

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

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

**REQUEST FOR PROPOSAL  
DEMANDE DE PROPOSITION**

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

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

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

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

**Comments - Commentaires**

<b>Title - Sujet</b> CG634 GEN II INTERIM COMBAT HELMETS		
<b>Solicitation No. - N° de l'invitation</b> W8486-148836/A	<b>Date</b> 2014-11-28	
<b>Client Reference No. - N° de référence du client</b> W8486-148836		
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$\$PR-707-66243		
<b>File No. - N° de dossier</b> pr707.W8486-148836	<b>CCC No./N° CCC - FMS No./N° VME</b>	
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2015-01-30</b>		<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Daylight Saving Time EDT
<b>F.O.B. - F.A.B.</b> Specified Herein - Précisé dans les présentes <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input type="checkbox"/> <b>Other-Autre:</b> <input checked="" type="checkbox"/>		
<b>Address Enquiries to: - Adresser toutes questions à:</b> Elder, Sylvie		<b>Buyer Id - Id de l'acheteur</b> pr707
<b>Telephone No. - N° de téléphone</b> (819) 956-3830 ( )		<b>FAX No. - N° de FAX</b> (819) 956-5454
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b>  Specified Herein Précisé dans les présentes		

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**

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

**Issuing Office - Bureau de distribution**

Clothing and Textiles Division / Division des vêtements et  
des textiles  
11 Laurier St./ 11, rue Laurier  
6A2, Place du Portage  
Gatineau, Québec K1A 0S5

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

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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.

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

### **1.4 TRADE AGREEMENT**

The requirement is subject to the provisions of the Agreement on Internal Trade (AIT).

## **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 (2014-09-25) 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: sixty (60) calendar days

Insert: three hundred and sixty-five (365) calendar days

#### **SACC Manual clauses**

A9130T 2014-06-26 Controlled Goods Program

### **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 reference the written proposal must be submitted in writing to the Contracting Authority no later than fifteen (15) calendar days before the bid closing date. Enquiries received after those timing 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

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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.

## **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 REFERENCE SAMPLES**

In order to receive Technical Data Packages, reference helmet sample and User Manual 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 to the following:

E-mail: [sylvie.elder@tpsgc-pwgsc.gc.ca](mailto:sylvie.elder@tpsgc-pwgsc.gc.ca)

It is imperative that the request for the reference samples be done as soon as possible to ensure timely receipt. Notwithstanding Canada must not be held responsible for untimely release of the reference samples. The reference samples must be returned with the pre-award samples.

## **2.6 REFERENCE SAMPLES - RETURN TO SENDER**

The reference helmet sample which is sent to respective bidders is to be returned to the Contracting Authority with pre-award samples. The reference sample are not to be mutilated or cut, and must be returned in the same condition as sent to the Bidder.

Reference samples will only be sent to helmets manufacturer.

## **2.7 SPÉCIFICATIONS 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](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



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E-mail: [ncr.cgsb-ongc@pwgsc-tpsgc.gc.ca](mailto: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)
- Section III - Certifications (1 hard copy)

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

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

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

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) <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, duotangs or binders.

#### 3) Green Initiatives (for PWGSC information only)

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

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

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### **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, Evaluation Procedures, 4.1.1 Mandatory Technical Criteria).

### **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 services will evaluate the bids.

(c) The evaluation will be done in three (3) phases

Phase I: Evaluation of written proposal

Phase II: Evaluation of Bidder's test reports and Canadian components, DND testing of pre-award samples

Phase III: Financial evaluation

#### **4.1.1 WRITTEN TECHNICAL PROPOSAL EVALUATION (PHASE 1 – 10%)**

4.1.1.1 This part of the technical evaluation is due at bid closing and is to confirm a Bidder's capability of meeting the technical requirements in accordance with Annex C.

The following must be included with the bid:

- a) Written Manufacturing and Delivery Plan as described in paragraph 4.1.2. (Point rated and mandatory criteria); and
- b) DRAFT Quality Assurance Plan as described in paragraph 4.1.3 (Mandatory criteria).

**4.1.1.2. Manufacture and Delivery Plan.** The plan will include a Work Breakdown Structure (WBS), the Bidder's armour control system and a schedule. The plan can be presented in the bidder's own format and the topic requirements are detailed in Annex F- Guidance to Bidders. The proposal will be evaluated in accordance with the evaluation Grid at table 1 below. A minimum of 30 points is required to PASS and to proceed to Phase II.

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TABLE 1 -EVALUATION GRID

<b>MANUFACTURE AND DELIVERY PLAN</b>					
	Does the written plan address a work breakdown structure, armour testing and control, and a work schedule?	___/70 points			
		Not discussed	Incomplete information	Complete but limited details	Comprehensive discussion
1.1	<b>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.</b>				___/36
	-project management authority = 2	0	1	2	N/A
	-contractor facilities/equipment = 8	0	4	6	8
	-production set-up for helmet = 8	0	4	6	8
	-prototyping capabilities = 4	0	2	3	4
	-material/component testing ballistic = 4	0	2	3	4
	-blunt impact testing = 2	0	1	2	N/A
	-engineering, design & configuration management capability = 4	0	2	3	4
	-data item deliverables = 4	0	2	3	4
1.2	<b>Provide a detailed description of the contractor <u>Armour Control</u></b>				___/16



1.3	<b><u>System.</u></b>				
	-describe steps taken to receipt and store armour material = 6	0	3	4	6
	-describe contractor system to segregate and control each lot/sub-lot = 4	0	2	3	4
	-describe contractor system to control material design lay-up, marking, and traceability to test records = 6	0	3	4	6
	<b>Provide a work <u>schedule</u> for the contract phases.</b>				____/18
	-key supplier and sub-contractor lead times = 4	0	2	3	4
	-schedule for preproduction items = 4	0	2	3	4
	-schedule for main deliverables = 2	0	1	2	N/A
	-schedule for options post-production shutdown = 4	0	2	3	4
	-discussion of risk elements = 4	0	2	3	4

**4.1.1.3. Quality Assurance DRAFT.** The proposal must 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 must 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.

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#### **4.1.2 BIDDERS'S TEST REPORTS AND CANADIAN COMPONENTS (Phase II)**

##### **4.1.2.1. PRE-AWARD SAMPLES AND SUPPORTING TEST DOCUMENTATION (60%)**

As part of the technical evaluation, and to confirm a bidder's capability of meeting the technical requirements, sixteen (16) complete helmet assemblies, fourteen (14) additional ballistic shells and eight (8) spare impact liners and the bidders test records ( Table F1) will be requested from bidders who were successful in Phase 1.

This part of the evaluation is due eight weeks (8) weeks after notification from the contracting Authority that bidder was successful in Phase I. Bidder test records and pre-award samples will be evaluated in accordance with Annex F. The total combined score out of 70% for Phase I and 2 will be used to determine the technical merit before the evaluation of Phase 3.

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.

Laboratory analysis of the product offered showing ballistic test results for specific tests listed in Annex F must be provided with the pre-award samples. Ballistic testing can be performed by an in-house lab or an independent laboratory facility and must be in accordance with the test methods detailed in the requirement (Annex C). The laboratory report and test results must be dated after Request for Proposal posting date.

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

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

The Bidder must deliver the required pre-award samples and test results at no charge to Canada and must ensure that they are received within the timeframe specified above in 1.2.1. The samples submitted by the Bidder will remain the property of Canada and will be tested as per information given in Annex F and point rated as per tables below.



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V50 17gr FSP	Points	V50 16gr Sph	Points	Backface	Points
Raw Data		Raw Data		Raw Data	
≤ 675 m/s	Fail	≤ 650 m/s	Fail	> 20.4mm	Fail
676-685 m/s	0	651-660 m/s	0	19.1-20.4mm	0
686-695 m/s	5	661-670 m/s	5	18.1-19.0mm	5
696-705 m/s	10	671-680 m/s	10	17.1-18.0mm	10
706-715 m/s	15	681-690 m/s	15	16.6-17.0mm	15
716-725 m/s	20	691-700 m/s	20	16.1-16.5mm	20
726-735 m/s	30	701-710 m/s	30	15.6-16.0mm	30
736-745 m/s	40	711-720 m/s	40	15.1-15.5mm	40
746-755 m/s	50	721-730 m/s	50	14.6-15.0mm	50
756-765 m/s	60	731-740 m/s	60	14.1-14.5mm	60
766-775 m/s	70	741-750 m/s	70	13.6-14.0mm	70
776-785 m/s	80	751-760 m/s	80	13.1-13.5mm	80
786-795 m/s	90	761-770 m/s	90	12.6-13.0mm	90
> 795 m/s	100	> 770 m/s	100	≤ 12.5mm	100

95% 17gr FSP	Points	Tech Admin	Points	Weight	Points	Reduction
Raw Data		Raw Data		Raw Data		
≤ 635 m/s	Fail	0-6	5	> 1005 g	Fail	
636-650 m/s	0	7-12	10	991-1005 g	5	15%
651-665 m/s	5	13-18	20	976-990 g	10	
666-680 m/s	10	19-24	30	961-975 g	15	
681-690 m/s	15	25-30	40	946-960 g	20	20%
691-700 m/s	20	31-36	50	931-945 g	30	
701-710 m/s	30	37-42	60	916-930 g	40	
711-720 m/s	40	43-48	70	901-915 g	50	
721-730 m/s	50	49-54	80	886-900 g	60	25%
731-740 m/s	60	55-60	90	871-885 g	70	
741-750 m/s	70	> 60	100	856-870 g	80	
751-760 m/s	80			840-855 g	90	
761-770 m/s	90			< 840 g	100	30%
> 770 m/s	100					

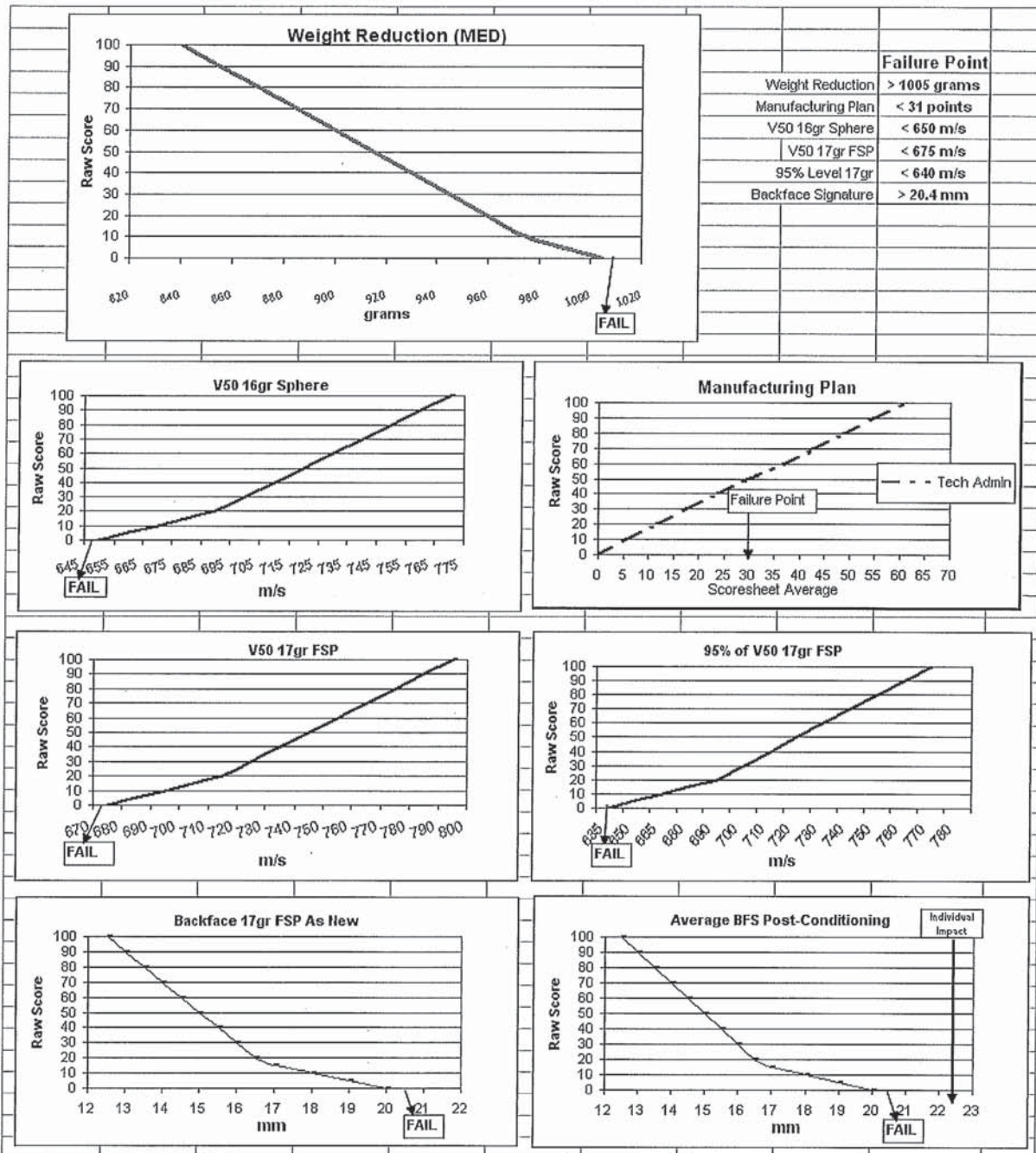
Chemical Resistance Bonus = 6 points/chemical 15 for DEET

Flame Resistance Bonus = 25 points Max

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Chemical Resistance BONUS 6 points per chemical/ 15 points for DEET (Max 75points) Flame  
Resistance BONUS (Max 25 points)



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#### 4.1.2.2 CANADIAN COMPONENTS (5%)

The Bidder must also submit with their pre-award samples a list of the major components used in the manufacture of their helmets CG634, Generation II that are manufactured in Canada. They can also include components that are bought outside of Canada and explain how they will be incorporated into the final product by a Canadian supplier. A maximum of five percent (5%) of the rating will be given for Canadian Component.

% of Canadian Components	% given
80-100% manufactured in Canada	5%
56-79% manufactured in Canada	4%
46-55% manufactured in Canada	3%
26-45% manufactured in Canada	2%
5-25% manufactured in Canada	1%

#### 4.1.3 FINANCIAL EVALUATION – (PHASE 3- 25%)

##### 4.1.3.1 MANDATORY FINANCIAL CRITERIA

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

b. The Bidder must submit firm unit pricing for all items and all destinations including option year 1 and "as and when requested quantities". The Bidder is requested to quote firm unit pricing at no more than two decimal points.

c. The Bid price must not exceed the average bid value of all bids by 50% or more (All applicable taxes extra, as appropriate).

##### 4.1.3.2 SACC MANUAL CLAUSE

A9033T 2012/07/16 Financial Capability

##### 4.1.3.3. FINANCIAL EVALUATION METHODOLOGY

The bid price will be calculated as follows: Evaluation of the option quantities will be done by multiplying the cost given for a quantity of 1,000 -10,000 helmets with delivery to Montreal by 7,500 and Edmonton by 2,500. The evaluation of the "as and when" quantities will be done by multiplying the cost given for estimated quantity of each item with delivery to both destinations by the estimated quantity for each item. Both totals will then be added to the total cost of the firm quantities.

The labor rates will not be evaluated.

#### 4.2 BASIS OF SELECTION-HIGHEST COMBINED RATING OF TECHNICAL AND PRICE

1. To be declared responsive, a bid must:
  - a. comply with all the requirements of the bid solicitation; and
  - b. meets all mandatory criteria.
2. Bids not meeting (a) and (b) will be declared non-responsive.

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3. 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 merit, 5% for Canadian Component and 25 % for the aggregate unit price.

4. To establish the technical merit score, the overall technical score for each responsive bid will be determined as follows: total number of points obtained for each category prorated and weighted IAW Annex F and Table 2.

5. For each responsive bid, the technical merit score and the pricing score after normalization will be added to determine its combined rating.

6. If there is a tie in points, the tie breaker will be done by choosing the best average weight.

7. Neither the responsive bid obtaining the highest technical score nor the one with the lowest evaluated price will necessarily be accepted. The responsive bid with the highest combined rating of technical merit and price will be recommended for award of a contract.

The table below illustrates an example where 4 of the five bids are responsive and the selection of the contractor is determined by a 70/25/5 ratio of technical merit, price and Canadian Component, respectively.

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

**TABLE 2**

Raw score after Test Data Conversion		Bid A	Bid B	Bid C	Bid D	Bid E
Score/100	Weight reduction scaled	50	10	60	70	fail
Score/100	Ballistic average scaled  (V50 17g FSP, V50 176g Sph, 95% 17g FSP)	18	12	53	68	24
Score/100	Materials scaled  (backface)	91	80	85	95	89
Score/100	Written proposal scaled	100	90	90	80	90
	% Canadian component Bid price	75% \$9,400,000	60% \$8,600,000	55% \$10,000,000	15% \$6,900,000	45% NA
Individual technical weighting after normalization						
25%	Mass reduction	17.9%	3.6%	21.4%	25.0%	fail



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	weighted					
30%	Ballistic average weighted	8.0%	5.4%	23.4%	30.0%	N/A
5%	Materials weighted	4.8%	4.2%	4.5%	5.0%	N/A
10%	Written proposal weighted	10.0%	9.0%	9.0%	8.0%	N/A
Technical sub-total		40.7%	22.2%	58.3%	68.0%	fail

#### Normalized category weighting

Max 70%	Technical merit	40.7%	22.2%	58.3%	68.0%	fail
Max 5%	Canadian component	5.0%	4.0%	3.7%	1.0%	N/A
Max 25%	Pricing proposal	18.8%	20.8%	17.3%	25%	N/A
	Total points	69.8%	49.2%	82.6%	89.1%	N/A

#### 4.3. CONTRACT FINANCIAL SECURITY

- 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 security deposit as defined in clause "Security Deposit Definition" in the amount of up to ten percent (10%) of the contract price.
- Security deposits in the form of government guaranteed bonds with coupons attached will be accepted only if all coupons that are unmaturing, 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.
- 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

- "security deposit" means
  - 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
  - a Government guaranteed bond; or
  - an irrevocable standby letter of credit, or
  - such other security as may be considered appropriate by the Contracting Authority and approved by Treasury Board;
- "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.

## **PART 5 - CERTIFICATIONS**

Bidders must provide the required certifications and associated 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 in carrying out any of its obligations under the Contract, 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 may render the bid non-responsive or constitute a default under the Contract.

### **5.1 Certifications Precedent to Contract award**

#### **5.1.1 INTEGRITY PROVISIONS - ASSOCIATED INFORMATION**



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By submitting a bid, the Bidder certifies that the Bidder and its Affiliates are in compliance with the provisions as stated in Section 01 Integrity Provisions - Bid of Standard Instructions 2003. The associated information required within the Integrity Provisions will assist Canada in confirming that the certifications are true.

#### **5.1.2 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" list ([http://www.labour.gc.ca/eng/standards\\_equity/eq/emp/fcp/list/inelig.shtml](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, when the Contract is valued at \$1,000,000 and above, Applicable Taxes included.

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.

#### **5.1.3 SAMPLES AND PRODUCTION CERTIFICATION**

The bidder certifies that:

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

### **PART 6 - RESULTING CONTRACT CLAUSES**

#### **6.1 SECURITY REQUIREMENT**

There is no security requirement associated with the requirement.

#### **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 (<http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/acho-eng.jsp>) Manual issued by Public Works and Government Services Canada.

##### **6.3.1 General Conditions**

2030 (2014/09/25), General Conditions - Goods (Higher Complexity-goods) apply to and form part of the Contract.

##### **6.3.2 Supplemental General Condition**

4007 (2010/08/16) Canada to Own Intellectual Property Rights in Foreground Information



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## 6.4 TERM OF CONTRACT

### 6.4.1 Delivery Date

#### **Delivery required – (Desirable) firm quantity**

Delivery of firm quantities is requested to start 4 weeks after production sample approval.

##### **Delivery Required - Firm Quantity**

The first delivery must be made within (A) calendar days from the date of the written notice of approval of the production sample. The quantity delivered must be (B) each. The balance must be delivered at the rate of (C) each monthly after the first delivery until completion of the Contract.

item	A	B	C
1			
2			
3			
4			
5			
6			

##### **Delivery - Option Quantity**

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

#### **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, Qué.  
514-252-2777, ext. 2363

#### **6.4.1.2 Preparation for Delivery**

The Contractor must prepare helmets and spares for delivery in accordance with Annex D CDRL 006.

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The contractor will deliver the helmet system and spare components in the quantities and size breakdown as specified in the Contract End item List (CEIL- Annex E), inclusive of associated administration, technical and logistic support data outlined in Annex B-1.

#### **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	2011/05/16	Controlled Goods Program
B4060C	2011/05/16	Controlled Goods
D5510C	2012/07/16	Quality Assurance Authority (DND) - Canadian-based Contractor
D5515C	2010/01/11	Quality Assurance Authority (DND) - Foreign-based and United States Contractor
D5540C	2010/08/16	ISO 9001:2008 - Quality Management Systems - Requirements (QAC Q)
D5604C	2008/12/12	Release Documents (DND) - Foreign-based Contractor
D5605C	2010/01/11	Release Documents (DND) - United States-based Contractor
D5606C	2012/07/16	Release Documents (DND) - Canadian-based Contractor
D6010C	2007/11/30	Palletization

#### **6.4.1.5 NATO Standardisation 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 will provide in its 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.

If an item is 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 CF 1280.

## **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



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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**

The Technical Authority for this Contract is:

##### **Mailing/Shipping Address**

Department of National Defence  
101 Colonel By Drive  
Ottawa, Ontario  
K1A 0K2

Attn: DSSPM \_\_\_\_\_ (to be advised at contract)

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

#### **6.5.3 Procurement Authority**

The Procurement Authority for the Contract is:

101 Colonel By Drive  
Ottawa, Ontario  
K1A 0K2

Attn: DLP \_\_\_\_\_ (to be advised at contract)

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

#### **6.5.4 Quality Assurance Authority**

The Quality Assurance representative for the contract is :

101 Colonel By Drive  
Ottawa, Ontario  
K1A 0K2

Attn: DQA \_\_\_\_\_ (to be advised at contract)

The Quality Assurance Authority is the representative of the department or agency for whom the Work is being carried out under the Contract. The Quality Assurance is responsible for the quality of goods required for this Contract. The Contractor may discuss Quality Assurance matters identified in the Contract with the Quality Assurance Authority however the Quality Assurance 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.

#### **6.5.5 Contractor's Representative**

The person responsible for :

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#### **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 - Firm Unit Prices**

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

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

#### **6.6.2 SACC Manual Clauses**

H1001C 2008/05/12 Multiple Payments

### **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: DLP \_\_\_\_\_

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

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

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



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

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

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

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

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

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

## 6.8 **CERTIFICATIONS**

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

## 6.9 **APPLICABLE LAWS**

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

## 6.10. **PRIORITY OF DOCUMENTS**

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

- a) The Articles of Agreement;
- b) The general conditions 2010A (2011/05/16), General Conditions - Goods (Medium Complexity);
- c) Annex A, Requirement;
- d) Annex B-1, Statement of Work-1 – Helmet, CG634, Generation II Interim Production dated July 2011;
- e) Annex B-2, Statement of Work-2 – Helmet, CG634, Generation II Design and Prototyping
- f) Annex C, Technical Purchase Description for Helmet, CG634, Generation II Interim
- g) Annex D, Contract Data Requirement Lists;
- h) Annex E, Data Item Description;
- i) Sealed Samples;
- j) The Contractor's bid dated \_\_\_\_\_

## 6.11. **DEFENCE CONTRACT**

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

## 6.12. **SACC MANUAL CLAUSES**

C2611C	2007-11-30	Customs Duties - Contractor Importer
C2800C	2013-01-28	Priority Rating
C2801C	2011-05-16	Priority Rating - Canadian-based Contractors

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#### **6.13. MATERIALS: CONTRACTOR'S SUPPLY**

The Contractor will be responsible for obtaining all materials required in the manufacture of developmental items unless otherwise covered by Government sourced material specified in individual tasks. The delivery stated allows the necessary time to obtain such materials.

#### **6.14. PROCEDURES FOR DESIGN CHANGE/DEVIATIONS**

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

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

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

#### **6.15. PLANT CLOSING**

The Contractor's plant closing for Christmas and Summer holidays are as follows. During this time there will be no Combat Helmet for the Canadian Forces.

##### **2015-2016**

Christmas Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_  
Summer Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_

##### **2016-2017**

Christmas Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_  
Summer Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_

##### **2017-2018**

Summer Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_  
Christmas Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_

##### **2018-2019**

Summer Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_  
Christmas Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_

##### **2019-2020**

Summer Holiday FROM \_\_\_\_\_ TO \_\_\_\_\_  
Christmas 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.



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

#### **6.18. QUALITY PLAN**

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

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

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

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

#### **6.19. MEETINGS**

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

A post contract award meeting may be convened by Canada within twenty (20) calendar days after award of contract. Participants may include representatives of the Contractor, Technical Authority, DNDQAR, Contracting Authority and the 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 meetings will normally be attended by three (3) government representatives. These meetings will be chaired jointly by the Contractor PM and DND Technical Authority meetings will be in accordance with CDRL 002.

#### **6.20. PRODUCTION SAMPLES**

1. The Contractor must provide the production samples consisting of two (2) helmets of each size, to the Technical Authority for acceptance within 100 calendar days from contract award.
2. The samples submitted by the Contractor are part of the total firm quantities specified in Annex A.
3. Original invoices for these samples are to be sent to the Procurement Authority.



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4. If the production samples are accepted by either full acceptance or conditional acceptance, the Contractor must proceed with production as per the Contract requirements.
5. The Contractor must carry out all required inspection and tests to verify conformance to the technical requirements of the Contract.
6. The Technical Authority will notify the Contractor, in writing, of the full acceptance, conditional acceptance, or rejection of the 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.
7. 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.

#### **6.21. ENVIRONMENTAL IMPACT AND SAFETY**

The production of a product to the specifications may require the use of materials that could be hazardous. These specifications do not import to address all safety, health and environmental concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health and environmental practices and determine the applicability of regulatory limitations prior to use.

The contractor(s) will comply with all laws applicable to the performance of the work or any part thereof including, without limitation, all laws concerning health and labour conditions and the protection of the environment, and will require compliance therewith by all its subcontractor(s). Evidence of compliance with such laws will be furnished by the contractor(s) to the contracting authority at such times as the contracting authority may reasonably request.

#### **6.22. 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

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until completion of the contract period.

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## **ANNEX A REQUIREMENT**

### **1. TECHNICAL REQUIREMENT**

The Contractor is required to provide the Department of National Defence with CG634 Gen II helmets plus all spare components , in accordance with the Statement of Work , Annex B, the technical purchase description, Annex C, the Contract Data Requirements Lists (CDRL), Annex D, the Data Item Descriptions (DID), Annex E, Product specification, Annex G.

### **2. ADDRESSES**

<b>Destination Address</b>	<b>Invoicing Address</b>
<b>WB941</b> Department of National Defence 25 CFSD Montreal 6363 Notre Dame St. E. Montreal, Quebec H1N 1V9	<b>WB941</b> Department of National Defence 25 CFSD Montreal PO BOX 4000 Succ K Montreal, Quebec H1N 3R9
<b>W248A</b> Department of National Defence 7 CF Supply Depot Receipt and issue section Edmonton, Alberta J2E 1A9	<b>W248A</b> Department of National Defence 7 CF Supply Depot STN Forces PO BOX 10500 Edmonton, Alberta T5J 4J5

### **3. DELIVERABLES**

Year 1: if exercised (ordered) within 12 to 24 months from contract award date.  
Year 2: if exercised (ordered) within 25 to 36 months from contract award date.  
Year 3: if exercised (ordered) within 37 to 48 months from contract award date.  
Year 4: if exercised (ordered) within 49 to 60 months from contract award date.  
Year 5: if exercised (ordered) within 61 to 72 months from contract award date.  
Year 6: if exercised (ordered) within 73 to 84 months from contract award date.



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### 3.1 CONTRACT

#### 3.1.1 Firm Quantity

Item	Description	NSN	Quantity	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra	Destination
1	CG634 Gen II Interim combat helmets	TBD	6000	each	\$ _____	Montreal
			2,000		\$ _____	Edmonton
2	headband	8471-21-912-7613-20% 8471-21-912-7614-60% 8471-21-912-7615-20%	3000	Each	\$ _____	Montreal
			1000		\$ _____	Edmonton
3	Suspension sub-system (as defined in section 3.5 of Annex C).	8471-21-912-7607-20% 8471-21-912-7608-60% 8471-21-912-7609-20%	1,500	EA	\$ _____	Montreal
			500		\$ _____	Edmonton
4	Retention chinstrap standard	8471-21-912-7610-20% 8471-21-912-7611-60% 8471-21-912-7612-20%	3,000	EA	\$ _____	Montreal
			1,000		\$ _____	Edmonton
5	Screw and barrel nut	8471-21-912-7617	300	Boxes of 30	\$ _____	Montreal
			100		\$ _____	Edmonton
6	Retention chinstrap (right side buckles)	8471-21-912-7647-20% 8471-21-912-7648-60% 8471-21-912-7649-20%	600	EA	\$ _____	Montreal
			200		\$ _____	Edmonton

3.1 The Contractor will produce and deliver progress reports as required in CDRL001 and DID MGTD-19001 in Annex E.

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3.2 The Contractor will produce and distribute a packaging specification as required in CDRL006 and DID ILSD-19001 SC in Annex E.

### 3.1.2. Option- year 1

#### 3.1.2.1 Additional quantities

Item	Description	NS N	Estimated Quantity per year	Unit of Issue	Firm Unit Price, DDP, Transportation costs included, GST extra	Destination
7	CG634 Gen II Interim combat helmets	TBD	1,000 - 10,000	each	\$ _____	Montreal
					\$ _____	Edmonton
			<div>10,001- 20,000</div>		\$ _____	Montreal
					\$ _____	Edmonton

Any order will be for a minimum quantity of 1,000 units for any size that is ordered

### 3.1.3. As and when requested quantities -year 1

#### 3.1.3.1 Spares

Item	Description	NSN	Estim ated Quanti ty per	Unit of Issu e	Firm Unit Price, DDP, Transportation costs included, GST extra	Destination
8	headband	8471-21-912- 7613	2250	each	\$ _____	Montreal
		8471-21-912- 7614	750		\$ _____	Edmonton
		8471-21-912- 7615				
9	Suspension sub-system (as defined in section 3.5 of Annex C).	8471-21-912- 7607	1,500	each	\$ _____	Montreal
		8471-21-912- 7608				Edmonton
		8471-21-912- 7609	500		\$ _____	

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10	Retention chinstrap standard	8471-21-912-7610	2,100	each	\$ _____	Montreal
		8471-21-912-7611 8471-21-912-7612	700		\$ _____	Edmonton
11	Retention chinstrap[ right side buckles)	8471-21-912-7647	150	each	\$ _____	Montreal
		8471-21-912-7648 8471-21-912-7649	50		\$ _____	Edmonton
12	Screw and barrel nut	8471-21-912-7617	150	Boxes of 30	\$ _____	Montreal
			50		\$ _____	Edmonton

### 3.1.3.2. Labour and design improvement services

Item 13	Category of personnel	Firm hourly rate					
		Year 1	year 2	year 3	year 4	year 5	year 6
13a)		\$	\$	\$	\$	\$	\$
13b)		\$	\$	\$	\$	\$	\$
13c)		\$	\$	\$	\$	\$	\$
Etc ...							

### 3.2 Firm unit prices (for years 2 to 6)

For years two to six of the option to purchase additional quantities (item 7) and "as and when requested" quantities (items 8 to 12), 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.

### 4. AS AND WHEN REQUESTED (items 8-13)

Under this Contract, the Contractor is required to provide certain goods and services 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 or services under this Contract and this Contract does not represent a commitment to purchase such goods or services exclusively from the Contractor.



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DND may issue orders for "as and when requested" items directly to the Contractor detailing the exact quantities of goods to be ordered or services to be performed 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 items 8-13 is only an approximation of requirements.

Order will be made on Form 942 or 626.

The period for placing "as and when requested" orders will be 84 months from the date of contract award.

Delivery of items will be made within \_\_\_\_\_ calendar days after receipt of order document.

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

#### **Order procedure for labour and design Improvement Services**

1. The Procurement Authority will provide the Contractor with a description of the task using the "DND 626, Task Authorization Form.
2. The Task Authorization (TA) will contain the details of the activities to be performed, a description of the deliverables, and a schedule indicating completion dates for the major activities or submission dates for the deliverables.
3. The Contractor must provide the Technical Authority, within 14 calendar days of its receipt, the proposed total estimated cost for performing the task and a breakdown of that cost.
4. The Contractor must not commence work until a TA authorized by the Technical Authority has been received by the Contractor.
5. No cost s incurred before the receipt of a signed order can be charged to an order.
6. No Service charges may be incurred or invoiced to DND without prior written approval. DND is not liable to pay for any services that they have not requested in writing and when provided a quote.

#### **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 (item 7)**

The Contractor grants to Canada the irrevocable option to acquire the goods described at Annex A under the same terms and conditions and at the prices stated in the Contract.

Any options exercised will be for a Minimum of 1,000 helmets per mould used up to a Maximum of 10,000 helmets total for all mould used for each amendment and will be evidenced, for administrative purposes only, through multiple contract amendments. The maximum value for all amendments combined must not exceed \$(to be inserted at contract) excluding applicable taxes.



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The Contracting Authority may exercise the options at any time after contract by sending a written notice to the Contractor. The option will be valid for 84 months from contract award. The pricing which will apply to the option quantities ordered will be determined by the year in which the option is exercised. The method for determining years 2 to 6 pricing is described in paragraph 3.2.

Multiple amendments may result.

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**ANNEX "H" 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)





National  
Defence

Défense  
nationale

2184D-18470-102  
OTT\_LSTL#3401666  
August 2013



**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 - 1**



**HELMET, CG634  
GENERATION II INTERIM**

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OPI : DSSPM  
BPR: DAPES

**Canada**

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

## STATEMENT OF WORK

### HELMET, CG634

### GENERATION II – INTERIM

#### 1.0 SCOPE

1.1 **Purpose.** This Statement of Work (SOW) defines the work to be performed by the Contractor to provide the Land Force (LF) with a lightweight ballistic shell for the CG634 helmet system. The helmet must satisfy the requirements specified in the Technical Purchase Description (TPD).

