

Appendix-1

10.0 INPUT MATERIAL SPECIFICATION OF CCC, PRD, IT:

10.1 LIST OF DRAWINGS

Sl.	Assembly/ Component	Nomenclature	OFN Drawing No.	TOT Drawing No. (for Ref. only)
1	IT	Igniter Tube, machined for 155 mm BMCS M91 & M92	BMCS-M91-M92-IT-01	05730-001400A-203
2	IT	Igniter Tube, pressed for 155 mm BMCS M91 & M92	BMCS-M91-M92-IT-02	05730-001410A-203
3	CCC	Combustible Cartridge Case (CCC) pressed for 155 mm BMCS M91 (Empty)	BMCS-M91-CCC-01	05730-001502A-203
4	CCC	Combustible Cartridge Case (CCC) machined and coated for 155 mm BMCS M91 (Empty)	BMCS-M91-CCC-02	05730-001500A-203 05730-001501A-203
5	PRD	Propellant Retaining device (PRD) (Punched) for 155 mm BMCS M91	BMCS-M91-PRD-01	05730-000100A-203
6	PRD	Propellant Retaining device (PRD) (Pressed) for 155 mm BMCS M91	BMCS-M91-PRD-02	05730-000101A-203

10.2 CHEMICAL SPECIFICATIONS:

Specification No. OFN/SPEC/BMCS/M91/CCC-PRD-IT/00						
Chemical & Physical Properties	Case	PRD	IT	Test Methods As per	TOT spec. Doc. No. for Ref only	DCL
NC Gun Cotton (in %)	75.0±4.0	75.0±4.0	75.0±4.0	OFN Specification No. OFN/QC(Lab)/CCC/008 dated 02.05.2016 Ref. MIL-L-48176B(AR) and JSG-0116:1996	06-7600-2020-033	Critical
Ethyl Centralite (in%)	1.8 - 3.0	1.8 - 3.0	1.8 - 3.0		06-7600-2010-001	Critical
Volatile Matter (in %)	≤ 4.0	≤ 4.0	≤ 4.0		---	Major
Colour Hue	142 ± 10	142 ± 10	142 ± 10		---	Minor
Methyl Violet at 134.5°C (in Minutes) A. Complete discolouration to pink	Not less than 40 minutes	Not less than 40 minutes	Not less than 40 minutes			Critical
B. Emission of brown fumes	Not less than 60 minutes	Not less than 60 minutes	Not less than 60 minutes			Critical
Tensile Strength at max load, MPa	Min 4.2	---	---		---	
Elongation at max load, mm	Min 6.0					
Colour	Green	Green	Green		---	
Dimensions	As per Section: 10.1				---	
Raw material Specification Reference	OFN/SPEC/RAW MAT/M91/CCC/00 OFN/SPEC/RAW MAT/M91/PRD/00					

