51-54)				XXLGE/ XXX-LGE ↓
REGULAR 56 (22)	7080-2535	7054	X	
TALL 58 (23)	8090-2535	7354	X	
XXX-LARGE 135-145 (55-58)				
REGULAR 58 (23)	7080-3545	7058	X	

Notes: 1. Quantities are specified in the contract. Custom sizes can be fabricated using scale of measurement tables.
2. Accessory components are specified at Appendix 5.

3.3.3 Labels and Markings. Labels/marking shall be applied to each outer shell

component as specified at 4.5.1.1. Marking for accessory components such as throat, groin, and arm protection will be specified under separate cover at Appendix 5, if applicable.

3.3.4 Bullet Resistant Plate (BRP) Interface. The bullet resistant plate pockets, front and rear, shall meet the critical interface requirements as specified at 4.5.1.2.

3.3.5 Material Properties. Material properties are detailed in appendices 1 and 2. The FPV outer shell components shall meet the requirements when inspected as specified at 4.5.1.3. The shell material shall be in Canadian Disruptive Pattern (CADPAT™), Temperate Woodland (Type 1) or Arid Regions (Type 2), as called up in the Contract and all components shall meet the colour and IRR requirements as specified. Alternate outer shell materials/colours can be special ordered and would be specified and catalogued under separate cover (Appendix 6) for unique operational elements.

3.4 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.

4. QUALITY ASSURANCE PROVISIONS

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

- a. Pre-award qualification;
- b. Preproduction inspection; and
- c. Production inspection.

4.2 Pre-Award Qualification. Pre-award qualification shall comprise all requirements defined in the Guidance to Bidders instruction. The responsibilities for testing of technical requirements are detailed in the instruction. Testing conducted by bidders shall be supported by original test data and supplied as part of a bid proposal. DND reserves the right to validate any or all of the results supplied by bidders. Pre-award qualification of outer shell components shall be conducted in two (2) phases. On completion of both phases, proposals will be rated and a down-selection of the highest rated bid proposal will be made based on performance and value.

4.2.1 Phase 1: Material Qualification - Will include an assessment based on the test results for the non-ballistic material requirements of pre-award samples, the DND assessment of CADPAT™ camouflage quality. Bidders who comply with all mandatory requirements will be considered compliant for this aspect.

4.2.2 Phase 2: Construction Verification – On completion of Phase 1, bidders will have their written proposals assessed in accordance with the Guidance to Bidders instruction and the FPV carriers and cover samples will be inspected for dimensional compliance, construction standards, and workmanship.

4.3 Preproduction Inspection. First article lot size shall be a minimum of 18 and a maximum of 27 outer shell sets equally divided between sizes specified in the Statement of Work. The presence of any defect (see Table 4.1) or failure to pass any test shall be cause for rejection of the first article lot. First article samples shall be completely representative of the final product, being made from the same parts and materials and by the same tools and processes that will be used in quantity production.

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 any test shall be cause for rejection of the production lot.

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 specified within. Every CADPAT material lot

during production shall be tested and approved for release by the Technical Authority prior to cutting and assembly into components. Test reports, including IRR data (in EXCEL formatted spreadsheets) shall be submitted with the 1 meter samples at least one week prior to required approval date.

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 shipping lot should normally exceed 500 units during production and shall be in one size only.

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 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.

Table 4.1 – End Item Examination

Visual Examination	Defect
Outer Shell carriers and covers	<p>Incorrect plate pocket dimensions, construction, or location. (100% Verification with Government approved BRP gauge)</p> <p>Incorrect dimensions of finished carrier components (Verification with Government approved carrier gauge set)</p> <p>Any unfinished edges or non-conforming seams or stitches.</p> <p>Any incorrect colour or markings.</p> <p>Any incorrect pattern orientation.</p> <p>Any material defects including cuts, tears, needle chews, holes or abrasion marks.</p>
Workmanship	<p>Any malformed, or incorrectly assembled or secured components.</p> <p>Any wrongly-sized or missing components</p> <p>Any incorrect labelling.</p> <p>Any oily, waxy, greasy, or dirty components.</p>

4.4.4 SUBCONTRACTOR OBLIGATION. If the prime contractor is not the manufacturer, then the subcontractor shall 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.

4.4.5 VISUAL EXAMINATION. The lot size shall be expressed in individual FPV units in one size only. 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 CONSTRUCTION. FPV components shall be inspected for workmanship and compliance with applicable manufacturing and dimensional requirements (appendices 1, 2, 3, and 5). First Article qualification (by quantity and size) will be as specified in the Statement of Work. Production verification shall be done in accordance with section 4.4.3. Interchangeability of removable ballistic inserts (of the same size) will be assessed for each lot during the review of construction standards using Government approved carrier gauge set. Selection and inspection of samples for pre-award will be as specified in the Guidance to Bidders instruction.

4.5.1.1 Component Labels and Marking. Labels and marking during for First Article and production shall be applied in accordance with requirements in appendices 4 and 5. Pre-award samples shall be prepared as specified in the Guidance to Bidders instruction.

4.5.1.2 Critical Interface – Carrier/BRP. Critical interface dimensions for the bullet resistant plate location and fit shall be verified 100%. Pocket locations shall be verified IAW Appendix 3 and the Government approved BRP production gauge shall be used to verify pocket dimensions and fit. Dimensional verification shall be recorded and made available to the DND Quality Assurance Authority whenever requested.

4.5.1.3 Material Properties. Every lot of material including shell, webbings, elastics, tapes, hook and loop, buckles, and covering materials shall be verified for technical, colour, and where specified IRR requirements by independent lab. Lab results, C of C, and samples of each preproduction material shall be submitted to DND Technical Authority for review. Additionally, during production, a 1 meter sample from each lot of shell material shall be submitted to the Technical Authority for review with the IRR data in EXCEL spreadsheet format. During production data and samples shall be submitted for approval prior to cutting.

5.0 TRANSPORTATION PACKAGING AND LABELLING

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

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

6.0 NOTES

6.1 Definitions

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

Assessment Criteria. 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

Desirable criteria are used to promote more sensitive evaluation of contending items which meet all essential requirements. A desirable criterion describes a performance requirement where performance better than the stated essential level is deemed to have significant operational value and will generally have a rating associated with it during Bid Evaluation. The word "**should**" is to be considered synonymous with desirable

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.

Sealed Pattern: the sealed pattern is a duplicate of the Master Sealed Pattern, which is the Department of National Defence approved sample, of the product being procured. For this requirement, the patterns made available to the Contractor are sealed for purposes of design construction only, and not performance or technical requirements.

Engineering Drawings: engineering drawings are those prepared in accordance with specification D-01-400-002/SF-000 and are provided by the Directorate of Quality Assurance (DQA).

Pattern Drawings: pattern drawings are those prepared in accordance with Style Code IMPFPV26 and are provided by the Directorate of Soldier Systems Program Management (DSSPM 3).

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 the Bullet Resistant plates (BRP), this vest will optimise the protection levels to defeat multiple ballistic hazards across the battlefield continuum.

FPV Carrier: The external carrier assembly which contains the ballistic (flexible armour) inserts and the BRP and to which other FPV accessory components can be attached. The carrier assembly is made up of a front and rear outer shell and the shoulder protector covers.

APPENDIX 1

**11.0 FPV CONSTRUCTION AND MATERIAL REQUIREMENTS
OPERATIONAL TYPE 1 (Temperate Woodland)**

11.1 General. All workmanship shall be executed in accordance with the best commercial practices and by trades-persons duly qualified in their respective trades. The finished vest components shall meet the dimensional requirements stated in the scale of measurements at appendices 3 and 5.

11.2 Cutting. Vest components shall be cut using government supplied pattern drawings. Pattern drawings include seam allowances but do not include make-up allowance. The Contractor shall be responsible for any adjustments necessary for make-up allowance to accommodate production methods, however, the design configuration, grading, and technical performance requirements specified within shall be strictly adhered to.

11.2.1 The shell components shall be cut in the direction of the warp as indicated on the pattern drawings.

11.2.1.1 The shell components (front and rear carrier) of each individual vest shall be cut from the same print run of material with the exception of the shoulder protectors or accessory components.

11.2.1.2 The methodology utilised to mark the position of components on the fabric prior to manufacture is left to the contractor's discretion, however, no process where the fabric is damaged will be permitted.

11.3 Sewing. Seams and stitches shall be in accordance with Table 12.1. Seams shall be a minimum of 9.5mm (3/8") and all topstitching shall be 1mm (1/16") from the finished edge.

11.3.1 Thread tension shall be maintained to ensure there will be no loose stitching and that the interlacing of the threads is embedded midway between the surfaces of the materials being sewn. The ends of all threads shall be securely backstitched to prevent unravelling. All thread ends shall be trimmed and removed.

11.3.2 Hook and loop tapes shall be stitched around all edges.

11.3.3 Tapes that are wider than 1-inch shall be sewn around all edges and through the center or have an "X" enclosed with the outer stitching.

- 11.3.4 Stitching shall be formed in the hook or loop portion of the tape, 3/16" from the outer edge of the tape.

Table 11.1 - Seams and Stitches

CAN/CGSB-54.1-M Description	Seam Type National (ISO)	Stitch Type	Stitch Count
Topstitching	SSe 2 (1.06.02)	301	(3-3.5 per cm, 7-9 per in.)
General	SSa-1 (1.01.01)	301	(3-3.5 per cm, 7-9 per in.)
Box and Cross	SSau-1 (5.04.03)	301	(3-3.5 per cm, 7-9 per in.)
Hemming (front plate pocket)	Efa-1 (6.02-03)	301	(3-3.5 per cm, 7-9 per in.)
Bar Tack 25mm (1 in.)		304	(12-14 per cm, 30-35 per in.)
Bar Tack 12.5 mm (1/2 in.)		304	(12-14 per cm, 30-35 per in.)

11.4 Setting of Eyelets and Grommets. Holes punched shall be smaller than the barrel so that the barrel is forced through the hole. The eyelet or grommet shall be securely clinched without cutting or excessively puckering the material. Snap fasteners shall be double reinforced with shell material applied with a box and cross stitch.

11.5 Hot Cutting or Fusing. Tape and webbing materials shall be hot-cut or fused to prevent fraying.

11.6 Materials.

11.6.1 SHELL MATERIAL. The shell material shall be Cloth, Coated, Nylon-Polyurethane, 235g/m² conforming to DSSPM 2-2-80-210 for technical requirements and to sealed sample 259-04 for hand. Deviations from the stiffness and hydrostatic requirements specified in Table II of DSSPM 2-2-8-210, applicable to fabric used for the FPV, are included in an addendum to the specification. Sealed sample DSSPM 259-04 represents the desired degree of stiffness. DSSPM 2-2-80-500, CADPAT™ Temperate Woodland, shall apply for colour, IRR, and pattern requirements. Refer to compliance requirements at Table 11.3.

11.6.2 UPPER COLLAR. The upper collar material shall be Cloth, Nylon, Laminated, 200g/m² Waterproof Moisture Vapour Permeable conforming to DSSPM 2-2-80-220. CADPAT™ Temperate Woodland shall apply for colour, IRR, and pattern requirements in accordance with DSSPM 2-2-80-500. Refer to compliance requirements at Table 11.3.

11.6.3 **FASTENER, HOOK AND LOOP.** The tape fastener, hook and loop, shall be nylon, plain backed, conforming to A-A-55126. The Hook tape shall be Type 2, Class 1 and the Loop tape shall be Class 1. The hook and loop for the Shoulder Extension may be strips of tape, die-cut, or a combination of both as long as the entire surface as indicated on the pattern is covered. The colour shall be a close visual match to the Canadian Average Green in the shell material.

11.6.4 **BINDING TAPE.** The tape, textile reinforcing, nylon shall be Type III, class 2, conforming to MIL-PRF-5038 (25mm). The colour shall be a close visual match to the Canadian Average Green in the shell material.

Table 11.2 – Physical Property Requirements for 25 and 51mm (1” and 2”) elastic.

PROPERTY	METHOD	REQUIREMENT	MINIMUM	MAXIMUM
Weight – meters/kg 25 mm 51 mm		17 34	15 31	19 37
Width (overall mm) 25 mm 51 mm		25 51	24 49	26 53
Ends/width 25 mm 51 mm	6*/ISO*** 72211/2	138 264	131 251	145 277
Number of rubber ¹ ends per width 25 mm 51 mm		23 45		
Elongation @ 10lbf	D 4964-96**		<u>25 mm</u> 65% <u>51 mm</u> 17%	
Load @ 50% Elongation	D 4964-96**		<u>25 mm</u> 30N <u>51 mm</u> 100N	
Dimensional Stability to Laundering after 3 Cycles	58* III.E			Length: ± 6% Width: ± 6%
Colourfastness to Laundering Colour Change only	19* Test No. 2	GS 5		GS4
Colourfastness to Light	18.3* Test No.1		L5	
Colourfastness to Crocking	22*	Wet: GS 4 Dry: GS 4		Wet: GS 4 Dry: GS 4

¹ Number of ends required when using 28 Gauge Rubber.

* CAN/CGSB Canadian General Standards Board, Textile Test Methods

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11.6.5 **WEBBING.** The webbing shall be nylon, textile woven, Class 2, conforming to MIL-W-17337 (25mm and 50mm). The colour shall be a close visual match to the Canadian Average Green in the shell material and IRR compliant with Table 11.3.

11.6.6 **NON-SLIP MESH.** The non-slip mesh shall be a black, chemical-resistant, polymer on natural polyester mesh and will be supplied as GSM. No substitutes are permitted without a full abrasion and chemical resistance product qualification. Refer to Technical Authority for additional detail.

11.6.7 **THREAD.** The thread shall be a bonded, multifilament nylon, tex 70, in accordance with CGSB 4-GP-85, Class A, Type II. The thread shall meet the physical requirements specified in Table 2 of CGSB 4-GP-85 for Tex Ticket No. R70 tex. The colour for shell components should be a good visual match to Canadian Average Green in the shell material.

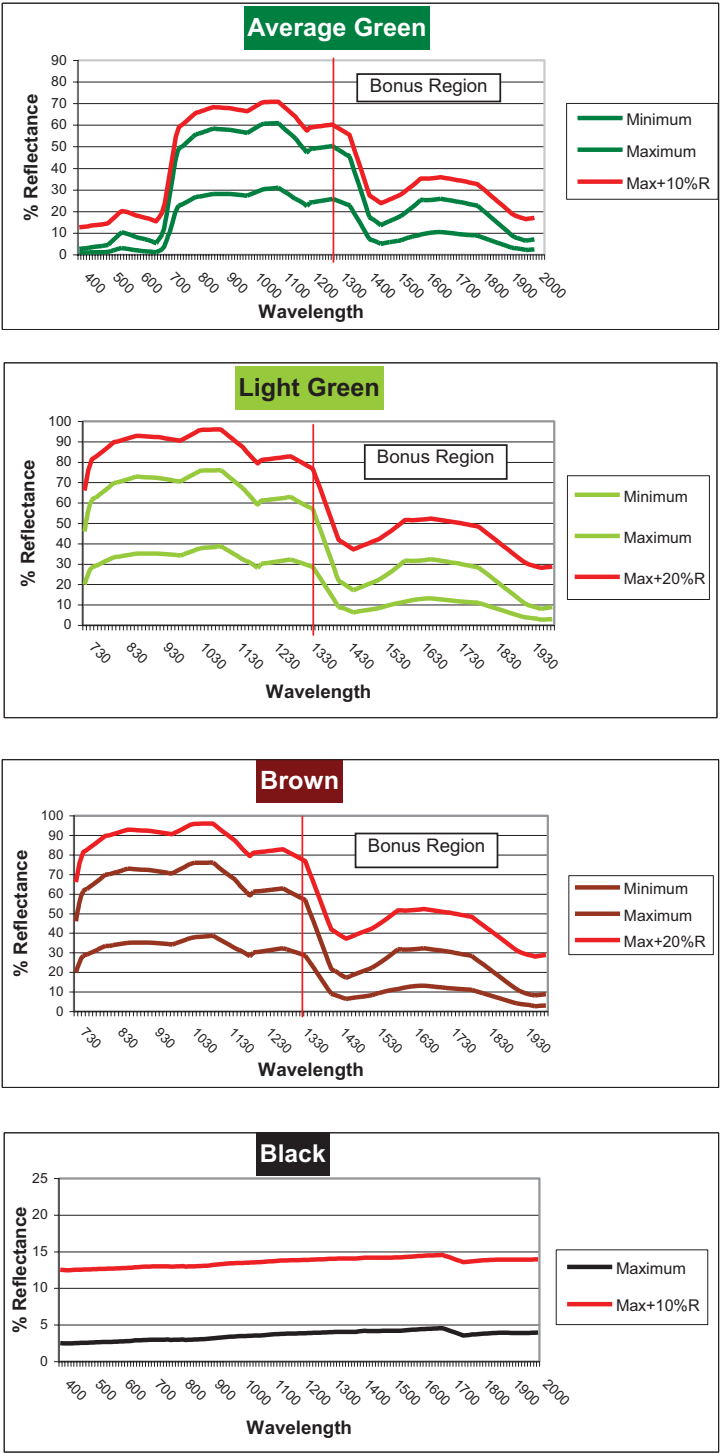
Table 11.3 – Colour and IRR Compliance Temperate Woodland

Material Description	Average Green	Light Green	Brown	Black
SHELL MATERIALS (including the upper collar)	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± Standard Deviation M = Max D +10R%	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± Standard Deviation M = Max D +20R%	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± Standard Deviation M = Max D +20R%	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± Standard Deviation M = D +10R%
WEBBING	<u>Colour</u> Close visual match to Canadian Average Green <u>IRR</u> D ± Standard Deviation M = Max D +10R%	N/A	N/A	N/A
HOOK AND LOOP BINDING TAPE ELASTIC	<u>Colour</u> Close visual match to Canadian Average Green	N/A	N/A	N/A

Notes: 1. D=Specification Values for evaluation (Annex F). M=max tolerance (waiver on case by case basis in production).
2. IRR applies to compulsory zones only

11.6.8 **ELASTIC.** A previously qualified supplier for the elastic was Narroflex using part number NS 212-51mm and NS 210-25mm. Substitutes are permitted following a product qualification in accordance with Table 11.2 below. Refer to Technical Authority for additional detail. The colour shall be a close visual match to the Canadian Average Green in the shell material.

FIGURE 11.1 – IRR Tolerance Graphs



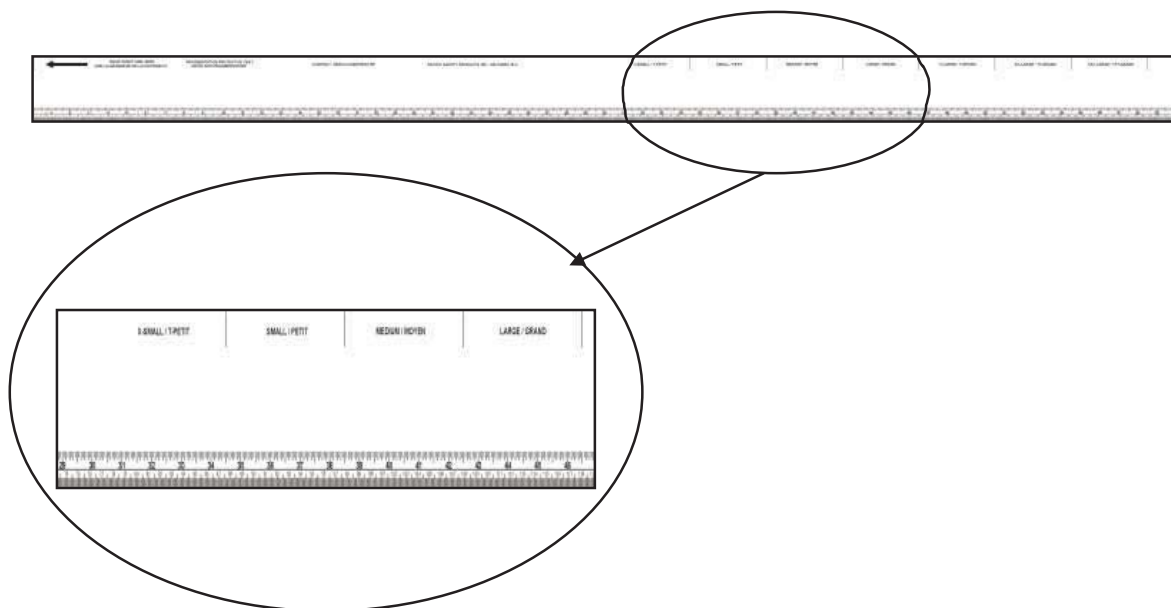
11.6.9 **SNAP FASTENERS.** The fasteners shall be brass material with dull black oxide finish and shall include:

sockets in accordance with drawing CS149-1;
studs in accordance with drawing CS150-1;
eyelets in accordance with drawing CS151-1; and
buttons in accordance with drawing CS153-2.

11.6.10 **GROMMETS.** The grommets shall be #00, plain, (with washer), brass with dull black oxide finish conforming to drawing CS108.

11.7 A disposable measuring tape for use in the initial fitting of personnel shall be packaged with each complete FPV system (all variants). It should contain imperial (inches-fractions) and metric (cm-mm) measurements on one side for back measurements and should include a simplified chest sizing profile on one side. The tape should be constructed of plastic, Tyvek-type paper, or an equivalent material. Design is at the discretion of the Contractor and shall be approved by the Technical Authority. A sample of the concept is depicted in Figure 11.3. below.

FIGURE 11.3 – Disposable Measuring Tape



APPENDIX 2

**12.0 FPV CONSTRUCTION AND MATERIAL REQUIREMENTS
OPERATIONAL TYPE 2 (Arid Regions)**

12.1 General. All workmanship shall be executed in accordance with the best commercial practices and by trades-persons duly qualified in their respective trades. The finished vest components shall meet the dimensional requirements stated in the scale of measurements at appendices 3 and 5.

12.2 Cutting. Vest components shall be cut using government supplied pattern drawings. Pattern drawings include seam allowances but do not include make-up allowance. The Contractor shall be responsible for any adjustments necessary for make-up allowance to accommodate production methods, however, the design configuration, grading, and technical performance requirements specified within shall be strictly adhered to.

12.2.1 The shell components shall be cut in the direction of the warp as indicated on the pattern drawings.

12.2.1.1 The shell components (front and rear carrier) of each individual vest shall be cut from the same print run of material with the exception of the shoulder protectors.

12.2.1.2 The methodology utilised to mark the position of components on the fabric prior to manufacture is left to the contractor's discretion, however, no process where the fabric is damaged will be permitted.

12.3 Sewing. Seams and stitches shall be in accordance with Table 12.1. Seams shall be a minimum of 9.5mm (3/8") and all topstitching shall be 1mm (1/16") from the finished edge.

12.3.1 Thread tension shall be maintained to ensure there will be no loose stitching and that the interlacing of the threads is embedded midway between the surfaces of the materials being sewn. The ends of all threads shall be securely backstitched to prevent unravelling. All thread ends shall be trimmed and removed.

12.3.2 Hook and loop tapes shall be stitched around all edges.

12.3.3 Tapes that are wider than 1-inch shall be sewn around all edges and through the center or have an "X" enclosed with the outer stitching.

12.3.4 Stitching shall be formed in the hook or loop portion of the tape, 3/16" from the outer edge of the tape.

Table 12.1 - Seams and Stitches

CAN/CGSB-54.1-M Description	Seam Type National (ISO)	Stitch Type	Stitch Count
Topstitching	SSe 2 (1.06.02)	301	(3-3.5 per cm, 7-9 per in.)
General	SSa-1 (1.01.01)	301	(3-3.5 per cm, 7-9 per in.)
Box and Cross	SSau-1 (5.04.03)	301	(3-3.5 per cm, 7-9 per in.)
Hemming (front plate pocket)	Efa-1 (6.02-03)	301	(3-3.5 per cm, 7-9 per in.)
Bar Tack 25mm (1 in.)		304	(12-14 per cm, 30-35 per in.)
Bar Tack 12.5 mm (1/2 in.)		304	(12-14 per cm, 30-35 per in.)

12.4 Setting of Eyelets and Grommets. Holes punched shall be smaller than the barrel so that the barrel is forced through the hole. The eyelet or grommet shall be securely clinched without cutting or excessively puckering the material. Snap fasteners shall be double reinforced with shell material applied with a box and cross stitch.

12.5 Hot Cutting or Fusing. Tape and webbing materials shall be hot-cut or fused to prevent fraying.

12.6 Non Ballistic Materials.

12.6.1 SHELL MATERIAL. The shell material shall be Cloth, Coated, Nylon/Polyurethane, 235g/m² conforming to DSSPM 2-2-80-210 for technical requirements and to sealed sample 259-04 for hand. Deviations from the stiffness and hydrostatic requirements specified in Table II of DSSPM 2-2-8-210, applicable to fabric used for the FPV, are included in an addendum to the specification. Sealed sample DSSPM 259-04 represents the desired degree of stiffness. DSSPM 2-2-80-501, CADPAT™ Arid Regions, shall apply for colour, IRR, and pattern requirements. Refer to compliance requirements at Table 12.3.

12.6.2 UPPER COLLAR. The upper collar material shall be Cloth, Nylon, Laminated, 200g/m² Waterproof Moisture Vapour Permeable conforming to DSSPM 2-2-80-220. CADPAT™ Arid Regions shall apply for colour, IRR, and pattern requirements in accordance with DSSPM 2-2-80-501. Refer to compliance requirements at Table 12.3.

12.6.3 **FASTENER, HOOK AND LOOP.** The tape fastener, hook and loop, shall be nylon, plain backed, conforming to A-A-55126. The Hook tape shall be Type 2, Class 1 and the Loop tape shall be Class 1. The hook and loop for the Shoulder Extension may be strips of tape, die-cut, or a combination of both as long as the entire surface as indicated on the pattern is covered. The colour shall be a close visual match to the Light Sand in the shell material.

12.6.4 **BINDING TAPE.** The tape, textile reinforcing, nylon shall be Type III, class 2, conforming to MIL-PRF-5038 (25mm and 50mm). The colour shall be a close visual match to the Light Sand in the shell material and IRR compliant with Table 12.3.

Table 12.2 – Physical Property Requirements for 25 and 51mm (1” and 2”) elastic.

PROPERTY	METHOD	REQUIREMENT	MINIMUM	MAXIMUM
Weight – meters/kg 25 mm 51 mm		17 34	15 31	19 37
Width (overall mm) 25 mm 51 mm		25 51	24 49	26 53
Ends/width 25 mm 51 mm	6*/ISO*** 72211/2	138 264	131 251	145 277
Number of rubber ¹ ends per width 25 mm 51 mm		23 45		
Elongation @ 10lbf	D 4964-96**		<u>25 mm</u> 65% <u>51 mm</u> 17%	
Load @ 50% Elongation	D 4964-96**		<u>25 mm</u> 30N <u>51 mm</u> 100N	
Dimensional Stability to Laundering after 3 Cycles	58* III.E			Length: ± 6% Width: ± 6%
Colourfastness to Laundering Colour Change only	19* Test No. 2	GS 5		GS4
Colourfastness to Light	18.3* Test No.1		L5	
Colourfastness to Crocking	22*	Wet: GS 4 Dry: GS 4		Wet: GS 4 Dry: GS 4

¹ Number of ends required when using 28 Gauge Rubber.

* CAN/CGSB Canadian General Standards Board, Textile Test Methods

** ASTM American Society for Testing and Materials

*** ISO International Organisation for Standardization

12.6.5 **WEBBING.** The webbing shall be nylon, textile woven, Class 2, conforming to MIL-W-17337 (25mm). The colour shall be a close visual match to the Light Sand in the shell material.

12.6.6 **NON-SLIP MESH.** The non-slip mesh shall be a black, chemical-resistant, polymer on natural polyester mesh and will be supplied as GSM. No substitutes are permitted without a full abrasion and chemical resistance product qualification. Refer to Technical Authority for additional detail.

12.6.7 **THREAD.** The thread shall be a bonded, multifilament nylon, tex 70, in accordance with CGSB 4-GP-85, Class A, Type II. The thread shall meet the physical requirements specified in Table 2 of CGSB 4-GP-85 for Tex Ticket No. R70 tex. The colour shall be a good visual match to the Light Sand in the shell material.

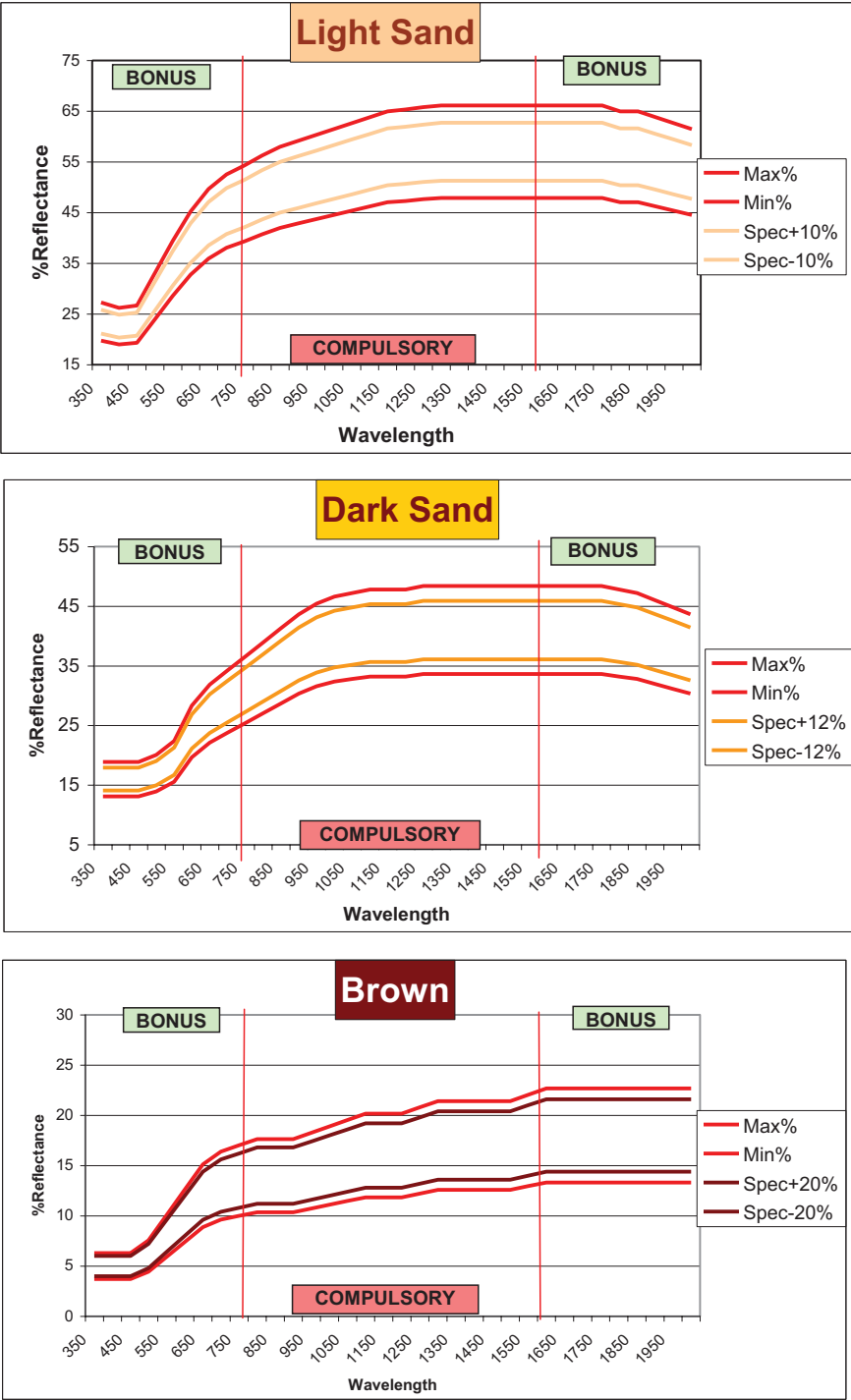
Table 12.3 – Colour and IRR Compliance Arid Regions

Material Description	Light Sand	Dark Sand	Brown
SHELL MATERIALS (including the upper collar lining)	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± 10% M = D ± 16%	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± 12% M = D ± 18%	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D ± 20% M = D ± 26%
WEBBING	<u>Colour</u> Close Visual Match to Light Sand <u>IRR</u> D ± 10% M = D ± 16%	N/A	N/A
HOOK AND LOOP BINDING TAPE ELASTIC	<u>Colour</u> Close Visual Match to Light Sand	N/A	N/A

Notes: 1. D=Specification Average for evaluation (Annex F). M=max tolerance (waiver on case by case basis in production).
2. IRR applies to compulsory zones only

12.6.8 **ELASTIC.** A previously qualified supplier for the elastic was Narroflex using part number NS 212-51mm and NS 210-25mm. Substitutes are permitted following a product qualification in accordance with Table 12.2 below. Refer to Technical Authority for additional detail. The colour shall be a close visual match to the Light Sand in the shell material

Figure 12.1 IRR Compliance Graphs



12.6.9 SNAP FASTENERS. The fasteners shall be brass material with dull black oxide finish and shall include:

sockets in accordance with drawing CS149-1;
studs in accordance with drawing CS150-1;
eyelets in accordance with drawing CS151-1; and
buttons in accordance with drawing CS153-2.

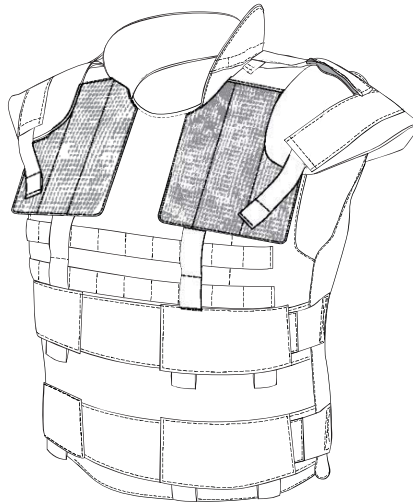
12.6.10 GROMMETS. The grommets shall be #00, plain, (with washer), brass with dull black oxide finish conforming to drawing CS108.

13.0 Scale of Measurement Tables – FPV Core Components

Scale of Measurement tables are provided as guidance for finished dimensions in Metric and Imperial units.

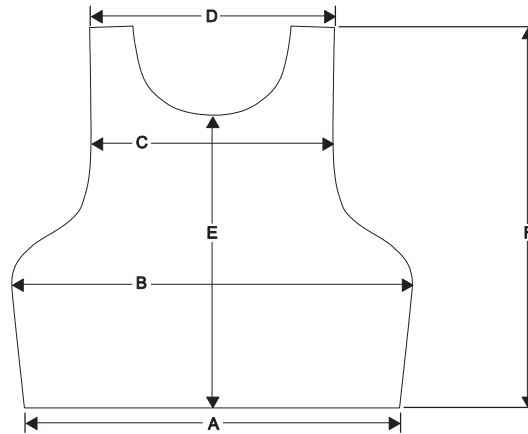
Tolerances are as specified with each table attachment. Imperial measurements are given in decimal format and annotated below with equivalent fractional value and mm units required. All finished dimensions are subject to verification during production in accordance with Quality Control procedures.

