

Tender Request & Specification for the Supply, Manufacture, Finishing and Assembly of Mechanical Hardware for the General Coarse Bundle

1 Introduction

This document presents the mechanical hardware to be supplied, manufactured, finished and assembled. An assembly drawing list is provided to express the quantity of hardware required. A parts drawing list of manufacturing drawings is also supplied for information, particularly on issue versions. The primary specification for the assemblies and components shall be the issued detail design drawings in conjunction with this specification.

2 Scope of Contract & Timescale

The contract covers the supply and delivery of all components necessary, including:

- Manufacture of components as per the drawings and specification
- Purchasing of off the shelf components as per the drawings
- Finishing of components as per the drawings and specification
- Assembly of finished/purchased components with off the shelf items as per the drawings
- Cleaning of components and assemblies
- Inspection of assemblies
- Packaging and transportation to STFC RAL
- Making good any deviations from expected quality prior to delivery

The delivery of completed product is required 15 weeks from receipt of order (FROO), however higher priority items (labelled 1) are required within 10 weeks from receipt of order (FROO), earlier delivery is preferred. It is acceptable to deliver components in stages provided the quality assurance requirements have been met. A logically linked delivery plan considering the priority of items and their expected delivery (if staged) shall be included in the tender response.

The price should be broken down to at least assembly level for the tender response.

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3 Drawing Lists

The table below shows the assemblies and components included in this bundle of work:

Drawing Number	Drawing Name	Issue	Quantity	Remarks	Delivery Priority
SL-1027640	DEBRIS SHIELD 10J	C	2		3
SL-1039056	10J AMPHEAD SUPPORT FRAME	A	1	THE ASSEMBLY HAS TWO CONFIGURATIONS, USING EITHER ITEM 4 (FOR R2) OR ITEM 1 AND COMPONENTS WITHIN PHANTOM LINES (FOR XFEL). SUPPLIER MUST PROVIDE ALL ITEMS ON THE BOM BUT DELIVER IN THE CONFIGURATION FOR R2.	1
SL-1039031	BT PERISCOPE FRAME – BEAM UP	A	1		1
SL-1026313	DIA90 VAC TUBE SUPPORT FRAME	A	1		1
SL-1026245	DIA165 VAC TUBE SUPPORT FRAME	A	1		1
SL-1039203	MIRROR MOUNT TABLE (45 DEG)	A	1		2
SL-1039228	LENS MOUNT SUPPORT TABLE	A	1		2
SL-1039241	MIRROR SUPPORT TABLE (SPLIT LEVEL)	A	1		2
SL-1038333	MIRROR MOUNT SUPPORT TABLE	A	1		2
SL-1024989	MIRROR / LENS SUPPORT TABLE	B	1		2
SL-1040018	MIRROR MOUNT SUPPORT TABLE	A	1		2
SL-1024974	LENS MOUNT SUPPORT TABLE	A	1		2
SL-1025174	MIRROR/LENS SUPPORT FRAME	D	1		2
SL-1025064	MIRROR MOUNT TABLE	B	1		2

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SL-1025155	FIDUCIAL MOUNT SUPPORT TABLE	B	1		2
SL-1025398	BEAM DUMP SUPPORT TABLE	C	1		2
SL-1025139	MIRROR MOUNT SUPPORT POST	B	2		2
SL-1040524	100J VSF SUPPORT FRAMES	A	1		1
SL-1040775	FRAME SUPPORT DARK FIELD AFT FF	A	1		1
SL-1026073	FRAME SUPPORT TABLE PASS 4 BEAM	B	1		1
SL-1036769	QUARTZ ROTATOR MOUNT TABLE	A	1		2
SL-1039073	100J AMPHEAD SUPPORT FRAME	A	1	THE ASSEMBLY HAS TWO CONFIGURATIONS, USING EITHER ITEM 7 (FOR R2) OR ITEM 1 AND COMPONENTS WITHIN PHANTOM LINES (FOR XFEL). SUPPLIER MUST PROVIDE ALL ITEMS ON THE BOM BUT DELIVER IN THE CONFIGURATION FOR R2.	1
SL-1040806	BALLISTIC CHAMBER ASSY	A	1		3
SL-1040814	BALLISTIC CHAMBER ASSY	A	1		3

The table below shows the part drawings required for this bundle of work:

