

26. Tram interior and passenger comfort

26.1 The Tram Supplier shall ensure that the Tram interior includes at least the following:

- (i) all passenger areas of Trams shall be provided with an adequate means of heating and ventilation which performs in accordance with the relevant DIN standards and VDV recommendations. The heating system shall be as described in Part 1 of Schedule 3 to the Tram Supply Contract;
- (ii) all passenger areas of Trams shall be provided with windows in all side walls to maximise visibility for passengers. This requirement shall also apply to draught screens and separation walls to the driver's cabs. Headroom throughout the seating areas shall be 2.3m to ceiling in the low floor areas and 2.1m to ceiling in the high floor areas;
- (iii) toughened safety glass complying with BS 857 shall be employed for all windows except for Tram end windscreens which shall be of laminated glass providing adequate protection against impacts;
- (iv) each Tram shall be equipped with adequate emergency evacuation facilities;
- (v) the interior shall be provided with a suitable surface for the application of route-maps, safety notices and bye-laws, advert frames and other notices. The Tram Supplier shall liaise with the Operator in this regard
- (vi) the floor covering shall be bonded to the floor and shall consist of materials with anti-slip and fire-retardant properties. PVC material shall not be used;
- (vii) anti-slip strips of contrasting colour shall be inserted in the floor at the door entrance areas to enable safe access in both wet and dry conditions. Step nosings and treads shall be nonslip and durable, with nosings in a bright contrasting colour such as yellow or in a black/yellow "shark's tooth" or other pattern;
- (viii) the minimum seat width shall be 450mm per passenger. The top of each seat, inclusive of cushion where provided, shall be between 430mm and 480mm above the floor immediately in front of the seat. The clear headroom above each seat shall be at least 1.4m from the top of the seat cushion;
- (ix) the distance between the front surface of the seat back and the back of the seat(s) in front shall be at least 680mm, and the distance (i.e. knee room) between the foremost part of a seat and a vertical plane through the rearmost part of the seat in front shall be at least 230mm. Where facing pairs of seats are provided the knee room between them shall be at least 500mm. Inward facing seats shall be provided with one vertical handrail to every two seats;
- (x) the tops or backs of all forward facing seats shall be fitted with a rigid handhold. Where no such handhold or vertical handrail is available, a horizontal handrail shall be provided where appropriate for this purpose (e.g. in front of seats facing a bulkhead);

8.4 Windows in the Passenger Area.

The layout of the bodyside windows is shown in drawing 69.00.619.


All windows, including those in doors, are made of single toughened safety glass of 4 mm thick. They are bronze coloured and have a transparency of approximately 60 %.

There are 12 windows located in the low floor part of the vehicle which are fitted with ventilation flaps in the top part. The height of the ventilation-flaps is about 2000 mm above low floor area. In the low-floor part, two windows have fixed glazing. In the high-floor area above the motor bogies, there are eight windows with fixed glazing.

The panes and the ventilation-flap frames are bonded elastically and are easily replaceable.

The window panes and ventilation-flap frames are manufactured to tight tolerances to ensure that no touch up work is needed when a broken pane is replaced. The side window panes can be replaced without removing the bodyside panelling.

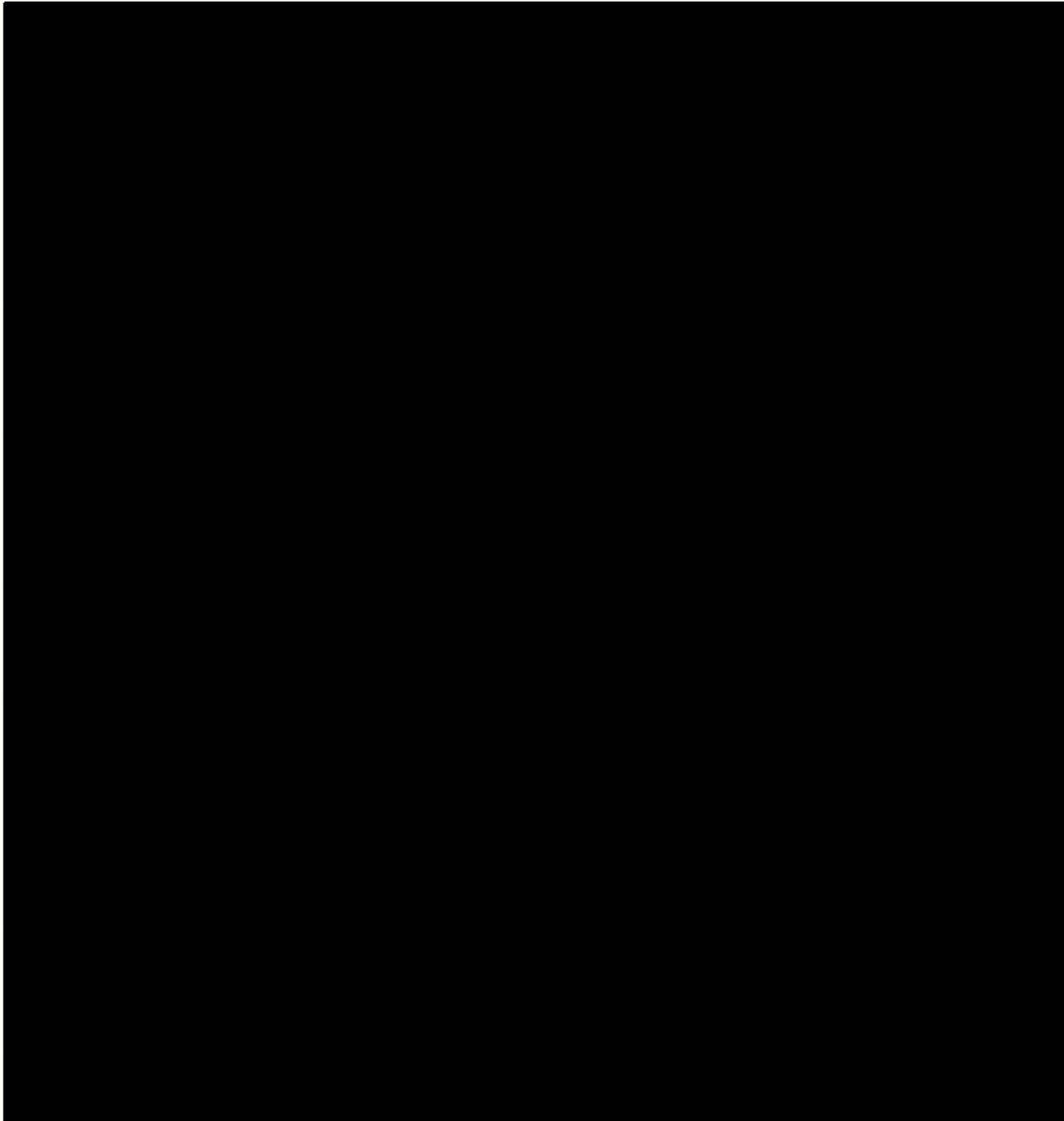
The short centre section is fitted with a small window behind the seats. The drivers cabs have a bronze tinted, heated, convex laminated windscreen of compound safety glass. The transparency is > 74 %. The windscreen is additionally heated by the heating system to prevent the screen from freezing or condensing. The corner window panes in the driver's cab are also heated and made of toughened safety glass.


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	Accepted:			CJV	
	Approved:	29.09.1997	Dr. M. Petz	BWS	Mod.No.
	Compiled:	29.09.1997	Kozak, Lürick Poisinger	BWS	Page 34 of 96
	Title: Technical Description LOW FLOOR VEHICLE CROYDON				Doc.No: TB-0104-03

The side windows of the driver's cab, those on the bodysides as well as those in the outer door have a transparency of about 70% to 74%. The window in the outer door is designed as sash window.

