



SMITHERS
P I R A



Test Report

Distribution Testing

UN Package Performance Tests on aluminium Large Packaging to contain 1 x Lithium ion battery

Report reference: VA0492



Private and confidential

This report is issued in accordance with Smithers Pira's standard terms and conditions which may be viewed via the following link:

<https://www.smithersrapra.com/SmithersRapra/media/Terms-and-Conditions/Smithers-Rapra-and-Smithers-Pira-Ltd-Terms-Conditions.pdf>

Distribution Testing

Ref: VA0492
Page 1 of 4

United Nations Dangerous Goods Large Packaging (LP) Performance Test

Client: Kite Packaging Ltd
186 Torrington Avenue
Tile Hill
Coventry
CV4 9AJ

Purpose of test: Issue of new certificate.

Certificate Application No: 9189

Summary

- Design type tested: Aluminium alloy large packaging comprising box fitted with internal foam furnishings to contain 1 x Lithium ion battery cradles within mild steel framework. Box is fitted to wooden pallet base for transport.
- Construction: Two off swaged aluminium panels, 1.5 mm thickness, spot welded to form box container and fitted with 1.5 mm base with reinforced seam.
- Closure: Full aperture aluminium alloy hinged lid secured with 3 off equidistantly spaced toggle fasteners at front and 1 off toggle fastener at ends. Fasteners sealed with wire ties.
- Inner fitments: Fabricated foam sections comprising base foam, intermediate foam, bespoke cut out foam and top foam.

A specimen of the large packaging detailed at Appendix A was tested in accordance with the relevant provisions of Part 6.6.5 of Chapter 6.6 of the United Nations Model Regulations, 20th edition. The methods of preparation and test are detailed in the UK Operational Instructions for Test Stations, 6th revised edition, issued under arrangements with the Department for Transport.

The results were as follows.

Test	Intensity	Result
Bottom lift to paragraph 6.6.5.3.1	Required load 299.06 kg	No deformation or loss of contents
Top lift to paragraph 6.6.5.3.2	Required load 478.50 kg	No deformation or loss of contents
Stack to paragraph 6.6.5.3.3	3 high at gross mass 239.25 kg	No deformation or loss of contents
Drop to paragraph 6.6.5.3.4	1.8 m	No damage liable to affect safety and no loss of contents

The specimens passed the tests.

Ref: VA0492

Page 2 of 4

1. Description of design type tested

Aluminium large packaging UN code 50B for 1 x Lithium ion battery. The large packaging is described in the specifications, specification checks, photographs and drawings which are included as appendices to this report.

Test sample details

Number of samples submitted:	2
Date of receipt:	21 st August 2018
Tare weight:	88.75 kg (inclusive of foam, cradle and pallet)
Net mass	150.50 kg
Maximum gross mass:	239.25 kg

2. Tests performed and preparation

Tests were conducted in accordance with Chapter 6.6 of the 20th revised edition of the UN Recommendations on the Transport of Dangerous Goods.

The test station mocked up a mass comprising of steel weights secured to the mild steel framework in order to replicate the mass of the Lithium ion battery to achieve the maximum gross mass required.

3. Bottom lift test and results

The LP was loaded to 1.25 times the maximum gross mass by the addition of a superimposed load, then lifted and lowered twice by a fork lift truck from each possible direction of entry.

The fork penetration was 75% of the possible depth and the fork spacing was spaced at 75% of the dimension of the entry face.

Required test loading: 299.06 kg

Test loading: 328.55 kg

Result: No permanent deformation which renders the IBC unsafe for transport and no loss of contents.

Test date: 22nd August 2018

Ref: VA0492
Page 4 of 4

7. Conclusion

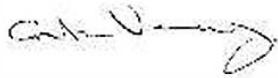
The LPs were prepared as for transport and tested to the relevant provisions of Chapter 6.6 of The UN Recommendations on the Transport of Dangerous Goods, 20th edition.

The design type specified in Appendix A was tested to contain 1 x Lithium ion battery for Packing Group I not exceeding a maximum gross mass of 239.25 kg.

The LP design type was considered to have met the test requirements.

The use of assembly methods, components, materials or dimensions other than those specified herein shall invalidate any approval based on these tests.

Prepared by

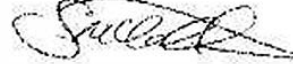
Handwritten signature of G Verney in black ink.

G Verney

Senior Packaging Technologist

Date: 6th September 2018

Approved by

Handwritten signature of S McCallion in black ink.