1.2 **Background.** Specific elements of the Land Force will be issued the lightweight ballistic helmets. The interim helmet system will only include modifications to the ballistic shell. The shell will retain the same coverage and interior geometry of the current sizes of CG634 helmets at a lighter weight, remains fully interchangeable with in-service helmet components, and will be backwards compatible with currently-fielded CG634 accessory items.

#### 1.3 Terminology.

1.3.1 GFE. This acronym is used as the abbreviation for Government Furnished Equipment provided to the Contractor for purposes of system compatibility assessment or system integration.

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

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



1.3.4 TDP. This acronym is used as the abbreviation for the Technical Data Package and represents the compilation of the engineering drawings, product specifications, and other technical documentation for this project.

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

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

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

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

2184D-18470-102	Technical Purchase Description Helmet, CG634 Generation II - Interim Directorate of Soldier Systems Program Management September 2013
D-02-006-008/SG-001	Design Change, Deviation and Waiver Procedure
D-02-002-001/SG-001	Identification Marking of Canadian Military Property
D-LM-008-036/SF-000	Manufacturer's Standard Pack
D-01-400-001/SG-000	Engineering Drawing Practices
C-01-100-100/AG-005	Adoption of Commercial and Foreign Government Publications

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

### **3.0 REQUIREMENTS AND TASKS**

3.1 **General.** The Contractor shall perform all the work required to deliver the helmet systems and components in accordance with this SOW, the technical purchase description (Annex C), 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 12 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 62 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 CG634 Gen II-Interim Helmet.** The Contractor shall deliver the helmet system and spare components in the quantities and size breakdown as specified in the CEIL (section 4.0), inclusive of associated administrative, technical, and logistics support data 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 design, production, and contractual decisions and communicate to the Government the planning and coordination of Contractor activities in all disciplines as related to this work.

**3.3.2 Progress Reports.** The Contractor shall produce and distribute Progress Reports as required in CDRL 001 and DID MGTD-19001.

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

**3.3.4 Agenda and Minutes of Reviews.** The Contractor shall produce and distribute agenda and minutes for technical reviews as required in CDRL 002 and DID ADMD-19001.

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

**3.4.1 Technical Data Package.** The Contractor shall produce and deliver the revised engineering drawings and product specification as required in CDRL 003 and DID CMGT-19001.

**3.5 Quality Control and Testing.** The helmet components provided by the Contractor shall comply with technical and performance requirements in the TPD



and Product Specification (Annex G). 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 Table 1. 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 helmet production as required in the RFP. The plan must include a system for traceability of finished production helmets to the original ballistic material lots. The final plan shall be delivered for approval by the QAR at the Production Readiness Review meeting.

3.5.2 **Test Records.** The Contractor shall provide notification and test records to the Technical Authority of any test series as defined in CDRL004 and DID ENGD-19001. Routine test data and inspection records during production shall be recorded and maintained in accordance with the Contractor's QA Plan and made available on request.

3.6 **User Manual.** The Contractor shall produce and distribute, with each helmet, a user manual as required in CDRL 005 and DID TMPB-19001.

3.7 **Packaging Specification.** The Contractor shall produce and deliver a packaging specification as required in CDRL006 and DID ILSD-19001.

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

3.9 **Location.** Unless otherwise stated in the contract, the technical documentation, ILS records, Test and Evaluation (T&E) records, and pre-production samples for DND testing 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 – Test Sample Requirements**

TPD SECTION	TEST REQUIREMENT	Preproduction First Article or Failed Lot	Production
	ANNEX C	(Note 6)	(Note 1 and 6)
V50 Ballistic Limit 17 gr FSP	3.2.1.1	1/mould	1/lot
V50 Ballistic Limit 16 gr Sphere	3.2.1.2	1/mould	1/lot
Vproof Backface Signature	3.2.2	2/mould	2/lot
Environmental Qualification	3.2.3	(Note 2)	N/A
Extreme Temperature Conditioning	3.2.4	See 3.2.5	N/A
Blunt Impact Protection	3.2.5	7/size Dismounted 4/size Parachutist	2/lot (Note 4) Dismounted
Ballistic Performance Post-Impact Damage	3.2.5	(7/size-Note 3)	(2/lot-Note 3)
Compression Resistance and Ballistic Safety	3.2.6	6/size (2 ea orientation)	2/lot (note 4 & 5)
Weight	3.3	100%	QA Sampling Plan
Shell Construction	3.4	2/size	QA Sampling Plan (Note 6)
Suspension Sub-System	3.5	100% Visual Only	QA Sampling Plan
Retention Sub-System	3.6	3 any size	QA Sampling Plan
Chemical Resistance	3.7.1	(Note 2)	N/A
Flame Resistance	3.7.2	(Note 2)	N/A
Water Absorption and Ballistic Performance	3.7.3	3 Any size	N/A
Fungus Resistance	3.7.4	1 Any size	N/A
Counter-surveillance	3.7.5	Coupons	Each paint Lot

- Notes:**
1. Selected randomly from each lot.
  2. Conducted at Bid Evaluation and First Article only.
  3. Same samples as non-ballistic impact (Dismounted Soldier).
  4. Ambient ONLY.
  5. Side-to-side orientation ONLY; additional tests contingent on result.
  6. All ballistic samples to be measured for thickness.



#### 4.0 DELIVERABLES

HELMET COMPONENT SAMPLES CONTRACT END ITEMS LIST (CEIL)		Quantity		
<b>CONTRACT</b>				
<b>Preproduction</b>		Refer to RFP/Contract		
Preproduction visual samples (DND) (Note 1)		2 Helmets each Size (Small, Medium, and Large)		
First Article - test samples and records		Refer to Table 1(DND to witness testing)		
<b>Production Deliverables (Note 2)</b>		Small	Medium	Large
Helmet Kit CG634 Gen II-Interim (Note3)		NSN TBD 20 % MIN 8,000	NSN TBD 60 % TOTAL FOR 3 SIZES	NSN TBD 20 % MAX 16,000
Headband		8471-21-912-7613	8471-21-912-7614	8471-21-912-7615
Quantity		800	2,400	800
Suspension sub-system (as defined in section 3.5 of annex C)		8471-21-912-7607	8471-21-912-7608	8471-21-912-7609
Quantity		400	1,200	400
Retention Chinstrap Standard		8471-21-912-7610	8471-21-912-7611	8471-21-912-7612
Quantity		800	2,400	800
Screw and Barrel Nut		8471-21-912-7617		
Quantity		400(boxes of 30)		
Retention Chinstrap Right Side Buckle		8471-21-912-7647	8471-21-912-7648	8471-21-912-7649
Quantity		100	600	100
<b>Data Item Description (DID)</b>		<b>CRDL #</b>	<b>DID #</b>	
Progress Reports		001	MGTD-19001	
Technical Review Records		002	ADMD-19001	
Technical Data Package		003	CMGT-19001	
Test Records		004	ENGD-19001	
User Manuals		005	TMPB-19001	
Packaging Specification		006	ILSD-19001	

**Notes:** 1. Delivery to DND Technical Authority.  
2. Does not include option years.  
3. Kits include User Manual.





National Défense  
Defence nationale

2184D-18470-102(D)  
OTT\_LSTL#3401703  
July 2013



**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 - 2**



**HELMET, CG634 GENERATION II  
DESIGN AND PROTOTYPING**

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OPI : DSSPM  
BPR: DAPES

**Canada**

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

**STATEMENT OF WORK**  
**HELMET, CG634 GENERATION II**  
**DESIGN AND PROTOTYPING**

**1.0 SCOPE**

**1.1 Purpose.** This Statement of Work (SOW) defines potential work to be performed by the Contractor in support of DND technical and human-factors trials of new helmet sub-systems. The work includes the design, testing, and limited production of prototype sub-system concepts based on the CG634 Gen II-Interim helmet baseline.

**1.2 Background.** The next generation combat helmet capability will consist of an optimum-coverage, lightweight ballistic system that is modifiable to integrate complementary ballistic protection and accessory items. DND intends to explore concepts of alternate sub-systems to provide technical advancement possibilities for the next generation combat helmet. In support of the development of this new combat helmet capability, the contractor may be requested to undertake the following:

- Develop design concepts and prototypes;
- Conduct test and evaluation including but not limited to threat and failure analysis;
- Develop new test methodologies to assess helmet performance capabilities; and
- Report on cutting edge manufacturing capabilities and techniques associated with the production and modification of ballistic helmets.

**1.3 Terminology.**

**1.3.1 GFE.** This acronym is used as the abbreviation for Government Furnished Equipment provided to the Contractor for purposes of system compatibility assessment and system integration.

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

1.3.3 RFP. This acronym is used as the abbreviation for the Request for Proposal and represents the contractual requirements for bid evaluation, task capability, and negotiated rates for each personnel resource classification.

1.3.4 TDP. This acronym is used as the abbreviation for a Technical Data Package and represents the compilation of the engineering drawings, specifications, test records, and other scientific and technical documentation resulting from any funded development tasks for which DND will own non-exclusive intellectual property rights.

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

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

1.3.7 MOTS. This acronym is used as the abbreviation for modified off the shelf components to be delivered under this SOW and the Contract deliverables.

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

2184D-18470-102	Technical Purchase Description Helmet, CG634 Generation II - Interim Directorate of Soldier Systems Program Management September 2013
D-01-400-001/SG-000	Engineering Drawing Practices
C-01-100-100/AG-005	Adoption of Commercial and Foreign Government Publications

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



### 3.0 REQUIREMENTS AND TASKS

3.1 **General.** The Contractor shall demonstrate the capability to perform the work required to develop new techniques, processes, and component prototypes under contract for the advancement of helmet studies, trials, and engineering data packages of alternative suspension, retention, and protection modules and their integration to the helmet system.

3.2 **Tasks.** Detailed task requirements, if funded by DND, will be submitted for contractor acceptance and costing on a case by case basis. All pricing will be in accordance with negotiated rates approved by PWGSC under contract. Priced tasks will be forwarded for approval to the Technical Authority prior to commencement of any work. Tasks shall include, but are not limited to the following types of core activities.

3.2.1 Engineering Support. The Contractor shall provide engineering support services, such as technical investigations, alternate material studies, failure analysis, manufacturing optimization, and data package development. Engineering drawings shall be as specified in DID CMGT-19001.

3.2.2 Test and Evaluation (T&E) Support. The Contractor shall provide T&E services, including ballistic testing, blunt impact studies, material testing, and field support to DND human-factors trials. The Contractor shall provide notification and test records to the Government of any special test series that are tasked as defined in DID ENGD-19001.

3.2.3 Prototyping. The Contractor shall provide design and prototyping services of new concepts for sub-system components (up to 40 pieces for trials and evaluation) that enhance safety performance over the current component design or that add to operational capability and efficiency. Prototyping tasks shall include support data for optimization of mass-production techniques.

3.2.4 Technical Reviews. The Contractor shall provide meeting facilities and conduct periodic technical review meetings. The meetings will normally be attended by three government representatives and minutes for technical reviews as required in CDRL 002 and DID ADMD-19001.

3.3 **Limitations.** Payments for services undertaken on an individual task to address investigations, modifications, or deficiencies shall be paid after the associated report or other specified deliverable (test data, drawings, etc.) is signed off by the Technical Authority. Payments for prototyping and delivery of goods can be broken down into negotiated milestones payments with the Contractor to cover the acquisition of supplies, tooling, and/or sub-contracts necessary to set-up and undertake limited manufacture of new concepts for trials.

**3.4 Technical Authority** (Refer to Annex B-1).

**3.5 Location.** Unless otherwise stated in the contract, the design data documentation, Test and Evaluation (T&E) records, and prototype concepts 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

**4.0 DELIVERABLES**

Details will be provided in individual contract Call-Ups.

**4.1 SCHEDULE**

Details will be provided in individual contract Call-Ups.



National Défense  
Defence nationale

2184D-18470-102  
September 2013



**NOTICE**

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**TECHNICAL PURCHASE DESCRIPTION**



**HELMET, CG634  
GENERATION II – INTERIM**

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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

### HELMET, CG634 GENERATION II – INTERIM

#### 1. SCOPE AND CLASSIFICATION

**1.1 Scope.** This document details the characteristics and performance required of a lighter weight combat helmet system. The helmet system provides head protection, primarily against fragmentation from high explosive detonation or other explosive devices; and secondarily, against other impacts on a 24 hour, all-weather/climate continuum.

**1.2 Intended Use.** The interim helmet system will replace the CG634 and provide protection to specified combat arms and combat support troops. The ballistic shell will also be used as the lightweight trial platform for the further development of the requirements and technical specifications for the next generation helmet system.

**1.3 System Overview.** The next generation combat helmet system will consist of an optimum-coverage, lightweight ballistic shell platform that is modifiable to integrate complementary ballistic protection and accessory items. The helmet assembly will incorporate a four-point adjustable retention sub-system, an improved headband stabilized suspension sub-system, an advanced impact liner assembly, and interchangeable environmental covers. The interim helmet system will only include modifications to the in-service ballistic shell to achieve weight reduction and to remove the front brim. The shell retains the same coverage and interior geometry of the current sizes of CG634 helmets at a lighter weight, remains fully interchangeable with in-service helmet components, and will be backwards compatible with currently-fielded CG634 accessory items.

#### 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 to meet all specified requirements cited in this technical purchase description (TPD), 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 shall be those in effect on the date of the applicable design data list, released with the Request for Proposal.

## STANDARDS

FED-STD-595	Colours used in Government Procurement
STANAG 2920 (Edition 2)	Ballistic Test Method for Personal Armour Materials

## SPECIFICATIONS

MIL-DTL-64159B	Coating, Water Dispersible Aliphatic Polyurethane, Chemical Agent Resistant
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-83133	Turbine Fuel, Aviation, Kerosene Type, Grade JP-8
MIL-L-46000	Lubricant, Semi-Fluid (Automatic Weapons
MIL-PRF-372	Cleaning Compound, Solvent
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missiles, and Ordnance
MIL-PRF-6083	Hydraulic Fluid, Petroleum Base, For Preservation and Operation
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft
MIL-PRF-14107	Lubricating Oil, Weapons, Low Temperature

**2.3 Other Government documents and drawings.** The following other Government documents form a part of this TPD and will be distributed automatically by DND.

## PUBLICATIONS

D-80-001-055/SF-001	Label, Clothing and Equipment
OTT_LSTL#3426001	C-3/57

## ENGINEERING DRAWING PACKAGE

9675125                      Helmet Assembly CG634 and all subsidiary drawings

## ENGINEERING DRAWINGS

0676441                      CVC Impact Shell, Regular Size  
1079722                      CVC Impact Shell, Large Size

**2.4 Other Specifications and Standards.** The documents listed in section 2.4 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 RFP. They are not provided by the Government and may be purchased from the sources shown below.

### American Society for Testing and Materials (ASTM)

D123	Standard Terminology Relating to Textiles
D523	Standard Test Method for Specular Gloss
D543	Standard Test Methods for Resistance of Plastics to Chemical Agents
D1230	Standard Test Method for Flammability of Apparel Textiles
D910	Gasoline, Aviation
G21	Standard Practise for Determining Resistance of Synthetic Polymeric Materials to Fungi
D3359	Standard Test Methods for Measuring Adhesion by Tape Test
E308	Standard Practice for Computing the Colors of Objects by Using the CIE System
E1331	Standard Test Method for Reflectance Factor and Color by Spectrophotometry Using Hemispherical Geometry



## ANSI PUBLICATIONS

ANSI/ASQC Z1.4 Sampling Tables

## Canadian General Standards Board

CGSB 3.157	Automotive Diesel Fuel
CGSB 4-GP-85Ma	Nylon Thread (Continuous Multifilament)
CGSB 4.2-CAN/CGSB	Textile Test Methods
CGSB 4.131-93.6	Thread Cotton Covered Polyester
CGSB 54.1-M90	Stitches and Seams Part 1 (ISO 4915-1981)
CGSB 54.1-M90	Stitches and Seams Part 2 (ISO 4916-1982)
CAN/CSA 22.2NO.17-00	Evaluation of Properties of Polymeric Materials
CAN/CSA Z94.3-92	Industrial Eye and Face Protectors

**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. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

**3.1 General Requirements.** The interim helmet system shall be functionally efficient to use, adjust, change components, and stow. Removable components shall disassemble easily and re-assemble securely without the use of tools. Removable components shall be fully interchangeable and interoperable with other in-service CG634 helmets of the same size. Helmets shall satisfy the following performance categories (see Table 3.1):

- a. defined protection levels;
- b. designated construction and features; and
- c. specified characteristics and finishes.

3.1.1 Definitions. Definitions applicable to this purchase description are found at section 6.

3.1.2 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. First Article samples shall be subjected to preproduction inspection in accordance with section 4.3.

3.1.3 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. All finished components shall be free of rough or sharp edges that could result in discomfort or abrasion to the head.

3.1.4 Sizing and Standoff Requirements. The helmet assemblies shall be constructed to provide the following nominal adjustment range or better in each size. The minimum separation distance of 12.5 mm (Standoff) between the ballistic shell interior surface and the wearer's skull shall be maintained when the headband is at its maximum extension:

Helmet Size	Nominal Adjustment Range		
	<u>Head Length</u>	<u>Head Breadth</u>	<u>Circumference</u>
Small	17.0 to 19.3 cm	13.0 to 14.8 cm	51.0 to 55.0 cm
Medium	18.0 to 20.5 cm	14.0 to 16.0 cm	55.0 to 59.0 cm
Large	19.0 to 21.5 cm	15.0 to 17.0 cm	59.0 to 62.0 cm

**Table 3.1 - System Requirements**

CATEGORY	REQUIREMENT(S)	REQUIREMENT SECTION(S)	TEST METHOD SECTION(S)
<b>Protection Levels</b>	Ballistic Limit	3.2.1	4.5.1 App 1
	Backface Transient Deformation	3.2.2	4.5.2
	Environmental Qualification	3.2.3	4.5.3 App 2
	Extreme Temperature Conditioning	3.2.4	4.5.4
	Blunt Impact Protection	3.2.5	4.5.5 App 3
	Compression Resistance	3.2.6	4.5.6 App 4
<b>Construction and Features</b>	Weight	3.3	4.6
	Shell Construction	3.4	4.7
	Suspension Sub-System	3.5	
	Retention Sub-System	3.6	4.8 App 5
<b>Physical Characteristics</b>	Chemical Resistance	3.7.1	4.9.1 App 6
	Flame Resistance	3.7.2	4.9.2
	Water Absorption	3.7.3	4.9.3
	Fungus Resistance	3.7.4	4.9.4
	Counter-surveillance	3.7.5	4.9.5

### 3.2 Protection Levels.

3.2.1 Ballistic Limit  $V_{50}$ . The ballistic performance forms part of the **RATED** selection process. When tested in accordance with 4.5.1, the shell ballistic limit shall meet or exceed the requirements specified below. There shall be no spall resulting from a hit by a fragment.

3.2.1.1  $V_{50}$  Standard 17gr FSP. When tested against the NATO 17gr fragment simulating projectile (FSP) as defined within, the minimum  $V_{50}$  value should be  $\geq 725\text{m/s}$  and shall not be less than 675m/s.



- 3.2.1.2 V<sub>50</sub> Standard 16gr Sphere. When tested against the 16gr sphere as defined within, the minimum V<sub>50</sub> value should be  $\geq 700\text{m/s}$  and shall not be less than 650m/s.
- 3.2.2 Backface Deformation. When tested in accordance with 4.5.2, the shell backface deformation shall not exceed 20mm when struck by 17gr FSP at 575m/s  $\pm 10\text{m/s}$ .
- 3.2.3 Environmental Qualification. After undergoing the environmental cycling protocol in accordance with 4.5.3, the minimum V<sub>50</sub> value shall remain  $\geq 95\%$  of the V<sub>50</sub> Standard 17gr FSP specified at section 3.2.1.1, the average shell backface deformation shall not exceed 20mm at a velocity of 565m/s $\pm 10\text{m/s}$ , and no individual deformation measurement shall exceed 22mm. This conditioning series is only done for full design qualification and will be conducted by DND. The post-environmental ballistic performance forms part of the **RATED** selection process.
- 3.2.4 Extreme Temperature Conditioning. Any requirements incorporating extreme temperature conditioning shall be done in accordance with 4.5.4.
- 3.2.5 Blunt Impact. When tested in accordance with 4.5.5, the helmet system should attenuate each impact to the levels specified in Table 3.2 below and the average of all impacts on a sample shall meet the minimum levels specified for each task role. No individual impact shall exceed 250G for the dismounted soldier series or 350G for the parachutist series.

**Table 3.2 – Impact Attenuation Average by Task Element**

	<b>Dismounted</b>	<b>Parachutist</b>
<b>Crown</b>	$\leq 150\text{G @ } 55 \text{ Joules}$	$\leq 250\text{G @ } 90 \text{ Joules}$
<b>Sides</b>	$\leq 150\text{G @ } 30 \text{ Joules}$	$\leq 250\text{G @ } 65 \text{ Joules}$
<b>Front/Rear</b>	$\leq 150\text{G @ } 30 \text{ Joules}$	$\leq 250\text{G @ } 65 \text{ Joules}$

The specified conditions simulate mechanical and thermal shocks encountered in-service and although these conditions may not produce any visible damage to the shell, they may still degrade the ballistic performance of a helmet sample. After undergoing the blunt impact protocol for dismounted soldiers the ballistic shell shall pass the visual inspection at Table 4.1. The minimum V<sub>50</sub> value shall remain  $\geq 95\%$  of the V<sub>50</sub> Standard 17gr FSP specified at section 3.2.1.1, the average shell backface deformation shall not exceed 20mm at a velocity of 565m/s $\pm 10\text{m/s}$ , and no individual deformation measurement shall exceed 22mm.

The post-impact ballistic performance forms part of the **RATED** selection process.

- 3.2.6 **Compression Resistance.** After undergoing the compression resistance protocol, in accordance with 4.5.6, the shell deformation measurements shall not exceed the limits specified in Table 3.3 below. The average shell backface deformation shall not exceed 20mm at a velocity of 565m/s  $\pm$  10m/s and no individual deformation measurement shall exceed 22mm. The post-compression ballistic performance forms part of the **RATED** selection process.

**Table 3.3 – Deformation Limits - Compression**

ORIENTATION	SIDE/SIDE (mm)	FRONT/BACK (mm)	TOP/DOWN (mm)
Maximum Deformation Under load (B* - A)	24.0	24.0	6.0
Permanent Deformation Unloaded (C - A)	8.0	8.0	2.0
Restitution Value After 24 hours (D - A)	5.0	5.0	1.0

**3.3 Weight.** When weighed as specified at section 4.6, the ballistic shells in each size shall be less than or equal to 85% of the in-service CG634 shell nominal weights specified in Table 3.4 below. Production weights in each size will be based on Bidder supplied data and samples submitted for assessment. The helmet to helmet variability within each size during production should not exceed 60 grams. The weight of the helmet shell forms part of the **RATED** selection process.

**Table 3.4 – In-Service Nominal Weights (Finished Shell - see 3.4.3)**

	Size Small	Size Medium	Size Large
CG634 Shell in grams	1100	1180	1260

**3.4 Shell Construction.** The shape of the unfinished shell shall be as specified in Drawings 9675127 (CG634 Small), 9675128 (CG634 Medium), and 9675129 (CG634 Large) except that the front tapered lip shall be eliminated and the flush frontal surface shall maintain the same downward coverage. The outside surface shall be defined by the inner geometry plus thickness.

- 3.4.1 **Thickness.** When measured as specified at section 4.7.1, the average thickness of the shell shall not exceed the in-service nominal thickness (7.6mm)



circumference and 8.4mm crown) by more than 1.0mm in order to maintain compatibility with the in-service environmental covers.

3.4.2 Shell Surface Raised benchmarks of approximately 1mm in height at the crown, centre front, and 2 rear side locations (equidistant from centre rear) shall be moulded into the interior of each shell to assist with precision alignment of the trim lines for the CVCMH (see Definitions section 6.0) conventional and extended coverage shells and the interior attachment points of the CVCMH impact shell. The crown benchmark shall be an 8mm±2mm cross (+) aligned front to rear and the rim benchmarks shall extend up from any edging material 5mm±2mm or if edging is not required, 8mm±2mm from the bottom edge of the rim.

3.4.3 Surface Finish The shell surface shall be prepared in accordance with the paint manufacturer's instructions and holes shall be precision-drilled prior to any surface finishing. Holes shall be clean and free of any frayed material. Minor surface gaps and pits on the outer shell surface may be filled with suitable material to achieve a smooth and continuous finish, but no cutting and filling of blisters or other defects in the ballistic material are permitted. The paint shall be applied to the outer surface of the shell including any edging (if required). When tested in accordance with section 4.7.2 the painted surfaces of the ballistic shell shall resist chipping or peeling. The ballistic shell coating shall be Green 383 matching colour 34094 of Fed-STD-595 and shall comply with MIL-DTL-64159B. For counter-surveillance properties refer to section 3.7.5. After application of the coating, hardware for the holes shall pass through freely and benchmarks shall be clearly visible. Testing shall be conducted in accordance with section 4.7.3.

3.4.4 Edging If edging is required to protect ballistic fibres from delaminating, fraying, or tearing, then it shall consist of a single piece, cut to length and bonded firmly with the cut ends placed at the rear centre. No overlap of butt ends or gap exceeding 2mm is permitted. The edging material shall be resistant to peeling when tested in accordance with section 4.7.4.

**3.5 Suspension Sub-System.** The suspension sub-system, including the headband and ventilated trauma liner shall be manufactured in accordance with the CG634 Product Specification Rev. 3 - Dec 06 (pages 50-74 inclusive).

3.5.1 Reference Samples The formal approval of component markings and colours will be made at the Production Readiness Review meeting and samples will be sealed for subsequent visual inspections during production.

**3.6 Retention Sub-System.** The retention sub-system, including the screw and barrel nut sets shall be manufactured in accordance with the CG634 Product



Specification Rev. 3 - Dec 06 (pages 24-49 inclusive), and the performance requirements shall be as specified below.

- 3.6.1 Retention Sub-System Strength. When tested in accordance with 4.8, the retention sub-system shall not detach and the maximum elongation of the retention system during the impact shall not exceed 25mm and immediately following the dynamic impact the residual elongation shall not exceed 12mm.
- 3.6.2 Strap Slippage. The helmet retention sub-system shall remain secure after comfort and fit adjustments. When tested in accordance with 4.8, the total slippage through the frictional grip shall not exceed 10 mm
- 3.6.3 Ease of Release. When tested in accordance with 4.8, release mechanisms for the retention sub-system shall be capable of being operated by a force not exceeding 30N when the retention sub-system is loaded by a downward force of  $500 \pm 10\text{N}$ .
- 3.6.4 Partial Engagement. There shall be some positive indication to the wearer that correct engagement of the locking buckle has occurred. This may be provided by an auditory or sensory clue. Failing that, the parts partially engaged shall disconnect under a tensile load of 10N or less. Test in accordance with 4.8.
- 3.6.5 Reference Samples. The formal approval of component markings and colours will be made at the Production Readiness Review meeting and samples will be sealed for subsequent visual inspections during production.

### **3.7 Physical Characteristics**

- 3.7.1 Chemical Resistance. The ballistic shell and the external helmet components shall be resistant to damage from common battlefield fluids to the extent practical. These include but are not limited to lubricants, greases, fuels, cleaning agents, and insect repellents. The ASTM D543 or equivalent should be used for guidance for this requirement. The components shall have an evaluation grade of no higher than "1" for test fluids when tested as specified at section 4.9.1.
- 3.7.2 Flame Resistance. The ballistic shell and the external helmet components shall not support combustion when tested in accordance with section 4.9.2.
- 3.7.3 Water Absorption. Following water immersion of the ballistic shells in accordance with section 4.9.3, the average percentage increase in weight shall be less 3%. The shells shall pass the visual inspection at Table 4.1 and shall also maintain the ballistic properties at section 3.2.1.1(V<sub>50</sub> 17gr FSP) and 3.2.2 (backface deformation).

- 3.7.4 Fungus Resistance. To the greatest extent practical, the ballistic shell and any non-removable components of the shell shall be non-nutrients for fungi. Only inherently fungus resistant grades of materials shall be employed in the manufacturing process. First Article qualification shall be conducted in accordance with 4.9.4.
- 3.7.5 Counter-surveillance. The ballistic shell shall have a matte finish, both wet and dry, which when tested in accordance with 4.9.5 shall not exceed a gloss rating specified in Table 3.5 below. The shell coating shall conform to the near IR values specified in MIL-DTL-64159 (Table III) for colour Green 383.

**Table 3.5 – Specular Gloss**

Angle	Minimum	Maximum
60 degree	-	1.0
85 degree	-	3.5



#### **4. QUALITY ASSURANCE PROVISIONS**

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

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

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

**4.3 First Article Inspection.** First article lot size shall be a minimum of 50 and a maximum of 100 helmets for each mould. The presence of any defect (see Table 4.1) or failure to pass specified technical requirements shall be cause for rejection of the first article (refer to Statement of Work).

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

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

**4.4.2 PRODUCTION LOT SIZE.** The lot or batch size from which samples are drawn shall be defined by the Contractor and submitted to the DND Technical Authority and the Quality Assurance Authority for review and acceptance. No lot should exceed 600 units during production.

**4.4.3 QUALITY CONTROL INSPECTION.** Unless otherwise specified in the contract, the Contractor shall be responsible for the performance of all inspection requirements 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 .

- 4.4.4 **SUBCONTRACTOR OBLIGATION.** Subcontractors 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.

**Table 4.1 – End Item Examination**

Visual Examination	Defect
Finished Shell	<p>Any evidence of cracking or delamination.</p> <p>Any incorrect colour, labelling or markings.</p> <p>Any incorrectly finished surface areas, edges or drill holes.</p> <p>Any benchmarks missing or indiscernible when viewed at workbench distances.</p> <p>Any surface creases, dents, softening, or blistering.</p> <p>Discontinuities or overlap bulges in protective edging (if applicable).</p> <p>Any grease, oil or adhesives on finish or tacky finish.</p> <p>Any unauthorized repairs or patched areas on shell surface.</p>
Suspension Sub-System	<p>Any incorrect colour, labelling or markings.</p> <p>Any unfinished edges, holes, or seams.</p> <p>Any missing or incorrectly assembled components.</p> <p>Any hardware components with sharp edges or burrs.</p> <p>Missing or damaged impact liners.</p>
Retention Sub-System	<p>Any incorrect colour, labelling or markings.</p> <p>Any unfinished edges or seams.</p> <p>Any missing or incorrectly assembled components.</p> <p>Any hardware components with sharp edges or burrs.</p> <p>Missing or damaged screw and barrel nut sets.</p>
User Manual	<p>Incorrect paper type.</p> <p>Any missing instructions.</p> <p>Any tears, holes, cuts, or other defects in pamphlet material.</p> <p>Any ink, format or alignment defects in printed material.</p>

- 4.4.5 VISUAL EXAMINATION. The lot size shall be expressed in individual units of helmets by size. The end items shall be visually examined for the defects listed in Table 4.1 using a DND approved sampling plan.

#### **4.5 Protection Levels**

- 4.5.1 Ballistic Limit  $V_{50}$ . As per Appendix 1.
- 4.5.2 Backface Deformation. As per Appendix 1.
- 4.5.3 Environmental Qualification. As per Appendix 2
- 4.5.4 Extreme Temperature Conditioning. Prior to extreme temperature conditioning, each test sample shall be pre-conditioned to a temperature of  $20^{\circ}\pm 2^{\circ}\text{C}$  and a relative humidity of  $65\pm 5\%$  for at least twelve hours. For extreme hot, condition the samples for a minimum of 18 and a maximum of 24 hours at  $50^{\circ}\pm 2^{\circ}\text{C}$  with 95% RH (non-condensing). For extreme cold, condition the samples for a minimum of 18 and a maximum of 24 hours at  $-40^{\circ}\pm 2^{\circ}\text{C}$  with RH uncontrolled. Test duration times after removal from chambers are specified within each specific protocol.
- 4.5.5 Blunt Impact. As per Appendix 3.
- 4.5.6 Compression Resistance. As per Appendix 4.
- 4.6 Weight.** Finished helmets shall be verified by actual measurement to the nearest 0.01 kilograms. Equipment used for measurement shall be calibrated for accuracy and should be capable of weighing with a precision of at least  $\pm 1$  gram.

#### **4.7 Shell Construction.**

- 4.7.1 Thickness. The thickness of the finished helmet shells shall be verified by actual measurement to the nearest 0.1 mm. Equipment used for measurement shall be calibrated for accuracy and should be capable of measuring with a precision of at least  $\pm 0.01\text{mm}$ . Five measurements at the front, rear, sides and crown (refer to Table 13.1) shall be taken and recorded.
- 4.7.2 Coating Adhesion. The surface coat adhesion shall be assessed as per Classification No. 5 of Method B of ASTM D3359.
- 4.7.3 Finish Inspection. The ballistic shell shall be visually examined for any defects as



outlined in Table 4.1

4.7.4 Edging Adhesion. The helmet shall be secured firmly in the horizontal position and the cut edge shall be facing downward. A length of edging material of sufficient length for the test, approximately 70 mm is pulled away from one of the butted ends. A 0.8 kg weight is fixed to the loose end of the edging material and left to hang freely for 2 minutes. No downward movement of the weight is permitted for the duration of the test.

4.8 **Retention Sub-System.** As per appendix 5.

4.9 **Helmet Physical Characteristics.**

4.9.1 Chemical Resistance. The chemical resistance shall be tested using the method described in Appendix 6. Substances shall be applied on the shell surface and other external components.

4.9.2 Flame Resistance.

4.9.2.1 Ballistic Shell. The ballistic shell coating and edging shall be evaluated as per CAN/CSA 22.2 No17-00 Test Method A and B respectively. Testing shall be with flame at 20 degree angle impingement on side of sample. For the shell coating use Test A = 5 x 15s flame side-impingement on vertically held sample. For shell edging material (if applicable) use Test B=5 x 5s flame side-impingement on vertically held sample.

4.9.2.2 Other Materials. Other materials used in the system externally such as the cover and webbings shall be tested as per CAN/CSA-Z94.3-92. The samples shall be held horizontally at 45 degree angle with flame impingement at tip for 10s and the rate of burning shall not exceed 75 mm/minute.