Fraction (inches)	Decimal (inches)	Metric (mm)
1/16	0.0625	2
1/8	0.125	3
3/16	0.1875	4-5
1/4	0.25	6
5/16	0.3125	7-8
3/8	0.3750	9
7/16	0.4375	10-11
1/2	0.50	12-13
9/16	0.5625	14
5/8	0.625	15-16
11/16	0.6875	17-18
3/4	0.75	19
13/16	0.8125	20-21
7/8	0.875	22
15/16	0.9375	23-24



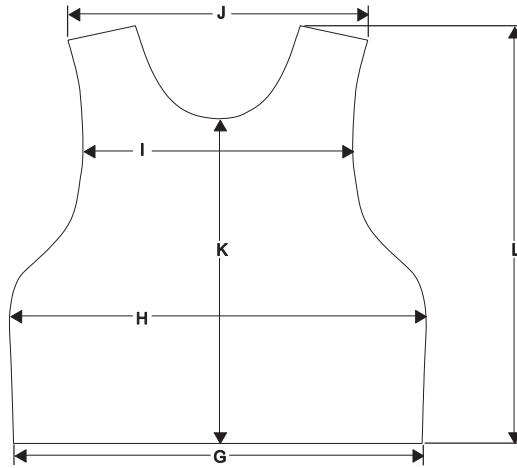
***CRITICAL DIMENSIONS AS DEFINED IN SECTION 4.5.1.2 ARE SHOWN IN RED, UNDERLINED AND ARE SUBJECT TO 100% VERIFICATION.**

BALLISTIC PANELS (For Interface Information ONLY)
FRONT PANEL COMPONENT DIMENSIONS



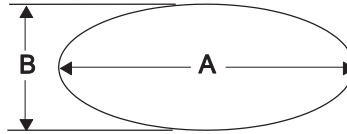
		A		B		C		D		E		F	
		Width Across Bottom of Panel		Width Across Widest Part of Panel		Width Across 2 Inches (51mm) Below Neck Line		Width Across Top of Panel		Centre Front Length		Overall Height of Panel	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
SHORT	X-SMALL	17.625	448	19.125	486	12.25	311	12.75	321	13.75	349	19.125	486
	SMALL	19.625	498	21.125	537	13.125	333	13.375	338	14.75	375	20.125	511
	MEDIUM	21.625	549	23.125	587	14	356	14	356	15.75	400	21.125	537
	LARGE	23.625	600	25.125	638	14.875	378	14.625	373	16.75	425	22.125	562
	X-LARGE	25.625	651	27.125	689	15.75	400	15.25	391	17.75	451	23.125	587
	XX-LARGE	27.625	702	29.125	740	16.625	422	15.875	408	18.75	476	24.125	613
	XXX-LARGE	29.625	752	31.125	791	17.50	445	16.5	426	19.75	502	25.125	638
REG	X-SMALL	17.625	448	19.125	486	12.25	311	12.75	321	14.75	375	20.125	511
	SMALL	19.625	498	21.125	537	13.125	333	13.375	338	15.75	400	21.125	537
	MEDIUM	21.625	549	23.125	587	14	356	14	356	16.75	425	22.125	562
	LARGE	23.625	600	25.125	638	14.875	378	14.625	373	17.75	451	23.125	587
	X-LARGE	25.625	651	27.125	689	15.75	400	15.25	391	18.75	476	24.125	613
	XX-LARGE	27.625	702	29.125	740	16.625	422	15.875	408	19.75	502	25.125	638
	XXX-LARGE	29.625	752	31.125	791	17.50	445	16.5	426	20.75	527	26.125	664
TALL	X-SMALL	17.625	448	19.125	486	12.25	311	12.75	321	15.75	400	21.125	537
	SMALL	19.625	498	21.125	537	13.125	333	13.375	338	16.75	425	22.125	562
	MEDIUM	21.625	549	23.125	587	14	356	14	356	17.75	451	23.125	587
	LARGE	23.625	600	25.125	638	14.875	378	14.625	373	18.75	476	24.125	613
	X-LARGE	25.625	651	27.125	689	15.75	400	15.25	391	19.75	502	25.125	638
	XX-LARGE	27.625	702	29.125	740	16.625	422	15.875	408	20.75	527	26.125	664
	XXX-LARGE	29.625	752	31.125	791	17.50	445	16.5	426	21.75	552	27.125	689
TOLERANCE (+/-)		0.125	3	0.125	3	0.125	3	0.25	6.35	0.125	3	0.125	3

REAR PANEL COMPONENT DIMENSIONS



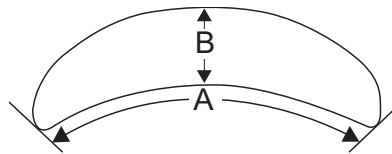
		G		H		I		J		K		L	
		Width Across Bottom of Panel		Width Across Widest Part of Panel		Width Across 2 Inches (51mm) Below Neck Line		Width Across Top of Panel		Centre Back Length		Overall Height of Panel	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
SHORT	X-SMALL	19.75	502	20.25	514	14	356	16	403	15.75	400	21	533
	SMALL	21.75	552	22.25	565	14.875	378	16.625	421	16.75	425	22	559
	MEDIUM	23.75	603	24.25	616	15.75	400	17.25	438	17.75	451	23	584
	LARGE	25.75	654	26.25	667	16.625	422	17.875	456	18.75	476	24	610
	X-LARGE	27.75	705	28.25	718	17.50	445	18.50	473	19.75	502	25	635
	XX-LARGE	29.75	756	30.25	768	18.375	467	19.125	491	20.75	527	26	660
	XXX-LARGE	31.75	806	32.25	819	19.25	489	19.75	508	21.75	552	27	686
REG	X-SMALL	19.75	502	20.25	514	14	356	16	403	16.75	425	22	559
	SMALL	21.75	552	22.25	565	14.875	378	16.625	421	17.75	451	23	584
	MEDIUM	23.75	603	24.25	616	15.75	400	17.25	438	18.75	476	24	610
	LARGE	25.75	654	26.25	667	16.625	422	17.875	456	19.75	502	25	635
	X-LARGE	27.75	705	28.25	718	17.50	445	18.50	473	20.75	527	26	660
	XX-LARGE	29.75	756	30.25	768	18.375	467	19.125	491	21.75	552	27	686
	XXX-LARGE	31.75	806	32.25	819	19.25	489	19.75	508	22.75	578	28	711
TALL	X-SMALL	19.75	502	20.25	514	14	356	16	403	17.75	451	23	584
	SMALL	21.75	552	22.25	565	14.875	378	16.625	421	18.75	476	24	610
	MEDIUM	23.75	603	24.25	616	15.75	400	17.25	438	19.75	502	25	635
	LARGE	25.75	654	26.25	667	16.625	422	17.875	456	20.75	527	26	660
	X-LARGE	27.75	705	28.25	718	17.50	445	18.50	473	21.75	552	27	686
	XX-LARGE	29.75	756	30.25	768	18.375	467	19.125	491	22.75	578	28	711
	XXX-LARGE	31.75	806	32.25	819	19.25	489	19.75	508	23.75	603	29	737
TOLERANCE (+/-)		0.125	3	0.125	3	0.125	3	0.25	6.35	0.125	3	0.125	3

SHOULDER PANEL COMPONENT DIMENSIONS



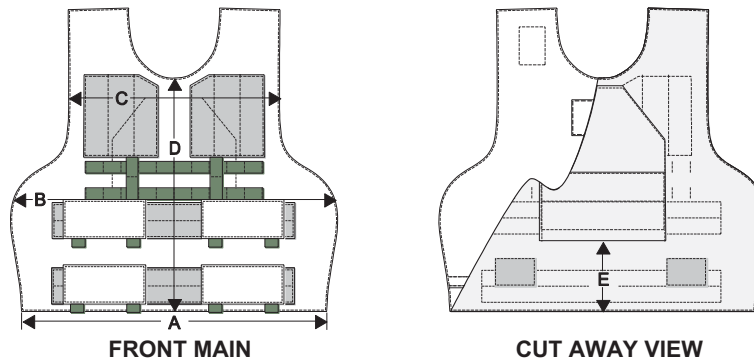
	A		B	
	Length Across Shoulder Panel		Height of Shoulder Panel	
	inches	mm	inches	mm
X-SMALL/SMALL	10.375	264	4.5	114
MEDIUM	10.875	276	4.75	121
LARGE/X-LARGE	11.875	302	5.25	133
XX-LARGE/XXX-LARGE	12.875	327	5.75	146
TOLERANCE PLUS OR MINUS	0.125	3	0.125	3

COLLAR PANEL COMPONENT DIMENSIONS



	A		B	
	Length Along Bottom of Collar Panel		Width of Collar Panel at Centre	
	inches	mm	inches	mm
X-SMALL	9.5	241	2.375	60
SMALL	10	254	2.375	60
MEDIUM	10.5	267	2.375	60
LARGE	11	279	2.375	60
X-LARGE	11.5	292	2.375	60
XX-LARGE	12	305	2.375	60
XXX-LARGE	12.5	318	2.375	60
TOLERANCE PLUS OR MINUS	0.125	3	0.125	3

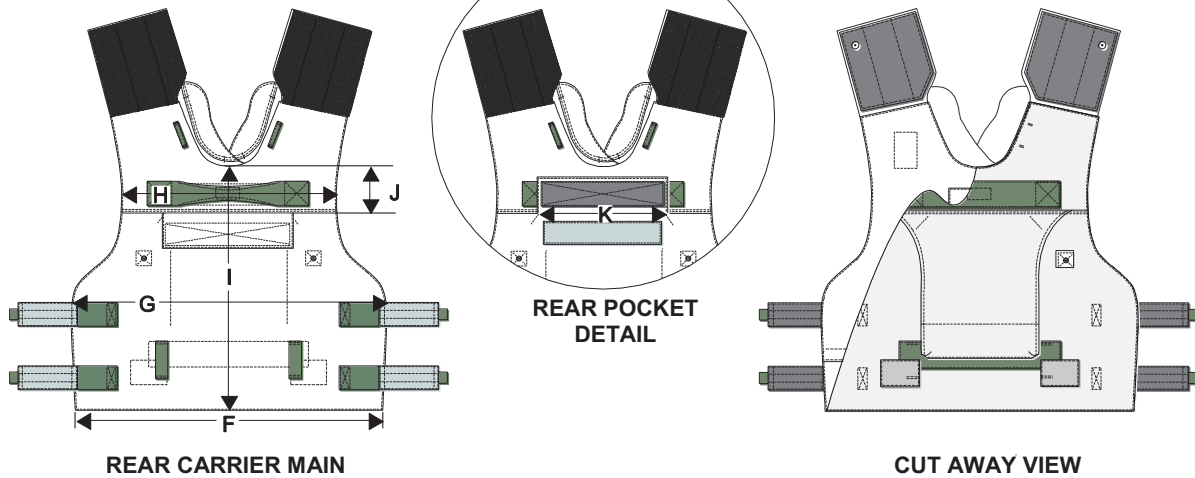
FRONT CARRIER DIMENSIONS



- These drawings are representative of a size Regular Medium, details will vary with sizing

		A		B		C		D		E	
		Width Across Lower Edge of Carrier		Width Across Measured at Top of Loop Fastener		Width Across 2 Inches (51mm) Below Neck Line		Centre Front Length		Distance From Flap Stitching to Bottom of Carrier	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
SHORT	X-SMALL	18.50	470	20.125	511	13.50	343	14.5	368	<u>2.875</u>	<u>73</u>
	SMALL	20.50	521	22.125	562	14.25	362	15.5	394	<u>3.875</u>	<u>98</u>
	MEDIUM	22.50	572	24.125	613	15.00	381	16.5	419	<u>4.875</u>	<u>124</u>
	LARGE	24.50	622	26.125	664	15.75	400	17.5	445	<u>5.875</u>	<u>149</u>
	X-LARGE	26.50	673	28.125	714	16.50	419	18.5	470	<u>6.875</u>	<u>175</u>
	XX-LARGE	28.50	724	30.125	765	17.25	438	19.5	495	<u>7.875</u>	<u>200</u>
	XXX-LARGE	30.50	775	32.125	816	18.00	457	20.5	521	<u>8.875</u>	<u>225</u>
REG	X-SMALL	18.50	470	20.125	511	13.50	343	15.5	394	<u>3.875</u>	<u>98</u>
	SMALL	20.50	521	22.125	562	14.25	362	16.5	419	<u>4.875</u>	<u>124</u>
	MEDIUM	22.50	572	24.125	613	15.00	381	17.5	445	<u>5.875</u>	<u>149</u>
	LARGE	24.50	622	26.125	664	15.75	400	18.5	470	<u>6.875</u>	<u>175</u>
	X-LARGE	26.50	673	28.125	714	16.50	419	19.5	495	<u>7.875</u>	<u>200</u>
	XX-LARGE	28.50	724	30.125	765	17.25	438	20.5	521	<u>8.875</u>	<u>225</u>
	XXX-LARGE	30.50	775	32.125	816	18.00	457	21.5	546	<u>9.875</u>	<u>251</u>
TALL	X-SMALL	18.50	470	20.125	511	13.50	343	16.5	419	<u>4.875</u>	<u>124</u>
	SMALL	20.50	521	22.125	562	14.25	362	17.5	445	<u>5.875</u>	<u>149</u>
	MEDIUM	22.50	572	24.125	613	15.00	381	18.5	470	<u>6.875</u>	<u>175</u>
	LARGE	24.50	622	26.125	664	15.75	400	19.5	495	<u>7.875</u>	<u>200</u>
	X-LARGE	26.50	673	28.125	714	16.50	419	20.5	521	<u>8.875</u>	<u>225</u>
	XX-LARGE	28.50	724	30.125	765	17.25	438	21.5	546	<u>9.875</u>	<u>251</u>
	XXX-LARGE	30.50	775	32.125	816	18.00	457	22.5	572	<u>10.875</u>	<u>276</u>
TOLERANCE PLUS		0.25	6.35	0.25	6.35	0.25	6.35	0.25	6.35	<u>0.125</u>	<u>3</u>
TOLERANCE MINUS		0.125	3	0.125	3	0.125	3	0.125	3	<u>0.125</u>	<u>3</u>

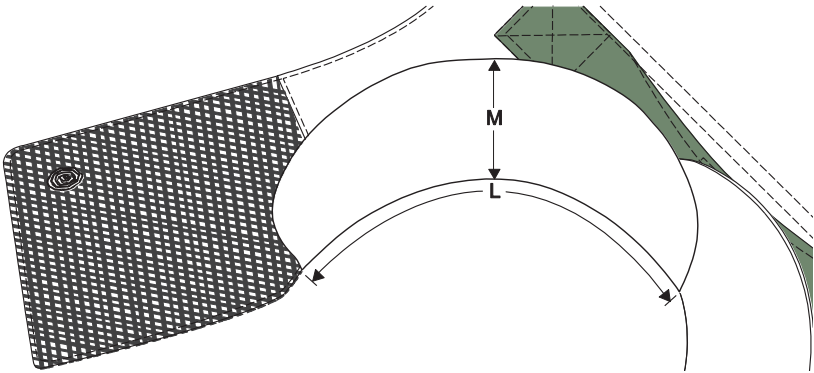
REAR CARRIER DIMENSIONS



These drawings are representative of a size Regular Medium, details will vary with sizing

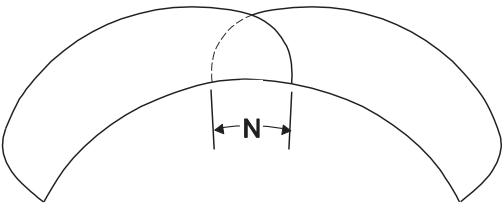
		F		G		H		I		J		K	
		Width Across Lower Edge of Carrier		Width Across Measured at Top of Elastic Strap		Width Across 2" Below Neck Line		Centre Back Length		Yoke Length at Centre Back from Neck Seam to Top of Pocket Flap		Length of Pocket Opening	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
SHORT	X-SMALL	20.625	524	21.125	537	15.25	387	16.75	425	<u>3.25</u>	<u>83</u>	11	279
	SMALL	22.625	575	23.125	587	16.00	406	17.75	451	<u>3.25</u>	<u>83</u>	11	279
	MEDIUM	24.625	625	25.125	638	16.75	425	18.75	476	<u>3.25</u>	<u>83</u>	11	279
	LARGE	26.625	676	27.125	689	17.50	445	19.75	502	<u>3.25</u>	<u>83</u>	11	279
	X-LARGE	28.625	727	29.125	740	18.25	464	20.75	527	<u>3.25</u>	<u>83</u>	11	279
	XX-LARGE	30.625	778	31.125	791	19.00	483	21.75	552	<u>3.25</u>	<u>83</u>	11	279
	XXX-LARGE	32.625	829	33.125	841	19.75	502	22.75	578	<u>3.25</u>	<u>83</u>	11	279
REG	X-SMALL	20.625	524	21.125	537	15.25	387	17.75	451	<u>3.25</u>	<u>83</u>	11	279
	SMALL	22.625	575	23.125	587	16.00	406	18.75	476	<u>3.25</u>	<u>83</u>	11	279
	MEDIUM	24.625	625	25.125	638	16.75	425	19.75	502	<u>3.25</u>	<u>83</u>	11	279
	LARGE	26.625	676	27.125	689	17.50	445	20.75	527	<u>3.25</u>	<u>83</u>	11	279
	X-LARGE	28.625	727	29.125	740	18.25	464	21.75	552	<u>3.25</u>	<u>83</u>	11	279
	XX-LARGE	30.625	778	31.125	791	19.00	483	22.75	578	<u>3.25</u>	<u>83</u>	11	279
	XXX-LARGE	32.625	829	33.125	841	19.75	502	23.75	603	<u>3.25</u>	<u>83</u>	11	279
TALL	X-SMALL	20.625	524	21.125	537	15.25	387	18.75	476	<u>3.25</u>	<u>83</u>	11	279
	SMALL	22.625	575	23.125	587	16.00	406	19.75	502	<u>3.25</u>	<u>83</u>	11	279
	MEDIUM	24.625	625	25.125	638	16.75	425	20.75	527	<u>3.25</u>	<u>83</u>	11	279
	LARGE	26.625	676	27.125	689	17.50	445	21.75	552	<u>3.25</u>	<u>83</u>	11	279
	X-LARGE	28.625	727	29.125	740	18.25	464	22.75	578	<u>3.25</u>	<u>83</u>	11	279
	XX-LARGE	30.625	778	31.125	791	19.00	483	23.75	603	<u>3.25</u>	<u>83</u>	11	279
	XXX-LARGE	32.625	829	33.125	841	19.75	502	24.75	629	<u>3.25</u>	<u>83</u>	11	279
TOLERANCE PLUS		0.25	6.35	0.25	6.35	0.25	6.35	0.25	6.35	<u>0.125</u>	<u>3</u>	0.125	3
TOLERANCE MINUS		0.125	3	0.125	3	0.125	3	0.125	3	<u>0.125</u>	<u>3</u>	0.125	3

COLLAR PROTECTOR DIMENSIONS

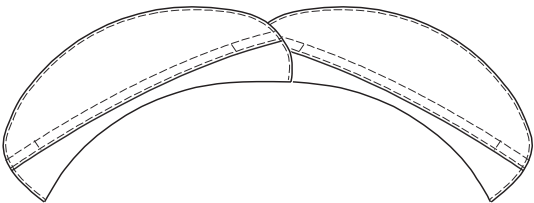


	L		M		N	
	Collar Length at Neck Seam		Width of Collar at Centre		Finished Collar Pieces Overlap	
	inches	mm	inches	mm	inches	mm
X-SMALL	10	254	2.375	60	3.5	89
SMALL	10.5	267	2.375	60	3.5	89
MEDIUM	11	279	2.375	60	3.5	89
LARGE	11.5	292	2.375	60	3.5	89
X-LARGE	12	305	2.375	60	3.5	89
XX-LARGE	12.5	318	2.375	60	3.5	89
XXX-LARGE	13	330	2.375	60	3.5	89
TOLERANCE PLUS OR MINUS	0.125	3	0.125	3	0.25	6

COLLAR OVERLAP, LEFT AND RIGHT

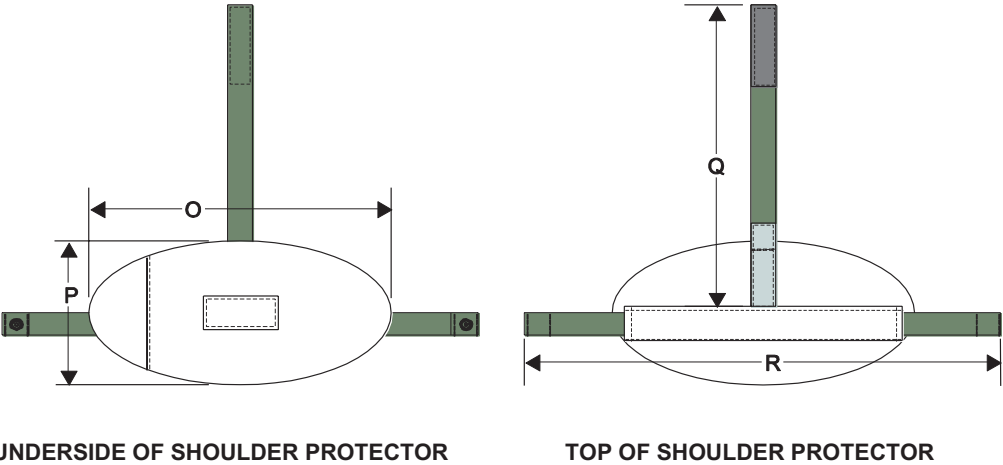


UPPER



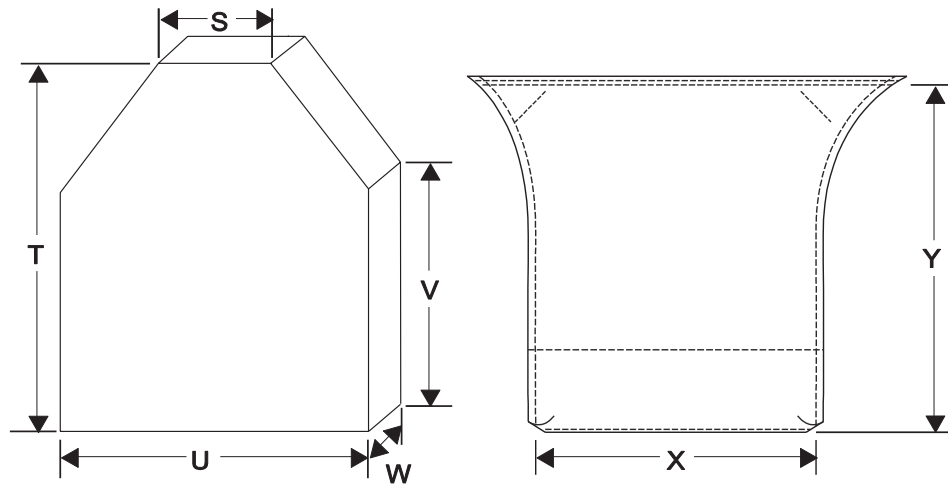
UNDER

SHOULDER PROTECTOR DIMENSIONS



	O		P		Q		R	
	Length Across Shoulder Panel		Height of Panel		Length of Centre Attachment Strap		Length of Relaxed Hold Down Strap	
	inches	mm	inches	mm	inches	mm	inches	mm
X-SMALL/SMALL	11	279	5.25	133	11.5	292	16.5	419
MEDIUM	11.5	292	5.5	140	12.25	311	17	432
LARGE/X-LARGE	12.5	318	6	152	13	330	18	457
XX-LARGE/XXX-LARGE	13.5	343	6.5	165	14.25	362	19	483
TOLERANCE PLUS OR MINUS	0.125	3	0.125	3	0.25	6.35	0.25	6.35

FRONT AND REAR PLATE POCKET DIMENSIONS



FRONT PLATE POCKET

REAR PLATE POCKET

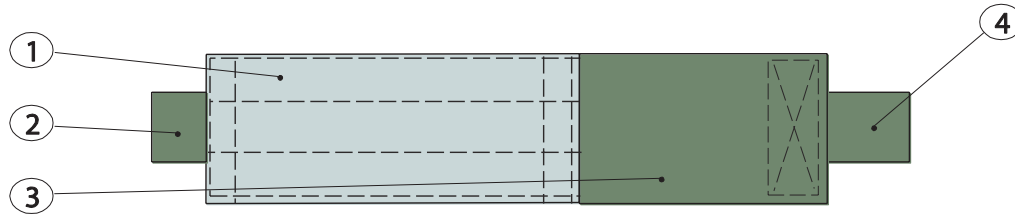
FRONT PLATE POCKET

	S		T		U		V		W	
	Width Across Top of Pocket		Full Height of Pocket		Width Lower Section of Pocket		Height of Side to Chamfer		Depth of Pocket	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
ALL SIZES	<u>4.375</u>	<u>111</u>	11.375	290	<u>10.75</u>	<u>273</u>	<u>6.3125</u>	<u>160</u>	<u>1</u>	<u>25</u>
TOLERANCE PLUS OR MINUS	<u>0.20</u>	<u>5</u>	0.20	5	<u>0.20</u>	<u>5</u>	<u>0.125</u>	<u>3</u>	<u>0.125</u>	<u>3</u>

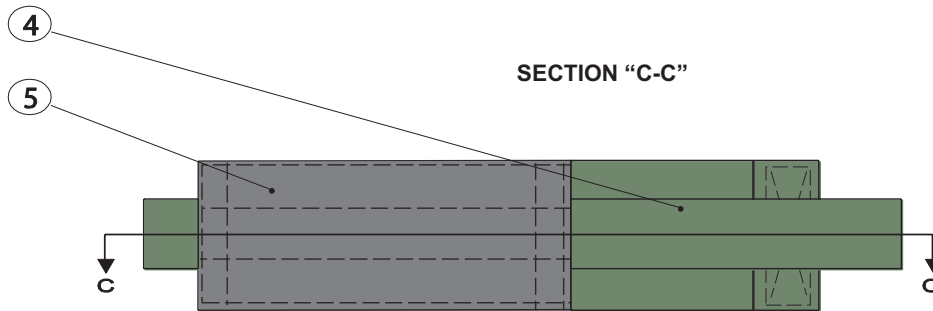
REAR PLATE POCKET

	X		Y	
	Width of Pocket		Full Height of Pocket	
	inches	mm	inches	mm
ALL SIZES	<u>10.875</u>	<u>276</u>	12.75	324
TOLERANCE PLUS	<u>0.25</u>	<u>6.35</u>	0.125	3
TOLERANCE MINUS	<u>0.125</u>	<u>3</u>	0.125	3

TECHNICAL DRAWINGS – REAR CARRIER, ADJUSTABLE WAIST CLOSURE



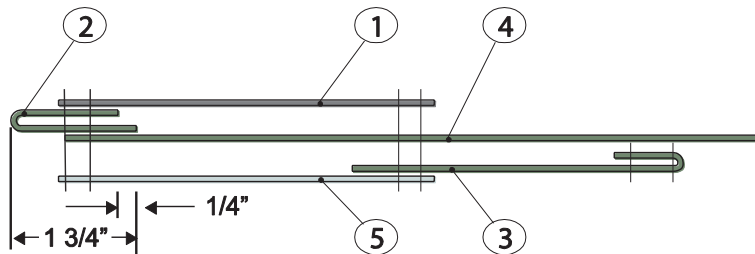
LOOP SIDE



SECTION "C-C"

HOOK SIDE

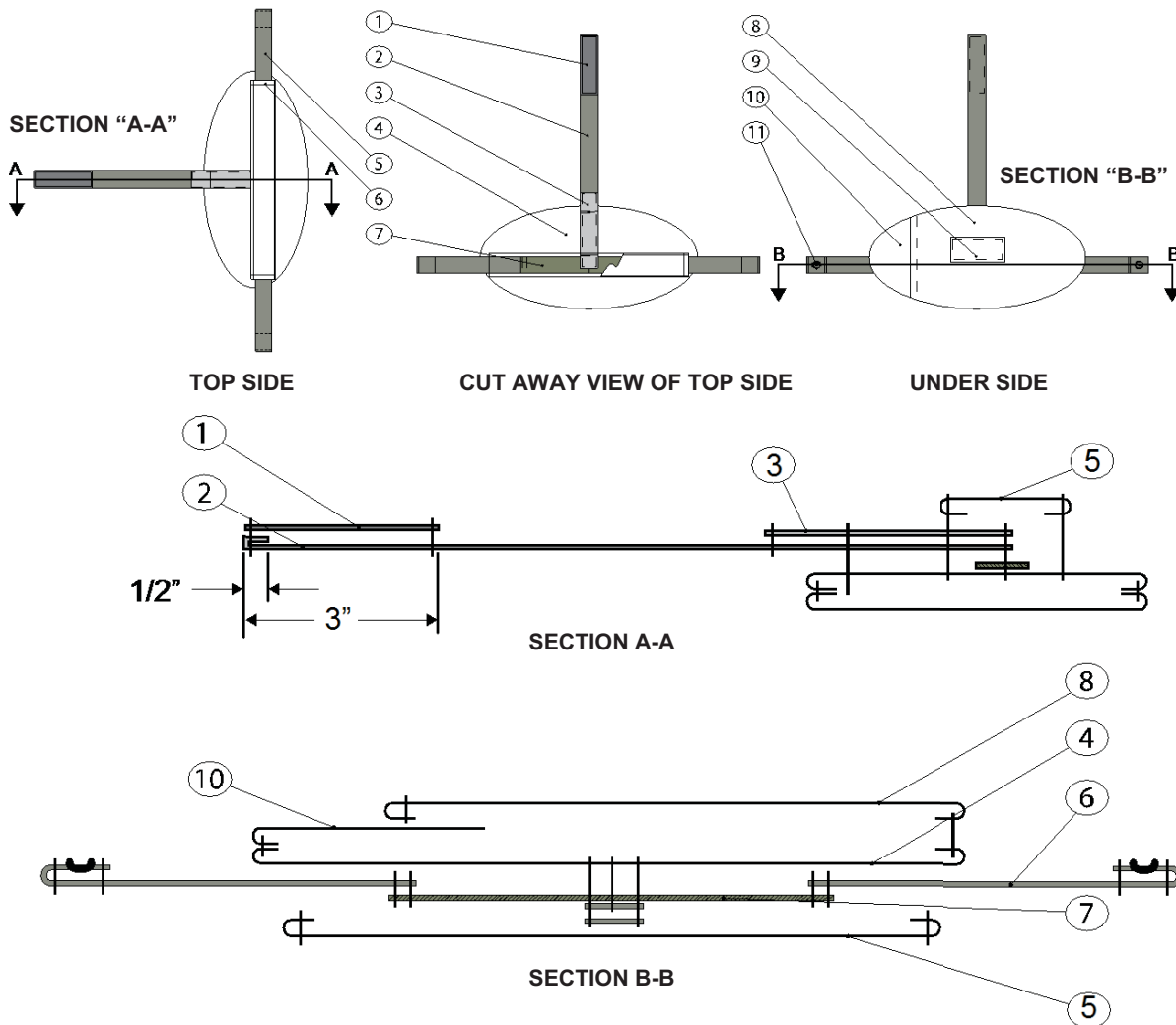
**STAGGERED
ASSEMBLY**



SECTION C-C

Item No	Description
1	Hook Adjustable Waist Closure
2	Webbing, Tab Adjustable Waist Closure
3	Elastic, Adjustable Waist Closure
4	Binding, Adjustable Waist Closure
5	Loop, Adjustable Waist Closure

TECHNICAL DRAWINGS – SHOULDER PROTECTOR



Item No	Description
1	Hook Tape, Shoulder Protector Web Strap
2	Webbing, Centre Attachment Strap
3	Loop, Shoulder Protector Web Strap
4	Shell, Shoulder Protector Cover
5	Shell, Shoulder Protector Channel
6	Webbing, Hold Down Straps, Front and Rear
7	Elastic, Shoulder Hold Down Connector
8	Shell, Shoulder Protector Cover
9	Label
10	Shell, Shoulder Protector Cover
11	Snaps, Female

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Note 2: Or 1.5" (38mm) and 2" (50mm) to match the pattern

Linear Goods Table (mm) Modified FPV

Width	Nomenclature	ID	QTY	SH	R	SH	R	T	SH	M	R	T	SH	R	T	SH	R	T	R	2XL	T	R
50mm-2in	WEBBING- Drag Strap	LG01	1	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356	356
50mm-2in	WEBBING- Drag Strap Reinforcement	LG02	1	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362	362
50mm-2in	WEBBING- Rear Pocket Reinforcement	LG03	1	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343
25mm-1in	WEBBING- Center Attachment Strap	LG04	2	337	337	337	337	337	356	356	356	356	375	375	375	375	375	375	400	400	400	400
25mm-1in	WEBBING- Hold Down Strap, Front and Rear	LG05	4	184	184	184	184	184	191	191	191	191	203	203	203	203	203	203	216	216	216	216
25mm-1in	WEBBING- Belt Loops Chest Rig	LG06	2	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
25mm-1in	WEBBING- Shoulder Protector Attachment Loops	LG07	2	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
25mm-1in	WEBBING- Tabs Adjustable Waist Closure	LG08	4	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
25mm-1in	WEBBING- Groin Attachment	LG09	1	292	292	292	292	292	292	292	292	292	292	292	292	292	292	292	292	292	292	292
25mm-1in	WEBBING- Horizontal Ladder Attachment	LG10	2	330	330	406	406	406	406	406	406	406	406	406	483	483	483	483	483	483	483	483
25mm-1in	WEBBING- Vertical Ladder Attachment	LG11	2	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
25mm-1in	WEBBING- Tabs Front Flap Closure	LG12	8	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
69mm-2½in	LOOP- Waist Closure Die Cut (Note 1)	LG13	2	381	381	432	432	432	483	483	483	483	533	533	533	584	584	584	635	635	686	686
50mm-2in	LOOP- Adjustable Waist Closure Outside	LG14	4	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127
50mm-2in	LOOP- Ballistic Insert Attachment, Front	LG15	4	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
50mm-2in	LOOP- Ballistic Insert Attachment, Rear	LG16	4	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
50mm-2in	LOOP- Rear Plate Pocket Closure	LG17	1	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254
50mm-2in	LOOP- Front Plate Pocket Closure	LG18	2	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
25mm-1in	LOOP- Shoulder Protector Web Strap	LG19	2	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
25mm-1in	LOOP- Ballistic Insert Access, Rear Main	LG20	1	445	445	495	495	495	546	546	546	546	597	597	597	648	648	699	699	749	749	749
25mm-1in	LOOP- Drag Strap Attachment	LG21	1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
25mm-1in	LOOP- Ballistic Insert Access, Front Main	LG22	1	419	419	470	470	470	521	521	521	521	572	572	572	622	622	673	673	724	724	724
19mm-¾in	LOOP- Collar Closure	LG23	2	191	191	203	203	203	216	216	216	216	229	229	229	241	241	241	254	254	267	267
150mm-6in	LOOP- Front Shoulder Die Cut (Note 2)	LG24	2	133	133	146	146	146	159	159	159	159	171	171	171	184	184	184	197	197	210	210
50mm-2in	HOOK Adhesive-Ballistic Insert Attachment	LG25	8	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
69mm-2½in	HOOK- Waist Closure Flap Die Cut (Note 1)	LG26	4	152	152	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178
50mm-2in	HOOK- Adjustable Waist Closure Inside	LG27	4	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127
50mm-2in	HOOK- Rear Plate Pocket Closure	LG28	1	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267
50mm-2in	HOOK- Front Plate Pocket Closure	LG29	2	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
25mm-1in	HOOK- Shoulder Protector Web Strap	LG30	2	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
25mm-1in	HOOK- Ballistic Insert Access, Rear Lining	LG31	1	445	445	495	495	495	546	546	546	546	597	597	597	648	648	699	699	749	749	749
25mm-1in	HOOK- Drag Strap Attachment	LG32	1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
25mm-1in	HOOK- Ballistic Insert Access, Front Lining	LG33	1	419	419	470	470	470	521	521	521	521	572	572	572	622	622	673	673	724	724	724
19mm-¾in	HOOK- Collar Closure	LG34	2	191	191	203	203	203	216	216	216	216	229	229	229	241	241	241	254	254	267	267
150mm-6in	HOOK- Shoulder Extension Die Cut (Note 2)	LG35	2	133	133	146	146	146	159	159	159	159	171	171	171	184	184	184	197	197	210	210
50mm-2in	ELASTIC- Adjustable Waist Closure	LG36	4	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
25mm-1in	ELASTIC- Shoulder, Hold-down Connector	LG37	2	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152
25mm-1in	BINDING- Adjustable Waist Closure	LG38	4	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222

Note 1: Or 0.75" (19 mm) and 2" (50 mm) to match the pattern

Note 2: Or 1.5" (38mm) and 2" (50mm) to match the pattern

14.0 LABELS AND MARKING

14.1 Marking. Two types of permanent marking shall apply to the fragmentation protective vest shell:

- (1) Identification labelling; and
- (2) Instruction labelling.

14.1.1 LABELS. All labels for covers shall conform to D-80-001-055/SF-001 Type I. The label colour shall be Canadian Average Green (DSSPM 281-01) with black lettering for Operational Type 1 and Light Sand (DSSPM 263-02) with black lettering for Type 2.

14.1.2 Identification labels for the shoulder protectors shall be Style 1 as depicted in Figure 14.1. The Identification Label for the carrier assemblies (front/rear) shall be Style 2 as depicted in Figure 14.2. Label sizes shall be as specified in Table 14.1 and labelling data as specified in Table 14.2.

Figure 14.1 - Identification Label Style 1



Shoulder Protector Covers

14.1.3 Instruction labels shall be applied **only** to the rear carrier assembly (Figure 14.3) and to the front and rear ballistic inserts just below the identification label or alternatively as a combination label.