S McCallion

Project Manager – UN Testing



0112

PACKAGING SPECIFICATION

Boxes, Metal

Ref: VA0492
Page 1 of 7 rev.1
Appendix A

PACKAGE TYPE:	Box, Aluminium						UN TYPE CODE	50B	
MANUFACTURER	Zarges GmbH								
PRODUCTION ADDRESS	Zarges GmbH, Zargesstrasse 7, Zargesstrasse 7 D-8232 Weilheim Germany						POSTCODE		
CONSTRUCTION	SPECIFICATION OR DRAWING No.*			40876GGV					
	MANUFACTURING STANDARD			ISO 9001:2000					
	METHOD OF FABRICATION			Swaging, spotwelding, rivetting					
	SEAM OR JOINT FORMATION			Swaging and spotwelding					
	REINFORCEMENTS			Swaging and extruded profiles. Euro wooden pallet base, mass 22 kg					
PACKAGE DIMENSIONS	EXTERNAL DIMENSIONS (mm)			INTERNAL DIMENSIONS (mm)			WEIGHT (kg)		
	Length	Breadth	Height	Length	Breadth	Height	Empty box	Box & all contents	
	1688	786	697	1650	750	670	30	239.25	
MATERIALS		TYPE	NOMINAL THICKNESS (mm)	TOLERANCE		MATERIAL STANDARD (ISO OR OTHER Ref.)			
				Plus	Minus				
	TOP	al. Alloy	1.5	0.1	0.1				
	BASE	al. Alloy	1.5	0.1	0.1				
SIDES	al. Alloy	1.5	0.1	0.1					
CLOSURES, FASTENINGS & HINGES	TOP			BOTTOM					
	TYPE, QUANTITY & MATERIAL		POSITION & SPACING		TYPE, QUANTITY & MATERIAL		POSITION & SPACING		
	5 Alloy / Steel Catches		3 on the front 1 left and right						
	REINFORCEMENT								
INTERNAL FITTINGS, MOULDINGS Etc.	MANUFACTURER'S NAME & ADDRESS		Palziv UK Ltd, Corngreaves Trading Estate, Portersfield Road, Cradley Heath, West Midlands, B64 7BN						
	TYPE or STYLE		Fabricated foam fittings to suit product profile						
	SPECIFICATION or DRAWING No.*		10255		MATERIAL & GRADE		Palziv PA30FR		
	EXTERNAL DIMENSIONS (mm)			INTERNAL DIMENSIONS (mm)			WEIGHT (kg)		28.300
	Length	Breadth	Height	Length	Breadth	Height			
	1643	744	670	NA	NA	NA			
CUSHIONING or ABSORBENT MATERIAL	MATERIAL TYPE		NA						
	NOMINAL VOLUME (Litres)		NA		WEIGHT (kg)		NA		
LINER	DIMENSIONS	Length	Breadth	Height	MATERIAL	PE Film			
CONTENTS *	Lithium Ion Battery - 115 KG. Box strapped to pallet base with 2 x 12 mm wide PP across width								