4.9.3 Water Absorption. Four (4) helmet ballistic shells (any size), excluding their suspension and retention subsystems, shall be conditioned as per method ASTM D618. After weighing, the shells are immersed in water at  $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$  for 18 hours  $\pm 1$  hour. The ballistic shells are then wiped dry and re-weighed. The average percentage weight of the four shells shall be calculated based on the original conditioned weight. Ballistic testing ( $V_{50}$  17gr FSP and backface deformation) shall be completed within 2 hours of removal from water.

4.9.4 Fungus Resistance. ASTM G21-90 or equivalent shall be used as guidance in providing evidence for this requirement.



- 4.9.5 Counter-surveillance. Specular gloss shall be tested in accordance with ASTM D523 and infrared reflectance shall be measured using a spectrophotometer capable of measuring total diffuse reflectance in accordance with ASTM E308 and ASTM E1331.

**5.0 PACKAGING AND LABELLING**

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

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

## 6.0 NOTES

6.1 DEFINITIONS. Ballistic definitions shall apply to those sections related to ballistic limit and backface deformation performance of the test samples. General definitions apply to the helmet system. 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. In some documents, angle of obliquity is used with the same meaning.

Assessment Criteria. "**Essential**" requirements are criteria 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.

Backface: the surface of a test sample designed to be positioned next to the body.

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 and the stand-off distance.

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).

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 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 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.

CVCMH Abbreviation for the Combat Vehicle Crew Modular Helmet which utilizes trimmed CG634 base shells with the addition of adaptor kits and cover attachment loop.

Fair hit: a zero degree obliquity ( $\pm x$  degrees) impact using the specified weight and type of un-yawed projectile ( $x=5$  degrees for 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 (refer to Figure 11.6).

HPP: highest partial penetration velocity.

Instrumentation velocity  $V_m$ : the velocity measured, at a given distance in front of the target sample 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 during a ballistic limit test.

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 or backing material.

Rejected hit (invalid impact): impacts are rejected and are 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 sample not meeting the pass criteria and it came after an unfair but accepted hit having more severe test conditions.

Sabot: a plastic carrier in which a projectile is centred to permit firing in a larger calibre barrel. The sabot is 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 test sample or the target retaining fixture.

Stand-off distance: the pre-test distance between the undisturbed backface of the test sample and the witness or backing material.

Strike face: the surface of a test sample 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 (refer to appendix 11).

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 location, i.e., too close to the edge of the specimen or to another shot.

$V_{50}$  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 at a specified angle of impact in a limited statistical test. The method involves obtaining a minimum of 8 shots using the modified up-and-down firing technique. The  $V_{50}$  is computed using the maximum likelihood method (Probit as per EXCEL file available from DRDC Valcartier). Used as a quantitative measure of ballistic capability.

$V_{proof}$ : 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 are fired in a test series and where no complete penetration or backface signature beyond the specified requirement for partial 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.



Yaw: the angle between the main axis of the projectile and its trajectory (velocity vector - refer to appendix 1). It is 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.

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 and comparison of the ballistic performance of the CG634 Generation II-Interim shell. Two (2) ballistic test methods are included, the ballistic limit test (V50), and the backface deformation test (Vproof). These tests are based upon STANAG 2920.

#### 11.2 Test Equipment

**11.2.1 Projectiles.** The tests, which are described in this appendix, are carried out using a 16 grain chrome alloy sphere and a 17 grain NATO fragment simulating projectile (FSP) depicted in Figure 11.6. The chrome alloy steel ball projectile shall be  $6.34 \pm 0.01$  mm diameter, weigh  $1.04 \pm 0.005$  g, and have a Rockwell hardness of  $63 \pm 3$ . Grade 20 ball bearings from FAG or SKF meet these requirements. The FSP shall be  $5.46 \pm 0.02$  mm diameter chisel nose steel projectile, weigh  $1.102 \pm 0.02$  g and have a Rockwell hardness of  $30 \pm 2$ . A precise description (mass, diameter, supplier...) shall be included in the test report. Since the projectiles may be damaged during impact, they shall be used only once.

**11.2.2 Launching system.** The launching system shall consist of any device capable of propelling the specified projectiles reproducibly at the designated impact angle and within the specified velocity range (defined within). 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. The projectile can be inserted in a split plastic sabot fitting a larger barrel when the size of the launcher available is larger than the calibre of the projectile or when high impact velocities are required (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 6.34 mm sphere is a smooth bore barrel chambered for .22 cal Ramset blank cartridges. The launching device shall also be held in such a manner that its alignment does not change upon firing.

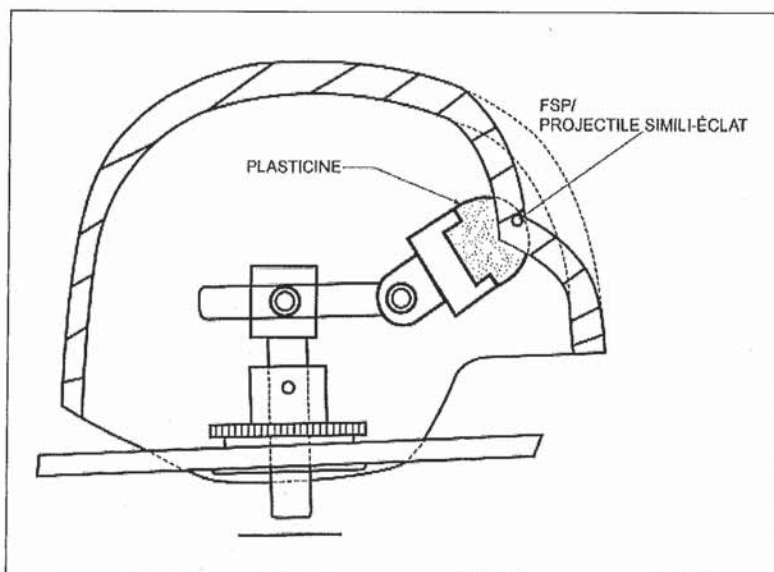
**11.2.3 Launcher Calibration.** For the ballistic tests, the launching system (launcher and propellant) shall be capable of launching the projectile at velocities up to 1000 m/s. For powder guns, to obtain the specified velocity, hand loading of the ammunition is usually done. The muzzle velocity can also be set by adjusting the projectile seat distance in the barrel. The control of projectile velocity with a precision of  $\pm 15$  m/s of the desired velocity for the V50 and Vproof tests is required. A projectile velocity/propellant mass curve for the launcher system used shall be determined before any testing is performed.

### 11.3 Sample Retention Method

11.3.1 The helmet shell shall be capable of being clamped on either its two opposite side brims or front and rear brims to a fixed, rigid support fixture similar to the one illustrated in Annex E to STANAG 2920 Figure E1. It shall be secured such that it is not damaged by the mounting procedure and such that it remains firmly in place before, during and after fragment impact. The support fixture shall be capable of adjustment so that the impact points can be located anywhere on the helmet surface, and so that the projectiles strike the helmet surface perpendicularly (zero obliquity). The fixture shall allow the conditioned helmet to be quickly mounted and dismounted to minimise changes in pre-conditioned temperature.

### 11.4 Witness System

11.4.1 Penetration Witness. The witness used for the definition of a complete penetration in the ballistic resistance tests (V50) shall be made of aluminum alloy sheet (Al 2024T3 or equivalent), 0.5mm. thick, and shall be rigidly mounted inside the ballistic shell 50mm behind and parallel to the area of impact as shown in Annex E to STANAG



2920 Figure E2. The recommended size of the witness plate is 50mm in diameter.

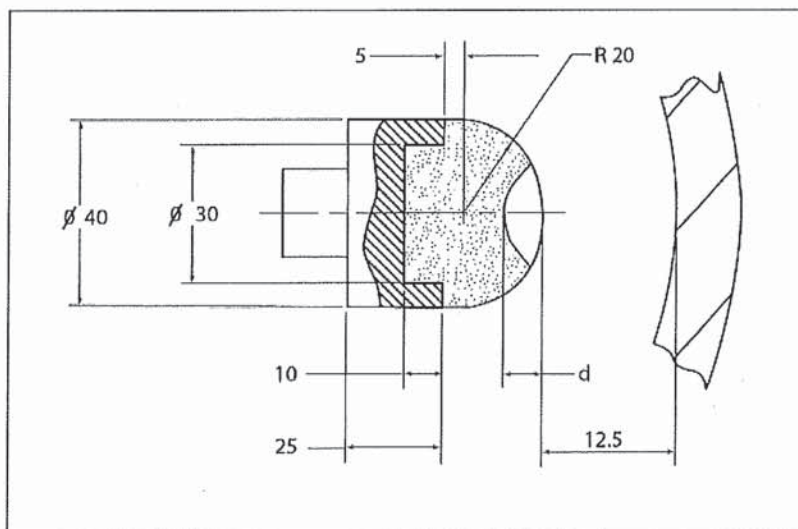
11.4.2 Backface Deformation Witness. The standard clay witness is used to measure the maximum backface deformation of the target sample. The same support fixture as described for the penetration witness is used, except that a clay holding fixture is substituted as depicted at the left. The clay backing material shall be

Roma Plasticina 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.

The clay material shall be shaped into a cylindrical head with a hemispherical front surface, such that it fits adequately into the holding fixture as illustrated below



(dimensions in mm). Forming of the clay shall be made using slow pressing in a mould having the final desired dimensions. For easier de-moulding, the mould should be placed in cold water.



The clay blocks shall then be conditioned at a temperature of  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$  for at least six hours prior to testing. Clay hardness shall be measured with a type A Shore durometer, and it shall be  $10 \pm 2$ . Clay consistency shall be measured on three spare blocks using the setup shown in Figure 11.1. An average deformation E of  $6.7\text{mm} \pm 0.5\text{mm}$  shall be obtained when the blocks are impacted with a  $250\text{g} \pm$

2g cylindrical mass dropped from a height of 700mm  $\pm$  1mm. A guide tube may be used to assure that the cylinder impacts the clay blocks squarely.

## 11.5 Measurements

11.5.1 Velocity measurement. The velocity of the projectile before impact shall be measured with any suitable measurement system that can provide an accuracy of  $\pm 0.2\%$ , (e.g. a true velocity of 1000 m/s should be recorded within an accuracy of  $\pm 2$  m/s). The measurement system used shall be calibrated and certified for accuracy. 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 0.4%. When chronographs are used they shall have a precision of  $1\mu\text{s}$ . The detectors may 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 impactor trajectory. All distances are kept constant for the whole duration of a test. The separation distance between the triggering planes of the detectors shall be measured and recorded.

**11.5.2 Velocity correction.** To evaluate the velocity at the target, the velocity measured at the distance **X** (Figure 11.2) from the target should be corrected to allow for any velocity loss due to air drag, and slowing effects caused by detection screens using the following relations:



$$V_s = V - RX$$

Where:

**R**: retardation (m/s/m);

**X**: distance between the measurement point and the target (m);

**V**: measured velocity (m/s);

**V<sub>s</sub>**: velocity at the target (m/s).

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.

The retardation used depends on the shape of the projectile and its velocity at the measurement point. The following section gives the relationship to be used for the 16-grain sphere.

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

$$R(V) = \frac{\rho \cdot S \cdot C_d \cdot V}{2 \cdot m}$$

where:

**V**: measured velocity (m/s)

**S**: presented surface area of the projectile (m<sup>2</sup>)

**m**: mass of the projectile (kg)

**ρ**: air density (1.225 kg/m<sup>3</sup>)

**C<sub>D</sub>**: drag coefficient for the projectile

The drag coefficient **C<sub>D</sub>** can be found from:

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

This equation of **C<sub>D</sub>** is valid only for:

$$0.0 < M < 1.0$$

where:

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

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.

**11.5.3 YAW Measurement.** The yaw angle for the FSP 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  $\pm 0.5$  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, 200 by 200 mm in size, may be used for the yaw card. They should be placed perpendicular to the line of flight and positioned as near the target surface as possible (desirably within 150 mm from the shell). Yaw shall be measured firing five successive shots. However, when the barrel is new, a minimum of 25 shots shall be fired to break in the barrel.

When using FSP, the dimensions  $D1$ ,  $D2$  and  $L$  (see Figure 11.3) 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 ( $\theta$ ) 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. The maximum acceptable yaw ( $\theta$ ) shall not exceed 5 degrees, and desirably should not exceed 3 degrees. Any FSP for which the measured yaw exceeds 5 degrees shall be rejected for excessive yaw, and a further projectile shall be fired under the same test conditions. If three projectiles out of five exhibit unacceptable yaw, the gun barrel should be replaced by 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  $\pm 0.25$  degrees.

## 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. 11.2. When the launcher is a powder gun used in conjunction with light detectors, the following guidelines apply. The first detector should be placed at a minimum distance of 1.5 m from the muzzle of the test barrel to prevent false triggering



from muzzle blast. The separation distance between the pair of detectors shall be at least 0.5 m, and shall not exceed 2.0 m. The exact distances used shall be specified in the test report. The test specimen shall be placed at a distance from the launching device compatible with the velocity measurement systems used and for which the projectile is stable (impact angle less than 3°). When using powder guns, the recommended target distance is 5 meters.

**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 thirty (30) minutes after the completion of pre-conditioning. The temperature and humidity measurements may be made with any equipment having a minimum accuracy of  $1^{\circ}\text{C}$  for temperature, and 3% for humidity. If any variations to these conditions are made then the conditions used shall be recorded in the final report.

**11.6.3 Test Specimens Selection and Quantity.** Only new and complete samples as offered for bid or sale shall be conditioned and tested. The specified quantity of specimens (refer to Statement of Work) of the required size, selected at random from a distinct lot/batch, shall constitute a statistically valid test sample for design or production qualification. Prior to testing, each sample shall be weighed, measured for thickness, and visually examined to make sure that they are free from dents, cracks, chips, delaminating, or other damage. A full description of each test sample shall be recorded as specified at 11.8 prior to testing.

**11.6.4 Conditioning of Test Specimens.** Prior to ballistic testing, each test specimen shall be preconditioned for a minimum of 18 hours and a maximum of 24 hours prior to testing. Ambient conditioning shall be a temperature of  $20^{\circ}\pm 2^{\circ}\text{C}$  and a relative humidity of  $65\pm 5\%$ . Extreme temperature conditioning shall be in accordance with section 4.5.4. For extreme temperature testing the shot(s) shall be completed no more than twenty (20) minutes after removal from the conditioned chamber. The helmets shall be reconditioned for at least one hour after each 20 minute cycle. The temperature and %RH of the test laboratory shall be recorded at the beginning and completion of a test sequence.

**11.6.5 Test Specimen Positioning and Impact angle.** The helmet and support fixture shall be aligned with a laser sighting and mirror system so that the barrel axis coincides with a line normal to the surface of the helmet shell at the intended impact location. This procedure is used to ensure the angle of incidence of the fragment simulator is as close as possible to zero. The maximum acceptable obliquity angle is 3 degrees.

**11.6.6 Test Specimen Impact Location and Number.** For the ballistic tests the impact locations shall be uniformly spaced over the helmet surface area and they shall be located a minimum distance from any edge, drill hole, clamping point, damaged area and each other as specified in Table 11.1. The minimum number of fair hits per test is



eight (8) for a V50 test and ten (10) for a Vproof test as defined in Table 11.2. The maximum number of shots per helmet sample is eight (8) for a V50 test and five (5) for a Vproof test.

**TABLE 11.1 Criteria for Fair/Unfair Hits**

Test Sequence	V50 (FSP)	V50 (Sphere)	Vproof Backface (FSP)
Max Obliquity Angle	$\pm 3^\circ$	$\pm 3^\circ$	$\pm 3^\circ$
Max YAW Angle	$\pm 5^\circ$	NA	$\pm 5^\circ$
Min from Rim Edge, Blunt Impact Site, or Drill Hole	50 mm	50 mm	40 mm
Min from a Damaged Area or Clamping Point	50 mm	50 mm	50 mm
Min Shot Separation	80 mm	80 mm	80mm
Min Number of Fair Hits per Test	8	8	10
Maximum Number of Shots per Helmet Sample	8	8	5

The sectioning of the helmet surface area into impact location zones is described in Table 11.2 and depicted at Figure 11.3. The intended impact locations shall be clearly marked directly on the test specimen. The exact hit location and sequence used shall be described in the test report. Ear shots are tested for uniformity; backface deformation measurements are not used in the calculation of average backface.

**TABLE 11.2 Impact Location Zones**

Zone (Figure 11.3)	Boundaries	V50 Test	Vproof Backface
Front Zone	315° - 45°	Max 2 shots	1 Shot each Sample
Rear Zone	135° - 225°	Max 2 shots	1 Shot each Sample
Side Zones (excluding ears)	45° - 135° & 225° - 315°	Max 2 shots each side	1 Shot each Side Sample 1
Ears Left and Right			1 Shot each Side Sample 2
Crown (Centered Ellipse)	Major – Minor Axes		
Small	120 – 90 $\pm 2$ mm		1 Shot Crown forward Sample 1
Medium	130 – 100 $\pm 2$ mm		1 Shot Crown rearward Sample 2
Large	140 – 110 $\pm 2$ mm		
X-Large	150 – 120 $\pm 2$ mm		

The angle of impact and the hit locations shall conform to the previously defined values for a fair hit. For the ballistic limit test (V50), an impact shall be unfair and invalid if it

causes damage which extends up to an edge or into the area of a previous impact. All unfair hits will not count and shall be repeated and reported. For the backface deformation Vproof tests, there are circumstances in which the unfair hit can be accepted as a valid hit. These are defined and summarized in Table 11.3. 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 fair 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 failure.

**TABLE 11.3 - Criteria for Fair/Unfair Accepted/Rejected Hits (Vproof Tests)**

Conditions	Impact Velocity	Hit 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

11.6.7 Velocity Correction. Each impact velocity shall be measured and recorded and if not within accuracy required, that impact shall be disregarded. When warm-up rounds are needed for constant velocity adjustment or for launcher or test specimen alignment, the projectile shall be fired through the witness paper plate to determine the exact point of impact. Additional projectiles shall be fired until a stable striking velocity and the proper alignment have been achieved.

11.6.8 Helmet Positioning and Obliquity. The helmet and support fixture shall be aligned with a laser sighting and mirror system so that the barrel axis coincides with a line normal to the surface of the helmet shell at the intended impact location. This procedure is used to ensure the angle of incidence of the fragment simulator is as close as possible to zero. The maximum acceptable obliquity angle is 3 degrees.

## 11.7 Test Sequence



#### 11.7.1 $V_{50}$ Test Sequence (*modified up-and-down method*)

At least 8 fair impacts ( $N_T$ ) (normal incidence) shall be done per  $V_{50}$  test using the shot pattern defined in Table 11.2. All firings shall be conducted after the samples have been conditioned and shall continue until the required number of fair hits are obtained. The identification of shots as perforation or non-perforation shall be made after each firing by inspecting the paper witness sheet. 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,  $i = 2$  thru ( $N_T-2$ );  
and where  $\Delta V$  is the fixed velocity increment or decrement to use.

For the first  $V_{50}$  sample evaluation ( $V_{50}$ )<sub>1</sub>,  $\Delta V$  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 ( $V_{50}$ )<sub>2-4</sub>,  $\Delta V$  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 8 shots and more than one sample may be required) until the three (3) lowest velocities for complete penetrations and the three (3) highest velocities for partial penetrations are within a velocity spread of 40 m/s. A zone of mixed results (ZMR) occurs when a partial penetration occurs at a higher velocity than at least one complete penetration. The ZMR is then the difference between the lowest complete penetration velocity (*LCP*) and the highest partial penetration velocity (*HPP*) actually obtained. The ZMR for each  $V_{50}$  should be less than 25 m/s. If these conditions are not achieved, a retest should be conducted with a new sample.

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 samples.

11.7.2      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 hits. If the  $V_{50}$  cannot be attained using one sample, because the specified velocity spread is not respected or insufficient fair hits can be done on one sample, testing should be continued on a second sample 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 6 fair impact velocities consisting of the 3 highest velocities for partial penetration and the 3 lowest velocities for complete penetration within a velocity spread of 40 m/s. If a different method is used to compute the  $V_{50}$ , it shall be clearly indicated in the test report by referencing to the standard followed.

11.7.3       $V_{50}$  Compliance Verification. The test shall be declared as being in compliance with the performance requirements if the calculated  $V_{50}$  for each individual test exceeds the minimum specified requirements.

11.7.4      Backface Deformation test sequence. Sufficient quantity of pre-test rounds shall be fired to have a reasonable assurance that the test rounds will have a striking velocity within the defined velocity spread. Each test specimen shall be weighed and fixed to the selected target support.

11.7.5      Penetration by any fair hit, or penetration by a projectile at a velocity lower than the minimum required impact velocity shall constitute a failure to meet the required protection level. While two samples may be sufficient to complete the number of shots required, unfair hits may require additional samples. A maximum number of five (5) shots can be fired at a sample. Any unfair hit shall be disregarded in evaluating compliance with the requirements.



Prior to shooting, the clay holding fixture should be adjusted so that the surface of the clay hemisphere is at a distance of  $12.5\text{mm} \pm 0.1\text{mm}$  from the interior of the helmet shell at the projected point of impact. One shot shall be fired at each designated impact location at the specified striking velocity and there shall be no penetrations. New clay hemispherical sample shall be used for each impact.

At least 10 valid impacts (more than two samples may be required) shall be done per Vproof test using the shot pattern defined above. After each impact, the clay sample and its holding fixture shall be taken out, and the maximum depth of indentation (or backface signature) of the clay backing material shall be measured to an accuracy of  $\pm 0.1\text{mm}$  using a calibrated micrometer depth gage as shown in Figure 11.5. The backface transient deformation is then calculated by adding the measured backface signature to the minimum stand-off distance for the helmet of  $12.5\text{mm}$ . Should the results of any fair impact produce an excessive backface transient deformation, testing shall be terminated and the helmet design declared non-compliant with the requirements.

## **11.8 Test Report**

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

- a) Date and place of trial.
- b) The sampling procedure and description of helmet sample tested including: mass and thickness (section 4.7.1), size, manufacturer, and lot number.
- c) For each test series, barrel calibre, length, and twist (if applicable) and test specimen mounting configuration.
- d) For each impact, mass and dimensions of the projectile.
- e) Temperature and humidity at the test facility, and sample pre-conditioned temperature if different from test facility.
- f) For each impact, approximate location of impact, intended and actual striking velocities obtained, partial or complete penetration, fair or unfair, accepted or rejected.
- g) For each  $V_{50}$  test, firing sequence used,  $V_{50}$  computed using the maximum likelihood method, lowest complete penetration, highest partial penetration, zone of mixed results, and velocity spread for the values considered.

- h) For a group (min. of 3) of  $V_{50}$  tests using a given projectile, average values obtained ( $MV_{50}$ ), and velocity spread of the group.
- j) For the backface deformation test, maximum depth of indentation in the backing material.
- k) Any other information or remarks pertinent to the conduct of the test, or behaviour of the material.
- m) For each test series, indication of compliance with minimum specified ballistic performance requirements.
- n) Name and location of the test laboratory.
- p) Name of the testing personnel, and any witnesses present.



**TABLE 11.4 – Preproduction Qualification of Helmet Shells**

<b><u>Test Sequence</u></b>	<b><i>V<sub>50</sub> 17g FSP</i></b>	<b><i>V<sub>50</sub> 16g Sphere</i></b>	<b><i>V<sub>proof</sub> Backface Transient Deformation (BTD)</i></b>
Quantity of Tests 1) As new 2) Post-Impact conditioned 3) Post-compression 4) Post-water immersion	1/mould 1/size N/A 1 (any size)	1/mould N/A N/A N/A	1/mould 1/size x each temperature 1/size x each orientation 1 (any size)
Quantity of shells per test 1) As new 2) Post-Impact conditioned 3) Post compression 4) Post-water immersion	1 1 N/A 1 (any size)	1 N/A N/A N/A	2 6 (2 each temperature) 6(2 each orientation) 2 (any size)
Maximum # of fair shots/sample	8	8	5
Minimum # of fair shots/test	8	8	10
Minimum number of samples	2/size + 1 any	1/size	14/size + 2 any
<b>Projectile Type</b>	<b><i>NATO FSP</i></b>	<b><i>Large Sphere</i></b>	<b><i>NATO FSP</i></b>
Projectile mass g ( <i>grain</i> )	1.102±0.02 (17)	1.040±0.003 (16)	1.102±0.02 (17)
Projectile diameter (mm)	5.46±0.02	6.34±0.01	5.46±0.02
Projectile length (mm)	6.52 nominal	6.34±0.01	6.52 nominal
Projectile designation	Refer to Figure 11.6	Ball Grade G20 SKF, FAG, or equivalent	Refer to Figure 11.6
Projectile material	4340 Steel or equivalent	Chrome Alloy Steel	4340 Steel or equivalent
Rockwell C hardness	28-32 RC	60-66 RC	28-32 RC
<b>MV50</b> As new	Average all moulds	Average all sizes	

- Figure 11.1 - Setup to measure clay consistency
- Figure 11.2 - Typical Range Setup
- Figure 11.3 - Impact Location Zones
- Figure 11.4 - FSP Angle of YAW Measurement
- Figure 11.5 - Indentation Depth Measurement
- Figure 11.6 - 17 grain FSP Dimensions



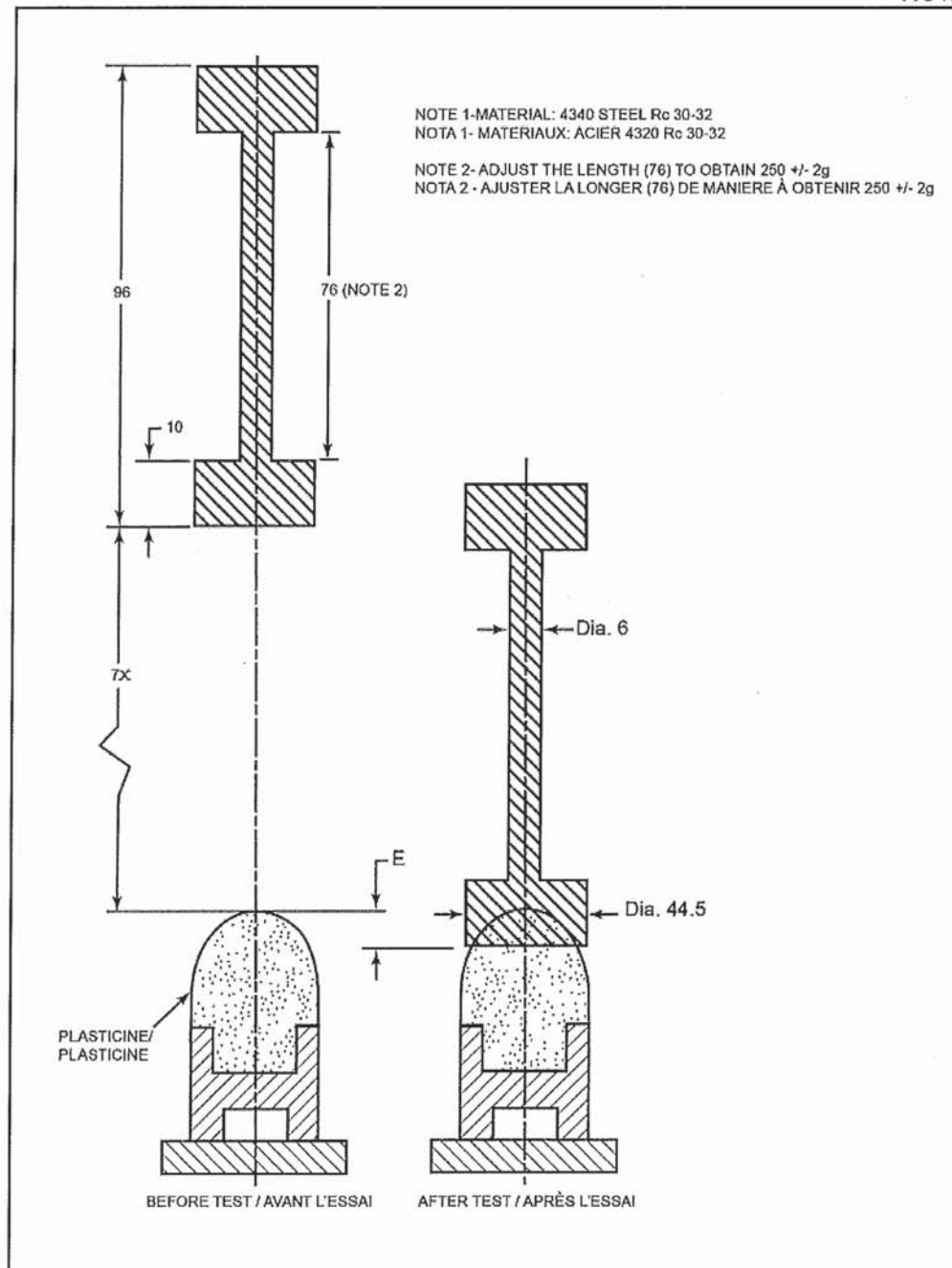


Figure 11.1 - Setup to measure clay consistency

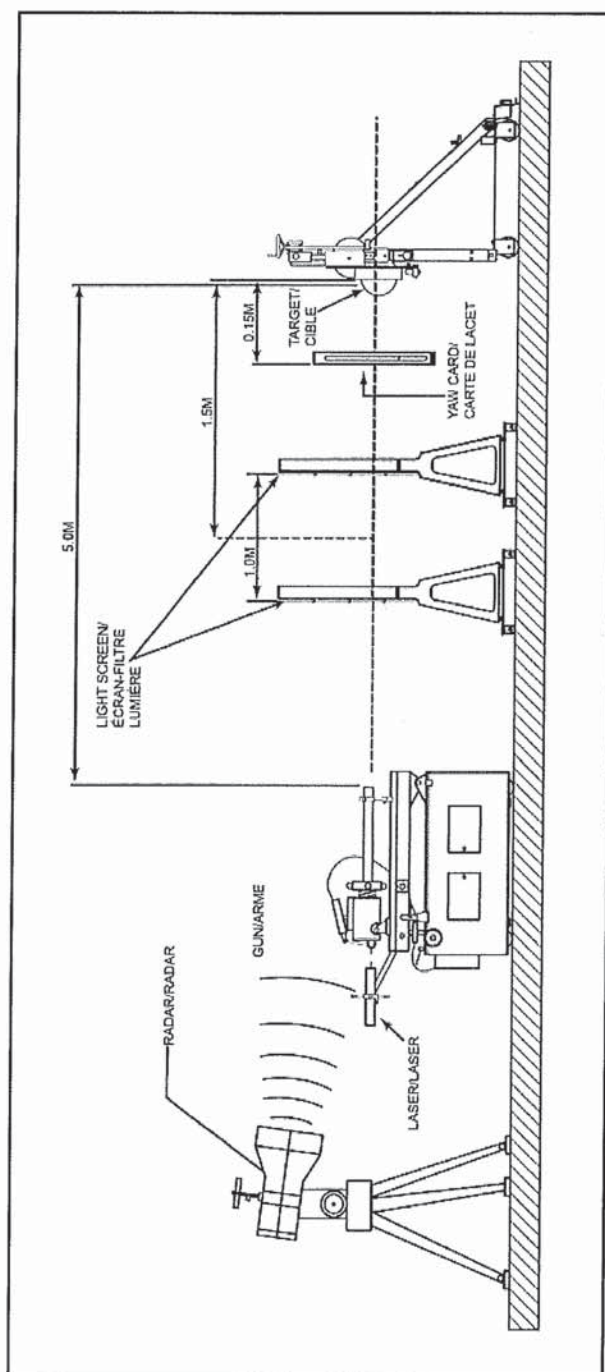


Figure 11.2 - Typical Range Setup



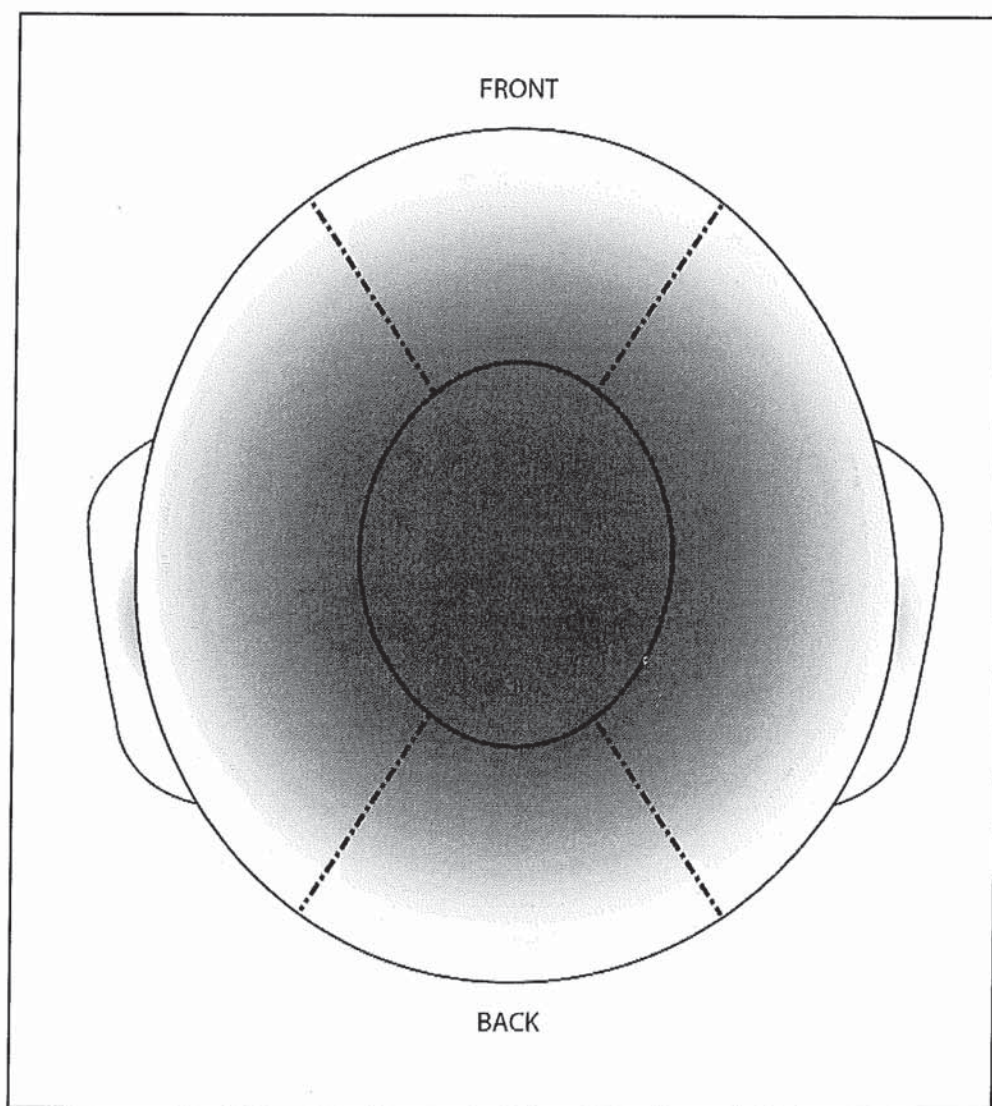


Figure 11.3 - Impact Location Zones (refer to Tables 11.2 and 13.1)