Figure 14.2 - Identification Labels Style 2

<p>ENGLISH NOMENCLATURE</p> <p>NOMENCLATURE FRANCAISE</p> <p>NSN 8470-XX-XXX-XXXX</p> <p>NATO SIZE XXXX-XXXX TAILLE OTAN</p> <p>Size/Grandeur</p> <p>MANUFACTURER</p> <p>CONTRACT -XXXXXXXXXXXX- CONTRAT</p> <p>DND CANADA MDN</p>

<p>FRAGMENTATION PROTECTIVE VEST</p> <p>THIS VEST PROVIDES PROTECTION AGAINST BOMB, SHELL AND GRENADE FRAGMENTS. PROTECTION FROM SMALL ARMS AND OTHER LETHAL THREATS INCLUDING POINTED AND SHARP-EDGED OBJECTS (KNIVES) CAN ONLY BE ACHIEVED WITH THE ADDITION OF THE BULLET RESISTANT PLATES.</p> <p>VESTE ANTI-FRAGMENTATION</p> <p>CETTE VESTE PROTÈGE CONTRE LES ÉCLATS D'OBUS ET DE GRENADES. LA PROTECTION CONTRE LES ARMES LÉGÈRES ET AUTRES MENACES MORTELLES INCLUANT LES OBJETS POINTUS ET COUPANTS (COUTEAUX) N'EST POSSIBLE QU'AVEC L'ADDITION DES PLAQUES DE PROTECTION BALISTIQUES.</p>	
<p>CARRIER</p> <p>CARE AND CLEANING INSTRUCTIONS</p> <p>REMOVE BALLISTIC INSERTS BEFORE WASHING</p> <p>-MACHINE WASH IN WARM WATER</p> <p>-USE MILD LAUNDRY DETERGENT</p> <p>-DO NOT USE BLEACH</p> <p>-TUMBLE DRY ON DELICATE CYCLE OR HANG TO DRY</p> <p>-OUTER SHELL MUST BE DRY BEFORE REPLACING BALLISTIC INSERTS</p> <p>-DO NOT IRON</p> <p>-DO NOT DRYCLEAN</p> <p>MADE IN CANADA</p>	<p>L'ENVELOPPE</p> <p>MODE D'ENTRETIEN ET DE NETTOYAGE</p> <p>SORTIR LES PANNEAUX BALISTIQUES DE L'ENVELOPPE AVANT DE NETTOYER</p> <p>-LAVÉ À L'EAU TIEDE À LA MACHINE</p> <p>-UTILISER UN DÉTERGENT DOUX</p> <p>-NE PAS UTILISER DE JAVELISANT</p> <p>-SECHER À CYCLE DOUX OU ÉTENDRE MOUILLE</p> <p>-L'ENVELOPPE DOIT ÊTRE SEC AVANT D'INSÉRER LES PANNEAUX BALISTIQUES</p> <p>-NE PAS REPASSER</p> <p>-NE PAS NETTOYER À SEC</p> <p>FABRIQUÉ AU CANADA</p>
<p>      </p>	

Figure 14.3 – Instruction Label – REAR CARRIER ASSEMBLY

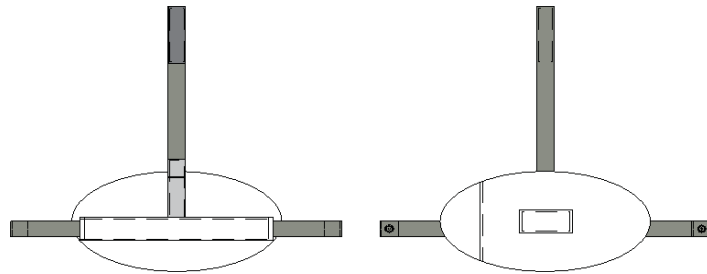
14.1.4 LETTERING SIZE. The character size used in the identification and instruction labels shall be readable and maximised to fit within the applicable label size. The identification "DND CANADA MND" should be approximately double that size. The character size used in the safety label or marking shall be a minimum of 1.5cm high. Traceability markings shall be as established by the Contractor.

14.2 Labels shall be permanently affixed and all printing and markings shall be indelible. Approximate sizes of labels shall be in accordance with Table 14.1.

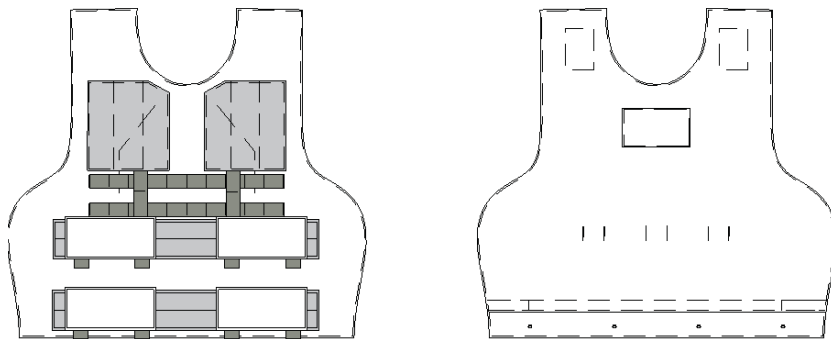
Table 14.1 Label Size and Application

External Markings	Front Carrier Assembly	Rear Carrier Assembly	Shoulder Protector Covers
Identification Label type and size (wide x high)	Style 2	Style 2	Style 1
	Minimum 12cm x 6cm	Minimum 12cm x 6cm	Approximately 3cm x 3cm
Instructional Label size	N/A	Approximately 12cm x 10cm	N/A

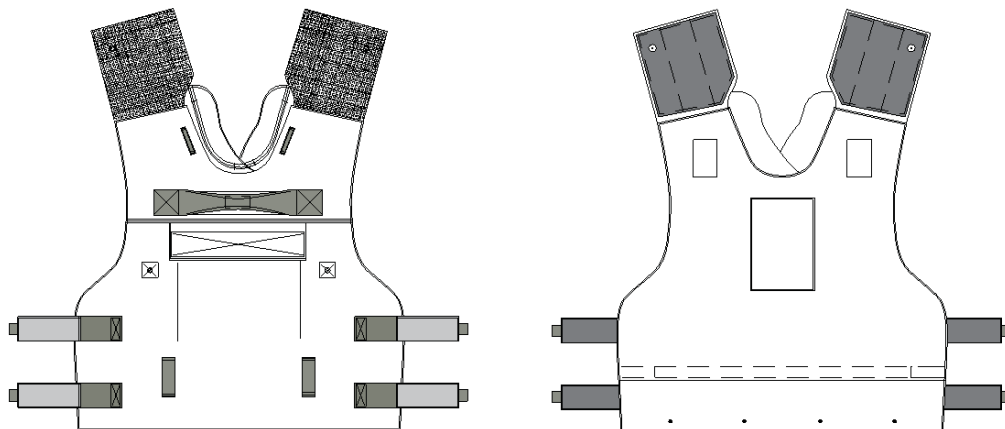
**Figure 14.4
LABEL LOCATIONS**



SHOULDER PROTECTORS



FRONT CARRIER



REAR CARRIER

Table 14.2 - Labelling Data – Identification Labels

LABEL - STYLE 1					
Shoulder Protector Covers, Left & Right CADPAT™ (TW)	SIZE/GRANDEUR				NSN
	XS/TP & S/P				8470-21-921-3211
	M/M				8470-21-921-3212
	L/G & XL/TG				8470-21-921-3213
	XXL/TTG & XXXL/TTTG				8470-21-921-3214
	SIZE/GRANDEUR				NSN
	XS/TP & S/P				8470-20-001-6084
	M/M				8470-20-001-6088
	L/G & XL/TG				8470-20-001-6091
XXL/TTG & XXXL/TTTG				8470-20-001-6093	
SIZE/GRANDEUR				NSN	
XS/TP & S/P				8470-20-008-0725	
M/M				8470-20-008-0726	
L/G & XL/TG				8470-20-008-0727	
XXL/TTG & XXXL/TTTG				8470-20-008-0728	
LABEL - STYLE 2					
Carrier Shell, FRONT, CADPAT™ (TW)	SIZE/GRANDEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte		CARRIER FRONT	ENVELOPPE AVANT	6070-7585	8470-20-008-0615
Small Short/Petit Courte		CARRIER FRONT	ENVELOPPE AVANT	6070-8595	8470-20-008-0617
Medium Short/Moyen Courte		CARRIER FRONT	ENVELOPPE AVANT	6070-9505	8470-20-008-0620
Large Short/Grand Courte		CARRIER FRONT	ENVELOPPE AVANT	6070-0515	8470-20-008-0623
X-Large Short/T-Grand Courte		CARRIER FRONT	ENVELOPPE AVANT	6070-1525	8470-20-008-0626
X-Small Regular/T-Petit Régulière		CARRIER FRONT	ENVELOPPE AVANT	7080-7585	8470-20-008-0616
Small Regular/Petit Régulière		CARRIER FRONT	ENVELOPPE AVANT	7080-8595	8470-20-008-0618
Medium Regular/Moyen Régulière		CARRIER FRONT	ENVELOPPE AVANT	7080-9505	8470-20-008-0621
Large Regular/Grand Régulière		CARRIER FRONT	ENVELOPPE AVANT	7080-0515	8470-20-008-0624
X-Large Regular/T-Grand Régulière		CARRIER FRONT	ENVELOPPE AVANT	7080-1525	8470-20-008-0627
XX-Large Regular/TT-Grand Régulière		CARRIER FRONT	ENVELOPPE AVANT	7080-2535	8470-20-008-0629

XXX-Large Regular/TTT-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-3545	8470-20-008-0631
Small Tall/Petit Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-8595	8470-20-008-0619
Medium Tall/Moyen Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-9505	8470-20-008-0622
Large Tall/Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-0515	8470-20-008-0625
X-Large Tall/T-Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-1525	8470-20-008-0628
XX-Large Tall/TTT-Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-2535	8470-20-008-0630
Carrier Shell, FRONT, CADPAT™ (AR) SIZE/GRADEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-7585	8470-20-008-0632
Small Short/Petit Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-8595	8470-20-008-0634
Medium Short/Moyen Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-9505	8470-20-008-0637
Large Short/Grand Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-0515	8470-20-008-0640
X-Large Short/T-Grand Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-1525	8470-20-008-0643
X-Small Regular/T-Petit Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-7585	8470-20-008-0633
Small Regular/Petit Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-8595	8470-20-008-0635
Medium Regular/Moyen Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-9505	8470-20-008-0638
Large Regular/Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-0515	8470-20-008-0641
X-Large Regular/T-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-1525	8470-20-008-0644
XX-Large Regular/TT-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-2535	8470-20-008-0646
XXX-Large Regular/TTT-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-3545	8470-20-008-0648
Small Tall/Petit Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-8595	8470-20-008-0636
Medium Tall/Moyen Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-9505	8470-20-008-0639
Large Tall/Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-0515	8470-20-008-0642
X-Large Tall/T-Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-1525	8470-20-008-0645
XX-Large Tall/TTT-Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-2535	8470-20-008-0647
Carrier Shell, FRONT, Navy (Black) SIZE/GRADEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-7585	8470-20-008-0683
Small Short/Petit Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-8595	8470-20-008-0685
Medium Short/Moyen Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-9505	8470-20-008-0688
Large Short/Grand Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-0515	8470-20-008-0691
X-Large Short/T-Grand Courte	CARRIER FRONT	ENVELOPPE AVANT	6070-1525	8470-20-008-0694
X-Small Regular/T-Petit Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-7585	8470-20-008-0684
Small Regular/Petit Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-8595	8470-20-008-0686
Medium Regular/Moyen Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-9505	8470-20-008-0689
Large Regular/Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-0515	8470-20-008-0692
X-Large Regular/T-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-1525	8470-20-008-0695
XX-Large Regular/TT-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-2535	8470-20-008-0697
XXX-Large Regular/TTT-Grand Régulière	CARRIER FRONT	ENVELOPPE AVANT	7080-3545	8470-20-008-0699

Small Tall/Petit Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-8595	8470-20-008-0687
Medium Tall/Moyen Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-9505	8470-20-008-0690
Large Tall/Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-0515	8470-20-008-0693
X-Large Tall/T-Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-1525	8470-20-008-0696
XX-Large Tall/TT-Grand Grande	CARRIER FRONT	ENVELOPPE AVANT	8090-2535	8470-20-008-0698
Carrier Shell, REAR, CADPAT™ (TW) SIZE/GRADEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-7585	8470-20-008-0649
Small Short/Petit Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-8595	8470-20-008-0651
Medium Short/Moyen Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-9505	8470-20-008-0654
Large Short/Grand Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-0515	8470-20-008-0657
X-Large Short/T-Grand Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-1525	8470-20-008-0660
X-Small Regular/T-Petit Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-7585	8470-20-008-0650
Small Regular/Petit Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-8595	8470-20-008-0652
Medium Regular/Moyen Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-9505	8470-20-008-0655
Large Regular/Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-0515	8470-20-008-0658
X-Large Regular/T-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-1525	8470-20-008-0661
XX-Large Regular/TT-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-2535	8470-20-008-0663
XXX-Large Regular/TTT-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-3545	8470-20-008-0665
Small Tall/Petit Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-8595	8470-20-008-0653
Medium Tall/Moyen Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-9505	8470-20-008-0656
Large Tall/Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-0515	8470-20-008-0659
X-Large Tall/T-Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-1525	8470-20-008-0662
XX-Large Tall/TT-Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-2535	8470-20-008-0664
Carrier Shell, REAR, CADPAT™ (AR) SIZE/GRADEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-7585	8470-20-008-0666
Small Short/Petit Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-8595	8470-20-008-0668
Medium Short/Moyen Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-9505	8470-20-008-0671
Large Short/Grand Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-0515	8470-20-008-0674
X-Large Short/T-Grand Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-1525	8470-20-008-0677
X-Small Regular/T-Petit Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-7585	8470-20-008-0667
Small Regular/Petit Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-8595	8470-20-008-0669
Medium Regular/Moyen Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-9505	8470-20-008-0672
Large Regular/Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-0515	8470-20-008-0675
X-Large Regular/T-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-1525	8470-20-008-0678
XX-Large Regular/TT-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-2535	8470-20-008-0680
XXX-Large Regular/TTT-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-3545	8470-20-008-0682
Small Tall/Petit Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-8595	8470-20-008-0670

Medium Tall/Moyen Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-9505	8470-20-008-0673
Large Tall/Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-0515	8470-20-008-0676
X-Large Tall/T-Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-1525	8470-20-008-0679
XX-Large Tall/TT-Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-2535	8470-20-008-0681
Carrier Shell, REAR, Navy (Black)				
SIZE/GRANDEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-7585	8470-20-008-0700
Small Short/Petit Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-8595	8470-20-008-0702
Medium Short/Moyen Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-9505	8470-20-008-0705
Large Short/Grand Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-0515	8470-20-008-0708
X-Large Short/T-Grand Courte	CARRIER REAR	ENVELOPPE ARRIERE	6070-1525	8470-20-008-0711
X-Small Regular/T-Petit Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-7585	8470-20-008-0701
Small Regular/Petit Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-8595	8470-20-008-0703
Medium Regular/Moyen Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-9505	8470-20-008-0706
Large Regular/Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-0515	8470-20-008-0709
X-Large Regular/T-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-1525	8470-20-008-0712
XX-Large Regular/TT-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-2535	8470-20-008-0714
XXX-Large Regular/TTT-Grand Régulière	CARRIER REAR	ENVELOPPE ARRIERE	7080-3545	8470-20-008-0716
Small Tall/Petit Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-8595	8470-20-008-0704
Medium Tall/Moyen Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-9505	8470-20-008-0707
Large Tall/Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-0515	8470-20-008-0710
X-Large Tall/T-Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-1525	8470-20-008-0713
XX-Large Tall/TT-Grand Grande	CARRIER REAR	ENVELOPPE ARRIERE	8090-2535	8470-20-008-0715

15.0 FPV Accessory Components

ISSUED UNDER SEPARATE COVER

**Includes Stylecode Drawings
Scale of Measurement (Metric & Imperial)
Linear Goods Data and
Labelling Data (Bilingual)**

APPENDIX 6

**16.0 FPV CONSTRUCTION AND MATERIAL REQUIREMENTS
CUSTOM OUTER SHELL - NAVY**

16.1 General. All workmanship shall be executed in accordance with the best commercial practices and by tradespersons duly qualified in their respective trades. The finished vest components shall meet the dimensional requirements stated in the scale of measurements at appendices 3 and 5.

16.2 Cutting. Vest components shall be cut using government supplied pattern drawings. Pattern drawings include seam allowances but do not include make-up allowance. The Contractor shall be responsible for any adjustments necessary for make-up allowance to accommodate production methods, however, the design configuration, grading, and technical performance requirements specified within shall be strictly adhered to.

16.2.1 The shell components shall be cut in the direction of the warp as indicated on the pattern drawings.

16.2.2 The shell components (front and rear carrier) of each individual vest shall be cut from the same print run of material with the exception of the shoulder protectors.

16.2.3 The methodology utilised to mark the position of components on the fabric prior to manufacture is left to the contractors' discretion, however, no process where the fabric is damaged will be permitted.

16.3 Sewing. Seams and stitches shall be in accordance with Table 16.1. Seams shall be a minimum of 9.5mm (3/8") and all topstitching shall be 1mm (1/16") from the finished edge.

16.3.1 Thread tension shall be maintained to ensure there will be no loose stitching and that the interlacing of the threads is embedded midway between the surfaces of the materials being sewn. The ends of all threads shall be securely backstitched to prevent unravelling. All thread ends shall be trimmed and removed.

16.3.2 Hook and loop tapes shall be stitched around all edges.

16.3.3 Tapes that are wider than 1-inch shall be sewn around all edges and through the center or have an "X" enclosed with the outer stitching.

16.3.4 Stitching shall be formed in the hook or loop portion of the tape, 3/16" from the outer edge of the tape.

Table 16.1 - Seams and Stitches

CAN/CGSB-54.1-M Description	Seam Type National (ISO)	Stitch Type	Stitch Count
Topstitching	SSe 2 (1.06.02)	301	(3-3.5 per cm, 7-9 per in.)
General	SSa-1 (1.01.01)	301	(3-3.5 per cm, 7-9 per in.)
Box and Cross	SSau-1 (5.04.03)	301	(3-3.5 per cm, 7-9 per in.)
Hemming (front plate pocket)	Efa-1 (6.02-03)	301	(3-3.5 per cm, 7-9 per in.)
Bar Tack 25mm (1 in.)		304	(12-14 per cm, 30-35 per in.)
Bar Tack 12.5 mm (1/2 in.)		304	(12-14 per cm, 30-35 per in.)

16.4 Setting of Eyelets and Grommets. Holes punched shall be smaller than the barrel so that the barrel is forced through the hole. The eyelet or grommet shall be securely clinched without cutting or excessively puckering the material. Snap fasteners shall be double reinforced with shell material applied with a box and cross stitch.

16.5 Hot Cutting or Fusing. Tape and webbing materials shall be hot-cut or fused to prevent fraying.

16.6 Non Ballistic Materials.

16.6.1 SHELL MATERIAL. The shell material shall be Cloth, Duck, Textured Nylon, Type III, Class 4, conforming to MIL-DTL-32439 for technical requirements. DSSPM2-2-80-500, Black ONLY, shall apply for colour and IRR requirements. Refer to compliance requirements at Table 16.3.

16.6.2 UPPER COLLAR. The upper collar material shall be Cloth, Nylon, Laminated, 200g/m² Waterproof Moisture Vapour Permeable conforming to DSSPM2-2-80-220 for technical requirements. DSSPM2-2-80-500, Black ONLY, shall apply for colour and IRR requirements. Refer to compliance requirements at Table 16.3.

16.6.3 FASTENER, HOOK AND LOOP. The tape fastener, hook and loop, shall be nylon, plain backed, conforming to A-A-55126. The Hook tape shall be Type 2, Class 1 and the Loop tape shall be Class 1. The hook and loop for the Shoulder Extension may be strips of tape, die-cut, or a combination of both as long as the entire surface as indicated on the pattern is covered. The colour shall be a close visual match to the

Black in the shell material.

16.6.4 **WEBBING.** The webbing shall be nylon, textile woven, Class 2, conforming to MIL-W-17337 (25mm and 50mm). The colour shall be a close visual match to the Black in the shell material.

16.6.5 **ELASTIC.** A previously qualified supplier for the elastic was Narroflex using part number NS 212-51mm and NS 210-25mm. Substitutes are permitted following a product qualification in accordance with Table 11.2 below. Refer to Technical Authority for additional detail. The colour shall be a close visual match to the Black in the shell material.

Table 16.2 – Physical Property Requirements for 25 and 51mm (1” and 2”) elastic.

PROPERTY	METHOD	REQUIREMENT	MINIMUM	MAXIMUM
Weight – meters/kg 25 mm 51 mm		17 34	15 31	19 37
Width (overall mm) 25 mm 51 mm		25 51	24 49	26 53
Ends/width 25 mm 51 mm	6*/ISO*** 72211/2	138 264	131 251	145 277
Number of rubber ¹ ends per width 25 mm 51 mm		23 45		
Elongation @ 10lbf	D 4964-96**		<u>25 mm</u> 65% <u>51 mm</u> 17%	
Load @ 50% Elongation	D 4964-96**		<u>25 mm</u> 30N <u>51 mm</u> 100N	
Dimensional Stability to Laundering after 3 Cycles	58* III.E			Length: ± 6% Width: ± 6%
Colourfastness to Laundering Colour Change only	19* Test No. 2	GS 5		GS4
Colourfastness to Light	18.3* Test No.1		L5	
Colourfastness to Crocking	22*	Wet: GS 4 Dry: GS 4		Wet: GS 4 Dry: GS 4

¹ Number of ends required when using 28 Gauge Rubber.

* CAN/CGSB Canadian General Standards Board, Textile Test Methods

** ASTM American Society for Testing and Materials

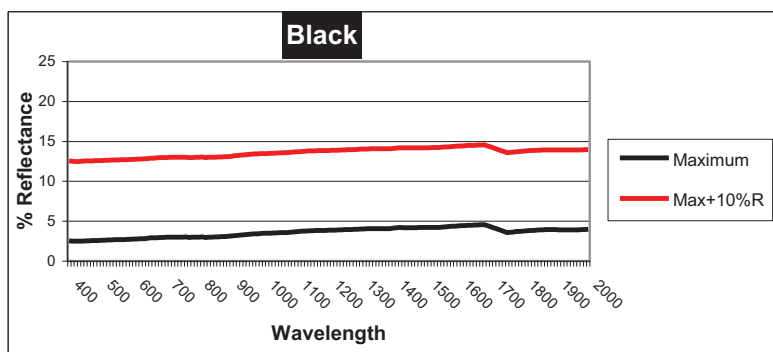
*** ISO International Organisation for Standardization

Table 16.3 – Colour and IRR Compliance Naval Black

Material Description	Tolerances
SHELL MATERIALS (including the upper collar lining)	<u>Colour</u> D ± 2 CIE Lab Units M ± 3.6 CIE Lab Units <u>IRR</u> D = Spec Maximum M = D+10%R
WEBBING HOOK AND LOOP BINDING TAPE ELASTIC	<u>Colour Black</u> Close Visual Match

Notes: 1. D=Specification Values for evaluation (Annex F).
M=max tolerance (waiver on case by case basis in production).

Figure 16.1 IRR Compliance Graphs



16.6.6 BINDING TAPE. The tape, textile reinforcing, nylon shall be Type III, class 2, conforming to MIL-PRF-5038 (25mm). The colour shall be a close visual match to the Black in the shell material.

16.6.7 NON-SLIP MESH. The non-slip mesh shall be a black, chemical-resistant, polymer on natural polyester mesh and will be supplied as GSM. No substitutes are permitted without a full abrasion and chemical resistance product qualification. Refer to Technical Authority for additional detail.

16.6.8 THREAD. The thread shall be a bonded, multifilament nylon, tex 70, in accordance with CGSB 4-GP-85, Class A, Type II. The thread shall meet the physical requirements specified in Table 2 of CGSB 4-GP-85 for Tex Ticket No. R70 tex. The

colour for shell components should be a good visual match to the Black in the shell material.

16.6.9 SNAP FASTENERS. The fasteners shall be brass material with dull black oxide finish and shall include:

sockets in accordance with drawing CS149-1;
studs in accordance with drawing CS150-1;
eyelets in accordance with drawing CS151-1; and
buttons in accordance with drawing CS153-2.

16.6.10 GROMMETS. The grommets shall be #00, plain, (with washer), brass with dull black oxide finish conforming to drawing CS108.



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.



National Défense
Defence nationale

2184DE-18740-200 (BI)
October 2014



NOTICE

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TECHNICAL PURCHASE DESCRIPTION



BALLISTIC INSERTS FOR FRAGMENTATION PROTECTIVE VESTS

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

TECHNICAL PURCHASE DESCRIPTION

FRAGMENTATION PROTECTIVE VEST, BALLISTIC INSERTS

1. SCOPE AND CLASSIFICATION

1.1 Scope. This document details the design, technical, and performance requirements for the soft armour inserts of the individual, battlefield Fragmentation Protective Vest (FPV), for soldiers.

1.2 Intended Use. The FPV provides protection on a 24 hour, global, all-weather continuum to the extent practical. The FPV is designed to provide, primarily, ballistic protection from fragmenting munitions and debris resulting from high explosive detonation or other explosive devices. Combined with the Bullet Resistant plates (BRP), this vest will optimise the protection levels to defeat multiple ballistic hazards across the battlefield continuum. The FPV was designed ergonomically for wear over the IECS combat jacket and under the Close Combat Modular Fighting Rig (CCMFR). Each sub-assembly of the FPV is comprised of environmental camouflage shells (temperate woodland and arid regions) and removable ballistic inserts. Fragmentation protection is achieved with the use of flexible armour materials. These materials, when assembled and inserted into the FPV carrier, must not degrade the full range of motion necessary by a soldier to undertake mission essential tasks.

2. APPLICABLE DOCUMENTS

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

2.2 Government Specifications and Standards. The following specifications and standards form part of this purchase description to the extent specified herein. The issue or amendment of documents effective for a specific solicitation shall be that in effect on the date of the applicable design data list, released with the Request for Proposal.

SPECIFICATIONS

D-80-001-055/SF-001	Label, Clothing and Equipment
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A-A-55126 Fastener Tapes, Hook and Loop, Synthetic

PUBLICATIONS

DSSPM 2-2-80-223 Cloth, Nylon, Ripstop, Water Resistant, 92 g/m²

PATTERN DRAWINGS

Style Code - IMPFPV26 FPV MODIFIED PACKAGE

2.3 Other Specifications and Standards. The documents listed in section 2.3 form a part of this purchase description to the extent specified herein. The effective dates shall be those in effect on the date of the applicable design data list, released with the Request for Proposal. They are not provided by the Government and may be purchased from the sources shown below.

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

D123	Standard Terminology Relating to Textiles
D1776	Practice for Conditioning Textiles for Testing
D1777	Standard Test Method for Thickness of Textile Materials
D3776	Standard Test Method for Mass Per Unit Area (Weight) of Fabric
D3886	Standard Test Method for Abrasion Resistance to Textile Fabrics
D4032	Standard Test Method for Stiffness of Fabric by the Circular Bend Procedure
E6	Practices for Force Verification of Testing Machines
F392	Standard Test Method for Flex Durability of Flexible Barrier Materials

ANSI PUBLICATIONS
11 West 42nd Street,
New York, NY 10036

ASQC Z1.4 Sampling

Canadian General Standards Board
Place de Portage Phase 3
11 Laurier Street
Gatineau, Quebec, Canada K1A 1G6

CGSB 4-GP-85Ma	Nylon Thread (Continuous Multifilament)
CAN/CGSB 4.2	Textile Test Methods
CAN/CGSB 54.1-M90	Stitches and Seams Part 1 (ISO 4915-1981)
CAN/CGSB 54.1-M90	Stitches and Seams Part 2 (ISO 4916-1982)

2.4 Order of precedence. In the event of a conflict between the text of this purchase description and the references cited herein, the text of this purchase description shall take precedence, followed by the pattern drawings, and any sealed patterns in that order.

3. REQUIREMENTS

3.1 Environmental Protection Requirements. It is the responsibility of the Contractor to ensure compliance to Canadian environmental laws and regulations and those in force in the country where the product and its components are developed, tested and manufactured.

3.1.1 HEALTH AND SAFETY. The materials used in manufacturing the system and its components must be such that when properly used and as directed (during transportation, storage, in-service use and disposal) will not cause harm to humans or the environment and that the relevant environmental and 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 parts 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 section 4.3.

3.3 System Requirements. The FPV forms a component of the Land Forces Body Armour System (refer to definitions section 6) and the FPV flexible armour inserts are removable and consist of the following modular elements:

- a. front and rear carrier inserts;
- b. left and right collar inserts;
- c. two shoulder protector inserts; and
- d. inserts for accessory components (ECPE).

3.3.1. Construction. Construction requirements are detailed in Appendix 2. The ballistic panels are not restricted to a single ballistic ply solution, but all qualified solutions shall conform to the performance requirements specified herein.

3.3.2 Sizes. The core ballistic inserts can be manufactured in seven (7) sizes of varying lengths and are governed by pattern package-DSSPM Style Code IMPFPV26 and the Scale of Measurement tables (Appendix 3). The core sizes for procurement are detailed in Table 3.1 below. The FPV shall meet the sizing requirements specified when inspected as specified at 4.5.1. Removable inserts must be fully interchangeable between systems of the same size. Ballistic insert details for accessory components such as throat, groin, and arm protection are specified under separate cover at Appendix 6, if applicable.

Table 3.1 – FPV Core Component Sizing

Chest Measure cm (in) Back Length cm (in)	SIZE		Carrier Front & Rear INSERTS	Collar Left and Right INSERTS	Shoulder Protector INSERTS
	NATO (Metric)	Canadian (Imperial)			
X-SMALL < 85 (<34)				XSML	XSML/SML
SHORT 41 (16)	6070-7585	6734	X	↓	↓
REGULAR 43 (17)	7080-7585	7034	X	↓	
SMALL 85-95 (35-38)				SML	↓
SHORT 43 (17)	6070-8595	6738	X	↓	
REGULAR 45 (18)	7080-8595	7038	X		
TALL 48 (19)	8090-8595	7338	X		
MEDIUM 95-105 (39-42)				MED	MED
SHORT 45 (18)	6070-9505	6742	X	↓	↓
REGULAR 48 (19)	7080-9505	7042	X		
TALL 51 (20)	8090-9505	7342	X		
LARGE 105-115 (43-46)				LGE	LGE/XLGE
SHORT 48 (19)	6070-0515	6746	X	↓	↓
REGULAR 51 (20)	7080-0515	7046	X		
TALL 53 (21)	8090-0515	7346	X		
X-LARGE 115-125 (47-50)				XLGE	
SHORT 51 (20)	6070-1525	6750	X	↓	↓
REGULAR 53 (21)	7080-1525	7050	X		
TALL 56 (22)	8090-1525	7350	X		
XX-LARGE 125-135 (51-54)				XXLGE	XXLGE/
REGULAR 56 (22)	7080-2535	7054	X	↓	XXX-LGE
TALL 58 (23)	8090-2535	7354	X		
XXX-LARGE 135-145 (55-58)				XXX-LGE	↓
REGULAR 58 (23)	7080-3545	7058	X		

Notes: 1. Quantities are specified in the contract. Custom sizes can be fabricated using scale of measurement tables.
2. Accessory components are specified at Appendix 6.

3.3.3 Labels and Markings. Labels/marking shall be applied to each ballistic insert as specified at 4.5.1.1.

3.4 Armour Characteristics.

3.4.1 Armour Materials. Flexible armour materials used for the ballistic panels shall be of durable quality, that is, material characteristics shall not undergo appreciable alterations under the influence of ageing or environmental conditions for which the FPV is designed for wear (see Intended Use). The protective properties of the ballistic panels must be guaranteed for a minimum period of 10 years while sealed in their water-proof protective cover (as defined in section 6.1) and used under normal service conditions. The armour material shall be free from any imperfections that may affect quality or serviceability of the finished product.

3.4.2 Ballistic packs. Ballistic packs include shoot-packs and armour material-packs (as defined in section 6.1) that are provided for testing. The material used in the ballistic packs to evaluate performance characteristics shall be fully representative of the production solution proposed. Each shoot-pack shall be tacked in the four corners, unless the production solution includes a specific stitching pattern. In this case the shoot-packs shall be stitched to the same pattern.

3.4.3 Hybrid Solutions. Non-symmetric hybrid armour materials (non-homogeneous construction) are allowed in the construction of the ballistic solution. The ballistic fill layering order and positioning of each ply in the panel shall be defined for shoot-packs and for all component ballistic panels used in production. The strike face and alignment of the materials shall be clearly indicated on each layer (ply) of material if its direction or positioning is performance sensitive. If more than one component material is used, then the following data for each different material shall be provided: composition, layering order, and manufacturing details.

3.4.4 Ballistic Panel Areal Density (AD). The armour material shall be as light as possible while meeting the minimum ballistic requirements. When measured in accordance with 4.5.2.1, the maximum areal density of the armour material-packs and the ballistic panels shall not exceed 3.25 kg/m^2 . The maximum variability of areal density between the test specimens shall be less than 0.15 kg/m^2 .

3.4.5 Ballistic Panel Thickness. The thickness of the armour material-packs and the production panels should not exceed 4 mm, but shall not exceed 7mm when tested in accordance with 4.5.2.2.

3.4.6 Ballistic Panel Flexibility. The armour material shall be as flexible as possible while meeting the minimum ballistic requirements. As a guideline, the stiffness/flexibility of the armour material-packs should be less than 1.4 N/mm, but shall not be greater than 2.2 N/mm when tested in accordance with 4.5.2.3. The value of each production lot must remain within $\pm 20\%$ of the average established during the preproduction and initial production phase (first 5 material lots).

3.4.7 Ballistic Panel Static Water Absorption. After static water immersion, the ballistic shoot-pack should not gain more than 20% in weight when tested in accordance with 4.5.2.4.

3.5 Ballistic Performance. Six tests are included for ballistic qualification of the FPV armour solution. Five ballistic limit tests (V50) using 4 projectile types (small and large sphere, right circular cylinder, and fragment simulating projectile); one proof velocity test (Vproof) with an FMJ handgun bullet for backface deformation resistance. These tests are also used in the evaluation of ballistic performance score that will determine the rating for ballistic fill proposals during a bid evaluation (refer to Guidance to Bidder instructions for details). During production, traceability of ballistic component materials shall be verified as specified at 4.5.3.1 and ballistic testing shall be conducted as specified at 4.5.3.2.

3.5.1 Ballistic Limit Resistance (Min. V50). The ballistic limit resistance (V50) of the armour solution of the FPV shall be such that it will meet or exceed the five ballistic limit test requirements as specified in Table 11.4. The average **MV₅₀** for each threat shall be calculated from the arithmetic mean of individual **V₅₀** values having a maximum velocity spread of 30 m/s. During a bid evaluation this **MV₅₀** value will be used to rate each proposal and will represent the **V_{50ca}** during production (see definitions in section 6.1). The minimum **V₅₀** value for any individual test shall not be less than minimums specified below. The zone of mixed results (ZMR) for each **V₅₀** value shall be less than 60 m/s, and the ZMR for each **MV₅₀** value shall be less than 50 m/s.

3.5.1.1 The **V₅₀** using the 17-grain FSP (5.46mm calibre) in the dry condition should be greater than 530m/s, but shall not be less than 500 m/s. This test ensures that the proposed solution meets or exceeds the performance level of the in-service vest.

3.5.1.2 The **V₅₀** using the 16-grain steel ball projectile (6.34 mm calibre) in the **wet condition** (30 minutes water immersion) should be greater than 450m/s, but shall not be less than 415 m/s and in **dry condition** should be greater than 490m/s, but shall not be less than 455 m/s.

3.5.1.3 The **V₅₀** using the 64-grain RCC (8.74mm calibre) in the dry condition should be greater than 380m/s, but shall not be less than 350m/s.

3.5.1.4 The **V₅₀** using the 1-grain steel ball projectile (2.49mm calibre) in the dry condition at ambient temperature should be greater than 560m/s, but shall not be less than 525m/s. These tests are utilised to rate the relative performance against other fragmentation solutions and to establish **V_{50ca}** for each threat.