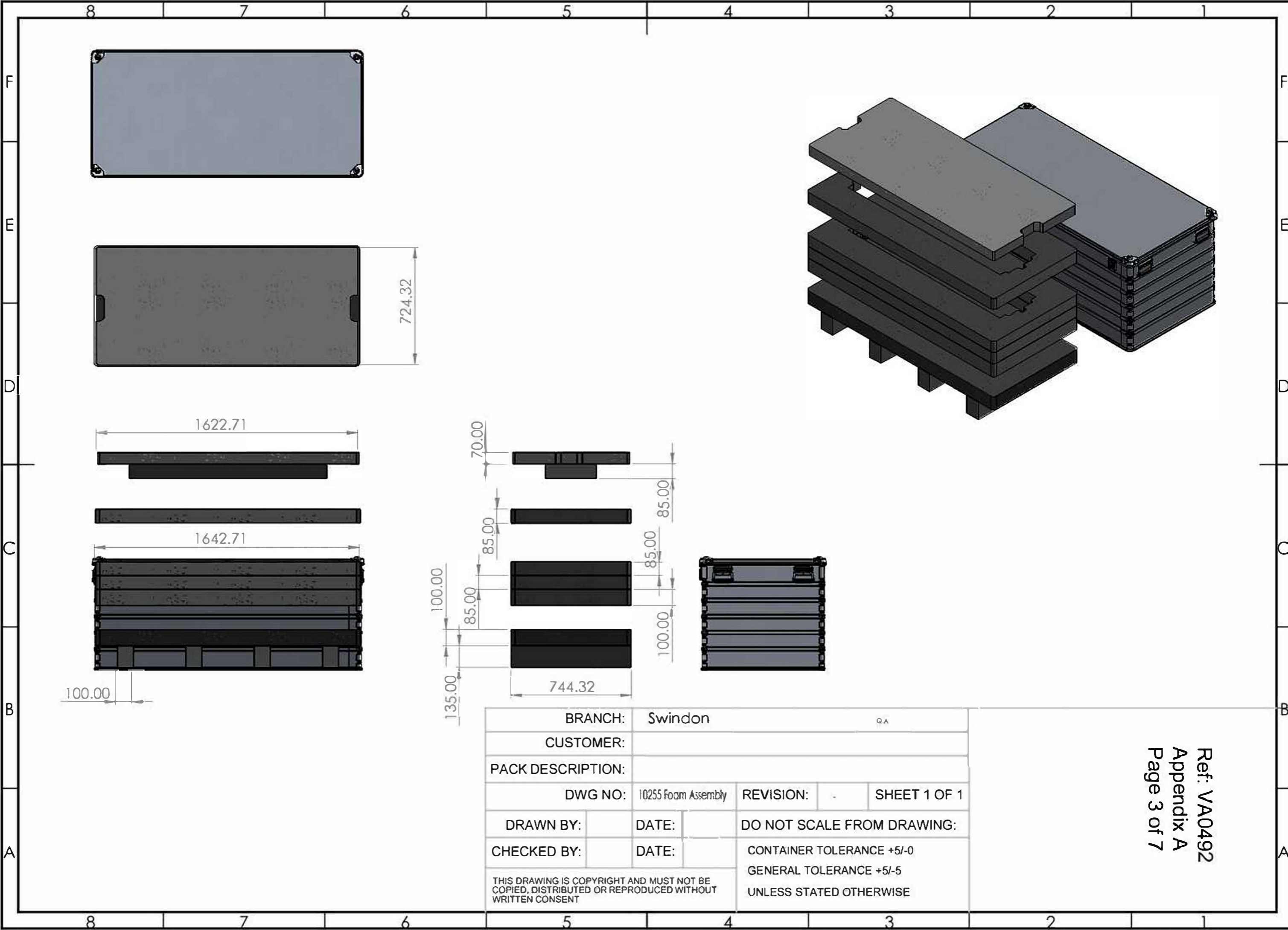
* Note: The data on this form should be supported by fully dimensioned general assembly drawings of the box, the fittings and when appropriate, the contents, in a format not larger than A3