OFN/SPEC/RAW MAT/M91/IT/00

10.2.1 CHEMICAL SPECIFICATIONS OF RAW MATERIALS FOR CCC:

TABLE:1						
Specification No. OFN/SPEC/RAW MAT/M91/CCC/00						
Sl. No.	Raw Material for CCC	Test clause	Test Spec.	DCL	OFN Test Method	TOT Test Method (for Ref.)
1	NC 13.4 (Gun cotton)	N ₂ content %	13.35 Min	Major	JSS-1376-10:2011	SLM 401
		Abel heat Test at 65°C (Min.)	35 Min.	critical		
		B & J Test at 132°C N ₂ mgN/g	1.6 Max	Major		
		Matter Soluble in Diethyl Ether / Ethyle Alcohol %	10 Max	Minor		
		Matter insoluble in Acetone %	0.5 Max	Minor		
		Fineness in cm ³	105 Max	Minor		
		Hoeppler Viscosity (mPa.s)	30 - 50	Major		
2	Wood Pulp	Methylene Chloride content %	0.25 Max	Minor	SLM-1158	SLM-1158
		Ash content %	0.5 Max	Minor	MIL 216-A	MIL-C-50269A
		water content %	15 Max	Minor		
		Chloride Content as NaCl %	0.05 Max	Minor		
		Sulphate Content as Na ₂ SO ₄ %	0.25 Max	Minor		
		P ^H of water Extract	5.0 - 8.0	Minor		
3	Anti-foaming Agent	Relative Density at 25 °C	1.0 approx	Minor	SLM-1168	SLM-1168 MIL-T-48149A
		Active Antifoaming Content %	10.0 approx	Minor		
		pH of 10% Aqueous solution	5 - 7	Minor		
4	Ethyl Centralite or Carbamate	Setting point (° C)	71.7-72.5	Critical	SLM 1001	SLM-600 MIL-E-255A
		Ash Content %	0.1 Max	Critical		
		Volatile matter at 105°C in %	0.1 Max	Critical		
		Hydrolysable Chloride %	0.01 Max	Minor		
		Acidity as HCl	0.004 Max	Minor		
		Amines %	0.1 Max	Minor		
5	Resin Binder	Appearance	No foreign matter	Major	ASTM D 2074-92	SLM-1167
		Solid Content %	40 Min	Minor	SLM-1167	
		Density (g/cm ³)	0.92 approx.	Minor		
		pH	4.3 approx.	Minor		
6	Resin Catalyst	Appearance	Free from grit	Major	SLM-1428	SLM-1428
		Viscosity at 25°C mPa.s	1- 5 approx.	Minor		
		Specific Gravity at 20°C	1.24 approx.	Minor		
		pH	< 1.0	Minor		
		Aluminium Chloride in%	40.0 approx.	Minor		
7	Acetone	Relative Density at 20°/20°C	0.790-0.792	Major	SLM-1002	SLM-1002
		Initial boiling point	55.7°C min.	Major		
		Dry Point	56.7°C max	Major		
		Residue on Evaporation mg/Kg	47 max	Major		
		Permanganate Test (min)	120 min	Major		
		Alkalinity to bromothymol blue	Neutral	Major		

TABLE:1						
Specification No. OFN/SPEC/RAW MAT/M91/CCC/00						
Sl. No.	Raw Material for CCC	Test clause	Test Spec.	DCL	OFN Test Method	TOT Test Method (for Ref.)
		Acidity as CH ₃ COOH mg/Kg	20 max	Major		
		Water Content %	0.5 max	Minor		
		Alcoholic impurities	Not detectable	Minor		
8	Sodium Carbonate	Sodium Carbonate %	97.0 Min	Major	FED spec no O-S-571E	---
		Matter insoluble in water %	0.02 Max	Major		
		Loss on heating at 150-155 °C	1.0 Max	Major		
		Chloride Content as NaCl %	0.7 Max	Major		
9	Lacquer	Solids %	18.0-19.0	Major	SLM-408	SLM-408
		Ford cup No.4 Viscosity at 25C	24.0-34.0	Minor		
		Scroll Test	No scroll formation	---	03986-022146-604	03986-022146-604
10	Screenlac Black 23-75	Appearance	Shall be in the form of black coloured, viscous liq, free from visible impurities.	---	---	---
		NCA 1825 NC black chip %	13.5 ± 0.7	---	---	---
		Ethyl Acetate %	5.0 ± 0.3	---	---	---
		Butyl Cellusolve %	51.7 ± 2.6	---	---	---
		Epoxidisd Soyabean oil %	10.0 ± 0.5	---	---	---
		Nitro Cellulose %	19.8 ± 1.0	---	---	---
11	Aluminium Sulphate Grade-2	Aluminium Content as Al ₂ O ₃ %	7.0 - 8.5	Major	IS 260:2001 (specified limit-17% min.)	SABS-1241-1978
		Iron Content as Fe %	0.7 Max	Minor	Parmanganatory method	
		Water Insoluble matter %	0.10 Max	Major	SLM 1066	