3.5.2 Backface Deformation Resistance (Vproof). The average backface deformation of the FPV ballistic fill supported on clay in the dry conditions should not be more than 44 mm when tested using a 124-grain FMJ bullet (9 mm calibre) impacting at an average velocity of 365 m/s. In addition, each single indentation in the clay material shall be not be more than 50 mm, and no complete penetration of the armour material shall occur with the FMJ bullet.

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.

4. QUALITY ASSURANCE PROVISIONS

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

- a. Pre-award qualification;
- b. Preproduction inspection; and
- c. Production inspection.

4.2 Pre-Award Qualification. Pre-award qualification shall comprise all requirements defined in the Guidance to Bidders instruction. The responsibilities for testing of technical requirements are detailed in the instruction. Testing conducted by bidders must be supported by original test data and supplied as part of a bid proposal. DND reserves the right to validate any or all of the results supplied by bidders.

4.2.1 Ballistic Qualification - Will include an assessment based on the test results for the ballistic requirements of pre-award ballistic shoot-packs as specified in Table 11.4. Successful bidders who comply with all mandatory requirements will be considered compliant for this aspect. Proposals will be rated and a down-selection of the highest rated technical merit will be made based on technical performance values.

4.3 Preproduction Inspection. First article lot size shall be a minimum of 18 and a maximum of 27 insert sets equally divided between sizes specified in the Statement of Work. The presence of any defect (see Table 4.1) or failure to pass any test shall be cause for rejection of the first article lot. First article samples shall be completely representative of the final product, being made from the same parts and materials and by the same tools and processes that will be used in quantity production.

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 any test shall be cause for rejection of the production lot.

4.4.1 MATERIAL INSPECTION. During production the contractor shall provide certification that the inserts and materials have been inspected in accordance with all the requirements specified within. Every ballistic material lot/sub-lot during production shall be fully tested and approved for release by the Technical Authority prior to ply-cutting and assembly into panels and inserts.

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 shipping lot shall normally exceed 500 units during production and shall be in one size only.

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 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, 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
Ballistic Inserts	Incorrect dimensions of finished ballistic inserts (Verification with <u>Government approved insert gauge set</u>) Any unfinished edges or non-conforming seams or stitches. Any incorrect colour or markings. Any material defects including cuts, tears, holes, improper seam welds, or abrasion marks.
Workmanship	Any malformed, or incorrectly assembled or secured components. Any wrongly-sized or missing components. Any incorrect labelling. Any oily, waxy, greasy, or dirty components.

4.4.5 VISUAL EXAMINATION. The lot size shall be expressed in individual FPV units in one size only. 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 CONSTRUCTION. Components shall be inspected for workmanship and compliance with manufacturing and dimensional requirements (appendices 2, 3 and 6).

Selection of samples for First Article qualification (by quantity and size) will be as specified in the Statement of Work. Production verification shall be done in accordance with section 4.4.3. Interchangeability of removable ballistic inserts (of the same size) will be assessed for each finished lot using Government approved component gauge set. Selection and inspection of samples for pre-award will be as specified in the Guidance to Bidders instruction.

4.5.1.1 Labels and Marking. Labels and marking during for first article and production shall be applied in accordance with requirements in appendices 4 and 6. Pre-award samples shall be prepared as specified in the Guidance to Bidders instruction.

4.5.2 ARMOUR CHARACTERISTICS. Ten (10) armour material-packs, as defined in section 6, shall be submitted to non-destructive testing for qualification of each lot of material.

4.5.2.1 Ballistic Panel Areal Density (AD). The materials in the armour material-packs and the production panels shall be measured in accordance with ASTM Standard 3776 (option A, or C) or equivalent and the average areal density calculated. Equipment used for measurement shall be calibrated for accuracy and should be capable of weighing with a precision of ± 1 gram. The average value of the ten (10) armour material-pack measurements will be used for qualifying each material lot.

4.5.2.2 Ballistic Panel Thickness. The thickness of the armour material-packs and the production panels shall be measured using ASTM standard D1777 (option 1) or equivalent. The average value of the ten (10) armour material-pack measurements and variance will be used for qualifying each material lot.

4.5.2.3 Ballistic Panel Flexibility. The armour material-packs flexibility shall be measured using the modified circular bend test (developed by CMC/DREV) method as specified in Appendix 5. The average value of the ten (10) armour material-packs and variance will be recorded for information and monitored for significant deviation from the production average.

4.5.2.4 Water Absorption. The ballistic shoot-packs used in wet target tests shall be measured as specified in section 11.6.5 and the percentage weight gain calculated. The average value of three contractor-measured samples and the three DND-measured samples will be used for pre-award qualification.

4.5.3 BALLISTIC PROTECTION Verification during production shall be done using shoot-packs and material-packs constructed from each ballistic material lot/sub-lot prior to cutting into plies for production panels.

4.5.3.1 Ballistic Lot Traceability. Traceability of finished production panels/inserts must be maintained in all cases to the original material lots. Ballistic material lots shall not normally exceed 4000 metres and shall be based on a woven beam. Lots shall be further broken down into finished sub-lots and rolls. A sub-lot (for test qualification) will be based on the finishing date or 1000 metres whichever is smaller. Rolls shall be strictly controlled by the prime contractor and his supplier and grouped by finish date and woven beam.

4.5.3.2 Lot Qualification and Test Methodology. Ballistic shoot-packs, as defined in section 6, shall be submitted to destructive testing for ballistic qualification. The DND approved ballistic test methodology is detailed at Appendix 1 and the specific procedures and sequences for each individual test are covered in sections 11.6 and 11.7. The ballistic qualification for First Article is summarised in Tables 11.4.a and 11.4.b. and the production lot qualification requirements are summarized in Table 11.5.

5.0 PACKAGING AND LABELLING

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

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

6.0 NOTES

6.1 Definitions

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

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

Sealed Pattern: the sealed pattern is a duplicate of the Master Sealed Pattern, which is the Department of National Defence approved sample of the product being procured. For this requirement, the patterns made available to the Contractor are sealed for purposes of design construction only, and not performance or technical requirements.

Pattern Drawings: pattern drawings are those prepared in accordance with the Style Codes specified at section 2.2 and are provided by the Directorate of Soldier Systems Program Management (DSSPM 3).

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 the new Bullet Resistant (BR) plates, this vest will optimise the protection levels to defeat multiple ballistic hazards across the battlefield continuum.

FPV Carrier: The external carrier assembly which contains the ballistic (flexible armour) inserts and the BRP and to which other FPV accessory components can be attached. The carrier assembly is made up of a front and rear outer shell.

Assessment Criteria. 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

Desirable criteria are used to promote more sensitive evaluation of contending items which meet all essential requirements. A desirable criterion describes a performance requirement where performance better than the stated essential level is deemed to have significant operational value and will generally have a rating associated with it during Bid Evaluation. The word "**should**" is to be considered synonymous with desirable.

6.1.2 BALLISTIC DEFINITIONS. Ballistic definitions shall apply only to those sections related to spall resistance and ballistic penetration performance of the ballistic fill arrangement found in the various ballistic inserts for the FPV and the ballistic shoot-packs for testing. Definitions are listed alphabetically.

Accepted hit (valid impact): 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 target sample (see Fig. 11.1). In some documents, angle of obliquity is used with the same meaning.

Area of coverage: the area in square meters of the flexible ballistic insert used in a FPV; also area of a ballistic shoot-pack used for ballistic testing.

Areal density: a measure of the weight of the assembled ballistic material panel (assembled as a ballistic material pack, a shoot-pack, or production component) per unit area. It is expressed in kg/m^2 and is the ratio of the mass of the material over its area of coverage. This value is used to compare the various ballistic solutions.

Backface: the surface of a test specimen designed to be positioned next to the body; also referred to as the wear face.

Backface deformation: the maximum transient displacement of the back 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 front surface of this material.

Backing material: a block of tissue-simulating material placed next to the back 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). For the V_{50} tests, no backing material is used.

Ballistic ply: a flexible armour material layer contained in the proposed ballistic solution prior to assembly into a panel.

Ballistic inserts: the finished ballistic production component, comprising the final construction of the ballistic panel, assembled and sealed in their protective cover. The core ballistic inserts include the collar and shoulder protector inserts and the front and rear ballistic inserts. All are modular and removable from their corresponding carrier shell components.

Ballistic panel: either a production or a qualification panel fully assembled in the final design construction of the ballistic fill layers, but not including the protective cover.

Ballistic shoot-pack: a 400 x 400 mm test specimen used for destructive testing. It is fully representative of the production panel solution, but used only for ballistic validation. Ballistic shoot-packs shall be assembled and corner stitched (or replicate stitching if a quilted solution is proposed) to replicate the ballistic inserts, but do not include any protective cover. Traceability shall be maintained in accordance with section 4.5.3.1.

Armour material-pack: a 152 x 152mm test specimen used only for non-destructive testing and physical measurements. Material packs shall be assembled in the final design construction, but not stitched, unless a quilted solution is proposed. If a quilted solution is provided, then four (4) additional ballistic shoot-packs (400x400mm) shall be delivered in lieu of material-packs. From these samples will be cut into necessary test coupons. Traceability shall be maintained in accordance with section 4.5.3.1.

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 a backface deformation resistance test (V_{proof}).

Ballistic retardation, R: a measure of the average attenuation of velocity or air drag deceleration of a projectile per unit distance (m/s/m) from the launcher up to the test sample.

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 for the V_{proof} test, or has passed through the witness paper for the V_{50} test (crack or hole permitting light passage). 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 for the V_{proof} test.

Fair hit: a zero degree obliquity ($\pm x$ degrees) impact using the specified weight and type of un-yawed projectile ($x=3$ degrees maximum for 9-mm bullet and 5 degrees for RCC and FSP) within the specified velocity range and at the specified location on the target sample.

Fragment simulator: a generic projectile type used in ballistic testing. Fragment simulators have various geometric and physical characteristics designed to simulate the terminal effects of fragmenting munitions.

Fragment simulating projectile (FSP): a specific fragment simulator based on a standardised cylindrical projectile with a chisel nose (see Fig. 11.5).

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 (Fig. 11.2). 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 ballistic shoot-pack (Fig. 11.3, by a suitable device providing the required accuracy. When using a pair of detectors, measure to the middle of the two detectors.

LCP: lowest complete penetration velocity

mp: mass of the projectile or fragment simulator

Partial penetration (PP): any fair shot which is not identified as a complete penetration using the definition above, is to be recorded as a partial penetration; that is, the projectile rebounded, or remained embedded in the test sample without causing perforation of or imprint on the witness sheet or backing material.

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.

Residual velocity (V_r): for complete penetration impacts, velocity of the projectile after impacting and exiting the armour material.

Right Circular Cylinder (RCC): a standardised cylindrical fragment simulator with a flat nose and sharp edges (see Fig. 11.4)

Sabot: a plastic carrier (see Figure 11.6) in which a projectile is centred to permit firing in a larger calibre barrel. The sabot is usually discarded in flight a short distance from the launcher, and only the sub-calibre projectile continues until the target.

Separation distance: the distance between the centres of any two hits or the centre of any one hit and the edge of the armour sample or the target retaining fixture.

Stand-off 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 1.5 m in front of the target.

Test range: the distance between the muzzle of the test barrel and the strike face of the target sample (see Fig. 11.3).

Twist Length: the horizontal distance along the gun barrel in which the rifling makes one complete turn; not to be confused with the actual length of the rifling over the complete barrel.

Unfair hit: a shot that does not conform to the criteria specified (see Table 11.1), 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, i.e., too close to the edge of the specimen or to another shot. For the backface deformation test (Vproof), impact for which the velocity is outside the range specified.

V_{50} ballistic limit: the striking velocity at which 50% of the impacts of a particular projectile are expected to result in complete penetrations of a target sample of a given number of plies and physical properties at a specified angle of impact in a limited statistical test. The method involves obtaining a minimum of 14 shots using the modified up-and-down firing technique. The V_{50} is computed using the maximum likelihood method (DRDC Probit as per EXCEL file available from DRDC-Valcartier). Used as a quantitative measure of armour capability.

MV_{50} : average of the individual V_{50} 's for a specified threat having a spread of less than 30 m/s; if not, extra samples will need to be tested until the required number are found falling within the spread (refer to Tables 11.4 and 11.5 at Appendix 1).

MV_{50QC} : Minimum average value (MV_{50}) of a production material lot and is used for quality control. It must be greater than or equal to 97% of V_{50ca} .

V_{50ca} : the MV_{50} established during a bid evaluation for each specified threat.

Vproof: the minimum velocity specified for a particular projectile for a pass/fail test such as the backface deformation resistance test where a given number of rounds is fired at a test specimen and where no complete penetration is allowed.

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

Witness paper: a 0.38-mm thick Hilroy poster board sheet no 20210 (270 g/m²) placed 150±2 mm behind and parallel to the target surface at the impact point used to qualify the perforation result.

Yaw: the angle between the main axis of the projectile and its trajectory (velocity vector - refer to Figure 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 a discarding sabot are more susceptible to yaw.

Yaw card: a stiff paper-type material placed in the projectile's line of flight, and used to determine the projectile yaw. The yaw card can also be used to find the exact hit location 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).

APPENDIX 1

11.0 BALLISTIC TEST PROCEDURES

11.1 Scope. This appendix describes reproducible test procedures defined for the evaluation of ballistic shoot-packs and the qualification of ballistic fill solutions for use in the FPV. These procedures will be used to confirm the specified minimum ballistic performance requirements. The following test methods are defined:

- [1] the Ballistic Limit V_{50} tests (large/small sphere, RCC, and NATO FSP); and
- [2] the Backface Deformation Vproof test (9mm projectile).

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 purchase description are specified in the table. A precise description (mass, diameter, lot number, etc.) of all projectiles used must be included in test reports. Since the projectiles may be damaged during impact on the test specimen, they shall be used only once.

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 and at the specified velocity range for Vproof 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. The projectiles shall be single launched to obtain the number of fair hits required on each sample. When a rifled barrel is used, the barrel twist length (refer to definitions at section 6.1.2) should be recorded and it shall be as specified in Table 11.1. When the size of the launcher is larger than the calibre of the projectile or when high impact velocities are required, the projectile can be inserted into a split plastic sabot, e.g., a 6.34 mm sphere can be fired from a common 7.62 mm (.308 in) barrel. The preferred method to launch the 6.34mm sphere is a smooth bore barrel chambered for .22 cal Ramset blank cartridge. The drawing of a suitable sabot to launch the 2.5mm sphere from a 5.56mm barrel is depicted in Fig. 11.6. The launching device shall also be held in such a manner that its alignment does not change upon firing. For the ballistic tests, the launching system (launcher and propellant) must be capable of launching the projectile at velocities up to 1000 m/s.

11.2.3 Launcher Calibration. To obtain the specified velocity for powder guns, hand loading of the ammunition is usually done. The muzzle velocity can also be set by adjusting the projectile seat in the barrel. A control of projectile velocity with a precision of ± 10 m/s of the desired velocity is required for the V_{50} and Vproof tests based on a

series of 10 shots. A projectile velocity/propellant mass curve (or gas pressure curve) for the launcher system used shall be determined before any testing is performed. This curve is required to 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 5m (refer to Figure 11.3) from the muzzle to the test 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 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

PROJECTILES	Small Sphere	Large Sphere	NATO FSP	RCC	9x19mm FMJ
Ballistic Test	Section 11.1 [1]	Section 11.1 [1]	Section 11.1 [1]	Section 11.1 [1]	Section 11.1 [2]
Projectile mass g (grain)	0.064±0.002 (1)	1.042±0.03 (16)	1.12±0.03 (17)	4.15±0.02 (64)	8.03±0.13 (124)
Projectile Material	Chrome Alloy Steel	Chrome Alloy Steel	4340 Steel or Equivalent	4340 Steel or Equivalent	Copper Jacket Lead Core
Projectile Hardness	60-66 RC	60-66 RC	28-32 RC	28-32 RC	---
Acceptable Source	Ball Grade G20, G28 or G40 SKF, FAG or Equivalent	Ball Grade G20, SKF, FAG or Equivalent	Figure 11.5 or Equivalent	Figure 11.4 or Equivalent	Hornady #3557 or Equivalent
Projectile Diameter mm	2.49±0.01	6.34±0.01	5.46±0.02	8.74±0.02	9.02
Projectile Length mm	2.49±0.01	6.34±0.01	6.52 nominal	9.17 nominal	---
LAUNCHER					
Barrel twist length mm	406 Sabot Separation	Smooth Bore Barrel	Max 250	Max 406	Max 250

11.3 Witness Systems

11.3.1 Penetration Witness. The witness system for V₅₀ Ballistic Limit tests consists of a nominal 0.38-mm thick Bristol paper placed at a 150 ± 2mm stand-off distance behind and parallel to the target surface at the impact point (refer to Figure 11.3). The witness system must extend over a sufficient area such that all projectiles with sufficient momentum can be detected. Perforation of the sheet will be considered as perforation (complete penetration) of the target material. Impacts that are not identified as perforations using this definition are to be recorded as non-perforations.

11.3.2 Backface Deformation Witness. A clay backing material used to measure the maximum backface deformation of the target sample regardless of the tendency of the ballistic material to recover to its original shape. The backing 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.

11.4 Sample Retention Method

11.4.1 Specimen Retention System (V_{50}). The ballistic shoot-pack shall be clamped along its edge to a rigid support fixture (sandwich window frame) of such size that the unsupported impact area is 30 x 30 cm and that it remains firmly in place before, during and after projectile impact. The surrounding clamping fixture shall have interlocking ribs to ensure minimal target slippage during testing. A typical target fixture is shown in Fig. 11.7. The target frame shall be tightened such that the closing force is 30 ± 3 kN. The test sample must lie smooth and flat and must only be slightly stretched between the two frames. The target centre deflection before firing shall be such that when pushing the panel at the centre by a distance of 9 mm beyond the original front surface plan with a load cell having a cylindrical probe diameter of 12.5 ± 0.5 mm, the load registered shall fall between 2 N and 30 N (see Fig. 11.13).

Fabric test specimens can be replaced to initial shape after every shot, if desired, but this is not required. The test sample may have to be readjusted between the shots when excessive pulling from the retention fixture so that the required deflection is maintained throughout the test sequence. Target restraint provides for more accurate, reproducible, and cost effective method of data acquisition.

The support fixture shall be capable of vertical and horizontal adjustment to ensure that the impact points can be located anywhere on the strike face, and that the projectiles strike the target surface normal (zero deg impact angle) to the line of fire. The fixture shall allow the conditioned sample to be quickly mounted or dismounted to minimise changes in conditioning temperature.

11.4.2 Specimen Retention System (Backface Deformation). The ballistic shoot-pack shall be mounted on a rigid metallic box of the following minimum internal dimensions (340 x 340 x 100 mm) filled with the clay backing material specified at 11.3.2. The ballistic shoot-pack shall be attached to the block of backing material by means of two elastic straps or by equivalent means to ensure a good contact between

the specimen and the block. The distance between the two straps should be approximately 150 mm apart and the point of impact shall be at an equal distance from the two straps so that there is no interference with the shot pattern. No individual shot shall fall within 50 mm of either retaining strap or band. The block itself shall be supported on a rigid fixture so that it remains firmly in place before, during and after projectile impact. The support fixture shall be capable of adjusting the position of the block horizontally and vertically such that the prescribed shot pattern can be followed and so that zero degree obliquity can be achieved anywhere on the test specimen.

11.5 Measurements

11.5.1 Velocity Measurement. The velocity of the projectile before impact and after impact (if required) shall be measured with any suitable measurement system that can provide an accuracy of $\pm 0.3\%$ (e.g. a true velocity of 1000 m/s should be recorded within an accuracy of ± 2 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, conductive screens, laser ribbons, acoustic, inductance or capacitance type. Doppler radar systems are also appropriate. 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.

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.

11.5.2 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 fragment will punch a clean hole showing its presented area at impact. Processed

photographic paper, single weight, 200x200 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 from the shoot-pack).

When using FSP or RCC, the dimensions $D1$, $D2$ and L (see Fig. 11.8) shall be measured immediately prior to firing. Yaw is then computed by measuring, using an optical device with a magnification factor of at least 5X, the largest dimension (A) of the hole caused during perforation of the witness plate. For fragment simulator having no rear skirt, $D1=D2$. The yaw angle (θ) is then determined using the following formulas:

$$DM = \frac{D1 + D2}{2}$$

$$T = \sqrt{L^2 + DM^2}$$

$$\theta = \alpha - \beta = \sin^{-1}(A / T) - \tan^{-1}(DM / L)$$

When the hole in the yaw card is a perfect circle there is no yaw. For FSP and RCC, the maximum acceptable yaw (θ) must not exceed 5° , and desirably should not exceed 3° . Any round for which the measured yaw exceeds 5° shall be rejected for excessive yaw, and a further round fired under the same test conditions. If three rounds out of five exhibit unacceptable yaw, the gun barrel should be replaced with a new one. In case of dispute, yaw shall be measured using either an orthogonal photographic or flash X-ray system to an accuracy of $\pm 0.25^\circ$.

11.5.3 Measurement of Backing Material. 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. 11.2.

11.6 Test Procedures

11.6.1 Test Range. The set-up used to conduct the ballistic tests shall be similar to the one shown in Fig. 11.3. When the launcher used is a powder gun in conjunction with light detectors, the following guidelines apply. The first detector should be placed at a minimum distance (F) of 1.5 m from the muzzle of the test barrel to prevent false triggering from muzzle blast. The separation distance (D) between the pair of detectors shall be at least 0.5 m, and shall not exceed 1.5 m. The exact distances used shall be specified in the test report. The ballistic shoot-pack shall be placed at a distance (R) from the launching device compatible with the velocity measurement systems used and for which the projectile is stable (impact angle less than 3 or 5 deg). When using powder guns, the recommended target distance is 5 meters. For residual velocity measurement using a pair of detectors, the measurement point shall be at a maximum distance of 0.5 m away from the target. The separation distance between the two detectors shall be 0.5 m.

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 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 both the dry and wet test conditions shall be a ballistic shoot-pack as defined at Section 6. Only new armour material samples as offered for bid or sale shall be tested. The specified quantity of specimens (refer to Statement of Work), selected at random from a distinct lot/batch, shall constitute a statistically valid test series for qualification. Prior to testing, each shoot-pack shall be weighed and visually examined to make sure that it is free from defects or other damage. A full description of each test specimen shall be provided as specified at section 11.8.1.

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. If additional requirements are specified for extreme temperature conditioning, they shall be defined in the contract or Request for Proposal.

11.6.5 Water Immersion Test Conditions (wet target). For testing requiring a wet target, the ballistic shoot-pack shall be weighed dry and then submerged vertically (using a clamp system) in water at 15°C to 25°C for a period of thirty (30) minutes. It is then removed from water and held vertically from two corners and allowed to drain for three minutes. The specimen shall be re-weighed and the ballistic test carried out using the specified test method. The first shot should be fired within 5 min of the completion of the draining period and the final shot not more than 40 min later for a maximum test duration of 45 minutes. If the testing has not been completed in the time permitted, the test data shall be discarded and wet testing must begin again with a new target sample.

11.6.6 Test Specimen Positioning and Impact Angle. Each ballistic shoot-pack shall be mounted on a rigid support with the area to be impacted perpendicular to the line of fire so that each impact is made normal to the intended impact location. 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.

11.6.7 Test Specimen Shot Location and Number. The shot spacing and sequences that will be used are illustrated in Fig. 11.10 through 11.12. A maximum of 18 shots per sample (14 shots typical) for spheres and FSP (Figures 11.10 and 11.12) and 9 shots per sample for the larger RCC and the 9mm bullet (Figure 11.11). As illustrated in Figures 11.10 and 11.11, the shot sequence for the dry tests must proceed from the centre radiating outward in a clockwise direction. For the wet test, the shot sequence is from the left top corner down to the lower right corner (see Fig 11.12). Since the fibres tend to be strained and pulled in the warp and fill directions, the aim points should be staggered at least 12 mm off the horizontal and vertical lines of any previous point.

The maximum angle of yaw for the RCC and FSP projectiles shall be as defined under 'Fair Hits' in the definitions (see Table 11.2). The intended shot locations shall be clearly marked directly on the test specimen. The exact location and sequence used shall be described in the test report.

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 and used for V_{50} estimation.

TABLE 11.2 - Criteria for Fair/Unfair Hits

Test Sequence	Small Sphere V_{50}	Large Sphere V_{50} (Wet & Dry)	FSP V_{50}	RCC V_{50}	9mm V_{proof}
Max Impact Angle	$\pm 3^\circ$	$\pm 3^\circ$	$\pm 3^\circ$	$\pm 3^\circ$	$\pm 3^\circ$
Max YAW Angle	---	---	$\pm 5^\circ$	$\pm 5^\circ$	$\pm 3^\circ$
Edge Separation	>50 mm	>50 mm	>50 mm	>50 mm	>75 mm
Shot Separation	>40 mm	>40 mm	>40mm	>75mm	>75 mm
Min. no of shots per sample	9	9	9	5	5
Max. no of shots per sample	18	18 (16 wet)	18	9	9

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.

TABLE 11.3 - Criteria for Accepted/Rejected Hits (Backface Deformation)

Condition	Impact velocity	Shot/Edge Separation Distance	Impact Angle	Impact Fairness	Partial Penetration	Complete Penetration
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.

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

11.6.9 Preparation and Control of the 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 clay blocks shall then be conditioned at a constant temperature (+/- 1°) between 20°C and 38°C for at least three hours prior to testing such as to obtain the desired consistency. 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.

11.6.10 Calibration of the 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 63.5 +/- 0.05 mm is dropped in free fall without a guide tube from a height of 2000 +/- 5 mm, as measured from the surface of the backing material, the depth of the indentations from three such drops shall each be 20 +/- 3 mm (see Fig. 11.9). 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. 11.9. The consistency of the backing material during ballistic testing shall also be measured with a pocket penetrometer using a flat head of 8 mm diameter. The peak hardness value shall be 50 + 3 N/mm².

11.6.11 Velocity Correction Fragment Simulators. No correction for air drag effect is required for 9mm bullets. To evaluate the velocity of fragment simulators at the target, the velocity measured at the distance **X** from the target should be corrected to allow for any velocity loss due to air drag, and slowing effects caused by detection screens. For air drag corrections the following equations shall be used:

$$V_s \text{ or } V_r = V_m + R \cdot X$$

Where:

- R:** ballistic retardation (m/s/m);
- X:** distance between the measurement point and the target (m);
- V_m:** measured velocity (m/s);
- V_s:** velocity at the target (m/s);
- V_r:** residual velocity (m/s).

When doing correction for residual velocity measurement, the distance **X** is negative, i.e., the impact velocity is greater than the measured velocity. To maximise the accuracy of the velocity the distance **X** should be kept to a low value. The recommended measurement distances are 1.5 m ahead of the target for the striking velocity, and 1.0 m behind the target for the residual velocity. The retardation used **R** (m/s/m) depends on the shape of the projectile and its velocity at the measurement point. The following sections give the relationships to be used:

RCC (64 grain)

The retardation R (m/s/m) is found from:

$$\underline{R = 0.01272Vm + 0.1986}$$

where:

Vm : measured velocity (m/s)

This equation for R is valid only for:

$$275 \text{ m/s} < Vm < 450 \text{ m/s}$$

FSP (17 grain)

The retardation R (m/s/m) is found from:

$$\underline{R = 0.0185Vm}$$

where:

Vm : instrumentation velocity (m/s)

This equation for $R(V)$ is valid only for:

$$450 \text{ m/s} < Vm < 700 \text{ m/s}$$

Sphere (1 and 16 grain)

The retardation R (m/s/m) is found from:

$$R(V) = \frac{\rho \cdot \pi \cdot D^2 \cdot Cd \cdot Vm}{8 \cdot m}$$

where:

Vm : instrumentation velocity (m/s)

D : diameter of sphere (m);

m : mass of the projectile (kg)

ρ : air density (**1.225 kg/m³**)

C_D : drag coefficient for the projectile

The drag coefficient C_D can be found from:

$$C_D(M) = 0.1045M^3 - 0.7322M^2 + 1.6139M - 0.1245$$

where:

M: Mach number. **$M = V_m/a$** ; **$a = 340$ m/s (speed of sound)**

This equation for **C_D** is valid only for:

$$340 \leq V_m \leq 1000$$

For lower velocities, **C_D** can be evaluated from:

$$C_D(M) = 0.9224M^3 - 0.8595M^2 + 0.2718M + 0.4501$$

This equation of **C_D** is valid only for:

$$0.0 < V_m < 340$$

An alternative method for velocity correction for air retardation is the direct measurement of the retard by means of measurements of the velocity at multiple distances, two distances being a minimum, or the use of a Doppler radar system.

11.7 Test Sequence

11.7.1 V_{50} Test Sequence (modified up-and-down method). At least 14 valid impacts (**N_T**) (normal incidence) shall be done per V_{50} test using the shot pattern defined in Figures 11.10 through 11.12 as applicable. All firings shall be conducted after the samples have been conditioned and shall continue until the total required number of fair hits is obtained. The identification of shots as perforation or non-perforation shall be made after each firing by inspecting the paper witness sheet. Ensure that the witness sheet material is mounted in the appropriate position behind the test specimen. After each complete penetration shot on the ballistic shoot-pack, the corresponding hole in the witness sheet should be marked and numbered with a felt pen. Whenever excessive damage occurs to the witness sheet material, it shall be replaced with a new one before the next test sequence. 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

V_1 = estimated V_{50}

$V_i = V_{i-1} + \Delta V$, where **V_i** = intended velocities, $i = 2-14$;
and where ΔV is the fixed velocity increment or decrement to use.

For the first V_{50} sample evaluation (V_{50})₁, ΔV shall be:

$\Delta V = +20$ (if previous shot is partial as per examination of paper witness plate)

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

for the subsequent V_{50} sample evaluation (V_{50})₂₋₄, ΔV shall be:

$\Delta V = +15$ (if previous shot is partial)

$\Delta V = -15$ (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 test series where the control of velocity may not be as precise as needed.

The firings shall continue (more than 14 shots may be required) until the five (5) lowest velocities for complete penetrations and the five (5) highest velocities for partial penetrations are within a velocity spread of 60 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 the difference between the lowest complete penetration velocity (LCP) and the highest partial penetration velocity (HPP) actually obtained. The ZMR for each V_{50} shall be less than 60 m/s. If the ZMR is greater than 60 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 60 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, a new sample should be selected for testing.

It is also necessary that the following additional conditions are complied with in order for the Probit analysis to work adequately:

- the shot with the lowest impact velocity should be a partial penetration and it should not be separated from the LCP by more than 20 m/s.

- the shot with the highest impact velocity should be a complete penetration and should not be separated from the HPP by more than 20 m/s.

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.

11.7.1.1 Calculation of the V_{50} . The V_{50} and standard deviation for each sample shall be computed by applying a maximum likelihood statistical analysis (DREV Probit) based on the cumulative normal distribution using all fair shots. If the V_{50} cannot be attained using one sample (e.g. for 64 grain RCC), because the specified velocity spread is not respected or insufficient fair impacts can be done on one shoot-pack, testing should be continued on a second shoot-pack from the same lot; the V_{50} can then be computed from the results obtained with these two samples. The arithmetic V_{50} shall be also computed for reference use by taking the arithmetic average of ten (10)

fair impact velocities consisting of the 5 highest velocities for partial penetration and the 5 lowest velocities for complete penetration within a velocity spread of 60 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.

11.7.1.2 V_{50} Compliance Verification. A valid ballistic fill material shall be declared as being in compliance with the performance requirements if the calculated V_{50} for each solution exceeds the minimum individual value for specified conditions and all other requirements are met. The average of the combined tests (MV_{50}) for each projectile will be rated against the minimum specified requirements and the spread must be within 30 m/s. If the minimum requirements are not met, then the testing must be repeated using new samples selected at random from the same lot.

11.7.2 Backface Deformation Resistance Test Sequence. A sufficient number of pre-test rounds shall be fired to have a reasonable assurance that each test round (9mm FMJ bullets) will have a striking velocity within the defined velocity spread allowed. The test specimen shall be weighed and placed on the clay backing material using two elastic bands to restrict its movement from the original position. The placement of the elastic bands will be such that they do not interfere with the impact point on the sample and they do not introduce significant stresses in the target material. The distance between the bands shall be approximately 150 mm centered to the intended impact location.

One test specimen shall be fired at the five impact locations (see Fig. 11.11) using the appropriate weapon and projectile such as to ensure that the angle of yaw is less than 3°. Penetration by any fair shot 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. While one specimen may be sufficient to complete the number of shots required, unfair impacts may require additional samples. A maximum number of 9 shots shall be fired per shoot-pack. Any unfair impact shall be disregarded in evaluating compliance with the requirements.

After each shot, the inside surface of the test specimen shall be examined and any visible evidence for a complete penetration shall be recorded. The backface deformation will be measured from the original planar surface of the prepared clay media using an appropriate depth gauge measurement tool (see Fig. 11.2). The test specimen shall be repositioned and flattened to ensure consistency. The specimen shall be restored as closely as practical to its original state, ensuring that the layers are smoothed as flat as possible. 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.

Should the results of any fair impact produce a complete penetration, or indentation exceeding 50 mm the protective material shall be declared non-compliant with the performance requirements. Any unfair impact shall be disregarded in evaluating compliance with the requirements. A minimum of five fair impacts out of nine possible

impacts on one panel must be obtained to make a valid sample test. When fewer than 5 fair impacts are obtained, the test specimen shall be rejected and replaced by a new one from the same lot and the test repeated.

11.7.2.1 Backface Deformation Compliance Verification. A test specimen shall be declared as being in compliance with the performance requirements if the backface deformation for any of the fair impacts is less than 50mm and no complete penetration of the armour material shall occur.

11.8 Test Report

11.8.1 A ballistic test report shall be prepared incorporating the following information:

- a) Date(s) of test series and name and location of facility.
- b) Sampling procedure, and full description of each ballistic shoot-pack set tested including: weight, size, thickness, number of plies, and plies sequence (hybrid), nominal areal density, quilting pattern (if applicable) material type, manufacturer and lot number.
- c) For each test series the barrel calibre, length, and twist if applicable, the specimen mounting configuration, and the precise projectile description.
- d) Temperature and humidity at the test facility, and sample pre-conditioned temperature if different from test facility.
- e) For each impact, the location of impact (shot pattern no), intended and actual striking velocities obtained, partial or complete penetration, fair or unfair hit, accepted or rejected impact.
- f) For each **V₅₀** test, firing sequence used, **V₅₀** computed using the maximum likelihood method, lowest complete penetration, highest partial penetration, zone of mixed results, and velocity spread for the ten values considered.
- g) For the combination of all **V₅₀** test values (as specified within) using a given projectile, average values obtained (**MV₅₀**), and velocity spread of the group.
- h) For the backface deformation test, indentation depth and number of plies penetrated for each impact, and average depth for the 5 accepted impacts.
- j) For each series, state compliance against ballistic performance requirements.
- k) Provide any supplementary information or remarks pertinent to the conduct of the test, or behaviour of the material.
- l) Provide names of the testing personnel, and any witnesses present.