Drawing Number	Drawing Name	Issue	Remarks
SL-1027640	DEBRIS SHIELD - 10J	C	
SL-1027641	TOP PANEL - DEBRIS SHIELD	A	
SL-1027642	SIDE PANEL - DEBRIS SHIELD	B	
SL-1027643	SIDE PANEL - DEBRIS SHIELD	A	
SL-1027646	SIDE PANEL - DEBRIS SHIELD	B	
SL-1027647	SIDE PANEL - DEBRIS SHIELD	B	

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SL-1027693	COVER - DEBRIS SHIELD	B	
SL-1038001	SIDE PLATE - DEBRIS SHIELD	A	
SL-1038002	SIDE PLATE - DEBRIS SHIELD	A	
SL-1038003	TOP PLATE - DEBRIS SHIELD	A	
SL-1027660	FRAME ASSY - DEBRIS SHIELD 10J	A	
SL-1039056	10J AMPHEAD SUPPORT FRAME	A	
SL-1039057	LOWER PLATE - 10J AMPHEAD SUPPORT FRAME	A	
SL-1039062	UPPER PLATE - 10J AMPHEAD FRAME	A	
SL-1039065	PROFILE 80x80 - 10J AMPHEAD FRAME	A	
SL-1039068	PROFILE 40 x 40 - 10J AMPHEAD FRAME	A	
SL-1039100	X-MEMBER - 10J AMPHEAD FRAME	A	
SL-1039101	X-MEMBER - 10J AMPHEAD FRAME	A	
SL-1039110	PROFILE 80x80 - 100J AMPHEAD FRAME	A	
SL-1040274	AMP SUPPORT FRAME DISC POSITIONER	A	
SL-1040283	FOOT PLATE - 10/100J AMPHEAD FRAME	A	
SL-1040338	PROFILE 60 x 60 - AMPHEAD FRAME	A	
SL-1040342	10J TABLE FLOOR PLATE	A	
SL-1039031	BT PERISCOPE FRAME - BEAM UP	A	
SL-1023837	FIDUCIAL FRAME BASE LOCKING DISC	A	
SL-1034125	BASE PLATE - BT PERISCOPE FRAME	A	
SL-1034127	PROFILE 60 x 60 - BT PERISCOPE FRAME	A	
SL-1038229	TOP PLATE - BT PERISCOPE FRAME	A	
SL-1026313	Ø90 VAC TUBE SUPPORT FRAME	A	
SL-1026076	SUPPORT BASE - VAC TUBE SUPPORT	A	
SL-1026314	Ø90 TUBE CLAMP - LOWER	A	
SL-1026315	Ø90 TUBE CLAMP - UPPER	A	
SL-1026317	TOP PLATE - Ø90 TUBE SUPPORT	A	
SL-1026384	SUPPORT COLUMN - Ø90 TUBE SUPPORT	A	

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SL-1026245	Ø165 VAC TUBE SUPPORT FRAME	A	
SL-1026076	SUPPORT BASE - VAC TUBE SUPPORT	A	
SL-1026246	Ø165 TUBE CLAMP - LOWER	A	
SL-1026247	Ø165 TUBE CLAMP - UPPER	A	
SL-1026266	TOP PLATE - Ø165 PIPE SUPPORT	A	
SL-1026387	SUPPORT COLUMN - Ø165 TUBE SUPPORT	A	
SL-1039203	MIRROR MOUNT TABLE (45 DEG)	A	
SL-1039227	MIRROR MOUNT TOP PLATE	A	
SL-1039228	LENS MOUNT SUPPORT TABLE	A	
SL-1039229	LENS SUPPORT TABLE TOP	A	
SL-1039241	MIRROR SUPPORT TABLE (SPLIT LEVEL)	A	
SL-1039261	MIRROR MOUNT TOP PLATE	A	
SL-1038333	MIRROR MOUNT SUPPORT TABLE	A	
SL-1025572	RAIL EXTRUSION 95mm x 612mm LONG	B	
SL-1025574	RAIL EXTRUSION 66mm x 615.8mm LONG	B	
SL-1038334	MIRROR MOUNT TOP PLATE	A	
SL-1038345	RAIL EXTRUSION 66mm x 615.8mm LONG	A	
SL-1040265	RAIL EXTRUSION XT66mm	A	
SL-1040464	FOOT PLATE SPECIAL - XT66 RAIL	A	
SL-1040687	VERTICAL MOUNTING PLATE - MODIFIED	A	
SL-1024989	MIRROR/LENS SUPPORT TABLE	B	
SL-1024990	MIRROR/LENS MOUNT LOWER PLATE	B	
SL-1024998	MIRROR/LENS UPPER MOUNT PLATE	A	
SL-102557	RAIL EXTRUSION 95mm x 232mm LONG	A	
SL-1025579	RAIL EXTRUSION 95mm x 393mm LONG	A	