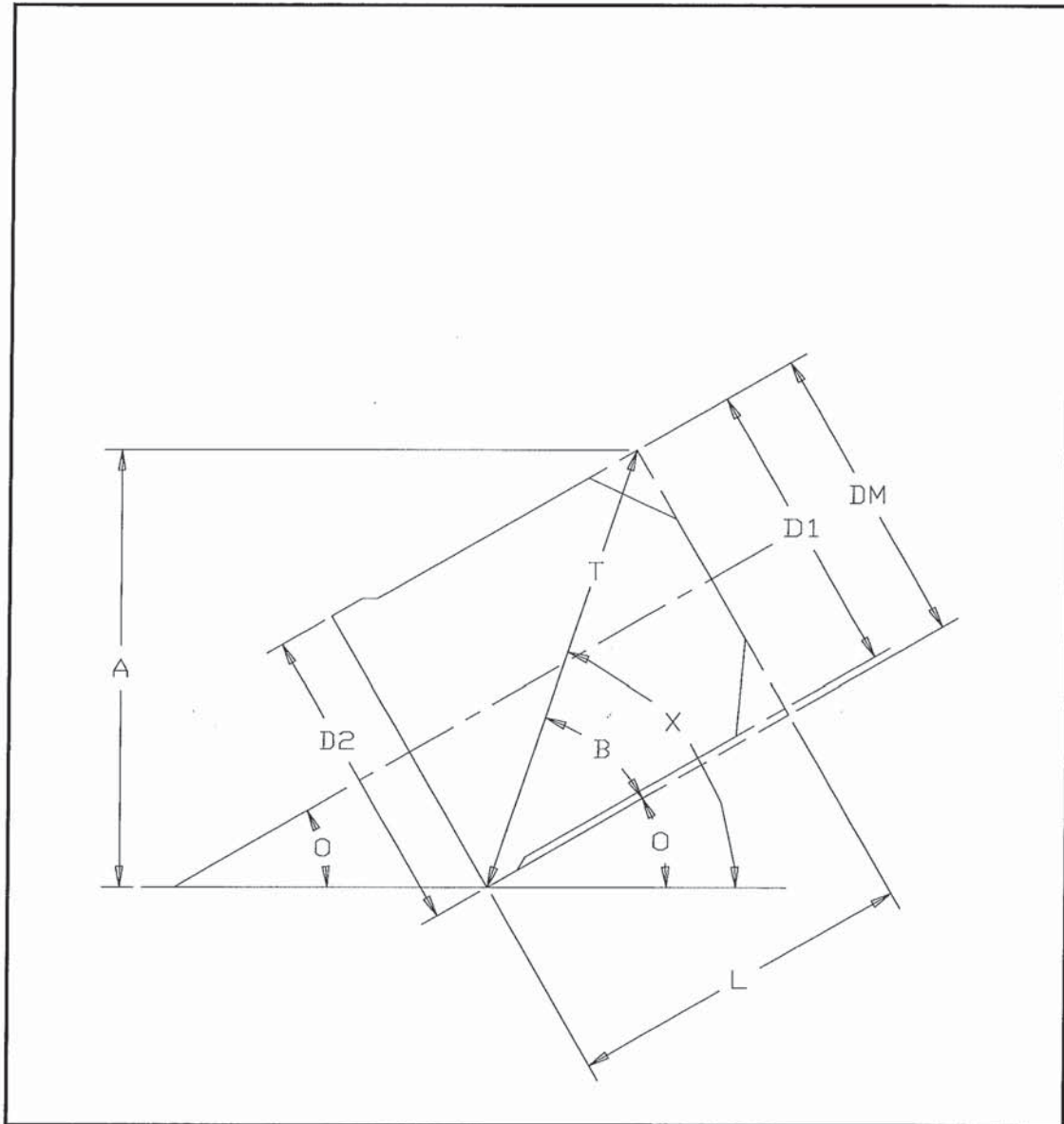


Figure 11.4 - FSP Angle of YAW Measurement

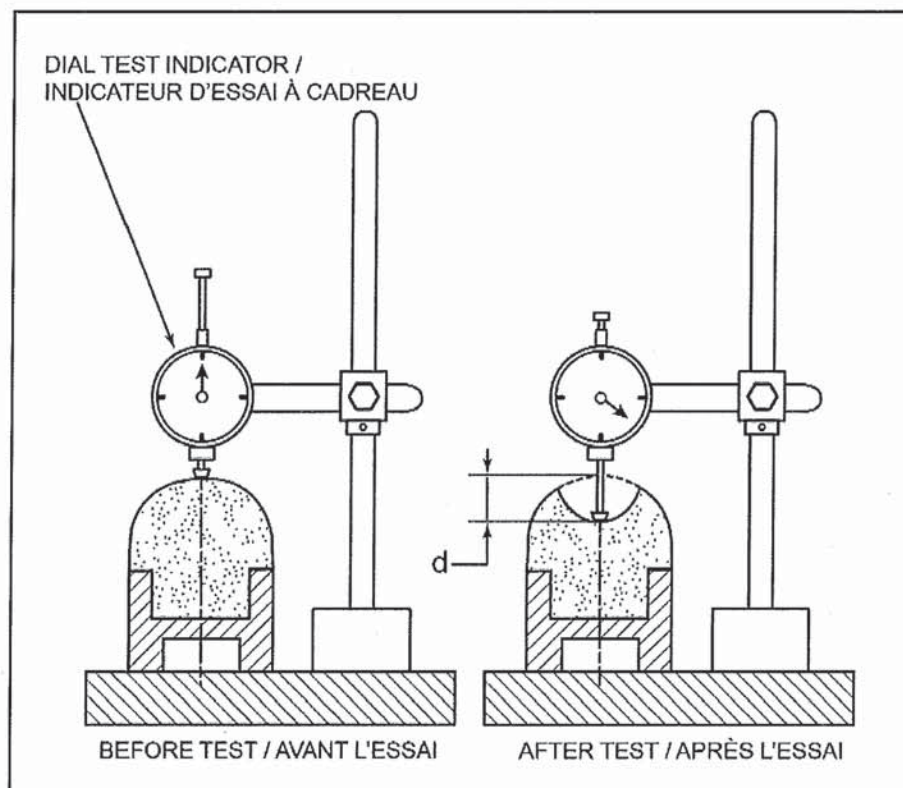


Figure 11.5 - Indentation Depth Measurement



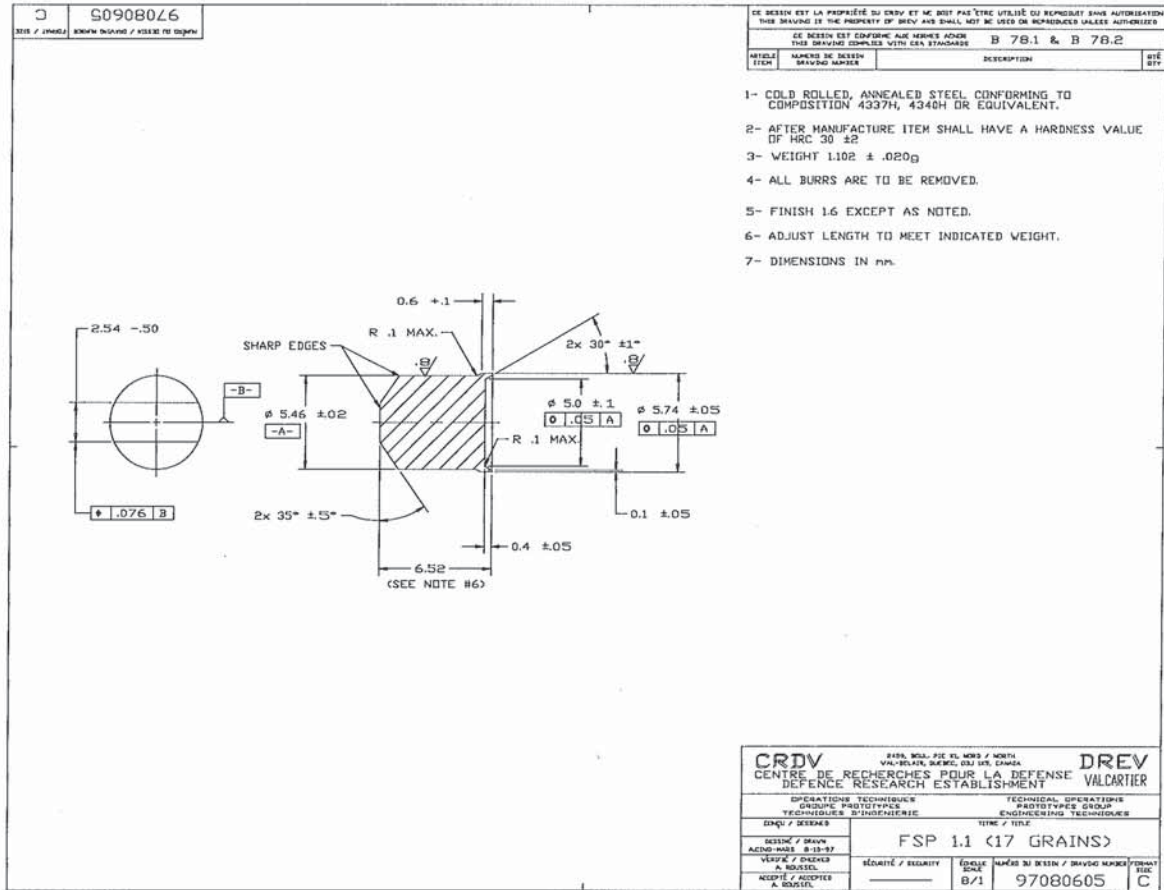


Figure 11.6 – 17 grain Fragment Simulating Projectile (FSP) Dimensions

## Appendix 2

### 12.0 ENVIRONMENTAL QUALIFICATION

**12.1 Solar Radiation.** Six (6) test samples shall first be weighed. The helmet samples shall then be exposed to artificial radiation in accordance with MIL-STD-810E, Method 505, with solar profile (1120 watts/sq. m) for one (1) hour. The chamber temperature shall be maintained at  $49^{\circ}\pm 2^{\circ}\text{C}$ . A shield between the samples and the chamber air stream shall be used to prevent air-cooling. On completion of the solar radiation test, the outside surface of the helmets shall be examined and any evidence of visual damage shall be recorded.

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

**12.3 Loose Cargo (hot and cold).** The same helmet samples shall then be exposed to vibration testing in accordance with MIL-STD-810E, Method 514.4, category 3, for a simulated duration of 1100km (a total of 90 minutes). Initially, the test samples shall be divided into two groups. (1) The first group of 3 samples shall be conditioned at  $+71^{\circ}\pm 2^{\circ}\text{C}$ ; (2) the second group shall be conditioned at  $-51^{\circ}\pm 2^{\circ}\text{C}$  for at least 8 hours and then subjected to the cargo test. After each 20 minute test segment, the samples will be returned to the temperature conditioning chambers for at least one hour. On completion of the test cycle, the outside surface of the helmets shall be examined and any further evidence of visual damage shall be recorded. Care shall be taken to identify by permanent marking which samples were exposed to each conditioning temperature.

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

**12.5 Cold Temperature.** The same helmet samples shall then be exposed to low temperature testing in accordance with MIL-STD-810E, Method 502.3, Procedure I for 24 hours. On completion of the test, the outside surface of the helmet shall be examined and any further evidence of visual damage shall be recorded. The specimens shall then be inspected and submitted for the ballistic testing at section 3.2.3.



### Appendix 3

**13.0 BLUNT IMPACT PROTECTION** Impact attenuation of the helmet system shall be determined from the acceleration imparted to a helmeted head-form when it is dropped in a guided vertical free fall onto a fixed steel anvil with a flat impact face.

**13.1 Test Sites.** Each helmet shall be impacted once in the crown zone and then impacted at four other sites as indicated in Table 13.1 (order of the impacts is left to the discretion of the test facility). They shall be located randomly within each zone at a distance of at least 50mm from any visible damaged area, edge, screw, or the centre of any previous impact. The calculation of both energy levels shall be based on head-form drop frame mass (excluding the mass of the helmet) and the helmet velocity.

**TABLE 13.1 Impact Location Zones**

Zone (Figure 11.3)	Boundaries	Impacts
Front Zone	315° - 45°	1 Impact per Sample
Rear Zone	135° - 225°	1 Impact per Sample
Right Side Zone (excluding ears)	225° - 315°	1 Impact per Sample
Left Side Zone (excluding ears)	45° - 135°	1 Impact per Sample
Crown (Centered Ellipse) Small Medium Large X-Large	Major – Minor Axes 120 – 90 ±2mm 130 – 100 ±2mm 140 – 110 ±2mm 150 – 120 ±2mm	1 Impact per Sample

**13.2 Temperature Conditioning.** Eleven (11) helmet samples of each size shall be tested, 7 for the dismounted task role and 4 for the parachutist task role. Sample requirements shall be in accordance with Table 13.2 below. Extreme temperature conditioning shall be in accordance with section 4.5.4 prior to testing.

**Table 13.2 – Impact Attenuation Samples**

Ambient	Dismounted Soldier Role		Parachutist Role (Impact ONLY)
	Impact	Post-Impact Ballistics	
	3 each size	1 x V50 and 2 x Backface	2 each size
Hot	2 each size	2 x Backface	1 each size
Cold	2 each size	2 x Backface	1 each size

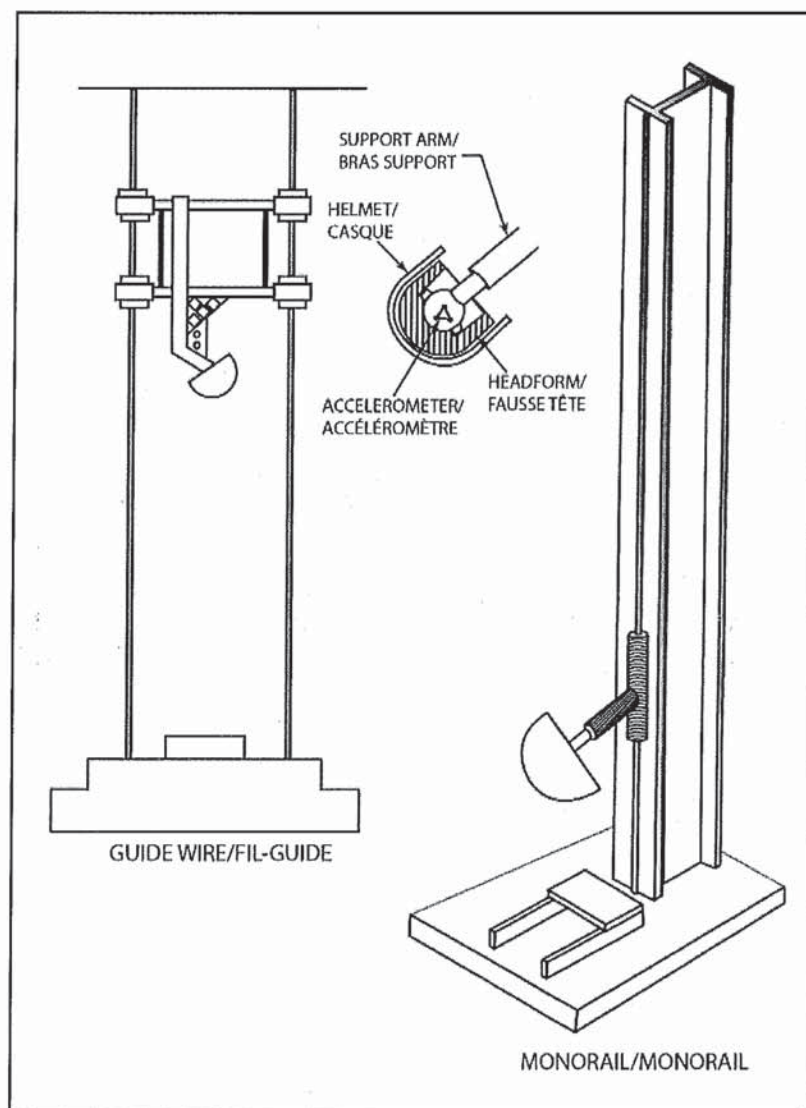
Note: The trauma liner can be replaced (1) after crown impact and (2) for a second impact in the same zone.



**13.3 Test Apparatus.** A uni-axial accelerometer mounted at the centre of gravity of the test head-form shall be aligned to within 1° of the direction of the impact. The measurement transducer shall be capable of withstanding a shock of 2000 G without damage. Data from the transducer shall be sampled at a minimum sampling rate of

10,000 Hz using an analog filter conforming to Channel Frequency Class 1000

filter as recommended by SAE J211 revision Dec. 2003. ISO impact head-forms will be used to evaluate the impact performance of the helmet systems. The ISO E, J, and M head-forms will be used to test the size small, medium, and large shells respectively.



**13.4 Instrumentation Check.** The operation of the instrumentation shall be verified before and after each series of tests by dropping a test head-form three times, from a height of 1.0 m, onto a calibrated MEP pad at 75s±15s intervals. The average peak acceleration of the post-test impacts shall be within 15 G of the pre-test average, otherwise the test data is to be considered invalid.

**13.5 Impact Test Procedure.** Each sample shall be carefully marked to record the environmental conditioning and the task role for which it is being tested. A helmet shall be removed from the conditioning environment and positioned on the head-form in the appropriate test orientation. Use of a head positioning index (HPI) is recommended to ensure that the helmet samples are placed on the headform in a consistent manner. The complete assembly shall be dropped onto the flat anvil so that the calculated

energy is as specified. The velocity of the impacting mass shall be measured immediately prior to impact. The resultant maximum acceleration shall be recorded for each impact. The mass of the falling assembly shall be 5 kg +/-100 grams and includes the head-form and supporting structure, but does not include the mass of the helmet being tested.

**13.6 Anomalous Readings.** Due to the large number of impacts during a test series, the occasional reading error may occur from helmet set-up or fastening problems. Rather than selecting and retesting a new sample, a second impact reading can be taken within the same zone as the previous impact location and used for calculating the average. If this occurs more than once on the same sample then a new sample shall be selected for the test series. Only one helmet sample can be replaced during a test series (series refers to each role and temperature condition). Sacrificial trauma liners can be replaced if conducting a second impact in the same zone or after crown impacts as indicated in Table 13.2.

**13.7 Post-Impact Testing.** At the conclusion of the Dismounted Soldier task role, the seven (7) helmets shells shall be submitted to the ballistic testing specified in Table 13.2. Each shell shall be re-conditioned to the temperature recorded on the sample then tested in accordance with section 3.2.5. Shot location spacing from a blunt impact site shall be in accordance with Table 11.1



## Appendix 4

### 14.0 COMPRESSION TEST PROTOCOL

**14.1 Conditioning and Set-up.** Six (6) untested helmet shells (of each size) will be subjected to the compression testing procedure outlined below. The samples shall be tested at extreme temperature HOT condition with two (2) samples in each of the three orientations specified below.

14.1.1 Pre-condition all samples at ambient for a minimum of 18 hours. Measure the pre-test maximum helmet width (ear-to-ear, front to back, or top to bottom as required – measured to the outside edge) **A**. For the lateral (left to right) and longitudinal (front to back) compression testing, if any edging is present, it shall be either fully removed or cut away at the contact points with the compression testing device or any measuring device. Condition all samples for a minimum of 18 and a maximum of 24 hours at  $50^{\circ}\pm 2^{\circ}\text{C}$ .

14.1.2 Place sample on a rigidity tester. For lateral (left to right) and longitudinal (front to back) compression testing, a foam block shall be placed between the crown of the test sample and a fixed surface on the compression testing device to prevent any helmet movement during the cyclic test. Laterally position the sample and the stops such that the support foam as seen in Figure 14.1 and Figure 14.2 is flat against the fixed surface and just touching the crown of the sample. Firmly lock down the stops and slide in a sheet of Teflon® (PTFE) to compress the support foam. Geometry: 0.125" thick (0.32cm) and approximately 4.0" (10cm) wide x 4.0" (10cm) long, a quantity of 4 are required for testing. An acceptable source is McMaster-Carr, Part #: 8735K15.

The support foam will be PlastazoteLD15 Foam  $15\text{kg/m}^3$  and 45 kPa @ 25% deflection (ISO 7214). The geometry should be approximately 1.5" (3.8cm) thick x 4" (10cm) wide x 4" (10cm) long. The block is to be replaced after each test. The device that supports the foam located at the crown of the helmet should permit vertical translation of the foam but restrict movement about other degrees of freedom.



Figure 14.1 Compression Test Setup Front-Back

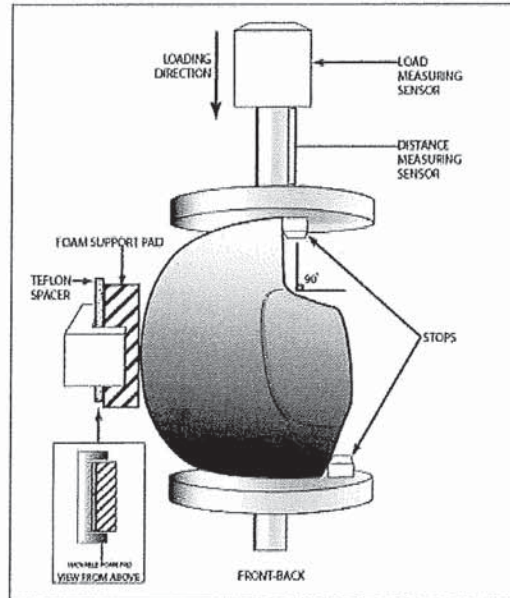
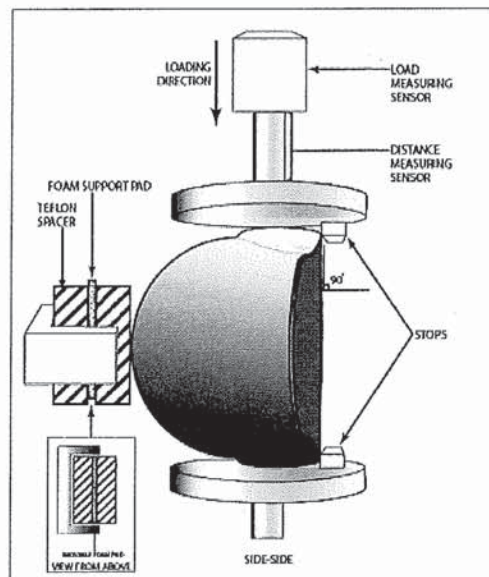


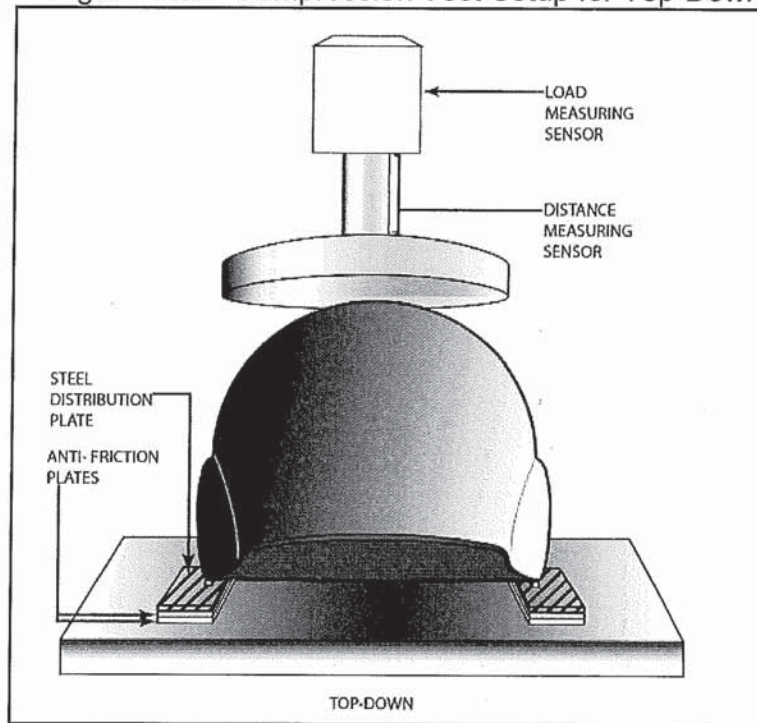
Figure 14.2 Compression Test Setup Side-Side



For vertical (top to bottom testing), each of the two bottom edges (at the ear cup) of the test sample shall be supported by a steel distribution plate and two layers of anti-friction material as shown in Figure 14.3. Attempts should be made to centre the sheets of steel and Teflon on the lower edge of the test sample. If the helmet sample

is stable with an applied load, while sitting on the rigidity tester, then no additional support is required. Should the helmet not be stable, then a support of appropriate material and size shall be added under the front brim of the test sample to provide support. The steel distribution plate shall be low carbon steel, precision ground both sides. Geometry: 0.25" thick (0.635cm) and approximately 3.0" (7.5cm) wide x 6.0" (15cm) long, a quantity of 2 are required for testing. An acceptable source is McMaster-Carr, Part #: 9517K217. The anti-friction sheets shall be Teflon® (PTFE). Geometry: 0.125" thick (0.32cm) and approximately 3.0" (7.5cm) wide x 4.0" (10cm) long, a quantity of 4 are required for testing. An acceptable source is McMaster-Carr, Part #: 8732K63.

Figure 14.3 - Compression Test Setup for Top-Down



**14.2 Compression Cycling.** Apply a force at maximum width (ear-to-ear, front to back, or top to bottom as required) until a 25 N pre-load is reached. Measure the width,  $A^*$ , of the helmet to the outside edges of the shell (ear-to-ear, front to back, or top to bottom as appropriate to the test configuration).

Compress the test sample at a rate of 100 mm/minute until a load of 1100N (for side-side and front-back) or a load of 1500N (for top-down) is reached while recording the force/displacement curve. The sampling rate for recording the force/displacement curve shall be a minimum of 10Hz (10force displacement readings per second). Reduce the compression load to 25 N and repeat until all cycles are completed. Samples in each



orientation will be subjected to 45 cycles. During the final cycle, measure the helmet width **B\*** with the helmet under maximum load. Reduce the load to 25N for the final time and measure the helmet width **C\***.

The total test duration (after removal from the conditioning chamber to measurement "**C\***") shall not exceed 30 minutes. In order to complete the testing in as short a period as possible, there is to be no dwell time at either the full load or the 25 N load for any one of the cycles to be completed on the test sample.

Remove the helmet from the test frame. Measure the final unloaded helmet width, **C** one and one half (1½) hours after removal from the conditioning chamber. After 24±1 hour, re-measure the final helmet width **D**.

**14.3 Compression Measurements.** Calculate the following deformation values:

- Maximum deformation under load (**B\* - A**)
- Permanent deformation under preload (**C\* - A\***)
- Permanent deformation unloaded (**C - A**)
- Restitution value after a 24 hour recovery period (**D - A**)

**Table 14.1 – Deformation Measurements**

ORIENTATION	Sample 1	Sample 2	NOTES
<b>SIDE TO SIDE</b>			
B* - A			
C* - A*			
C - A			
D - A			
<b>FRONT/BACK</b>			
B* - A			
C* - A*			
C - A			
D - A			
<b>TOP/DOWN</b>			
B* - A			
C* - A*			
C - A			
D - A			

All measurements shall be to the nearest 0.1mm. Visually inspect all samples and note any delaminating, ply separation, or prominent buckling at conclusion of the test sequence. The measured values shall be verified against Table 3.3 and the validated samples shall be submitted to backface deformation testing. Submit the Deformation Measurement table and the force-displacement curves at the completion of testing.



## Appendix 5

### 15.0 RETENTION SUB-SYSTEM

**15.1 Dynamic Strength.** A modified ISO-J or modified Hybrid III 50th percentile male headform is rigidly fixed to a retention test apparatus such that its Y-Z plane is inclined 30 degrees forward of vertical (Figure 15.1 illustrates a typical apparatus). The intersection of the Y-Z plane and the base plane of the head are in line with the support plate of the stirrup, which is used to simulate the lower jawbone structure. Extending below the stirrup is a guide bar that carries a free-sliding mass of 5 kg. The helmet shall be positioned in the head-form in accordance with manufacturer's instructions. The chin strap shall be passed around the stirrup, buckled, and then drawn up until the position of the stirrup approximates the position of a wearers jaw. The weight of the anvil shall impart a tensioning force of 50 N to the chin strap system. The mass is then dropped in free fall on to the anvil that supports a rubber pad of Shore Durometer 60 from a height of 750 mm. The pad will be of approximate diameter of 70-80 mm and a thickness of 1-2 mm.

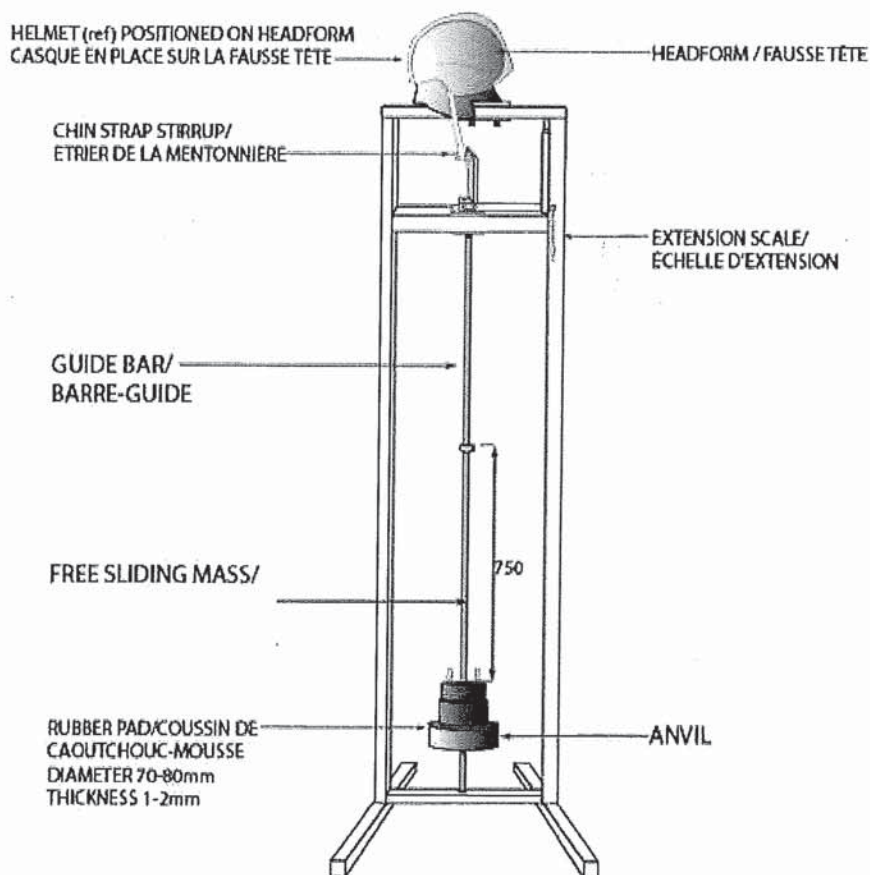


Figure 15.1 – Typical Setup for Dynamic Strength

**15.2 Strap Slippage.** One end of the chin strap/retention system strap is attached to a 2.0 kg mass which provides the load (Figure 15.2 illustrates a typical apparatus). The opposite end of the chin strap/retention system strap is routed over a pulley and attached to a clamp which reciprocates horizontally between 0.5 and 2.0 Hz and an amplitude of 50 mm. The slack is removed from the chin strap/retention system strap such that the mass is just resting on the base of the apparatus. With this set-up, the chin strap/retention system strap is cyclically off-loaded as the mass contacts the base of the apparatus. The apparatus is operated through 20 cycles to settle the strap. Once the chin strap/retention system strap has been allowed to settle, it is marked at the frictional grip and operated through 500 cycles. It is marked once again and the slippage is then recorded.

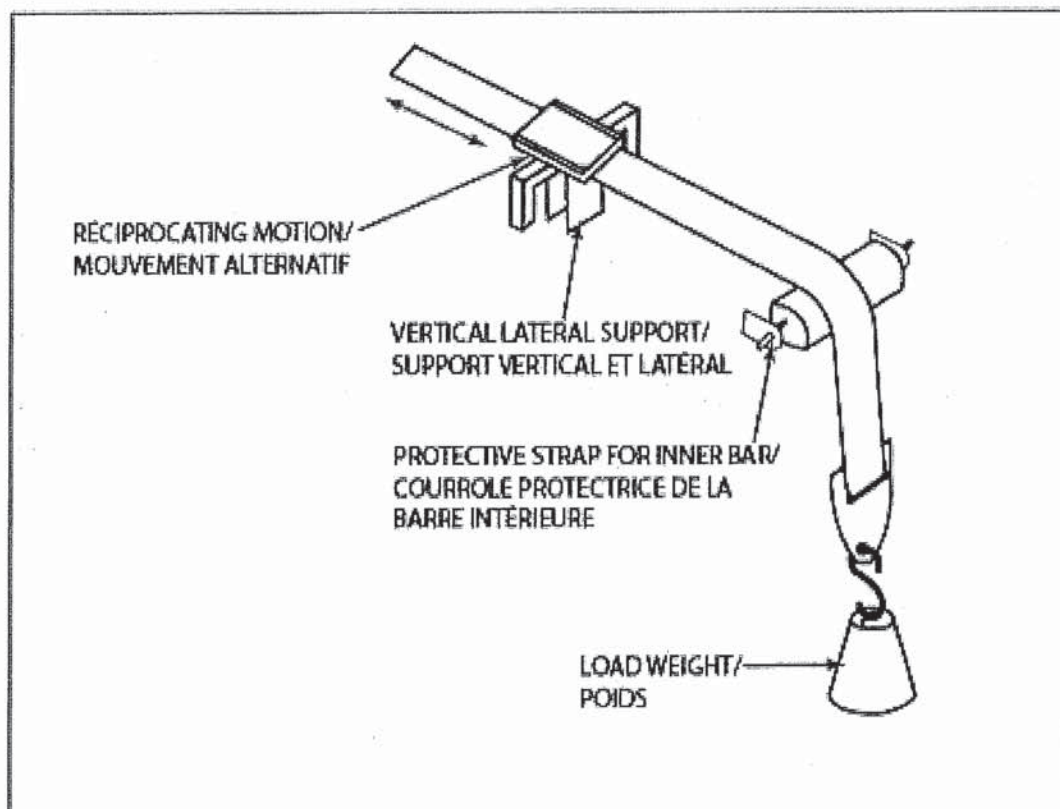


Figure 15.2 – Typical Setup for Strap Slippage Test

**15.3 Ease of Release.** A modified ISO-J or modified Hybrid III 50th percentile male head-form is rigidly fixed to a retention test apparatus such that its Y-Z plane is inclined 30 degrees forward of vertical (Figure 15.3). The intersection of the Y-Z plane and the base plane of the head are in line with the support plate of the stirrup, which is used to simulate the lower jawbone structure. Extending below the stirrup is a guide bar that

carries a free-sliding mass of 50kg. The helmet shall be positioned on the head-form in accordance with manufacturer's instructions. The chin strap shall be passed around the stirrup, buckled, and then drawn up until the position of the stirrup approximates the position of a wearers jaw. An appropriate mass will then be lowered such that the tension on the chin strap system shall be  $500 \pm 10$  N. A force of 30 N will be applied by an extensometer, indentometer or other suitable force-loading device onto the release mechanism.