PACKAGING SPECIFICATION

Bags, Plastics Film

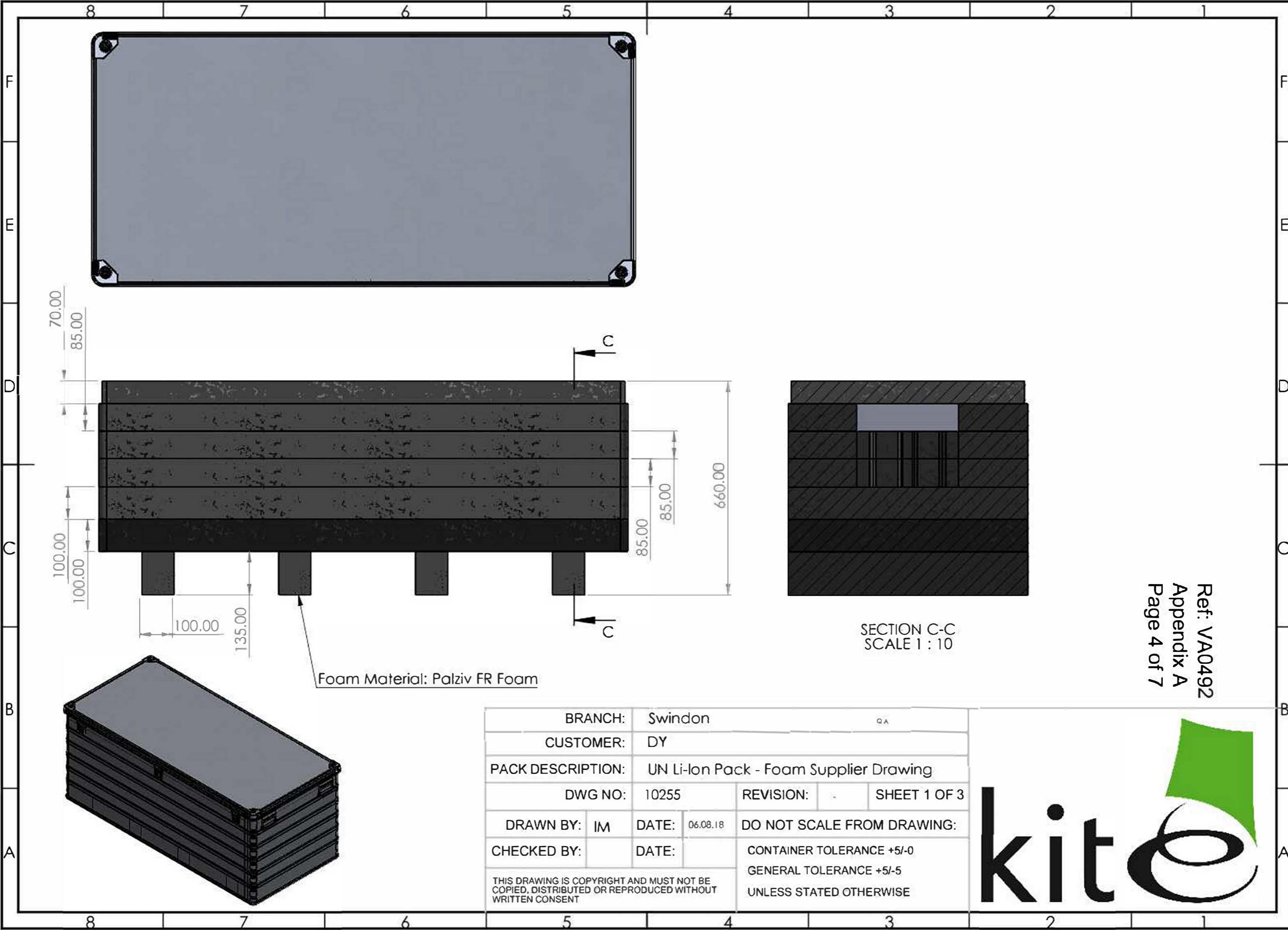
Ref: VA0492
Page 2 of 7
Appendix A

PACKAGE TYPE	Poly Bag				UN TYPE CODE			
MANUFACTURER	I G Industries Ltd				PRODUCT CODE or Ref.			
PRODUCTION ADDRESS	The Flarepath Elsham Wold Brigg North Lincolnshire				POSTCODE	DN20 0SP		
CONSTRUCTION <i>select all that apply</i>	Open mouth	Valved	Gusseted	Non-gusseted	Side Seam	Back Seam	Tubular	
	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	
	Seaming method	N/A						
DIMENSIONS <i>(mm)</i>	<i>Measured in flat, unopened condition (except gusset)</i>	Length	Face width (closed)	Face width (open)	Bottom width	Valve width	Gusset width (open)	
		2180	660				520 / 505	
MATERIAL	Type & Grade	Poly bag, Natural GB Conversion CO-EX				Thickness (Micron)	45	
VALVE	Position and dimensions (mm)	N/A						
METHOD OF CLOSURE	Base	Weld sealed						
	Top	Folded						
	Stitching <i>(if applicable)</i>	Stitch type				Stitches per 100 mm		
		Thread type				Min breaking load <i>(Newtons)</i>		
		Filter cord						
	Adhesive							
Capping								
REMARKS	Weight - 0.2133kg							



BRANCH:		Swindon		QA
CUSTOMER:				
PACK DESCRIPTION:				
DWG NO:		10255 Foam Assembly	REVISION:	SHEET 1 OF 1
DRAWN BY:	DATE:	DO NOT SCALE FROM DRAWING:		
CHECKED BY:	DATE:	CONTAINER TOLERANCE +5/-0		
THIS DRAWING IS COPYRIGHT AND MUST NOT BE COPIED, DISTRIBUTED OR REPRODUCED WITHOUT WRITTEN CONSENT		GENERAL TOLERANCE +5/-5		
		UNLESS STATED OTHERWISE		