Sl. No.	Raw Material for CCC	Test clause	Test Spec.	DCL	OFN Test Method	TOT Test Method (for Ref.)
12	Pigment Colorants	Pigment Colorants as per BS-381C	Yellow (74) Green (7)	---	SLM 1429	SLM 1429
		Viscosity at 25°C (Poise)	15 - 25 4 - 10	Minor		
		Specific Gravity at 25°C (g/cm ³)	1.704-1.884 1.322-1.462	Minor		
		Fineness of Grind (µm)	15 15	Minor		
		Colour strength/ Difference (Delta E)	0.6 0.6	Minor		

10.2.2 CHEMICAL SPECIFICATIONS OF RAW MATERIALS FOR PRD:

TABLE:2						
Specification No. OFN/SPEC/RAW MAT/M91/PRD/00						
Sl. No.	Raw Material for PRD	Test clause	Test Spec.	DCL	OFN Test Method	TOT Test Method (for Ref.)

1	Nitro Cellulose (Gun Cotton)	As per Table 1 Sl. No. 1
2	Wood Pulp (Kraft Sheet)	As per Table 1 Sl. No. 2
3	Anti-foaming Agent	As per Table 1 Sl. No. 3
4	Ethyl Centralite or Carbamite	As per Table 1 Sl. No. 4
5	Resin Binder	As per Table 1 Sl. No. 5
6	Resin Catalyst	As per Table 1 Sl. No. 6
7	Acetone	As per Table 1 Sl. No. 7
8	Sodium Carbonate	As per Table 1 Sl. No. 8
9	Lacquer	As per Table 1 Sl. No. 9
10	Aluminium Sulphate Grade-2	As per Table 1 Sl. No. 11
11	Pigment Colorants	As per Table 1 Sl. No. 12

10.2.3

CHEMICAL SPECIFICATIONS OF RAW MATERIALS FOR IT:

TABLE-3						
Specification No. OFN/SPEC/RAW MAT/M91/IT/00						
Sl. No.	Raw Material for PRD	Test clause	Test Spec.	DCL	OFN Test Method	TOT Test Method (for Ref.)
1	Nitro Cellulose (Gun Cotton)	As per Table 1 Sl. No. 1				
2	Wood Pulp (Kraft Sheet)	As per Table 1 Sl. No. 2				
3	Anti-foaming Agent	As per Table 1 Sl. No. 3				
4	Ethyl Centralite or Carbamite	As per Table 1 Sl. No. 4				
5	Resin Binder	As per Table 1 Sl. No. 5				
6	Resin Catalyst	As per Table 1 Sl. No. 6				
7	Acetone	As per Table 1 Sl. No. 7				
8	Sodium Carbonate	As per Table 1 Sl. No. 8				
9	Aluminium Sulphate Grade-2	As per Table 1 Sl. No. 11				
10	Pigment Colorants	As per Table 1 Sl. No. 12				

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16.0 INPUT MATERIAL SPECIFICATION OF DISC SPACER FOR BMCS M91 & M92:

16.1 LIST OF DRAWINGS

Sl.	Assembly/ Component	Nomenclature	OFN Drawing No.	TOT Drg. No.
1	Ring/Disc Spacer	Ring/ Disc Spacer	BMCS-M91-M92-DS-01	03812-100000-203

16.2 PHYSICAL SPECIFICATIONS OF DISC SPACER:

Specification No. OFN/SPEC/BMCS/M91/M92/DS/00

Sl. No.	PROPERTIES	UNIT	SPEC. LIMITS	DCL	Reference
1	Outer Dia. of the Disc	mm	155±0.2	Major	TOT Drg No. 03812-100000- 203
2	Thickness of the Disc	mm	1.8±0.2	Major	
3	Inner Dia. of the Cylindrical Portion	mm	135±0.2	Major	
4	Thickness of the Cylindrical Portion	mm	4.0±1.0	Major	
5	Height of the Cylindrical Portion from the Disc	mm	25±0.2	Major	
6	Hole Dia. of the Disc	mm	50±0.2	Major	
7	Drawing No.	---	as per Section 18.1	---	