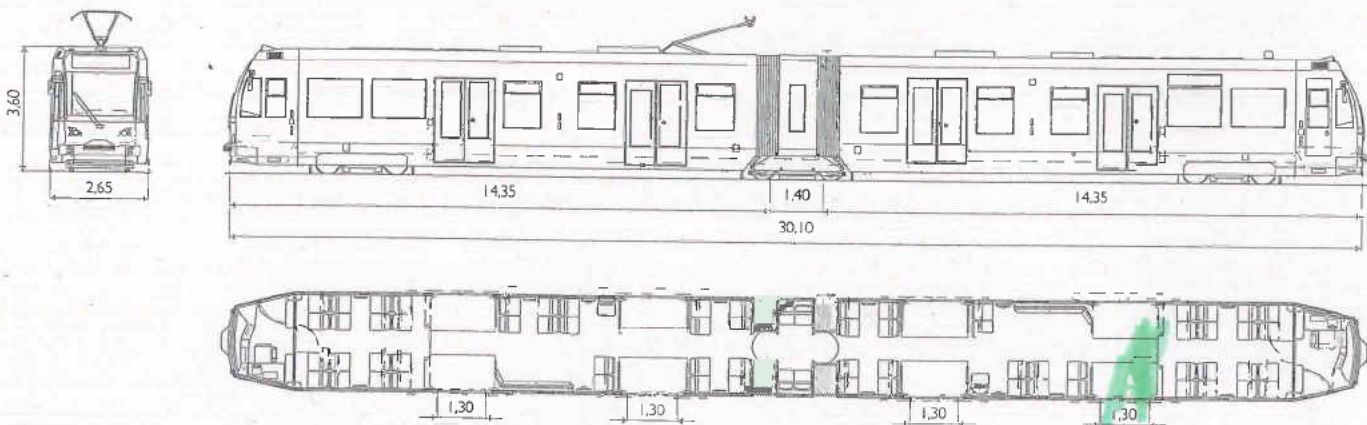
and the cab body side (805, 16/10/97)

The glass in the cab partition wall has a transparency of 60%.



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City-Tram



GENERAL SPECIFICATIONS

type of vehicle	bi-directional
length	30,100 mm
width	2,650 mm
height (retracted pantograph)	3,600 mm
floor height above TOR,	
- low-floor entrance	max 350 mm
- low-floor area	400 mm
- above powered bogies	580 mm
height difference between platform and entrance	max. 50 mm
percentage of low-floor area	76 %
gauge	1,435 mm
minimum curve radius (loaded/empty)	25/20 m
maximum gradient	80 ‰
powered bogies	2
trailer bogies	1
maximum axle load	104 kN
wheel diameter new/worn	630/550 mm
electric bi-parting plug doors	
- number per side	4
- free width at entrance	1,300 mm
driver's cabs	2
vehicle weight	
unloaded tare	36.3 t
loaded (2/3)	52.9 t
buff load	600 kN
number of seats	70
standees (4 persons/m ²)	138
prams/wheelchair/bicycle area	2
aisle width	600 mm

ELECTRICAL/MECHANICAL SPECIFICATIONS

catenary voltage	750 Vdc
braking energy recuperation	Yes
low voltage	24 Vdc
maximum speed	80 km/h
acceleration rate	1.2 m/s ²
service braking rate	1.3 m/s ²
emergency braking rate	2.75 m/s ²
brakes:	
- electrical service brake	regenerating motor
- mechanical service	disk brake
- parking	disk brake
- magnetic	6 x 66 kN
motor:	
- power	4 x 120 kW
- cooling system	air-cooled
- type	3-phase asynchronous motor
bogies:	
- primary suspension	rubber/metal
- secondary suspension	coil springs
- sanders	8
- flange lubrication device	4
- anti-slip, anti-skid	yes

BOMBARDIER
TRANSPORTATION



1101 Parent Street, St. Bruno, Québec, Canada J3V 6E6 • Telephone 1 (450) 441-2020

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www.transportation.bombardier.com

Ref [2] – Tram 2530 pre-window modification, 23rd April 2004



Ref [3] – Tram 2545 post window mod, 4th November 2004



Your ref:
Our ref: nm-trm-080711.a

Mike Smith
Chicago Glass (UK) Limited
Kingston House
Waterside Court
Neptune Close
Rochester
Kent
ME2 4NZ

14th July 2008

Dear Mike

Tram Refresh Works – Tram Window Cleaning

Background

Transport for London (TfL) has recently acquired Tramlink, the 28km tram system which operates through the London Boroughs of Croydon, Bromley and Merton.

Following acquisition, London Tramlink is responsible for the operation of the system and will oversee reactive and preventative maintenance, infrastructure renewal and upgrade, and capacity enhancement of the system.

London Tramlink will now be carrying out a Programme of Immediate Improvements (PII). This is a programme of immediate capital investment which will deliver tangible, value for money benefits to TfL, the public and the affected London Boroughs, through aesthetic and safety critical improvements to the network assets, within three months of acquisition.

A key project under this programme will involve the refresh of all tram vehicles. As part of this refresh it is proposed to apply new vinyl livery to the exterior of each tram, along with other activities including a deep clean of the vehicles, seat refurbishment and window cleaning.

Requirement

Please provide a proposal for the cleaning of all tram windows (excluding the cab windscreen) for the entire fleet of 24 Tramlink CR4000 tram vehicles (see attached Tram Drawing).

Your proposed solution and associated costs are to meet the following requirements:

- Works to be undertaken at night, Monday to Friday at Tramlinks Therapia Lane Depot
- Trams will be made available in the shed between 20:00 hrs and 05:00hrs the following day
- One tram to be completed each night shift
- It is anticipated that the first night shift will be Monday 18 August 2008
- Trams will be inspected every morning before entering service by TfL – any defects will be notified for rework
- Provide an option for the application of a glass protection system (Singo Glassguard or similar)
- Provide an option for the removal and replacement of all tram window internal films
- Provide an option for the removal of external window etched graffiti
- Provide an option for the removal of internal window etched graffiti
- Provision of protection of areas adjacent to the working area (and making good)
- Provide an option for working weekend days and weekend nights
- Provision of tram handback/inspection documentation (detailing work undertaken – format to be agreed)
- Provision of all tools and equipment necessary to undertake the works
- Provision of photographic evidence of additional work undertaken (i.e. removal of etched graffiti, replacement of internal film)

Cost Breakdown

The costs applicable to the above requirements are to be broken down into the following constituents:

Window Cleaning

- Cost per tram
- Cost of frustrated access (e.g. tram unavailable)
- Cost of late access (specify time applicable)

Glass Protection

- Cost per tram

Replacement of Internal Film

- Cost per window

Removal of Etched Graffiti (Internal & External)

- Cost per window (within heavy, medium or light categories)

Further Information

In addition to the above please also provide the following information:

- 1) Method Statements
- 2) Risk Assessments (including COSHH)
- 3) Lead time for mobilisation
- 4) Resource Plan
- 5) Organisation Chart and key contact details
- 6) Identification of any aspects that will not be covered under your proposed cost including identification of any items required to be carried out by a third party, for instance, removal of any fixtures and fittings.
- 7) Proposal for rework of any defects identified by TfL
- 8) Confirmation of warranty conditions and period of cover
- 9) Information of previous experience of working on the London Tramlink system, TfL Buses, LUL or similar fleets
- 10) Details of Employer's Liability and Public Liability Insurance
- 11) Minimum notice period required (hours) to stand down a shift without incurring cost

Form of Contract

The form of contract will be NEC3 Engineering Construction Short Contract (June 2005).

TfL Drugs & Alcohol Policy

Please note that the TfL Drugs & Alcohol Policy is to be adhered to at all times when on TfL premises and as such the Contractor must ensure that all staff involved are fully aware of the content of this policy.