TABLE 11.4.a – Preproduction Qualification Summary of Ballistic Fill

Test Sequence	V_{50} 17 gr FSP	V_{50} (Dry test) 16 gr Sphere	V_{50} (Wet test) 16 gr Sphere
Minimum no of shoot-packs	3	3	3
Minimum no of fair shots per V_{50}	14	14	14
Total no of fair shots	42	42	42
Nominal impact angle (deg)	0	0	0
Max. impact angle (deg)	5	3	3
Armour sample conditioning	Section 11.6.4 Dry	Section 11.6.4 Dry	Section 11.6.5 Wet
Witness/Backing material	Section 11.3.1	Section 11.3.1	Section 11.3.1
Target retention	Rigid Frame	Rigid Frame	Rigid Frame
Calibration V_{50} (m/s) (Lexan 9034 sheet)	405±10 (12.37-mm sheet)	405±10 (9.12-mm sheet)	405±10 (9.12-mm sheet)
Min. individual V_{50} (m/s)	500	455	415
Min. average MV_{50qc} (m/s) (average of 3 V_{50})	≥0.97xV50ca	≥0.97xV50ca	≥0.97xV50ca
Max diff. in 3 V_{50} tests (m/s)	30	30	40
Max individual ZMR (m/s)	60	60	70
Max average ZMR (m/s) (3 V_{50} tests)	50	50	60

TABLE 11.4.b – Preproduction Qualification Summary of Ballistic Fill

Test Sequence	V_{50} 1 gr Sphere	V_{50} 64gr RCC	V_p 9mm FMJ bullet
Minimum no of shoot-packs	3	6 (2 samples / V_{50})	1
Minimum no of fair shots per V_{50}	14	14	---
Total no of fair shots	42	42	5
Nominal impact angle (deg)	0	0	0
Max impact angle (deg)	3	3	3
Armour sample conditioning	Section 11.6.4 Dry	Section 11.6.4 Dry	Section 11.6.4 Dry
Witness/Backing material	Section 11.3.1 Rigid Frame	Section 11.3.1 Rigid Frame	Section 11.3.2 2 elastic bands with patting down between shots
Target retention			
Calibration V_{50} (m/s) (Lexan 9034 sheet)	562±10 (5.80-mm sheet)	275±10 (12.37-mm sheet)	---
Proof velocity, V_p (m/s)	---	---	365±7 5 shots with no perforation
Backface deformation (BD)	---	---	mean BD<44 mm max individual BD <50 mm
Min. individual V_{50} (m/s)	525	350	---
Min. average MV_{50qc} (m/s) (average of 3 V_{50})	≥0.97x V_{50ca}	≥0.97x V_{50ca}	---
Max diff. in V_{50} tests (m/s)	30	30	---
Max individual ZMR (m/s)	60	60	---
Max average ZMR (m/s) (combined V_{50} tests)	50	50	---

TABLE 11.5 - Quality Control Ballistic Material Lots

Test Sequence	V₅₀ 1 gr Sphere	V₅₀ (dry test) 16 gr Sphere	V₅₀ 17 gr FSP	V₅₀ (wet test) 16 gr Sphere
Min no. of shoot-packs per material lot for 3 V ₅₀	3	3	N/A	N/A
Min no. of shoot-packs per sub-lot for V ₅₀	N/A	N/A	1	1
Min no. of fair shots per test	14	14	14	14
Min total no of fair shots	42	42	14	14
Nominal impact angle (deg)	0	0	0	0
Max impact angle (deg)	3	3	3	3
Armour sample conditioning	Section 11.6.4 Dry	Section 11.6.4 Dry	Section 11.6.4 Dry	Section 11.6.5 Wet
Witness material	Section 11.3.1	Section 11.3.1	Section 11.3.1	Section 11.3.1
Target retention	Rigid Frame	Rigid Frame	Rigid Frame	Rigid Frame
Min individual V ₅₀ (m/s)	525	455	CONTROL 500	415
Min average MV _{50qc} (m/s) (average of 3 V ₅₀)	≥0.97xV _{50ca}	≥0.97xV _{50ca}	N/A	N/A
Max difference in 3 V ₅₀ tests (m/s)	30	30	N/A	N/A
Max individual ZMR (m/s)	60	60	60	60
Max average ZMR 3 V ₅₀ tests (m/s)	50	50	N/A	N/A

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- Figure 11.10 - Shot Pattern for Projectiles $\leq 7\text{mm}$ Diameter (dry target)
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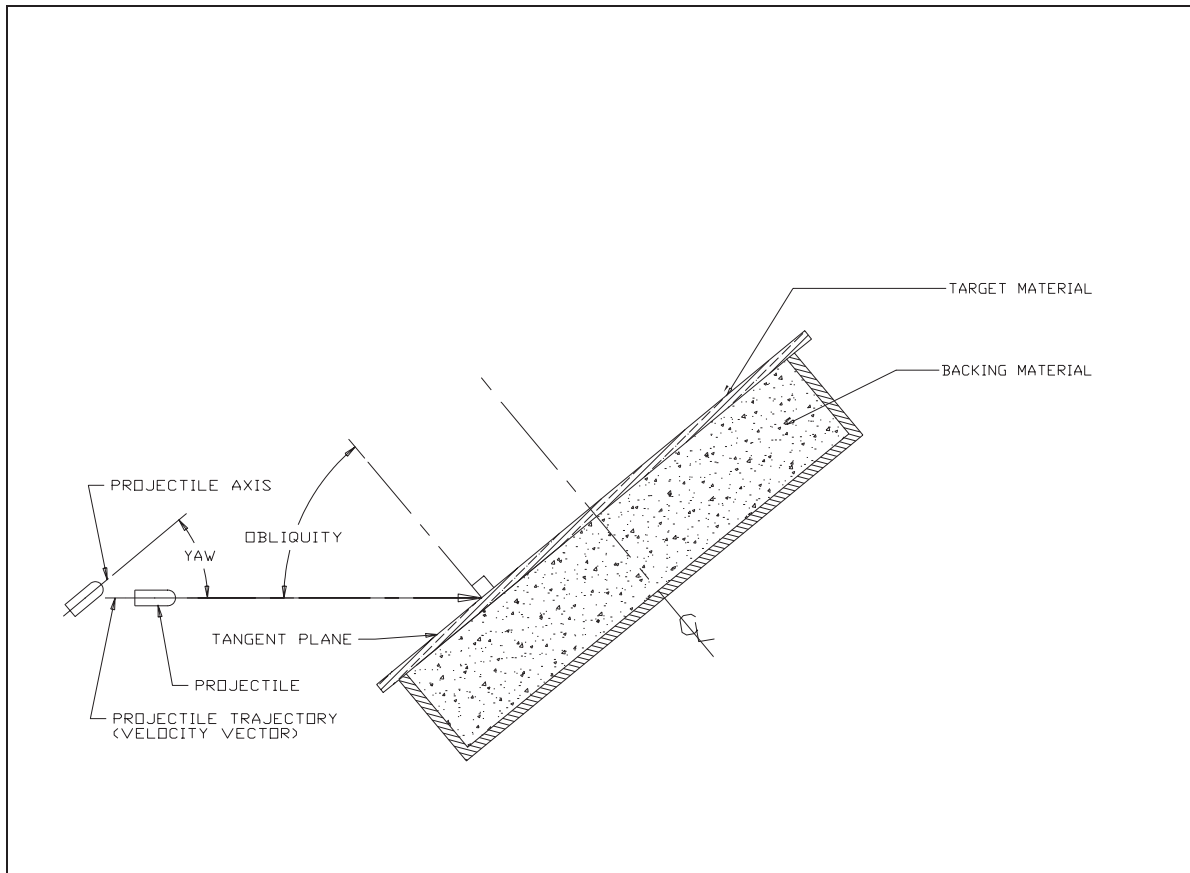


Figure 11.1 – Angle of Impact and Yaw

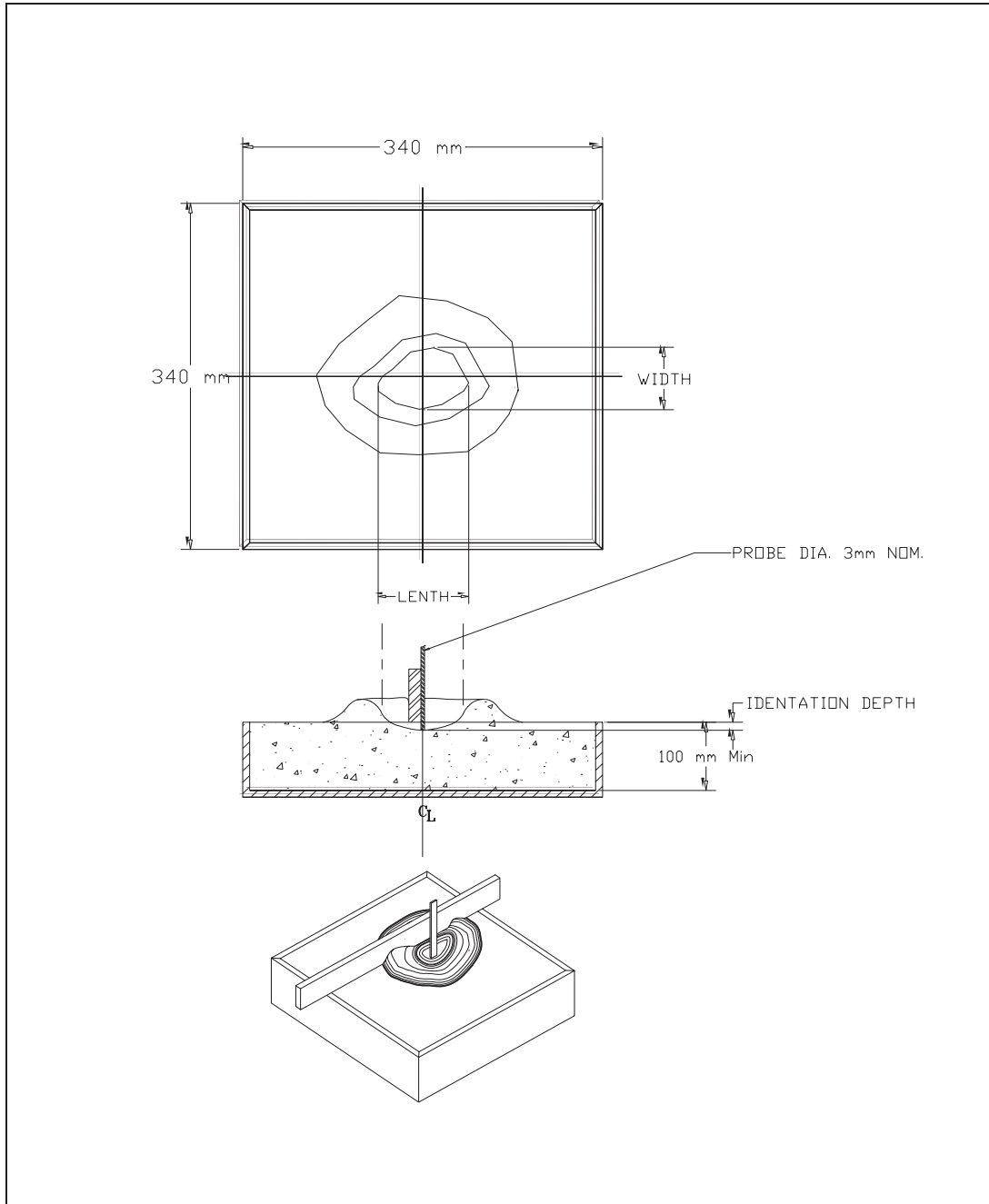


Figure 11.2 – Clay Block Dimensions and Cavity Measurement

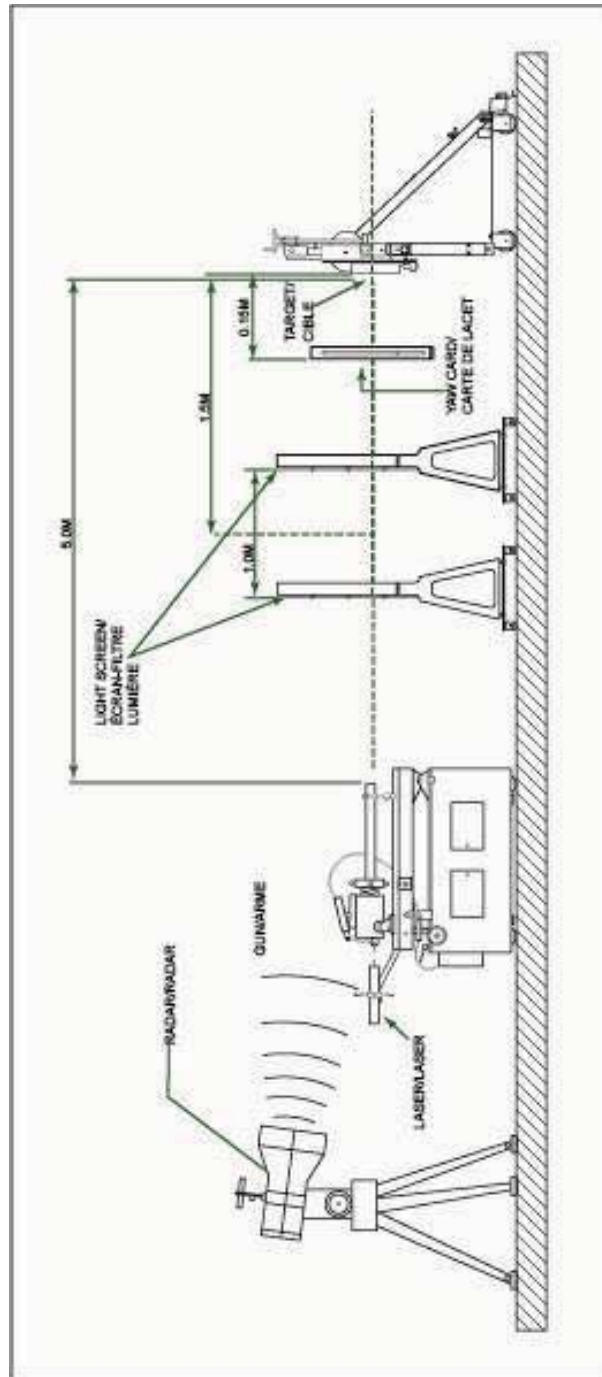


Figure 11.3 – Typical set-up used for Ballistic Testing

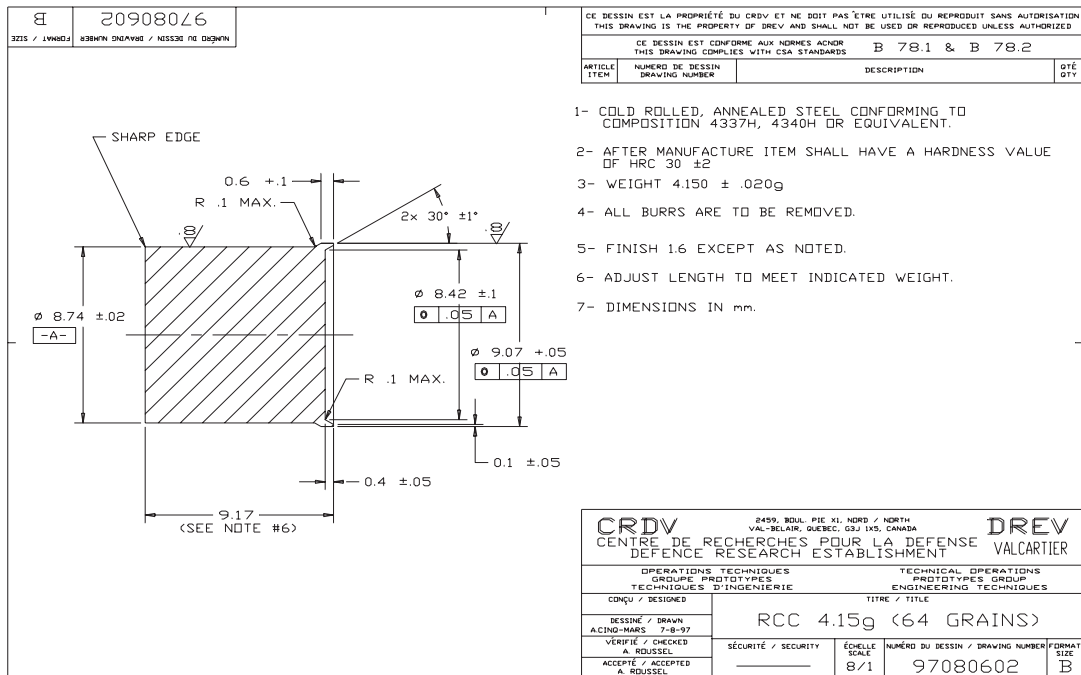


Figure 11.4 – Right Circular Cylinder (RCC) Dimensions

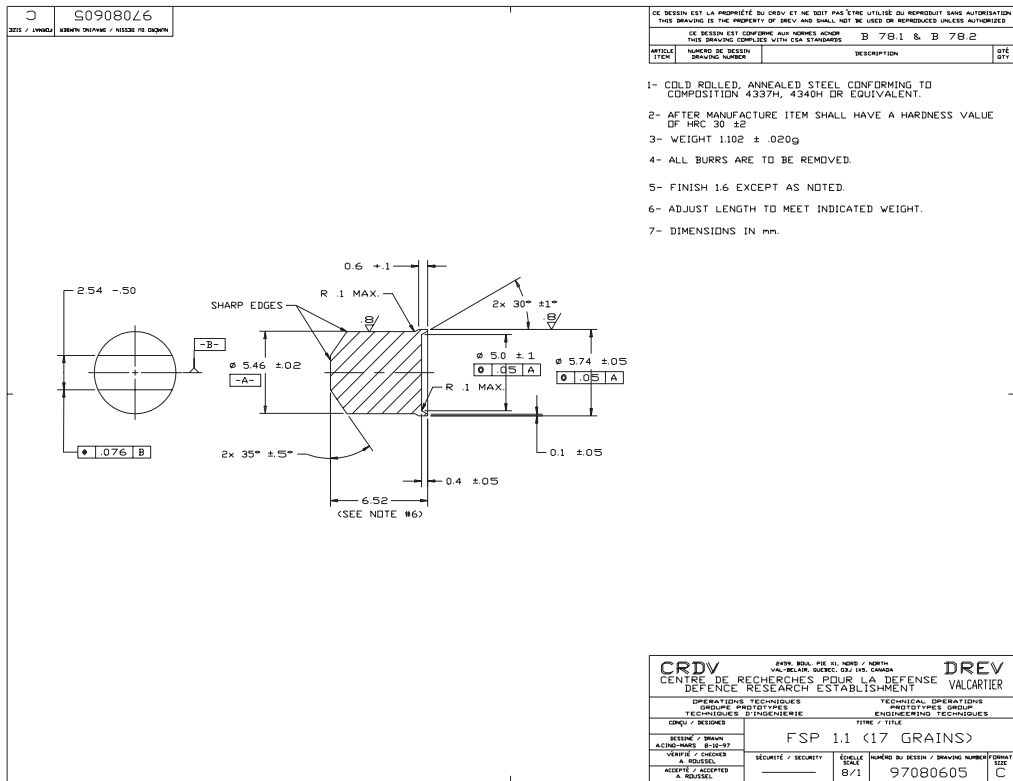


Figure 11.5 – Fragment Simulating Projectile (FSP) Dimensions

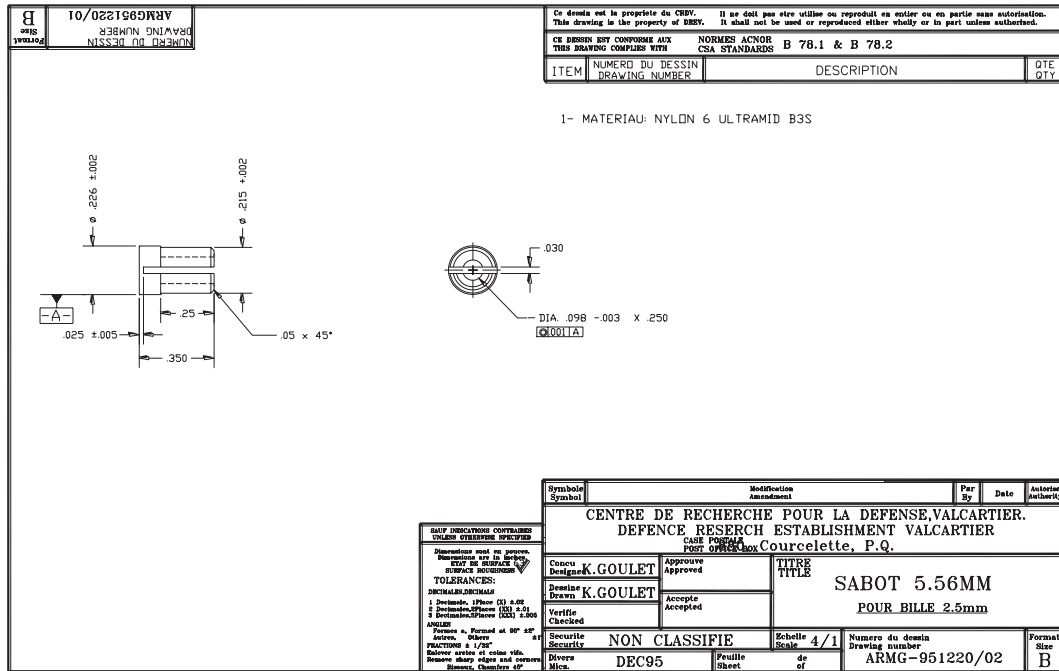


Figure 11.6 – Plastic Sabot for Launching 1-grain Sphere

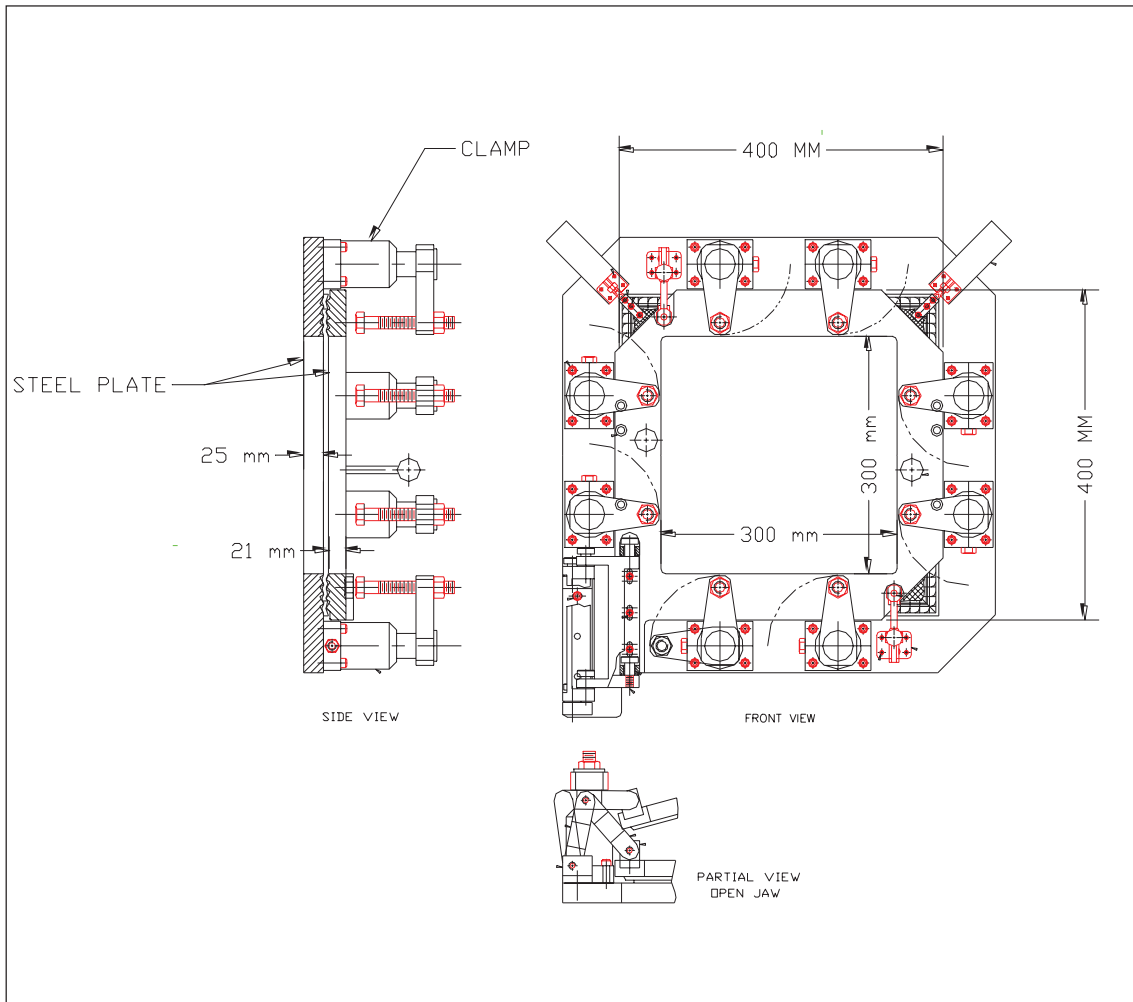


Figure 11.7 – Shoot-Pack Clamping Fixture

Figure 11.8 – Yaw Measurement with Paper Card

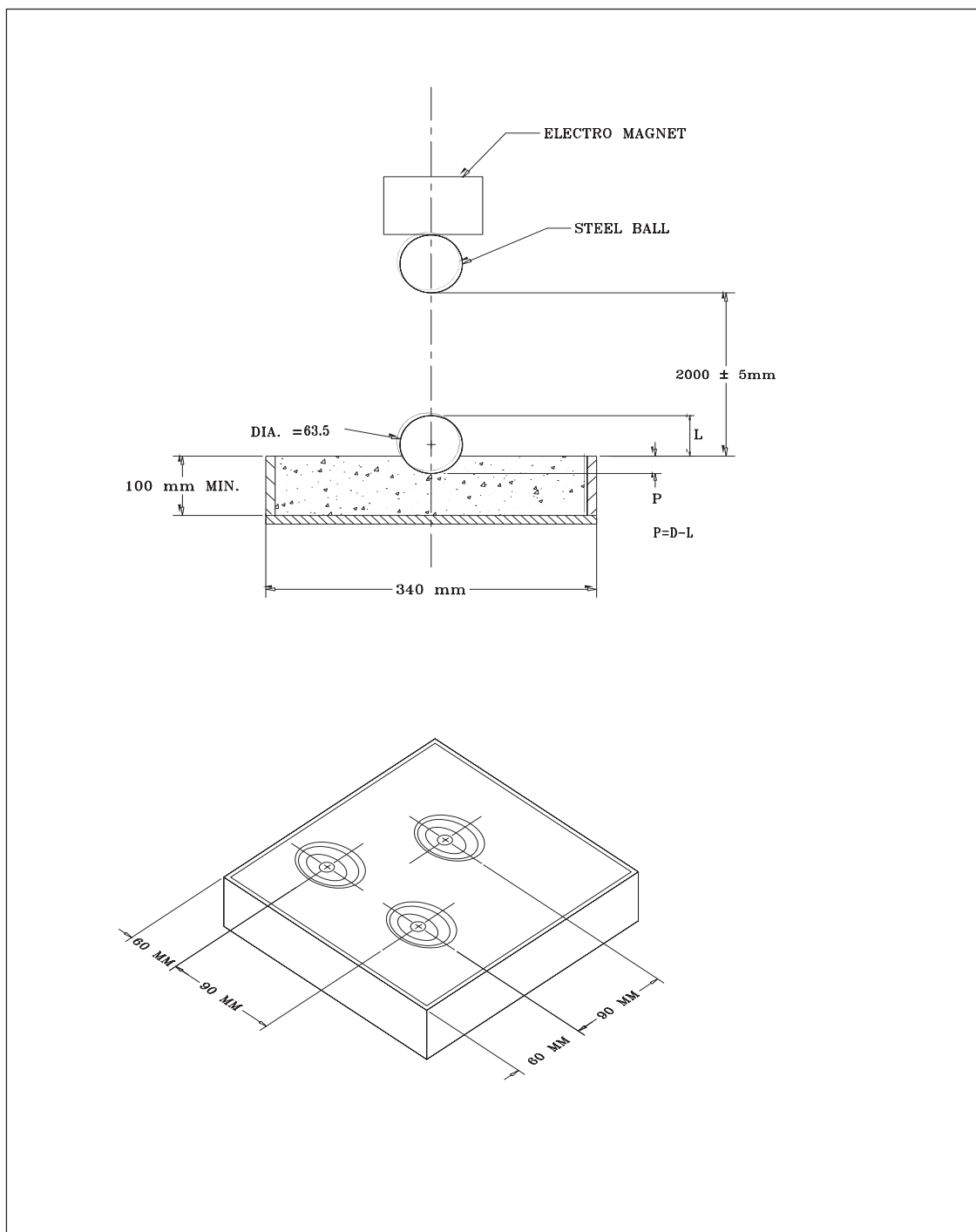


Figure 11.9 – Clay Block Calibration

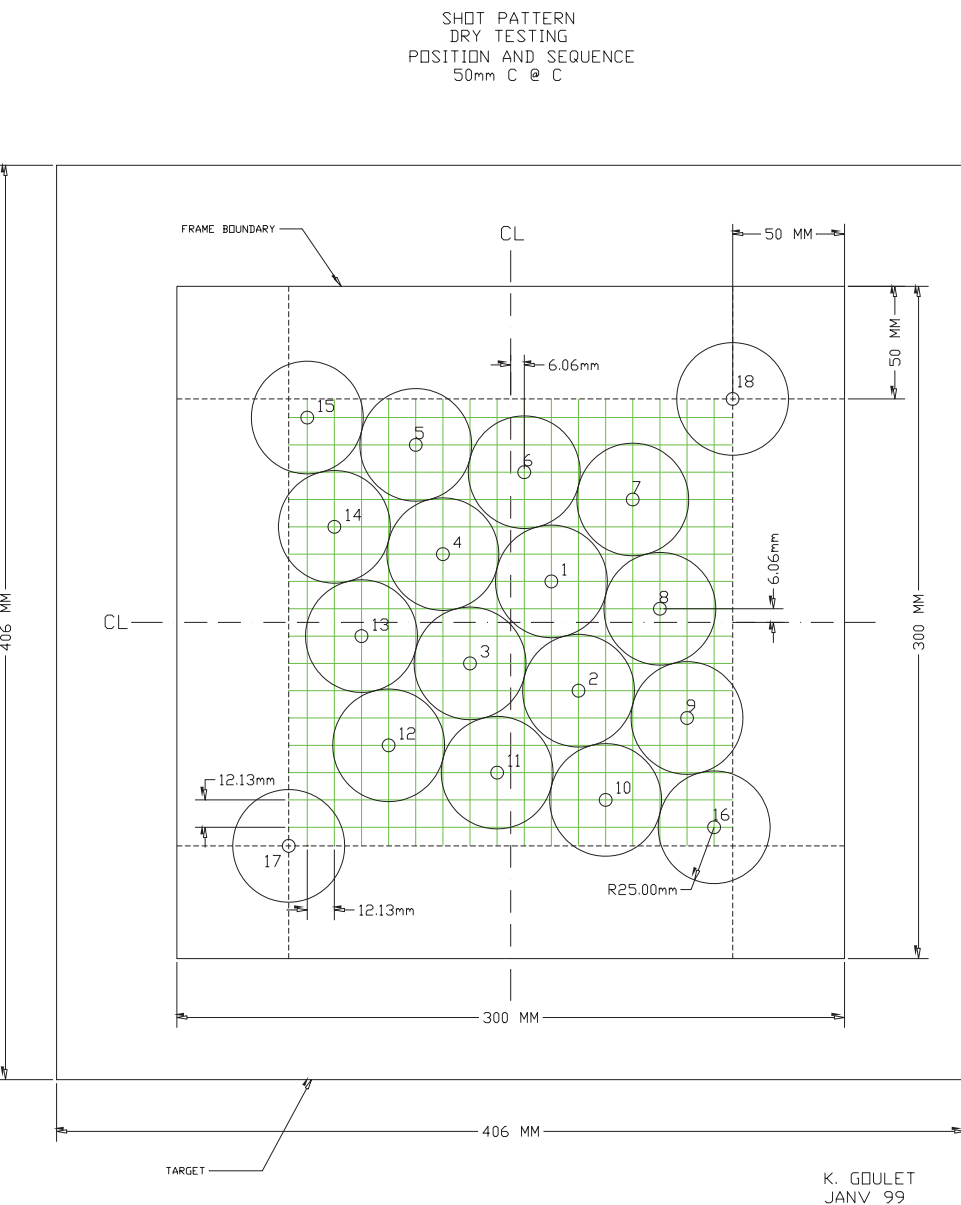


Figure 11.10 – Shot Pattern for Projectiles $\leq 7\text{mm}$ Diameter (dry target)

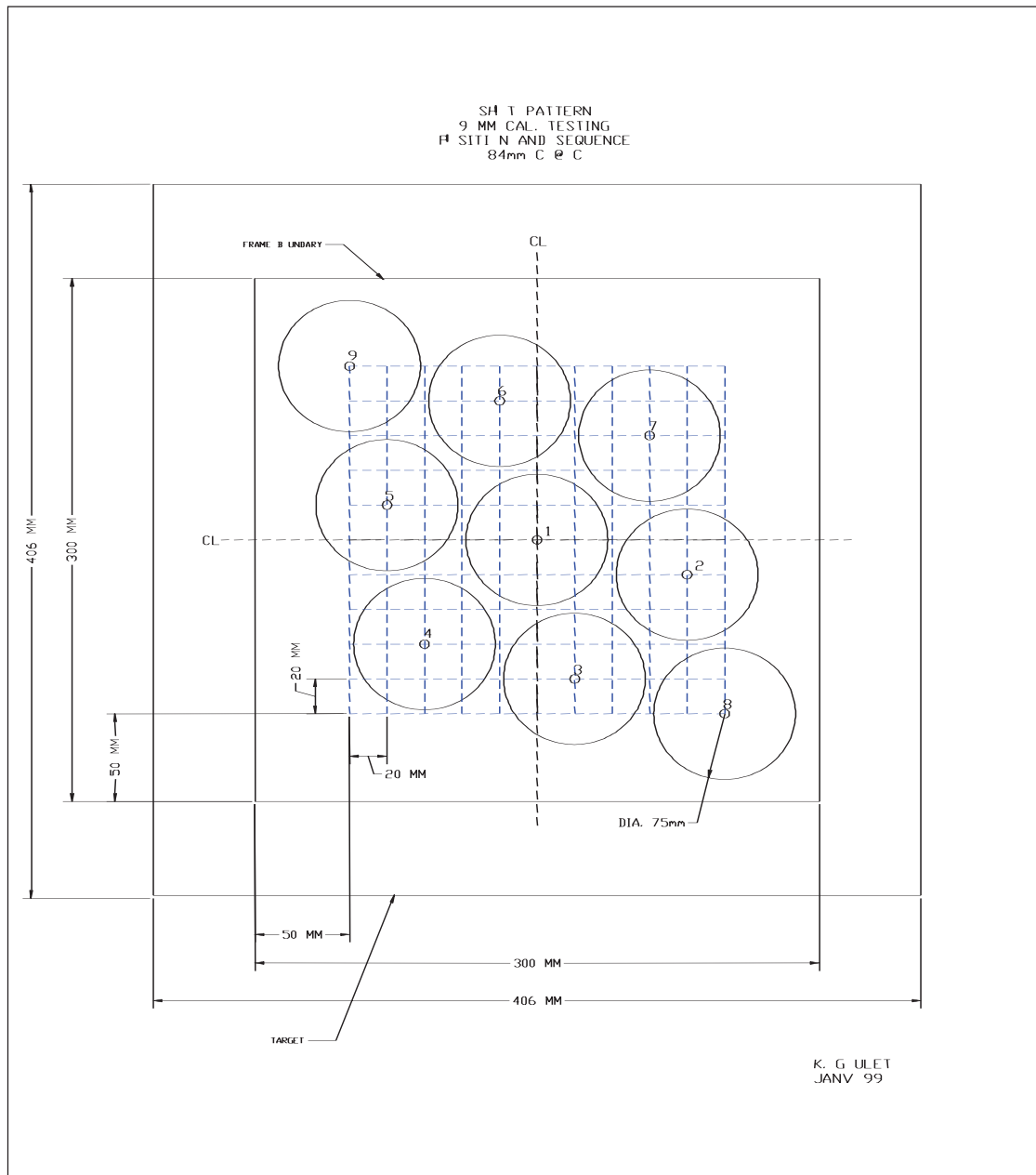


Figure 11.11 – Shot Pattern for Projectiles >7mm Diameter (dry target)