16.3 CHEMICAL SPECIFICATIONS OF DISC SPACER:

Specification No. OFN/SPEC/BMCS/M91/M92/DS/00

Sl. No.	Properties	Specification Limit	Test Method No.
1	Moisture Content %	9.0 max	IS: 1060 (Pt-1) -1966
2	pH of water extract	5.5-7.5	
3	Ash on incineration %	10.0 max	
4	Water soluble Chlorides (as NaCl) %	0.05 max	IS: 1060 (Pt-2) -1960
5	Water soluble Sulphates (as Na ₂ SO ₄) in %	0.25 max	
6	Fatty acids (as oleic acid) %	0.25 max	

Appendix-9

18.0 INPUT MATERIAL SPECIFICATION OF FINAL PACKING TUBE CYLINDER 8703 FOR BMCS M91 & M92:

18.1 LIST OF DRAWINGS

Sl.	Assembly/ Component	Nomenclature	OFN Drawing No.	TOT Drg. No.
1	Final Packing Tube/ Cylinder 8703	Cylinder 8703 (Sand Stone)	BMCS-M91-M92-FPT-01	06-8140-03765-00001-202
2		Lid assembly of Cylinder 8703	BMCS-M91-M92-FPT-02	06-8140-03765-01001-202
3		Spacer- packing, Top of Cylinder 8703	BMCS-M91-M92-FPT-03	05306X101004-203
4		Body Assembly of Cylinder 8703	BMCS-M91-M92-FPT-04	06-8140-03765-02001-202
5		Metal end and outer Tube (Body) Assembly of Final Packing Tube Cylinder 8703	BMCS-M91-M92-FPT-05	06-8140-03765-02002-202
6		Metal end and outer Tube (LID) Assembly of Final Packing Tube Cylinder 8703	BMCS-M91-M92-FPT-06	06-8140-03765-01002-202
7		155 mm BMCS M92 filled, final packed in cylinder 8703	BMCS-M92-FPT-07	05730-102000-202
8		Sealed 155 mm BMCS M92 in cylinder 8703	BMCS-M92-FPT-09	05730-102001-202
9		155 mm BMCS M91 filled, final packed in cylinder 8703	BMCS-M91-FPT-08	05730-101000-202
10		Sealed 155 mm BMCS M91 in cylinder 8703	BMCS-M91-FPT-10	05730-101001-202
11		Inner Tube (Body) of Cylinder 8703	BMCS-M91-M92-FPT-11	06-8140-03765-02004-203
12		Outer Tube (Body) of Cylinder 8703	BMCS-M91-M92-FPT-12	06-8140-03765-02003-203
13		Metal End of Cylinder 8703	BMCS-M91-M92-FPT-13	06-8140X3395-01006-203
14		Liner corrugated Board of Cylinder 8703	BMCS-M91-M92-FPT-14	06-1320X2629-98041
15		Protecting Disc of Cylinder 8703	BMCS-M91-M92-FPT-15	06-8140X03765-01004-203
16		Outer tube (Lid)	BMCS-M91-M92-FPT-16	06-8140-03765-01003-203
17		Package Marking of 155mm BMCS M92 packed in Cylinder 8703	BMCS-M92-FPT-17	05730-992001-223
18		Package Marking of 155mm BMCS M91 packed in Cylinder 8703	BMCS-M91-FPT-18	05730-991001-223