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SL-1025932	RAIL EXTRUSION 66mm x 235.8mm LONG	A	
SL-1040018	MIRROR MOUNT SUPPORT TABLE	A	
SL-1025581	RAIL EXTRUSION 95mm x 638mm LONG	B	
SL-1025582	RAIL EXTRUSION 95mm x 277mm LONG	B	
SL-1025583	RAIL EXTRUSION 66mm x 326.7mm LONG	B	
SL-1040016	FOOT PLATE - XT66 PROFILE	A	
SL-1040020	RAIL EXTRUSION XT66mm	A	
SL-1040021	MIRROR MOUNT MIDDLE PLATE	A	
SL-1040092	MIRROR MOUNT TOP PLATE	A	
SL-1040094	BREADBOARD SPECIAL	A	
SL-1040100	BRACKET - SUPPORT FRAME	A	
SL-1040687	VERTICAL MOUNTING PLATE - MODIFIED	A	
SL-1040700	BAFFLE PLATE - 100J PASS 2 PRE-VSF	A	
SL-1024974	LENS MOUNT SUPPORT TABLE	A	
SL-1024976	LENS MOUNT MIDDLE PLATE	A	
SL-1024983	LENS MOUNT TOP PLATE	A	
SL-1025580	RAIL EXTRUSION 25mm x 118mm LONG	A	
SL-1025599	RAIL EXTRUSION 95mm x 182mm LONG	A	
SL-1025174	MIRROR/LENS SUPPORT FRAME	D	
SL-1025133	MIRROR/LENS REAR MOUNTING PLATE	B	
SL-1025548	MIRROR/LENS FRONT MOUNTING PLATE	C	
SL-1025585	RAIL EXTRUSION 95mm x 315mm LONG	A	
SL-1025586	RAIL EXTRUSION 95mm x 450mm LONG	A	
SL-1025587	RAIL EXTRUSION 95mm x 185mm LONG	A	
SL-1025610	RAIL EXTRUSION 95mm x 755mm LONG	A	
SL-1025611	RAIL EXTRUSION 95mm x 500mm LONG	A	
SL-1025675	MIRROR MOUNTING PLATE	A	
SL-1030473	COVER - SUPPORT FRAME	A	

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SL-1025064	MIRROR MOUNT TABLE	B	
SL-1024954	MIRROR MOUNT TOP PLATE	A	
SL-1025155	FIDUCIAL MOUNT SUPPORT TABLE	B	
SL-1025138	FIDUCIAL SUPPORT TABLE TOP	A	
SL-1025398	BEAM DUMP SUPPORT TABLE	C	
SL-1025129	BEAM DUMP SUPPORT PLATE	B	
SL-1025139	MIRROR MOUNT SUPPORT POST	B	
SL-1025140	TOP SUPPORT PLATE	B	
SL-1025572	RAIL EXTRUSION 95mm x 612mm LONG	B	
SL-1040524	100J VSF SUPPORT FRAMES	A	
SL-1026413	100J VSF SUPPORT FRAME (Ø127x 514)	A	
SL-1026463	BACK PLATE - 100J VSF SUPPORT FRAME	A	
SL-1026466	Ø127 100J VSF TUBE CLAMP - LOWER	B	
SL-1026470	Ø127 100J VSF TUBE CLAMP - UPPER	A	
SL-1026787	STOP ROD - VSF TUBE SUPPORT	A	
SL-1026626	Ø127 VSF TUBE SUPPORT FRAME (SINGLE)	A	
SL-1026208	Ø127 TUBE CLAMP - UPPER	A	
SL-1026415	COLUMN A - VSF SUPPORT FRAME	B	
SL-1026417	TOP PLATE - Ø127 TUBE SUPPORT	A	
SL-1026419	Ø127 TUBE CLAMP - LOWER	A	
SL-1026423	SUPPORT BASE - VAC TUBE SUPPORT	A	
SL-1026530	Ø90 100J VSF TUBE SUPPORT ASSY	A	
SL-1026528	COLUMN B - Ø90 VSF TUBE SUPPORT	A	
SL-1026715	FOOT PLATE - Ø90 VAC TUBE SUPPORT	A	
SL-1026608	Ø90 100J VSF TUBE SINGLE CLAMP	A	
SL-1026507	BACK PLATE B- 100J VSF TUBE SUPPORT	A	