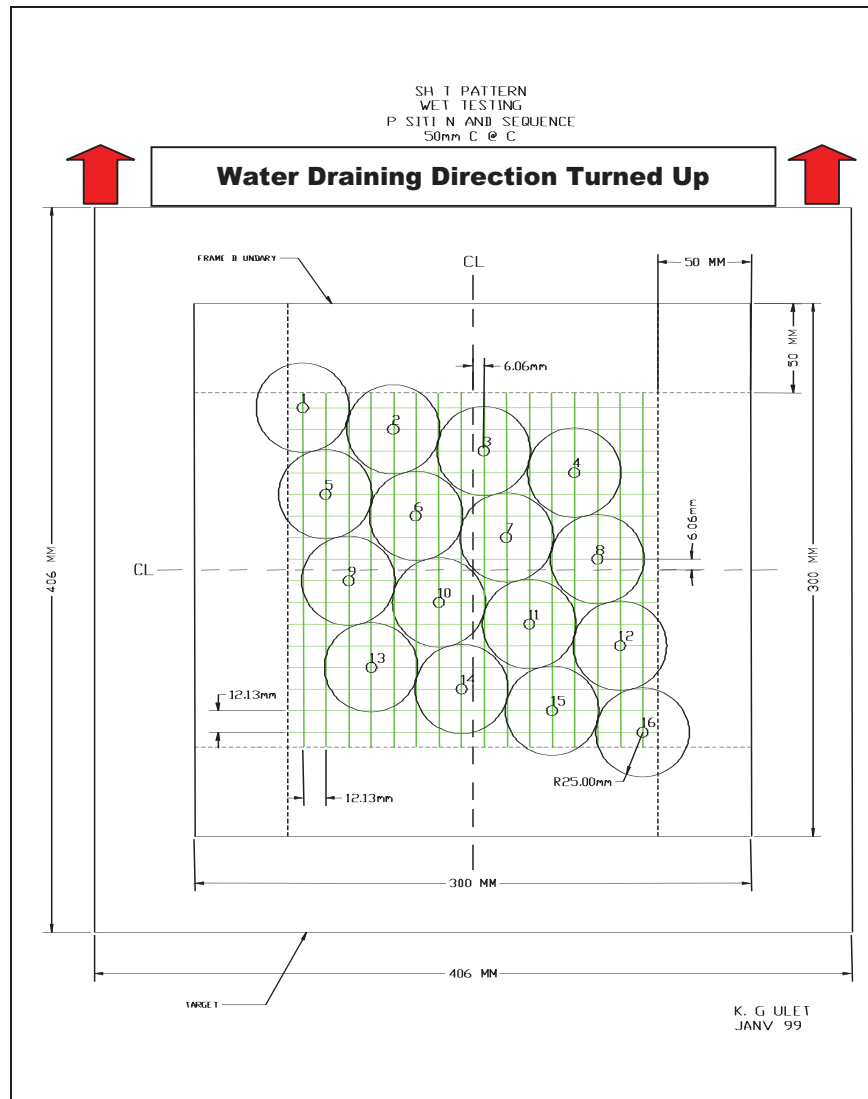


Figure 11.12 – Shot Pattern for Projectiles ≤ 7 mm Diameter (wet target)

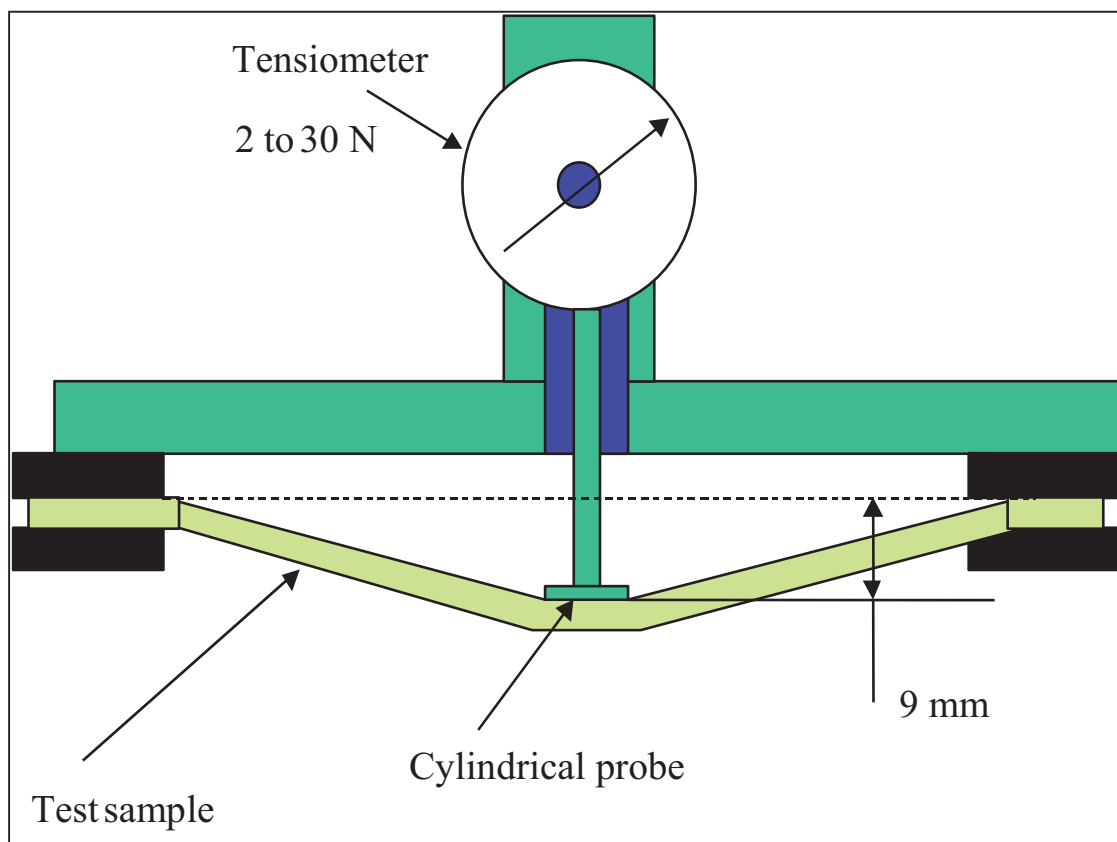


Figure 11.13 – Test Device for Measuring Ballistic Shoot-Pack Tightness

APPENDIX 2

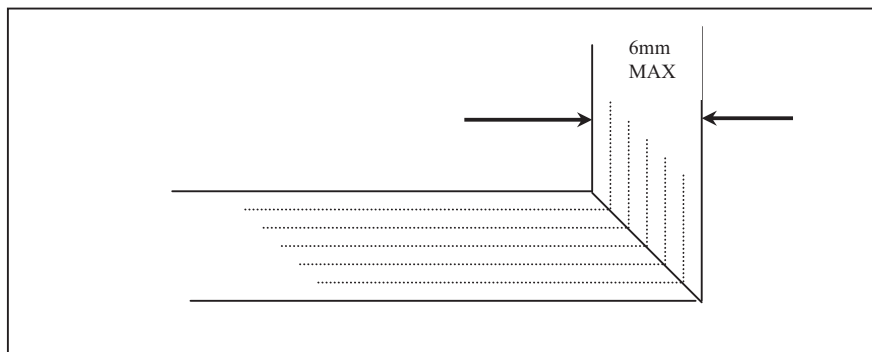
12.0 FPV BALLISTIC INSERT CONSTRUCTION

12.1 General. All workmanship shall be undertaken in accordance with the best commercial practices and by trades-persons duly qualified in their respective trades. The finished panels/inserts shall meet the dimensional requirements stated in the scale of measurements at Appendix 3 or 6 as applicable.

12.2 Cutting. Ballistic insert covers and panels shall be cut using government supplied pattern drawings. The Contractor shall be responsible for any adjustments necessary for make-up allowance to accommodate production methods or heat seams, however, the design configuration, grading, and technical performance requirements specified within shall be strictly adhered to.

12.3 Ballistic Materials. Each ballistic panel shall contain the layers of ballistic plies in the controlled design type, quantity, and direction as determined by the Contractor. Plies for each panel shall be tacked to prevent misalignment. Minor offset of layers, caused by material slippage during the tacking process is permitted but the feathering of the panel edge shall not exceed 6 mm as depicted in Figure 12.1 below. Front and rear ballistic panels shall be secured within the cover at the shoulders to prevent the panel from falling or shifting out of position.

FIGURE 12.1 - Tacked Front and Rear Panels



12.4 Finished Ballistic Inserts. The ballistic insert cover material shall be in accordance with DSSPM 2-2-80-223 Type 1. The material colour shall be black. All seams in these protective covers shall be water-resistant after fabrication to prevent moisture from accessing the ballistic panel. When tested in accordance with

CAN/CGSB-4.2, No. 32.2, welded seams shall have a minimum seam strength of 150N in both length and width directions.

12.4.1 TEST SPECIMENS. Welded seams for testing shall be prepared by the end item manufacturer and shall be fully representative of end item production, being made with the materials and processes that will be used in quantity production.

12.4.2 RESULTS. Individual values and the average result shall be reported. Test reports shall include a description of the seam tested, including seam width.

12.5 Tape Fastener. The tape fastener, hook, shall be nylon, adhesive backed, conforming to A-A-55126: Hook tape Type II, Class 1. The hook tape colour shall be black. When tested in accordance with the Machine Method specified in ASTM D413 for *Strip Specimens: Type A, 180° Peel*, the adhesion value shall be a minimum of 45N/25mm.

12.5.1 TEST SPECIMENS. A strip of hook tape, at least 150mm in length, shall be bonded to a piece of cover fabric. The length of the hook tape shall be aligned with the warp direction of the fabric. Samples for testing for testing shall be prepared by the end item manufacturer and shall be fully representative of end item production, being made with the materials and processes that will be used in quantity production

12.5.2 RESULTS. A total of 5 specimens shall be tested. Individual values and the average result shall be reported.

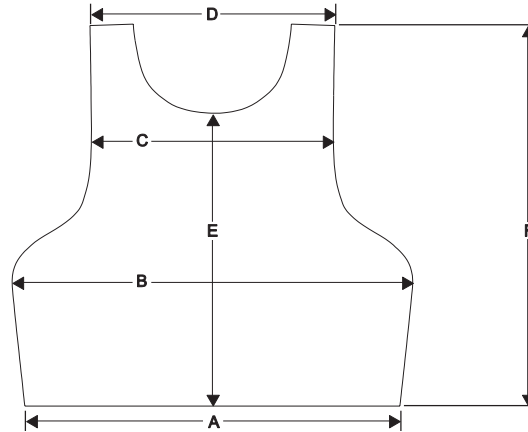
12.6 Labels. Labels for the ballistic inserts (see Appendix 4) shall be heat set adhesive white labels with black lettering. When tested in accordance with the Machine Method specified in ASTM D413 for *Strip Specimens: Type A, 180° Peel*, the adhesion value shall be a minimum of 5N/25mm.

12.6.1 TEST SPECIMENS. A strip of label material, at least 150mm in length, shall be bonded to a piece of cover fabric. The length of the label material shall be aligned with the warp direction of the fabric. Samples for testing shall be prepared by the end item manufacturer and shall be fully representative of end item production, being made with the materials and processes that will be used in quantity production.

12.6.2 RESULTS. A total of 5 specimens shall be tested. Individual values and the average result shall be reported.

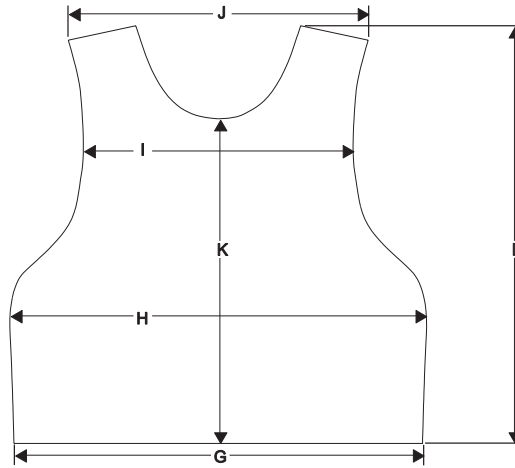
13.0 Scale of Measurement Tables – FPV Ballistic Panels

FRONT PANEL COMPONENT DIMENSIONS



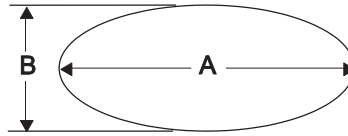
		A		B		C		D		E		F	
		Width Across Bottom of Panel		Width Across Widest Part of Panel		Width Across 2 Inches (51mm) Below Neck Line		Width Across Top of Panel		Centre Front Length		Overall Height of Panel	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
SHORT	X-SMALL	17.625	448	19.125	486	12.25	311	12.75	321	13.75	349	19.125	486
	SMALL	19.625	498	21.125	537	13.125	333	13.375	338	14.75	375	20.125	511
	MEDIUM	21.625	549	23.125	587	14	356	14	356	15.75	400	21.125	537
	LARGE	23.625	600	25.125	638	14.875	378	14.625	373	16.75	425	22.125	562
	X-LARGE	25.625	651	27.125	689	15.75	400	15.25	391	17.75	451	23.125	587
	XX-LARGE	27.625	702	29.125	740	16.625	422	15.875	408	18.75	476	24.125	613
	XXX-LARGE	29.625	752	31.125	791	17.50	445	16.5	426	19.75	502	25.125	638
REG	X-SMALL	17.625	448	19.125	486	12.25	311	12.75	321	14.75	375	20.125	511
	SMALL	19.625	498	21.125	537	13.125	333	13.375	338	15.75	400	21.125	537
	MEDIUM	21.625	549	23.125	587	14	356	14	356	16.75	425	22.125	562
	LARGE	23.625	600	25.125	638	14.875	378	14.625	373	17.75	451	23.125	587
	X-LARGE	25.625	651	27.125	689	15.75	400	15.25	391	18.75	476	24.125	613
	XX-LARGE	27.625	702	29.125	740	16.625	422	15.875	408	19.75	502	25.125	638
	XXX-LARGE	29.625	752	31.125	791	17.50	445	16.5	426	20.75	527	26.125	664
TALL	X-SMALL	17.625	448	19.125	486	12.25	311	12.75	321	15.75	400	21.125	537
	SMALL	19.625	498	21.125	537	13.125	333	13.375	338	16.75	425	22.125	562
	MEDIUM	21.625	549	23.125	587	14	356	14	356	17.75	451	23.125	587
	LARGE	23.625	600	25.125	638	14.875	378	14.625	373	18.75	476	24.125	613
	X-LARGE	25.625	651	27.125	689	15.75	400	15.25	391	19.75	502	25.125	638
	XX-LARGE	27.625	702	29.125	740	16.625	422	15.875	408	20.75	527	26.125	664
	XXX-LARGE	29.625	752	31.125	791	17.50	445	16.5	426	21.75	552	27.125	689
TOLERANCE (+/-)		0.125	3	0.125	3	0.125	3	0.25	6.35	0.125	3	0.125	3

REAR PANEL COMPONENT DIMENSIONS



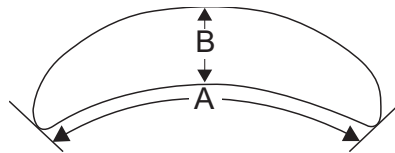
		G		H		I		J		K		L	
		Width Across Bottom of Panel		Width Across Widest Part of Panel		Width Across 2 Inches (51mm) Below Neck Line		Width Across Top of Panel		Centre Back Length		Overall Height of Panel	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
SHORT	X-SMALL	19.75	502	20.25	514	14	356	16	403	15.75	400	21	533
	SMALL	21.75	552	22.25	565	14.875	378	16.625	421	16.75	425	22	559
	MEDIUM	23.75	603	24.25	616	15.75	400	17.25	438	17.75	451	23	584
	LARGE	25.75	654	26.25	667	16.625	422	17.875	456	18.75	476	24	610
	X-LARGE	27.75	705	28.25	718	17.50	445	18.50	473	19.75	502	25	635
	XX-LARGE	29.75	756	30.25	768	18.375	467	19.125	491	20.75	527	26	660
	XXX-LARGE	31.75	806	32.25	819	19.25	489	19.75	508	21.75	552	27	686
REG	X-SMALL	19.75	502	20.25	514	14	356	16	403	16.75	425	22	559
	SMALL	21.75	552	22.25	565	14.875	378	16.625	421	17.75	451	23	584
	MEDIUM	23.75	603	24.25	616	15.75	400	17.25	438	18.75	476	24	610
	LARGE	25.75	654	26.25	667	16.625	422	17.875	456	19.75	502	25	635
	X-LARGE	27.75	705	28.25	718	17.50	445	18.50	473	20.75	527	26	660
	XX-LARGE	29.75	756	30.25	768	18.375	467	19.125	491	21.75	552	27	686
	XXX-LARGE	31.75	806	32.25	819	19.25	489	19.75	508	22.75	578	28	711
TALL	X-SMALL	19.75	502	20.25	514	14	356	16	403	17.75	451	23	584
	SMALL	21.75	552	22.25	565	14.875	378	16.625	421	18.75	476	24	610
	MEDIUM	23.75	603	24.25	616	15.75	400	17.25	438	19.75	502	25	635
	LARGE	25.75	654	26.25	667	16.625	422	17.875	456	20.75	527	26	660
	X-LARGE	27.75	705	28.25	718	17.50	445	18.50	473	21.75	552	27	686
	XX-LARGE	29.75	756	30.25	768	18.375	467	19.125	491	22.75	578	28	711
	XXX-LARGE	31.75	806	32.25	819	19.25	489	19.75	508	23.75	603	29	737
TOLERANCE (+/-)		0.125	3	0.125	3	0.125	3	0.25	6.35	0.125	3	0.125	3

SHOULDER PANEL COMPONENT DIMENSIONS



	A		B	
	Length Across Shoulder Panel		Height of Panel	
	inches	mm	inches	mm
X-SMALL/SMALL	10.375	264	4.5	114
MEDIUM	10.875	276	4.75	121
LARGE/X-LARGE	11.875	302	5.25	133
XX-LARGE/XXX-LARGE	12.875	327	5.75	146
TOLERANCE PLUS OR MINUS	0.125	3	0.125	3

COLLAR PANEL COMPONENT DIMENSIONS



	A		B	
	Length Along Bottom of Collar Panel		Width of Collar Panel at Centre	
	inches	mm	inches	mm
X-SMALL	9.5	241	2.375	60
SMALL	10	254	2.375	60
MEDIUM	10.5	267	2.375	60
LARGE	11	279	2.375	60
X-LARGE	11.5	292	2.375	60
XX-LARGE	12	305	2.375	60
XXX-LARGE	12.5	318	2.375	60
TOLERANCE PLUS OR MINUS	0.125	3	0.125	3

APPENDIX 4

14.0 LABELS AND MARKING

14.1 Marking. Four types of permanent marking shall apply to the ballistic inserts for the fragmentation protective vest:

- (1) Safety markings;
- (2) Traceability markings;
- (3) Identification labelling; and
- (4) Instruction labelling.

14.1.1 SAFETY LABEL OR MARKINGS. The **strike face** of both front and rear ballistic inserts shall be clearly marked or labelled with the following:

STRIKE FACE / FACE AVANT

14.1.2 TRACEABILITY MARKINGS. The Contractor shall provide a fail-safe system of identifying and linking ballistic insert lot numbers to ballistic material lots/sub-lots, key material finishing processes, and ballistic test records.

14.1.3 LABELS. All labels shall conform to D-80-001-055/SF-001 Type 1.

14.1.4 Identification Labels for the collar inserts and shoulder protector inserts shall be Style 1. The manufacturer, contract number, and lot/serial number markings for these three components shall be located on the ballistic insert covers inside the assembly. The Identification Label for the ballistic inserts (front/rear) shall be Style 2. Label sizes shall be as specified in Table 14.1 and labelling data as specified in Table 14.2.

Figure 14.1 - Identification Labels Style 1

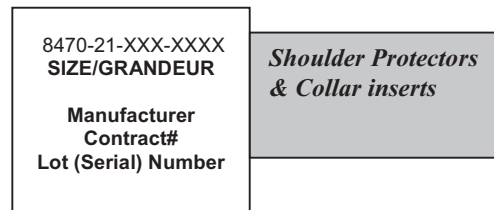


Figure 14.2 - Identification Labels Style 2

<p>ENGLISH NOMENCLATURE</p> <p>NOMENCLATURE FRANCAISE</p> <p>NSN 8470-21-XXX-XXXX and BARCODE (Refer to RFP)</p> <p>NATO SIZE/TAILLE OTAN</p> <p>Size/Grandeur</p> <p>MANUFACTURER</p> <p>CONTRACT -XXXXXXXXXX- CONTRAT</p> <p>LOT (Serial) NUMBER -XXXXXXXX- NUMERO DU LOT</p> <p>DND CANADA MDN</p>
--

Figure 14.3 - Instruction Label - FRONT AND REAR BALLISTIC INSERTS

<p>WARNING</p> <p>THIS INSERT PROVIDES PROTECTION AGAINST BOMB, SHELL AND GRENADE FRAGMENTS.</p> <p>MISE EN GARDE</p> <p>CE PANNEAU PROTEGERA CONTRE LES ECLATS D'OBUS ET DES GRENADES.</p>	
<p>CARE AND CLEANING INSTRUCTIONS</p> <p>REMOVE BALLISTIC INSERTS BEFORE WASHING</p> <ul style="list-style-type: none"> -HAND WASH WITH CLOTH, MILD SOAP AND WATER -DO NOT USE BLEACH -RINSE WELL TO REMOVE ALL TRACE OF SOAP -HANG TO DRY -DO NOT IRON -DO NOT DRYCLEAN -DO NOT DRY OR STORE IN DIRECT SUNLIGHT 	<p>MODE D'ENTRETIEN ET DE NETTOYAGE</p> <p>SORTIR LES PANNEAUX BALISTIQUES DE L'ENVELOPPE AVANT DE NETTOYER</p> <ul style="list-style-type: none"> -LAVER A LA MAIN AVEC UN TISSU, L'EAU ET LE SAVON DOUX -NE PAS UTILISER DE JAVELISANT -BIEN RINSER POUR ENLEVER TOUTE TRACE DE SAVON -ETENDRE MOUILLE -NE PAS REPASSER -NE PAS NETTOYER A SEC -NE PAS FAIRE SECHER OU ENTREPOSER EN PLEIN SOLEIL
    	

NOTE: Instruction labels applied **only** to the front and rear ballistic inserts (Figure 14.3) just below the identification label or as a combination label.

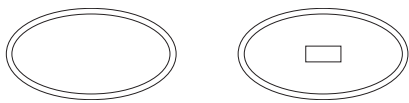
14.1.6 LETTERING SIZE. The character size used in the identification and instruction labels shall be readable and maximised to fit within the applicable label size. The identification "DND CANADA MND" should be approximately double that size. The character size used in the safety label or marking shall be a minimum of 1.5cm high. Traceability markings shall be as established by the Contractor.

14.2 Labels shall be permanently affixed and all printing and markings must be indelible. Approximate sizes of labels shall be in accordance with Table 14.1.

Table 14.1 Label Size and Application

External Markings	Front and Rear Insert, Ballistic	Shoulder Protector and Collar Inserts
Identification Label Style and Size (wide x high)	Style 2	Style 1
	Minimum 12cm x 6cm	Approximately 3cm x 3cm
Instructional Label size	Approximately 12cm x 12cm	N/A
Safety Marking size	Approximately 15cm x 2cm	N/A

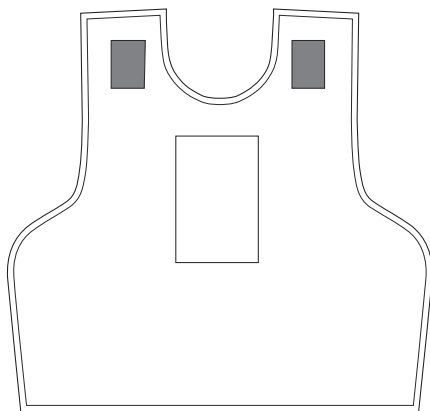
**Figure 14.5
LABEL LOCATIONS**



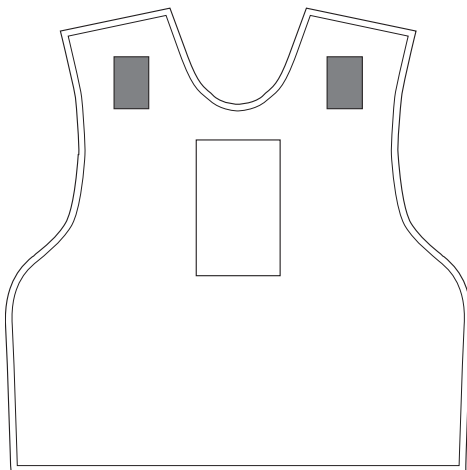
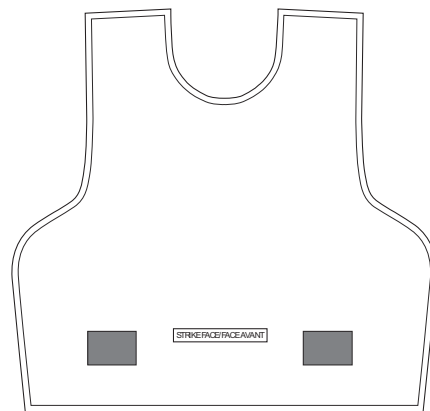
SHOULDER BALLISTIC INSERT



COLLAR BALLISTIC INSERT



FRONT BALLISTIC INSERT



REAR BALLISTIC INSERT

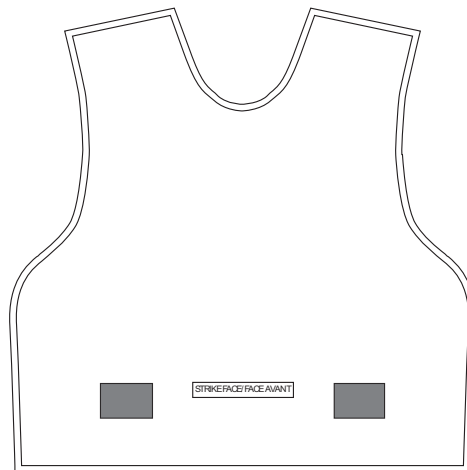


Table 14.2 – Identification Labelling Data

LABEL - STYLE 1			
Collar Ballistic Inserts		SIZE/GRANDEUR	NSN
X-Small/T-Petit		X-S/TP	8470-21-921-3199
Small/Petit		S/P	8470-21-921-3201
Medium/Moyen		M/M	8470-21-921-3202
Large/Grand		L/G	8470-21-921-3203
X-Large/T-Grand		XL/TG	8470-21-921-3204
XX-Large/TT-Grand		XXL/TTG	8470-21-921-3206
XXX-Large/TTT-Grand		XXXL/TTTG	8470-21-921-3207
Shoulder Ballistic Inserts		SIZE/GRANDEUR	NSN
Left & Right			
X-Small/T-Petit & Small/Petit		XS/TP & S/P	8470-21-001-5839
Medium/Moyen		M/M	8470-21-001-5846
Large/Grand & X-Large/T-Grand		L/G & XL/TG	8470-21-001-5853
XX-Large/TT-Grand & XXX-Large/TTT-Grand		XXL/TTG & XXXL/TTTG	8470-21-001-5854
LABEL - STYLE 2			
Ballistic Insert, FRONT			
SIZE/GRANDEUR	ENGLISH	NOMENCLATURE	NATO SIZE
			NSN

	NOMENCLATURE	FRANCAISE	TAILLE OTAN	
X-Small Short/T-Petit Courte	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	6070-7585	8470-21-921-3154
Small Short/Petit Courte	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	6070-8595	8470-21-921-3156
Medium Short/Moyen Courte	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	6070-9505	8470-21-921-3159
Large Short/Grand Courte	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	6070-0515	8470-21-921-3162
X-Large Short/T-Grand Courte	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	6070-1525	8470-21-921-3166
X-Small Regular/T-Petit Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-7585	8470-21-921-3155
Small Regular/Petit Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-8595	8470-21-921-3157
Medium Regular/Moyen Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-9505	8470-21-921-3160
Large Regular/Grand Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-0515	8470-21-921-3164
X-Large Regular/T-Grand Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-1525	8470-21-921-3167
XX-Large Regular/TT-Grand Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-2535	8470-21-921-3169
XXX-Large Regular/TTT-Grand Régulière	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	7080-3545	8470-21-921-3172
Small Tall/Petit Grande	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	8090-8595	8470-21-921-3158
Medium Tall/Moyen Grande	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	8090-9505	8470-21-921-3161
Large Tall/Grand Grande	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	8090-0515	8470-21-921-3165
X-Large Tall/T-Grand Grande	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	8090-1525	8470-21-921-3168
XX-Large Tall/TT-Grand Grande	BALLISTIC INSERT FRONT	PANNEAU BALISTIQUE AVANT	8090-2535	8470-21-921-3171
Ballistic Insert, REAR				

SIZE/GRANDEUR	ENGLISH NOMENCLATURE	NOMENCLATURE FRANCAISE	NATO SIZE TAILLE OTAN	NSN
X-Small Short/T-Petit Courte	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	6070-7585	8470-21-921-3173
Small Short/Petit Courte	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	6070-8595	8470-21-921-3175
Medium Short/Moyen Courte	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	6070-9505	8470-21-921-3178
Large Short/Grand Courte	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	6070-0515	8470-21-921-3181
X-Large Short/T-Grand Courte	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	6070-1525	8470-21-921-3185
X-Small Regular/T-Petit Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-7585	8470-21-921-3174
Small Regular/Petit Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-8595	8470-21-921-3176
Medium Regular/Moyen Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-9505	8470-21-921-3179
Large Regular/Grand Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-0515	8470-21-921-3183
X-Large Regular/T-Grand Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-1525	8470-21-921-3187
XX-Large Regular/TT-Grand Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-2535	8470-21-921-3191
XXX-Large Regular/TTT-Grand Régulière	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	7080-3545	8470-21-921-3194
Small Tall/Petit Grande	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	8090-8595	8470-21-921-3177
Medium Tall/Moyen Grande	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	8090-9505	8470-21-921-3180
Large Tall/Grand Grande	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	8090-0515	8470-21-921-3184
X-Large Tall/T-Grand Grande	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	8090-1525	8470-21-921-3189
XX-Large Tall/TT-Grand Grande	BALLISTIC INSERT REAR	PANNEAU BALISTIQUE ARRIERE	8090-2535	8470-21-921-3192

15.0 MODIFIED CIRCULAR BEND TEST METHOD

15.1 SCOPE

- 15.1.1 This test method covers the determination of the stiffness / flexibility of fabrics by the modified circular bend procedure.
- 15.1.2 This test method is applicable to most of the fabric types. The sample is a multi-layer system as in current soft armour systems.
- 15.1.3 This procedure does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this specification to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.
- 15.1.4 The values stated in either SI units or inch-pound units are to be regarded separately. Within the text, the inch-pound units are shown in brackets. The values stated in each system are not necessarily exact equivalents; therefore, each system should be used independently of the other.

15.2 REFERENCED DOCUMENTS

- ASTM D123 Standard Terminology Relating to Textiles.
- ASTM D1776 Practice for Conditioning Textiles for Testing.
- ASTM D1777 Standard Test Method for Thickness of Textile Materials.
- ASTM D4032 Standard Test Method for Stiffness of Fabric by the Circular Bend Procedure.
- ASTM E6 Practices for Force Verification of Testing Machines.

15.3 TERMINOLOGY

- 15.3.1 Circular bend - simultaneous, multidirectional deformation of a fabric in which one face of a flat specimen becomes concave and the other becomes convex.
- 15.3.2 Stiffness - resistance to bending. With regard to the circular bending of fabrics, resistance to multidirectional bending expressed as a predefined slope on the force-displacement curve when a specimen is pushed through an orifice.
- 15.3.3 Flexibility - Compared to stiffness, the lower the stiffness is, the higher the flexibility will be.
- 15.3.4 Areal density - mass per unit area.

15.4 SIGNIFICANCE AND USE

- 15.4.1 The modified circular bend test gives a force per unit length value related to fabric stiffness, simultaneously averaging stiffness in all directions. The stiffness gives the indication of the flexibility of the fabric.
- 15.4.2 The modified circular bend test is simple to perform and is suitable for most multi-layer systems, which cannot be accurately measured by the existing test methods. This method is a modification from ASTM D4032 in order to account for multiple-ply fabrics.

15.5 SUMMARY OF TEST METHOD

- 15.5.1 The modified circular bend test consists of pushing a multi-layer system through a 101.6mm (4") Ø orifice in a platform, using a hemispheric 25.4mm (1") Ø plunger. The fabric stiffness / flexibility can then be evaluated by studying the results of the average maximum secant slope found after a 30mm displacement. See secant slope definition in section 15.11 Analysis.

15.6 SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

15.6.1 Follow safety, health and environmental regulations and general laboratory precautions as given by the Material Safety Data Sheet, the Area Safety Manual and Laboratory Safety Rules.

15.7 APPARATUS

15.7.1 Testing Machine - for instance servo-hydraulic or standard screw driven machines. The testing machine shall be in conformance with practice ASTM E6, and shall satisfy the following requirements:

15.7.1.1 Testing Machine Heads - The testing machine shall have both an essentially stationary head (base) and a movable head (crosshead).

15.7.1.2 Drive Mechanism - The testing machine drive mechanism shall be capable of imparting to the crosshead a controlled velocity with respect to the base.

15.7.1.3 Load and displacement Indicator - The testing machine load and displacement sensing devices shall be capable of indicating the total load being supplied to the test specimen and the vertical displacement with an accuracy of $\pm 1\%$ of the indicated values or better.

15.7.2 Modified Circular Bend Stiffness Set-ups (Figures 15.1 to 15.4), having the following parts:

15.7.2.1 Supporting Frame (Fig. 15.1 and 15.2), 203 x 305 x 127 mm (8 x 12 x 5 in.), or equivalent, steel box, with a 152mm (6 in.) diameter orifice at the top surface. The top surface plate is 12 mm (0.5 in.) thick. The structure is fixed to the testing machine base.

15.7.2.2 Platform, 203 x 203 x 6 mm (8 x 8 x 0.25 in.) or equivalent, smooth-polished steel, with 102 mm (4 in.) diameter orifice (Fig. 15.2 a. and b.). The lap edge of the orifice should be rounded at a radius of 3.2mm (0.125 in.). For smoothness and uniform friction conditions, one ply of a polyester lining *, having the same size as the specimen, is laid on the top surface (Fig. 15.3 a.). The polyester lining has the same size as the specimen and shall bend freely with it. The platform is placed on the top the supporting structure.

- 15.7.2.3 Plunger, hemispherical, 25.4 mm (1 in.) \varnothing (Fig. 1 and 3), smooth-polished steel. The plunger, mounted on the testing machine crosshead, should be concentric with the platform's orifice. The bottom of the plunger should be flush in contact with the specimen top surface. The downward force is applied from this position.
- 15.7.2.4 Scale, capable of weighing to the nearest 1.0 mg.
- 15.7.2.5 Thickness or Dial gauge, capable of measuring to the nearest 0.01 mm.

* Commercially available polyester lining with the following average characteristics:

areal weight : $66 \pm 4 \text{ gr/m}^2$; thickness = $0.075 \pm .01 \text{ mm}$ (0.003in).

15.8 PREPARATION OF TEST SPECIMENS

- 15.8.1 Cut specimens square from new and unused material. The specimen dimensions shall be 152 x 152mm (6 x 6 in.). The specimens shall be free of any stitching pattern, unless a quilted solution is proposed (refer to Instructions to Bidders).
- 15.8.2 Prepare a minimum of 10 specimens for each sample. Ten individual results shall be used for the material's flexibility calculations.
- 15.8.3 Avoid selvages, end pieces, and creased or folded places.
- 15.8.4 Handle the specimens as little as possible.

15.9 CONDITIONING

- 15.9.1 Bring the specimens to moisture equilibrium, as directed in Practice ASTM D 1776. The standard atmosphere for testing textiles is $21 \pm 1^\circ\text{C}$ ($70 \pm 2^\circ\text{F}$) and $65 \pm 2\%$ relative humidity. However, an environment with a temperature of $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and a relative humidity of $50 \pm 5\%$ is acceptable.

15.10 TEST PROCEDURE

- 15.10.1 Measure the dimensions of the specimen, its thickness and its weight.
- 15.10.2 Test the adequately conditioned specimens in a standard atmosphere for testing as described in section 15.9.1.

- 15.10.3 Handle the test specimens carefully to avoid altering the natural state of the material.
- 15.10.4 Select a load cell with a capacity in order to have the results within 10 and 90 % of its total range.
- 15.10.5 Mount the platform supporting structure, the platform and the selected plunger, with the plunger concentric with the orifice.
- 15.10.6 Set the crosshead speed to 15 mm/mn (0.6in./mn).
- 15.10.7 Set the data acquisition rate to a minimum of 6.67 points per second.
- 15.10.8 Centre the specimen on the orifice platform below the plunger, using the centering marks. For non-symmetric hybrid plies lay-up, the face in contact with the body shall be the bottom layer in contact with the lining material.
- 15.10.9 Lower the plunger to bring it tangent with the top of the specimen without pushing on it.
- 15.10.10 Re-initialise the load and the displacement.
- 15.10.11 Start the test and record the load versus the vertical displacement until the specimen is pushed through the orifice. Avoid touching the specimen during testing. Discard any result where the specimen undergoes any other external force than that supplied by the test machine.
- 15.10.12 Continue as directed in 15.10.8 through 15.10.11 to test the remaining specimens.