Ref: VA0492
Appendix A
Page 3 of 7



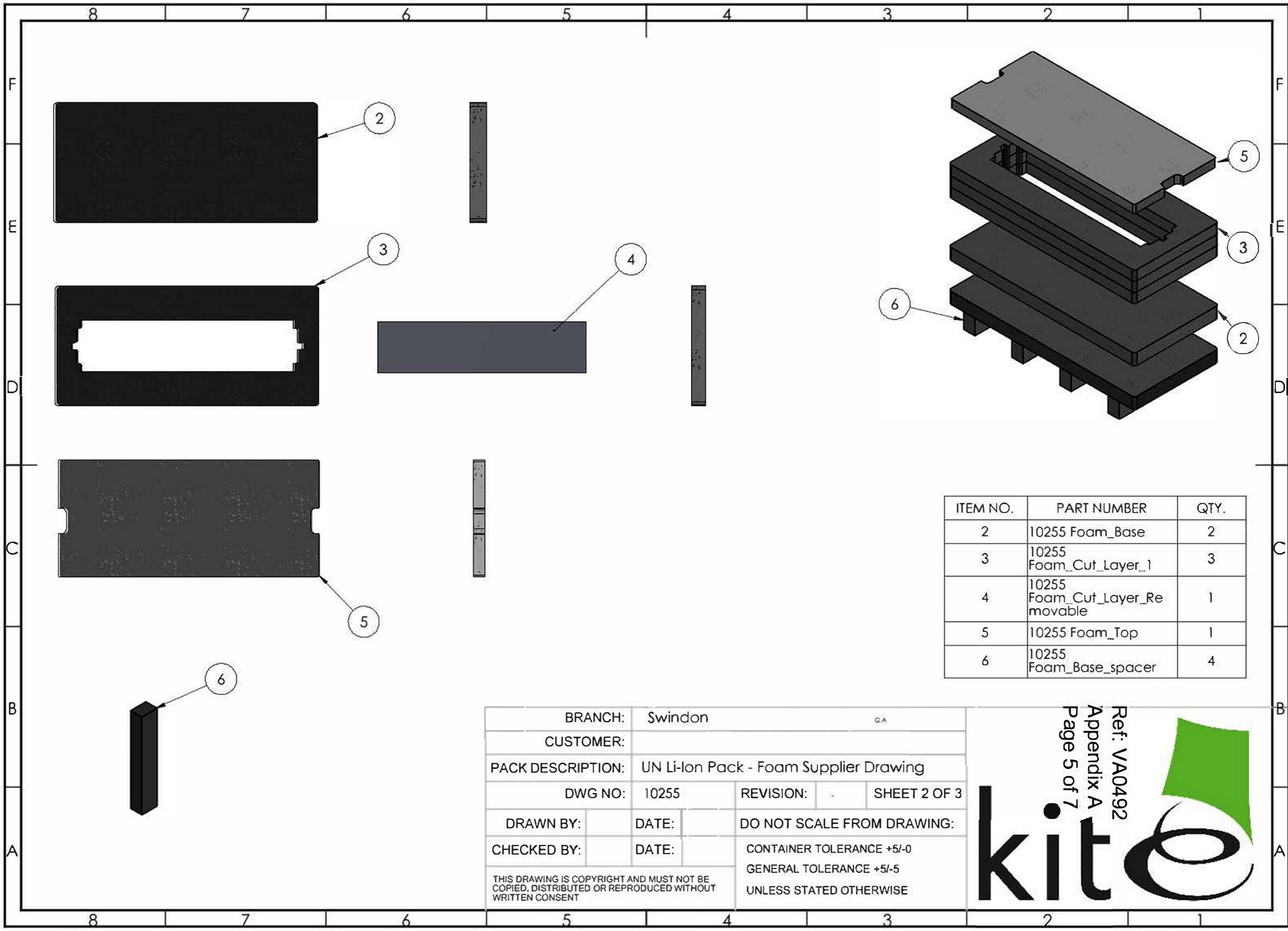
Foam Material: Palziv FR Foam

SECTION C-C
SCALE 1 : 10

Ref: VA0492
Appendix A
Page 4 of 7

BRANCH:		Swindon		QA
CUSTOMER:		DY		
PACK DESCRIPTION:		UN Li-Ion Pack - Foam Supplier Drawing		
DWG NO:		10255	REVISION:	SHEET 1 OF 3
DRAWN BY:	IM	DATE:	06.08.18	DO NOT SCALE FROM DRAWING:
CHECKED BY:		DATE:		CONTAINER TOLERANCE +5/-0
THIS DRAWING IS COPYRIGHT AND MUST NOT BE COPIED, DISTRIBUTED OR REPRODUCED WITHOUT WRITTEN CONSENT				GENERAL TOLERANCE +5/-5
				UNLESS STATED OTHERWISE