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SL-1026509	Ø90 100J VSF TUBE CLAMP - LOWER	A	
SL-1026520	Ø90 100J VSF TUBE CLAMP - UPPER	A	
SL-1026540	SUPPORT FRAME - VSF PIN HOLE VESSEL	C	
SL-1026564	TOP PLATE - VSF PIN HOLE VESSEL FRAME	B	
SL-1026565	TOP PLATE - VSF PIN HOLE VESSEL FRAME	B	
SL-1026592	TOP PLATE - VSF PIN HOLE VESSEL FRAME	B	
SL-1026600	FOOT PLATE - PIN HOLE VESSEL SUPPORT	D	
SL-1027512	ADJUSTABLE BRACKET - DIGITAL CAMERA	A	
SL-1027519	ADJUSTER BRACKET - DIGITAL CAMERA	A	
SL-1027535	ADJUSTABLE BRACKET - DIGITAL CAMERA	A	
SL-1026707	SUPPORT FRAME - VSF PIN HOLE VESSEL	A	
SL-1026773	Ø165 VAC TUBE SUPPORT FRAME	A	
SL-1026246	Ø165 TUBE CLAMP - LOWER	A	
SL-1026247	Ø165 TUBE CLAMP - UPPER	A	
SL-1026774	TOP PLATE - Ø165 PIPE SUPPORT	A	
SL-1026779	SUPPORT BASE - VAC TUBE SUPPORT	A	
SL-1026781	COLUMN - Ø165 VAC TUBE SUPPORT	A	
SL-1026875	Ø127 VAC TUBE SUPPORT - LOWER	A	
SL-1026859	Ø127 TUBE CLAMP - LOWER	B	
SL-1026861	BASE PLATE - VSF TUBE SUPPORT	A	
SL-1026876	Ø90 VAC TUBE SUPPORT - LOWER	A	
SL-1026864	Ø90 100J VSF TUBE CLAMP - LOWER	A	
SL-1026869	BASE PLATE - VSF TUBE SUPPORT	A	
SL-1028323	Ø90 VSF TUBE SUPPORT FRAME (DOUBLE)	A	
SL-1026615	BACK PLATE B - 100J VSF SUPPORT FRAME	A	
SL-1028325	SPACER - LOWER TUBE CLAMP	A	
SL-1028324	Ø90 VSF 100J TUBE SUPPORT FRAME	A	
SL-1026314	Ø90 TUBE CLAMP - LOWER	A	
SL-1026315	Ø90 TUBE CLAMP - UPPER	A	
SL-1026476	COLUMN B - Ø90 100J VSF TUBE SUPPORT	A	
SL-1026501	TOP PLATE - Ø90 100J VSF TUBE SUPPORT	B	
SL-1026502	SUPPORT BASE - 100J VSF TUBE SUPPORT	B	
SL-1040526	Ø90 VAC TUBE SUPPORT FRAME	A	
SL-1040527	Ø90 VSF 100J TUBE SUPPORT FRAME	A	
SL-1040528	TOP PLATE - Ø90 100J VSF TUBE SUPPORT	A	

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SL-1040529	SUPPORT BASE - 100J VSF TUBE SUPPORT	A	
SL-1040530	SUPPORT COLUMN A - VSF PIN HOLE VESSEL	A	
SL-1040532	Ø90 100J VSF TUBE SINGLE CLAMP	A	
SL-1040533	BACK PLATE B- 100J VSF TUBE SUPPORT	A	
SL-1040784	100J VSF SUPPORT FRAME (Ø127x 514)	A	
SL-1040783	Ø127 VSF TUBE SUPPORT FRAME (SINGLE)	A	
SL-1040785	COLUMN A - VSF SUPPORT FRAME	A	
SL-1040788	COLUMN A - VSF SUPPORT FRAME	A	
SL-1040775	FRAME SUPPORT DARK FIELD AFT FF	A	
SL-1026105	FRAME BASE MOUNTING PLATE	A	
SL-1040870	EXTRUSION 80x80x54 LONG	B	
SL-1026073	FRAME SUPPORT TABLE PASS 4 BEAM	B	
SL-1026105	FRAME BASE MOUNTING PLATE	A	
SL-1026644	ALUMINIUM PROFILE 8 80x80	A	
SL-1036769	QUARTZ ROTATOR MOUNT TABLE	A	
SL-1024948	LENS MOUNT TOP PLATE	A	
SL-1039073	100J AMPHEAD SUPPORT FRAME	A	
SL-1039065	PROFILE 80x80 - 10J AMPHEAD FRAME	A	
SL-1039068	PROFILE 40 x 40 - 10J AMPHEAD FRAME	A	
SL-1039075	LOWER PLATE - 100J AMPHEAD FRAME	A	
SL-1039083	UPPER PLATE - 100J AMPHEAD FRAME	A	
SL-1039110	PROFILE 80x80 - 100J AMPHEAD FRAME	A	
SL-1040274	AMP SUPPORT FRAME DISC POSITIONER	A	
SL-1040280	100J TABLE FLOOR PLATE	A	
SL-1040283	FOOT PLATE - 10/100J AMPHEAD FRAME	A	
SL-1040291	PROFILE 60 x 60 - AMPHEAD FRAME	A	
SL-1040393	UPPER PLATE INFILL	A	