Submittal of Proposal

The closing date for this tender bid return is Monday 21 July 2008. Please ensure your submission reaches London Tramlink by 12.00pm of the above mentioned date in a sealed envelope to the address below

Nick Morgans
London Tramlink
2nd Floor
1 Butler Place
St James Park
London
SW1 0PT

Should you require a visit to the London Tramlink depot to carry out a more detailed survey of any vehicles prior to submitting your proposal for these works, or should you require any further clarification or information please contact me on [REDACTED]

In the meantime I look forward to receiving your response.

Yours sincerely

Andy Gemmell
Project Manager
Email: [andygemmel@\[REDACTED\]](mailto:andygemmel@[REDACTED])
Direct line: [REDACTED]
Mob: [REDACTED]
Copy to: Nick Morgans
Colin Parker
Victoria Day
Att. 1 – Tram Drawing



METHOD STATEMENT AND RISK ASSESSMENT FOR REPLACING ANTI-GRAFFITI FILM ON TRAM CARS

Client: London Tramlink Division of TFL

Location of work: Tramlink Depot Croydon

Start Date: T.B.A.

Scope of work: To remove and replace damaged anti-graffiti film applied to inside panels of 24 tram units.

Method statement:

- Existing film is carefully removed from glass panes.
- Any excess glue left behind is removed using the appropriate 16" triumph blade and using enough water to avoid scratching the glass during the process.
- The glass is given a thorough clean to remove any residues of glue or other contaminants.
- A new piece of anti-graffiti film is applied over a wet surface and then locked into place using a squeegee.
- All excess water is paddled out leaving perfectly clear glass.

PPE: All staff shall wear appropriate PPE at all time, including high visibility vests, safety footwear and ear defenders and eye protection when polishing.

Environmental Risk: There is no environmental risk from any of the materials used in the process.

Risk Assessment Risk is considered negligible but care should be taken not to allow any pieces of film to be left on the floor of the car as can be a slip hazard. Any water on the floor should be mopped up immediately.

Site Cleanliness At the end of each shift car should be left clean. All cloths, paper, off cuts of film and disposable items should be placed in black sacks and removed from site. All tools should be kept in tool boxes.

At the end of each shift all materials, tools and property of Chicago Glass should be removed from site.

Signed
Title

Alan Button
General Manager

CG701

CONTRACTORS GENERAL METHOD STATEMENT
- FILMING OF UNDAMAGED GLASS

Chicago Glass offers a variety of different films to meet client needs on solar control safety and sacrificial films for protection of glass from etched graffiti.

All of the films used by Chicago Glass are produced by Bekaert Speciality Films of USA and are warranted as suitable for and passed all of the relevant British Standard tests and meet trade standards for the industries where they will be used.

All of the technicians employed by Chicago Glass have been through manufacturers training school and are competent in the application of film to glass.

The method of application of the film is to thoroughly clean the glass to remove any dirt, grease or other contaminants from the surface. The film is cut oversized to the glass. A solution of water and detergent is sprayed onto the glass and onto the adhesive of the film as the backing sheet is peeled off.

The film is applied to the glass. All of the excess water is squeezed out in order that the adhesive fixes directly onto the glass. The film is then trimmed with a sharp knife to follow the profile of the window frame.

There is no environmental risk as all materials used are non-toxic.

The only hazard identified is the backing sheet and off-cuts of the film which can create a very slippery environment on the floor of the working area. All off-cuts and backing sheets should be collected up as soon as they are available and placed in rubbish bags for safe removal from site to suitable waste container facilities.

All technicians will wear PPE relevant to the site they are working on and Chicago Glass will rely on the client to provide details of any special Health & Safety regulations that apply to the site.

Technicians will work in minimum teams of two with one designated as, "Person in Charge". Each team is allocated to a Field Project Manager who is responsible for their meeting working practices on site.

The Technical Manager of the Company is Gary Missions, based at head office on 01634 735 616.

Signed

Alan Button
General Manager

CHICAGO
Glass

CG306

CHICAGO *Glass*

METHOD STATEMENT AND RISK ASSESSMENT FOR REFURBISHING AND THEN PROTECTING ETCHED GRAFFITI WINDOWS ON TRAM CARS

- Client:** London Tramlink Division of TFL
- Location of work:** Tramlink Depot Croydon
- Start Date:** T.B.A.
- Scope of work:** To identify any windows that have been etched with graffiti, prepare the glass and apply sacrificial, anti-graffiti film to leave a clear, protected surface.
- Plant & Equipment:** 110 volt transformer and 100v sander type hand tool.
- Method statement:**
- The damaged glass will be prepared initially using a fine abrasive pad fitted to a 110v sander type of hand tool, which will be worked over the graffiti damaged area to haze the glass and break down the hard edges of the scratches..
 - The glass will then be cleaned down using water and a squeegee prior to polishing the hazed area with a non toxic polishing compound, using a 110v sander type of machine.
 - The glass is cleaned again prior to the application of a sacrificial anti graffiti film.
 - The special adhesive on the film wicks into any scratches or hazing on the glass and within 8 hours, the glass is totally clear.
- PPE:** All staff shall wear appropriate PPE at all time, including high visibility vests, safety footwear and ear defenders and eye protection when polishing.
- Environmental Risk:** There is no environmental risk from any of the materials used in the process.
- Risk Assessment**
- Risk is considered negligible but care should be taken not to allow any pieces of film to be left on the floor of the car as can be a slip hazard. Any water on the floor should be mopped up immediately. Care must be taken with the trailing leads from the power source to the hand drills, to make sure they are not a trip hazard for other contractors working on site.



Site Cleanliness

At the end of each shift car should be left clean. All cloths, paper, off cuts of film and disposable items should be placed in black sacks and removed from site. All tools should be kept in tool boxes.

At the end of each shift all materials, tools and property of Chicago Glass should be removed from site.

Signed
Title

Alan Button
General Manager

CG710

REVISED METHOD STATEMENT AND RISK ASSESSMENT
FOR DEEP CLEANING WINDOWS AND FRAMES WITH
HIGH DEGREE OF SURFACE CONTAMINATION ON
OUTSIDE OF TRAM ROLLING STOCK

- Client:** London Tramlink Division of TFL
- Location:** Tramlink Dept Croydon
- Scope of Work:** To clean all of the outside glass and frames (excluding cab windscreen) on 24 Tramlink CR 4000 tram vehicles based at this depot. The glazing consists of 20 large windows, 12 hoppers, 16 doors, 2 intercar panels and 12 smaller windows in cab areas. Work will be carried out from low level platforms or from floor level.
- Personnel Required:** 4 men including SPIC
- Commencement Date:** T.B.A
- Completion Date:** One tram per shift
- Personal Protection:** High visibility vests, safety footwear, safety glasses, vinyl and anti vibration gloves.
- Plant Required:** 110v transformer and leads using client's 240 volt supply.
- Tools Required:** General window cleaning equipment including sponges, mops, squeegees, blades and pressure water bottles, 110 volt sander type polishing machine.
- Preventative and Protection Measures:** Whilst working on platforms, all tools will be kept in a tool box on the floor of the platform and only taken out when individual items are being used. Cleaning fluids may only be applied within the confines of the platform and containers should be returned to tool box before using cleaning tools on the glass, anti vibration gloves must be worn whilst using polishing machine. All PPE must be worn at *all* times including vinyl gloves and safety glasses when handling chemicals for cleaning aluminium and glass. COSHH sheets are available for all chemicals being used.
- Risk Assessment:** Risk is considered negligible when working at floor level and very limited when working from a step up platform of one metre as platform has safety bar at rear and small steps each end. Care must be taken to keep any trailing leads for transformers away from walking area and if necessary taped to the floor. Work should be behind pedestrian control barriers.

Method Statement:

Deep soak each window in turn and scrape off all deposits and contaminants adhering to glass using a broad sharp scraper, rewash and squeegee dry.

Apply chemical cleaner to glass by hand agitating it over the whole surface with non abrasive pads, wash and squeegee dry.

Machine polish the bulk of the glass as close as possible to edges and corners using non abrasive non toxic polishing compound.