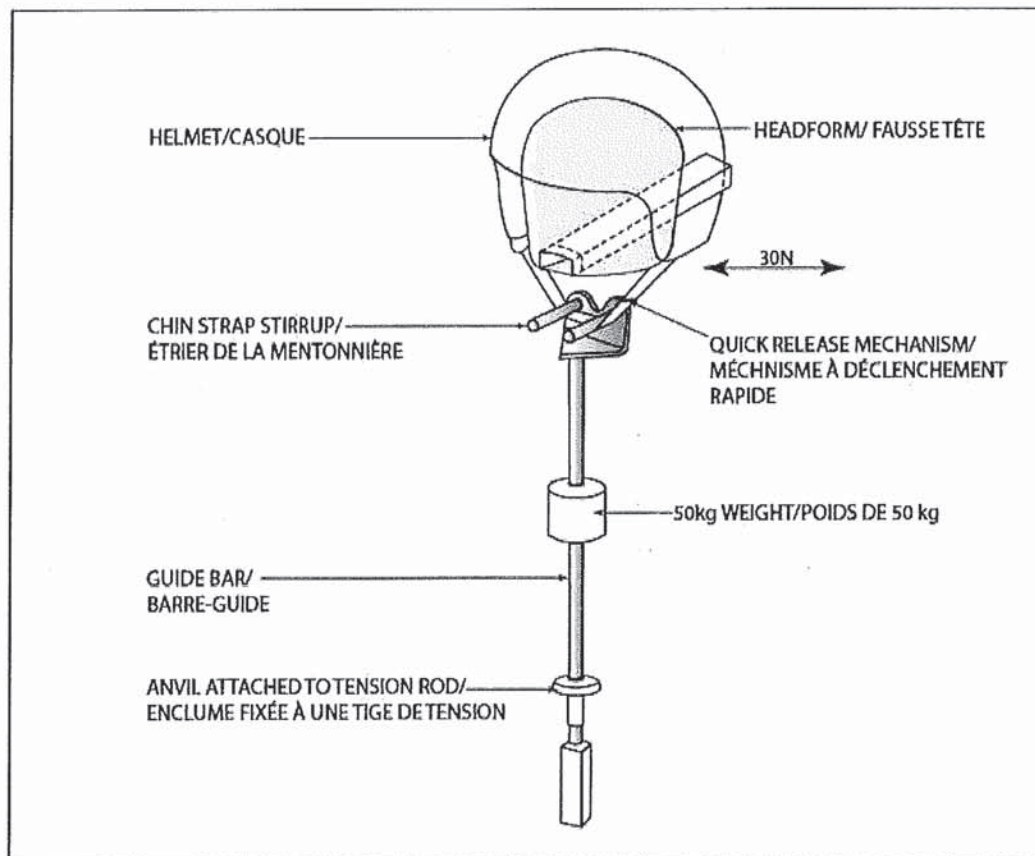


Figure 15.3 – Typical setup for Ease of Release Test

**15.4 Partial engagement.** This test is used only if the locking buckle does not have a positive engagement mechanism. One end of the chin strap is attached to a 1.0 kg mass which provides a load of  $10 \pm 1$  N (see Figure 15.4 for typical set-up). The opposite end of the chin strap is routed over a pulley and fixed. The slack is removed from the chin strap such that the mass is just resting on the base of the apparatus. With this set-up, the chin strap release mechanism is engaged from every orientation possible. If partial engagement occurs then the additional force of  $10 \pm 1$  N shall



completely disengage the mechanism.

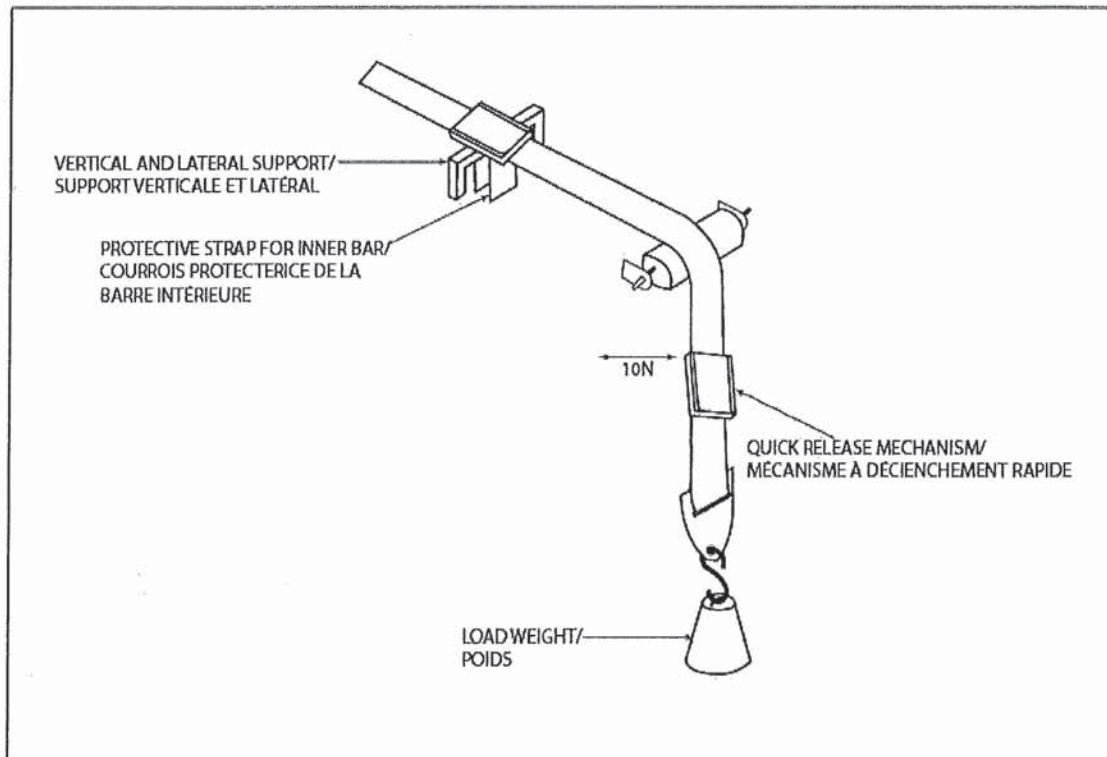


FIGURE 15.4 – Typical Setup for Partial Engagement Test

## Appendix 6

### 16.0 CHEMICAL RESISTANCE TEST PROCEDURES

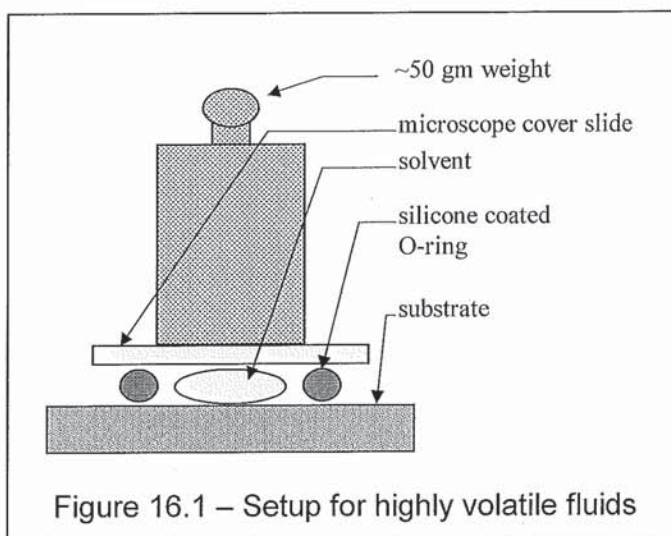
**16.1 Scope.** This method is intended to investigate the resistance of the product surface to a short exposure to fluids that are commonly found in the field. The list of fluids can be found in Table 16.2 of this appendix.

**16.2 Procedure.** The specimen shall be new and shall NOT be cleaned using any liquid media prior to exposure. Dust may be removed by means of a soft brush or dry compressed air.

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

16.2.2 For highly volatile solvents an O-ring shall be used, preferably made of Viton® rubber. It shall have an inside diameter of approximately 12.7 mm (0.5 inch), and have an outside diameter of approximately 19 mm (0.75 inch). The O-ring shall be thoroughly coated with a thick silicone grease (such as Dow Corning®'s high vacuum silicone grease) to protect the O-ring against the harsher solvents and to ensure a proper seal by thoroughly coating the O-ring. A ~50 g weight shall be used to help seal the O-ring assembly.

**16.3 Test sequence.** The test agents are listed in Table 16.2 of this appendix. Thoroughly wet the test pad by drenching it in the test agent. Without delay, place the pad on the horizontal specimen. Cover with the cover glass to minimize evaporation. The test pad shall be kept thoroughly wet during the exposure time. In the case of solvents with high volatility, the use of a covered O-ring shall be made instead of the covered test pad, as shown in Figure 16.1. The exposure time shall be 2 hours, which represents a degree of severity of 01 (ISO 9022-12).



The exposure time shall be 2 hours, which represents a degree of severity of 01 as referenced in ISO 9022-12 *Optics and optical instruments - Environmental test methods - Part 12: Contamination*.

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

**16.5 Evaluation.** Evaluate the specimen immediately after having dried them, and again after 24 hours. With the unaided eye and using appropriate illumination by varying the angle of incidence and view, evaluate the contamination caused by each test agent and determine the evaluation grade in conformity with Table 16.1.

**16.6 Requirement.** The helmet shall have an evaluation grade of no higher than "1" for insect repellent and should have an evaluation grade of no higher than "1" for other test fluids. If the evaluation grade is higher than "1", then consideration will have to be made regarding the residual ballistic properties of a contaminated helmet.



**Table 16.1 - Evaluation Grade**

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

**Table 16.2 - Test Fluids**

Specification	Test Fluid
	Insect repellent, 95% DEET
MIL-PRF-372	Cleaning Compound, Solvent (For Bore of Small Arms and Automatic Aircraft Weapons)
CGSB 3.157	Automotive Diesel Fuel
ASTM D-910	Gasolines, Aviation
MIL-PRF-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missiles, and Ordnance
MIL-PRF-6083	Hydraulic Fluid, Petroleum Base, For Preservation and Operation
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft
MIL-PRF-14107	Lubricating Oil, Weapons, Low Temperature
MIL-L-46000	Lubricant, Semi-Fluid (Automatic Weapons)
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-DTL-83133	Turbine Fuel, Aviation, Kerosene Type, Grade JP-8



**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.

**CONTRACT DATA REQUIREMENTS LIST**



**HELMET CG634, GEN II INTERIM  
FOR THE LAND FORCE**

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

A. SYSTEM / ITEM Helmet CG634-GenII Interim for Land Forces				B. CONTRACT / RFP NUMBER W8486-148836			
C. SOW IDENTIFIER 2184D-18470-102		D. DATA CATEGORY Project Management		E. CONTRACTOR N/A			
1. ITEM NUMBER 001		2. TITLE OR DESCRIPTION OF DATA Progress Report		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) MGTD-19001		5. CONTRACT REFERENCE SOW B-1 section 3.3.2		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ASREQ	12. DATE OF 1 <sup>st</sup> SUBMISSION Block 16	14. DISTRIBUTION and ADDRESSEES			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUB SUBMISSION Block 16	A. ADDRESS	B. COPIES		
					DRAFT	FINAL	
						REG	REP
16. REMARKS Block12: The initial submission will be delivered as a DRAFT at the Production Readiness Review meeting. Refinements will be established jointly between the Government and the Contractor at this time.  Block 13: Reports shall be submitted electronically by E_Mail at least once per quarter, commencing AFTER the first production shipment.				DSSPM 3-5-1	1	1	0
				QAR	1	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2013		APPROVED BY DSSPM 3			
17. CONTRACT FILE/DOC NUMBER		18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE		15. TOTAL	
						2 2 0	



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

A. SYSTEM / ITEM Helmet CG634-GenII Interim for Land Forces				B. CONTRACT / RFP NUMBER W8486-148836			
C. SOW IDENTIFIER 2184D-18470-102		D. DATA CATEGORY Project Administration		E. CONTRACTOR N/A			
1. ITEM NUMBER 002		2. TITLE OR DESCRIPTION OF DATA Technical Review Records		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) ADMD-19001		5. CONTRACT REFERENCE SOW B-1 section 3.3.4 and SOW B-2 section 3.2.4		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ASGEN	12. DATE OF 1 <sup>st</sup> 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		
16. REMARKS Block13: The Agenda shall be distributed no later than one week prior to scheduled technical reviews. Minutes shall be distributed within two weeks of the meeting.  Block 14: Additional addressees will be periodically identified by the Technical Authority and/or the Contracting Officer.					DRAFT	FINAL	
						REG	REP
				PWGSC	0	1	0
				DSSPM3-5-1	0	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2013	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) DND Form 1413							
A. SYSTEM / ITEM Helmet CG634-GenII Interim for Land Forces				B. CONTRACT / RFP NUMBER W8486-148836			
C. SOW IDENTIFIER 2184D-18470-102		D. DATA CATEGORY Configuration Management		E. CONTRACTOR N/A			
1. ITEM NUMBER 003		2. TITLE OR DESCRIPTION OF DATA Technical Data Package		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) CMGT-19001		5. CONTRACT REFERENCE SOW B-1 section 3.4.1 and SOW B-2 section 3.2.1		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ONE/R	12. DATE OF 1 <sup>st</sup> 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		
16. REMARKS The Technical Data Package for the ballistic shell shall be delivered within 6 weeks of First Article.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5-1	2	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2013		APPROVED BY DSSPM 3			
17. CONTRACT FILE/DOC NUMBER	18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	2	1	0

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

A. SYSTEM / ITEM Helmet CG634-GenII Interim for Land Forces				B. CONTRACT / RFP NUMBER W8486-148836			
C. SOW IDENTIFIER 2184D-18470-102		D. DATA CATEGORY System Engineering		E. CONTRACTOR N/A			
1. ITEM NUMBER 004		2. TITLE OR DESCRIPTION OF DATA Test Records		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) ENGD-19001		5. CONTRACT REFERENCE SOW B-1 section 3.5.2 and SOW B-2 section 3.2.2		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ASGEN	12. DATE OF 1 <sup>st</sup> 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 Block12: Written notification of the First Article test 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 test series. Written notification shall also be submitted for any qualification series of accessory items or design options exercised by the Government. Block12: A written summary including test reports for any special test series (as defined within DID ENGD-19001) shall be submitted to DSSPM 3-5-1 and DSSPM 3-5-1/C1 within two weeks of the test series.  Production test data shall be recorded and maintained in accordance with the QA Plan and CDRL001.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5-1	0	1	0
				QAR	0	1	0
PREPARED BY DSSPM3-5-1/C1		DATE APR 2013		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) DND Form 1413

A. SYSTEM / ITEM Helmet CG634-GenII Interim for Land Forces				B. CONTRACT / RFP NUMBER W8486-148836			
C. SOW IDENTIFIER 2184D-18470-102		D. DATA CATEGORY Publications		E. CONTRACTOR N/A			
1. ITEM NUMBER 005		2. TITLE OR DESCRIPTION OF DATA User Instructions		3. SUBTITLE N/A			
4. AUTHORITY (Data Item Number) TMPB-19001		5. CONTRACT REFERENCE SOW B-1 section 3.6		6. REQUIRING OFFICE DSSPM 3			
7. INSPECTION N/A	9. INPUT	10. FREQUENCY ONE/R	12. DATE OF 1 <sup>st</sup> 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 Block12: The in-service Manual shall be delivered to the Contractor at Bid Evaluation. The final Proof Instructions, incorporating mutually agreed revisions, shall be delivered at the Production Readiness Review meeting in electronic format (WORD and PDF) and in hard copy as specified in Block 14.  NOTE: Reproducible copies shall be delivered 1/Helmet box as outlined in the contract. The final Proof and the reproducible copies shall be on water-resistant paper.					DRAFT	FINAL	
						REG	REP
				DSSPM3-5-1	3	3	Note
PREPARED BY DSSPM3-5-1/C1		DATE APR 2013	APPROVED BY DSSPM 3				
17. CONTRACT FILE/DOC NUMBER	18. ESTIMATED NO OF PAGES		19. ESTIMATED PRICE	15. TOTAL	3	3	Note

## DND Form 1413

Jun 13



**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.

**DATA ITEM DESCRIPTIONS**



**CG634 GEN II INTERIM HELMET  
FOR THE LAND FORCE**



ANNEX E		DATA ITEM DESCRIPTION		W8486-148836
1. TITLE Progress Report		2. IDENTIFICATION NUMBER MGTD-19001		
3. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government to monitor the progress of all significant work activity.				
4. APPROVAL DATE APR 13		5. OFFICE OF PRIMARY INTEREST DSSPM 3		6. GIDEP APPLICABLE
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the structure, format, and content of the Progress Report for the CG634 Gen II Interim procurement.				
8. ORIGINATOR DSSPM 3-5-1/C1		9. APPLICABLE FORMS		

J. PREPARATION INSTRUCTIONS

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

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

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

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

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

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

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

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

ANNEX E		DATA ITEM DESCRIPTION	W8486-148836
1. TITLE Agenda and Minutes for Technical Reviews		2. IDENTIFICATION NUMBER ADMD-19001	
3. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government to assist in the preparation for technical review records.			
4. APPROVAL DATE APR 13	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 periodic Technical Review agenda and minutes for the CG634 GenII Interim helmet procurement.			
8. ORIGINATOR DSSPM 3-5-1/C1		9. APPLICABLE FORMS	



## 10. PREPARATION INSTRUCTIONS

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

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

10.3 Content.

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

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

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

- a. record of discussion shall be accurate but should be abbreviated;
- b. decisions shall 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 shall be signed as acknowledgement that the information recorded is complete and correct; and
- d. no direct changes to the contract, nor direct work that falls outside of the scope of the contract shall result from any decisions recorded during a technical meeting without formal follow-up contract amendment processed through the Project Authority and the Contracting Authority.

ANNEX E		DATA ITEM DESCRIPTION	W8486-148836
1. TITLE Technical Data Package		2. IDENTIFICATION NUMBER CMGT-19001	
3. DESCRIPTION/PURPOSE This document will be used by the Contractor and the Government as a reference for establishing the design configuration of the helmet system, maintaining backwards compatibility with in-service components, and managing the preparation and delivery of system documentation.			
4. APPROVAL DATE APR 13	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE	
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains the instructions for the preparation of technical and support data for the selected helmet shell design and any approved modifications to the existing system components.			
8. ORIGINATOR DSSPM 3-5-1/C1	9. APPLICABLE FORMS		
10. PREPARATION INSTRUCTIONS  10.1 General. The Technical Data package draft shall include for REFERENCE PURPOSES assembly level engineering drawings and detailed interface drawings with dimensional data. The final package will include unrestricted drawings for critical interface dimensions between interchangeable components and a general product specification incorporating all revisions to the original in-service product.  10.2 Format. The engineering drawings shall be in accordance with enclosure 1 to Annex E and the product specification should be produced in the DND sample format. Copies of 3D CAD files shall be provided in IGS or STEP format.  10.3 Content. The submission of the product specification shall include the following:  a. an equipment breakdown structure (EBS) for the helmet design contracted in graphical format (family tree) or table format;  b. a specification form for each sub-assembly/component. Specification forms should include as a minimum a descriptive title, a 3D graphical view, reference to applicable materials specifications and drawing(s), specification test requirements (where applicable), and any special notes.			



ANNEX E		DATA ITEM DESCRIPTION		W8486-148836
1. TITLE Test Records		2. IDENTIFICATION NUMBER ENGD-19001		
3. DESCRIPTION/PURPOSE This document will be used to notify the Government of any special test activity being conducted by the Contractor, which will affect the qualification and acceptance of the CG634 Gen II Interim, as defined in the procurement SOW (Annex B-1). Test reports will be used to record and verify compliance with specification requirements. This document will also be used for any special test series authorized in the prototyping SOW (Annex B-2)				
4. APPROVAL DATE APR 13		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 Notification of Testing and for test reports and data for the helmet procurement and prototyping activities.				
8. ORIGINATOR DSSPM 3-5-1/C1		9. APPLICABLE FORMS		
10. PREPARATION INSTRUCTIONS  10.1 Content. - Test reports shall contain all information specified in the applicable test protocols called up in the Technical Purchase Description (TPD).  10.2 Format. - Test reports and data may be provided in the Contractor's own format but shall as a minimum comply with guidelines outlined below:  10.2.1 First Article or failed lot tests - SOW (Annex B-1) and TPD (Annex C).  10.2.2 Special test series as authorized in a task call-up - SOW (Annex B-2).  10.2.3 Routine Production Tests:  a. ISO 9001:2008 Quality Management Systems - Requirements  b. the Contractor's Quality Assurance (QA) Plan in accordance with ISO10005:2005.  10.2.3 The Notification of Testing is only applicable to First article or special test series as defined above and should be provided in writing to the Government Technical and QA Authorities at least two weeks prior to the testing. Routine production testing shall be coordinated with the QA Authority or delegated representative.				



ANNEX E		DATA ITEM DESCRIPTION		W8486-148836
1. TITLE User Manuals		2. IDENTIFICATION NUMBER TMPB-19001		
3. DESCRIPTION/PURPOSE The User Manual for the CG634 Gen II Interim helmet shall describe in bilingual format (English and French) the pertinent information for using and maintaining the helmet system.				
4. APPROVAL DATE APR 13	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 information contained in the User Manual.				
8. ORIGINATOR DSSPM 3-5-1/C1	9. APPLICABLE FORMS			
10. PREPARATION INSTRUCTIONS  10.1 Requirements. The User Manual is provided in accordance with the C-01-100-100/AG-005, Adoption of Commercial and Foreign Government Publications. The in-service DND sample will be supplied to each bidder during the bid evaluation phase and the final proof, incorporating DND/Contractor revisions, shall be delivered by the Contractor at the Production readiness Review meeting. DND will assist with official translation requirements.  10.2 Format. The in-service User Manual format shall be used throughout (qty 8 pages, 8.5" x 14" [legal size], printed Black & White both sides, on water-resistant paper and folded into booklet format as per sample).  10.3 Content. The in-service manual includes all necessary information to allow the user to correctly use, clean, and maintain the helmet. The booklet, as a minimum, will require minor photographic, description, and illustration revisions.				

ANNEX E		DATA ITEM DESCRIPTION		W8486-148836
1. TITLE Packaging Specification		2. IDENTIFICATION NUMBER ILSD-19001		
3. DESCRIPTION/PURPOSE The Government requires a packaging specification in order to plan for the introduction into service of the system and its components.				
4. APPROVAL DATE APR 13	5. OFFICE OF PRIMARY INTEREST DSSPM 3	6. GIDEP APPLICABLE		
7. APPLICATION/INTERRELATIONSHIP This Data Item Description contains general instructions for the format, content, and preparation of the packaging requirements for the helmet and the replaceable system components. The final solution and packaging specification will be jointly formalized following approval of the proposal. DND will provide appropriate drawings and samples of packaging for the in-service helmet for additional guidance.				
8. ORIGINATOR DSSPM 3-5-1/C1	9. APPLICABLE FORMS			

1. One (1) helmet shall be packaged in a suitable box in accordance with good commercial practice. On one end of the box, the following shall be legibly marked or labelled. Helmet spare component packaging shall be formalized at the first technical review meeting.

NATO Stock Number \* - As shown on contract  
Nomenclature (incl. size) \*\* - As shown on contract  
Quantity / Unit of Issue - 1 EA

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

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

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

3. Closure of the corrugated fiberboard box shall be in accordance with CGSB specification CAN/CGSB-43.21-M91 (Appendix B).
4. On one end of each corrugated fibreboard box, stenciling 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 - \_\_\_/EA  
Gross Weight (nearest kg) - As applicable  
Contract Serial Number - As specified on contract

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

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

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.

6. 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.
7. 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



ENGINEERING DRAWINGS  
AND  
ASSOCIATED LISTS  
FOR  
CG634 HELMET  
GEN II INTERIM

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**1 General:**

Engineering Drawings, Associated Lists and Reference Documents shall be provided in accordance with the following requirements and in the final form specified below.

**1.1 DSCO 4-3-2 Technical Data Action Notice (TDAN) Number:**

The following number has been assigned to control the acquisition of all Engineering Drawings and Associated Lists produced under this contract:  
**TDAN Number 134471074**

**1.2 Governing Specification:**

D-01-400-002/SF-000 dated **2011-03-01** Drawings, Engineering and Associated Lists.

**1.3 Governing Standard:**

D-01-400-001/SG-000 dated 79-07-05, Engineering Drawing Practices.

**1.4 Applicable Documents:**

ISO 9660, Information Processing - Volume and File Structure of CDROM for Information Interchange

Z234.1-00, Canadian Metric Practices Guide

D-LM-008-022/SG-000, Standard for Packaging of Documentation

TIFF Revision 6, Adobe Systems Incorporated, dated June 3, 1992

**1.5 Drawing Level:**

Level 1 - Design Concept  
Level 2 - Prototype / Limited Production  
Level 3 - Production

**2 DND/CF Data Lists (NSCM 35907):**

Data Lists complete with Cover Sheets are required and shall be prepared in accordance with the governing standard and supplied as part of the Engineering Drawings. Data Lists shall be prepared at the item level of assembly (and/or end item) declared for future production by the Technical Authority.

**3 Reference Documents:**

Reference documents called up on the engineering drawings (excepting those, which are government, society and readily available industrial specifications or standards) shall be included as part of the engineering drawings and associated lists.

#### **4 Contractor Drawings:**

Existing Contractor drawings shall be acceptable provided they meet the requirements of paragraph 3.2 of D-01-400-002/SF-000. In the event that contractor drawings do not meet the specified requirements the contractor shall rework the drawings to ensure that the requirements are met.

#### **5 DND/CF Drawings (NSCM 35907):**

New Engineering Drawings and Associated Lists shall be prepared in accordance with the governing Specification/Standard and the clauses set out herein.

##### **5.1 Drawing Number Allocation:**

Canadian Forces drawing numbers shall be allocated for use on DND/CF engineering drawings and associated lists (data lists and cover sheets). The allotment shall be requested in writing from DSCO 4-3-2 (address as specified herein). Requests shall specify the quantity of numbers required, the contract number and contract name. Drawing number requests shall be sufficiently liberal to preclude the necessity of subsequent requests. Allocated Canadian Forces drawing numbers shall be used for this contract only.

##### **5.2 Technical Data Action Notice (TDAN):**

A TDAN shall be prepared listing all Drawings and Associated Lists delivered as a result of the contract. A sample TDAN can be provided upon request.

##### **5.3 Forms:**

Drawing and Associated List electronic forms shall be Government supplied material and obtained by written request to DSCO 4-3-2.

##### **5.4 Drawing System:**

The mono-detail drawing system shall be used.

##### **5.5 Drawing Types:**

The contractor shall provide the necessary types of drawings that will satisfy the sophistication of the specified drawing level and shall be subject to the approval of both the DND Technical Authority and DSCO 4-3-2.

##### **5.6 Parts Lists:**

Parts lists shall be prepared integral with the drawings. On multi-sheet drawings, the parts list shall be placed on sheet one (1).

##### **5.7 Control Drawings:**

Control drawings as defined in the governing standard shall be prepared for commercial items approved for use in the design, which are not defined by Government or nationally recognized industrial specifications and standards.



#### **5.8 Family-Tree Drawing(s):**

The contractor shall prepare a Family-Tree Drawing(s) of the complete configuration of the Engineering Drawing Package and it shall be subject to the approval of both the DND Technical Authority and DSCO 4-3-2.

#### **5.9 Title / Revision Blocks:**

Identifiers shall be inserted in the Title / Revision Block of each Drawing and Associated List as shown in Table 1.

#### **5.10 Units of Measure:**

The DND Technical Authority will determine the units of measure (metric or Imperial). Metric drawings shall comply with Z234.1-00 Canadian Metric Practices Guide.

#### **6 Integration:**

The prime Contractor shall be fully responsible for the integration of Contractor and DND/CF Drawings to form a complete Engineering Drawing Package.

#### **7 Data Rights:**

Unless otherwise specified in the Terms and Conditions of the contract, the Government of Canada shall have rights in data as set out below.

##### **7.1 Unlimited Rights (Foreground Data-NSCM 35907):**

The Government of Canada shall have unlimited rights in all Engineering Drawings, Associated Lists and Reference Documents produced or provided as a result of this contract. The Government of Canada shall have the right to use, translate into Canada's other official language, duplicate, revise or disclose such technical data, in whole or in part, in any manner and for any purpose whatsoever, and to have or permit others to do so.

##### **7.2 Limited Rights (Background Data):**

The Government of Canada shall have limited rights only and shall hold in confidence all Existing Engineering Drawings, Associated Lists and Reference Documents supplied under this contract that bears the Contractor's "Limited Proprietary Rights" restrictive legend. The Government of Canada shall have the right to use, translate, duplicate or disclose such technical data, in whole or in part, by or for the Government of Canada, with the express limitation that such technical data shall not, without the express written permission of the Contractor furnishing such technical data, be:

- a. Released or disclosed in whole or in part outside the Government of Canada;
- b. Used in whole or in part by the Government of Canada for manufacture; and
- c. Used by a party other than the Government of Canada, except for:

- (1) Emergency repair or overhaul work only, by or for the Government of Canada, where the item or process concerned is not reasonably available to enable timely performance of the work, provided that the release or



disclosure thereof outside the Government of Canada shall be made subject to the prohibition against further use, release or disclosure, and

- (2) Release to other Governments for the furtherance of the mutual defence of Canada and other such Governments, only for the information and evaluation within such Governments, or for such Governments under the conditions of (1) above.

## **8 Quality Assurance Provisions:**

Quality of the Engineering Drawings and Associated Lists delivered on this contract is the responsibility of the contractor and subject to the quality requirements of the contract.

### **8.1 Acceptance:**

Acceptance of the Engineering Drawings, Associated Lists and Reference Documents for technical content requirements will be the responsibility of the DND Technical Authority. Acceptance of the Engineering Drawings, Associated Lists, Reference Documents and Electronic Data Deliverables for format requirements will be DSCO 4-3-2.

#### **8.1.1 Interim Deliverables for Acceptance Purposes:**

Two complete, full-size, print copy sets of the Engineering Drawings, Associated Lists and Reference Data shall be delivered in hard copy form for acceptance purposes (reduced size" print copies may be acceptable provided that they are legible). If the package cannot be accepted, for reasons of either technical content or format, it may be necessary to resubmit the print copy sets.

##### **8.1.1.1 Level 1 - Design Concept:**

The Level 1 Engineering Drawings, Associated Lists and Reference Documents shall be forwarded to the Technical Authority upon completion.

##### **8.1.1.2 Level 2 - Prototype / Limited Production:**

Following acceptance of the Level 1 Engineering Drawings, Associated Lists and Reference Documents, the Level 2 Engineering Drawings, Associated Lists and Reference Documents shall be forwarded to the Technical Authority.

##### **8.1.1.3 Level 3 - Production:**

Following acceptance of the Level 2 Engineering Drawings, Associated Lists and Reference Documents, the Level 3 Engineering Drawings, Associated Lists and Reference Documents shall be forwarded to DSCO 4-3-2.

## **9 Final Deliverables:**

Upon acceptance, the Level 3 Engineering Drawings, Associated Lists and Reference Data shall be delivered in soft copy form as outlined herein.

## **9.1 Soft Copy Deliverables:**

Soft copy deliverables shall include the Engineering Drawings, Associated Lists, Reference Data and the associated Metadata in electronic form.

### **9.1.1 Engineering Drawings:**

Unless otherwise specified in the individual tasks, Engineering Drawings shall be delivered in the Native format, Vector data and in the distributed format, Raster data. Multi-sheet Drawings shall be delivered one sheet per file.

- a. **Vector data** shall be delivered in their native file format in which the data was originally created.
- b. **Raster data** shall be delivered in accordance with Para 9.1.6 herein.

### **9.1.2 Associated Lists:**

Associated Lists shall be delivered in the native MSWord file and a PDF file (300 DPI).

### **9.1.3 Reference Documents:**

Reference Documents shall be delivered as a PDF file (300 DPI) or in a format deemed acceptable by the DSCO 4-3-2.

### **9.1.4 TDAN:**

The TDAN shall be delivered in the native MSWord file and a PDF file (300 DPI). Alternate file formats may be acceptable provided they have been discussed and approved in writing by DSCO 4-3-2. NOTE: One (1) hard copy of the TDAN complete with contractor's signatures shall be provided with the final deliverables.

### **9.1.5 Metadata (Capture of Related Information):**

Metadata (the data that describes data objects) shall be provided for all Engineering Drawings, Associated Lists and Reference Data deliverables. Metadata records shall contain the information in the order shown in Table 2. Metadata shall be delivered as a Microsoft Access 2003 database table. Sample Metadata record entries are shown at Figure 1.