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SL-1040806	BALLISTIC CHAMBER ASSY	A	
SL-1030419	MOUNTING FOOT	A	
SL-1030422	MOUNTING BRACKET	A	
SL-1030554	ENCLOSURE FRONT 1	A	
SL-1030555	ENCLOSURE SIDE 1	B	
SL-1030556	ENCLOSURE SIDE 2	B	
SL-1030557	ENCLOSURE REAR 1	A	
SL-1030558	ENCLOSURE REAR 2	B	
SL-1030559	ENCLOSURE REAR 3	A	
SL-1030560	ENCLOSURE REAR 4	A	
SL-1030561	ENCLOSURE COVER	A	
SL-1030562	ENCLOSURE REAR 5	A	
SL-1030564	ENCLOSURE REAR 6	A	
SL-1030565	COVER SUPPORT 1	A	
SL-1030566	COVER SUPPORT 2	A	
SL-1030567	COVER SUPPORT 3	A	
SL-1030568	COVER SUPPORT 4	A	
SL-1030570	ENCLOSURE COVER 1	A	
SL-1030571	ENCLOSURE COVER 2	A	
SL-1030575	ENCLOSURE COVER 3	A	
SL-1030577	ENCLOSURE DOOR 1	A	
SL-1030578	ENCLOSURE DOOR 2	A	
SL-1030579	BALLISTIC ENCLOSURE 2	A	
SL-103058	ENCLOSURE FRONT 2	A	
SL-1030582	ENCLOSURE COVER 4	A	
SL-1030583	ENCLOSURE REAR 7	A	
SL-1030584	ENCLOSURE SIDE 3	A	
SL-1030585	ENCLOSURE SIDE 4	B	
SL-1030586	COVER SUPPORT 5	A	
SL-1030589	GUIDE SLEEVE	A	
SL-1030590	GUIDE SLEEVE	A	
SL-1030591	GUIDE SLEEVE	B	
SL-1030594	BAFFLE PLATE - REMOVABLE	A	
SL-1030620	INFILL	A	

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SL-1030730	BLANKING PLATE	A	
SL-1040501	SPACER BAR - INFILL	A	
SL-1040809	BALLISTIC ENCLOSURE 1	A	
SL-1040814	BALLISTIC CHAMBER ASSY	A	
SL-1030341	ENCLOSURE SIDE 1	A	
SL-1030342	ENCLOSURE INNER	A	
SL-1030343	ENCLOSURE SIDE 2	A	
SL-1030344	ENCLOSURE SIDE 3	A	
SL-1030345	ENCLOSURE FRONT 1	A	
SL-1030347	ENCLOSURE FRONT 2	A	
SL-1030348	ENCLOSURE REAR 1	A	
SL-1030349	ENCLOSURE - REAR 2	A	
SL-1030350	COVER PANEL 1	A	
SL-1030351	COVER PANEL 2	A	
SL-1030352	JOINER PLATE	A	
SL-1030353	COVER SUPPORT BEAM	A	
SL-1030354	FRONT PANEL 1	A	
SL-1030355	FRONT PANEL 2	A	
SL-1030357	JOINER PLATE	A	
SL-1030358	SUPPORT BEAM 2	A	
SL-1030359	SUPPORT BEAM 1	A	
SL-1030360	COVER PANEL 3	A	
SL-1030381	BALLISTIC ENCLOSURE 2	A	
SL-1030405	BAFFLE PLATE - REMOVABLE	A	
SL-1030410	GUIDE SLEEVE	A	
SL-1030413	LENS GUARD	A	
SL-1030414	LASER SCREEN INFILL	A	
SL-1030419	MOUNTING FOOT	A	
SL-1030422	MOUNTING BRACKET	A	
SL-1030460	FUSED SILICA WINDOW 150 x 20	A	
SL-1030483	ENCLOSURE INNER	A	
SL-1030485	BLANKING PLATE	A	
SL-1030512	SHIELD	A	