Hand polish any remaining areas of contaminants or staining of the glass using a non abrasive polish.

At the end of each shift, site should be left clean. All cloths, paper and disposable items should be placed in black sacks and removed from site. All tools should be in tool boxes and securely stored. Any chemical containers should be placed in separate polybags then placed in clearly marked black bags and returned to Medway for safe disposal.

At the end of each shift all materials, tools and property of Chicago Glass should be removed from site.

It should be recognised that because of possible unseen flaws within the glass, that would not be detectable before the polishing work commences, there is a very small risk on a catastrophic failure of the glass whilst it is being worked on. Should this occur, Chicago Glass (UK) Ltd cannot be held responsible for the cost of the glass or any cost involved in its replacement.

Signed:



Alan Button
Managing Director

PII4130	Seat moquette material order for 2 to 23 by TOL	20-Jun-08 A	26-Jun-08 A	10	100%		PII4120	PII02620, PII4180		
PII4180	Moquette delivered for Tram 2 to 23	27-Jun-08 A	26-Aug-08	60	90%		PII4130	PII02640		
PII4190	Obtain price from TOL for full seat refurb works	01-Jul-08 A	08-Aug-0...	10	100%	NM	PII4120	PII350790		
PII3507	Submit contract proposal to Project Board for G0.1		12-Aug-0...	0	100%		PII4190	PII350730	Submit contract proposa	
PII4200	Issue instruction for works to TOL for trams 2 to 23	26-Aug-08	01-Sep-08	5	0%	NM, ...	PII350730, PII350...	PII02640		
Exterior window polishing		16-Jun-08 A	22-Aug-08	45					22-Aug-08, Exterior w	
PII1340	Identify suitable contractor to carry out works	16-Jun-08 A	04-Jul-08 A	15	100%	NM	PII02400	PII1350		
PII1350	Confirm procurement route and if necessary prepare ...	07-Jul-08 A	18-Jul-08 A	10	100%	NM	PII1340	PII1360		
PII1360	Contractors prepare and submit ITT response	21-Jul-08 A	25-Jul-08 A	5	100%		PII1350	PII1370		
PII1370	Review responses, carry out final negotiations and is...	28-Jul-08 A	01-Aug-0...	5	100%	NM, ...	PII1360	PII350800		
PII350800	Submit contract proposal to Project Board for G0.1		29-Jul-08 A	0	100%		PII1370	PII350730	Submit contract proposal to F	
PII1390	Prepare & Issue contract	18-Aug-08	22-Aug-08	5	0%	NM, ...	PII350730	PII1380		
Interior window film replacement		30-Jun-08 A	22-Aug-08	25					22-Aug-08, Interior w	
PII1400	Identify current contractor and obtain price for works	30-Jun-08 A	25-Jul-08 A	20	100%	NM	PII02400	PII1410, PII350810		
PII350810	Submit contract proposal to Project Board for G0.1		25-Jul-08 A	0	100%		PII1400	PII350730	Submit contract proposal to Pr	
PII1410	Place order for Int window film replacement as variatio...	18-Aug-08	22-Aug-08	5	0%	NM, ...	PII1400, PII350730			
Deep clean tram interior		23-Jun-08 A	22-Aug-08	27					22-Aug-08, Deep clea	
PII1450	Obtain comments from TOL on draft deep clean spec.	23-Jun-08 A	21-Jul-08 A	15	100%	NM	PII02400	PII1460, PII1650		
PII1650	Trial deep clean	13-Jul-08 A	13-Jul-08 A	1	100%		PII1450			
PII1460	Obtain price from TOL for works	21-Jul-08 A	01-Aug-0...	10	100%	NM	PII1450	PII350840		
PII350840	Submit contract proposal to Project Board for G0.1		12-Aug-0...	0	100%		PII1460	PII350730	Submit contract proposa	
PII1470	Issue instruction to TOL to carry out works	18-Aug-08	22-Aug-08	5	0%	NM, ...	PII350730	PII350880		
Lighting improvements		30-Jun-08 A	09-Sep-08	36					09-Sep-08, Light	
PII1490	Confirm scope of 1st tram refresh works	30-Jun-08 A	21-Jul-08 A	10	100%	NM	PII02400	PII1500		
PII1500	Obtain price from TOL (Bom) for 1st tram refresh	14-Jul-08 A	21-Aug-08	10	60%	NM	PII1490	PII350850		
PII350850	Submit contract proposal to Project Board for G0.2		21-Aug-08	0	0%		PII1500	PII350740	Submit contract propo	
PII1510	Instruct TOL to carry out works	27-Aug-08	09-Sep-08	10	0%	NM, ...	PII350740			
New passenger information panels		16-Jun-08 A	05-Sep-08	54					05-Sep-08, New	
PII1600	Obtain design requirements from GM	16-Jun-08 A	20-Aug-08	20	85%	NM	PII02400	PII1610		
PII1610	Ascertain procurement route/contractor to carry out w...	21-Aug-08	26-Aug-08	3	0%	NM	PII1600	PII1620		
PII1620	Obtain quotes for work	27-Aug-08	01-Sep-08	4	0%	NM	PII1610	PII1630, PII350870		
PII350870	Submit contract proposal to Project Board for G0.3		01-Sep-08	0	0%		PII1620	PII350920	Submit contract p	
PII350920	Project board G0.3	02-Sep-08	02-Sep-08	1	0%		PII350870	PII1630		
PII1630	Place order for New passenger information panels	03-Sep-08	05-Sep-08	3	0%	NM, ...	PII1620, PII350920	PII1640		

6.8 Exterior Finish

The Tram Supplier shall ensure that:

- a. The exterior paint of each Tram shall have a minimum life of six years without the need for repair;
- b. The painted surfaces of each Tram shall be such that they are compatible with the agreed wash process;
- c. The paint surface of each Tram shall be optimised for the removal of graffiti and
- d. The paint surface of each Tram shall be suitable for the repeated application and removal of vinyls/decals.

6.9 Windows

All passenger saloon windows shall comply with BS 857, or a similar suitable European standard such as BN 918511.

The Hopper windows shall only be “lockable” if the saloon air-conditioning is part of the standard Tram design, refer to Section 17.1

The Tram Supplier shall ensure that the windows in the passenger saloon are adequately sealed, to prevent draughts and water ingress, and have lockable, by operations staff, opening hopper windows to allow a means of secondary ventilation. The design of the windows, including hoppers shall be such that they are easily replaced and the replacement times shall be no greater than 6 hours, including curing time for bonded windows.

The Tram Supplier shall fit anti-graffiti film to the inside of the passenger saloon windows, door windows, both sides of any internal partition glass, the saloon side of the cab/saloon partition glass and the inside of the cab side windows.

Any proposed window mounted labels (e.g. No Smoking/Priority Seat/Wheelchair Area signage) shall be applied by the Tram Supplier to the window before the film is applied.

C Vehicle fitting out

Several anti-vandalism-measures are realised at the vehicle, e.g. the interior covering, which is made of imbued plastics. Scratches on the surface will not lead to a change of colour. Furthermore anti-vandalism screws are used in the interior. Due to a dirt-rejecting lacquer the plane exterior panelling is easy to dean. The window panes can be equipped with scratch-protection screen as well.

C-B Windows

The side windows are made out of tinted safety glass (5 mm). They can be bonded to the vehide body or can be fixed in a rubber frame. The vehide is equipped with an adequate number of skylight windows.

The windshields are made of laminated glass and are designed to avoid any reflection or colour distortions. The windshield and the side windows of the driver's cab are electrically heatable. The driver's cab can be equipped with sliding windows.