#### **9.1.5.1 DATABASE TABLE:**

Each delivered image shall have a corresponding database record. All records shall be entered into a single Microsoft Access 2003 database table. Fields without corresponding information shall remain blank. The Microsoft Access 2003 database file shall be named "metadata.mdb".

### **9.1.6 File Formats for Raster Data:**

Raster data shall be Tagged Image File Format in accordance with Adobe Systems Inc. specification "TIFF Revision 6", compressed to CCITT Group 4. Files shall be UNTILED and be wholly raster (hybrid files shall not be delivered).



#### **9.1.6.1 Pel Density:**

Raster image pixel element (Pel) density shall be 200 dpi.

#### **9.1.6.2 Position of Pels:**

Position of Pels shall be as follows:

- i) Portrait Data: line progression 270 degrees, Pel path 0 degrees.
- ii) Landscape Data: line progression 270 degrees, Pel path 0 degrees.

#### **9.1.6.3 Image Sizes:**

Image sizes as outlined in Table 3 are provided as a guide and sizes may vary slightly, but no more than plus or minus one inch (25 mm) in either width or length.

#### **9.1.6.4 Cropping:**

Images shall be cropped such that the engineering drawing is free from extraneous information. For example, drawing formats having an inside and an outside border shall be cropped closely to the outside of the outside border. Drawing formats having only one border, where zone or quadrant identification is outside of that border shall be cropped such that the zone information is retained.

#### **9.1.6.5 Skew Correction:**

In general, skew correction is not required. If the Contractor deems it necessary, correction shall be done to 0 degrees and 90 degrees.

#### **9.1.6.6 Despeckling:**

If any despeckling is required, the Contractor shall ensure that data integrity is not compromised by this operation.

#### **9.1.6.7 Image Foreground /Background:**

Images shall be black on white background.

#### **9.1.6.8 File Names/Batch Number Allocation:**

File names and a batch number shall be requested in writing from DSCO 4-3-2. Quantity of file names required shall be specified at the time of the request.

#### **9.1.7 Media of Delivery:**

The media form for final delivery of electronic data shall be CD-ROM, written in accordance with ISO 9660. (File compression software shall not be used.) Each CD-ROM and its case shall be labeled or marked in a method of the contractor's choosing. Each label or marking shall display the Batch Number, Contract / Task number, TDAN number and the date the CD-ROM was created.



**10 Packaging/Marking/Loss/Damage:**

Reproducible and non-reproducible data shall be preserved packaged and marked in accordance with CF Standard D-LM-008-022/SG-000. Exterior shipping containers shall be marked with the contract and TDAN number and in the event of loss or damage while in shipment, the responsibility for replacement shall be that of the primary Contractor and shall be at the primary Contractor's expense.

**11 Mail or Courier Delivery:**

DSCO 4-3-2 Deliverables shall be forwarded to:

Department of National Defence  
National Defence Headquarters,  
MGen George R. Pearkes Building,  
OTTAWA ON K1A 0K2

Attention: **DSCO 4-3-2, 1 LSTL**

**12 Inquiries or Visits:**

After contract award, **DSCO 4-3-2** may be contacted at **(819) 994-9352**, fax **(819) 997-0302**. The address is:

Department of National Defence  
Louis St. Laurent Building  
555 boul de la Carriere,  
GATINEAU QC J8Y 6R5

Attention: **DSCO 4-3-2**

**TABLE 1 Title and Revision Block Entries**

<b>Title Block</b>	<b>Insert</b>
DESIGN AGENT / CONCEPTION	The contractor shall insert their company name or NSCM.
NSCM / CAO F	The contractor shall insert "35907".
INSPECT/INSPECTE	The contractor shall insert "DSCO 4-3-2"
CF APPVL / APP FC	The contractor shall insert the DND Technical Authority's designation.
APPVL DATE D'APPROB	The contractor shall contact the Drawing Authority (DSCO 4-3-2) for the appropriate date to be inserted in this block.
<b>Revision Block</b>	<b>Insert</b>
ZONE	The contractor shall insert a dash "-".
LTR / LET	The contractor shall insert a dash "-".
REVISION	The contractor shall insert the TDAN NUMBER in this block (see para 1.1).
DATE	The contractor shall insert a dash "-".
DWN / DES	The contractor shall insert a dash "-".
CKD / VER	The contractor shall insert a dash "-".
APPVL / APP	The contractor shall insert a dash "-".

**TABLE 2 INDEX FIELDS**

Order	Field Name	Max Field Length	Field Definition / Description	Example Entry
1	<b>FILENAME</b> <i>(all one word)</i>	12 (8.3)	Name of electronic file - unique filename for uploading in database. File names will be issued by DSCO 4-3-2. Alpha characters shall be uppercase.	<b>LZ000235.TIF</b>
2	<b>BATCHNO</b> <i>(all one word)</i>	8	Batch number - used for uploading files in database. Batch number will be assigned with filenames. Alpha characters shall be uppercase.	<b>LZ001</b>
3	<b>DOCUMENTNO</b> <i>(all one word)</i>	25	This field shall contain the document number.	<b>9775458</b>
4	<b>REVISION</b>	3	Letter or number indicating the revision level. If there is no rev, indicate with dash ("-")	<b>B</b>
5	<b>SHEETNO</b> <i>(all one word)</i>	3	Sheet number x of y. Enter the value of x.	<b>1</b>
6	<b>NOOFSHEETS</b> <i>(all one word)</i>	3	Sheet number x of y. Enter the value of y.	<b>1</b>
7	<b>FRAMENO</b> <i>(all one word)</i>	3	Frame number x of y. Enter the value of x. (This field is applicable only when capturing data from aperture cards.) When field is not applicable, leave blank.	
8	<b>NOOFFRAMES</b> <i>(all one word)</i>	3	Frame number x of y. Enter the value of y. (This field is applicable only when capturing data from aperture cards.) When field is not applicable, leave blank.	
9	<b>NSCM</b>	5	This field shall contain the NATO Supply Code for Manufacturers (NSCM) of the Owner of the data. (Also known as FSCM, CAGE or NCAGE code.)	<b>35907</b>
10	<b>SIZE</b>	2	This field contains the document size. -For imperial sizes use A, B, C, D, E, F, G, H, J, K and LE (for legal) -For metric sizes use A4, A3, A2, A1, A0 and B1.	<b>A2</b>
11	<b>ADDITIONALIDENTIFIER</b> <i>(all one word)</i>	10	This open field shall be used when two (2) or more documents have the same document number but are different documents. e.g. Document 12345, Document 12345 DCR 001, then "DCR 001" would be entered in this field. When field is not applicable, leave blank.	<b>DCR 001</b>



12	<b>DATARIGHTS</b> (all one word)	1	The data rights as specified in the contract. "L" for "LIMITED" or "U" for "UNLIMITED"	<b>U</b>
13	<b>DOCUMENTTITLE</b> (all one word)	240	Title of document. (i.e. Drawing title)	<b>BRACKET ASSY</b>
14	<b>TDANNO</b> (all one word)	12	This field shall be used to enter the TDAN number assigned for the project.	134471074
15	<b>ERN</b>	<b>12</b>	This field shall be used for the Equipment Registration Number. Information shall be provided if required, otherwise the field shall be left blank.	
16	EAC	8	This field shall be used for the Equipment Application Code. Information shall be provided if required, otherwise the field shall be left blank.	
17	EQUIPMENT	75	Name of the Equipment. Information shall be provided if required, otherwise the field shall be left blank.	
18	CTAT	1	If the data is "Controlled Goods" , DM Code "D" shall be entered, otherwise the field shall be left blank	<b>D</b>
19	PROJECTNAME	30	This field shall be used for "Controlled Goods" data and will be filled in by DSCO 4-6. This field shall be left blank.	

**TABLE 3 DRAWING SIZES**

<b>METRIC DRAWING SIZES</b>			
<b>Drawing Size</b>	<b>W x L (max) (mm)</b>	<b>Pels Per Line</b>	<b>Number of Lines</b>
A4	210 X 297	1656	2344
A3	297 X 420	2344	3312
A2	420 X 594	3312	4680
A1	594 X 841	4680	6624
A0	841 X 1189	6624	9368
B1	707 X 1000	5567	7875
<b>NORTH AMERICAN / IMPERIAL DRAWING SIZES</b>			
<b>Drawing Size</b>	<b>W x L (max) (inches)</b>	<b>Pels Per Line</b>	<b>Number of Lines</b>
A	8.5 x 11	1704	2200
B	11 x 17	2200	3400
C	17 x 22	3400	4400
D	22 x 34	4400	6800
E	34 x 44	6800	8800
F	28 x 40	5600	8000
G	11 x 90	2200	18000
H	28 x 143	5600	28600
J	34 x 176	6800	35200
K	40 x 143	8000	28600
Legal	8.5 x 14	1704	2800

**Sample record entries (Metadata) in database table:**  
(The following table is shown on three lines to suit page width.)

FILENAME	BATCHNO	DOCUMENTNO	REVISION	SHEETNO	NOOFSHEETS	FRAMENO	NOOFFRAMES
LZ000235.TIF	LZ001	9775458	B	1	1	1	1
LZ000236.TIF	LZ001	9775457	-	1	1		

NSCM	SIZE	ADDITIONALIDENTIFIER	DATARIGHTS	DOCUMENTTITLE	TDANNO	ERN	EAC	EQUIPMENT
35907	A2	DCR 001	U	BRACKET ASSY	134471074			
35907	A1		U	BRACKET	134471074			

CTAT	PROJECTNAME
D	
D	

**FIGURE 1 Sample Metadata Records**





**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



### HELMET CG634 GENERATION II - INTERIM

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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 shall include thirty (30) samples, (**Medium size ONLY**), specified bidder test reports, a written manufacturing plan and a QA Plan preliminary draft as outlined within.

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

- (1) infrastructure, preproduction activity, and tasks specified in the Statements of Work (annexes B-1 and B-2),
- (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 Annex B-1.

Particular attention should be paid to the engineering, design, and prototyping capabilities.

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. Both documents shall be submitted 8 weeks after release of the RFP.

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

2.1 Bidder Testing. Bidder testing shall be conducted in accordance with the procedures in the Technical Purchase Description (Annex C) and test data shall be provided for the requirements identified in Table F1.

2.2 Pre-award Samples. The Bidder shall produce sufficient helmets from a single ballistic lot of material to conduct its own testing and to provide DND with the required quantity of pre-award samples. The thirty-eight deliverable samples (16 complete helmet assemblies, 14 additional ballistic shells, and 8 spare Impact Liners) shall be submitted with the bidder test records 8 weeks after close of Bids and will be tested by DND in accordance with Table F2.

2.3 Weight Reduction. Special attention is drawn to the high rating that is afforded to weight reduction for this solicitation (25%). Bidders are reminded that they shall certify the nominal weight of their ballistic shell (Medium Size) and the estimated variance in weight lot to lot during production as part of their proposal.

**Table F1 - Bidder Testing**

	TPD PARAGRAPH	INSPECTION & TEST REQUIREMENTS	Min Test Samples
Annex C	3.2.1.1	V50 17grain NATO FSP	1
Annex C	3.2.1.2	V50 16grain Sphere	1
Annex C	3.2.2	Vproof 17grain FSP- Backface	2
Annex C	3.2.5	Non-Ballistic Impact (Dismounted Soldier)	7
Annex C	3.2.5	Post-Impact Ballistics	7 (Note 1)
Annex C	3.2.5	Non-Ballistic Impact (Parachutist)	4
Annex C	3.2.6	Compression Resistance	6
Annex C	3.2.6	Post-Compression Ballistics	6 (Note 1)
Annex C	3.7.3	Water Absorption	3
Annex C	3.7.3	Post-Immersion Ballistics	3 (Note 1)

**Notes:** 1. Same samples as previous test. Testing shall be IAW Annex C.

2.4 **DND Testing.** DND will inspect the submitted helmets/shells, measure, weigh, and conduct testing as outlined in Table F2, below. Ballistic rating will be based on the combined average of Bidder and Government test results, provided bidder test data is within  $\pm 5\%$  of DND results. Otherwise only DND results will be used.

**Table F2 - DND Testing**

	TPD PARAGRAPH	INSPECTION & TEST REQUIREMENTS	Min Test Samples
Annex C	3.2.1.1	V50 17grain NATO FSP	1
Annex C	3.2.1.2	V50 16grain Sphere	1
Annex C	3.2.2	Vproof 17grain FSP- Backface	2
Annex C	3.2.3	Environmental	6
Annex C	3.2.3	Post-Environmental Ballistics	6 (Note 1)
Annex C	3.2.5	Non-Ballistic Impact (Dismounted Soldier)	7
Annex C	3.2.5	Post-Impact Ballistics	7 (Note 1)
Annex C	3.2.6	Compression Resistance	6
Annex C	3.2.6	Post-Compression Ballistics	6 (Note 1)
Annex C	3.3	Helmet Weight	Average all shells
Annex C	3.7.1	Chemical Resistance	1
Annex C	3.7.2	Flame Resistance	1
Annex C	3.7.3	Retention System	First Article ONLY
	Spare Samples		5

**Notes:** 1. Same samples as previous test.

3. **Manufacture and Delivery Plan.** The plan shall include a Work



Breakdown Structure (WBS) and certification for Controlled Goods. The plan can be presented in the bidder's own format and shall cover as a minimum relevant discussion of the project manager and his/her authority, contractor infrastructure (facilities and equipment), and production set-up for helmet manufacture. The bidder shall discuss their prototyping capability and configuration management system including design and customization capabilities. The plan shall include the details of specified testing of non-ballistic and ballistic materials, and the inspection of finished assemblies. The bidder shall clearly address the data deliverables (refer to CDRLs and DIDs).

The armour control system shall address the receipt and storage of armour material, the steps that are to be taken to ensure traceability of finished ballistic shells back to their material lots/sub-lots and rolls, the test records, any ballistic material finish processes, and layering controls for hybrid designs during the manufacturing process.

The work schedule shall include discussion on key material suppliers and lead times, the preproduction deliverables (new tooling 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 shall 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. Pre-Award Samples.** Control of pre-award samples will be done as follows. A government-assigned alpha-character identifier shall be clearly marked on all pre-award shell samples 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 of a bid proposal. A medium-sized CG634 helmet and a copy of the in-service User Manual will be released by DND at the same time. The helmet is provided to scan the interior shell geometry and assist the bidder with production of medium pre-award samples (unofficial 3-D data is available and can also be requested by the Bidder). The in-service manual is provided to assist with the pricing of the reproducible copies during production (refer also to CDRL005 and DID TMPB-19001).

**5.1 Internal Sub-Assemblies.** The in-service retention sub-assemblies will be provided by DND for the Bidder supplied pre-award samples. Bidder manufactured assemblies will not be required until First Article production. A

qualified source for impact liners is Polymos Inc., 150, 5e Boulevard Terrasse-Vaudreuil, Québec Canada. Suspension sub-assemblies remain the responsibility of bidders to manufacture for their proposals. Two (2) weeks after close of Bids, thirty (30) retention straps with screw and barrel nuts will be shipped to bidders achieving a minimum 50% score on their written proposal.

5.2 Pre-award Labels. Marking and labelling of pre-award samples are for purposes of assessing the quality and durability of markings and for test matrix anonymity and control at the DND supporting agencies. A blank label made of the production material, in the approximate size as planned on the production version should be provided. The Identification portion for each component shall contain the assigned alpha-character identifier and shall be applied in combination with the following: "BID SAMPLE NOT FOR ISSUE", as illustrated below.

**NOTE:** The Identification labels for pre-award samples **ARE NOT** required in the format specified in the drawing package until after contract award. For Bid Evaluation, the samples **SHALL NOT** contain any company identification markings other than as specified above. 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.

Pre-award label sample

<p><b>SAMPLE #</b> <b>BID SAMPLE</b> <b>NOT FOR ISSUE</b></p>
---

6. **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**

<b>Pre-Award Proposal</b>	
<b>Technical Content</b>	<b>DND Assessment (70%)</b>
<b>QA Draft</b>	<b>Mandatory</b> - Section 4
<b>Manufacture &amp; Delivery Plan</b>	<b>Rated (10/70)</b>
Work Breakdown Structure	Bidder written proposal. Section 3
Armour Testing and Control	
Work Schedule	Due 8 weeks after RFP Release
<b>Retention Sub-System (Note 1)</b>	
First Article testing ONLY	DND supplied for pre-award samples
	Available 10 weeks after RFP Release
<b>Pre-award Samples</b>	<b>Mandatory</b> - 16 complete helmet assemblies, 14 ballistic shells, and 8 spare trauma liners. Section 5
	Due 8 weeks after Bid closure
<b>Helmet Performance</b>	<b>Rated (35/70)</b>
Ballistic Performance As New and after Compression Test, Environmental Conditioning, Impact Damage Conditioning, and Water Immersion	Bidder Test Data. Section 2.1 and Table F1 and DND performance assessment Section 2.2 and Table F2
Chemical Resistance Flame Resistance	Table F2
<b>Helmet Weight Reduction</b>	<b>Rated (25/70)</b>
Average weight thirty helmet shells	Table F2
<b>Cost Component</b>	<b>PWGSC Assessment (30%)</b>

Note 1: Contingent on compliant Written Proposal





**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.

**PRODUCT SPECIFICATION**



**CG634 COMBAT HELMET  
FOR THE CANADIAN FORCES**

## **Table of contents**

- 1.0 Introduction**
- 2.0 Product structure diagram**
- 3.0 CG634 Product Specification forms**

## **1.0 Introduction**

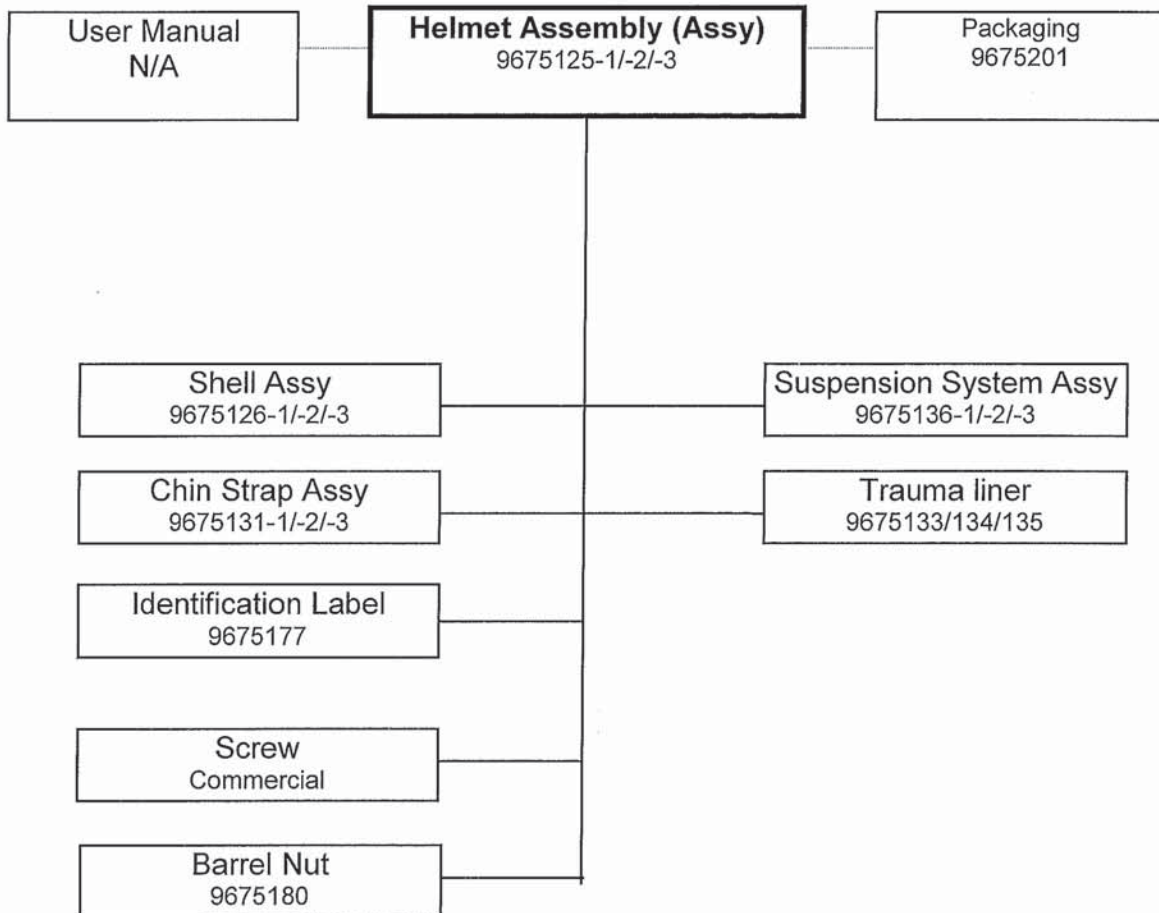
These CG634 Product Specifications describe the components and assemblies of the Canadian Forces ground troops and parachutists ballistic helmet model CG634.

Production level drawings and data lists take precedence over the following specifications.




## 2.0 Product structure diagram

---



### 3.0 CG634 Product Specification forms

CG634 Product Specification		
Title: <b>Helmet Assembly</b> <b>Small size</b>	Manufacturer part #: Superseded	
	Dwg #: 9675125-1	Rev: 3
	NSN: 8470-21-912-7604	
<p>Description: Ground troops and parachutists ballistic helmet Model CG634</p> 		
<p>3.2.2.1 Impact protection (Soldier): Crown = 150 G for 55 J impact. Other = 150 G for 30 J impact.</p> <p>3.2.2.2 Impact protection (Parachutist): Crown = 250 G for 90 J impact. Other = 250 G for 65 J impact.</p> <p>3.3.1 Helmet weight is approximately 1300 g.</p> <p>3.3.2 Center of gravity of the helmeted head is within a 25 mm radius sphere of center of gravity of the bare head.</p> <p>3.4 Cleaning of the helmet can be carried out by the wearer using commonly available cleaning fluids.</p> <p>3.5 The material of the helmet does not pose any toxic hazard to personnel wearing, maintaining or repairing the helmets.</p>		

Process / Operations: Assembly, screw method			
Parts list			
	Drawing #	Description / Material	Qty
	9675126-1	Shell assembly, small size	1
	9675131-1	Chin strap assembly, small size	1
	9675136-1	Suspension system assembly, small size	1
	9675133	Trauma liner, Small size	1
	- - -	Screw, M3 x 8mm, Pan head, Slot drive, (DIN 85) Stainless steel 304, Dull black finish.	3
	9675180	Barrel nut, M3 thread, Brass 260 , Black oxide	3
	9675177-1	Identification Label	1
	0575310	Foam Pad Security	1
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.3.1 Helmet weight		4.3.4 Helmet weight	
3.9.2 Workmanship		4.4.4 Visual examination.	
Notes:			



### CG634 Product Specification

Title: <b>Helmet Assembly Medium size</b>	Manufacturer part # : Superceded	
	Dwg # : 9675125-2	Rev: 3
	NSN : 8470-21-912-7605	


Description:

Ground troops and parachutists ballistic helmet  
Model CG634



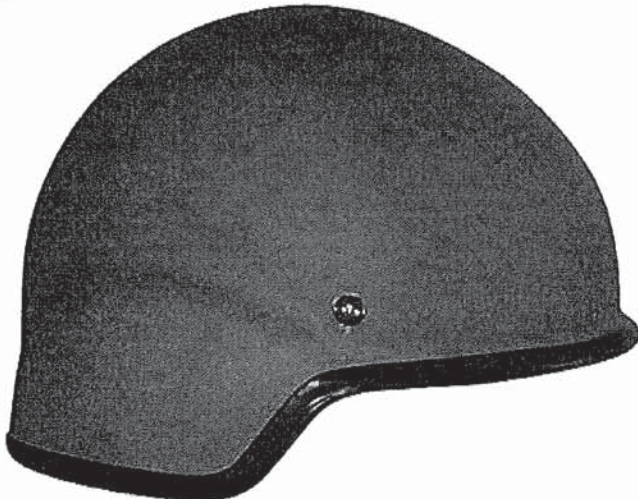
- 3.2.2.1 Impact protection (Soldier): Crown = 150 G for 55 J impact.  
Other = 150 G for 30 J impact.
- 3.2.2.2 Impact protection (Parachutist): Crown = 250 G for 90 J impact.  
Other = 250 G for 65 J impact.
- 3.3.1 Helmet weight is approximately 1400 g.
- 3.3.2 Center of gravity of the helmeted head is within a 25 mm radius sphere of center of gravity of the bare head.
- 3.4 Cleaning of the helmet can be carried out by the wearer using commonly available cleaning fluids.
- 3.5 The material of the helmet does not pose any toxic hazard to personnel wearing, maintaining or repairing the helmets.

Process / Operations: Assembly, screw method			
Parts list			
	Drawing #	Description / Material	Qty
	9675126-2	Shell assembly, medium size	1
	9675131-2	Chin strap assembly, medium size	1
	9675136-2	Suspension system assembly, medium size	1
	9675134	Trauma liner, medium size	1
	---	Screw, M3 x 8mm, Pan head, Slot drive, (DIN 85)	3
		Stainless steel 304, Dull black finish.	
	9675180	Barrel nut, M3 thread, Brass 260 , Black oxide	3
	9675177-2	Identification Label	1
	0575310	Foam Pad Security	1
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.3.1 Helmet weight		4.3.4 Helmet weight	
3.9.2 Workmanship		4.4.4 Visual examination.	
Notes:			

CG634 Product Specification		
Title: <b>Helmet Assembly Large size</b>	Manufacturer part #: Superseded	
	Dwg #: 9675125-3	Rev: 3
	NSN : 8470-21-912-7606	
Description: Ground troops and parachutists ballistic helmet Model CG634		
		
3.2.2.1 Impact protection (Soldier): Crown =150 G for 55 J impact. Other = 150 G for 30 J impact.		
3.2.2.2 Impact protection (Parachutist) : Crown = 250 G for 90 J impact. Other = 250 G for 65 J impact.		
3.3.1 Helmet weight is approximately 1575 g.		
3.3.2 Center of gravity of the helmeted head is within a 25 mm radius sphere of center of gravity of the bare head.		
3.4 Cleaning of the helmet can be carried out by the wearer using commonly available cleaning fluids.		
3.5 The material of the helmet does not pose any toxic hazard to personnel wearing, maintaining or repairing the helmets.		
Process / Operations: Assembly, screw method		



Parts list			
	Drawing #	Description / Material	Qty
	9675126-3	Shell assembly, Large size	1
	9675131-3	Chin strap assembly, Large size	1
	9675136-3	Suspension system assembly, Large size	1
	9675135	Trauma liner, Large size	1
	---	Screw, M3 x 8mm, Pan head, Slot drive, (DIN 85)	3
		Stainless steel 304, Dull black finish.	
	9675180	Barrel nut, M3 thread, Brass 260, Black oxide	3
	9675177-3	Identification Label	1
	0575310	Foam Pad Security	1
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.3.1    Helmet weight		4.3.4    Helmet weight	
3.9.2    Workmanship		4.4.4    Visual examination.	
Notes:			

CG634 Product Specification		
<b>Title: Shell Assembly</b> <b>Small size</b>	Manufacturer part # : Superceded	
	Dwg # : 9675126-1	Rev: 3
	NSN : N/A	
<b>Description:</b> Painted ballistic shell, small size, assembled, black edge. Green 383 color.		
		
3.2.1.1	Minimum resistance to projectiles (V50) = 634 m/s	
3.2.1.3	Extreme temperatures, Minimum V50 shall be not less than 570 m/s.	
3.2.1.2	Maximum shell backface transient deformation at 560 ±10 m/s is 20 mm.	
3.3.3	The material in the ballistic shell, the edging material and the shell coating shall inhibit flame. (As per CSA Standard No. 22.2 No. 0.6-M1982, Test A and B).	
3.3.4	No visible fungus growth (ASTM G21-90)	
3.3.5	Water absorbency : Ballistic shell does not gain more than 5% in weight and surface coating does not show softening, peeling or blistering.	
3.6.1	After 3 low velocity impacts, The ballistic shell retains its ballistic protection and does not show visible damages.	

3.6.2 Edging material does not peel or delaminate.			
3.6.4 The ballistic shell is resistant to lubricants, greases, fuels, cleaning agents			
Process / Operations: Assembly, adhesive method			
Parts list			
	Drawing #	Description / Material	Qty
	9675127	Shell, small size	1
	9675130	Edge	AR
	- - -	Industrial Cyanoacrylate Adhesive	AR
		Loctite 406 or equivalent	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.2.1.1 Minimum shell resistance to projectiles (V50).		4.3.1.1 / Appendix 2.	
3.2.1.2 Maximum shell backface transient deformation.		4.3.1.2 / Appendix 3.	
3.6.2 Edging material adhesion		4.3.9.2 Edging material peel test.	
3.9.2 Workmanship		4.4.3 Visual examination	
Notes:  Edging material tailored to fit shell size.			



### CG634 Product Specification

Title: **Shell Assembly**  
**Medium size**

Manufacturer part # : Superceded

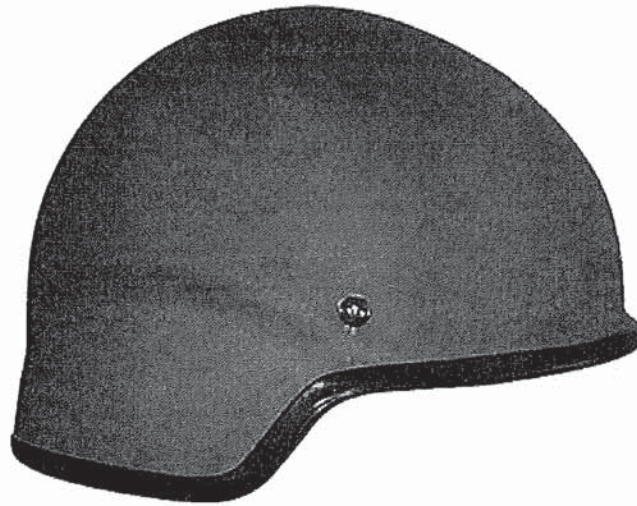
Dwg # : 9675126-2

Rev: 3

NSN : N/A


Description:

Painted ballistic shell, medium size, assembled, black edge.  
Green 383 color



- 3.2.1.1 Minimum resistance to projectiles (V50) = 634 m/s
- 3.2.1.3 Extreme temperatures, Minimum V50 shall be not less than 570 m/s.
- 3.2.1.2 Maximum shell backface transient deformation at  $560 \pm 10$  m/s is 20 mm.
- 3.3.3 The material in the ballistic shell, the edging material and the shell coating shall inhibit flame. (As per CSA Standard No. 22.2 No. 0.6-M1982, Test A and B).
- 3.3.4 No visible fungus growth (ASTM G21-90).
- 3.3.5 Water absorbency : Ballistic shell does not gain more than 5% in weight and surface coating does not show softening, peeling or blistering.
- 3.6.1 After 3 low velocity impacts, The ballistic shell retains its ballistic protection and does not show visible damages.

3.6.2 Edging material does not peel or delaminate.			
3.6.4 The ballistic shell is resistant to lubricants, greases, fuels, cleaning agents			
Process / Operations: Assembly, adhesive method			
Parts list			
	Drawing #	Description / Material	Qty
	9675128	Shell, medium size	1
	9675130	Edge	AR
	---	Industrial Cyanoacrylate Adhesive	AR
		Loctite 406 or equivalent	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.2.1.1 Minimum shell resistance to projectiles (V50).		4.3.1.1 / Appendix 2.	
3.2.1.2 Maximum shell backface transient deformation.		4.3.1.2 / Appendix 3.	
3.6.2 Edging material adhesion		4.3.9.2 Edging material peel test.	
3.9.2 Workmanship		4.4.3 Visual examination.	
Notes:			
Edging material tailored to fit shell size.			

CG634 Product Specification		
Title: <b>Shell Assembly Large size</b>	Manufacturer part # : Superceded	
	Dwg # : 9675126-3	Rev: 3
	NSN : N/A	
Description: Painted ballistic shell, Large size, assembled, black edge. Green 383 color		
		
3.2.1.1	Minimum resistance to projectiles (V50) = 634 m/s	
3.2.1.3	Extreme temperatures, Minimum V50 shall be not less than 570 m/s.	
3.2.1.2	Maximum shell backface transient deformation at 560 ±10 m/s is 20 mm.	
3.3.3	The material in the ballistic shell, the edging material and the shell coating shall inhibit flame. (As per CSA Standard No. 22.2 No. 0.6-M1982, Test A and B).	
3.3.4	No visible fungus growth (ASTM G21-90).	
3.3.5	Water absorbency : Ballistic shell does not gain more than 5% in weight and surface coating does not show softening, peeling or blistering.	
3.6.1	After 3 low velocity impacts, The ballistic shell retains its ballistic protection and does not show visible damages.	



3.6.2 Edging material does not peel or delaminate.			
3.6.4 The ballistic shell is resistant to lubricants, greases, fuels, cleaning agents			
Process / Operations: Assembly, adhesive method			
Parts list			
	Drawing #	Description / Material	Qty
	9675129	Shell, Large size	1
	9675130	Edge	AR
	---	Industrial Cyanoacrylate Adhesive	AR
		Loctite 406 or equivalent	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.2.1.1 Minimum shell resistance to projectiles (V50).		4.3.1.1 / Appendix 2.	
3.2.1.2 Maximum shell backface transient deformation.		4.3.1.2 / Appendix 3.	
3.6.2 Edging material adhesion		4.3.9.2 Edging material peel test.	
3.9.2 Workmanship		4.4.3 Visual examination.	
Notes:  Edging material tailored to fit shell size.			

### CG634 Product Specification

Title: **Shell**

**Small size**

Manufacturer part #: Superseded

Dwg #: 9675127

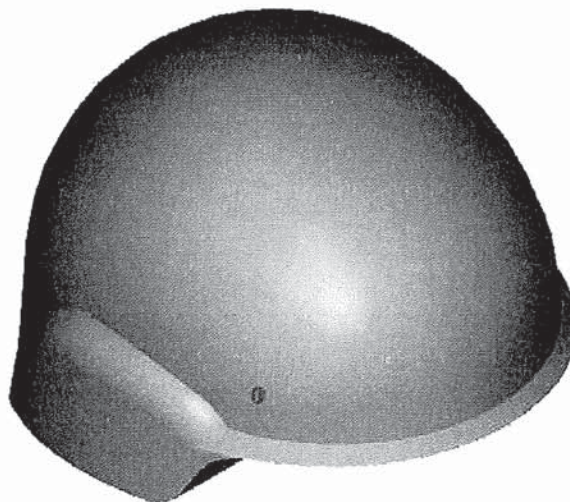
Rev: 3

NSN: N/A

Description:

Painted ballistic shell, small size.  
Green 383 color

Overall dimensions:   Length:     25.1 cm approx.  
                              Breadth:    23.0 cm approx.  
                              Height:     16.5 cm approx.