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SL-1030513	SHIELD	A	
SL-1030514	SHIELD	A	
SL-1030534	SILICA WINDOW ASSY	A	
SL-1030461	GASKET - PTFE 152 X 140 X 2	A	
SL-1030462	SPACER RING	A	
SL-1030463	HOLDER - SILICA WINDOW	A	
SL-1030468	MOUNTING BLOCK - ANGLED	A	
SL-1030526	CLAMPING RING	A	
SL-1030531	PACKER - PTFE	A	
SL-1040811	BALLISTIC ENCLOSURE 1	A	

4 Technical Specification

4.1 Materials

4.1.1 Aluminium

- A 6000 series grade is selected for the majority of machined Aluminium components for its good machining and formability properties, medium to high strength and the suitability of the grade for hard anodising.
- Where no Aluminium grade has been specified, 6061-T6 or Tooling Plate has been specified, it is acceptable to exchange this for 6082-T6. However, where Aluminium grade 6082-T6 has been specified on the drawing it is not acceptable to exchange this for any other material grade.
- A 5000 series grade is selected for the majority of formed sheet Aluminium components for its good formability and the suitability of the grade for hard anodising.
- It is acceptable to exchange 5083 for 5251 or vice versa for any formed sheet work.
- It is essential that any assemblies containing multiple aluminium parts are manufactured from the same grade of Aluminium to avoid any difference in appearance. The grade used should be stated in writing to ensure any future order or spares or replacement parts are made from the same material grades

4.1.2 Stainless Steel

- Stainless Steel grades 304 and 316 are selected for their good machinability, weldability, clean finish, corrosion resistance and vacuum compatibility.
- It is acceptable to use 304 or 316 for any components where the stainless steel grade is not specified. It is acceptable to exchange 304 for 316 if deemed beneficial.

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However, where Stainless Steel grade 316 has been specified on the drawing, it is not acceptable to exchange this for any other material grade.

- It is desirable that any assemblies containing multiple Stainless Steel parts are manufactured from the same grade of Stainless Steel to avoid any difference in appearance. The grade used should be stated in writing to ensure any future order or spares or replacement parts are made from the material grades

4.1.3 Extrusion

- Extrusion is specified at a particular size and by a specific supplier to meet the requirements of the overall system assembly.
- Thorlabs guide rail is not interchangeable with any other extrusion as there are optical carriages in the system assembly that require the specific profile.
- STFC expects that it is more cost effective to procure un-anodized (raw) guide rail from Thorlabs and perform the manufacturing and finishing processes than to procure custom finished rails from Thorlabs
- Thorlabs guide rail shall be anodised black.
- ITEM is the preferred manufacturer for all other extrusion. However, the supplier is welcome to present an alternative manufacturer of extrusion to STFC for consideration in the tender process, provided profile size is maintained.
- Colour of anodised finish on extrusion to be supplied as per the drawings.
- Method of joining extrusion is most appropriately defined by the extrusion supplier, but on some drawings there are suggested options. In general, STFC would require:
 - o Any sliding nuts are kept in position within extrusion groove by spring loaded ball on the sliding nut
 - o Corner joints are made through corner brackets or fastener through the profile (requiring machining of the extrusion)
 - o Cross members are removable and adjustable without dismantling the whole assembly

4.2 Machining & Forming

4.2.1 Tolerances

- Drawing tolerances must be maintained to ensure successful assembly
- Components that have an important fit within an assembly shall to be machined as a matched pair.
- The dimensional tolerances on the drawings must be met after anodising or after any residual machining following anodising. Any machining must take into consideration the expected anodising thickness. Since hard anodising converts rather than deposits, some of the anodising thickness will ingress the material and some will be growth out of the material – typically 50%, but manufacturers to confirm with anticipated anodising supplier.

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4.2.2 Machining Finishes

- All components, excluding sheet and extrusion, to have a fine machined surface finish, to better than 1.6µm roughness (unless specified better on the drawing).
- All surfaces to be smooth without objectionable tool marks.
- Surface roughness specification applies to all surfaces and is applicable both before and after subsequent application of finish (such as anodising).
- It is desirable that assemblies have the same direction cutting patterns to avoid a mismatched appearance. This also applies to ensure consistent and uniform surface finishes
- Surface finish should, unless otherwise stated, have a machined finish rather than a shot peened, buffed or polished finish.