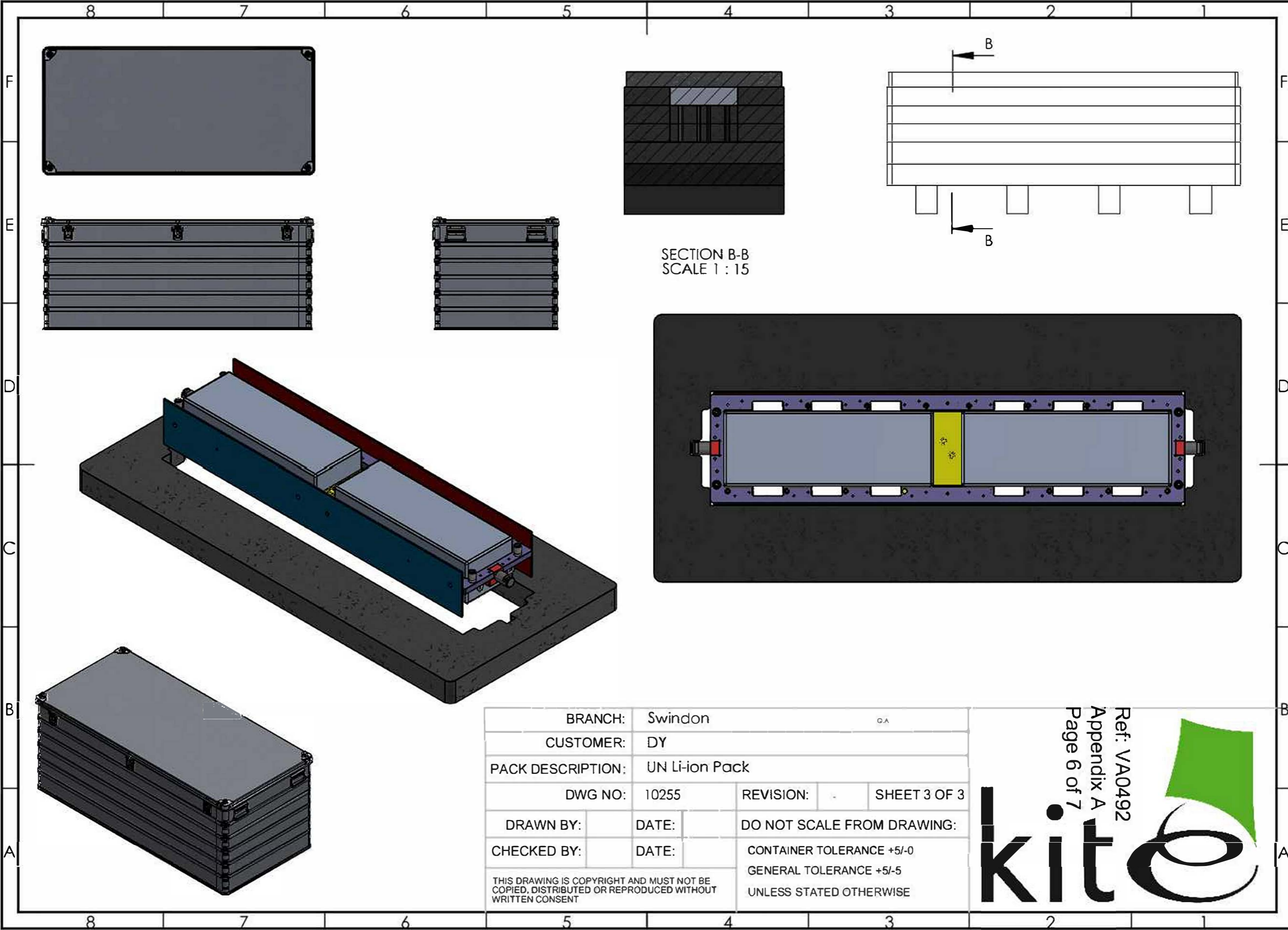




ITEM NO.	PART NUMBER	QTY.
2	10255 Foam_Base	2
3	10255 Foam_Cut_Layer_1	3
4	10255 Foam_Cut_Layer_Removable	1
5	10255 Foam_Top	1
6	10255 Foam_Base_spacer	4