- 3.3.6.1   Specular gloss rating does not exceed 1 unit under any geometry. As per ASTM D523, 20/60/85°. The ballistic shell has a matte finish, both wet and dry.
- 3.3.6.2   Near Infra Red Reflectance values comply with Reference curve and limit curve of Appendix 1 of STANAG 2338. *Deviations from the reference curve are allowed if they show an increase in reflectance when compared with values at shorter wavelengths. Between 850 nm and 1200 nm reflectances may gradually decrease. The curve is allowed to fall only once in only one region. Reflectance curves with allowable deviations must be within tolerance limits.*

<p>3.3.6.3 Shell color is GREEN 383 as per method 6241.1 of FED-STD-141. Luminance: Y=6.3-8.3 Chromaticity: <math>x=0.328 \pm 0.008</math> <math>y=0.365 \pm 0.008</math> See also 3.3.6.2</p> <p>3.6.3 Coating material does not peel or chip. As per ASTM D3359, Method B, Classification No. 5.</p>																			
<p>Process / Operations: Compression molding , Air-gun painting.</p>																			
<p>Parts list</p> <table border="1"> <thead> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Aramid fiber</td> <td>AR</td> </tr> <tr> <td></td> <td></td> <td>Bi-composite Acrylic primer or equivalent Army green color  ICI, Autocolor, Hi-Bond Rapid Primer, #P565-668 or eq ICI, Autocolor, M.S. Hardener, #P210-796 or eq.</td> <td>AR</td> </tr> <tr> <td></td> <td></td> <td>Bi-Composite Acrylic paint or equivalent. IR green 383. Texture ratio : 125 ml/GUS.  PPG Canada inc. Paint # G60351 or eq. Catalyst # GC500 or eq. Beads (130 micron) #G60357 or eq</td> <td>AR</td> </tr> </tbody> </table>					Drawing #	Description / Material	Qty			Aramid fiber	AR			Bi-composite Acrylic primer or equivalent Army green color  ICI, Autocolor, Hi-Bond Rapid Primer, #P565-668 or eq ICI, Autocolor, M.S. Hardener, #P210-796 or eq.	AR			Bi-Composite Acrylic paint or equivalent. IR green 383. Texture ratio : 125 ml/GUS.  PPG Canada inc. Paint # G60351 or eq. Catalyst # GC500 or eq. Beads (130 micron) #G60357 or eq	AR
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<p>Specific Production Test Requirements</p> <table border="1"> <thead> <tr> <th>Specifications:</th> <th>QA procedures and test methods:</th> </tr> </thead> <tbody> <tr> <td>3.6.3 Surface coating adhesion.</td> <td>4.3.9.3 / ASTM D3359, Method B, Classification No.5.</td> </tr> <tr> <td>3.9.2 Workmanship</td> <td>4.4.3 Visual examination.</td> </tr> </tbody> </table>				Specifications:	QA procedures and test methods:	3.6.3 Surface coating adhesion.	4.3.9.3 / ASTM D3359, Method B, Classification No.5.	3.9.2 Workmanship	4.4.3 Visual examination.										
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3.9.2 Workmanship	4.4.3 Visual examination.																		
<p>Notes:</p>																			



### CG634 Product Specification

Title: **Shell**

**Medium size**

Manufacturer part # : Superceded

Dwg # : 9675128

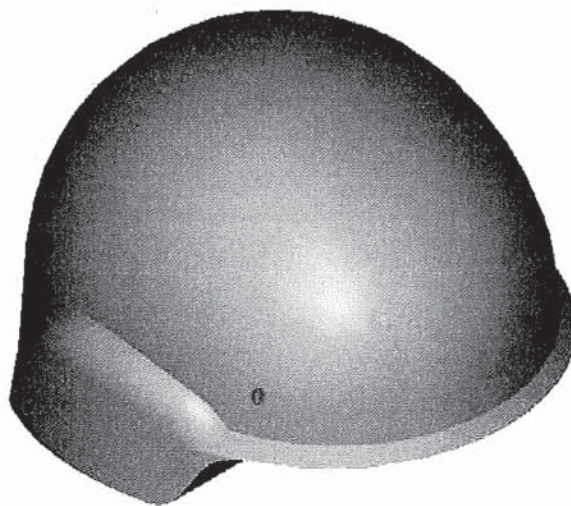
Rev: 3

NSN : N/A

Description:

Painted ballistic shell, medium size.  
Green 383 colour

Overall dimensions:   Length:   26.2 cm approx.  
                                  Breadth: 24.2 cm approx.  
                                  Height:  17.0 cm approx.



- 3.3.6.1   Specular gloss rating does not exceed 1 unit under any geometry. As per ASTM D523, 20/60/85°. The ballistic shell has a matte finish, both wet and dry.
- 3.3.6.2   Near Infra Red Reflectance values comply with Reference curve and limit curve of Appendix 1 of STANAG 2338. *Deviations from the reference curve are allowed if they show an increase in reflectance when compared with values at shorter wavelengths. Between 850 nm and 1200 nm reflectances may gradually decrease. The curve is allowed to fall only once in only one region. Reflectance curves with allowable deviations must be within tolerance limits.*

3.3.6.3	Shell color is GREEN 383 as per method 6241.1 of FED-STD-141. Luminance: Y=6.3-8.3 Chromaticity: $x=0.328 \pm 0.008$ $y=0.365 \pm 0.008$ See also 3.3.6.2		
3.6.3	Coating material does not peel or chip. As per ASTM D3359, Method B, Classification No. 5.		
Process / Operations: Compression molding , Air-gun painting.			
Parts list			
	Drawing #	Description / Material	Qty
		Aramid fiber	AR
		Bi-composite Acrylic primer or equivalent Army green color  ICI, Autocolor, Hi-Bond Rapid Primer, #P565-668 or eq ICI, Autocolor, M.S. Hardener, #P210-796 or eq.	AR
		Bi-Composite Acrylic paint or equivalent. IR green 383. Texture ratio : 125 ml/GUS.  PPG Canada inc. Paint # G60351 or eq. Catalyst # GC500 or eq. Beads (130 micron) #G60357 or eq	AR
Specific Production Test Requirements			
Specifications:   3.6.3    Surface coating adhesion.  3.9.2    Workmanship		QA procedures and test methods:   4.3.9.3 / ASTM D3359, Method B, Classification No.5.  4.4.3    Visual examination.	
Notes:			

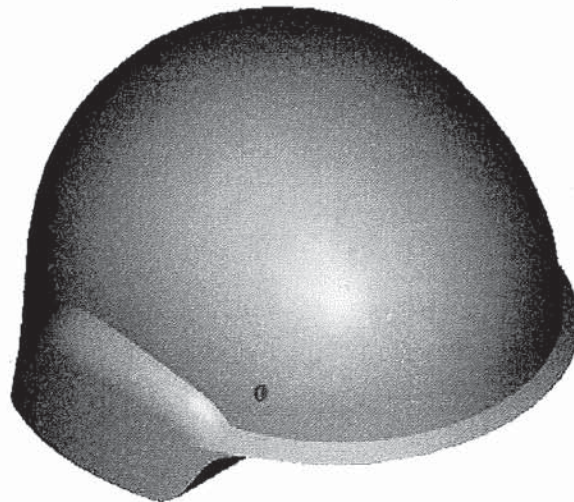
### CG634 Product Specification

Title: <b>Shell</b> <b>Large size</b>	Manufacturer part #: Superceded	
	Dwg #: 9675129	Rev: 3
	NSN: N/A	

Description:

Painted ballistic shell, Large size.  
Green 383 colour


Overall dimensions:   Length:   27.1 cm approx.  
                                  Breadth: 25.2 cm approx.  
                                  Height:  17.5 cm approx.

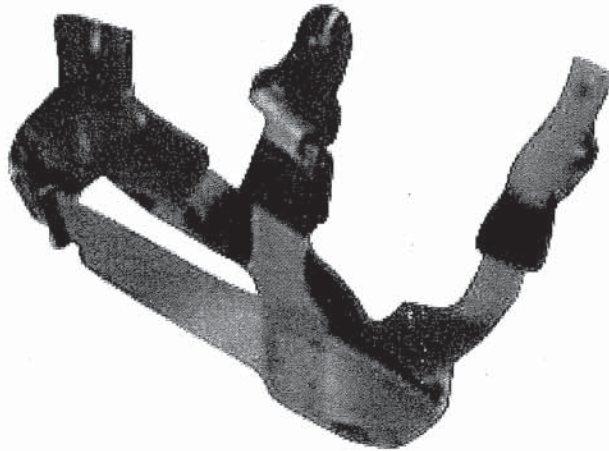


- 3.3.6.1   Specular gloss rating does not exceed 1 unit under any geometry. As per ASTM D523, 20/60/85°. The ballistic shell has a matte finish, both wet and dry.
- 3.3.6.2   Near Infra Red Reflectance values comply with Reference curve and limit curve of Appendix 1 of STANAG 2338. *Deviations from the reference curve are allowed if they show an increase in reflectance when compared with values at shorter wavelengths. Between 850 nm and 1200 nm reflectances may gradually decrease. The curve is allowed to fall only once in only one region. Reflectance curves with allowable deviations must be within tolerance limits.*



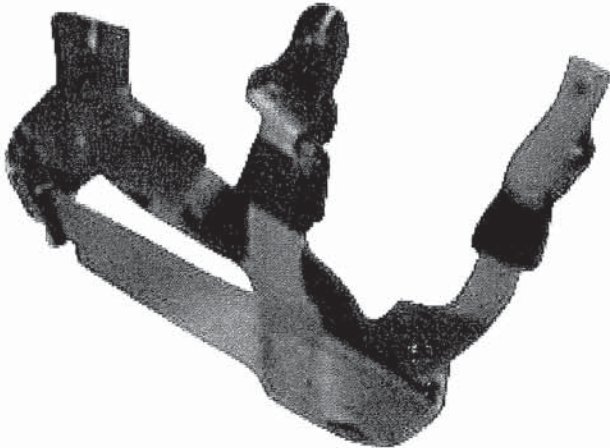
3.3.6.3	Shell color is GREEN 383 as per method 6241.1 of FED-STD-141. Luminance: Y=6.3-8.3 Chromaticity: x=0.328 ± 0.008    y=0.365 ± 0.008 See also 3.3.6.2		
3.6.3	Coating material does not peel or chip. As per ASTM D3359, Method B, Classification No. 5.		
Process / Operations: Compression molding , Air-gun painting.			
Parts list			
	Drawing #	Description / Material	Qty
		Aramid fiber	AR
		Bi-composite Acrylic primer or equivalent Army green color  ICI, Autocolor, Hi-Bond Rapid Primer, #P565-668 or eq ICI, Autocolor, M.S. Hardener, #P210-796 or eq.	AR
		Bi-Composite Acrylic paint or equivalent. IR green 383. Texture ratio : 125 ml/GUS.  PPG Canada inc. Paint # G60351 or eq. Catalyst # GC500 or eq. Beads (130 micron) #G60357 or eq	AR
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.6.3	Surface coating adhesion.	4.3.9.3 / ASTM D3359, Method B, Classification No.5.	
3.9.2	Workmanship	4.4.3 Visual examination.	
Notes:			

CG634 Product Specification															
Title: <b>Edge</b>		Manufacturer part # : Superceded													
		Dwg # : 9675130	Rev: 3												
		NSN : 8470-21-912-7616													
Description: "U" shape extruded profile. Flat black.  Thickness = 0.9 to 2.2 mm Width of opening = 7 mm  															
3.3.3 The material in the ballistic shell, the edging material and the shell coating shall inhibit flame. (As per CSA Standard No. 22.2 No. 0.6-M1982, Test A and B).  3.3.4 No visible fungus growth (ASTM G21-90).															
Process / Operations: Extrusion molding															
<table border="1"> <thead> <tr> <th colspan="4">Parts list</th> </tr> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td>---</td> <td>PVC, Black, 65 Durometer shore A R314AE (Synergistics) or equivalent</td> <td>AR</td> </tr> </tbody> </table>				Parts list					Drawing #	Description / Material	Qty		---	PVC, Black, 65 Durometer shore A R314AE (Synergistics) or equivalent	AR
Parts list															
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	---	PVC, Black, 65 Durometer shore A R314AE (Synergistics) or equivalent	AR												
<table border="1"> <thead> <tr> <th colspan="2">Specific Production Test Requirements</th> </tr> </thead> <tbody> <tr> <td>Specifications:</td> <td>QA procedures and test methods:</td> </tr> <tr> <td colspan="2"> <div style="height: 100px;"></div> </td> </tr> </tbody> </table>				Specific Production Test Requirements		Specifications:	QA procedures and test methods:	<div style="height: 100px;"></div>							
Specific Production Test Requirements															
Specifications:	QA procedures and test methods:														
<div style="height: 100px;"></div>															
Notes: <div style="height: 50px;"></div>															

CG634 Product Specification			
Title: <b>Chin strap assembly Small size</b>		Manufacturer part # : Superseded	
		Dwg # : 9675131-1	Rev: 3
		NSN : 8470-21-912-7610	
Description:			
<p>Chin strap assembly Army green and black color With leather chin, automatic buckle backing and nape pad. Spun polyester webbing Screw attachment method Small size</p>			
			
<p>3.7.1 Retention system strength: maximum dynamic elongation: 25 mm maximum residual elongation: 12 mm</p> <p>3.7.3 Strap slippage: Strap does not slip more the 10 mm.</p>			
Process / Operations:			
Assembly: Sewing, riveting.			
Parts list			
	Drawing #	Description / Material	Qty
	9675169	Adjustment buckle	4
	9675168	D-Ring	2

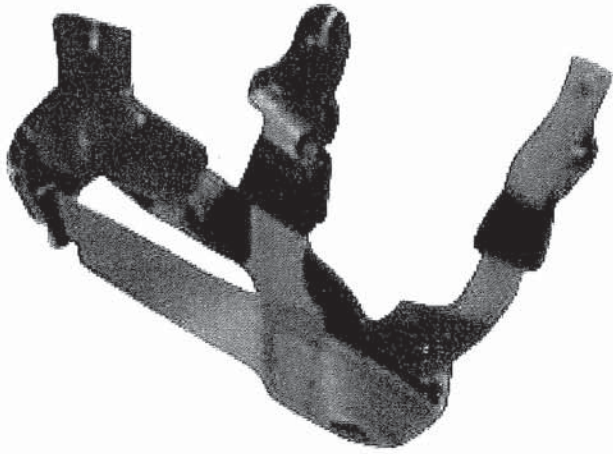


9675167-1	Automatic buckle leather backing, Front layer	1
9675167-2	Automatic buckle leather backing, Rear layer	1
9675132	Plastic eyelet	2
9675159	Automatic buckle assembly	1
9675160	Buckle (male)	1
9675161	Automatic buckle support plate	1
9675163	Nape pad rear layer	2
9675164	Nape pad filler foam	1
9675165	Nape pad leather strap	1
9675166	Chin backing leather	1
9675199	Automatic buckle filler foam	1
9675139-1	18 mm strap	1
9675139-2	18 mm strap	1
9675176-1	Identification label	1
0575311	Nape Pad Reinforcement	1
---	Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.	3
---	Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.	6
---	Polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
---	Rivet post, Brass (Stimpson Co. inc. # A1411) or eq.	1
---	Rivet cap, Brass, Dull black finish (Stimpson Co. inc. # D3048) or eq.	1
Specific Production Test Requirements		
Specifications:	QA procedures and test methods:	
3.9.2 Workmanship	4.4.3 Visual examination	
Notes:		

<b>CG634 Product Specification</b>			
<b>Title: Chin strap assembly</b> <b>Medium size</b>		Manufacturer part # : Superceded Dwg # : 9675131-2      Rev: 3 NSN : 8470-21-912-7611	
<p><b>Description:</b></p> <p>Chin strap assembly            Army green and black color            With leather chin, automatic buckle backing and nape pad.            Spun polyester webbing            Screw attachment method            Medium size</p> <div style="text-align: center; margin: 20px 0;">  </div> <p>3.7.1 Retention system strength: maximum dynamic elongation: 25 mm            maximum residual elongation: 12 mm</p> <p>3.7.3 Strap slippage: Strap does not slip more the 10 mm.</p>			
<p><b>Process / Operations:</b></p> <p>Assembly: Sewing, riveting.</p>			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675169	Adjustment buckle	4
	9675168	D-Ring	2
	9675167-1	Automatic buckle leather backing, Front layer	1
	9675167-2	Automatic buckle leather backing, Rear layer	1

	9675132	Plastic eyelet	2
	9675159	Automatic buckle assembly	1
	9675160	Buckle (male)	1
	9675161	Automatic buckle support plate	1
	9675163	Nape pad rear layer	2
	9675164	Nape pad filler foam	1
	9675165	Nape pad leather strap	1
	9675166	Chin backing leather	1
	9675199	Automatic buckle filler foam	1
	9675139-3	18 mm strap	1
	9675139-4	18 mm strap	1
	9675176-2	Identification label	1
	0575311	Nape Pad Reinforcement	1
	---	Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.	3
	---	Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.	6
	---	Polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
	---	Rivet post, Brass (Stimpson Co. inc. # A1411) or eq.	1
	---	Rivet cap, Brass, Dull black finish (Stimpson Co. inc. # D3048) or eq.	1
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.9.2 Workmanship		4.4.3 Visual examination	
Notes:			



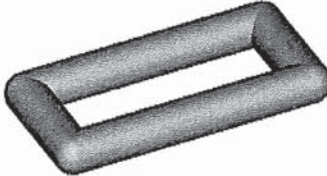
<b>CG634 Product Specification</b>			
<b>Title: Chin strap assembly</b> <b>Large size</b>		Manufacturer part #: Superceded	
		Dwg #: 9675131-3	Rev: 3
NSN : 8470-21-912-7612			
<p><b>Description:</b></p> <p>Chin strap assembly            Army green and black color            With leather chin, automatic buckle backing and nape pad.            Spun polyester webbing            Screw attachment method            Large size</p> <div style="text-align: center; margin: 20px 0;">  </div> <p>3.7.1 Retention system strength: maximum dynamic elongation: 25 mm            maximum residual elongation: 12 mm</p> <p>3.7.3 Strap slippage: Strap does not slip more the 10 mm.</p>			
<p><b>Process / Operations:</b></p> <p>Assembly: Sewing, riveting.</p>			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675169	Adjustment buckle	4
	9675168	D-Ring	2
	9675167-1	Automatic buckle leather backing, Front layer	1
	9675167-2	Automatic buckle leather backing, Rear layer	1
	9675132	Plastic eyelet	2

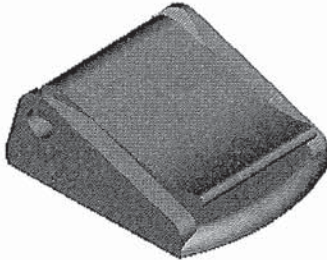
	9675159	Automatic buckle assembly	1
	9675160	Buckle (male)	1
	9675161	Automatic buckle support plate	1
	9675163	Nape pad rear layer	2
	9675164	Nape pad filler foam	1
	9675165	Nape pad leather strap	1
	9675166	Chin backing leather	1
	9675199	Automatic buckle filler foam	1
	9675139-5	18 mm strap	1
	9675139-6	18 mm strap	1
	9675176-3	Identification label	1
	0575311	Nape Pad Reinforcement	1
	---	Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.	3
	---	Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.	6
	---	polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
	---	Rivet post, Brass (Stimpson Co. inc. # A1411) or eq.	1
	---	Rivet cap, Brass, Dull black finish (Stimpson Co. inc. # D3048) or eq.	1
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.9.2 Workmanship		4.4.3 Visual examination	
Notes:			

CG634 Product Specification			
Title: <b>18 mm strap</b>		Manufacturer part # : Superceded	
		Dwg # : 9675139-X	Rev: 3
		NSN : N/A	
Description: Spun polyester webbing.			
<u>Dash #</u>		<u>Length (approx.)</u>	
-1		48.4 cm	
-2		69.8 cm	
-3		54.3 cm	
-4		76.9 cm	
-5		58.0 cm	
-6		82.8 cm	
-7		65.0 cm	
Process / Operations: Warm die cutting			
Parts list			
	Drawing #	Description / Material	Qty
	---	100 % Spun polyester flat webbing  Width: min: 17mm normal:18 mm max: 19mm Color: Green #3778 (Lagran Canada inc.) (Pantone reference # 5743) Weave construction : Herringbone Twill 2/2 Pick per cm : 6.6 Weight/meter: min:13g Thickness min: 0.8 mm max: 1.0 mm Tensile : 254 kg min. Total warp ends: 165 No dimensional change in wetting as per T.M. CGSB-CAN 2-4.2 - M77 Test m 25.1 at 20°C.  (LaGran Canada inc. pattern#5083)	---
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			




CG634 Product Specification																									
Title: <b>27.5 mm strap</b>		Manufacturer part # : Superceded																							
		Dwg # : 9675140-X	Rev: 3																						
		NSN : N/A																							
Description: Spun polyester webbing																									
<table border="1"> <thead> <tr> <th>Dash #</th> <th>Length (approx.)</th> </tr> </thead> <tbody> <tr><td>-1</td><td>64.8 cm</td></tr> <tr><td>-2</td><td>69.0 cm</td></tr> <tr><td>-3</td><td>71.5 cm</td></tr> <tr><td>-4</td><td>66.8 cm</td></tr> <tr><td>-5</td><td>70.4 cm</td></tr> <tr><td>-6</td><td>72.5 cm</td></tr> <tr><td>-7</td><td>9.0 cm</td></tr> <tr><td>-8</td><td>10.0 cm</td></tr> <tr><td>-9</td><td>11.0 cm</td></tr> <tr><td>-10</td><td>17.8 cm</td></tr> </tbody> </table>				Dash #	Length (approx.)	-1	64.8 cm	-2	69.0 cm	-3	71.5 cm	-4	66.8 cm	-5	70.4 cm	-6	72.5 cm	-7	9.0 cm	-8	10.0 cm	-9	11.0 cm	-10	17.8 cm
Dash #	Length (approx.)																								
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-2	69.0 cm																								
-3	71.5 cm																								
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-5	70.4 cm																								
-6	72.5 cm																								
-7	9.0 cm																								
-8	10.0 cm																								
-9	11.0 cm																								
-10	17.8 cm																								
Process / Operations:  Warm die cutting																									
<table border="1"> <thead> <tr> <th colspan="4">Parts list</th> </tr> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>           100 % Spun polyester flat webbing             Width: min: 26mm normal:27.5 mm max: 29mm            Color: Green #3778 (Lagran Canada inc.) (Pantone reference # 5743)            Weave construction : Herringbone Twill 2/2            Pick per cm : 6.6            Weight/meter: min:20g            Thickness min: 0.8 mm max: 1.0 mm            Tensile : 381 kg min.            Total warp ends: 251            No dimensional change in wetting as per T.M. CGSB-CAN 2-4.2 - M77 Test m 25.1 at 20°C.             (LaGran Canada inc. pattern#5083)         </td> <td></td> </tr> </tbody> </table>				Parts list					Drawing #	Description / Material	Qty			100 % Spun polyester flat webbing  Width: min: 26mm normal:27.5 mm max: 29mm Color: Green #3778 (Lagran Canada inc.) (Pantone reference # 5743) Weave construction : Herringbone Twill 2/2 Pick per cm : 6.6 Weight/meter: min:20g Thickness min: 0.8 mm max: 1.0 mm Tensile : 381 kg min. Total warp ends: 251 No dimensional change in wetting as per T.M. CGSB-CAN 2-4.2 - M77 Test m 25.1 at 20°C.  (LaGran Canada inc. pattern#5083)											
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Specific Production Test Requirements																									
Specifications:		QA procedures and test methods:																							
Notes:																									


CG634 Product Specification			
Title: <b>D-Ring</b>		Manufacturer part # : Superceded	
		Dwg # : 9675168	Rev: 3
		NSN : N/A	
Description: Rectangular plastic "D-ring" loop for 18 mm strap. Black color 29 mm X 14 mm 4 mm diameter Finish: VDI 27			
			
Process / Operations: Injection molding			
Parts list			
	Drawing #	Description / Material	Qty
		Polyamide 6, Black "Durethan", B 30 S (Bayer) or equivalent	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

CG634 Product Specification			
Title: <b>Adjustment buckle</b>		Manufacturer part # : Superceded	
		Dwg # : 9675169	Rev: 3
		NSN : N/A	
Description:  Adjustment buckle Black For 18 mm strap.  Overall dimensions (approx) : L = 32 mm W = 25.5 mm H = 12.5 mm  <div style="text-align: center;">  </div>			
Process / Operations: Standard off the shelf component.			
Parts list			
	Drawing #	Description / Material	Qty
		Cam buckle #HPCB320 (version 1987) , Black (Fixlock)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

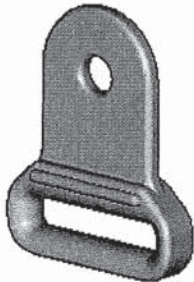


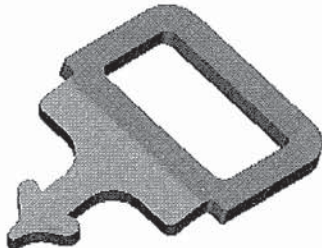
CG634 Product Specification			
<b>Title: Automatic buckle</b> <b>Leather backing</b> <b>Front layer</b>		Manufacturer part # : Superceded	
		Dwg # : 9675167-1	Rev: 3
		NSN : N/A	
Description: Automatic buckle leather backing Front layer With one rivet hole.			
Process / Operations: Die cut			
Parts list			
	Drawing #	Description / Material	Qty
	- - -	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max.  Green color ( Pantone reference #5743)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			


CG634 Product Specification			
Title: <b>Automatic buckle Leather backing Rear layer</b>		Manufacturer part # : Superceded	
		Dwg # : 9675167-2	Rev: 3
		NSN : N/A	
Description: Automatic buckle leather backing Rear layer <div style="text-align: center;">  </div>			
Process / Operations: Die cut			
Parts list			
	Drawing #	Description / Material	Qty
	---	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max.  Green color ( Pantone reference #5743)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

CG634 Product Specification			
Title: <b>Chin backing leather</b>		Manufacturer part #: Superceded	
		Dwg #: 9675166	Rev: 3
		NSN: N/A	
Description: Chin backing leather "V" shape <div style="text-align: center;">  </div>			
Process / Operations: Die cut			
Parts list			
	Drawing #	Description / Material	Qty
	---	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max.  Green color ( Pantone reference #5743)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:  Tailored to fit chin cup size.			




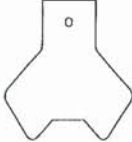
CG634 Product Specification			
Title: <b>Plastic eyelet</b>		Manufacturer part # : Superceded	
		Dwg # : 9675132	Rev: 3
		NSN : N/A	
Description: Chin strap supporting eyelets. Internal width = 22 mm Black color Finish = VDI 27			
			
Process / Operations: Injection molding			
Parts list			
	Drawing #	Description / Material	Qty
		Polyamide 6, Black "Durethan", B 30 S (Bayer) or equivalent	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

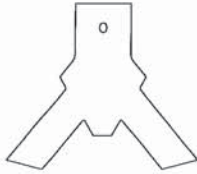
CG634 Product Specification			
Title: <b>Buckle (male)</b>		Manufacturer part # : Superceded	
		Dwg # : 9675160	Rev: 3
		NSN : N/A	
Description: Automatic buckle's male part Arrow shape end Flat black For 18 mm strap <div style="text-align: center;">  </div>			
Process / Operations: Metal stamping, Painting.			
Parts list			
	Drawing #	Description / Material	Qty
	---	Steel : HRPO HSLA A 715 Type 6	
	---	Thickness = 2.5 mm	
	---	Vinyl primer, low gloss (Kel Coatings Ltd. # Y1B-6279 or eq.)	
	---	Acrylic-Enamel paint, Flat black (Technical Coatings Co. Ltd. # XM-902 or eq.)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

CG634 Product Specification			
Title: <b>Automatic buckle's Support plate</b>		Manufacturer part # : Superceded	
		Dwg # : 9675161	Rev: 3
		NSN : N/A	
Description: Stainless steel support plate. <div style="text-align: center;">  </div>			
Process / Operations: Metal stamping			
Parts list			
	Drawing #	Description / Material	Qty
		Sheet stainless steel, type 304, 0.0321" thk, (No 22 Standard MFR gauge)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			




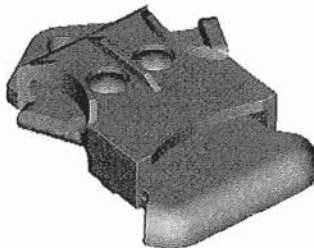
CG634 Product Specification			
Title: <b>Nape pad filler foam</b>		Manufacturer part #: Superceded	
		Dwg #: 9675164	Rev: 3
		NSN: N/A	
Description:  Nape pad filler foam with adhesive backing. "Y" shape, <div style="text-align: center;">  </div>			
Process / Operations: Die cut			
Parts list			
	Drawing #	Description / Material	Qty
		Polyether Urethane, open cell foam Density = 1.4 to 1.7 pcf Load deflection at 25% = 38 to 44 psi Tensile strength = 15 psi minimum. Elongation = 150 to 200 % maximum. Thickness = 10 mm (Jacobs & Thompson inc. Foamflex # 1715) or eq	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

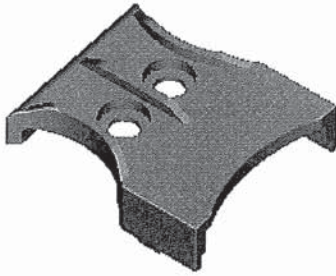
CG634 Product Specification			
Title: <b>Nape pad rear layer</b>		Manufacturer part #: 200096	
		Dwg #: 9675163	Rev: 3
		NSN: N/A	
Description: Nape pad rear layer "Y" shape <div style="text-align: center;">  </div>			
Process / Operations: Die cut			
Parts list			
Manufacturer part #	Drawing #	Description / Material	Qty
---	---	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max. Green color ( Pantone reference #5743)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

CG634 Product Specification			
Title: <b>Nape pad leather strap</b>		Manufacturer part # : Superceded	
		Dwg # : 9675165	Rev: 3
		NSN : N/A	
Description:			
<p>"Y" shape strap</p> 			
Process / Operations:			
Die cut			
Parts list			
	Drawing #	Description / Material	Qty
	---	Cow hide leather Thickness = 1.8 mm min. Tensile strength = 2000 Lb/Sq.In. min. Elongation at break = 70% min. Mullen Burst = 800 Lb/Sq.In. min. Grease = 9-12% Chromic oxide = 2.5-3.0% Chromic oxide, Hide substance basis = 3.5-4.0% ASH = 180% max. Hide substance = 70% max. PH = 3.5 max.  Green color ( Pantone reference #5743)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

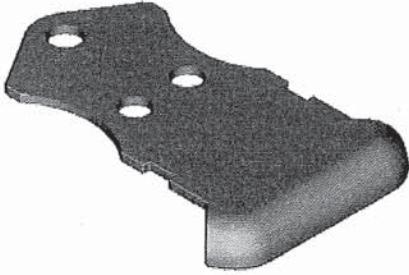



CG634 Product Specification															
Title: <b>Automatic buckle filler foam</b>		Manufacturer part # : Superceded													
		Dwg # : 9675199	Rev: 3												
		NSN : N/A													
Description: Filler foam  															
Process / Operations: Die cut															
<table border="1"> <thead> <tr> <th colspan="4">Parts list</th> </tr> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>           Polyether Urethane, open cell foam            Density = 1.4 to 1.7 pcf            Load deflection at 25% = 38 to 44 psi            Tensile strength = 15 psi minimum.            Elongation = 150 to 200 % maximum.            Thickness = 10 mm             (Jacobs &amp; Thompson inc. Foamflex # 1715) or eq         </td> <td></td> </tr> </tbody> </table>				Parts list					Drawing #	Description / Material	Qty			Polyether Urethane, open cell foam Density = 1.4 to 1.7 pcf Load deflection at 25% = 38 to 44 psi Tensile strength = 15 psi minimum. Elongation = 150 to 200 % maximum. Thickness = 10 mm  (Jacobs & Thompson inc. Foamflex # 1715) or eq	
Parts list															
	Drawing #	Description / Material	Qty												
		Polyether Urethane, open cell foam Density = 1.4 to 1.7 pcf Load deflection at 25% = 38 to 44 psi Tensile strength = 15 psi minimum. Elongation = 150 to 200 % maximum. Thickness = 10 mm  (Jacobs & Thompson inc. Foamflex # 1715) or eq													
Specific Production Test Requirements															
Specifications:		QA procedures and test methods:													
Notes:															

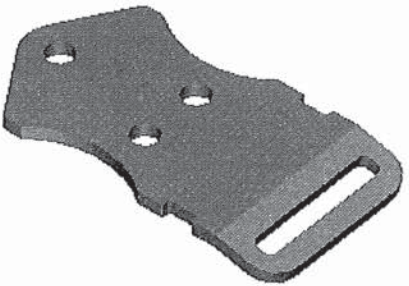
CG634 Product Specification			
Title: <b>Automatic buckle assembly</b>		Manufacturer part #: Superceded	
		Dwg #: 9675159	Rev: 3
		NSN: N/A	
Description: Automatic buckle, flat black, 2 buttons, downside 18 mm webbing attachment			
			
3.7.2 Inadvertent release by pressure / inertia : The buckle does not release.  3.7.5 Partial engagement : The buckle detaches when partially engaged.			
Process / Operations: Assembly : Riveting			
Parts list			
	Drawing #	Description / Material	Qty
	9675170	Automatic buckle, Plastic housing	1
	9675171-1	Automatic buckle, Right button	1
	9675171-2	Automatic buckle, Left button	1
	9675172	Automatic buckle, Spring	1
	9675173	Automatic buckle, Plate	1
	---	Semi-tubular rivet, steel, dia=3.98mm, Lg=11.112mm, Head dia=6.35mm, Head Thk=1.143mm, Hole I.D.=2.54/2.718mm, Min. hole depth=3.175mm, Dull black finish	2
	9675200	Protective cover	1
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.9.2 Workmanship		4.4.4 Visual examination.	
Notes:			