18.2 SPECIFICATIONS OF FINAL PACKING TUBE CYLINDER:

Specification No. OFN/SPEC/BMCS/M91/M92/FPT/00

Sl.	CHARACTERISTICS	UNIT	SPECIFICATION	REMARKS
1	DESCRIPTION			
The container shall be constructed of two multiple spirally wound tubes, with one glued inside the other, fitted with metal ends and telescopic-type removable cover.				
2	FINAL CYLINDER			
2.1	PHYSICAL PROPERTIES			
2.1.1	Overall Height	mm	1002.00	Refer Drg.No. BMCS-M91-M92- FPT-04
2.1.2	Thickness of tube	mm	6±0.3	
2.1.3	Inner dia. at the metal end	mm	181±0.2	
2.1.4	Distance Between two metal ends	mm	938±3.00	
3	OUTER TUBE			
3.1	PHYSICAL PROPERTIES			
3.1.1	Height	mm	752 ± 1.00	Refer Drg. No BMCS-M91-M92- FPT-12
3.1.2	Thickness	mm	6 ± 0.30	
3.1.3	Inner Dia	mm	181 ± 0.20	
3.2	MATERIAL			
3.2.1	Asphalt Impregnated kraft	---	MIL-P-20293A	Colour-Light Stone to BS 381 TINT 361
	Poly Kraft 150 micron	---	IS 1060-1966 (Part-1) RA 2014	
3.2.2	Aluminium Strip	---	BS 1470:1972	---
3.2.3	Adhesive			
3.2.3.1	For Asphalt Impregnated Kraft	---	GENKEM AKV 6139	---
3.2.3.2	For Poly Kraft	---	GAR 169	---
4	INNER TUBE			
4.1	PHYSICAL PROPERTIES Refer Drawing No BMCS-M91-M92-FPT-11			
4.1.1	Height	mm	926 ± 1.00	
4.1.2	Thickness	mm	3 ± 0.25	
4.1.3	Outer Diameter	mm	181 ± 0.2	
4.1.4	No of Holes	No.	2	
4.1.5	Dia of Holes 180° apart	mm	8.00	
4.1.6	Distance of Centre of holes from top	mm	190±1.00	
4.2	MATERIAL			
4.2.1	Asphalt Impregnated kraft	---	MIL-P-20293A	Colour- Light Stone to BS 381 TINT 361
4.2.2	Adhesive Asphalt Impregnated Kraft	---	GENKEM-AKV 6139	---
5	LID (OUTER TUBE)			
5.1	PHYSICAL PROPERTIES			
5.1.1	Height	mm	250 ± 1.00	Refer Drawing No BMCS-M91- M92-FPT-16
5.1.2	Thickness	mm	6 ± 0.3	
5.1.3	Inner Diameter	mm	181 ± 0.2	
5.2	MATERIAL			
5.2.1	Asphalt Impregnated kraft	---	MIL-P-20293A	Colour- Light Stone to BS 381 TINT 361
	Poly Kraft 150 micron	---	IS 1060-1966 (Part 1) RA 2014	
5.2.2	Aluminium Strip	---	BS 1470:1972	---
5.2.3	Adhesive			