BRANCH: Swindon		QA	
CUSTOMER:			
PACK DESCRIPTION: UN Li-Ion Pack - Foam Supplier Drawing			
DWG NO: 10255		REVISION: - SHEET 2 OF 3	
DRAWN BY:		DATE:	
CHECKED BY:		DATE:	
DO NOT SCALE FROM DRAWING:			
CONTAINER TOLERANCE +5/-0			
GENERAL TOLERANCE +5/-5			
UNLESS STATED OTHERWISE			
THIS DRAWING IS COPYRIGHT AND MUST NOT BE COPIED, DISTRIBUTED OR REPRODUCED WITHOUT WRITTEN CONSENT			

Ref: VA0492
 Appendix A
 Page 5 of 7



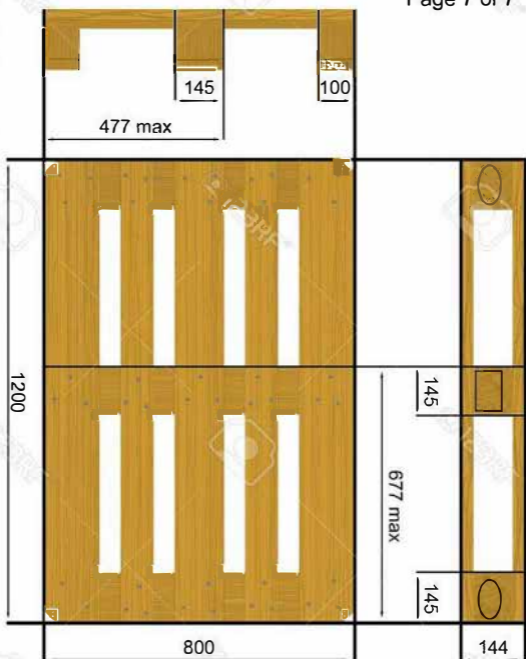
SECTION B-B
SCALE 1 : 15

BRANCH:		Swindon		G.A	
CUSTOMER:		DY			
PACK DESCRIPTION:		UN Li-ion Pack			
DWG NO:		10255	REVISION:	SHEET 3 OF 3	
DRAWN BY:	DATE:	DO NOT SCALE FROM DRAWING:			
CHECKED BY:	DATE:	CONTAINER TOLERANCE +5/-0			
		GENERAL TOLERANCE +5/-5			
		UNLESS STATED OTHERWISE			
THIS DRAWING IS COPYRIGHT AND MUST NOT BE COPIED, DISTRIBUTED OR REPRODUCED WITHOUT WRITTEN CONSENT					

Ref: VA0492
Appendix A
Page 6 of 7

kit

*all dimensions in millimeters



PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

LARGE PACKAGING SPECIFICATION CHECK

Test Ref. VA0492

Appendix B

Sheet 1 of 3

METAL LARGE PACKAGINGS

- | | | |
|------|---------------------------------|--|
| i. | Manufacturer's mark | : Zarges label on front and rear and shown on closure catches and corner reinforcements. |
| ii. | Package Style | : Swaged aluminium panels, spot welded together. Base fitted with reinforced seam and 2 x panel stiffeners across width. Large Packaging fitted to wooden pallet base and secured with 2 x 12 mm wide PP strapping across width. |
| iii. | Identification marks or symbols | : None. |
| iv. | Method of closure | : Full aperture aluminium lid fitted with stainless steel piano hinge at rear. Front sealed with 3 off steel toggle catches and ends sealed with 1 off steel toggle fastener. All secured with wire fasteners. 1685 x 785 mm external dimensions. Lid has 2 x panels riveted to external surface across width. |
| | Gasket | : Rubber gasket within lid recess. |
| v. | Dimensions (external) | |
| | Length | : 1685 mm (overall inclusive of lid)
1655 mm (box section only) |
| | Width | : 785 mm (overall inclusive of lid)
754 mm (box section only) |
| | Height | : 705 mm (inclusive of corner reinforcement) |
| | Weight | : 29.20 kg (box only)
57.50 kg (inclusive of foam fittings)
9.55 kg (mild steel cradle)
21.70 kg (pallet weight) |
| vi. | Material type | : Aluminium alloy. |
| | Thickness | Body : 1.363 mm
Lid : 1.376 mm
Base : 1.365 mm |

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

LARGE PACKAGING SPECIFICATION CHECK

Test Ref. VA0492

Appendix B

Sheet 2 of 3 rev.1

METAL LARGE PACKAGINGS

- | | | |
|-------|--|--|
| vii. | Method of joining panels | : Overlapped joins x 2 spot welded. Crimped base seam. |
| viii. | Internal fittings | : 4 piece foam set comprising of base pad with skid feet, intermediate foam pad, bespoke cut out pad comprising 6 layers of individual foams and 1 x top layer pad comprising of 2 layers of individual foams with centre block. |
| | Weight | : 28.30 kg (combined) |
| ix. | Handles | : Steel drop handles affixed with riveted plates. 2 per end face. |
| x. | Contents | : 1 x Lithium ion battery within mild steel framework.