CG634 Product Specification			
Title: <b>Automatic buckle Plastic housing</b>		Manufacturer part # : Superceded	
		Dwg # : 9675170	Rev: 3
		NSN : N/A	
Description:  Automatic buckle plastic housing Black color Finish = VDI 27  			
Process / Operations: Injection molding			
Parts list			
	Drawing #	Description / Material	Qty
		Acetal resin, black "Ultraform" W2320 (BASF) or equivalent	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

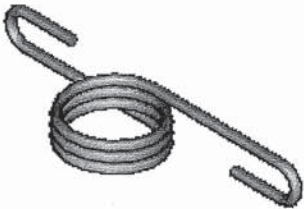


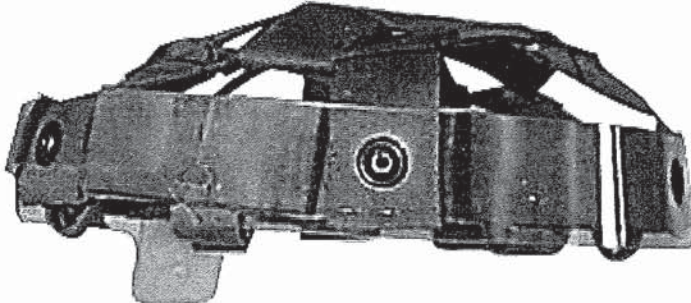
CG634 Product Specification															
Title: <b>Automatic buckle Protective cover</b>		Manufacturer part # : Superceded													
		Dwg # : 9675200	Rev: 3												
		NSN : N/A													
Description:  Automatic buckle protective cover Black color Finish = VDI 27  															
Process / Operations: Injection molding															
<table border="1"> <thead> <tr> <th colspan="4">Parts list</th> </tr> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Acetal resin, black "Ultraform" W2320 (BASF) or equivalent</td> <td></td> </tr> </tbody> </table>				Parts list					Drawing #	Description / Material	Qty			Acetal resin, black "Ultraform" W2320 (BASF) or equivalent	
Parts list															
	Drawing #	Description / Material	Qty												
		Acetal resin, black "Ultraform" W2320 (BASF) or equivalent													
<table border="1"> <thead> <tr> <th colspan="2">Specific Production Test Requirements</th> </tr> </thead> <tbody> <tr> <td>Specifications:</td> <td>QA procedures and test methods:</td> </tr> <tr> <td>   </td> <td>   </td> </tr> </tbody> </table>				Specific Production Test Requirements		Specifications:	QA procedures and test methods:	   	   						
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Notes:															

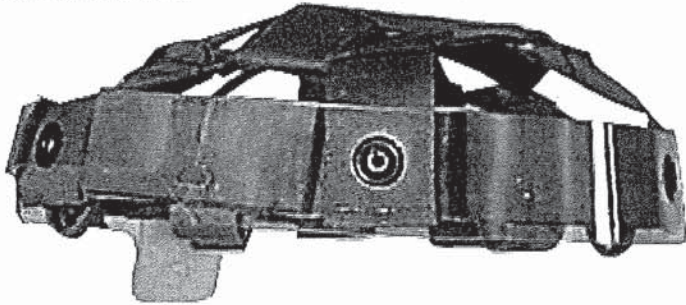
<b>CG634 Product Specification</b>			
<b>Title: Automatic buckle Button</b>		<b>Manufacturer part # : Superceded</b>	
		<b>Dwg # : 9675171-X</b>	<b>Rev: 3</b>
		<b>NSN : N/A</b>	
<b>Description:</b>  Buttons for automatic buckle  Right button: Drawing # 9675171-1 Left button : Drawing # 9675171-2  <div style="text-align: center; margin: 20px 0;">  </div>			
<b>Process / Operations:</b> Metal stamping, Painting			
<b>Parts list</b>			
	<b>Drawing #</b>	<b>Description / Material</b>	<b>Qty</b>
	---	Steel : HRPO HSLA A 715 type 6 Thickness = 2.5 mm	
	---	Vinyl primer, low gloss (Kel Coatings Ltd. # Y1B-6279 or eq.)	
	---	Acrylic-Enamel paint, Flat black (Technical Coatings Co. Ltd. # XM-902 or eq.)	
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>		<b>QA procedures and test methods:</b>	
<b>Notes:</b>			

CG634 Product Specification																			
Title: <b>Automatic buckle Plate</b>		Manufacturer part #: Superceded																	
		Dwg #: 9675173	Rev: 3																
		NSN: N/A																	
Description:  Automatic buckle plate  For 18 mm strap  																			
Process / Operations: Metal stamping, Painting																			
Parts list <table border="1"> <thead> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td>---</td> <td>Steel, HRPO HSLA A 715 type 6 Thickness = 2.0 mm</td> <td></td> </tr> <tr> <td></td> <td>---</td> <td>Vinyl primer, low gloss (Kel Coatings Ltd. # Y1B-6279 or eq.)</td> <td></td> </tr> <tr> <td></td> <td>---</td> <td>Acrylic-Enamel paint, Flat black (Technical Coatings Co. Ltd. # XM-902 or eq.)</td> <td></td> </tr> </tbody> </table>					Drawing #	Description / Material	Qty		---	Steel, HRPO HSLA A 715 type 6 Thickness = 2.0 mm			---	Vinyl primer, low gloss (Kel Coatings Ltd. # Y1B-6279 or eq.)			---	Acrylic-Enamel paint, Flat black (Technical Coatings Co. Ltd. # XM-902 or eq.)	
	Drawing #	Description / Material	Qty																
	---	Steel, HRPO HSLA A 715 type 6 Thickness = 2.0 mm																	
	---	Vinyl primer, low gloss (Kel Coatings Ltd. # Y1B-6279 or eq.)																	
	---	Acrylic-Enamel paint, Flat black (Technical Coatings Co. Ltd. # XM-902 or eq.)																	
Specific Production Test Requirements <table border="1"> <thead> <tr> <th>Specifications:</th> <th>QA procedures and test methods:</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>				Specifications:	QA procedures and test methods:														
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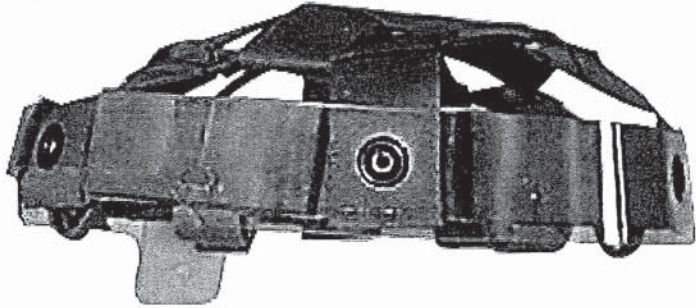


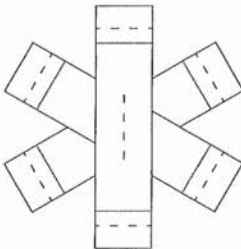
<b>CG634 Product Specification</b>			
<b>Title: Automatic buckle Spring</b>		Manufacturer part #: Superceded Dwg #: 9675172      Rev: 3 NSN: N/A	
<b>Description:</b> Automatic buckle torsion spring          <div style="text-align: center;">  </div>			
<b>Process / Operations:</b> Spring metal forming			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	---	Galvanized Hard drawn M.B, Wire dia=0.65mm, I.D.=4.5mm, Total length=19mm, Thickness=2.5mm, Active coils=3.3743, Total coils=3 Original angle=180, Max. operational deflection=45° Load/1° deflection=23.3g.	
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>		<b>QA procedures and test methods:</b>	
<b>Notes:</b>			

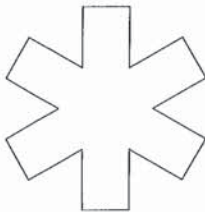
<b>CG634 Product Specification</b>			
<b>Title: Suspension system assembly Small size</b>		<b>Manufacturer part # : Superceded</b> <b>Dwg # : 9675136-1</b> <b>Rev: 3</b> <b>NSN : 8470-21-912-7607</b>	
<b>Description:</b> Suspension system assembly Army green webbing Brown leather crown and head band Clear polycarbonate support Lace crown adjustment method <div style="text-align: center; margin-top: 20px;">  </div>			
<b>Process / Operations:</b> Assembly: Riveting			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675137	Crown assembly	1
	9675145-1	Head band support assembly, small size	1
	9675141-1	Head band assembly, small size	1
	---	Lace, Spun polyester, OG-107 color Length=65 cm with ends. Meets D-80-001-028/SF-001 requirements (Calko Canada inc. style # 1636-B) or eq.	1
	---	Polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
	9675176-4	Identification label	1
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>   3.9.2 Workmanship		<b>QA procedures and test methods:</b>   Visual examination	
<b>Notes:</b>			

<b>CG634 Product Specification</b>			
<b>Title: Suspension system assembly Medium size</b>		Manufacturer part # : Superceded Dwg # : 9675136-2      Rev: 3 NSN : 8470-21-912-7608	
<b>Description:</b> Suspension system assembly Army green webbing Brown leather crown and head band Clear polycarbonate support Lace crown adjustment method <div style="text-align: center; margin-top: 20px;">  </div>			
<b>Process / Operations:</b> Assembly: Riveting			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675137	Crown assembly	1
	9675145-2	Head band support assembly, medium size	1
	9675141-2	Head band assembly, medium size	1
	---	Lace, Spun polyester, OG-107 color Length=65 cm with ends. Meets D-80-001-028/SF-001 requirements (Calko Canada inc. style # 1636-B) or eq.	1
	---	Polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
	9675176-5	Identification label	1
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>   3.9.2 Workmanship		<b>QA procedures and test methods:</b>   Visual examination	
<b>Notes:</b>			

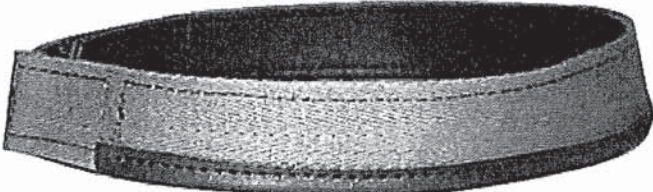


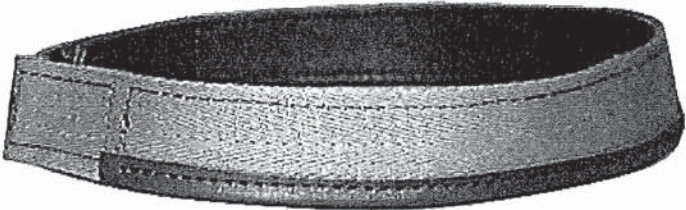
CG634 Product Specification			
Title: <b>Suspension system assembly</b> <b>Large size</b>		Manufacturer part # : Superceded	
		Dwg # : 9675136-3	Rev: 3
		NSN : 8470-21-912-7609	
Description: Suspension system assembly Army green webbing Brown leather crown and head band Clear polycarbonate support Lace crown adjustment method			
			
Process / Operations: Assembly: Riveting			
Parts list			
	Drawing #	Description / Material	Qty
	9675137	Crown assembly	1
	9675145-3	Head band support assembly, large size	1
	9675141-3	Head band assembly, large size	1
	---	Lace, Spun polyester, OG-107 color Length=65 cm with ends. Meets D-80-001-028/SF-001 requirements (Calko Canada inc. style # 1636-B) or eq.	1
	---	Polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
	9675176-6	Identification label	1 7
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.9.2 Workmanship		Visual examination	
Notes:			


<b>CG634 Product Specification</b>			
Title: <b>Crown assembly</b>		Manufacturer part # : Superceded	
		Dwg # : 9675137	Rev: 3
		NSN : N/A	
Description: Crown assembly 6 branches star shape O.D. = 130 mm approx. <div style="text-align: center; margin-top: 20px;">  </div>			
Process / Operations: Assembly: Sewing, Sticking			
Parts list			
	Drawing #	Description / Material	Qty
	9675138	Leather star	1
	9675140-10	27.5 mm strap	3
	---	Contact glue ADBOND 8392 ( Les Adhésifs Adchem Montréal inc.) or eq.	AR
	---	Polyamid thread, 92 tex, OG-107 color, (Coats # CSB92) or eq.	AR
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

CG634 Product Specification			
Title: <b>Leather star</b>		Manufacturer part # : Superceded	
		Dwg # : 9675138	Rev: 3
		NSN : N/A	
Description:  Crown's leather star O.D. = 130 mm  			
Process / Operations: Die-cut			
Parts list			
	Drawing #	Description / Material	Qty
	---	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max.  Brown color ( Pantone reference #4975)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			




CG634 Product Specification			
Title: <b>Head band assembly</b> <b>Small size</b>		Manufacturer part # : Superceded	
		Dwg # : 9675141-1	Rev: 3
		NSN : 8470-21-912-7613	
Description: Head band assembly, with "quick adjustment" system. Cotton polyester webbing, army green color and brown leather Hook and pile attachment method Fits head circumferences from 51.0 to 55.0 cm.			
			
Process / Operations: Assembly: Sewing			
Parts list			
	Drawing #	Description / Material	Qty
	9675140-1	27.5 mm strap	1
	9675174	"Quick adjustment" leather tab	1
	9675144-1	Leather band	1
	9675142-1	"Hook" (velcro) OG-107 color,	1
	9675142-2	"Hook" (velcro) OG-107 color,	1
	9675143-1	"Loop" (velcro) OG-107 color,	1
	9675143-2	"Loop" (velcro) OG-107 color,	1
	9675176-7	Identification Label	1
	---	Polyamid thread, 92 tex, 1488 color (Coats) (Pantone reference # 4975) (Coats # CSB92) or eq.	AR
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.9.2 Workmanship		4.4.3 Visual examination	
Notes:			

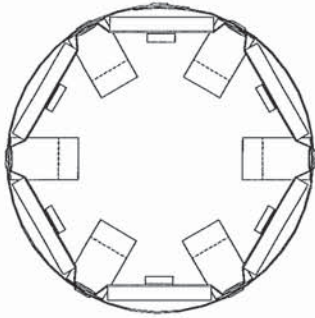
<b>CG634 Product Specification</b>			
<b>Title: Head band assembly Medium size</b>		Manufacturer part # : Superceded Dwg # : 9675141-2      Rev: 3 NSN : 8470-21-912-7614	
<b>Description:</b> Head band assembly, with "quick adjustment" system. Cotton polyester webbing, army green color and brown leather Hook and pile attachment method Fits head circumferences from 55.0 to 59.0 cm.			
			
<b>Process / Operations:</b> Assembly: Sewing			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675140-2	27.5 mm strap	1
	9675174	"Quick adjustment" leather tab	1
	9675144-2	Leather band	1
	9675142-1	"Hook" (velcro) OG-107color,	1
	9675142-2	"Hook" (velcro) OG-107color,	1
	9675143-1	"Loop" (velcro) OG-107color,	1
	9675143-2	"Loop" (velcro) OG-107color,	1
	9675176-8	Identification Label	1
	---	Polyamid thread, 92 tex, 1488 color (Coats) (Pantone reference # 4975) (Coats # CSB92) or eq.	AR
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>  3.9.2 Workmanship		<b>QA procedures and test methods:</b>  Visual examination	
<b>Notes:</b>			

CG634 Product Specification			
Title: <b>Head band assembly</b> <b>Large size</b>		Manufacturer part # : Superceded	
		Dwg # : 9675141-3	Rev: 3
		NSN : 8470-21-912-7615	
Description: Head band assembly, with "quick adjustment" system. Cotton polyester webbing, army green color and brown leather Hook and pile attachment method Fits head circumferences from 59.0 to 62.0 cm.			
			
Process / Operations: Assembly: Sewing			
Parts list			
	Drawing #	Description / Material	Qty
	9675140-3	27.5 mm strap	1
	9675174	"Quick adjustment" leather tab	1
	9675144-3	Leather band	1
	9675142-1	"Hook" (velcro) OG-107 color,	1
	9675142-2	"Hook" (velcro) OG-107 color,	1
	9675143-1	"Loop" (velcro) OG-107 color,	1
	9675143-2	"Loop" (velcro) OG-107 color,	1
	9675176-9	Identification Label	1
	---	Polyamid thread, 92 tex, 1488 color (Coats) (Pantone reference # 4975) (Coats # CSB92) or eq.	AR
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
3.9.2 Workmanship		4.4.3 Visual examination	
Notes:			

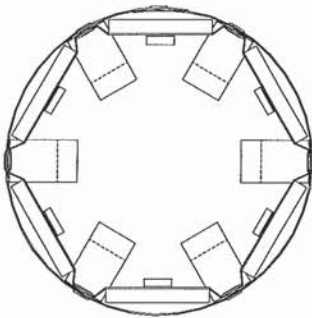


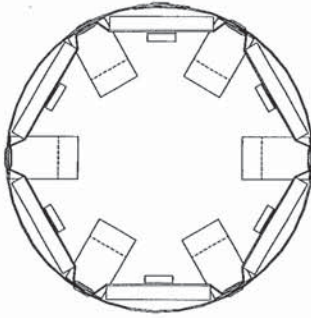
CG634 Product Specification			
Title: <b>Quick adjustment leather tab</b>		Manufacturer part #: Superceded	
		Dwg #: 9675174	Rev: 3
		NSN: N/A	
Description: Adjustment leather tab  			
Process / Operations: Die-cut			
Parts list			
	Drawing #	Description / Material	Qty
	---	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max.  Brown color ( Pantone reference #4975)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

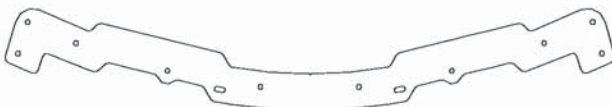
CG634 Product Specification											
<b>Title: Leather band</b> <b>Small / medium / Large</b>		Manufacturer part # : Superceded									
		Dwg # : 9675144-X	Rev: 3								
		NSN : N/A									
<b>Description:</b> Leather band Brown 40 mm wide.											
<table border="1"> <thead> <tr> <th>Drawing #</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>9675144-1</td> <td>456 mm approx.</td> </tr> <tr> <td>9675144-2</td> <td>494 mm approx.</td> </tr> <tr> <td>9675144-3</td> <td>522 mm approx.</td> </tr> </tbody> </table>				Drawing #	Length	9675144-1	456 mm approx.	9675144-2	494 mm approx.	9675144-3	522 mm approx.
Drawing #	Length										
9675144-1	456 mm approx.										
9675144-2	494 mm approx.										
9675144-3	522 mm approx.										
<b>Process / Operations:</b> Die-cut											
<b>Parts list</b>											
	Drawing #	Description / Material	Qty								
	---	Sheep skin leather Thickness = 0.8 to 1.0 mm Tear strength = 3 daN min. Color: Alkaline/Cotton = 3-4 min. Acid/Cotton = 4-5 min. Alkaline/Wool = 3-4 min. Acid/Wool = 4-5 min. "Hexan" extractible material = 4% min. Chromic Oxide = 1.8% min. Chrome in water soluble material = 0.02% max. Ph = 3.5 min. Diff. = 0.7 max.  Brown color ( Pantone reference #4975)									
<b>Specific Production Test Requirements</b>											
Specifications:		QA procedures and test methods:									
<b>Notes:</b>											

<b>CG634 Product Specification</b>			
<b>Title: Head band support Assembly Small size</b>		Manufacturer part # : Superceded Dwg # : 9675145-1      Rev: 3 NSN : N/A	
<b>Description:</b> Head band support assembly  <div style="text-align: center;">  </div>			
<b>Process / Operations:</b> Assembly : Riveting, Sewing			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675146-1	Webbing assembly, small size	1
	9675149	Head band plastic support, small size	1
	9675175-1	Upright strap, small size	6
	9675148	Rectangular plastic washer, black	6
	---	Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.	7
	---	Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.	7
<b>Specific Production Test Requirements</b>			
Specifications:		QA procedures and test methods:	
Notes:			





<b>CG634 Product Specification</b>			
<b>Title: Head band support Assembly Medium size</b>		Manufacturer part # : Superceded Dwg # : 9675145-2      Rev: 3 NSN : N/A	
<b>Description:</b>  Head band support assembly  <div style="text-align: center;">  </div>			
<b>Process / Operations:</b> Assembly : Riveting, Sewing			
Parts list			
	Drawing #	Description / Material	Qty
	9675146-2	Webbing assembly, medium size	1
	9675150	Head band plastic support, medium size	1
	9675175-2	Upright strap, medium size	6
	9675148	Rectangular plastic washer, black	6
	---	Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.	7
	---	Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.	7
Specific Production Test Requirements			
<b>Specifications:</b>		<b>QA procedures and test methods:</b>	
<b>Notes:</b>			

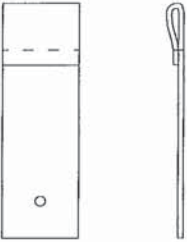
CG634 Product Specification																																			
Title: <b>Head band support Assembly Large size</b>		Manufacturer part # : Superceded																																	
		Dwg # : 9675145-3	Rev: 3																																
		NSN : N/A																																	
Description: Head band support assembly  <div style="text-align: center;">  </div>																																			
Process / Operations: Assembly : Riveting, Sewing																																			
<table border="1" style="width: 100%;"> <thead> <tr> <th colspan="4">Parts list</th> </tr> <tr> <th></th> <th>Drawing #</th> <th>Description / Material</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td></td> <td>9675146-3</td> <td>Webbing assembly, Large size</td> <td>1</td> </tr> <tr> <td></td> <td>9675151</td> <td>Head band plastic support, Large size</td> <td>1</td> </tr> <tr> <td></td> <td>9675175-3</td> <td>Upright strap, Large size</td> <td>6</td> </tr> <tr> <td></td> <td>9675148</td> <td>Rectangular plastic washer, black</td> <td>6</td> </tr> <tr> <td></td> <td>---</td> <td>Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.</td> <td>7</td> </tr> <tr> <td></td> <td>---</td> <td>Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.</td> <td>7</td> </tr> </tbody> </table>				Parts list					Drawing #	Description / Material	Qty		9675146-3	Webbing assembly, Large size	1		9675151	Head band plastic support, Large size	1		9675175-3	Upright strap, Large size	6		9675148	Rectangular plastic washer, black	6		---	Eyelet, Brass, Dull black finish, OD=4.65mm, Flange dia=7.37mm, Metal thickness=0.267mm, Length under flange=6.35mm. (Stimpson Co. inc. # GS6-8) or eq.	7		---	Washer, Brass, Dull black finish, OD=9.53mm ID=4.78mm (Stimpson Co. inc. # C63) or eq.	7
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CG634 Product Specification			
Title: <b>Head band plastic support Small size</b>		Manufacturer part # : Superceded	
		Dwg # : 9675149	Rev: 3
		NSN : N/A	
Description:  Polycarbonate plastic support Thickness = 1.0 mm  			
Process / Operations: Die-cut			
Parts list			
	Drawing #	Description / Material	Qty
	---	Clear polycarbonate, 1.0 mm thick "HIZOD GP" (Sheffield Plastics inc.) or eq.	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

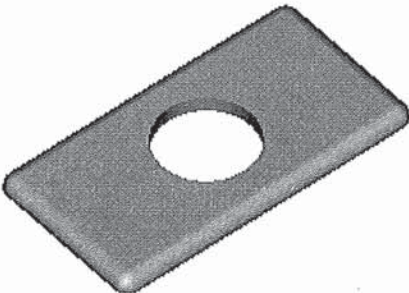


<b>CG634 Product Specification</b>			
<b>Title: Head band plastic support Medium size</b>		<b>Manufacturer part #</b> <div style="border: 1px solid black; display: flex; justify-content: space-between; padding: 2px;"> <span>Dwg # : 9675150</span> <span>Rev: 3</span> </div> NSN : N/A	
<b>Description:</b>  Polycarbonate plastic support Thickness = 1.0 mm  <div style="text-align: center;">  </div>			
<b>Process / Operations:</b> Die-cut			
Parts list			
	Drawing #	Description / Material	Qty
	9675150	Clear polycarbonate, 1.0 mm thick "HIZOD GP" (Sheffield Plastics inc.) or eq.	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
<b>Notes:</b>  <div style="height: 40px;"></div>			

<b>CG634 Product Specification</b>			
<b>Title: Head band plastic support</b> <b>Large size</b>		<b>Manufacturer part # : Superceded</b> <b>Dwg # : 9675151</b> <b>NSN : N/A</b>	
<b>Description:</b>  Polycarbonate plastic support Thickness = 1.0 mm  <div style="text-align: center;">  </div>			
<b>Process / Operations:</b> Die-cut			
<b>Parts list</b>			
	<b>Drawing #</b>	<b>Description / Material</b>	<b>Qty</b>
	9675151	Clear polycarbonate, 1.0 mm thick "HIZOD GP" (Sheffield Plastics inc.) or eq.	
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>		<b>QA procedures and test methods:</b>	
<b>Notes:</b>			

<b>CG634 Product Specification</b>			
<b>Title: Upright strap</b> <b>Small / Medium / large</b>		Manufacturer part # : Superceded Dwg # : 9675175-X      Rev: 3 NSN : N/A	
<b>Description:</b> Upright strap Cotton / polyester webbing, army green color 27.5 mm wide			
			
<u>Drawing#</u>		<u>Size</u>	
9675175-1		Small      50.0 mm	
9675175-2		Medium      60.0 mm	
9675175-3		Large      65.0 mm	
<b>Process / Operations:</b> Assembly : Sewing			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
	9675140-7	27.5 mm strap	1
	9675140-8	27.5 mm strap	1
	9675140-9	27.5 mm strap	1
	---	polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
<b>Specific Production Test Requirements</b>			
Specifications:		QA procedures and test methods:	
Notes:			



CG634 Product Specification			
Title: <b>Rectangular plastic washer</b>		Manufacturer part #: Superceded	
		Dwg #: 9675148	Rev: 3
		NSN: N/A	
Description: Rectangular plastic washer Black Thickness = 1.5 mm Finish=VDI 27			
			
Process / Operations: Injection molding			
Parts list			
	Drawing #	Description / Material	Qty
		Polyamid 6, Black "Durethan" B 30 S (Bayer) or eq.	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			

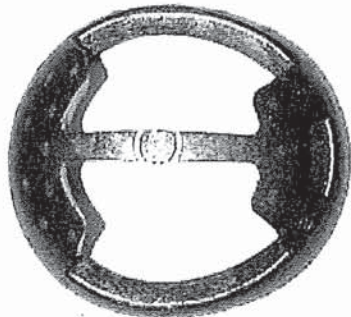
<b>CG634 Product Specification</b>			
<b>Title: Webbing assembly</b> <b>Small / Medium / large</b>		Manufacturer part # : Superceded Dwg # : 9675146-X      Rev: 3 NSN : N/A	
<b>Description:</b> Suspension system, webbing assembly Army green cotton / polyester webbing Black foam  <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 10px;"> <span><u>Drawing #</u></span> <span><u>Size</u></span> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">9675146-1</div> <div style="width: 30%;">Small</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">9675146-2</div> <div style="width: 30%;">Medium</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">9675146-3</div> <div style="width: 30%;">Large</div> </div>			
<b>Process / Operations:</b> Assembly : Sewing, sticking			
<b>Parts list</b>			
	<b>Drawing #</b>	<b>Description / Material</b>	<b>Qty</b>
	9675140-4	27.5 mm strap	1
	9675140-5	27.5 mm strap	1
	9675140-6	27.5 mm strap	1
	---	polyamid thread, 92 tex, OG-107 color (Coats # CSB92) or eq.	AR
	9675147	Foam pad, 10 mm thick, black	6
	9675139-7	18 mm strap	6
	---	Contact glue ADBOND 8392 or eq. ( Les Adhésifs Adchem Montréal inc.)	AR
<b>Specific Production Test Requirements</b>			
<b>Specifications:</b>		<b>QA procedures and test methods:</b>	
<b>Notes:</b>			

CG634 Product Specification			
Title: <b>Foam pad</b>		Manufacturer part #: Superceded	
		Dwg #: 9675147	Rev: 3
		NSN: N/A	
Description: Rectangular foam pad Black 30 x 70 x 10 mm			
Process / Operations: Die-cut			
Parts list			
	Drawing #	Description / Material	Qty
		Neoprene / EPDM, Closed cell, Black Density=8-12 PCF, Compression deflection at 25%=9-13 psi, Tensile streingth=100 psi, Elongation=150%, Max. water absorbtion=5% Compliance with MIL-R-6130C, Grade IIA Medium (Jacobs and Thompson, "Foamflex" #1260 or eq.)	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			





CG634 Product Specification									
Title: <b>Hook (Velcro)</b>		Manufacturer part : Superceded							
		Dwg # : 9675142-X	Rev: 3						
		NSN : N/A							
Description: Hook (velcro) Army green 25 mm wide  <table> <thead> <tr> <th>Drawing #</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>9675142-1</td> <td>88 mm approx.</td> </tr> <tr> <td>9675142-2</td> <td>30 mm approx.</td> </tr> </tbody> </table>				Drawing #	Length	9675142-1	88 mm approx.	9675142-2	30 mm approx.
Drawing #	Length								
9675142-1	88 mm approx.								
9675142-2	30 mm approx.								
Process / Operations: Die-cut									
Parts list									
	Drawing #	Description / Material	Qty						
	9675142	Polyamid, Hook ribbon, OG-107 color 25 mm wide (Velcro Canada # H80) or eq.							
Specific Production Test Requirements									
Specifications:		QA procedures and test methods:							
Notes:									

CG634 Product Specification									
Title: <b>Loop (Velcro)</b>		Manufacturer part #: Superceded							
		Dwg #: 9675143-X	Rev: 3						
		NSN: N/A							
Description: Loop (velcro) Army green 25 mm wide  <table> <thead> <tr> <th>Drawing #</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>9675143-1</td> <td>88 mm approx.</td> </tr> <tr> <td>9675143-2</td> <td>40 mm approx.</td> </tr> </tbody> </table>				Drawing #	Length	9675143-1	88 mm approx.	9675143-2	40 mm approx.
Drawing #	Length								
9675143-1	88 mm approx.								
9675143-2	40 mm approx.								
Process / Operations: Die-cut									
Parts list									
	Drawing #	Description / Material	Qty						
	9675143	Polyamid, Loop ribbon, OG-107 color 25 mm wide (Velcro Canada # L1000) or eq.							
Specific Production Test Requirements									
Specifications:		QA procedures and test methods:							
Notes:									

CG634 Product Specification			
Title: <b>Trauma liner</b> <b>Small size</b>		Manufacturer part # : Superceded	
		Dwg # : 9675133	Rev: 3
		NSN : 8470-21-912-7618	
Description:			
<p>Ventilated trauma liner for 6 branches star crown.</p> <div style="text-align: center;">  </div>			
Process / Operations:			
Expansion molding			
Parts list			
	Drawing #	Description / Material	Qty
		Expanded polystyrene, Black density = 60 g/l. (56.1 to 64.1 g/l,) Weight = 21.3 to 34.4 g.	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			
Title, Size, NSN, PT, CONTR, MFR and MDN CANADA DND are marked on the outside surface.			



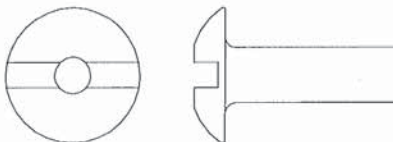
CG634 Product Specification			
Title: <b>Trauma liner</b> <b>Large size</b>		Manufacturer part # : Superceded	
		Dwg # : 9675135	Rev: 3
		NSN : 8470-21-912-7620	
Description:			
Ventilated trauma liner for 6 branches star crown.			
			
Process / Operations: Expansion molding			
Parts list			
	Drawing #	Description / Material	Qty
		Expanded polystyrene, Black density = 50 g/l. (46.7 to 53.4 g/l.) Weight = 28.3 to 32.5 g	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			
Title, Size, NSN, PT, CONTR, MFR and MDN CANADA DND are marked on the outside surface.			

CG634 Product Specification			
Title: <b>Trauma liner</b> <b>Medium size</b>		Manufacturer part #: Superceded	
		Dwg #: 9675134	Rev: 3
		NSN : 8470-21-912-7619	
Description:			
<p>Ventilated trauma liner for 6 branches star crown.</p> 			
Process / Operations:			
Expansion molding			
Parts list			
	Drawing #	Description / Material	Qty
		Expanded polystyrene, Black density = 50 g/l. (46.7 to 53.4 g/l.) Weight = 20.0 to 23.0 g	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			
Title, Size, NSN, PT, CONTR, MFR and MDN CANADA DND are marked on the outside surface.			

<b>CG634 Product Specification</b>			
<b>Title: Identification label</b> <b>Adhesive</b>		Manufacturer part # : Superceded <hr/> Dwg # : 9675177      Rev: 3 <hr/> NSN : N/A	
<b>Description:</b>  <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;">           Identification label              Length : 65 mm approx.            Width: 32 mm approx.         </div> <div style="width: 55%; border: 1px solid black; padding: 10px; text-align: center;">           Title            Titre  <b>Size / Grandeur</b>            NSN XXXX-XX-XXX-XXXX            PT / PC XXXX-XXXX MFR GSI            CONTR XXXXXXXXXXXX            LOT XXXXXXXX DATE XX/XX/XX            MDN CANADA DND         </div> </div>			
<b>Process / Operations:</b>			
<b>Parts list</b>			
	Drawing #	Description / Material	Qty
		Metallized, matte chrome polyester, thk=2 mil Acrylique adhesive (Industrial Marking Systems inc. PermaPrint 2S-1 or eq.) (Printed with Industrial Marking Systems inc. PP2 type ribbon or eq.)	
<b>Specific Production Test Requirements</b>			
Specifications:		QA procedures and test methods:	
<b>Notes:</b>			



### CG634 Product Specification

Title: <b>Barrel Nut</b>		Manufacturer part #: Superceded	
		Dwg #: 9675180	Rev: 3
		NSN: N/A	
Description:  Barrel Nut, M3 thread, thru the part Slot drive			
			
Process / Operations:			
Parts list			
	Drawing #	Description / Material	Qty
		Brass 260 Black oxide finish	
Specific Production Test Requirements			
Specifications:		QA procedures and test methods:	
Notes:			