C-C Floor

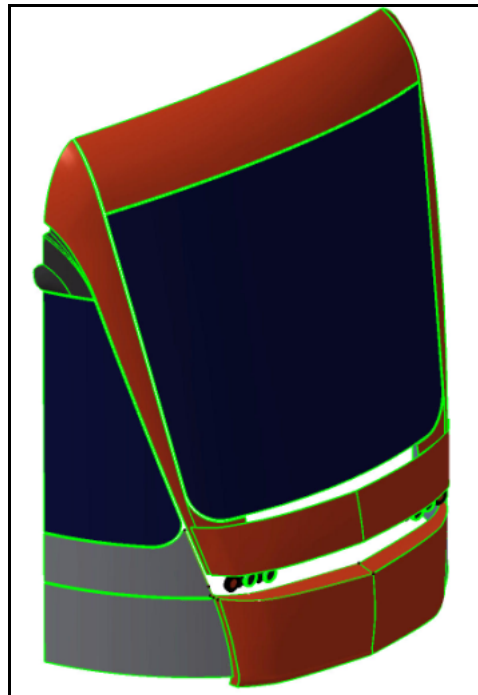
The floor is made of plywood plates which are fixed on rubber elements to improve noise insulation. The floor covering is continuously coated with 2 mm thick floor coating. All joints are welded and sealed together.

C-F Exterior panelling

The exterior panelling is made of GRP plates. Those plates are bonded elastically to the rough bodywork with 5 mm thick adhesives. Due to this flexible connection of the side plates, the transmission of vibrations is systematically avoided.

In case of repair, the adhesive can be cut easily by using an electric knife and cutting wire. Any bonding material remaining on the body shell does not have to be removed as this surface provides a good basis for the new bonding materials, used for the substitution panels. An excellent surface is reached due to this differential design process.

In order to enable sufficient access to the bogie, the lower side plates on the bogie modules are removable. The exterior panelling, windows, and the doors close flush with one another, so that the entire side wall forms a smooth surface.



Exterior panelling

The Scope of Service

THE REFRESH OF TRAM INTERIOR WINDOW GLASS FILMS FOR TRAMS ON THE LONDON TRAMLINK SYSTEM.

1.0 PURPOSE

The purpose of this document is to define the requirements for the provision of Interior Window Glass Filming for the existing London Tramlink fleet, to be undertaken in May/June 2012.

The fitment of the film is to reduce the visual impact of glass graffiti caused by:

1. Scratching of glass using sharp objects.
2. Etching of glass resulting from the use of strong acids.

2.0 INTRODUCTION

The Contractor shall provide London Tramlink (the trading name of Tramtrack Croydon Limited) with the supply of labour and materials for the filming of the Tram interior window and door glass panels.

The total number of 24 trams is to be filmed over a period of four weeks, more specifically four Sunday shifts. It is anticipated that the entire fleet will be refreshed in this time.

The contractor will be expected to meet the needs by supplying appropriately skilled staff, on time, and to complete the work within the time window allocated for the fitment. The contractor will also supply the correct and LT approved Film Material (and any subsequently approved films) as agreed with Contract Manager to the right specification to complete the work.

The following 100µm polyester films have been approved:

- Llumar SCL SR PS4 – from CP Films
- Graffiti Guard – Bekaert Speciality Films (UK) Limited

London Tramlink undertakes to provide notice of 48 hours if it is clear that it will not be possible to provide a train for film application. However it is expected that there will be no charge made to London Tramlink in the event that 48 hours notice is

provided.

In addition to the Project Scope, London Tramlink (LT) will need ongoing ad hoc arrangement for patch repair work as required, which will include the newly delivered Tram stock. This work will be discussed at a later date, should the initial refresh programme prove satisfactory.

The requirement of this scope for this contract is therefore to provide filming for 24 trams between mid-May 2012 and June 2012.

3.0 SCOPE

3.1 SCOPE OF WORKS

The Contractor shall provide trained and licensed labour, plant and tools, equipment, materials and such other resources to provide protective filming to the tram stock on TL property. The outline scope of works includes:

- Film the interior glass panels and doors of the 24 trams using a workforce fully licensed to work on LT premises. The total number of cars to film is 48 (two per tram).
- Provide the full and complete preparation of surfaces for the filming of the interior window and door glass panes to the film manufacturer's and LT's standards. This may include the polishing of windows to remove any sub-surface scratches, though this will not be dealt with on initial application of the film, but will be recorded for later action whenever the tram should be brought into the depot building.
- Provide an approved film material for interior body panel filming to LT standards.
- Provide delivery of materials and staff to site at Tramlink Depot, Coomber Way, Croydon, CR0 4TQ.
- Provide all filming and preparation materials, equipment, tooling and consumables including any small portable appliances including compressor requirements.
- Provide all necessary apparatus (including step systems), safety equipment and PPE for working at all levels (including low and high) that is compliant with LT Standards.
- Provide SHEQ documentation and management structure (including holiday and sick cover) as required.
- Provide a quality and assurance sign off of each vehicle including inspection for each car.

- Attendance at periodic meetings to report on progress, assurance and KPIs, if required. This shall also include the information required for the Product and Completion Records.
- Clear the depot work area prior to and after work including the removal of scrap materials from site on the day of completion of the works. Any dropped materials must be reported.
- Have staff available to undertake any warranty work (to make good).
- The above works are to be carried out in the sidings at LT's tram maintenance depot at Therapia Lane stop. The Contractor will be provided with access to all trams in the sidings to work on at Therapia Lane Depot on a Sunday, from early morning to late evening (theoretically until the trams are required for service on Monday morning). The power supply to the trams will be on during the works via the overhead power supply.
- Any damage to LT property caused by the contractor (damage to tram or property etc) will be charged to the contractor.
- Any other items as will be agreed by variation to the scope over the contract duration.

3.2 TECHNICAL REQUIREMENTS AND DESIGN INFORMATION

Attached [as Appendix 2] is the CR-4000 tram layout and design for information purposes only. The Contractor shall review the tram layout and propose the most suitable method to deliver the filming layout and installation method. There will be the opportunity to undertake measurement of the tram surfaces before beginning the works.

Any additional filming cost, material or resourcing required by the contractor through the duration of the framework (due to incorrect dimensions, failed application or any other reason) will be the supplier's full responsibility.

3.3 INTERRELATED WORKS

The first three of six new Stadler trams have been delivered to the depot, with more arriving shortly. There will be an ongoing requirement to maintain the interior films on both these trams and the existing fleet once the refresh is complete.

There is also a requirement to maintain the interior handrails and other internal poles which will be dealt with as a separate project. These works may well be able to be

combined with the interior window filming works either for the refresh or as part of the ongoing programme.

They will, however, be let as separate packages of works and the award of these works should not be assumed from the award of the contract for the initial filming refresh. (See separate specification for ongoing filming requirements).

3.4 PRODUCT AND COMPLETION RECORDS

The Contractor shall maintain detailed records of all windows completed and associated film batch details and shall provide this information in the Inspection Document (A document listing all windows completed). Each car completed will be counter signed by a project representative before entering service.

Information in the inventory shall include but will not be limited to:

- Record the vehicle condition before filming;
- Car number and identification;
- Any surface preparation issues;
- Delivery date and details;
- Certificate of Conformity;
- Film material batch number and batch details;
- Temperature Reading;
- Identification of the Operative working on each vehicle;
- Any building facilities issues;
- Material Batch Inspection and Vehicle Inspection results.

These records shall be available to LT during the contract on request and the full records will be provided to LT on completion of the contract in electronic format.

4. STANDARDS AND ASSURANCE

4.1 STANDARDS COMPLIANCE

The Contractor shall comply with all London Tramlink Standards, European Union and National Legislation, Regulations and Industry Guidance.

4.2 SKILLS AND COMPETENCIES

The Contractor's personnel shall be fully trained to meet the requirements of the Scope of Services. Such training, including any subsequent refresher training shall be at the Contractor's expense and shall be organised by the Contractor.

Training for working on LT premises will, at minimum, be required to complete Depot Induction training.

The Contractor shall provide proof of training for all LT licensed labour on file which must be available on request by the LT project team.

Any training should be requested [4] weeks in advance of any requirement to be on site. The Contractor shall organise for this training to be undertaken.