4.2.3 Sheet Work

- It is acceptable to laser cut or punch cut apertures in sheet metal provided the edges are suitably finished, no burrs, snags, sharp edges or excessive chamfer.
- Surfaces of stock sheet must be free from pitting, seam marks, roller marks and trade names. The surfaces must be smooth and consistent before applying cleaning and finishes.
- Forming and bending of sheet metal must be performed such that no cracking or grain separation occurs in the bend or form.
- Particular attention must be made to the drawings of sheet work as the dimension references may not be as per the industry standard (due to the requirement of tolerancing specific dimensions for assembly).
- Minimum bend radius must be maintained as per detail drawing.
- Bend relief length detail at the supplier's discretion, but must not be excessive for purpose.

4.3 Welding

The welding specification for any welded joint is specified on the drawing. Additional considerations include:

- Cleaned surfaces must not come into contact with oily or greasy objects during welding (including bare hands).
- It is expected that conventional Tig welding process will be used for welding, unless specified otherwise by the supplier.
- All weld regions must be free from scale, voids, discoloration, blow holes or visible evidence of inclusions.
- All welding marks to be removed and suitably cleaned.
- Weld repairs are not permitted without prior approval from STFC.

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4.4 Cleaning

4.4.1 Clean

Unless specified otherwise on the drawing, all components are required to be supplied clean (as per the definition below) as they will be installed in an ISO7 class clean area environment.

- All burrs to be removed
- Swarf and cutting material to be cleared from all holes (especially blind holes and threaded holes) using high pressure air-line.
- Residual contamination to be removed by washing out, swabbing or rinsing with a general purpose solvent.
- Scrubbing, wire brushing, grinding, filing or other mechanically abrasive methods shall not be used for cleaning.
- All machining fluids, greases or dirt to be removed using hot water, detergent and cleaning wipes followed by Isopropanol and a clean lint free cloth prior to any post machining finish such as anodising.
- Specific attention is drawn to all holes especially tapped holes where cutting residue and contamination can be difficult to remove
- Surfaces should be checked for signs of contamination by rubbing surfaces with lint free cloth. There should be no sign of dirt on the cloth. If dirt is found, the cleaning process must be repeated until there is no dirt on the cloth.
- All cleaning is to be thorough and inspected prior to packaging and as appropriate, in preparation for further treatment i.e. anodising
- Cleaning of components to be repeated after finishing treatments and prior to assembly.

4.5 Finishes

4.5.1 Anodising

Where anodising is the specified finish on the drawing, the finish shall be:

- Hard anodising for improved wear resistance (unless alternative sample provided by supplier and deemed acceptable by STFC)
- Where black is specified we expect jet black colour
- Where clear on drawings we expect the finish to be colourless
- 25µm thick (range 25µm-50µm acceptable)
- Free from scratches, inclusions, defects
- Uniform and consistent appearance across all assembly components
- Threaded holes shall be masked or threads made good after anodising
- Holes with specified fits (e.g. H7) shall be masked and be free from anodising or may be machined after anodising

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- Anodising around holes must not be damaged or incomplete through the process of masking or making good of threads.
- The dimensional tolerances on the drawings must be met after anodising. Any machining must take into consideration the expected anodising thickness. Since anodising converts rather than deposits, some of the anodising thickness will ingress the material and some will be growth out of the material – typically 50%, but manufacturers shall confirm with anticipated anodising supplier.

In order to ensure the quality of anodising required, it is expected that the supplier will:

- Ensure all surfaces on an assembly of components have a similar finish providing uniform and consistent anodising finish across each assembly.
- Ensure all surfaces are free from oils, greases, dirt and debris prior to anodising.
- Ensure that the anodising process is appropriately controlled, timings etc. calculated and monitored.
- The method of supporting components in the anodising bath is considered to avoid un-anodised or poorly anodised regions due to contact of support on component. Where timings are not known, it is expected that the supplier will arrange sample anodising to be approved by STFC to ensure the quality of the final product

4.5.2 Painting

Where Matt Black Paint is specified on the drawings, the finish shall be:

- A powder coat
- Consistent uniform matt black colour (jet black)
- Consistent and uniform thickness
- There shall be no paint dribbles or pooling in the painted surface
- There shall be no scratches, dents or inclusions in the paint
- Threaded holes shall be masked or threads made good after painting
- Dimensional tolerances must be met after painting

In order to ensure the quality of the painted finish, it is expected that the supplier will:

- Ensure all surfaces are free from oils, greases, dirt and debris prior to anodising.
- The method of supporting components for painting is considered to avoid un-painted regions due to contact of support on component.