Framework dimensions: 1320 x 315 x 165 mm (l x w x h)

Framework thickness: 2 mm |
| xi. | Other points, remarks | : Corners of lid fitted with galvanised steel reinforcement which also provide interstacking stability. Lid fitted with retaining straps internally.

Drawing reference 10255 agreed. |
| | Top lift facilities | : 4 off steel drop handles located on end faces. |
| | No. of base access points | : Four. Facilitated by wooden pallet.
1200 x 800 mm footprint. 144 mm height.
22 mm deck board thickness. |
| | No. to be stacked during transport | : Three. |
| xi. | The packaging complies with the relevant definition of paragraph 1.2.1 and the requirements of 6.6.4.1 | |

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

PACKAGING SPECIFICATION CHECK

Test Ref. VA0492

Appendix B

Sheet 3 of 3

BAGS

- | | | | |
|------|---|---|---|
| i. | Manufacturer's mark | : | Not shown on tested specimen. |
| ii. | UN code | : | N/A – Inner packaging. |
| iii. | Description - | | |
| | Style | : | Open mouthed, gusseted plastics film bag. |
| | Number of plies | : | One. |
| | Seam (side/back/none) | : | None. |
| iv. | Dimensions - | | |
| | Length * | : | 2180 mm |
| | Face width * | : | 660 mm |
| | Gusset (side 1) | : | 520 mm |
| | Gusset (side 2) | : | 505 mm |
| | Bottom width * | : | N/A |
| | Valve width * | : | N/A |
| v. | Closure method - | | |
| | Top | : | Folded. |
| | Base | : | Heat sealed. |
| | Sideseam | : | N/A |
| vi. | Grammage of components (g/m ²) for paper or
thickness (micron) for plastics film | | |
| | Ply 1 (Outer) | : | 46.08 microns (average of 10 readings) |
| | Range | : | 44.3 – 48.0 microns |
| vii. | Other points, remarks | : | Bag to be used to contain battery. |

* When applicable and in flat unopened condition

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

PHOTO APPENDIX

Test Ref. VA0492

Appendix C

Sheet 1 of 5



Aluminium large packaging fitted with wooden pallet base submitted for performance testing



Spot welded seams on sidewall



End face view showing location of drop handles



Base view showing panel stiffener



Corner reinforcement



Toggle catches located on front face

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

PHOTO APPENDIX

Test Ref. VA0492
Appendix C
Sheet 2 of 5



Wire tie seal



Rear hinge



Lid panel stiffener



End faced toggle fastener



Foam set



Base pad with skids

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

PHOTO APPENDIX

Test Ref. VA0492

Appendix C

Sheet 3 of 5



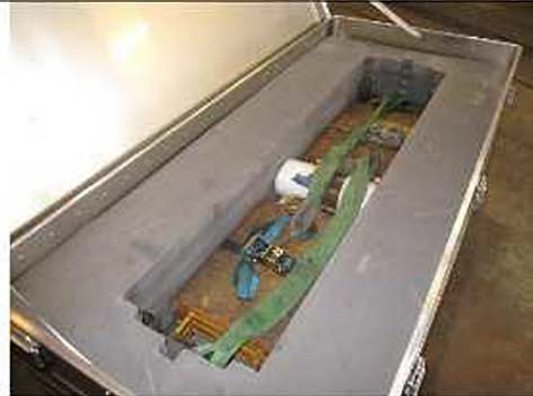
Intermediate pad on top



Bespoke cut out pad on top



Top pad with centre block



Foam set and battery mock-up within framework inserted into recess



Top pad placed on top



Large Packaging prepared for testing

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

PHOTO APPENDIX

Test Ref. VA0492

Appendix C

Sheet 4 of 5



Mild steel framework



Framework loaded with weights



Wooden pallet



Plastics film bag inner packaging



Bottom lift test entry on front face



Bottom lift test entry on rear face

PERFORMANCE TESTS OF PACKAGINGS FOR DANGEROUS GOODS

PHOTO APPENDIX

Test Ref. VA0492
Appendix C
Sheet 5 of 5



Bottom lift test entry on end face



Bottom lift test entry on opposite end face



Top lift test in progress



Stack test in progress



Drop test orientation