This includes working manual handling, working at heights and at low level. All training records must be maintained and available immediately on request. The contractor must have trained First Aiders on site during all shifts and will have use of the Depot First Aid Facilities via co-operation with Tram Operations Limited (TOL), who run the depot facilities.

5. PACKAGING AND DELIVERY AND REMOVAL

Provide delivery of materials to site at Therapia Lane depot.

Access will be via reception, with all staff signing in individually and obtaining depot entry permits. Compliance with these arrangements is mandatory.

The dates and times of any deliveries required are to be mutually agreed between the Contractor and LT.

Removal of all waste and redundant materials from the site will be the responsibility of the contractor as per the site waste management plan and to the approval of the Project Manager.

6. KEY PERFORMANCE INDICATORS:

1. Staff Attendance – Attendance of correct amount of staff on a shift basis. The contractor will be required to supply the correct amount of competently trained staff as specified in the Activity Schedule. Failure to comply with the above shall be considered a violation.

The contractor may be allowed to make up shifts from one Sunday to another as agreed with LT. It will be considered a violation of the contract if the supplier fails to utilise available trams due to lack of labour.

2. Tram Target per weekend – Up to 6 trams (or more if available) per weekend are required to be completed by the contractor and must accumulate to the defined 4 week period total (24). Failure to comply with the above shall be considered a violation.

3. Work Report – The Contractor will produce and submit a work report on a weekend basis to TOL control officer or Tramlink staff showing details of the full documentation required in this scope completed.

4. Submission of Invoices – Invoices are required to be submitted each month. It is anticipated that there will be one invoice at month's end to cover all work until that date and a further invoice on project completion for all outstanding works. Along with the normal information, invoices must detail at least the following.

- Number of windows/trams filmed per weekend for the period.
- Total cost for the Period.

5. Arriving at the agreed time to each shift, completing the specified Hours work as per contractual obligations.

6. Training Ensuring all staff have completed the necessary training and hold a valid permit for Depot access. All staff must carry the permits at all times without fail. All staff must comply with Depot rules and regulations.

7. Quality of Workmanship against inspection criteria and approved method statement and scope requirements.

Appendix 1: Material Specification, film installation quality controls

The following Appendix details the quality controls proposed during the inspection of film batches, during installation and prior to train hand over for LUL inspection. These quality controls shall be adhered to or an alternative better method proposed and agreed.

1.0 Inspection of Film Batches

Technical Compliance Matrix			
ID	Parameter	Compliance	Remarks
1	Certificate of Conformity available for each batch of film clearly showing colour reference and batch number.	Valid batch CofC available for inspection	

2.0 Inspection of Installation Works

Technical Compliance Matrix			
ID	Parameter	Compliance	Remarks
1	Surface preparation being conducted as per Contractor's approved Method Statement.	Inspection	as detailed in section 4
2	Film application being conducted as per Contractor's approved Method Statement.	Inspection	as detailed in section 4

3.0 Inspection prior to LT Handover

Technical Compliance Matrix			
ID	Parameter	Compliance	Remarks
1	All aspects of Contractor's approved Quality Assurance System have been logged as compliant for each car as detailed in section 4	Inspection	as detailed in section 4
2	Sample inspection of cars by LT personnel to ensure film has been fitted to all areas with no visual evidence of de-bonding.	Inspection	

Compliances

All staff working on the film application contract will be required to comply with the following:

- Possess Permit to enter LT premises and hold certification to work on site.

- Comply with SHEQ Conditions for this contract.
- Have been trained to fit clear polyester films.
- TfL Standard Terms and Conditions will apply.

Key Performance Indicators:

- Reports submitted everyday work is completed.
- Submission of invoices on time and correct details
- On time arrival and completion of full 8 hour shifts (or hours agreed)
- Compliance with depot rules and regulations

Tender Evaluation Assessment

Top Level Criteria	Weighting Criteria	Sub-Criteria	Weighting of Sub Criteria	Evaluator	Chicago Glass	Score	Graffiti Solutions	Score	Revitaglaze	Score	SSDM	Score
Window Filming	33%	Proposed method	10		To continue the process currently carried out ; can be undertaken inside or outside if weather conditions and ambient temperature permit	5	Happy to work in sidings provided proper induction is provided; previously mentioned that film will be cut on site.	5	Can be worked on anywhere. Films will be pre-cut. Less need for equipment on site.	5	10 x 2 man shifts. Sunday application.. Equipment stored on site for very short response times.	5
		Date range compliance	8		Anticipate that work will be undertaken over 6 weekends.	3	4x Sundays	8	4x Sundays	8	4 - 6 week period	6
		Extra equipment req'd (at cost to London Tramlink)	5		None	5	+ VAT to supply cabinet with drawers for on site cutting of films.	1	None as standard	5	None given	5
		Facilities required	5		Pit boards which are currently provided;	5	Sole access to all trams for entire shift	5	Internal lights must be on and sole access is req'd	5	Minimum temp 12 C. Power supply preferable	4
		Proposed added value	5		None	0	Possible synergies from TOL cleaning contract for ongoing repairs	5	Service portfolio for all requirements	5	Comprehensive online monitoring system	5
		Section Score	33				18		24		28	
Cost (Value for Money)	35%	Price - Window filming	25			20		14	8	24		15
		Price - Handrail repairs	10		None provided	0		9		7		5
		Section Score	35			20		23		31		20
Commercial terms and financial stability	7%	Acceptance of TfL T&Cs	7		PO terms currently accepted	3	Terms accepted	7	Terms accepted	7	Terms accepted	7
Communications	7%	Promptness of communication	3		Replies often delayed or not received at all	0	Replies well within the due date	2	Regular calls/voicemails left	3	Prompt replies	2
		Clarity/directness	4		Many points left unanswered after first response. No second response received despite prompting	1	Answered most points in first reply; other points answered when clarification requested.	3	All points covered in first response	4	Most points covered in first reply; Remaining points covered when clarification requested.	3
		Section Score	7			1		5		7		5
Window polishing	5%	Methodology	5		None offered/mentioned		Offered as part of shift rate for handrail repairs. /shift	5	for a specialist per shift.	5	On average we estimate to remove scratches from some 6-10 windows per shift. The method would be based on using polishing pads which have a degree of glass polishing grit inclusions and these are used in a variation	5
		Section Score	5			0		5		5		5
Handrail repairs	13%	Methodology	5				Two operatives per shift	4	Three options - time/motion study, top price for all work (inc. Assumptions) and a price for minimal labour on a worst affected first treated basis.	5	SSDM would colour match paint to allow small touch-in to areas shown on your picture supplied. OR 2. The second offering would be to wrap damaged areas with a colour matched film	4
		Timescales	5				Work rate - 18 repairs / 8hr shift	3	Nightly basis (under a week) 12 hr curing process req'd	4	Turn around in a week/ Unspecified number of shifts	3
		Compatability with filming schedule	3				No disruption to filming	2	As part of service portfolio	3		
		Section Score	13			0		9		12		7
		Tender Price										
Total Score	100					42		73		90		69

Recommendation

Summary
 All four suppliers were presented with the basic request to quote for a fixed number of windows as well as providing information on any additional service they may be able to offer. Following the receipt of the responses, a clarification was sent to all companies to obtain any information which was unclear or had not yet been provided. The evaluation matrix above shows the results of these communications and the scoring they received. Chicago Glass is the lowest at 42, and Revitaglaze the highest at 90.

Background
 Tramlink tram windows are fitted with a sacrificial anti-graffiti filming, designed to protect the window from scratching and damage. The replacement of these films when badly scratched was initiated by the approach of a supplier, Chicago Glass., who proposed a weekly replacement of affected filming. This currently takes place on a Sunday, weekly, but is subject to the availability of trams. There is no guarantee that the whole fleet is covered and nor any active monitoring of the repairs undertaken, though the supplier does provide a diagrammatic breakdown of the windows and trams covered. A tender exercise is therefore being undertaken to obtain a supplier to move through the whole fleet and attend to any windows bring it up to an acceptable standard.