Specification No.OFN/SPEC/BMCS/M91/M92/FPT/00

Sl.	CHARACTERISTICS	UNIT	SPECIFICATION	REMARKS
5.2.3.1	For Asphalt Impregnated Kraft	---	GENKEM AKV 6139	---
5.2.3.2	For Ploy Kraft	---	GAR 169	---
6	LID ASSEMBLY			
6.1	PHYSICAL PROPERTIES			
6.1.1	Height	mm	250±1.00	Refer Drawing No BMCS-M91-M92- FPT-02
6.1.2	Thickness	mm	6±0.3	
6.1.3	Thickness of Protecting Disc	mm	20.00	
6.1.4	Height Upto Protecting Disc from bottom	mm	218±1.00	
6.1.5	Height from top to Protecting Disc	mm	12.00	
6.2	MATERIAL			
6.2.1	Asphalt Impregnated kraft	---	MIL-P-20293A	Colour- Light Stone to BS 381 TINT 361
	Poly Kraft 150 micron	---	IS 1060-1966 (Part 1) RA 2014	
6.2.3	Alluminium Strip	---	BS 1470:1972	---
6.2.4	Adhesive			
6.2.4.1	For Asphalt Impregnated Kraft	---	GENKEM AKV 6139	---
6.2.4.2	For Ploy Kraft	---	GAR 169	---
7	METAL END			
7.1	PHYSICAL PROPERTIES			
7.1.1	Bottom Diameter	mm	205 ± 0.5	Refer Drawing No BMCS-M91-M92- FPT-13
7.1.2	Top Diameter	mm	180.80 ± 0.5	
7.1.3	Thickness between bottom and top dia	mm	12 ± 0.5	
7.1.4	Distance from Bottom dia to Lower Inner circle	mm	42.50 ± 0.5	
7.1.5	Distance from Top dia to Upper Inner circle	mm	19 ± 0.5	
7.1.6	Thickness between Top and bottom inner circles	mm	5 ± 0.5	
7.1.7	Thickness of Decoration	mm	0.64 ± 0.16	
7.2	MATERIAL			
7.2.1	TIN plate	---	ISCOR NORM S.P.E.150	---
	Salt Spray Test	---	ASTM-B 117:1994	---
7.2.2	TIN coating type E1	---	Thickness-0.47 mm (Nominal)	---
7.2.3	External Decoration	---	Light Stone	(MAT finish) to BS 381C:TINT 361 with a specular gloss at 60° of 10% max.of SABS method 134
7.2.4	DECORATION	---		
7.2.4.1	INTERNAL	---	One Coating (Roller)	Size MB 44:one coating
	LACQUER AND VARNISH	---	Two coating	Lacquer MBT: Two coatings
7.2.4.2	EXTERNAL	---	One Coating (Roller)	Size MB 44: one coating
	LIGHT STONE	---	Two Coating	Litho Printed
	Varnish MB 32	---	One Coating	Lacquer MBT: Two coatings
	Varnish MB 32	---	One Coating	With mating Agent
8	PROTECTING DISC			
8.1	PHYSICAL PROPERTIES			
8.1.1	Diameter	mm	180.40±0.3	Refer Drawing No BMCS-M91-M92-

Specification No.OFN/SPEC/BMCS/M91/M92/FPT/00

SI.	CHARACTERISTICS	UNIT	SPECIFICATION	REMARKS
8.1.3	Diameter of Inner circle	mm	6±3	FPT-15
8.1.4	Thickness	mm	20±1	
8.2	MATERIAL			
8.2.1	BOARD	---	Softwood IS Spec.- IS:6198-1992	Remove all Burns and Sharp Edges. A Maximum of 1mm x 30 mm Flat Surface allowed on circumference of protecting disc.
9	FOAM SPACER, PACKING TOP			
9.1	PHYSICAL PROPERTIES			
9.1.1	Outer Diameter	mm	165±2	Refer Drawing No BMCS-M91-M92-FPT-03
9.1.2	Thickness	mm	38±2	
9.1.3	No of Holes	Nos.	3	
9.1.4	Dia of Holes	mm	20.00	
9.1.5	Angle Between the centre of two holes with centre of spacer	Deg	120°	
9.2	MATERIAL			
9.2.1	FOAM	---	Expanded closed cell, Cross linked Polyethylene	---
	Colour	---	Charcoal Black	---
	Density	kg/m ³	33	ASTM D 3575 suffix W
	Type	---	SPX33	---

18.3 PHYSICAL TESTS ON FINAL PACKING CYLINDER 8703

SI.	Description	Specification	Reference
1	Crimping Test	---	As per TOT document No. 2031005 Revision 2
2	Torque Test	11.3 Nm	
3	Drop Test	1 mtr	
4	Water proofness Test	---	
5	Peel Strength	---	
6	Salt Spray Test	ASTM-B 117:1994	