4.6 Assembly

The supplier will assemble the goods to be fit for purpose, with due regard to the cleanliness requirements stated, by ensuring:

- Nitrile gloves are worn when handling cleaned components during assembly
- Components are assembled square and flat
- All fittings and fasteners shall be appropriately tightened for purpose

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- No thread-lock is to be used on any of the assemblies

All assemblies must be made and inspected even if not transported in their final assembly form. For any assemblies being flat-packed, photos of the build-up procedure shall be supplied.

A final clean of the assembly shall occur before packing to remove any contamination occurring during the assembly process

4.7 Packaging

- Bubble wrap and sealable plastic bags shall be used as a packaging material for components and assemblies.
- Additional protective packaging of assemblies is to be such that the assembly is not damaged during transportation or storage. It is expected that any freely moving parts will be adequately supported for the means of transportation engaged.
- All packaging is to be labelled, with the component or assembly drawing number, quantity (if more than one) and with any other information deemed necessary by the supplier.
- For large assemblies it is acceptable to flat pack the assembly into sensible units. However, trial assembly must have been completed and inspected prior to flat packing.
- All necessary fittings for re-assembling flat packed items must be included and suitably labelled for delivery.
- STFC shall be made aware of the packing proposal and associated modified labelling prior to delivery.

5 Communication

The supplier is expected and encouraged to raise any concerns or questions where any query arises, no matter how small, insignificant or inconsequential they appear.

Similarly the supplier is expected and encouraged to voice their concerns or opinions if a design or assembly does not appear correct.

Any recommendations on simple design changes that facilitate the achievement of our quality expectation are welcome from the supplier.

Any deviations from the specification or drawing must be agreed in writing by both parties.

Where any changes to the drawing are required, from a supplier request or STFC necessity, the drawing shall be re-issued by STFC at a higher version (based on increasing letter from A – Z). Upon the receipt of a newly issued drawing, all copies (hard or electronic) of previous versions must be deleted by the supplier to prevent incorrect manufacture of parts.

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6 Quality Assurance, Control & Testing

The supplier shall provide details of their quality assurance programme and specific processes including tests and inspections they intend to carry out so as to ensure that finished product meets this specification. Activities will include retention of material certificates, proposed inspection of components manufactured in house or by sub-contractor, testing procedure of completed assemblies and documentation produced.

A quality inspection and test plan shall be provided by the contractor together with the processes and procedures that they intend to follow and all testing and confirmatory quality checks that they shall carry out on product to assure conformity to this specification.

This shall, as a minimum, cover the following areas:

- Materials sourcing including material certificates, verification and record keeping
- Manufacturing processes (QC on machining, finishes, cleanliness etc.) and record keeping
- Anodising process (including QC on prior cleaning, process temperatures, process source materials, inspections, etc.)
- Assembly and testing of finished product including verification QA and functional testing
- Pre-delivery inspection process and sign-off by an appropriately qualified person (e.g. the contractors Quality Manager).

STFC reserve the right to enter the contractor's premises or those of any of their subcontractors at any time during the execution period of the contract in order to undertake quality inspections. The visits will focus on verifying that processes and quality control requirements, as stipulated by the contractor in their quality inspection and test plan are being applied appropriately.

The attention of the contractor is drawn to the following:

Appendix A shows the minimum quality verification that STFC wish to directly witness. However, STFC anticipates that the supplier will wish to undertake significant additional QC activities. These should be detailed in the quality inspection and test plan.

STFC is particularly interested in the anodising process, including preparation techniques, and will require a list of expected sub-contractors selected by any contractor for the undertaking of this process. Evidence of good quality anodising, in the form of a sample, is also required.

STFC will require evidence of the understanding of and previous experience of adequately cleaning machined components and assemblies for an ISO 7 clean room environment.

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Appendix A

Inspection and Test Plan								
General Coarse Bundle								
Quality Control Requirements: A - Approval, I - Inspection, S – Submission, V – Verification, H – Hold Point, W – Witness								
No	Activity	Ref Document	Acceptance Criteria	Frequency	Responsible Person	QC Req	Resulting Documents	Remarks
1	Anodising	Manufacturing Specification	Visual inspection meets the expectation	Sample provided at tender	Supplier	A		
2	Machining, Finishing and Cleaning	Design drawings and Manufacturing Specification	Visual inspection, measurement of some critical dimensions, wipe with lint free cloth	Sample of components, when high priority list complete	STFC	H	Sign off sheet, photographs	
3	Assembly	Design drawings and Manufacturing Specification	All assemblies functioning and key assembly dimensions in tolerance	Every assembly, prior to delivery	STFC	H	Sign off sheet, photographs	

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