15.11 ANALYSIS

- 15.11.1 For the set-up, compute the following data for all type of materials:
 - 15.11.1.1 Areal density of the individual specimens.
 - 15.11.1.2 Trace load-displacement curves for each individual specimen.
 - 15.11.1.3 Determine the maximum load after 30mm displacement (P).
 - 15.11.1.4 Determine the displacement (D) associated with this maximum load found previously (P).

- 15.11.1.5 Secant Slope General Calculation Procedure. This slope method is defined as a line between two points: the origin (zero) and the maximum load found after 30 mm displacement. (See Figure 5)
- Determine the slope of the linear curve (S) between zero and the displacement (D) corresponding to a maximum load found after 30mm (P) as follows: $S = P/D$
 - Repeat steps for each specimen.
 - To calculate the average maximum secant slope for a particular material, do the average of all calculated maximum secant slopes of each specimen.
 - If a curve has a secant slope value that is **3 standard deviations away** from the average value calculated previously, eliminate that curve and recalculate the average maximum secant slope value.
 - Calculate the standard deviation for each average maximum secant slope value.

15.12 REPORT

- 15.12.1 State that the specimens were tested as directed by this procedure. Describe the material or product tested.
- 15.12.2 Report the following information:
- 15.12.2.1 Individual areal density, average areal density and the standard deviation.
 - 15.12.2.2 Individual thickness, average thickness and the standard deviation.
 - 15.12.2.3 Load-displacement curves.
 - 15.12.2.4 Average maximum secant slopes after 30mm displacement and standard deviations.
 - 15.12.2.5 Bar chart histograms of all materials.
 - 15.12.2.6 Number of specimens tested.
 - 15.12.2.7 Test machine type and set-up description.

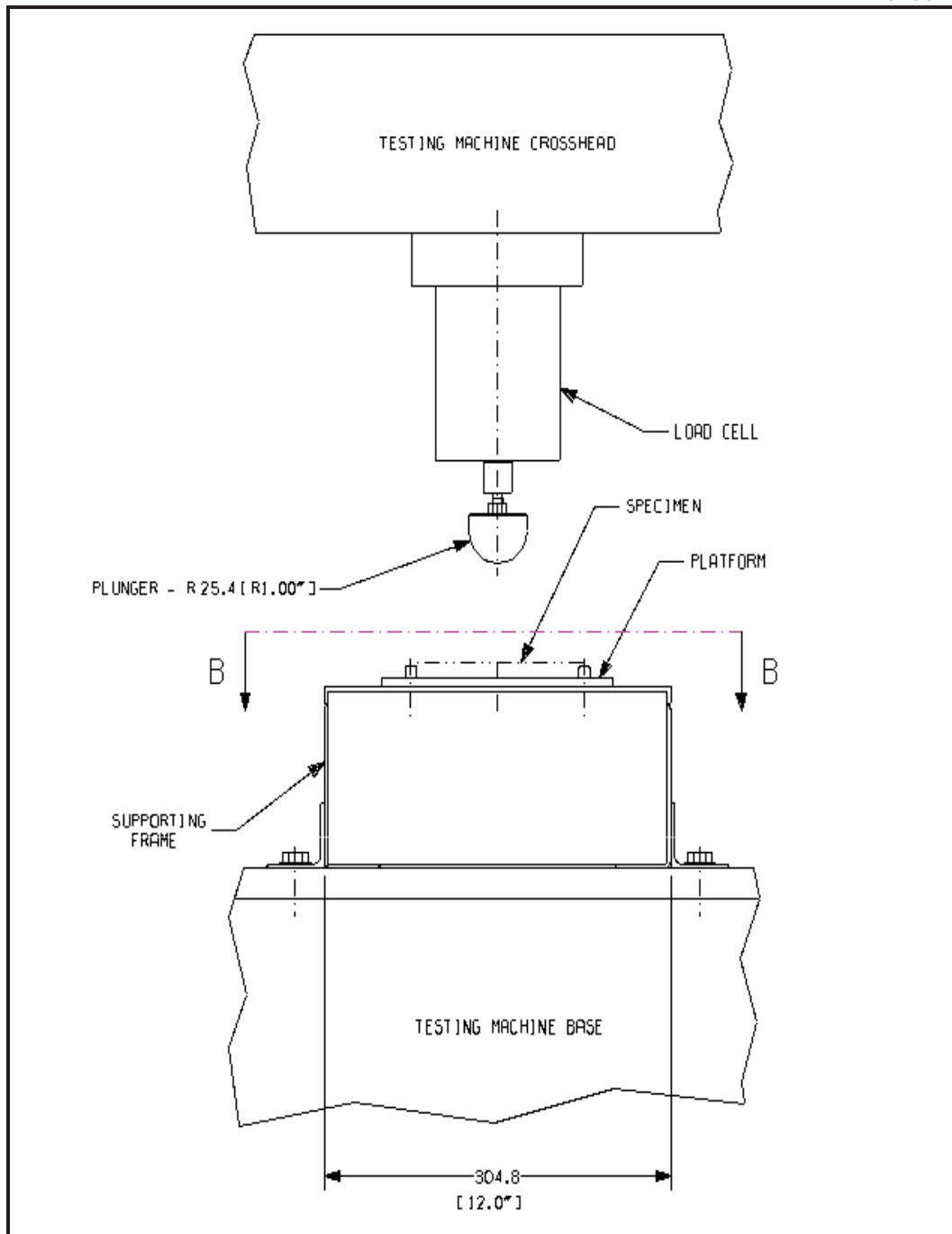
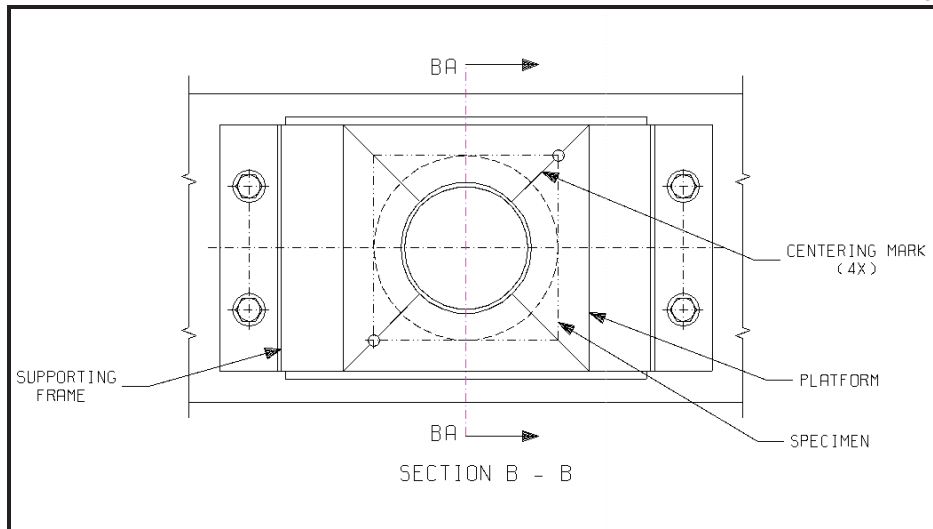
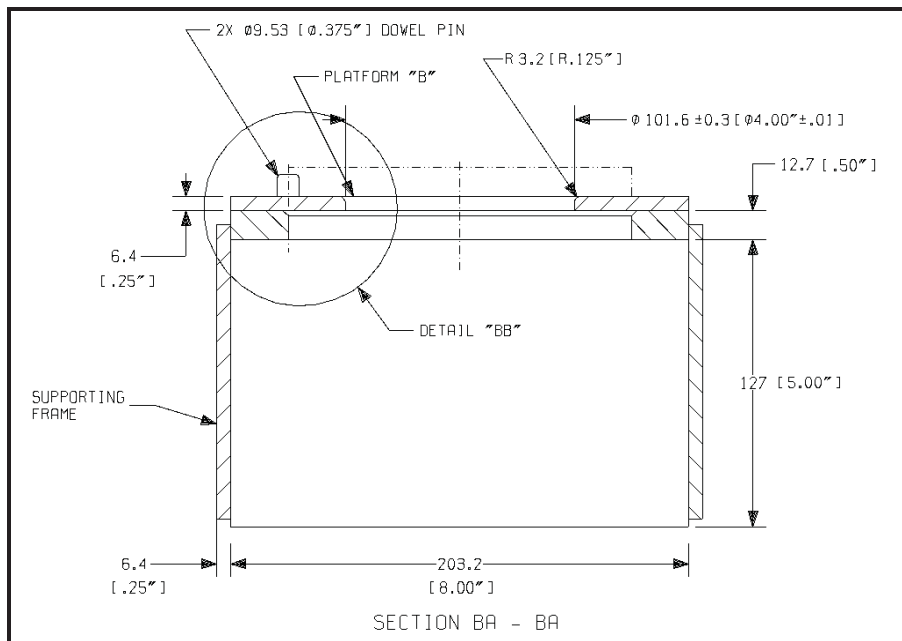


Figure 15.1. General View of the New Test Method

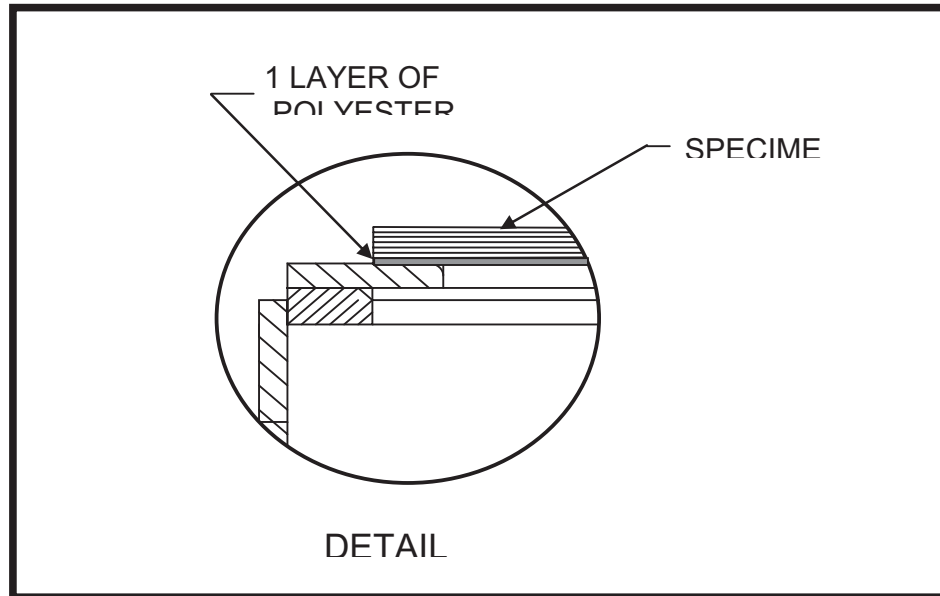


(a) Section BB from Figure 15.1

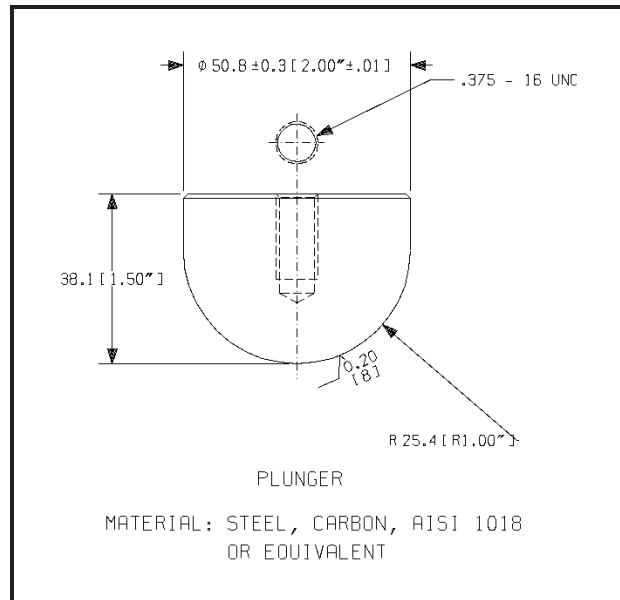


(b) Section BA-BA from Section BB

Figure 15.2. Test Set-Up: Supporting Frame and Platform



(a) Detail BB from Figure 2(b)



(c) Test Set-Up: Plunger 1"

Figure 15.3. Test Specimen and Plunger

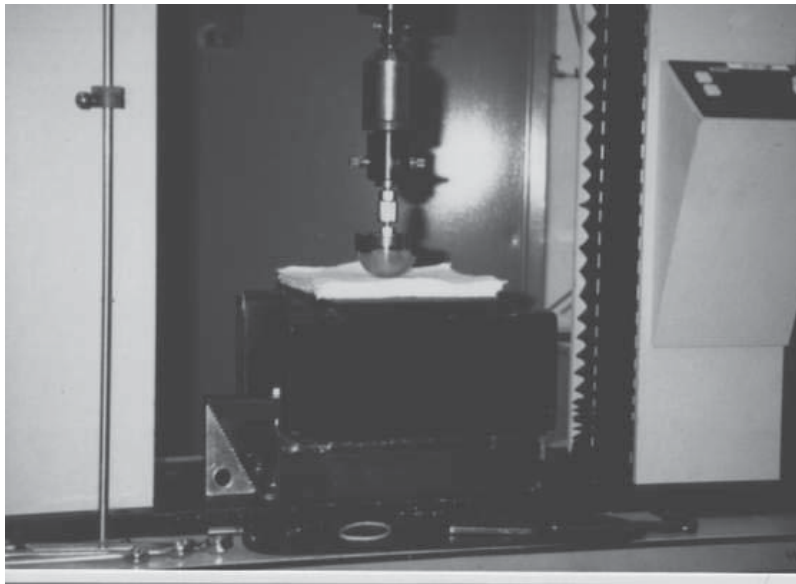


Figure 15.4. A typical Specimen Under Testing

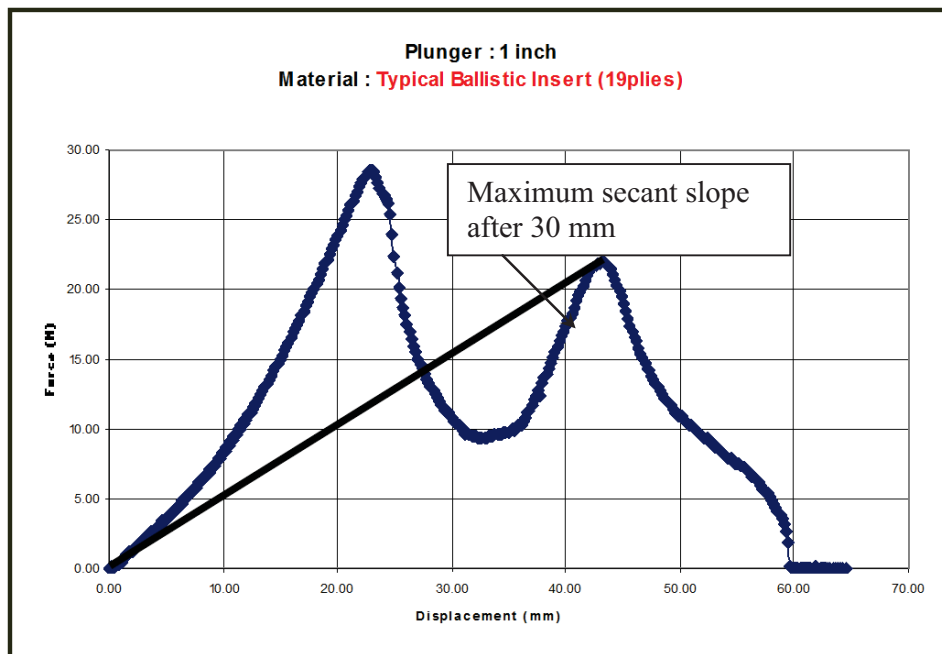


Figure 15.5. An example of maximum secant slope

16.0 FPV Accessory Inserts

ISSUED UNDER SEPARATE COVER

**Includes Stylecode Drawings
Scale of Measurement (Metric & Imperial)
Linear Goods Data and
Labelling Data (Bilingual)**



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CONTRACT DATA REQUIREMENTS LIST



MODIFIED FRAGMENTATION PROTECTIVE VEST FOR THE CANADIAN ARMY

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

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) DND Form 1413							
A. SYSTEM / ITEM FPV Modular Components				B. CONTRACT / RFP NUMBER W8486-149840			
C. SOW IDENTIFIER 2184DE-18470-200		D. DATA CATEGORY Administration		E. CONTRACTOR N/A			
1. ITEM NUMBER 001		2. TITLE OR DESCRIPTION OF DATA Technical Review Records		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) ADMD-17001		5. CONTRACT REFERENCE SOW paragraph 3.3.3		6. REQUIRING OFFICE DSSPM 2-7			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ASGEN	12. DATE OF 1 st SUBMISSION ASREQ	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		
11. REMARKS Block16: 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. Additional addressees will be periodically identified by the Technical Authority and the Contracting Officer.					DRAFT	FINAL	
						REG	REP
				PWGSC	0	1	0
				DSSPM3-5-1	0	1	0
PREPARED BY DSSPM3-5-1/C		DATE MAR 2014	APPROVED BY DSSPM 3				
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) Form 1413							
A. SYSTEM / ITEM FPV Modular Components				B. CONTRACT / RFP NUMBER W8486-149840			
C. SOW IDENTIFIER 2184DE-18470-200		D. DATA CATEGORY System Engineering		E. CONTRACTOR N/A			
1. ITEM NUMBER 002		2. TITLE OR DESCRIPTION OF DATA Test Records		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) ENGD-17001		5. CONTRACT REFERENCE SOW paragraph 3.5.2		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ASGEN	12. DATE OF 1 st SUBMISSION Block 16 ASREQ	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUB SUBMISSION N/A	A. ADDRESS	B. COPIES		
16. REMARKS Block16: A. Written notification of the First Article qualification series shall be submitted to the Technical Authority (DSSPM 3-5-1) and to the DND Quality Assurance staff at least two weeks prior to the review. Written notification shall also be submitted for any qualification series of accessory items, re-qualification of a failed lot, or contract options exercised by the Government. B. A written summary including test reports for any special test series (as defined within DID ENGD-17001) shall be submitted through the DND Quality Assurance Representative to DSSPM 3-5-1 within two weeks of the test series. Routine production test data shall be recorded and maintained in accordance with the QA Plan.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5-1	0	2	0
				QAR	0	1	0
PREPARED BY DSSPM3-5-1/C		DATE MAR 2014	APPROVED BY DSSPM 3				
17. CONTRACT FILE/DOC NUMBER		18. ESTIMATED NO OF PAGES	19. ESTIMATED PRICE	15. TOTAL	0	3	0

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item)					DND Form 1413		
A. SYSTEM / ITEM FPV Modular Components				B. CONTRACT / RFP NUMBER W8486-149840			
C. SOW IDENTIFIER 2184DE-18470-200		D. DATA CATEGORY Integrated Logistic Support		E. CONTRACTOR N/A			
1. ITEM NUMBER 003		2. TITLE OR DESCRIPTION OF DATA Packaging Specification		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) ILSD-17001		5. CONTRACT REFERENCE SOW paragraph 3.6		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ONE/R	12. DATE OF 1 st SUBMISSION Block 16 ASGEN	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUB SUBMISSION N/A	A. ADDRESS	B. COPIES		
16. REMARKS Block16: The current DND specification sheets will be provided to the Contractor for review. Any necessary revisions to the current packaging specification shall be provided by the Contractor in draft form at the Production Readiness Review meeting for review and approval of any mutually agreed revisions. The final version shall be provided by the Contractor in electronic format (WORD and PDF) and in hard copy as specified in block 14.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5-1	1	2	0
PREPARED BY DSSPM3-5-1/C		DATE MAR 2014	APPROVED BY DSSPM 3				
17. CONTRACT FILE/DOC NUMBER		18. ESTIMATED NO OF PAGES	19. ESTIMATED PRICE	15. TOTAL	1	2	0

ANNEX D CONTRACT DATA REQUIREMENTS LIST (1Data Item) DND Form 1413							
A. SYSTEM / ITEM FPV Modular Components				B. CONTRACT / RFP NUMBER W8486-149840			
C. SOW IDENTIFIER 2184DE-18470-200		D. DATA CATEGORY Publications		E. CONTRACTOR N/A			
1. ITEM NUMBER 004		2. TITLE OR DESCRIPTION OF DATA User Manual and Tape Measure		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) TMPB-17001		5. CONTRACT REFERENCE SOW paragraph 3.7		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ONE/R	12. DATE OF 1 st SUBMISSION Block 16 ASGEN	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUB SUBMISSION N/A	A. ADDRESS	B. COPIES		
REMARKS Block 16: The in-service manual and disposable tape samples will be provided during Bid Evaluation (for pricing) as specified in Annex F (Instructions to Bidders). The electronic version shall be delivered to the Contractor at the contract award meeting. The final Proof Instructions and disposable tape measure template, incorporating all mutually agreed revisions, shall be delivered by the Contractor for the Production Readiness Review meeting in electronic format (WORD and PDF) and in hard copy as specified in Block 14. NOTE: The tape measures and reproducible copies of the manual shall be delivered 1/FPV system package as outlined in the contract.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5-1	3	3	Note Block 16
PREPARED BY DSSPM3-5-1/C1		DATE MAR 2014	APPROVED BY DSSPM 3				
17. CONTRACT FILE/DOC NUMBER		18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	3	3
							1/FPV



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DATA ITEM DESCRIPTIONS



MODIFIED FRAGMENTATION PROTECTIVE VEST FOR THE CANADIAN ARMY

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

ANNEX E		DATA ITEM DESCRIPTION		Requisition W8486-149840
1. TITLE Agenda and Minutes		2. IDENTIFICATION NUMBER ADMD-17001		
3. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government to assist in the preparation of technical and progress review meeting records.				
4. APPROVAL DATE MAR 2014	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE		
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of the scheduled Technical Review agenda and minutes for the FPV system and component procurement. Technical reviews will include but are not limited to (1) the post-contract award meeting, (2) the Production Readiness Review, (3) First Article approval, and (4) periodic progress meetings.				
8. ORIGINATOR DSSPM 3-5-1/C		9. APPLICABLE FORMS		

10. PREPARATION INSTRUCTIONS

10.1 General. The Contractor shall provide the Agenda and Minutes for the 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 witness and data review, QA plan and procedures, investigations, etc), and
 - (3) Logistics Support items (support procedures, user manuals, 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, or direct work that falls outside of the scope of the contract shall result from any decisions recorded during a technical review without formal follow-up contract amendment processed through the Contracting Authority.

ANNEX E		DATA ITEM DESCRIPTION	Requisition W8486-149840
1. TITLE Test Records		2. IDENTIFICATION NUMBER ENGD-17001	
3. DESCRIPTION/PURPOSE This document will be used to notify the Government of any special inspection or test activity being conducted by the Contractor, which will affect the qualification and acceptance of the FPV components, as defined in the Statement of Work. Test reports will be used to record and verify compliance with specification requirements.			
4. APPROVAL DATE MAR 2014	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE	
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of the test records and data for the FPV components.			
8. ORIGINATOR DSSPM 3-5-1/C	9. APPLICABLE FORMS		
10. PREPARATION INSTRUCTIONS 10.1 Content. - Test reports must contain all information specified in the applicable test protocols called up in the Technical Purchase Descriptions (annexes C-1 and C-2). 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 First Article Test Series - Refer to the Statement of Work and applicable Technical Purchase Description. 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 as approved at the production readiness review. 10.2.3 The Notification of Testing is applicable to First Article test series as defined above or any other special test series that may be directed during production. Notification 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 W8486-149840
1. TITLE Packaging Specification		2. IDENTIFICATION NUMBER ILSD-17001		
3. DESCRIPTION/PURPOSE The Government requires the current packaging specification be updated in order to plan for the introduction into service of any transportation packaging changes or modified components for the FPV system.				
4. APPROVAL DATE MAR 2014	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE		
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the guidance instructions for the transportation packaging requirements for both the complete FPV system and separate modular components. DND will provide the currently approved Packaging Specification (section 9) to the Contractor at the post-contract award meeting for examination of the documentation. If any revisions to the document are necessary they will be jointly reviewed and finalized at the Production Readiness Review meeting.				
8. ORIGINATOR DSSPM 3-5-1/C	9. APPLICABLE FORMS 847619801-Packaging Instructions 24 Jan 2005			

CFTPO Guideline [Extracted from CFTPO –FPV-CTS]

1. (xx) components (refer to current DND specification sheets) 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 fibreboard 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 fibreboard 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 fibreboard 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

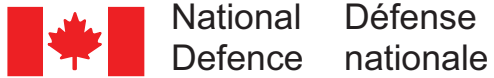
6. In the case of spare part components the side on which the shipping instructions are contained (paragraph 5), an envelope containing the Packing List, Release Note, etc. This water-resistant envelope shall be prominently marked "Packing List Enclosed" and shall be securely affixed to the outside wall 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 47 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

ANNEX E		DATA ITEM DESCRIPTION	Requisition W8486-149840
1. TITLE User Manual and Tape Measure		2. IDENTIFICATION NUMBER TMPB-17001	
3. DESCRIPTION/PURPOSE The User Manual for the FPV System describes in bilingual format (English and French) the pertinent information for fitting, wearing, and maintaining the FPV and the tape measure is utilized to ensure proper fitting of the vest. DND will provide the in-service manual and tape measure for guidance.			
4. APPROVAL DATE MAR 14	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE	
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the guidelines for the revision and preparation of the reproducible copies of the User Manual and the disposable tape measure.			
8. ORIGINATOR DSSPM 3-5-1/C	9. APPLICABLE FORMS		
10. PREPARATION INSTRUCTIONS 10.1 Requirements. The User Manual and tape measure will be based on the in-service product delivered during the previous program. The Contractor may offer any recommendations for refinement or modifications of these items throughout the pre-production phase. As a minimum new photos and graphics will require updating in the manual to accommodate carrier modifications and the naval variant of the FPV. Reproducible copies and tape measures shall be included one per vest system during production. 10.2 Format. The instructions will be pre-formatted in DND bilingual format. The master copy will be provided in electronic format (WORD and PDF) and pricing of reproducible copies will be based on the current in-service manual (qty 7 pages, 8.5" x 14" legal size) printed in colour both sides, on water-resistant paper and folded into booklet format as per sample. The tape measure shall be produced IAW with the technical purchase description (Annex C-1, section 11.7) and the sample provided.			



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 EVALUATION REQUIREMENTS GUIDANCE TO BIDDERS



MODIFIED FRAGMENTATION PROTECTIVE VEST FOR THE CANADIAN ARMY

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

GUIDANCE TO BIDDERS **TECHNICAL REQUIREMENTS**

1. General. Technical proposals must include six (6) complete FPV assemblies, six (6) ballistic shoot-packs, bidder ballistic test data, non-ballistic material samples with specified test data, a written manufacturing plan and a QA Plan preliminary draft as outlined below.

1.1. The manufacturing plan shall address in the Bidder's own format:

- (1) infrastructure, preproduction activity, and tasks specified in the Statement of Work (SOW),
- (2) a comprehensive description of the bidder's armour testing and traceability control system, and
- (3) a work schedule based on the milestones in the SOW.

Particular attention should be paid to design and test capabilities and the proposal for the FPV and BRP gauge sets.

1.2. The QA Plan draft shall be in accordance with the RFP references and will not be required in final format and detail until after contract award.

2. Pre-Award Samples and Test Data. The Bidder shall provide all samples and data as outlined below.

2.1. Non-ballistic Materials. The bidders shall deliver one meter (39 in) of the outer shell materials (500D Cordura in both CADPAT patterns) from a primary and an alternate supplier (if available) and shall include test results in accordance with section 5 below. DND will assess the quality. A certificate of compliance (C of C) and independent Lab results for all other non-ballistic materials shall also be provided as specified at Table F1 and will be reviewed by DND.

2.2. Ballistic Solution. The Bidder shall produce all shoot-packs, armour-packs, and ballistic inserts for pre-award assemblies from a single armour material lot. This includes packs for its own testing as well as those for DND. The Bidder shall produce and test 10 armour material-packs and 16 ballistic shoot-packs as specified at Table F1. Test results shall be provided as detailed in Appendix 1 of Annex C-2.

2.3. Pre-award Samples. The Bidder shall deliver six (6) ballistic shoot-packs and six (6) complete FPV assemblies (6 x finished carrier assemblies and their ballistic inserts and 6 x shoulder protector sets) in accordance with DND pattern

drawing style code IMPFPVSH26 and the technical purchase descriptions (annexes C-1 and C-2). Ballistic inserts from assemblies will be removed and converted to shoot-packs by DND after inspection. The FPV assemblies shall be Operational Type 1 – Temperate Woodland and shall be in sizes Large-Short, Large-Regular, and Large-Tall (2 of each size). Rating is based on construction standards and dimensional accuracy (see **Enclosure 1**). If a bidder is proposing multiple ballistic solutions for evaluation then 16 shoot-packs for the second solution shall also be submitted with their proposals and must include bidder test results for each solution. A maximum of two (2) solutions can be proposed by each bidder.

Table F1 - Bidder Testing

	TPD PARAGRAPH	INSPECTION & TEST REQUIREMENTS	Design Qualification Samples/Solution
CARRIER			<i>FPV Assemblies</i>
Annex C-1	3.3.5	Non-Ballistic Materials	Certifications/Test Data
ARMOUR			16 Ballistic Shoot-Packs 10 Armour material-packs
Annex C-2	3.5.1.1	V50 17gr NATO FSP	3 shoot-packs
Annex C-2	3.5.1.2	V50 (Wet) 16gr Large Sphere	3 shoot-packs
Annex C-2	3.5.1.3	V50 64gr RCC	6 shoot-packs
Annex C-2	3.5.1.4	V50 1gr Small Sphere	3 shoot-packs
Annex C-2	3.5.2	Vproof 9mm FMJ Backface	1 shoot-pack
Annex C-2	3.4.4-3.4.6	Armour Characteristics	10 armour-packs
Annex C-2	3.4.7	Panel Water Absorption	(Note 1)

Notes: 1. Same shoot-packs used in the V50 (Wet) Test (16g Sphere) can be used for this result.

2.4 DND Testing. DND will inspect FPV assemblies and conduct testing as outlined in Table F2. A rating program of the armour solution, based on the combined average of Bidder/Government test data, provided bidder test data is within $\pm 5\%$ of DND results. Otherwise only DND results will be used. Each FPV assembly and shoot-pack submitted shall be labeled in accordance with section 6.1.

Table F2 - DND Testing

TPD PARAGRAPH		INSPECTION & TEST REQUIREMENTS	Design Qualification Samples
CARRIER			<i>FPV Assemblies (Note 1)</i>
Annex C-1	3.3.1	Vest Construction Standards	6
Annex C-1	3.3.2	Dimensional Audit and Assembly Interchangeability	6
ARMOUR			<i>Shoot-packs (Note 1)</i>
Annex C-2	3.5.1.1	V50 17gr NATO FSP	3 shoot-packs
Annex C-2	3.5.1.2	V50 (Wet) 16gr Large Sphere	3 shoot-packs
Annex C-2	3.5.1.2	V50 (Dry) 16gr Large Sphere	3 shoot-packs
Annex C-2	3.5.1.4	V50 1gr Small Sphere	3 shoot-packs
Annex C-2	3.5.2	Vproof 9mm FMJ Backface	1 shoot-pack
			3 spare

Notes: 1. DND will remove and convert ballistic inserts from assemblies to obtain the necessary shoot-packs.

3. Manufacture and Delivery Plan. Rating of the written proposal is in accordance with **Enclosure 2**. The plan must include a Work Breakdown Structure (WBS). It can be presented in the bidder's own format and shall cover as a minimum relevant discussion of project manager and his/her authority, contractor infrastructure (facilities and equipment) and production set-up of FPV manufacture. The bidder must discuss their configuration management system including design and customization capabilities. The plan must discuss relevant testing of non-ballistic and ballistic materials, and the inspection of finished assemblies. The bidder must examine scale of measurement and provide a design proposal for the gauge set for dimensional verification during production, in particular critical dimensions. The proposal must clearly address the data deliverables (CDRLs and DIDs).

The armour control system must address the receipt and storage of armour material, the steps that are to be taken to ensure traceability of finished ballistic panels back to their material lots/sub-lots and rolls, the test records, any material finish processes, and layering controls of hybrid designs during the manufacturing process. If external ballistic test facilities are used, the identification and accessibility to government authorities of this test agency are required by certification.

The work schedule must include discussion on key material suppliers and lead times, the preproduction deliverables (new tooling, gauges, and data items), planned delivery schedules of main contract items, option delivery support, and

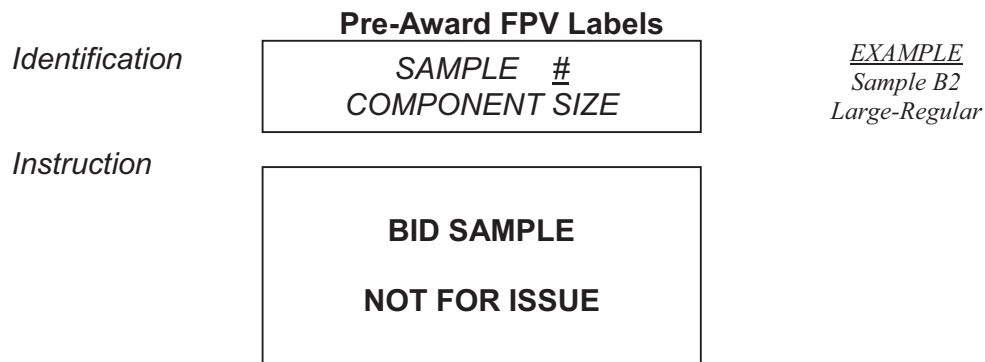
risk elements.

4. Quality Assurance DRAFT. The proposal shall contain a draft QA plan and must as a minimum outline the Bidder's organizational QC structure and responsibilities (quality system), the specific quality practices, resources, and processes it employs in its quality management by relating them against the quality elements in ISO 10005 and 9001. The proposal should describe how the quality requirements will be applied to the scope of the work of the resultant contract. The final Quality Plan will be deliverable at the production readiness review for approval by the QAR.

5. CADPAT™ Patterns. The temperate woodland and arid region pattern quality of shell material samples will be assessed against three distinct criteria; (1) general appearance; (2) colour coordinates of each colour; and (3) infra-red reflectance (IRR) of each colour. Bidder data submission and DND assessment shall be in accordance with **Enclosure 3**.

6. Pre-Award Sample Identification. Control of pre-award assemblies will be done using the format illustrated below. A government-assigned alpha-character identifier shall be clearly marked on all sample FPV assemblies and shoot-packs delivered with the bid proposal. The alpha-character identifier can be requested from PWGSC any time after release of the RFP by any bidder committing to supply a bid proposal. At the same time 1 meter of GSM (non-slip mesh) for the manufacture of pre-award shoulder extension closures will be released to bidders. A copy of the in-service User Manual and a disposable tape measure sample will also be released at the same time for pricing of the manuals (refer to CDRL004 and DID TMPB-17001) and tape measures (refer to section 11.7 of Annex C-1).

6.1 Pre-Award Labels. Marking and labelling of pre-award assemblies are for purposes of assessing the quality and durability of markings and for test matrix anonymity and control. A blank label made of the production material, in the approximate size as planned on the production version shall be provided. The Identification portion for each assembly shall contain the assigned alpha-character identifier and size. The Instruction portion for the rear carrier shall be marked with the following: "BID SAMPLE NOT FOR ISSUE", as illustrated below.



NOTE:

The Identification and Instruction labels for pre-award samples **ARE NOT** required in the format specified in the TPD (Annexes C-1 and C-2) until after contract award. For Bid Evaluation, they **SHALL NOT** contain any company identification markings other than as specified above. For shoot-packs, they shall only contain the alpha-character issued to the bidder written in indelible ink. DND will add its own control numbers on receipt of samples.

7. Pre-Award Assessment Summary. Technical merit is worth 70% of the assessment and the cost component is worth 30% as outlined in the RFP. Table F3 below summarizes the performance weighting of individual technical criteria and a re-cap of deliverable requirements for the technical evaluation as presented within this annex.