Review of Tenders
 Chicago Glass - Responses were slow and incomplete. Basic prices provided but nothing for handrail repairs or other available services. Lower price but longer completion date than the other suppliers. Clarification request has still not been answered, despite verbal assurances that a reply was on the way

Graffiti Solutions - Responses have been prompt and they have indicated that there may be possible synergies from the award of another TL contract. Their quoted price for the quantity of windows provided is the most expensive. Cutting of films would be undertaken on-site, with the requirement that a specialised cabinet be purchased by TL and kept on site - cost to TL of on top of quoted price.

Revitaglaze - The responses from the supplier have been prompt and informative. Supplier has demonstrated interest by actively pursuing the process. They have provided the cheapest quote within the timescales indicated in the original communication. Their service portfolio option endeavours to ensure that TL is not paying for idle time as there should always be an activity to be getting on with. Films would be pre-cut; options given for the best way to undertake the handrail repairs.

SSDM - Provided the second most expensive quote and good timescale for the requirement, though not as tight as some other suppliers. Options provided for the additional works requested. Concern that they may need to film in the depot if temperature falls below 12 degrees. Best aspect of their offer would be the comprehensive online monitoring system offered.

Conclusion
 Revitaglaze's bid offers the best value to London Tramlink and their Services Portfolio option represents the right work ethic from the supplier. Chicago Glass's bid is incomplete and it is recommended that they are discounted at this stage. SSDM and Graffiti Solutions are less favourable but may present alternatives should it prove impossible to reach agreement with Revitaglaze for the provision of the service. Long term it may be advantageous to transfer the services to Graffiti Solutions if they are able to demonstrate that savings could be made from the synergies from their other TL contract. This would need to be proven and judged at a later date.

Approval

Submitted By					
Name	Signature	Date	Title		
Chris Green		16/04/2012	Contracts Assistant		
Agreed By					
Name	Signature	Date	Title		
Greg Lyons		17/04/2012	Contracts & Commercial Manager		
Approved By					
Name	Signature	Date	Title		
Nick Baker		17/04/2012	Head of Operations & Contracts		



London Tramlink Modifications Panel

Submissions Template

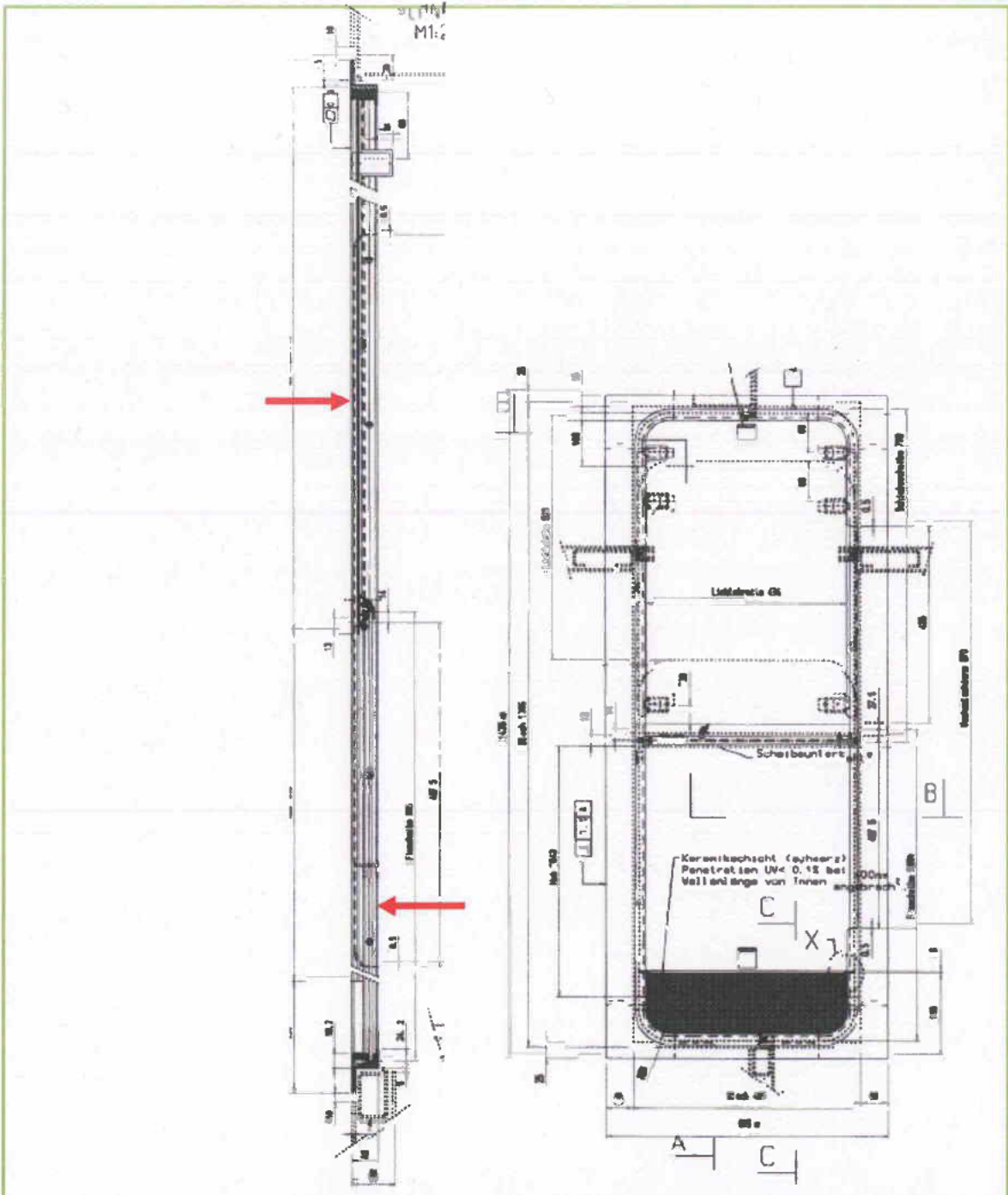
Proposal Information	Descriptions	
Submission Ref:	LT-Mods-13-008	
Document Title	Stadler Tram cab droplight window filming	
Date of Submission:	20/02/2013	
Submitted by:	Louis Wohlgemuth, London Tramlink	
Areas impacted by the change: <small>[Please tick all discipline areas or risk topics to ensure appropriate review of submission paper]</small>	TOL Operations	<input checked="" type="checkbox"/>
	3 rd Party works	<input type="checkbox"/>
	Track / Infrastructure	<input type="checkbox"/>
	Street Works	<input type="checkbox"/>
	Electrical Systems/OLE/signalling/DTO	<input type="checkbox"/>
	CDM applicable works	<input type="checkbox"/>
	Tram Technical Specification	<input checked="" type="checkbox"/>
	Depot Access	<input type="checkbox"/>
	Operational Procedures (including training / briefing)	<input checked="" type="checkbox"/>
Approval by MODs Chair	Name: 	Signature: 
	Date: 13.3.13	



It is proposed that film is applied to the sash (droplight) window in order to prevent the glass shattering in the unlikely event that a second impact is received before the glass is changed out.

It is proposed that the first installation is tried in 1 out of the SVT cabs to ensure that:

c.





Criterion c) will be measured empirically using an IsoTech Lux 1335 Digital Light Meter. The SolarGard Amorcoat 4 Mil Clear film has a transmissivity of 89%. The Stadler supplier drawing (Euromotive 1-00231R01 issue 1) states the following:

	<p>Glasaufbau:Oben-ESG-5mm Farbe:Klarglas nach EN 12150-1 Unten-ESG-5mm Farbe wie Glas oben jedoch mit Siebdruck</p> <p>Lichttrans: .. Energietrans:.. K-Wert: 5.7 W/m²K Rw- 29 dB</p> <p>EN 12150-1 refers the reader to EN572-1 for it mechanical properties and a 5mm glass should have a minimum light transmittance value of 86%. Combining these two values gives 76.5% which easily meets the Road Vehicle Regs.</p>
Impact of the change	None – can be done outside service hours.
Mitigation of risk	None currently.
Benefits of change	Improved protection from shattered glass in the event of a double impact on the cab sash window.
Duration of project	20mins per window.
Change to IMS?	The tram specification will have to be updated. Tram Maintenance Manuals to be updated.



London Tramlink Modifications Panel

Submissions Template

Proposal Information	Descriptions	
Submission Ref:	LT-Mods-13-042	
Document Title	Stadler Tram cab window filming – sash and quarterlights	
Date of Submission:	02/07/2013	
Submitted by:	Louis Wohlgenuth, London Tramlink	
Areas impacted by the change: <small>[Please tick all discipline areas or risk topics to ensure appropriate review of submission paper]</small>	TOL Operations 3 rd Party works Track / Infrastructure Street Works Electrical Systems/OLE/signalling/DTO CDM applicable works Tram Technical Specification Depot Access Operational Procedures (including training / briefing)	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Items Specific to Modification: <small>[Please add Y (Yes) or N (No) to confirm whether or not these areas are required]</small>	<ul style="list-style-type: none"> • Variobahn Operating Manual update • Variobahn Maintenance Manuals update • Variobahn Wiring Drawings & Schematics update • Variobahn Spares Requirement (include part No.) • Variobahn Spares Lists / Manuals update • Variobahn Maintenance Training Requirement • KDDOKU update • Software update 	N N N N N N N N
Approval by MODs Chair	Name:  Date: 31.7.13	Signature: 

Detail of Submission for Review

Background/ Introduction

The Stadler Variobahn Trams (SVT) have been supplied with no glass film on the cab windows. Used for Dutch graffiti (scratch) prevention in the saloon, in the cab the film would be to prevent glass shattering onto the driver in the event of a missile (vandalism) attack or a tree / infrastructure strike.

The windscreen and quarter lights are VSG glass, multi-layered laminated, but the droplight window is ESG, Extra Pure Single Layer Toughened Glass. Although resistant to an extent, after a second impact, ESG glass then shatters. It has also been found that VSG glass, with a single impact, the laminations, under curve stress eject a small shower of glass directly behind the impact point, into the cab, as shown below, on 2557.

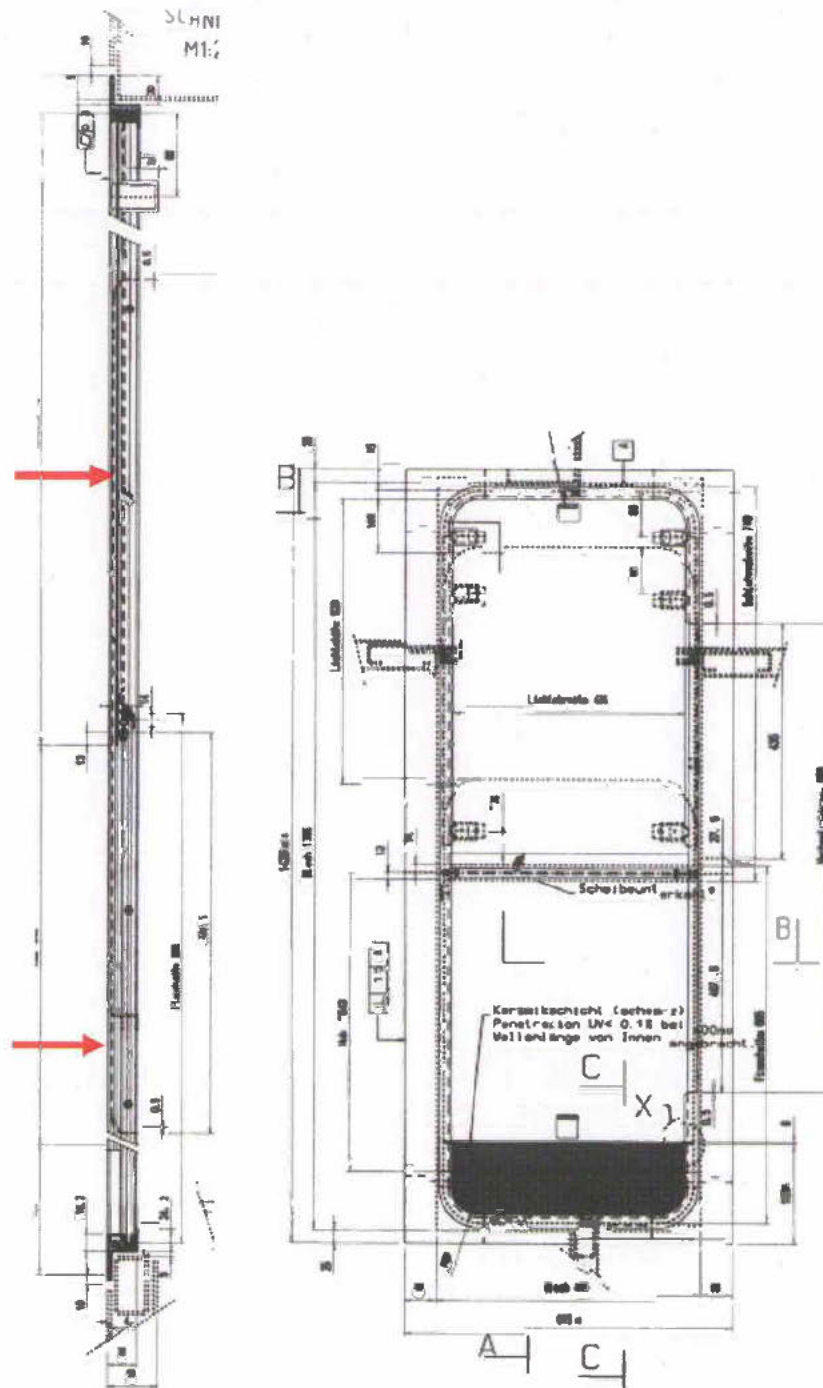


It is proposed that:

- an external film is applied to the sash (droplight) window in order to prevent the glass shattering in the unlikely event that a second impact is received before the glass is changed out, and
- an internal film is applied to the quarter-light to prevent the ejection of small pieces of glass onto the driver.

Details of the proposal – Including scope and purpose

A trial has been carried out on the two sash windows of tram 2554 with Solar Gard Sentinel 4 Mil Clear OSW, and it has been shown that a clear film applied externally to both halves of the sash (as below) does not compromise water tightness, reduce visibility, and maintains a light transmissivity of 89% with a single film.



The Road Vehicles (Construction and Use) Regulations 1986

No.1078 Part IIE Glass Regulation 32 requires all screens, apart from windscreens, to maintain a transmissivity of

The internal film, to be applied to the quarterlight, will be SolarGard Armorcoat 4 Mil Clear film has a transmissivity of 89%. The Stadler supplier drawing (Euromotive 1-00231R01 issue 1) states the following:

**Glasaufbau:Oben-ESG-5mm Farbe:Klarglas nach EN 12150-1
Unten-ESG-5mm Farbe wie Glas oben jedoch mit
Siebdruck**

Lichttrans: ..

Energietrans:..

K-Wert: 5.7 W/m²K

Rw- 29 dB

EN 12150-1 refers the reader to EN572-1 for its mechanical properties and a 5mm glass should have a minimum light transmittance value of 86%. Combining these two values gives 76.5% which easily meets the Road Vehicle Regs.

Impact of the change	None – can be done outside service hours.
Mitigation of risk	None currently.
Benefits of change	Improved protection from shattered glass in the event of a double impact on the cab sash window.
Duration of project	20mins per window.
Change to IMS?	The tram specification will be updated. No other changes are required, except to change the specification of the tram filming agent.