Table F3 – Assessment Summary

Pre-Award Proposal	
Technical Content	DND Assessment (70%)
FPV Assemblies	Rated (10/70) Enclosure 1
Carrier & Insert Samples	6 FPV assemblies as per sections 2.3 and 6
Construction Standards	Section 2.3
Sizing and Dimensions	Section 2.3
Manufacture & Delivery Plan	Rated (15/70) Enclosure 2
Work Breakdown Structure	Bidder written proposal as per section 3
Armour Testing and Control	
Work Schedule	
Non-Ballistic Materials	Rated (10/70) Enclosure 3
CADPAT Quality	Bidder Lab Results. IRR data in EXCEL spreadsheet as per section 5
500D Cordura (Outer shell) samples	One (1) meter (in both CADPAT patterns) and Bidder Lab results as per section 2.1
Other Materials	C of C and Bidder Lab Results as per section 2.1
Ballistic Panels	Rated (35/70) Table F1 and F2 - ARMOUR
Armour Characteristics	Bidder Test Data as per section 2.2 and Table F1
Ballistic Performance	Bidder Test Data as per section 2.2 and Table F1 DND performance assessment as per Table F2

Shoot-pack samples	Six (6) packs for one solution. Multiple armour solutions - 16 additional shoot-packs for solution 2, if applicable. Refer to sections 2.2 and 6
QA Draft	Mandatory – Refer to section 4
Cost & Canadian Content	(30%) <i>Refer to RFP</i>

Enclosure 1 – Dimensional Verification and Construction Standards Evaluation

Enclosure 2 – Manufacture and Delivery Plan Evaluation

Enclosure 3 – CADPAT Quality Assessment

Enclosure 1 to Annex F Dimensional Verification, Construction Standards and Ballistic Solution Integration						
1.0	Dimensional Verification					Total Weight
		Annex C-1 Appendix 3		Points Deducted for each Dimension out of Tolerance	Total Possible Points Available	
1.1	Front Carrier: Are the dimensions in accordance with the scales of measurements tables - Dimensions A, B, C, D, E	A	0.5	4		
		B				
		C				
		D				
		E				
1.2	Rear Carrier: Are the dimensions in accordance with the scales of measurements tables - Dimensions F, G, H, I, J, K	F	0.5	4		
		G				
		H				
		I				
		J				
		K				
1.3	Collar: Are the dimensions in accordance with the scales of measurements tables - Dimensions L, M, N	L	1	2		
		M				
		N				
1.4	Shoulder Protector: Are the dimensions in accordance with the scales of measurements tables - Dimensions O, P, Q, R	Right Side	1	3		
		Left Side				
		O				
		P				
		Q				
1.5	Front Plate Pocket: Are the dimensions in accordance with the scales of measurements tables - Dimensions S, T, U, V, W	R	1	5		
		S				
		T				
		U				
		V				
		W				
1.6	Rear Plate Pocket: Are the dimensions in accordance with the scales of measurements tables - Dimensions X, Y	X	1	2		
		Y				
						20%

2.0	Cutting - General					
2.1	Is there evidence that the materials have been cut off-grain, not in accordance with the grain lines identified on the pattern drawings, style code IMPFPV26. Samples will be assessed by visual match of the Sealed Sample DSSPM 259-04 (Cloth, Nylon, polyurethane coated, 235g/m2) against the shell material components of the vest.		1	4		
2.2	Are there any exposed drill holes		1	3		
2.3	Is there any fraying evident in the process for hot cutting or fusing of ends		1	3		
						10%

3.0	Sewing - General					
					Total Possible Points Available	
3.1	Is there evidence of improperly formed stitches, uneven tension, skipped stitches			1	3	
3.2	Are the number of stitches per inch as per the specification			0.5	2	
3.3	Is the stitching and placement of hook and loop as per the specification and pattern drawings, style code IMPFPV26			2	4	
3.4	Is the hook and loop placed in accordance with the pattern drawings, style code IMPFPV26, and sewn to affect proper closure			0.5	3	
3.5	Where there are openings with hook and loop closures, have the ends of the hook and loop been caught into the seams			1	2	
3.6	Are all bar tacks applied with the specified number of stitches and in the proper lengths			1	3	
3.7	Are there any missing or improperly formed box and cross stitch applications			1	2	
3.8	Is the webbing placed in accordance with the pattern drawings, style code IMPFPV26, and placed evenly			2	4	
3.9	Is there any evidence of improperly applied eyelets or grommets, i.e. exposed material, cut material, loose application of metal parts			0.5	1	
3.10	Is there too much tension in the curved areas (neckline and armhole) due to insufficient clipping of seam allowances			0.5	2	
						26%

4.0	Construction Quality - Specific Design Features		Points Deducted Per Improper Application	Total Possible Points Available	
4.1	<p>Front Plate Pocket Assembly:</p> <p>a. has the pocket been misaligned or improperly placed, not in accordance with the pattern drawings style code IMPFPV26, technical drawings and sealed sample</p> <p>b. does the stitching of pocket interfere with intended use of front outer components</p>		<p>2</p> <p>2</p>	4	
4.2	<p>Back Plate Pocket Assembly:</p> <p>a. has the pocket bag been properly formed in accordance with the pattern drawings style code IMPFPV26, technical drawings and sealed sample</p> <p>b. has the pocket bag been attached to the back shell in accordance with the pattern drawings style code IMPFPV26, technical drawings and sealed sample</p> <p>c. do the pocket opening and flap assembly lay flat without puckering or sagging</p>		<p>2</p> <p>2</p> <p>1</p>	5	
4.3	<p>Side Attachment Straps:</p> <p>a. does the binding tape extend the full length of the hook and loop assembly</p> <p>b. are the webbing tab ends staggered</p>		<p>1</p> <p>1</p>	3	
4.4	<p>Have the elastic and webbing hold down straps in the shoulder protectors, been assembled as per the specification and technical drawings</p>		1	2	

4.5	Waist Closure Flaps: a. are the flaps aligned with their corresponding loop portions b. are the pull tabs assembled in accordance with the technical drawings		0.5 0.5	3	
4.6	MOLLE webbing stitching: is there consistent 1-1/2" spacing between vertical stitch applications in order to affect proper installation of pouches.		1 point deducted per improper application where pouch assembly cannot be affixed to carrier	3	
					20%
5.0	Ballistic Solution Integration		Points Deducted Per Occurrence/Improper Application Location	Total Possible Points Available	
5.1	Ballistic Pack Integration - Main Body: a. does the front ballistic pack lay flat without any pulling, bunching or folding once placed inside its carrier and fully engaged with hook and loop b. does the rear ballistic pack lay flat without any pulling, bunching or folding once placed inside its carrier and fully engaged with hook and loop c. are the hook and loop attachments on the ballistic packs properly aligned with the carriers to ensure sufficient attachment		2 2 2	4 4 6	

5.2	<p>Ballistic Solution Covers:</p> <p>a. has the sealing/seaming process of the cover material affected a closure that is continuous without any gaps around the perimeter of the ballistic panel</p> <p>b. is there evidence of bunching, pulling or folding of the cover material at any seal/seam location</p> <p>c. is there evidence of damage to the cover material at any seal/seam location</p>		<p>1</p> <p>1</p> <p>1</p>	4	
5.3	<p>Ballistic Pack Integration - Shoulder and Neck Protection:</p> <p>a. do the ballistic packs for the shoulder protectors lay flat once placed inside their carriers</p> <p>b. is there any excessive shifting or movement of the shoulder protector ballistic packs inside their carriers</p> <p>c. do the ballistic packs for the neck protector portions lay flat once placed inside their carriers</p> <p>d. is there any excessive shifting or movement of the neck protector ballistic packs inside their carriers</p>		<p>2</p> <p>2</p> <p>2</p> <p>2</p>	6	
					24%

Enclosure 2 to Annex F

1.0 MANUFACTURE AND DELIVERY PLAN					
	Does the written plan address a work breakdown structure, armour testing and control, and a work schedule?	___/60 points		(15/70 overall weight)	
		Not Discussed	Incomplete Information	Complete but limited detail	Comprehensive Discussion
1.1	Provide a <u>Work Breakdown Structure (WBS)</u> in any format (descriptive or point form)Points to be awarded contingent on the level of detail provided in discussing SOW tasks, infrastructure, preproduction activities, design capabilities, configuration management, testing, and data deliverables.				___/30
	-project management authority = 2	0	1	2	N/A
	-contractor facilities/equipment = 5	0	2.5	4	5
	-production set-up for FPV = 5	0	2.5	4	5
	-material testing non-ballistic = 5	0	2.5	4	5
	-configuration design & management = 4	0	2	3	4
	-component gauge set = 5	0	2.5	4	5
	-data item deliverables = 4	0	2.5	3	4
1.2	Provide a detailed description of the contractor <u>Armour Control System</u>. -describe steps taken to receipt and store armour material = 4	0	2	3	___/20 4
	-describe contractor system to segregate and control each lot/sub-lot = 8	0	4	6	8
	-describe ballistic test facilities, contractor system to control panel layers, marking, and traceability to test records = 8	0	4	6	8
	<u>Certification</u> required for external test facility				
1.3	Provide a work schedule for the contract phases.				___/10
	-key supplier lead times = 3	0	1	2	3
	-schedule for preproduction items = 2	0	1	1.5	2
	-schedule for main deliverables = 1	0	.5	1	N/A
	-schedule for options post-production shutdown = 2	0	1	1.5	2
	-discussion of risk elements = 2	0	1	1.5	2

Enclosure 3 to Annex F

1.0 CADPAT™ Quality Evaluation FPV. The temperate woodland and arid region pattern quality of FPV shell material samples will be assessed against three distinct criteria; (1) general appearance; (2) colour coordinates of each colour; and (3) infra-red reflectance (IRR) of each colour.

1.1 General Appearance. The evaluation of this criterion will take into consideration the following elements and will be **Pass/Fail**. Assessment will be conducted by a Textile SME from DSSPM 2:

- Direction of the print pattern;
- Definition of pattern (motif) and size;
- Print Quality - clarity and definition must be at least as good as exhibited by the sealed pattern with clean lines separating the colours and minimal overlap visible from colour to colour; and
- Uniformity of each colour - colour shall be even and clear throughout with no side-to side or end-to-end shading. It shall be free from wrinkles, crack marks, spots, etc. Colour penetration must be well into the material.

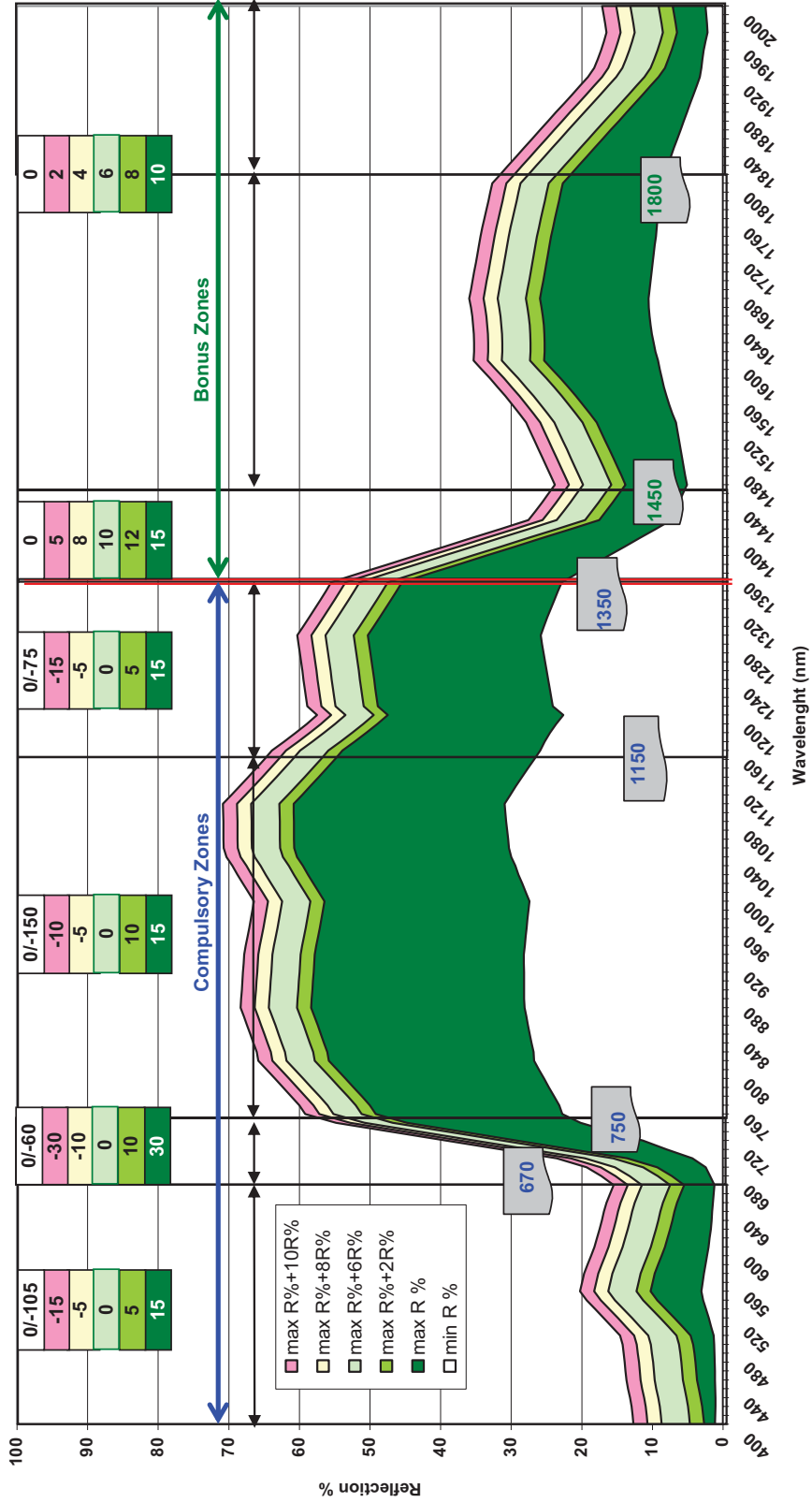
1.2 Colour Coordinates. The CADPAT™(TW) and (AR) specifications require that all colour measurements be made IAW CIE publication 15.2 and ASTM E308-99 using CIE Illuminant C and a 2 degree observer, specular component included. The generally accepted tolerances for all colours are ± 2 CIELAB units for each coordinate ($L^*a^*b^*$ values, not deltas) and should not exceed maximum tolerance values specified in the Annex C-1 appendices 1 and 2. Bidders must supply $L^*a^*b^*$ measurements for each colour new and after 15 washings for assessment by DND in accordance with this Table.

Reference Table		Points
CIELAB Unit	Range	
0.0	1.0	25
1.1	2.0	15
2.1	3.0	0
3.1	3.5	-15
3.6	over	-25

1.3 Infra-Red reflectance. The desired IRR characteristics are defined in the Annex C-1 appendices 1 and 2 for each pattern. Note the compulsory and bonus regions selected for each colour. The optimum IRR values should lie between the upper and lower limits (as depicted in Figures 11.1 and 12.1 of Annex C-1) in at least the compulsory zones and should not exceed the maximum values in these zones. Bidders must supply measurements for each pattern new and after 15 washings for assessment by DND. Data points shall be supplied to DND in Microsoft EXCEL spreadsheets as follows. The Temperate Woodland pattern shall be measured in 10nm steps from 400 to 2000nm and the Arid Region pattern shall be measured in 50nm steps from 350 to 2000nm. Rating will be in accordance with the tables below. Bonus points for TW are awarded only if the following minimums are achieved in compulsory zones (Average Green-55/75; Brown and Light Green 40/55).

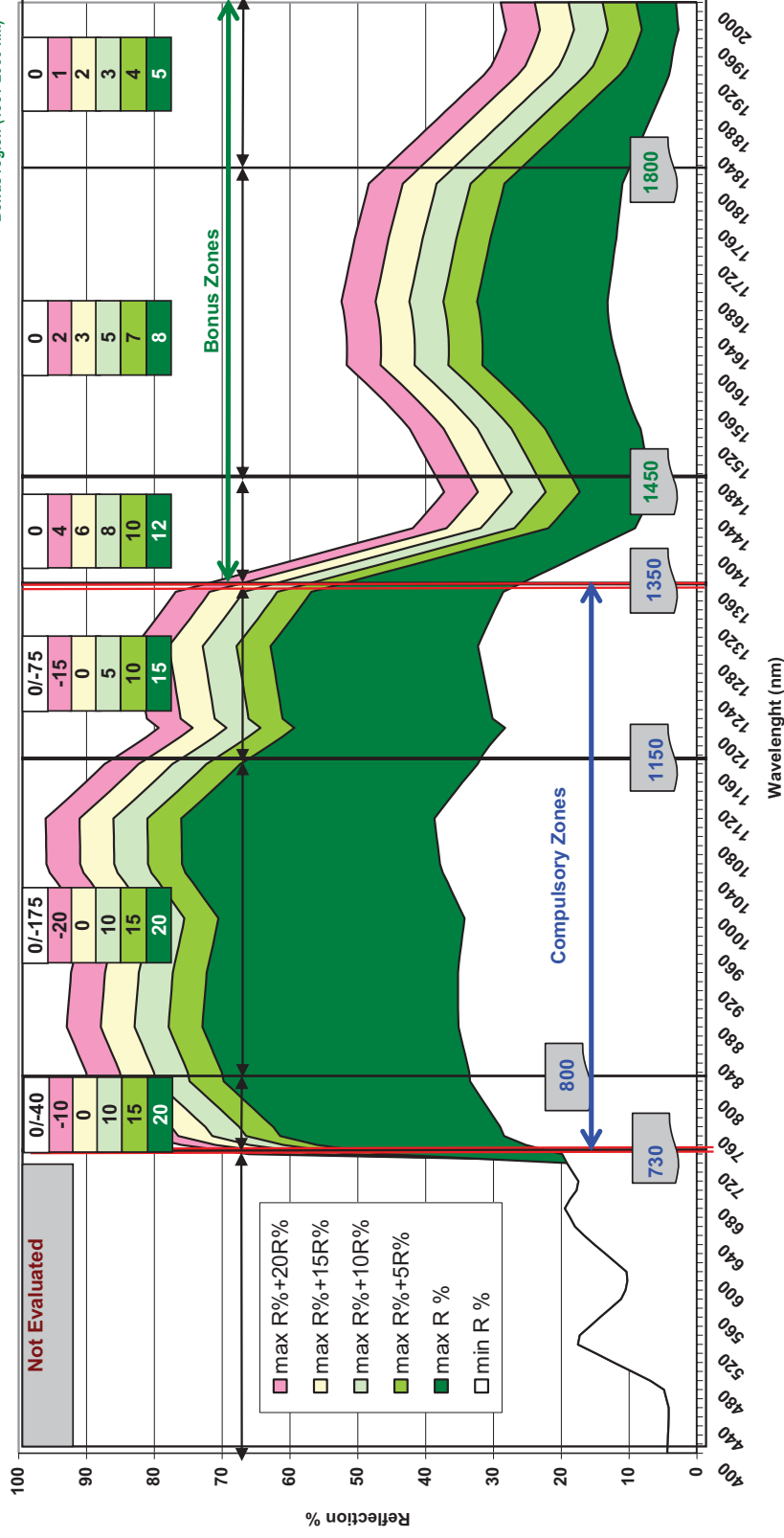
Point Allocation Chart CANADIAN AVERAGE GREEN

Compulsory Region (400-1350 nm)
Bonus Region (1351-2000 nm)



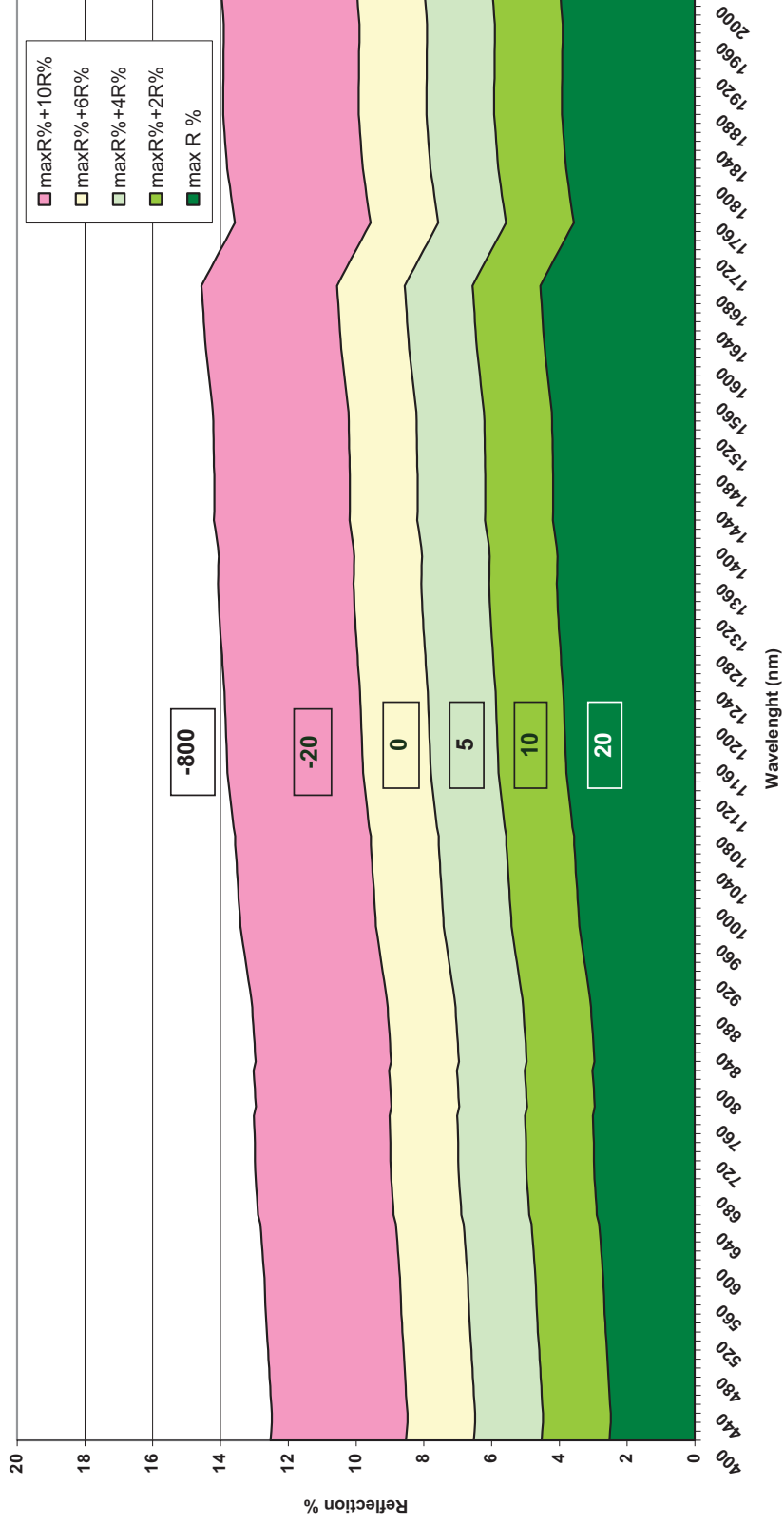
Point Allocation Chart LIGHT GREEN & BROWN

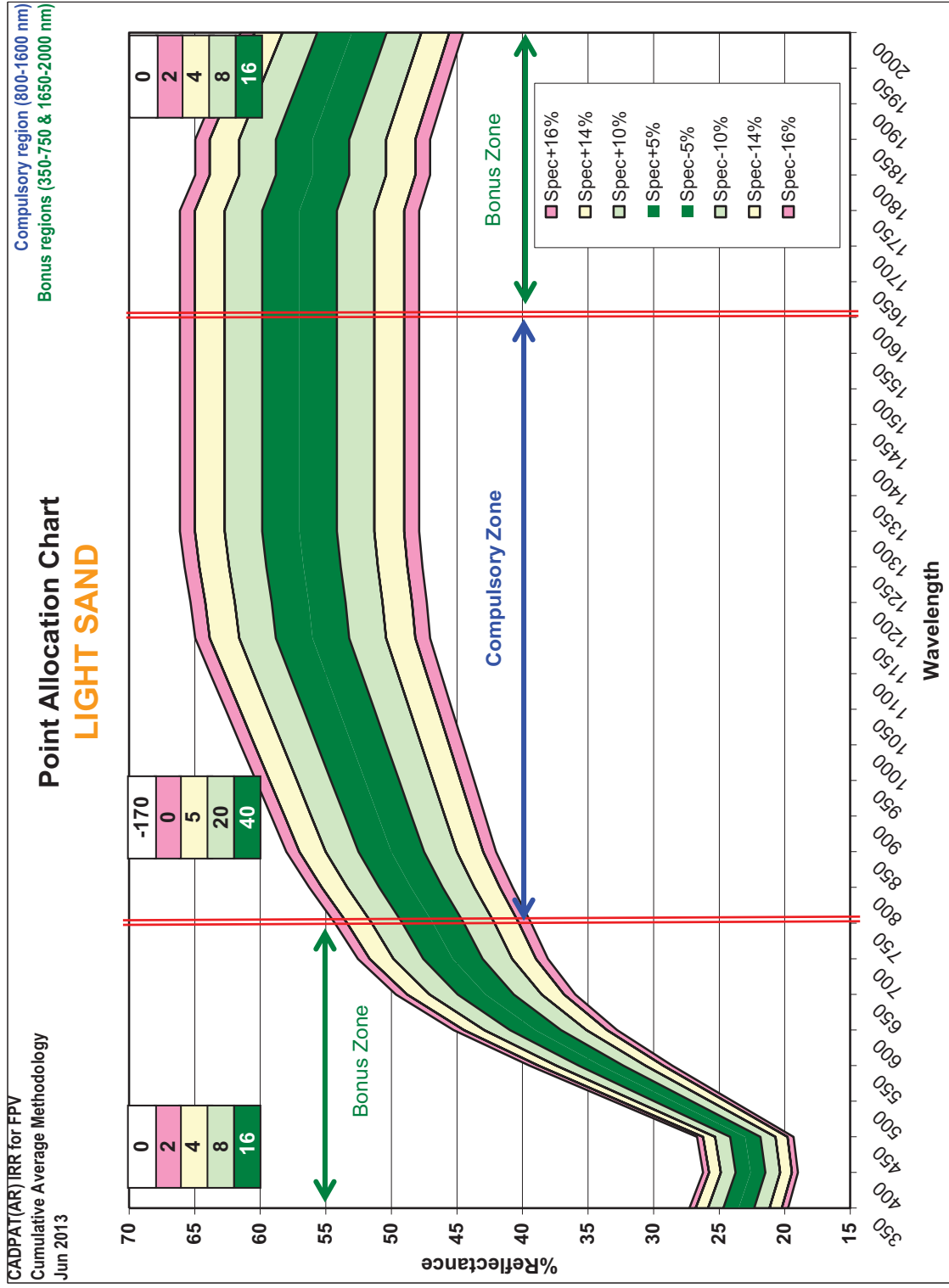
Compulsory region (400-1350 nm)
Bonus region (1351-2000 nm)

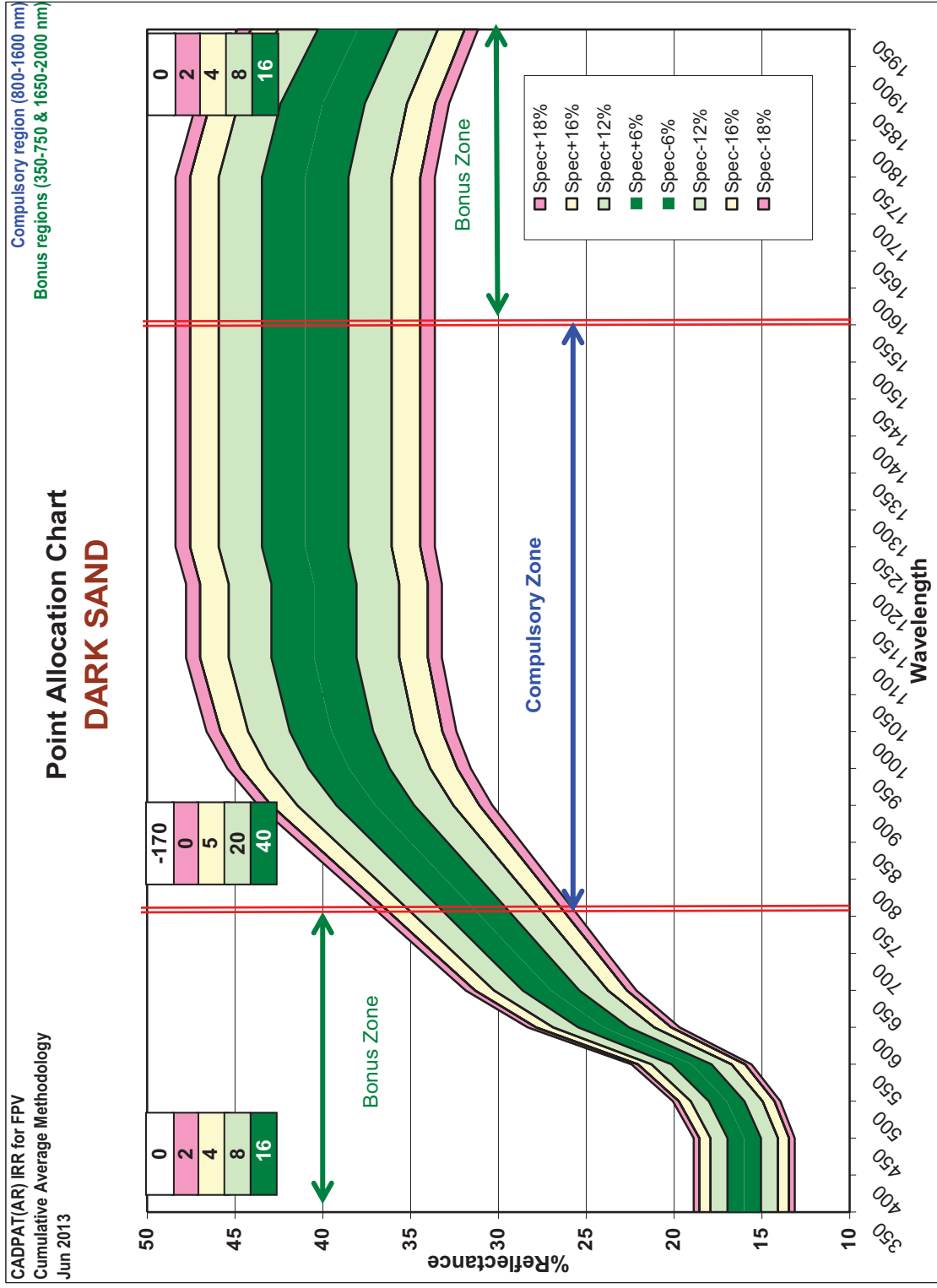


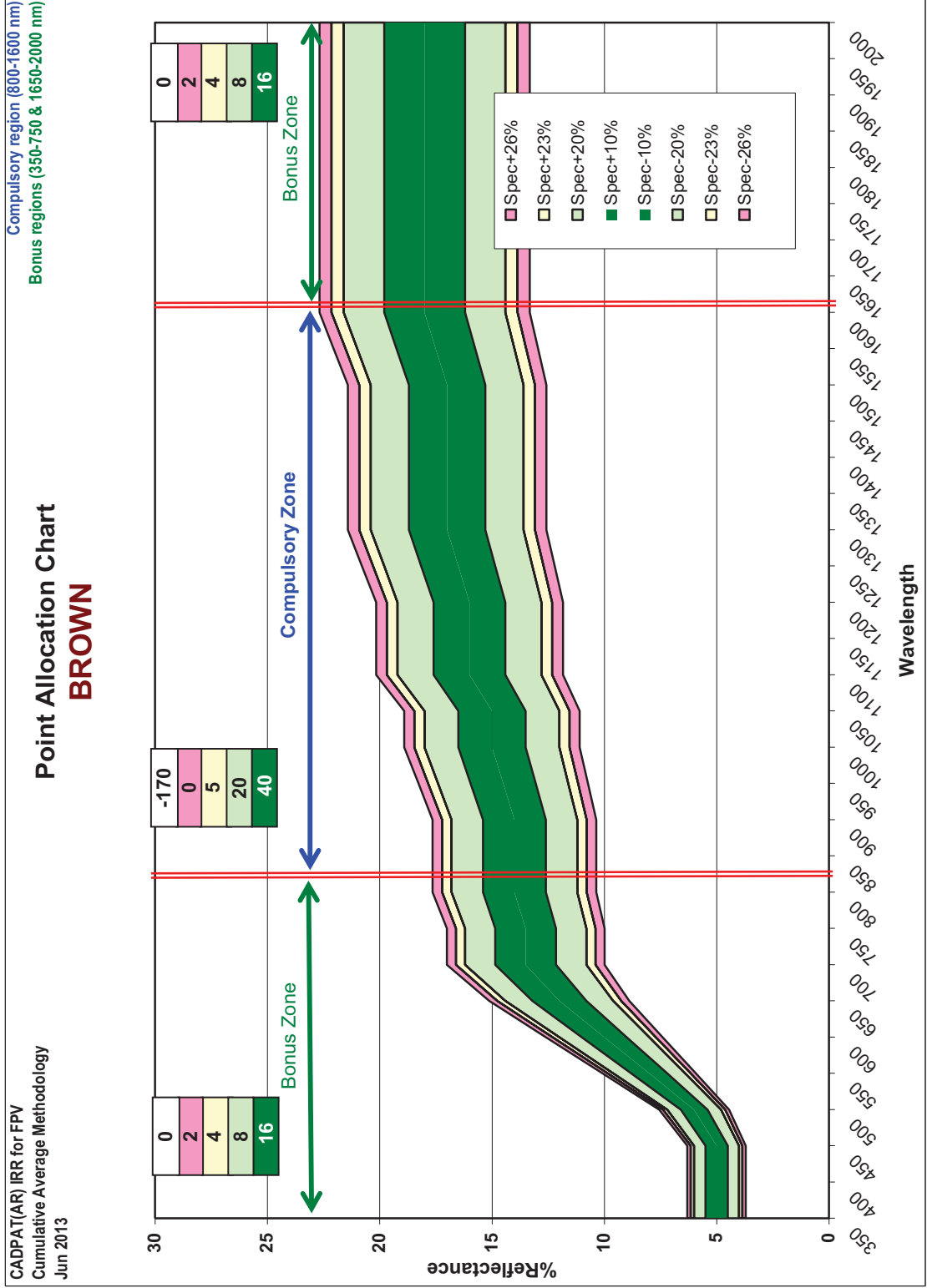
Point Allocation Chart COLOUR BLACK

Compulsory region (400-2000 nm)
No Bonus Region









**ANNEX "G" to PART 5 - BID SOLICITATION FEDERAL CONTRACTORS
PROGRAM FOR EMPLOYMENT EQUITY - CERTIFICATION**

I, the Bidder, by submitting the present information to the Contracting Authority, certify that the information provided is true as of the date indicated below. The certifications provided to Canada are subject to verification at all times. I understand that Canada will declare a bid non-responsive, or will declare a contractor in default, if a certification is found to be untrue, whether during the bid evaluation period or during the contract period. Canada will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply with any request or requirement imposed by Canada may render the bid non-responsive or constitute a default under the Contract.

For further information on the Federal Contractors Program for Employment Equity visit [Employment and Social Development Canada \(ESDC\)-Labour's website](#).

Date: _____ (YYYY/MM/DD) (If left blank, the date will be deemed to be the bid solicitation closing date.)

Complete both A and B.

A. Check only one of the following:

- ☐ A1. The Bidder certifies having no work force in Canada.
 - ☐ A2. The Bidder certifies being a public sector employer.
 - ☐ A3. The Bidder certifies being a federally regulated employer being subject to the Employment Equity Act.
 - ☐ A4. The Bidder certifies having a combined work force in Canada of less than 100 employees (combined work force includes: permanent full-time, permanent part-time and temporary employees [temporary employees only includes those who have worked 12 weeks or more during a calendar year and who are not full-time students]).
- A5. The Bidder has a combined workforce in Canada of 100 or more employees; and

- ☐ A5.1. The Bidder certifies already having a valid and current Agreement to Implement Employment Equity (AIEE) in place with ESDC-Labour.

OR

- ☐ A5.2. The Bidder certifies having submitted the Agreement to Implement Employment Equity (LAB1168) to ESDC-Labour. As this is a condition to contract award, proceed to completing the form Agreement to Implement Employment Equity (LAB1168), duly signing it, and transmit it to ESDC-Labour.

B. Check only one of the following:

- ☐ B1. The Bidder is not a Joint Venture.

OR

- ☐ B2. The Bidder is a Joint Venture and each member of the Joint Venture must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification. (Refer to the Joint Venture section of the Standard Instructions)